IDAHO COMPREHENSIVE STATE WATER PLAN

Payette River Basin

PLAN SUMMARY

Prepared by: Idaho Department of Water Resources
Water Planning Bureau

Prepared for: Idaho Water Resource Board

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

Adopted February 5, 1999

PLAN SUMMARY

BACKGROUND

In February 1991 the Idaho Water Resource Board adopted the *Comprehensive State Water Plan: Payette River Reaches* that was approved by the Idaho Legislature in April 1991. The Payette River Reaches Plan examined segments of the North Fork Payette River from Cabarton Bridge to Banks, the South Fork Payette River from the Sawtooth National Recreation Area boundary to Banks, and the main Payette River from Banks to Black Canyon Dam. Segments of the North Fork, South Fork and main Payette rivers were designated as state recreational rivers.

The Board began a review of the Payette River Reaches Plan in 1995, but decided to prepare a comprehensive state water plan for the entire Payette River Basin instead of updating the Payette River Reaches Plan. The Payette River Basin Plan describes and evaluates water resources and related economic, cultural, and natural resources in the basin. The plan takes actions and recommends water policy and water resource management options to improve, develop, and conserve the water resources of the Payette River Basin. Goals, objectives, actions, and recommendations contained in the plan were developed with the help of a Payette River Citizens Group, comprised of individuals representing various water users in the basin.

BASIN OVERVIEW

The Payette River is a major tributary to the Snake River, draining a 3,320 square mile watershed in west-central Idaho. Approximately 4,000 stream miles delineate the basin. Three major branches, the North, Middle, and South forks, conveying water from the mountainous headwaters, converge at the southwestern edge of the Idaho batholith to form the Payette River. The confluence of the South and Middle forks in Garden Valley, 80.7 miles upstream from the mouth, forms the Payette River proper. However, the eight-mile stretch from the Middle Fork Payette confluence to Banks is locally known as part of the South Fork Payette, and is referred to as such in the plan.

About 60 percent of the basin is public land. The estimated amount of water entering the basin each year as precipitation is about 5.3 million acre-feet. The amount leaving the basin as the annual flow volume of the Payette River at Payette is 2.2 million acre-feet. The remaining 3.1 million acre-feet are diverted or lost through evapotranspiration by native vegetation and crops, through evaporation from open water and bare ground, or ground water recharge. An unknown volume leaves the basin as ground water discharge into the Snake River.

The Payette River Basin is rural, with an estimated population of 37,000 people in 1996. Major population centers include Payette, Emmett, Fruitland, McCall, New Plymouth, Cascade, Horseshoe Bend, Donnelly, and Crouch. Average annual population growth rates for the basin exceed the state average for the period from 1970 to 1996.

Major industries are agriculture (farming and ranching), timber, and recreation. Irrigated agriculture mainly occurs in two areas of the basin: the lower Payette Valley below Emmett, and Long Valley between McCall and Cabarton. Smaller valleys have some irrigated agriculture as well. Approximately 33 percent of the basin is considered

tentatively suitable for timber harvest. The basin is characterized by 60,000 surface acres of boatable rivers, lakes, and reservoirs, comprising 9.1 percent of the state total. Five of the sixteen lakes in the state managed for a trophy or quality trout angling experience occur in the Payette River Basin. Winter sports are an important sector of the economy for upper basin communities.

PLANNING APPROACH

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 resource attributes*** - The resource attribute inventory is contained in the Payette River Basin Plan. Resource information, figures, and statistics for this plan were obtained through in-house analysis, literature review, field reconnaissance, contact with state and federal agency personnel, and citizen input. Maps of resource data were prepared at a scale of 1:24,000 using a geographic information system (GIS). Resource data were reviewed for accuracy by government agencies, a local citizens group, and interested public.

2) ***Identify local issues, concerns, and goals*** - Issues, concerns, and goals related to water use and management framed the scope of the Payette River Basin Plan. These were identified through meetings with the public, management agencies, local officials, and a citizens group.

3) ***Assess current and potential water uses and constraints*** - An assessment of current and potential water uses and constraints is contained in the Payette 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 unique or rare features regionally or nationally, and/or 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 Payette River Basin Plan.

5) ***Develop alternatives or strategies*** - Strategies may be actions, recommendations, or policies responding to the issues and concerns identified, and intended to achieve the selected goals. They represent alternatives proposed by the public and agencies, and considered by the Board.

6) ***Determine actions and recommendations*** - After considering alternatives and the public interest, actions and recommendations relative to improving, developing, and conserving water resources were identified by the Board. Many actions and recommendations were the result of consensus achieved at Payette River Citizens Group workshops.

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 consultation, and citizens group workshops provided opportunity for public critique and suggestions for the Payette River Basin Plan. Public information meetings were conducted April through May 1997 in McCall, Donnelly, Cascade, Lowman, Crouch, Horseshoe Bend, Sweet, Ola, Emmett, New Plymouth, Payette, and Boise to inform the public about preparation of a Payette River Basin Plan, and to ask the public to identify issues and concerns. In

1998 another public information meeting was held in Horseshoe Bend, announcing the formation of a citizens group and summarizing the issues identified at the Spring 1997 meetings.

The Payette River Citizens Group was formed in March 1998 to inform the Board and its staff about local concerns, review information used in the development of the plan, and provide feedback and suggestions for the Board's consideration. The group consisted of individuals representing various water users in the basin, including, but not limited to, irrigators, local government, property owners, fishermen, boaters, other recreationists, ranchers, timber industry, and hydropower. People representing these users were invited to participate to ensure all interests were represented and heard. However, membership and participation on the Citizens Group was open; any interested individual could be a member by attending the workshops.

The Board held a series of five Payette River Citizens Group workshops in April through June 1998. During these workshops, the Citizens Group ranked issues, developed goals, and identified actions and recommendations to submit to the Board. About eighty individuals attended one or more of these workshops. Newsletters were circulated through the U. S. Postal Service or Internet to an additional 312 individuals that summarized the development of the Payette River Basin Plan, announced Citizens Group workshops, and requested comment on key pieces of information

Summary of Public Comment on Draft Payette River Basin Plan

The Board circulated a Draft Comprehensive State Water Plan for the Payette River Basin on November 9, 1998 for a sixty-day comment period. Information meetings and hearings occurred in Cascade, Horseshoe Bend, and Boise in November and December 1998 to discuss and receive comment on the draft plan. Thirty-four people testified at the public hearings and sixty-eight written comments were received prior to the close of the comment period on January 8, 1999.

The majority (72 percent) of comments supported the actions and recommendations contained in the Draft Payette River Basin Plan. Fourteen percent of the comments received did not support the Draft Plan. Most of these comments concerned three main areas, including 1) designation of about 193 miles of bull trout focal habitat as state recreational rivers; 2) a proposal to process a water right application for a minimum stream flow below Payette Lake; and 3) a request to amend recreational river designations on the South Fork and main Payette rivers to allow recreational mining. The Board reexamined these actions and reviewed some additional information.

Actions and recommendations contained in the Draft Payette River Basin Plan were revised or expanded in response to these concerns. The Board adopted a *Final Comprehensive State Water Plan for the Payette River Basin* on February 5, 1999. The Final Plan was then presented to the Legislature for its consideration as required by Section 42-1734B of the Idaho Code. A summary of the public review schedule follows:

- Public Comment Period - *November 9, 1998 to January 8, 1999*
- Public Information Meetings in Cascade, Horseshoe Bend, and Boise - *November 1998*
- Public Hearings in Horseshoe Bend and Boise - *December 1998*
- Board Adoption of Final Plan - *February 5, 1999*
- Submit to Legislature for Approval - *February 8, 1999*
- Signed by Governor - *March 26, 1999*

GOALS AND OBJECTIVES

The statute provides some guiding criteria for the Board in developing a comprehensive state water plan. These are found at Idaho Code 42-1734A and include:

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

2. Optimum economic development in the interest of and for the benefit of the state as a whole will 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 will be preserved and protected.

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

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

Additional goals and objectives contained in the Payette River Basin Comprehensive State Water Plan reflect local concerns, current and future uses of water, and the resource values of the basin. Discussions about priority issues by the Payette River Citizens Group identified some general wants and needs, or desired outcomes, falling into ten categories. Goals were developed to address these desires. Goals are general statements about citizens' desired future for the basin. The Payette River Citizens Group developed, discussed, and reviewed goals at workshops conducted in May and June 1998. The following lists the goals developed and supported by the Citizens Group for each issue category.

State Protected Rivers Designations

1. Recognize and maintain the outstanding fish and wildlife, aesthetic, recreation, and geologic values of waterways in the Payette River Basin.

Water Allocation

2. Work toward cooperation among all water users for optimum use of the Payette River Basin's water resources.

3. Maintain flexibility when providing water for different uses to address changing demands, while recognizing existing water rights and contracts in accordance with state law.

4. Support the management of the water delivery system to meet irrigation water rights and contracts, and other objectives such as water quality, flood management, private property, fisheries, wildlife, energy, and recreation needs.

Water Storage and Delivery

5. Improve the efficiency of surface water delivery systems where cost effective and beneficial.

6. Identify and protect potential water storage opportunities in the basin for the purposes of municipal water supply, irrigation, and flood management.

Municipal Water Supply

7. Maintain or develop an adequate supply of

good quality water to meet present and future municipal needs.

Water Quality

8. Maintain, improve, and protect water quality of all surface and ground water within the Payette River Basin.

9. Improve coordination between the Idaho Division of Environmental Quality, Idaho Department of Water Resources, Health Districts, and local governments to manage, maintain, or enhance the basin water quality.

Flood Management

10. Minimize potential flood damage by managing riparian zones and open space along streams and rivers.

11. Repair damage from the 1997 flood.

12. Improve maintenance and management of the levee system along the Payette River from Horseshoe Bend to its mouth.

13. Update floodplain mapping in the Payette River Basin.

Resource Development

14. Recognize and consider the importance of industrial resources in the basin, such as timber, minerals, and agriculture, in maintaining a viable economy.

15. Consider the economic feasibility of hydropower projects that maintain or enhance environmental quality, and provide economic benefits to the basin.

16. Encourage energy conservation and development of hydropower at existing structures where feasible.

Fisheries

17. Improve the quality of fisheries in the basin.

Agency Planning and Coordination

18. Improve the efficiency of the permitting process for stream channel alterations, particularly during emergencies.

19. Encourage or improve coordination among the agencies, private landowners, and public in managing the resources in the Payette River Basin.

Recreation

20. Recognize and consider the positive economic and social values of recreation and tourism in the basin.

21. Maintain the diversity and quality of recreation opportunities on the Payette River system.

22. Minimize water-related recreation user impacts in the basin, such as environmental damage, adverse social impacts, and the cost of public services, while maintaining aesthetic, recreational, and environmental qualities.

ACTIONS AND RECOMMENDATIONS

Actions and recommendations of the Board are consistent with Idaho law, the *Idaho State Water Plan*, private property rights, and local and state management plans. Actions and recommendations were developed after considering the desires of local citizens of the basin and region. They recognize public consensus achieved at Payette River Citizens Group workshops conducted in May and June 1998, and public comment received on the Draft Payette River Basin Plan in November 1998 through January 1999.

The Board has constitutional and statutory authority to formulate and implement the State Water Plan, including designating state protected rivers, filing applications to appropriate water for instream flows or other uses beneficial to the public, providing funds for water projects, undertaking

special water projects, administering the water supply bank, and when requested by the Governor, representing the State in water right negotiations with the federal government and tribes. Other state agencies are required to “exercise their duties in a manner consistent with the comprehensive state water plan” [Idaho Code 42-1734B(4)]. All local 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 Payette River Basin.*

Actions

The Payette River Basin Plan comprises a review and analysis of present needs, and future needs, and opportunities for fifteen resource categories specified by the Idaho Legislature. 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 use; and other aspects of environmental or economic development [Idaho Code 42-1734A(3)]. A need was identified to designate certain river reaches as state protected rivers to preserve current values for Idaho.

STATE PROTECTED RIVER 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 that possesses outstanding fish and wildlife, recreation, geologic, or aesthetic values” [Idaho Code 42-1731 (7) and (9)]. A “natural” or “recreational” designation refers to the level of development in the river corridor. 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.

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

Pursuant to Idaho Code 42-1734A(6), the following activities are prohibited within the stream channel or below the high water 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, and diversion works, and for the maintenance of real (private or public) property. State designation does not change or infringe upon existing water rights or other vested property rights. It does not restrict the maintenance of existing uses. Recreational dredge mining (defined as the use of suction dredges with

an intake diameter of 5 inches or less, and equipment rated at 15 horsepower or less) falls under the stream channel alteration category and not dredge or placer mining.

The Board considered the impact of protected river designations on the social, economic, and environmental livelihood of the region. To protect the public interest, current resource uses, and the multiple-use character of the basin, the Board designates river/stream reaches as indicated below. Each river reach in this plan has been found to qualify for the level of protection identified.

Existing Designations

The *Comprehensive State Water Plan: Payette River Reaches* adopted by the Board in February 1991 designated state protected rivers to preserve outstanding resource values. The Payette River Basin Plan retains those state protected river designations as listed below and depicted in Map 1.

North Fork Payette River *(9.6 miles): Cabarton Bridge to Rainbow Bridge - recreational*
South Fork Payette River *(7.9 miles): Deadwood River confluence to Big Pine Creek confluence - recreational*

The following activities are prohibited on these reaches:

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

Exceptions to the above prohibitions include:

- New diversion works shall be limited to pump installations that do not create an obstruction in the river, and are sized to supply water for the standard domestic definition or a capacity sufficient for stock water or developed rest areas, picnic, and campground purposes (not to exceed a diversion rate of 0.04 cubic feet per second) .
- Stream channel alterations necessary to maintain and improve existing utilities, roadways, managed stream access facilities, and diversion works, and for the maintenance of real (private or public) property.

North Fork Payette River *(18.4 miles): Rainbow Bridge to Banks - recreational*
South Fork Payette River *(7.6 miles): Middle Fork confluence to Banks - recreational*
Payette River *(7.2 miles): Banks to Beehive Bend boat access - recreational*

The following activities are prohibited on these reaches:

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

Exceptions to the above prohibitions include:

- New diversion works shall be limited to pump installations for the following purposes that do not create an obstruction in the river: irrigation of basin lands; stock water; developed rest area, picnic and campground areas; and for domestic, commercial, municipal and industrial needs.
- Stream channel alterations necessary to maintain and improve existing utilities, roadways, managed stream access facilities, and diversion works, and for the maintenance of real

(private and public) property.

South Fork Payette River *(20.3 miles): Sawtooth National Recreation Area boundary to Deadwood River confluence - recreational*
South Fork Payette River *(16.0 miles): Big Pine Creek confluence to Middle Fork confluence - recreational*

The following activities are prohibited on these reaches:

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

Exceptions to the above prohibitions include:

- New diversion works shall be limited to pump installations for the following purposes that do not create an obstruction in the river: irrigation of basin lands; stock water; developed rest area, picnic and campground areas; and for domestic, commercial, municipal and industrial needs.
- Stream channel alterations necessary to maintain and improve existing utilities, roadways, managed stream access facilities, and

  diversion works, and for the maintenance of real (private and public) property.
- Recreational dredge mining is permitted as regulated by the Idaho Department of Water Resources and Idaho Department of Lands.

Alteration of the streambed, except for maintenance and repair of existing diversion works, must comply with the Idaho Stream Channel Alteration Rules and Minimum Standards.

Additional State Protected Designations

The Board considered the impacts of additional protected river designations, and determined it is in the public interest to designate the additional stream reach listed below and depicted in Map 1.

North Fork Payette *(23.6 miles): Headwaters (including Cloochman and Trail creeks) to Payette Lake Inlet - recreational*

The following activities are prohibited on this reach:

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

Exceptions to the above prohibitions include:

- Stream channel alterations necessary to maintain and improve existing utilities, roadways, managed stream access facilities, and diversion works, and for the maintenance of real (private and public) property.
- Alterations of the stream channel for installation of fisheries enhancement structures and other activities necessary for fishery management.
- This designation is not intended to restrict current and future operations at Upper Payette Lake by the Lake Reservoir Company, including enlargement of the dam or lake.

Alteration of the streambed, except for maintenance and repair of existing diversion works, must comply with the Idaho Stream Channel Alterations Rules and Minimum Standards.

NORTH FORK PAYETTE HYDROPOWER

PROJECT PROPOSAL

The Board retains the current state protected designation on the North Fork Payette River that prohibits hydropower projects. Gem Irrigation District requested an amendment to this designation to construct a hydropower project in the Smiths Ferry to Banks reach. The project proposal is described in the Payette River Basin Plan.

When deciding whether to amend the designation, the Board was guided by the hydropower siting policy (Policy 4E) in the *Idaho State Water Plan* (Idaho Water Resource Board, 1996). This policy states:

> The Idaho Water Resource Board believes energy conservation and efficiency improvements are the most desirable methods to provide for additional power requirements. The state will be best served through conservation and the upgrading of existing energy systems. The Board prefers that new hydropower resources be developed at dams having hydropower potential that do not currently generate power or do not generate at their maximum potential. New structures should be carefully evaluated to insure that benefits to the state outweigh any negative consequences associated with the proposed development" (Idaho Water Resource Board, 1996).

Public and agency comment about the project identified many concerns, and the need for additional information and studies. The Board requested additional specific information from the project applicant by letter during this planning effort. The applicant did not provide any information in response to the Board's request, including demonstrating that the project is financially feasible.

Adequate information has not been presented to justify changes to the existing state recreational river designation. Based on the information that is available, the Board concludes that it is not in the public interest to modify the existing state recreational river designation to allow the proposed North Fork Payette hydropower project by Gem Irrigation District. This action is consistent with the Payette River Citizens Group's recommendations concerning the North Fork Payette hydropower project.

MINIMUM STREAM FLOWS

It is the policy of Idaho that the 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 file applications to appropriate water for instream flows. A minimum stream flow is the minimum instream flow 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 stream flow 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 satisfied.

In order for the Board to acquire a minimum stream flow, a process separate from the development of a comprehensive state water plan occurs. Studies to determine the quantity and timing of the minimum stream flow may need to be conducted. The Director of the Idaho Department of Water Resources determines whether the minimum stream flow right is granted based on guidance in the Idaho Code. Legislative review of minimum stream flow rights granted by the Idaho Department of Water Resources is then required.

The Idaho Water Resource Board will take

action to obtain a minimum stream flow on the North Fork Payette River at Fisher Creek above Payette Lake. The reach location is depicted on Map 1.

The Big Payette Lake Management Plan, established by the Big Payette Lake Water Quality Council and adopted by the Idaho Legislature in 1998 recommends the Board obtain a minimum stream flow for the North Fork Payette River below Upper Payette Lake to protect kokanee spawning and resident trout species. The Idaho Department of Fish and Game conducted a modeling study, using the Riverine Habitat Simulation program, to model the relationship between flow and availability of fish habitat (Apperson, 1998). The suggested minimum stream flow is 60 cubic feet per second at the gage below Fisher Creek from July 1 to September 7.

The available period of record for the gage at Fisher Creek is October 1994 to April 1998, a period of above average streamflows. The calculated flow duration was adjusted using a longer record station at Lake Fork above Jumbo Creek (USGS 13240000) to produce a duration curve that reflects a long-term average (1946-97). Based on this adjusted flow duration, the suggested minimum stream flow of 60 cubic feet per second for July through September would be met or exceeded about 59 percent of the time. The Board will file an application for this water right with the Idaho Department of Water Resources.

Recommendations

The Board has the authority to establish water policy for the state of Idaho, and to plan for the improvement, development, and conservation of water resources through development and implementation of the State Water Plan [Idaho Constitution, Article 15, Section 7]. The Board requests that federal, state, and local agencies, and the entities referenced work with the Board to implement the recommendations contained in the plan. State agencies are asked to "exercise their duties in a manner consistent with the comprehensive state water plan" [Idaho Code 42-1734B (4)]. Federal agencies are required to consider a comprehensive state water plan, and are encouraged to manage their lands in a manner consistent with the recommendations contained in this plan.

Recommendations contained in the Payette River Basin Plan reflect input received from citizens and agencies. The Payette River Citizens Group submitted recommendations to the Board for their consideration. After considering Citizens Group agency input, and public comment on a Draft Payette River Basin Plan, the Board makes the following recommendations.

PROTECTED RIVER DESIGNATIONS

Federal Wild and Scenic River System

The Forest Service and Bureau of Land Management have found reaches within the Payette River Basin eligible for further study as potential federal wild and scenic rivers. Additionally, three national forests (Boise, Payette and Sawtooth) within the Payette River Basin are reexamining the eligibility of rivers and streams for possible wild and scenic designation during the forest plan revision process. Suitability studies to determine whether to recommend designation to Congress would occur after forest plan revisions are complete.

The Board recommends that the revised forest plans recognize state protected river designations as the best option for managing and protecting the outstanding resource values of waterways in the basin. The Forest Service and Bureau of Land Management are reminded that state designations should not be the basis for seeking inclusion of such waterway in the National Wild and

Scenic Rivers System [Idaho Code 42-1736]. The Board does not support federal wild and scenic river designation of any waterway in the Payette River Basin, believing state designation serves the general public equally well and best addresses local concerns. Because of the comprehensive scope of state water planning, the Board encourages the Bureau of Land Management and Forest Service to work within the state water planning process, and to support state protected river designations.

Northwest Power Planning Council Protected Area Designations

The Board designates the rivers shown on Map 1 as state protected rivers. The Board recommends that the Northwest Power Planning Council protected area designations reflect the state protected river designations.

WATER ALLOCATION

The Payette River Citizens Group was unable to reach consensus on many issues that concern water allocation. A Payette River Watershed Council was formed in 1996 to improve communication, cooperation, and sharing of information about the Payette River and its watershed. In past years the Watershed Council has worked towards consensus about releases from Cascade and Deadwood reservoirs. Changing water needs and additional demands will highlight the importance of this group to resolve water issues. The Board supports the continued efforts of the Watershed Council as a forum to discuss and resolve water allocation and other water-related issues at the local level. The Board encourages the Payette River Watershed Council to expand its forum to respond to issues identified in this plan.

Flow Augmentation

Flow augmentation involves using water stored in the Snake River Basin reservoirs in Idaho to flush smolts to, and in some cases through, the reservoirs behind the lower four Snake River Dams (located outside Idaho) as a means to aid salmon recovery. The Idaho Department of Water Resources recently examined the effectiveness of flow augmentation in improving velocity to assist migrating juvenile chinook salmon (Dreher, 1998). The Department demonstrated that flow augmentation provides minimal improvements in average flow velocities in the lower reach of the Snake River, and does not come close to achieving velocities that occurred before construction of the four dams below Lewiston. It is also important to note that the Snake River Basin in Idaho (which includes the Payette River Basin) has insufficient water quantities in dry years to achieve the seasonal average flow objectives identified by the National Marine Fisheries Service.

Using Payette River Basin water for flow augmentation jeopardizes the economic and environmental health of the basin. Out-of-basin use precludes the availability of water to meet present and future demands such as irrigation in drought years, reservoir and river recreation, and future municipal supply. Flow augmentation also limits the capability to manage releases to protect water quality and resident fisheries.

The evidence and conclusions presented by Dreher (1998), and the potential economic and environmental impacts in the Payette River Basin and to the State, point out that continued use of water from the Snake River Basin to flush smolts in the lower reach of the Snake River is not justified. There is no evidence that temperature control and velocity can be improved by using Payette River Basin water for flow augmentation.

Water Conservation

Water conservation in irrigation practices was identified as an issue for further study. There is concern that conservation may result in forfeiture or

partial forfeiture of water rights, and may reduce ground water recharge. The Board recommends further study of irrigation water conservation.

WATER STORAGE AND DELIVERY

Irrigation Water Measurement, Delivery and Management

To promote optimum and efficient water use, continued improvements in water delivery and measurement are necessary. To better track water supply and availability, the Board recommends that the U.S. Geological Survey, U.S. Bureau of Reclamation, Idaho Department of Water Resources, Water District 65, or some partnership of these entities pursue installing and funding additional automated gages in the following order of priority:

1) Middle Fork Payette just upstream of the confluence with the South Fork Payette River
2) South Fork Payette (main Payette River) just upstream of Banks

Currently, installation and maintenance of gages in the basin are funded by the U.S. Geological Survey, Idaho Department of Water Resources, U.S. Bureau of Reclamation, Water District 65, and Idaho Power Company. Other sources to fund the installation and maintenance of gages should be explored.

Continued improvements in water measurement and tracking by the automated accounting system for Water District 65 are desirable. Improvement is needed in the tracking method for pump diversions, possibly through installation of flow meters or use of power consumption coefficients. Additional water measurements are needed to track diversions more closely, including measurement of smaller diversions (30 cubic feet per second or less) on a weekly basis, and larger diversions on a daily basis. Additional investments in automating Water District 65's water delivery system is encouraged.

The desire to insure efficient and optimal use of the basin's water, coupled with the need to improve or protect water quality, has led to an examination of the many diversions and water delivery systems in the basin. Diversion upgrades have been recommended to improve water quality, fisheries habitat, and water delivery efficiency. Some recommendations are listed in Tables 1 and 2. Funding priority should reflect projects that accomplish multiple objectives, and that meet the objectives, goals, and recommendations contained in Payette River Basin Plan and the *Idaho State Water Plan.*

Water District 65 is the largest water district in the Payette River Basin. There are four additional water districts active in the basin. Improved communication and coordination between these water districts will maximize the benefits of water management.

J Ditch Irrigation Pipeline Project

The J Ditch irrigation pipeline, designed to improve water quality in Cascade Reservoir, will eliminate the discharge of McCall's treated wastewater effluent into the North Fork Payette River. The J Ditch pipeline mixes treated effluent with irrigation water, and transports both irrigation water and enriched irrigation water through a paired pipeline to downstream irrigators within the Mud Creek watershed. A Lake Fork Irrigation District canal system serving those same irrigators will be replaced.

Table 1. Recommendations for Cascade Reservoir Watershed Diversions.

Diversion	Study Recommendations
Lake Fork Watershed	
Westside Lake Fork Ditch	Catch point: Install weir flow measurement device, inlet box should be raised to mitigate backwater problems Replace corroding 24" steel outlet pipes with PVC; Cipolletti weir blade needs sharpened or replaced; scheduled maintenance and program to clear vegetation and other obstructions
Lake Irrigation District Canal	Install a measuring device - a ramp flume structure suggested
Spink-Barker Ditch	Replace diversion with more permanent structure; requires headwall and attachment to corrugated metal pipe; install stage recorder and stilling well with stage recording equipment at weir
Ditch F	Install 24" slide gate on ditch with a check structure; install small ramp flume structure; invert at head should be lowered slightly
Pump F	Install flow meter
Mud Creek Watershed	
Ditch B	Install 36" headgate structure at diversion and replace existing culvert; install 36" headgate at wasteway with turnout to farm ditch; install ramp flume structure with staff gage at both; replace check structure in creek
Ditch C	Install 36" headgate structure at the diversion point and replace existing culvert; install 36" headgate structure at wasteway with turnout to farm ditch; install ramp flume structure and staff gage at both; replace check structure serving farm ditch
Ditch D	Install 12" headgate structure; install weir flow measurement device on headgate; can remove check/waste box; install fencing to keep livestock out
Ditch L	Replace 60" corrugated metal pipe with 2 -36" gated culverts and bulkheads; install ramp flume structure and staff gate
Stock Pond B	Remove structure as it has been abandoned
Boulder Creek	
Pump B	Clean or replace trash rack; install flow meter for each pipe
Stock Pond D/ Ditch A	Install staff gage and 3' Cipolletti weir structure; rehabilitate eroded rock chute spillway with concrete design; clear head of spillway
Upper Jug Reservoir	Clear dead timber from reservoir
Ditch K	Install riprap bank protection, sharpen or replace weir blade
Gold Fork	
Pump C	Replace sediment diversion dam with more permanent structure; install flow meter; clean oil and diesel fuel contaminated area
Pump D	Replace sediment diversion dam with more permanent structure; install flow meter on pump
Center/Gold Fork Canal	Install Cipolletti weir in canal above Gold Fork flume crossing; reconstruct north wingwall at diversion; repair several canal sections
Ditch E	Install 12" gated turnout; install staff gage and 2.5' Cipolletti weir or flume structure; require new outlet facility
Ditch G	Install 36" gate and headwall structure; install 6' Cipolletti weir structure; extend ditch to river; install wasteway structure at confluence with side channel
Ditch H	Install 15" gate and headwall structure; install 2.5' Cipolletti weir or flume and staff gage
Ditch I	Install Cipolletti weir and gage staff; install headwall; install 4" Cipolletti weir o flume structure and staff gage; recommend regular clearing
Stock Pond C	Install flume structure in farm ditch and staff gage; raise contour ditch around meadow; install drop structure in wasteway
Willow Creek	
Diversion 701	Install flow meter
Diversion 702	Install 15" gate and headworks structure; install 1" Cipolletti weir

Sources: Natural Resources Consulting Engineers, Inc., 1996

Table 2. Lower Payette Diversion Inventory Recommendations.

Diversion	Recommendations
Bilbrey Enterprise Diversion	Signage to inform recreationists about diversion
Boise Cascade- Emmett	Construction of a permanent structure proposed
Eagle Island Diversion	Signage to inform recreationists about diversion
Farmers Cooperative Diversion	Possibility of additional signage upstream to inform recreationists
Last Chance Diversion	Culverts installed for Plaza Road are undersized, eventually county will replace with clear span structure, might want to consider Parshnall measuring flume; signage to inform recreationists of diversion dam and portage route
Lower Payette Diversion	Possible consolidation with Simplot pumps; signage to inform recreationists of diversion and possible portage
Seven Mile Slough Diversion	Possibility of improving diversion to make the structure more permanent; install trash rack in front of headworks for safety; signage to inform recreationists about diversion and possible portage
Washoe Diversion	Headgate may need rebuilt; repair needed to check structure; signage to inform recreationists about diversion and recommending portage route
Acord Diversion	Possible permanent structure

Source: Quadrant Consulting, Inc., et al., 1997.

The project replaces diverted waters from Mud Creek and Lake Fork, with the desired benefit of improving instream flows in these waterways. The Board recommends that the Idaho Department of Water Resources work with the Lake Fork Water District to develop an automated accounting program to more efficiently track rental pool, natural flow, and storage water rights. This will improve the watermaster's ability to deliver and manage water.

Water Storage

The Payette River Citizens Group identified the need for additional water storage for municipal water supply, irrigation, and flood control. Several options for meeting municipal water supply are listed in the next section. The need, feasibility, and opportunities to provide additional storage for these uses should be further explored. Small and large reservoir sites should be considered. The Board will consider reserving additional sites in the basin if warranted.

MUNICIPAL WATER SUPPLY

Basin population growth exceeds the state average, and is projected to continue to do so. Planning for and securing adequate water supplies to meet the demands of this growth needs to be a priority. Some municipalities need to acquire additional water supplies, or build infrastructure to provide for growth. These needs are summarized in the Payette River Basin Plan.

Idaho law [Idaho Code 42-202] provides that municipalities can appropriate water for reasonably anticipated future needs as determined through comprehensive plans or other supporting data. All communities are encouraged to pursue long-term planning, projecting future growth and reviewing water systems, to determine if current municipal water supply is adequate to meet projected growth. Water applications may be filed with the Idaho Department of Water Resources if a need is determined by a comprehensive plan or other supporting data.

Numerous options are available for meeting future water demands. The Board supports making water conservation a priority strategy. Other options that can be considered in long-term planning include:

- Measuring delivery to user and structuring municipal water rates to reflect the quantity of water used, instead of a flat rate. This measure can result in reduced water use.
- Purchasing a senior water right from a willing seller.
- Requiring land use developers to demonstrate that adequate water supplies are available for projects before local governments authorize them. The developer should work with the Idaho Department of Water Resources to identify water sources to serve the needs of the development. If the development will rely on a community water supply, water rights associated with the developed land should be gifted to the municipality by the developer.
- Obtaining contracts from the State Water Supply Bank.
- Obtaining storage contracts from the U.S. Bureau of Reclamation storage facilities.
- Condemning senior water rights with compensation.
- Building water storage projects that are consistent with the *Idaho State Water Plan*. The Payette River Citizens Group has supported building storage reservoirs to supply future needs. The Board supports this recommendation only if it may be accomplished with minimal environmental and social impact, and if adequate attention has been given to meeting demand through water conservation efforts. Off-channel reservoirs which provide flood control and fishery enhancements may provide a reasonable alternative.

In the *Idaho State Water Plan*, the Board identified a potential reservoir site on the Gold Fork River for 80,000 acre-feet of irrigation storage (Idaho Water Resource Board, 1996). The Board will continue to reserve this potential reservoir site and include municipal water supply as a project purpose.

The City of Horseshoe Bend needs to identify a secure water supply. The Board encourages the City to initiate a study of various alternatives. Additional alternatives for the City may include rehabilitating the wells abandoned in the 1970s and treating the water.

Other basin communities will need funding to replace aging infrastructure, or upgrade infrastructure to meet water quality standards and increased demands. A number of funding options were suggested by the Payette River Citizens Group, including revenue bonds through the Idaho Water Resource Board, user fees to generate funds allocated specifically to a water treatment facility, and federal funding.

WATER QUALITY

Planning and administration of water quantity and water quality are divided between two state agencies. The Idaho Department of Water Resources is primarily responsible for programs relating to water quantity, and the Idaho Division of Environmental Quality is primarily responsible for protecting the quality of the state's water. The Board has the authority to "study and examine" water quality issues, and "advise, cooperate and counsel" the Idaho Division of Environmental Quality about these issues [Idaho Code 42-1734(15)].

The Board will coordinate with the Idaho

Division of Environmental Quality on water quality concerns in the basin when it is consistent with the Board's authority. The Board recommends local citizens participate in the activities of the Southwest Basin Advisory Group and the several Watershed Advisory Groups active in the basin in preparing water quality management plans. The Board will address at a later date actions and recommendations contained in the Idaho Division of Environmental Quality's water quality plans for which they have responsibility or authority.

Coordination of Well and Septic System Installation

The Idaho Department of Water Resources is responsible for permitting the construction of wells. The Health District establishes guidelines for septic tank and leachfield locations and design. This current system can result in wells being permitted and constructed without specific knowledge of local septic tank or field locations, risking well contamination. The Payette River Citizens Group has expressed a desire to see improved coordination in well and septic system permitting. The Board recommends that the Idaho Department of Water Resources and Health District examine additional opportunities to improve coordination between their permitting responsibilities.

Increased urbanization, soil characteristics, and the hydrologic conditions in the basin indicate conventional septic systems will not be adequate to protect the resource. Development in rural areas with individual septic systems and domestic wells increases the potential for water quality and health problems. The Board recommends that subdivisions exceeding specified sizes or densities should be required to construct community waste treatment systems or hook-up with existing systems. This should be a high priority for development in Long Valley, Garden Valley, along the Middle Fork Payette River, and the lower Payette Valley.

In areas where individual septic tanks continue to be used, the Board recommends that counties and communities require lot sizes reflect the assimilative capacity of soils to safely site leachfields and wells. Where individual septic tanks prove acceptable, the density should be based on the assimilative capacity of the soils for the developed area. It may be necessary to establish a community well away from the influences of septic systems to protect drinking water supplies.

Minimum Stream Flows

Minimum Stream Flow - North Fork Payette Below Payette Lake Outlet to Cascade Reservoir

In May 1994 the Board filed an application with the Idaho Department of Water Resources for a minimum stream flow on the North Fork Payette River from Payette Lake Outlet to Cascade Reservoir for the protection of water quality, wildlife habitat, aquatic life, and recreation values. The Board has not asked the Director of the Department of Water Resources to process the application, because they wanted to first consider public response provided during the development of the Payette River Basin Plan.

The minimum stream flow considered in the Draft Payette River Basin Plan was 145 cubic feet per second from April 1 to June 30, and 72 cubic feet per second from July 1 to March 31. (The original application filed in 1994 was for 145 cubic feet per second from April 1 to September 30, and 72 cubic feet per second from October 1 to March 31.) Based on stream flow records from 1944 to 1997, the suggested minimum stream flow of 145 cubic feet per second for April through June would be met or exceeded about 83 percent of the time. The suggested minimum stream flow of 72 cubic feet per second for July through March would be exceeded about 64 percent of the time. (The flow duration curves do not distinguish between natural flows and storage water.)

The Draft Payette River Basin Plan proposed to process this minimum stream flow water right application. Written comment and testimony revealed some concerns that should be addressed before the Board pursue processing its minimum stream flow water right application. Local citizens, including the McCall City Council and Mayor, have expressed support for the minimum stream flow.

The Lake Reservoir Company, managers of Payette Lake storage water, have concerns about the proposed minimum stream flow. The Company's operations at Payette Lake would not be impacted, because of its senior water right. However, the Company is concerned that the public will expect releases of storage water from Payette Lake to meet a minimum stream flow even in years when this may not be practical. This expectation could impact the good public relations the Company has strived to establish. In July through October the proposed minimum stream flows are usually achieved through release of storage water.

Most concerns may be resolved by discussions between the interested parties. The Board encourages the Lake Reservoir Company, Trout Unlimited, McCall and Valley County representatives, and interested individuals to work cooperatively to address the concerns raised. The Payette River Watershed Council would be a good forum for these discussions. The Board will consider a request to process the minimum stream flow water right application when the interested parties reach a satisfactory resolution, maintaining the May 1994 priority date in the interim.

Minimum Stream Flow Studies

In support of recommendations by the Payette River Citizens Group, the Board requests that instream flow technical studies or analyses be conducted to determine if minimum stream flows are warranted for the following river reaches:

- Lake Fork - Little Payette Lake to Cascade Reservoir;
- Gold Fork River - Gold Fork diversion dam to Cascade Reservoir; and
- Several reaches of the Payette River:
  - Banks to Black Canyon
  - Black Canyon to Letha
  - Letha to Snake River confluence

Idaho law requires specific data to support an application for a minimum stream flow. The Board currently does not have the data required to pursue minimum stream flows on the river reaches listed above. The Board recommends that the Idaho Division of Environmental Quality and/or the Idaho Department of Fish and Game conduct studies to quantify flows and acquire other necessary information to process minimum stream flow applications for the above-mentioned streams. First priority should be given to Lake Fork because of the extensive investments made in constructing the J Ditch irrigation pipeline.

Minimum pools were administratively established by the U. S. Bureau of Reclamation for Cascade and Deadwood reservoirs. The Idaho Department of Fish and Game has noted that these minimum pools were intended for winter periods, and based on nutrient loading conditions occurring in 1980-81. Reexamination of minimum pools to maintain water quality and for fishery enhancement is needed. The Board supports minimum pools for these reservoirs, as long as they do not interfere with irrigation storage and delivery authorities.

Irrigation Diversion Improvements

Several studies have occurred in the basin examining opportunities to improve diversion structures and/or irrigation practices. A summary of recommendations from these studies are contained in Tables 1 (page 13) and 2 (page 14). Recommendations may include converting from

flood to sprinkler irrigation, consolidating or relocating diversions, controlling stream/canal bank erosion, and improving water control and measurement. The Board supports pursuing funding for these projects, focusing on those improvements recommended in the Idaho Division of Environmental Quality's implementation plans for water quality management.

Roads and Sediment

Best management practices are encouraged to mitigate or minimize sediment contributions from roads. The filtering capabilities of riparian zones should be protected. Slope stabilization should be required and can include using gravel or seeding. Runoff control should be required.

FLOOD MANAGEMENT

As the basin sees an increase in population and development, the potential impact of flood events could increase. Recent flooding has led to public concern about floodplain development and taxpayer liability for future damage from flood events. The Board encourages local governments to take proactive actions to prevent or minimize impacts from future flood events. Pre-disaster flood planning and floodplain management are essential elements in reducing flood risk.

The Payette River Citizens Group supports local governments applying stricter regulations for floodplain development. Local governments should consider prohibiting any new development in the 100-year floodplain, or at least allowing only development that is adequately protected. Floodplain cut and fill standards should be adopted that require compensating for fill placed in the floodplain by excavation to maintain stream channel flood capacity. Higher elevation standards for structures in the floodplain should be considered. These activities may result in reduced flood insurance premiums through the Community Rating System discussed later in this section.

It is State policy to encourage protection of floodplains, and rely on management rather than structural alternatives in reducing or preventing flood damage (Idaho Water Resource Board, 1996; See Policy 3I). Future growth may lead to increased land values and pressures to allow development in floodplains. In keeping with State policy, the counties and communities are encouraged to zone floodplains for appropriate uses that avoid expensive structural flood control and flood repair. Land use planning is a more viable and economical way to minimize flood damages. Structural controls are expensive to build and maintain. Lack of adequate maintenance can result in failure and an increased danger. The current lack of federal funding to repair damaged levees or to construct new ones must be considered in state planning.

The adoption of floodplain ordinances as a participant in the National Flood Insurance Program (managed by the Federal Emergency Management Agency) is one nonstructural alternative for flood management. The Board encourages all counties and communities in the basin to participate in the National Flood Insurance Program. Participation has resulted in adoption of floodplain ordinances which outline land use measures to minimize flood damage. The Board encourages the counties and communities to continue monitoring floodplain development to ensure ordinances are followed and that development does not increase potential flood damage.

As participants in the National Flood Insurance Program, communities may enhance flood management and further minimize flood risks by enrolling in the Community Rating System. This program provides a means for local governments to

voluntarily engage in additional flood management activities, choosing from several options with minimal investment. The result is decreased risks to property and life, and reduced flood insurance premiums for property owners. Valley County is the only basin jurisdiction currently participating in this component of the National Flood Insurance Program. Other communities are encouraged to contact the State Flood Coordinator at the Idaho Department of Water Resources to enroll in the Community Rating System.

Jurisdictions from Horseshoe Bend downstream may want to consider forming a "flood management committee" to prepare a flood management plan. This plan should include exploring coordinated management of the existing levee system to insure proper maintenance and adequate protection. Currently, regulatory oversight of levee construction and maintenance is limited. The Board recommends that minimum standards for levee maintenance and construction be established. Repair or replacement of levees should be monitored so that improvements do not place additional areas at risk by transferring erosion and flood problems to downstream property owners. The committee is encouraged to investigate alternatives to levee replacement and expansion. The "flood management committee" should explore the possibility of forming a Flood Control District for long-term management of levees and the floodplain.

Additional information is required to develop a flood management plan. Accurate floodplain and floodway mapping is needed that reflects the current river channel configuration. Aerial photography produced during the 1997 flood event should be obtained and input into a geographic information system to produce accurate maps. Development of a computer model to help determine what is inundated at various flows is desirable. More accurate spatial information is needed about levee location along the lower reach of the Payette River so that coordinated maintenance and management may occur. Spatial identification of all levees using Global Positioning System (GPS) technology is suggested.

RESOURCE DEVELOPMENT

The Board has not amended the state recreational designation to allow construction of a hydropower project proposed for the Smiths Ferry to Banks reach of the North Fork Payette River for the reasons cited on page 9. Recognizing the future need for new generating capacity, the Board believes there are alternatives to meet future energy demands, including expansion of capacity at existing hydropower facilities in the basin. Developing hydropower at existing dams in the basin should also be explored in more depth. Some of these options may be preferable because of favorable economics, and the potential to minimize environmental and other impacts.

FISHERIES

Many fishery issues in the basin are associated with water quality concerns. Recommendations made in the earlier *Water Quality* section address some of these concerns, including minimum stream flows, improvements to diversion structures, and irrigation management. Recommendations specific to reaches in the Cascade Reservoir watershed are summarized in Table 3. The Board supports further evaluation of the design and financial feasibility of these alternatives. An alternative to expensive fish screens may be orienting diversion openings parallel to flows to minimize diverting fish into ditches, and positioning diversion structure overflows where fish can most easily use
them. Another alternative is to consider constructing or enlarging existing headwater storage reservoirs to establish lake fisheries and enhance downstream summer flows. Cooperative funding among the many players involved in fisheries, water

quality, and water delivery should be explored.

Table 3. Possible Alternatives to Address Fisheries Concerns in the Cascade Reservoir Watershed.

Priority/Diversion	Problem(s)	Possible Alternatives
1) Gold Fork Diversion - About 4 mi. up Gold Fork from State Highway 55 bridge on Cascade Reservoir	Dam (18 ft. high) with occasionally no flows below that blocks 46 miles of trout habitat capable of producing 250,000 native trout annually for Cascade Reservoir.	- Fishway and partial canal screening - Minimum flow
2) Lake Irrigation District Canal (LID) - Below Little Payette Lake on Lake Fork	Diversion claims adults and juvenile fish in large numbers. The diversion is located immediately downstream of a major rainbow / redband spawning area. There is occasional dewatering of Lake Fork.	- Modify diversion structure and/or orientation to flow - Partial fish screen - Coordination of rental pool releases
3) Cruzen Canal - 5 miles below Lake Irrigation District Canal on Lake Fork	Diversion claims many adult and juvenile native redband/rainbow trout that would otherwise enter Cascade Reservoir. There is frequent dewatering of Lake Fork.	- Modify diversion structure and/or orientation to flow - Partial fish screen - Flow measuring device to pass rental pool releases
4) Brown's Pond Dam - 2 miles above Little Payette Lake on Lake Fork	Dam blocks fish migration to many miles of high quality fish habitat.	- Fishway
5) Alpha Ditch - Located on Clear Creek	Diversion diverts fish claims native redband/rainbow trout adults and juveniles. There is dewatering.	- Modify diversion structure and/or orientation to flow - Partial fish screen

Source: Anderson, Idaho Department of Fish and Game, 1998.

Bull Trout

Bull trout are listed as threatened in Idaho under the Endangered Species Act. In 1996 the state of Idaho prepared a *Bull Trout Conservation Plan* before the listing occurred, to identify conservation actions to recover the species (Batt, 1996). Implementation of this plan in the Payette River Basin occurs under the direction and guidance of the Southwest Basin Native Fish Watershed Advisory Group, with assistance from a technical group. This strategy focuses on locally developed solutions applicable to individual watersheds.

The state will continue bull trout recovery efforts as defined in the state of Idaho plan. The Board supports the actions of the Southwest Basin Native Fish Watershed Advisory Group (WAG), believing the state is best able to address the challenges to recover this species. The U.S. Fish and Wildlife Service is the federal agency charged with recovery of the bull trout since its listing under the Endangered Species Act. The Board recommends that the U.S. Fish and Wildlife Service recognize and work with the state WAGs to develop recovery strategies for the bull trout and avoid duplicative efforts.

Bull trout focal habitats are "critical areas supporting a mosaic of high-quality habitats that sustain a diversity or unusually productive complement of native species" (Batt, 1996). Bull trout focal habitat for key watersheds in the Payette River Basin are listed in Table 4. Protecting these reaches that support healthy sub-populations can

increase persistence of adjacent populations in lower quality habitats. Land and water management activities should minimize impacts to these reaches.

Table 4. Bull Trout Focal Habitat in the Payette River Basin.

Gold Fork Bull Trout Key Watershed

North Fork Gold Fork River and tributaries *(18.5 miles)* - Headwaters to South Fork Gold Fork River confluence, and unnamed perennial tributaries upstream of the Lodgepole Creek confluence
South Fork Gold Fork River *(4.7 miles)* - Headwaters to North Fork Gold Fork River confluence

South Fork Payette Bull Trout Key Watershed

South Fork Payette River *(9.7 miles)* - Smith Falls to Mink Creek confluence
Goat Creek *(5.8 miles)* - Blue Rock Lake Creek confluence to South Fork Payette River confluence
Baron Creek *(7.6 miles)* - Braxon Lake Creek confluence to South Fork Payette River confluence
Wapiti Creek *(5.5 miles)* - Headwaters to South Fork Payette River confluence
Canyon Creek and tributaries *(14.8 miles)* - Headwaters to South Fork Canyon Creek confluence, and the following tributaries:

- *North Fork Canyon Creek* - Headwaters (including unnamed perennial headwater tributary) to mouth
- *South Fork Canyon Creek* - Headwaters to mouth

Clear Creek *(12.5 miles)* - Headwaters to Blacks Creek confluence,
Warm Springs Creek and tributaries *(18.9 miles)* - Headwaters to East Fork Warm Springs Creek confluence, and the following tributaries:

- *Middle Fork Warm Springs Creek* - Headwaters to mouth, including unnamed perennial tributary
- *East Fork Warm Springs Creek* - Headwaters (including unnamed perennial headwater tributaries) to mouth

Scott Creek and tributary *(9.6 miles)* - Headwaters to South Fork Scott Creek confluence, and the following tributary:

- *Smith Creek* - Headwaters to mouth

Deadwood Bull Trout Key Watershed

Deadwood River *(4.3 miles)* - Headwaters to East Fork Deadwood River confluence
Deer Creek and tributaries *(14.6 miles)* - Headwaters to Deadwood River confluence, and the following headwater tributaries:

- *North Fork Deer Creek* - Headwaters to mouth
- *South Fork Deer Creek* - Headwaters (including unnamed perennial headwater tributary) to mouth

South Fork Beaver Creek *(0.1 miles)* - One hundred yards upstream of Forest Trail 023 to Deadwood Reservoir
Trail Creek *(6.5 miles)* - Headwaters to Deadwood Reservoir

Middle Fork Payette Bull Trout Key Watershed

Middle Fork Payette River and tributaries *(18.3 miles)* - Headwaters to Ligget Creek confluence, and unnamed perennial tributaries
Bull Creek and tributary *(10.6 miles)* - Headwaters to mouth, and the following tributary:

- *Oxtail Creek* - Headwaters to mouth

Squaw Creek Bull Trout Key Watershed

Squaw Creek and tributaries *(11.2 miles)* - Poison Creek confluence to Cold Spring Creek confluence, and the following tributaries:

- *Pole Creek* - Headwaters to mouth
- *Unnamed tributary* - Headwaters (located in T. 13 N., R. 2 E., southeast 1/4 of Section 15) to mouth
- *Third Fork Squaw Creek and tributaries (15.8 miles)* - Headwaters to Mesa Creek confluence, and unnamed perennial tributaries

The Board recognizes the importance of focal habitats in maintaining and recovering the bull

trout populations. State protected river designation of bull trout focal habitat would recognize the outstanding resource values provided by these reaches as important spawning habitat. State protected designation can complement actions proposed in the conservation plan, and would demonstrate the State's ability and willingness to protect critical habitat to ensure long-term persistence. The designation has the flexibility to specify activities allowed for the conservation of bull trout. The Board encourages the Southwest Basin Native Fish Watershed Advisory Group to consider recommending state protected river designation as one action in the bull trout conservation plan being prepared for the Payette River Basin. The Board will consider amending the Payette River Basin Plan to designate bull trout focal habitat for state protected designation at the request of the Watershed Advisory Group.

The Board recommends that other agencies conduct activities in bull trout key watersheds in a manner that does not impact the persistence of the species, and is compatible with the Southwest Basin Native Fish Watershed Advisory Group activities and recommendations. The Board recommends that the Idaho Department of Water Resources continue to coordinate a review of any water right applications in bull trout key watersheds with the Idaho Department of Fish and Game.

AGENCY PLANNING AND COORDINATION

Stream Channel Alteration Permitting

The public desires the stream channel alteration permitting process to be more efficient, particularly in emergency situations. Suggestions to achieve this goal include Idaho Department of Water Resources-sponsored public information meetings in areas susceptible to flooding to identify stream channel protection measures needed before flood season, and adequately funding agencies to review the onslaught of applications after flood events. A streamlined permitting process is used in emergency situations. The Board encourages evaluating the permitting process to see if the process can be further expedited during emergencies. The Board recommends that the U.S. Army Corps of Engineers stream channel alteration permit functions be consolidated under the authority of the Idaho Department of Water Resources.

Naming Convention for the Payette/South Fork Payette River

Citizens in the basin would like the Payette River from the Middle Fork Payette confluence to Banks officially recognized as the South Fork Payette. This requires a request to the U.S. Board of Geographic Names. The Board will complete the necessary paperwork to request an official name change. Boise County Coalition will help the Board with this effort, coordinating with local jurisdictions.

RECREATION

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

The Payette River Recreation Fee Demonstration project, begun in 1998, provides one mechanism to raise funds for government agencies that provide recreational opportunities along the South Fork Payette and main Payette rivers. Boise

County will receive some compensation for services provided through this program. However, other mechanisms must be explored to compensate state and local entities for services provided. The Board recommends that some of the fees collected from the federal fee demonstration project be used to examine and quantify the economic impact and benefits to the local counties and communities from the associated recreational activities.

Significant increase in whitewater recreation and agency actions to manage this use have the public concerned that recreation diversity and quality in the Payette River corridor is diminishing. The public desires to maintain a diversity of recreation opportunities along the river corridor. Many feel that funding and recreation management has focused on boating recreation to the detriment of other recreation opportunities. This issue needs to be explored by the recreation management agencies. The Board recommends that all recreation management agencies work together to develop a Payette River corridor recreation management plan. This plan must strive to balance competing uses while maintaining a quality experience for all recreation activities. County commissions and local planning and zoning should be involved in plan development to incorporate their concerns, and ensure recreation activities are compatible with land use comprehensive plans.

Recreational Dredge Mining

During the public comment period for the Draft Payette River Basin Plan, the Idaho Gold Prospectors Association requested the Board amend state recreational river designations for three reaches in the Payette River Basin to allow recreational mining. The request was for the following reaches:

- Payette River - Banks to Beehive Bend
- South Fork Payette - Middle Fork Payette River confluence to Banks
- South Fork Payette - Deadwood River to Big Pine Creek

These are some of the state recreational river reaches designated by the Board in 1991 which prohibited stream channel alterations, including recreational dredge mining.

In considering the Idaho Gold Prospectors Association request, some concerns were identified during discussions with some of the resource agencies. The Idaho Department of Fish and Game indicates opening any of the South Fork Payette reaches would be incompatible with bull trout recovery efforts. Idaho Department of Parks and Recreation noted these reaches receive the most boating use in the basin by private and commercial boaters, and the possibility for user conflicts. The Payette River Basin contains a summary of the background history and other considerations in the Appendix.

The Payette River Citizens Group did not address this issue, because it was not raised until the final hearing for the completed Draft Payette Plan. The Board believes additional discussion between interested individuals needs to occur. The Board encourages the Idaho Gold Prospectors Association to meet with boaters, outfitters, and other recreationists to reach consensus. If an agreement is reached that provides adequate protection to the water resources, the Board will then consider amending the recreational designation to allow recreational dredge mining on the main Payette River.

REFERENCES

Anderson, D., Regional Fisheries Manager, Idaho Department of Fish and Game. 1998. Personal Communications.

Apperson, K. A. 1998. Instream Flow Study and Recommendation for Minimum Summer Discharge in the Upper North Fork Payette River. Excerpted from Technical Report on the Water Quality of Big Payette Lake: An Integrated Watershed and Lake Assessment.

Batt, P. E. 1996. State of Idaho Bull Trout Conservation Plan. Boise, ID: Office of the Governor.

Dreher, K. J. 1998. A View on Idaho's Experience with Flow Augmentation. *Proceedings*, Competing for the Mighty Columbia River - Past, Present and Future: The Role of Interstate Allocation, April 30-May 1, 1998, Boise ID. American Bar Association, Section of Natural Resources, Energy and Environmental Law.

Idaho Water Resource Board. 1991. Comprehensive State Water Plan: Payette River Reaches.

Idaho Water Resource Board. 1996. Idaho State Water Plan.

Natural Resources Consulting Engineers, Inc. 1996. Analysis Summary Report: Cascade Reservoir Irrigation Management Plan. Prepared for Idaho Division of Environmental Quality.

Quadrant Consulting, Inc.; McLaughlin Water Engineers, Ltd., and Resource Systems, Inc. 1997. Boise and Payette Rivers Diversion Upgrade Project - Task 1 Report, In Inventory of Irrigation Diversion Structures. Prepared for Boise River 2000.

IDAHO COMPREHENSIVE STATE WATER PLAN

Payette River Basin

Prepared by: Idaho Department of Water Resources
Water Planning Bureau

Prepared for: Idaho Water Resource Board

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

Adopted February 5, 1999

BEFORE THE WATER RESOURCE BOARD
OF THE STATE OF IDAHO

IN THE MATTER OF THE PAYETTE)
RIVER BASIN COMPONENT OF THE) A RESOLUTION
COMPREHENSIVE STATE WATER PLAN)

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 Payette 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 basin; 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 Payette 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 – Payette River Basin.

PASSED AND APPROVED this 5th day of February, 1999.

Clarence Parr
CLARENCE PARR, Chairman

ATTEST:

J. David Ericksson
J. DAVID ERICKSON, Secretary

PREPARERS AND CONTRIBUTORS

Water Planning Bureau

Wayne Haas - Planning and Policy Division Administrator
Bill Graham - Planning Bureau Chief
John Beal - Planning Section Manager
Ellen Berggren - Principal Author
Cyle Butler - Database Management and Analysis
Zena Cook - Economist
Dave Greegor - Aquatic Biologist
Jessie Larson - GIS Analyst
Ralph Mellin - Special Projects Coordinator
Maria Minicucci - Water Resources Planner
Jim Oakleaf - GIS Analyst
John Olson - Water Resources Planner
Brian Patton - Associate Water Resources Engineer

Ruth Schellbach, Rod Jensen and Kevin Martin - former Planning Bureau staff

Other Contributors:

Numerous individuals in the Idaho Department of Water Resources contributed to the preparation of this document. We want to especially thank:

Karl Dreher - Director of Idaho Department of Water Resources
Norm Young - Water Management Division Administrator

Legal Services
John Homan
Phil Rassier

Hydrology Section
Shane Bendixsen
Sheryl Howe
Bill Ondrechen
Bob Sutter
Scott Urban

Ground Water Monitoring
Janet Crockett
Ken Neely

Adjudication Bureau
Dave Tuthill
Don Shaff

Ground Water Protection Section
Mark Slifka

Stream Channel Unit
Erv Ballou

Resource Information/Data Section
Linda Davis
Windy Stephens

Water Distribution Section
Tim Luke

Flood Plain Management Unit
Fred Eisenbarth

Water Rights Permits Section
Shelley Keen
Sharla Curtis
Cindy Zimmerman

Threatened and Endangered Species Coordinator
Frank Sherman

Energy Division
Ken Eklund

Western Regional Office
Gary Spackman
John Westra
Gene Gibson

Clerical Support
Rita Fleck
Brandy Griffis
Cody Kinney
Kathy Strand

We thank the state, federal, and local agencies and governments, and private citizens, especially the Payette River Citizens Group, who attended numerous meetings, reviewed information, and wrote letters, helping to make this a better plan.

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

LIST OF MAPS

EXECUTIVE SUMMARY

In February 1991, the Idaho Water Resource Board adopted the *Comprehensive State Water Plan: Payette River Reaches* that was approved by the Idaho Legislature in April 1991. The Payette River Reaches Plan examined segments of the North Fork Payette River from Cabarton Bridge to Banks, the South Fork Payette River from the Sawtooth National Recreation Area boundary to Banks, and the main Payette River from Banks to Black Canyon Dam. The Board began a review of this plan in 1995, but decided to prepare a comprehensive state water plan for the entire Payette River Basin instead of updating the Payette River Reaches Plan. The Payette River Basin Comprehensive State Water Plan encompasses the North Fork Payette, South Fork Payette, Deadwood, Middle Fork Payette, and main Payette rivers, and all tributaries draining into these waterways.

The Payette River Basin Plan describes and evaluates water resources and related economic, cultural, and natural resources in the basin. The plan takes actions and recommends water policy and water resource management options to improve, develop, and conserve the water resources of the Payette River Basin. Goals, objectives, actions, and recommendations contained in the plan were developed with the help of a Payette River Citizens Group, comprised of individuals representing various water users in the basin.

River segments with outstanding fish and wildlife, recreational, scenic, or geologic values are identified and assessed for state protection in the plan. If the Board decides that the values of preserving the waterway in its existing state outweigh the values of continued development, it can, subject to legislative approval, prohibit several activities from occurring within the stream channel to protect existing values and uses.

The Payette River is a major tributary to the Snake River, draining about 3,320 square miles in west-central Idaho. About 60 percent of the basin is public land. The estimated amount of water entering the basin each year as precipitation is about 5.3 million acre-feet. The amount leaving the basin as the annual flow volume of the Payette River at Payette is 2.2 million acre-feet. The remaining 3.1 million acre-feet are diverted or lost through evapotranspiration by native vegetation and crops, through evaporation from open water and bare ground, or ground water recharge. An unknown volume leaves the basin as groundwater discharge into the Snake River.

The Payette River Basin is rural with an estimated population of about 37,000 people in 1996. Major population centers include Payette, Emmett, Fruitland, McCall, New Plymouth, Cascade, Horseshoe Bend, Donnelly, and Crouch. Average annual population growth rates for the basin exceeded the state average for the period from 1970 to 1996.

Major industries are agriculture (farming and ranching), timber, and recreation. Irrigated agriculture mainly occurs in two areas of the basin: the lower Payette Valley below Emmett, and Long Valley between McCall and Cabarton. Smaller valleys have some irrigated agriculture as well. Approximately 33 percent of the basin is considered tentatively suitable for timber harvest. The basin is characterized by 60,000 surface acres of boatable

rivers, lakes, and reservoirs, comprising 9.1 percent of the state total. Five of the sixteen lakes in the state managed for a trophy or quality trout angling experience occur in the Payette River Basin. Winter sports are an important sector of the economy for upper basin communities.

Summary of Public Comment Period on Draft Payette River Basin Plan

The Board circulated a Draft Payette River Basin Plan on November 9, 1998 for a sixty-day comment period. The majority of comments (72 percent) supported the actions and recommendations contained in the Draft Plan. Fourteen percent of the comments received did not support the Draft Plan. Most of these comments concerned three areas, including 1) designation of 193 miles of bull trout focal habitat as state recreational rivers; 2) a proposal to process a water right application for a minimum stream flow below Payette Lake; and 3) a request to amend the recreational designations on the South Fork and main Payette rivers to allow recreational dredge mining. The Board has made revisions to the Draft Plan in response to these comments which are more specifically addressed in the *Actions and Recommendations* section of the final Payette River Basin Plan.

Plan Actions

The Payette River Basin Plan retains the 87 miles of state recreational rivers designated in the 1991 Payette River Reaches Plan. Additionally, the Board has designated a 23.6 mile reach of the North Fork Payette River above Payette Lake as a state recreational river. The designations are summarized in the table that follows. Other Board actions include filing an application for a minimum stream flow on the North Fork Payette below Upper Payette Lake.

During the planning process, Gem Irrigation District asked the Board to amend the recreational designation for the North Fork Payette River below Smiths Ferry to allow construction of a hydropower project. The Board has rejected this request, and maintains the recreational designation with the prohibition of new hydropower projects. A number of recommendations addressing water allocation, water storage and delivery, municipal water supply, water quality, flood management, resource development, fisheries, agency planning and coordination, and recreation are included in the plan.

Payette River Basin State Protected River Designations.

River Reach	Length	Outstanding Resource Values	Designation
State Protected River Designations made in 1991			
North Fork Payette River - Cabarton Bridge to Banks	28.0 miles	fish & wildlife, recreation, scenic	recreational
South Fork Payette River - Sawtooth National Recreation Area boundary to Banks	51.8 miles	fish & wildlife, recreation, scenic	recreational
Payette River - Banks to Beehive Bend	7.2 miles	fish & wildlife, recreation	recreational
Additional Designation			
North Fork Payette River - Headwaters to Payette Lake	23.6 miles	fish & wildlife, recreation, scenic	recreational
Total Recreational River Miles:	**110.6 miles**		

INTRODUCTION

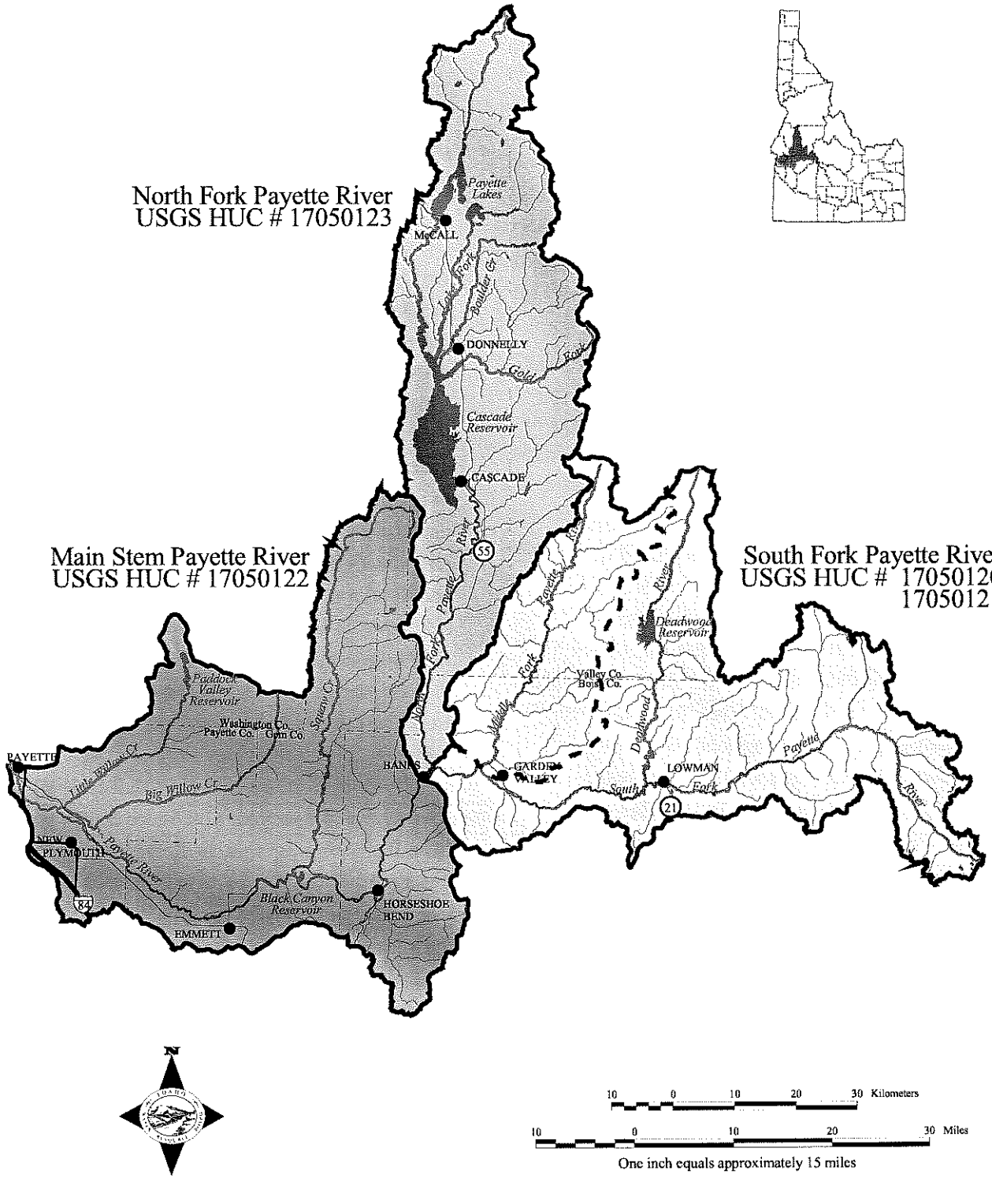
The Idaho Water Resource Board (Board) is a constitutional agency responsible for developing a plan for the State's water resources (Article XV, Section 7 of the Idaho Constitution). Legislation in 1988 provided for the development of a "comprehensive state water plan" based upon "waterways, river basins, drainage areas, river reaches, groundwater aquifers, or other geographic considerations" [Idaho Code 42-1734A]. Each basin or waterway plan becomes a component of the Comprehensive State Water Plan - Part B. The Board is to prepare a comprehensive state water plan for the conservation, development, management and optimum use of all unappropriated water resources and waterways in the public interest.

The Board is also authorized to preserve highly-valued waterways 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. The 1988 legislation specifically recognized reaches of the North Fork Payette (Cabarton Bridge to Banks), South Fork Payette (Sawtooth Wilderness Boundary to Banks), and main Payette (Banks to Black Canyon Dam) rivers for possible designation. On July 1, 1988, these reaches were given state interim protection with a two-year deadline to complete a comprehensive state water plan to determine if designation was warranted. In February 1991, the Board adopted the *Comprehensive State Water Plan for the Payette River Reaches*. Board actions included designating reaches of the North Fork Payette, South Fork Payette, and main Payette rivers as recreational rivers. The Idaho Legislature approved the plan in April 1991.

Because public concerns, values, and demands change over time, the Comprehensive State Water Plan must be reevaluated and may be amended. The Board will review and reevaluate the Comprehensive State Water Plan upon a request from the Idaho Legislature through a concurrent resolution, a petition from a state agency or individual to amend the plan, or if the Board determines it is necessary [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, its affects on existing water rights, and whether it is necessary to provide adequate and safe water for human consumption or to protect life. All amendments to the Comprehensive State Water Plan are submitted for review to the Idaho Legislature as required by law.

In 1995 the Board decided to prepare a comprehensive state water plan for the entire Payette River Basin in lieu of updating the Payette River Reaches Plan. The Payette River Basin Plan provides a general assessment of water supply, use, and management, encompassing the watershed area draining into the North Fork, South Fork, and main Payette rivers (See Map 1). The 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.

Map 1. Subbasins and U.S. Geological Survey Level 4 Hydrologic Unit Code (HUC) Boundaries



y:\payette\arcview\projects\projects2\hydro.apr (8/16/98)

Planning Approach

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 resource attributes*** - The resource attribute inventory is summarized in the *Basin Overview, Water Resources* and *Other Resources* sections of the Payette River Basin Plan. Resource information, figures, and statistics for this plan were obtained through in-house analysis, literature review, field reconnaissance, contact with state and federal agency personnel, and citizen input. Maps of resource data were prepared at a scale of 1:24,000 using a geographic information system (GIS). Resource data were reviewed for accuracy by government agencies, a local citizens group, and interested public.

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

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* and *Institutional Constraints and Opportunities* sections of the Payette 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 unique or rare features regionally or nationally, and/or 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 Payette River Basin Plan.

5) ***Develop alternatives or strategies*** - Strategies may be actions, recommendations or policies that respond to the issues and concerns identified, and intended to achieve the selected goals. They represent alternatives proposed by the public and agencies, and considered by the Board. The strategies considered for the Payette River Basin are listed in Appendix B.

6) ***Determine 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 Payette River Citizens Group workshops, and are described in the *Actions and Recommendations* section of the Payette 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 consultation, and citizens group workshops provided opportunity for public critique and suggestions for

the Payette River Basin Plan. Public information meetings were conducted April through May 1997 in McCall, Donnelly, Cascade, Lowman, Crouch, Horseshoe Bend, Sweet, Ola, Emmett, New Plymouth, Payette, and Boise to inform the public about preparation of a Payette River Basin Plan, and to ask the public to identify issues and concerns. In 1998 another public information meeting was held in Horseshoe Bend, announcing the formation of a citizens group and summarizing the issues identified at the Spring 1997 meetings.

The Payette River Citizens Group was formed in March 1998 to inform the Board and its staff about local concerns, review information used in the development of the plan, and provide feedback and suggestions for the Board's consideration. The group consisted of individuals representing various water users in the basin, including, but not limited to, irrigators, local government, property owners, fishermen, boaters, other recreationists, ranchers, timber industry, and hydropower. People representing these users were invited to participate to ensure all interests were represented and heard. However, membership and participation on the Citizens Group was open; any interested individual could be a member by attending the workshops.

The Board held a series of five Payette River Citizens Group workshops in April through June 1998. During these workshops, the Citizens Group ranked issues, developed goals, and identified actions and recommendations to submit to the Board. A list of Payette River Citizens Group members and a summary of Citizens Group workshops are furnished in Appendix C. About eighty individuals attended one or more of these workshops. Newsletters were circulated through the U. S. Postal Service or electronic mail to an additional 312 individuals that summarized the development of the Payette River Basin Plan, announced Citizens Group workshops, and requested comment on key pieces of information.

Summary of Public Comment on Draft Payette River Basin Plan

The Board circulated a Draft Comprehensive State Water Plan for the Payette River Basin on November 9, 1998 for a sixty-day comment period. Information meetings and hearings occurred in Cascade, Horseshoe Bend, and Boise in November and December 1998 to discuss and receive comment on the draft plan. Thirty-four people testified at the public hearings and sixty-eight written comments were received prior to the close of the comment period on January 9, 1999.

The majority (72 percent) of comments supported the actions and recommendations contained in the Draft Payette River Basin Plan. Fourteen percent of the comments received did not support the Draft Plan. Most of these comments concerned three main areas, including 1) designation of about 193 miles of bull trout focal habitat as state recreational rivers; 2) a proposal to process a water right application for a minimum stream flow below Payette Lake; and 3) a request to amend recreational river designations on the South Fork and main Payette rivers to allow recreational mining. The Board reexamined these actions and reviewed some additional information.

Actions and recommendations contained in the Draft Payette River Basin Plan were revised or expanded in response to these concerns. The Board adopted a *Final Comprehensive State Water Plan for the Payette River Basin* on February 5, 1999. The Final Plan was then presented to the Legislature for its consideration as required by Section 42-1734B of the Idaho Code. A summary of the public review schedule follows.

- Public Comment Period - *November 9, 1998 to January 8, 1999*
- Public Information Meetings in Cascade, Horseshoe Bend, and Boise - *November 1998*

- Public Hearings in Horseshoe Bend and Boise - *December 1998*

- Board Adoption of a Final Plan - *February 5, 1999*

- Submit to Legislature for Approval - *February 8, 1999*

- Signed by Governor - March 26, 1999

BASIN OVERVIEW

The Payette River drains an environmentally diverse 3,320 square mile watershed in west-central Idaho. Approximately 4,000 stream miles delineate the basin. Three major branches, the North, Middle, and South forks, conveying water from the mountainous headwaters, converge at the southwestern edge of the Idaho batholith to form the Payette River (Map 1, page 2). The confluence of the South and Middle forks in Garden Valley, 80.7 miles upstream from the mouth, forms the Payette River proper. However, the eight-mile stretch between Garden Valley and the North Fork confluence at Banks is locally known as part of the South Fork Payette, and will be referred to as such in this plan.

The Payette River Basin coincides with U.S. Geological Survey hydrologic cataloguing units 17050120; 17050121; 17050122; and 17050123 (Map 1). For descriptive purposes the Payette River Basin can be subdivided into three subbasins. These are generally described below and depicted in Map 1.

North Fork Payette Subbasin

The North Fork, which drains about one-third of the Payette River Basin, begins in the numerous mountain lakes and snow fields surrounding Payette Lake. Below the lake, the river meanders approximately 40 miles through Long Valley before it enters a narrow, steep gorge and cascades to its confluence with the Payette River at Banks. Elevations in the North Fork drainage range from 8,000 feet at Fitsum Peak to 5,000 feet on the floor of Long Valley, and drop to 2,800 feet at Banks. Major North Fork tributaries are Lake Fork, Gold Fork, and Boulder Creek, all of which flow into Cascade Reservoir.

South Fork Payette Subbasin

The South Fork Payette originates near the 9,000 foot-level on the western slopes of the Sawtooth Range. It flows generally westward for 55 miles through a narrow mountain valley. Near Lowman, the South Fork is joined by a major tributary, the Deadwood River. The Middle Fork emanates on the south and west slopes of the Salmon River mountains, draining mountain ridges between 8,000 and 9,000 feet high. It flows 35 miles southwest to join the South Fork near Crouch. Technically the main Payette River begins at this point. (In this plan, the reach down to Banks is referred to as the South Fork Payette River.) Together, the South and Middle fork watersheds encompass slightly more than one-third of the Payette River Basin.

Main Payette Subbasin

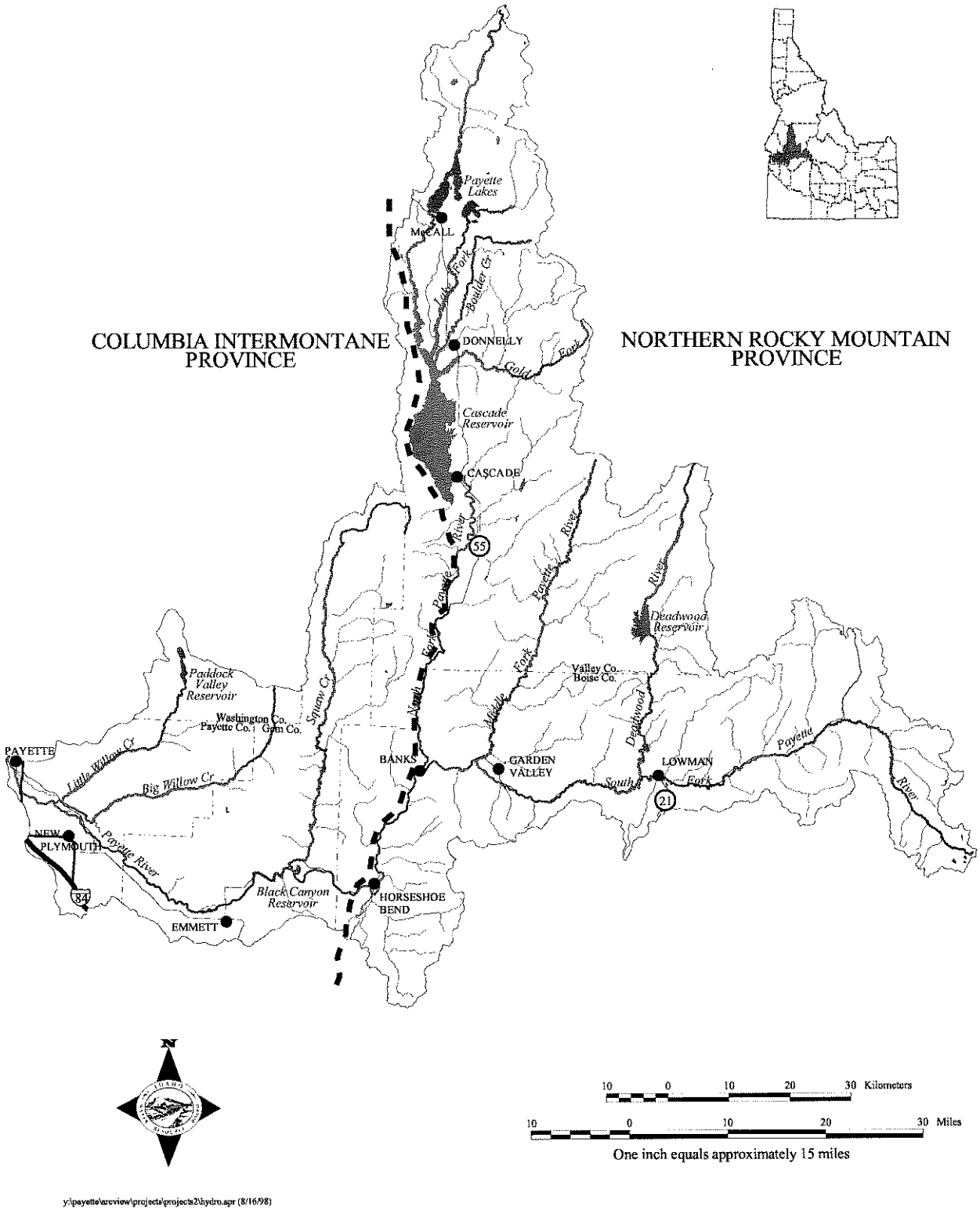
Below Banks, the Payette River flows south to Horseshoe Bend and then generally west to join the Snake River near the town of Payette at 2,100 feet in elevation. Significant tributaries in the lower third of the basin are Squaw Creek, and Big and Little Willow creeks. Squaw Creek headwaters begin at about 8,000 feet in elevation. Big and Little Willow headwaters are considerably lower, generally beginning at below 4,000 feet in elevation.

Geomorphology and Soils

The Payette River Basin is located in two geomorphic provinces. The boundary between them roughly corresponds to the base of West Mountain and the axis of the North Fork Payette River (Map 2). The Northern Rocky Mountain geomorphic province encompasses the eastern half of the basin, and the

Map 2. Geomorphic Provinces

(Source: Ross & Savage, 1967)



y:\payette\arcview\projects\projects2\hydro.apr (8/16/98)

western half is within the Columbia Intermontane geomorphic province.

Terrain in the Northern Rocky Mountain province is characterized by large, north-south trending ridges separated by long narrow valleys, a result of block faulting and erosion of the Idaho batholith -- a Cretaceous granitic intrusion. Alluvium fills the fault valleys, especially Long Valley (Schmidt and Mackin, 1970). The primary river forks and major tributaries generally follow geologic faults, typically joining at right angles. Upland features are predominately steep, deeply incised slopes with gradients in excess of 60 percent. Mid-slope landscapes are steep to moderately steep, with dendritic V-shaped drainages. Floodplains in the upper basin are generally narrow and confined, and in some places defined only by stream channels.

Glaciation during the Pleistocene Epoch is responsible for some dramatic landscape features. Alpine glaciers carved U-shaped stream valleys, and the steep peaks and small cirque basins found at higher elevations (Jenks, 1997). Small lakes often fill the cirque basins. Icecap glaciation flattened a significant portion of the watershed north of McCall, excavating Payette Lake, Little Payette Lake and Upper Payette Lake. Ridge tops in the upper basin are somewhat smooth and rounded. Moraines and outwash deposits of varying age are identifiable in many Northen Rocky Mountain drainages and are particularly prominent in Long Valley (Schmidt and Mackin, 1970; Othberg, 1987).

Terrain in the Columbia Intermontane province is characterized by rolling hills or badland topography and terraced alluvial valleys. Upland features are moderately steep and incised; ridge tops are generally smooth and rounded. First and second-order streams are dry much of the year and a trellis-type drainage pattern is common. The topography relates to a substructure dominated by a folded and warped complex of late Tertiary basalts and lakebed sediments (Savage, 1961).

Valleys in the Columbia Intermontane province are deeply alluviated, and commonly contain an intricate series of terraces and old river channels (Savage, 1961). The lower Payette Valley is a terraced alluvial plain, extending 30 miles from a point east of Emmett to the Snake River near Payette. Its width varies from four to six miles, with the decrease in elevation ranging from 2,379 feet at its eastern margin to 2,140 feet at the Snake River. Surface drainage patterns are modified by irrigation and drainage projects.

Soils of the Payette River Basin are primarily disintegrated granites which form coarse-grained, gray or yellowish-gray soils. Much of the soil at lower elevations has been derived from silica-rich ash, clay, silt and arkose of the Idaho Formation. Varying thicknesses of loess also form soil types in the basin. While soils are generally shallow in most of the basin, some bottom lands have built up a considerable thickness of soil and partially weathered debris from adjacent slopes. The county soil reports, prepared by the U.S. Natural Resources Conservation Service, contain detailed soil characteristics applicable to the soils of this basin. Soil association, types, agricultural use, and land capability are discussed in these reports.

Climate

The Payette River Basin's climatic regime is broadly characterized by warm, dry summers and cold, moist winters. Climatic patterns in general are influenced by latitude, distance from oceans, mountain barriers, prevailing winds, and variations in altitude. The Payette River Basin is located at approximately 44° north latitude and 500 miles inland from the Pacific Ocean. North and east of the basin,

the Rocky Mountains act as a barrier to the more severe arctic cold and destructive summer storms which are common on the Great Plains. General aridity and a relatively wide temperature range between summer and winter are largely attributable to the Cascade Range in Oregon and Washington, which creates a major barrier to maritime air masses.

Within the basin, elevation and topographic barriers are the most important factors influencing temperature and precipitation differences, and consequently climatic distinction between the lower and upper basins. A semiarid climatic classification has been applied to the lower Payette Valley and tributary watersheds below Squaw Creek, and a sub-humid continental classification to the mountainous portion of the basin. Table 1 displays climatological data from weather stations in the Payette River Basin.

Pacific maritime air masses brought into the region by prevailing westerly winds contain moisture which is the source of nearly all precipitation in the basin. Through June, July, and August, a stationary low pressure trough along the west coast of the United States positions a high-pressure ridge and its associated subtropical air over Idaho. This relatively dry air results in only modest rainfall over the basin during most summers (Figure 1). Occasionally, summer thunderstorms develop as moist air, from the Gulf of Mexico or subtropical Pacific Ocean, circulates northward.

By September intensification of the upper westerly winds results in a more west-to-east air movement aloft. At the same time, eastward migration of the Pacific longwave trough allows frontal systems to move into Idaho. November, December, and January are generally the wettest months of the year in the Payette River Basin. Southward progression of dry polar air masses often results in decreased mid-winter precipitation. However, a second cycle of precipitation usually occurs during spring, as the polar front returns northward into Canada.

Table 1. Climatological Summary Data 1961-1990.

Station	Payette	Emmett	Ola	Garden Valley	Lowman	Cascade	McCall
Elevation (feet)	2150	2370	2990	3212	3920	4896	5025
Annual Precipitation (inches)	11	13.1	20.1	23	25.4	22.2	27.7
Annual Snow Fall (inches)	18	18	27	71	91	95	152
Average January Precipitation	1.5	1.6	2.6	3.7	2.8	2.8	3.8
Average July Precipitation	0.2	0.2	0.5	0.5	0.8	0.6	0.8
Avg. January Minimum (°F)	19	21	16	17	14	11	12
Avg. January Maximum	36	37	34	35	34	29	31
Avg. July Minimum	56	55	51	47	43	44	44
Avg. July Maximum	93	92	90	91	88	82	81
Lowest Temperature 1961-90	-26	-27	-37	-30	-32	-36	-31
Highest Temperature 1961-90	109	109	107	108	108	100	99
Growing Season†	141	143	101	92	58	68	57

†Number of days daily minimum temperature is greater than 32°F, 5 years in 10.

Source: Abramovich, Molnau and Craine, 1998.

Much of the precipitation that falls on the basin is initiated by orographic lift. Average annual precipitation at Payette in the lower Payette Valley is less than 12 inches, but on higher mountain peaks it may be 60 inches, much of it as snow (Map 3). Winter precipitation is about evenly divided between rain and snow at elevations below 3,000 feet, but above that level most of the precipitation occurs as snow.

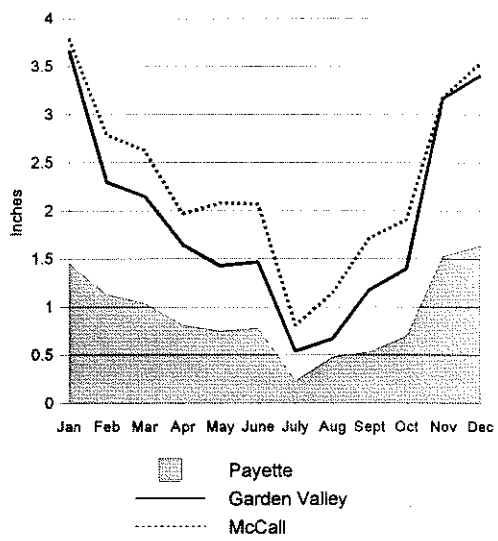


Figure 1. Average Monthly Precipitation in Inches, 1961-1990 (Abramovich, Molnau and Craine, 1998).

Land Ownership and Use

The Payette River Basin spans slightly more than 2.1 million acres across southwest and central Idaho. About 60 percent of the Payette River Basin is publicly owned (Figure 2). Federal agencies manage over 1.2 million acres; state and local governments oversee about 135,000 acres. The U.S. Forest Service and the U.S. Bureau of Land Management are the largest land managers in the basin. Other federal agencies managing land in the Payette River Basin include the U.S. Bureau of Reclamation and the U.S. Fish and Wildlife Service. Private interests own and manage more than 700,000 acres in the Payette River Basin or nearly 34 percent of the total land area. Map 4 (page 12) delineates land ownership and jurisdiction in the basin.

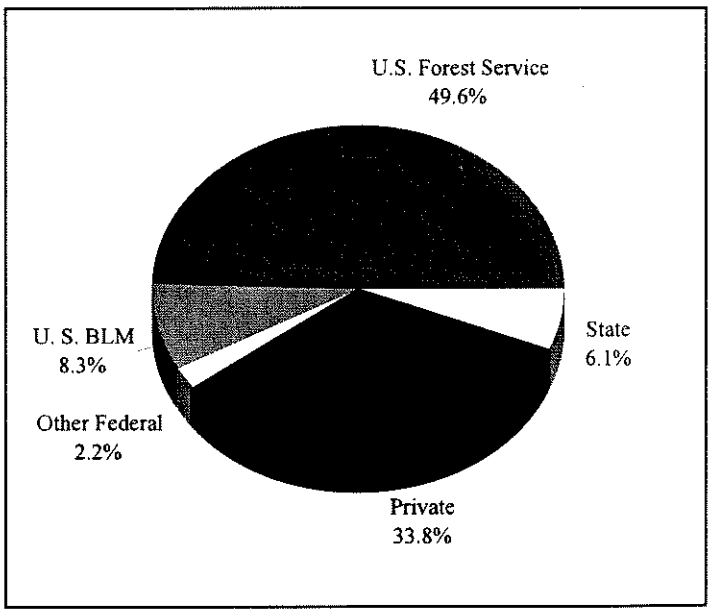


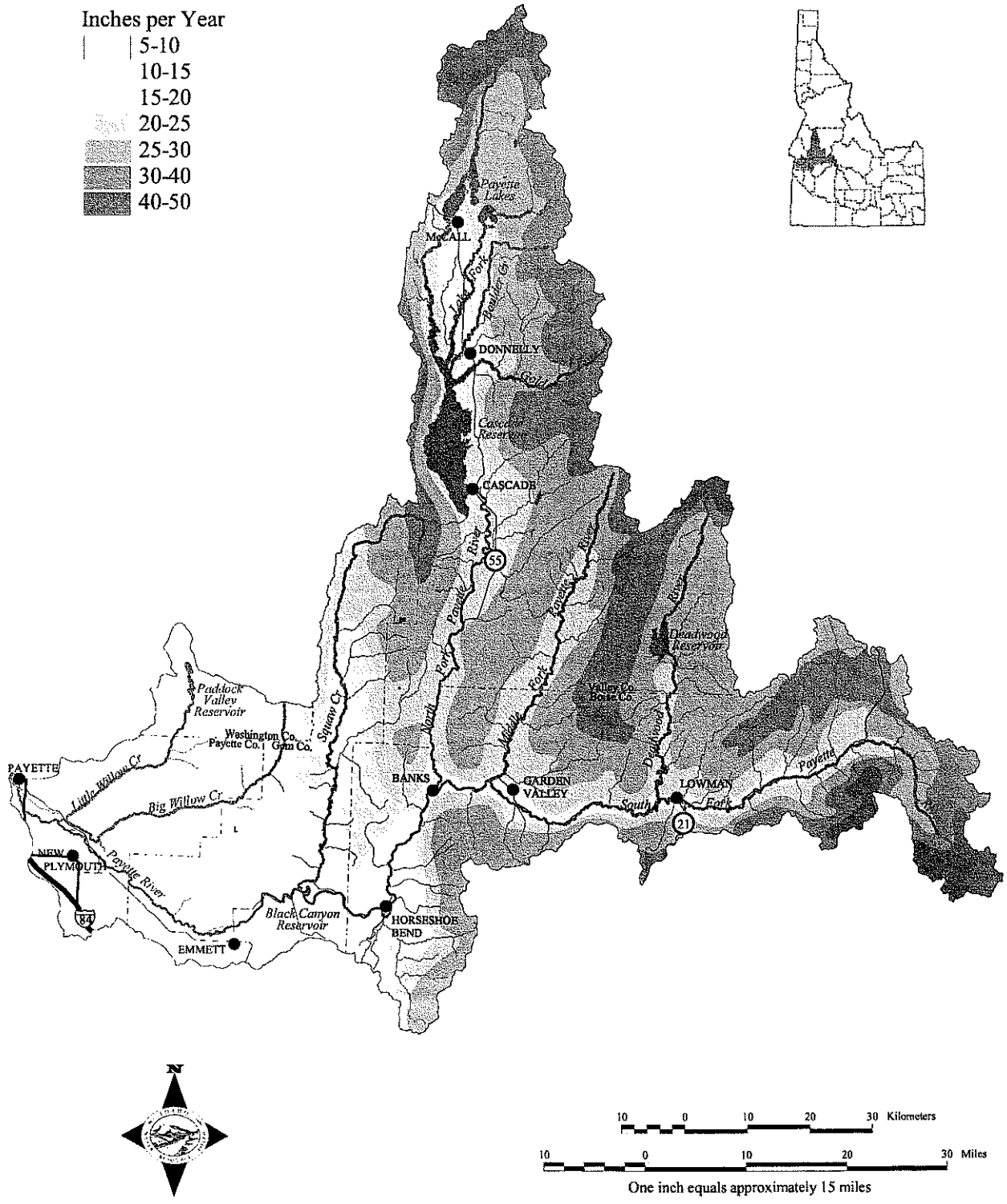
Figure 2. Land Ownership/Jurisdiction in the Payette River Basin. (Derived from U.S. Bureau of Land Management 1:100,000 Surface Management Status maps)

Topography, climatic conditions and soil are major influences on land use in the basin. Vegetation distribution in the Payette River Basin, while locally complex because of rugged terrain, falls into two primary land covers: lowland sagebrush grasslands and upland evergreen forests. Table 2 (page 14) lists acreage and Map 5 (page 13) illustrates each classified land coverage in the basin.

The North Fork Payette and South Fork Payette subbasins are predominately forested, with the main tree associations consisting of ponderosa pine, Douglas fir, subalpine

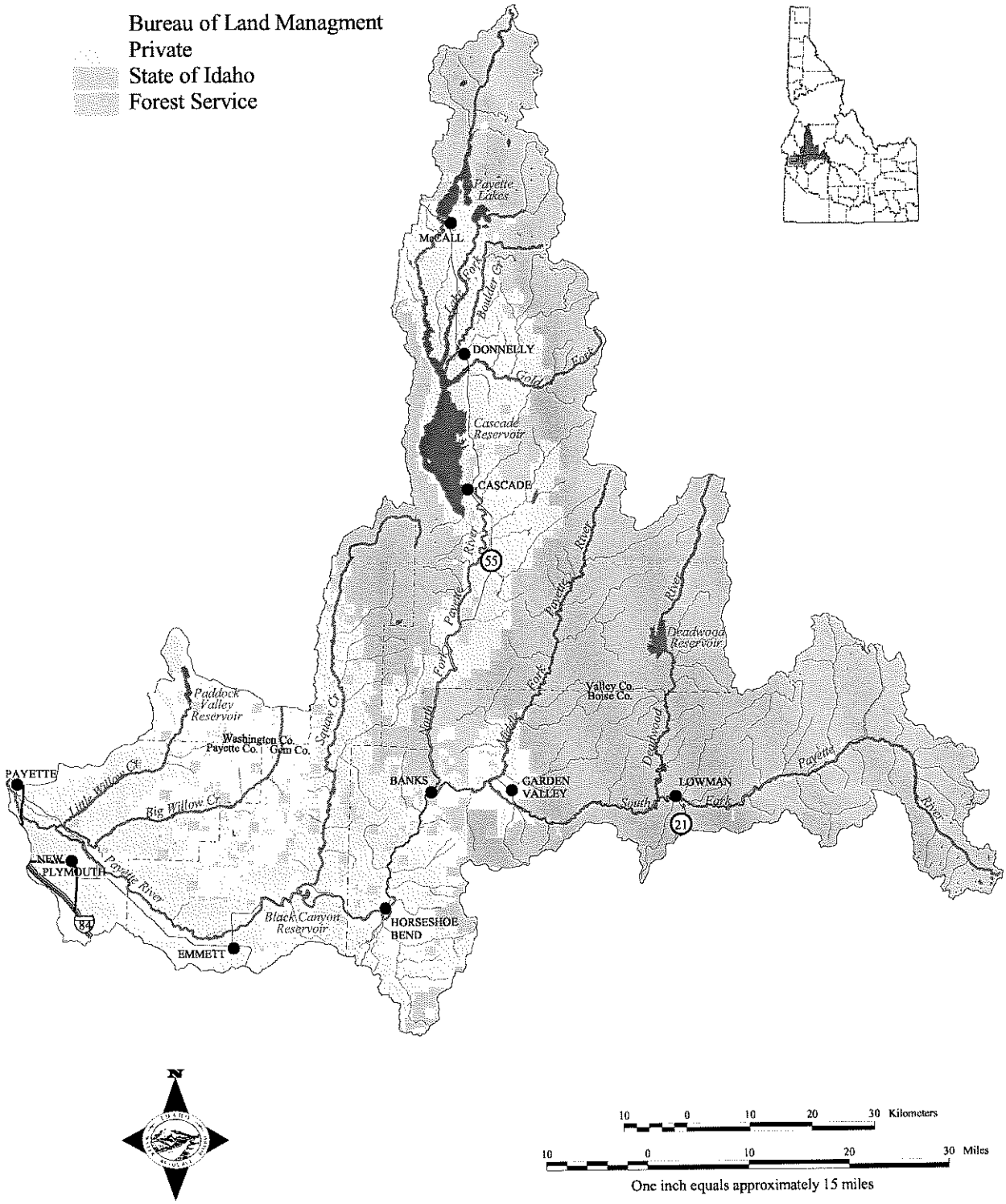
Map 3. Precipitation

(Source: Molnau, 1991)



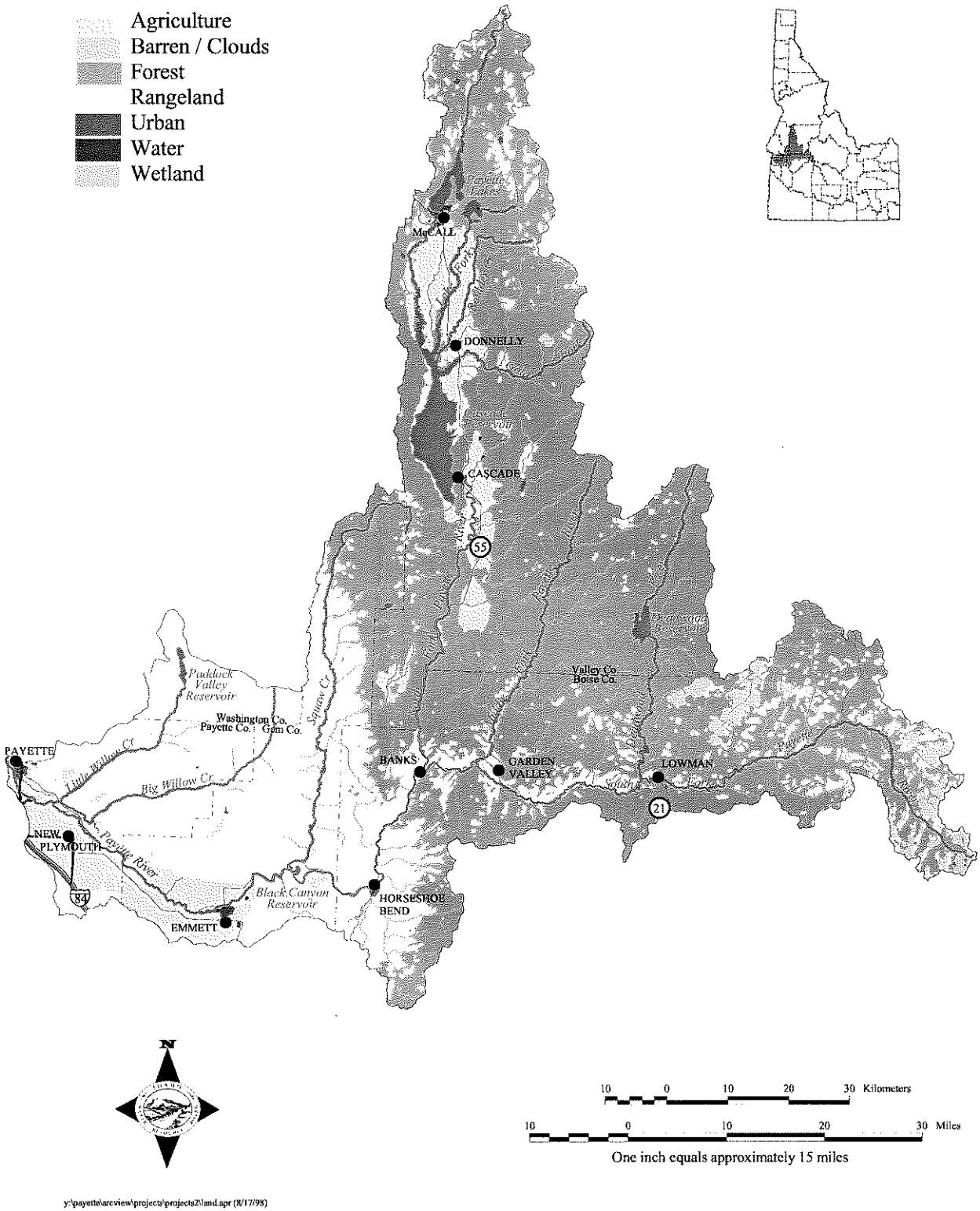
y:\payette\arcview\projects\projects2\hydro.apr (8/16/98)

Map 4. Land Ownership/Jurisdiction



y:\payette\arcview\projects\projects2\manage.spr (8/16/98)

Map 5. Land Cover/Use



y:\payette\arcview\projects\projects2\land.apr (8/17/98)

Table 2. Land and Water Area and Land Cover in the Payette River Basin.

