US Army Corps
of Engineers®
Walla Walla District

Water Resources Development in Idaho 1999

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Idaho Water Facts

State water surface area	880 square miles
Number of lakes	More than 2,000
Largest lake — Pend Oreille	148 square miles
Deepest lake — Pend Oreille	More than 1,100 feet
Highest waterfall	600 feet, Big Fiddler Creek, Boise River Basin
Streams and rivers	93,000 miles
Longest river — Snake River	779 miles
Average annual precipitation	Varies from less than 10 to more than 60 inches
Most precipitation in 24-hour period	7.7 inches of rain, Rattlesnake Creek, Idaho, 1909
Annual stream inflow to state	About 37 million acre-feet
Annual stream outflow to state	About 75 million acre-feet
Irrigated area of state	4 million acres
Highest dam	Dworshak, North Fork Clearwater, 717 feet
Active reservoir storage capacity	12,384,000 acre-feet
Largest active storage reservoir — Dworshak	2,016,000 acre-feet
Snake Plain Aquifer storage — top 100 feet of aquifer	About 100 million acre-feet

SOURCE: Idaho Department of Water Resources

Chapter 1. Overview — The Corps Civil Works Mission

Introduction

From 1775 to the present, the U.S. Army Corps of Engineers (Corps) has served the nation in peace and war. The Corps traces its history to June 1775, when the Continental Congress appointed Colonel Richard Gridley as Chief of Engineers of the Continental Army, under General George Washington. The original Corps was the Army's engineering and construction arm until it mustered out of service at the close of the Revolutionary War in 1783.

In 1802, Congress re-established a separate Corps of Engineers within the Army. At the same time, it established the U.S. Military Academy at West Point, New York — the country's first, and for 20 years its only, engineering school. With the Army having the nation's most readily available engineering talent, successive Congresses and administrations established a role for the Corps as an organization to carry out both military construction and works "of a civil nature."

Throughout the 19th century, the Corps supervised the construction of coastal fortifications, lighthouses, several early railroads, and many of the public buildings in Washington, D.C., and elsewhere. The Corps also became increasingly involved with river and harbor improvements, carrying out its first harbor and jetty work in the first quarter of the 19th century. The Corps' ongoing responsibility for federal river and harbor improvements dates from 1824, when Congress passed two acts authorizing the Corps to survey roads and canals and to remove obstacles on the Ohio and Mississippi Rivers.

In the early 1800s, many immigrants and pioneers moved westward and trade flourished. Under the General Survey Act of 1824, the Corps of Topographical Engineers, which enjoyed a separate existence for 25 years (1838-63), mapped much of the American West. They laid out early stagecoach routes, Pony Express routes, railroads, and military roads.

Army engineers served with distinction in war, with many engineer officers rising to prominence during the Civil War. During the Civil War, Army engineers continued their work in the Northwest. One of their efforts was removing navigation hazards such as rocks, stumps, and sandbars from the Snake River between what is now Pasco, Washington, and Lewiston, Idaho, so sternwheelers could navigate the river, carrying gold from Idaho mines to federal coffers to finance the war.

Over the years, the expertise gained by the Corps in navigation projects led succeeding administrations and Congresses to assign new water-related missions to the Corps in such areas as flood control, shore and hurricane protection, hydropower, recreation, water supply and quality, and wetlands protection.

One hundred years ago, the work of Army engineers consisted largely of efforts to improve navigation. Pulling snags from river waterways, cutting a sandbar to a depth of 17 feet with a primitive bucket dredge, or dynamiting rocks out of the Columbia or Snake Rivers was typical of the work done at the turn of the 20th century. Since then, Congress has directed the Corps to design, construct, and operate numerous multipurpose water resources development projects.

Today the Corps carries out missions in three broad areas: construction and engineering support to military installations; reimbursable support to other federal agencies (such as the Environmental Protection Agency's "Superfund" program to clean up hazardous and toxic waste sites); and the civil works mission, centered around navigation, flood control, and a growing role in environmental restoration.