Coverage	Acres	Percentage
Land Area	2,083,504	98.1
Water Area	40,230	1.9
Basin Total	***2,123,734***	
Land Cover		
Forest Land	1,161,388	54.7
Range Land	669,244	31.5
Agricultural Land	195,299	9.2
Urban or Built-up Land	5,018	2.4
Barren land	14,432	0.7
Wetland	2,919	0.1

Derived from a computer classification of Landsat Thematic Mapper data from June 1992 and August 1993.

fir, lodgepole pine, and Engelman spruce. Brush fields blanket many old burn or harvest areas. South facing mountain slopes are often grass-covered. Dominant land uses in the forested areas include timber harvest and recreation. Other land uses include livestock grazing and residential development. Livestock grazing occurs on irrigated and non-irrigated private lands, and on public lands. Residential development is concentrated around Payette Lake and Cascade Reservoir, with more rural development in Long and Round valleys in the North Fork Payette subbasin. In the South Fork Payette subbasin, residences are found in the Garden Valley and Lowman areas along the Middle Fork Payette and South Fork Payette rivers.

In the Main Payette subbasin where land is not irrigated or developed, native vegetation is dominated by a series of sagebrush associations. Grasses include wheatgrass, Idaho fescue, bluegrass, cheatgrass, needlegrass, and snowberry. Rangeland grazing and irrigated agriculture are the predominant land uses. Residential development is concentrated in Horseshoe Bend and the lower Payette Valley, including the communities of Emmett, New Plymouth, Fruitland, and Payette.

Transportation

Waterways and the surrounding mountain ranges significantly limit transportation networks in the Payette River Basin. State Highways 21, 52, and 55 are the primary automobile and truck transportation routes. Idaho State Highway 55 is a major north-south route, and one of the busiest roads in the state. The Idaho Transportation Department estimates that traffic on Highway 55 increases by three percent each year (Viste, 1997). In the lower Payette Valley and Long Valley, a majority of the section lines are improved roads.

The Idaho Northern & Pacific Railroad provides freight service between Payette and Cascade. Railroad tracks built for timber harvest operations up tributary drainages, and the lines between McCall and Cascade, and Nampa and Emmett, have been removed. Train excursions are offered on weekends between Cascade and Smiths Ferry by Idaho Historical Railroads, Inc., a nonprofit organization.

Air transportation into the basin is facilitated by numerous public-use airports near towns, ranger stations, and U. S. Bureau of Reclamation facilities. The Cascade and McCall airports are major access points for the Idaho backcountry. The Cascade airport, with a 4,300 foot-long asphalt runway, is

owned by the City of Cascade. McCall's municipally-owned airport, with its 6,150 foot-long asphalt runway, serves as a major Air Tanker and Smoke Jumper Base for the U.S. Forest Service.

Navigation

Under the Idaho Admissions Act and the 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 of commerce" on the date that the state of Idaho was admitted to the Union (July 3, 1890). State title applies to the bed and banks below the ordinary high water mark. The State claims title to the beds and banks of all rivers and lakes in the Payette River Basin listed below (Idaho Department of Lands, 1986):

Rivers

North Fork Payette - Payette Lake outlet to Banks
South Fork Payette - West boundary of T9N, R9E (downstream of Blue Jay Creek) to Banks
Main Payette - Banks to mouth

Lakes

Boulder Lake
Box Lake
Granite Lake
Louie Lake
Payette Lake
Little Payette Lake
Upper Payette Lake

Commercial navigation is defined as the moving of commodities by water. No commercial navigation currently occurs in the Payette River Basin. Outfitters use some reaches in the basin for commercial float trips. Eight outfitters are licensed by the Idaho Outfitters and Guides Licensing Board to operate on reaches of the North Fork, South Fork and main Payette rivers. This activity is discussed further in the *Recreation* section.

Basin History

PREHISTORY

Archeological evidence indicates human presence in the Payette River Basin over the last 10,000 years (Ames, 1982; Arnold, 1984; Reddy, 1995a). Aboriginal people foraged the lengths of the Payette River Basin. Seasonal salmon migrations provided an abundant protein resource. Berries, the camas bulb, and other roots could be gathered in the mountains and high valleys during the summer. Small and large game were hunted in the upper basin during the summer and in the lower river valleys during the winter. Timber Butte, southwest of Banks, was a regional source of valuable obsidian.

The Payette River Basin was a contact zone between the Columbia Plateau culture from the north and west, represented today by the Nez Perce, Cayuse, Umatilla, and the Great Basin culture from the south and east, represented by the Northern Shoshone, Bannock, and Northern Paiute. Prehistoric site artifacts in the basin indicate a mixed material culture reflecting both Plateau and Great Basin influences (Arnold, 1984). In historic times, Northern Shoshone and Paiute families occupied winter camps in the lower Payette Valley. During the summer they might travel to the upper basin valleys to hunt big game, gather seeds, roots, and berries, and lay fish traps. Nez Perce utilized Payette Lake and Long Valley which they called "*Two-e-new-he-ess-pah*" — "Land of the Silver Tip Grizzlies" (Arnold, 1984; Jones, 1996).

The most indigenous group was the Tukudeka, often referred to as the Sheepeater Shoshoni, who inhabited the mountains of west-central Idaho (Ames, 1982; Arnold, 1984; Jones, 1996). Tukudeka language and culture set them apart from other Shoshoni groups. They exploited their range in much the same way as the Nez Perce, but depended more than the Nez Perce on big game hunting in the high mountains. Expert hunters and furriers, they often trapped and tanned exotic, scarce animals for their skins. Their quality dressed furs, skins, and tailored garments were in demand for trading, as were their highly crafted mountain sheep horn bows (Reddy, 1995b).

Groups of two to three Tukudeka families moved seasonally from place to place hunting, in conjunction with root gathering and fishing, in preparation for winter. Long Valley and its vicinity was a summer habitat where the Tukudeka gathered food and fished (Arnold, 1984; Jones, 1996). During the winter, Tukudeka families would gather at good fishing spots along the rivers to set up semi-permanent encampments. Camps would vary in population from year to year, depending upon where the seasonal round left people at the start of winter. The lower Payette Valley and Smiths Ferry were popular winter campsites (Mills, 1963; Wells, 1980; Reddy 1995b).

After the Nez Perce (1877) and Bannock Wars (1878), the only Native Americans in southern and central Idaho not confined on a reservation were Tukudeka groups in the Salmon River Mountains and the Payette River Basin. In the Dry Buck Valley west of Banks, a Tukudeka group attempted an isolated, settled life; farming, planting orchards and working in a sawmill (Ames, 1982; Reddy, 1995b). They attracted little attention from the outside world. About 1900, following the death of Eagle Eye, their patriarch, the families reluctantly decided to move to the Lemhi Reservation where they had a Tukudeka spokesman. In 1907 the Tukudeka were forced to move to the Fort Hall Reservation when the Lemhi Reservation closed (Wells, 1980; Ames, 1982; Reddy, 1995b).

HISTORY

William Clark's map of the western United States, published in 1814, delineates the Payette River, Timber Butte ("Flint Rock"), the South Fork Payette, and the North Fork Payette to Payette Lake ("Shallet Lake"). Clark's depiction of the Payette River Basin and surrounding territory is probably based on a relief map of southwest Idaho prepared by a Shoshoni at the explorers' Lemhi camp (Wells, 1978). Donald McKenzie is acknowledged as the first European to encounter the Payette River in 1811. He was a partner in the Astor Company and bound for the mouth of the Columbia as a group leader with the Wilson Hunt party.

McKenzie returned to Idaho in the spring of 1818, leading the first "Snake country" trapping expedition. Francois Payette, a young trapper of French-Canadian and Native American descent, accompanied McKenzie on this expedition. From 1818 to 1834, trapping expeditions annually invaded southwestern Idaho. British, American, French-Canadian and native trappers fanned out over the region, methodically traversing the rivers and creeks, often with their families (Mills, 1963; Ingraham, 1992). On a map of the Oregon Territory dated 1838, the Payette River is called "Lake River," and Payette Lake is labeled "Woods Lake" (Preston, 1972).

Francois Payette, who first saw the river that bears his name in 1818, participated prominently in the Snake country brigades and became the first manager of Fort Boise, the Hudson Bay Company's regional outpost. Payette lived at Fort Boise until 1844. Payette's sons, Louis and Joseph, who married or lived with local Native American women, were the first stockmen in the Payette Valley. By 1850 maps of the territory identify "Payette's River." According to Mills (1963), the Payette family left the area around 1864, presumably for better trapping in Canada and to escape the hordes of settlers and gold seekers traversing the country.

When gold was discovered in the Boise Basin and at Warren, Idaho in 1862, settlements simultaneously appeared throughout the Payette River Basin. The Brownlee Trail, Packer John Trail, and the Basin Trail (or Placerville Road) were major routes to the mining country through the Payette River Basin. Regular pack trains, express lines, and stage routes with stopping places were established.

Miners paused on their way to "the diggings" to prospect the basin's rivers and streams, or stopped beside the trails to take up land.

In 1862 David Bivens built a home and set up a Payette River ferry at "Bluff Station," near the mouth of Little Willow Creek. A few years later he moved upstream and established a stage stop at the Basin Trail and Overland Road junction (near Falk Bridge). Miners bound for Warren started a town, called Lake City, east of McCall. It lasted only two years, from 1862 to 1864 (Ingraham, 1992). The earliest recorded legal action regarding the Payette River Basin was the granting of a license to operate a ferry across the Payette River near Gardena in 1863 (Mills, 1963). The ferry served the rush of gold-seekers hurrying to the Boise Basin over the Brownlee Trail. The town of Emmett grew up around the Martin and Smith ferry, initiated in the spring of 1863, downstream from a Basin Trail stage stop. By 1864, Horseshoe Bend, a strategic site on the road to Placerville, was bustling with settlers and businesses (Mills, 1963).

Early settlers built their cabins and ranches near the Payette River where fish could be caught, wildfowl shot, and small, easily-dug ditches could bring water for fields and gardens. During the first decade, 1863-1873, businesses were sustained primarily by travelers coming and going on the basin's trails (Mills, 1963; Lyon, 1979). Settlers supplemented their meager incomes by hauling turkeys, chickens, fish, eggs, butter, fruits, and vegetables into the mining camps.

The first settlers in the Garden Valley area were miners who crossed the valley on their way to the Boise Basin via the Packer John Trail. By 1867 families had settled along the lower Middle Fork. They sustained themselves by farming, selling produce, eggs, and milk to miners in the Boise Basin and Deadwood camps, providing river crossings and stopping places for travelers, and perhaps mining a little on the side (Mills, 1963; Rader, 1981). Logging camps were set-up in the area by the 1870s. Forests along the South Fork and in the Garden Valley area supplied the Horseshoe Bend, Emmett, and Payette sawmills. Annual log drives were synchronized with spring floods (Mills, 1963; Lyon, 1968; Witherell, 1989).

The first substantial settlement in Long Valley was Van Wyck, established in 1882, at a site three-quarters of a mile northwest of the present town of Cascade. In the 1880s and 1890s, other small communities arose: Center, Roseberry, Crawford, McCall, Lardo, and Alpha. Logging and cattle ranching were major industries. The short growing season and high altitude limited crops. Wheat, oats and other grains were cultivated as well as timothy for hay. There were several flour mills in the valley where the settlers' wheat could be ground.

In 1914 the Union Pacific completed the railroad from Emmett to McCall. The coming of the railroad significantly changed Long Valley homesteaders' lives. The railroad was primarily to haul lumber and railroad ties produced in the McCall area, and made commercial logging more profitable. The trains provided freight and passenger service, but towns bypassed by the railroad quickly died. Van Wyck, Crawford and Thunder City moved businesses to the new townsite of Cascade on the railroad line. Roseberry moved many buildings and business west to form the new town of Donnelly (Ingraham, 1992). The town sites of Van Wyck, Center, and Arling are now covered by the water in Cascade Reservoir.

McCall was established in 1899 when a wagon caravan camped along the shores of Payette Lake and the McCall family decided to establish a

residence (Boone, 1988). In 1896 the Warren Dredge Company opened a sawmill on Payette Lake (Valley County Commissioners, 1998). The Hoff and/or Brown families operated a sawmill in McCall for more than 50 years, selling it to the Boise Cascade Corporation in 1964 (Jordan, 1998). The mill was an important part of McCall's economy.

Payette Lake became a popular vacation destination by the early 1900s. People traveled to the area to escape the high summer temperatures of the lower Boise and Payette valleys. Hotels and inns around Payette Lake provided accommodations in the early days. By the 1920s, the inns were being bypassed for individually owned cabins being built around the lake. McCall held its first Winter Carnival in 1922. More than 2000 people came by train to visit and have fun in the snow. Recreation and tourism have remained important to the local economy.

About 1870 Jonathan Smith, with the help of neighbors, constructed the first ditch which diverted water to Payette Valley settlers for milling and irrigation. Part of the Emmettsville Ditch, as it was called, is being used at the present time and waters land southwest of Emmett. The head of the ditch and two miles of its course has since been taken over by the Farmers Co-op Canal. Downstream, near Payette, the first irrigation canal was the Lower Payette Ditch. In 1884 about 16 miles of canal were constructed from the diversion point, near the mouth of Big Willow Creek, to north of Payette; the canal was later extended to Weiser. By the turn of the century, sawmills, irrigated fields, and electric power were evident throughout the lower basin.

Basin Demographics

POPULATION PATTERNS

The Payette River Basin is characteristically rural with an estimated population by the Idaho Department of Water Resources of 37,167 in 1996. This constitutes about three percent of the state's population. All or parts of five counties lie within the Payette River Basin -- Boise, Payette, Gem, Valley, and Washington. Data on the first four counties, in their entirety, are used to represent the basin. Washington County was excluded because only a small section of the county lies within basin boundaries.

Idaho Department of Water Resources has estimated that 76 percent of the four counties' population live within the basin's boundaries. Population estimates for counties and cities in the basin are presented in Table 3. Population estimates for counties were obtained from Idaho Power Company's 1996 County Economic Forecast and the U.S. Bureau of the Census (1997). Seventy-eight percent of the basin's 1996 population reside in the lower basin (Gem and Payette counties). However, recreation home and property owners add an estimated 19,000 parcels to the upper basin's housing base (Valley and Boise counties; Roark, 1998 and Hileman, 1998).

Estimates and projections of the upper and lower basin's population are illustrated in Figure 3. Population has increased in both regions throughout the period from 1970 to 1995, and it appears that the rate of population increase was greatest in both regions in the early 1990s. The average annual rate of population growth over the period 1970 to 1995 is 2.14 percent, which is greater than the rate for the state as a whole (1.72 percent).

Of the basin's counties, Payette County has the largest population in 1996 (19,957) and the third highest rate of growth in the early 1990s (Table 3). In contrast, Boise County has the smallest population, with 4,864 in 1996, and the highest rate of growth in the early 1990s (36.94 percent). Compared with the state as a whole, the four basin counties demonstrate higher average annual growth rates for the period from 1990 to 1996 (Table 3).

Table 3. Population and Estimates, Percent Growth and State Ranking for Counties and Cities in Payette River Basin.

Location	1970	1980	1990	1991	1992	1993	1994	1995	1996	% Growth 90-96	% Growth State Ranking
Boise County[1]	**1763**	**2999**	**3552**	**3717**	**3974**	**4281**	**4466**	**4669**	**4864**	**36.9%**	
Crouch	71	69	75	80	85	92	98	104	107	42.7%	11
Horseshoe Bend	511	700	643	683	735	798	836	881	921	43.2%	10
Banks	na	na	50	na	na	na	na	na	na	na	na
Garden Valley	na	na	150	na	na	na	na	na	na	na	na
Gardena	na	na	60	na	na	na	na	na	na	na	na
Lowman	na	na	100	na	na	na	na	na	na	na	na
Gem County[1]	**9387**	**11972**	**11940**	**12287**	**12463**	**13178**	**13547**	**13871**	**14129**	**18.3%**	
Emmett	3945	4605	4601	4752	4877	5055	5163	5211	5242	13.9%	69
Letha	na	na	100	na	na	na	na	na	na	na	na
Montour	na	na	50	na	na	na	na	na	na	na	na
Ola	na	na	15	na	na	na	na	na	na	na	na
Sweet	na	na	70	na	na	na	na	na	na	na	na
Payette County[1]	**12401**	**15825**	**16446**	**16977**	**17582**	**18171**	**19000**	**19559**	**19957**	**21.4%**	
Fruitland	1576	2559	2400	2488	2595	2692	2827	2889	2963	23.5%	29
New Plymouth	986	1186	1313	1354	1394	1438	1500	1525	1532	16.7%	53
Payette	4521	5448	5672	5823	6007	6173	6379	6489	6647	17.2%	50
Valley County[1]	**3609**	**5604**	**6150**	**6544**	**6898**	**7352**	**7623**	**7848**	**7988**	**29.9%**	
Cascade	833	945	877	934	974	1020	1043	1057	1059	20.8%	37
Donnelly	114	139	135	143	148	156	158	165	166	29.9%	33
McCall	1758	2188	2005	2174	2336	2534	2667	2787	2876	43.4%	9
Lake Fork	na	na	10	na	na	na	na	na	na	na	na
Smiths Ferry	na	na	22	na	na	na	na	na	na	na	na
State of Idaho			1,011,941						1,189,251	17.5%	na

[1] County population estimates have not been proportionalized to reflect basin population within the county.
Source: Idaho Power Company, 1996; U. S. Bureau of Census, 1997.

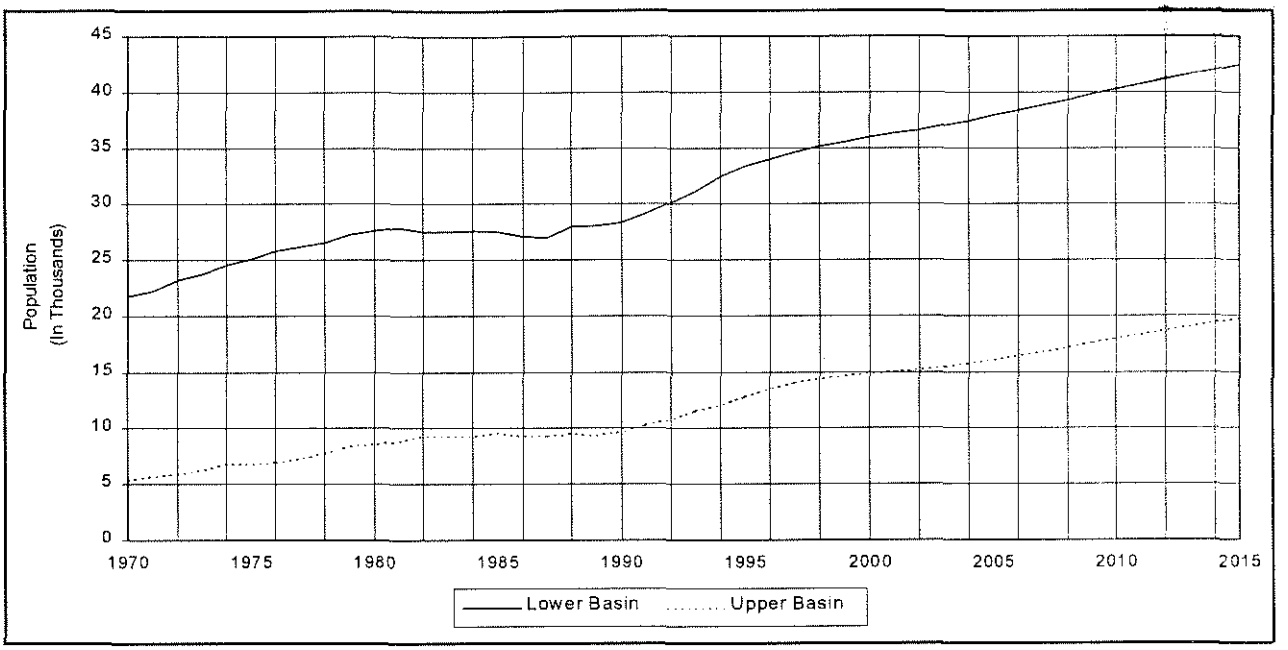


Figure 3. Population Estimates and Forecasts (Idaho Power Company, 1996).

Of the basin cities, the City of Payette is the largest population center with 6,647 residents and has the fourth highest growth rate in the basin between 1990 and 1996 (17.2 percent). McCall is the fourth largest city and has the highest growth rate in the basin between 1990 and 1996 (43.4 percent). McCall, Horseshoe Bend, and Crouch are among the fastest growing cities in the state (ninth, tenth, and eleventh highest, respectively).

The City of Boise, Idaho's largest metropolitan center, is undergoing rapid growth, and in turn stimulating growth in the Payette River Basin. Approximately ten percent of residents in the Garden Valley, Horseshoe Bend, and Emmett areas commute to work in Ada County (Idaho Department of Commerce, 1996). Relatively lower land prices, a rural setting, and abundant recreational opportunities create an attractive real estate market for both commuters and recreation home-buyers. In addition, there are a number of communities located adjacent to the basin which have experienced some of the greatest population increases in the state. These are Boise, Meridian, Nampa, Eagle, Caldwell, and Garden City (U.S. Bureau of the Census, 1997). Growing populations in these communities place increased demands on resources in the basin, particularly on outdoor recreation opportunities.

Slower growth is expected into the next century (Table 4). Idaho Power Company (1996) estimates an annual growth rate through year 2015 of approximately 1.4 percent. It is likely that rural "amenity rich" counties in the basin that provide recreation, aesthetics, culture, and other amenities and services will continue to experience growth.

Figure 4 illustrates trends and forecasts the number of households and persons per household for the Payette River Basin for the period from 1970 to 2015. The number of households is measured on the left scale of the figure, persons per household on the right scale. In 1995 there were an estimated 14,014 households located in the basin, forecasted to increase almost 50 percent by the year 2015 to 20,955 households. This implies an average annual growth rate between 1996 and 2015 of approximately 2 percent. Note that this is higher than the 1.29 percent projected increase in the population.

Table 4. Average Annual Population Growth Rates 1970 to 1995 and Projected Growth Rates 1996 to 2015.

	Upper Basin	Lower Basin	Payette River Basin	State of Idaho
Average Annual Percentage Change in Population Between 1970 and 1995	3.74%	1.72%	**2.14%**	1.72%
Average Annual Percentage Change in Population Between 1996 and 2015	2.18%	1.09%	**1.44%**	1.29%

Source: Idaho Power Company, 1996.

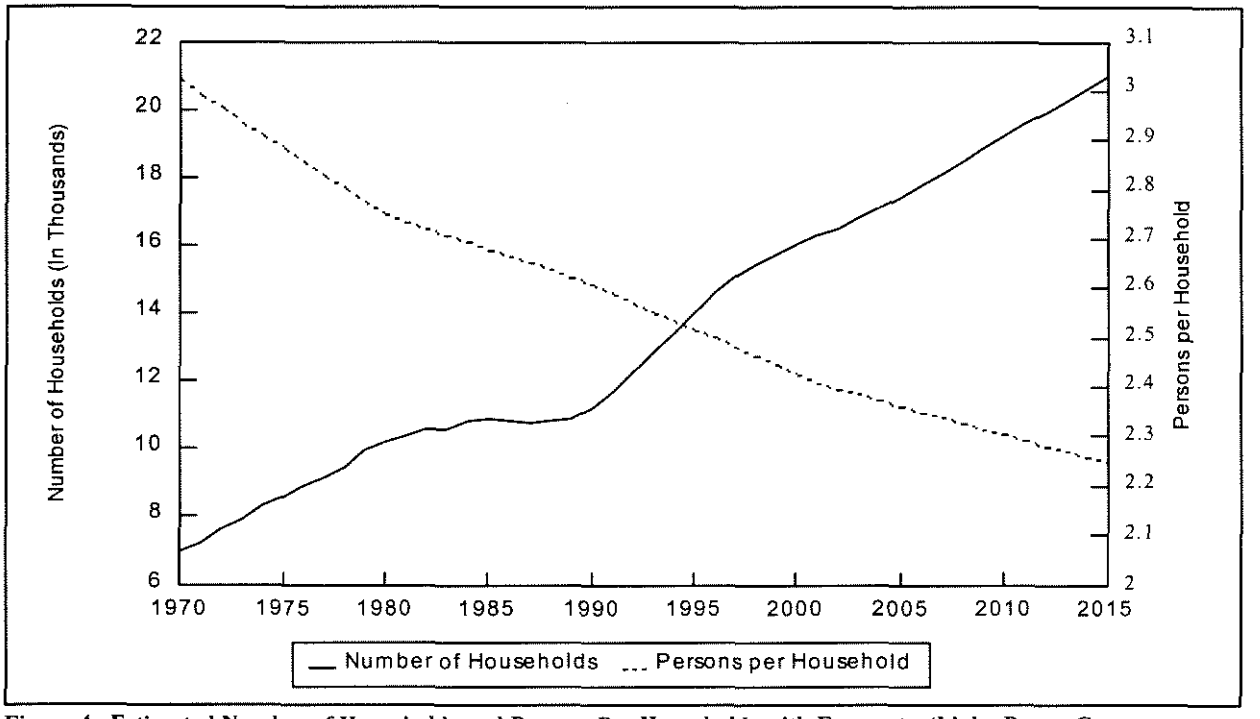


Figure 4. Estimated Number of Households and Persons Per Households with Forecasts (Idaho Power Company, 1996).

The difference between rates of increase in households and population may be explained by the downward trend in household size. The decrease in the number of persons per household, in turn, may be explained by a decrease in children per family and out-migration of young adults. The pattern of out-migration would have been especially strong from the early 1980s through the mid-1990s when rural areas were experiencing significant recession or chronic depression.

Changes in the age distribution of the basin population have some important implications for future demand for housing, services and water resources in the basin. To observe past changes in distributions, age distributions in the basin in 1970, 1980 and 1990 are presented in Figure 5. Note that in the 1970 distribution the largest concentrations of the population are in the age classes between 0 and 19. In 1980 this concentration enlarges to include the age classes between 20 and 44. Finally, in 1990 the

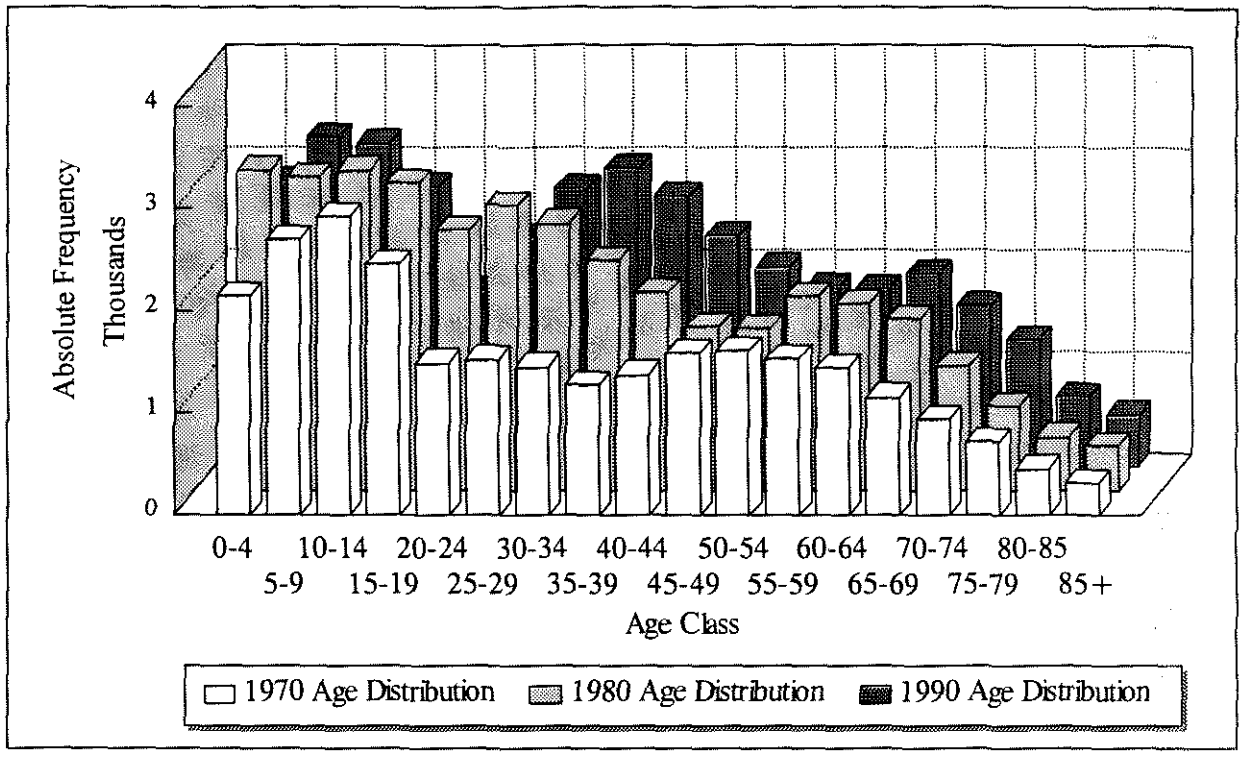


Figure 5. Decennial Census Age Distribution (Church, 1997).

concentration is found in the age classes between 35 and 59. A similar trend may be observed for the 40 through 64 year age classes in the 1970 distribution. In effect, the concentrations in the population move through the age classes over time, changing the demands for housing, services, and water resources.

Recognition of intertemporal changes in distributions allows prediction about future distributions. The highest population concentration in the 1990 age distribution are in age classes 0 through 19. These will likely appear as concentrations in the 20 through 39 classes in the 2000 Census. This implies increased demand for housing, other related investment activities, and durable and nondurable goods and services in the near future. In addition, a secondary concentration in the 35 through 59 year age classes would be expected to move to the right in the distribution. This is expected to impact retirement activities such as recreation and travel, health care services, and retirement community housing.

It is noteworthy that the peak for the younger 1990 age distributions (classes 0 through 19 years) is slightly higher than the previous two decades. As this group proceeds through its life-span, the increases in demand for goods, services, and water resources is likely to be greater than that experienced with previous groups in this age range.

INCOME AND EMPLOYMENT

Figures 6 and 7 illustrate a pattern of growth in real total personal income (i.e. income adjusted for inflation) and fairly constant real per capita income throughout the period from 1970 to 1995. The difference between the two measures can be explained by the sharp increase in population during the same period (Table 4, page 21). Constant real per capita incomes imply area incomes have kept pace with inflation, but not much more than that.

Figures 8 and 9 (page 24) summarize the employment trends in the lower and upper basins. The farm sector has remained relatively static over

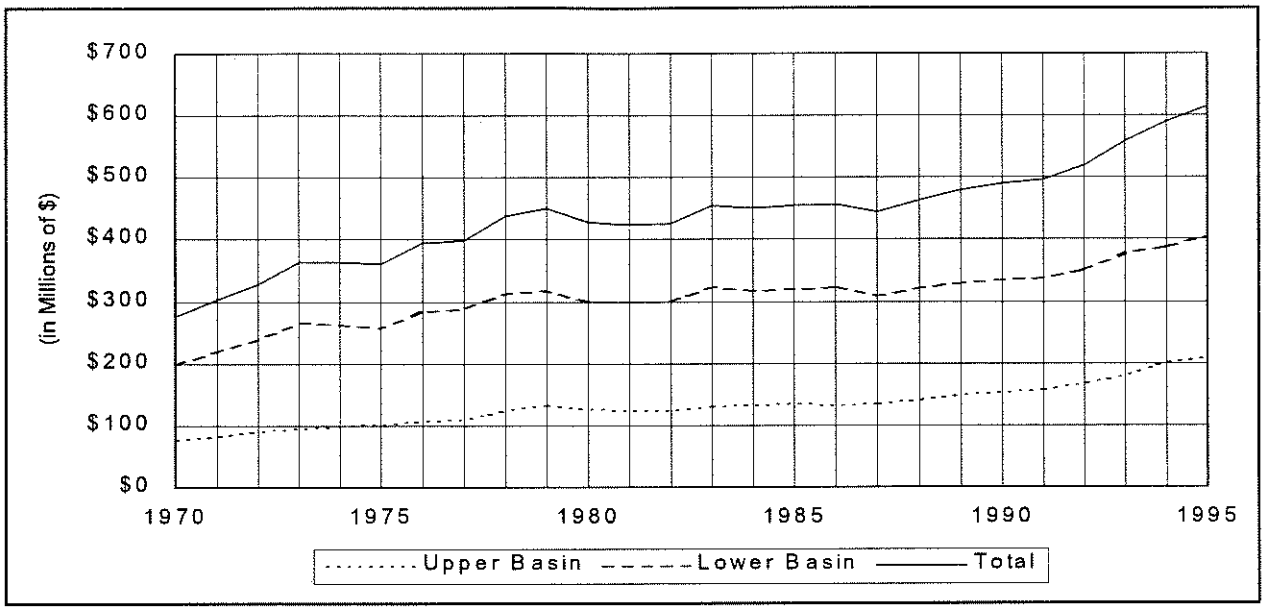


Figure 6. Total Personal Income of the Payette River Basin in 1996 dollars (U.S. Department of Commerce, 1997).

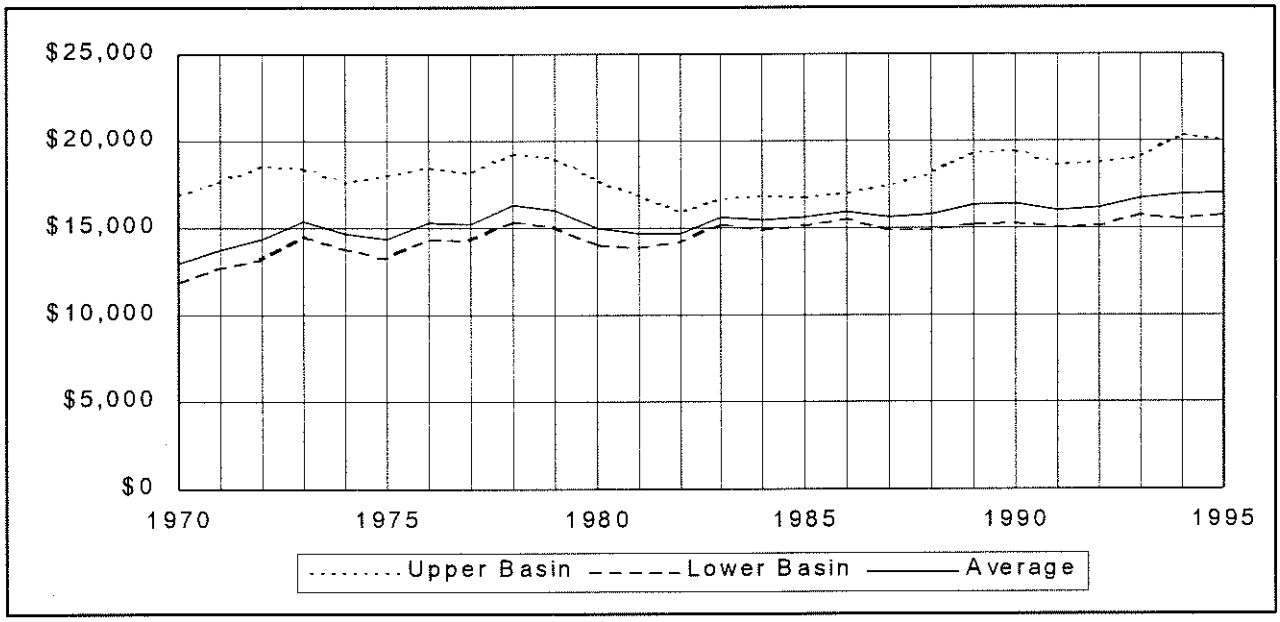


Figure 7. Per Capita Income for the Payette River Basin in 1996 dollars (U.S. Department of Commerce, 1997).

time in both areas, whereas the nonfarm sector has more than doubled in the upper basin and almost doubled in the lower basin. Trends in nonfarm employment have closely followed population growth patterns and total income growth patterns in both the upper basin and the lower basin, showing a steeper upward trend around 1988.

Describing nonfarm employment trends at the level of major industrial categories reveals important changes in the composition of nonfarm employment. In the upper basin, manufacturing, notably lumber and wood products, is one of the two leading employers in the early 1970s, but begins to decline significantly around 1980, ranking only sixth in 1995 (Figure 10, page 25). In contrast, services,

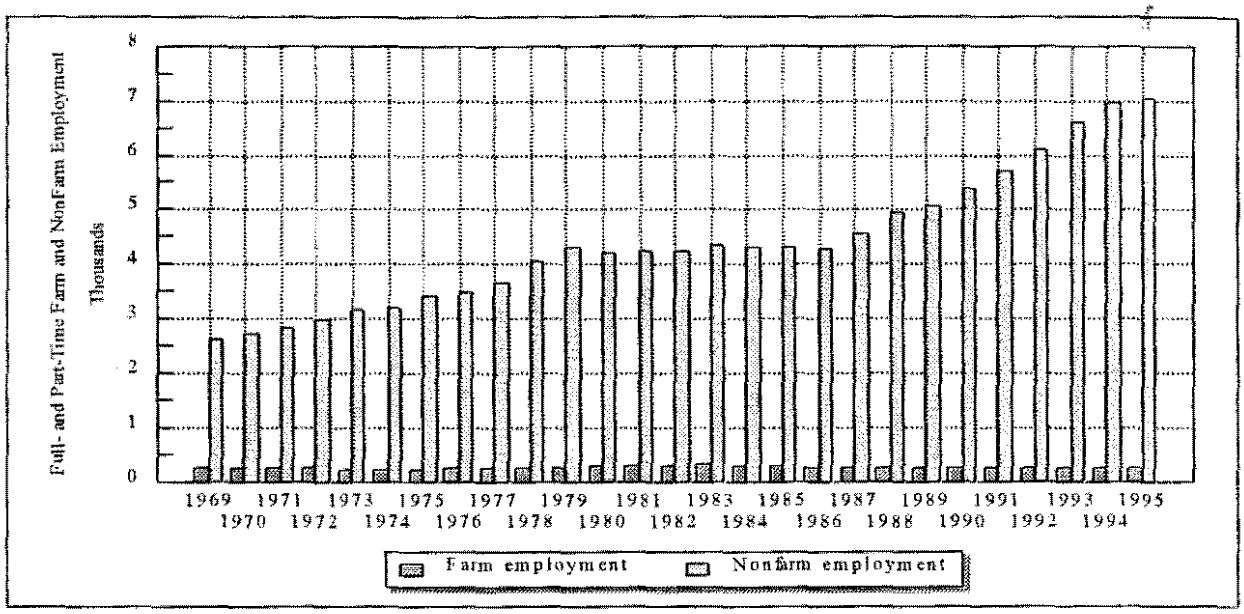


Figure 8. Farm and Nonfarm Employment in Upper Basin Counties (Boise and Valley) (U.S. Department of Commerce, 1997).

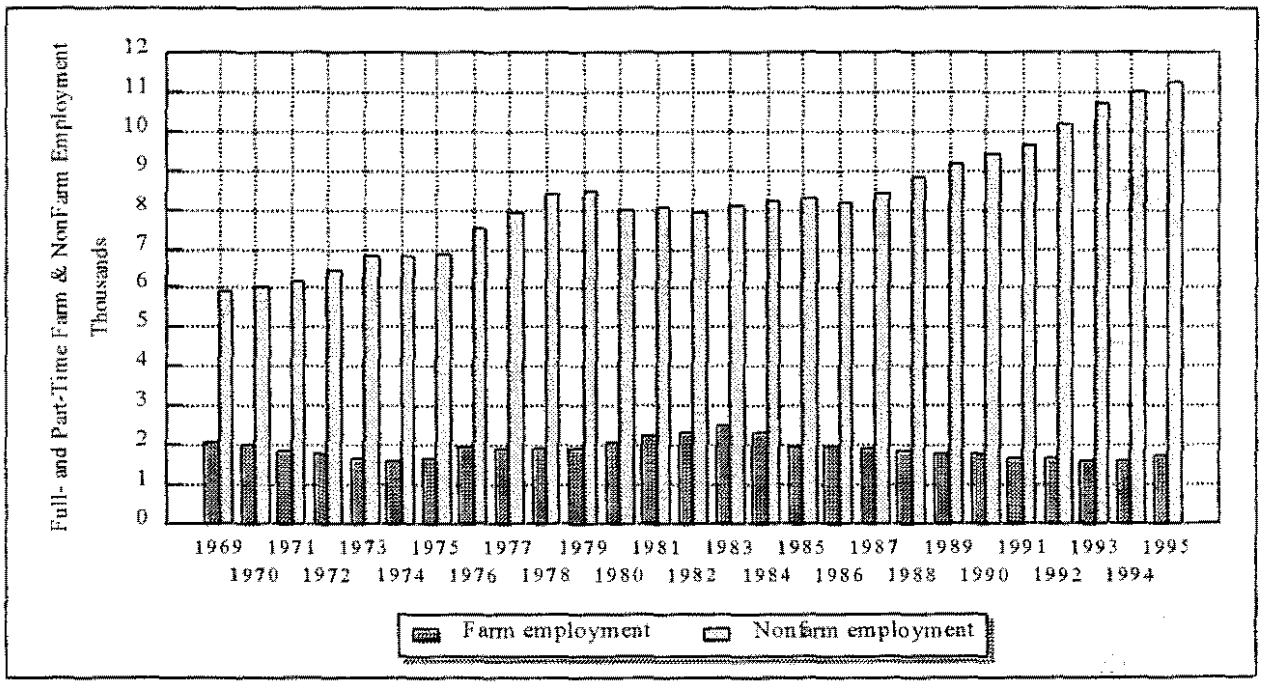


Figure 9. Farm and Nonfarm Employment in Lower Basin Counties (Gem and Payette) (U.S. Department of Commerce, 1997).

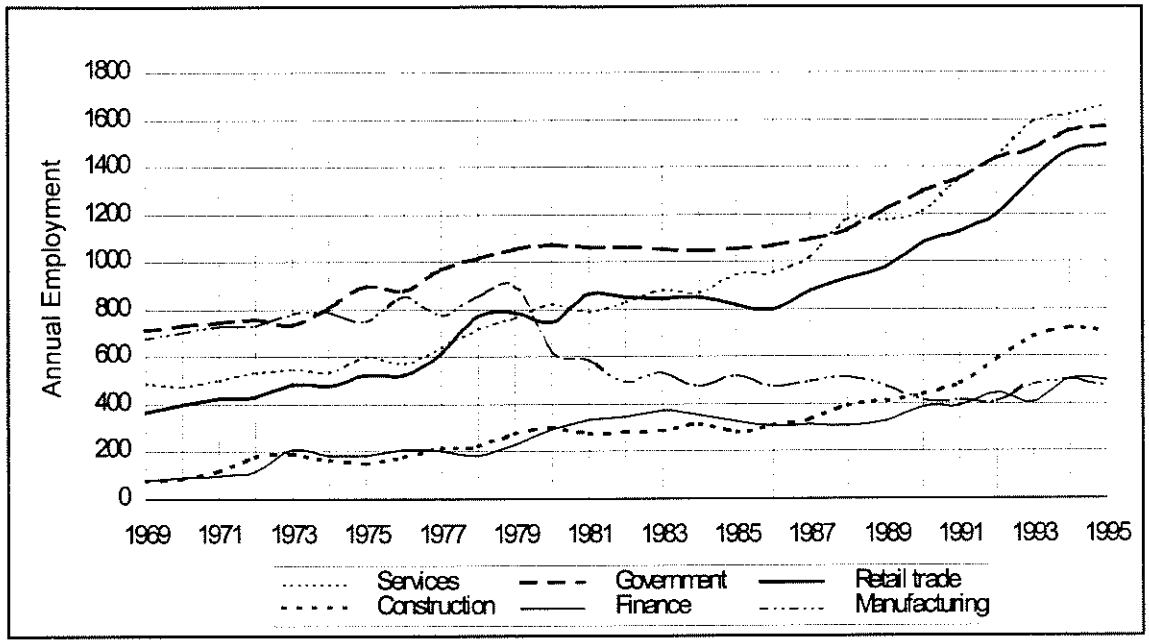


Figure 10. Nonfarm Employment by Major Standard Industrial Classification Divisions for Upper Basin (U.S. Department of Commerce, Bureau of Economic Analysis, 1997).

government, and retail trade are among the top four in the 1970s, increasing throughout the period and becoming the top three employers in 1995. Indeed, the service and retail sectors increase more than threefold during the period, presumably due to the increase in residential and recreational population in the area. Finance, insurance, and real estate (FIRE) also demonstrate rather strong job growth after the mid-1980s.

Therefore, the economy has shifted from mixed manufacturing and service-based to a service-based one. Strong employment growth in the construction sector, but not in the manufacturing sector, since the mid-1980s suggests an increase in residential housing which includes part-time as well as full-time residential housing. The remaining employment categories are not depicted in Figure 10.

In the lower basin, services, manufacturing, government, and retail trade sectors dominate the employment opportunities throughout the period, and all four sectors demonstrate substantial increases after 1987 (Figure 11). Services have more than doubled over the period and retail has increased by more than 50 percent. (Increases in services and retail reflect the increase in residential and non-residential population using the area.) Manufacturing has nearly doubled. Increases in manufacturing employment reflect strong job formation in food and kindred products (chiefly canned, cured, and frozen foods in Payette County) and lumber and wood products in Gem and Payette counties.

Transportation, communication, and public utilities (T, C and PU), while smaller in absolute terms, have also increased substantially. Construction demonstrates strong growth since 1991, reflecting both manufacturing and residential growth. The remaining employment categories (wholesale; mining; agricultural services; forestry and fishing; and finance, insurance, and real estate) are relatively small, and do not change significantly over the period.

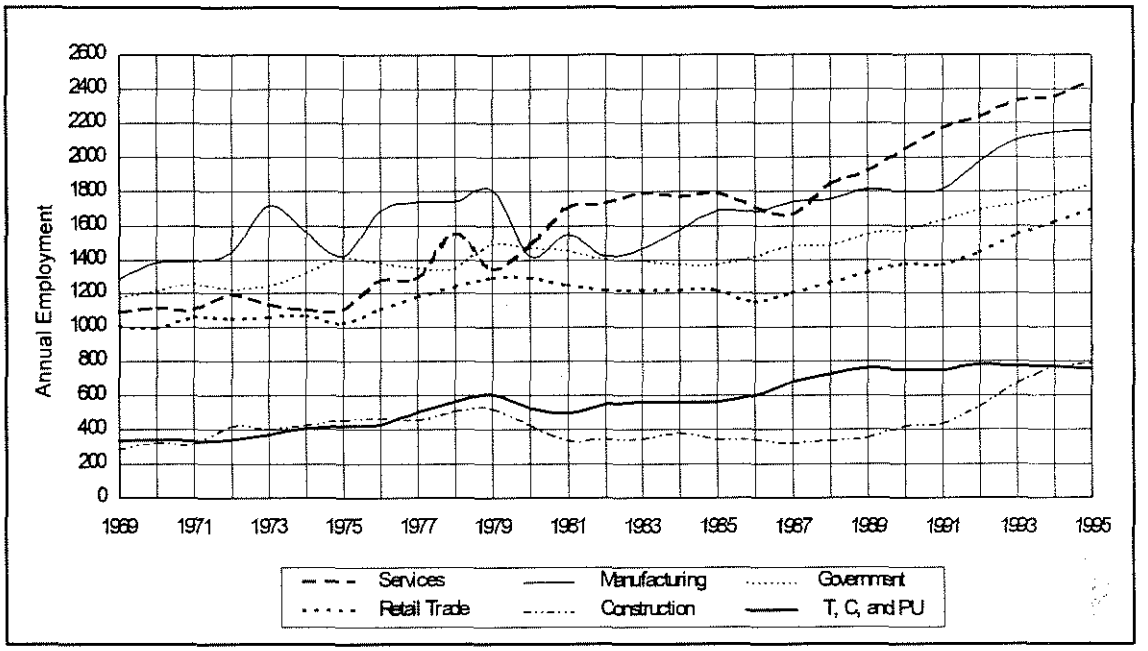


Figure 11. Nonfarm Employment by Major Standard Industrial Classification Divisions for Lower Basin (U.S. Department of Commerce, 1997).

Special Sector Analysis-Agriculture

In view of agriculture's important role in water use, a detailed analysis of the sector is presented in this section. All the data referenced come from two sources. One is the Census of Agriculture which is conducted every fifth year. The most recent estimates are available for 1982, 1987, and 1992. The second is the U. S. Department of Agriculture's National Agricultural Statistics Service (NASS) which generates data on an annual, period basis, or both, depending on the crop.

Figures 8 and 9 demonstrated earlier that agricultural employment, while not declining, has become a smaller proportion of total employment. According to the Census of Agriculture, the acreage devoted to agriculture in the basin has also declined significantly. A list of significant field crops produced in the Payette River Basin from 1982 to 1992 is presented in Table 5. Harvested acres in field crops decreased from 90,171 in 1982 to 80,119 in 1992 (a decrease of 11 percent). Acres in orchards declined from 6,786 to 4,920 (or by 27 percent) (See Table 6). Only the acreage in vegetables increased a little from 4,655 to 4,900 (see Table 7, page 28).

The substantial decline in harvested acres does not necessarily reflect a reduced demand for irrigation water. Field crops, representing the largest acreage of all crops, experienced a significantly smaller decline in irrigated acres compared with non-irrigated acres (Table 5). Irrigated acres declined from 78,433 in 1982 to 72,547 in 1992, a decrease of only 7.5 percent, whereas non-irrigated acres declined from 11,738 to 7,572, a decrease of 35 percent. Also while total acres in orchards declined by 27 percent, and almost all of these are irrigated (97 percent), they represent a small number of acres overall.

Table 5. Selected Major[1] Field Crops for All Payette River Basin Counties (acres).

Variable	1982	1987	1992
Harvested cropland[2]	90171	78654	80119
Harvested cropland - irrigated	78433	71194	72547
Wheat for grain	10146	8482	10321
Wheat for grain - irrigated	8795	7146	9353
Barley for grain	10923	4901	3387
Barley for grain - irrigated	9815	4379	3069
Dry edible beans except dry limas	1229	1662	973
Dry edible beans except dry limas - irrigated	1229	1662	973
Irish potatoes	818	725	1221
Irish potatoes - irrigated	818	725	1221
Sugar beets for sugar	3600	4507	5360
Sugar beets for sugar - irrigated	3600	4507	5360
Hay - all	36476	34832	33454
Hay - all irrigated	27430	27297	28075

[1] Major crops based on total acres harvested.
[2] Represents cropland acres actually harvested for the year reported. It is estimated from surveys of farmers in each county.
Source: U.S. Bureau of Census, 1982; 1987; and 1992.

Table 6. Selected Specialty Fruit Crops for the Payette River Basin.[1]

Variable	1982	1987	1992
Land in orchards, Total (acres)	6786	7724	4920
Land in orchards, Irrigated (acres)	6704	7717	4776
Apples, Total (acres)	5289	5866	3895
Apples, Harvested (pounds)	**62,279,374**	**102,040,895**	**33,812,054**
Apricots, Total (acres)	11	5	18
Apricots, Harvested (pounds)	**3,900**	[2]	**53,100**
Cherries, Total (acres)	362	255	141
Cherries, Harvested (pounds)	**1,076,558**	**791,517**	**757,455**
Sweet cherries, Total (acres)	0	153	[2]
Sweet cherries, Harvested (pounds)	**0**	[2]	**757,455**
Grapes (fresh wt), Total (acres)	41	54	[2]
Grapes (fresh wt), Harvested (pounds)	[2]	**77380**	[2]
Nectarines, Total (acres)	[2]	18	20
Nectarines, Harvested (pounds)	[2]	**93650**	[2]
Peaches, Total (acres)	296	143	119
Peaches, Harvested (pounds)	**1,366,146**	**1,018,300**	**640,265**
Pears, Total (acres)	57	115	29
Pears, Harvested (pounds)	**143,901**	**124,043**	**71,985**
Plums & prunes(fresh wt), Total (acres)	693	1015	621
Plums & prunes(fresh wt) Harvested (lb)	**4,823,209**	**10,719,480**	**3,730,316**

[1] Gem and Payette counties account for all production of these crops in the Payette River Basin.
[2] Information not reported to avoid disclosure of individual operations.
Source: U.S. Bureau of Census, 1982; 1987; and 1992.

Table 7. Selected Specialty Vegetable Crops for the Payette River Basin.*

Variable	1982	1987	1992
Vegetables harvested, total (acres)	4655	4152	4900
Vegetables harvested, irrigated (acres)	4646	4152	4900
Dry onions, total harvested (acres)	720	1295	1265
Dry onions, irrigated (acres)	720	1295	1265
Sweet corn, total harvested (acres)	3857	2762	3580
Sweet corn, irrigated (acres)	3857	2762	3580

* Gem and Payette Counties account for all production of these crops in the Payette River Basin.
Source: U.S. Bureau of Census, 1982; 1987; and 1992.

The most substantial area of agriculture occurs in the lower basin, particularly below Black Canyon Reservoir, slightly northeast of Emmett. Fruits, vegetables, and most field crops are grown in the lower basin. The proportions of total field crop acreage found in lower basin counties are presented in Table 8. The proportions are very high for all crops, both irrigated and non irrigated-acres. This illustrates the relative importance of the lower basin area for crop production and the utilization of Payette River Basin irrigation water.

Livestock, previously important in the agricultural economy of the lower basin, appears to play a steadily smaller role. Figure 12 illustrates cash receipts from crops and livestock during the period from 1969 to 1995. Cash receipts from livestock are greater than crop receipts in 1980, but are less than crop receipts by 1983 and through 1995. Hence, there appears to be a change from a primarily livestock-based economy to one that has slightly greater emphasis on crops.

There have also been substantial changes in field cropping patterns between 1982 and 1992, implying potentially important changes in water demand. The major crops measured by acreage are hay and wheat. The irrigated acreage allocated to potatoes and sugar beets, relatively high users of water, increased substantially over the ten-year period, whereas the irrigated acreage in barley and beans, relatively low users of water, declined substantially. Irrigated acreage allocated to hay and wheat increased a little.

There have been some noteworthy changes in the composition of vegetables. Onion production has increased substantially while sweet corn has fallen somewhat (See Table 7). These constitute the largest vegetable crops measured in terms of harvested acres. Both crops are important in the Idaho economy. In 1992 lower basin counties accounted for between 12.65 percent and 13.75 percent of fresh onion acres harvested in the state. Idaho ranked sixth in the nation in the production of sweet corn for processing, and fourth in the nation for fresh onions. It also led the nation in average yield per acre for both crops.

Many fruits are grown commercially in the lower basin. Most important, and in order of pounds harvested, are apples, plums and prunes, cherries, peaches, pears, and apricots (See Table 6, page 27). Apple, peach and pear production has declined substantially. Plum and prunes have declined somewhat less than the others, while apricot production has increased.

Table 8. Percentage of Total Selected Payette River Basin Crops Grown in Gem and Payette Counties (acres).

Variable	1982	1987	1992
Harvested cropland	87.91%	90.54%	88.87%
Harvested cropland - irrigated	93.40%	92.01%	91.99%
Wheat for grain	98.26%	96.23%	85.97%
Wheat for grain - irrigated	100.00%	100.00%	91.60%
Barley for grain	90.09%	90.14%	83.55%
Barley for grain (bushels)	92.04%	91.19%	89.66%
Barley for grain - irrigated	91.49%	90.39%	85.53%
Dry edible beans except dry limas	100.00%	100.00%	100.00%
Dry edible beans except - irrigation	100.00%	100.00%	100.00%
Irish potatoes (farms)	84.00%	81.25%	95.00%
Irish potatoes	100.00%	81.52%	100.00%
Irish potatoes - irrigated	100.00%	81.52%	100.00%
Sugar beets for sugar	100.00%	100.00%	100.00%
Sugar beets for sugar - irrigated	100.00%	100.00%	100.00%
Hay - all	76.89%	78.49%	85.65%
Hay - all, irrigated	87.68%	85.76%	89.04%

Source: U.S. Bureau of Census, 1982; 1987 and 1992.

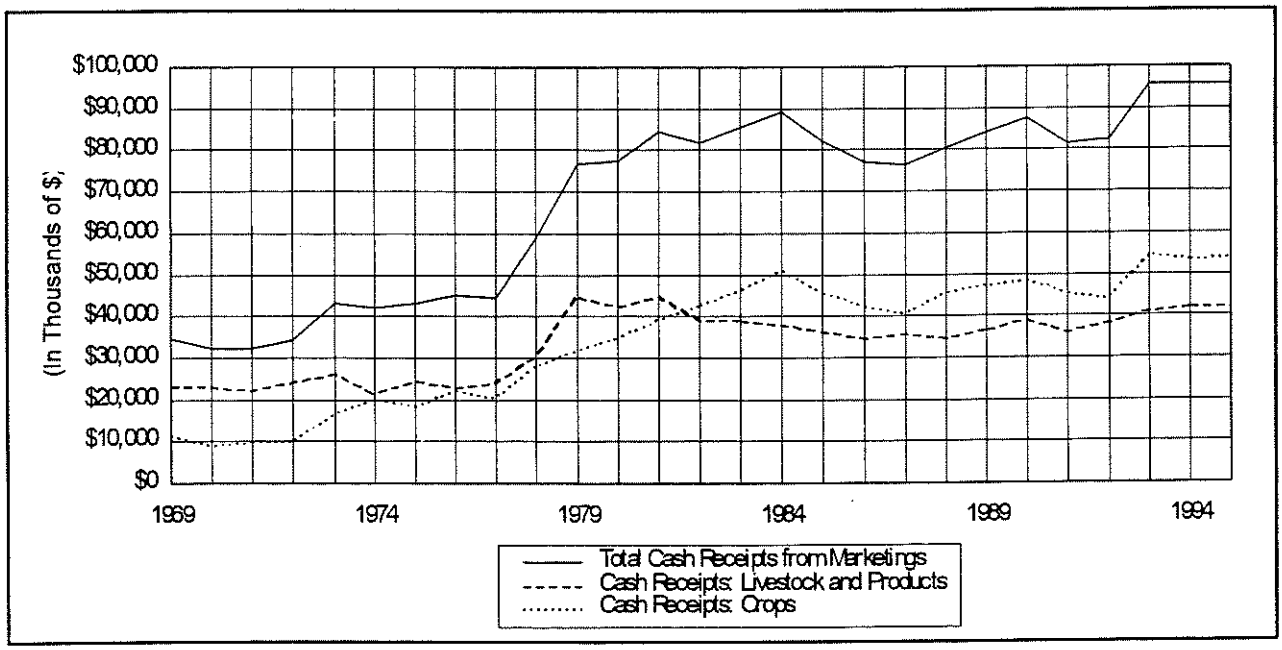


Figure 12. Cash Receipts from Marketing of Farm Products in Lower Basin Counties (U.S. Department of Commerce, 1997).

WATER RESOURCES

Water Supply

Water sources within the basin include the natural flow of the Payette River and its tributaries, lakes and storage projects, ground water, springs, and return flows. Annual precipitation, timing of runoff, water quality, water allocation, and current water use all affect the water supply and potential water use in the basin.

Based on an average annual precipitation of 30 inches, the annual average volume of water entering the Payette River Basin is 5.3 million acre-feet (Warnick, et al., 1981b). The volume of water leaving the basin is assumed to be the discharge of the Payette River at its mouth. Annual average discharge of the Payette River at the U.S. Geological Survey gage near the city of Payette is 2.2 million acre-feet (Table 9). The difference between the annual volume of precipitation and measured outflow, 3.1 million acre-feet per year, is used or lost through evapotranspiration by native vegetation or crops, evaporation from open water and bare ground, sublimation of snow, or ground water recharge. Some ground water leaves the basin as discharge to the Snake River below and above the Payette River confluence (Deick and Ralston, 1986).

SURFACE WATER

The majority of Payette River Basin runoff originates as snow melt from the upper watershed above Banks. Average annual runoff of the Payette River at Horseshoe Bend is about 2.35 million acre-feet of water per year, based on the 77-year record from 1920 to 1997. The maximum recorded runoff at Horseshoe Bend was 3.8 million acre-feet in 1974 and the minimum was 1.06 million acre-feet in 1931. Payette River runoff at its mouth is slightly less than runoff recorded at Horseshoe Bend, 60 miles upstream. Diversions for consumptive use below Horseshoe Bend reduce total runoff at downstream stations. Average annual runoff of the Payette River near its mouth is about 2.2 million acre-feet of water per year, based on a 69-year record from 1928 to 1997. Table 9 lists average annual runoff and maximum and minimum recorded flows at principal gaging stations in the basin. Map 6 shows U.S. Geological Survey stream gage locations.

The Gold Fork River, Lake Fork, Deadwood River, Middle Fork Payette River, and Squaw Creek watersheds are the largest tributary drainages in the Payette River Basin, contributing significant water volume to total basin runoff. Annual estimates for major tributaries in each geographic section of the basin are listed in Table 10 (page 33).

The natural flow regime of the Payette River and its upper basin tributaries exhibit a seasonal pattern of low flows during the fall and winter months while snow is accumulating, and high flows during the spring and early summer snow melt season. Water content of the snow pack at the basin's higher elevations generally reaches a maximum in late April or early May, with snow pack persisting into June in most years. The annual high-water period begins with a gradual increase in discharge in March, peaks usually between April 15 and June 15, and recedes to base flows during August. Average runoff from April through July at Horseshoe Bend is 1.6 million acre-feet, or nearly 68 percent of the basin's annual average runoff. Low flows normally prevail from August through February. The Lowman hydrograph

Table 9. *Average Annual Runoff, Maximum and Minimum Recorded Flows at Principal U.S. Geological Survey Stream Flow Gaging Stations in the Payette River Basin.*

Station	Period of Record	Drainage Area (square miles)	Ave. Annual Runoff Volume (acre-ft/year)	Max. cfs* (period of record)	Min. cfs* (period of record)
North Fork Payette Subbasin					
#13238322 North Fork Payette below Fisher Creek	1995 - 1997	85	278,500	4,570	4
#13239000 North Fork Payette at McCall	1919 - 1997	144	262,700	4,950	0
#13245000 North Fork Payette at Cascade	1941 - 1997	600	733,800	7,320	2
#13246000 North Fork Payette near Banks	1947 - 1997	933	963,000	8,830	36
South Fork Payette Subbasin					
#13235000 South Fork Payette at Lowman, Idaho	1941 - 1997	456	630,300	8,980	130
#13237500 South Fork Payette near Garden Valley	1921 - 1960	779	1,112,930	10,600	75
#13238000 South Fork Payette near Banks	1921 - 1960	1,200	1,513,100	13,800	225
Main Payette Subbasin					
#13247500 Payette River near Horseshoe Bend	1906 - 1916 & 1919 - 1997	2,230	2,347,000	27,000	260
#13249500 Payette River near Emmett	1925 - 1997	2,680	2,152,000	32,700	0.7
#13250000 Payette River near Letha	1952 - 1954; 1979-1986; 1994 - 1997	2,760	2,555,000	27,000	51
#13251000 Payette River near Payette	1928 - 1997	3,240	2,208,000	32,000	71

* cfs = cubic feet per second

Source: U.S. Geological Survey, 1996 and 1997.

Map 6. U.S. Geological Survey Stream Gaging Stations

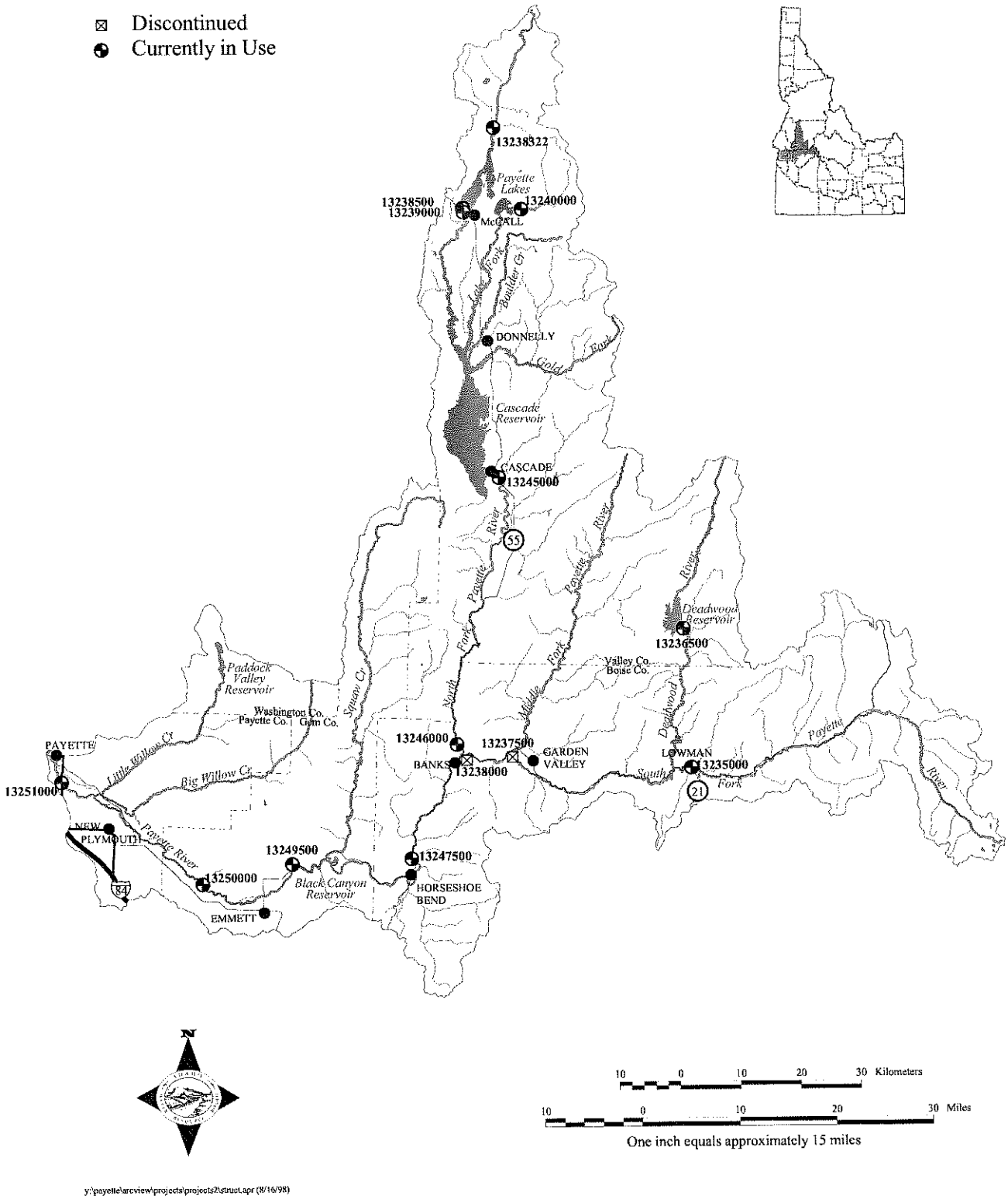


Table 10. Estimated Average Runoff for Major Tributaries from Intermittent Measurements and Drainage Area Calculations.

Station	Est. Avg. Runoff (acre-ft/year)	Drainage Area (acres)
North Fork Payette Subbasin		
Gold Fork	150,000	97,600
Boulder Creek	40,000	32,300
Lake Fork Creek	100,000	53,400
South Fork Payette Subbasin		
Warm Springs Creek	60,000	35,575
Deadwood River	300,000	150,770
Middle Fork	226,000	217,700
Main Payette Subbasin		
Shafer Creek	54,000	55,990
Squaw Creek	110,000	218,900
Big Willow	18,000	102,200
Little Willow	14,000	98,000

Source: Peebles, 1962; Warnick, et al., 1981b; Sear-Brown Group, 1990; Natural Resources Consulting Engineers, Inc., 1996; Ondrechen, 1997.

in Figure 16 (page 37) is an example of this natural flow regime. Construction of Cascade and Deadwood reservoirs and other storage facilities have altered the natural flow regime for many rivers and streams in the basin.

Elevation is a critical factor defining the flow regime of basin tributaries. Streams at higher elevations, such as Clear Creek near Lowman, sustain low flows from late summer through the winter, and with the exception of major winter flood events, usually peak with late spring and early summer snow melt (Figure 13). Flow on unregulated streams at lower elevations increases through the winter and generally peaks in mid to late spring. A relatively low elevation stream, Big Willow Creek, displays a general increase in flow from September through February, and a flashy response to episodic rain and snow melt events (Figure 13). Its low flow period is the months of July and August. Summer thunderstorms may produce brief and rapid flow increases in both lower and higher elevation tributaries.

Tributary flows in the Payette River Basin are largely unregulated, although some tributaries do have storage reservoirs. Water storage and diversion have altered the natural flow regime of 55 tributary streams in the Payette River Basin. In general, water storage operations reduce spring peak flows and may reduce winter flows, depending on elevation of the project. At higher elevation sites, winter flows are naturally very low, and reservoir storage has little impact on the natural flow regime. At lower elevation sites, natural winter flows normally increase over the course of the season. Water storage may substantially reduce winter flow on these tributaries. Diversions may significantly diminish late spring and summer flows on basin tributaries. However, on tributaries with water storage projects, water releases during the irrigation season supplement naturally diminished summer flows

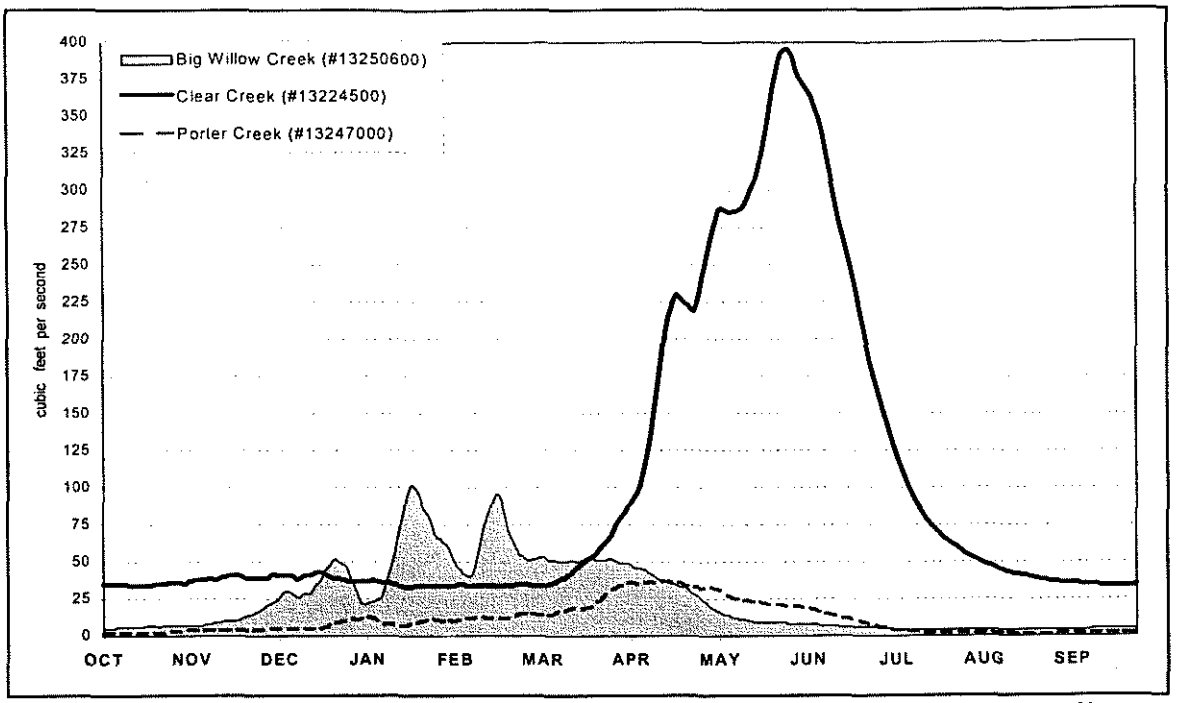


Figure 13. Comparison of Average Daily Flow of Lower Elevation Tributaries (Big Willow Creek near New Plymouth and Porter Creek near Horseshoe Bend) with a Higher Elevation Tributary (Clear Creek near Lowman). Note: Big Willow Creek gage period of record from 1961 to 1982; Porter Creek gage period of record from 1939 to 1945; and Clear Creek gage period of record from 1941 to 1949.

above diversions, and irrigation return flows may supplement discharges in the lower reaches.

North Fork Payette Subbasin

Figure 14 displays hydrographs for the North Fork Payette at McCall, Cascade, and Banks. The Cascade and Banks hydrographs reflect storage and release at Cascade Dam for flood control and irrigation. Payette Lake is regulated to store irrigation water, with storage releases typically occurring in September and October. At McCall the North Fork Payette flow displays a typical unregulated stream flow pattern despite operation of Payette Lake for storage. Payette Lake naturally stored water before construction of the dam, and the additional storage volume created by dam construction is relatively small. Therefore, regulation has not changed outflows below the lake significantly from what they were historically.

Through the winter the North Fork Payette at Cascade and downstream near Banks reflects natural precipitation and runoff, in addition to a winter minimum flow release of 200 cubic feet per second from Cascade Reservoir. Flow is fairly stable until March. From March through May, the Cascade hydrograph is relatively flat while Cascade Reservoir stores North Fork Payette flow for irrigation and flood control. When the reservoir is close to full, releases are increased to match inflow.

The increase in Cascade releases generally coincides with the McCall hydrograph apex (Figure 14). Flows at Cascade begin to drop mid-June, trailing the McCall hydrograph by approximately one month. By mid-July irrigation releases from Cascade Reservoir elevate downstream flow. Storage releases from Cascade Reservoir comprise more than 80 percent of the total North Fork Payette flow measured at Banks from July through September.

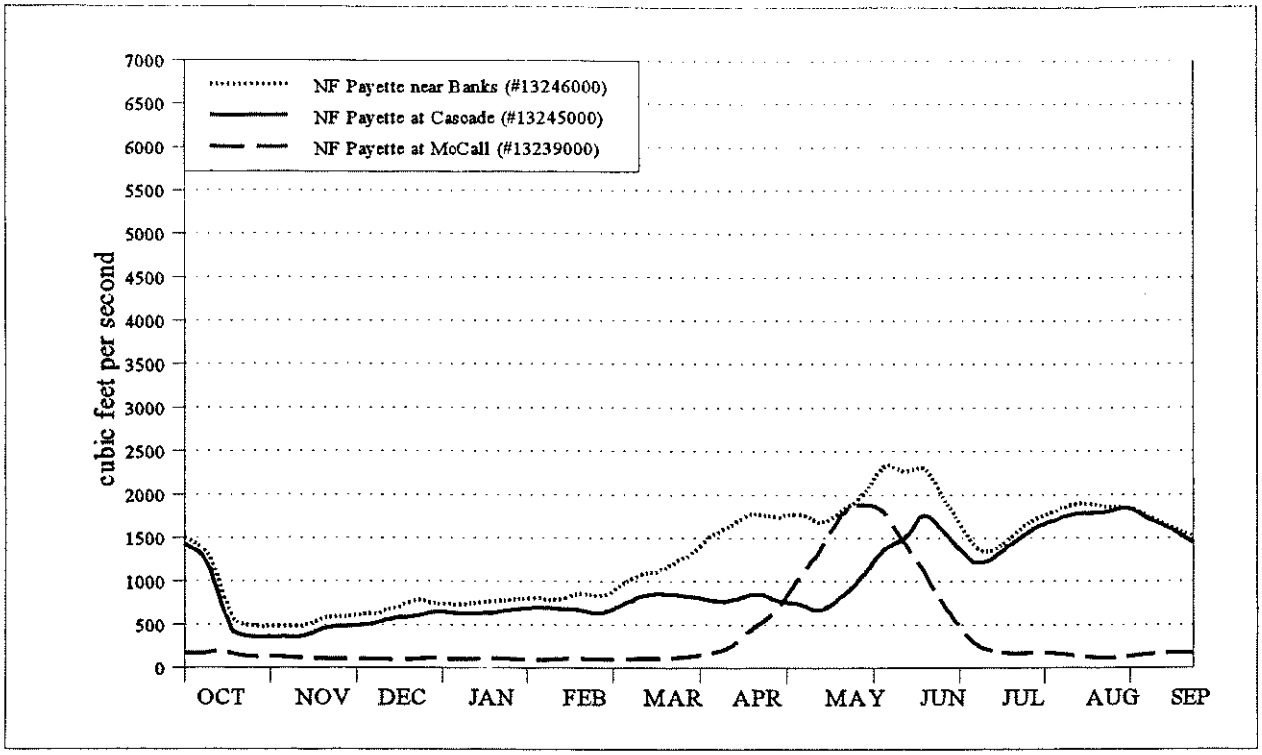


Figure 14. North Fork Payette Average Daily Flows for Period of Gage Record (see Table 9).

The North Fork Payette flow at Banks mirrors Cascade flow except during the early spring snow melt period (March-June), when tributaries below Cascade contribute significant runoff to the North Fork Payette. Tributary input between Cascade and Banks comprises more than 50 percent of the total flow measured at Banks during April and May storing. However by mid-summer, tributary input nearly ceases, and flow measured at Banks reflects Cascade Reservoir releases.

Figure 15 compares historic North Fork Payette flow measurements at Van Wyck with flow measurements at Cascade. The Van Wyck site, now covered by Cascade Reservoir, was located two miles upstream from the present gage location at Cascade. Although the Van Wyck record is short, it displays the classic natural flow regime, peaking during spring snow melt and low flow the remainder of the year.

Southwest Idaho's largest natural lake is Payette Lake, a 5,000-acre lake formed by glacial scouring approximately 15,000 years ago. Estimated volume of the lake is about 500,000 acre-feet. Mean lake depth is 121 feet, with a maximum depth of 304 feet (Woods, 1997a). Daily inflows at the lake are not measured, but annual outflows of 266,600 acre-feet are estimated using the U. S. Geological Survey gaging station downstream of the outlet dam on the North Fork Payette River. The contribution of groundwater to the lake water budget is unknown. Numerous small creeks flow into Payette Lake, but the single largest inflow is the North Fork Payette River.

Little Payette Lake, also formed by glaciation, lies slightly southeast of Payette Lake. The lake is fed and drained by the Lake Fork. Little Payette Lake is separated from Payette Lake by a narrow ridge and is 115 feet higher in elevation. The natural lake volume is an estimated 18,000 acre-feet, with a maximum depth of 105 feet (Anderson, 1997). Both Payette Lake and Little Payette Lake are regulated by dams at their outlets to provide storage

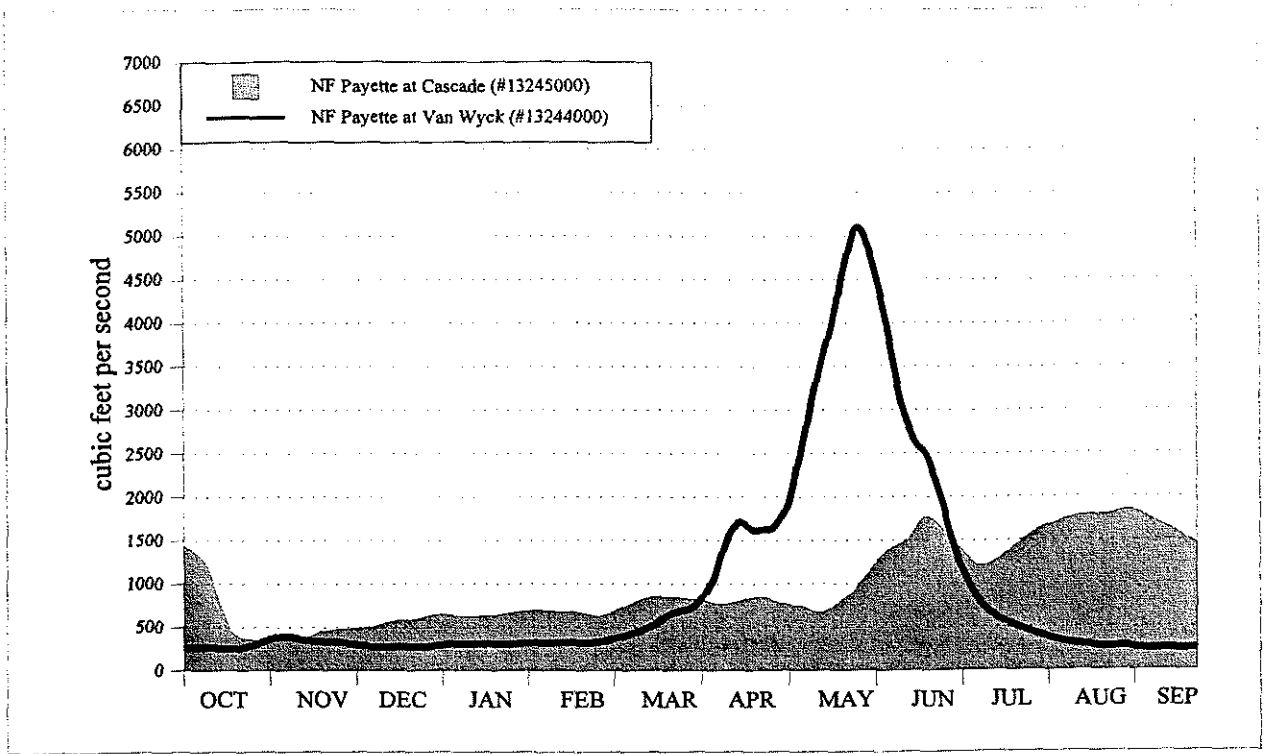


Figure 15. Comparison of North Fork Payette Average Daily Flow Pre-Cascade Dam at Van Wyck (1912-1915) and Post-Cascade Dam at Cascade (1948-1995).

water, with Payette Lake containing about 41,000 acre-feet of storage water and Little Payette Lake about 17,000 acre-feet.

South Fork Payette Subbasin

A comparison of the South Fork Payette hydrographs at Lowman, Garden Valley, and Banks shows fundamentally the natural flow pattern of an unregulated river (Figure 16). The South Fork Payette gage near Garden Valley was located upstream of the Middle Fork confluence, and the South Fork Payette River gage at Banks measured flows just above the confluence of the North Fork Payette and South Fork Payette. Deadwood River inflows are reflected in the Garden Valley hydrograph. The flow of the South Fork Payette at Lowman, 33 river miles upstream of the Banks gage, represents a substantial 45 percent of that observed at Banks through the winter and spring snow melt period. By late summer, average Deadwood Reservoir releases comprise nearly 70 percent of the downstream South Fork Payette flow.

Deadwood River flows are regulated by Deadwood Dam, 18 miles upstream from its mouth. Water is stored in Deadwood Reservoir for irrigation in the lower Payette Valley and for power generation at Black Canyon Dam. Figure 17 compares Deadwood River flow before Deadwood Dam construction with regulated flow after its construction. Winter flows are fairly similar. Storage during the winter months decreases natural winter flow by an average 40 cubic feet per second. Reservoir operation considerably reduces spring peak flows and substantially increases late summer flows. Natural high flows during the spring snow melt period are reduced by an average of 300 cubic feet per second. Water releases through the months of July, August, and September average 600 cubic feet per second compared with an average 150 cubic feet per second prior to project operation.

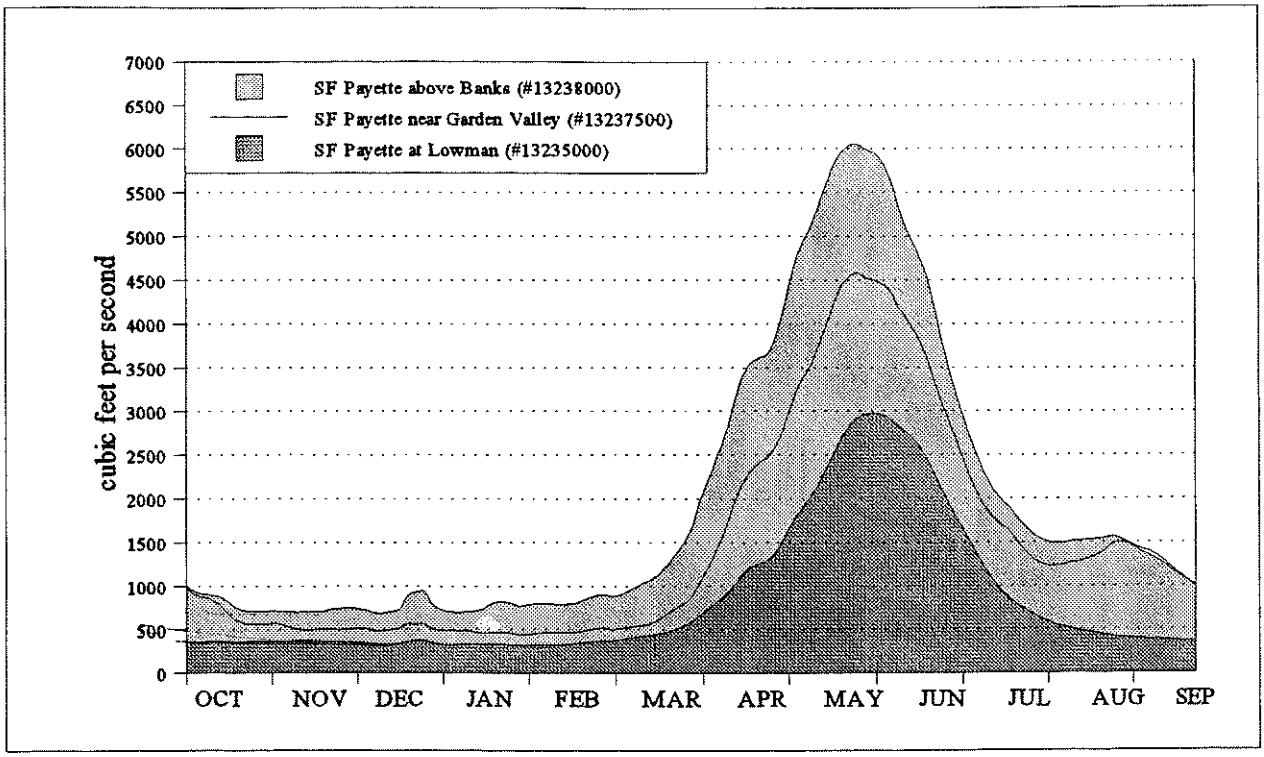


Figure 16. South Fork Payette and Payette River Average Daily Flows for Period of Gage Record (see Table 6).

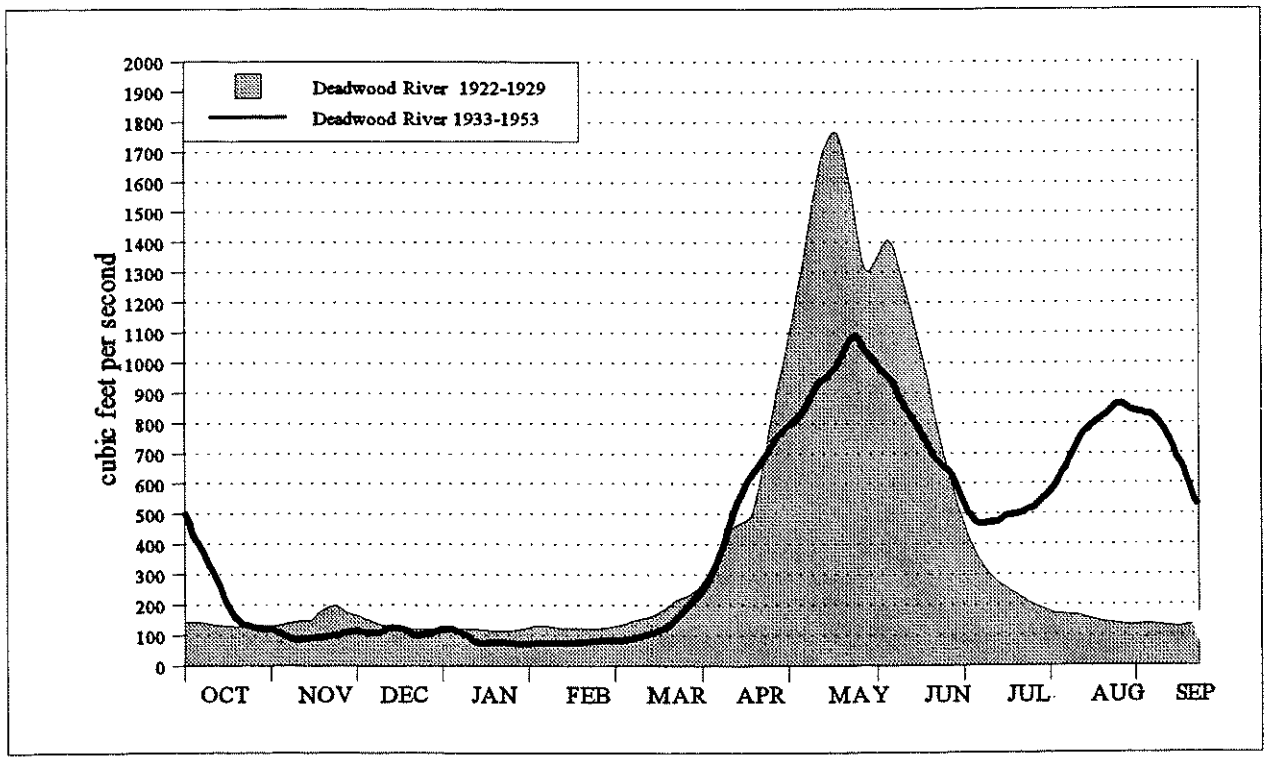


Figure 17. Comparison of the Average Daily Flow of the Deadwood River Near the Mouth – Pre-dam (1922-1929) and Post-dam (1933-1953) (U.S. Geological Survey gage # 13237000).

The Middle Fork Payette inflow substantially increases South Fork Payette flow through the winter and spring. It contributes an average 300 cubic feet per second, or approximately 35 percent of measured South Fork Payette flow near Banks during the winter, and an average 30 percent during the spring snow melt period. However by late August, Middle Fork input is negligible, and the South Fork Payette flow near Banks reflects the flow measured at Garden Valley.

Main Payette Subbasin

Several distinctive traits of the Payette River's seasonal flow pattern in the lower basin are shown in Figure 18. Evident in each of the hydrographs is a gradual flow increase through the winter months attributable to lower elevation tributaries. The Horseshoe Bend hydrograph follows a fairly unregulated pattern, but late summer releases from Cascade and Deadwood reservoirs are readily apparent. Payette River flows from July through September, measured at Horseshoe Bend, are significantly higher than natural flow levels for that time of year.

From October to April, Payette River flow at Letha and near Payette is greater than flow measured at Horseshoe Bend. Relatively low elevation tributaries between Horseshoe Bend and Payette contribute significant flows through the late winter and early spring. By mid-April Payette River flow at Letha and Payette is less than flow at Horseshoe Bend due to diversions for consumptive uses. Payette River flow at the Letha gage averages 1,000 cubic feet per second during the growing season. At times, irrigation diversions between Horseshoe Bend and Letha may reduce Payette River flow at the Letha gage to 135 cubic feet per second.

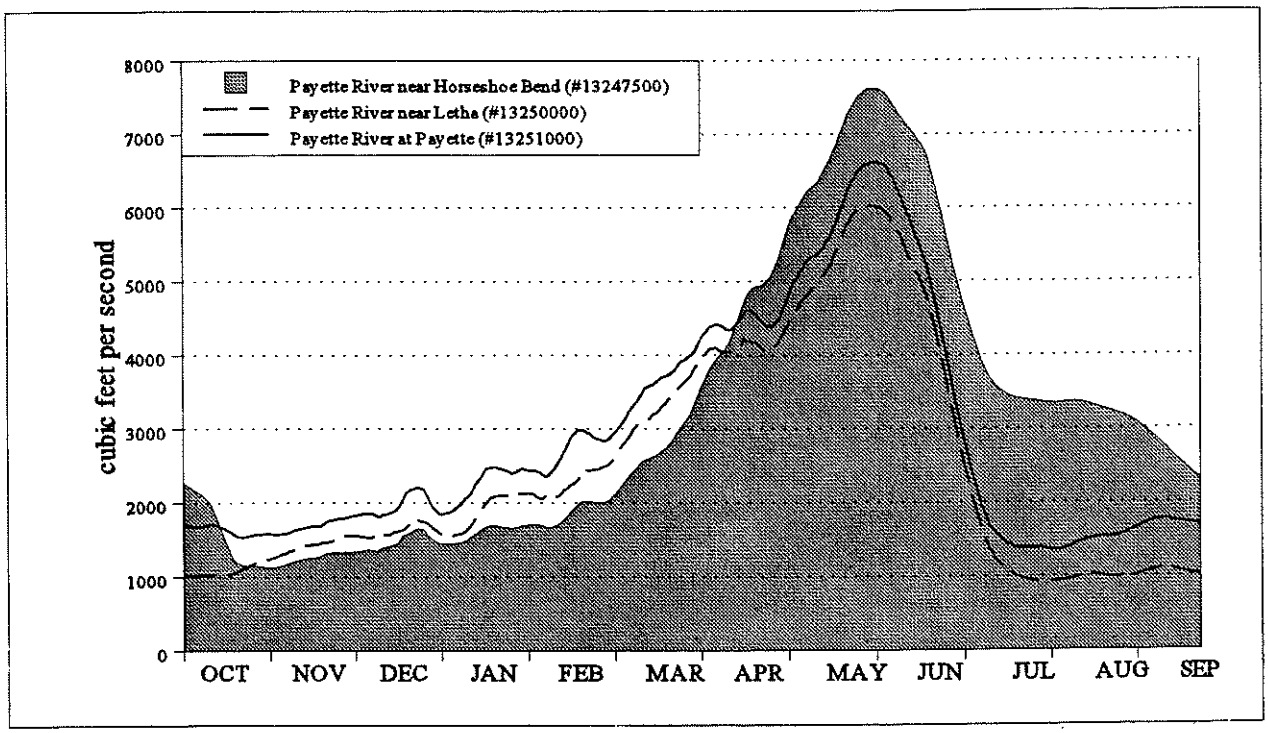


Figure 18. Payette River Average Daily Flows for Period of Gage Record (See Table 9). (Note: Letha average flows were estimated to correct inherent discrepancies in comparing a short record period at Letha with a much longer period of record at Payette. Letha average flows were calculated by averaging the difference between flows at Payette and flows at Letha for each day of common record.)

Payette River flow near Payette is slightly higher than the measured flow at Letha due to tributary inflows and irrigation return flows. Big and Little Willow creeks contribute significant flows to the river below Letha through the winter and early spring. By late-June contributions from these tributaries have generally ceased and flows past Letha approach the flow at Payette. Irrigation return flows between the two gages increase river flow, measured at Payette, by mid-July. Irrigation return flows and ground water intercepted by drainage channels below Letha account for 30 percent of river flow at Payette from about mid-July to mid-October.

Hydrography in the lower Payette Valley is complex due to numerous irrigation canals, laterals, and drainage channels. Irrigation wasteways return flow on both sides of the Payette River. These drainages also carry ground water and runoff from precipitation and snow melt. Although many of these drains have been measured, no clear separation of surface return from ground-water flow has been made. Ingham (1996) estimated a 200,000 acre-feet discharge to the Payette River between Emmett and Payette by subtracting flow of the Payette River near Emmett and inflow from Big and Little Willow Creeks from flows in the river near Payette. Nearly all of the drainages carry water year-round, but flows are generally greatest during the irrigation season. The Payette Soil and Water Conservation District (1993) measured irrigation wasteways and drains along the lower 15 miles of the river during the 1991 irrigation season. Average drain discharge was 20 cubic feet per second, and ranged from 60 cubic feet per second to 1.2 cubic feet per second.

Flood Occurrence

Flood-stage flows over-top stream banks and levees, and extensively erode channels and floodplains. Flood-stage flows in the basin's rivers and streams may develop from frontal system or convective thunderstorm rainfall, excessive rainfall associated with snow melt, rapid spring snowmelt, or runoff from an excessive snowpack. Closely associated with flood events in the Payette River Basin are mud and debris flows triggered by excessive runoff over saturated soils.

Flooding problems on the North Fork Payette River are predominately associated with overflow near McCall downstream from Payette Lake Outlet and at Cascade (Federal Emergency Management Agency, 1990). The maximum discharge of the North Fork Payette at McCall was 4,950 cubic feet per second in June 1974 (U.S. Geological Survey, 1996). This equates to an exceedence probability of less than one percent.

Flooding in the South Fork Payette Subbasin is mostly due to rain-on-snow events, very warm temperature snowmelts, or short duration-high intensity summer storms (Federal Emergency Management Agency, 1988). Rapid snowmelt has caused major flooding on the South Fork Payette near Lowman, while rain-on-snow events are predominate causes of flooding on the Middle Fork Payette.

The largest flood in Boise County occurred in December 1964 when the South Fork Payette near Banks had a flow of 20,800 cubic feet per second, with an estimated 7,350 cubic feet per second contributed by the Middle Fork Payette (Federal Emergency Management Agency, 1988). Upstream the peak discharge for the South Fork Payette near Lowman was 5,280 cubic feet per second. These flows were deemed a four year-recurrence interval for the South Fork Payette at Lowman, but a 200-year event for the Middle Fork Payette and the South Fork Payette near Banks. Peak flows at the South Fork Payette Lowman gage have occurred in May or June, indicating high elevation snowmelt events. The record peak flow was 8,980 cubic feet per second in June 1974. By comparison, flows during the January 1997 flood event were 4,260 cubic feet per second (Ondrechen, 1997).

The flatness of the lower Payette Valley floor allows extensive flooding with only 2 to 5 feet of overbank depths (U.S. Army Corps of Engineers, 1982). The flood patterns in the Emmett Valley are complicated by the numerous irrigation canals and sloughs (Federal Insurance Administration, 1977; U.S. Army Corps of Engineers, 1982). Floods usually occur from heavy rainfall augmented by snowmelt during winter or early spring.

At Horseshoe Bend the Payette River channel can accommodate flows exceeding 18,000 cubic feet per second (Wells, 1997). Flows at or exceeding 16,000 cubic feet per second are considered flood-stage flows below Emmett (Federal Insurance Administration, 1977; Mellema, 1997). Payette River flows in excess of 16,000 cubic feet per second at Emmett have occurred on eight occasions in the last forty years. Probabilities of flood events under existing, regulated conditions are shown in Table 11 for major rivers in the Payette River Basin.

Table 12 and Figure 19 show that Payette River flood-stage flows are principally related to spring snow melt, which generally produces sustained high river flows. Flood-stage flows may persist for several days to several weeks, while flood flows caused by other circumstances generally last for a much shorter period of time. The highest flood-stage flows were produced by excessive rainfall in association with a warm, regional frontal system that also rapidly melted snow at low and intermediate altitudes. The maximum instantaneous flow of record at several Payette River stations occurred in December 1964 under these conditions: the Payette River flow was 27,000 cubic feet per second at Horseshoe Bend and 32,700 cubic feet per second at Emmett.

Large-scale flooding inundated the Payette River Basin in early January 1997, virtually repeating the 1964 flood scenario, with flows of 24,400 cubic feet per second at Horseshoe Bend and 32,300 cubic feet per second at Emmett (Brennon, 1997; Figure 20, page 42). There was widespread water-related damage and extensive landslide activity (Figure 21, page 42). Analogous to the 1964 flood, the primary factors contributing to the 1997 flood-stage flows were repeated above-normal precipitation events in late fall and early winter which produced saturated soils and above-normal snowpack and snowpack water content; and major storms in late December and early January which brought substantial moisture and unseasonably mild air from the subtropics into

Table 11. Flood Exceedence Probabilities for Major River Reaches in the Payette River Basin.

Recurrence Intervals (years)	2	5	10	25	50	100
Exceedence Probability (percent)	50%	20%	10%	4%	2%	1%
North Fork Payette						
at McCall	4,820	2,950	3,600	3,950	4,300	4,590
at Banks	4,130	5,770	6,850	8,200	9,200	10,200
South Fork Payette						
at Lowman	4,320	5,640	6,420	7,320	7,940	8,530
at Banks	7,920	10,900	12,700	15,000	16,600	18,100
Main Payette						
at Horseshoe Bend	12,700	17,400	20,200	23,400	25,600	27,600
at Emmett	13,300	18,700	22,00	26,100	29,000	31,700

Source: U.S. Geological Survey, 1996.

Table 12. Major Floods in the Payette River Basin, 1927-1997.

Year	Month	Flow at Horseshoe Bend	Flow at Emmett
1927	May	19,000 cfs	21,400 cfs
1928	May	21,500 cfs	22,000 cfs
1933	June	18,900 cfs	20,700 cfs
1936	April	18,900 cfs	21,600 cfs
1938	May	20,100 cfs	22,800 cfs
1940	March	13,500 cfs	19,200 cfs
1943	June	20,000 cfs	21,900 cfs
1946	April	15,600 cfs	18,600 cfs
1947	May	16,900 cfs	17,900 cfs
1948	June	15,300 cfs	16,700 cfs
1952	April	16,600 cfs	18,400 cfs
1955	Dec	19,200 cfs	22,700 cfs
1957	May	14,000 cfs	18,200 cfs
1964	Dec	27,000 cfs	32,700 cfs
1971	June	20,400 cfs	21,300 cfs
1974	June	19,300 cfs	18,600 cfs
1978	June	11,600 cfs	17,200 cfs
1983	May	18,000 cfs	19,700 cfs
1984	May	14,400 cfs	16,900 cfs
1986	March	12,200 cfs	16,400 cfs
1997	January	24,400 cfs	32,300 cfs

Source: U.S. Geological Survey, 1991; Brennon, 1997; and Ondrechen, 1997.

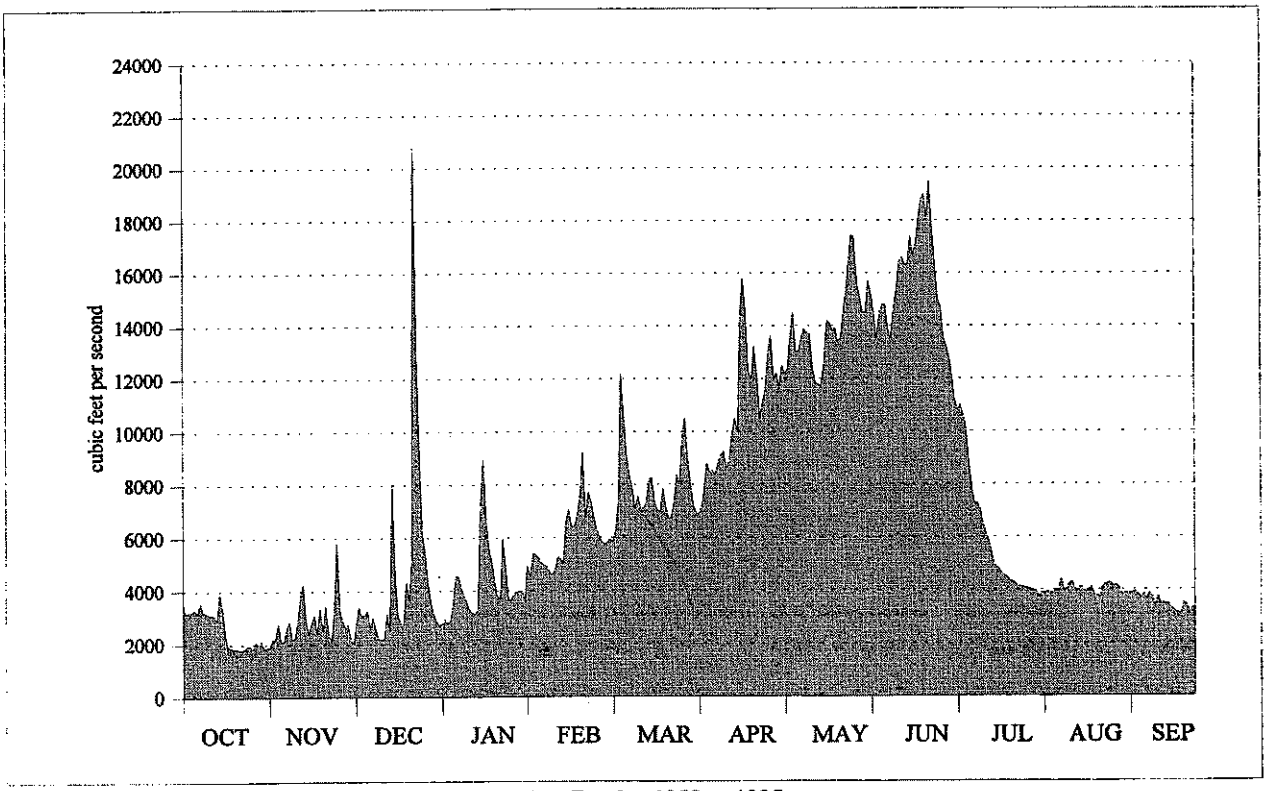


Figure 19. Maximum Mean Daily Flows at Horseshoe Bend -- 1958 to 1995.

Figure 20. Flooding Along the Payette River near Payette, Idaho, January 1997.

Figure 21. Landslide Debris Along the South Fork Payette, January 1997.

southwest Idaho. Garden Valley received a 100+ year precipitation event, with eleven inches between December 24, 1996 and January 2, 1997, while Lowman registered over eight inches, and Cascade and Ola six inches (National Weather Service, 1997). In addition to the exceptionally heavy rainfall, warm temperatures melted mid-elevation and low-elevation snowpack, resulting in massive run-off, debris flows from supersaturated soils, and eventual flooding of many of the basin's rivers and creeks.

Mass Wasting (Slope Failure)

In the Payette River Basin mass wasting, or slope failure, often occurs in concert with flood flows. The terms "debris flow," "debris flood," "debris torrent," "mudslide," "mudflow," and "landslide" have different technical definitions, but they all refer to similar processes by which mixtures of water, soil, and rock debris may rapidly and destructively flow down streambeds or slopes. Water usually plays an important role in landslide and debris flow development; it is often the critical factor that triggers the downslope movement.

Intense rainstorms, rain-on-snow events, or rapid snowmelt, especially when the soils are already thoroughly wetted, may make the soil mass unstable and susceptible to mass movement. The introduction of large quantities of water onto slopes can trigger landslides in two primary ways: (1) the water can infiltrate into the slope, reducing the strength of the slope material; and/or (2) the water can concentrate on the surface as runoff to initiate a debris flow, which gains sediment as it moves down the slope.

Natural factors contributing to mass wasting include slope morphology, slope material, bedrock geology, vegetation, and climate. Generally in a given material, the steeper a slope is, the more prone it is to sliding. In the Idaho batholith, Megahan and others (1979) found that most slides occurred on slopes of about 30 degrees. Jenks (1997) found that slopes of 60 percent or greater were much more susceptible to mass failures in the headwaters of the North Fork Payette River watershed.

Landslides associated with the January 1997 flooding were distinctly delineated in an elevation zone between 4000 and 5000 feet (Gillerman, 1997a). Intense landsliding was generally confined to the South Fork Payette, Middle Fork Payette, and main Payette River watersheds above Gardena on steep slopes where the ground was not frozen or snow-covered. South-facing slopes, less prone to being frozen, were hit hardest, as were areas that had sparse tree cover or those which had recently burned (Gillerman, 1997a).

Drought Occurrence

Drought in southwest Idaho is fairly common. Droughts decrease stream flow, the availability of water for storage in reservoirs, and ground water storage. Droughts during the past several decades generally were the result of an unseasonable northward displacement of the Pacific high-pressure system, or the positioning of a polar front at much lower latitudes than usual.

Significant droughts, indicated by the Surface Water Supply Index (SWSI), are illustrated in Figure 22 and summarized in Table 13. The Surface Water Supply Index was developed by the U.S. Natural Resources Conservation Service to quantify water availability in a basin compared to historic supply. It is calculated by summing the two major components of water supply, March 31 reservoir storage and April through September stream flow, and fitting a scaled probability distribution. Values range from +4.1 (extremely wet) to -4.1 (extremely dry). A value of zero indicates a median water supply compared to historic occurrences. Figure 22 reveals that drought existed more than one-third of the period between 1920 and 1996.

Figure 23 illustrates the general sequence of wet and dry periods at the Horseshoe Bend gaging station. Conditions in the Payette River drainage for the period 1987 through 1992 were drier than any other six-year sequence in the basin's hydrologic record. Scant winter snowpacks and prolonged periods of greater than average temperatures resulted in unseasonable early snow melt, high water demands, and the lowest stream flows since 1977.

In southwestern and central Idaho, this six-year drought was more severe than the 1930s drought. Payette River runoff at Horseshoe Bend averaged only 62 percent of normal runoff from 1987 to 1992. Low-flow records were set for many days during the summers of 1987, 1988, 1991, and 1992 at long-term gages on the Payette River system. Cascade Reservoir contents on June 30, 1992 were 551,000 acre-feet of water, lower than any historic or simulated volume for any June 30th in the record.

The most prolonged historical drought was the decade of the 1930s; that drought spanned 10 years. Payette River runoff at Horseshoe Bend averaged only 74 percent of normal runoff between 1929 and 1937, and 80 percent of normal runoff from 1929 through 1941.

GROUND WATER

Map 7 portrays general lithology in the Payette River Basin. Most rock units in the basin contain some ground water. However, about 90 percent of the ground water utilized in the Payette River Basin comes from alluvium, chiefly

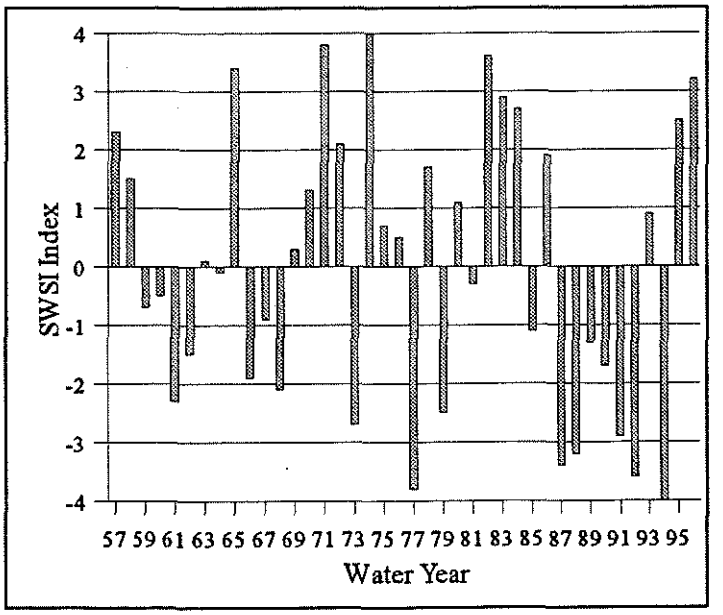


Figure 22. Payette River Basin Surface Water Supply Index for Water Years 1957 - 1996 (U.S. Natural Resources Conservation Service, 1994)

Table 13. Major Droughts in Southwest Idaho, 1894-1996.

Years	Area Affected	Recurrence Interval (Years)
1929 - 41	Statewide	>50
1959 - 63	Southern and Central Idaho	10 to >25
1966 - 68	Southwest Idaho	10 to >25
1977	Statewide	10 to >25
1987 - 94	Statewide	25 to >50

Source: U.S. Geological Survey, 1991; Sutter, 1996.

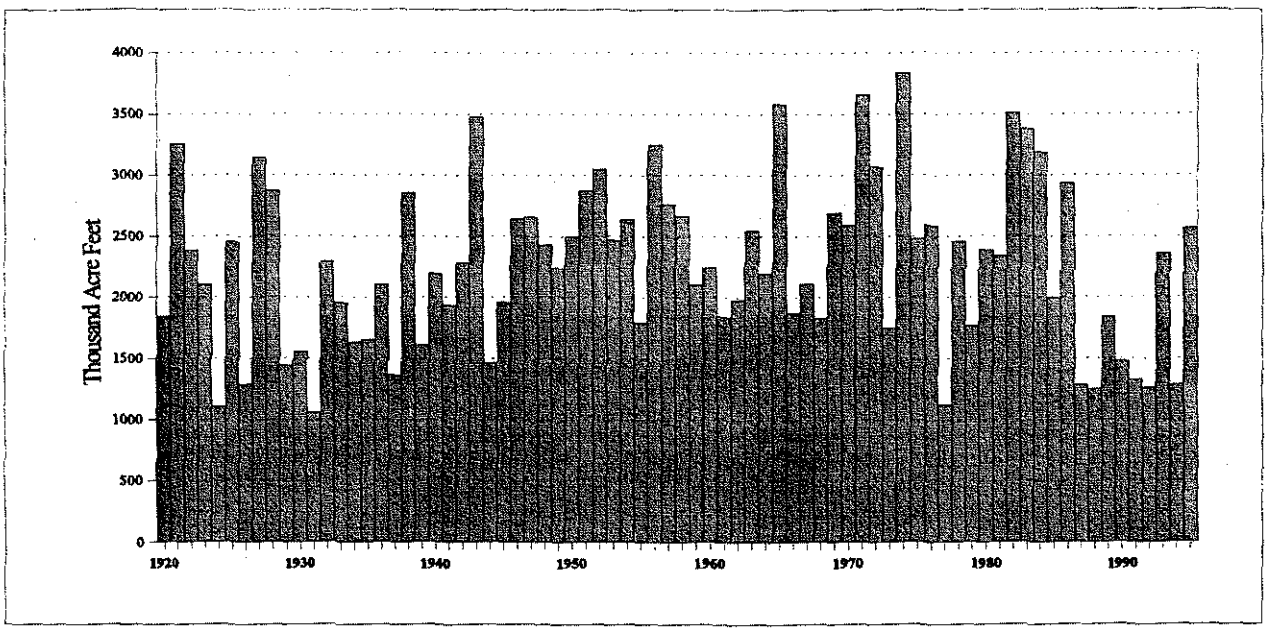
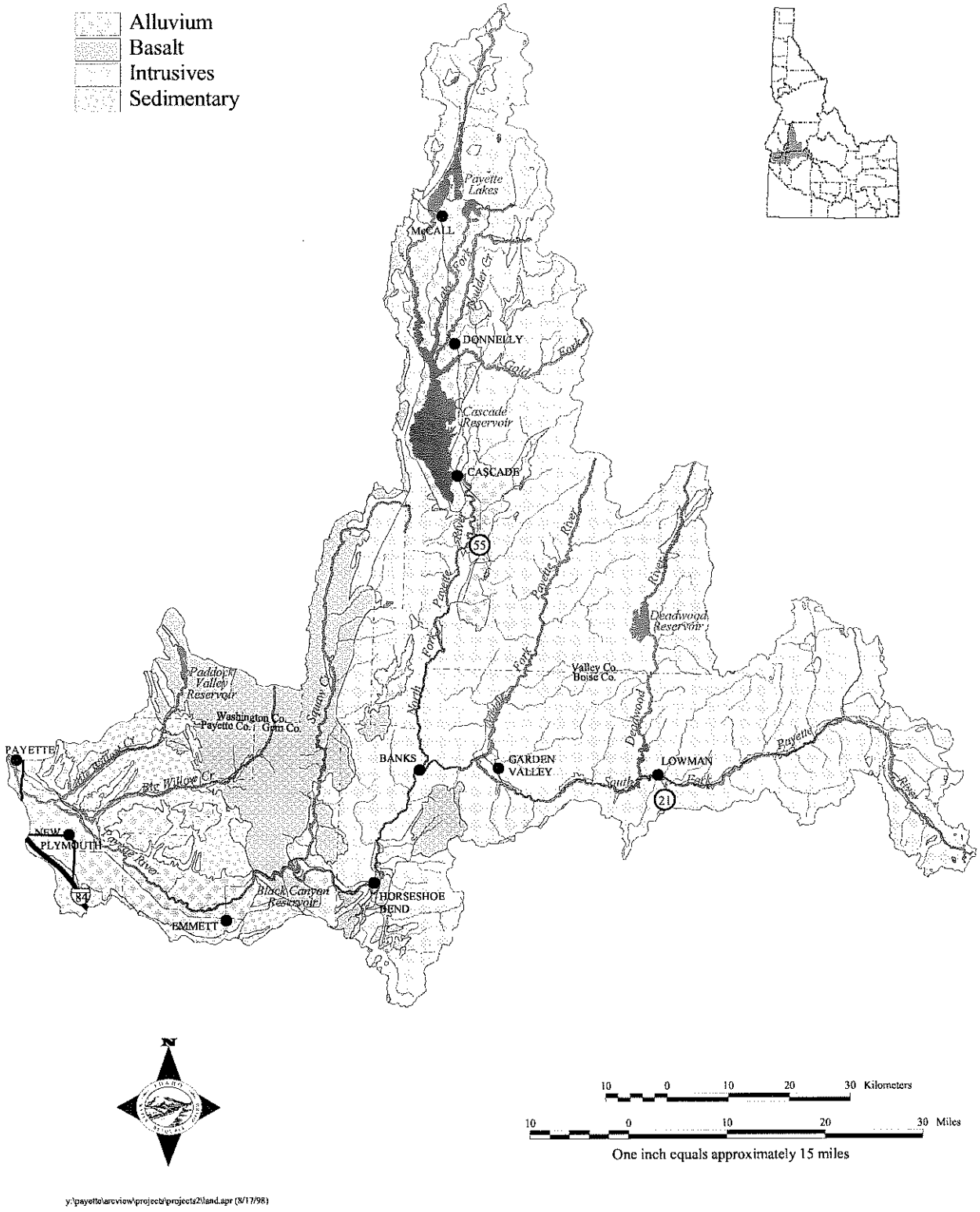


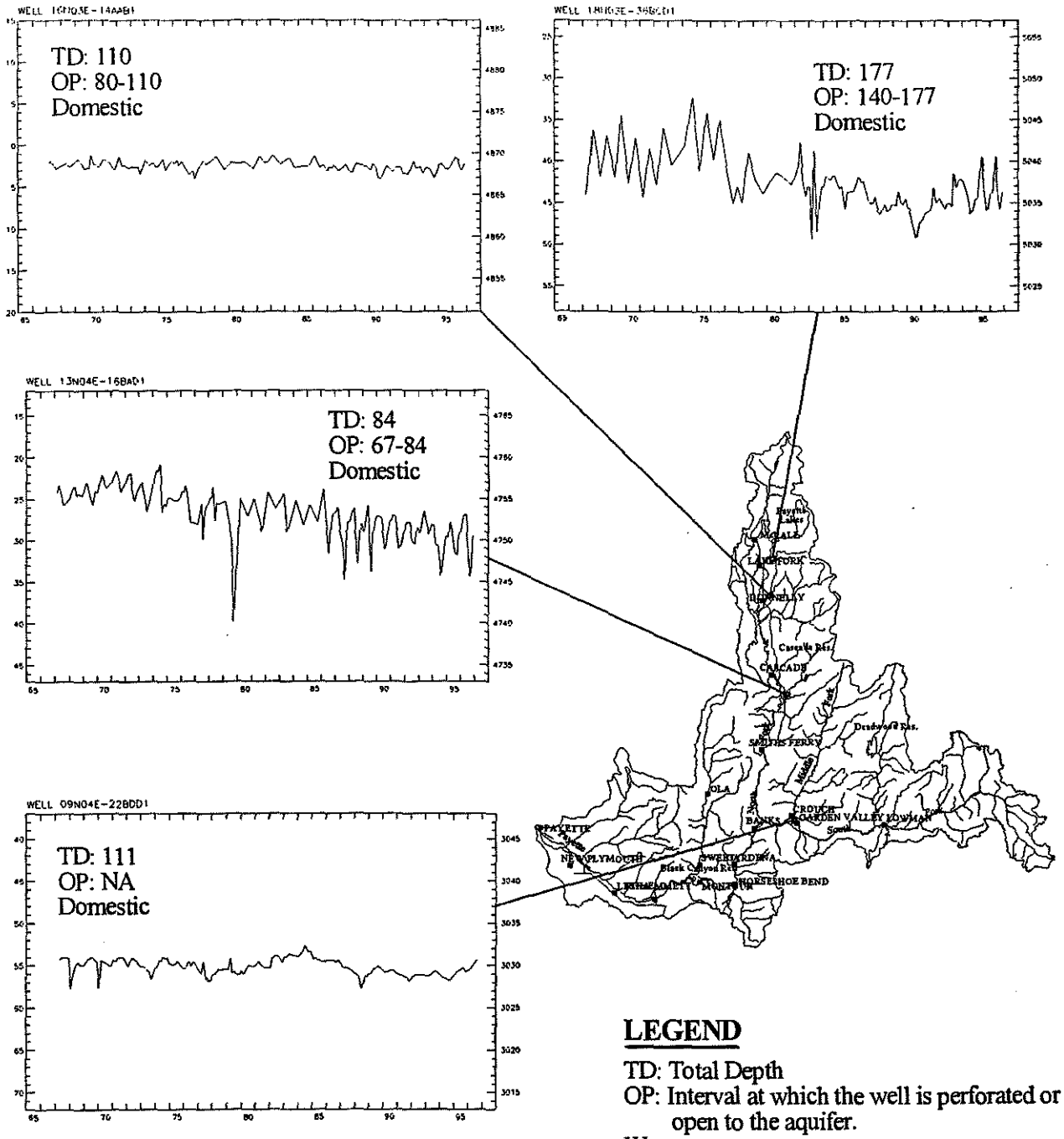
Figure 23. Annual Runoff of the Payette River at Horseshoe Bend, 1920-1995.

unconsolidated sand and gravel deposits in valley-fill. Long-term water level trends in the basin's valleys appear generally stable (Figures 24, page 46 and Figure 25, page 47). Incidental ground water recharge in the valleys is provided by irrigation surface water diversions, stream losses, lateral ground water inflow, and precipitation. Ground water is discharged into field drains, springs, and streams.

In the mountainous upper basin, ground water supplies are meager to modest. In general, porosity and permeability of the granitic and metamorphic rocks are low. However, where the rock has been weathered, it is considerably more porous and permeable than the underlying bedrock. In the upper basin, this weathered zone supports many small springs and shallow wells (Keller Associates, 1996). A well that encounters faults or rock joints may produce up to 50 gallons-per-minute, but five gallons-per-minute is a more typical yield (Slifka, 1997). In the basin's narrow canyon corridors, ground water supplies are confined chiefly

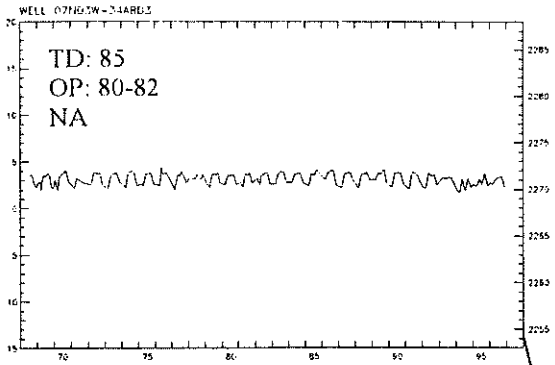
Map 7. Lithology

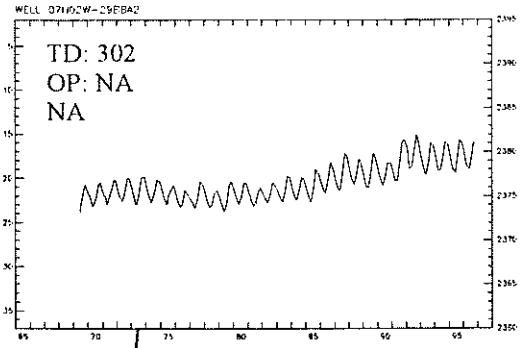


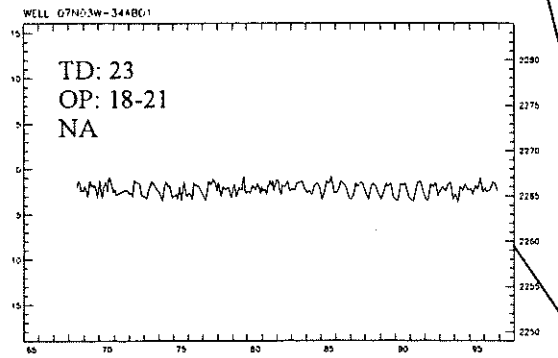


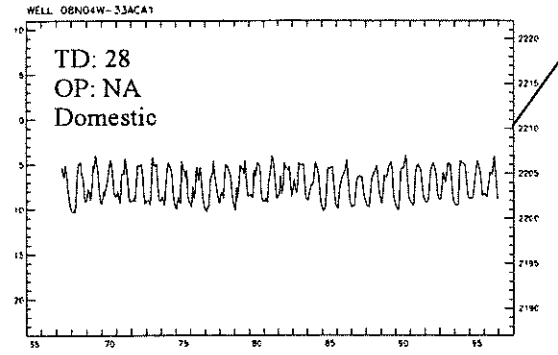
Source: USGS data compiled by the IDWR.

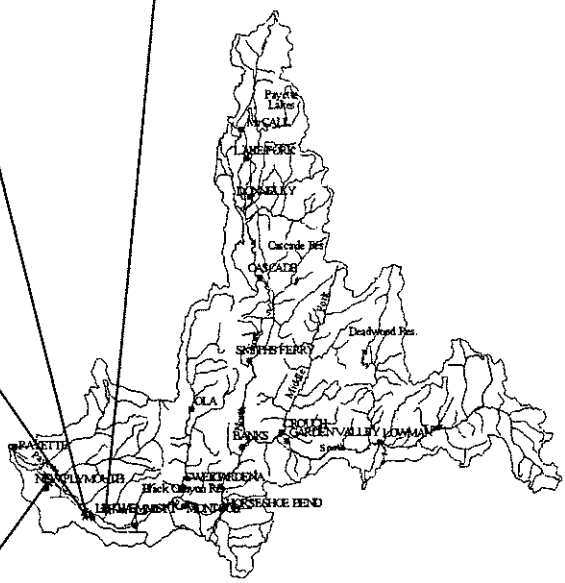
Figure 24. Ground Water Levels for the Payette River Basin Above Banks.











Source: USGS data compiled by the IDWR.

LEGEND

TD: Total Depth
OP: Interval at which the well is perforated or open to the aquifer.
Water use
AXIS
- Left side: Depth to Water
- Right side: Water Elevation
- Base: Year

All Measurements in feet.

Figure 25. Ground Water Levels for the Payette River Basin Below Banks.

to the river alluvium, and the water table in these areas fluctuates with the river stages.

Recharge in the mountains is almost entirely from precipitation and snowmelt. Soils derived from granitic or metamorphic parent materials have high infiltration rates, but limited storage capacities. Water stored in weathered granite moves only short distances as subsurface flow, and much of the subsurface flow is in the upper 20 feet of soil (Nelson, 1976). The geologic unit, however, provides short-term storage space for a large volume of water that maintains the base flow of mountain streams. Discharge from the weathered material also moves laterally into the alluvial deposits and younger volcanic rocks underlying the valleys.

In the lower basin, a succession of basaltic lava flows comprise the upper portions of the Big and Little Willow Creek drainages and most of the Squaw Creek drainage. Interbeds of tuff, ash, and sand and gravel are common (Savage, 1961). Individual basalt flows generally have low permeability, but jointing, fracturing, weathering, and openings caused by the expansion of gases when the lava cooled, provide space for water storage and avenues for movement (Kinnison, 1955). Contact zones of successive flows generally have high to moderate permeability. Where wells penetrate several contact zones, moderate water yields may be realized.

Recharge in the basalt upland and plateau areas is by direct precipitation, snowmelt, and seepage from streams. Generally only the major streams in the basalt uplands benefit from ground water discharge; the smaller streams are usually above the regional water table and consequently intermittent (Pacific Northwest River Basins Commission, 1970).

Sedimentary deposits in the Payette River Basin consist of thin sections of silt, tuffaceous siltstone, sandstone, clay, and fine sand, interbedded with thinner lenses of medium to coarse sand and gravel that are moderately permeable (Savage, 1961). The finer-sized sediments act as confining beds for the sand and gravel aquifers and may contribute to artesian pressure (Kinnison, 1955). The deposits are of Quaternary and Tertiary age, and include sediments of the Snake River and Idaho groups, the Payette Formation, and similar strata (Savage, 1961).

Sedimentary deposits are scattered throughout the basin. The deposits are prominent in the lower Payette Valley where they form terraces and bluffs along the Payette River. Some Payette Formation sediments are found in Garden Valley (Johnson, et al. , 1988). Wells drilled in sedimentary deposits a few hundred feet deep may furnish up to 20 gallons of water per minute (Slifka, 1997). In general, the younger, more coarse strata in the Snake River and Idaho groups yield more water than the finer strata of the Payette Formation and equivalents.

Major Ground Water Sources

Alluvium in the Payette River Basin comprises the present flood plain; river benches and terraces; glacial outwash and other deposits; lacustrine silt, clay, and fine sand; and windblown sand deposits. Loess, or windblown silt, is evident around Payette. Some alluvial deposits are interbedded with younger basaltic lavas. The amount of water present and available for use in alluvium is controlled by the size, sorting, shape, and roundness of the sediments, and the size and efficiency of the intake area (Kinnison, 1955).

Extensive deposits of porous and permeable coarse sand and gravel are found in Long Valley and lower Payette Valley alluvium. The deposits are thick enough to yield moderately large to large quantities

of ground water. Yields from the coarser material are commonly 20 to 50 gallons-per-minute (Slifka, 1997). Garden Valley and the upper Deadwood Valley contain an unknown thickness of alluvial deposits with granitic and metamorphic rock boundaries.

Significant ground water resources exist in the deep valley fill of the Long Valley-Round Valley area. Important aspects of the geologic framework that control the natural ground water hydrology are the steep granitic mountains in fault contact with a very thick (depth to 7,000 feet) accumulation of sedimentary materials in the valley (Kinoshita, 1962).

The upper hundred feet of Long Valley fill is comprised of sandy glacial outwash material, river alluvium, and minor amounts of finer-grained sediments of former boggy areas now buried. These sandy surficial materials have relatively high vertical and lateral permeability. Natural water tables are typically 10 to 20 feet deep beneath much of the main valley floor, and only a few feet above the elevation of the perennial streams that have cut narrow flood plains 10 to 50 feet into the outwash surfaces (U. S. Forest Service, et al., 1990). Ground water deeper than 100 feet may be confined and vertically separated from the shallow ground water by clay and silt layers. Geophysical logs indicate that the vertical permeability of the deep aquifers is very low.

Ground water recharge in Long Valley-Round Valley is from downward percolation of precipitation and snowmelt, runoff from surrounding uplands, and leakage from Payette Lake, Cascade Reservoir, and the North Fork Payette River and its tributaries. Irrigation raises the water table as close as ten feet to the surface along ditches and laterals, or where fields are flood irrigated.

Ground water in the lower Payette Valley occurs in three main aquifer zones associated with the surficial alluvial valley-fill deposits, underlying unconsolidated sediments, and older sedimentary and volcanic rocks. The first and most productive is a shallow zone in sand and gravel lenses of surficial deposits and terrace gravels (Savage, 1961; Steed, et al. , 1993). A second zone is an intermediate, warmer unit in sand layers within the blue clay of the Glenns Ferry Formation sediments. The third zone is generally more than 1700 feet deep in the lower Glenns Ferry Formation (Kinnison, 1955; Deick and Ralston, 1986; Steed, et al., 1993).

Most ground water wells in the valley are less than 100 feet deep. In most cases, well depths increase as the land surface elevation increases. Farther away from the floodplain and nearer the terraces, ground water is typically greater than 100 feet below the surface (Deick and Ralston, 1986). Between Emmett and Payette, thick deposits of clay confine sand and gravel aquifers, and as a result, flowing wells are common in this region (Kinnison, 1955; Deick and Ralston, 1986; Steed, et al., 1993).

Ground water in the Payette Valley is recharged by infiltration from irrigation, rivers and streams, septic/sewage system effluents, and precipitation in mountain areas. Near the river, ground water recharge is usually associated with flooding of the river itself. An unknown volume of water leaves the basin as ground water discharge to the Snake River (Deick and Ralston, 1986). The deeper aquifers are recharged mainly from the shallow aquifers and from stream flow along the Boise Front (Steed, et al., 1993).

Evaluations of water level contours suggest that ground water flows toward the Payette River from the highlands. The Payette River receives discharge from the ground water system along most of its course in the lower valley. A ground water divide exists along the ridge which parallels Interstate 84 on the south (Deick and Ralston, 1986; Steed, et al., 1993). Ground water to the southeast of this

divide flows toward, and an unknown volume is discharged to the Snake River (Deick and Ralston, 1986). Water north and east of the divide flows toward the Payette River. Seeps and springs at the foot of terraces that border the valley mark discharge from the shallow aquifers.

Ground water levels under natural conditions are generally highest in the spring and lowest in the fall. Late winter and spring are times of recharge from snowmelt, high streamflow, and increased rainfall. However, ground water levels in areas of intense surface water irrigation are lowest in the spring prior to the irrigation season, and highest in the fall at the end of the irrigation season. Ground water levels for wells in the valley indicate a direct relationship to intensive surface irrigation.

Springs

Map 8 shows spring locations identified through the Idaho Department of Water Resources water rights database and the Idaho Geological Survey (Mitchell, et al., 1986 and 1991). Springs are found throughout the Payette River Basin, but are conspicuously located along stream courses, canyons, or mountain bases where fractures and faulting allow ground water to discharge. Basin springs are most commonly found in fractured basalt, and fractured and weathered granitic rock.

Spring discharge rates in the Payette River Basin are small compared with spring discharge rates of 300 to 500 cubic feet per second from the Snake Plain Aquifer. Some of the larger discharge rates in the basin issue from drains in the lower Payette Valley. Ground water discharge to one drain is approximately 24 cubic feet per second.

Springs in the Payette River Basin are important water sources for domestic and livestock use. Basin springs are particularly significant water sources in mountainous areas, the Ola Valley, and the headwaters of Big and Little Willow creeks. Water appropriations from spring sources average 0.1 cubic feet per second in the Payette River Basin and total over 150 cubic feet per second.

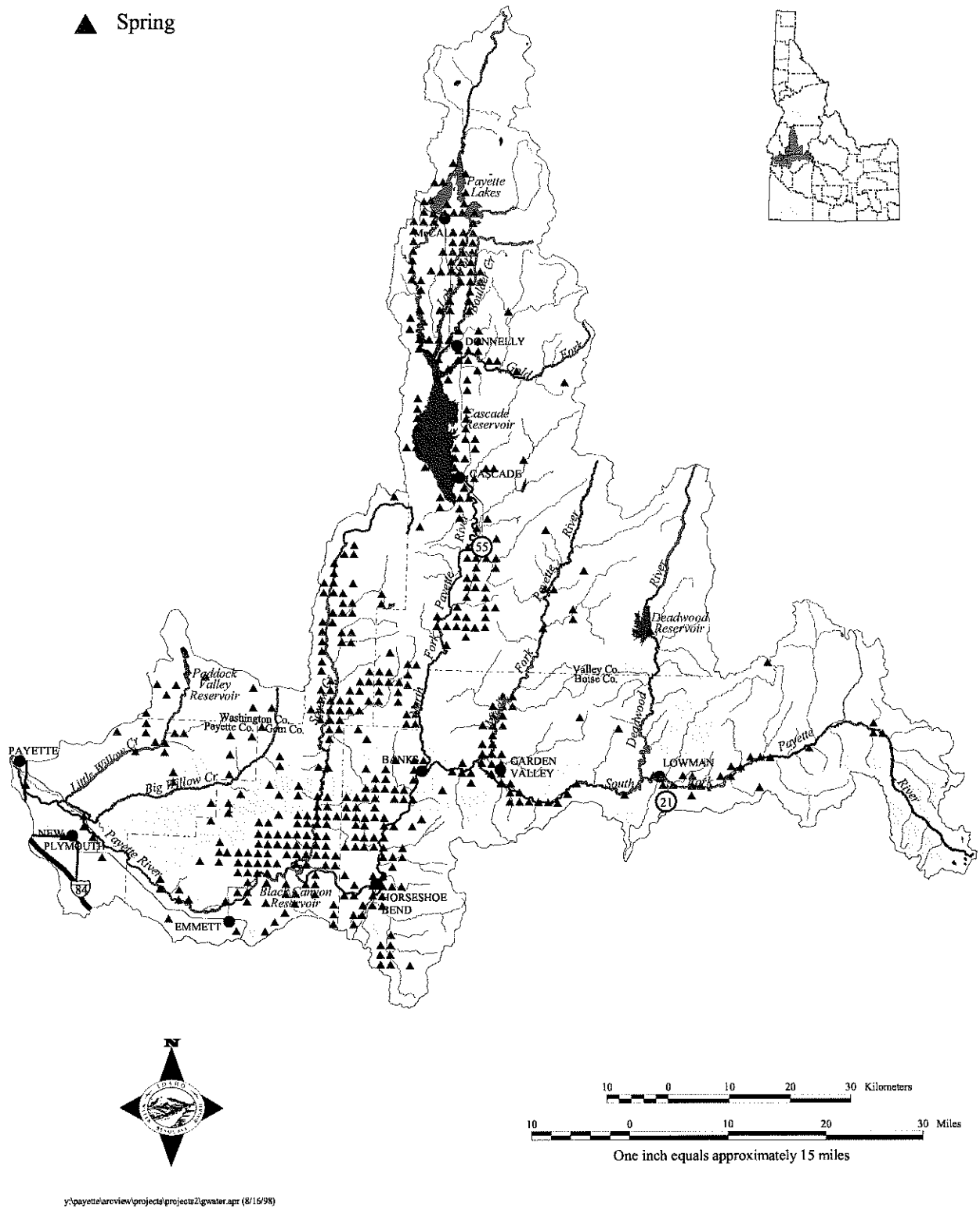
Geothermal Water Resources

In the Payette River Basin thermal water is encountered in rocks from Precambrian to Holocene age, and is used for many purposes discussed in the next section. Thermal springs issuing from granitic rocks appear in most instances to be associated with major regional fault structures, as demonstrated by their areal occurrence and alignment along major rivers. Thermal springs issuing from other rocks are randomly scattered, and probably are associated with local faulting (Ross, 1971; Mitchell, et al., 1980; Young, 1985). There are 31 thermal springs and 35 thermal wells identified in the Payette River Basin (Lewis and Young, 1980; Neely, 1997).

Thermal water in Idaho is generally defined as water with a temperature greater than 85°F. The temperature of geothermal water in the basin averages 100°F, but is as high as 250°F in several wells (Neely, 1997). Mitchell and others (1980), and Young (1985) estimated the subsurface or reservoir temperatures of several hot springs in the basin at more than 300°F.

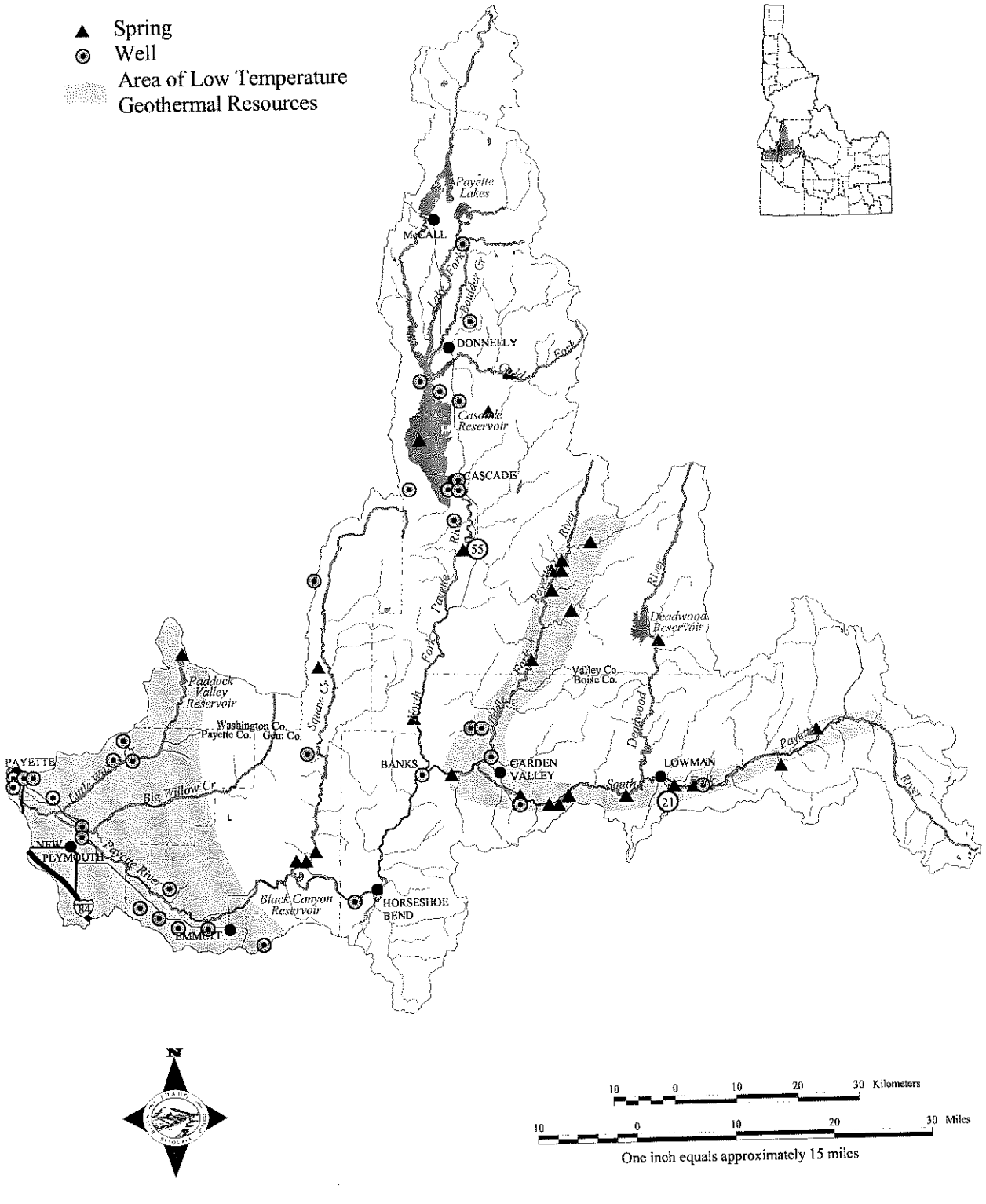
Thermal water discharge in the Payette River Basin ranges from less than one gallon-per-minute to over 500 gallons-per-minute (Lewis and Young, 1980; Mitchell, et al., 1980). Thermal springs discharge about 5,700 acre-feet of water annually (Lewis and Young, 1980). Map 9 shows the locations of identified thermal springs and wells in the Payette River Basin, and general areas of low temperature geothermal resources identified by the Idaho Department of Water Resources (Mitchell, et al., 1980; Neely, 1997).

Map 8. Springs



y:\payette\arcview\projects\project2\gwater.apr (8/16/98)

Map 9. Geothermal Sources



y:\payette\arcview\projects\projects2\gwater.apr (8/31/98)

There are more than a dozen thermal springs and wells in the Cascade-Gold Fork area. The hottest water (140°- 160°F) is at Cabarton Hot Spring. This spring flows about 60 gallons-per-minute from a coarse granite at the intersection of two faults (Ross, 1971). Two thermal springs are now covered by Cascade Reservoir.

More than a dozen thermal springs occur along the 60-mile east-west lineament that marks the South Fork Payette River (Ross, 1971; Young, 1985; Mitchell, et al., 1986 and 1991). All the springs are in granitic rocks, and have similar geologic occurrences and water chemistry. Although temperatures are variable (37^0 to 67^0 C), the water chemistries are amazingly similar (Lewis and Young, 1980). Total dissolved solids only range from 216 to 270 milligrams per liter - a very narrow range for water samples collected over a reach about forty miles in length. Specific conductances, alkalinity, and individual water quality variables also show results with very limited variability.

Temperatures are relatively high; the lowest is 124°F and most are greater than 140°F. The hottest water is at Bonneville Hot Spring on Warm Spring Creek. The thermal spring yields 350 gallons-per-minute of 187°F water from a fault in granite (Ross, 1971). Chemical geothermometers indicate that subsurface temperatures cool along a fairly systematic gradient from a high at Bonneville Hot Springs in the upper reach of the South Fork Payette River to a low near Danskin Creek Hot Springs. However, temperatures rise again to the west. Deer Springs, four miles west of Garden Valley, has a surface temperature of 178°F.

Eight thermal springs flow from granitic rocks along shear zones paralleling the Middle Fork of the Payette. Springs along the Middle Fork seem to lie along an extension of the same fault that acts as a conduit for springs along the South Fork of the Salmon River (Ross, 1971; Mitchell, et al., 1980). The hottest water (183°- 192°F) is at Boiling Springs. This spring discharges approximately 150 gallons-per-minute from coarse granite at the intersection of two faults (Ross, 1971). Thermal springs and many thermal wells are also located in the Garden Valley-Crouch area.

In the lower Payette River Basin, five springs and nineteen wells produce thermal water. Most wells in the lower basin tap water within a temperature range of only 68°- 84°F. However, the Rassmussen well in the Little Willow Creek drainage, with a depth of over 4,000 feet, produces water at 267°F (Neely, 1997). Generally, the deeper the well in the lower basin, the hotter the water. This also applies to hot springs. While the surface temperature of Roystone Hot Spring near Emmett is only 160 °F, Young (1985) calculates the deeper reservoir temperature of the hot spring at over 300°F. This temperature calculation is substantially higher than other basin thermal reservoir temperature estimates.

Water Allocation and Use

Water resources in the Payette River Basin have been extensively developed and appropriated for irrigation, power generation, domestic, commercial, municipal and industrial supply, wildlife, recreation and aesthetics, among others. Water allocation and use examines the use of water from two perspectives. First, the administrative allocation of water in the Payette River Basin for beneficial use by the Idaho Department of Water Resources is examined. Secondly, a description of specific water use categories is provided, including an estimate of the quantity of water associated with these uses.

WATER ALLOCATION

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 unappropriated 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 appropriations are administered by the Idaho Department of Water Resources following the prior appropriation doctrine, best described as "first in time - first in right."

The prior appropriation doctrine is a system of water law adopted by most western states. A water right is the right to divert the public waters of the state of Idaho, and put them to beneficial use in accordance with one's priority date. Water rights are issued by date of appropriation for specific quantities, diversion points, places of use, and purposes. Changes in water rights, such as diversion point or use, require application to and approval by the Idaho Department of Water Resources. If a change exceeds 50 cubic feet per second or 5,000 acre-feet, the change must be approved by the Idaho Legislature.

Surface and ground water rights in the Payette River Basin were decreed in a court of law as part of an adjudication begun in 1969, reviewing all water right claims filed before October 19, 1977. About 10,500 claims were filed. Partial decrees were issued, beginning in 1986 through 1990, for all but about 90 of the water right claims. With the exception of the Forest Service federal reserved right claims (approximately 49), the remainder have been resolved and are waiting for a decree to be issued.

The current Snake River Basin Adjudication will also examine water rights in the Payette River Basin. This process was prompted by the 1984 Swan Falls agreement between the state of Idaho and Idaho Power Company. Consequently, the Idaho Legislature determined that an adjudication of the entire Snake River Basin was in the public interest, and should proceed subject to the stated constraints regarding federal reserved right claims [Idaho Code 42-1406A].

The solicitation of water right claims for the Snake River Basin Adjudication began in February 1988. The Payette River Basin is the Department's Administrative Basin 65. More than 11,000 water right claims were filed in Basin 65. Water rights decreed in the Snake River Basin Adjudication will supercede decrees issued in the Payette River Basin Adjudication. A Director's report was filed in April 1998 that makes recommendations to the Snake River Basin Adjudication Court for nearly 9,000 stock and domestic water rights. A director's report to address water right claims for other beneficial uses is planned for publication in July 2000.

Figure 26 displays patterns in water appropriations for irrigation and non-irrigation uses in the basin from pre-1900 to the present. The information reflects the priority date of water right licenses, permits, and decreed rights from the Payette River Basin adjudication. Many irrigation appropriations occurred before 1900 and during the 1930 to1939 period. These reflect water rights acquired by canal companies operating in the lower Payette basin, and appropriations for U.S. Bureau of Reclamation projects, including Cascade, Deadwood and Black Canyon facilities. Surface water accounts for more than 98 percent of the basin's irrigation appropriations. Irrigation ground water appropriations have steadily increased over time, with this trend most noticeably beginning in the 1950s.

Non-irrigation appropriations include domestic, commercial, municipal, industrial, livestock, fish propagation, and other uses. Appropriations (in terms of flow rate) have been greatest in the period from 1960 to 1989, coinciding with population growth

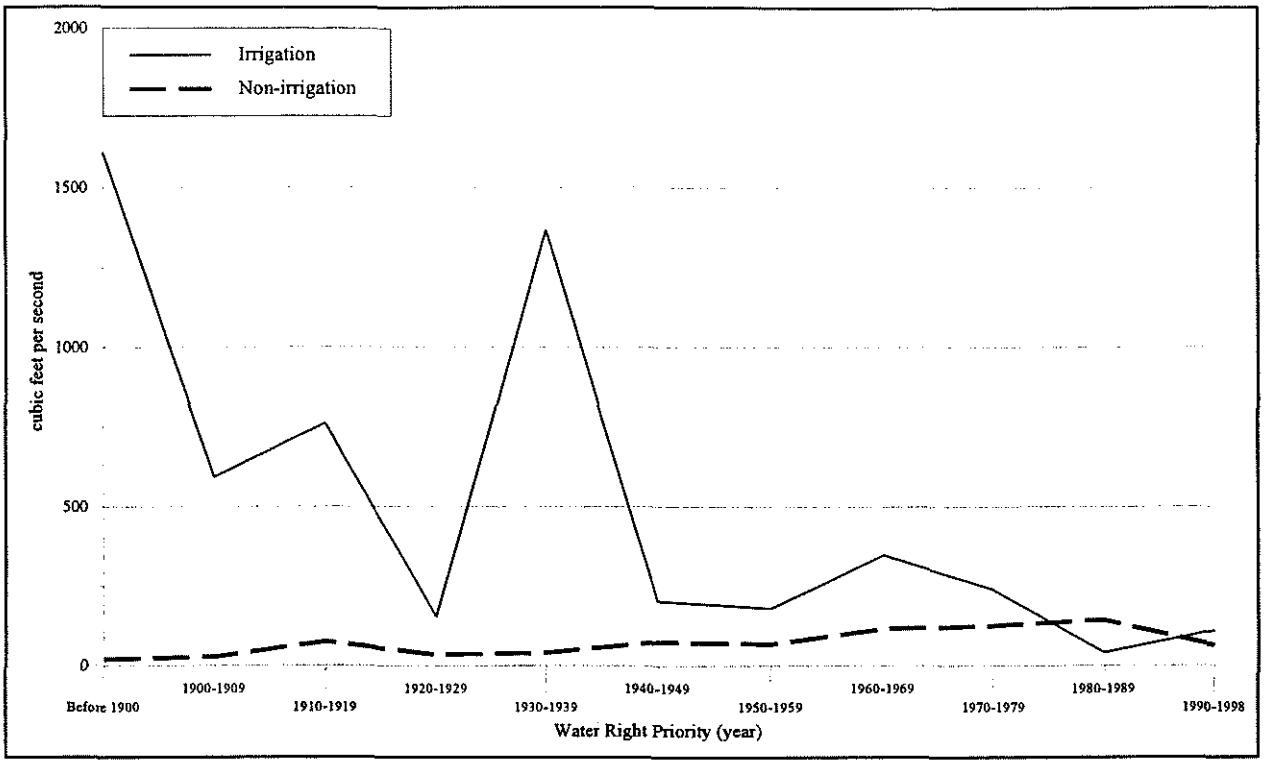


Figure 26. Water Appropriations in the Payette River Basin (in cubic feet per second). ***Note: The figure does not include hydropower or minimum stream flow appropriations.*** (Derived from a review of Idaho Department of Water Resources Water Rights Database).

in the basin. Total appropriations for non-irrigation uses are almost equally split between surface and ground water sources. Non-irrigation ground water appropriations exceed irrigation ground water appropriations in most decades.

Hydropower and minimum stream flow appropriations are not depicted in Figure 26. The major hydropower appropriations occurred in the 1920s reflecting the power development at Cascade and Black Canyon dams, in the 1970s reflecting the increased capacity at the Cascade hydropower facility, and in the 1980s for the Horseshoe Bend hydropower project. All approved minimum stream flow appropriations in the basin occurred in the mid to late-1980s when the Board filed applications for instream flows on reaches of the North Fork and South Fork Payette rivers (See Table 53, page 168).

Figure 27 summarizes the estimated volume of major surface and ground water right appropriations in the Payette River Basin as of 1998. Figure 27 does not include hydropower or minimum stream flow appropriations, as these are instream non-consumptive uses. The figure also excludes other non-consumptive uses and some minor consumptive use appropriations. These appropriation numbers do not equate to actual water use, but instead represent the sum of the water right licenses, permits, decrees, claims, and applications in the water rights database of the Idaho Department of Water Resources. They show a potential and theoretical maximum diversion that could be used under the rights. Total quantity appropriated exceeds actual water supply, as some water rights appropriate the return flows from water diverted upstream, are for non-consumptive uses, or have junior priority dates.

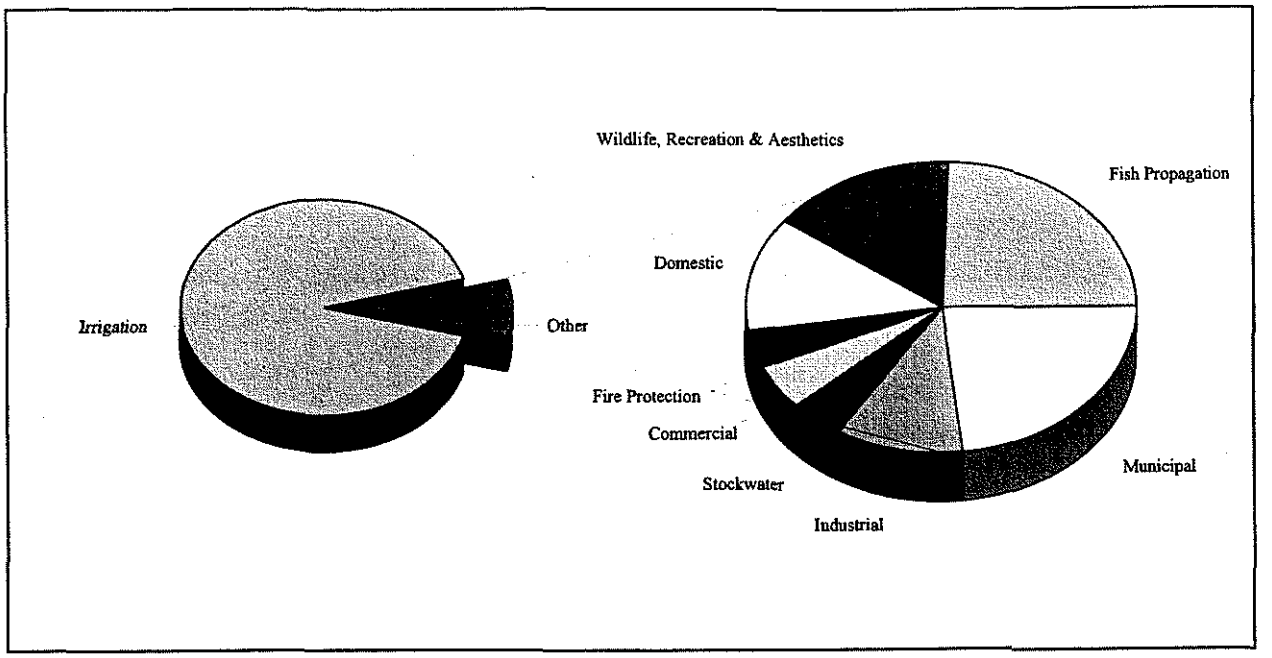


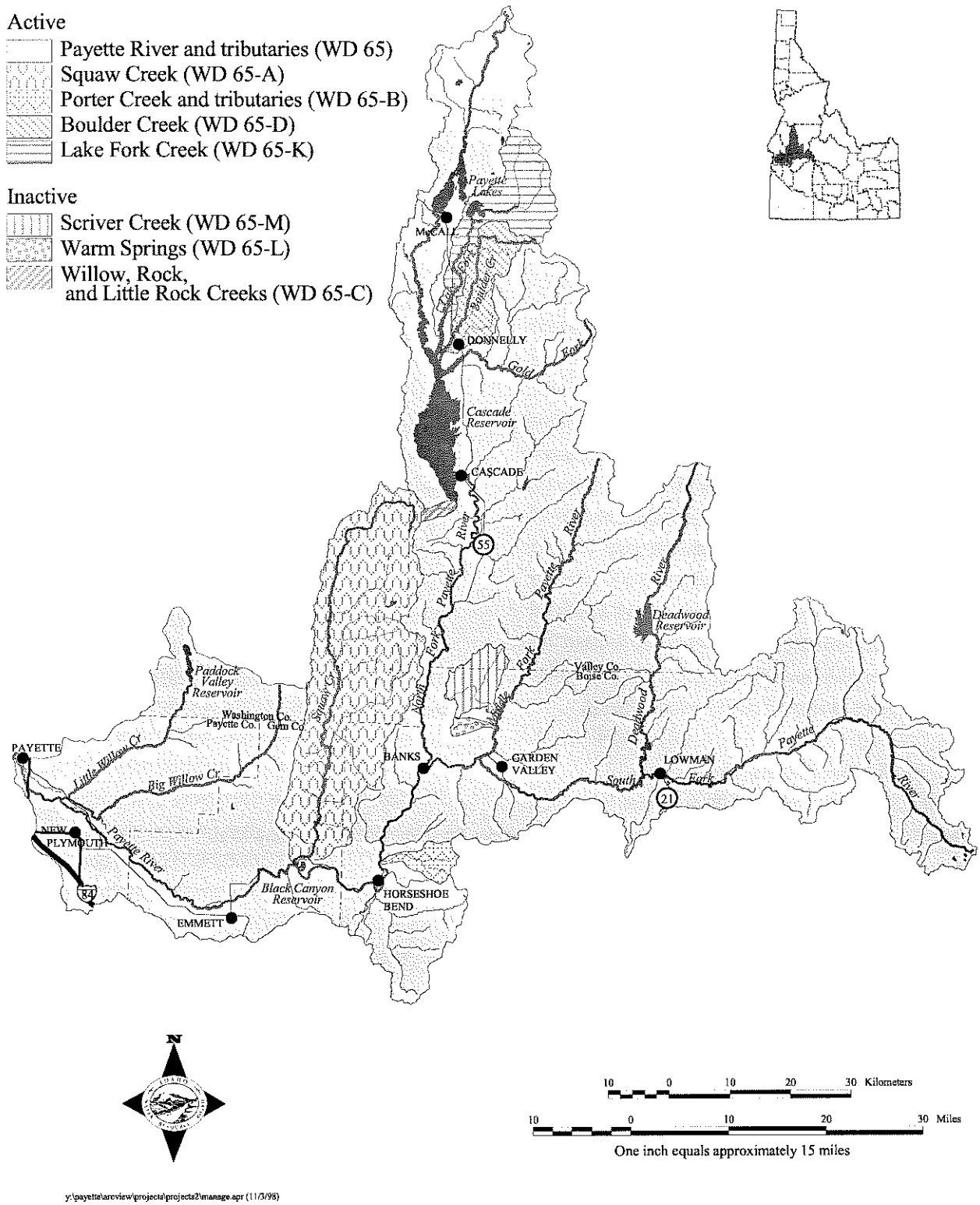
Figure 27. Water Appropriations in the Payette River Basin Based on Water Rights (in percent of estimated volume). ***Note: Hydropower and minimum streamflow water rights are not represented.*** (Derived from a review of the Idaho Department of Water Resources Water Rights Database.)

Water appropriations in the basin indicated in Figure 27, and excluding those mentioned above, total almost 2.3 million acre-feet. This represents the estimated volume of water that could legally be used under the water right license, if it were available. About one percent of these (based on volume) rely on ground water. Irrigated agriculture comprises ninety-one percent of this total. Municipal water supplies and fish propagation comprise the next largest water use, each encompassing about two percent of the total. (Fish propagation consists of hatcheries or fish ponds). Hydropower and minimum stream flow rights would add another 8.9 million acre-feet of non-consumptive use.

Water districts are created by the Director of the Idaho Department of Water Resources for areas that have been adjudicated by a court of law [Idaho Code 42-604]. Watermasters are responsible for distributing water in the district according to the water right priorities under the supervision of the Department. Water users in the water districts annually elect a watermaster who is then appointed by the Director of the Department. Eight water districts were created in the Payette River Basin. Three of these are inactive including the Willow, Rock and Little Rock Creeks - Water District 65C; Warm Springs - Water District 65L; and Scriver Creek- Water District 65-M. Water district boundaries are depicted in Map 10.

The majority of surface water in the basin is distributed through Water District 65, encompassing the portion of the Payette River Basin outside the other six water district boundaries. Water distribution in Water District 65 is accomplished through use of an automated accounting program, developed and housed in the Idaho Department of Water Resources. On a regular basis the watermaster calculates the amount of natural flow available, total

Map 10. Water Districts



y:\payette\arcview\projects\projects2\manage.apr (11/3/98)

diversions, and the amount of contract storage water used by each space holder. Measurements of flows and diversions are obtained from an automated system operated by the U. S. Bureau of Reclamation, known as the HYDROMET, which monitors several river gages. Additional information is obtained from automated headgates in the basin. Data not available through automation are acquired from measurements made by ditch riders, or estimated based on power records. Approximately one million acre-feet of water, predominately for irrigation, was delivered within Water District 65 in water year 1996 (November 1, 1995 to October 31, 1996). This quantity varies each year, depending on water demand and availability. Factors affecting availability are precipitation, snowpack, and carry over of storage.

WATER USE

Although irrigation is by far the largest consumptive use of available water in the basin, other offstream and instream water uses are important to the area's economy. Processing and manufacturing industries depend on an ample supply of good quality water. Municipal water supplies, hydroelectric power generation, fish, wildlife and the recreation/tourism industry in the basin are dependent on river flows, spring flows, lake and reservoir levels, and good quality water. Though small relative to other uses, domestic, commercial, industrial, and stock water use are essential to residents of the basin. Table 14 summarizes the estimated volume of water use within the Payette River Basin in 1996 by type of use.

Irrigated Agriculture Water Use

The Payette Valley is one of the most productive agricultural areas in Idaho. Over forty different crop varieties are grown in the basin under numerous types of irrigation systems. Based on acres harvested, major crops are alfalfa, wheat, sugar beets, and assorted fruits and vegetables (corn and onions). These commodities provide the raw products for food and seed processing plants located throughout the area.

Irrigation of agricultural land accounts for about 97 percent of offstream water use in the Payette River Basin. In 1996 about 190,000 acres were irrigated using more than 1.15 million acre-feet of Payette River Basin water, of which about 43,000 acres are located in the Boise River Basin (U.S. Department of Agriculture, *1996*; Idaho Department of Water Resources 1998; Orr, 1998). About 281,000 acre-feet was diverted into the Boise River Basin (Orr, 1998). Map 5 shows most of the irrigated acreage in the Payette River Basin is located in two areas: (1) the

Table 14. *Estimated* Water Used by Categories in the Payette River Basin for 1996 (acre-feet).

Water Use	Acre-feet
Irrigated agriculture	1,155,546[1]
Stock water	1,231
Domestic/ Commercial / Municipal	11,188
Industrial	20,690
Power generation	4,021,708

[1] An estimated 281,000 acre-feet of this total is diverted for use in the Boise River Basin (Orr, 1998).
Source: Compiled by Idaho Department of Water Resources from various sources.

lower Payette Valley downstream from Emmett, and (2) Long Valley between McCall and Cabarton. The smaller irrigated areas, generally located in tributary valleys, commonly produce forage crops for livestock and small grains.

Based on estimated irrigation diversions for water year 1996, surface water supplies about 1.10 million acre-feet. Approximately 996,000 acre-feet are diverted from the Payette River and 107,000 acre-feet from tributaries. Ground water diversions supply an estimated 52,000 acre-feet to agricultural lands. About 75 percent of basin ground water withdrawals take place in the lower Payette Valley.

Twenty-seven canals and ditches, and 59 pumps divert and deliver water from the Payette River to irrigated farmsteads below Gardena (Howe, 1996). Map 11 shows major diversions and inflows comprising some of the water delivery network to these lands. Water from storage comprised about 13 and 21 percent of annual diversions below Gardena in 1995 and 1996 respectively. In low runoff years, such as 1994, storage provided 55 percent of annual diversions.

Surface water sources have been adequate to serve irrigation needs in average water years, and ground water has not been exploited to a significant degree. Water for irrigation is delivered through several large gravity canal systems developed by irrigation companies in the early 1900s. Virtually all the crop land is furrow irrigated, however, approximately 26,404 acres in the Payette River Basin are irrigated by sprinklers (McAndrews, 1992). For marketing and storage reasons, furrow irrigation is the preferred method of irrigating seed crops and onions.

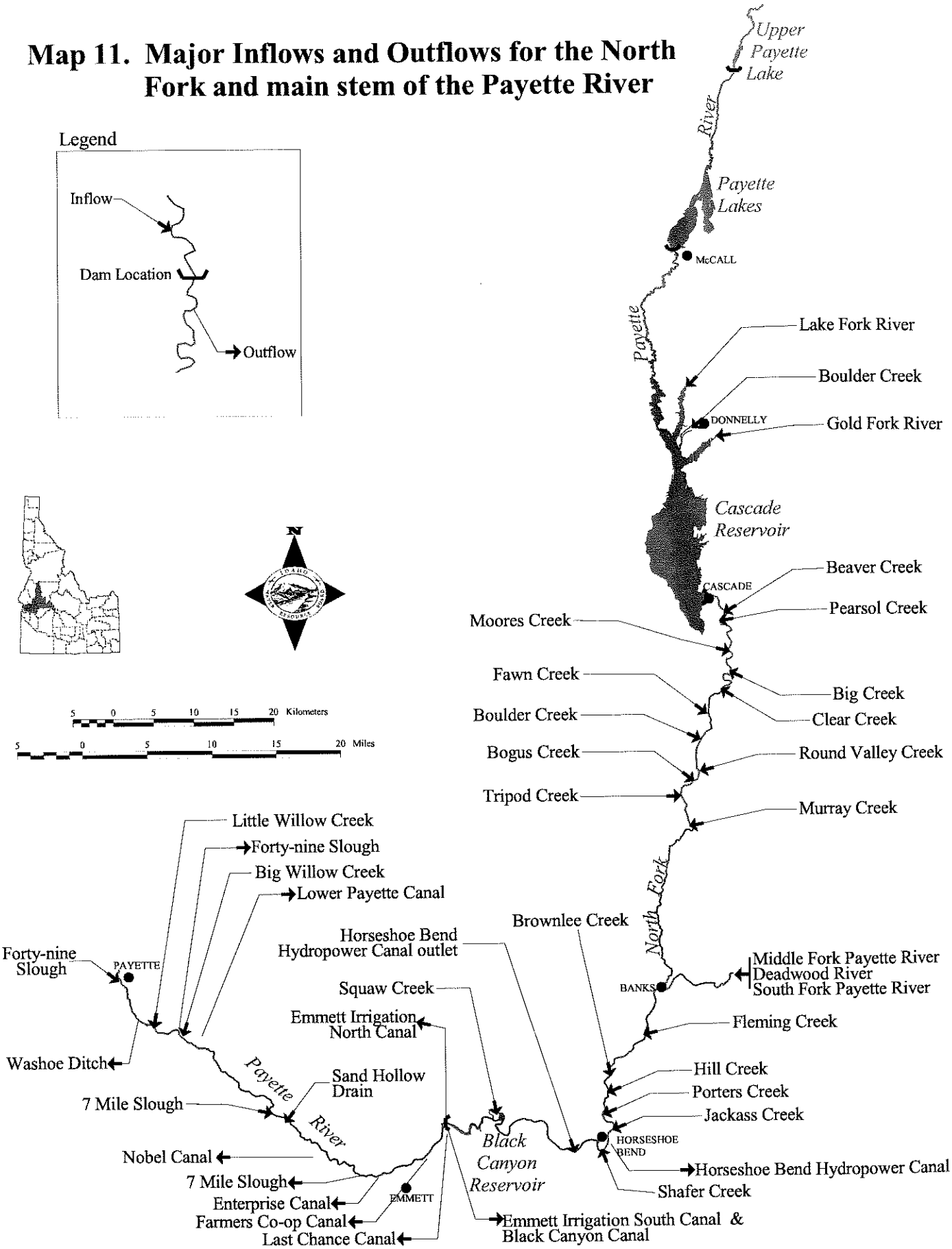
Irrigation requirements vary from year to year, depending on temperature, the amount and seasonal distribution of precipitation, and crop type. Winter, spring, and fall precipitation will reduce irrigation water withdrawals, if adequate soil moisture delays the start of irrigation in the spring or hastens its end in the fall. Scant precipitation during summer months has less effect on irrigation water withdrawals. Average crop consumptive irrigation requirements range from 1.33 acre-feet per acre annually for grains (barley, oats, and wheat) to 2.69 acre-feet per acre annually for alfalfa (U.S. Natural Resources Conservation Service, 1991). Generally, alfalfa, sugar beets, pasture, and potatoes have the highest consumptive water use rates in the basin.

The Idaho Department of Water Resources estimated irrigation water management efficiency in the Payette River Basin at about 32 percent for 1996. This was estimated by determining the consumptive water use for each crop type irrigated in the basin for that year. The amount of water applied to crops generally exceeds irrigation water requirements because of on-farm losses. Water evaporates from exposed water surfaces in gravity-distribution systems. Runoff and seepage occur when more water is applied than can be evapotranspired, or absorbed and retained by the soil. Water also seeps from unlined ditches.

Stock Water Use

Livestock numbers in the Payette River Basin total more than 70,000 head. About ten percent of the cattle are dairy cows and about 4.5 percent of livestock are sheep (Idaho Agricultural Statistics Service, 1996). Livestock enterprises are important in all parts of the basin, but they are relatively more important in the high valley areas. In these areas, practically all agricultural activities are associated with livestock production, with hay and pasture produced on private lands, and grazing on public lands.

Map 11. Major Inflows and Outflows for the North Fork and main stem of the Payette River



Livestock water use in the Payette River Basin is an estimated 1,231 acre-feet annually. Dairy industry withdrawals are an estimated 300 acre-feet of that total. As a general rule, one range cow consumes 10 to 15 gallons of water per day, but dairy cows require about 35 gallons-per-day (Moore, 1966).

Livestock water use includes water for both stock watering and other on-farm needs aside from irrigation. The U.S. Geological Survey estimates that approximately 60 percent of water used for livestock in the Payette River Basin is provided by ground water (Maupin, 1997). Livestock water supplies are usually developed by private individuals. On the range and in the mountains, livestock usually water freely from streams or springs unless watering stations have been developed.

Domestic, Commercial, Municipal and Industrial Water Uses

Domestic, commercial, municipal, and industrial water use is relatively small, but essential to human life and economic development. Domestic and commercial water use includes drinking, food preparation, washing, and lawn and garden watering. Municipalities supply water not only to residences and commercial enterprises, but also to schools, fire departments, and municipal parks. Industrial water use incorporates manufacturing processes, cooling, and employee sanitation.

Domestic, commercial, municipal, and industrial water demand is increasing due to population growth. The Payette River Basin's population has increased nearly 73 percent in the twenty-six years between 1970 and 1996. The cities, which are the fastest growing areas, may require new water supplies to provide for additional people. As the industrial potential of the area is developed, water requirements for industrial use will also increase. While the basin is not considered to be limited in water supply, most of the water is allocated to other uses. Locating additional supplies for domestic, municipal, commercial, and industrial uses may require administrative actions, policy changes, or reallocation to make additional water supplies available for these uses.

Ground water supplies at least 75 percent of the domestic, commercial, and municipal water demand in the basin. Exact water use quantities are difficult to define, because many individuals, businesses, and communities do not have water meters.

Withdrawals for domestic, commercial, and municipal water use in the Payette River Basin total an estimated 11,200 acre-feet per year (Idaho Department of Water Resources, 1998). Municipal and domestic estimates for the Payette River Basin were derived by summing documented annual water use for municipal systems with estimated use for the remaining population based on average water use per day. More than 50 percent of basin households rely on municipal or public drinking water systems. Forty-four percent use individual wells (Table 15). Public drinking water systems are water supply systems with ten or more hook-ups.

Municipal Water Supply and Uses

Many communities in the basin are trying to expand and upgrade their water systems. Improvements range from new wells, storage tanks, and pipelines to water treatment facilities. Some communities have paid for these improvements without outside help, but most have made use of public funding programs. Table 16 and the following section summarize municipal water supplies in the basin and projected demand.

Table 15. Source of Water for Housing Units by County.

Source	Boise	Gem	Payette	Valley	Basin Total
Public system or Private Co.	1,134	1,839	3,858	3,769	10,600
Individual Wells	1,322	2,794	2,633	2,533	9,282
Other	438	92	29	338	897

Source: U.S. Bureau of Census, 1990.

Table 16. Summary of Municipal Water Use and Needs.

Municipality	Population Served	Water Supply (Water Rights)	Peak System Capacity	Projected Ave. Demand (2010)	Water Source
McCall	2700 hook-ups	9.71 MGD	6.0 MGD	1.56 MGD	Payette Lake (primary) & groundwater
Cascade	6500 people	1.36 MGD 3.0 MGD (back-up)	1.87 MGD	0.66 MGD	ground water Campbell & Hazard Cr. (back-up)
Donnelly	95 hook-ups	1.6 MGD	0.059 MGD	0.05 MGD	ground water
Horseshoe Bend	321 hook-ups	1.43 MGD 0.70 MGD	0.50 MGD	0.31 MGD	Payette River groundwater (wells abandoned)
Emmett	2700 hook-ups	9.5 MGD	2.5 MGD	1.28 MGD	ground water
New Plymouth	657 hook-ups	2.99 MGD	2.66 MGD	0.45 MGD	ground water
Fruitland	1074 hook-ups	3.84 MGD	1.25 MGD	0.97 MGD	ground water
Payette	2300 hook-ups	6.64 MGD	2.23 MGD	1.31 MGD	ground water

MGD = million gallons-per-day

Source: Compiled by Idaho Department of Water Resources from various sources.

Current water supply for each municipality was derived from a review of water right appropriations for that community, and represents a best case estimate. Actual supply may be limited by infrastructure capacity, diversion rates, or the priority date of the water right. The peak capacity of the water supply system for each community is displayed in Table 16. Industry standards suggest peak capacity should be about 2.5 times the continuous usage rate. Projected demand was calculated by determining average daily per capita use based on current water use, and applying this number to the projected population for 2010. This number reflects the average daily use projected for 2010 and does not address peak demand. Appendix D contains maps delineating the water systems for these municipalities.

City of McCall

Current Water Supply: The City of McCall uses surface water from Payette Lake as its primary water source. In 1996 the city started construction of

a water treatment plant to meet Safe Drinking Water Act requirements. Infrastructure upgrades included providing for storage, piping, isolation of the golf course, and meters to all units. Phase 1, consisting of water distribution improvements, pumping station modifications, and water treatment plant construction for disinfection, has been constructed. Phase 2 will require an additional $4 million to implement filtration (Kimball, 1997).

About 7 percent of the hook-ups serve commercial water users, including motels, restaurants, and other retail businesses. No major industrial users rely on the municipal system. Most areas outside city limits are on individual wells. Over 300 lakeside households are on independent water systems that draw their water supply from the lake (Johnson, 1996).

Projected Water Demand and Needs: The water treatment plant has a capacity of 6 million gallons-per-day which is the estimated peak demand for the year 2004 (Kimball, 1997). Preliminary review indicates the City has sufficient water rights to meet the 2004 estimated peak demand and the projected average daily demand to at least 2010. However, eight percent of water used in 1997 was purchased from the rental pool (See page 165, describing rental pools). The immediate need is funding to construct Phase 2 of the water treatment plant, so that McCall can meet drinking water standards. The City may need to examine whether current facility capacity will meet peak demands beyond the year 2004.

City of Donnelly

Current Water Supply: The City of Donnelly acquires its water supply from a well that taps the deep aquifer at a depth of 522 feet. This well was recently constructed with financial assistance from the Board. Previously, the City relied on three wells pumping from a shallow production zone. The water distribution system includes two storage tanks. Treatment involves disinfection by chlorination. Commercial users include several local businesses.

Projected Water Demands and Needs: Preliminary review indicates water rights are adequate to meet the water needs for projected population growth. However, the current peak capacity of the system may need to be reexamined to serve this growth.

City of Cascade

Current Water Supply: Water is supplied by four wells on the south end of Cascade Reservoir. The first of these wells was constructed with funding assistance from the Board. The remainder of the wells were constructed in 1996. Prior to 1988, Cascade relied on surface water from Campbell and Hazard creeks treated in the West Mountain water treatment plant. This facility is now used as a back-up supply. A small dam at Skein Lake also diverted water into this plant in the past, but is no longer functional.

Projected Water Demand and Needs: Cascade currently has ground water rights to provide up to 1.36 million gallons-per-day. Projected peak water demand for 2010 is 1.6 million gallons-per-day. To meet future water demands Cascade either needs to acquire additional ground water rights, or invest in expensive upgrades to the West Mountain treatment plant to allow its surface water to be used as a primary water supply.

Horseshoe Bend

Current Water Supply: Horseshoe Bend's water supply system was constructed in 1968. Originally five wells tapping into the shallow aquifer supplied municipal water. The community began to divert water from the Payette River in 1976, because of water quality problems with the wells. The flow of the Payette River is not adequate to provide water at all times given the junior priority date of the water right. Horseshoe Bend has had to purchase water from the rental pool to meet demand when its Payette River water right is not in priority. In 1996 Horseshoe Bend purchased one-third of its water supply from

the rental pool. The city recently completed a water treatment plant upgrade to process Payette River water to meet Federal Safe Drinking Water Act standards. A major industrial user was the Boise Cascade Corporation, but the mill closed in September 1998.

Projected Water Demand and Needs: The junior water right requires purchase of water from the rental pool, raising concerns about the lack of a secure supply of water to meet current and future demand. Horseshoe Bend needs to examine securing a water right with a senior priority date, or some other avenue to obtain a more secure water supply. Closure of Boise Cascade's mill is estimated to reduce current water demand by 10 to14 percent. Associated economic impacts from mill closure, such as people moving to other areas to pursue work, and reduced property taxes, may affect Horseshoe Bend's ability to pay the long-term debt incurred for the recently completed water treatment plant.

City of Emmett

Current Water Supply: The City of Emmett relies on four primary wells and two back-up wells for municipal water supply. There are no major commercial or industrial water users relying on the municipal water supply. The cemetery and golf course are irrigated with separate wells. Schools are the major water users.

Projected Water Demand and Needs: A preliminary review indicates the City of Emmett has sufficient water rights to meet projected demand. Infrastructure needs include minor remodeling of the mixing capacity for water treatment and more water storage capacity (Evans, 1998).

City of New Plymouth

Current Water Supply: The City of New Plymouth obtains its water supply from four wells, one of which is used for back-up only. In 1995 the Board helped reduce demands on the municipal water system by assisting in financing the development of an alternative surface water source to irrigate the City's thirteen acre park. In November 1997 the city undertook a major water system improvement project that included construction of a new well, 300,000 gallon storage tank, and replacement of many water mains. These upgrades were designed to accommodate population growth through 2017.

Projected Water Demand and Needs: New Plymouth has a water right and water right claims totaling almost 3 million gallons-per-day. Water quality from the wells complies with current Safe Drinking Water Act requirements without treatment. No immediate need for additional infrastructure or water supply is foreseen.

City of Payette

Current Water Supply: Municipal water is supplied by seven wells. A separate well irrigates the golf course. In 1996 the major industrial user, a food processor, used forty percent of municipal water delivered (Gabiola, 1997).

Projected Water Demand and Needs: A preliminary review indicates the City has adequate water rights to meet projected demand. Examination of peak system capacity to meet projected future demands may be beneficial.

City of Fruitland

Current Water Supply: The City of Fruitland relies on ten wells to provide municipal water. Eighty percent of the water comes from the wells tapping the shallow aquifer at about 70 feet (Campbell, 1997). The City currently has a water right permit to appropriate water in the deeper aquifer at a depth of about 400 feet. About 25 percent of water delivery in 1996 was to the two major industrial users

in Fruitland -- the Coca Cola bottling plant and a frozen food processor.

Projected Water Demand and Needs: A preliminary review indicates the City of Fruitland has sufficient water rights to meet projected demands. The peak production of the current water supply system (1.25 million gallons per day) equates to 1.6 times the continuous usage rate (0.78 million gallons per day). The City will probably have to upgrade system capacity to meet peak water demands and fire protection flows.

Industrial Water Uses

The food processing and timber industries are the primary industrial water users in the Payette River Basin. The industrial water requirement in the basin is approximately 20,600 acre-feet annually. Most large industrial water users have developed independent ground water supplies, although municipal or public supply systems deliver to some manufacturing uses in Fruitland and Payette.

Food-processing industries withdraw relatively large volumes of water for meat packing and fruit and vegetable preparation and preservation. Withdrawals for food processing have a distinct seasonal pattern. Water use for potato processing is highest from September through March. Water use for canning and freezing of fruits and vegetables peaks from July through October. Water use for milk- and meat-processing industries is relatively constant throughout the year.

Fish production, or aquaculture, in the Payette River Basin uses, non-consumptively, an estimated 15,000 acre-feet of water per year (Maupin, 1997). There are two licensed fish producers in the Payette River Basin, and a federal hatchery facility at McCall on the North Fork Payette River which is operated by the Idaho Department of Fish and Game. The two private fish producers in the basin raise fish for pond stocking and fee fishing. The federal hatchery at McCall raises summer chinook salmon for release in the South Fork Salmon River. The facility also serves as a redistribution center for rainbow trout and a rearing facility for westslope cutthroat trout. The rainbow and westslope cutthroat trout are released in the region's high mountain lakes (Rogers, 1997).

The forest products industry requires water for lumber and wood products manufacturing, and storing and moving logs. Water rights have also been acquired for fire protection.

Sand and gravel processing is the primary use of water in the basin by the mining industry. Water is essential in mining and processing minerals, however, total water requirements of the industry are small. The U.S. Department of the Interior has estimated that the mining industry consumes less than one-half of one percent of all diverted water, and recycles the same water several times (U.S. Geological Survey, 1991). The mining or minerals industry in the Payette River Basin diverts an estimated 200 acre-feet annually (Maupin, 1997).

Water Used for Power Generation

More than 4 million acre-feet passed through hydropower plants located at Cascade Reservoir Dam, Horseshoe Bend, and Black Canyon Dam in 1996. This quantity was estimated by comparing power plant capacity with river flows occurring below these hydropower plants. An assumption is that each plant diverts up to its maximum capacity through its turbines. Most hydropower plants in the basin operate as run-of-the river, meaning water is not released from storage reservoirs specifically for power generation. An exception is a minimum 200 cubic feet per second release from Cascade Reservoir to fulfill Idaho Power Company's natural flow right for power generation.

Idaho Power Company's Power Plant at Cascade Dam can divert up to 2300 cubic feet per second through its turbine. The Horseshoe Bend Power Plant diverts flows above 420 cubic feet per second, and up to 3500 cubic feet per second, into its power canal. The hydropower plant capacity at Black Canyon Dam is 1600 cubic feet per second.

Geothermal Water Use

Geothermal energy has been used in southwest Idaho since human occupation. Table 17 summarizes current geothermal water use in the Payette River Basin. Space heating is the most common use of geothermal water in the basin in terms of number of developments. The largest quantity of geothermal water is used for fish production and recreational uses. Several hot spring resorts operate in the basin. The U.S. Forest Service uses hot springs for shower facilities at some campgrounds. Greenhouse operations using geothermal energy are located on the South Fork Payette River. Stock watering in winter is another important use.

Water Development and Management

IRRIGATION STORAGE DEVELOPMENT

Since the early part of the century, the need for water storage to supplement natural flows during the irrigation season was recognized in the Payette River Basin. In 1902 the first storage project in the basin was completed by the Roseberry Irrigation District at Boulder Lake. Paddock Valley Reservoir was the first storage project in the lower basin, constructed on Little Willow Creek in 1917 by the Little Willow Irrigation District. In 1921 the Lake Reservoir Company, representing the Emmett Irrigation District, the Farmers' Cooperative Ditch Company, the Enterprise Ditch, the Letha Irrigation District, and the Lower Payette Canal Company, installed outlet works to store water and control releases at Payette Lake. In 1926 storage was added to Little Payette Lake with the construction of an earth and rockfill dam at the outlet.

Federal water development projects were constructed in the Payette River Basin by the U.S. Bureau of Reclamation as part of the Boise Project. The Boise Project, encompassing the Payette Division, Boise Division, and Succor Creek Division, was proposed in 1905. The irrigation service area for the Boise Project encompasses a total 400,000 acres, with 120,000 acres located in the Payette River Basin (U.S. Bureau of Reclamation, 1996).

Portions of the Boise Project located in the Payette River Basin include Black Canyon Dam (a diversion dam) and two storage facilities (Cascade and Deadwood reservoirs). Information about these facilities are provided in Table 18. Black Canyon Dam was constructed in 1924 as a diversion structure for

Table 17. Estimated Geothermal Water Use in the Payette River Basin, 1995.

Use	No. of Developments	Estimated Annual Use (acre-feet)
Fish Production	1	40,000
Recreation	38	14,200
Space Heating	300	8,600
Greenhouse	10	6,200
Stock Water	13	230

Source: Derived from a review of the Idaho Department of Water Resources Water Rights and Adjudication Claims databases.

Table 18. Payette River Basin Water Storage Projects with a Capacity Greater than 250 Acre-feet.

Name	Owner or Operator	Stream	Storage Capacity (acre-feet)	Purpose*
North Fork Payette Subbasin				
Blackhawk Lake	LB Industries, Inc.	Duffner Creek	1,630	I
Boulder Lake	Roseberry Irrigation District	Boulder Creek	1,800	I
Boulder Meadow	Private	Boulder Creek	550	I
Box Lake	Lake Reservoir Company	Box Creek	1,295	I
Browns Pond	Private	Lake Fork	1,043	I
Cascade	US Bureau of Reclamation	NF Payette	653,200	IFP
Corral Creek	Private	Corral Creek	560	I
Davis	Private	Mud Cr & Pearsol Cr	1,200	I
Herrick	Private	Skunk Creek	562	DI
Horsethief	Idaho Department of Fish and Game	Horsethief Creek	4,900	RHG
Granite Lake	Lake Reservoir Company	Lake Creek	2,900	I
Jemima K	Private	W Fk Beaver Creek	3,000	I
Jug Creek	Jug Creek Reservoir, Inc.	Jug Creek	1,132	SI
Knox Meadow	Private	Lake Fork	1,073	I
Little Payette Lake	Lake Fork Irrigation District	Lake Fork	17,000	I
Louie Lake	Boulder Irrigation District	Louie Creek	400	I
Payette Lake	Lake Reservoir Company	NF Payette	41,000	I
Tom J	Private	Beaver Creek	2,950	I
Upper Payette Lake	Lake Reservoir Company	NF Payette	3,000	I
South Fork Payette Subbasin				
Deadwood	US Bureau of Reclamation	Deadwood River	161,900	ICR
Main Payette Subbasin				
Black Canyon	US Bureau of Reclamation	Payette River	29,822	IP
Bettis	Private	Dry Creek	1,060	I
Hidden Lake	Hidden Lakes, Inc.	Padget Creek	375	RH
Little (Van Duesan)	Private	Bissell Creek	1,228	SI
Paddock Valley	Little Willow Creek Irrigation District	Little Willow Creek	36,400	I
Sage Hen	Squaw Creek Irrigation	Sage Hen Creek	5,210	DI

* D = Domestic; F = Flood Control; G = Wildlife Propagation; H = Fish Propagation; I = Irrigation; P = Power; R = Recreation; S = Stock water

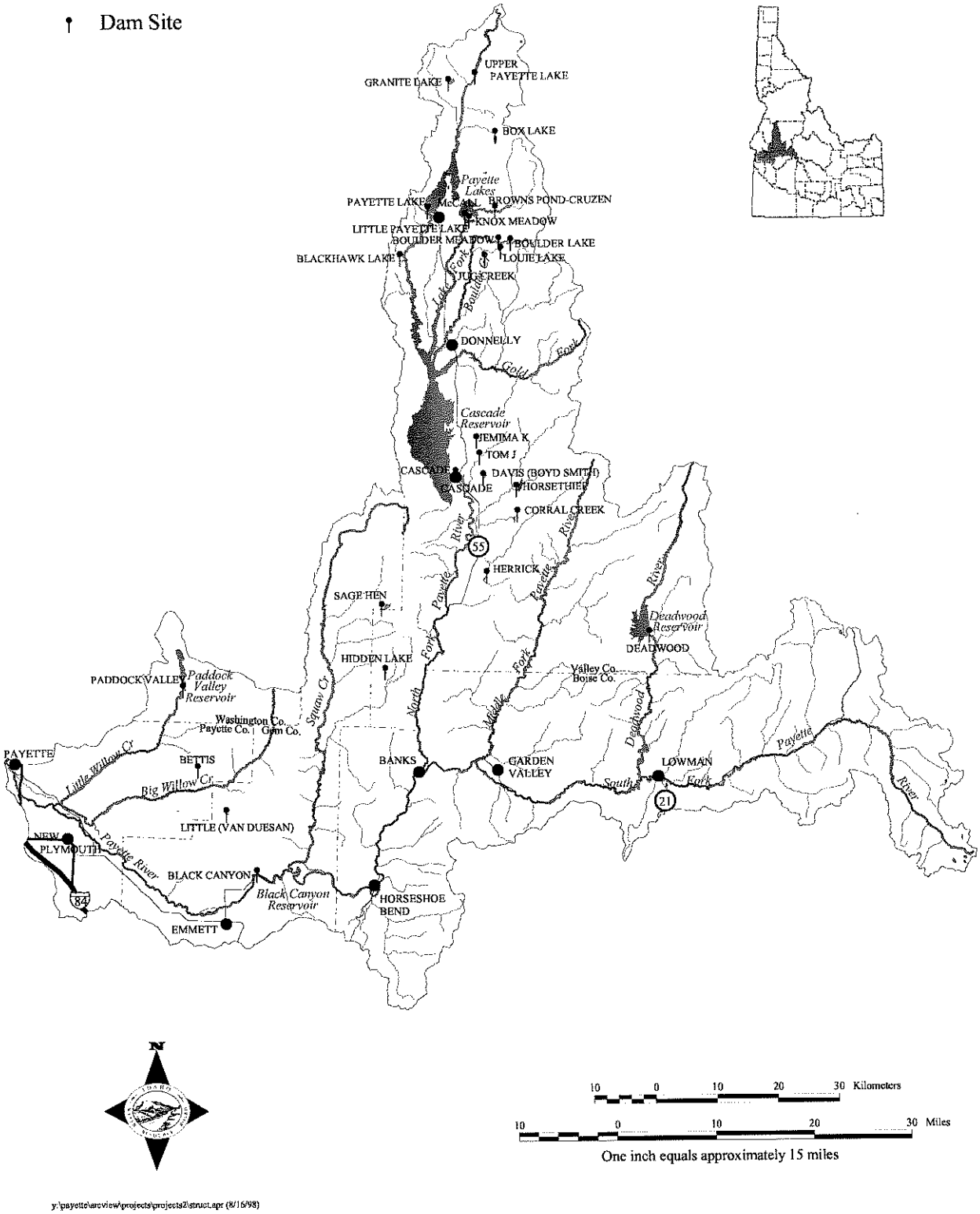
Source: Derived from the Idaho Department of Water Resources Dam Safety and Water Rights databases.

the Black Canyon Canal. Deadwood Dam, completed in 1931, was the first major storage structure on the Payette River. The project was built to store water to generate electricity at Black Canyon Dam to power project pumps. Cascade Dam was constructed on the North Fork Payette in 1946-48.

WATER STORAGE

In 1996 reservoir storage space in the Payette River Basin totaled more than one million acre-feet. Cascade Reservoir, on the North Fork of the Payette River, is the largest reservoir in the basin with a total capacity of 704,000 acre-feet. Map 12 displays the location of Payette River Basin reservoirs with a storage capacity greater than 250 acre-feet. Table 18 lists ownership, water source, storage capacity, and project purpose. Thirty-eight smaller reservoirs also impound basin runoff with storage capacity ranging from 4 to 200 acre-feet and averaging 70 acre-feet.

Map 12. Dams with Reservoir Capacity greater than 250 acre-feet



Potential Reservoir Sites

Population growth and economic development will bring additional demands on the basin's water resources. The construction of additional reservoirs may be needed to improve flood management, or accommodate growing municipal demands. Table 19 provides an initial inventory of potential reservoir sites identified in past investigations. Sites that were identified for hydropower, but show some potential for storage are included. None of these sites have been evaluated for economic or environmental feasibility. The Gold Fork site is reserved as a potential storage reservoir in the Board's 1996 *Idaho State Water Plan.*

FLOOD MANAGEMENT

Flood control operation on the Payette River relies on upstream storage at Cascade and Deadwood reservoirs, and a system of levees along the lower reaches of the Payette River. Although flood control was not included in the authorized purposes of Cascade and Deadwood dams, the U.S. Bureau of Reclamation makes releases from these dams by an informal agreement according to flood control rule curves (U.S. Bureau of Reclamation, 1996). Releases from Cascade and Deadwood reservoirs are coordinated in an attempt to limit flows at Horseshoe Bend to 12,000 cubic feet per second. This is not always possible as 65 percent of the basin is not regulated. Reservoir releases for flood control are dependent on the amount of storage that must be evacuated with respect to runoff forecasts. Flood control operations designate 80 percent of flood control space to Cascade Reservoir and 20 percent to Deadwood Reservoir (U. S. Bureau of Reclamation, 1996 and 1997).

Cascade and Deadwood reservoirs reduced the flood peak at Emmett in 1964 by nearly 9,000 cubic feet per second, and in 1997 reduced the peak at Emmett by approximately 14,000 cubic feet per second (Wells, 1997). However, runoff from areas below 5,000 feet in elevation have produced the largest flood-stage flows. There is no regulation of low elevation runoff. Flood regulation by these reservoirs decreases above the 100-year recurrence interval, and is uncertain to non-existent at the 500-year recurrence interval (U. S. Army Corps of Engineers, 1982).

A series of levees are located along the Payette River from Horseshoe Bend to its mouth. Map 13 (page 71) depicts ownership and location of these. These levees were built by individuals or the U.S. Army Corps of Engineers, usually under emergency situations. Levees in Horseshoe Bend were constructed by the U.S. Army Corps of Engineers in 1965 and 1969 (Federal Emergency Management Agency, 1984). These levees are considered temporary by the U.S. Army Corps of Engineers and unsuitable for protection for large flood events (Federal Emergency Management Agency, 1988). There are at least fifteen levees in Gem County constructed before 1977 in response to floods (Federal Insurance Administration, 1977).

Specific information about level of protection and year of construction for most levees is lacking. Seven jurisdictions currently have responsibility for maintaining the levees located in the basin as indicated on Map 13. Lack of funding and coordination between jurisdictions has reduced the effectiveness of levee protection. Numerous levees were damaged or failed during the most recent flood that occurred in 1997 (Interagency Hazard Mitigation Team, 1997).

All counties within the basin and all communities, except Crouch, participate in the National Flood Insurance Program. The program was established in 1968 by the National Flood Insurance Act, making flood insurance available to homeowners. To participate, communities or counties

Table 19. Potential Reservoir Sites Identified in the Payette River Basin.

Project Name	Stream	Identified Use	Dam Height (in feet)	Storage (acre-feet)
North Fork Payette Subbasin				
Bogus Creek	North Fork Payette	Power		33,000
Squaw Meadow	North Fork Payette			
Upper Lake	North Fork Payette	Power	95	49,000
Tamarack Falls	North Fork Payette	Power	<35	20,000
Gold Fork	Gold Fork			79,700
Louie Lake	Louie Creek		25	
Round Valley Creek	Round Valley Creek			
Scott Valley	Big Creek			
Big Creek	Big Creek			
South Fork Payette Subbasin				
Steep Creek	South Fork Payette	Power		
Canyon Creek	South Fork Payette	Power		
Grand Jean	South Fork Payette	Power		88,000
Big Pine Creek	South Fork Payette	Power		
Casner Creek	South Fork Payette	Power		
Archie Creek	South Fork Payette	Power		
Elk Lake	South Fork Payette	Power		
Clear Creek	Clear Creek	Power		
Pine Flat	South Fork Payette	Power		
Fogus	Canyon Creek	Power		
Garden Valley	South Fork Payette	Irrigation		1,940,000
Cloverleaf	Deadwood	Power		
Scott Creek	Deadwood	Power		
Rocky Canyon	Middle Fork Payette	Power	150	
Boiling Springs	Middle Fork Payette	Power		
Peace Valley	Silver Creek	Power		13,000
Main Payette Subbasin				
Bissel Creek	Bissel Creek	Offstream Storage	258	153,500
Montour Valley	Payette	Power		
Big Willow Creek	Big Willow Creek	Irrigation		6,500

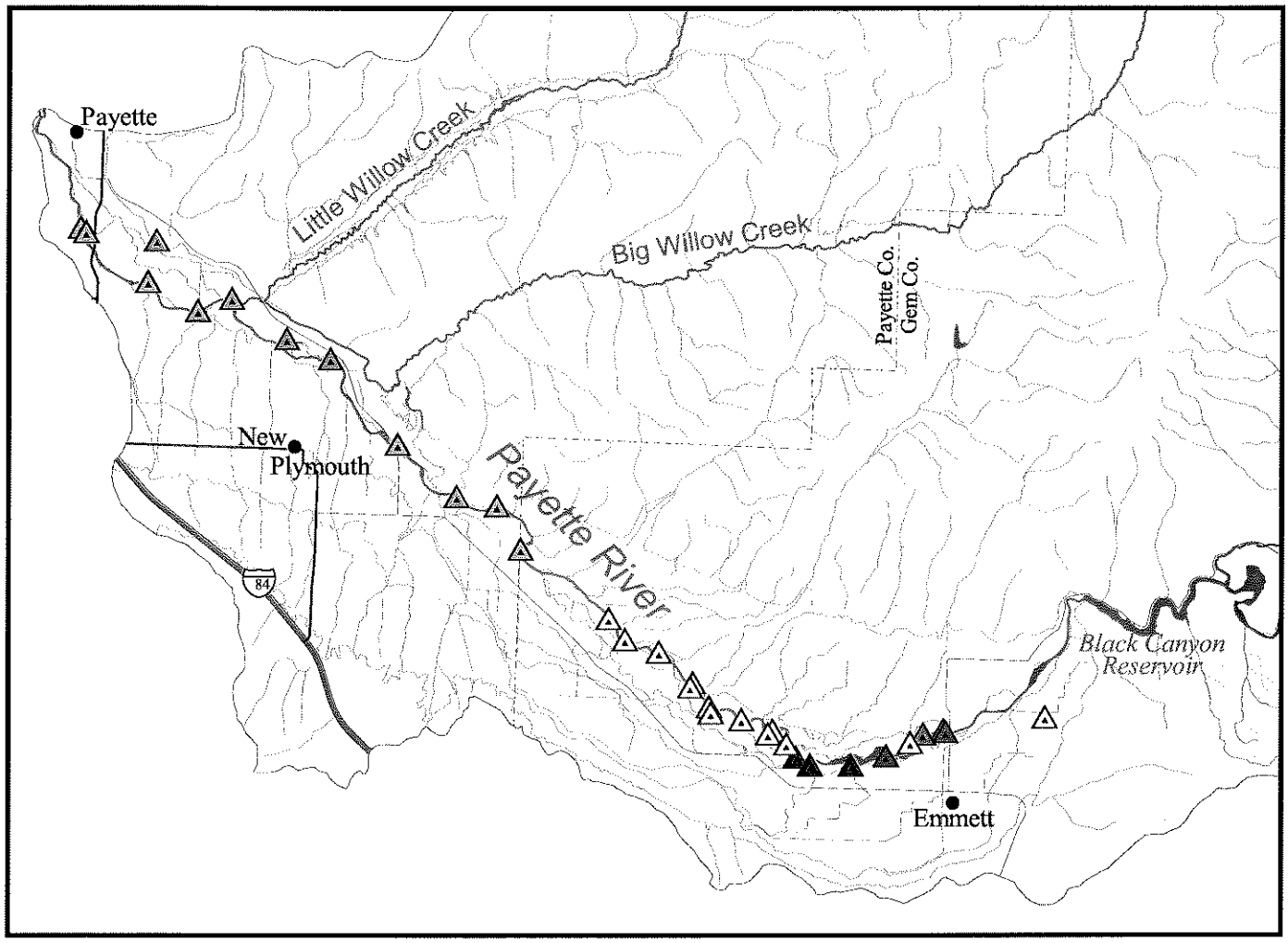
The Idaho Department of Water Resources Potential Hydropower Sites database was used to compile this table. The database was developed by using information from the sources listed below.

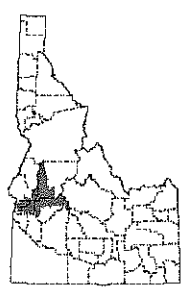
Sources: Idaho Department of Water Resources, 1976; U.S. Army Corps of Engineers, 1986; U.S. Bureau of Reclamation and U.S. Army Corps of Engineers, 1994; and U.S. Geological Survey, 1965.

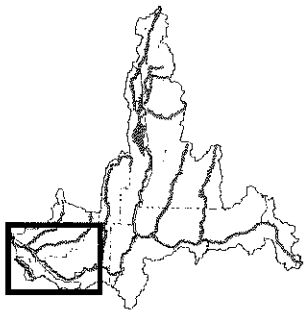
Map 13. Levee Ownership

Owner

- Bilbury Ditch Co.
- City of Emmett
- Payette County
- Natural Resources Conservation Service
- Gem County
- Lower Payette Ditch Co.







2 0 2 4 6 8 10 Kilometers

2 0 2 4 6 8 10 Miles

One inch equals approximately 4 miles

y:\payette\arcview\projects\projects2\struct.apr (8/16/98)

must adopt a floodplain ordinance that specifies land use measures in flood prone areas to avoid or reduce future flood damage. The Federal Emergency Management Agency that administers the National Flood Insurance Program has established minimum standards for participating cities and counties.

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 floodplain ordinance requirements, and determining that other required federal, state, and local permits have been obtained before issuing a development permit.

Participation in the National Flood Insurance Program 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.

The Federal Emergency Management Agency 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 for Gem County in 1978, Payette County in 1984, Boise County in 1988, and Valley County in 1990.

HYDROPOWER DEVELOPMENT

Existing and Historic Development

Hydropower facilities currently operating in the Payette River Basin are summarized in Table 20. Cascade Power Plant, owned by Idaho Power Company, is located on the North Fork Payette at Cascade Dam. A hydropower facility was originally constructed in 1926 by the Wood River Power Company near this location prior to Cascade Dam (Holt, 1935). In the same year West Coast Power Company acquired the project. Idaho Power Company later purchased the West Coast Power Company in 1944 (Young and Cochrane, 1978).

The current power plant located at the Cascade Dam was constructed in 1984 by Idaho Power Company (Federal Energy Regulatory Commission License No. 2848). The generating plant includes two Kaplan turbines which can divert a combined total of about 2,300 cubic feet per second (Boyles, 1997). Idaho Power Company holds a natural flow water right of 200 cubic feet per second that is senior to the storage water right at Cascade Reservoir. Inflows up to 200 cubic feet per second are required to be released from the dam year-round.

Table 20. Existing Hydropower Development in the Payette River Basin.

Facility	Location	Capacity (MW)	Owner
Cascade	North Fork Payette	12.8	Idaho Power Company
Horseshoe Bend	Main Payette	9.5	Horseshoe Bend Hydroelectric Company
Black Canyon	Main Payette	8.0	U. S. Bureau of Reclamation

Average annual generation is 47,000 megawatt-hours (megawatt-hours = 1,000 kilowatt-hours).

The Horseshoe Bend Power Plant, owned by Horseshoe Bend Hydroelectric Company, is located on the main Payette River. The project consists of a diversion dam located at the east edge of Horseshoe Bend, and a 3-mile power canal that crosses the town to the power plant located downstream. In 1902 the Boise-Payette River Electric Power Co. built a hydropower project at this location which operated until 1954 (See Table 21). The original project consisted of a diversion structure and power canal with 1.0 megawatt of capacity (later enlarged to 1.5 megawatts) (Holt, 1935). The plant was constructed to augment an 180 kilowatt plant built in 1887 off the Ridenbaugh Canal in Boise for use in Boise (Young and Cochrane, 1978).

The current Horseshoe Bend Project was licensed by the Federal Energy Regulatory Commission (License No. 5376) in 1986 and constructed in 1995. Facility operation entails a minimum bypass of 420 cubic feet per second into the river, and a diversion of up to 3500 cubic feet per second when available (Buchanan, 1997). The 9.5 megawatt capacity of the hydropower facility involves two units rated at 5.9 megawatts and 3.6 megawatts, each with a maximum head of 48 feet (See water permit number 65-12563). Average annual generation is 53,000 megawatt-hours.

The Black Canyon Power Plant, built by the U. S. Bureau of Reclamation in 1925, is located at Black Canyon Dam about 4 miles upstream from the town of Emmett. The power plant supplies power for the Boise Project canal relift pumps, the Owyhee and Minidoka Projects, and other public and private consumers outside the basin as part of an exchange agreement with Idaho Power Company. The 8.0 megawatt powerplant has two 4.0 megawatt generating units, with a maximum peaking capability of 10.2 megawatts. Total turbine capacity is 1,600 cubic feet per second (See water right licenses no. 65-02288 for 1,300 cubic feet per second and 65-09481 for 300 cubic feet per second). Average annual generation is 78,000 megawatt-hours. In addition, two 625 horsepower direct-connected turbine driven pumps are located in the powerhouse to serve the Emmett Irrigation District's canal on the north side of the river.

Several hydropower facilities operated in the basin, but are no longer in existence. These are listed in Table 21, and briefly described below. Two were located in the North Fork Payette Subbasin - one on

Table 21. Historic Hydropower Sites Developed in the Payette River Basin - No Longer Operating.

Project Name	Location	Capacity (MW)	Comments
North Fork Payette Subbasin			
McCall	Lake Fork	0.03	Constructed in 1918
Cascade	North Fork Payette	0.3	Constructed 1926 before Cascade Dam
South Fork Payette Subbasin			
Lowman	Clear Creek	0.03	Constructed in 1940
Statton Ck / Deadwood Lodge	Statton Creek	0.15	Constructed in 1924
Deadwood	Deadwood River	0.375	Constructed in 1928
Grimes Pass	South Fork Payette	1.22	Constructed in 1904
Main Payette Subbasin			
Horseshoe Bend Project	Main Payette	1.0*	Constructed 1902, operated until 1954

*Later expanded to 1.5 megawatts

Sources: Holt, 1935; Colbert, 1966; Young and Cochrane, 1978; Murray, 1990.

the Lake Fork and a small powerplant located near Donnelly on the North Fork.

Several facilities were constructed in the South Fork Payette Subbasin. A household generator on Bear Creek, a tributary to the South Fork near Grandjean, was issued a Federal Energy Regulatory Commission License (No. 1385) in 1936 (Holt, 1935). The Statton Creek Power Plant (Federal Energy Regulatory Commission License No. 568) was constructed for use in the Deadwood mines by the Bunker Hill & Sullivan Mining & Concentrating Company, and subsequently served the Deadwood Lodge. The Deadwood Power Plant, constructed on the Deadwood River, was also constructed by the Bunker Hill & Sullivan Mining & Concentrating Company for use by the Deadwood mines. The Lowman Hydropower Project (Federal Energy Regulatory Commission License No. 1808) was located on Clear Creek (Colbert, 1966). The Grimes Pass Power Plant was constructed on the South Fork Payette River just above Garden Valley by the Centerville Dredging Company. This powerplant was rebuilt in 1909 by the Boston & Idaho Gold Dredging Company, later selling the project to the Grimes Pass Power Company in 1926 (Murray, 1990). The electricity was used for dredge mining and municipal purposes in the Boise Basin (Idaho City vicinity) (Holt, 1935). Construction of Deadwood Reservoir in 1931 with 162,000 acre-feet of active storage significantly reduced the water available for power production during all but the summer months.

Potential Hydropower Development

Table 22 summarizes hydropower development opportunities that have been identified in the basin without considering economic or environmental feasibility. Most of these sites are identified in a report prepared by the Idaho Water and Energy Resources Research Institute. This report compiled information about hydropower development opportunities that were listed in more than 24 reports prepared by government and private entities (Warnick, et al., 1981).

The South Fork Payette has an average gradient of 35 feet per mile, with some reaches near 60 feet per mile. The lower reach of the South Fork Payette possesses better sites for dam construction, because greater volumes of water are available. Many of the South Fork Payette tributaries have steep gradients, making the available energy significant despite the small quantities of water. Some hydropower development sites have been identified in the Main Payette Subbasin (See Table 22).

The most recent project investigated in the South Fork Payette Subbasin was located near the mouth of the Deadwood River. An application was filed by Intermountain Power Corporation for the Oxbow Bend Hydroelectric Project (Federal Energy Regulatory Commission No. 6329) in 1984. The project proposed to use a 1,000-foot long tunnel previously constructed for hydraulic mining. The Board designated the reach a state recreational river in 1991, prohibiting hydropower construction. In 1992 the Federal Energy Regulatory Commission denied the application, because the Forest Service found the river reach eligible for further study as a National Wild and Scenic River, which precludes hydropower development in the interim.

Several very small power projects also have been studied throughout the basin; however, construction is not known to have started on any project. Many of these projects are located in the upper watersheds and proposed by individual property owners. The relief in the basin provides an opportunity for many similar projects.

Table 22. Hydropower Sites Investigated in the Payette River Basin.

Project	Site	Capacity (MW)	Comments
North Fork Payette Subbasin			
Upper Lake	North Fork Payette	3.2 / 1.4	Hydropower potential identified at existing site
Upper Payette Lake	North Fork Payette	0.4	Hydropower potential identified at existing site
Payette Lake	North Fork Payette	0.3	Hydropower potential identified at existing site
Browns Pond	Lake Fork	1.9	Hydropower potential identified at existing site
Little Payette Lake	Lake Fork	1.0	Hydropower potential identified at existing site
Sugarloaf	North Fork Payette	111.0	Offstream reservoir or diversion w/hydropower potential
Sugarloaf Tunnel	North Fork Payette	200.0	Offstream reservoir or diversion w/hydropower potential
Horsethief Basin	Big Creek	1.4	Tributary to North Fork Payette
Alpha	North Fork Payette	7.6	
Bogus Creek/Cabarton	North Fork Payette	13.5 / 60.7	
Clear Creek	Clear Creek	2.1 / 37.6	Tributary to North Fork Payette
Upper Squaw Creek	North Fork Payette	90.0	Offstream reservoir or diversion w/hydropower potential
Squaw Creek Upper Tunnel	North Fork Payette	200.0	Offstream reservoir or diversion w/hydropower potential
Lower Squaw Creek	North Fork Payette	57.5	Offstream reservoir or diversion w/hydropower potential
Squaw Creek Lower Tunnel	North Fork Payette	215.0	Offstream reservoir or diversion w/hydropower potential
Middle Fork Payette	North Fork Payette	139.9	Offstream reservoir or diversion w/hydropower potential
North Fk to Mid Fk Tunnel	North Fork Payette	72.0	Offstream reservoir or diversion w/hydropower potential
Tripod Creek	North Fork Payette	7.7	
Upper Smiths Ferry	North Fork Payette	7.3	
Middle Smiths Ferry	North Fork Payette	7.3	
Lower Smiths Ferry	North Fork Payette	7.3	
Ferncroft	North Fork Payette	174.0	Idaho Power Company received FERC license in 1982, relinquished in 1986.
Banks	North Fork Payette	99.0	Idaho Power Company received FERC license in 1982, relinquished in 1986.
Round Valley	North Fork Payette	350	Offstream reservoir or diversion w/hydropower potential
Banks Pumped Storage	North Fork Payette	500	Offstream reservoir or diversion w/hydropower potential
Banks	North Fork Payette	10.0	Most current proposal by Gem irrigation District
Upper Scriver	North Fork Payette	28.9	
Scriver Creek Unit	North Fork Payette	107.5	
South Fork Payette Subbasin			
Elk Lake	South Fork Payette	1.3 / 1.5	
Baron Creek	South Fork Payette	1.2 / 1.4	
Grand Jean	South Fork Payette	4.1 / 7.5	
Fogus	Canyon Creek	0.4 / 1.7	Tributary to South Fork Payette
Canyon Creek	South Fork Payette	2.4 / 8.5	
Bull Trout Lake	Warm Spring Creek	0.1	Hydropower potential identified at existing site
Casner Creek	South Fork Payette	3.5 / 50.7	
Eightmile Creek	Eightmile Creek	0.6 / 1.2	Tributary to South Fork Payette
Archie Creek	South Fork Payette	4.8 / 17.5 / 79.8	
Kirkham Hot Springs	South Fork Payette	1.6	
Steep Creek	South Fork Payette	4.9 / 25.6	
Lowman	South Fork Payette	2.9	
Oxbow Bend	South Fork Payette	26.1 / 93.7	
Oxbow Bend	South Fork Payette	30.0	FERC application filed in 1984, denied in 1992.
Pine Flat	South Fork Payette	14.1	Idaho Power relinquished FERC permit in 1981
Big Falls	South Fork Payette	6.6 / 28.1	Idaho Power relinquished FERC permit in 1981.
Big Pine	South Fork Payette	20.5 / 96.0	
Black Bear	South Fork Payette	16.1	Idaho Power relinquished FERC permit in 1981.
Grimes Pass	South Fork Payette	16.1	Idaho Power relinquished FERC permit in 1981.
Garden Valley	South Fork Payette	34.4 / 844	
Garden Valley Reregulating	South Fork Payette	64.0	
Garden Valley	South Fork Payette	285.2	
South Fk to Mid Fk Tunnel	South Fork Payette	29.0	

Project	Site	Capacity (MW)[1]	Comments
South Fork Payette Subbasin *(continued)*			
Cloverleaf	Deadwood	6.9 / 13.5 / 12.6	
Tranquil Basin	Deadwood	*n/a*	
Deadwood	Deadwood	0.1 / 6.4	
Deadwood Dam	Deadwood	7.0	
Scott Creek	Deadwood	5.2 / 6.9 / 56.9	
Josie Creek	Deadwood	2.8	
Slaughterhouse Creek	Deadwood	2.7	
Boiling Springs	Middle Fork Payette	1.1 / 3.7	
Peace Valley	Silver Creek	0.7 / 1.9	Tributary to Middle Fork Payette
Rocky Canyon	Middle Fork Payette	3.0 / 2.7	
Lower Scriver	Mid Fork tributary	48.5	
Middle Fork Payette	Middle Fork Payette	139.9	Offstream storage site with hydropower potential
Main Payette Subbasin			
Dry Buck	Payette	13.5	
Gardena	Payette	11.7	
Porter Creek	Payette	8.0	
Horseshoe Bend	Payette	49.7 / 501.9	
Sage Hen	Sage Hen Creek	0.2	Tributary to Squaw Creek
Montour Valley	Payette	16.0 / 56.0	
Black Canyon Diversion	Payette	64.0	
Black Canyon Upgrade	Payette	10.0	Hydropower potential identified at existing site
Paddock Valley	Little Willow Creek	1.2	Hydropower potential identified at existing site

[1] Sites with more than one capacity listed indicate that several project configurations have been identified.
Sources: Warnick, et al., 1981; U.S. Bureau of Reclamation, 1986; Gem Irrigation District, 1990; Myers, 1995.

Proposed North Fork Payette Hydropower Project

Projects pursued by private individuals are reviewed and licensed by the Federal Energy Regulatory Commission. Several projects have been licensed or issued permits for study in the past. The only hydroproject currently pursued in the basin is proposed for the North Fork Payette between Smiths Ferry and Banks. The steep river gradient of 112 feet-per-mile make this an attractive site for hydropower development. Several configurations have been proposed over the years.

The U.S. Bureau of Reclamation and the U.S. Army Corps of Engineers suggested development at various times between 1961 and 1977 (U.S. Bureau of Reclamation and U.S. Army Corps of Engineers, 1961; U.S. Bureau of Reclamation, 1977). In 1982 Idaho Power Company obtained a Federal Energy Regulatory Commission license to develop 316.0 megawatt project on two river reaches totaling 1,385 feet of head (known as the Banks and Ferncroft projects). The diversion was located below Smiths Ferry with an 11-mile tunnel and penstock discharge. In 1986 Idaho Power Company requested a termination of the license, because construction costs and energy needs did not justify its development.

In 1988 the Gem Irrigation District received a Federal Energy Regulatory Commission permit to study a project on the same river reach. The original project proposed diverting water from the North Fork Payette between Cabarton Bridge and Smiths Ferry to an offstream re-regulating reservoir in Round Valley. Water would drop through a tunnel into a power plant approximately one-half mile below Smiths Ferry. A second intake below the first power plant would again drop water through a 65,000-foot gravity tunnel to a second power plant at Banks. In an attempt to address public concerns, a second proposal was made in 1990. The Banks Pumped Storage Project proposed to pump water from the North Fork Payette below Smiths Ferry into High Valley to the west. The water would drop from High Valley to an underground power plant near Banks.

Gem Irrigation District has further modified its proposal. The current hydropower project proposal involves diverting water downstream of Smiths Ferry into a 4-foot diameter steel pipeline, approximately 13 miles in length, buried beneath the Idaho Northern and Pacific railroad bed. A powerhouse would be located 2.5 miles upstream from Banks installed with a single, horizontal-shaft, Pelton turbine, connected to a 10 megawatt generator. Project operation would entail diversion of up to 100 cubic feet per second from the river downstream of Smiths Ferry, while maintaining a 200 cubic feet per second bypass flow. The project could operate with flows ranging from a maximum of 100 cubic feet per second to a minimum of 10 cubic feet per second. This current proposal is not under an active Federal Energy Regulatory Commission permit, and has not been granted a water right.

Hydropower Potential at Existing Dams

The Board prefers that new hydropower resources be developed at dams having hydropower potential that do not currently generate power or do not generate at their maximum potential (Idaho Water Resource Board, 1996; See Policy 4E). Several opportunities may be available in the Payette River Basin. One proposed at Payette Lake Outlet was investigated by the Payette Power Company in 1994. The project is not currently being pursued.

The possibility of adding hydropower capabilities to Deadwood Dam has been considered. The U.S. Bureau of Reclamation has determined that this is not economically feasible, because of transmission costs (Jarsky, 1997). The U.S. Bureau of Reclamation has also investigated the potential to expand power generation at Black Canyon Dam. The study determined that a 10 megawatt generating capacity could be added to the existing facility (U.S. Bureau of Reclamation, 1986). Although feasible from a technical and water availability standpoint, construction costs could not be recouped with current energy surpluses and prices (Jarsky, 1997). Changes in energy supply/demand and deregulation may make the project economically feasible in the future.

WATER QUALITY

SURFACE WATER QUALITY

The Idaho Division of Environmental Quality in *The 1994 Idaho Water Quality Status Report* summarized water quality concerns for the Payette River Basin. Minor impacts from timber management and mining were cited on the North Fork Payette above Payette Lake, but subsequent beneficial use reconnaissance indicated that all uses were fully supported. The water quality of Payette Lake was described as excellent. Cascade Reservoir was cited as a special state concern. Many activities contributed to the reservoir's water quality problems, including the shallow depth and size of the waterbody. Livestock grazing, timber management, and impacts from roads were cited as water quality

concerns on the North Fork Payette below Cascade Reservoir, the South Fork Payette, the Middle Fork Payette, and the main Payette to Black Canyon Reservoir. Impacts from irrigated crop and pasture lands were additional concerns on the main Payette to Black Canyon Reservoir. Nutrients, bacteria, and temperature problems have led to designation of the Payette River below Black Canyon Reservoir as water quality limited.

Water Quality Limited Water Bodies

In 1996 the Environmental Protection Agency, under the authority of the Federal Clean Water Act, released a 303(d) list which identified 962 water quality limited waterways in Idaho. The 39 water quality limited waterbodies located in the Payette River Basin and the pollutant(s) of concern are identified in Table 23 and depicted in Map 14. Water quality limited waterbodies are those not currently meeting applicable water quality standards for specific designated beneficial uses (Zaroban, 1993). Beneficial uses for water quality standards include, but are not limited to, domestic water supply, agriculture, navigation, recreation in and on the water, wildlife habitat, and aesthetics [IDAPA 16.01.02003,01].

Water quality limited designations under Section 303(d) require that the U.S. Environmental Protection Agency develop total maximum daily load (TMDL) plans. These plans are designed to restore the impaired waterbodies to compliance with water quality standards through establishment of load allocations (nonpoint sources) and waste load allocations (point sources). Two waterways in the basin are high priority for total maximum daily load plan development -- Cascade Reservoir and the Payette River from Black Canyon Dam to the Snake River. The remaining water quality limited waterways are low priority, indicating that designated uses are not fully supported, but risks to human health, aquatic life, recreation, economics, or aesthetics are minimal. The status of total maximum daily load plans for the Payette River Basin is described further in the *Institutional Constraints and Opportunities* section.

Special Resource Waters

The Idaho Legislature may designate waterbodies as Special Resource Waters with the intent of protecting beneficial uses against further degradation by point source pollution. Special Resource Waters are specific water bodies needing intensive protection to preserve either outstanding or unique characteristics, or to maintain a designated beneficial use (Zaroban, 1993). New discharge sources are allowed only if water quality of the receiving water remains unchanged. Map 14 depicts the eight basin waterbodies designated as Special Resource Waters.

Water Quality Summaries

North Fork Payette Subbasin

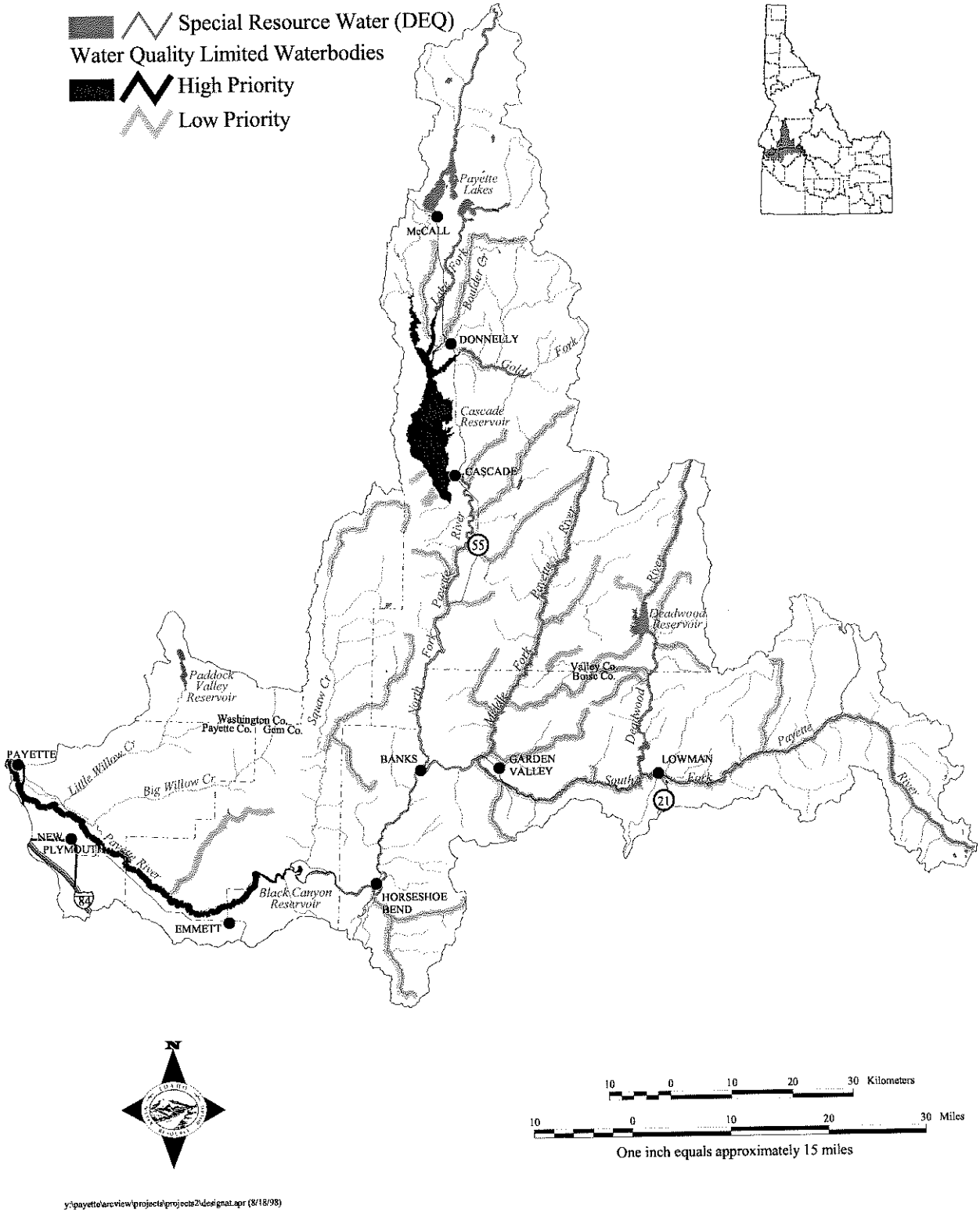
North Fork Payette: Headwaters to Payette Lake Outlet -- According to *The 1994 Idaho Water Quality Status Report*, streams above Payette Lake contribute small amounts of sediment and nutrients from timber management activities and mining, but all beneficial uses were still fully supported (Idaho Division of Environmental Quality, 1994). A recent Payette National Forest study found that human-caused pollution sources to Payette Lake include roading, logging, home building, and recreation (Weaver, 1995). Recreation and residential development contribute sediment, human waste, garbage, detergents, oils, and fuels to the rivers and lakes.

Table 23. Payette River Basin Waterbodies on the Environmental Protection Agency's 1996 Idaho 303(d) List.

Waterbody / Reach	Pollutants
HIGH PRIORITY	
Cascade Reservoir	nutrients, pathogens, dissolved oxygen, pH
Payette River - Black Canyon Dam to Snake River	nutrients, bacteria, temperature
LOW PRIORITY	
North Fork Payette Subbasin	
North Fork Payette - Clear Creek to Smiths Ferry	nutrients, sediment, temperature modification, flow alteration, habitat alteration
Alder Creek	sediment
Beaver Creek	sediment
Big Creek	sediment
Boulder Creek	nutrients, sediment, dissolved oxygen, temperature modification, flow alteration
Browns Pond	habitat alteration
Campbell Creek	sediment
Clear Creek	sediment
Fawn Creek	sediment
French Creek	sediment
Gold Fork River - Flat Creek to Reservoir	nutrients, sediment
Hazard Creek	sediment
Mud Creek	nutrients, sediment, dissolved oxygen, pathogens, ammonia
Round Valley Creek	sediment
South Fork Payette Subbasin	
South Fork Payette River - Headwaters to Banks	sediment
Deadwood River - Above Deadwood Reservoir	sediment
Middle Fork Payette River	sediment
Anderson Creek	sediment
Basin Creek	sediment
Big Pine Creek	sediment
Bulldog Creek	sediment
Eightmile Creek	sediment
Lightning Creek	sediment
Ninemile Creek	sediment
Scott Creek	sediment
Scriver Creek	sediment
Silver Creek	sediment
Trail Creek	sediment
Whitehawk Creek	sediment
Wilson Creek	sediment
Main Payette Subbasin	
Bissel Creek	sediment
Black Canyon Reservoir	nutrients, sediment, oil/grease
Harris Creek	sediment
Little Squaw Creek	sediment
Shafer Creek	sediment
Soldier Creek	low dissolved oxygen
Upper Squaw Creek	sediment

Source: Environmental Protection Agency, 1996.

Map 14. Water Quality Designations



y:\payette\arcview\projects\projects2\designat.apr (8/18/98)

Motorized watercraft leak oil and gas into Payette Lake, and runoff from lawns along the lakeshore contribute fertilizer and pesticide contaminants. Timber harvesting and associated road building contribute sediment to tributary streams, while grazing is only a minor contributor of sediment.

Although Payette Lake water quality is generally considered good, concerns about degradation from population growth and watershed changes initiated a watershed project in 1992 by the Big Payette Lake Water Quality Council and community of McCall (Big Payette Lake Technical Advisory Committee, 1997). The Big Payette Lake Technical Advisory Committee reported that the Payette Lake water quality had progressively deteriorated because of eutrophication. Tributaries to the lake as well as the development around the lake are nutrient sources. Phosphorus and sediment loadings were found to be higher in 1995 and 1996 after 50 percent of the watershed burned in 1994. Roads were reported to contribute sediment to streams, affecting Upper Payette and Payette lakes. Storm runoff contributing sediment, nitrogen, and phosphorus from the urban/residential areas around Payette Lake was found to be a larger contributor than the tributary streams. Upper Payette Lake was found to be an important sink for nutrients and sediments that may otherwise move on to Payette Lake.

A 1995-96 U.S. Geological Survey study found Payette Lake is still oligotrophic (low in nutrients and biological productivity), but the lake has recently developed an anoxic (no oxygen) condition in the southwest end during the summer and autumn. The condition was more extensive than predicted by nutrient loads (Woods, 1997a). This condition is believed to have progressively developed as nutrient loads increased over the years. The lake has retained 54 percent of its influent load of nitrogen and 79 percent of influent phosphorus, primarily as accumulated lakebed sediments. Phosphorus is largely contributed by the North Fork Payette (58 percent), with the remainder from surface runoff and other tributaries around the lake. Woods concludes that the anoxic condition would be unresponsive to reduced nutrient loading, but a goal should be to prevent an increase in phosphorus loading to the lake.

About 450 tons of sediment (20-35 percent of the total to the lake) is delivered to Payette Lake from management-related activities each year, primarily road erosion. The sediment and phosphorus loading has resulted in aquatic macrophyte production with nine genera observed in the lake's littoral areas. The presence of eurasian milfoil (*Myriophyllum spicatum* var. *spicatum*), a nuisance plant of special concern, received a positive taxonomic identification. Later DNA tests have showed inclusive results for identification (Woods, 1999).

North Fork Payette: Payette Lake Outlet to Cascade Reservoir Dam -- The Phase II Cascade Reservoir Watershed Management Plan identifies major point and nonpoint pollution concerns (Idaho Division of Environmental Quality, 1998). Two point sources of pollution contributing nutrients and other constituents to the reservoir were McCall's wastewater treatment facility and the Idaho Department of Fish and Game's fish hatchery. Both discharged wastewater into the North Fork Payette River above the reservoir.

Development of the J Ditch irrigation pipeline project eliminates discharge of McCall's wastewater into the North Fork Payette River. The J Ditch carries the effluent to irrigators, replacing water diverted from Mud Creek and Lake Fork Creek. This project relied on land application of treated wastewater on agricultural lands near McCall for the first time in

1998. Currently the project is operational during the irrigation season, until cells are completed to store waste water in the off-season.

Several nonpoint pollution sources affect Cascade Reservoir, including forest management and agricultural practices, urban/suburban runoff, nutrient-enriched ground water, shoreline erosion, and internal nutrient recycling. Summaries of these sources are contained in the watershed management plan (Idaho Division of Environmental Quality, 1998).

Phosphorus loading is the main concern for Cascade Reservoir. Combined point and nonpoint contributions are summarized in Figure 28. Agriculture contributes a high proportion of phosphorus, while urban/suburban sources contribute a small percentage. Contributions from the McCall wastewater treatment plant would be eliminated with completion of the J Ditch. Natural internal recycling is a significant contributor, and combined with precipitation, accounts for just over one-quarter of the total load.

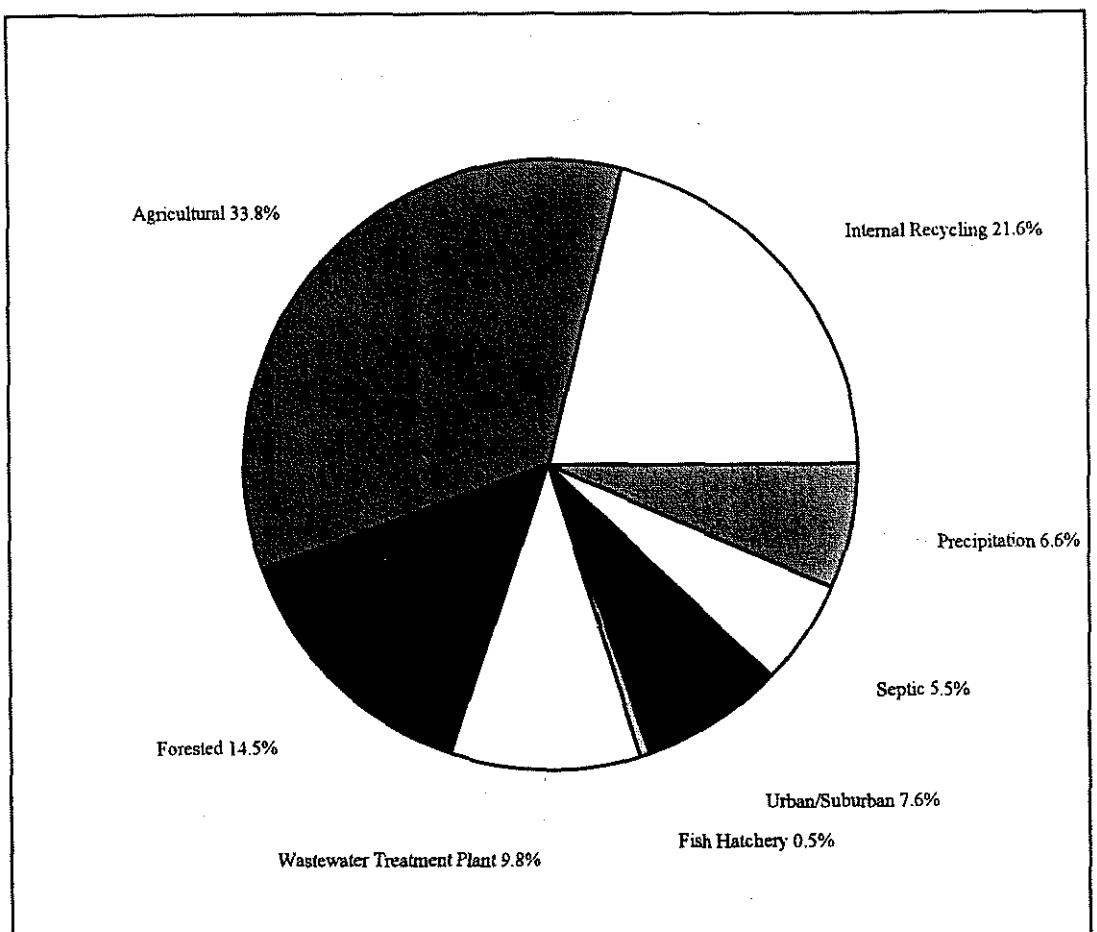


Figure 28. Phosphorus Loading in Cascade Reservoir (Idaho Division of Environmental of Quality, 1998).

Major Cascade Reservoir tributaries (Mud Creek, Boulder Creek, Willow Creek, and Gold Fork River) flowing through irrigated pasture land and degraded riparian areas contribute phosphorus and sediment to the reservoir (Idaho Division of Environmental Quality, 1998). Sediment is also contributed by timber management activities in the tributary drainages. Boulder Creek, Browns Pond (Lake Fork), Gold Fork River, and Mud Creek are all listed as water quality limited by the Environmental Protection Agency (Table 23, page 79). Several agencies and entities are involved in land management activities to address these concerns.

The Boise National Forest is involved in rehabilitation projects in the Gold Fork watershed to reduce surface erosion through riparian set-backs, road surfacing, and special timber harvest techniques. Boise Cascade Corporation, in cooperation with federal and state agencies, has completed a large-scale soil and phosphorus contribution analysis for the Gold Fork watershed (Boise Cascade Corporation, 1996). State Agricultural Water Quality Projects have occurred in the Boulder, Willow, and Mud Creek watersheds. A riparian demonstration project in the Boulder Creek drainage is improving grazing practices to demonstrate improved water quality and phosphorus reductions. The Valley County Soil and Water Conservation District is instrumental in the implementation of the J Ditch project. In addition to eliminating discharge of McCall wastewater into the North Fork Payette, the J Ditch resulted in the conversion of flood irrigated lands to more water efficient sprinkler irrigation in the Mud Creek watershed.

North Fork Payette: Cascade Reservoir Dam to Banks -- Eleven waterbodies or river reaches are considered water quality limited within this subwatershed, including the North Fork Payette from Clear Creek to Smiths Ferry, which is listed for nutrients, sediment, temperature modification, flow alteration, and habitat alteration (Table 23, page 79). Sediment is the single pollutant identified in the remaining ten waterbodies. According to the Idaho Department of Fish and Game, sediment, high water temperatures, and low flows have likely impaired the fishery in the North Fork Payette from Cascade Dam to Smiths Ferry (Anderson, 1996).

South Fork Payette Subbasin

Few water quality studies have been done on the South Fork, Middle Fork, and Deadwood River watersheds, but several of their tributaries have received Beneficial Use Reconnaissance Project monitoring. This monitoring program was started in 1993 by the Division of Environmental Quality on Idaho streams identified as water quality limited under Section 303(d) of the Federal Clean Water Act (Idaho Division of Environmental Quality, 1996). Sixteen water bodies are designated as water quality limited by the Environmental Protection Agency, with sediment being listed as the pollutant of concern (Table 23, page 79).

South Fork and Middle Fork Payette Rivers -- Prior to Black Canyon Dam construction in 1923, the South Fork Payette and Middle Fork Payette were excellent anadromous fish streams with large runs of chinook and steelhead (Payette Soil & Water Conservation District, 1993). Currently, the water quality is adequate to support bull trout, wild rainbow trout, and mountain whitefish (Grunder, 1991). Granitic rock and shallow, unstable soils have contributed considerable amounts of sediment from the steep slopes in the South Fork watershed, resulting in some degradation of water quality. Current Beneficial Use Reconnaissance Project monitoring in this area will provide information to determine the beneficial use status in the future.

Deadwood River: Headwaters to South Fork Payette River -- A Forest Service ecosystem analysis of Deadwood Reservoir tributaries indicated that sedimentation rates into the reservoir were low (U.S. Forest Service, no date). Forest Service water quality assessments for tributaries, including Trail Creek, Moulding Creek, and South Fork Beaver Creek, indicated normal background sediment contributions.

A 1983 study of Idaho lakes identified Deadwood Reservoir as a moderately productive, or oligo-mesotrophic, water body (Milligan, et al., 1983). The U.S. Bureau of Reclamation (1985) found water quality at Deadwood Dam good. Dissolved oxygen exceeded minimum standards (6 parts per million) for coldwater biota and salmonid spawning throughout the year (U.S. Bureau of Reclamation, 1985). A water quality study conducted in 1993 to 1994 had similar findings (Allen, et al., 1996). The study concluded water quality parameters had not changed significantly from those identified in a study conducted 30 years earlier. Late season oxygen reduction occurred in the reservoir below the 15 meter depth, but not enough to limit salmonid growth and survival. The study also concluded that removal of 20,000 acre-feet of water in the late season for salmon flow augmentation would have little impact on oxygen levels. Game fish populations were not impacted by water level reductions below the minimum conservation pool (50,000 acre-feet).

The U.S. Forest Service ecosystem analysis of Deadwood Reservoir and Deadwood River found sedimentation rates from tributaries below the dam much higher than those above, which is inconsistent with the water quality limited designation (U.S. Forest Service, no date). Little is known about the water quality of the Deadwood River below the reservoir, in large part because of it's inaccessibility, but it is generally considered to be very good (Ingham, 1997).

Main Payette Subbasin

Intensive water quality investigations have not occurred for the Payette River upstream of Black Canyon Reservoir (Thornton, 1997; Ingham, 1997).

Payette River: Black Canyon Reservoir Dam and tributaries -- In 1973, fifty years after construction of Black Canyon Dam, silt had filled one-third of the original pool (almost the total upper end of reservoir). The U.S. Bureau of Reclamation found fish habitat conditions for warmwater species fair to poor in Black Canyon Reservoir (U.S. Bureau of Reclamation, 1984). Silt-free shoreline areas are lacking, although a stable water level allows for development of benthic species for fish forage. Few areas of abundant vegetation exist to control shoreline water temperature and provide woody debris for fish habitat.

The Division of Environmental Quality evaluated beneficial uses for Squaw Creek in 1993, a tributary to the reservoir (McIntyre, 1993). The study reported cumulative impacts from combined timber harvest and grazing activities. Wild trout were present, but the author noted that the stream was deteriorating and lacked adequate rearing habitat for salmonids. An investigation of agricultural impacts on beneficial uses of Squaw Creek found the lower reach was moderately impacted by sediment, phosphorus, and high temperature (Kerpa, 1995). The most substantial impacts to the beneficial uses were temperature exceedences for coldwater biota and salmonid spawning.

Payette River: Black Canyon Dam to Mouth -- A 1985 study concluded water quality was good immediately below Black Canyon Dam (U.S. Bureau of Reclamation, 1985). However, dissolved solids, nutrients, and bacteria concentrations cumulatively increased downstream, attributed largely to irrigation return flows and municipal wastewater from Emmett.

In 1993 the Payette Soil and Water Conservation District identified major pollutants in the lower ten miles of the river (Payette Soil & Water Conservation District, 1993). Agriculture was cited as the predominant pollutant source, with more than 90 percent of sediment originating from surface irrigated cropland. Nitrogen loading was 1,219 pounds per day from cropland and feedlot runoff, while phosphorus loading to the river was 525 pounds per day. Both rates are typical for agricultural areas. Phosphorus concentrations in all agricultural drains were high, and many drains were found to carry high concentrations of fecal coliform bacteria. Fecal coliform counts ranged from 23.0 - 40,000 colonies per 100 milliliters, with the majority originating from livestock.

Additional pollutant sources identified include septic systems, municipal sewage treatment facilities, land waste applications, and applications of nutrients and pesticides to urban areas. Several pesticides were detected in water samples, bottom sediment, and fish collected by the U.S. Geological Survey and U.S. Fish and Wildlife Service in 1990 (Payette Soil and Water Conservation District, 1993). Most were from the organochlorine group (e.g., DDD, DDE, DDT, dieldrin, and toxaphene), which are no longer in widespread use. Concentrations found in the fish were in excess of the dietary concentrations that impact bird reproductive success.

From their 1993 study, the Payette Soil and Water Conservation District identified critical areas in the Lower Payette. Critical areas are sources of agricultural nonpoint pollution that have the most significant impact on the water quality. Surface irrigated cropland, and dairies and feedlots were considered critical because of excessive sediment, nutrient, and bacteria contributions to the Payette River, and leachable nutrients and pesticides to the ground water. Irrigation return flow drains were also considered critical, because of excessive sediment and nutrient loading to the river. Irrigated pasture was not identified as critical, because it did not contribute significantly to total erosion and sedimentation. The Payette Soil and Water Conservation District is working with irrigators to minimize water quality problems in critical areas by implementing a number of best management practices.

From 1992 to1993, the Division of Environmental Quality studied agriculture return drains on the lower Payette River for sediments, nutrients, pesticides, and bacteria (Ingham, 1996). The data indicated that irrigated row crops contributed excessive amounts of nutrients, bacteria, and sediments to the river, and impacted designated beneficial uses. Dacthal, a fumigant pesticide, was detected in a selected number of drains during the non-irrigation season.

GROUND WATER QUALITY

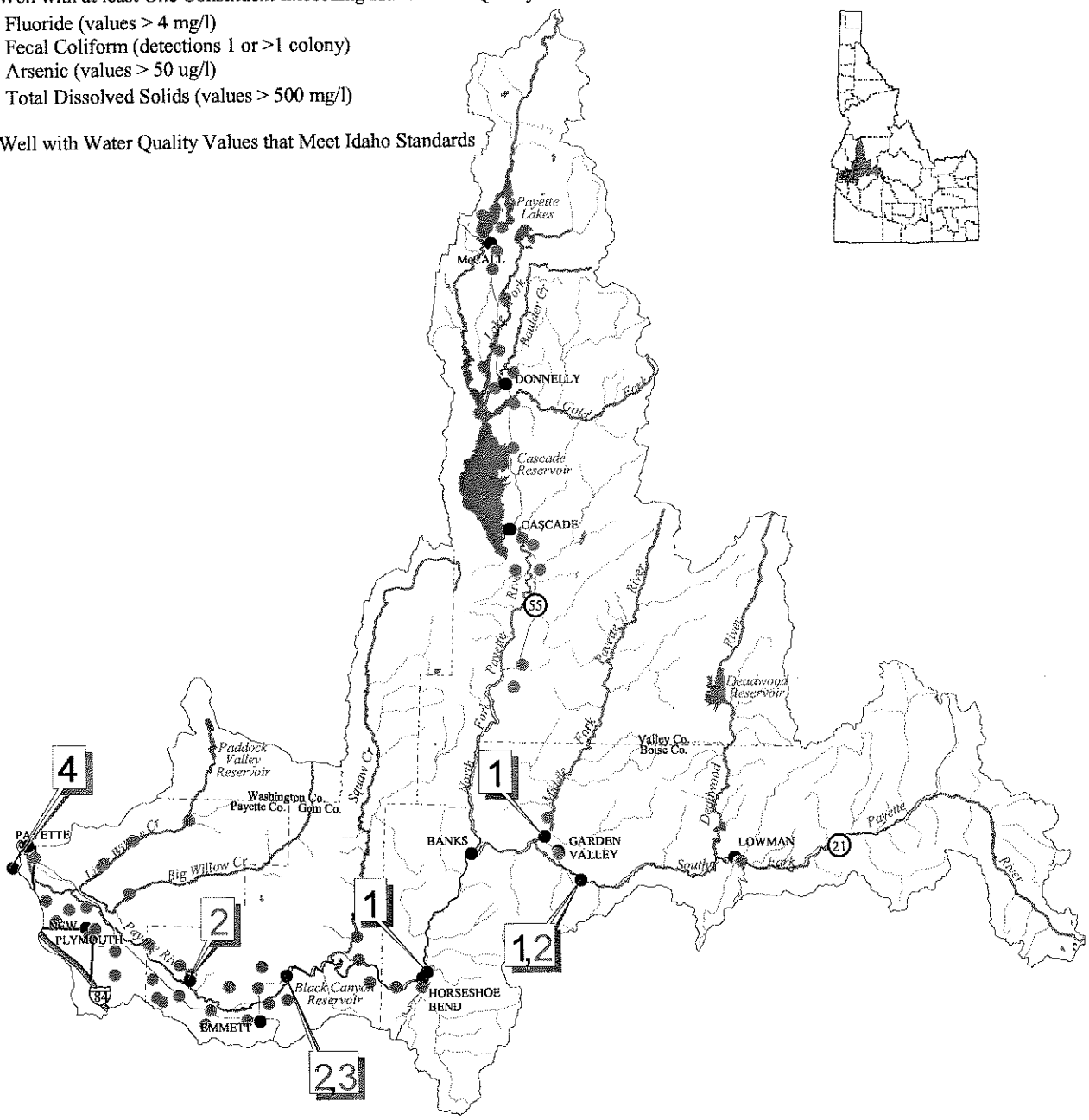
The Idaho Ground Water Quality Monitoring Program, administered by the Idaho Department of Water Resources, provides random, ambient data for statistical analyses of ground water quality characterization, long term trends, and recognizing potential ground water quality problems. Maps 15 and 16 presents results of this program. The following section summarizes these and other data for ground water resources in the Payette River Basin.

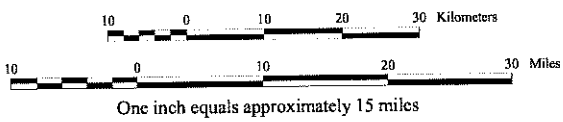
North Fork Payette Subbasin

Sampling in the Lake Fork-McCall area through the Statewide Ground Water Monitoring Program has found mildly elevated nitrate levels (4.0 milligrams per liter or less) in several wells (Crockett, 1997). Two-thirds of the sites tested in Valley County had elevated levels of iron and manganese. None of the constituents were present at levels that exceeded state water quality standards.

Map 15. Results from the Statewide Ambient Ground Water Monitoring Program

- Well with at least One Constituent Exceeding Idaho Water Quality Standards
  - 1 Fluoride (values > 4 mg/l)
  - 2 Fecal Coliform (detections 1 or >1 colony)
  - 3 Arsenic (values > 50 ug/l)
  - 4 Total Dissolved Solids (values > 500 mg/l)
- Well with Water Quality Values that Meet Idaho Standards

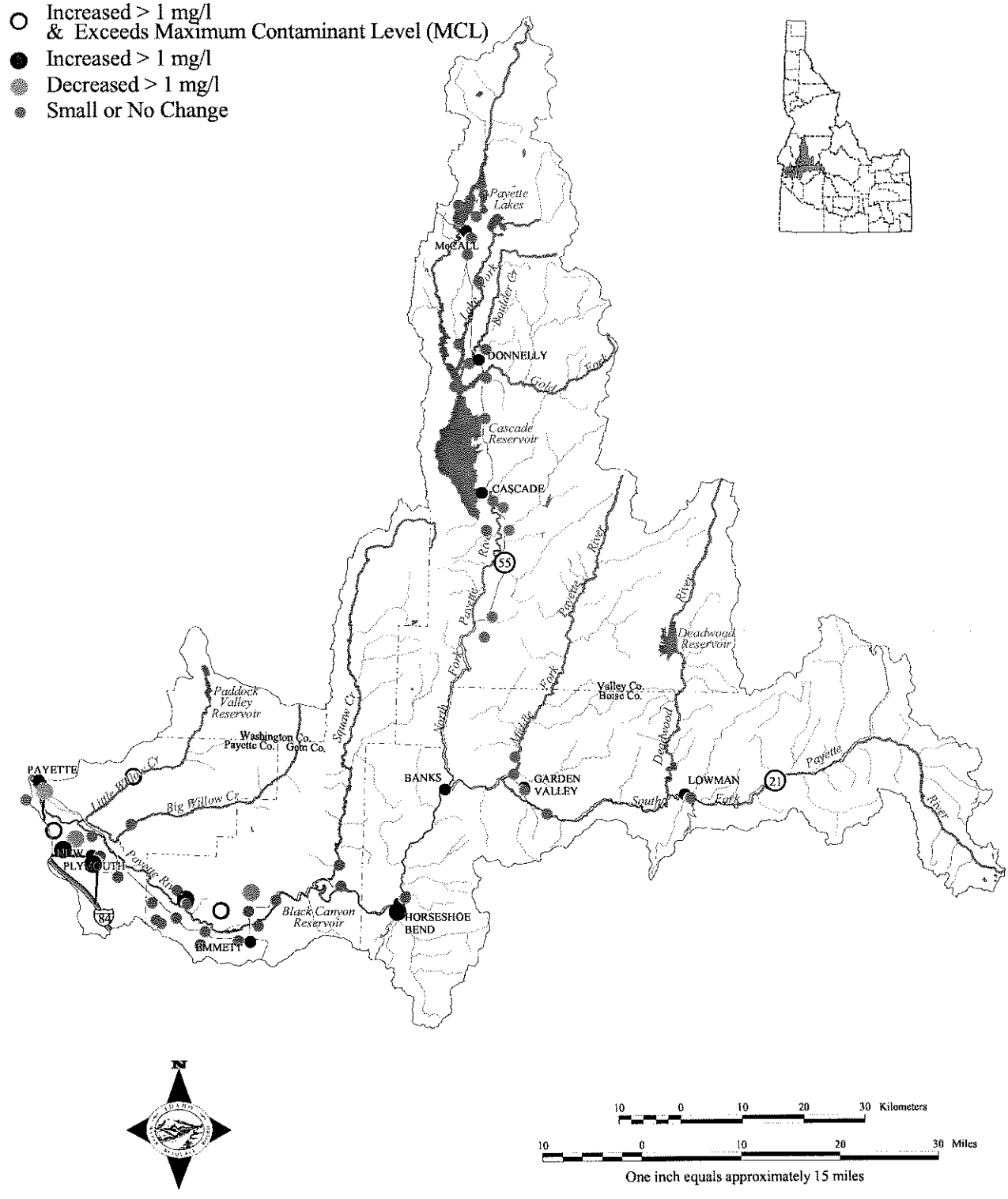




One inch equals approximately 15 miles

y:\payette\arcview\prjs-av30\wqual.apr (2/2/99)

Map 16. Nitrate Changes from the Statewide Ambient Ground Water Monitoring Program



y:\payette\arcview\prjs-av30\wqual.spr (2/2/99)

South Fork Payette Subbasin

Sampling of wells for the Statewide Ground Water Monitoring Program has identified some wells in the Garden Valley area with fluoride levels exceeding Idaho water quality standards (See Map 15, page 86). Elevated fluoride levels can occur in areas with geothermal influences, despite cooler water temperatures (Neely, 1998). One well exceeded fecal coliform standards.

Main Payette Subbasin

Of the sites tested for ground water quality through the Idaho Statewide Ground Water Quality Monitoring Program, twenty-nine percent of the wells sampled had elevated nitrate concentrations (2.0 to 10.0 milligrams per liter), indicating impacts from land use activities. The majority of these sites were located in the Lower Payette River Valley. Map 16 (page 87) shows possible trends in nitrate concentrations for wells sampled between 1991 and 1994, and then sampled again four years later. A number of wells show a trend of increasing nitrate concentration, with several exceeding the maximum contaminant levels. Several wells show a decrease in nitrate concentration. These data indicate nitrate is impacting ground water quality in the lower Payette River area.

Some sampled wells exceeded state water quality standards for fluoride, fecal coliform, arsenic, and total dissolved solids (Map 15). Pesticides were also detected in a majority of the wells, but none of the detections exceeded primary maximum contaminant levels.

A study done in the early 1990s by the Division of Environmental Quality found that elevated nitrates occurred in ground water throughout the lower Payette Valley (Ingham, 1996). Some sampled wells exhibited high levels of nitrates, with several samples exceeding the 10 milligrams per liter primary maximum contaminant level standard. Thirty-eight pesticides were analyzed in this same study, and only Dacthal di-acid and 2-4-D were detected, neither in exceedence of safe drinking water criteria.

In 1993 the Lower Payette River Water Quality Planning Project reported on the ground water in the lower Payette Valley (Payette Soil & Water Conservation District, 1993). Secondary maximum contaminant levels for sulfate, iron, and total dissolved solids were exceeded in some of the sampled wells. Primary maximum contaminant levels protect against adverse health effects and are enforceable. Secondary maximum contaminant levels were established for aesthetic reasons such as taste and color, and are not enforceable.

Sulfates were greater than the 250 milligrams per liter secondary maximum contaminant level in 16 percent of wells sampled (Payette Soil and Water Conservation District, 1993). Iron exceeded the 300 micrograms per liter secondary maximum contaminant level in 25 percent of the wells sampled. Twenty-one percent of the sampled wells exceeded the secondary standard for total dissolved solids (500 milligrams per liter), with 10 percent exceeding the primary maximum contaminant level of 1000 milligrams per liter. The highest values for total dissolved solids (and nitrates) were obtained from shallow wells in heavily irrigated areas.

Reports of possible fecal contamination in 1996 resulted in a preliminary ground water study conducted in the Emmett area by the Idaho Department of Water Resources (Kellogg, et al., 1996). Of the fourteen wells sampled, three were contaminated with *Escherichia coli* possibly from animal wastes or a leaking septic system. All three were within fifty feet of each other. Follow-up actions were taken. The report recommended that central sewer and public water supply wells should be considered in the future.

OTHER RESOURCE VALUES

Timber Resources

Approximately 1.16 million acres of the basin are forested. Approximately 60 percent of the public and federal lands is considered tentatively suitable for harvest (See Table 24). 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, aspect, and species type. Dominant timber tree species in the basin include ponderosa pine, spruce, lodgepole pine, and Douglas fir.

Timber harvest in the basin occurs under the direction of the U.S. Forest Service, the Idaho Department of Lands, and private interests, principally the Boise Cascade Corporation. The majority of the Forest Service lands are under the jurisdiction of the Boise National Forest. The Payette National Forest has a small area located in the northern section of the basin. Minor suitable timber acreage is found on U.S. Bureau of Land Management lands.

HISTORY

Timber resources have a long history of influence on the local economy of the Payette River Basin. In the early 1860s, Benjamin Warriner, later an Idaho City banker, owned a sawmill at Horseshoe Bend (Mills, 1963). By 1866 three sawmills were operating at "The Bend." In 1870 the first sawmill (water-driven) was built in Emmett (Lyon, 1968). Many mills were established around Emmett and Payette in the late 1800s. Logs cut from the mountains surrounding Garden Valley supplied the Emmett and Payette mills. Lumber from sawmills in Dry Buck Valley was carried by wagons down the road along Squaw Creek to the lower Payette and Boise valleys.

Table 24. Timber Acreage Suitable for Harvest in the Payette River Basin.

Owner/ Manager	Total Acres in Basin	Tentatively Suitable (acres)
Boise National Forest	916,629	566,536*
Payette National Forest	137,448	109,274*
Bureau of Land Management	178,362	16,428
State lands	130,365	n/a
Private	717,245	n/a
TOTAL	**2,080,049**	**692,238**

* Note: Based on current Forest Plans. These two national forests are currently revising their Land and Resource Management Plans.
Sources: Koski, 1997; Jones, 1998; U.S. Forest Service, Boise National Forest, 1990; and U.S. Forest Service, Payette National Forest, 1988.

Many loggers lived and worked in the woods most of the winter in order to bring logs to the sawmill via Payette River "drives" from mid-May until mid-June. Most of the logging crew followed the river drive and dislodged the logs jammed at bends and on gravel bars with peavey hooks and draft horses. To catch the logs as they came down stream, a boom was laid across part of the river near Emmett and at Payette (Mills, 1963; Lyon, 1979). To aid North Fork Payette river runs, a huge splashdam was erected below Smiths Ferry, impounding 36.5 acres of backwater. By 1918 the log drives were discontinued in favor of rail transport.

Long Valley's first sawmill was built and operated by Jackson Westfalls near Alpha, south of Cascade, in 1889. A few years later, in 1896, the Warren Dredge Company established the first sawmill on Payette Lake. Prior to World War I many sawmills operated in Long Valley, producing both railroad ties and lumber (Ingraham, 1992). Fire destroyed many of these mills and most were never rebuilt. The Boise Payette Lumber Company began a branch office in Cascade and later moved their operations to Cabarton. In 1924, J.P. Dion built a sawmill on the east side of Cascade, near the river. It has operated continuously since then and is now owned by Boise Cascade.

From 1914 to 1929, the McCall area was logged, with most timber processed at Hoff and Brown's mill in McCall. The Oregon Short Line Railroad, a branch of the Union Pacific, began service from McCall in about 1915. Large scale logging declined in the 1930s, although there were still a few small logging operations cutting timber (Ingraham, 1992). Some logging activity occurred north of Payette Lake during the 1930s and 40s. Log decks were built at the north end of the lake at North Beach. Logs were dumped in the lake and floated to the mill at McCall. The timber market rose through the 1960s, but slumped again in the 1970s. Many sawmills closed including the Boise Cascade mill in McCall. The Hoff and Brown sawmill in McCall operated until the late 1970s.

Some early logging occurred in the Squaw Creek drainage in the 1920s and 1930s in support of local homesteads and ranches. Large-scale timber harvest activities did not occur in the drainage until after World War II, particularly after 1960.

CURRENT TIMBER HARVEST AND FOREST PRACTICES

Timber harvest totals in the basin for the past five years (1993-1997) and planned for the next five years (1998-2003) are summarized in Table 25. Harvest volumes in the basin are projected to

Table 25. Timber Harvest and Estimated Value Between 1993 to 1997 and 1998 to 2003.

	1993 - 1997		1998 - 2003	
	Harvested (MMBF)	Estimated Value (millions)	Estimated Harvest (MMBF)	Estimated Value (millions)
National Forest	110.5	10.5	261.7	39.7
BLM	4.5	N/A	4.3	N/A
State lands	13.8	1.3	36.1	3.6
Private	225.0	186.0	225.0	186.0
TOTAL	**353.8**	**197.8**	**527.1**	**229.3**

MMBF = million board feet
Sources: Brevig, 1997; Roberts 1997; Clark, 1997; Marshall, 1997; Demetriades, 1997; and Jones, 1998.

increase almost 50 percent over the next five years, with the increased volume coming off national forest and state lands.

Although timber volumes can be estimated, actual harvest acres can be lower due to on-the-ground conditions and political constraints (Marben, 1997). The proposed Forest Service road policy, proposing an 18-month moratorium on road construction in roadless areas, may delay some of the planned sales for the period 1998-2003, resulting in a reduction of actual harvest volumes from that estimated (Giles, 1998). Additionally, other events, such as the bull trout listing and revision of Forest Plans, may result in decreased volumes harvested.

In the next five years (1998-2003), the total value of harvested timber is expected to increase disproportionately to total volume due to shifts in timber supply locations and average sale prices. On national forest lands the predicted values of timber and returns to the counties is estimated to increase by 279 percent (given all proposed harvest takes place), while total volume will increase only 137 percent (Table 26).

A summary of employment and income related to past and future estimates of timber harvest in the basin are shown in Table 27. Timber-related occupations are those associated with the harvest and processing of timber into lumber including loggers, equipment operators, and mill workers. Employment-related income is the aggregate salaries of timber-related employees. Although employment (jobs) and related income are estimated to increase,

Table 26. National Forest Timber Harvest Volumes/Values and Returns to Counties.

	1993-1997			1998-2003		
	Harvest Vol. (MMBF)	Harvest Value	Return to Counties**	Estimated Vol. (MMBF)	Estimated Value *	Return to Counties**
TOTAL	110.5	$10,483,077	$2,620,768	261.7	$39,731,918	$9,912,979
Net increase				137%	279%	278%

*Timber values are estimated on actual sale prices recorded in 1993-1997 sale records.
**Returns to counties are figured at 25% of Harvest Value.
MMBF = million board feet
Sources: U.S. Forest Service, Boise National Forest, 1993-1997a and b; and Demetriades, 1997.

Table 27. Income and Employment from Timber- Related Activities.

	1993-1997		1998-2003	
	Timber- Related Employment	Employment-Related Income (1000's)	Estimated Timber-Related Employment	Estimated Employment-Related Income (1000's)
TOTAL	2,212	$101,675	4964	$230,708
Net increase			124%	126%

Multipliers for both timber-related employment and income were calculated from the Timber Sale Program Annual Report FS-591 for both the Boise and Payette national forests.
Sources: Schuster, et al., 1996; and U.S. Forest Service, 1996.

actual amounts cannot be guaranteed. Factors influencing actual timber harvest can reduce potential harvest volumes dramatically. Most notably, the closure of Boise Cascade Corporation's Horseshoe Bend Mill will result in a loss of jobs.

A high percentage of state land in the Payette River Basin is managed for commercial timber production under the responsibility of the Payette Lakes (McCall) and the Southwest Idaho (Boise) supervisory areas within the Idaho Department of Lands. Harvest volume and value on state managed lands are summarized in Table 25 (page 90). Timber harvested on state lands between 1993 and 1997 comprised almost 4 percent of the total harvested volume in the basin. Future volumes are estimated to increase 162 percent over the next five years.

Boise Cascade Corporation is a major landowner of private commercial forest land in the basin. The corporation currently operates two mills in the basin in Cascade and Emmett. A third mill in Horseshoe Bend was recently closed. Boise Cascade obtains 70 to 80 percent of its Idaho timber supply from state and federal lands (Malany, 1998).

Mineral Resources

The Payette River Basin has been the site of mineral interest and activity for over 125 years. Mining districts were set up for placer gold; one was set up for coal. Over 125 mines and prospects are located in the basin. Mining exploration and production has been sporadic over time, but there has been consistent general interest (Idaho Geological Survey, 1997). Mines and prospects within the Payette River Basin are shown in Map 17.

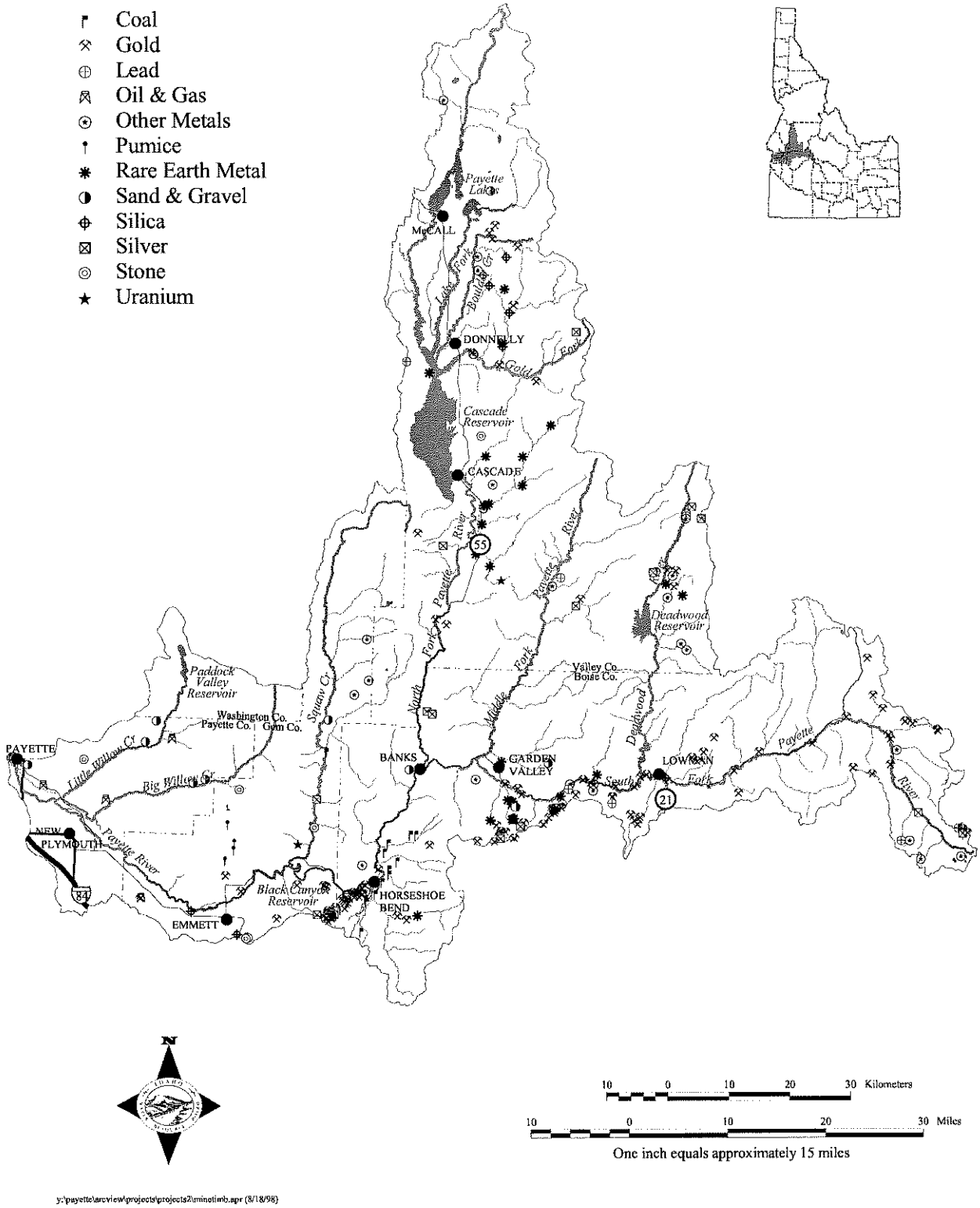
Important mineral commodities in the Payette River Basin are sand and gravel, and industrial quality silica sand. Less abundant and of uncertain value are impure forms of clay, limestone, diatomite, and pumice. Sandstone, arkose, and basalt are available as dimension stone. Several unsuccessful attempts have been made to develop oil and natural gas in the lower basin. Neither hydrocarbon resource appears to be present in commercially valuable amounts (Savage, 1961; Rains, 1991).

Sand and Gravel - Sand and gravel production comprises the largest mineral industry in the basin. Deposits are readily available in the larger valleys and near rivers and streams (See Map 17). State, county, and private sand and gravel operations are located near rivers and streams near Lowman, Garden Valley, and Horseshoe Bend, but are not operating in the stream channel. Major production is from alluvial gravels. The Idaho Department of Transportation and the County Highway Districts are the largest consumers of natural and manufactured aggregates.

The value of sand and gravel produced in the basin over the past five years was almost ten times that of gold, silver, lead, and zinc produced for the same period (Gillerman, 1997b). Future gravel demands are expected to increase from construction in the Treasure Valley near Boise. For this reason, gravel extraction locations should be prioritized for future uses (Gillerman, 1997b).

Silica - Unimin Corporation, the largest silica sand producer in the United States, operates a plant at Emmett and is the only industrial silica sand producer currently operating in Idaho. The sand is marketed mainly in the Pacific Northwest for container glass, foundry molds, sand blasting, filtration, and roofing granules. Unimin is also the leading supplier of golf course bunker sand in the United States. Gem Silica Company, a predecessor to Unimin Corporation, started operations at Emmett in 1949 (U.S. Bureau of Mines, 1962).

Map 17. Mines and Prospects



y:\payette\arcview\projects\projects2\minotimb.apr (8/18/98)

The silica sand is mined from the Idaho Formation, which was deposited during the Pliocene and Pleistocene in a piedmont plain environment with shallow lakes that fluctuate in size and water depth. This sand, along with gravel, silt, and clay, was derived from the erosion of granite and quartz monzonite of the Idaho Batholith. When washed and screened, the product yields 85 percent silicon dioxide (quartz).

Gold and Other Metallic Minerals - Gold deposits are considered sparse in the Payette River Basin, without significant concentrations to currently warrant commercial mining (Gillerman, 1997b). Most gold produced in the Payette River Basin was gold dust widely disseminated through gravel and sand placer materials (Ross and Savage, 1967). Placer gold deposits in most mining districts were characterized by only a few very rich concentrations of gold. Some modern exploration for hard rock gold has taken place near Emmett and Horseshoe Bend, but no commercial resource has been discovered.

The Deadwood Mine, located north of the Deadwood Reservoir along the Deadwood River, was a significant base metal producer, with lead, zinc, gold and silver ore. Exploration of a molybdenum prospect occurred in the 1970s on the South Fork Payette near Little Falls.

In the lower basin, known metallic mineral resources are limited. Near Horseshoe Bend the Pearl mining district yields gold, silver, lead, and zinc from veins in the Idaho Batholith and Eocene intrusive rocks. In the past, extensive placer operations were located in the Rock Creek headwaters, on the Payette side of Crown Point. However, most past mining ventures and all current operations are on the Boise side of the divide, along the north fork of Willow Creek. Minor amounts of gold, silver, copper, lead, and zinc are found in stream beds. However, mining activity within stream beds is limited to recreational dredging at this time. Silver and copper have been reported to occur in the Squaw Creek district a few miles north of Montour. However, Savage (1961) could not find verification nor any signs of mining activity in the "district" during field investigations. Considering present conditions, including the price of gold, the known quantity of metallic minerals in the Payette River Basin does not constitute a major mineral resource.

Thorium and Rare Earth Metals - Thorium is frequently found in placers. The most important thorium mineral is monazite. Some of the richest and most productive of the monazite placers are those in Long Valley, especially near the mouth of Big Creek, in the vicinity of Cascade. The monazite dredges suspended operations when purchases by the Atomic Energy Commission ceased, the only market for the recovered material (Murray, 1999; Cook, 1957).

Feldspar - Although there appear to be no markets for feldspar produced in Idaho, the Payette River Basin is a potential producer of feldspar. Along the borders and within the interior of the Idaho batholith are thousands of pegmatites of all sizes, a number of which are potential producers of commercial quantities of feldspar. Commercial grade clay and feldspar are the two necessary ingredients of a ceramic industry. A number of claims cover the west ridge of Wash Creek in the Garden Valley District.

Uranium - Pegmatites in the Garden Valley area are known to contain uranium minerals. None of these pegmatite deposits, however, have commercial potential. Low-grade uranium-bearing lignites occur in Payette County. These beds are a potential low-grade source of uranium. Uranium-bearing radioactive black minerals are found in most of the gold-monazite placers of central Idaho.

Garnet - Placer deposits in the Gold Fork-Little Valley area contain large quantities of garnet-bearing gravel.

Pumice - Pumice deposits in Idaho are large enough for the state to rank fourth in national production. Map 17 (page 93) shows locations of active mines in the Payette River Basin. The major use of pumice is in the construction industry, where it is used in concrete, building block, and as plaster aggregate.

Dimension stone - Dimension stone is any stone which is quarried, cut, shaped, and possibly polished for structural, architectural and ornamental applications. The rock is usually gathered from where it lies loose on the ground, loaded onto flatbed trucks, and shipped to local and regional building supply dealers. Dimension stone mined in the Payette River Basin includes sandstone and basalt.

Oil and Gas - Like most of Idaho, the Payette River Basin is generally underlain by rocks that are not favorable either as source rocks or reservoir sites for oil or gas; the lithologic, structural, and environmental conditions of deposition are all generally adverse (Idaho Bureau of Mines and Geology, 1923). Deposits in the Payette River Basin are fluviatile and lacustrine in origin and not marine, as is the case in large producing fields. There are no filings for oil and gas leases in the basin at this time.

Eight wells drilled in Gem County and thirteen wells drilled in Payette County have failed to produce commercial quantities of natural gas or oil. Plans for exploiting envisioned reserves of natural gas and oil have waxed and waned sporadically in southwest Idaho for about 100 years. As early as 1908, a well drilled 10 miles north and three miles west of Emmett in Sand Hollow reportedly produced some natural gas (Savage, 1961). Additional wells were drilled over the periods 1926-35 and 1955-56. Many of the water wells drilled in the Payette area yield gas from small pocket accumulations. After several days, natural gas ceases to flow in the wells. Savage (1961) reported that one well produced 75 million cubic feet of gas per day for a short period then ceased to flow.

There is no geophysical or drilling activity occurring in the basin at this time. Low prices of oil and gas have had the effect of greatly reduced petroleum exploration all over the U.S. Leasing and exploration in an extremely speculative area, such as the Payette River Basin, will most likely be minimal in the immediate future. Beyond the immediate future, exploration in the basin will probably be cyclical and vary with the economics of the oil and gas industry.

Coal - There are currently twelve coal mines registered within the Payette River Basin. Coal for local consumption has been mined in the Horseshoe Bend area in Boise County. Coal occurring in the Horseshoe Bend area is found in Tertiary sediments of the Payette Formation which consists of sand, shale, and clay interbedded with thin seams of subbituminous and lignite coal. The Henry Mine operated in 1910 and produced subbituminous coal. In 1938 lignite was mined from a 4-foot-thick bed at the Gaston Mine. Coal in the Horseshoe Bend area is not currently an economic commodity, because it does not occur over a large-enough area nor does it have a consistent thickness or quality (Gillerman, 1997b).

Energy Supply And Conservation

Most of the early basin electric generating plants developed in the basin were steam driven. Sawdust burning plants were started in Payette in 1903 by J.W. Prestel & Sons and in Emmett in 1904 by a predecessor of the Emmett Power & Water Co. These steam plants, the Horseshoe Bend hydroelectric plant, and service territories were purchased between 1907 to 1909 by Idaho-Oregon Light & Power Company. This company and five

other companies across southern Idaho reorganized in 1915-16 through an intermediary company, the Electric Investment Company, to become Idaho Power Company. Steam production was terminated shortly after reorganization.

ENERGY SUPPLY

Today electrical energy to meet the growing consumer needs of the Payette River Basin is provided by the Idaho Power Company. Most of this energy is produced by company-owned hydropower facilities located along the Snake River outside the Payette basin and coal plants in Wyoming and Oregon. The Company's 12.8 megawatt plant at Cascade Dam on the Payette River is its only generation facility in the basin.

Additional electric power generation in the basin occurs at the U. S. Bureau of Reclamation's 8.0 megawatt generator at Black Canyon Dam near Emmett. The Horseshoe Bend Power Plant is a refurbished facility using water diverted from the Payette River at Horseshoe Bend to generate 9.5 megawatts of power for sale to the Idaho Power Company. Boise Cascade Corporation burns sawmill waste at its Emmett sawmill to generate 13 megawatts of electricity which is also sold to the Idaho Power Company (Fleischman, 1997). The basin also has independent power production at several locations where utility line extension is impractical or cost prohibitive. One of the most conspicuous applications of photovoltaic generation in Idaho is a solar-powered subdivision located on Horseshoe Bend Hill (Eklund, 1997).

The electric power customer base in the Payette River drainage grew an average of 4.6 percent per year between 1991 and 1995. The highest growth in the drainage was McCall at 3.9 percent and Cascade at 3.8 percent (Idaho Power Company, 1996). Households in the Payette River Basin are predicted to increase almost 14 percent in the next five years, and 30 percent by 2010. Demand for electrical power in the Payette River Basin has been rising steadily since 1990, while use per customer has declined (Idaho Power Company, 1996). In 1990, average electrical consumption per residential customer was 14,340 kilowatt-hours and decreased to an average 13,430 kilowatt-hours in 1996 (Idaho Power Company, 1991 and 1996). The reduction in use per customer may be due to the increased use of propane for heating, with some decreased use due to the Idaho Residential Energy Standard for site-built homes and the Super Good Cents® certified energy efficiency program for manufactured homes.

Much of residential energy usage is for seasonal or occasional service to second homes near McCall, Cascade, and the South and Middle Forks of the Payette River. Space heat in the upper part of the basin is provided by electricity, propane, and wood, with most homes having electric heat, although recently propane has become more popular. Most hot water is heated with electricity. Electricity also provides all the lighting, refrigeration, and most of the cooking.

Throughout the basin demand for electricity peaks in the winter, contrary to Idaho Power's system load which peaks in the summer. This is due to the preponderance of residential and commercial loads in the basin which use more for space heating and lighting during the colder, darker months. Outside the basin, loads are influenced by irrigation pumping which leads to summer peak demand. (Idaho Power Company, 1996).

ENERGY CONSERVATION

Energy conservation is defined as the more efficient use of energy by using less energy to produce a given service at a desired amenity level. Available conservation programs designed to increase energy use efficiencies can play a major role

in meeting part of the present and future increases in energy needs. The Northwest Energy Code, Model Energy Code, and other locally-adopted building codes support modern conservation standards for new building construction. Other conservation advancements are also becoming increasingly feasible.

The Energy Division of the Idaho Department of Water Resources provides information, technical assistance, and marketing to promote cost-effective conservation and the efficient use of energy resources. Owners of new and existing commercial buildings and existing residential buildings may apply for low-interest loans from the Energy Division. These loans finance the installation of energy savings measures which have a simple pay back period of less than 10 years.

While not part of any established conservation program, conversions to alternative sources of energy have been proposed to reduce dependence on over-committed sources. Main alternative energy sources include use of Idaho's geothermal energy, renewable wood products, solar, and wind resources. A geothermal energy source is used at Terrace Lakes to heat water in the swimming pool. Use of wood for space heating has been very popular in the Payette River Basin, but potential problems with air pollution and overuse of supplies make it less attractive.

Application of solar energy for space heating and production of electrical energy has not been used extensively in the basin, primarily due to the costs of development. Some houses are sited to take advantage of solar gain during the winter, and a few photovoltaic installations have been attempted on individual facilities, but none are of utility scale. Even the best commercially available solar cells are relatively inefficient and not effective for large-scale use in Idaho where electric kilowatt-hour rates are generally below 5 cents per kilowatt-hour (Idaho Department of Water Resources, 1994). Wind power has not been found commercially feasible, because winds are not of sufficient sustained velocity to constitute a reliable power resource. Even brief lulls in wind speed can reduce the reliability of wind-powered generators below the threshold of usability.

The current move toward electric power deregulation may have significant impacts upon power generation and distribution throughout Idaho, as well as on hydropower-related water use demands (Eklund, 1997). Recent Federal Energy Regulatory Commission orders have allowed for bulk power users (such as manufacturing facilities) to purchase power from any willing supplier, and require local utilities to transmit (wheel) the power over their lines. If the state of Idaho decides to implement deregulation, "retail wheeling" may also occur. This could allow power purchasers at any level to buy power from whomever they choose at whatever rates they can negotiate. If fully implemented, deregulation could have an overall "equalizing" affect on power costs, lowering the costs in high rate areas and raising the costs in low rate areas such as Idaho.

The potential utility deregulation has already affected the ability of utilities to continue aggressive programs promoting energy efficiency in residences. Idaho Power's Good Cents® Program trained builders in energy efficient construction and gave them incentives to build more efficient homes. As a result, most homes built in Valley County had highly efficient low emissivity windows and insulated floors. Both measures are cost-effective given the county's climate. When the program ended in 1994, builders stopped using low emissivity windows and insulated the crawl space perimeter instead of the floor, resulting in much greater heat loss. Many new homes are being built throughout the upper basin to

a much lower energy standard than is recommended for the climate (Keithley, 1997). The increase in energy use above the Good Cents standard is approximately 50 percent per home (Idaho Department of Water Resources, 1997a).

Another example of the effect of utility deregulation is in the manufactured housing sector. Manufactured homes account for approximately 40 percent of the new residences in the basin (Matthews, 1997). From April 1992 to August 1995, the region's utilities provided incentives to the manufactured housing industry to build highly energy efficient homes that rely on electric heat. During this period 100 percent of the new manufactured homes (403 homes) in the basin were certified energy efficient. After the incentives ended, certified efficient homes have continued to be available, but only about nine percent of the manufactured homes meet the program standards. The difference in energy performance between certified energy efficient homes and the standard product ranges from 35 percent to 60 percent more space heating energy used (Eklund, 1997).

Fish and Wildlife Resources

FISHERIES

The major river branches of the Payette River Basin originate in the Sawtooth and Salmon River mountains and flow through a variety of environments, ranging from elevations exceeding 10,000 feet to 2,125-foot elevation at the Snake River confluence. This range in elevation contributes to a diversity of aquatic habitats for cold and warmwater fish (Idaho Department of Fish and Game, 1996). Annual migration runs of anadromous fish, which once thrived in the basin, have been eliminated by construction of the Hells Canyon and Black Canyon dams. The abundance, diversity, and migration patterns of many remaining native salmonids have been altered by habitat modifications and introduced fish populations.

There are three large reservoirs in the basin - Deadwood, Cascade, and Black Canyon -- and several large natural lakes that were impounded for irrigation storage -- Upper Payette Lake, Little Payette Lake, and Payette Lake. These reservoirs and lakes sustain important fisheries in the basin. There are almost 180 natural alpine lakes in the basin, about half of which are stocked with various game fish species (Idaho Department of Fish and Game, 1996). In many of the lakes, brook trout were stocked in the 1940s and 1950s. Rainbow trout, westslope cutthroat trout, rainbow-cutthroat hybrids, brown trout, and lake trout have been stocked since the 1960s, along with arctic grayling. Before the days of stocking, most of the alpine lakes were barren of fish, but did have native amphibian and invertebrate populations.

Table 28 lists coldwater and warmwater game species found in basin waterways. Table 38 (page 128) in the *Recreation* section identifies river reach locations for specific species. A description of fisheries and habitat for the three subbasins follows. Bull trout, listed as threatened under the Endangered Species Act, are discussed in the *Federally Listed Threatened and Endangered Species* section.

North Fork Payette Subbasin

North Fork Payette: Headwaters to Payette Lake Outlet - Prior to the turn of the century, the fish habitat for the North Fork Payette River and Payette Lake were described as near-pristine (Gilbert & Evermann, 1894). Species described in Payette Lake included three-toothed lamprey (*Lampetra spp.*), black sucker (*Catastomus spp.)*, Columbia River sucker (*Catastomus spp.*), northern squawfish (*Ptychocheilus spp.*), steelhead trout (Oncorhynchus mykiss), mountain whitefish, chinook, sockeye,

Table 28. Cold and Warmwater Game Fish Species in the Payette River Basin.

Coldwater Species	Warmwater Species
mountain whitefish (*Prosopium williamsoni*)	smallmouth bass (*Micropterus dolomieu*)
rainbow trout (*Oncorhynchus mykiss*)	largemouth bass (*Micropterus salmonides*)
brown trout (*Salmo trutta*)	black crappie (*Pomoxis nigromaculatus*)
westslope cutthroat trout (*Oncorhynchus clarki lewisi*)	bluegill (*Lepomis macochirus*)
bull trout (*Salvelinus confluentus*)	yellow perch *(Perca flavescens)*
brook trout (*Salvelinus fontinalis*)	pumpkinseed (*Lepomis gibbosus*)
kokanee salmon (*Oncorhynchus nerka kennerlyi*)	brown bullhead (*Ameiurus nebulosus*)
coho salmon (*Oncorhynchus kisutch*)	channel catfish (*Ictalurus punctatus*)
rainbow-cutthroat hybrid	flathead catfish (*Pylodictis olvaris*)
splake (lake trout - brook trout hybrid)	
arctic grayling (*Thymallus arcticus*)	
lake trout (*Salvelinus namaycush*)	
fall chinook salmon (*Oncorhynchus tshawytscha*)	

Source: Idaho Department of Fish and Game, 1996.

kokanee, cutthroat trout, bull trout, sculpin (*Cottus spp.*), western dace *(Rhinichthys spp.)*, and shiners *(Richardsonius spp.)*. The chinook spawned in the tributaries, arriving in September. Sockeye spawned in Payette Lake between August and late October, and steelhead ran up all tributaries during high water in April (Ames, 1982). According to Gilbert and Evermann (1894), the North Fork Payette River was so dense with salmon that early settlers had to drive fish away before horses would ford the river. More than 25,000 sockeye salmon were reportedly captured at the Payette Lake Outlet (Big Payette Lake Technical Advisory Committee, 1997). The sockeye runs were eliminated with the construction of Black Canyon Dam.

The Payette Lake kokanee population has persisted, and now spawns along the lake shore and in the North Fork Payette River above the lake. Recently, the kokanee population increased dramatically (Big Payette Lake Technical Advisory Committee, 1997). Between 1988 and 1996, the adult spawning run increased from 2,000 to 65,000 individuals. Spawning activity in the North Fork Payette River also increased.

Lake trout were introduced to Payette Lake in the 1950s and cutthroat trout in 1988. Lake trout provide a trophy fishery with about half the lake trout exceeding 15 pounds in 1988 (Big Payette Lake Technical Advisory Committee, 1997). Tributaries to Payette Lake and the North Fork Payette River contain good populations of rainbow trout, cutthroat trout, and brook trout.

A unique population of the Pennask strain of rainbow trout is found in Little Payette Lake; its only location in Idaho (Janssen and Anderson, 1992). For a three-year period prior to 1994, Idaho Department of Fish and Game found that largescale suckers and squawfish had increased significantly in Little Payette Lake, threatening the trophy rainbow trout fishery (Janssen, et al., 1994b). Almost 90 percent of the fish biomass in the lake consisted of large-scale suckers and squawfish (Janssen and Anderson, 1993). The current fish community

consists of rainbow trout, kokanee, smallmouth bass, redside shiners, large-scale suckers, and northern squawfish.

Before fish stocking began in the 1940s, most of the alpine lakes in the North Fork Payette watershed contained no fish (Brunner, 1995). Twenty of the thirty alpine lakes in the North Fork Payette watershed are now stocked with rainbow trout, cutthroat trout, or arctic grayling. Five of the eight lakes in the trophy mountain lakes program of the Idaho Department of Fish and Game are located in the upper North Fork Payette basin, and include Brush Lake, Blackwell Lake, and Louie Lake. These are managed as trophy fisheries with a 20-inch minimum catch size and two fish limit (Grunder, 1996; Anderson, 1996).

North Fork Payette: Payette Lake Outlet to Cascade Reservoir Dam---The native fish species of the Long Valley area include rainbow trout, whitefish, bull trout, and kokanee, and once included migratory runs of steelhead, chinook, and sockeye (Arnold, 1984). The northern squawfish is a native species which spawns in large numbers in the North Fork Payette between Cascade Reservoir and Payette Lake from late May to early June (Anderson, 1996). The Idaho Department of Fish and Game has indicated that instream flow maintenance below Payette Lake is critical for trout survival, particularly because the fish depend on this and other reservoir tributaries as refuges when water quality in Cascade Reservoir is poor (Anderson, 1996). Other issues affecting the fishery include development on the North Fork Payette floodplain below Payette Lake to Hartsell Bridge (the upper end of Cascade Reservoir) which may have a detrimental impact on the riparian community and the fish habitat (Anderson, 1997).

Cascade Reservoir has had one of the most productive and diverse fisheries in the state (EDAW, Inc., 1991). At one time or another, it has had good populations of yellow perch, rainbow trout, coho, kokanee, chinook, mountain whitefish, northern squawfish, largescale suckers, and black and brown bullheads. Perch fishing is very popular in summer and winter, as is year-round fishing for rainbow trout and coho salmon. The reservoir provides productive habitat for both warm and coldwater species, because of a broad, shallow shoreline habitat which is productive for benthic invertebrates and aquatic vegetation (U.S. Forest Service, et al., 1990).

The present water quality conditions in the reservoir favor yellow perch and nongame species. Salmonid survival is marginal because of water quality conditions, including low dissolved oxygen under winter ice and late summer algal blooms caused by phosphorus loading (EDAW, Inc., 1991).Reservoir drawdowns during summer irrigation releases can also reduce fish habitat.

The tributaries, particularly North Fork Payette River, Gold Fork River, and Lake Fork Creek, provide an important sanctuary function when water quality conditions in the reservoir deteriorate (Anderson, 1996). The major tributaries to Cascade Reservoir are closed to fishing during the spring salmonid spawning period. The west side tributaries are also important salmonid spawning areas.

Riparian vegetation removal along the tributaries result in increased erosion and water temperatures that hinder salmonid spawning. Fish passage is a concern on Lake Fork and Gold Fork because of diversion structures and dewatering. Sediment which can cover habitat for fish food (macroinvertebrates) and spawning beds is also a concern in both drainages.

North Fork Payette: Cascade Reservoir Dam to Banks--Native fish species once included

rainbow trout, mountain whitefish, kokanee, and migratory runs of steelhead, chinook, and sockeye (Arnold, 1984). The current species list includes wild trout, mountain whitefish, yellow perch, brown trout, and bullhead. From Cascade Dam to Cabarton Bridge, the river contains some hatchery rainbow trout, yellow perch, and mountain whitefish (Anderson, 1996). The reach from Cabarton Bridge to Smiths Ferry contains a more productive fishery because of its largely unaltered character, compared to reaches upstream and down (Idaho Department of Fish and Game, 1996). The fish in this reach have self-sustaining populations, with active spawning in both the North Fork Payette and tributaries. From Smiths Ferry to Banks, the river has been altered by railroad and highway construction providing a marginal salmonid fishery (Idaho Department of Fish and Game, 1996). Species present are predominantly wild rainbow trout, with a few hatchery rainbows, and northern squawfish.

Horsethief Reservoir is a small impoundment on the east side of Long Valley that supports a varied fishery. Rainbow trout, rainbow-cutthroat hybrids, cutthroat trout, brook, brown, yellow perch, bullhead, and splake are among the variety of species stocked there (Idaho Department of Fish and Game, 1996; Allen, et al., 1995b; and Reid, 1979).

South Fork Payette Subbasin

The aquatic habitat of the South and Middle Fork Payette River drainages are unique because they contain only one impoundment -- Deadwood Reservoir. The rest of the drainage is free-flowing, containing a wide variety of habitat types. The South Fork Payette River contains wild rainbow trout, brook trout, westslope cutthroat trout, bull trout, mountain whitefish, sculpin, large-scale sucker, and several species of dace (Grunder, 1996). River sampling has also identified northern squawfish, bridgelip sucker, and redside shiner (Allen, et al., 1995a). The drainages are situated in unstable, granitic parent material, so much sediment has entered and been entrained in the system. Sediment causes decline in suitability of available fishery habitat by filling in substrates and pools which are important for spawning, rearing, and holding areas (Grunder, 1996). Sedimentation in these drainages are the result of human-caused and natural events.

Deadwood River – Deadwood River above Deadwood Reservoir is a wild rainbow trout fishery and an important kokanee spawning area (Grunder, 1996). The streams which flow directly into Deadwood Reservoir are inhabited by wild and hatchery rainbow trout, westslope cutthroat trout, introduced cutthroat - rainbow hybrids, mountain whitefish, and brook trout. Deadwood Reservoir contains a salmonid fishery, with good populations of westslope cutthroat trout, kokanee, and wild rainbow trout (Yundt, 1996). Other fish species include bull trout, brook trout, mountain whitefish, and fall chinook (Idaho Department of Fish and Game, 1996). Resident salmonids in the reservoir use Trail, Moulding, and South Fork Beaver creeks for spawning and rearing young fish.

Kokanee were introduced into Deadwood Reservoir in 1963 (U.S. Forest Service, Boise National Forest, Lowman Ranger District, 1992). An estimated seventy to eighty percent of the kokanee spawn in the Deadwood River. Heavy kokanee spawning also occurs in Wild Buck, Basin, and Trail creeks in late August into September. In an attempt to control kokanee populations, Atlantic salmon were planted in Deadwood Reservoir in 1990, and rotenone was applied to lower Trail and Beaver creeks in 1992. Drought, coupled with low reservoir water levels, in 1993-94 further reduced the number of kokanee, stabilizing the population (Allen, et al., 1996; Mabbott and Holubetz, 1989).

The fish community below the Deadwood Dam consists of westslope cutthroat trout, rainbow-cutthroat hybrids, wild and hatchery rainbow trout, brook trout, bull trout, mountain whitefish, kokanee, shorthead sculpin, and suckers (Grunder, 1996; Yundt, 1996). Limiting factors to the fishery include temperature fluctuations, low winter flows, and sediment from timber harvest and road construction (Yundt, 1996). A study conducted by Idaho Department of Fish and Game in 1979 concluded a minimum stream flow of 125 cubic feet per second from September 1 to March 31 was needed for fishery maintenance below the dam (Cochnauer and Hoyt, 1979). Currently a negotiated flow of 50 cubic feet per second is released in the winter.

Middle Fork Payette River -- The Middle Fork Payette River is a key bull trout watershed above Lightning Creek (Batt, 1996). In addition to bull trout, the Middle Fork and tributaries have good populations of wild and hatchery rainbow trout, brook trout, westslope cutthroat trout, mountain whitefish, and sculpin (Grunder, 1996). Sediment from residential development, road construction, and stream channelization threatens fish habitat in the lower half of the drainage (Reid and Mabbott, 1987).

Main Payette Subbasin

The river and tributaries above Black Canyon Reservoir contain predominantly coldwater species, including wild rainbow trout, bull trout, westslope cutthroat trout, brook trout (in Squaw Creek), and mountain whitefish, and some warmwater species such as smallmouth and largemouth bass (Idaho Department of Fish and Game, 1996; Yundt, 1996). Black Canyon Reservoir supports a marginal fishery because sedimentation has covered most habitat (Idaho Department of Fish and Game, 1996). Squaw Creek, a tributary to the Payette River at Black Canyon Reservoir, is designated a key bull trout watershed (Batt, 1996). Sage Hen Reservoir, located on a tributary to Squaw Creek, supports good rainbow, rainbow-cutthroat hybrid, and brook trout fisheries (Idaho Department of Fish and Game, 1996).

The Payette River below Black Canyon Dam is a mixed fishery (Idaho Department of Fish and Game, 1996). From Black Canyon Dam to Letha smallmouth bass, rainbow trout, and mountain whitefish predominate, but below Letha northern squawfish, suckers, and smallmouth bass prevail (Yundt, 1996). Viable populations of wild rainbow trout and brook trout are found in some tributaries, including Big and Little Willow creeks. The black crappie and largemouth bass fisheries in Paddock Valley Reservoir are considered good (Idaho Department of Fish and Game, 1996).

WILDLIFE AND WILDLIFE HABITATS

The numerous wet meadows and riparian communities in the basin are dominated by willows, cottonwood, red alder, and numerous shrub species. The fourteen plant species listed in Table 29, occurring in wetlands and riparian areas in the basin, are regarded as sensitive by the Conservation Data Center of the Idaho Department of Fish and Game. Sensitive species are considered at risk, because of low numbers, limited distribution, or other factors. No plants listed as threatened or endangered under the Endangered Species Act have been identified in the basin.

Riparian habitats offer food, water, and cover for a majority of the wildlife species in the basin. Mule deer and elk commonly utilize the riparian corridors of the main Payette and North Fork Payette. The riparian areas also provide critical winter range for big game species. The Deadwood River corridor and tributaries are major migration routes for elk. Whitetail deer, bobcat, black bear, mountain lion, coyote, pine marten, red fox, mink, river otter, and beaver inhabit the riparian corridors.

Table 29. Sensitive Plant Species in the Payette River Basin.

Common Name	Scientific Name
Globally Rare (Species that are rare throughout their entire range)	
Aase's Onion	*Alium anceps*
Swamp Onion	*Alium tolmiei var. persimile*
Meadow Milkvetch	*Astragalus drummondii*
Pored Lungwort	*Meesia longiseta*
Slick Spot Peppergrass	*Lepidium papilliferum*
Idaho Douglasia	*Douglasia idahoensis*
State Rare (Species that are rare in Idaho, but more common elsewhere)	
Bronze Sedge	*Carex breweri var. paddoensis*
Mt. Shasta Sedge	*Carex tumulicola*
Pale Sedge	*Carex luzulina var. atropurpurea*
Cusick's Camas	*Camissonia palmeri*
Sierra Sanicle	*Sanicula graveolens*
Tobias' Saxifrage	*Saxifraga bryophora var. tobiasiae*
Rush Aster	*Astragalus amblytropis*
Kellogg's Bitterroot	*Lewisia kelloggii*

Source: Idaho Department of Fish and Game, Conservation Data Center, 1998.

and common mergansers and Canada geese over-winter and nest on river islands, particularly on the main Payette below Banks.

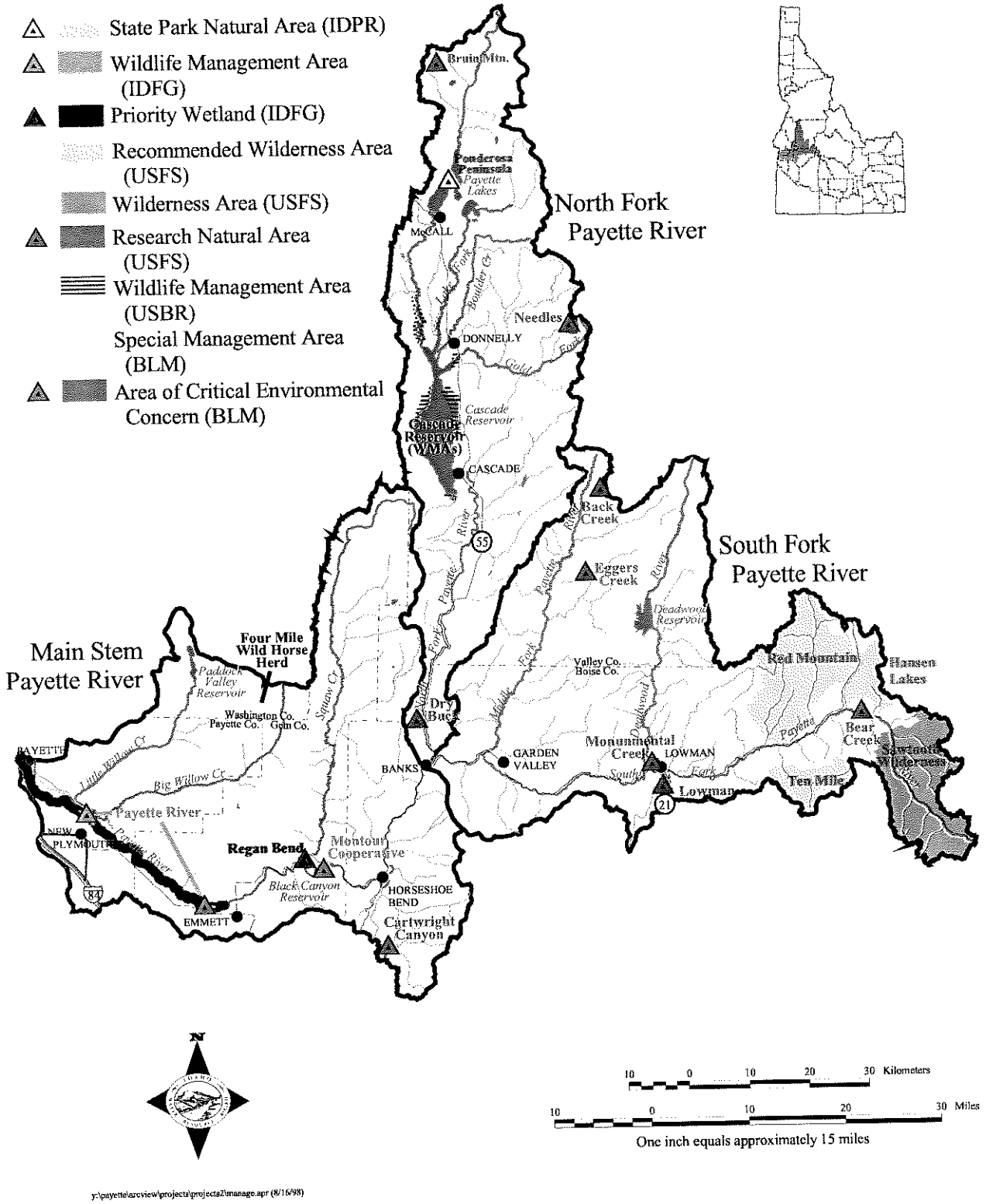
Other vegetation communities in the basin fall into two broad categories: upland coniferous forest and lowland sagebrush. The coniferous forest is dominated by Douglas fir, ponderosa pine, and lodgepole pine. The sagebrush communities have associations, primarily with grasses, including wheatgrass, Idaho fescue, bluegrass, cheatgrass, and needlegrass.

Wildlife and habitat found in the Payette River Basin is described by subbasin in the following section. Map 18 depicts the location of special management areas that provide important fish and wildlife values. Map 19 identifies some of the wildlife habitat in the basin.

North Fork Payette Subbasin

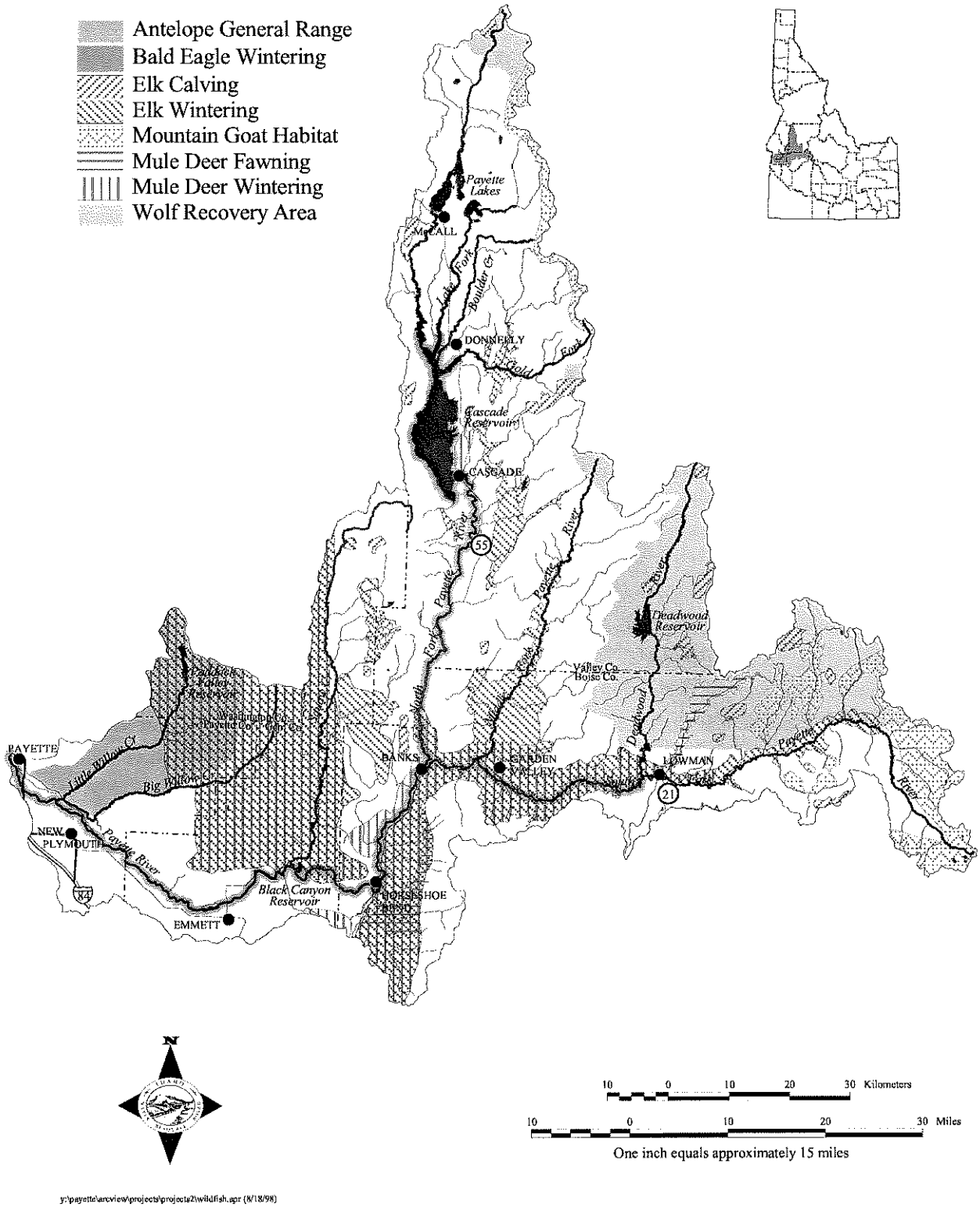
Area cultural history suggests that, except for the grizzly bear and gray wolf, wildlife species composition in the upper subbasin is generally the same today as when the first settlers arrived, although some species abundance has changed. The fisher and wolverine are nearly gone (Arnold, 1984). Elk, mule deer, and whitetail deer are now the dominant big game herbivores, while bighorn sheep and mountain goats are of limited distribution. Mule deer populations are stable on the Payette National Forest, but elk have steadily increased since 1917 (Brunner, 1995). Moose are present, but have never been a dominant species. The mountain goat population diminished around 1920 and again in the 1970s from range competition and hunting pressure. Other mammal species found in the area include black bear, mountain lion, snowshoe hare, beaver, mink, marten, muskrat, river otter, fisher, pine squirrel,

Map 18. Special Management Areas



y:\payette\arcview\projects\projects2\manage.apr (8/16/98)

Map 19. Wildlife Habitats



y:\payette\arcview\projects\projects2\wildfish.apr (8/18/98)

flying squirrel, ground squirrel, chipmunk, pika, hoary marmot, mouse, vole, and wood rat (Big Payette Lake Technical Advisory Committee, 1997).

Golden eagles have recently increased in the area because of an increase in open habitat created by forest fires (Brunner, 1995). Common to moderately common raptors include the red-tailed hawk, Swainson's hawk, ferruginous hawk, rough-legged hawk, kestrels, sharp-shinned hawk, and goshawks. Peregrine falcons are occasionally observed. Great horned owl, great gray owl, boreal owl, sawwhet owl, and the screech owl are all residents. Other birds found in the basin include the sandhill crane, great blue heron, sandpiper, kingfisher, pileated woodpecker, northern three-toed woodpecker, blue grouse, ruffed grouse, spruce grouse, and dippers. Neotropical migrant birds are species which migrate between temperate and tropical latitudes, and include the Hammond's flycatcher, Townsend's warbler, McGillivray's warbler, and the olive-sided flycatcher.

Long Valley is an important range for wintering and calving elk (Grunder, 1996; Map 19). Elk also winter east of Donnelly in the Gold Fork River drainage. Elk that summer on West Mountain migrate to the Weiser River basin in winter. Black bears are nomadic and usually stay in the wooded areas of West Mountain, using the North Fork Payette River as a travel corridor.

Since its construction, Cascade Reservoir has provided habitat for nesting bald eagles, osprey, waterfowl, and shorebirds (Grunder, 1996; EDAW, Inc., 1991). Common loons, curlews, and pelicans utilize the reservoir. The shallow marshes and wet meadows are critical nesting, feeding, and resting areas for waterfowl and shorebirds. For water birds migrating south in the fall, the reservoir is an important mass migration staging, resting, and congregation area. The north reservoir arms support the highest concentrations and diversity of birds, because of the variety of habitats and minimal human disturbance (EDAW, Inc., 1991). A large great blue heron rookery exists along the North Fork Payette inlet.

Osprey populations have increased since Cascade Dam was completed. More than thirty pairs of osprey nest in the reservoir area (EDAW, Inc., 1991). Downstream, six occupied osprey nests and a small great blue heron rookery of twelve nests were identified near Brush and Moores creeks in 1990. Red-tailed, rough-legged, ferruginous, marsh, and sparrow hawks, and short-eared, gray, and great horned owls also inhabit the area.

Large numbers of waterfowl appear on the reservoir during the April and May migration, including mallards, gadwalls, pintails, American widgeons, blue-winged teal, green-winged teal, cinnamon teal, and redhead ducks (U.S. Forest Service, et at., 1990). In May, western grebe, common mergansers, and Canada geese begin breeding along the shoreline. Because of the large number of migrating waterfowl that use the reservoir, several management agencies have recommended that livestock be excluded from shoreline areas to protect waterfowl nesting habitat (EDAW, Inc., 1991). Seasonal water level fluctuations also affect nesting waterfowl. Construction of potholes, offshore islands, and side channels from the reservoir have been recommended to create additional waterfowl habitat.

South Fork Payette Subbasin

Wildlife in the South Fork Payette drainage include black bear, elk, mountain lion, mule deer, beaver, otter, mink, moose, mountain goat, beaver, martin, pika, osprey, bald eagle, golden eagle, grouse, Canada geese, numerous waterfowl species,

and more than forty kinds of songbirds (Moore and Ames, 1979). Mountain goats inhabit Eightmile, Tenmile, and Warm Springs creek drainages, all tributaries to the upper South Fork Payette (Map 19, page 105). Important elk and deer winter range occurs at lower elevations near the river (Grunder, 1996; Yundt, 1996).

The Deadwood River corridor and adjacent tributaries are part of a major elk migration route (Yundt, 1996). The entire watershed provides extensive summer and fall elk habitat (U.S. Forest Service, Boise National Forest, Lowman Ranger District, 1992). Gray wolves have been reported in the area (Idaho Department of Fish and Game, Conservation Data Center, 1998).

The headwaters of the Middle Fork Payette River watershed provide habitat for black bear, elk, mule deer, mountain lion, gray wolf, beaver, otter, mink, moose, osprey, and numerous migratory songbirds (Grunder, 1996). At the lower elevations, good winter range exists for elk and deer, and the entire watershed is good summer range for both species. The Conservation Data Center of the Idaho Department of Fish and Game, has documented the presence of endangered gray wolves and peregrine falcons in the area (Idaho Department of Fish and Game, Conservation Data Center, 1998).

Main Payette Subbasin

The area upstream of Black Canyon Reservoir is elk and mule deer winter range, while the area north of the reservoir serves as important mule deer wintering and fawning habitat (Map 19, page 105). Migrating bald eagles typically winter along this entire reach of the Payette River. Upland game bird diversity is high, including pheasant, California quail, gray partridge, and mourning dove (Payette Soil and Water Conservation District, 1993).

Waterfowl are diverse and abundant in the lower Payette Valley because of aquatic habitat variety created by the presence of the river, irrigation diversions, and farm ponds. A 1984 survey found a substantial population of geese nesting and rearing broods on the river islands from Emmett to the mouth (U.S. Bureau of Reclamation, 1984). Reproductive success is affected by fluctuating river flows; low flows provide predator access to the nests, while high flows flood the islands and destroy the nests.

Willow Creek, a typical lower basin tributary, is home of the Four Mile wild horse herd (Idaho Department of Fish and Game, Conservation Data Center, 1998). The drainage also provides deer and elk winter range. Longbill curlews nest along the lower stream reaches. Antelope also utilize the habitat of Little and Willow creek drainages, as does the Southern Idaho ground squirrel, a Species of Special Concern to the Idaho Department of Fish and Game.

FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

Four species found in the basin are listed as endangered or threatened by the U.S. Fish and Wildlife Service under the authority of the Endangered Species Act -- peregrine falcon as endangered, the gray wolf as endangered, the bald eagle as threatened, and the bull trout as threatened.

Peregrine falcons are occasionally observed in the Payette Lake area (Brunner, 1995). The U.S. Fish and Wildlife Service released 39 birds (37 have since fledged young) in Scott Valley, east of Cascade, between 1982 and 1989 (Levine, 1993). Peregrines are currently seen on the northwest side of Cascade Reservoir, where the prey base is abundant and nesting sites available on the cliffs of West Mountain (Howard, 1997). However, no nests have yet been found.

The gray wolf once inhabited the upper North Fork Payette watershed, but has been extirpated. Recent wolf sitings have been reported along the Middle Fork Payette and Deadwood River drainages (Grunder, 1996; Arnold, 1984). Although sitings are reported, no breeding gray wolf populations are known to occur. The Central Idaho Wolf Recovery Area (depicted in Map 19, page 105), identified by the U.S. Fish and Wildlife Service as an area for wolf reintroduction, extends into a good portion of the Payette River Basin (Idaho Department of Fish and Game, Conservation Data Center, 1998).

Wintering bald eagle populations have been identified along the North Fork, South Fork, and main Payette rivers, and nesting sites have been recorded around Cascade Reservoir and Payette Lake (Brunner, 1995). Overall, eagle numbers have increased in the basin during the past ten to twenty years. Cascade Reservoir has the largest population of nesting eagles in the basin, first recorded in 1976 (Evans, et al., 1990). By 1990 eagles had established seven active nesting territories in the vicinity, five on the reservoir, and two on the North Fork Payette River, one above and one below Cascade Reservoir (U.S. Forest Service, et al., 1990; Evans, et al., 1990). From Cascade to Smiths Ferry, the river provides habitats for a variety of fish and waterfowl species which serve as important prey for the eagles (Grunder, 1996). Survey data from 1980 to 1995 report wintering bald eagles along the South Fork and main Payette rivers with a reported average of 8.4 adults and immature birds in the Lowman to Banks reach; an average of 4.3 between Banks and Emmett; and an average of 5.7 birds from Emmett to Payette. (Steenhof, 1995).

Bull trout are a fall spawning salmonid and the only char native to Idaho (Grunder, 1996). More than thirty non-native fish species compete with bull trout. Brown trout, brook trout, and lake trout have depressed or replaced many local bull trout populations. Brook trout are an especially important competitor, because they hybridize and have a higher reproductive potential.

In 1996 the state of Idaho initiated a Bull Trout Conservation Plan to restore and maintain bull trout populations (Batt, 1996). The plan designated 59 key watersheds statewide that are critical to the long-term persistence of regionally important bull trout populations. Five of these are in the Payette River Basin, including the Gold Fork River above the diversion, the upper portions of the South and Middle Forks of the Payette River, the Deadwood River above the dam, and the upper half of Squaw Creek (Map 20). The actual distribution of existing populations of bull trout is often patchy, and spawning and rearing habitat is restricted to increasingly isolated headwater "islands" (U.S. Forest Service and U.S. Bureau of Land Management, 1997). Historically, bull trout populations were connected throughout the Columbia River Basin, occurring throughout the Payette River Basin (Batt, 1996).

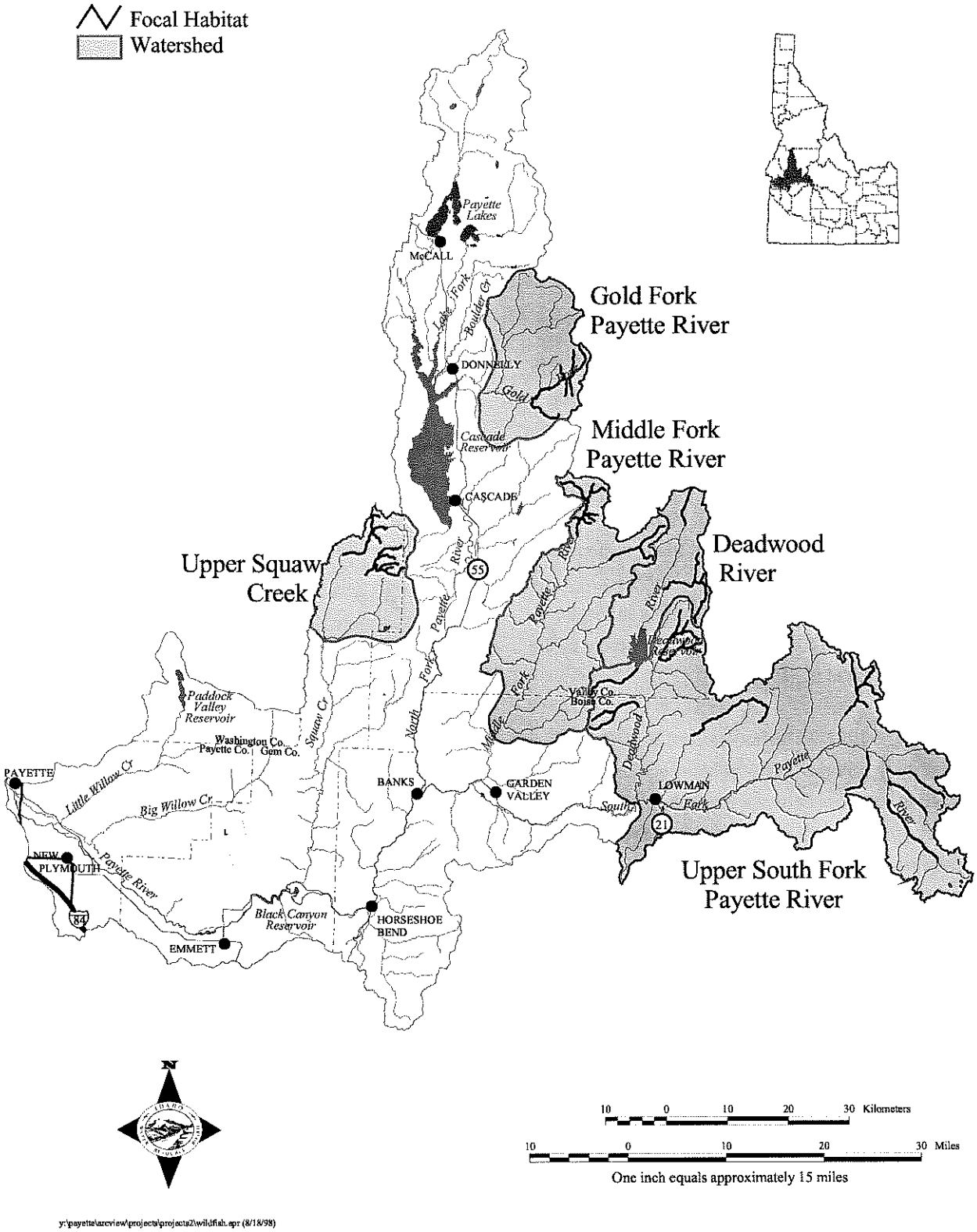
Recreation Resources

Several federal, state, county and local entities manage lands and facilities providing recreation opportunities in the basin. Based on land area, primary recreation providers are the Boise and Payette national forests, Upper Snake District Bureau of Land Management, and the U. S. Bureau of Reclamation. Additional opportunities are available at sites managed by Idaho Department of Parks and Recreation, Idaho Department of Fish and Game, and private entities.

REGIONAL RECREATION PATTERNS

The Idaho Department of Parks and Recreation divides the state into seven regions for planning purposes. The Payette River Basin located within the upper section of Region 3, encompasses the western third of Valley county, the northern half

Map 20. Bull Trout Key Watersheds



y:\payette\arcview\projects\projects2\wildfish.apr (8/18/98)

of Boise County, most of Gem and Payette counties, and a very small portion of Washington county. See Map 21. Studies examining recreational and tourism activities in Idaho by region were conducted most recently in 1993 and 1994 -95. Pertinent results of these studies are summarized here for an understanding of the regional context of recreation patterns in the Payette River Basin.

The 1993 Nonresident Motor Vehicle Travel in Idaho study examined nonresident motorists traveling from April through November 1993 (Hunt et al., 1995). The study estimated 4.8 million individuals (23 percent of all nonresident travelers visiting Idaho) traveled in Region 3. Approximately 2.7 million of these visitors (or 56 percent) were visiting Region 3 or another location in Idaho. The primary purpose of 36 percent was to visit attractions or natural areas, or participate in specific recreation activities. Most nonresident travelers originated from Oregon, Washington, California, and Utah (Hunt et al., 1995; Figure 29). Region 3 ranked third of the seven Idaho regions for volume of nonresident traffic. Total 1993 nonresident expenditures while traveling in Region 3 were estimated at $205.8 million, or 15 percent of the state total (Hunt et al., 1995).

The 1994-95 Idaho Resident Recreation & Travel study surveyed resident household recreation and travel activities between December 1993 and January 1995 (Parrish et al., 1996). The resident survey estimated 62 percent of Region 3 residents recreated within the region and 23 percent traveled out-of-state. Residents from other Idaho regions traveling to Region 3 to recreate included 13% of Region 4 residents (South Central Idaho) and 9% of Region 7 residents (Central Idaho).

In 1994 Region 3 residents spent more than $336 million within Idaho while recreating outside their community (Parrish et al., 1996). Region 3 residents spent more for recreational pursuits than other Idaho regions. Expenditures were for traditional outdoor activities such as fishing and hunting, and restaurants, museums, or visiting out-of-town friends.

Resident and nonresident participation in Region 3 outdoor recreation activities is depicted in Figure 30 (page 112). Water-based recreation comprised 12.5 percent of nonresident motorists and 19.4 percent of residents outdoor recreation activity. Most outdoor recreation for residents consists of non-motorized land-based activities. This category includes hiking, walking, biking and picnicking, and urban-related activities such as walking around town, using greenbelts, and walking the dog. Information on winter sports was not collected in the 1994-95 nonresident study.

RECREATION OPPORTUNITIES IN THE PAYETTE RIVER BASIN

Quantification of total recreation use for the Payette River Basin is difficult using available data. Agency estimates employ different measurements for units and time periods. Much information is derived

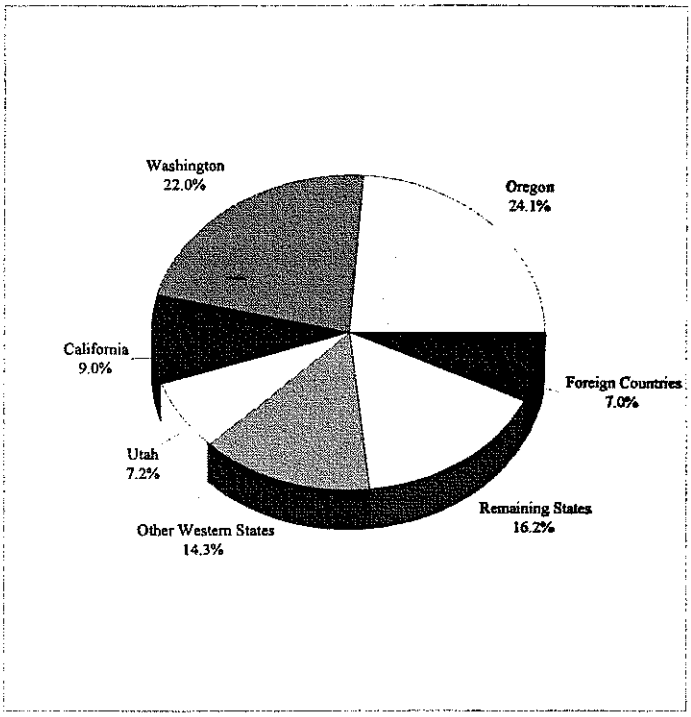
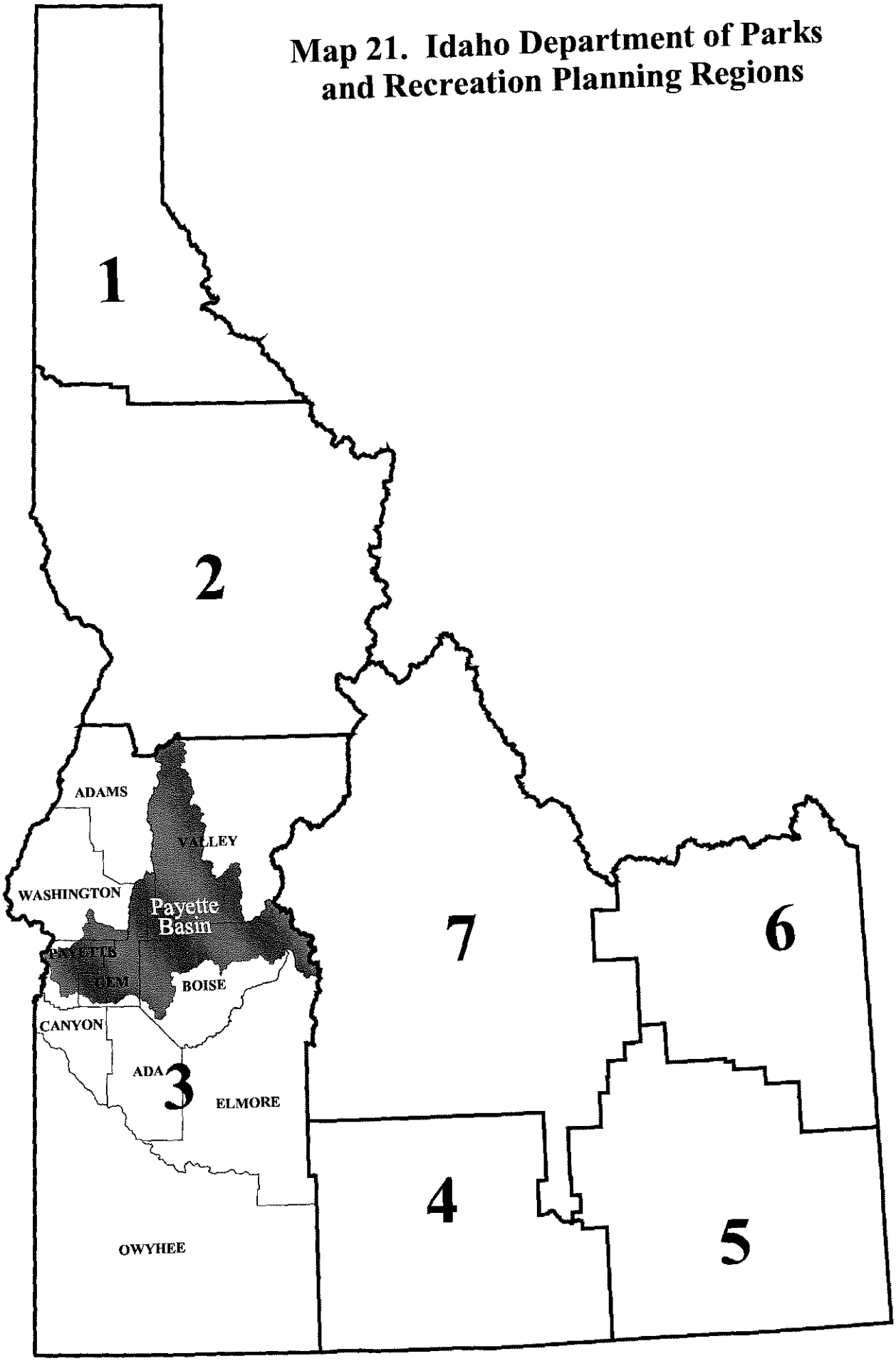


Figure 29. Origin of Nonresident Motorists Traveling Through Region 3 (Source: Hunt et al., 1995).

Map 21. Idaho Department of Parks and Recreation Planning Regions



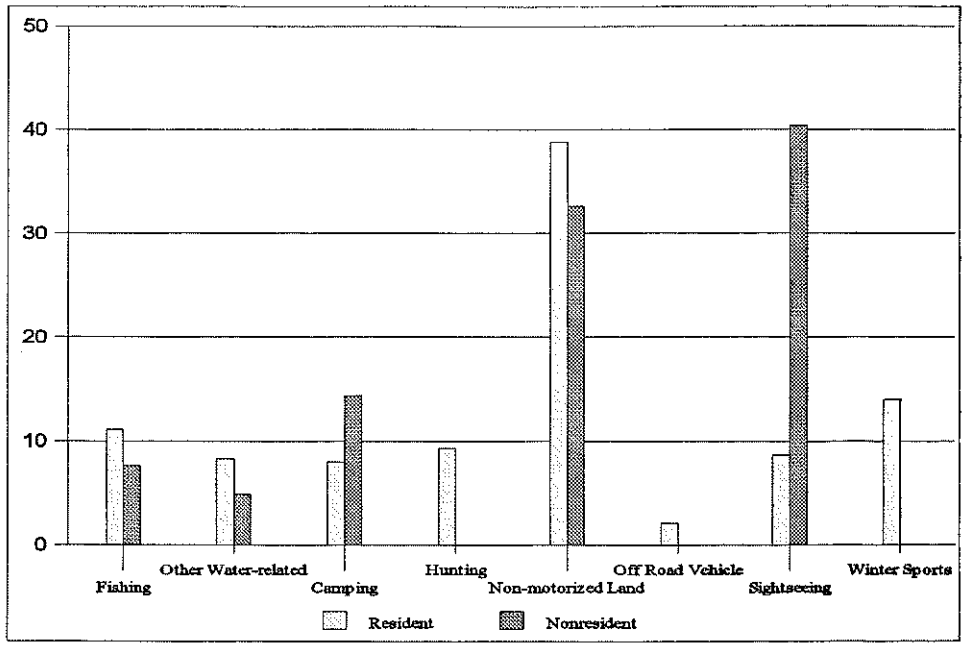


Figure 30. Percentage Estimated Outdoor Recreation Activity Participation in Region 3 (Sources: Hunt, et al., 1995; Parrish, et al., 1996).

by professional estimate as opposed to formal survey methods. Additionally, considerable activity occurs as dispersed use or through private entities which is difficult to quantify. (Dispersed use is activity that occurs outside developed facilities.) Recreation information is available for individual agencies or for isolated locations and activities within the basin.

Agency recreation estimates for lands within the Payette River Basin are displayed in Table 30. Most of this information are estimates based on professional judgment. A recreation visit is estimated for each activity that an individual participates; therefore, use estimates represent total recreation activity participation and not total numbers of individuals recreating in the basin. Information pertaining to specific areas within the basin, or for specific recreation activities, are described in the sections that follow.

Studies conducted in 1980 and 1983 provide estimates of recreation use for the North Fork and Payette rivers from Smiths Ferry to Lower Banks, South Fork Payette from Alder Creek (Garden Valley) to Banks, and the South Fork Payette from Grandjean to Alder Creek. A survey conducted in 1996 experienced sampling limitations which preclude reliable estimates of more current recreation activity in the river corridors or basin. A summary of river recreation participation by activity for the 1980 and 1983 studies is presented in Table 31.

Total hours of recreation activity almost doubled in the Smiths Ferry to Lower Banks reach from 1980 to 1983, and quadrupled in the Alder Creek to Banks reach (Reid, 1980; Idaho Power Company, 1984). Surveys of the South Fork Payette above Alder Creek to Grandjean showed significantly greater recreation use in 1980 than the downstream reach (Reid and Anderson, 1981). Most of this recreation activity occurred in or near river-oriented campgrounds, while the reach downstream of Alder Creek has limited campsites. Individuals engaged in recreation activities categorized as "other" were predominately sightseeing.

Whitewater boating activity increased substantially on both reaches between 1980 and 1983. The 1983 study found 52.2 percent of whitewater boating occurred on the South Fork Payette below

Table 30. Estimated Recreation Use in the Payette River Basin by Agency.

Agency	Time Period	Estimated Recreation Use
Idaho Department of Parks and Recreation	*1996 (Jan .1 - Dec. 31)*	Approx. 159,377 Visits
U. S. Bureau of Land Management	*FY 1996 (Oct. 1, 1995 - Sept. 30,1996)*	439,058 Visits
U. S. Bureau of Reclamation	*FY 1993 (Oct. 1, 1992 - Sept. 30,1993)*	370,503 Recreation Unit Visits
U. S. Forest Service	*FY 1996 (Oct. 1, 1995 - Sept. 30,1996)*	1,169,929 Recreation Visitor Days

Note: Idaho Department of Parks and Recreation data is for Ponderosa State Park only.
FY 1993 is the most current data available for U. S. Bureau of Reclamation.
Recreation Unit Visits or Visits = Participation by an individual in an activity regardless of length of stay.
Recreation Visitor Days = Participation in an activity for twelve hours. This could be four individuals participating in an activity for three hours each, one individual for twelve hours, or any combination equaling twelve hours.
Sources: Overton, 1997; U.S. Bureau of Land Management, 1996; Elliot, 1997; U. S. Forest Service, Boise National Forest, 1996; and Hoosick, 1997.

Table 31. Payette River Corridor Recreation Activity in 1980 and 1983 (percentages).

	North Fork and Main Payette **Smiths Ferry to Lower Banks** *(May - Oct.)*		***South Fork Payette*** **Alder Creek to Banks** *(May - Oct.)*		***South Fork Payette*** **Grandjean to Alder Creek** *(July - Oct.)*
Activity	***1980***	***1983****	***1980***	***1983****	***1980***
Camping	62.0	45.5	-	16.4	71.2
Sightseeing	19.7	*	-	*	2.4
Fishing	8.0	4.2	67.0	5.8	22.0
Whitewater boating	5.0	12.9	23.0	39.3	1.0
Picnicking	2.6	*	-	*	1.6
Horseback Riding	-	*	-	*	0.5
Swimming	-	*	-	*	0.9
Woodcutting	2.4	*	-	*	0.5
Other	0.3	37.4	10.0	38.5	-
TOTAL HOURS	**45,926**	**91,803**	**5,036**	**20,361**	**111,408**

* 1983 study compiled sightseeing, picnicking, horseback riding, swimming and woodcutting activities under the "Other" category.
Sources: Reid, 1980; Reid and Anderson, 1981; and Idaho Power Company, 1984.

Alder Creek, 44.3 percent on the Payette River below Banks, and 3.5 percent on the North Fork Payette from Smiths Ferry to Banks (Idaho Power Company, 1984). Whitewater boating activity in the Payette River basin has experienced an even greater increase since these surveys (Reid, 1997). One indicator is the increased volume of traffic on State Highway 55. Average daily traffic volumes on State Highway 55 between Porter Creek and Banks have more than doubled from 1980 to 1995 (Idaho Transportation Department, 1980 and 1995).

A summary of major recreation opportunities in the Payette River Basin are described for three sub-basins defined here as the North Fork Payette, the South Fork Payette, and the Main Payette. These descriptions include discussion of recreation opportunities along major tributaries within the sub-basins.

North Fork Payette Subbasin

The North Fork Payette drainage includes a diversity of recreational settings including high mountain lakes, forested landscapes, and broad, open

valleys. The North Fork Payette River headwaters are located north of McCall. Numerous tourism and recreation opportunities are available in the several communities located along the North Fork Payette corridor including McCall, Cascade and Donnelly. Boaters and anglers are attracted by several lakes and reservoirs that include Upper Payette, Payette and Little Payette lakes, and Cascade and Horsethief reservoirs. The lower end of the North Fork Payette is known for its whitewater boating opportunities.

Recreational activities in the headwaters area of the North Fork Payette include backpacking, hiking, horseback riding, fishing, mountain biking, and firewood cutting. A number of mountain lakes occur on tributaries to the North Fork Payette, some with special fishing restrictions providing good to excellent angling experiences. Some of the more popular mountain lakes include the Twentymile Lakes, Box, Granite, Snowslide, Louie, Boulder and Blackwell lakes. Many people hike this area to access the South Fork Salmon and main Salmon drainages.

The three Payette lakes are natural lakes that have been impounded to increase storage for irrigation needs. The most upstream is the 400 surface acre Upper Payette Lake located north of McCall. Recreation facilities surrounding the lake are managed by the Payette National Forest and consist of campgrounds, a boat launch and an interpretive trail. Fishing and camping are the main recreation activities.

Payette Lake has approximately 5,337 surface acres and 22 miles of shoreline. Private residences, including recreational homes, surround much of the lake. Only .8 miles, or 3.6 percent of the shoreline, allow public lake access (Idaho Department of Parks and Recreation, 1994). Public lake frontage includes five parks managed by the City of McCall on the southern end of Payette Lake, several with public beaches and boat ramps. The Idaho Department of Parks and Recreation manages two public beaches in Ponderosa State Park.

Ponderosa State Park is located on the southeast side of the lake, encompassing approximately 840 acres of the peninsula. The park provides campsites, day use areas for picnicking, beaches, boat ramp, nature trails and mountain biking opportunities. More than ten miles of groomed Nordic trails are available for all skill levels. Nature study and wildlife viewing opportunities are important activities. On the north end of Payette Lake the Idaho Department of Parks and Recreation manages the North Beach unit of the park, the largest public beach on the lake, encompassing an additional 630 acres. In addition to water play, jet skies and boaters launch from this area to water ski. The North Fork Payette reach upstream of Payette Lake is becoming increasingly popular for non-motorized floating. To better manage this use, Idaho Department of Parks and Recreation plans to develop this reach as a water trail with boat access and interpretive pull-outs (Hoosick, 1997).

Almost 31,000 visitors camped in the park in 1996. Camping visits have stabilized, because campground capacity has been reached during the summer season for the last six years (Hoosick, 1997). Sixty-six percent of campers are Idaho residents, with most from the Boise area (Reading and Lansing, 1996). Day use activities, such as picnicking, boating, water play, hiking, biking and skiing, grow each year, increasing 147 percent since 1990 (Table 32).

Seven organization camps located around the perimeter, and an additional five camps near the lakeshore, use facilities on the lake. A survey conducted in 1996 estimated about 37,800 to 48,600 users may participate in water activities at these camps from June through August (Spencer, 1996). Activities include swimming, boating, waterskiing, snorkeling and fishing.

Table 32. Estimated Recreation Use at Ponderosa State Park.

Activity	1990	1996
Camping	35,928 visits	30,852 visits
Day Use (includes skiing)	45,049 visits	111,442 visits
Nordic Skiing	10,745 visits *(Dec 1989 - Mar 1990)*	20,333 visits *(Dec. 1995-Mar 1996)*
North Beach Unit		*(Memorial Day to Labor Day)*
Day use		13,483 visits
Dispersed camping		3,341
Motorized boating		Approx. 400-600 crafts
Non-motorized boating		300-500 craft

Sources: Hoosick, 1997; Coyle, 1997.

Little Payette Lake is a 1,450 surface acre lake located to the southeast of Payette Lake. Fishing is the predominant recreational activity. Developed facilities are limited to a boat and float tube launches. Although no developed campground is available, camping does occur at the lake.

Downstream of Payette Lake the North Fork Payette River enters Long Valley. Lands in the valley are mainly under private ownership. National forest lands border the east and west edges of the valley. Access is available at several points along the river. The North Fork Payette downstream of Payette Lake is popular for fishing, tubing, rafting, canoeing, kayaking, and wildlife viewing. An annual kayak slalom race in this reach attracted 50 participants from the local and Boise areas in May 1997 (McClaran, 1997). Most angler activity occurs below Lardo Dam, at the McCall Fish Hatchery, Sheep Bridge, Riverfront Park and Hartsell Bridge (Gebhards, 1992; Anderson, 1997). Maintaining access to the river may become an issue with increasing development of private lands.

Cascade Reservoir is an irrigation reservoir with 86 miles of shoreline and 28,300 surface acres at full pool. Since the establishment of an administrative 300,000 acre-foot minimum pool in 1983, the mean annual drawdown is 12 feet, maintaining access for recreational use in the late summer and fall. The lowest water levels typically occur in October (EDAW, Inc., 1991).

Recreation facilities surrounding the reservoir are owned by the U. S. Bureau of Reclamation and Forest Service. These two agencies lease land to local government and private entities for recreation purposes. Beginning in 1998, the Idaho Department of Parks and Recreation is managing the U.S. Bureau of Reclamation's recreation facilities as Lake Cascade State Park through a management agreement.

The most concentrated recreation use occurs at the southeast and northwest ends of the reservoir near developed recreation facilities, and in the arms surrounded by residential development (EDAW, Inc., 1991). The most current information estimated recreation use at 299,811 recreation visits from October 1, 1992 to September 30, 1993. Estimates of recreation use demonstrated a 17.5 percent increase between 1988 and 1993 (EDAW, Inc., 1991; Overton, 1997).

The top three recreational activities associated with the reservoir are fishing, camping and motorized boating (Overton, 1997). Fishing is the primary activity. The reservoir is one of the most heavily fished waters in the state (Idaho Department of Fish and Game, 1996). Camping is a secondary use to fishing and is at 85 percent capacity during most of the season (EDAW, Inc., 1991). During holidays and many weekends the campgrounds exceed capacity. Boating activity is associated with fishing, water skiing and sightseeing. The reservoir also provides abundant wildlife viewing opportunities. Habitat is available for songbirds, shorebirds and waterfowl. Osprey and bald eagles nest near and adjacent to the reservoir.

Recreation opportunities provided by Cascade Reservoir are a significant part of the local area's economy (Mount, 1997). The Cascade Chamber of Commerce has capitalized on this by organizing several events to attract people to the area. Events include ice fishing contests, several fishing tournaments, water ski competitions, sprint boat races and a sailboat regatta (Mount, 1997).

Tributaries to Cascade Reservoir receive recreational use where public access is available. The lower reaches of Lake Fork, Boulder Creek and Gold Fork do not have much public access. Further upstream on national forest lands, camping, hunting, hiking and sightseeing are popular activities. Facilities include developed campgrounds and trails. Most use is associated with horseback riding and hunting (Ludvigsen, 1997). Backpackers use the area to access high mountain lakes in the Payette River Basin and areas in the South Fork Salmon drainage. Rock climbing is popular at Slick Rock located in the North Fork of the Lake Fork drainage.

Angling and floating are popular recreation activities below Cascade Dam. Several private campgrounds and RV parks are located adjacent or near the river. Some canoeing occurs below the dam downstream to Cabarton Bridge. Most of the land ownership is private along this reach so access is limited.

Horsethief Reservoir has 275 surface acres when full, and provides fishing, boating and camping facilities managed by the Idaho Department of Fish and Game. Recreationists are mainly from the Boise area (Hardy, 1997). The primary recreation activity is fishing. In 1994 an estimated 30,000 angler hours occurred on the reservoir from May 1 to July 30 (Turnipseed, 1997). For the same period, 7,500 tents and campers were counted.

Below Cabarton Bridge public access is available on Boise Cascade lands. This reach is considered an important angling reach, because it is relatively undisturbed by railroad and highway construction. Access is provided by a dirt road paralleling much of this reach. Whitewater boating is popular in the reach from Cabarton Bridge to Smiths Ferry.

State Highway 55, designated as the Payette River scenic byway, parallels the North Fork Payette from Banks to Smiths Ferry. Scenic byways are designated by the Idaho Transportation Board, identifying travel routes with superior aesthetic characteristics. The Smiths Ferry to Banks reach requires expert whitewater skills, and is considered by many to be the most challenging whitewater in North America (Stuebner, 1995). Motorists stop at highway pull-offs to observe kayakers and engage in angling, picnicking, and water play. Several Forest Service campgrounds are located along the river and are used for overnight and day use activities.

South Fork Payette Subbasin

The South Fork Payette headwaters are located in the Sawtooth Wilderness Area where only non-motorized, non-mechanized recreation activities are allowed. Several trails traverse the wilderness area parallel to major waterways, including the South Fork Payette River, Barron Creek and Trail Creek. Backpacking, horseback riding, hunting and fishing are the predominate recreation activities. Use estimates for 1994 along Trail Creek and the South Fork Payette River indicate that 80 percent of users access the wilderness by foot, with the remaining 20 percent riding horseback (Dean, 1997).

Grandjean, named after a former Boise National Forest supervisor, is located at the boundary of the Sawtooth Wilderness. A privately operated lodge and Forest Service campground are located here. The Grandjean resort consists of a campground, cabins and a geothermal pool. Sacajawea Hot Springs are located adjacent to the river downstream of Grandjean. Forest Service permitted summer homes are located on downstream tributaries at Wapiti, Bear, and Camp creeks.

From Grandjean to Lowman, the South Fork Payette is paralleled in most places by State Highway 21 -- the Ponderosa Pine state scenic byway. A number of developed and dispersed camping opportunities are available in this reach. (Dispersed campsites may have stone fire rings, but no other facilities.) Several developed campgrounds have natural hot springs nearby. Bonneville campground is one of these, receiving the highest use of the campgrounds located in the South Fork Payette sub-basin. Kirkham campground and hot springs, located adjacent to State Highway 21 and the South Fork Payette River, is another popular campground. Adequate flows for whitewater boating generally occur during spring runoff, usually from April through June.

The Banks-Lowman Highway, or Forest Highway 17, parallels near the South Fork Payette. Views of falls and major rapids are afforded by numerous pullouts. Whitewater boating occurs from the Deadwood River confluence downstream to Banks, generally from spring through the summer. Two developed campgrounds -- Pine Flats and Hot Springs -- offer natural hot springs nearby. Boaters floating the South Fork and main Payette rivers use these campgrounds and a number of dispersed areas. Fishing is also a popular activity along this reach. Recreational dredge mining occurs in the vicinity of Lowman and Garden Valley.

According to the U. S. Board of Geographic Names nomenclature, the Main Payette River begins at the confluence of the Middle and South forks. However, the locals refer to this reach (Middle Fork confluence to Banks) as the South Fork Payette River. This reach is best known for whitewater boating opportunities. Sightseers use Forest Highway 17 to observe boaters and to access recreation opportunities in other areas of the Payette or Salmon basins.

Deadwood River and Reservoir

The Deadwood River joins the South Fork Payette downstream from Lowman. Deadwood Reservoir is accessed by driving about 26 miles on a rough, gravel road. Despite the primitive road, the campgrounds are full most weekends, attracting recreationists because of the isolated experience (Waugh, 1997). The Forest Service has several developed campgrounds and boat access facilities around the perimeter of the reservoir. Recreation use was estimated at 5,670 recreation visits from October 1, 1992 through September 30, 1993. The three main recreational activities include fishing, motorized boating, and non-motorized boating (Overton, 1997).

Above the reservoir, the river is paralleled by a dirt road providing access to camping and fishing at dispersed sites. No developed facilities are provided in this reach. Advanced whitewater boating skills are required to float the steep, isolated canyon below Deadwood Reservoir. From the Julie Creek confluence to the South Fork confluence a dirt road parallels the river. Julie Creek is a popular area for fishing, camping, trail access and whitewater boat put-in and take-out. Six areas on the Deadwood River below Julie Creek confluence are popular dispersed campsites and fishing spots.

Middle Fork Payette and Tributaries

Most land in the Middle Fork Payette sub-basin is under the jurisdiction of the Boise National Forest. The Forest Service estimates 2,000-3,000 people recreate on national forest lands in the sub-basin on a summer weekend (Hale, 1997). Private development and the community of Crouch are located downstream of Tie Creek. Primary recreation activities are camping, hiking, soaking in hot springs, off road vehicle use, hunting and some fishing.

The upper reach from the headwaters to Boiling Springs is paralleled by a trail with numerous hot springs adjacent. This trail receives the highest use of trails in the Middle Fork Payette sub-basin (Hale, 1997). The middle reach (Boiling Springs to Tie Creek Campground) is paralleled by an unimproved road, accessing five public campgrounds. Minor whitewater boating activity occurs along this reach. The lower reach (below Tie Creek) is paralleled by private lands with rural land uses and recreational homes. Most boating use on the Middle Fork Payette occurs on this reach where Tie Creek is a popular canoe put-in.

The Terrace Lakes Resort, located north of Crouch, is a year-round resort requiring membership. Facilities include a golf course, geothermally heated pool, tennis, and restaurant. In the winter, the resort functions as a beginning point for snowmobile trips.

A major tributary to the Middle Fork Payette is Silver Creek, located in Peace Valley, which receives substantial use and provides diverse recreation activities. Camping occurs at several developed and dispersed camping sites. The trails system is popular with motorized users. The Idaho Department of Fish and Game stocks Silver Creek regularly, attracting many anglers. Silver Creek Plunge is a privately operated resort offering camping, cabins, a geothermally heated swimming pool and creek access.

Main Payette Subbasin

Landownership influences the recreation opportunities available in the Main Payette sub-basin. The main stem is predominantly under private ownership so access is limited to points along the river where public land jurisdiction occurs. The Payette River is paralleled by roads, including State Highways 55 and 52, from Banks to Black Canyon Dam.

Banks is located where the North Fork Payette joins the South Fork Payette River. The area is the center of boating activity serving as a put-in and take-out for several whitewater reaches. A store and cafe provide services to boaters and motorists driving State Highway 55 and Forest Highway 17. The Payette River from Banks to Beehive Bend is the most floated whitewater reach in the basin, because adequate flows are available year-round, convenient access is provided by the adjacent highway, developed parking areas are available at key put-ins and take-outs, and its proximity to the Boise area. The many pull-offs along State Highway 55, sandy beaches and gravel bars also invite other recreationists to picnic, water play, fish and observe boaters.

At the Horseshoe Bend Hydroelectric Project a boat bypass has been constructed at the diversion canal intake, locally known as "The Gutter". The bypass attracts beginning kayakers because of its training opportunities, and more advanced kayakers for play wave opportunities. In the past two years the Payette Whitewater Rodeo has held the freestyle competition at the bypass.

Downstream of Horseshoe Bend, Montour Wildlife/Recreation Area is managed by cooperative agreement between the U. S. Bureau of Reclamation and Idaho Department of Fish and Game. The 1100-acre site includes the townsite of Montour which experienced flooding problems after construction of Black Canyon Dam in 1924. In 1976 the U. S. Bureau of Reclamation purchased lands within the 100-year floodplain, including the townsite of Montour. Today the primary management objective for the area is to provide waterfowl and upland game habitat, game bird hunting, and other wildlife-related recreation opportunities. The top recreational activities at the wildlife recreation area are hunting and camping (Overton, 1997). Other recreation activities include fishing, wildlife viewing, hiking and photography (Shelton, 1997).

Black Canyon Reservoir, located on the Payette River between Horseshoe Bend and Emmett, is managed by the U. S. Bureau of Reclamation. Recreation use was estimated at 59,022 recreation visits for October 1, 1992 through September 30, 1993. The top three recreational activities are picnicking, water skiing, and swimming (Overton, 1997). Users are primarily from the local area.

Below Black Canyon Dam, the river is surrounded by private land with limited access. Recreation access is provided by seven Idaho Department of Fish and Game sportsman's access areas. The river is popular with fishermen, hunters, birdwatchers, and sightseers, receiving some boating activity. Letha marks the division between a mixed warmwater/coldwater fishery upstream and a warmwater fishery downstream. The Idaho Department of Fish and Game estimates recreation use at about 20,000 user days annually (Shelton, 1997).

The Idaho Department of Fish and Game also manages the Birding Island Wildlife Management Area in this reach. The wildlife management area is managed for waterfowl and upland bird game production. Recreation use is estimated at 10,000 user days annually, including anglers, hunters, picnickers, boaters, and sightseers (Turnipseed, 1997; Shelton, 1997). About half of the recreationists reside in the area and the other half originate from Boise and Nampa, with some from out-of-state (Shelton, 1997)

In the community of Payette, local residents float the river with inner tubes and rafts. Current plans are to construct a greenbelt adjacent to the Payette River to the Snake River confluence.

Squaw Creek Drainage

Squaw Creek is tributary to the Main Payette at Black Canyon Reservoir. The headwaters of the drainage are located in the Boise National Forest. Recreational activities include camping, hiking, hunting, fishing and snowmobiling. Sagehen Reservoir, with about 180 surface acres, is located on the Second Fork of Squaw Creek. The reservoir is surrounded by several public campgrounds and a boat ramp. Numerous trails in the vicinity connect with trails located in the North Fork Payette drainage. The reservoir is a popular fishery and considered one of the best for angling success in the State.

Big and Little Willow Creeks

Land in the Big Willow Creek drainage is mainly under private ownership so public recreation opportunities are more limited. The drainage receives some use from fisherman, and waterfowl and upland bird hunters. Recreation use at Paddock Valley Reservoir, located in the headwaters of Little Willow Creek, is associated with angling. The reservoir is considered one of the best bass and crappie fisheries in the state (Hardy, 1997). Although recent drought has affected the fishery, it is expected to recover. Estimated use is 10,000 angler days annually, with most anglers from the Boise area (Shelton, 1997). Hunting for deer, elk, waterfowl and upland bird also occurs. Dispersed camping is associated with this use.

DISCUSSION OF SPECIFIC RECREATION ACTIVITIES IN THE BASIN

Participation in water-based recreation activities is substantial in the Payette River Basin, and is enjoyed by basin and Boise area residents. Water-based recreation activities and recreation indirectly associated with waterways are described in the following sections. Map 22 shows boat access and the Idaho Department of Fish and Game's sportsman's access areas, providing access for water-based recreation.

Boating

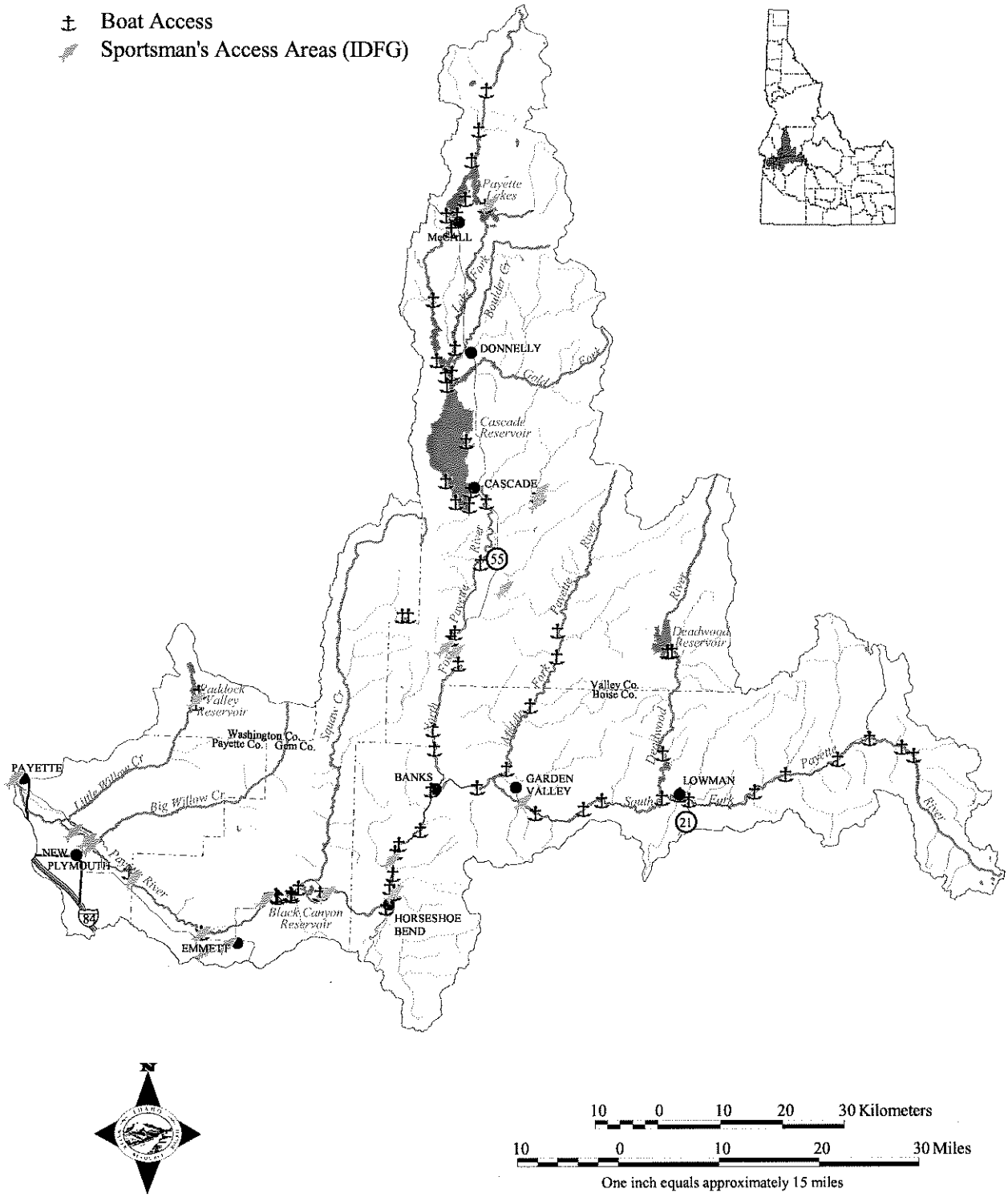
The basin possesses about 60,000 surface acres of boatable rivers, lakes and reservoirs, comprising 9.1 percent of the state total (Murphey, 1996). Over 80,000 motor boats and sailboats were registered in Idaho in 1996, a 25 percent increase from 1990 (Hiatt, 1997). Boat owners can designate primary and secondary counties of use during the registration process. Approximately 9 percent of registered boaters in Idaho selected counties in the Payette River Basin as their primary destination. Valley County was ranked fourth in the state which includes the Payette lakes, Cascade Reservoir, Deadwood Reservoir and the Payette River. Boaters designating Valley County as their primary/secondary use area have increased 8.5 percent annually from 1988 through 1991 (Idaho Department of Parks and Recreation, 1994). Increased boating activity and dramatic increases in personal watercraft (jet skies) are leading to reported conflicts among recreation users on Cascade Reservoir and Payette Lake (Helms, 1997).

Lakes and Reservoirs

Payette Lake is considered one of the premiere boating lakes in southwestern Idaho, because of its scenic setting, proximity to Idaho's major population base, accessibility, and the amenities offered in the City of McCall (Idaho Department of Parks and Recreation, 1994). Currently only three public ramps exist around the lake -- one each at Ponderosa State Park's Peninsula and North Beach units, and one at the City of McCall's Legacy Park. Physical carrying capacity of the lake is estimated at 305 boats at one time (Idaho Department of Parks and Recreation, 1994).

Motor boats are the predominate boating activity on Payette Lake (Big Payette Lake Technical Advisory Committee, 1997). A boating recreation and creel survey conducted on Payette Lake estimated 36,558 hours of boating activity from July 1995 through June 1996. Figure 31 (page 122) depicts the type of boating use. Motor boat use is largely associated with general sightseeing and transportation. Most boating occurs in the months of July through September. Marine Sargent reports indicate that crowding and reckless operation are a major concern (Helms, 1997). In 1997 seven accidents were reported, including two fatalities (Helms, 1997). This is slightly higher than the average reported over the past four years.

Map 22. Recreation Access



y:\payette\arcview\projects\projects2\recscen.apr (8/18/98)

Cascade Reservoir is the largest waterbody in the basin, with thirteen sites providing boat access. According to the 1991 Cascade Reservoir Resource Management Plan, 150 to 200 boats are on the reservoir at one time during weekends, and as many as 250 boats during holidays (EDAW Inc., 1991). Estimated low density physical carrying capacity is 2,177 boats at one time with full pool, and 1,300 boats at low pool. However, the configuration of the reservoir and location of recreation facilities limit carrying capacity for portions of the reservoir. Physical carrying capacity at the northern arm is more limited, because of the narrowness of the reservoir. Most waterskiing and boating occurs in this area. The Boulder Creek arm experiences high density use due to the numerous homes along the shoreline. Three accidents, including one fatality, were reported on the reservoir in 1997 (Helms, 1997). This is an increase from previous years.

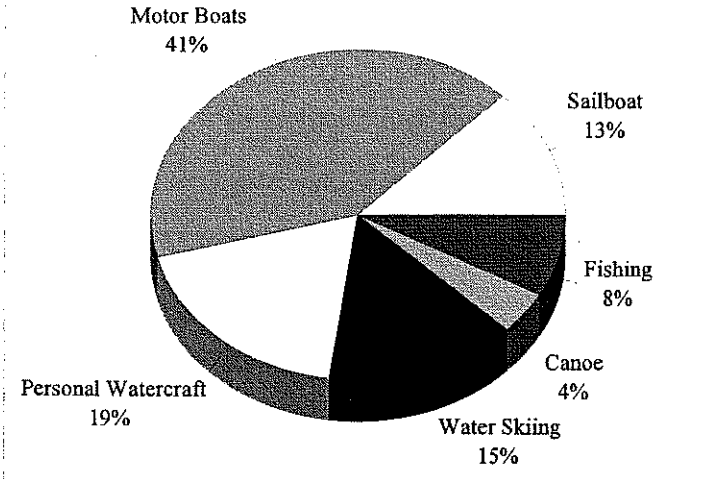


Figure 31. Boat Types Using Payette Lake (Source: Big Payette Lake Technical Advisory Committee, 1997).

Rivers

Whitewater boating opportunities in the basin are diverse in terms of boating difficulty, landscape settings and quality of experience. Close proximity to the Boise area, easy access to a number of river reaches, and developed boat access facilities make whitewater boating a significant attraction to boaters from the Boise area. The boating opportunities also attract people nationally. A survey conducted in 1989 (the most recent survey data available), found 27 percent of boaters on the Payette River, 52 percent of boaters on the North Fork Payette, and 30 percent of boaters on the South Fork Payette were from out-of-state (Idaho Department of Parks and Recreation, 1989). At least 44 percent of commercial boating clientele were nonresidents (Table 36, page 126).

Table 33 demonstrates the diversity of floating opportunities identified in the basin, comprising more than 200 river miles. The information in this table reflects the relative difficulty, and minimum and maximum flow levels required for the majority of boaters. Difficulty and skills required can vary significantly, depending on the river flows, equipment and boater experience. At maximum flow levels most of the Payette River reaches require advanced and/or expert boating skills. An optimum flow for most reaches is 1,500 cfs (Loveland, 1997). Landslides occurring adjacent to the South Fork and main Payette in 1997 altered the river channel, changing the boating difficulty of some reaches.

A number of nationally-recognized whitewater competitions occur in the basin regularly, attesting to the national significance of boating opportunities. Many consider the variety and quality of whitewater to provide excellent training opportunities for future Olympic kayak contenders (Beck, 1997). The Payette Whitewater Roundup takes place on the main Payette the weekend following the Fourth of July, occurring for a three-day period. The event attracted 123 participants in 1997 (Beck, 1997). The majority originated from Idaho (62 individuals) with an additional 51 individuals from other western states, individuals from eastern states, and 2 individuals journeyed from outside the country. An estimated 400-600 spectators come to watch the activity.

Table 33. River Boating Opportunities in the Payette River Basin.

Put-in/Take-out	Min. Flow (cfs)	Max. Flow (cfs)	Class*/Skill Level
North Fork Payette			
Below Upper Payette Lake to Fisher Ck.	800	3,000	IV / Adv. Intermediate
Fisher Creek to North Beach	800	N/A	I / Beginner
Rotary Park to Sheep Creek Bridge	800	N/A	II / Beginner *(One class II)*
Sheep Creek Br to Hartsell Bridge	800	2,000	Intermediate
Cascade Bridge (south side of town) to Cabarton Bridge	800	N/A	I / Beginner
Cabarton Bridge to Smiths Ferry	800	4,000	III / Intermediate
Smiths Ferry to Banks	800	2,500	V / Expert *(Above 2,000 cfs - V+; above 4,000 -VI)*
South Fork Payette			
Sacajawea Hot Springs to Mountainview Campground	600	5,000	IV / Advanced *(Above 3,000 - IV+)*
Deadwood River to Danskin Station (Canyon section)	600	3,000	IV / Advanced *(Above 3,000 - IV+)*
Danskin Station to Alder Creek (Swirly Canyon)	600	3,000	III / Adv. Intermediate *(Above 3,000 - IV)*
Alder Creek to Deer Creek	800	N/A	II / Beginner
Deer Creek to Banks (Staircase)	600	4,000	III-IV+ / Intermediate - Advanced *(Above 4,000 Advanced / IV+)*
Deadwood			
Deadwood Dam to Julie Ck Campground	800	3,000	IV-V / Expert *(Because of remoteness)*
Julie Ck Campground to South Fk Payette	800	3,000	IV / Advanced
Middle Fork Payette			
West Fork Bridge to Trail Creek	600	2,500	IV / Adv. Intermediate
Tie Creek Campground to Crouch	600	2,500	II / Beginner
Main Payette			
Banks to Beehive Bend	800	10,000	III / Adv. Beginner *(Advanced above 10,000)*
Beehive Bend to Horseshoe Bend Br.	800	N/A	III / Beginner *(One class IV rapid above 8-10,000)*
Horseshoe Bend Bridge to Montour	800	N/A	I-II / Beginner
Montour Br to backwaters Black Canyon	800	N/A	I / Beginner
Black Canyon Dam to Letha Bridge	800	N/A	I / Adv. Beginner *(Diversion dams to watch)*
Letha Bridge to Payette mouth	800	N/A	Advanced Beginner *(Diversion dams to watch)*

* Based on the international scale of difficulty with Class I being the easiest and Class VI being extremely difficult.

N/A = Not available

Sources: Amaral, 1990; McClaran and Moore, 1989; Stuebner, 1995; and Loveland, 1997.

A competition organized by the U. S. Canoe and Kayak Team for nationally ranked Junior (18 years old and under), Senior (30 to 40 years old), and Masters (over 40 years old) boaters occurs approximately every other year on the Payette River system. In 1997 the competition took place on the North Fork Payette River. The competition attracted 64 competitors with 15 individuals originating from Idaho, 27 individuals from other western states, and 22 from eastern states (Beck, 1997).

Use estimates for recreational whitewater boating activity on the North Fork, South Fork and main Payette rivers are reported in Table 34. Trends are difficult to discern because documented boating use has been reported using different units (hours versus boaters), and for different reaches. Recreation managers believe boating activity has increased significantly since these surveys. Accurate quantification of current boating activity on these reaches has been difficult because of budget limitations and low compliance at registration boxes.

Indicators of significant increases in whitewater boating in the basin include growth in area boating equipment sales and rentals, increased traffic volumes on State Highway 55, and higher densities at public access facilities. Raft and kayak rentals have increased at least 10 to 15 percent annually over the last fifteen years for area businesses, with some experiencing a doubling of business in the early 1990s (Darr, 1997; Kolby, 1997). Local raft manufacturing companies have experienced yearly sales growth in the range of 15 to 30 percent over the last three to five years (Tims, 1997). A notable trend is the increase in boating equipment purchases by private individuals compared to sales primarily to commercial outfitters ten to fifteen years ago. Growth is attributed to population increases in the Boise region, changes in boating technology, and the increased popularity of paddle sports nationally. Most boating activity occurs from May to September. With adequate flows and favorable weather, boating may continue into October. Although most floating occurs on weekends, weekday activity is greater than

Table 34. Estimated Whitewater Boating Activity in the Payette River Basin.

River Reach	1980 *(May 24-Oct 10)*	1983	1989 *(May 29-Sept 10)*
North Fork Payette			
Cabarton to Smiths Ferry		5,096 hours *(May 28-Sept 5)**	
Smiths Ferry to Banks		544 hours *(May 24-Oct 10)*	2,154 hours
Smiths Ferry to Lower Banks	2,483 hours		
South Fork Payette			
Grandjean to Alder Creek Bridge	516 hrs. *(Jul 19-Oct 10)*	8,002 hours *(May 24-Oct 10)*	
Alder Creek Bridge to Banks	1,224 hours		
Deadwood River to Banks			31,542 hours*
Deer Creek to Banks		16,584 hours±15,576 *(May 28-Sept 5)**	
Main Payette			
Banks to Gardena		6,795 hours *(May 24-Oct 10)*	32,252 hours*
		19,948 hours±10,760 *(May 28-Sept5)**	

* Study originally documented boating use as number of boaters. This was converted to hours to allow comparison with earlier studies.
Sources: Reid, 1980; Reid and Anderson, 1981; McLaughlin and Feldman, 1983; Idaho Power Company, 1984; and Idaho Department of Parks and Recreation, 1989.

would typically be expected. Many people are able to float the Payette after work during the summer, because of the basin's proximity to Boise and the long daylight hours.

Commercial Outfitting

The Idaho Outfitters and Guides Licensing Board regulates the commercial boating industry, determining the maximum number of outfitters allowed per river reach or lake/reservoir [IDAPA 25 Title 01 Chapter 59]. Table 35 lists the number of licensed outfitters operating on rivers and reservoirs in the basin. Commercial outfitting is not permitted on Payette River basin waterways not listed in this table.

Based on numbers of guests, trips on the main Payette River from Banks to Beehive Bend and the Staircase reach (Deer Creek to Banks) are most popular (Long, 1997; Fisher, 1997; Fourney, 1997: See Table 36). Other popular commercial reaches are the South Fork Payette from Deadwood to Danskin (known as the South Fork Canyon), North Fork Payette from Cabarton Bridge to Smiths Ferry, and Grandjean reach of South Fork Payette.

Commercial boating trips have increased almost 79 percent from 1992 to 1996 (See Table 36). Fluctuations in client numbers reflect ownership changes for some businesses, requiring establishment of new clientele. Additionally, outfitting opportunities are controlled by weather conditions, spring runoff, and releases from Cascade and Deadwood reservoirs. The commercial season generally extends from May to September on most reaches. Table 37 lists maximum and minimum optimal flows required to offer commercially marketable trips. Gross revenues for commercial whitewater boating trips in the basin is estimated to be at least $1.3 million annually (Long, 1998).

Fishing

Topographic variation in the basin supports a variety of fish habitats and angling opportunities. Management objectives instituted by the Idaho Department of Fish and Game in its Fisheries Management Plan direct angling opportunities for specific waterways (Idaho Department of Fish and Game, 1996). Fisheries management objectives within the basin include preservation, trophy trout, wild trout, put-and-take, or general management.

Table 35. Licensed Boating Outfitters Currently Operating in the Payette River Basin.

Waterbody	Maximum Allowed	Outfitters Operating
North Fork Payette River		
Payette Lake	2	2
Little Payette Lake	2	1
Big Payette Lake Outlet to Hartsell Bridge	2	2
Cascade Reservoir	2	2
Cascade City Park to Cabarton Bridge	2	2
Cabarton Bridge to Smiths Ferry	5	5
South Fork Payette River		
Grandjean to Deadwood River	5	4
Deadwood River to Banks	5	5
Deadwood Reservoir	2	1
Main Payette River		
Banks to Black Canyon dam	5	5

Table 36. Commercial Boating Activity: Number of People Using the Services of an Outfitter from 1992-1996.

Reach	1992		1993		1994		1995		1996	
	Res	NR[1]	Res	NR	Res	NR	Res	NR	Res	NR
North Fork Payette										
Payette Lakes Outlet to Hartsell Br.	41	17	34	4	5	53	20	12	29	10
Cascade City Park to Cabarton	—	—	10	2	8	0	4	12	3	6
Cabarton to Smiths Ferry	889	443	632	489	588	344	230	325	837	277
South Fork Payette										
Grandjean to Deadwood	86	329	56	128	12	52	50	363	235	340
Deadwood to Banks	1,678	1,483	2,376	1,916	1,697	1,520	3,023	3,596	3,775	1,809
Main Payette										
Banks to Black Canyon	811	532	1,077	1,078	1,281	1,005	1,430	2,565	2,675	1,281
Resident/Nonresident Totals	***3,505***	***2,804***	***4,185***	***3,617***	***3,591***	***2,974***	***4,757***	***6,873***	***7,554***	***3,723***
TOTAL CLIENTS	**6,309**		**7,802**		**6,565**		**11,630**		**11,277**	

[1] Res = Resident; NR = Non-residents

Source: *Idaho Outfitters and Guides Licensing Board, 1993 and 1997.*

Table 37. Maximum and Minimum Flows for Commercial Float Trips in the Payette River Basin

Reach	Maximum (cubic feet per second)	Minimum (cubic feet per second)
North Fork Payette		
Cabarton Bridge to Smiths Ferry	6,000	900
South Fork Payette		
Grandjean - Grandjean to Deadwood confluence	Not available	600-700
Canyon - Deadwood R. confluence to Danskin Station	3,500-5,000	700 - 1,000
Staircase - Deer Creek to Banks	10,000	700-1,000
Main Payette		
Banks	14 ,000-15,000	Not available

Source: Fisher, 1997; Fourney, 1997; and Long, 1997.

Preservation management prohibits harvest to rebuild wild populations. Bull trout are managed for preservation in the basin. Bull trout harvest was prohibited in most of Idaho in 1994, and extended to the remainder of the state in 1996.

Trophy trout management involves increasing the catch rate and size of trout through special regulation. This management objective focuses on streams with good productivity and growth potential.

Wild trout management relies on natural production to provide angling opportunities in a waterway. A two fish bag limit is instituted for waterways with moderate to light angling pressure.

Put-and-take management objectives involve intensive stocking of catchable size hatchery rainbow trout to provide high consumptive rates. A six fish bag limit is applied on waterways with moderate to high fishing pressures and good access.

General management occurs for waterways that are not suitable for wild trout or put-and-take management. No special regulations are established.

Tables 38 and 39 list fishery management objectives and game species present for river/stream reaches, lakes and reservoirs in the basin. The Idaho Department of Fish and Game manages fishing opportunities for about 26,000 miles of trout streams and rivers, and 202 lakes and reservoirs in Idaho (Idaho Department of Fish and Game, 1997). Only 16 lakes or reservoirs in the state are managed for a trophy or quality trout experience; five of these occur in the Payette River Basin (See Table 39, page 129).

Over 418,000 Idaho fishing licenses were purchased statewide in 1996. About 38 percent were nonresident licenses (Idaho Department of Fish and Game, 1997). Within Region 3, almost 139,000 fishing licenses were purchased, comprising one-third of statewide license sales. Of these, almost 22 percent were nonresident licenses. Although all purchasers may not reside or fish in the vicinity of license purchase, there is likely some relationship.

A random survey of 1029 resident and nonresident anglers who purchased a 1994 fishing license was conducted in 1995. Anglers identified Cascade Reservoir as one of the top waters fished in Idaho, and it is considered one of the most heavily fished waters in the state (Idaho Department of Fish and Game, 1995; Idaho Department of Fish and Game, 1996). In a 1987 survey asking anglers to identify their most frequently fished water, 11.5 percent of Region 3 residents named Cascade Reservoir (Reid, 1989). Nonresident anglers named the Payette River (1.7 percent) and Cascade Reservoir (1.2 percent) as most frequently fished waters, ranking these waterbodies in the top twenty fishing waters of Idaho.

Creel census surveys have been completed for some reservoirs, lakes and river reaches in the Payette River basin. Most available information has focused on the reservoirs and lakes in the basin, providing enough information to document trends in angling activity. Table 40 (page 130) reports studies conducted on reservoirs and lakes in the basins. Table 41 (page 131) summarizes creel census data for river reaches.

Payette Lake anglers spent an estimated 11,849 hours from May 1995 to July 1996. Most of the fishing pressure during this period (95 percent) were from boat anglers. The remaining 5 percent were comprised of shore anglers (3.6 percent) or ice fishing (1.4 percent) (Big Payette Lake Technical Advisory Committee, 1997). Angler pressure has declined since 1986 (Table 40).

Kokanee comprised the majority of the harvest (69 percent) during the 1995-96 season, followed by rainbow trout (13 percent), lake trout (6 percent), and cutthroat trout (3 percent) (Big Payette Lake Technical Advisory Committee, 1997). Payette Lake is gaining popularity as a lake trout fishery, and is managed as a trophy fishery for this species. In 1996 harvest regulations were implemented to improve the quality of the angling experience by increasing the size of lake trout. Fishing for lake trout is considered excellent compared to lakes around the nation (Big Payette Lake Technical Advisory Committee, 1997). Cutthroat trout within

Table 38. Idaho Department of Fish and Game Fisheries Management Objectives for Rivers/Streams in the Basin.

Reach	Management Objective	Species Present
North Fork Payette		
Headwaters to Payette Lake, including tributaries	Preservation	bull trout
	Wild trout	Pennask rainbow trout, cutthroat trout
	Put-and-take	mountain whitefish, rainbow trout, brook trout, kokanee
Below Payette Lake to Cascade Reservoir	Put-and-take	rainbow trout, brook trout, mountain whitefish, brown trout, kokanee
Cascade Dam to Smiths Ferry, including tributaries	General	yellow perch, brown trout, mountain whitefish, bullhead,
	Wild trout	rainbow trout
Smiths Ferry to Banks	Wild trout	rainbow trout
		mountain whitefish
Lake Fork Creek		
Headwaters to Brown's Pond Outlet	Put-and-take	rainbow trout, brook trout
Brown's Pond Outlet to Little Payette Lake	Trophy	rainbow trout
		kokanee salmon
Below Little Payette Lake, includes tributaries	General	rainbow trout, kokanee salmon, coho salmon, brook trout
Boulder Creek and tributaries	Put-and-take	rainbow trout, brook trout
Gold Fork Creek and tributaries	Put-and-take	rainbow trout, brook trout, kokanee salmon, coho salmon,
	Preservation	bull trout
Clear Creek	Preservation	bull trout
	General	rainbow trout, mountain whitefish
South Fork Payette		
Headwaters to Middle Fork and tributaries	Preservation	bull trout
Headwaters to Tenmile Bridge including tributaries	Wild trout	rainbow trout
	Preservation	bull trout
		cutthroat trout, brook trout, mountain whitefish
Tenmile Bridge to Deadwood Bridge and tributaries	Put-and-take	cutthroat trout, brook trout, mountain whitefish, rainbow trout
Deadwood River confluence to Middle Fork	Wild trout	rainbow trout
		mountain whitefish, cutthroat trout
Deadwood River		
Deadwood Dam to mouth and tributaries	Preservation	bull trout
	Wild trout	rainbow trout
		mountain whitefish
Middle Fork Payette		
Headwaters to Silver Creek	Preservation	bull trout,
	Wild trout	rainbow trout
		cutthroat trout, mountain whitefish, brook trout
Silver Creek to mouth	Preservation	bull trout
	Put-and-take	rainbow trout, cutthroat trout, mountain whitefish, brook trout
Silver Creek		
Headwaters to Silver Creek Plunge	Preservation	bull trout
	Wild trout	rainbow trout
		brook trout, cutthroat trout, mountain whitefish
Silver Creek Plunge to mouth	Preservation	bull trout
	Put-and-take	rainbow trout, cutthroat trout, mountain whitefish
Main Payette		
Middle Fork to Black Canyon Reservoir	Preservation	bull trout
	Wild trout	rainbow trout
		mountain whitefish, cutthroat trout
Black Canyon Dam to mouth	General	smallmouth bass, channel catfish, largemouth bass, black crappie, flathead catfish, bullhead, bluegill, yellow perch, pumpkinseed, mountain whitefish, rainbow trout, brown trout
Squaw and Willow Creeks	Wild trout	rainbow trout
	General	bullhead, catfish

Source: Idaho Department of Fish and Game, 1996.

Table 39. Idaho Department of Fish and Game Fisheries Management Objectives for Basin Lakes/ Reservoirs.

Lake/Reservoir	Management	Species Present
Upper Payette Lake	General	rainbow trout, brook trout, splake
Payette Lake	General Trophy	rainbow trout, cutthroat trout, kokanee salmon lake trout
Blackwell Lake	Trophy	rainbow trout
Little Payette Lake	Trophy	rainbow trout smallmouth bass, kokanee salmon
Brush and Louie Lakes	Trophy	rainbow trout cutthroat trout, rainbow x cutthroat hybrids
All other alpine lakes	General	rainbow trout, Arctic grayling, brook trout, cutthroat trout, brown trout, rainbow x cutthroat hybrids
Cascade Reservoir	General	rainbow trout, kokanee salmon, coho salmon, yellow perch, channel catfish, black crappie, smallmouth bass
Horsethief Reservoir	General	rainbow trout, rainbow x cutthroat hybrids, brook trout, brown trout, yellow perch, splake
Bull Trout Lake	General	brook trout, rainbow trout, kokanee salmon, Atlantic salmon
Deadwood Reservoir	Preservation General	bull trout kokanee salmon, cutthroat, rainbow trout, fall chinook salmon, brook trout, mountain whitefish
Sagehen Reservoir	Put-and-take	rainbow trout
Emmett, Airport & Star Lane Ponds	General	largemouth bass, bullhead, bluegill, pumpkinseed, channel catfish, rainbow trout
Black Canyon Reservoir	General	largemouth bass, black crappie, bullhead, bluegill, channel catfish
Paddock Reservoir	General	largemouth bass, black crappie, bullhead, bluegill

Source: Idaho Department of Fish and Game, 1996.

the lake provide bank anglers better opportunities to catch fish. Both kokanee and lake trout reside in deep open waters within the lake not accessible to anglers limited to shore access. Cutthroat reside in shallow shore areas, providing greater opportunities to bank anglers and owners with smaller boats.

Table 40 depicts angling trends for Cascade Reservoir in terms of angler effort and catch rates since 1969. Angler effort has varied, peaking at 414,000 in 1982. Effort is predominately a reflection of the quality of the fishery and harvest success (Janssen, 1997). Anglers stop fishing Cascade Reservoir when success is low. The primary species anglers seek are yellow perch, rainbow trout, and landlocked coho salmon. The state record coho at 5 lb. 8 oz. was caught in Cascade Reservoir in 1992. Angling effort decreased significantly in 1992, reflecting a natural downturn in the yellow perch population (Janssen and Anderson, 1994). Trout

Table 40. Angler Hours and Catch Rates for Reservoirs and Lakes in the Payette River Basin.

Lake/Reservoir	Year	Angler Hours	Catch Rate (fish/hour)	Study Period
Upper Payette Lake	1971	7,725	0.81	May 29 - Sept. 3
	1972	5,795	1.14	May 27 - Sept. 8
	1988	15,803	0.70	June - Sept.
Payette Lake	1971	17,618	0.68	May 29 - Sept. 3
	1972	16,934	0.74	May 27 - Sept. 8
	1987	13,114	0.31	May - Oct.
	1988	27,754	0.27	May - Oct.
	1995	8,333	0.13	April 30 - Nov. 1
	1996	3,516	0.07	Jan. 19 - July 4
Little Payette Lake	1987	943	0.05	June - Sept.
	1990	9,142	0.39	June - Sept.
Cascade Reservoir	1969	66,694	0.89	April 19 - Oct. 31
	1982	414,287	n/a	Dec. 26, 1981 - April 23, 1982
	1986	391,780	1.60	April 1986 - May 1987
	1991	251,052	0.33	Dec. 1990 - Nov. 1991
	1992	383,242	0.70	Dec. 1991 - Nov. 1992
Horsethief Reservoir	1978	61,235	0.38	May 26 - Aug. 26
	1994	30,000	n/a	n/a
Sagehen Reservoir	1994	27,876	0.64	June 1 - Oct. 2
Paddock Reservoir	1987	57,153	1.89	April 4 - Sept. 18

Sources: Irizarry, 1970; Reid, 1979; Reininger, et al., 1983; Anderson, et al., 1987; Mabbott and Holubetz, 1989; Scully and Anderson, 1989; Grunder, et al., 1990; Janssen and Anderson, 1992; Janssen and Anderson, 1994; Janssen, et al, 1994a; Allen, et al., 1995b; Big Payette Lake Technical Advisory Committee, 1997; and Turnipseed, 1997.

populations did not survive well under water quality conditions in the reservoir and therefore, comprised a small percentage of fish harvest. Public opinion indicates that opportunities to catch rainbow trout at the reservoir is an important opportunity to anglers.

In 1992 shore anglers accounted for 60 percent of angling effort and 53 percent of the harvest, boat anglers accounted for 19 percent of effort and 12 percent of harvest, and ice anglers 21 percent of effort and 35 percent of harvest (Janssen, et al., 1994a). Increased fishing pressure between 1991 and 1992 is attributed to an increase in yellow perch catch rates (Janssen, et al, 1994a). However, angler hours were less than those expended in 1982 and 1986.

Fishing opportunities at alpine lakes are an important angling experience in the basin. Alpine lakes received the highest approval rating among anglers in the 1987 survey compared to satisfaction ratings for trout fishing in streams, rivers, lakes and reservoirs.(Reid, 1989). The Idaho Department of Fish and Game stocks 90 alpine lakes in the basin (Idaho Department of Fish and Game, 1996). Some have self-sustaining populations. Popular lakes in the basin include Blackwell, Louie and Brush lakes managed as trophy fisheries. Pearl Lake, Box Lake and Twenty-mile Lakes also attract much use.

The Payette River basin possesses numerous quality lake and reservoir angling opportunities, but stream opportunities are more limited (Anderson,

1997). For this reason, although not renowned as "blue ribbon trophy" fisheries, several reaches provide important angling opportunities (Anderson, 1997). The North Fork Payette below Payette Lake and Cascade Reservoir provide opportunities to area residents. The Cabarton reach provides an isolated walk-in stream fishery for wild rainbow trout close to Boise and McCall. Easy access provided by campgrounds and highway pull-offs below Smiths Ferry attract anglers as well. Wild trout opportunities on reaches of the South Fork Payette, Middle Fork Payette, main Payette, Squaw Creek and Willow Creek provide important angling opportunities.

Very few creel census surveys have been conducted on rivers and streams in the Payette River basin. The limited available data is reported in Table 41. Creel census surveys conducted in 1980 on reaches of the North Fork and South Fork, found angling pressure was greatest on the South Fork Payette above Alder Creek Bridge (Reid and Anderson, 1981; Reid, 1980). A 1992 survey of angler activity on the South Fork Payette from Grandjean campground to Deadwood River found most angling hours, almost 59 percent of total effort, occurred on the lower reach (Eightmile Creek to the Deadwood River confluence) (Elle, 1993). Managed as a put-and-take fishery, this reach also had higher catch rates compared to the wild trout fishery upstream. Eighty-five percent of anglers were Idaho residents.

Wildlife management areas and sportsman's access areas are funded from fishing and hunting license fees to secure access for these uses. Idaho Department of Fish and Game has arranged for public access through land ownership, or by procuring an easement from the owner. Access areas also provide opportunities for hunting, wildlife observation and nature study. Twenty-four sportsman's access areas occur within the Payette River Basin, all providing public access to angling opportunities (See Map 22, page 121).

Recreational Dredge Mining

Recreational dredge mining occurs on several reaches within the Payette River Basin. This activity is regulated by the Idaho Department of Water Resources under the One Stop Permit. Restrictions on the size of equipment used and the

Table 41. Angling Use and Catch Rates for the North Fork, South Fork and Payette Rivers.

River Reach	1980 *May 24-Oct 10* Angler hours/Catch rate	1983 *May 24-Oct 10* Angler hours/Catch rate	1992 *May 23-Sept 11* Angler hours/Catch rate	1994 *Mar 10-Apr 3* Angler hours
North Fork Payette				
Smiths Ferry to Lower Banks	3,580 hrs / 0.43 fish/hr	4,364 hrs. / 0.77 fish/hr		
South Fork Payette				
Grandjean to Alder Creek Br.	10,298 hrs / 0.85 fish/hr *(July 19-Oct 10)*			
Grandjean -Grandjean Jct			3,116 hrs./1.62 fish/hr.	
Grandjean Jct - Eightmile Ck			3,483 hrs / 1.71 fish/hr	
Eightmile Creek to Deadwood Rr			9,411 hrs / 2.21 fish/hr	
Alder Creek Br to Banks	3,574 hrs / 0.67 fish/hr.	1,173 hrs / 0.80 fish/hr		
Payette River				
Banks to Lower Banks		802 hrs / 0.77 fish/hr		
Black Canyon Dam to mouth (Steelhead fishing)				2,104 hrs.

Source: Reid, 1980; Reid and Anderson, 1981; Idaho Power Company, 1984; Elle, 1993 and Allen, et al., 1995b.

movement of material preclude commercial operations. These restrictions include the use of nozzle diameters of 5 inches or less, and equipment rated at 15 horsepower or less [Idaho Code Section 42-3803(a)]. Individuals must fill out an Individual Recreational Dredging Application from the Idaho Department of Water Resources. Additionally, the Forest Service and Bureau of Land Management mining regulations require individuals to provide a Notice of Intent indicating where dredging activities will occur.

Recreational dredge mining is prohibited or restricted at certain times of the year in some river reaches to minimize impact to spawning salmonids. Open reaches are listed in Table 42. Recreational dredge mining predominately occurs on the South Fork Payette downstream from Grandjean between Tenmile and Archie creeks, and in the Garden Valley area (Sigrist, 1997; Deaguero, 1997). Tributaries to the South Fork Payette River receiving use include Elk Creek. Minor activity occurs on the Deadwood River, Middle Fork Payette River and the Gold Fork River. Activity also occurs on Lake Fork (Mackelprang, 1998). Approximately 65 individuals have filed Notices of Intent in the Payette River Basin with the Forest Service in 1996 (Sigrist, 1997; Cropp, 1997; Deaguero, 1997). Actual use is probably twice this number, because compliance with the application requirement is estimated at about 50 percent (Sigrist, 1997; Curtis, 1997).

Camping

The majority of public campgrounds in the basin are adjacent to waterways or in close proximity (Map 23). Most of these are located on major tributaries in the basin. Estimated use for Forest Service campgrounds is based on campground fees (Table 43). Use estimates represent number of people camping, and does not account for total days a person may stay at a campground.

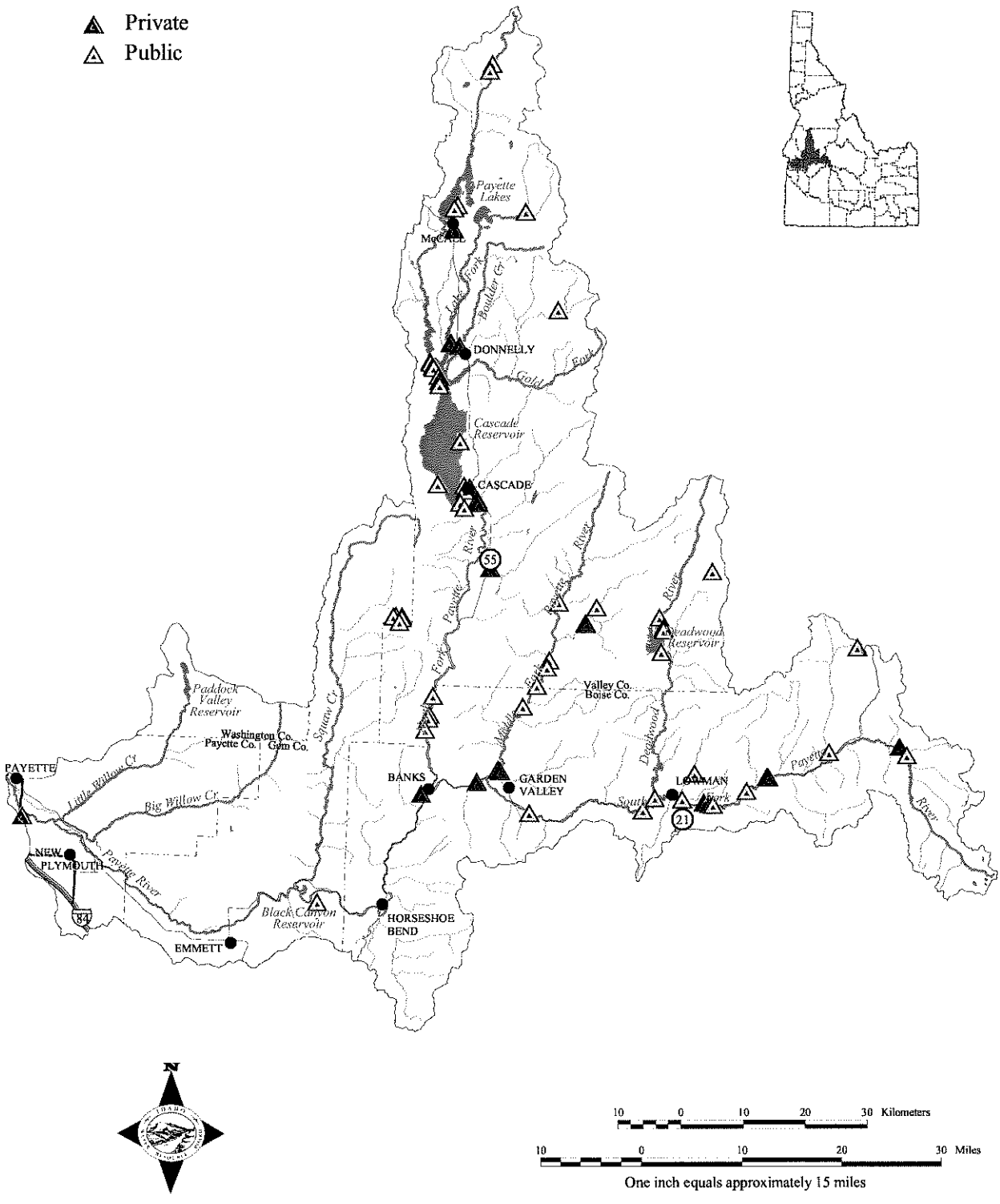
Public campgrounds provide more than 1000 campsites in the basin. The majority are operated by the Forest Service or by others through contracts with the Forest Service. The U. S. Bureau of Reclamation provides campgrounds surrounding Cascade Reservoir and near Black Canyon Reservoir. Bureau of Reclamation campgrounds at Cascade Reservoir and two campgrounds on Payette Lake are managed by the Idaho Department of Parks and Recreation. Some

Table 42. Reaches Open to Recreational Dredge Mining in the Payette River Basin Under the One Stop Permit.*

Reach	Period Open
North Fork Payette & tributaries	
North Fork Payette and tributaries: Headwaters to Upper Payette Lake	All year
North Fork Payette and tributaries: Big Payette Lake to Cabarton Bridge	All year
Gold Fork Creek	July 1 - October 31
Kennally Creek	July 1 - October 31
Lake Fork Creek above Little Payette Lake	July 1 - October 31
Boulder Creek	July 1 - October 31
South Fork Payette & tributaries	
South Fork Payette: Sawtooth National Recreation Area to Deadwood River confluence	July 1- October 31
South Fork Payette: Big Pine Creek to Middle Fork confluence	July 1 - October 31
Deadwood River & tributaries	July 1 - October 31
Middle Fork Payette & tributaries	July 1 - October 31

* As listed in the 1998 Recreational Dredging Application - Attachments to Application for a Permit to Alter a Stream Channel.

Map 23. Campgrounds



y:\payette\arcview\projects\projects2\recscen.apr (8/18/98)

Table 43. Public Campgrounds and Estimated Use (where available) for 1996.

Campground	No. Sites	Estimated No. of People	Landowner/Manager
NORTH FORK PAYETTE			
Upper Payette	9	Not available	Payette National Forest
Lake Fork	9	Not available	Payette National Forest
Kennally Creek	11	Not available	Payette National Forest
Paddy Flat	3	Not available	Payette National Forest
Payette Lake	170	48,595	Idaho Department of Parks and Recreation
Cascade Reservoir (3 campgrounds)	43	7,384	Boise National Forest
Cascade Reservoir (11 campgrounds)	475	Not available	U. S. Bureau of Reclamation *
Horsethief Reservoir	30	7,400 (1994)	Idaho Department of Fish and Game
Big Eddy	4	709	Boise National Forest
Cold Springs	5	483	Boise National Forest
Canyon	7	Not available	Boise National Forest
Swinging Bridge	11	1,712	Boise National Forest
TOTAL	***777***	***66,283***	
SOUTH FORK PAYETTE			
Grandjean	34	3,295	Sawtooth National Forest
Bonneville	22	11,800	Boise National Forest
Helende	10	600	Boise National Forest
Kirkham	16	1,300	Boise National Forest
Mountain View	14	4,000	Boise National Forest
Park Creek	26	2,000	Boise National Forest
Deadwood	5	1,200	Boise National Forest
Pine Flats	25	10,000	Boise National Forest
Hot Springs	7	2,666	Boise National Forest
TOTAL	***159***	***36,861***	
DEADWOOD RIVER			
Deer Flat	5	Not available	Boise National Forest
Deadwood Reservoir (4 campgrounds)	29	Not available	Boise National Forest
TOTAL	***34***	----	
MIDDLE FORK PAYETTE			
Silver Creek	4	69	Boise National Forest
Boiling Springs	9	708	Boise National Forest
Trail Creek	11	489	Boise National Forest
Rattlesnake Creek	10	539	Boise National Forest
Hardscrabble	6	527	Boise National Forest
Tie Creek	6	759	Boise National Forest
TOTAL	***46***	***3091***	
MAIN PAYETTE			
Sagehen Reservoir (4 campgrounds)	47	8451	Boise National Forest
Montour	17	Not available	U.S. Bureau of Reclamation
TOTAL	***64***	***8451***	

* U. S. Bureau of Reclamation sites at Cascade Reservoir are managed by Idaho Department of Parks and Recreation.

Source: U.S. Forest Service, Boise National Forest, 1997; Turnipseed, 1997: Hoosick, 1997; Idaho Travel Council, 1996.

camping opportunities are provided at sportsman's access areas. About 20 privately operated campgrounds with more than 1100 camping sites are found in the basin. Privately operated camping facilities are concentrated in communities in the basin such as McCall, Cascade, Donnelly, Banks, Garden Valley, Emmett, and Payette. Dispersed campsites (areas lacking services or facilities) occur throughout the basin on public lands.

Winter Sports

Although some recreational activities may be limited in the winter, extensive winter recreation opportunities occur in the basin. Groomed Nordic and snowmobile trails are prevalent. Ponderosa State Park started grooming Nordic ski trails in 1977, and today provides 10 ½ miles of groomed trails for all skill levels. The program received 20,333 visitors during the 1995-96 winter season (December 1995 to March 1996) (Hoosick 1997). Use has almost doubled since 1989 (Idaho Department of Parks and Recreation, 1994). About half of the skiers reside in Boise and the other half are from the local area, predominately McCall (Stephens, 1997). McCall Golf Course also provides groomed trails. Outside the basin, but located nearby and to the west, is the Little Ski Hill providing nordic and alpine skiing opportunities. Cross country skiing occurs in other parts of the basin, but groomed trails are not provided.

Some alpine skiing opportunities are possible in the basin as well. The back side of Brundage Mountain Ski area near McCall occurs in the upper north end of the basin. In the 1994-95 ski season Brundage Mountain received 97,328 skier visits; 82 percent were Idaho residents (Hunt, et al., 1996). Brundage Mountain Ski area accounted for seven percent of all skier visits in the state during the 1994-95 season. A portion of the Bogus Basin ski resort near Boise occurs in the south central portion of the basin. Residents expended almost $10.2 million in the 1994-95 ski season and nonresident skiers $1.6 million for alpine skiing activities at both Brundage and Bogus Basin resorts. Brundage and Bogus are the ski destination for most of Idaho's residents. Brundage Mountain Ski Area is the headquarters for the Winter Games of Idaho, the state's official winter sports contest. West of Cascade Reservoir the West Rock ski resort has been proposed.

Winter recreation is a significant part of McCall's economy. The community has capitalized on this by organizing several events including the Winter Carnival, snowmobile races, dog sledding races, and nordic ski marathons. More than 100,000 individuals attend the Winter Carnival, with Idaho residents comprising about 60 percent (Deal, 1997). The remainder of tourists originate from Oregon, Washington, Montana, and the eastern part of the United States.

Snowmobile trails are groomed by the counties with funds acquired through the registration program administered by the Idaho Department of Parks and Recreation. Almost 7,000 snowmobiles were registered in the Payette River basin region (includes Ada, Boise, Custer, Gem, and Valley counties) in 1995, comprising 21 percent of the state total. Valley County has the largest program in the state (Cook, 1997). The more than 400 miles of groomed trails are mainly located along drainages or use Forest Service Roads. The McCall area has snowmobile opportunities north of Payette Lake along the North Fork Payette, the Granite Lake area, Brundage Mountain and paralleling the North Fork of the Lake Fork River. Extensive trails are available on the west side of Cascade Reservoir connecting with the Upper Squaw Creek drainage. Another area with an extensive trail network is the Smiths Ferry area. Groomed trails within the South Fork Payette drainage occur near Grandjean, along Clear Creek in the Lowman area, and paralleling the Middle Fork Payette.

Ice fishing is a popular activity on Cascade Reservoir. Annual use varies, depending on the quality of the fishery. Table 44 indicates angler effort and catch rate trends. Ice fishing also occurs on Payette Lake, but is a minor part of the overall fishing activity on the lake.

Hunting

Big game, waterfowl, upland bird, and upland game hunting occur in the basin. Wildlife management areas and sportsman's access areas provide public access for hunters and anglers in the basin (See Map 22, page 121). The Idaho Department of Fish and Game subdivides the state into big game hunting units for management purposes. The Payette River basin consists of Big Game Hunting Units 24, 33, and 35, and the south halves of both 32 and 32A, and the west half of 34. Hunting use for waterfowl, upland birds and game are estimated by county. Hunter day estimates in the Payette Rive Basin are presented in Table 45. Hunting activity has increased between 1991 and 1995. The most significant increase has been waterfowl hunting, almost doubling for this period. Upland game hunting has increased about 150 percent. Increases in hunter days for other game has ranged from 38 to 53 percent.

Cultural Resource

They occur as artifacts, sites, structures, or other landscape features, and can be both historic and prehistoric. Our understanding of local and regional history is significantly enhanced by the presence and interpretation of an area's cultural resources. These features constitute a legacy of evidence concerning the ways our predecessors found meaning in the use and development of an area for several thousand years.

PREHISTORIC SITES

The archaeological record of the Payette River Basin is slowly being revealed through findings of the remains of cultural habitation. Many of these sites are marked by "lithic scatters," meaning sites displaying a quantity of lithic debitage which were by-products of on-site tool making. Most of the debitage are of obsidian or other easily worked rock materials brought to the site from somewhere else (Moore and Ames, 1979; Kinsbury, 1996). Many sites also contained grinding tools, scrapers, and mortars and pestles.

Because the occurrence of obsidian is not widespread, modern scientific analytical techniques have been developed which use energy dispersive x-ray fluorescence to effectively correlate obsidian flakes with their geologic sources (Kingsbury, 1996). Most of the obsidian flakes and artifacts found in the Payette River Basin have been determined to originate from the Timber Butte obsidian source.

Lithic scatters and other artifact sources have been identified at many locations in the Payette River Basin. The same features which modern man finds desirable for camping, housing locations, or relaxation

Table 44. Ice Fishing Effort and Catch Rates on Cascade Reservoir.

Winter Season	Angler Hours	Catch Rate *(fish/hour)*	Percent of Annual Angler Effort
December 1981 - April 1982	39,827	0.9	10.0 %
December 1986- March 1987	50,810	1.4	13.0 %
December 1990 - March 1991	13,823	0.67	8.0 %
December 1991 - February 1992	61,776	1.49	21.0 %

Sources: Reininger, et al., 1983; Anderson, et al., 1987; Janssen and Anderson, 1994; Janssen, et al., 1994a.

Table 45. Estimated Hunter Days for Deer, Elk, Waterfowl, Upland Birds, and Upland Game in the Payette River Basin.

Hunting Unit or County	1991	1992	1993	1994	1995
DEER					
24	12,081	9,136	13,907	9,663	13,605
32	10,626	7,465	12,468	13,697	15,697
32A	7,504	7,395	10,279	10,533	11,796
33	6,957	8,313	9,887	9,179	8,738
34	3274	1625	3987	5872	7145
35	2,817	3,083	3,912	3,079	4,424
TOTAL	***43,259***	***37,017***	***54,440***	***52,023***	***61,405***
% of State Total	***8.3***	***5.9***	***5.6***	***5.1***	***5.9***
ELK					
24	11,228	13,406	13,815	11,794	14,709
32	6,568	8,507	11,872	10,228	10,340
32A	7,330	7,983	4,184	11,737	10,424
33	10,090	10,197	13,099	10,318	13,169
34	7,083	6,895	6,299	7,501	10,456
35	4,246	3,329	4,960	4,389	5,287
TOTAL	***46,545***	***50,317***	***54,229***	***55,967***	***64,385***
% of State Total	***9.0***	***9.8***	***9.1***	***8.9***	***9.7***
WATERFOWL (includes Canada geese and ducks)					
Boise	1	NA	-	1,199	772
Gem	9,946	NA	6,617	18,729	27,679
Payette	7,170	NA	5,134	12,211	19,495
Valley	1,513	NA	2,845	3,202	6,316
TOTAL	***18,630***	-	***14,596***	***35,341***	***54,262***
% of State Total	***6.6***	-	***4.0***	***8.4***	***10.6***
UPLAND BIRDS (includes chukkar, hun, pheasant and quail)					
Boise	3,103	NA	9,215	4,983	11,819
Gem	24,390	NA	17,317	21,632	27,070
Payette	15,653	NA	24,954	11,218	25,810
Valley	34	NA	897	2,135	1,544
TOTAL	***43,180***	-	***52,383***	***9,968***	***66,243***
% of State Total	***13.7***	-	***12.1***	***11.1***	***14.6***
UPLAND GAME (includes dove and rabbit)					
Boise	249	NA	959	1,892	2,051
Gem	2,239	NA	4,206	3,821	3,940
Payette	848	NA	3,556	2,079	2,153
Valley	-	NA	124	225	264
TOTAL	***3,336***	-	***8,845***	***8,017***	***8,408***
% of State Total	***7.9***	-	***3.4***	***5.5***	***5.2***

NA=Not available

Note: Portions of Hunting Units 32, and 32A are located within the Weiser River Basin. Portions of Hunting Unit 34 are located in the Salmon River Basin.

Sources: Nelson, 1991; Kuck, 1992-1994 and 1996; and Idaho Department of Fish and Game, 1991-1995.

were also sought by prehistoric inhabitants of the area. Most have an adequate supply of fresh water, relatively level land, and perhaps a natural hot spring for bathing or recuperation. Often a location by a main travel route was favored.

Arnold (1984) notes five cultural sites at relatively shallow depths along the meandering North Fork Payette River from McCall to Cascade Reservoir and 15 sites along the west side of the reservoir. The river sites are believed to be fishing camps, while the reservoir edge sites are more diversified and may have seen both early and late periods of prehistoric occupation. The reservoir sites are all located near or beside small streams descending off West Mountain.

The Indians followed a seasonal subsistence cycle, harvesting plant and animal resources when available. Seasonal migrations of salmon provided abundant protein resource in the Payette River Basin. The salmon would be eaten fresh and dried for winter supplies. They gathered berries that were found in the area, which were also dried for later use. The camas bulb and other roots were roasted, then ground into flour and dried. Small and large game were important, and provided fresh meat supplies or preserved.

Located in close proximity to the mountains and the valley floor, aboriginal peoples who used the sites were close to a variety of resources. The valley floor provided root crops during the early summer months, fish in the Payette River during the spring and fall, and migratory waterfowl using the marsh lands near the river in all seasons. Mountains to the west provided root and berry crops from summer to fall. Hunting of bighorn sheep in the mountains, and moose, elk, and deer was possible all year. Other locations have been noted along the east side of Payette Lake (Davis, 1997).

Inventories conducted along the Middle and South Forks of the Payette River in conjunction with proposed hydroelectric and highway improvement projects have located more than 40 sites. Some provided undisturbed data upon which inferences about site functions, seasonality, or settlement patterns could be made. However, most sites were altered during historic times (Moore and Ames, 1979; Ames, 1982). Many sites are located on private land and have not been extensively analyzed. A very large site may occur at the junction of the Middle and South Forks of the Payette River and extend throughout the Crouch and Garden Valley areas. Other major sites have been discovered at the Garden Valley Ranger Station at the mouth of Alder Creek, at Grimes Pass, the mouth of Danskin Creek, and the mouth of the Deadwood River (Moore and Ames, 1979). The Pine Flats and Deadwood campgrounds have been constructed on large prehistoric sites.

Upstream along the South Fork Payette River, the Kirkham Hot Springs area was often used as a stopping and resting site along the Lemhi-Snake River Trail (U.S. Forest Service, Boise National Forest, Lowman Ranger District, no date). Other places may have been camp sites used during summer trips to the Stanley Basin and Camas Prairie, where Indians of western Idaho and bands from the upper Snake country congregated to harvest camas and socialize (Corless, 1990). The Deadwood River-Johnson Creek corridor may also have been used for travel to the South Fork Salmon River (Reddy, 1993).

Archaeological investigations in the lower Payette Basin have shown similar affinities of early inhabitants to water sources. More than 80 cultural resource sites in the Squaw Creek, Ola, and Dry Buck valleys were found close to springs or perennial streams (Shaw, 1997; Ames, 1982). The occurrence of several very significant cultural resource discoveries in similar areas lead state archaeologists to believe that the lower Payette area may also contain important evidences of prehistoric settlement (Davis, 1997).

HISTORIC PLACES

Features associated with the Euro-American settlement of the Payette River Basin are associated with mining, farming and ranching, establishment of towns, and administration of federal lands. Some have been considered eligible for listing on the National Register of Historic Sites. The National Register is an official listing maintained by the National Park Service of archaeological, historic, and architectural properties of national, state, and local significance which are worthy of preservation. Compilation of the list was begun in 1966. Other places of historic importance may not yet have been studied for National Register significance, or exist only in memory with limited physical evidence of their presence.

Relics from early mining development are found in many places. One of the most distinctive sites of this era is the Oxbow Tunnel constructed by the Golden Treasure Mining Company in 1903 about one mile above Pine Flat Campground (Reed, 1996). The tunnel is more than 1000 feet long and is unique in the realm of placer mining technology. Another notable construction effort in the same vicinity are the remains of a dam across the South Fork Payette River. This was a water diversion structure for an early hydroelectric facility which furnished power to the Boise Basin dredges. Old mine adits, waste dumps, and prospect pits are evident along Bear Valley Creek, the Deadwood River, Long Valley about a mile southeast of the Cascade Airport, and several locations along the South Fork Payette River.

Structural remnants of farms and ranches are found frequently in the Long and Lower Payette valleys, but few have been evaluated for historic significance. The Finnish Evangelical Lutheran Church east of Lake Fork, and five churches in Emmett have been listed on the National Register of Historic Places. Several Forest Service administrative sites have been considered for listing, including the Warm Springs Ranger Station (Reed, 1996). Sites of historic ferry crossings and their significance in Euro-American settlement of the area are yet to be formally analyzed.

Facilities associated with early irrigation development have enormous significance in the developmental history of the Payette River Basin. Some of the early canals in the Emmett and Payette vicinities, as well as Black Canyon Dam, are being evaluated for historic recognition (Davis, 1997). Deadwood Dam has been determined eligible for the National Register (Reed, 1996).

Scenic Values and Natural Features

The Payette River Basin is located in the Northern Rocky Mountain and Columbia Intermontane geomorphic provinces. The Northern Rocky Mountain province in the northern and eastern most portions of the basin are noted for well-developed glacial features, including u-shaped valleys with steep walls and sharp ridges. Other portions of the province are characterized by deeply, incised v-shaped valleys. The Columbia Intermontane province is characterized by undulating topography leveling out to the flat Snake River plains of southern Idaho; typical of the landscapes found in the Main Payette subbasin. The *Geomorphology* section describes the characteristics of these provinces in more detail.

Landscape features in the basin contributing to the outstanding natural and scenic values include mountain ranges and peaks, lakes, natural hot springs, waterfalls, granitic canyons, and rivers. The most notable are described here based on special agency designation or management, but is by no means a complete inventory of important scenic and natural features in the Payette River Basin. An overview of outstanding natural areas conducted for several state agencies identified many landscapes in the Payette River Basin noted for scenic values (James C.

Montgomery, 1975). Many of these have been proposed as National Natural Landmarks, indicating the "sites [are] determined to be one of the best examples of a natural region's characteristic biotic or geologic features" (National Park Service, 1987, see Map 24). Nomination for inclusion in this program is an indication of the uniqueness of a feature.

Research Natural Areas comprise a national network of ecological landscapes set aside for research, education, and to maintain biological diversity. Areas selected are representative of typical and important landscapes with special or unique characteristics. A number of Research Natural Areas managed by the national forest occur in the basin and are depicted in Map 24.

North Fork Payette Subbasin

An overview of environmental attributes in Idaho noted the highly scenic values of the following waterbodies in the upper end of the North Fork Payette subbasin -- Upper Payette Lake, Payette Lake, Little Payette Lake, and numerous alpine lakes (James C. Montgomery, 1975). Other scenic waterbodies identified in the subbasin are Cascade Reservoir and the North Fork Payette River, and the pastoral, scenic valleys they are located.

Scenic values of the Lake Fork drainage are also mentioned, most notably the North Fork Lake Fork canyon (James C. Montgomery, 1975). The area is relatively pristine and dominated by huge, outcrops of granite and Late Cretaceous biotite granodiorite of the Idaho batholith. Pleistocene glaciers moving down the valley have polished the rocks and created hanging valleys. A notable rockform is Slick Rock, an enormous granite monolith. The site has been proposed for designation as a National Natural Landmark (Hyndman and Alt, 1982)

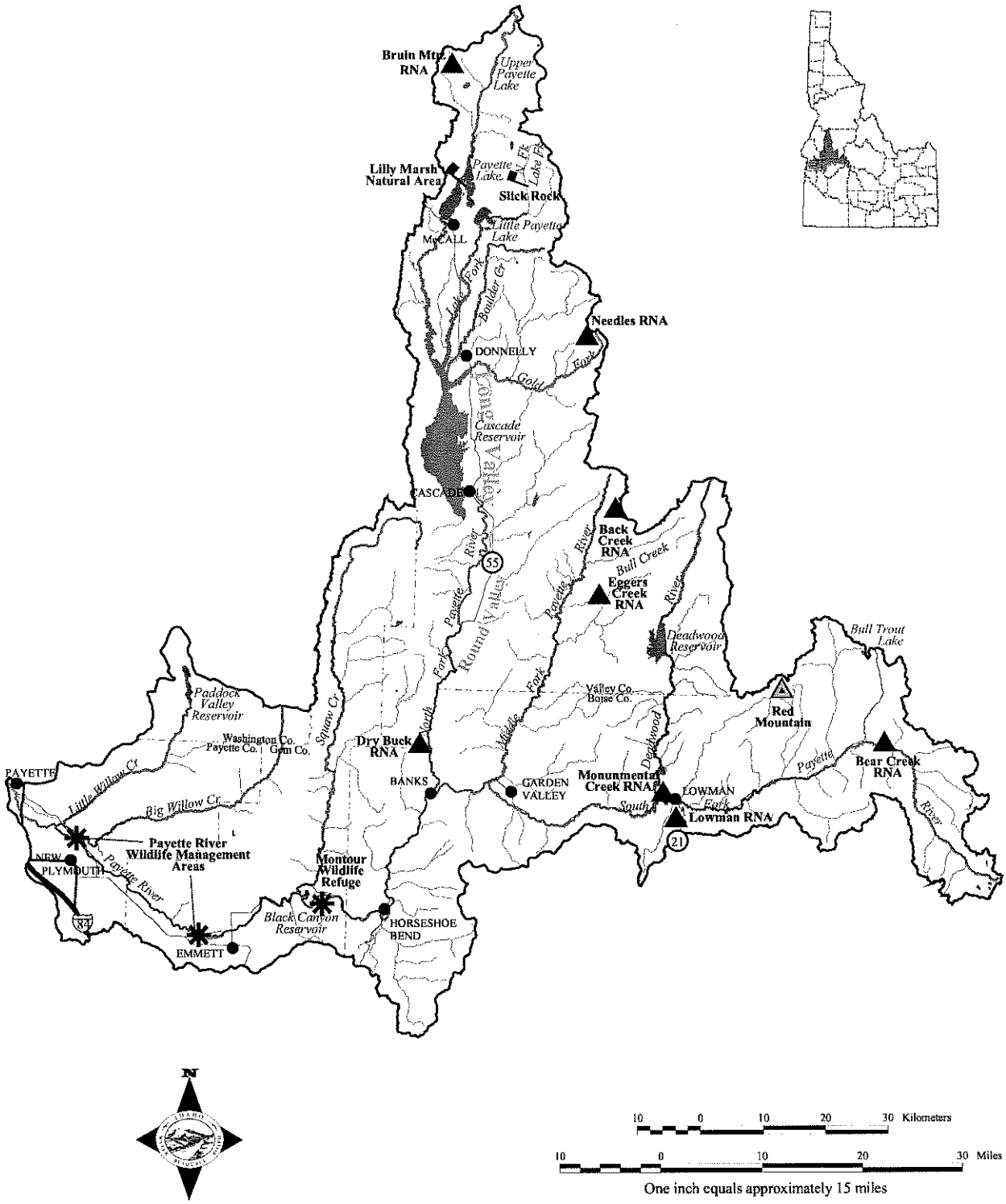
Ponderosa State Park is located on the peninsula extending into Payette Lake (James C. Montgomery, 1975). In 1982 the Idaho Parks and Recreation Board designated the Lily Marsh Natural Area to preserve unique natural features, including an undisturbed marsh ecosystem not commonly found in Idaho, and a rare plant community of Engelmann spruce/common horsetail (Idaho Department of Parks and Recreation, 1994). The natural area has also been nominated as a National Natural Landmark.

Three Research Natural Areas occur in the North Fork Payette subbasin. Bruin Mountain, located west of Upper Payette Lake in the North Fork Payette and Little Salmon drainages, is characterized by an alpine mountain setting with a hanging valley, a rare plant species of *saxifrage*, and mature and old growth subalpine fir/Engelmann spruce stands (U.S. Forest Service, Payette National Forest, 1988). Notable features in the Needles Research Natural Area, located in the Gold Fork drainage, include a lake, wet meadows, alder glades and subalpine fir habitat (U.S. Forest Service, Boise National Forest, 1990). Dry Buck Research Natural Area is located along the North Fork Payette above Banks, encompassing the southernmost occurrence of grand fir in Idaho (U.S. Forest Service, Boise National Forest, 1990).

South Fork Payette Subbasin

A variety of natural features and scenic assets occur in the South Fork Payette subbasin, including the high elevation peaks of the Sawtooth Wilderness, hot springs, open ponderosa pine vistas, and rugged granitic canyons. Scenic natural areas noted in an inventory of environmental attributes identified the South Fork Payette River, Middle Fork Payette River, Bull Trout Lake, and Bull Creek (James C. Montgomery, 1975). Other landscapes considered "highly scenic" are the Tenmile Creek area, located adjacent to the Sawtooth National Recreation Area east of Lowman, and Red Mountain, found northeast of Lowman.

Map 24. Scenic and Natural Features



y:\payette\arcview\projects\projects2\recscen.apr (8/18/98)

Five Research Natural Areas are found in this subbasin (Map 24). Bear Creek Research Natural Area, located east of the Grandjean junction adjacent to the South Fork Payette, preserves undisturbed sagebrush-grass vegetative features and is also proposed as a National Natural Landmark (U.S. Forest Service, Boise National Forest, 1990). Lowman Research Natural Area, located southwest of Lowman on the South Fork Payette, preserves the natural features of a ponderosa pine community. This landscape also is proposed for designation as a National Natural Landmark. Monumental Creek, found on the South Fork Payette between Lowman and the Deadwood River, is considered a good representation of a ponderosa pine/Douglas fir habitat type with a bitterbrush understory. Two of the Research Natural Areas are located in the Middle Fork Payette drainage and include Back Creek, providing "excellent" examples of several subalpine fir types, and Eggers Creek, functioning as a control watershed with grand fir and Douglas fir forest types.

Main Payette Subbasin

The Main Payette subbasin is predominately located in the Columbia Intermontane geomorphic province. Landscape features are significantly different than the North Fork Payette and South Fork Payette subbasins. Characteristic landscapes consist of rolling topography and predominately sagebrush-grassland plant communities. Irrigated agriculture and rangeland are the predominant land uses. Three priority wetlands, a prioritized list of wetlands that merit protection as determined by the National Wetlands Priority Conservation Plan, occur along the Payette River downstream of Horseshoe Bend (Idaho Department of Parks and Recreation, 1998). Priority wetlands include Regan Bend on the Black Canyon Reservoir, Payette River Slough, and Birding Island. The Payette River is also cited as a scenic resource (James C. Montgomery, 1975).

An evaluation of the scenic values of waterways in the basin was conducted as part of the Payette River Basin Plan. The evaluation and results are presented in the *Resources Evaluation* section that follows.

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 42-1731 (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 Citizens 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 Citizens Group and agencies. Table 46 summarizes the river and stream reaches identified with outstanding resource values. Map 25 depicts the locations of these reaches.

BIOLOGICAL VALUES EVALUATION

The River Biological Screening Procedure is a process to identify outstanding fish and wildlife values of a waterway. The procedure uses a number of different stream assessment methodologies, including the Environmental Protection Agency's Rapid Bioassessment Protocols and STREAMWALK, the Idaho Department of Health and Welfare/ Division of Environmental Quality's Beneficial Use Reconnaissance Procedure, and the Idaho Department of Fish and Game's StreamNet. The River Biological Screening Process involves a two-step analysis: 1) an aquatic and riparian assessment, an initial evaluation of twenty biological attributes; and 2) crucial species and habitats inventory, a final evaluation of the basin's unique species and habitats (Table 47, page 147).

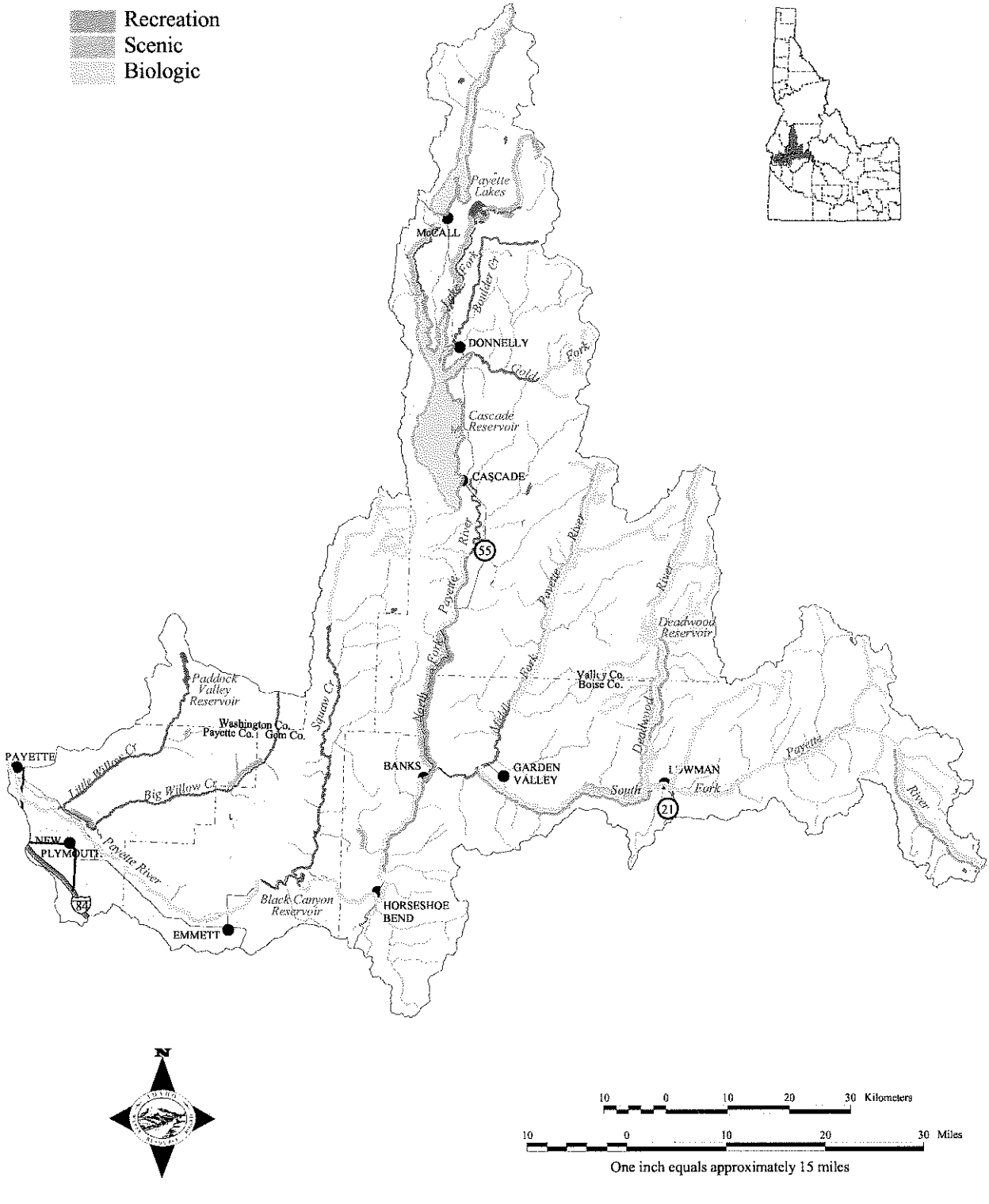
Aquatic and Riparian Assessment

Biological data were collected from various sources, including the Idaho Department of Fish and Game, the Boise and Payette national forests, the Bureau of Land Management, and several specific research studies described in the *Fish and Wildlife* section of the Payette River Basin Plan. The data were compiled for twenty biological attributes on each waterway evaluated. These attributes were divided into four components for ease of collecting and organizing the data:

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

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

Map 25. Waterways with Outstanding Resource Values



y:\payette\areview\projects\projects2\designat.apr (8/31/98)

Table 46. Summary of Outstanding Resource Values for Waterways in the Payette River Basin.

STREAM REACH	FISH & WILDLIFE	RECREATION	SCENIC
NORTH FORK PAYETTE SUBBASIN			
North Fork Payette			
Headwaters to Squaw Meadows	X	X	
Squaw Meadows to SE 1/4 NW 1/4 of Sec. 17 T21N, R4E	X	X	X
SE 1/4 NW 1/4 of Sec. 17 T21N, R4E to Upper Payette Lake Dam (including Upper Payette Lake)	X	X	
Upper Payette Lake Dam to Payette Lake inlet	X	X	X
Payette Lake		X	X
Payette Lake Outlet to Sheep Bridge	X		
Sheep Bridge to Cascade Reservoir backwaters	X		X
Cascade Reservoir	X	X	X
Cabarton Bridge to Smiths Ferry	X	X	
Smiths Ferry to NW 1/4 SW 1/4 of Sec. 22 T9 N R 3 E (just upstream of Phillips Creek)		X	X
NW 1/4 SW 1/4 of Sec. 22 T9 N R 3 E (just upstream of Phillips Cr) to Banks		X	
North Fork Lake Fork *(Headwaters to Lake Fork confluence)*			X
Lake Fork			
North and East Lake Fork confluence to Browns Pond outlet			X
Browns Pond outlet to Little Payette Lake		X	X
Little Payette Lake		X	
Little Payette Lake Dam to mouth			X
North Fork Gold Fork *(Headwaters to South Fork Gold Fork confluence) (includes unnamed perennial tributaries above Lodgepole Creek)*	X		
South Fork Gold Fork *(Headwaters to North Fork Gold Fork confluence)*	X		
SOUTH FORK PAYETTE SUBBASIN			
South Fork Payette			
Headwaters to Sawtooth NRA boundary	X	X	
Sawtooth NRA boundary to Canyon Creek	X		
Canyon Creek to Tenmile Creek	X		X
Tenmile Creek to Clear Creek	X		
Clear Creek to Deadwood River	X		X
Deadwood River to Big Gallagher Creek	X	X	X
Big Gallagher Creek to Banks	X	X	
Goat Creek *(Blue Rock Lake Creek to South Fork Payette confluence)*	X		
Baron Creek *(Braxton Lake Creek to South Fk Payette confluence)*	X		
Wapiti Creek *(Headwaters to mouth)*	X		
Canyon Creek *(Headwaters to mouth, including North Fk and South Fk Canyon Cr)*	X		
Clear Creek *(Headwaters to mouth)*	X		
Deadwood River			
Headwaters to Deadwood Reservoir backwaters	X		X
Deadwood Reservoir	X		
Deadwood Dam to Julie Creek	X	X	X
Julie Creek to South Fork Payette confluence	X		X
Deer Creek *(headwaters to Deadwood confluence, including North and South Forks Deer Creek)*	X		

STREAM REACH	FISH & WILDLIFE	RECREATION	SCENIC
SOUTH FORK SUBBASIN (con'd)			
South Fork Beaver Creek *(one-eighth mile above reservoir to Deadwood Res.)*	X		
Trail Creek (Headwaters to Deadwood Reservoir)	X		
Warm Springs Creek *(Headwaters to East Fork Warm Springs confluence)*	X		
Middle Fork Warm Springs *(Headwaters to Warm Springs confluence)*	X		
East Fork Warm Springs *(Headwaters to Warm Springs confluence)*	X		
Scott Creek *(Headwaters to South Fork Scott Creek confluence)*	X		
Smith Creek *(Headwaters to mouth)*	X		
Middle Fork Payette River			
Headwaters to Boiling Springs	X		X
Boiling Springs to Auglebright Gulch	X		X
Auglebright Gulch to Lightning Creek	X		
Bull Creek *(Headwaters to Middle Fork Payette confluence)*	X		
Oxtail Creek *(Headwaters to Bull Creek confluence)*	X		
PAYETTE RIVER SUBBASIN			
Payette River			
Banks to Porter Creek	X	X	
Porter Creek to Black Canyon backwaters	X		
Black Canyon Dam to Snake River confluence	X		
Squaw Creek *(Headwaters to Second Fork Squaw Creek confluence)*	X		
Pole Creek *(Headwaters to Squaw Creek confluence)*	X		
Third Fork Squaw Creek *(Headwaters to Mesa Creek)*	X		
(includes unnamed perennial tributaries)			
Big Willow Creek			
Jakes Creek to Rock Creek			X
Birding Island to Diversion Dam			X
Indian Creek			
Rattlesnake Creek to next tributary (unnamed located at NE 1/4 NE 1/4 Sec. 8 T 9 N R 2 W)			X

Crucial Species and Habitats Inventory

Species of habitats feature considered by biologists as regionally, nationally, or globally unique, such as the cottonwood gallery forest on the South Fork Snake River, considered biologically outstanding. In the Payette River Basin, these species and habitats include:

- bald eagle nesting
- bull trout focal habitat - The bull trout (*Salvelinus confluentus*) was recently listed as a federally threatened species (June 5, 1998). Focal habitat reaches as defined in the Governor's Bull Trout Conservation Plan are "areas supporting a mosaic of high quality habitats that sustain a diverse or unusually productive complement of native species" (Batt. 1996).

Table 47. River Biological Screening Procedure Data Sheet for the Payette River Basin.

I. AQUATIC AND RIPARIAN ASSESSMENT

HABITAT--Aquatic

D* +*

[ ][ ] 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 (circle applicable):

- Meets ***all*** beneficial uses; ***not*** 303(d) listed water body
- Outstanding Resource Water (nominated or designated)
- Special Resource Water

[ ][ ] 5. Critical spawning habitat

HABITAT--Riparian

D +

[ ][ ] 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: at least one of the following occurs along study reach (circle applicable):

- Pioneer Area
- Priority Wetlands
- Research Natural Area
- Recovery Area
- Wildlife Refuge
- Wildlife Management Area
- Wilderness Area or proposed
- Hot Springs Aquatic Community
- Wild & Scenic River or eligible
- Special Interest Botanical Area
- Bull Trout Key Watershed
- Area of Critical Environmental Concern

Critical wildlife habitat:

[ ][ ] 9. wintering/calving/fawning

[ ][ ] 10. migratory/roosting

SPECIES--Aquatic

D +

[ ][ ] 11. Fishery classification: at least one of the following IDFG fishery classifications applies to study reach (circle applicable):

- 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., EPT)

Rare aquatic biota:

[ ][ ] 15. federal listed species
Names/classification_____

[ ][ ] 16. State priority species (IDFG/CDC ranking)
Names/classification_____

SPECIES--Riparian

D +

[ ][ ] 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
Names/classification _____

[ ][ ] 20. State priority species (IDFG/CDC ranking)
Names/classification_____

II. CRUCIAL SPECIES AND HABITATS

[ ] Bull Trout Focal Habitat

[ ] Bald Eagle Nesting

* If data are available for a particular waterway attribute, it is indicated in the first column; and for those with a affirmative response (+), the second column is checked.

Results

Both components of the evaluation were considered to determine if a waterway possessed outstanding biological values. Waterways with outstanding biological values needed to fulfill the following criteria: at least 50 percent (5 minimum) of the available aquatic and riparian data were positive, *and/or* crucial species and habitats were present. Table 48 summarizes the assessment for the waterways evaluated in the Payette River Basin.

RECREATION EVALUATION

The recreation evaluation, conducted by Idaho Department of Water Resources personnel, focused on recreational opportunities occurring within specific river or stream reaches. The evaluation entailed identification of recreation units; analysis of the recreational diversity and importance of recreational opportunities in each unit; and determination of a final value -- outstanding, high, or moderate to low.

The river reaches within the Payette River Basin were grouped into twenty-five segments or discrete recreation units delineated on the basis of land use patterns, access, and/or recreational use patterns (Table 49, page 151). 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.

Recreational diversity is a measure of the variety of opportunities available in the recreation unit. Three criteria were assessed to arrive at a diversity value: 1) 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 wildlife habitat characteristics providing increased opportunities 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 four 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 by public comment and geographic draw of visitors); (3) use volume based on recreational survey data and agency consultation; and (4) 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 (greater than 12); b) provides a unique or rare experience within the region or basin; and/or c) receives significant or the highest use. A recreation unit evaluated as high is characterized by river segments: a) receiving high use; b) high

Table 48. Summary of Biological Evaluation in the Payette River Basin. (Reaches marked with a * were found to have biologically outstanding values.)

REACH[1]	AQUATIC AND RIPARIAN ASSESSMENT *(Total positive attributes/ Total attribute available)*	CRUCIAL SPECIES AND HABITAT[2]	
		✔	Description
*North Fork Payette River (Headwaters to Upper Payette Lake Dam)	10/20		
*North Fork Payette River (Upper Payette Lake Dam to Fisher Creek)	10/19		
*North Fork Payette River (Fisher Creek to Payette Lake)	10/20		
Payette Lake	7/19		
*North Fork Payette River (Payette Lake Outlet to backwaters Cascade Reservoir)	11/19	✔	Bald eagle nesting
*Cascade Reservoir	3/19	✔	Bald eagle nesting
Lake Fork Creek (Browns Pond to Little Payette Lake Dam)	8/19		
Lake Fork Creek (Little Payette Lake Dam to Cascade Reservoir)	8/19		
Gold Fork River (headwaters to Gold Fork Diversion Dam)	5/19		
*South Fork Gold Fork River (unnamed tributary to North Fork Gold Fork confluence)		✔	Bull trout focal habitat
*North Fork Gold Fork River and unnamed tributaries above Lodgepole Creek (headwaters to South Fork Gold Fork River confluence)		✔	Bull trout focal habitat
North Fork Payette River (Cascade Dam to Cabarton)	6/20	✔	Bald eagle nesting
*North Fork Payette River (Cabarton to Smiths Ferry)	11/20	✔	Bald eagle nesting
North Fork Payette River (Smiths Ferry to Banks)	7/19		
*South Fork Payette River (headwaters to confluence with Deadwood River)	7/12	✔	Bull trout focal habitat
*South Fork Payette River (Deadwood River to Middle Fork Payette River)	7/13		
*Goat Creek (Blue Rock Lake Creek to South Fork Payette River)		✔	Bull trout focal habitat
*Baron Creek (Braxon Lake Creek to South Fork Payette River)		✔	Bull trout focal habitat
*Wapiti Creek (headwaters to South Fork Payette River)		✔	Bull trout focal habitat
*Canyon Creek including North and South Forks Canyon Creek (headwaters to South Fk Payette River)		✔	Bull trout focal habitat

REACH[1]	AQUATIC AND RIPARIAN ASSESSMENT *(Total positive attributes/ Total attribute available)*	CRUCIAL SPECIES AND HABITAT[2]	
		✔	Description
*Clear Creek (headwaters to South Fork Payette River)	10/16	✔	Bull trout focal habitat
*Deadwood River (headwaters to Deadwood Reservoir Dam)	12/17	✔	Bull trout focal habitat
*Deadwood River (Deadwood Reservoir Dam to South Fork Payette River)	10/18		
*Deer Creek, including North and South Forks Deer Creek (headwaters to Deadwood River)		✔	Bull trout focal habitat
*South Fork Beaver Cr (approx. 1/8 mi. upstream of Deadwood Reservoir to Deadwood Reservoir)		✔	Bull trout focal habitat
*Trail Creek (headwaters to Deadwood Reservoir)		✔	Bull trout focal habitat
*Warm Springs Creek, and Middle and East Forks (headwaters to East Fk Warm Springs Cr confluence)		✔	Bull trout focal habitat
*Scott Creek, and Smith Creek (headwaters to confluence with South Fork Scott Creek)		✔	Bull trout focal habitat
*Middle Fork Payette and unnamed tributaries (headwaters to Lightning Cr confluence)	10/17	✔	Bull trout focal habitat
*Bull Creek and Oxtail Creek (headwaters to Middle Fork Payette River)		✔	Bull trout focal habitat
Silver Creek (headwaters to Middle Fork Payette River)	8/17		
Anderson Creek (headwaters to Middle Fork Payette River)	7/17		
*Payette River (Middle Fork Payette River to Black Canyon Reservoir)	10/15		
*Payette River (Black Canyon Dam to Snake River)	9/15		
*Squaw Creek and unnamed tributaries (headwaters to confluence with Second Fork Squaw Ck)	11/17	✔	Bull trout focal habitat
*Third Fork Squaw Creek and unnamed tributaries (headwaters to Mesa Creek)		✔	Bull trout focal habitat
*Pole Creek (headwaters to Squaw Creek)		✔	Bull trout focal habitat

[1] Complete reach descriptions are available for public review in Idaho Department of Water Resources files.
[2] Bull trout focal habitat upstream and downstream boundaries do not necessarily coincide with the total evaluated reach

Table 49. Recreation Evaluation Criteria and Results for the Payette River Basin.

OUTSTANDING **Significant recreational opportunities available as indicated by a great diversity of activities (> 12 activities); unique or rare experience; and/or highest use areas.**	**North Fork Payette** (*Headwaters to Payette Lake Inlet)* - significant diversity of recreation opportunities **Payette Lake** - significant diversity of recreation opportunities **Cascade Reservoir** - significant diversity of recreation opportunities **North Fork Payette** *(Cabarton Bridge to Banks)* - one of the reaches comprising a diverse array of whitewater boating opportunities attracting people nationally to the Payette River Basin, including a reach considered the most challenging whitewater in North America; significant boating and scenic driving use **Lake Fork** *(Browns Pond outlet to Little Payette Lake)* - trophy trout fishing opportunities **Little Payette Lake** - one of 16 trophy lake fisheries managed in Idaho **South Fork Payette** *(Headwaters to Sawtooth National Recreation Area boundary)* - outstanding unroaded recreation experience **South Fork Payette** *(Deadwood River to Banks)* - one of the reaches comprising a diverse array of whitewater boating opportunities attracting people nationally to the Payette River Basin; significant boating and camping use **Deadwood** (*Deadwood Dam to Julie Creek)* - unique, unroaded, expert whitewater experience **Payette** *(Banks to Porter Creek)* - one of the reaches comprising a diverse array of whitewater boating opportunities attracting people nationally to the Payette River Basin; significant boating and scenic driving use
HIGH **River segments with a high use volume; high diversity (10 to 12 recreational activities); and/or a recreation opportunity which is unique but typical in the region.**	**North Fork Payette** *(Payette Lake Outlet to Cascade Reservoir backwaters)* - high diversity of recreation opportunities **North Fork Payette** *(Cascade Dam to Cabarton Bridge)* - high use area below bridge **North Fork of the Lake Fork** *(Headwaters to confluence with Lake Fork)* - moderate diversity of recreation opportunities, but rock climbing opportunities at Slick Rock area in the basin **Lake Fork** *(Below Little Payette Lake to mouth)* - moderate to low diversity of recreation opportunities **South Fork Payette** *(Sawtooth National Recreation Area boundary to Deadwood River)* - high diversity of recreation opportunities, high use area **Middle Fork Payette** *(Boiling Springs to Tie Creek)* - high to moderate diversity of recreation opportunities **Black Canyon Reservoir** - High to moderate diversity of recreation opportunities **Payette** (*Black Canyon Dam to confluence with Snake River)* - high to moderate diversity of recreation opportunities
MODERATE AND LOW **River segments with moderate to low use volume; moderate to low diversity of opportunities (less than 10 activities); and/or providing recreational opportunities typical and abundant within the region.**	**Lake Fork** *(Confluence with North Fork Lake Fork to Little Payette Lake Inlet)* - moderate diversity of recreation opportunities **Deadwood** (*Headwaters to Deadwood Reservoir backwaters)* - moderate diversity of recreation opportunities **Deadwood Reservoir** - moderate diversity of recreation opportunities **Deadwood** *(Julie Creek to confluence with South Fork Payette)* - moderate to low recreation opportunities **Middle Fork Payette** *(Headwaters to Boiling Springs)* - moderate diversity of recreation opportunities **Middle Fork Payette** *(Tie Creek to confluence with South Fork Payette)* - low diversity of recreation opportunities **Payette** *(Porter Creek to Black Canyon backwaters)* - moderate diversity of recreation opportunities

diversity (10 to 12 activities); 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 (less than 10).

Table 49 summarizes the results of the recreation evaluation for river reaches in the Payette River Basin. The evaluation focused on the North Fork, South Fork, Middle Fork and Main Payette rivers, Deadwood River and Lake Fork.

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 separate landscapes along stream reaches into individual units. The second was to evaluate the scenic distinction or aesthetic value of these visual units.

Delineating Visual Units

Visual units define a landscape area which has similar spatial characteristics such as landform, vegetation, water form, or cultural modifications (Tetlow and Sheppard, 1980). Noticeable changes in any of these that significantly change the viewing experience define 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, ridgeline, or the extent of the foreground/middleground viewshed. Any distinct or conspicuous change in landscape elements which significantly changed the viewing experience as one progressed along the corridor marks the boundary between visual units. For the basin, visual unit boundaries generally indicate changes in the stream pattern or water characteristics (i.e., free flowing water versus reservoirs, or single channel versus braided, 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 by Idaho Department of Water Resources personnel between 1993 and 1998. Landscape characteristics were photographed and recorded on maps. Forms were also completed documenting characteristic landform, vegetation, water character, cultural modifications, and other characteristics for each unit.

An evaluation of scenic values was not completed for all rivers and streams in the basin. The evaluation focused on major waterways such as the Payette, North Fork Payette, South Fork Payette, Middle Fork Payette and Deadwood rivers, and tributaries as suggested by public input.

Scenic Distinction Classes

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 Payette River Basin are evaluated relative to typical landscape features in southwestern Idaho and not compared to northern Idaho landscapes.

The Forest Service and Bureau of Land Management have established procedures for measuring the aesthetic quality of landscapes. Both

procedures use similar criteria for measuring scenic values of landscapes. Scenic distinction for the Payette River Basin used the rating scale provided in Table 50. This chart was developed by the U.S. Bureau of Land Management for use in evaluating scenic quality of public lands. 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 (U.S. Bureau of Land Management, 1986; U.S. Forest Service, 1974).

A numeric rating system is used to evaluate the degree of visual variety and harmonious composition of seven factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. Ratings are based on basic elements of design (line, form, color, and texture) to describe and evaluate the landscape. Each factor was rated using a value of one to five (with the exception of cultural modifications which is rated -4 to 2) based on the amount of variety, contrast, harmony, or distinctiveness within the unit – the higher the rating, the greater variety or more distinctive the feature. The components comprising the landscape are evaluated individually.

A scenic evaluation was completed for each visual unit identified in the Payette River Basin. A narrative description of each of the elements is prepared and each element given a numerical rating. A final rating is derived by totaling the scores for all seven landscape factors. 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 51 (page 155) describes the scenic evaluation results for the Payette River Basin.

Table 50. 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: U.S. Bureau of Land Management, 1986.

Table 51. Results of the Scenic Values Evaluation for the Payette River Basin.

SCENIC DISTINCTION CATEGORY	REACH
OUTSTANDING (Class A) Landscapes with significant variety in landscape features; and/or possessing distinctive or unique, rare features (received a score of 32 to 19).	***North Fork Payette Subbasin*** North Fork Payette - Squaw Meadows North Fork Payette - Upper Payette Lake Dam to Payette Lake inlet Payette Lake North Fork Payette - Sheep Bridge to Cascade Reservoir backwaters Cascade Reservoir North Fork Payette - Smiths Ferry to upstream of Phillips Creek confluence North Fork Lake Fork - Headwater to confluence Lake Fork - confluence to Little Payette Lake Lake Fork - Payette Lake outlet to mouth ***South Fork Payette*** South Fork Payette - Canyon Creek to Tenmile Creek South Fork Payette - Clear Creek to Big Gallagher Creek Deadwood River - Headwaters to Deadwood Reservoir backwaters Deadwood River - Deadwood Dam to South Fork Payette confluence Middle Fork Payette - Headwaters to Auglebright Gulch ***Main Payette Subbasin*** Big Willow - Jakes Creek to Rock Creek Big Willow - Birding Island area to Diversion Dam Indian Creek - Rattlesnake Creek to unnamed tributary located at NE 1/4 NE 1/4 of Sec. 8, T9N, R2W
HIGH (Class B) Landscapes which provide moderate variety in landscape features (received a score of 18 to 12)	***North Fork Payette Subbasin*** North Fork Payette - Headwaters to Squaw Meadows North Fork Payette - Downstream of Squaw Meadows to Upper Payette Lake inlet Upper Payette Lake North Fork Payette - Payette Lake outlet to Sheep Bridge North Fork Payette - Cascade Dam Smiths Ferry North Fork Payette - Upstream of Phillips Creek to Banks Gold Fork - Headwaters to mouth ***South Fork Payette Subbasin*** South Fork Payette - Headwaters to Canyon Creek South Fork Payette - Tenmile Creek to Clear Creek South Fork Payette - Big Gallagher Creek to Banks Pine Creek - Headwaters to mouth Deadwood Reservoir ***Main Payette Subbasin*** Main Payette - Banks to Black Canyon Dam Brownlee Creek - Headwaters to mouth Harris Creek - Headwaters to mouth Squaw Creek - Headwaters to mouth Big Willow Creek - Spring (SW 1/4 NW 1/4 of Sec. 24, T10N R1W) to Jakes Cr Jakes Creek - Headwaters to mouth Little Willow Creek - Paddock Reservoir to Ringer Gulch
MODERATE TO LOW (Class C) Landscapes where characteristic features posses little variety (received a score of 11 or less).	***Main Payette Subbasin*** Big Willow Creek - Headwaters to spring (SW 1/4 NW 1/4 of Sec. 24, T10N R1W) Big Willow Creek - Rock Creek to Birding Island area Big Willow Creek - Diversion Dam to mouth Little Willow Creek - Ringer Gulch to Big Willow Creek confluence

ISSUES, CONSIDERATIONS AND GOALS

Issues and Concerns

ISSUE IDENTIFICATION

The Board conducted public information meetings in March through May 1997 in McCall, Cascade, Donnelly, Lowman, Garden Valley, New Plymouth, Payette, Ola, Emmett, and Boise to discuss preparation of this Payette River Basin Comprehensive State Water Plan. Meeting participants were asked to identify water-related issues, problems and concerns, water development needs, water improvement options, and water conservation and protection measures. Additional information was obtained through letters and agency coordination meetings. More than 100 issues, concerns and problems were identified, covering ten general topics. A summary of these issues is contained in Appendix A.

In March 1998 a list containing these issues was compiled and distributed at a public information meeting, and later to citizens in the basin. Recipients were asked to rank issues on a scale of one to five regarding how much effort should be devoted to each. The Payette River Citizens Group reviewed the results of this ranking effort, narrowing the focus to thirty-three priority issues. The remainder of the planning effort for the Payette River Basin Plan focused on these priority issues. These are summarized for each category below. Specific problem statements developed for each issue are found in Appendix G.

Proposed State Protected Designations

The Board designated reaches of the North Fork Payette, South Fork Payette, and main Payette rivers as state recreational rivers in the *1991 Payette River Reaches Plan*. In the current planning effort, many citizens support continued protection of these reaches, and designation of some additional reaches, including:

- North Fork Payette - Headwaters to Payette Lake
- North Fork Payette - Payette Lake Outlet to Cascade Reservoir
- Lake Fork - Headwaters to mouth
- Gold Fork - Headwaters to mouth
- Clear Creek (tributary to South Fork Payette) - Headwaters to mouth
- Pine Creek (tributary to South Fork Payette) - Headwaters to mouth
- Deadwood River - Dam to mouth
- Middle Fork Payette - Headwaters to mouth
- Payette River - Horseshoe Bend to Black Canyon Reservoir
- Second Fork Squaw Creek - Below Sagehen Dam to mouth
- Squaw Creek - Second Fork confluence to mouth
- Bull trout focal habitat

Other citizens did not support state protected river designations, because of the perception that multiple use management is restricted, and the belief that activities such as grazing, timber or motorized use would be prohibited in the drainage. These concerns were discussed and addressed in Citizens Group workshops. Support for and against federal wild and scenic river designation was also presented.

Water Allocation

Water allocation addresses the distribution and use of water in the basin. Many rivers and streams are regulated, with irrigation the major consumptive water use. Some citizens want to consider water management flexibility by exploring other storage release alternatives that would optimize water use for multiple demands, including irrigation, flood management, fisheries, recreation, water quality, and municipal water supply. The need to protect existing water rights, storage contracts, and diversions, and acknowledge other legal constraints is also essential.

The J Ditch project was constructed to eliminate discharge of McCall's wastewater into the North Fork Payette River, and improve water quality in Cascade Reservoir. The project entails delivering the effluent to irrigators, replacing water diverted from Mud Creek and Lake Fork Creek. With irrigators diverting less from these waterways, it is hoped instream flows in Mud Creek and Lake Fork will increase, enhancing water quality and the fishery. Many individuals were concerned that any additional instream flows that may result from this project may be claimed through the water appropriations process, or continue to be diverted because efficient water control and flow measurement devices are lacking.

Of the 427,000 acre-feet of Idaho water released for salmon flow augmentation, 145,000 to 155,000 acre-feet annually came from the Payette River Basin from 1995 to 1997. This water consists of 95,000 acre-feet of uncontracted space in Cascade and Deadwood reservoirs, with the remainder purchased from the rental pool. Many concerns have been expressed about this use of the basin's water, and the possibility of more basin water being used to provide an additional one million acre-feet from Idaho for this purpose. Concerns include the irrigators not having water in drought years, impacts from drawdown of the reservoirs, the inability to acquire storage contracts for water to meet future needs, and questions of the effectiveness of using water for this purpose.

Irrigators expressed concern that water conservation in the form of improved water application or water delivery systems may put their water rights at risk. As an example, converting from flood irrigation practices to sprinkler irrigation uses less water to irrigate the same acreage. Water users are concerned that if they conserve and use less water, they may have their water allocation reduced by this amount. Many feel that the legal and administrative process for water appropriations and allocations should be more flexible so that water rights are not jeopardized.

The Board is the only entity that can acquire a minimum streamflow water right. The public has identified several waterways in the Payette River Basin where an instream flow is desired for water quality, recreation and fishery maintenance. Suggestions for instream flows for specific reaches in the basin are discussed under the appropriate issue categories.

Water Storage and Delivery

Improved management of water delivery in the basin is desired by many entities. Improved management can make additional water available in the rental pool. Some agencies have identified improved water management as a way to benefit water quality, especially in the Cascade Reservoir watershed and the lower Payette Valley. Some citizens have expressed a desire to improve irrigation efficiency, such as reducing irrigation diversions and return flows, and improving water application methods to make conserved water available for other uses and needs such as instream flows. Others note that water conserved from irrigation may result in

undesirable consequences, such as reduced aquifer recharge, and should therefore be carefully considered. Additional water storage was identified as a desire by the public for municipal water supply, flood control, and irrigation.

Irrigation diversion structures in the lower Payette Valley and Cascade Reservoir watershed were examined in two separate studies to determine if improvements could be made (Natural Resources Consulting Engineers, Inc., 1996; Quadrant Consulting, Inc., et al., 1997). These studies examined opportunities to consolidate or upgrade diversions to improve water management efficiency. The public suggested reviewing and summarizing the study recommendations.

Water users in Water District 65 are the predominant water users in the basin. There are several smaller water districts and irrigation companies operating on tributaries to the North Fork, South Fork, Middle Fork and main Payette rivers. Better coordination between these districts / companies might result in more efficient water management. One suggestion was to conduct a flow optimization study for the entire Payette River Basin, examining among other things, whether coordinated releases between tributary storage in the Cascade watershed can increase instream flows and enhance water quality.

Municipal Water Supply

The communities in the basin are experiencing significant growth, ranging from 14 to 43 percent from 1990 to 1996. Domestic, commercial, municipal, and industrial water demand is increasing due to population growth. The Payette River Basin's population has increased nearly 73 percent in the twenty-six years between 1970 and 1996. The cities, which are the fastest growing areas, may require new water supplies to provide for additional people. As the industrial potential of the area is developed, water requirements for industrial use will also increase.

Water supply to meet future municipal demands is an issue of allocation and not necessarily supply. There is adequate water to address the future municipal demands, but most available water in the basin is appropriated for other uses, predominately for agricultural irrigation. Uncontracted space in federal storage reservoirs are currently used for flow augmentation, making water storage contracts difficult to obtain. Planning is needed to identify mechanisms and water supplies to securely meet future municipal needs. Locating additional supplies for domestic, municipal, commercial and industrial uses may require administrative actions, policy changes, or reallocation to make additional water supplies available for these uses. Projected water demand and needs for municipalities in the basin are summarized in the *Domestic, Commercial, Municipal and Industrial Water Uses* section. Many communities in the basin face expensive infrastructure investments to meet Safe Drinking Water Act standards and/or increased demands.

The City of Horseshoe Bend has concerns about secure water supplies. It has a Payette River surface water right with a 1976 priority date. In 1996 about one-third of their water was purchased from the rental pool. They are concerned that this water may not be available in drought years, and that growth may be limited.

The City of McCall has recently made expensive investments in a water treatment plant, and still needs to fund Phase 2 to meet Safe Drinking Water Act requirements. The City is also concerned about planning and acquiring water to accommodate future growth. McCall also relies on water from the rental pool at times, which provided 8 percent of its 1997 water supply.

Water Quality

The Idaho Division of Environmental Quality is the primary state authority for addressing water quality issues. The Board has the authority to "study and examine" water quality issues, and "advise, cooperate and counsel" the Idaho Division of Environmental Quality about these issues [Idaho Code 42-1734(15)]. Since water quality and quantity are interrelated properties, they must be addressed by the Board in the comprehensive state water plan.

Currently, four watershed advisory groups (WAGs) have been organized in the basin to advise the Idaho Division of Environmental Quality on the development of water quality management plans. Citizens are concerned that the Board's plan will duplicate or be counterproductive to the efforts of these other groups. The Payette River Citizens Group suggested the Board's plan defer to the Idaho Division of Environmental Quality and the watershed advisory group process for most water quality issues, and address only issues that are within the Board's or Department's authority. Areas to be addressed in the Payette River Basin Plan would include coordination between well permitting and septic/drainfield installation, and instream flows.

The Idaho Department of Water Resources is responsible for well permitting. The Health District oversees permitting and installation of septic systems. This current system can result in wells being permitted and constructed without knowledge of local septic tank and drainfield locations. Increased individual waste disposal system density, particularly in rural areas with high water tables, increases the potential risk of contamination to wells, surface water, and ground water. This is a concern in the Cascade Reservoir watershed, Garden Valley, along the Middle Fork Payette River, and some areas in the Lower Payette Valley. The facilities plan for the City of Crouch identifies this as the highest potential adverse environmental impact (Toothman-Orton Engineering Company, 1993). Idaho Code does not require a developer to identify septic tank or well locations on subdivision development plans if the future property owners will be responsible for facility installation. With small lot sizes, development on adjacent lots may prevent landowners from locating wells and drainfields that meet Health District standards.

The Board has received suggestions to improve coordination between the Idaho Department of Water Resources' well permitting activities and the Health Districts' septic tank / drainfield location permitting responsibilities to minimize potential water quality impacts. Citizens have expressed a desire to make the permitting process for both more efficient by acquiring permits at one place. Instream flows are desired for several river reaches to improve or maintain water quality. Reaches suggested include:

- North Fork Payette: Upper Payette Lake to Payette Lake
- North Fork Payette: Payette Lake to Cascade Reservoir
- Lake Fork: Little Payette Lake to Cascade Reservoir
- Gold Fork: Gold Fork diversion to Cascade Reservoir
- Payette River: Banks to Black Canyon
- Payette River: Black Canyon to Letha
- Payette River: at Letha
- Payette River: Letha to Snake River

Some citizens have suggested that the 300,000 acre-foot minimum pool administratively established by the U.S. Bureau of Reclamation for Cascade Reservoir should be secured. Suggestions have included the Board pursuing a minimum lake level water right, or making it state policy.

Flood Management

Flood protection in the basin is provided by two upstream reservoirs (Cascade and Deadwood). This regulates flows for only 35 percent of the basin, with no regulation of flows in the low elevations. Flood control levees are located from Horseshoe Bend downstream.

Floods that occurred in January 1997 and high waters in the spring of the same year resulted in renewed concern about floodplain development and taxpayer liability for flood damage. Development adjacent to the river that encroaches into a floodway may reduce the flood stage flow volume and minimize the ability to manage floods without property damage. Many citizens do not want the state mandating or even suggesting actions to local jurisdictions. Others see the Board's plan as a way to get local planning authorities to recognize and address the issue. The public also questioned whether 1997 flood damage had been repaired at all locations.

A levee system exists on the Payette River from Horseshoe Bend downstream. Uncertainty exists about who is responsible for repair and maintenance. Levees are owned by numerous jurisdictions, cities, counties, and private entities (See Map 13). Repairs and replacements to many levees during the recent flooding may place the same areas at risk or expand areas at risk. There is a need to have regular maintenance and coordinated management of the levee system.

River channel capacity has changed for many waterways in the basin since the Federal Emergency Management Agency completed floodplain mapping. Flooding in 1997 deposited sediment and debris in the river channel, reducing river channel capacity from Horseshoe Bend downstream. These conditions have likely changed 100-year floodplain boundaries and floodways, suggesting a need to update floodplain mapping in the basin.

Resource Development

Hydropower development in the basin has been the predominant resource development focus during the planning process -- specifically, a hydropower project proposed for the North Fork Payette River. The proposed project would be located in the Smiths Ferry to Banks reach, currently designated as a state recreational river which prohibits construction of such projects. Gem Irrigation District has requested that the Board amend the *Payette River Reaches Plan* or provide an exemption to allow this proposed project.

Comments from the public have both opposed and supported the project. The public has identified many environmental concerns, including questions about impacts to the scenic, fishery and recreational values of the North Fork Payette canyon, and possible geologic hazards associated with construction and maintenance of the pipeline. Irrigators are concerned that the 100 cubic feet per second diverted for the hydroproject may disrupt downstream irrigation deliveries. The financial feasibility of the project has been questioned. Supporters of the project cite the future need for energy, and the economic benefits to counties in jobs and tax revenues.

Fisheries

The public would like to see the quality of fisheries improved or maintained in the basin. Reaches where improved quality and management are desired include Cascade Reservoir, North Fork Payette, South Fork Payette, Middle Fork Payette, and main Payette rivers. Suggestions for improving the fishery in Cascade Reservoir and tributaries

include altering diversions in the Gold Fork and Lake Fork drainages to allow fish passage, improving water measurement, installing fish screens, and minimizing sedimentation.

Instream flows have been suggested to maintain fishery values. Suggestions have involved reaches located below dams or diversions, including:

- North Fork Payette - below Upper Payette Lake, below Payette Lake and below Cascade Dam
- Lake Fork - below Little Payette Lake Dam
- Gold Fork - below Gold Fork diversion
- Deadwood River - below Deadwood Dam
- Payette River - below Black Canyon Dam

The bull trout was listed as threatened under the Endangered Species Act. A problem assessment is being prepared for the Payette River Basin which will identify threats to bull trout persistence. The Board has received a request to designate all bull trout focal habitat as state protected rivers so that adult and juvenile migration are not impeded. Focal habitats are the waterways where bull trout return to spawn and rear, and therefore, considered critical to survival.

Agency Planning and Coordination

Citizens desire coordination between agency efforts to minimize duplication of efforts, and to make permitting and review processes more efficient. The difficulty in obtaining permits for stream channel alterations was mentioned. The public felt permits take too long to obtain, especially during emergency situations. Citizens also questioned the need for permits to repair or replace previously approved structures. The concept of stream channel work permitted and performed to prevent flood damage as part of a coordinated pro-active plan was discussed.

Secondly, the naming convention for the river reach from the Middle Fork Payette confluence to Banks was raised. Most people refer to this reach as the South Fork Payette River. The official name, according to the U.S. Board of Geographic Names, is the Payette River. The citizens would like local naming convention to be formally recognized by all agencies.

Recreation

The Payette River Basin has a variety of quality outdoor recreation opportunities, but is probably best known for the quality and diversity of recreational boating activities on rivers and lakes. Recreation use has increased significantly as the area population expands, and the Payette River Basin is discovered by people outside the area. Increased use results in conflicts between different users, and increased pressures on area services. Many local residents feel that there is a need for additional services and facilities to handle the recreation pressures, and funding to support it. Although a federal fee program was implemented in the spring of 1998, funds are still needed to help local jurisdictions respond to the recreation demands and impacts. Specific concerns include impacts to riparian areas, the need for more parking and restrooms, private property trespass, and the need for more developed facilities and sites accessible to the disabled.

Others are concerned about changes in the quality of the outdoor recreation experience. Some citizens fear recreation activities will be prohibited or eliminated to minimize impacts. The majority wish to maintain the diversity of recreation opportunities available in the basin. Many citizens feel management has focused on recreational boating on the rivers, resulting in displacement and neglect of other recreation activities. They want a management focus on all recreation activities in the Payette River system.

State Highway 55 and the Banks-Lowman Highway (Forest Road 17) are major transportation

corridors used to access recreation opportunities in the basin. Traffic density on Highway 55 has increased significantly, more than doubling from 1980 to 1995. The public is concerned about safety and travel convenience. Traffic management is a priority concern.

River flows are regulated by releases from Upper Payette Lake, Payette Lake, Little Payette Lake, and Cascade and Deadwood reservoirs governed by irrigation requirements, and to some extent, flood control objectives. Many recreation opportunities and the quality of the recreation experience on the rivers and reservoirs are dependent on the quantity and timing of these releases.

Institutional Constraints and Opportunities

Other state, federal, and local entities have major roles in the regulation and management of water and land resources in the basin. These authorities and responsibilities have been taken into consideration in the development of the Payette River Basin Comprehensive State Water Plan. Some of these authorities provide a framework for which actions and recommendations contained in the Board's plan must be compatible. Many present opportunities to implement actions and make recommendations to address issues and achieve goals in this plan. Those authorities relevant to the Payette River Basin Plan are summarized here.

PAYETTE RIVER REGULATION

Operation and Management of the Federal Storage System

Federal, state, and private entities have roles in the operation and management of the federal storage system in the Payette River Basin. The U.S. Bureau of Reclamation operates the system as part of the Boise Project, authorized in 1905 under the 1902 Reclamation Act. Operations are 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 (U.S. Bureau of Reclamation, 1996). Appropriation, use and distribution of water is the responsibility of the Idaho Department of Water Resources. The watermaster for Water District 65 is responsible for coordinating water deliveries and accounting for use of natural and stored water in the system.

Appropriation and use of water by the U.S. Bureau of Reclamation for federal storage facility operation must comply with Idaho water law. Water stored in U.S. Bureau of Reclamation reservoirs have water rights with two components - the right to store and release water, and the right to divert water. Storage rights are associated with the storage facility and are held by the U.S. Bureau of Reclamation for Cascade and Deadwood reservoirs. Reservoir storage rights, along with natural flow rights, are satisfied in order of priority. The diversion rights for irrigation are appurtenant to the land, and are often held by an individual or an entity such as a canal company.

Deadwood and Cascade reservoirs are key components of the Payette River Basin federal storage system. Construction of Deadwood Dam and Reservoir were approved in 1928, and completed in 1931. Cascade Dam and Reservoir were approved in 1935, and completed in 1948. These reservoirs have a total storage capacity of 865,000 acre-feet, and supply water to approximately 120,000 acres of agricultural land (U.S. Bureau of Reclamation, 1996; See Table 52). Deadwood and Cascade are operated as a unified storage system, storing and releasing water to maximize the capability of the reservoirs.

Table 52. **Payette River Basin Federal Storage Reservoirs.**

Reservoir	Total Storage (acre-feet)	Active Storage (acre-feet)	Storage Right Priority Date	Authorized Purpose
Cascade Reservoir	703,200	653,200	12/24/37	irrigation, power
Deadwood Reservoir	162,000	161,900	12/31/26	irrigation, power

Source: U.S. Bureau of Reclamation, 1996.

The primary purpose of the federal storage system is irrigation. Power generation helps operate irrigation facilities at Black Canyon Dam. Flood control operations are based on an informal agreement. Operation of the project for recreation, fish, and wildlife benefits is a secondary objective, as the projects were not originally authorized for these purposes. Operational considerations for fish and wildlife include minimum releases below dams and minimum pools at Cascade and Deadwood reservoirs. Minimum pools were established by administrative decision, entailing 300,000 acre-feet at Cascade Reservoir, of which 250,000 acre-feet is active storage. A minimum pool of 50,000 acre-feet was established for Deadwood Reservoir. These targets may not always be met as the Bureau must meet contractual and other legal responsibilities first.

The amount of water available in the entire Payette River system and the amount of carry-over from the previous year impact the timing and volume of irrigation and flood control releases. Refilling the reservoirs for irrigation is balanced with flood control objectives, usually occurring during the period of April through July. Providing too much flood control space jeopardizes reservoir refill, and placing too much emphasis on reservoir refill jeopardizes flood control operations. The required space needed for flood control storage is determined by rule curves that 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.

Cascade and Deadwood reservoirs provide the only major flood control for the Payette watershed. Flood control operations follow informal agreements, with the objective of limiting flood flows to 12,000 cubic feet per second at Horseshoe Bend (U.S. Bureau of Reclamation, 1996). Cascade Reservoir is assigned 80 percent of the flood control space and Deadwood Reservoir is assigned 20 percent.

Irrigation releases occur as needed between April 1 and October 31, when the natural flow of the river is insufficient to meet irrigation demands. Water demand is determined by weather, crop consumptive use requirements, and cropping patterns. Flow at the Horseshoe Bend gage is typically maintained between 2,000 and 2,600 cubic feet per second to meet downstream irrigation needs (U.S. Bureau of Reclamation, 1996). In the past, Black Canyon Reservoir was managed to minimize fluctuations to less than 0.1 foot of full pool to ensure delivery for diversion canals. Construction of flanges on the drum gates in 1998 will allow the reservoir pool elevation to be raised six inches during the irrigation season, providing more flexibility.

Pool elevation of Cascade Reservoir is held as high as possible to maintain recreation and water quality values. Releases for irrigation demand are made from Deadwood Reservoir first, usually in July and August. This operation also enhances recreational boating on the South Fork Payette. After Labor Day releases from Deadwood Dam are reduced and late season irrigation demand is met by releases from Cascade Dam.

The Lake Reservoir Company operates four reservoirs (Payette Lake, Upper Payette Lake, Granite Lake and Box Lake) in the upper Payette River Basin to provide water supply for irrigation of lands located in the lower valley between Emmett and Payette. These reservoirs provide a total of 35,195 acre-feet of storage. Operations are coordinated with Water District 65 and the U.S. Bureau of Reclamation to manage lake surface elevations according to the conditions of the Lake Reservoir Company's water rights. Conditions for Payette Lake were established as part of an agreement made in 1924 and later decreed by the District Court in 1946 (District Court Valley County, 1946). The Lake Reservoir Company must manage Payette Lake so that the surface elevation does not exceed the normal high water line (7.05 feet as measured at the U.S. Geological Survey gaging station in McCall), or go below the normal low water line (1.51 feet at the gage). Releases of storage water must occur in a manner that does not interfere any more than necessary with the bathing beaches or natural fluctuation of the lake.

During average years the Lake Reservoir Company has raised the water level of the lake in mid-July to the maximum allowed, retaining this level for several days depending on snow depths and storm events (Big Payette Lake Technical Advisory Committee, 1997). As the Company withdraws its storage water, the surface elevation of the lake drops steadily through Labor Day, but remains high enough for general recreation, resort and related use (usually at the 5.00 foot level on the U.S. Geological Survey gage). Early irrigation demand for Payette Lake storage water is met by releases from Cascade Reservoir, later replaced by releases from Payette Lake throughout the season. (The flexibility to use Cascade Reservoir storage and later replace it with Payette Lake storage was not possible until Water District 65 was formed.) After Labor Day, the lake water level is gradually dropped to the minimum level (usually by October 20) to protect the dam from ice damage when the lake freezes.

Power generation is incidental to irrigation and flood control uses of the storage reservoirs. However, Idaho Power Company has a natural flow right at the Cascade Powerplant that is senior to the storage right for Cascade Reservoir, requiring release of natural inflows of up to 200 cubic feet per second at Cascade Dam.

Winter releases from the reservoirs are established early in November based on carryover storage and fall inflow. A minimum winter target release at Deadwood Dam is 50 cubic feet per second, established after new outlet gates were installed in 1990. Average winter releases at Deadwood Dam from 1961 to 1990 were 2 cubic feet per second, and 63 cubic feet per second since 1990 after the gates were installed. The target for winter outflow at Cascade Dam is 200 cubic feet per second, meeting a natural flow water right for Idaho Power Company's Powerplant (U.S. Bureau of Reclamation, 1996). Average winter releases (December - January) at Cascade Dam are 674 cubic feet per second based on a period of record from 1961 to 1990 (U.S. Bureau of Reclamation, 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.

The Water District 65 watermaster uses a water rights accounting system, maintained by the Idaho Department of Water Resources, 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. The watermaster adjusts deliveries according to water demand and availability.

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. The irrigation year for water accounting tracking begins on November 1 and ends October 31.

Space holders have contracts for 370,300 acre-feet of storage in Cascade and Deadwood reservoirs (U.S. Bureau of Reclamation, 1996). This comprises about 45 percent of the total active space in the reservoirs. The remainder of space is assigned to minimum pools, streamflow maintenance, reservoir evaporation and salmon flow augmentation.

Flow Augmentation

The National Marine Fisheries Service is the federal agency responsible for salmon and steelhead recovery under the Endangered Species Act. This agency has committed to make a decision about long-term recovery procedures for Idaho's salmon and steelhead by 1999. In the interim, the preferred federal approach has been to utilize water storage from upriver reservoirs to help flush smolts to the lower Snake River dams, and then transport them in barges and trucks for release below Bonneville Dam on the lower Columbia River (Idaho Department of Fish and Game, 1998). The U.S. Bureau of Reclamation is directed by the 1995 biological opinion issued by the National Marine Fisheries Service to provide 427,000 acre-feet of water from Upper Snake River 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. The Legislature has set out conditions to allow rental of storage water on a temporary basis until January 1, 2000 [Idaho Code 42-1763B].

Water used for salmon flow augmentation in the Payette River Basin has ranged from 145,000 to 155,000 acre-feet annually between 1995 through 1997. Of this, 95,000 acre-feet is obtained from uncontracted space in Cascade and Deadwood reservoirs, and the remainder leased by the U.S. Bureau of Reclamation from willing sellers in Water District 65's rental pool. All flow augmentation water is administered through the rental pool.

Water Rental Pools

In 1979 the Idaho Legislature authorized establishment of water bank and rental pools statewide. The rental pool provides flexibility in the system by allowing irrigators to lease excess storage water. Water Districts 65 and 65K operate the two water rental pools in the Payette River Basin. The Board appointed a committee to operate Water District 65's rental pool in 1990. The Lake Fork Water District (WD 65K) established a rental pool in 1997. The rental pools are administered by the district watermasters under the guidance of local rental pool committees. These committees establish rental rules and the price for rented water. Local water rental pools and leasing prices must be approved by the Board.

The primary purpose of the rental pool is to meet the needs of irrigation water users within the water districts. Irrigators have first priority in Water District 65 until July 1 of each year. After July 1 the remaining unrented stored water is available to other water users and other beneficial uses. Water rented out-of-basin is the last to fill for the following year. The U.S. Bureau of Reclamation has been the largest purchaser of Water District 65 rental pool water, using the water to meet salmon flow augmentation objectives discussed earlier.

The Lake Fork Water District (65K) established a water rental pool in 1997. Rental priorities are similar to Water District 65, except that

priority for irrigators in Water District 65K extends until June 15. No water may be leased below Lake Fork Creek mouth without written consent of the Water District 65 Rental Pool Committee.

IDAHO WATER RESOURCE BOARD PROGRAMS

Minimum Stream Flows and Lake Levels

The Idaho Legislature adopted a minimum stream flow law in 1978, providing for the Board to appropriate water for instream flows or minimum lake levels. Minimum stream flows are instream water rights with priority dates held by the Idaho Water Resource Board in the public interest. Water for minimum stream flows is not diverted and used, as is the case with most other water rights in Idaho. Instead the water remains in the stream or lake to protect fish and wildlife habitat, aquatic life, water quality, or for navigation, transportation, recreation, or aesthetic beauty. Chapter 15, Title 42 of the Idaho Code provides the authority and spells out the procedures the Board must follow.

To acquire a minimum stream flow or lake level water right, the Board files a water right application with the Idaho Department of Water Resources, establishing a priority date. The application describes the stream, amount of water sought, purpose, and location, and other information needed to satisfy the statutory and Department requirements. The Board may hold public meetings before filing the application to gather information and seek public input.

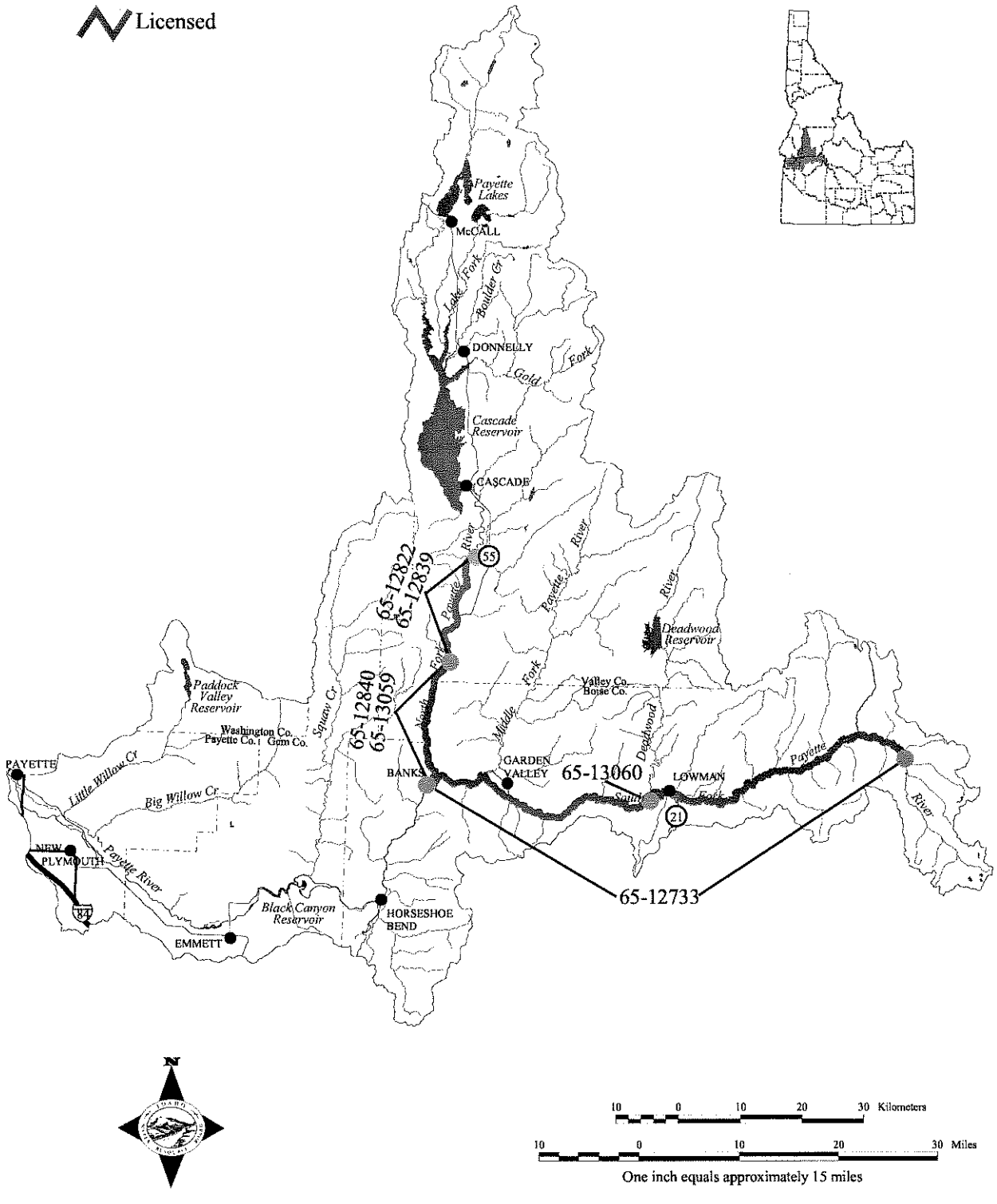
After receiving an application, the Idaho Department of Water Resources conducts a public hearing notifying the public, property owners, and water right holders in the area. Following the public hearing, the Director of the Department of Water Resources issues an order denying or approving the application. All minimum stream flow or minimum lake level water rights approved by the Director must be submitted to the Idaho Legislature for review. The Board, on behalf of the state of Idaho, holds six minimum stream flow water rights for river segments in the Payette River Basin. Map 26 displays and Table 53 lists the current minimum stream flow appropriations in the basin.

The Idaho Legislature declared the preservation of water in certain lakes for scenic beauty, health, and recreation purposes was a beneficial use of water as early as 1925. A statutory appropriation of water in Payette Lake was made in trust for the people of the state of Idaho and issued to the Governor [Idaho Code 67-4301 to 67-4312] (See water right 65-02333 in Table 53).

Water Resource Funding Programs

The Board's Water Resource Funding Programs provide monies to plan, design, construct, improve, and rehabilitate water projects that promote the efficient and effective use of Idaho's water resources. Funding is in the form of grants, low-interest loans, and water resource development revenue bonds administered through one of three programs. Local governments, associations, or non-profit corporations are eligible for funds. For-profit corporations are eligible if the projects are found to be in the public interest. Funding is available for projects or studies associated with community/municipal water supply and delivery systems, wastewater collection and treatment systems, irrigation water supply and delivery systems, aquifer recharge, energy production and energy conservation projects involving water, aquaculture water supply and delivery systems, flood control systems, drainage systems, water-related recreation projects, fish and wildlife enhancement projects, and water quality improvement projects. Projects must be in the public interest, compatible with the *Idaho State Water Plan*, economically and technically feasible, and environmentally acceptable.

Map 26. Existing Minimum Stream Flow Water Rights



y:\payette\arcview\projects\projects2\designat.apr (9/9/98)

Table 53. Minimum Stream Flow and Lake Level Water Rights in the Payette River Basin.

River Reach	Water Right	Priority Date	Flow (Season)
North Fork Payette			
Payette Lake (held by the Governor)	65-02333	3/5/25	25,495 acre-feet
Cabarton Bridge to Smiths Ferry	65-12822	12/17/87	1400 cfs (6/18 - 10/12) 106 cfs (10/13 - 3/15) 500 cfs (3/16 -6/17)
Cabarton Bridge to Smiths Ferry	65-12839	4/5/88	100 cfs (3/16 -6/17) 294 cfs (10/13 - 3/15)
Smiths Ferry to Banks	65-12840	4/5/88	1800 cfs (5/1 - 6/30) 1300 cfs (7/1 - 7/31) 1800 cfs (8/1 - 9/1)
Smiths Ferry to Banks	65-13059	5/1/89	400 cfs (9/2 - 4/30)
South Fork Payette River			
Sawtooth Wilderness boundary to Deadwood River confluence	65-12733a	4/26/85	212 (1/1 - 4/18) 1100 cfs (4/19 -7/15) 212 cfs (7/16 - 12/31)
Deadwood River confluence to upstream end of Oxbow Bend	65-12733b	" "	337 cfs (1/1-4/14) 1100 cfs (4/15-8/31) 337 cfs (9/1-12/31)
Upstream end of Oxbow Bend to NE 1/4,SE 1/4, Sec. 31, T9N, R7E	65-12733c	" "	337 cfs (1/1-4/14) 337 cfs - Mon-Thurs (4/15-8/31) 400 cfs - Fri-Sun (4/15-8/31) 337 cfs (9/1-12/31)
Deadwood River confluence to Middle Fork River confluence	65-12733d	" "	337 cfs (1/1-4/14) 1100 cfs (4/15-8/31) 337 cfs (9/1-12/31)
Middle Fork river confluence to Banks	65-12733e	" "	407 cfs (1/1-4/14) 1350 cfs (4/15-8/31) 407 cfs (9/1-12/31)
Downstream of Deadwood confluence	65-13060	5/16/89	763 cfs - Mon-Thurs (4/15-8/31) 700 cfs - Fri-Sun (4/15-8/31)

More than 400 water development, conservation, and management projects and studies around the state have received financial assistance from the Board; seventeen of these have been in the basin. The majority involved municipal / community water supply projects, with a few irrigation projects. Table 54 summarizes projects in the Payette River Basin receiving financial assistance from the Board. The Board's Water Resource Funding Programs are a potential source of funding for other water development, conservation, and management projects and studies needed in the basin.

Water Supply Bank

The Water Supply Bank, established by Idaho Code 42-1761, allows the Board to purchase, lease, accept as a gift, or otherwise obtain rights to natural flow or stored water, and credit them to the Water Supply Bank. These water rights may then be rented from the bank for other uses as long as there is no injury to other water rights, the use does not constitute an enlargement of the water right, and the use is in the public interest. The Board may appoint local committees, including water district advisory committees, to facilitate the rental of stored water. In the Payette River Basin the Board has appointed local committees in Water District 65 and 65K.

Table 54. Projects Funded by the Idaho Water Resource Board within the Payette River Basin.

Year	Project Sponsor	Project Description	Amount Funded
1982	City of Donnelly	Municipal water system expansion	$50,000 loan
1985	City of Donnelly	Construct municipal well	$3,000 grant
1987	City of Cascade	Municipal water supply alternatives study	$9,000 grant
1988	City of Cascade	Construct municipal well and pipeline	$90,377 loan
1988	Scenic Properties Water Assoc.	Replacement of water storage tank	$15,000 loan
1990	Payette County	Groundwater study	$5,000 grant
1991	City of Payette	Install city park water and sewer lines	$5,000 grant
1991	City of Crouch	Wastewater system design study	$4,414 grant
1991	City of Donnelly	Construct municipal well	$93,508 loan
1992	City of Cascade	Municipal water system improvement study	$5,000 grant / $12,850 loan
1994	Lowman Development Assoc.	New water system feasibility study	$5,000 grant
1995	Boise River 2000 Diversion Upgrade Committee	Diversion structure improvement study	$5,000 grant
1995	City of New Plymouth	Construct dual water system	$5,000 grant
1996	South Lake Water District	Cascade area drinking water study	$3,750 grant
	City of Cascade	" "	$3.750 grant
	Lake Cascade Homeowners Assoc.	" "	$3.750 grant
	West Mountain Water Users Assoc."	"	$3,750 grant
1996	Washoe Irrigation Company	Headgate replacement plans and specifications	$7,400 grant
1996	City of New Plymouth	Water system upgrade plans and specifications	$7,500 grant
1998	Garden Valley Ranchettes Homeowners Assoc.	Construct community well	$5,000 grant/ $55,000 loan

IDAHO DEPARTMENT OF WATER RESOURCES

The Idaho Department of Water Resources oversees many programs to conserve, protect, develop, and use Idaho's water and energy resources. The Department is comprised of three divisions - Water Management, Planning and Policy, and Energy.

The Water Management Division is responsible for implementing programs designed to manage and protect the ground and surface water resources of Idaho. This responsibility entails water rights administration and distribution, including supervision of the state's watermasters. Ground water protection activities include the licensing of well drillers, regulation of well construction, and oversight of underground injection wells. The Division inspects dams on a regular basis to insure dam safety. Floodplain management activities include coordination of the National Flood Insurance Program and assistance in planning for floods. The Division reviews and permits stream channel alteration activities.

The Planning and Policy Division provides technical data and information in support of the Department's water administration, management, and regulation responsibilities. The extent, nature and location of the state's surface and ground water resources are tracked using a number of tools including gaging stations, geographic information systems, hydrologic studies, and ground water quality studies. Another Division function includes review and evaluation of water resource issues, concerns, and opportunities raised by federal, state and private entities. Technical assistance is also provided to the Idaho Water Resource Board, including preparing comprehensive state water plans.

The Energy Division is responsible for implementing energy conservation programs, and providing technical assistance in high-efficiency technologies and renewable resource generation systems. The Division provides these services to energy consumers, producers, and policy makers.

OTHER PLANNING ACTIVITIES AND AUTHORITIES

Idaho Division of Environmental Quality and Water Quality Management Plans

The Idaho Division of Environmental Quality maintains and enforces water quality standards. The Division may provide funds to soil and water conservation districts to assist in water quality plans, and for cost-sharing with farmers who apply Best Management Practices (BMPs).

The Idaho Division of Environmental Quality has identified stream reaches in the Payette River Basin that are water quality limited (all beneficial uses are not being met) pursuant to Section 303(d) of the Clean Water Act (See Table 23, page 79). This designation requires development of Total Maximum Daily Load (TMDL) standards to control point and nonpoint pollution sources. Reaches are prioritized for development of Total Maximum Daily Loads based on risks. Most reaches in the Payette River Basin 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. Cascade Reservoir and the Payette River below Black Canyon Dam were assigned a high priority.

In 1995 the Idaho Legislature adopted water quality statutes to respond to 303(d) 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 Idaho Division of

Environmental Quality regarding water quality standards and monitoring, pollution budgets, and prioritization of impaired waters. Watershed advisory groups (WAGs) develop and implement watershed action plans to fulfill the Total Maximum Daily Load requirement. The Southwest Idaho Basin Advisory Group covers the Payette River Basin. Four watershed advisory groups operate in the basin. The activities of each are summarized below.

Big Payette Lake Water Quality Council

The Big Payette Lake Water Quality Council was authorized by the Legislature in 1993 to study the condition of Payette Lake and its watershed, and prepare a lake management plan. The Council developed the *Big Payette Lake Management Plan* that was adopted by the Legislature in 1998 (Big Payette Lake Water Quality Council, 1998). The Idaho Division of Environmental Quality coordinated studies and assembled the associated reports. The U.S. Geological Survey performed lake studies. A Technical Advisory Committee provided oversight of the studies.

The plan establishes water quality objectives for dissolved oxygen, total phosphorus, and chlorophyll-A based upon findings in the *Technical Report on the Water Quality of Big Payette Lake* (Big Payette Lake Technical Advisory Committee, 1997). The lake management plan also recommends voluntary actions to protect the lake and its watershed. The plan directs that rules and regulations may be required if monitoring indicates water quality objectives are not met through voluntary action. Recommendations address the following activities: timber harvest, mining, grazing, recreation, road construction and maintenance, stormwater management, commercial and residential development, utility installation, swimming pools, boat and dock use, and lawn and garden development.

The plan identifies the area encompassing the northern shore of Payette Lake and the North Fork Payette River corridor almost to its headwaters as the North Fork Payette Water Quality Corridor. This area is accorded special protection, because corridor activities adversely impact water quality in Payette Lake. The Board is requested to designate the North Fork Payette River from headwaters to Payette Lake inlet as a recreational river, and to obtain an instream flow water right for the North Fork Payette below Upper Payette Lake.

Cascade Reservoir Watershed Advisory Group

The Cascade Reservoir Coordinating Council functions as a watershed advisory group in the development and implementation of a Cascade Reservoir watershed management plan. A technical advisory committee and various work groups provide assistance to the watershed advisory group. The technical advisory committee reviews proposed projects to ensure they are consistent with phosphorus reduction goals, and follow scientifically acceptable procedures. Work groups were formed to prepare source plans for each designated nonpoint source category - forestry, agriculture, and urban/suburban.

The overall goal of the watershed management plan is to restore and maintain water quality in Cascade Reservoir and its tributaries so that designated beneficial uses are protected. A major focus and primary goal is to reduce total phosphorus loads into the reservoir by 37 percent (Idaho Division of Environmental Quality, 1998). To achieve the goals and objectives of the watershed management plan, the Idaho Division of Environmental Quality will rely on existing authorities and voluntary implementation of phosphorus reduction measures.

The watershed management plan for the Cascade Reservoir consists of three phases. Phase I established initial nutrient reduction goals and implementation strategies, and was approved in May 1996. Phase II contains further evaluation of phosphorus reduction goals and alternatives, and was submitted to the Environmental Protection Agency in December 1998. Phase III will consist of a plan evaluation and monitoring summary to determine if modification to management practices is necessary to attain water quality goals within the reservoir. An implementation plan, outlining projects that have been and will be initiated to effect required water-quality improvements within the reservoir, will be completed within eighteen months of the submission of the Phase II document (~ June 2000). Phase III is planned for completion by the year 2003.

Lower Payette Watershed Advisory Group

A total maximum daily load plan for the lower Payette River encompasses the reach below Black Canyon Dam to its mouth. A draft subbasin assessment identifying problem areas was undergoing public review in February 1999. A final total maximum daily load plan must be submitted to the Environmental Protection Agency by the end of December 1999. An implementation plan will be prepared eighteen months after the total maximum daily load plan is adopted.

Southwest Basin Native Fish Watershed Advisory Group

In mid-1996 Governor Batt and the state of Idaho issued an official conservation plan for bull trout recovery, hoping to prevent federal listing of the species under the Endangered Species Act (Batt, 1996). The bull trout was listed as threatened by the U.S. Fish and Wildlife Service in 1998. Despite the listing, the state is committed to continuing implementation of the *State of Idaho Bull Trout Conservation Plan* (Batt, 1996).

The mission of this plan is to maintain and/or restore complex interacting groups of bull trout populations throughout their native range in Idaho through the following goals: maintain the condition of areas that currently support bull trout; institute recovery strategies that produce measurable improvement in status, abundance, and habitats of bull trout; establish a secure, well-distributed set of sub-watersheds within key watersheds to achieve stable or increasing populations and to maintain options for future recovery; and achieve these goals while maintaining the economic viability of Idaho's industries.

The bull trout conservation plan identified five key watersheds in the Payette River Basin depicted on Map 20 (page 109). Key watersheds are those areas designated as critical to the long-term persistence of regionally important bull trout populations. Watershed specific plans for each key watershed are developed using the basin advisory group and watershed advisory group framework. Technical advisory teams assist the watershed advisory groups, providing the scientific framework for the plans.

The Southwest Basin Native Fish Watershed Advisory Group is currently preparing a problem assessment for key watersheds in the Payette River Basin. This Phase I document consists of a problem assessment and protection measures implementation, and is expected to be completed in 1999. Phase II will consist of development and implementation of a conservation and monitoring plan.

Idaho Department of Fish and Game Fisheries Management Plan

The Idaho Department of Fish and Game is mandated to preserve, protect, perpetuate, and manage the fish and wildlife resources of Idaho. The

Department's Fisheries Management Plan (1996-2000) describes the Department's direction in pursuing improvement of fish populations and angling opportunities in the basin. These include providing a diversity of angling opportunities; maintaining riparian and floodplain values; and maintaining the lake trout fishery in Payette Lake. Another plan objective is to secure fish and wildlife maintenance flows on the North Fork Payette above and below Payette Lake and Lake Fork below Little Payette Lake. The Idaho Department of Fish and Game has the capability to conduct technical studies to provide the Board information in applying for minimum stream flows.

Soil and Water Conservation Districts

Soil and water conservation districts are a subunit 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 the U.S. 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.

Irrigation Diversion Studies and Improvements

Two studies have examined the potential to improve irrigation diversions and water management in the basin. One study examined diversions in the Cascade Reservoir watershed, with the purpose of preparing an irrigation management plan (Natural Resources Consulting Engineers, Inc., 1996). The study evaluated life expectancy, current condition, and performance of diversion structures and conveyance systems. Engineering improvements and modifications were recommended.

The study concluded that the majority of sites performed adequately, but lack of water control and flow measurement on some delivery systems made development of an irrigation management plan difficult. Recommendations for improvement in these areas included installation of calibrated gates and checks, and placement or construction of measurement devices to improve water quality and instream flow. Some of these recommendations have already been implemented. Remaining recommendations for specific diversions are listed in Table 55.

An inventory of irrigation diversion structures in the Boise and lower Payette was conducted in 1996 (Quadrant Consulting, Inc., et al., 1997). The study included thirteen diversions on the Payette River below Black Canyon Dam. The inventory included interviews with operators to determine if consolidation was possible, and a visual assessment of safety for river recreationists. Recommendations for some diversions were made and are contained in Table 56. Task 2 of the study collected additional information for three Payette River diversions. This inventory looked at river health, safety, and floodway impacts.

Water District 65 has made a substantial investment in funding and providing technical support and training to improve water measurement, water right accounting, and water management. Table 57 summarizes these actions. The Water District plans to continue automating and installing

Table 55. Recommendations for Cascade Reservoir Watershed Diversions.

Diversion	Study Recommendations
Lake Fork Watershed	
Westside Lake Fork Ditch	Catch point: Install weir flow measurement device, inlet box should be raised to mitigate backwater problems Replace corroding 24" steel outlet pipes with PVC; Cipolletti weir blade needs sharpened or replaced; scheduled maintenance and program to clear vegetation and other obstructions
Lake Irrigation District Canal	Install a measuring device - a ramp flume structure suggested
Spink-Barker Ditch	Replace diversion with more permanent structure; requires headwall and attachment to corrugated metal pipe; install stage recorder and stilling well with stage recording equipment at weir
Ditch F	Install 24" slide gate on ditch with a check structure; install small ramp flume structure; invert at head should be lowered slightly
Pump F	Install flow meter
Mud Creek Watershed	
Ditch B	Install 36" headgate structure at diversion and replace existing culvert; install 36" headgate at wasteway with turnout to farm ditch; install ramp flume structure with staff gage at both; replace check structure in creek
Ditch C	Install 36" headgate structure at the diversion point and replace existing culvert; install 36" headgate structure at wasteway with turnout to farm ditch; install ramp flume structure and staff gage at both; replace check structure serving farm ditch
Ditch D	Install 12" headgate structure; install weir flow measurement device on headgate; can remove check/waste box; install fencing to keep livestock out
Ditch L	Replace 60" corrugated metal pipe with 2 -36" gated culverts and bulkheads; install ramp flume structure and staff gate
Stock Pond B	Remove structure as it has been abandoned
Boulder Creek	
Pump B	Clean or replace trash rack; install flow meter for each pipe
Stock Pond D/ Ditch A	Install staff gage and 3' Cipolletti weir structure; rehabilitate eroded rock chute spillway with concrete design; clear head of spillway
Upper Jug Reservoir	Clear dead timber from reservoir
Ditch K	Install riprap bank protection, sharpen or replace weir blade
Gold Fork	
Pump C	Replace sediment diversion dam with more permanent structure; install flow meter; clean oil and diesel fuel contaminated area
Pump D	Replace sediment diversion dam with more permanent structure; install flow meter on pump
Center/Gold Fork Canal	Install Cipolletti weir in canal above Gold Fork flume crossing; reconstruct north wingwall at diversion; repair several canal sections
Ditch E	Install 12" gated turnout; install staff gage and 2.5' Cipolletti weir or flume structure; require new outlet facility
Ditch G	Install 36" gate and headwall structure; install 6' Cipolletti weir structure; extend ditch to river; install wasteway structure at confluence with side channel
Ditch H	Install 15" gate and headwall structure; install 2.5' Cipolletti weir or flume and staff gage
Ditch I	Install Cipolletti weir and gage staff; install headwall; install 4" Cipolletti weir o flume structure and staff gage; recommend regular clearing
Stock Pond C	Install flume structure in farm ditch and staff gage; raise contour ditch around meadow; install drop structure in wasteway
Willow Creek	
Diversion 701	Install flow meter
Diversion 702	Install 15" gate and headworks structure; install 1" Cipolletti weir

Sources: Natural Resources Consulting Engineers, Inc., 1996

Table 56. Lower Payette Diversion Recommendations.

Diversion	Recommendations
Bilbrey Enterprise Diversion	Signage to inform recreationists about diversion
Boise Cascade- Emmett	Construction of a permanent structure proposed
Eagle Island Diversion	Signage to inform recreationists about diversion
Farmers Cooperative Diversion	Possibility of additional signage upstream to inform recreationists
Last Chance Diversion	Culverts installed for Plaza Road are undersized, eventually county will replace with clear span structure, might want to consider Parshnall measuring flume; signage to inform recreationists of diversion dam and portage route
Lower Payette Diversion	Possible consolidation with Simplot pumps; signage to inform recreationists of diversion and possible portage
Seven Mile Slough Diversion	*Possibility of improving diversion to make the structure more permanent; install trash rack in* front of headworks for safety; signage to inform recreationists about diversion and possible portage
Washoe Diversion	Headgate may need rebuilt; repair needed to check structure; signage to inform recreationists about diversion and recommending portage route
Acord Diversion	Possible permanent structure

Source: Quadrant Consulting, Inc., et al., 1997.

Table 57. Water District 65 Water Delivery System Improvements.

Year	Participant	Improvement
1995	Lower Payette Ditch Company	Installed broad-crested weir measuring device
1996	Water District 65	Funding partner in the Boise-Payette Rivers Diversion Upgrade Project
1996	Boise Cascade Corp./Smith Ditch	Installed measuring device
1997	Last Chance Ditch Company	Irrigation return flow reuse flume
1997	Farmers Co-op Irrigation Company	Automated headgates at river
1997	Farmers Co-op Irrigation Company	Automated spillway at Patton Point
1997	Lower Payette Ditch Company	Remote telemetry at measuring device
1997	Lake Reservoir Company	Automated radial gates at Lardo Dam
1997	Noble Ditch Company	Automated ramp flume at diversion
1997	Reed Ditch Company	Automated ramp flume at diversion
1997	Emmett Irrigation District	Headgate improvements
1998	Water District 65	Funding partner with U.S. Bureau of Reclamation to raise Black Canyon Reservoir 6 inches to improve irrigation delivery
1998	Farmers Co-op Irrigation Company	Two spillways automated, automated delivery of one lateral, telemetered reading from a lateral delivery.
1998	Enterprise Ditch Company	Automated ramp flume at diversion
1998	Black Canyon Irrigation District	Automate headgate at Black Canyon Dam diversion, automated a lateral delivery
1998	Emmett Irrigation District	Automate hydro pumps at Black Canyon Dam and telemetry
1999	Seven Mile Slough	A number of projects to automate deliveries and improve return flow reuse and storage delivery efficiencies

Source: Limbaugh, 1998

telemetry metering on its diversions (Limbaugh, 1998). In 1999 the Water District will take a number of actions to automate the Seven Mile Slough to more efficiently manage water storage and natural flow deliveries, irrigation return flows, and improve water measurement.

Idaho Department of Parks and Recreation

The Idaho Department of Parks and Recreation was established by the Idaho Legislature in 1965. The Department was directed to prepare and implement long-range comprehensive plans and programs for acquisition, planning, protection, operation, maintenance, development and wise use of areas of scenic beauty, recreational utility, historic, archaeological, or scientific interest, and acquire lands and water for these purposes. The Department provides and enhances recreation opportunities in the basin through its planning and administration activities.

The Department of Parks and Recreation guides the development and implementation of the Statewide Comprehensive Outdoor Recreation Plan. The current plan, *1996 Idaho Statewide Comprehensive Outdoor Recreation and Tourism Planning: Assessment and Policy Plan,* was updated in 1998 (Idaho Department of Parks and Recreation, 1998). This plan was developed under the direction of a task force comprised of government, non-government, organizations, and private sector businesses. The plan provides an assessment of outdoor recreation and tourism in the state, and a policy plan that outlines goals and strategies to guide coordinated efforts for high quality recreation and tourism opportunities. Goals contained in this plan most relevant to the comprehensive state water plan include: promoting and maintaining high quality fish and wildlife recreation opportunities; maintaining a diversity of water-based recreation opportunities; and protecting and enhancing landscapes, scenery, and visual resources.

The State Boating Program was established to improve boating safety, adopt boating safety standards, and promote development and recreational use of the waterways for watercraft. Activities engaged in include statewide boater education and information, marine law enforcement training, public access facility funding, and licensing of motorboats and sailboats. The program administers three accounts funded by boating registration fees or surcharges on state gasoline taxes. The majority of monies are transferred to the counties and used to fund recreational boating facilities and services.

The Department manages two state parks in the basin - Ponderosa State Park on Payette Lake and Lake Cascade State Park located on Cascade Reservoir. Additionally, through funding programs mentioned above and data collection and database management activities, the Department has been instrumental in helping recreation managers provide facilities and obtain information to aid resource management.

County Comprehensive Land Use Plans

Maintaining the social and resource components that comprise the quality of life is largely dependent on the direction and character of future development. Counties and communities have a major influence through their planning and zoning decisions. Portions of four counties are located in the basin -- Boise, Gem, Payette and Valley 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 uses and activities in the county, which are then implemented through the ordinances.

Valley County

Valley County is currently updating its comprehensive plan, originally adopted in 1978. It is hoped that the plan will be adopted by the end of

1998. Goals and policies contained in the draft plan include accommodating population growth while maintaining the rural character; monitoring water supplies to ensure water carrying capacity is not exceeded; maintaining surface and ground water quality; preserving open space and critically important riparian areas adjacent to waterways; maintaining the recreational value of waterways; encouraging improved irrigation water management practices to protect water quality; preserving and protecting fish and wildlife resources; prohibiting or controlling construction in the floodplains; recognizing waterways as special areas; preparing an area plan for the North Fork Payette River corridor; protecting greenways along watercourses; maintaining the role of agriculture; developing a county-wide recreation master plan; protecting the continued function of irrigation systems through new developed areas; and facilitating conversion from septic systems to sewers (Valley County Commissioners, 1998).

Boise County

The current Boise County comprehensive plan was adopted in 1994. The plan contains goals and policy statements covering thirteen elements, including economic development, land use, natural resources and hazardous areas, recreation, and community design. Goals most relevant to the comprehensive state water plan include maintaining the "livability" of the rural lifestyle; encouraging guidelines and design techniques for development in proximity to water resources; supporting coordination and cooperation between federal, state and county agencies for multiple use of open and natural spaces on publicly managed land; encouraging a high quality environment; preventing loss of agricultural, timber and range lands; encouraging high quality standards to protect ground and surface water; providing review of proposed subdivisions to ensure adequate water availability; promoting multiple use of streams and rivers; protecting floodplains; promoting the economic potential of rivers; and encouraging a variety of recreation activities for all segments of the public (Board of Boise County Commissioners, 1994). The Boise County comprehensive plan is currently being revised and updated.

Gem County

Gem County and Emmett completed a joint comprehensive plan in 1995. Goals and policies relevant to the Payette River Basin Plan include identification of the Payette River as a critical concern; protection of agricultural lands; protection of ground and surface water quality by reviewing development in these areas; encourage the "working river" status of the Payette River; discourage development that impacts agricultural or natural resource operations; encourage and support expansion of recreation programs at Black Canyon Dam and in the Payette River corridor; establish or maintain greenbelt and access to the Payette River and other waterways; acquire islands in the Payette River for public recreation use; preserve scenic values of the Payette River corridor, Squaw Creek and other watercourse corridors; identify areas with physical development constraints such as floodplains; utilize the Division of Environmental Quality's Idaho Wellhead Protection Plan; manage and prevent unsuitable uses along waterways for water quality protection; promote expanding Black Canyon power generation capabilities; and promote energy efficient building construction (Emmett City Council and Gem County Commissioners, 1995).

Payette County

Payette County originally adopted a comprehensive plan in 1979, most recently updating it in 1997. The plan contains goals and objectives for agriculture, residential, recreation, commercial, industrial, floodplains and hazardous areas,

community facilities, special areas, and transportation. Goals and objectives most relevant to issues identified during the Board's comprehensive state water planning process include: protect and promote agricultural assets and economy; encourage adequate drinking water and waste disposal facilities for residential development; encourage river bank greenbelts along the Payette River; and limit development in areas susceptible to flooding (Payette County Planning and Zoning Commission, 1997).

Interpretation and implementation of these goals and objectives will determine how land use will impact the future character and resource values in the basin. Local citizens must continue to actively participate in hearings and make known their desires to county commissioners just as they have in helping the Idaho Water Resource Board develop this plan.

U.S. Bureau of Reclamation

The Payette River Basin is within the Pacific Northwest Regional boundaries of the U.S. Bureau of Reclamation which is charged with managing, developing, and protecting water and related resources. The U.S. Bureau of Reclamation's main activity in the basin has encompassed the development and management of storage to provide supplemental water supplies. Several storage reservoirs and projects in the basin were developed for this purpose, including Cascade Reservoir, Deadwood Reservoir and the Black Canyon project. Operation of these projects was described earlier in this chapter. Project development occurred when the Bureau's main mission was water development. This mission has expanded to include a focus on water and related resources management.

Resource Management Plans

Resource management plans address the management of water and land surfaces, including protection of natural, recreational, archaeological, historical, and other resources. The 1991 Resource Management Plan for Cascade Reservoir is currently being updated and is scheduled for completion in 2001. Preparation of the first Resource Management Plan for the Black Canyon / Montour project will begin in the year 2001and be completed in 2003. Both processes are under the direction of the U.S. Bureau of Reclamation's Snake River Area office in Boise, and will involve numerous opportunities for people to participate in the development of the plans.

Snake River Resource Review

The U.S. Bureau of Reclamation is currently conducting a comprehensive review of its operations and the resources in the Snake River Basin above Brownlee Dam, known as the Snake River Resources Review. 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 Payette River Basin with other agencies.

The National Marine Fisheries Service has established a Process for Analyzing and Testing Hypotheses (PATH) for salmon recovery efforts. This group has requested that flow augmentation for an additional one million acre-feet of Idaho water be considered as one of the long-term alternatives for salmon protection in the U.S. Army Corps of Engineers' Juvenile Fish Migration Study. The Army Corps of Engineers asked the U.S. Bureau of Reclamation to evaluate this alternative. The Bureau is utilizing the resources and data developed during the Snake River Resources Review process to assist

in the one million acre-feet analysis. The analysis assesses the impacts of using additional water from Idaho, including Payette River Basin water, for flow augmentation and will serve as a pilot for the decision support system.

U.S. Forest Service

The Boise, Payette and Sawtooth national forests manage almost 50 percent of the lands in the Payette River Basin. The most recent forest plans for the Boise and Payette national forest were completed in 1990 and 1988, respectively. The Sawtooth National Forest completed its last plan in 1987. These forests are in the process of revising forest plans. The forest plan revision will guide all natural resource management activities, and establish management standards, guidelines and prescriptions over the next ten to fifteen years.

U.S. Bureau of Land Management

Resource Management Plan

The Cascade Resource Management Plan guides the management of public lands in the Payette River Basin (U.S. Bureau of Land Management, 1987). The Plan's goal is to provide an optimum mix of protection and enhancement of the natural environment, and commodity resource use. Resource management guidelines relevant to the Board's plan include maintaining, improving, protecting and restoring watershed conditions and water quality; constructing facilities and structures for water sources; and managing activities in the floodplains to restore or maintain their natural functions. A 100-foot riparian buffer zone was established along river corridors that prohibits road construction, timber harvest, gravel extraction, and application of pesticides and herbicides. A 500-foot riparian buffer was established that prohibits oil and gas exploration, and agriculture and mining activities that would contribute sediment or chemicals. The plan supports maintaining state recommended instream flows. Nineteen thousand acres along the Payette River Corridor are designated as a Special Recreation Management Area. Eight miles of the South Fork Payette River are found eligible for further study as a wild and scenic river (See Table 58).

Payette River Recreation Area Management Plan

A recreation management plan for 19,000 acres of public land along the North Fork, South Fork, Middle Fork, and main Payette rivers was completed in 1994 (U.S. Bureau of Land Management, 1994). The plan developed a management strategy to address recreation demand, user safety, and protection of natural resources. The plan makes recommendations for facility development and protection of natural resources.

Federal Wild and Scenic River Studies

The federal 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 Boise National Forest and Lower Snake District Bureau of Land Management have conducted wild and scenic river eligibility studies for reaches in the Payette River Basin. This analysis identified free-flowing river or stream reaches with "outstandingly remarkable" geologic, scenic, recreational, fish, wildlife, historic, and/or cultural values. The results of the eligibility findings are summarized in Table 58.

Three national forests occur within the Payette River Basin - Boise, Payette and Sawtooth. As part of the forest plan revision, the national forests will be reviewing the eligibility analysis

Table 58. Eligible Wild and Scenic Reaches in the Payette River Basin.

Reach	Location	Potential Classification
Boise National Forest		
North Fork Payette River	Forest boundary to forest boundary	recreational
South Fork Payette River	Forest boundary to Long Gulch	recreational
	Long Gulch to Pine Flat Creek	scenic
	Pine Flat Creek to Wolf Creek	recreational
	Wolf Creek to Forest boundary	scenic
Deadwood River	Headwaters to Deadwood Reservoir	recreational
	Deadwood Reservoir to Warm Springs Creek	scenic
	Warm Springs Creek to Pine Creek	wild
	Pine Creek to South Fork Payette confluence	scenic
Middle Fork Payette River	Railroad Bridge Pass to Middle Fork Bridge	recreational
	Middle Fork Bridge to Boiling Springs	wild
	Boiling Springs to Forest boundary	recreational
Lower Snake River District Bureau of Land Management		
South Fork Payette	Alder Creek to Banks	recreational

Sources: U.S. Forest Service, Boise National Forest, 1990; U.S. Bureau of Land Management, 1987.

conducted for previous plans. This may result in additions or removal of eligible reaches listed in Table 58. The Lower Snake District Bureau of Land Management needs to complete eligibility for tributaries to the Payette River system (Hagdorn, 1998).

Reaches found eligible are managed to preserve those values contributing to eligibility. The agencies need to complete a suitability study prior to recommending designation of eligible reaches as wild and scenic. Congressional approval is also needed for a river to become part of the National Wild and Scenic River System. The national forests do not intend to complete suitability studies until after forest plan revisions are completed. The Lower Snake District Bureau of Land Management will conduct suitability studies cooperatively with the Forest Service, pending future funding from Congress (Hagdorn, 1998). The Board supports the Forest Service and Bureau of Land Management working within the state planning process rather than pursuing federal protection of waters within the Payette River Basin.

Federal Emergency Management Agency

The Federal Emergency Management Agency administers the National Flood Insurance Program, established in 1968. The program provides flood insurance to property owners residing in communities and counties that participate in the program. Participation requires adoption of floodplain ordinances that contain minimum standards identified by the Federal Emergency Management Agency. All basin communities and counties, with the exception of Crouch, participate in this program.

Additional flood management opportunities are available through this agency. The Community Rating System program recognizes community efforts that go beyond the minimum floodplain

ordinance standards. Credit points are assigned for each additional activity. Based on the total number of points earned, a community is assigned to one of ten classes. Flood insurance premium discounts, ranging from 5 to 45 percent, are based on the rate class the community achieves.

Goals and Objectives

The statute provides some guiding criteria for the Board in developing a comprehensive state water plan. These are found at Idaho Code 42-1734A and include:

1. Existing rights, established duties, and the relative priorities of water established in the Idaho Constitution will be protected and preserved.
2. Optimum economic development in the interest of and for the benefit of the state as a whole will 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 will be preserved and protected.
4. Minimum stream flows for aquatic life, recreation, aesthetics, water quality, and the protection and preservation of waterways will be fostered and encouraged. Consideration will be given to the development and protection of water recreation facilities.
5. Watershed conservation practices consistent with sound engineering and economic principles will be encouraged.

Additional goals and objectives contained in the Payette River Basin Comprehensive State Water Plan reflect local concerns, current and future uses of water, and the resource values of the basin.

Discussions about priority issues by the Payette River Citizens Group identified some general wants and needs, or desired outcomes, falling into ten categories. Goals were developed to address these desires. Goals are general statements about citizens' desired future for the basin. The Payette River Citizens Group developed, discussed, and reviewed goals at workshops conducted in May and June 1998. The following lists the goals developed and supported by the Citizens Group for each issue category.

State Protected Rivers Designations

1. Recognize and maintain the outstanding fish and wildlife, aesthetic, recreation, and geologic values of waterways in the Payette River Basin.

Water Allocation

2. Work toward cooperation among all water users for optimum use of the Payette River Basin's water resources.
3. Maintain flexibility when providing water for different uses to address changing demands, while recognizing existing water rights and contracts in accordance with state law.
4. Support the management of the water delivery system to meet irrigation water rights and contracts, and other objectives such as water quality, flood management, private property, fisheries, wildlife, energy, and recreation needs.

Water Storage and Delivery

5. Improve the efficiency of surface water delivery systems where cost effective and beneficial.
6. Identify and protect potential water storage opportunities in the basin for the purposes of municipal water supply, irrigation, and flood management.

Municipal Water Supply

7. Maintain or develop an adequate supply of good quality water to meet present and future municipal needs.

Water Quality

8. Maintain, improve, and protect water quality of all surface and ground water within the Payette River Basin.

9. Improve coordination between the Idaho Division of Environmental Quality, Idaho Department of Water Resources, Health Districts, and local governments to manage, maintain, or enhance basin water quality.

Flood Management

10. Minimize potential flood damage by managing riparian zones and open space along streams and rivers.

11. Repair damage from the 1997 flood.

12. Improve maintenance and management of the levee system along the Payette River from Horseshoe Bend to its mouth.

13. Update floodplain mapping in the Payette River Basin.

Resource Development

14. Recognize and consider the importance of industrial resources in the basin, such as timber, minerals and agriculture, in maintaining a viable economy.

15. Consider the economic feasibility of hydropower projects that maintain or enhance environmental quality, and provide economic benefits to the basin.

16. Encourage energy conservation and development of hydropower at existing structures where feasible.

Fisheries

17. Improve the quality of fisheries in the basin.

Agency Planning and Coordination

18. Improve the efficiency of the permitting process for stream channel alterations, particularly during emergencies.

19. Encourage or improve coordination among the agencies, private landowners and public in managing the resources in the Payette River Basin.

Recreation

20. Recognize and consider the positive economic and social values of recreation and tourism in the basin.

21. Maintain the diversity and quality of recreation opportunities on the Payette River system.

22. Minimize water-related recreation user impacts in the basin, such as environmental damage, adverse social impacts, and the cost of public services, while maintaining aesthetic, recreational and environmental qualities.

Strategies

The Payette River Citizens Group prioritized and defined specific problems, issues, and concerns, resulting in thirty-five problem statements. The Citizens Group and other members of the public suggested strategies to respond to the issues and concerns identified, and achieve the goals. Strategies are proposed actions, recommendations, or policies that would accomplish the desired goals. More than 350 were identified during this process. These represent the alternatives considered for the Payette River Basin Comprehensive State Water Plan and are contained in Appendix B.

The Citizens Group reviewed the alternative strategies, identifying those they could not support. Strategies acceptable to everyone became recommendations to be submitted to the Board. Strategies lacking group agreement were discussed further, in an attempt to achieve consent by proposing word changes or modified strategies. If all participants could live with these proposals, they were also submitted to the Board as Citizens Group recommendations. The recommendations supported by the Board are contained in the *Actions and Recommendations* section that follows.

REFERENCES

Abramovich, R., M. Molnau, and K. Craine. 1988. Climates of Idaho. Moscow, ID: University of Idaho Cooperative Extension Service, College of Agriculture.

Allen, D.B., S.P. Yundt, and B.J. Flatter. 1995a. Population of Bull Trout (*Salvelinus confluentus)* in the Payette River Drainage in the Cascade Resource Area of the Boise District of the Bureau of Land Management. Tech. Bulletin No. 95-10. Idaho BLM.

Allen, D.B., S.P. Yundt, and B.J. Flatter. 1995b. Regional Fisheries Investigations. Project F-71-R-19. Idaho Department of Fish and Game.

Allen, D.B., S.P. Yundt, and B.J. Flatter. 1996. Regional Fisheries Management Investigations. Project -71-R-18. Idaho Department of Fish and Game.

Amaral, G. 1990. *Idaho The Whitewater State: A Guidebook.* Boise, ID: Watershed Books.

Ames, K.M. 1982. Archaeological Investigations in the Payette River Drainage, Southwestern Idaho. Archaeological Reports No. 11. Boise, ID: Boise State University.

Anderson, D., Regional Fisheries Manager, Idaho Department of Fish And Game. 1996, 1997, and 1998. Personal Communications.

Anderson, D., D. Scully, J. Hall-Griswold, and B. Arnsberg. 1987. Regional Fisheries Management Investigations. Project F-71-R11. Idaho Department of Fish and Game.

Apperson, K. A. 1998. Instream Flow Study and Recommendation for Minimum Summer Discharge in the Upper North Payette River. Excerpted from Technical Report on the Water Quality of Big Payette Lake: An Integrated Watershed and Lake Assessment.

Arnold, Q. M. 1984. Prehistory of Long Valley, Idaho. Cultural Resource Report No. 10. Ogden, UT: USDA Forest Service.

Batt, P. E. 1996. State of Idaho Bull Trout Conservation Plan. Boise, ID: Office of the Governor.

Beck, L., Registrar for Payette Whitewater Roundup and National Competition. 1997. Personal Communication.

Big Payette Lake Technical Advisory Committee. 1997. Technical Report on the Water Quality of Big Payette Lake: An Integrated Watershed and Lake Assessment. Submitted to Big Payette Lake Water Quality Council. Boise, ID: Idaho Division of Environmental Quality.

Big Payette Lake Water Quality Council. 1998. Big Payette Lake Management Plan. Prepared under the guidance of the Idaho Division of Environmental Quality.

Board of Boise County Commissioners. 1994. Boise County Comprehensive Plan.

Boise Cascade Corporation. 1996. Gold Fork Watershed Assessment Report.

Boone, L. 1988. *Idaho Place Names: A Geographical Dictionary.* Moscow, ID: The University of Idaho Press.

Boyles, J., Idaho Power Company. 1997. Personal Communication.

Brennon, T., Hydrologic Technician, U. S. Geological Survey. 1997. Personal Communication.

Brevig, R., Records Clerk, Idaho Tax Commission. 1997. Personal Communication.

Brunner, C. 1995. Blackwell Post-fire Landscape Assessment. Working Draft. McCall, ID: Payette National Forest.

Buchanan, K., Horseshoe Bend Hydroelectric Company. 1997. Personal Communication.

California Department of Fish and Game. 1994. Final Environmental Impact Report - Adoption of Regulations for Suction Dredge Mining.

Campbell, J., City of Fruitland. 1997. Personal Communication.

Church, J., Corporate Economist, Idaho Power Company. 1997. Personal Communication.

Clark, C., Forester, Payette Lakes Supervisory Area, Idaho Department of Lands. 1997. Personal Communication.

Cochnauer, T., and N. R. Hoyt. 1979. River and Stream Investigations. Project No. F-73-R-1, Study I. Idaho Department of Fish and Game.

Colbert, J. L. 1996. Review of Waterpower Classifications, Payette River Basin, Idaho. Open File Report 66-16. Portland, OR: Conservation Division, Geological Survey, U. S. Department of Interior.

Coleman, P., Chief Deputy Clerk, Boise County. 1998. Personal Communication.

Cook, E. F. 1957. Radioactive Materials in Idaho. Mineral Resources Report No.8. Moscow, ID: Idaho Bureau of Mines and Geology.

Cook, J., Motorized Trails Coordinator, Idaho Parks and Recreation. 1997. Personal Communication.

Corless, H. 1990. *The Weiser Indians: Shoshoni Peacemakers.* Salt Lake City, UT: University of Utah Press.

Coyle, D., Park Manager, Ponderosa State Park, Idaho Department of Parks and Recreation. 1997. Personal Communication.

Cropp, J., Cascade Ranger District, Boise National Forest. 1997. Personal Communication.

Crockett, J., Hydrogeologist, Idaho Department of Water Resources. 1997. Personal Communication.

Curtis, J., Boise National Forest. 1997. Personal Communication.

Darr, P., Boise Army-Navy. 1997. Personal Communication.

Davis, M. A., Office of the Idaho State Archaeologist. 1997. Personal Communication.

Deaguero, M., Emmett Ranger District, Boise National Forest. 1997. Personal Communication.

Deal, L., McCall Chamber of Commerce. 1997. Personal Communication.

Dean, L., Sawtooth National Forest. 1997. Personal Communication.

Deick, J. F., and D. R. Ralston. 1986. Ground Water Resources in a Portion of Payette County, Idaho. Moscow, ID: Idaho Water Resources Research Institute, University of Idaho.

Demetriades, J., Timber Staff, Payette National Forest. 1997 and 1998. Personal Communication.

District Court Valley County. 1946. *Payette Lakes Protective Association v. Lake Reservoir Company*, Case No. 855. Decree filed June 26, 1946. Chas, F. Koelsch, District Judge.

Dreher, K.J. 1998. A View on Idaho's Experience with Flow Augmentation. Proceedings of Competing for the Mighty Columbia River - Past, Present and Future: The Role of Interstate Allocation, April 30-May 1, 1998, Boise ID. American Bar Association, Section of Natural Resources, Energy and Environmental Law.

EDAW, Inc. 1991. Cascade Reservoir Resource Management Plan. Prepared for U.S. Bureau of Reclamation.

Eklund, K., Senior Conservation Specialist, Energy Division, Idaho Department of Water Resources. 1997. Personal Communication.

Elle, S. 1993. River and Stream Investigations, Subproject II, Study IV, Wild Trout Investigations: South Fork Payette River Studies. Project F-73-R-15. Idaho Department of Fish and Game.

Elliot, G., McCall Ranger District, Payette National Forest. 1997. Personal Communication.

Emmett City Council and Gem County Commissioners. 1995. Emmett and Gem County: Idaho's Valley of Plenty - Comprehensive Plan 1995 to 2010.

Environmental Protection Agency. 1996. The 1996 303 (d) List for the State of Idaho. U.S. Environmental Protection Agency Region 10.

Evans, B., Superintendent of Public Works, City of Emmett. 1998. Personal Communication.

Evans, D., M.J. Bechard, and K. Steenhof. 1990. Cabarton Bald Eagle Territory. Interim Report.

Federal Emergency Management Agency. 1984. Flood Insurance Study - City of Horseshoe Bend, Idaho, Boise County.

Federal Emergency Management Agency. 1988. Flood Insurance Study - Boise County, Idaho and Incorporated Areas.

Federal Emergency Management Agency. 1990. Flood Insurance Study - Valley County , Idaho and Unincorporated Areas.

Federal Insurance Administration. 1977. Flood Insurance Study - Gem County, Idaho Unincorporated Areas.

Fisher, S., Former Co-owner, Idaho Whitewater Unlimited. 1997. Personal Communication.

Fleischman, G., Engineer, Energy Division Idaho Department of Water Resources. 1997. Personal Communication.

Fourney, C., Co-owner, Headwaters River Company. 1997. Personal Communication.

Gabiola, J., Deputy City Clerk, City of Payette. 1997. Personal Communication.

Gebhards, S., Former Region 3 Supervisor, Idaho Department of Fish and Game. 1992. Letter to Valley County Commissioners.

Gem Irrigation District. 1990. Banks Pumped Storage Project - Description of Proposed Project.

Gilbert, C.H., and B.W. Evermann. 1894. Report of the Commissioner of Fish and Fisheries on Investigations in the Columbia River Basin in Regard to the Salmon Fisheries. Washington, DC: U.S. Government Printing Office.

Giles, B., Boise National Forest. 1998. Personal Communication.

Gillerman, V., Research Geologist, Idaho Geological Survey. 1997a. March 7, 1997 Memorandum to Landslide Task Force Science Committee.

Gillerman, V., Research Geologist, Idaho Geological Survey. 1997b. Personal Communication.

Grunder, S., Environmental Coordinator, Idaho Department of Fish and Game. 1991. Comments to Idaho Water Resource Board Re: Payette Corridors Water Plan.

Grunder, S., Environmental Coordinator, Idaho Department of Fish and Game. 1996 and 1998. Personal Communications.

Grunder, S. A., J.D. Linman, and D. R. Anderson. 1990. Regional Fisheries Management Investigations. Project F-71-R-13. Idaho Department of Fish and Game.

Hagdorn, B., Outdoor Recreation Planner, Lower Snake River District, U.S. Bureau of Land Management. 1998. Personal Communication.

Hale, D., Emmett Ranger District, Boise National Forest. 1997. Personal Communication.

Hardy, D., Region 3, Idaho Department of Fish and Game. 1997. Personal Communication.

Helms, D., Marine Sargent, Valley County Sheriff's Office. 1997. Boating Program Reports 1994-1997.

Hiatt, D., Licensing/Registration, Idaho Department of Parks and Recreation. 1997. Personal Communication.

Hileman, T., Chief Deputy, Boise County Tax Assessors Office. 1998. Personal Communication.

Holt, W. G. 1935. Water Utilization in the Snake River Basin. USGS Water Supply Paper 657. Washington, D.C.: Government Printing Office.

Hood, C. 1999. Letter dated November 25, 1999 to Clarence Parr, Idaho Water Resource Board Chairman, commenting on the Draft Payette River Basin Plan.

Hoosick, C., Assistant Manager, Ponderosa State Park, Idaho Department of Idaho Parks and Recreation. 1997. Personal Communication.

Howard, R., Biologist, U.S. Fish and Wildlife Service. 1997. Personal Communication.

Howe, S., Hydrologist, Idaho Department of Water Resources. 1996. Personal Communication.

Hunt, J. D., N. Sanyal, J. Vlaming, and S. R. Leidner. 1995. Regional Analysis of Nonresident Motor Vehicle Travel in Idaho: Region 3. Contribution #750. Moscow, ID: Department of Resource Recreation and Tourism, University of Idaho. 64 pps.

Hunt, J. D., S. R. Leidner, N. Sanyal, and J. Parrish. 1996. Idaho Winter Sports and Recreation. Contribution #795. Moscow, ID: Idaho Forest, Wildlife and Range Experiment Station, University of Idaho.

Hyndman, D.W., and D. Alt. 1982. Proposed Natural Landmarks of the Northern Rocky Mountains: Geologic Themes - Volume I. Prepared for the U.S. National Park Service. Missoula, MT: University of Montana.

Idaho Department of Commerce, 1996. County Profiles of Idaho. Boise, ID.

Idaho Agricultural Statistics Service. 1996. *Idaho Agricultural Statistics, 1996.*

Idaho Bureau of Mines and Geology. 1923. A Preliminary Reconnaissance of the Gas and Oil Possibilities of Southwestern and South-Central Idaho.

Idaho Department of Commerce. 1996. County Profiles of Idaho. Boise, ID.

Idaho Department of Fish and Game. 1991-1995. Summary of Bird Harvest Estimates.

Idaho Department of Fish and Game. 1995. Opinion Survey of Idaho Anglers. Idaho Department of Fish and Game Fish Research.

Idaho Department of Fish and Game. 1996. Fisheries Management Plan 1996-2000.

Idaho Department of Fish and Game. 1997. Idaho License and Tags Database.

Idaho Department of Fish and Game. 1998. Idaho's Anadromous Fish Stocks: Their Status and Recovery Options. Report to the Director - IDFG 98-13. Boise, ID.

Idaho Department of Fish and Game, Conservation Data Center. 1998. Conservation Data Center Database.

Idaho Department of Lands. 1986. Navigable Waters in Idaho. Operations Memorandum No. 1700.

Idaho Department of Parks and Recreation. 1989. Unpublished Boater Use Survey Data. Boise, ID.

Idaho Department of Parks and Recreation. 1994. Ponderosa State Park General Development Plan.

Idaho Department of Parks and Recreation. 1998. Idaho Statewide Comprehensive Outdoor Recreation and Tourism Planning: Assessment and Policy Plan.

Idaho Department of Water Resources. 1976. Potential Sites For Small Reservoirs. Technical Studies Report No. 2.

Idaho Department of Water Resources. 1994. Idaho Energy Vital Statistics '94. Boise, ID: Idaho Department of Water Resources Energy Division.

Idaho Department of Water Resources. 1997. Energy Division Analysis.

Idaho Department of Water Resources. 1998. In-house Analysis of Water Use in the Payette River Basin.

Idaho Division of Environmental Quality. 1994. The 1994 Idaho Water Quality Status Report.

Idaho Division of Environmental Quality. 1996. 1996 Beneficial Use Reconnaissance Project Work Plan. Idaho Division of Environmental Quality BURP Technical Advisory Committee.

Idaho Division of Environmental Quality. 1998. Cascade Reservoir Phase II Watershed Management Plan - Preliminary Draft. Boise, ID: Idaho Department of Health and Welfare, Division of Environmental Quality.

Idaho Geological Survey. 1997. Mines and Prospects Database.

Idaho Outfitters and Guides Licensing Board. 1993 and 1997. Data Files.

Idaho Power Company. 1984. North Fork Payette River Hydroelectric Project, FERC No. 2930, Consultation Package, Article 40 - Recreation.

Idaho Power Company. 1991. 1992 Economic Forecast. Boise, ID: Idaho Power Company.

Idaho Power Company. 1996. 1997 County Economic Forecast: 1996-2015.

Idaho Travel Council. 1996. RV Idaho - Idaho RV Parks, Campgrounds and Dump Stations.

Idaho Transportation Department. 1980-1995. Idaho Transportation Department, District 3 Report - Traffic Volume.

Idaho Water Resource Board. 1991. Comprehensive State Water Plan: Payette River Reaches.

Idaho Water Resource Board. 1996. Idaho State Water Plan.

Ingham, M. J. 1996. Lower Payette River Agriculture Irrigation Water Return Study and Ground Water Evaluation -- Payette County, Idaho 1992-1993. Water Quality Status Report No. 115. Boise, ID:

Idaho Department of Health and Welfare, Division of Environmental Quality, Southwest Idaho Regional Office.

Ingham, M. J., Water Quality Science Officer, Idaho Division of Environmental Quality. 1997. Personal Communication.

Ingraham, B. 1992. *Looking Back: Sketches of Early Days in Idaho's High Country*. Bend, OR: Maverick Publications.

Interagency Hazard Mitigation Team. 1997. Interagency Hazard Mitigation Team Report - Disaster 1154 Idaho.

Irizarry, R. 1970. Lake and Reservoir Investigations. Project No. F-53-R-4 and F-53-R-5. Idaho Department of Fish and Game.

James M. Montgomery. 1975. Idaho Environmental Overview. Prepared for Idaho Departments of Water Resources, Health and Welfare, and Fish and Game.

Janssen, P., Regional Fisheries Biologist, Idaho Department of Fish and Game. 1997. Personal Communication.

Janssen, P. and D. Anderson. 1992. Regional Fisheries Management Investigations. Project F-71-R-15. Idaho Department of Fish and Game.

Janssen, P. J. and D. R. Anderson. 1993. Regional Fishery Management Investigations. Project F-71-R-19. Idaho Department of Fish and Game.

Janssen, P., and D. Anderson. 1994. Regional Fisheries Management Investigations. Project F-71-R-16. Idaho Department of Fish and Game.

Janssen, P., D. R. Anderson, and J. J. Patterson. 1994a. Regional Fisheries Management Investigations. Project F-71-R-17. Idaho Department of Fish and Game.

Janssen, P., K. Apperson, and D. Anderson. 1994b. Regional Fishery Management Investigations. Project F-71-R-15. Idaho Department of Fish and Game.

Jarsky, S., U.S. Bureau of Reclamation. 1997. Personal Communication.

Jenks, M. 1997. Mass Wasting. In Draft Technical Report Eutrophication Potential of Big Payette Lake. Cascade, ID: Idaho Division of Environmental Quality.

Johnson, K. M., R. S. Lewis, E. H. Bennett, and T. H. Kiilsgaard. 1988. "Cretaceous and Tertiary Intrusive Rocks of South-Central Idaho." In Link, P. K., and W. R. Hackett, eds., *Guidebook to the Geology of Central and Southern Idaho*. Idaho Geological Survey Bulletin 27. Moscow, ID: Idaho Geological Survey, University of Idaho.

Johnson, P., Chairman, Big Payette Lake Water Quality Committee. 1996. Personal Communication.

Jones, J., Forester, U.S. Bureau of Land Management. 1998. Personal Communication.

Jones, M. 1996. *Native Americans of the Payette National Forest*. McCall, ID: Heritage Program, U.S. Department of Agriculture Forest Service, Payette National Forest.

Jordan, G.E. 1963. *Idaho Reader*. Syms-York Co.: Boise, ID pg. 199.

Jordan, G.E. 1998. *The King's Pines of Idaho*. Fruitvale, ID: Kirkwood Publishing Co.

Karl, T. R., L. K. Metcalf, M. L. Nicodemus, and R. G. Quayle. 1983. Statewide Average Climatic History - Idaho. Asheville, NC: National Climatic Data Center.

Keithley, S., Building Contractor. 1997. Personal Communication.

Keller Associates. 1996. Lowman Development Association Water Supply and Distribution Study. Report to Lowman Development Association.

Kellogg, S.T., V.A. Simon, M. Barlow, and D. Davidson. 1996. Ground Water Analysis at Emmett, Idaho. Open-File Report prepared for Idaho Department of Water Resources.

Kerpa, E. 1995. Final Water Quality Status Report - Squaw Creek, Gem County, Idaho: 1994-1995. Idaho Department of Health & Welfare/Division of Environmental Quality for Squaw Creek Soil Conservation District. Boise State University Internship Monitoring Program.

Kimball, G., Water Treatment Plant Manager, City of McCall. 1997. Personal Communication

Kinnison, P. T. 1955. A Survey of the Ground Water of the State of Idaho. Pamphlet No. 103. Moscow, ID: University of Idaho, Idaho Bureau of Mines and Geology.

Kinoshita, W. T. 1962. A Gravity Study of Part of the Long Valley District, Idaho. U.S. Geological Survey Open-File Report. Boise, ID: U.S. Geological Survey.

Kinsbury, L. A. 1996. *Obsidian and Prehistoric Transhumance On and Adjacent to the Payette National Forest, Idaho*. McCall, ID: Heritage Program, U.S. Department of Agriculture, Forest Service, Payette National Forest.

Kolby, S., Idaho River Sports. 1997. Personal Communication.

Koski, W., Idaho Department of Lands. 1997. Personal Communication.

Kuck, L. 1992, 1993, 1994, and 1996. Summary of Big Game Harvest Estimates for 1992-1994 and 1996. Idaho Department of Fish and Game.

Levine, E. 1993. The Idaho Peregrine Falcon Survey, Nest Monitoring and Release Program. Annual Report: Idaho Fish and Game Nongame and Endangered Wildlife Program.

Lewis, R. E., and H. W. Young. 1980. Thermal Springs in the Payette River Basin, West-Central Idaho. U.S. Geological Survey Open File Report 80-1020. Boise, ID: U.S. Geological Survey.

Limbaugh, M., Watermaster, Water District 65. 1998. Personal Communications.

Long, T., Owner, Cascade Recreation Company. 1997 and 1998. Personal Communications.

Loveland, B., Safety Chairman, Idaho Whitewater Association. 1997. Personal Communication.

Lucachick, M., Natural Resources Specialist, Idaho Department of Parks and Recreation. 1999. Personal Communication.

Ludvigsen, B., Landscape Architect, McCall Ranger District, Payette National Forest. 1997. Personal Communication.

Lyon, R. B. 1968. *Valley of Plenty*. Boise, ID: Capitol Lithograph and Printing Co.

Lyon, R. B. 1979. *The Village That Grew*. Boise, ID: Lithocraft, Inc.

Mabbot, B., and T. Holubetz. 1989. Regional Fisheries Management Investigations. Project F-71-R-12. Idaho Department of Fish And Game.

Mackelprang, R., Idaho Gold Prospectors Association. 1998. Personal Communication.

Malany, H., Forester, Boise Cascade Corporation. 1998. Personal Communication.

Marben, D., Silviculturist, Cascade Ranger District, Boise National Forest. 1997. Personal Communication..

Marshal, A., Production Engineer, Boise Cascade Cooperation. 1997. Personal Communication.

Matthews, K. K. 1997. First Security Bank Idaho Construction Reports.

Maupin, M., Geographer, U.S. Geological Survey. 1997. Personal Communication.

McClaran, D., Co-Author *Idaho Whitewater*. 1997. Personal Communication.

McClaran, D. and G. Moore. 1989. *Idaho Whitewater: The Complete Guide for Canoeists, Rafters and Kayakers*. McCall, ID: Class VI Whitewater.

McIntyre, M. 1993. Squaw Creek Beneficial Use Assessment, Gem County, Idaho, 1991-1992. Water Quality Status Report No. 108. Idaho Department of Health and Welfare, Division of Environmental Quality.

McLaughlin, W. J. and M. D. Feldman. 1983. Idaho River Study: A Look at Boater Use on Ten Non-Designated River Segments in Idaho. Moscow, ID: University of Idaho.

Megahan, W. F., N. F. Day, and T. M. Bliss. 1979. "Landslide Occurrence in the Western and Central Northern Rocky Mountain Physiographic Province in Idaho." In Youngberg, C.T., ed., *Forest Soils and Land Use; Proceedings of the 5th North American Forest Soils Conference*, August, 1978. Ft. Collins, CO: Colorado State University.

Mellema, M., Hydrologist, National Weather Service. 1997. Personal Communication.

Milligan, J. H., R.A. Lyman, C. Falter, E.E. Krumpe, and J.E. Carlson. 1983. Classification of Idaho's Freshwater Lakes. Idaho Water and Energy Research Institute. Moscow, ID: University of Idaho.

Mills, N. I. 1963. *All Along the River*. Private Printing for Payette Radio Limited. Montreal, Canada.

Mitchell, J. C., L. L. Johnson, and J. E. Anderson. 1980. Geothermal Investigations in Idaho. Water Information Bulletin No. 30, Part 9. Boise, ID: Idaho Department of Water Resources.

Mitchell, V. E., Strowd, W. B., G. S. Hustedde, and E. H. Bennett. 1986. Mines and Prospects of the Challis Quadrangle, Idaho. Moscow, ID: Idaho Geological Survey.

Mitchell, V. E., M. H. Ott, R. E. Vance, and E. H. Bennett. 1991. Mines and Prospects of the Hailey Quadrangle, Idaho. Moscow, ID: Idaho Geological Survey.

Molnau, M. 1991. Mean Annual Precipitation Map for Idaho, GIS database. Moscow, ID: Idaho Water Resources Research Institute and the Idaho Agricultural Experiment Station, University of Idaho.

Moore, D., Board Member, Western Whitewater Association. 1997. Personal Communication.

Moore, J.C. 1966. Stock Watering Ponds in Southwestern Idaho. Research Report No. 5 on Special Research Project No. 103. Moscow, ID: Engineering Experiment Station, University of Idaho.

Moore, J., and K. M. Ames. 1979. Archaeological Inventory of the South Fork of the Payette River, Boise County, Idaho. Reports in Archaeology No. 6. Boise, ID: Boise State University.

Mount, M., Cascade Chamber of Commerce. 1997. Personal Communication.

Murphy, J., Boating Facilities and Grants Coordinator, Idaho Department o f Parks and Recreation. 1996. Personal Communication.

Murray, S. 1990. A Bucket Full, Boise Basin's Dredging Heritage, 1908-1951. *Idaho Yesterdays.* Vol. 34, No. 3.

Murray, S., Minerals Bureau, Idaho Department of Lands. 1999. Personal Communication.

Myers, C.L., Myers Engineering Company. 1995. Letter of May 19, 1995 to Bill Graham, Planning and Policy Bureau Chief, Idaho Department of Water Resources.

National Oceanic and Atmospheric Administration. 1997. National Climatic Data Center, Climatological Database.

National Park Service. 1987. National Natural Landmarks. Brochure

National Weather Service. 1997. Climatological Database.

Natural Resources Consulting Engineers, Inc. 1996. Analysis Summary Report: Cascade Reservoir Irrigation Management Plan. Prepared for Idaho Division of Environmental Quality.

Neely, K., Hydrogeologist, Idaho Department of Water Resources. 1997. Personal Communication.

Nelson, D. O. 1976. Soil Survey of Middle Fork Payette River Area, Idaho. U.S. Department of Agriculture and University of Idaho.

Nelson, L. 1991. Summary of Big Game Harvest Estimates. Idaho Department of Fish and Game.

Ondrechen, B., Hydrologist, Idaho Department of Water Resources. 1997. Personal Communication.

Orr, R., Project Manager, Black Canyon Irrigation District. 1998. 1996 Water Delivery by Ride, Lateral and Canal Waste for Black Canyon Irrigation District.

Othberg, K. L. 1987. *Landforms and Surface Deposits of Long Valley, Valley County, Idaho.* Moscow, ID: Idaho Geological Survey.

Overton, D., Outdoor Recreation Planner, Pacific Northwest Region, U.S. Bureau of Reclamation. 1997. Personal Communication.

Pacific Northwest River Basins Commission. 1970. Columbia-North Pacific Region Comprehensive Framework Study – Water Resources. Appendix V, Vol. 1. Vancouver, WA: Pacific Northwest River Basins Commission.

Parrish, J., N. Sanyal, and J. D. Hunt. 1996. 1994-1995 Idaho Resident Recreation and Travel. Idaho Forest, Wildlife and Range Experiment Station Contribution #808. Moscow, ID: Department of Resource Recreation and Tourism, University of Idaho.

Payette County Planning and Zoning Commission. 1997. Payette County Comprehensive Plan.

Payette Soil and Water Conservation District. 1993. Lower Payette River Water Quality Planning Project: Final Report, Agricultural Pollution Abatement Plan. Payette, ID: Soil Conservation Service.

Peebles, J. J. 1962. Engineering Geology of the Cartwright Canyon Quadrangle. Idaho Bureau of Mines and Geology Pamphlet 127. Moscow, ID: Idaho Bureau of Mines and Geology.

Preston, R.N. 1972. *Maps of Early Idaho.* Corvallis, OR: Western Guide Publishers.

Quadrant Consulting, Inc.; McLaughlin Water Engineers, Ltd., and Resource Systems, Inc. 1997. Boise and Payette Rivers Diversion Upgrade Project - Task 1 Report, In Inventory of Irrigation Diversion Structures. Prepared for Boise River 2000.

Rader, N. A. 1981. *Our Mountain Valley.* Meridian, ID: J&D Printing.

Rains, R.L. 1991. "Garnet" and "Silica" in Principal Deposits of Industrial Minerals in Idaho, U.S. Bureau of Mines Special Report. U.S. Bureau of Mines.
Reading, D., and P. Lansing. 1996. Survey of Idaho State Park Campgrounds. Prepared for Idaho Department of Parks and Recreation.

Reddy, S. D. 1993. *The Empty Land: The Search for the Nez Perce on the Payette National Forest.* McCall, ID: Heritage Program, Payette National Forest.

Reddy, S.D. 1995a. "American Indians of Idaho, The Payette National Forest and the Frank Church River of No Return Wilderness." McCall, ID: Heritage Program, Payette National Forest, Intermountain Region, U.S. Forest Service.

Reddy, S.D. 1995b. "Shadows in the Wilderness. The Story of the Northern Shoshoni Band, the Tukudika, in the Frank Church--River of No Return Wilderness and the Payette National Forest." McCall, ID: Heritage Program, Payette National Forest, Intermountain Region, U.S. Forest Service.

Reed, C., Treasure, Boise County. 1998. Personal Communication.

Reed, W., Archaeologist, Boise National Forest. 1996. Personal Communication.

Reid, W. 1979. Horsethief Reservoir Fisheries Investigations. Project F-73-R-1. Idaho Department of Fish and Game.

Reid, W. 1980. North Fork Payette River Fisheries Investigation. Completion Report prepared for Idaho Power Company. Idaho Department of Fish and Game.

Reid, W. 1989. Idaho Anglers: A Survey of Opinions and Preferences. Job Completion Report F-35-R-13. Idaho Department of Fish and Game.

Reid, W., Idaho Department of Fish and Game. 1997. Personal Communication.

Reid, W., and D. Anderson. 1981. Regional Fishery Management Investigations: Region 3 Stream Investigations. Project F-71-R-5. Idaho Department of Fish and Game.

Reid, W., and B. Mabbott. 1987. Federal Aid in Fish and Wildlife Restoration. Job Performance Report. Project F-71-R-11.

Reininger, B., B. Rieman, and N. Horner. 1983. Cascade Reservoir Fisheries Investigations. Project F-73-R-5. Idaho Department of Fish And Game.

Roark, C., Valley County Assessor. 1998. Personal Communication.

Roberts, J., Forester, Southwest Idaho Supervisory Area, Idaho Department of Lands. 1997. Personal Communication.

Rogers, T., Fish Hatchery Supervisor, Idaho Department of Fish and Game. 1997. Personal Communication.

Ross, S.H., and C.N. Savage, 1967. Idaho Earth Science. Earth Science Series No. 1. Moscow, ID: Idaho Bureau of Mines and Geology.

Ross, S. H. 1971. Geothermal Potential of Idaho. Pamphlet 150. Moscow, ID: Idaho Bureau of Mines and Geology, University of Idaho.

Savage, C. N. 1961. Geology and Mineral Resources of Gem and Payette Counties. County Report No. 4. Moscow, ID: Idaho Bureau of Mines and Geology, University of Idaho.

Schmidt, D. L., and J. H. Mackin. 1970. *Quaternary Geology of Long and Bear Valleys, West-Central Idaho.* U.S. Geological Survey Bulletin 1311-A.

Schuster, E., W.J. McGinnis, and W.L. Stewart. 1996. Economic Indicator Maps for Rural Development in the Interior West. Intermountain Research Station, General Technical Report INT-GTR-330.

Scott, S., and R. Hall. 1986. Whitewater Racing - A New Idaho Cash Crop. *Idaho's Economy.* Summer 1986, pp 7.

Scully, R., and D. Anderson. 1989. Regional Fisheries Management Investigations. Project F-71-R-12. Idaho Department of Fish And Game.

Sear-Brown Group. 1990. Final Environmental Impact Statement for Valbois, The Resort at Cascade Lake, Idaho. Prepared for U.S. Forest Service, Boise National Forest, and U.S. Bureau of Reclamation, Boise Regional Office. Park City, UT.

Shaw, D., Boise District, U. S. Bureau of land Management. 1997. Personal Communication.
Shelton, T., Birding Island Wildlife Management Area Manager, Idaho Department of Fish and Game. 1997. Personal Communication.

Sigrist, M., Lowman Ranger District, Boise National Forest. 1997. Personal Communication.

Slifka, M., Section Manager, Ground Water Protection, Idaho Department of Water Resources. 1997. Personal Communication.

Southwest Basin Native Fish Watershed Advisory Group. 1998. Letter of August 17, 1998 to Ellen Berggren, Planner for the Idaho Water Resources Board.

Spencer, D. 1996. Impact of Summer Camps on Recreational Use of Payette Lake. Central District Health Department.

Steed, R., G. Winter, and J. Cardwell. 1993. Idaho Snake-Payette Rivers Hydrological Unit Ground Water Quality Assessment. Ground Water Technical Report No. 3. Boise, ID: Idaho Department of Health
and Welfare, Division of Environmental Quality, Southwest Idaho Regional Office.

Steenhof, K. 1995. Bald Eagle Winter Count Data from Raptor Research and Technical Assistance Center. U.S. Fish and Wildlife Service.

Stephens, K., Park Ranger, Ponderosa State Park, Idaho Department of Parks and Recreation. 1997. Personal Communication.

Stevenson, R., Senior Operating Property Appraiser, Idaho State Tax Commission. 1998. Personal Communication.

Stuebner, S. 1995. *Paddling the Payette - A Complete Flat-Water and Whitewater Guide to the Payette River Basin.* Paddling the Payette Productions.

Sutter, B., Section Manager, Hydrology Section, Idaho Department of Water Resources. 1996. Personal Communication.

Tetlow, R.J., and S.R.J. Sheppard. 1980. Visual Unit Analysis: A Descriptive Approach to Landscape Assessment. In *Our National Landscape: Proceedings of a Conference on Applied Techniques for Analysis and Management of Visual Resource.* Pacific Southwest Forest and Range Experiment Station, Berkeley, CA, pp. 567-574.

Thornton, J., Hydrologist, Boise National Forest. 1997. Personal Communication.

Tims, D., Maravia. 1997. Personal Communication.

Toothman-Orton Engineering Company. 1993. Facilities Plan - City of Crouch, Boise County.

Turnipseed, D., Region 3 Office, Idaho Department of Fish and Game. 1997. Personal Communications.

U.S. Army Corps of Engineers. 1982. Flood Plain Management Report for Payette River, Idaho. Prepared for the Idaho Department of Water Resources. Walla Walla, WA.

U.S. Army Corps of Engineers, North Pacific Division. 1986. Pacific Northwest Hydropower Database and Analysis System. Portland, OR.

U.S. Bureau of the Census. 1982, 1987, and 1992. Census of Agriculture. Washington, D.C.: U.S. Department of Commerce.

U. S. Bureau of the Census. 1990. 1990 Census of Population and Housing: Summary Population and Housing Characteristics - Idaho. Washington D.C.: U. S. Department of Commerce.

U.S. Bureau of Census. 1997. Washington D.C.: U.S. Department of Commerce.

U.S. Bureau of Land Management. 1986. Visual Resource Management Inventory and Contrast Rating Manuals - 8400 Series.

U.S. Bureau of Land Management. 1987. Cascade Resource Management Plan and Final Environmental Impact Statement.

U.S. Bureau of Land Management. 1994. Payette River Recreation Area Management Plan.

U.S. Bureau of Land Management. 1996. Recreation Management Information System Database.

U.S. Bureau of Mines. 1962. Mineral Resources at Montour Irrigation Site on Payette River, Gem Co. Idaho.

U.S. Bureau of Reclamation. 1977. Report on the Western Energy Expansion Study.

U. S. Bureau of Reclamation. 1984. Potential Solutions to Problems and Needs Payette River Basin. Boise Project Power and Modification Study, Idaho-Oregon.

U.S. Bureau of Reclamation. 1985. Boise Project, Idaho-Oregon Power and Modification Study - Payette River Basin - Water Quality appendix.

U.S. Bureau of Reclamation. 1986. Boise Project Power and Modification Study - Payette River Basin. Planning Report and Draft Environmental Statement.

U.S. Bureau of Reclamation. 1996. A Description of Bureau of Reclamation System Operation of the Boise and Payette Rivers. Boise, ID.

U.S. Bureau of Reclamation and U.S. Corps of Engineers. 1961. Upper Snake River Basin Wyoming-Idaho-Utah-Nevada-Oregon -- Volume I: Summary Report, Volume IV, Part 2, Plans, Studies, and Data - King Hill to Powder River.

U.S. Bureau of Reclamation and U.S. Army Corps of Engineers. 1994. Snake River Basin Storage Appraisal Study.

U.S. Department of Agriculture. 1996. National Agriculture Statistics Service.

U.S. Department of Commerce, Economics and Statistics Administration, Bureau of Economic Analysis. 1997. 1969-1995 Regional Economic Information System.

U.S. Forest Service. No date. Payette River Basin Study Area Land Association Types and Cover Types.

U.S. Forest Service. 1974. National Forest Landscape Management Volume 2, Chapter 1, The Visual Management System. Washington D.C.: U.S. Government Printing Office. Agriculture Handbook No. 462.

U.S. Forest Service. 1996. National Summary - Timber Sale Program Annual Report - Fiscal Year 1995. Report FS-591.

U.S. Forest Service, Boise National Forest. 1990. Land and Resource Management Plan for the Boise National Forest.

U.S. Forest Service, Boise National Forest. 1993-1997a. Sale Program Activity Schedule - STARS Report.

U.S. Forest Service, Boise National Forest. 1993-1997b. Timber Sale Accounting Program Reports.

U. S. Forest Service, Boise National Forest. 1996. Recreation Management Summary of Total Recreation
Use on National Forest Lands by Activity - Fiscal Year 1996.

U. S. Forest Service, Boise National Forest, Lowman Ranger District. No date. Lowman Ranger District Guide/Information: History of Lowman. Lowman, ID: Lowman Ranger District.

U. S. Forest Service, Boise National Forest, Lowman Ranger District. 1992. Fisheries Habitat Inventory.

U.S. Forest Service, Payette National Forest. 1988. Final Environmental Impact Statement for the Land and Resource Management Plan.

U. S. Forest Service and U.S. Bureau of Land Management. 1997. Upper Columbia River Basin Draft Environmental Impact Statement.

U. S. Forest Service, U. S. Fish & Wildlife Service, and U. S. Bureau of Reclamation. 1990. Cascade Reservoir Bald Eagle Management Plan.

U.S. Geological Survey. 1965. Water Power Resources of Idaho.

U. S. Geological Survey. 1991. National Water Summary 1988-89. United States Geological Survey Water Supply Paper 2375.

U. S. Geological Survey. 1996. Statistical Summaries of Streamflow Data for Selected Gaging Stations in Idaho and Adjacent States Through September 1990 - Vol. 1: Gaging Stations with Ten or More Years of Record. Water-Resources Investigations Report 94-4070. Boise, ID.

U.S. Geological Survey. 1997. Water Resources Data, Idaho, Water Year 1997 - Vol. 2: Upper Columbia River Basin below King Hill. U.S. Geological Survey Water - Data Report ID-97-2.

U.S. Natural Resources Conservation Service. 1991. Idaho Irrigation Guide - Title 210, Chapter 6.

U.S. Natural Resources Conservation Service. 1994. Idaho Surface Water Supply Index.

Valley County Commissioners. 1998. Draft Valley County Comprehensive Plan.

VanVooren, A. 1999. Letter dated January 4, 1999 to Clarence Parr, Idaho Water Resource Board Chairman, commenting on the Draft Payette River Basin Comprehensive State Water Plan.

Viste, R., Research Analyst, Idaho Transportation Department. 1997. Personal Communication.

Warnick, C.C., J.R. Filler, and P.J Vance. 1981a. Potential Hydroelectric Energy Resources of Idaho. Prepared for the Idaho Department of Water Resources. Moscow, ID: Idaho Water and Energy Resources Research Institute, University of Idaho.

Warnick, C. C., L. F. Heitz, L. A. Kirkland, and G. G. Burke. 1981b. User Guide for Idaho Hydrologic Maps. Moscow, ID: Idaho Water and Energy Resources Research Institute, University of Idaho.

Waugh, K, Lowman Ranger District, Boise National Forest. 1997. Personal Communication.

Weaver, P. 1995. Payette Lake Water Quality Report. McCall, ID: Payette National Forest.

Wells, M. 1978. *An Atlas of Idaho Territory, 1863-1890.* Boise, ID: Idaho Historical Society.

Wells, M. 1980. "Ethno History and Timber Butte Obsidian." *Idaho Archaeologist.* Vol. IV, No. 2. Idaho Archaeological Society.

Wells, R., Hydraulic Engineer, U.S. Bureau of Reclamation. 1997. Personal Communication.

Witherell, J. 1989. *The Log Trains of Southern Idaho - A History: The Railroads and Logging of Boise Payette Lumber.* Denver, CO: Sundance Publications, Ltd.

Woods, P. Limnologist, U.S. Geological Survey, Boise. 1997a. Eutrophication Potential of Payette Lake, Idaho. USGS Water-Resources Investigations Report 97-4145.

Woods, P. Limnologist, U.S. Geological Survey, Boise. 1997b and 1999. Personal Communications.

Young, G., and F. J. Cochrane. 1978. *Hydro Era: The Story of Idaho Power Company.* Caldwell, ID: Caxton Printers.

Young, H. W. 1985. Geochemistry and Hydrology of Thermal Springs in the Idaho Batholith and Adjacent Areas, Central Idaho. U.S. Geological Survey Water-Resources Investigations Report 85-4172. Boise, ID: U.S. Geological Survey.

Yundt, S., Fisheries Biologist, Idaho Department of Fish and Game. 1996. Personal Communication.

Zaroban, D.W. 1993. Abstracts of Idaho Stream Classifications and Designations - Appendix E, Water Quality. Advisory Working Committee Designated Stream Segments of Concern, 1992-1994. Idaho Division of Environmental Quality.

GLOSSARY

Acre-foot - the volume of water required to cover 1 acre of land (43,560 square feet) to a depth of 1 foot; this is equivalent to 325,851 gallons.

Adjudicated water right - a water right for which the defining parameters required by law have been determined and decreed by a court of law.

Alluvium - soil material, such as sand, silt and clay that has been deposited on land surface by water.

Alteration - any activity that obstructs, diminishes, destroys, alters, modifies, relocates, or changes the natural existing shape of the stream channel within or below the mean high water mark. It includes removal of material from the stream channel and emplacement of material or structures in or across the stream channel where the material or structure has the potential to affect flow in the channel as determined by the director.

Annual sustained yield - a term typically used in forestry which means the yield harvested in a given year is equivalent to the replacement during that same time period.

Anadromous - fish species, such as salmon, that are born in fresh water, spend most of their adult life in the ocean, and return to fresh water to spawn.

Appropriate or appropriation - to obtain the right to divert and use the public waters of the state of Idaho.

Beneficial use - a set of water uses which are considered a legitimate basis for a water right.

Best management practices (BMP) - the state-of-the-art practices that are efficient and effective, practical, economical, and environmentally sound to minimize soil erosion.

Board - Idaho Water Resource Board.

Bull trout - common name for *Salvelinus confluentus*, a char native to the Pacific Northwest and Canada.

Bypass reach - a reach of a stream with lowered water flow as the result of diversion and conveyance of water outside the channel. Typically water is returned to the channel after beneficial use is made of it.

Commercial water use - Commercial water is used by hotels, motels, restaurants, office buildings, retail sales, stores, educational institutions, churches, hospitals, and government and military facilities.

Comprehensive state water plan - the plan adopted by the board pursuant to Section 42-1734A of the Idaho Code, or a component of such plan developed for a particular water resource, waterway, or waterways and approved by the legislature.

Conservation - increasing the efficiency of energy or water use, production, or distribution.

Consumptive use - The portion of the annual volume of water diverted under a water right that is transpired by growing vegetation, evaporated from soils, converted to non-recoverable water vapor, incorporated into products, or otherwise does not return to the waters of the state. Consumptive use does not include any water that falls as precipitation directly on the place of use unless precipitation is captured, controlled, and used under an appurtenant water right [Idaho Code 42-202B(1)].

Confluence - the flowing together of two or more bodies of water.

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 mean velocity of one foot per second. It is equal to 448.8 gallons per minute, or 1.98 acre-foot per day.

Domestic water uses - the use of water for homes, organization camps, public campgrounds, livestock, and for any other purposes in connection with these, including irrigation of up to one-half acre of land if the total use does not exceed 13,000 gallons per day. It includes other uses if the total diversion rate does not exceed 0.04 cubic feet per second and a diversion volume of 2,500 gallons per day [Idaho Code 42-111].

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 - any species or subspecies which is in danger of extinction throughout all or a significant portion of its range, (other than a species of the Class Insecta determined by the Secretary of Interior to constitute a pest whose protection under the provisions of the Endangered Species Act would present an overwhelming and overriding risk to man).

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.

Evapotranspiration - the loss of moisture by evaporation from land and water surfaces and transpiration from plants.

Focal habitat - In reference to bull trout - Critical areas supporting a mosaic of high quality habitats that sustain a diverse or unusually productive complement of native species (Batt, 1996).

Fishery enhancement structure - structures deliberately placed within the waterway, under proper authority, to improve fish habitat.

Floodplain - the land that may be submerged by flood waters. 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.

Geothermal resource - the natural heat energy of the earth; the energy, in whatever form, which may be found in any position and at any depth below the surface of the earth present in, resulting from, or created by, or which may be extracted from such natural heat, and all minerals in solution or products obtained from the material medium of any geothermal resource. Ground water having a temperature of 212 degrees Fahrenheit or more in the bottom of a well [Idaho Code 42-4002].

Ground water - all water under the surface of the ground whatever may be the geological structure in which it is standing or moving [Idaho Code 42-230].

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.

High water mark - the line that separates aquatic vegetation from terrestrial vegetation. The line which the water impresses on the soil by covering it for sufficient periods of time to deprive the soil of its terrestrial vegetation and destroy its value for commonly accepted agricultural purposes.

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 42-1731(5)].

Idaho batholith - the body of intrusive igneous (volcanic) rock in central Idaho about 250 miles long and a maximum of 100 miles wide. It is approximately 100 million years old.

Idaho Code - the Idaho laws, especially those pertaining to water issues.

Idaho Water Resource Board - a constitutional water agency within the Idaho Department of Water Resources consisting of eight appointed members pursuant to the provisions of Article 15, Section 7 of the Idaho Constitution [Idaho Code 42-1732].

Industrial water use - 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.

Irrigation - water used for irrigation of cropland. Residential lawn and garden uses are not included.

Interim protected river - a waterway designated pursuant to Idaho Code 42-1734D or 42-1734-H as protected for up to two (2) years while a component of the comprehensive state water plan is prepared for that waterway.

Kilowatt (kw) - a unit of electric power equal to 1,000 watts, or about 1.34 horsepower.

Main stem - the main channel of a river. In this plan it is referring to the Payette River from Middle Fork confluence to its mouth.

Mean high water mark - a water level corresponding to the natural or ordinary high water mark. The line which the water impresses on the soil by covering it for sufficient periods of time to deprive the soil of its terrestrial vegetation and destroy its value for commonly accepted agricultural purposes [Idaho Code 42-3802(h)].

Megawatt (MW) - a unit of electrical power equal to 1,000,000 watts, or about 1,340 horsepower.

Minimum stream (instream) flow - water that is not diverted and used, but remains for wildlife habitat, recreation, navigation, and aesthetic beauty. The minimum flow of water in cubic feet per second of time, or minimum lake level in feet above mean sea level, required to protect fish and wildlife habitat, aquatic life, recreation, scenic beauty, navigation, transportation, or water quality of a waterway in the public interest [Idaho Code 42-1502(f)].

Municipal water use - water for residential, commercial, industrial, irrigation of parks and open space, and related purposes, excluding use of water from geothermal sources for heating, which a municipal provider is entitled or obliged to supply to all those users within a service area, including those located outside the boundaries of a municipality served by a municipal provider [Idaho Code 42-202B(3)].

Natural river - a designation made by the Idaho Water Resource Board in comprehensive state water plans. It defines a waterway which possesses outstanding fish and wildlife, recreation, geologic, or aesthetic 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 [Idaho Code 42-1731(7)].

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 earth material [Idaho Code 42-1731(4)].

Preliminary permit - a Federal Energy Regulatory Commission 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.

Public interest (local) - with regards to water appropriations encompasses the affairs of the people of the area directly affected by the proposed use [Idaho Code 42-203A(5)].

Recreational dredge mining - operation of vacuum or suction dredges and power sluice equipment in which the nozzle is 5 inches or less, and the equipment rated at 15 horsepower or less, and capable of moving 2 cubic yards per hour or less.

Recreational river - a designation made by the Idaho Water Resource Board in comprehensive state water plans. It defines a waterway which possesses outstanding fish and wildlife, recreation, geologic or

aesthetic values, and which might include some man-made development within the waterway or within the riparian area of the waterway [Idaho Code 42-1731(9)].

Rental pool - a market for exchange of stored water operated by a local committee. The committee is appointed by the Board.

Riparian area - that area within 100 feet of the mean high water mark of a waterway [Idaho Code 42-1731(10)].

Riparian vegetation - vegetation that is associated with aquatic (streams, rivers, lakes) habitats.

River basin - total drainage or catchment area of a stream (i.e., the watershed).

River corridor - the area of varying width along both sides of a study river that may affect the management alternatives for that river.

River reach - a continuous section of a river from one point to another; i.e., a stretch of the river.

Scrub vegetation - vegetation dominated by shrubs, typically found at elevations below montane (mountain) vegetation.

State agency - any board, commission, department, or executive agency of the state of Idaho.

Stream bed - a natural water course of perceptible extent with definite bed and banks, which confines and conducts the water of a waterway which lies below and between the ordinary highwater mark on either side of that waterway [Idaho Code 42-1731 (12)].

Threatened species - a species, as determined by the U.S. Fish and Wildlife Service, that is likely to become endangered within the forseeable future throughout all or a significant portion of their range.

Total Maximum Daily Load (TMDL) - 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.

Unappropriated water - water which is not subject to diversion and use under prior existing water rights established by diversion and application to a beneficial use or by application, permit, or license on file or issued by the Director of Idaho Department of Water Resources [Idaho Code 42-1502(g)].

Vegetation types - any of several different plant communities that are found in the region of study.

Vested Rights - those rights that are fixed and not contingent upon any future actions, for example water right licenses and decrees or mining claims. A protected river designation cannot interfere with vested property rights existing on the date a waterway is designated. Non-vested rights include, but are not limited to, pending applications for appropriation of water.

Water right - the legal right, however acquired, to the use of water for beneficial purposes [Idaho Code 42-230(e)].

Water right application - an application filed by any person, association, or corporation with the Department of Water Resources, intending to acquire the right to the beneficial use of the waters of any natural streams, springs, or seepage waters, lakes or ground water, or other public waters of the state of Idaho [Idaho Code 42-202].

Waterway - a river, stream, creek, lake, or spring, or a portion thereof.

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.

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.

APPENDIX A

Issue Summary

The following list represents all comments provided by individuals attending public meetings held by the Idaho Water Resource Board in March through May 1997, Payette River Citizens Group workshops, and written comments. Ten broad categories were identified. Individual comments were organized under the appropriate heading. Repetitious comments were condensed to a single statement. The order of presentation does not indicate significance or importance of the issue. The Payette River Citizens Group reviewed this list when ranking issues, identifying those that they felt should be addressed in the Payette River Basin Comprehensive State Water Plan.

PROPOSED STATE PROTECTED RIVER DESIGNATIONS

a) Maintain current state protected river designations contained in the Payette River Reaches Comprehensive State Water Plan.

b) Consider additional reaches of the Payette River and tributaries for state protected river designation. Some suggestions include:

- •North Fork Payette - headwaters to Payette Lake
- •North Fork Payette River - Payette Lake Outlet to Cascade Reservoir
- •Deadwood River - Dam to Julie Creek
- •Upper Middle Fork Payette
- •South Fork Payette tributaries - Pine Creek and Clear Creek

c) Investigate option of Federal Wild and Scenic designation

WATER ALLOCATION

a) Concerns about affects from implementation of the
J Ditch Project for McCall effluent - What happens to stream water replaced by effluent? Prevent allocation of any increased instream flows.

b) Possibility of exploring adjustments and flexibility to releases and timing from storage projects to meet irrigator water rights and contracts, as well as water quality, flood management, private property owners, fisheries, wildlife, and recreation needs .

c) Quantify federal reserved water rights in the Payette River Basin (Forest Service).

d) Desire minimum stream flow between Upper Payette and Big Payette Lake.

e) Desire summer releases in the North Fork Payette between Payette Lake Outlet and Cascade Reservoir to provide sufficient flows for fishery and recreation.

f) Desire minimum stream flows on Deadwood River below Deadwood Dam-- fall and spring transitional flows, adequate winter flows for fishery maintenance.

g) Desire minimum stream flow at Letha.

h) Concerns about water used for salmon flow augmentation.

i) Concerns about the ponds constructed for stock and recreation use in Round Valley and impacts to downstream users.

j) Black Canyon Irrigation District wastewater use.

k) Water spreading of Black Canyon project water.

WATER STORAGE AND DELIVERY

a) Improve efficiency of water delivery for Payette River System irrigation system.

b) Desire to see more water conservation - reduction in irrigation return flows.

c) Concerns that gains in efficiency and water rental pools may affect instream flows.

d) Implement Cascade irrigation diversion efficiency study.

e) Comprehensive study of irrigation diversions, especially Lower Payette - opportunity to consolidate diversions and/or upgrade them.

f) Need funding for permanent diversion structures.

g) Problem with silt in sluice gates at Black Canyon.

h) Public safety issue for irrigation diversion improvements (Lower Payette/Cascade area).

i) Mud Creek over appropriated with many water rights on wastewater returns.

j) Beaver dams in drainage ditches needing removed.

k) If irrigation districts are to maintain instream flows in tributaries to Cascade Reservoir, must have technical capability/infrastructure to do so.

l) Instream flows below Letha, concerned about zero flows.

m) Would like to see improved diversion measuring, more gages on the Payette River System, improved measuring devices, etc.

n) Concerns that improved irrigation efficiency will result in forfeiture or partial forfeiture of water rights.

o) Need improvements to Letha gage, needs frequent cleaning and calibration.

MUNICIPAL WATER SUPPLY

a) Infrastructure needed for Emmett to meet water quality standards and growth - funding needed.

b) Emmett needs centralized water systems and tanks in new subdivisions to fight fires.

c) Ola needs water storage for fire protection to lower their insurance rating.

d) Concerns about a secure municipal water supply for Horseshoe Bend - have junior water right requiring purchase of storage water every year. Will they be able to purchase in a low water year?

e) Future water supplies for the Garden Valley area - - should they go to a community system?

f) Study explored community well system for Lowman residents -- cost too high, other options for funding or supplying water?

g) City of Donnelly may be asked to provide water to north shore of Cascade Reservoir area, may require additional well.

h) City of McCall still needs to fund Phase 2 of water treatment plant.

WATER QUALITY

a) Need to collect information to identify baseline water quality characteristics for specific reaches.

b) Concerns that land use development in areas with high water table and separate septic systems will adversely impact water quality of wells, groundwater, canals and rivers.

c) Leaking canals may cause rise in the water table and may contribute to potential water quality problems in areas with septic systems.

d) Concerns about density of land use and associated individual septic systems adjacent to rivers (particularly near South Fork Payette and Middle Fork Payette).

e) Concerns that constructing sewage treatment plants to address individual septic system issues will promote development in the floodplain.

f) Concerns that older development does not meet current regulations.

g) Stream bank stabilization needed along lower Squaw Creek and lower reach of the Middle Fork Payette to control erosion.

h) Concerns about oil and dust from roads getting into rivers and streams.

i) Desire to have a Watershed Advisory Group (WAG) to address water quality issues for the Middle Fork Payette.

j) Concerns about quality of ground water used as drinking water -- groundwater high in iron, magnesium and fluoride.

k) Concerns about untreated storm water from highways and roads and community storm water being dumped into ditches and rivers.

l) Water temperature and instream flow concerns for the lower Payette River.

m) Minimum instream flows needed to improve water quality for river reaches in the Payette River Basin .

n) Concerns about grazing and potential water quality impacts.

o) Concerns about State logging practices and streamside protection.

p) Water project on southside Cascade Reservoir currently not supported by locals.

q) Secure Cascade Reservoir 300,000 acre-foot conservation pool.

r) Communities in Lower Payette concerned that Total Maximum Daily Loads (TMDLs) Plan will prohibit future discharges from waste treatment plants and may require expensive infrastructure upgrades.

FLOOD MANAGEMENT

a) Concerns about land use development in floodplain and taxpayers potential liability for funding flood damage.

b) Is there still a need for repairs from the 1997 flood?

c) Concerns about responsibility for maintaining levees.

d) Concerns about coordination of levee construction and maintenance.

e) High water table in area causes flooding of basements during spring snow melt.

f) Need to update floodplain mapping in the basin.

g) Ice jamming causes problems in some areas of the basin.

RESOURCE DEVELOPMENT

a) Concerns about land use development and loss of agricultural land.

b) Concerns that urban growth will use more water.

c) Consider agricultural economics when subdividing land -- should not build houses on good agricultural land with good irrigation access.

d) Should Gem Irrigation District be given an exemption to build a hydropower project on the North Fork Payette River?

e) Numerous concerns expressed about construction of Gem Irrigation District's proposed hydropower project on the North Fork Payette River, including:

- diverting 100 cfs from the North Fork
- pipeline maintenance and erosion control, pipe blowouts
- construction material getting into river
- worried about view and aesthetics
- disruption to downstream irrigation needs - 100 cfs will put "hole" in river
- increased temperature through bypass reach
- affects to fisheries
- determining the real benefits to the affected counties -- taxes, employment
- feasibility of the project in the next 10-15 years with energy deregulation

f) Concerns about foreclosing future hydropower options and desire to have no new hydropower development in the basin.

g) Desire to have a geothermal swimming pool in Cascade.

h) Explore possible geothermal greenhouse development.

i) Explore possible aquaculture development.

j) Concern about timber industry paying fair share for road maintenance.

k) Consider Gold Fork Dam study proposal.

l) Investigate possibility of irrigating upstream of Ola.

FISHERIES

a) Change two fish catch limit on Squaw Creek.

b) Actions to preserve native trout, such as bull trout.

c) Improve fisheries in Cascade Reservoir, North Fork Payette River, and South Fork Payette River.

d) Establish minimum instream flows to protect fisheries.

e) Improve riparian areas on the North Fork Payette from Cascade Dam to Cabarton to improve fishery.

f) Alter diversions on the North Fork Payette, Gold Fork and Lake Fork so fish can return to spawn.

g) Improve diversion structures, measurement, fish screening, sediment removal to help fishery.

h) Enhance fishery in Boulder Creek through Donnelly for recreation attraction.

i) Desire minimum stream flow below Upper Payette Lake and Payette Lake.

AGENCY PLANNING AND COORDINATION

a) Concerns about difficulty getting 404 permit for bank stability work on Squaw Creek.

b) Concerns about coordination and duplication of effort between the Board's Payette River Basin Comprehensive State Water Plan and the Total Maximum Daily Load (TMDL) Plans being developed by the Watershed Advisory Groups (WAGs) for areas in the basin, i.e. Payette Lake, Cascade Reservoir, and Lower Payette.

c) Desire for U.S. Geological Survey to recognize the local naming convention for the main Payette River from the Middle Fork confluence to Banks by changing the name for this reach to the South Fork Payette.

RECREATION

a) River recreationists need to pay fees to help pay for services and facilities.

b) Concerned about Federal fee program being proposed for Payette recreational corridor - Where will the money go?

c) Concerns about traffic density on State Highway 55 and Forest Road 17.

d) Improve public access to rivers and streams.

e) More facilities needed for recreationists in the Garden Valley area such as rest rooms. Who will fund?

f) Control recreation and other development pressures.

g) Maintain the diversity of whitewater opportunities on the Payette River system and its values as a whitewater training area.

h) Concerns about increased use at Sagehen Campground and need for more patrolling.

i) Pressures from over use at Horsethief Reservoir.

j) Safety concern for boaters at municipal and hydropower intakes in Horseshoe Bend.

k) Need to remove tree branches from river's edge for recreation safety in the Middle Fork Payette and South Fork Payette, but do not want to impact aesthetics or fish habitat.

l) Safety improvements to diversions on Lower Payette for boaters.

m) Concerns about impacts to recreation from sedimentation problems at Black Canyon and Cascade reservoirs

n) Concern about volume of outfitted boating use.

o) Impacts of recreation use on water quality.

APPENDIX B

Strategies Considered

BACKGROUND INFORMATION

Ten issue categories were identified through public meetings, written comment and Payette River Citizens Group workshops. The Payette River Citizens Group prioritized and defined specific issues, problems and concerns, resulting in thirty-five problem statements. At the third Citizens Group workshop, participants broke into smaller groups and identified potential strategies, or actions, recommendations or policies, to address the issues in each category. Additional strategies were suggested in written comment. A master list of all potential strategies was compiled, resulting in more than 350 strategies which follow. These represent alternatives considered for the Payette River Basin Plan.

The Payette River Citizens Group reviewed these strategies and identified those they could support. Those with group support were forwarded to the Board as Payette River Citizens Group recommendations. Not all strategies listed below became recommendations.

PROPOSED STATE PROTECTED RIVER DESIGNATIONS

PROBLEM STATEMENT: *1) What reaches in the Payette River Basin should be considered for a state protected river designation?*
Note: Current state designations made in 1991 include:

- *North Fork Payette River from Cabarton Bridge to Banks - recreational river;*
- *South Fork Payette River from the Sawtooth National Recreation Area to Banks - recreational river; and*
- *Main Payette River from Banks to Beehive Bend - recreational river.*

POSSIBLE STRATEGIES:

1. Maintain the current state protected river designations as stated in the Payette River Reaches Comprehensive State Water Plan.
2. Eliminate all or some of the current designations.
3. Designate all bull trout focal habitat. Focal habitat is defined as critical areas supporting a mosaic of high quality habitats that sustain a diverse or unusually productive complement of native species.
4. Do not allow dams on any designated reaches.

North Fork Payette River

5. Designate the North Fork Payette from its headwaters to Payette Lake as recommended in the Big Payette Lake Management Plan.
6. Designate the North Fork Payette River - Payette Lake Outlet to Cascade Reservoir.
7. Delete the case by case allowance for hydropower on the North Fork Payette River (Cabarton to Banks).
8. Amend the North Fork Payette River designation from Cabarton to Banks to allow hydro.
9. Designate the North Fork Payette from Cascade Reservoir to the North Fork Payette River headwaters.

10. Designate the North Fork Payette River from headwaters to Payette Lake as a recreational river.

11. Designate the North Fork Payette from Payette Lake outlet to Cascade Reservoir as a recreational river.

12. Do not amend the North Fork Payette designation to allow Gem's hydropower proposal.

13. Designate Lake Fork from headwaters to mouth.

14. Designate the Gold Fork from headwaters to mouth.

South Fork Payette Subbasin

15. Designate the Deadwood River - dam to mouth.

16. Designate the Upper Middle Fork Payette.

17. Designate the following South Fork Payette tributaries - Pine Creek and Clear Creek.

18. Change the South Fork Payette designation (Deadwood River to Danskin) from recreational to natural.

19. Change the South Fork Payette designation (Deadwood River to Danskin) from recreational to no designation.

20. Designate the Deadwood River from the dam to its mouth as a state recreational river.

21. Designate the Middle Fork Payette from headwaters to Lightning Creek as a natural river.

22. Designate the Middle Fork Payette River from Lightning Creek to the confluence as recreational.

23. Designate Pine Creek and Clear Creek as natural.

24. Designate the South Fork Payette River from headwaters to Danskin as natural.

25. Designate the Middle Fork Payette a state recreational river from the headwaters to Tie Creek.

26. Designate the Deadwood River as natural.

27. Designate Middle Fork Payette above Boiling Springs.

Main Payette

28. Designate the Payette from Horseshoe Bend to Black Canyon as recreational, allowing irrigation diversions.

29. Designate Squaw Creek below Sagehen Dam.

WATER ALLOCATION

PROBLEM STATEMENT: *1) Instream flows are desired in Mud Creek and Lake Fork. The J-Ditch project may replace diversions from these two waterways with effluent from the City of McCall. How can we insure that any additional instream flows resulting from the J Ditch Project are not appropriated?*

POSSIBLE STRATEGIES:

1. Allow long-term rental from Little Payette Lake to be delivered to Cascade Reservoir.

2. The Board could file minimum instream flow on J Ditch water.

3. Implement an automated accounting system that will help track storage versus natural flow rights. Require natural flow rights replaced by effluent remain instream to mitigate potential impacts to downstream users on the North Fork Payette River.

4. It was suggested that this issue is already addressed and does not need to be looked at in the Payette River Basin Comprehensive State Water Plan.

PROBLEM STATEMENT: *2) Realizing that water contracts and existing water rights must first be met, how can additional goals or outcomes be accomplished through adjustments in releases from the storage system? What are the additional specific desired outcomes or goals (water quality, fisheries, recreation)?*

POSSIBLE STRATEGIES:

1. Utilize the Payette River Watershed Council as a forum to explore flexibility in timing and releases.

2. Conduct a flow optimization study, examining the entire Payette River storage system, including the advantages of coordinating releases between the Federal and private reservoirs in the system.

3. Coordination of rental pool waters to time release/delivery with periods when flow is needed instream.

4. Make the Payette River Watershed Council a conservancy district. (State legislation is required.)

5. Utilize the Snake River Resource Review decision support system (prepared by the U.S. Bureau of Reclamation) as a tool to evaluate water release options.

6. Involve the Watershed Advisory Groups in this process.

7. Review existing water rights for need and practicality.

PROBLEM STATEMENT: *3) Where are minimum instream flows in the Payette River Basin desired, and for what purposes?*

POSSIBLE STRATEGIES:

1. Desire minimum instream flows in the summer for the North Fork Payette between Payette Lake Outlet and Cascade Reservoir to provide sufficient flows for fishery and recreation, and to provide temperature/dissolved oxygen sanctuary for Cascade Reservoir fishery/water quality.

2. North Fork Payette below Upper Payette Lake for water quality and resident fisheries.

3. North Fork Payette below Cascade Reservoir for recreation and resident fishery.

4. Lake Fork between Little Payette Lake and Cascade Reservoir to provide redband/rainbow spawning and rearing, and to provide temperature/oxygen sanctuary for Cascade Reservoir fisheries.

5. Gold Fork below Gold Fork diversion dam to Cascade Reservoir to provide temperature/dissolved oxygen sanctuary for Cascade Reservoir fishery/water quality.

6. Desire minimum instream flows on Deadwood River below Deadwood Dam-- fall and spring transitional flows and adequate winter flows for fishery maintenance.

7. Main Payette River at Letha - for water quality maintenance.

8. Utilize the Snake River Resource Review decision support system (prepared by the U.S. Bureau of Reclamation) as a tool to evaluate water release options.

9. Involve the Watershed Advisory Groups in this process.

10. Recommend the Idaho Department of Fish and Game and Forest Service conduct instream flow studies on the Deadwood River below the dam. The agencies can approach the Board at a later date, if the study results indicate a minimum streamflow is warranted.

PROBLEM STATEMENT: *4) Numerous concerns about the use of water for salmon flow augmentation have been expressed including: the fear that irrigators will not have water in drought years, impacts from drawdown of reservoirs, the inability to acquire contracts for water to meet future needs, and the outcome of a study that is examining the possibility of acquiring additional salmon water. List specific concerns and possible alternatives to address these concerns.*

POSSIBLE STRATEGIES:

1. Shift "salmon" water releases from the Payette Basin to Upper Snake River storage, thereby reducing impacts in the Payette and improving flow and habitat conditions in the Snake River.

2. Identify opportunities elsewhere in the state for salmon flow augmentation, thereby freeing up Payette Basin water for other uses.

3. The State of Idaho should support alternatives to recover salmon and steelhead that do not require flow augmentation (e.g. the "normative river" alternative). Idaho Department of Fish and Game is currently working on such a proposal.

4. In-basin water uses should be satisfied before any water is used for salmon flow augmentation.

5. Support removing the four lower Snake River Dams as an alternative to salmon flow augmentation.

6. Ban all sport and commercial fishing and/or live trapping. Move harbor seals from the mouth of the Columbia River.

PROBLEM STATEMENT: *5) How can improved irrigation efficiency and water conservation occur without forfeiture or partial forfeiture of water rights? And is this desirable?*

POSSIBLE STRATEGIES:

1. Amend law to allow water right holder to conserve water without losing water right.

2. Amend law to allow transfer or gifting of water rights for instream flows.

3. Allow tax incentive for the value of water left in the stream that would otherwise be diverted for irrigation

4. The Board can establish a Water Supply Bank to allow rental of unused portion of natural flow water rights.

5. Allow a farmer to put the portion of his water right conserved into the State Water Supply Bank for future use or sale.

6. Minimize wasteful water practices, such as creating return flows for downstream users. Keep the water in the natural stream course as much as possible.

7. Analyze efficiency.

WATER STORAGE AND DELIVERY

PROBLEM STATEMENT: *1) How can the efficiency of the water delivery system be improved?*

POSSIBLE STRATEGIES:

1. Install a gage on the Middle Fork Payette River just upstream of its confluence with the South Fork Payette River.

2. Identify areas where automation can improve water delivery efficiency.

3. Improved diversion measurement.

4. Reduce leakage in canals.

5. Replace flood irrigation with more efficient systems.

6. Audit water rights and acres being irrigated.

7. Install a gage on the South Fork Payette upstream of Banks.

8. Make additional water measurements to further improve the automated accounting system for Water District 65, including measurement of smaller (30 cfs or less) diversions weekly and larger diversions daily. Hire an assistant Watermaster in Water District 65 to improve the ability to measure water on a regular basis.

9. Improve the method for tracking diversions at pumps. This is possible through installation of flow meters or calculation of power consumption coefficients.

10. Investigate the feasibility of revamping the old gage located on the North Fork Payette near Banks highway bridge.

11. Review the water delivery system and determine whether gages are necessary.

12. Identify a funding source for additional gages. Should it be financed through the general fund or should additional user fees be sought such as recreational interests?

13. Improve coordination amongst agencies by locating information generated in a central location.

14. Work with the watermasters.

15. Install automatic control and measuring devices in all major canals.

16. Identify canal leakage and repair.

17. The Board can establish a Water Supply Bank

18. Cost shaping.

19. Develop automated accounting systems for other water districts in the basin to improve water management such as Lake Fork and Boulder Creek.

20. Conduct a flow optimization study to include entire Payette River Basin.

PROBLEM STATEMENT: *2) Review irrigation diversion studies prepared for the Lower Payette and Cascade Reservoir areas, and identify opportunities to consolidate diversions and/or upgrade them.*

POSSIBLE STRATEGIES:

1. Identify recommendations in the two studies that have not been implemented and prioritize.
2. Integrate data from Idaho Department of Fish and Game irrigation diversion research project.
3. Should the Board deal with this issue?
4. Complete inventory analysis before making specific recommendations.

PROBLEM STATEMENT: *3) Identify opportunities for additional water storage in the basin for the purposes of municipal water supply, irrigation or flood control.*

POSSIBLE STRATEGIES:

1. Increase storage in Upper Payette Lake.
2. The Idaho Water Resource Board has identified an 80,000 acre-foot Gold Fork Reservoir as a potential storage reservoir in the Idaho State Water Plan. Keep this storage reservoir in the Idaho State Water Plan.
3. Amend State Water plan to protect Gold Fork for municipal supply.
4. Investigate the feasibility of the Fisher Creek Reservoir site.
5. Analyze small as well as large reservoir sites.
6. Investigate increased efficiencies versus building additional storage.
7. Recommend Idaho Department of Water Resources inventory sites and evaluate what is and is not available in the system.
8. Increase the storage capacity of Granite and Upper Payette lakes.
9. Increase storage at Deadwood Reservoir.
10. Does not support dams for additional water supply.
11. Increase the storage capacity of the existing Gold Fork Reservoir.

MUNICIPAL WATER SUPPLY

PROBLEM STATEMENT: *1) How can Emmett acquire the infrastructure or other options for meeting drinking water standards?*

POSSIBLE STRATEGIES:

1. Seek a loan or bond through the Idaho Water Resource Board.
2. Charge user fees to generate funds allocated specifically to a water treatment facility.
3. Investigate how similar communities have acquired funding.
4. Raise water rates.
5. Investigate funding options with the Environmental Protection Agency, the Idaho Division of Environmental Quality, or through community block grants.
6. Recommend the Board actively seek and obtain federal funding to construct these and other projects.

PROBLEM STATEMENT: *2) What options are there for Horseshoe Bend to obtain a secure municipal water supply to meet current demands and plan for future growth?*

POSSIBLE STRATEGIES:

1. Purchase water rights with a senior priority date from willing sellers.
2. Construct a reservoir.
3. Obtain a storage contract from the U.S. Bureau of Reclamation (This would currently require mitigating for salmon flow augmentation).
4. Drill new wells.
5. Investigate the possibility of acquiring wells drilled by the Idaho Transportation Department during realignment of State Highway 55.
6. Condemn senior water rights and compensate owners.
7. Use existing wells and treat water.
8. Purchase storage from one of the private reservoirs in the basin.

9. Get a grant from the Board to investigate the feasibility of various options to acquire a water supply.

10. The Board could establish a Water Supply Bank so that Horseshoe Bend could purchase water.

11. Go to the Idaho Legislature, and the Congressional delegation if necessary, to get the rules/law changed so that municipal water needs are met before any water, stored water in particular, is sent out of the basin.

PROBLEM STATEMENT: *3) Does the Garden Valley area want to consider a community system? And if so, where would the water come from, and how would they fund it?*

POSSIBLE STRATEGIES:

1. Construction of pipes to deliver water in the Middle Fork area could be a pricey project.

2. New development in area should pay its own way.

3. A sewage system should be constructed first.

4. Conduct a feasibility study to plan for future growth and improve future management of the water supply.

5. The Board can fund a feasibility study.

6. Construct a single well for a development, instead of a well for each lot, to minimize potential contamination of household water supplies, the groundwater, and interference from neighboring wells, and improve the management of the water supply.

7. A few good wells exist in the area that could form the nucleus of a central system.

PROBLEM STATEMENT: *4) How can the City of McCall fund Phase 2 of the water treatment plant?*

POSSIBLE STRATEGIES:

1. Seek a loan or bond through the Idaho Water Resource Board.

2. Investigate solutions other communities have pursued.

PROBLEM STATEMENT: *5) How can municipalities plan and secure water to satisfy future growth?*

POSSIBLE STRATEGIES:

1. The Idaho Code (42-202) provides that municipalities can appropriate water for reasonably anticipated future needs as determined through comprehensive plans or other supporting data. It would be beneficial for communities in the basin to review current comprehensive land use plans, or during revisions and updates, to examine whether current municipal water supply is adequate to meet projected future growth. If additional water is needed, water applications to meet projected future growth can be filed in advance.

2. Limit growth or spread growth.

3. Municipalities need to be able to purchase water contracts from rental pool.

4. Construct a series of storage reservoirs - look to headwaters.

5. Need more municipal water conservation.

6. Compensate irrigators to conserve water.

7. Purchase senior water rights and put into the Water Supply Bank until needed.

8. Recommend that the municipalities in the basin conduct a long range plan, investigating population projections and water needs, so they can plan accordingly.

9. Purchase storage from one of the private reservoirs.

10. Recommend municipalities implement water conservation measures, and restrict growth if necessary.

PROBLEM STATEMENT: *6) Where is the additional water for urban/municipal growth in the basin going to come?*

POSSIBLE STRATEGIES:

1. Construction of storage reservoirs.

2. Improved water conservation in the community to supply some of the future water demand.

3. Purchase senior water rights from willing sellers.

4. Promote municipal water conservation.

5. Water rates based on amount of water used (requires installing water meters).

6. Encourage agricultural water conservation.

7. Put a moratorium on growth if a secure and quality water supply is not available.

8. Recommend the Board establish a water supply bank, allowing the purchase and rental of natural water rights from water right holders that may not need all of their water right.

9. As a condition of development, municipalities could require developers to transfer all existing water rights to the city, who would in turn transfer this water into the State Water Supply Bank.

WATER QUALITY

PROBLEM STATEMENT: *1) How can septic system and well permitting be improved to reduce the potential of water quality impacts to wells or to ground water.*

POSSIBLE STRATEGIES:

1. Improve coordination between District Health and Idaho Department of Water Resources in the permitting of septic systems and wells.

2. Implement performance-based standards for septic and well siting and design as opposed to prescriptive type standards.

3. Improve permitting efficiency and coordination by providing one place for property owners to obtain permits for wells and septic systems.

4. Coordinate the location of subdivisions with Idaho Department of Water Resources and District Health.

5. Expand sewer districts.

6. Educate property owners, land developers, well drillers, and excavators (drainfields) about the necessity to properly locate wells and drainfields.

7. Require central water systems for developments of a designated density.

8. Combine Idaho Department of Water Resources, Idaho Division of Environmental Quality and District Health.

9. Well drillers should lose license if they locate wells improperly.

10. Idaho Department of Water Resources should require the well driller to acquire a plat from District Health, identifying drainfield and septic tank locations, before giving well permit.

11. Idaho Department of Water Resources should request information on well permit application about drainfield distance from well. This in effect requires the well driller to verify the location of drainfields and septic tanks before getting permission to drill well.

12. Pre-locate wells and drain fields when subdivision is developed

13. Require waste treatment for certain subdivisions of certain densities.

14. Recommend that Planning and Zoning not give variances to bypass recommendations of the District Health or the Idaho Water Resource Board.

15. More community water systems tested for water and fire protection.

16. Consolidate/delegate permitting and oversight responsibilities for domestic systems to one lead agency.

17. Promote the use of sewer systems for developments or communities instead of individual septic tanks for each lot.

PROBLEM STATEMENT: *2) Identify river reaches where minimum instream flows would improve water quality.*

POSSIBLE STRATEGIES:

1. North Fork Payette - below Upper Payette Lake

2. North Fork Payette - below Payette Lake

3. Lake Fork - below Little Payette Lake to Cascade Reservoir

4. Gold Fork River - below Gold Fork diversion dam to Cascade Reservoir

5. Payette River - Banks to Black Canyon

6. Payette River - below Black Canyon to Letha

7. Payette River at Letha

8. Payette River - Letha to Snake River

9. Improve irrigation delivery systems and dedicate the "saved water" to instream flows.

10. Inventory water rights that are no longer used in subdivisions and dedicate conserved water to instream flows.

PROBLEM STATEMENT: *3) Identify options for establishing the Cascade Reservoir 300,000 acre-foot conservation pool.*

POSSIBLE STRATEGIES:

1. The Idaho Water Resource Board could acquire a minimum stream flow/lake level water right.

2. 300,000 acre-foot is probably inadequate because of increased nutrient loads since 1981. 300,000 acre-foot is for the December - March period only. Determine adequate minimum pool for "non-winter" months.

3. Idaho needs to enforce State constitution and not allow federal agencies to take water.

4. Develop an integrated rule curve for Cascade Reservoir.

5. Recommend the Board purchase the storage needed to establish.

6. Recognize the 300,000 acre-foot in the Idaho State Water Plan as state policy.

PROBLEM STATEMENT: *4) How can sediment contributions from roads be mitigated? (Sediment increases streambank erosion (also causing downstream deposition), and therefore increases frequency and number of applications for stream channel alterations.)*

POTENTIAL STRATEGIES:

1. Use silt fences and check dams where needed.

2. Do not allow expansion of State Highway 55 along the Payette and North Fork Payette rivers.

3. Eliminate the sidecasting of debris by railroad into the Payette and North Fork Payette rivers.

4. Limit road building in critical tributaries and drainages.

5. Minimize negative logging and grazing impacts.

6. Protect riparian zones.

PROBLEM STATEMENT: *5) How can potential water quality impacts (for example temperature and nutrients) from return flows be minimized?*

POTENTIAL STRATEGIES:

1. Reduce application rates of irrigation water, leaving more water in streams and reducing return flows.

2. Build settling basins on irrigation drains.

3. Salt leaching problem at Idaho Transportation Department's Horseshoe Bend maintenance yard needs to be corrected.

FLOOD MANAGEMENT

PROBLEM STATEMENT: *1) How do we manage land use development in the floodplain and minimize taxpayers' liability for flood damage?*

POSSIBLE STRATEGIES:

1. Enactment of House Bill 660aa, addressing floodplain management, gives local jurisdictions authority to adopt floodplain ordinances. Recommend that all communities respond by adopting floodplain ordinances and/or participating in the National Flood Insurance Program which will allow private property owners the opportunity to purchase flood insurance.

2. Recommend local governments apply stricter standards regarding development in the floodplain.

3. Require development in floodplain to maintain the floodway. Give them directions as to what they can and cannot do. Provide procedures. Provide access to do maintenance.

4. Prohibit residential development in the floodplain.

5. Plan and manage in advance for future floods. Stop ignoring the potential for flooding and plan for flood events.

6. Define and map flood zones more accurately.

7. Building in the 100-year floodplain should be accomplished without using fill, so that the ability of the floodplain and floodway to move and carry water are not impacted.

8. Idaho Department of Water Resources can provide technical advice to local planning efforts.

9. When dealing with issues involving floodplain development.

10. Enact state level regulations about floodplain development patterned after the Federal Emergency Management Agency regulations.

11. Do not allow building in the 50-year floodplain.

12. Do not allow building in the 100-year floodplain.

13. Build at your own risk in the 100-year floodplain.

14. Elevate foundations of buildings located in the floodplain.

15. Idaho Department of Water Resources could photograph and review flood events to update floodplain maps. Disseminate this information to appropriate county officials.

16. Remove gravel and silt bars, and other blockages in the river.

PROBLEM STATEMENT: *2) Identify any 1997 flood damage needing repair.*

POSSIBLE STRATEGIES:

1. Obtain a list from the Corps of Engineers, Idaho Department of Water Resources, Soil Conservation Districts, farm service agencies, Natural Resources Conservation Service, and Federal Emergency Management Agency of unfunded or uncompleted flood-related projects.

2. Remove gravel and silt bars, and other blockages in the river. Who can remove?

PROBLEM STATEMENT: *3) How to improve maintenance and management of the levee system along the Payette River from Horseshoe Bend downstream?*

POSSIBLE STRATEGIES:

1. Form a committee comprised of representatives from each jurisdiction to study the levees as a complete system, and develop a coordinated plan to manage and maintain the system.

2. Form a Flood Control District.

3. Taxation authority for Flood Control Districts needs to extend to at least those properties within the 100-year floodplain, rather than immediately adjacent to the river, to include all beneficiaries of flood management activities.

4. Recommend each county's Disaster Services Coordinator coordinate with the other jurisdictions along the river to ensure levees are adequately maintained.

5. Individuals should have authority to fix the damage. Allow those already in floodplain to maintain the floodway. Give them directions as to what they can and can not do. Provide procedures. Provide access to do maintenance.

6. Do not allow replacement of broken dikes and levees.

7. Flood management should not focus on using river channelization or other structural stream channel alteration controls as an approach.

8. Identify stream channel protection measures using non-structural flood control methods.

9. Accomplish flood management by protecting stream channel function, fisheries and water quality.

10. Develop a multi-agency Technical Advisory Committee to assist Flood Control Districts in their efforts to manage levees, and not impact other resource values.

11. Improve the levee system inventory, and spatially identify the location of all levees using Global Positioning System (GPS) technology.

PROBLEM STATEMENT: *4) How do we update floodplain mapping in the basin to reflect current river channel capacity?*

POSSIBLE STRATEGIES:

1. Obtain aerial photography produced during the 1997 flood event, and identify an entity to input this information into a geographic information system so maps can be produced.

2. Develop accurate 100, 50 and 25-year flood maps.

3. Require developers to help pay for new flood mapping.

4. Make all mapping available to potential new owners.

5. Start a state level floodplain mapping program that would be more responsive to the State's needs, patterned after other western states such as Colorado and Montana.

6. Recommend that the Board request the Federal Emergency Management Agency to update floodplain mapping for the Lower Payette.

7. Develop computer modeling to determine what is inundated at various flows.

8. Idaho Department of Water Resources could photograph and review flood events to update floodplain maps. Disseminate this information to appropriate county officials.

RESOURCE DEVELOPMENT

PROBLEM STATEMENT: *1) Should Gem Irrigation District be given an exemption to build a hydropower project on the North Fork Payette River? (Why or why not?)*

COMMENTS:

1. Hydro is a renewable clean resource.

2. The project will increase the property tax base for the counties.

3. The project will provide jobs and economic benefits.

4. Hydropower is cleanest and most environmental friendly of electrical production.

5. Not until a market is found and the economics (cost/benefit) are reviewed.

6. No, should not allow exemption. Concerns: senior water right, blasting (changes in bedrock structure), "sold bill of goods" from proponents, insufficient studies, i.e. questions about pipe location–do they really have 10 ft. right-of-way from railroad?

7. The project is only marginally feasible from an economic standpoint.

8. Power would likely go elsewhere under deregulation, because it will be expensive to produce and need to be sold at higher prices than current Idaho Power Company rates.

9. Do not support, because the project would change the character of the river.

10. The project is too incomplete to consider.

11. The project is not economically feasible and not competitive in the current energy market.

12. It is not in the best interests of Idaho residents. It is a private sector project and has no public sector benefits.

13. Decision should be weighted on opinions of residents of Boise and Valley counties.

14. Support is dependent on degree of environmental impact – If can hide intake and power plant, then should be no problem for aesthetics, railroad scenic trip, and river running.

15. Need to determine first whether really need power.

16. Only way to consider exemption is if all concerns mentioned today are completely addressed.

17. Investigate other options to find revenue to maintain and fund Gem Irrigation District infrastructure.

18. Alternative energy sources should be explored before constructing more hydropower in the basin.

19. Gem Irrigation District should first have to insure that the project, including transmission lines, is physically and environmentally feasible. (Include an independent engineer's evaluation to determine this.)

20. Insure that the project, including transmission lines, is economically feasible. This would include an independent financial analysis projecting the impact of deregulation.

21. Best to wait until the next plan update to consider this project, because we will know the consequences of deregulation.

22. Insure that Gem Irrigation District has obtained all the necessary right-of-ways for the project, including from the State of Idaho and Boise Cascade Corporation.

23. Insure that the construction of the project will not interfere with the railroad delivery schedules.

24. Insure that the developer has the financial ability to fix any environmental disaster created by a potential blowout of this high pressure system.

25. Determine Boise and Valley county residents' thoughts.

PROBLEM STATEMENT: *2) Are there additional hydropower options in the basin that need to be considered?*

POSSIBLE STRATEGIES:

1. Retrofit and upgrade all other sites in Idaho before building new ones.

2. Investigate small hydro - small plants that serve one or two houses and are not on the grid.

3. Use wind and solar power.

4. Research and document areas of potential hydropower development in the Payette River Basin.

5. None feasible on the South Fork Payette.

6. Development at Deadwood Dam not feasible because of access - too costly.

7. Nothing feasible at this point in time (economically).

8. Energy conservation should be explored.

9. Investigate Deadwood Dam, Payette Lake Dam, Gold Fork (if developed for storage), and expanding the capacity of Black Canyon Dam.

10. Investigate the possibility of developing small hydropower options on some of the smaller storage facilities and diversions.

FISHERIES

PROBLEM STATEMENT: *1) How can the quality of fisheries in Cascade Reservoir, North Fork Payette, Main Payette, Middle Fork Payette, and South Fork Payette rivers be improved?*

POSSIBLE STRATEGIES:

1. Improve diversion structures, measurement, fish screening, and sediment removal.

2. Obtain minimum instream flows for fishery maintenance (See Problem Statement 3).

3. Maintain constant water level in river.

4. Recommend Idaho Department of Fish and Game improve fishing opportunities through entire system (i.e., increased fish plantings).

5. Consider alternative algae management possibilities (e.g. Europe uses"algae eaters").

6. Control shoreline / river bank sediment / nutrient pollution from grazing (e.g. bank erosion) and other sources (homeowner fertilizers, wave actions).

7. Overfishing impacts certain areas (no specific areas mentioned).

8. Improve riparian habitat.

9. Consider utilizing "refrigerator incubators." These are currently used in the Clearwater Basin.

10. Manage for catch and release only, or reduce the daily bag limit.

11. Form a basinwide water users advisory group (Payette River Watershed Council) to work with Water District 65 to help release water efficiently to provide as many uses as possible while meeting primary responsibility to irrigators.

12. Limit road building in forests.

13. Take care of effluent (nutrients) coming off pastures adjacent to rivers and reservoir.

PROBLEM STATEMENT: *2) Identify possible modifications or improvements to diversions on the North Fork Payette, Gold Fork and Lake Fork to help improve fish passage and spawning.*

POSSIBLE STRATEGIES:

1. Modify diversions to allow fish passage on Lake Fork and Gold Fork.

2. Install fish screens at diversions on Lake Fork and Gold Fork.

3. Improve water delivery efficiency on the Lake Fork and Gold Fork systems to improve instream flows.

4. Orient diversion openings so that they are parallel to flows on the Lake Fork and Gold Fork, thus minimizing fish diverted into ditches.

5. Position diversion structure overflows where fish can most easily use.

6. Install a fish ladder at Gold Fork Diversion and Browns Pond Dam.

PROBLEM STATEMENT: *3) Identify river reaches where minimum instream flows are needed to protect fisheries.*

POSSIBLE STRATEGIES:

1. North Fork Payette River - below Upper Payette Lake for rainbow trout and kokanee spawning.

2. North Fork Payette River - below Payette Lake for resident fishery.

3. North Fork Payette River - below Cascade Reservoir for resident fishery.

4. Deadwood River - below Deadwood Dam for winter fishery maintenance.

5. Lower Payette - Black Canyon Dam to Letha.

AGENCY PLANNING AND COORDINATION

PROBLEM STATEMENT: *1) How can the permitting process for stream channel alterations be more efficient, particularly during emergency situations?*

POSSIBLE STRATEGIES:

1. Allow replacement of flood-damaged structures as they existed pre-flood without new permits.

2. Provide for pre-approval of river reach channel alterations developed as part of a flood repair plan. Work can then be done at owner's convenience and before floods occur.

3. Idaho Department of Water Resources can hold public information meetings in areas susceptible to flooding and identify stream channel protection measures needed before flood season.

4. Promote the use of non-structural stream control measures that do not require a stream channel alteration permit.

5. Reaffirm the Idaho Department of Water Resources minimum standards for stream channel alterations to promote attaining basin plan goals.

6. Adequately fund agencies to review onslaught of applications after flood events.

7. Certify contractors with training in hydrology/river mechanics; only they can perform strategies 1 & 2.

8. Consolidate/delegate permitting responsibilities to one agency, preferably a state agency.

9. Consolidate all stream channel alteration permit functions under the authority of the Idaho Department of Water Resources.

10. Involve the Natural Resources Conservation Service and districts.

11. People as a body should have the power to override authorities to implement activity.

12. Allow repair or replacement of structures to "nearly" as they were.

13. Recommend the Idaho Department of Water Resources train additional staff in advance to help with permitting during emergency situations.

14. Streamline the process for emergency situations. If a structure is lost during a flood, can some steps be skipped?

15. Idaho Department of Water Resources can conduct workshops in advance to educate before the permitting process. Explain why permits are needed; what can and cannot be done; and general river mechanics.

16. Maintain continuity in communication between the Idaho Department of Water Resources and Army Corps of Engineers, having one entity to handle all communication with property owner. Can Idaho Department of Water Resources handle all?

17. Move people out of the floodplain in critical areas: Stop issuing building permits in the floodplain and reduce the number of stream channel alteration permits issued.

18. Idaho Department of Water Resources can issue permits on the spot in emergency situations. The Army Corp of Engineer permits take several days. If the Department cannot take over the permitting process, arrange for team permitting during emergency situations, i.e. the Army Corp of Engineers staff accompanies Department staff in the field and they issue the permits simultaneously.

PROBLEM STATEMENT: *2) How can we ensure that the Payette River Basin Comprehensive State Water Plan does not duplicate the efforts of the Basin Advisory Groups (BAGs) and Watershed Advisory Groups (WAGs) in the Payette River Basin?*

POSSIBLE STRATEGIES:

1. The Board and Division of Environmental Quality will closely coordinate and monitor each other's efforts. The Payette River Basin Comprehensive State Water Plan will not address issues outside the Board's authority that will be addressed in Total Maximum Daily Load Plans.

2. The Payette River Basin Comprehensive State Water Plan will take actions to implement recommendations made in the Big Payette Lake Management Plan and Implementation Program that are consistent with the Board's authorities.

3. Idaho Department of Water Resources should regularly attend Watershed Advisory Group / Basin Advisory Group meetings and sit on Technical Advisory Committees.

4. The Board and Idaho Division of Environmental Quality will closely coordinate and monitor each other's efforts.

5. Maintain ongoing peer review of the Idaho Water Resource Board's program by the Idaho Division of Environmental Quality.

6. Emphasize that efforts will <u>not</u> be duplicated.

7. Coordinate with the Water District 65 Watermaster.

8. Identify opportunities for the Board to educate the public about how comprehensive state water plans differ from the activities of the Watershed Advisory Groups and Basin Advisory Groups.

9. Combine the Idaho Department of Water Resources and Idaho Division of Environmental Quality as one agency to eliminate duplication and inefficiencies.

PROBLEM STATEMENT: *3) How can we get all agencies to refer to the river reach from the Middle Fork Payette confluence to Banks as the South Fork Payette?*

POSSIBLE STRATEGIES:

1. The Idaho Water Resource Board will complete the necessary paperwork to request a name change with the U.S. Board of Geographic Names. Boise County Coalition will help the Board with this effort, coordinating with local jurisdictions.
2. Disseminate information about name change to the agencies.
3. Use the new name verbally and on paper.
4. Consolidate all agencies, or at least, establish one group using common terminology.

RECREATION

PROBLEM STATEMENT: *1) How can impacts to rivers in the basin from recreation activities be reduced? What services and facilities are needed to address these impacts, how do we fund them, and who should provide them? Impacts that need to be addressed include trampling of riparian vegetation, private property trespass, adequate parking and restroom facilities, and additional sites to reduce crowding and provide access to the disabled.*

POSSIBLE STRATEGIES:

1. Funds may be available from the Waterways Improvement Fund administered by the Idaho Department of Parks and Recreation.
2. Tax hydropower development and use the funds for recreation.
3. Mitigation for hydropower projects can involve recreation facilities.
4. Bureau of Land Management, Forest Service and Idaho Department of Parks and Recreation should charge a fee for the boats and not per car.
5. Open up area along the highway where the guardrail is to provide more parking sites off the road. Spread out the use.
6. Modify Idaho Code to allow counties to tax river use.
7. Provide more facilities along the river such as garbage drops and restrooms, particularly from Banks downstream.
8. Provide more disabled access.
9. Limit all recreation uses.
10. Limit outfitter use.
11. Charge user fees.
12. Use designated boat access areas only.
13. Recommend boating community educate and police itself as to problems seen by the locals.
14. Charge commercial outfitters additional fees to offset the impact of large groups (i.e., bus and van loads of people and multiple trips per day).
15. Limit outfitters on crowded weekends.
16. Require float boats to be licensed, similar to powerboats.
17. Encourage those with even numbered license plates to boat on Saturday, and odd numbered license plates to boat on Sunday.
18. Shift responsibility for payment of impacts to the users. Assess fines to help finance.

PROBLEM STATEMENT: *2) Identify ways to improve traffic management on State Highway 55 and the Banks-Lowman Highway (Forest Road 17).*

POSSIBLE STRATEGIES:

1. Construct the Indian Valley alignment, routing traffic to the west of State Highway 55.
2. Install a traffic light at the intersection of State Highway 55 and the Banks-Lowman Highway.
3. Provide new north-south road at a different location.
4. Use rail transportation.
5. Close the railroad and use the right-of-way to make two lanes north and two lanes south.
6. Provide more passing lanes and turnouts.
7. Do not widen State Highway 55, because of sediment impacts to the river and Black Canyon.

8. Install as many good "designated parking only" pull-offs and enforce the same.

9. Use rail or scenic bus trips to reduce traffic.

PROBLEM STATEMENT: *3) How can the diversity of recreation opportunities on the Payette River system be maintained?*

POSSIBLE STRATEGIES:

1. Responsible shared use of recreation resources.

2. Eliminate leases of old roadway right-of-ways on the North Fork Payette by Idaho Transportation Department and Idaho Department of Lands so all recreation users can access them.

3. Improve fisheries management by more intensive stocking from Banks to Smiths Ferry. This will provide more use by tourists and improve the economy.

4. Increase the fish limit on the South Fork.

5. Decrease the fish limit on the North Fork.

6. Forest Service should keep the camp sites open as long as possible -- into hunting season if possible.

7. Provide adequate access to allow recreationists to find what meets their needs.

8. Locate a greenbelt along as much of the Payette River and North Fork Payette River as possible (i.e., the railroad grade from Emmett to Cascade; the greenbelt around Cascade to McCall).

9. Work with county commissions and planning and zoning in the development of comprehensive land use plans, etc. to provide access and opportunities.

10. Control commercial boating use.

11. Promote responsible and cooperative water delivery management working through the Payette River Watershed Council.

12. Manage recreation opportunities by establishing a "Board" with at least half the members representing conservation and recreation interests.

APPENDIX C

Payette River Citizens Group

The Payette River Citizens Group consists of individuals representing various water users in the basin, including irrigators, local government, property owners, fishermen, boaters, ranchers, the timber industry and hydropower. People representing these and other interests were contacted and invited to participate in workshops conducted in April through June 1998. However, membership and participation in the Payette River Citizens Group was open. Any interested citizens could become a member by attending Payette River Citizens Group workshops.

The Citizens Group was formed to advise the Idaho Water Resource Board during the development of a comprehensive state water plan for the Payette River Basin. The Citizens Group informed the Board about local concerns, reviewed information used in the development of the plan, and provided feedback and suggestions for the Board's consideration. During Payette River Citizens Group workshops, the group ranked issues, developed goals, and identified actions and recommendations to submit to the Board.

The following is a list of the Payette River Citizens Group, consisting of all individuals attending at least one Payette River Citizens Group workshop conducted from April through June 1998.

Marilyn Arp - McCall City Council
Fred Bell - Western Whitewater Association
Hank Berntsen - Gem Soil Conservation District
Dick Beyers - Horseshoe Bend City Council
Jack Biddle - Holladay Engineering Co.
Steve Bliss - Northwest Timber Workers Resource Council, Boise County Coalition
Chet Bowers - Idaho Wildlife Federation
Judy Boyle - Congresswoman Helen Chenoweth's Office
Marti Bridges - Idaho Rivers United
Ted Century - Idaho Rivers United
Joan Cochrane - Idaho Rivers United, Horseshoe Bend Citizen
Phil Davis - Valley County Commissioner
Steve Dobson - Chairman, Water District 65
Maryjane Dobson - Irrigator, Water District 65
Jan Donley - Boise County Coalition
George Earll - Western Whitewater Association
Joe Eld - Roseberry Irrigation District
Kyle and Fern Ellis -Round Valley ranchers
Paul Erickson - Consultant for Gem Irrigation District
Steve Ethington - Gem Soil and Water Conservation District
Lois Evans - private citizen
Louis Fausset - South Lake Recreational Water and Sewer District
Jackie Fields - City of McCall
Jack Fisher - Region 3 Idaho Wildlife Council
Randall Fredricks - Cascade Reservoir Association
Mike Fry - Southwest Basin Native Fish Watershed Advisory Council
Kirk Hall - Big Payette Lake Water Quality Council
Marcia Herr - Letha Irrigation and Water Company
Tom Hoppell - City of Emmett
Representative Twila Hornbeck - District 8
Jerry Howard - High Valley citizen
Clyde Hutton - Gem Irrigation District
Linda Jenkins - Boise County Coalition

Warren Jindrich - Idaho Gold Prospectors Assoc.
John Kienitz - Idaho Farm Bureau
Paul and Gretel Kleint - Valley County Soil and Water Conservation District, Boulder Creek Water District
Chuck Knapp - private citizen
Julian Landa - Gem Irrigation District
Mark Limbaugh - Watermaster for Water District 65, Payette River Watershed Council
Al Malmstrom - Idaho Gold Prospectors Association
Mike McDonough - Horseshoe Bend rancher
Jessie Miller - High Valley citizen
Mack Miller - Roseberry Irrigation District
Shawn Miller - Idaho Trout Unlimited
Tuck Miller - flyfisherman
Carl L Myers - Gem Irrigation District
Herald Nokes - Lake Irrigation District
Ed Obermeyer - Enterprise Ditch Company
Dar Olberding - Emmett Irrigation District
Al Palin - Idaho Gold Prospectors Association
Harold Raper - Boise County Commissioner
Bruce Reay - Boise Cascade Corporation
Jayne Reed - Garden Valley citizen
Karl and Sue Siller - Emmett Irrigation District
Perry Silver - private citizen
Joy Sisler - Gill Slough
Joanne Smith - Boise County Coalition
Vaughn Spiker - Ola citizen
Wayne VanCour - Cascade Reservoir Coordinating Council, Payette River Watershed Council
Tracy Walton - Gem County Farm Bureau
John Wasson- Garden Valley citizen
Charles H. Williams - private citizen
Barbara K. Wilson - City of Payette
Ed Wood - Round Valley citizen
Dave Wroblewski - private citizen
Rocky Yoneda - Western Whitewater Association

Agency Representatives

Don Anderson - Idaho Department of Fish and Game
Kim Apperson - Idaho Department of Fish and Game
Rick Brown - Idaho Dept. of Park and Recreation
Tonya Dombrowski - Idaho Division of Environmental Quality
Scott Grunder - Idaho Department of Fish and Game
Dave Hale - Boise National Forest
Marty Jones - Central District Health Department
Mary Lucachick - Idaho Department of Parks and Recreation
Randy Phelan - Natural Resource Conservation Service
Rick Rieber - U.S. Bureau of Reclamation
Cindy Robertson - Idaho Department of Fish and Game
Warren Sedlacek - U.S. Bureau of Reclamation
Tom Turco - Central District Health
Perry Whittaker - Idaho Department of Lands

Summary of Payette River Citizens Group Workshops

The following summarizes activities at the five Payette River Citizens Group workshops that occurred in April through June 1998. Detailed meeting minutes are located in the Idaho Department of Water Resources Planning Bureau files.

Workshop #1 - Thursday, April 2, 1998; 10 a.m. - 4 p.m.; Horseshoe Bend Senior Citizens Center

The meeting began with introductions of those in attendance. Background information about the Payette River Reaches Plan adopted by the Board in 1991 was provided. The regulatory requirements of comprehensive state water plans was reviewed. The planning approach and schedule for the current Payette River Basin Plan was presented. The roles of the Board, Idaho Department of Water Resources and the Payette River Citizens Group in preparing the Payette River Basin Plan was discussed. Ground rules for Payette River Citizens Group workshops were established.

Phil Rassier, Attorney General for the Idaho Department of Water Resources, presented information 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; forfeiture of water rights; and the Snake River Basin and Payette River Basin adjudications.

Rick Wells with the U.S. Bureau of Reclamation provided an overview of operation of the federal storage system in the Payette River Basin. He described how storage space is allocated in the two federal storage reservoirs - Cascade and Deadwood. He reviewed operation in a typical water year and operation during the recent flood in water year 1997.

Ten categories of issues, concerns and problems identified during public meetings were reviewed. These issues were ranked by citizens at an earlier public information meeting. The top-ranking issues for each category were reviewed by the Citizens Group. Members suggested additional issues they desired to consider. This list comprised the issues the Payette River Citizens Group will address at remaining workshops to identify goals and develop actions and recommendations for the Board's consideration. Three of the ten issue categories (Agency Planning and Coordination, Proposed State Protected Designations, and Flood Management) were discussed in more detail to clarify and define problems.

Workshop #2 - Wednesday, April 29, 1998; 10 a.m. - 4 p.m.; Horseshoe Bend Senior Citizens Center

The majority of the meeting focused on examining and discussing priority issues for the seven remaining categories -- Water Quality, Resource Development, Fisheries, Water Storage and Delivery, Municipal Water Supply, Water Allocation, and Recreation. The discussions allowed Citizens Group members to share their knowledge and clarify the context and scope of the problems identified. General information about the Board's minimum instream flow water right program was provided.

Mark Limbaugh, Watermaster for Water District 65, discussed water district functions. Mark reviewed river operations, storage water delivery and accounting, and rental pool operation.

Workshop #3 - Wednesday, May 27, 1998; 10 a.m. - 4 p.m.; Horseshoe Bend Senior Citizens Center

The third Payette River Citizens Group workshop focused on four areas: the Board's minimum instream flow program; Gem Irrigation District's proposed hydroproject for the North Fork Payette River; draft goals and objectives for the Payette River Basin Plan; and strategies to address priority issues.

Information on two minimum instream flow requests were presented. Legislation directed the Big Payette Lake Water Quality Council to prepare a Big Payette Lake Management Plan. The plan recommends the Board acquire a minimum instream flow on the North Fork Payette River below Upper Payette Lake to protect kokanee spawning and resident trout species. Cindy Robertson of the Idaho Department of Fish and Game presented the results of a technical study supporting the requested minimum instream flow. Idaho Rivers United, with Idaho Department of Fish and Game's support, requested that the Board apply for a minimum instream flow on the North Fork Payette from Payette Lake outlet to Cascade Reservoir backwaters to maintain and protect wildlife habitat, aquatic life, recreational and water quality values.

Clyde Hutton of Gem Irrigation District presented information about a proposed hydropower project on the North Fork Payette River. The proposed project would be located in the Smiths Ferry to Banks reach which is currently designated as

a state recreational river, prohibiting construction of hydropower projects. Gem Irrigation District has requested that the Board amend the designation to allow its project. Questions, concerns and support for the project were documented.

A draft set of objectives and goals were distributed. Objectives guiding the Board in the development of comprehensive state water plans were taken from the Idaho Code. Two pages of draft goals were prepared for the ten issue categories identified by the Citizens Group. These draft goals were developed based on the discussions at the previous Citizens Group workshops, and from review of goals contained in the current Payette River Reaches Comprehensive State Water Plan. The Citizens Group was asked to review the goals and submit any comments, changes or additions, so a second draft could be prepared.

The remainder of the workshop focused on developing strategies. Strategies are actions, recommendations or policies that help to solve an issue or problem. The priority issues were restated as problem statements and presented in a worksheet. Meeting participants were divided into four groups to brainstorm strategies for each of the problem statements. The objective of this exercise was to generate many ideas.

Workshop #4 - Wednesday, June 17, 1998; 10 a.m. - 4 p.m.; Horseshoe Bend Senior Citizens Center

The main agenda items for the fourth Payette River Citizens Group workshop were to receive information about bull trout in the Payette River Basin, review a second draft of goals for the Payette River Basin Comprehensive State Water Plan, and evaluate potential strategies.

Scott Grunder of the Idaho Department of Fish and Game discussed bull trout in the Payette River Basin. He briefly described bull trout biology including the life history, reproduction, habitat and distribution. He also discussed the problems and threats to species persistence, and the recovery approach as summarized in Governor Batt's Bull Trout Conservation Plan (1996).

A second draft of goals for the Payette River Basin Comprehensive State Water Plan was distributed that reflected the comments and suggestions received from the Payette River Citizens Group. The second draft was discussed and additional suggestions for revision made. Staff from the Idaho Department of Water Resources agreed to prepare a final draft that would reflect these comments.

The Payette River Citizens Group evaluated more than 350 proposed strategies. The Citizens Group reviewed all the strategies, and individually identified those they could not support. Evaluation results were summarized at the end of the meeting, focusing on the strategies which received group support. The Citizens Group reached consent on about 20 percent of the strategies. All issues had strategies with group support, except state protected designations, minimum instream flows, hydropower development in the basin, salmon flow augmentation, and diversion upgrades and consolidation. Those strategies with group agreement will be presented to the Board for inclusion in the Payette River Basin Plan.

The group discussed how to address those strategies lacking Citizens Group agreement. It was decided the next workshop would focus on state protected river designations, minimum instream flows, and the North Fork Payette hydropower project. The Citizens Group would attempt to reach consent on strategies not supported by three or fewer individuals. If time allowed, other issue categories

would be discussed, again focusing on strategies with three or fewer not supporting.

Warren Jindrich of the Idaho Gold Prospectors Association provided some background information to the Citizens Group about recreational dredge mining.

The Idaho Department of Water Resources distributed draft resource evaluations for fish and wildlife, recreation and scenic values in the basin. The document would be discussed at the Payette River Citizens Group workshop scheduled next week.

Workshop #5 - Wednesday, June 24, 1998; 10 a.m. - 4 p.m.; Horseshoe Bend Senior Citizens Center

The main agenda items for the final Payette River Citizens Group workshop included finalizing goals and strategies to submit to the Board. The strategy evaluation results from last week's workshop were reviewed, focusing on the number of strategies that the group found acceptable. A final draft of the goals was reviewed, some changes made, and final goals approved.

Presentation of criteria used to identify outstanding fish and wildlife, recreation, and scenic values for waterways in the basin were presented. Dave Greegor, aquatic biologist with the Idaho Department of Water Resources, described the biological evaluation. The evaluation reviewed available data for aquatic and riparian habitat and species, and the presence of crucial species and habitat. Ellen Berggren, water resources planner with the Department, reviewed recreation and scenic values criteria. The Citizens Group was asked to review the criteria and provide comments.

During the second half of the meeting, the Citizens Group discussed state protected river designations, minimum instream flows, and Gem Irrigation District's hydropower project, attempting to reach consent about recommendations for these items. Several recommendations were agreed to by the group and are documented in the Workshop Summary available from the Idaho Department of Water Resources.

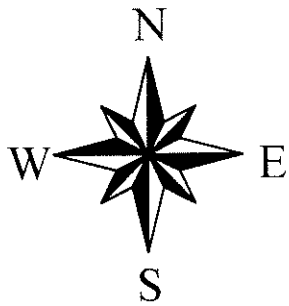
Joe Jordan of the Idaho Water Resource Board summarized a letter the Board is sending to Gem Irrigation District, asking for some additional information about the North Fork Payette hydropower project based on public comment and concerns about the project. The letter requests the following information: studies documenting the economic feasibility of the project; information that necessary rights-of-ways can and are being obtained; conceptual design information for the intake and powerhouse; evidence that Gem Irrigation District has the financial resources and is actively pursuing the project; and the current Federal Energy Regulatory Commission status of the project. Idaho Department of Water Resources investigated tax benefits to Boise County from the proposed hydropower project. This information was shared with the Citizens Group.

APPENDIX D

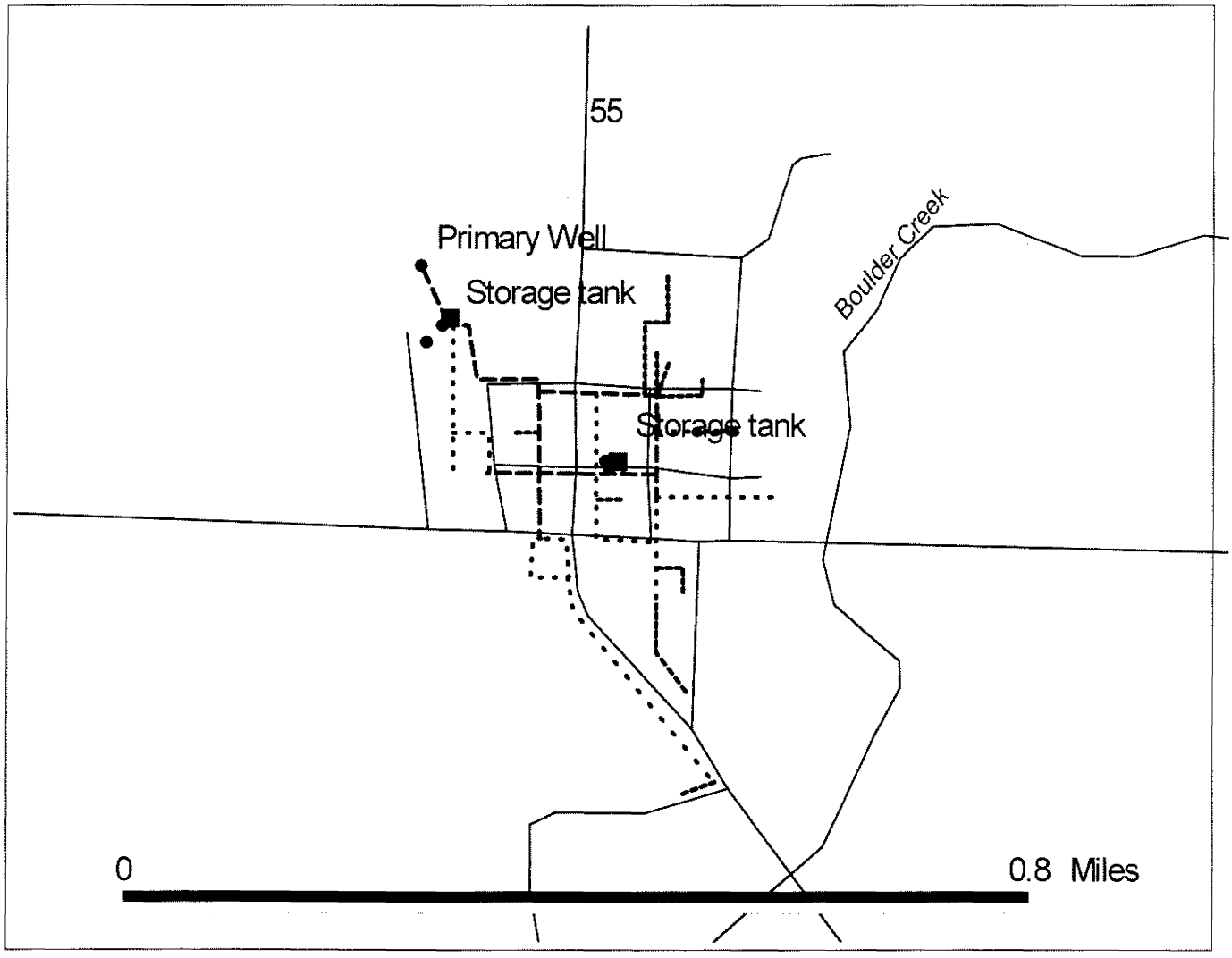
Maps of Municipal Water Systems

City of McCall

Current information not available



City of Donnelly



Water Main Legend

2" or less

3"

4"

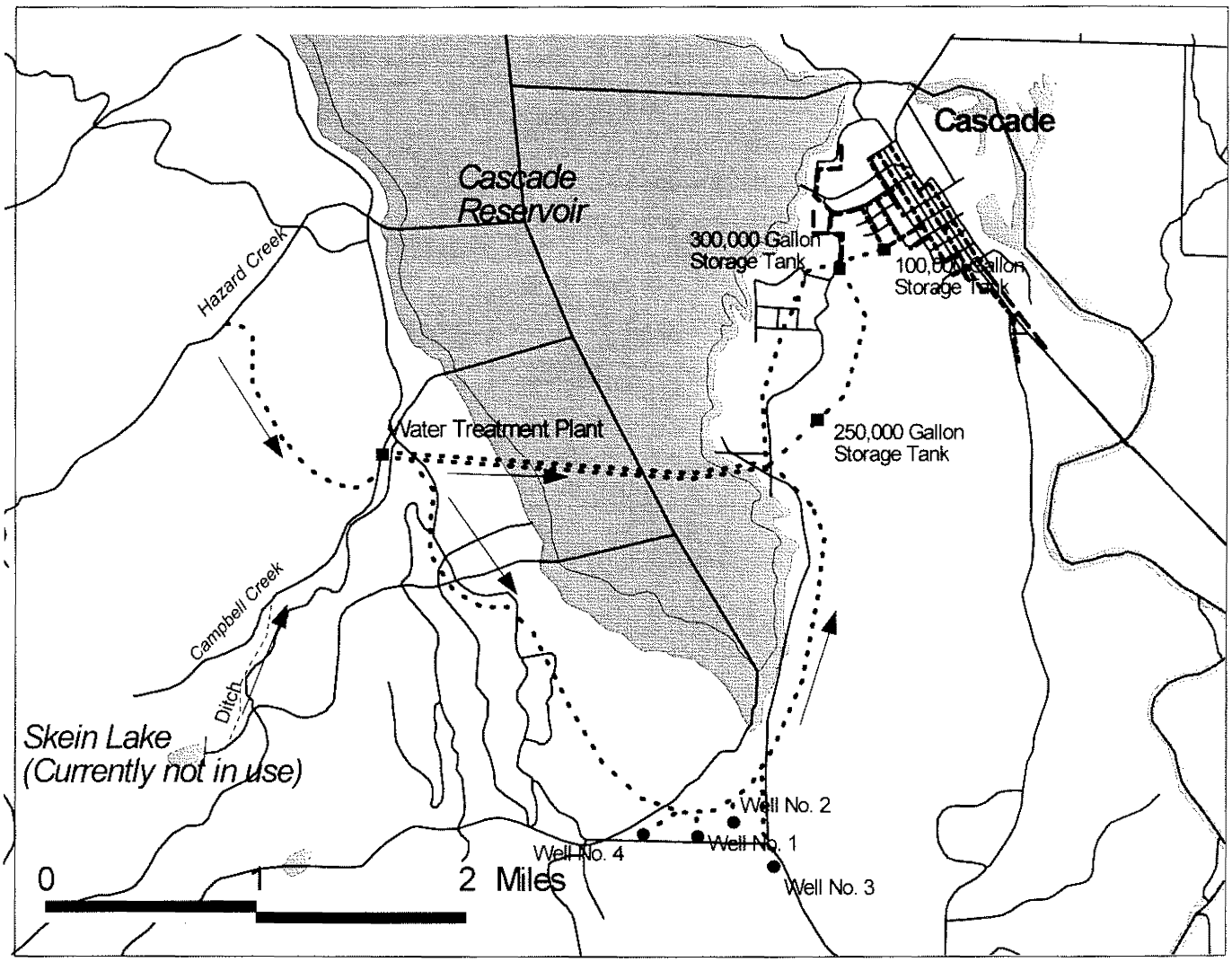
IDAHO WATER RESOURCE BOARD

N

W E

S

City of Cascade



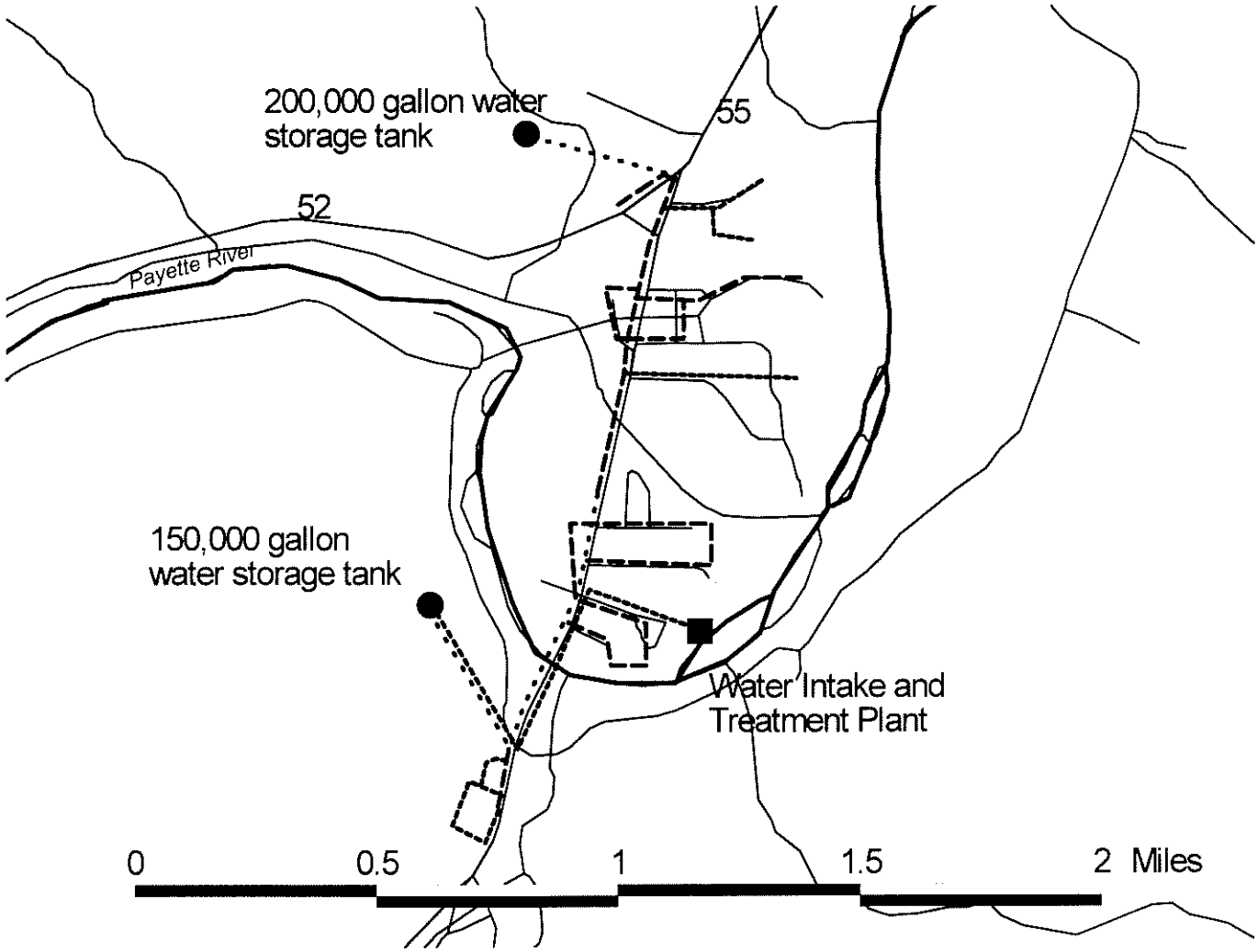
Water Main Legend

4" or Smaller
6" or Larger
Water Transmission Pipelines

IDAHO WATER RESOURCE BOARD

N
W E
S

City of Horseshoe Bend



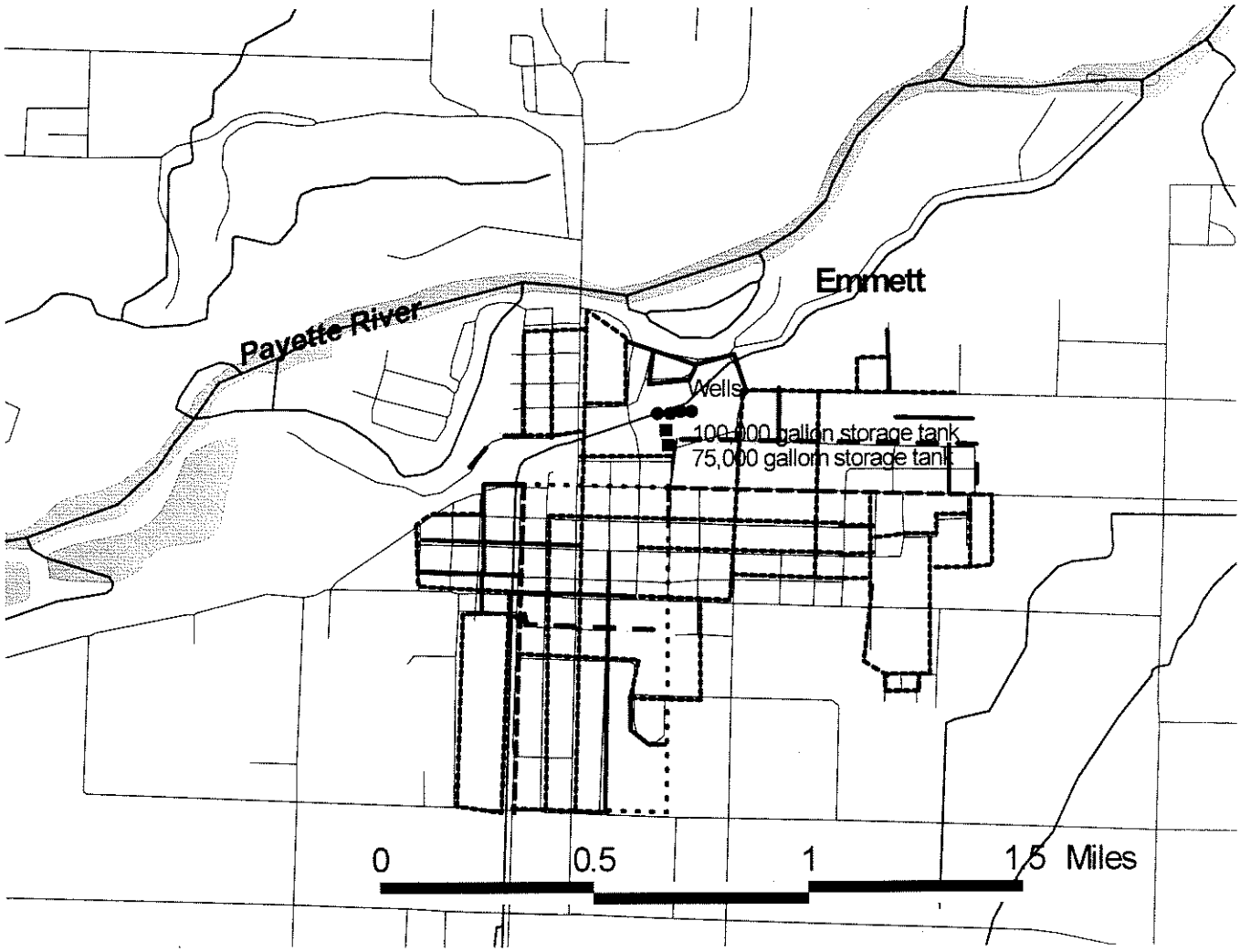
Water Main Legend

4"
8"
6"

IDAHO WATER RESOURCE BOARD

N
W
E
S

City of Emmett



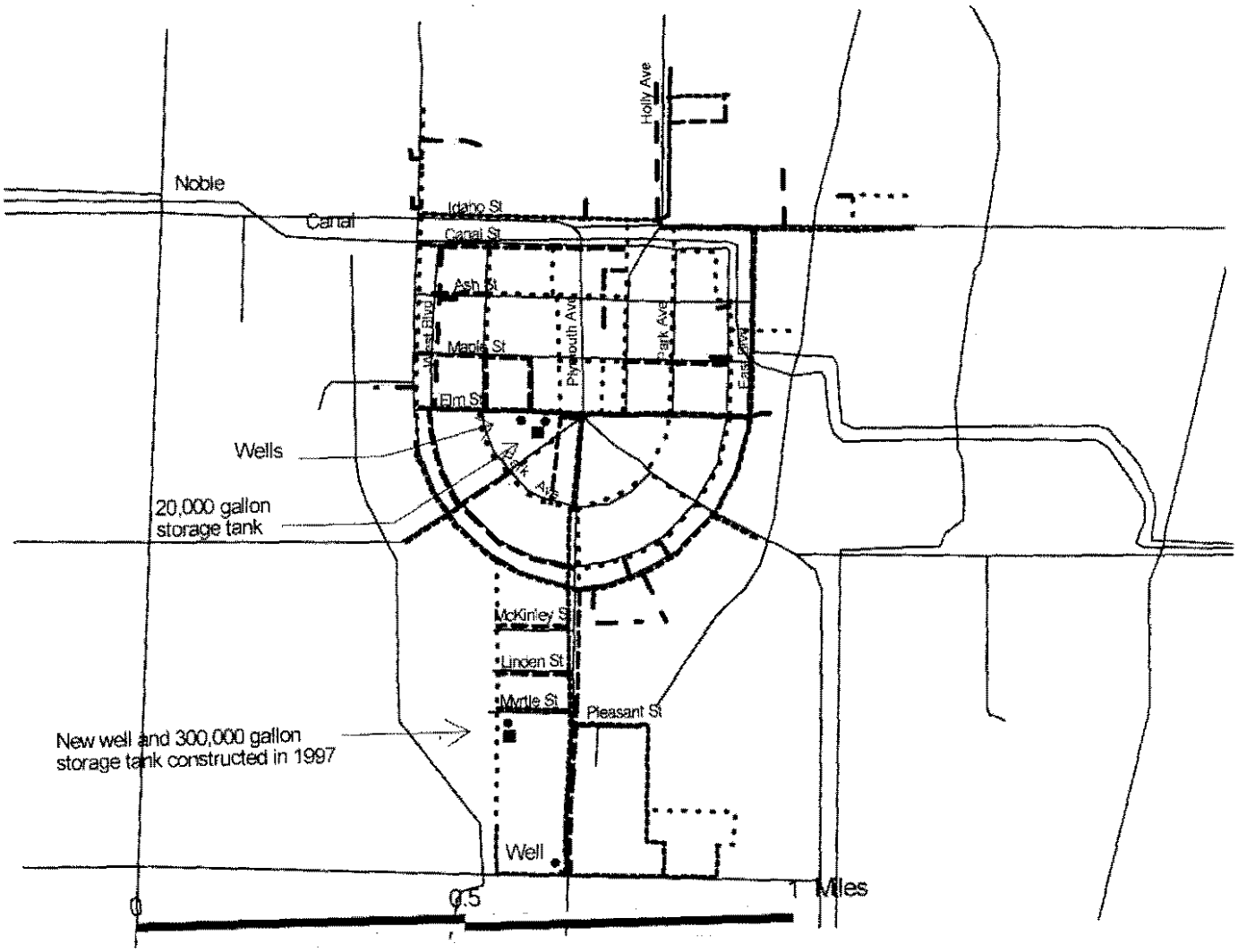
Water Main Legend

- 4"
- 6"
- 8"
- 10"
- 12"

IDAHO WATER RESOURCE BOARD

N
W E
S

City of New Plymouth



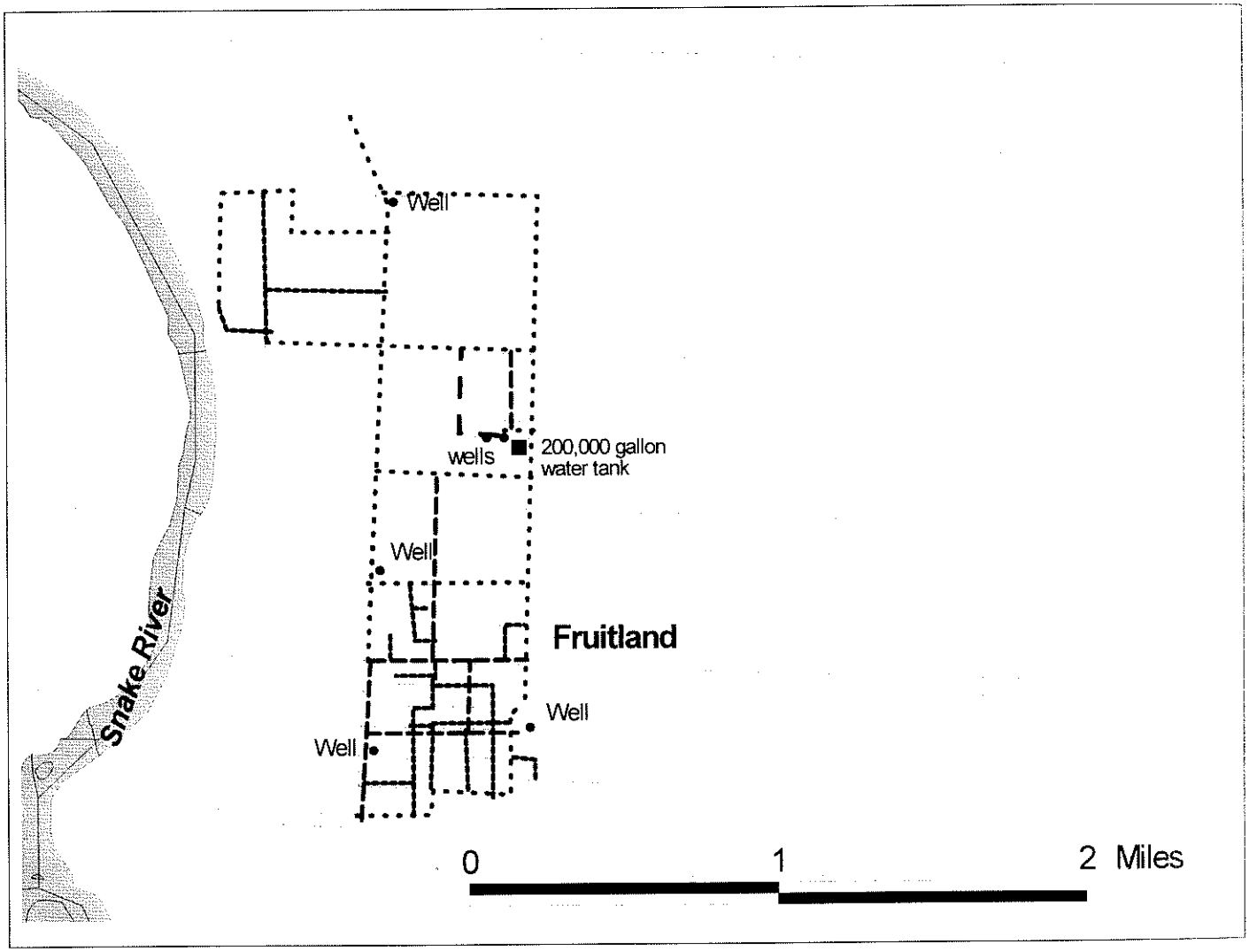
Water Main Legend

- 10" Lines
- 8" Lines
- 6" Lines
- 4" Lines
- 2" or Less

IDAHO WATER RESOURCE BOARD

N
W E
S

City of Fruitland



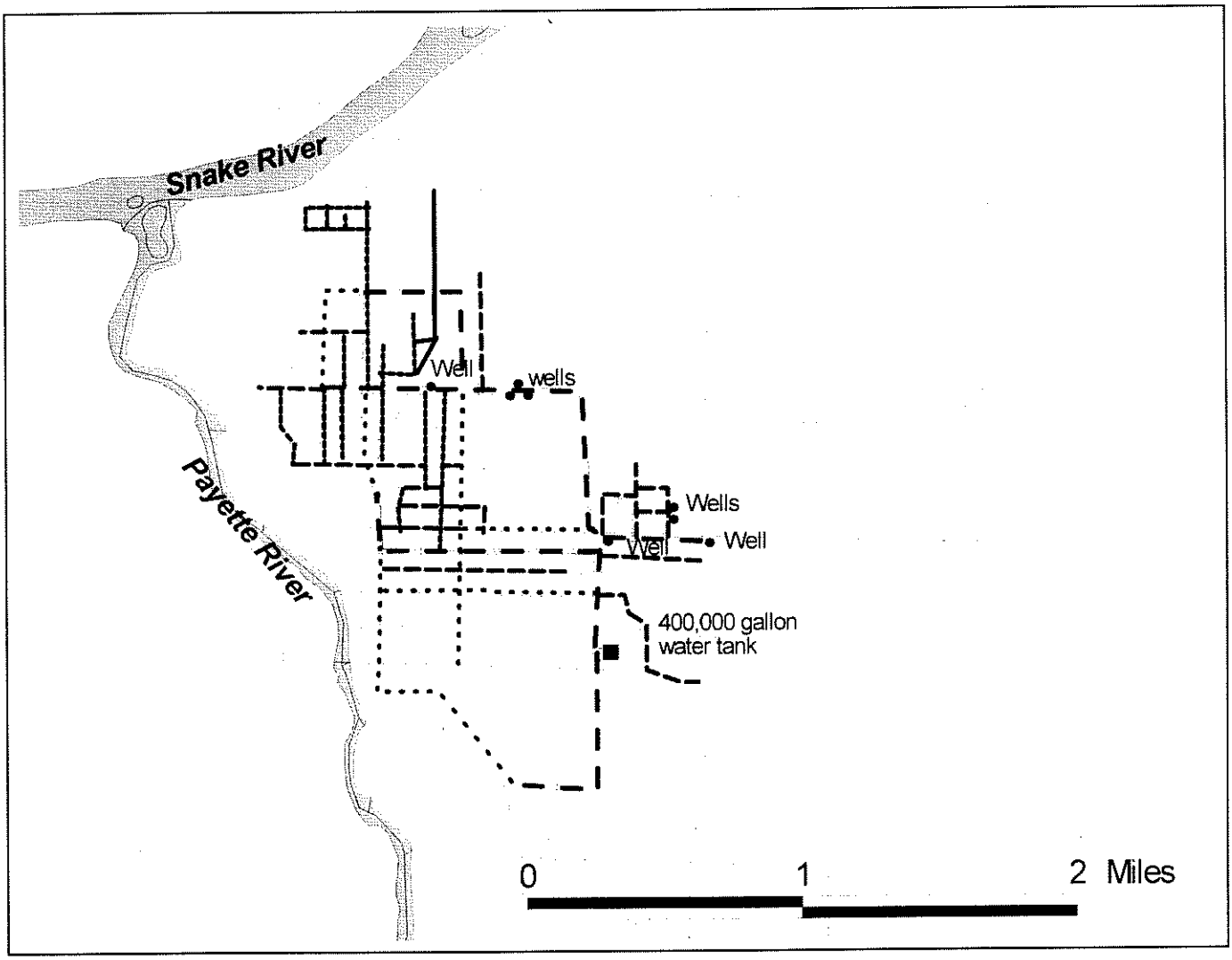
Water Main Legend

4"
6"
8"
12"

IDAHO WATER RESOURCE BOARD

N
W
E
S

City of Payette



Water Main Legend

- 4"
- 6"
- 8"
- 9"
- 10"

IDAHO WATER RESOURCE BOARD

N
W
E
S

APPENDIX E

Letter to Gem Irrigation District from the Idaho Water Resource Board Requesting Additional Information

IDAHO WATER RESOURCE BOARD

Clyde Hutton
Gem Irrigation District
Post Office Box 78
Homedale, Idaho 83628

June 24, 1998

Dear Mr. Hutton:

The Idaho Water Resource Board is currently revising the Payette River Reaches Comprehensive State Water Plan to incorporate the Payette River Basin. During this process Gem Irrigation District has requested that we consider amending the recreational designation on the North Fork Payette River to allow a hydropower project. Our staff has reviewed the draft application and other documents prepared by Gem, and board member Terry Uhling was present at the recent Payette River Citizens Group workshop on May 27, 1998 when the project was discussed.

The Board needs additional information to decide whether it is in the public interest to amend the current state recreational river designation on the North Fork Payette River. The Board would like you to provide the following information:

1) How much does Gem need to receive per kilowatt-hour to make this project economically feasible? Has Gem conducted the necessary studies to determine economic and financial feasibility, as well as constructability. If so, we would like copies.

2) Documentation that the necessary rights-of-way and water rights may be obtained, and are being successfully pursued.

3) Several concerns were expressed about how the project will affect aesthetics. Engineering drawings in our files show the proposed location of the pipeline, intake and power house, but do not provide information about the design of the powerhouse and intake. Has conceptual design of these structures been completed?

4) Provide evidence that Gem is actively pursuing this project, and that it is not speculative in nature. This includes support that they have sufficient financial resources to complete this project. A letter from Carl Myers dated January 1996 stated that Gem would submit a development application to the Federal Energy Regulatory Commission soon. Please advise us as to the current status of the FERC application.

The Board would like to make a decision on this issue during the formulation of the Payette River Basin Comprehensive State Water Plan. We intend to have a draft plan available for public review by September 1998. Therefore, we need to receive this information from you by August 15, or sooner if possible.

Please contact John Beal (327-7992), if you have any questions about this request.

Sincerely,

Joe Jordan, Vice Chairman
Idaho Water Resource Board

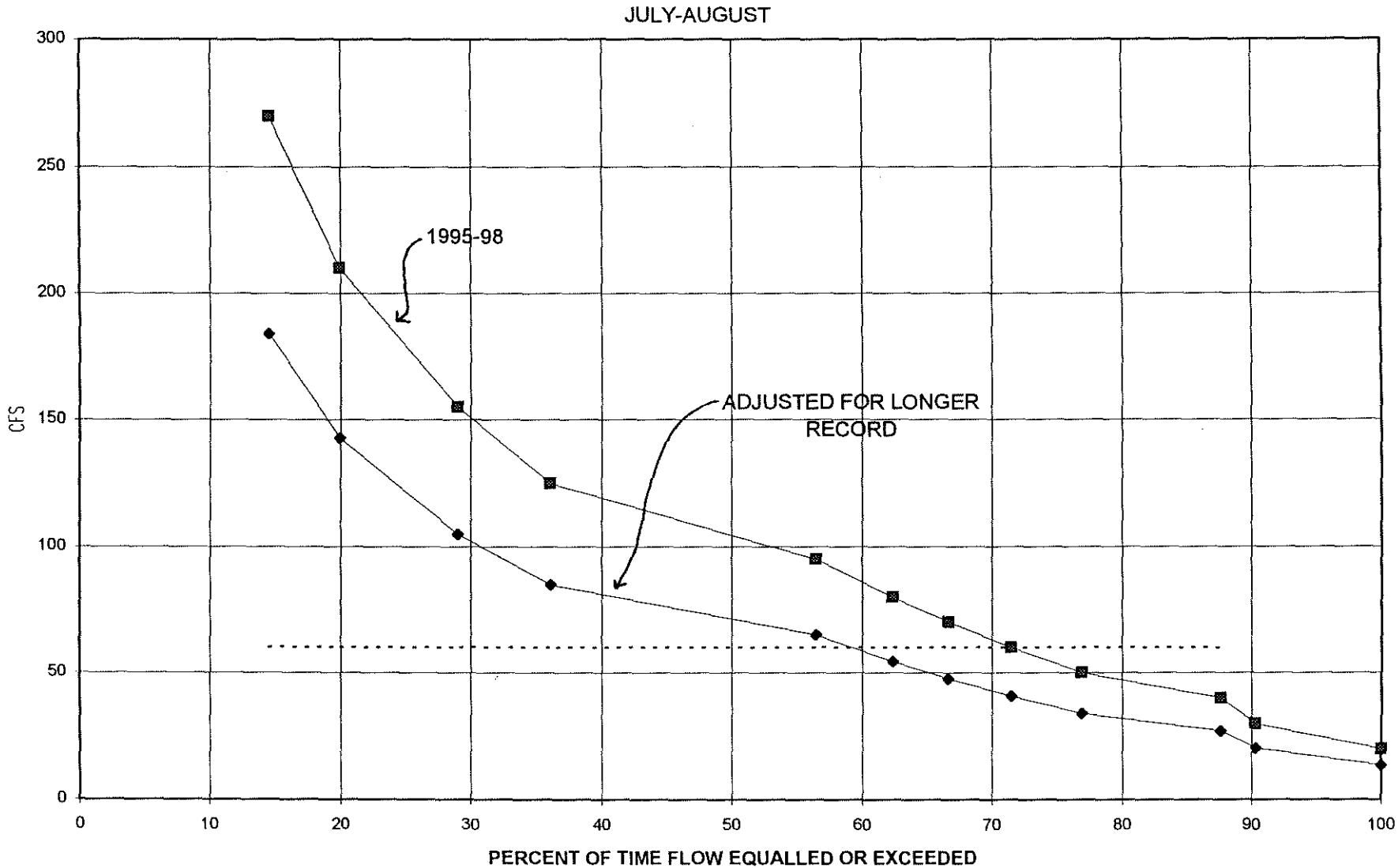
Terry Uhling
Idaho Water Resource Board

1301 North Orchard Street, Boise, ID 83706 Tel: (208) 327-7900 Fax: (208) 327-7866

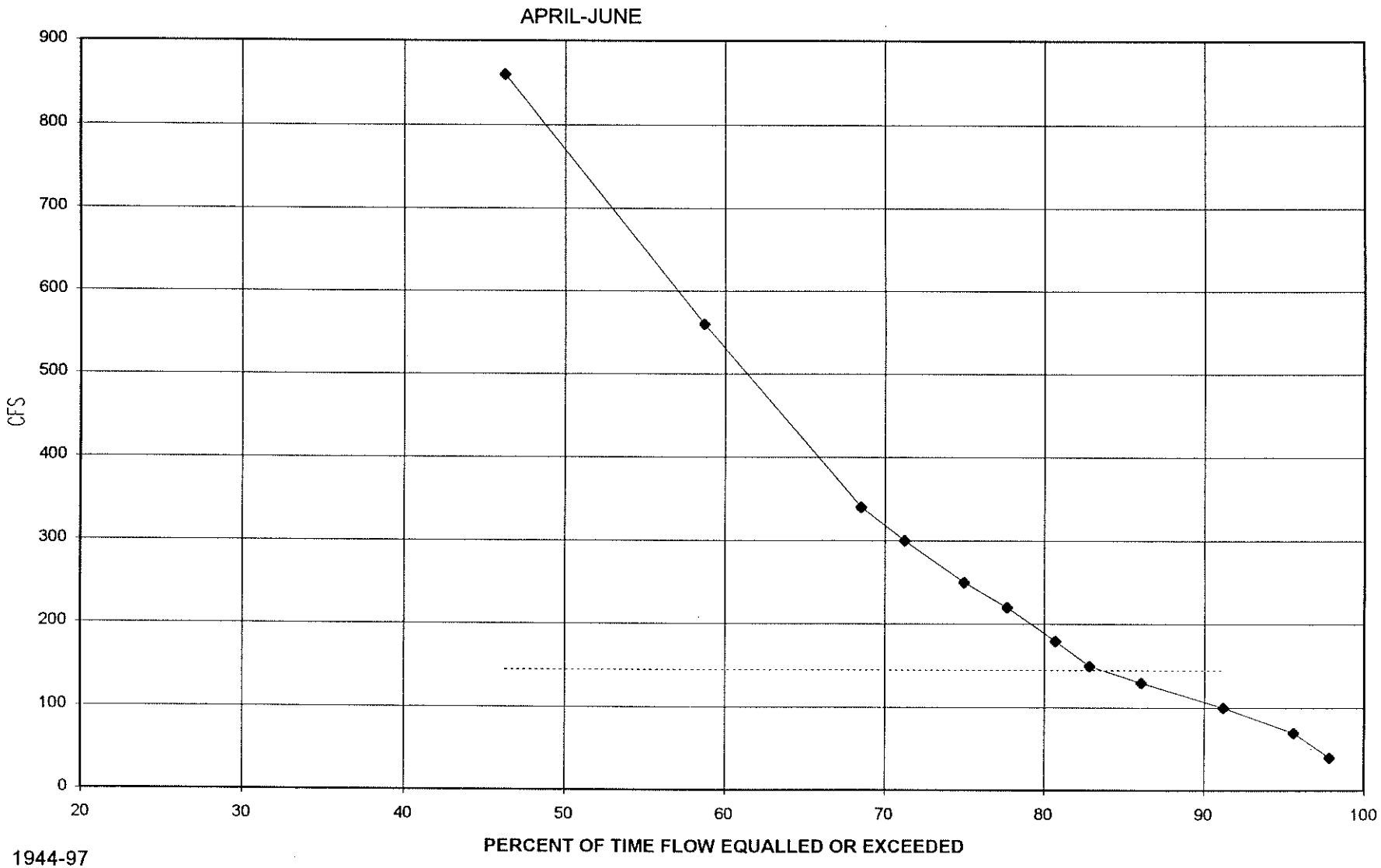
APPENDIX F

Minimum Stream Flow Exceedance Probabilities

FLOW DURATIONS NORTH FORK PAYETTE RIVER BL FISHER CREEK



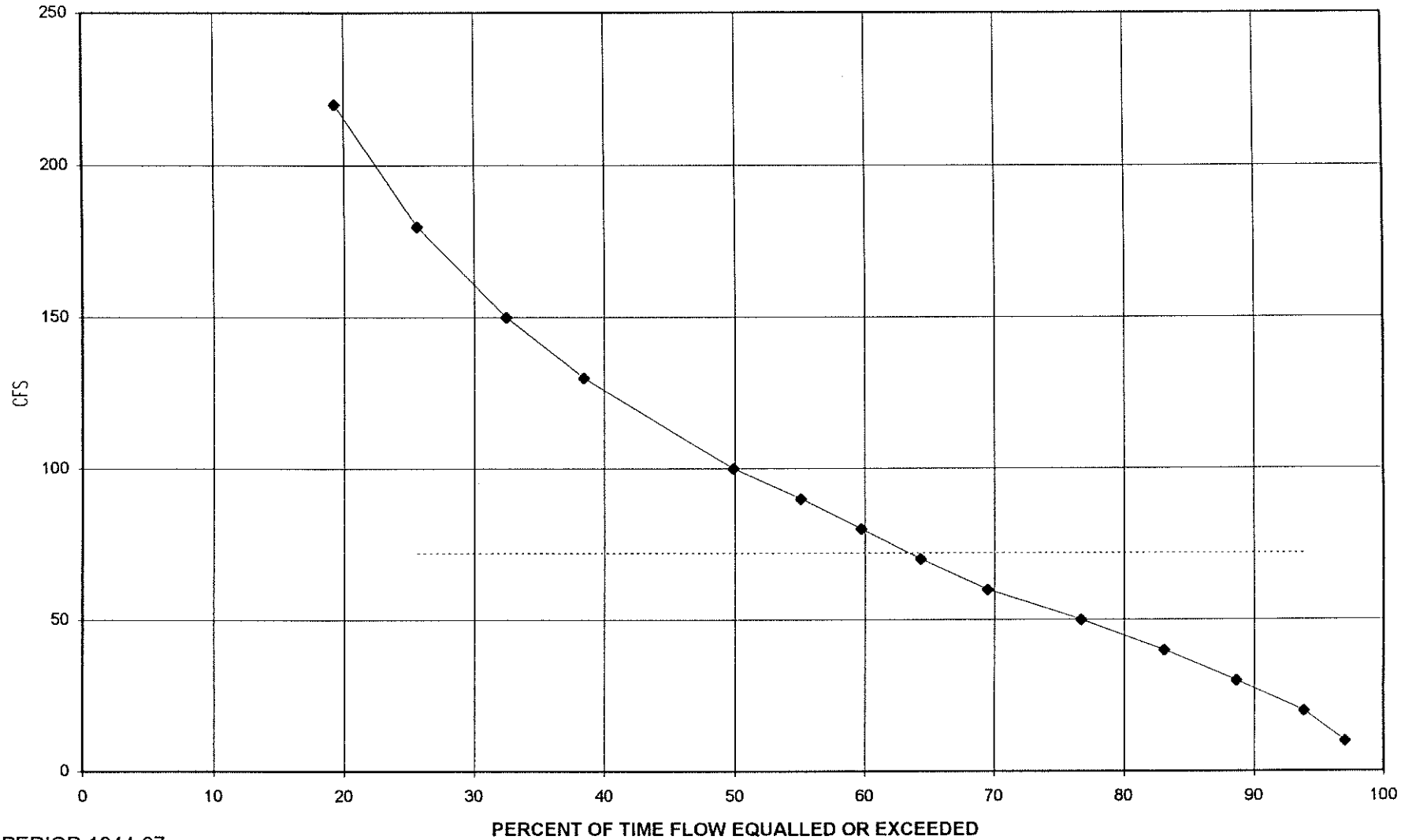
FLOW DURATION NORTH FORK PAYETTE RIVER AT MC CALL



1944-97

FLOW DURATION NORTH FORK PAYETTE RIVER AT MC CALL

JULY-MARCH



PERIOD 1944-97

APPENDIX G

Recommendations Made by the Payette River Citizens Group

The recommendations that follow were generated during Payette River Citizens Group workshops conducted in May and June 1998. Issue discussion led to identification of the problem statements listed under each issue category. The Citizens Group identified a number of strategies for each of the problem statements. The recommendations listed below contains the recommendations the Payette River Citizens Group consented to in addressing the problem statements. Issues where the Citizens Group was not able to reach consent are indicated.

PROPOSED STATE PROTECTED RIVER DESIGNATIONS

PROBLEM STATEMENT: *1) What reaches in the Payette River Basin should be considered for a state protected river designation? Current state designations made in 1991 include:*

- *North Fork Payette River from Cabarton Bridge to Banks - recreational river;*
- *South Fork Payette River from the Sawtooth National Recreation Area to Banks - recreational river; and*
- *Main Payette River from Banks to Beehive Bend - recreational river.*

RECOMMENDATIONS:

1. Maintain the current state protected river designations as stated in the Payette River Reaches Comprehensive State Water Plan. *(Note: The Citizens Group can live with maintaining the current designation and prohibitions with the exception of the hydropower prohibition. Some would like to see the hydropower prohibition removed, others would like it to remain.)*

2. Designate the North Fork Payette from its headwaters to Payette Lake as a recreational river. This designation is not intended to restrict Lake Reservoir Company's current and future operations at Upper Payette Lake. (*Note: The Payette River Citizens Group can live with this designation, because the local government and citizens have worked out and support this recommendation which is contained in the Big Payette Lake Management Plan.*)

WATER ALLOCATION

PROBLEM STATEMENT: *1) Instream flows are desired in Mud Creek and Lake Fork. The J-Ditch project may replace diversions from these two waterways with effluent from the City of McCall. How can we insure that any additional instream flows resulting from the J Ditch Project are not appropriated?*

Consent not reached.

PROBLEM STATEMENT: *2) Realizing that water contracts and existing water rights must first be met, how can additional goals or outcomes be accomplished through adjustments in releases from the storage system? What are the additional specific*

desired outcomes or goals (water quality, fisheries, recreation)?

RECOMMENDATION:

1. Involve the Watershed Advisory Groups in this process.

PROBLEM STATEMENT: *4) Numerous concerns about the use of water for salmon flow augmentation have been expressed. How do we address them?*

Consent not reached.

PROBLEM STATEMENT: *5) How can improved irrigation efficiency and water conservation occur without forfeiture or partial forfeiture of water rights? And is this desirable?*

RECOMMENDATIONS:

1. Amend law to allow water right holder to conserve water without losing water right

2. Allow a farmer to put the portion of his water right conserved into the State Water Supply Bank for future use or sale.

WATER STORAGE AND DELIVERY

PROBLEM STATEMENT: *1) How can the efficiency of the water delivery system be improved?*

RECOMMENDATIONS:

1. Review the water delivery system and determine where additional gages are necessary.

2. Identify a funding source for additional gages. Should it be financed through the general fund or should additional user fees be sought such as recreational interests?

PROBLEM STATEMENT: *2) Review irrigation diversion studies prepared for the Lower Payette and Cascade Reservoir areas, and identify opportunities to consolidate diversions and/or upgrade them.*

Consent not reached.

PROBLEM STATEMENT: 3) Identify opportunities for additional water storage in the basin for the purposes of municipal water supply, irrigation or flood control.

RECOMMENDATIONS:

1. The Idaho Water Resource Board has identified an 80,000 acre-foot Gold Fork Reservoir as a potential storage reservoir in the Idaho State Water Plan. Keep this storage reservoir in the Idaho State Water Plan.

2. Analyze small as well as large reservoir sites.

3. Recommend Idaho Department of Water Resources inventory sites and evaluate what quantity of water is available in the system.

MUNICIPAL WATER SUPPLY

PROBLEM STATEMENT: *1) How can Emmett acquire the infrastructure or other options for meeting drinking water standards?*

RECOMMENDATIONS:

1. Seek a loan or bond through the Idaho Water Resource Board.

2. Charge user fees to generate funds allocated specifically to a water treatment facility.

3. Recommend the Board actively seek and obtain Federal funding to construct these and other projects.

PROBLEM STATEMENT: *2) What options are there for Horseshoe Bend to obtain a secure municipal water supply to meet current demands and plan for future growth?*

RECOMMENDATIONS:

1. Purchase water rights with a senior priority date from willing sellers.

2. Drill new wells.

3. Use existing wells and treat water.

PROBLEM STATEMENT: *3) Does the Garden Valley area want to consider a community system? And if so, where would the water come from, and how would they fund it?*

RECOMMENDATIONS:

1. New development in area should pay its own way.

2. A sewage system should be constructed first.

PROBLEM STATEMENT: *4) How can the City of McCall fund Phase 2 of the water treatment plant?*

RECOMMENDATIONS:

1. Seek a loan or bond through the Idaho Water Resource Board.

2. Investigate solutions other communities have pursued.

PROBLEM STATEMENT: *5) How can municipalities plan and secure water to satisfy future growth?*

RECOMMENDATIONS:

1. Senate Bill 1535 provides that municipalities can appropriate water for reasonably anticipated future needs as determined through comprehensive plans or other supporting data. It would be beneficial for communities in the basin to review current comprehensive land use plans, or during revisions and updates, to examine whether current municipal water supply is adequate to meet projected future growth. If additional water is needed, water applications to meet projected future growth can be filed in advance.

2. Recommend that the municipalities in the basin prepare a long range plan, investigating population projections and water needs, so they can plan accordingly.

3. Municipalities need to be able to purchase water contracts from rental pool.

4. Construct a series of storage reservoirs - look to headwaters.

5. Need more municipal water conservation.

6. Compensate irrigators to conserve water.

7. Purchase storage from one of the private reservoirs.

PROBLEM STATEMENT: *6) Where is the additional water for urban/municipal growth in the basin going to come?*

RECOMMENDATIONS:

1. Construction of storage reservoirs.
2. Improved water conservation in the community to supply some of the future water demand.
3. Promote municipal water conservation.
4. Base water rates on the amount of water used - requires installing water meters.
5. Recommend the Board establish a water supply bank, allowing the purchase and rental of natural water rights from water right holders that may not need all of their water right.

WATER QUALITY

PROBLEM STATEMENT: *1) How can septic system and well permitting be improved to reduce the potential of water quality impacts to wells and ground water.*

RECOMMENDATIONS:

1. Improve coordination between District Health and Idaho Department of Water Resources in the permitting of septic systems and wells.
2. Require waste treatment for subdivisions of certain densities.

PROBLEM STATEMENT: *3) Identify options for establishing the Cascade Reservoir 300,000 acre-foot conservation pool.*

RECOMMENDATION:

1. Idaho needs to enforce the State constitution and not allow federal agencies to take water.

PROBLEM STATEMENT: *4) How can sediment contributions from roads be mitigated?*
RECOMMENDATIONS:

1. Use silt fences and check dams where needed.
2. Protect riparian zones.

PROBLEM STATEMENT: *5) How can potential water quality impacts (for example temperature and nutrients) from return flows be minimized?*
RECOMMENDATION:

1. Salt leaching problem at Idaho Transportation Department's Horseshoe Bend maintenance yard needs to be corrected.

FLOOD MANAGEMENT

PROBLEM STATEMENT: *1) How do we manage land use development in the floodplain and minimize taxpayers' liability for flood damage?*
RECOMMENDATIONS:

1. Enactment of House Bill 660aa, addressing floodplain management, gives local jurisdictions authority to adopt floodplain ordinances. Recommend that all communities respond by adopting floodplain ordinances and/or participating in the National Flood Insurance Program which will allow private property owners the opportunity to purchase flood insurance.
2. Recommend local governments apply stricter standards regarding development in the floodplain.
3. Define and map flood zones more accurately.
4. Encourage local planning and zoning to manage land use development in the floodplain to minimize taxpayers' liability for flood damage.

PROBLEM STATEMENT: *2) Identify any 1997 flood damage needing repair.*
RECOMMENDATION:

1. Obtain a list from the Corps of Engineers, Idaho Department of Water Resources, Soil Conservation Districts, farm service agencies, Natural Resources Conservation Service, and Federal Emergency Management Agency of unfunded or uncompleted flood-related projects.

PROBLEM STATEMENT: *3) How to improve maintenance and management of the levee system along the Payette River from Horseshoe Bend downstream?*
RECOMMENDATIONS:

1. Form a committee comprised of representatives from each jurisdiction to study the levees as a complete system, and develop a coordinated plan to manage and maintain the system.
2. Recommend each county's Disaster Services Coordinator coordinate with the other jurisdictions along the river to ensure levees are adequately maintained.
3. Improve the levee system inventory, and spatially identify the location of all levees using Global Positioning System technology.

PROBLEM STATEMENT: *4) How do we update floodplain mapping in the basin to reflect current river channel capacity?*
RECOMMENDATIONS:

1. Obtain aerial photography produced during the 1997 flood event, and identify an entity to input this information into a geographic information system so maps can be produced.
2. Develop accurate 100, 50 and 25-year flood maps.
3. Develop computer modeling to determine what is inundated at various flows.

RESOURCE DEVELOPMENT

PROBLEM STATEMENT: *1) Should Gem Irrigation District be given an exemption to build a hydropower project on the North Fork Payette River?*

RECOMMENDATIONS:
Before amending the Payette Plan to allow the North Fork Payette hydropower project:

1. The hydropower project must be consistent with the Resource Development goals; and

2. Gem Irrigation District must provide satisfactory answers to questions raised by the Idaho Water Resource Board in the June 24, 1998 letter to Gem.

PROBLEM STATEMENT: *2) Are there additional hydropower options in the basin that need to be considered?*

Consent not reached.

FISHERIES

PROBLEM STATEMENT: *1) How can the quality of fisheries in the basin be improved?*
RECOMMENDATIONS:

1. Improve diversion structures, measurement, fish screening, and sediment removal.
2. Consider alternative algae management possibilities (e.g. Europe uses"algae eaters").
3. Manage for the sustainability and improvement of the bull trout fishery in the Payette River Basin.

PROBLEM STATEMENT: *2) Identify possible modifications or improvements to diversions on the North Fork Payette, Gold Fork and Lake Fork to help improve fish passage and spawning.*
RECOMMENDATIONS:

1. Orient diversion openings so that they are parallel to flows on the Lake Fork and Gold Fork, thus minimizing fish diverted into ditches.
2. Position diversion structure overflows where fish can most easily use.

AGENCY PLANNING AND COORDINATION

PROBLEM STATEMENT: *1) How can the permitting process for stream channel alterations be more efficient, particularly during emergency situations?*
RECOMMENDATIONS:

1. Idaho Department of Water Resources can hold public information meetings in areas susceptible to flooding and identify stream channel protection measures needed before flood season.
2. Adequately fund agencies to review onslaught of applications after flood events.
3. Consolidate all stream channel alteration permit functions under the authority of the Idaho Department of Water Resources.
4. Streamline the process for emergency situations. If a structure is lost during a flood, can some steps be skipped?
5. Involve the Soil Conservation Districts in stream channel alteration permitting.

PROBLEM STATEMENT: *2) How can we ensure that the Payette River Basin Comprehensive State Water Plan does not duplicate the efforts of the Basin Advisory Groups (BAGs) and Watershed Advisory Groups (WAGs) in the Payette River Basin?*
RECOMMENDATIONS:

1. The Board and Division of Environmental Quality will closely coordinate and monitor each other's efforts. The Payette River Basin Comprehensive State Water Plan will not address issues outside the Board's authority that will be addressed in Total Maximum Daily Load Plans.
2. The Payette River Basin Comprehensive State Water Plan will take actions to implement recommendations made in the Big Payette Lake Management Plan and Implementation Program that are consistent with the Board's authorities.

3. Idaho Department of Water Resources should regularly attend Watershed Advisory Group / Basin Advisory Group meetings and sit on Technical Advisory Committees.

4. Emphasize that efforts will not be duplicated.

5. Coordinate with the Water District 65 Watermaster.

6. Identify opportunities for the Board to educate the public about how comprehensive state water plans differ from the activities of the Watershed Advisory Groups and Basin Advisory Groups.

PROBLEM STATEMENT: *3) How can we get all agencies to refer to the river reach from the Middle Fork Payette confluence to Banks as the South Fork Payette?*

RECOMMENDATIONS:

1. The Idaho Water Resource Board will complete the necessary paperwork to request a name change with the U.S. Board on Geographic Names. Boise County Coalition will help the Board with this effort, coordinating with local jurisdictions.

2. Disseminate information about name change to the agencies.

RECREATION

PROBLEM STATEMENT: *1) How can impacts to rivers in the basin from recreation activities be reduced? What services and facilities are needed to address these impacts, how do we fund them, and who should provide them? Impacts that need to be addressed include trampling of riparian vegetation, private property trespass, adequate parking and restroom facilities, and additional sites to reduce crowding and provide access to the disabled.*

RECOMMENDATIONS:

1. Bureau of Land Management, Forest Service and Idaho Department of Parks and Recreation should charge a fee for the boats and not per car.

2. Spread out the use.

3. Recommend boating community educate and police itself as to problems seen by the locals.

4. Require float boats to be licensed, similar to powerboats.

PROBLEM STATEMENT: *2) Identify ways to improve traffic management on State Highway 55 and the Banks-Lowman Highway (Forest Road 17).*

RECOMMENDATIONS:

1. Provide more passing lanes and turnouts.

2. Install as many good "designated parking only" pull-offs and enforce the same.

PROBLEM STATEMENT: *3) How can the diversity of recreation opportunities on the Payette River system be maintained?*

RECOMMENDATION:

1. Work with county commissions, and planning and zoning in the development of comprehensive land use plans, etc. to provide access and opportunities.

MINIMUM INSTREAM FLOWS

Water Quality: PROBLEM STATEMENT: *2) Identify river reaches where minimum instream flows would improve water quality.*

Fisheries: PROBLEM STATEMENT: *3) Identify river reaches where minimum instream flows are needed to protect fisheries.*

Water Allocation: PROBLEM STATEMENT: *3) Where are minimum instream flows in the Payette River Basin desired, and for what purposes?*

RECOMMENDATIONS:

1. Recommend the Idaho Water Resource Board obtain minimum instream flows on the North Fork Payette River:

- below Upper Payette Lake for fisheries
- below Payette Lake for water quality, fisheries and recreation.

2. Recommend instream flow technical studies or analyses be conducted to determine if minimum instream flows are warranted for the following river reaches:

- Lake Fork: Little Payette Lake to Cascade Reservoir for water quality and fisheries
- Gold Fork River: Gold Fork diversion dam to Cascade Reservoir for water quality and fisheries
- Payette River:

  Banks to Black Canyon for water quality
  Black Canyon to Letha for water quality
  Letha to Snake River for water quality.

APPENDIX H

Summary of Background History and Other Considerations for Recreational Mining

Some background about the regulations pertaining to recreational mining are presented, with a focus on history in the Payette River Basin.

BACKGROUND INFORMATION

In 1971 the Idaho Legislature enacted the Stream Channel Protection Act, requiring permits for most stream channel alterations. A permit is obtained by filing an application with the Idaho Department of Water Resources which is reviewed by several federal and state agencies to minimize negative environmental impacts.

In 1980 the Department streamlined the process by developing a "One Stop Permit" for recreational suction mining. The One Stop Permit is a pre-approved stream channel alteration permit obtained from the Department by completing an abbreviated application and paying a $10 filing fee. This procedure allows an applicant to receive a permit at the time he submits the application, a process similar to obtaining a hunting or fishing license. By comparison, the Stream Channel Alteration Permit entails completing a detailed application, a $30 filing fee, and a longer agency review period. The One Stop Permit only authorizes use of suction dredges with nozzle diameter 5 inches or less, and equipment rated at 15 horsepower or less on waterways listed as open in an attachment to the permit.

Immediate issuance of the One Stop Permit is possible, because the agency review required for stream channel alterations takes place annually as part of a pre-review requested by the Department. This review allows agencies to guide the One Stop Permit conditions, including identifying waters open under the permit, the period of year operation can occur, and operating requirements to protect water quality, fish, wildlife, and other instream values.

Agencies identify waterways where fish, wildlife and water quality concerns require closer scrutiny than occurs under the One Stop Permit. Additionally, rivers and streams closed to mineral entry by the Land Board, and Water Resource Board designated natural and recreational rivers prohibiting stream channel alterations are closed under the One Stop Permit. On some waterways closed under the One Stop Permit, recreational mining may occur if the longer Stream Channel Alteration Permit application is filed, which is processed using a full agency review of each individual application.

HISTORY OF ONE STOP PERMIT AUTHORIZATION IN THE PAYETTE RIVER BASIN

In July 1988 the Idaho Water Resource Board designated the North Fork Payette from Cabarton to Banks, the South Fork Payette from the Sawtooth Wilderness Area boundary to Banks, and the Payette from Banks to Black Canyon Dam as interim protected rivers. These reaches were open for all or parts of the year under the One Stop Permit before this designation. In August 1988 the Land Board closed these reaches to mineral entry in

conjunction with the Water Resource Board's interim protection. This action prohibited recreational dredge mining under the One Stop Permit or the Stream Channel Alteration Permit. In May 1989 the Water Resource Board adopted a resolution allowing recreational suction mining on interim protected rivers with a Stream Channel Alteration Permit.

While the Draft Payette River Reaches Plan was being prepared, the Land Board reconsidered mineral entry closures on the South Fork Payette in April 1990. They agreed to delay a decision until the Idaho Water Resource Board held public hearings on its Draft Payette River Reaches Plan.

A representative of the Idaho Gold Prospectors Association was a member of the first Payette River Citizens Group, and worked with the Water Resource Board and Land Board to get reaches of the South Fork Payette River open for recreational mining under the One Stop Permit. As a result, the Water Resource Board's Payette River Reaches Plan supported recreational mining under the One Stop Permit for two reaches of the South Fork Payette River: 1) from the Sawtooth Wilderness Area boundary to the Deadwood River, and 2) from Big Pine Creek confluence to the Middle Fork Payette confluence. All other reaches of the South Fork, North Fork and Payette River were closed to recreational mining under both the One Stop Permit and the longer Stream Channel Alteration Permit in that plan. The Land Board working cooperatively with the Water Resource Board amended the mineral closure on the South Fork Payette in 1990 to allow recreational mining only. The Idaho Gold Prospectors Association has now requested that some of these reaches be opened under the One Stop Permit.

ISSUES TO CONSIDER

In addition to the state protected designation that prohibits recreational dredge mining, the Payette River from Banks to Black Canyon Dam was closed by the Land Board to all mineral entry. The Land Board will have to amend the mineral closure on the main Payette in order for recreational mining to occur under the One Stop Permit. Reaches currently open to recreational dredge mining with a One Stop Permit are listed in Table 42 on page 114 of the Payette River Basin Plan. Many reaches closed under the One Stop Permit may be mined after completing an application for a Stream Channel Alteration Permit.

The Idaho Gold Prospectors Association have stressed that regulated suction dredge mining can have little to minimal impacts, while most research has reported on the impacts of unregulated activities. A review of some of this literature included the Final Environmental Impact Report for Adoption of Regulations for Suction Dredge Mining prepared by the California Department of Fish and Game (1994). The degree of impact is associated with dredge size, size of river and stream, size of stream compared to size of dredge, density of dredges, and amount of fine material dredged. Regulated dredge mining to minimize impacts consists of the following:

- Seasonal or permanent closure for reaches with special status fish species;
- Establishing suction dredge seasons to avoid critical spawning periods of fish;
- Prohibiting suction dredge mining into the stream bank;
- Prohibiting damage to woody riparian habitat from suction dredge operations;
- Placing conditions on the use of winches;
- Placing restrictions on the size of the nozzle intake;

- Prohibiting damming or obstructing a stream;
- Prohibiting diverting stream into a stream bank; and
- Prohibiting importing earth material into water.

These conditions are currently part of the One Stop Permit. However, the Department has one person to monitor and enforce One Stop and Stream Channel Alteration permits in the Southwest Region. Therefore, very little monitoring will occur.

Several agencies have identified some concerns about opening reaches of the South Fork and main Payette rivers to recreational mining. Idaho Department of Fish and Game notes that bull trout recovery efforts would not support opening the South Fork Payette under the One Stop Permit. The South Fork Payette is considered a bull trout migration corridor.

Idaho Department of Parks and Recreation notes the potential conflicts between recreationists. As the Recreation section in the Payette River Basin Plan indicates, the majority of float boating activity in the basin (commercial and private) occurs on the South Fork Payette and main Payette. Recreational miners tend to dredge in calmer waters, minimizing potential safety concerns, but there would likely be conflicts with other recreationists. Opening this reach could create conflicts between users groups that would then become the responsibility of recreation management agencies to resolve.

A representative for Idaho Department of Lands questions the potential to recover minerals in these reaches. None of the Lands Department personnel could determine if the Lands Board would be amenable to amending mineral entry closures to allow recreational mining. Idaho Geological Survey notes there are better places to mine for gold in the basin, such as near Grimes Pass or in the Deadwood drainage. Although it was acknowledged some gold may have washed downstream into the Payette River.

During the Department's annual review of the One Stop Permit, agencies have requested these reaches be closed under this permit. The Department has noted that if the Board were to remove the prohibition for recreational mining, the Department would likely keep these reaches closed under the One Stop Permit because of requests by other agencies.