Corps Organization

The Chief of Engineers, who holds positions as an Army Staff officer and as commander of a major Army Command, directs the Corps. Under the command of the Chief of Engineers are eight engineer divisions, four research laboratories, six engineer centers, and one battalion of soldiers — the 249th Engineer Battalion (Prime Power). Under the divisions, in turn, are 40 districts, 38 of which carry out civil works activities. More than 90 percent of the people involved in carrying out the Corps civil works program work in the districts.

Reflecting the Corps' mission orientation to water resources, district boundaries for the civil works program within the continental United States generally follow watersheds and drainage basins, while those for military construction follow state or other political boundaries.

The private sector is an essential element of the Corps' engineering team. The Corps employs private architectural, engineering, and construction firms for a high percentage of its design and all of its construction work. The partnership between the Corps and the private sector represents an immediate force multiplier of several hundred thousand architects, engineers, and builders, ready to support the nation in times of emergency.

Navigation

Corps involvement in navigation projects dates to the early days of the United States, when rivers and coastal harbors were the primary paths of commerce in the new country. Without its great rivers, the vast, thickly forested, region west of the

Appalachian Mountains would have remained impenetrable to all but the most resourceful early pioneers. Consequently, western politicians such as Henry Clay lobbied for federal assistance to improve rivers. At the same time, the War of 1812 showed the importance of a reliable inland navigation system to national defense.

There was, however, a question as to whether transportation was, under the Constitution, a legitimate federal activity. This question was resolved when the Supreme Court ruled that the Commerce Clause of the Constitution granted the federal government the authority, not only to regulate navigation and commerce, but also to make necessary navigation improvements.

The system of harbors and waterways maintained by the Corps remains one of the most important parts of the nation's transportation system. The Corps maintains the nation's waterways as a safe, reliable, and economically efficient navigation system. The 12,000 miles of inland waterways maintained by the Corps carry one-sixth of the nation's inter-city cargo. The replacement value of the inland waterways system has been calculated as over $1.25 billion dollars as of 1999. Where they operate, commercial barge lines provide by far the most efficient and economical mode of transportation for bulk commodities such as coal, grain, and chemicals — goods often bound to U.S. ports for export around the world. One barge can carry about as much freight as 15 railroad cars or 60 tractor-trailers. A barge can move this cargo at a cost per ton per mile about half that of rail transportation or one-tenth that of trucking.

The importance of the Corps mission in maintaining 299 deep-draft harbors (plus more than 600 smaller ports) is underscored by an estimated 15 million jobs — one in seven in the United States — being dependent, to some extent, on the commerce handled by these ports. The ports and waterways built, operated, and maintained by the Corps civil works program are not only vital to the nation's economy, but have direct military uses for strategic mobility. Harbor dredging maintains navigation channels not only for commercial traffic, but for naval vessels as well. Nearly every piece of equipment used in Operations Desert Shield and Desert Storm, for example, traveled to Southwest Asia through U.S. ports maintained by the civil works program.

Flood Control and Floodplain Management

Federal interest in flood control began in the alluvial valley of the Mississippi River in the mid-19th century. As the relationship of flood control and navigation became apparent, Congress called on the Corps to use its navigational engineering expertise to devise solutions to flooding problems along the river.

After a series of disastrous floods affecting wide areas in the 1920s and 1930s, Congress determined, in the Flood Control Act of 1936, that the federal government would participate in the solution of flooding problems affecting the public interest that were too large or complex to be handled by states or localities. The Corps authority for flood control work was thus extended to embrace the entire country. The Corps turns most of the flood control projects it builds over to non-federal entities for operation and maintenance once construction is completed.

The purpose of flood control work is to prevent damage through regulation of the flow of water and other means. Prevention of flood-related damages can be accomplished with structural measures, such as reservoirs, levees, artificial channels, and floodwalls that modify the characteristics of flood-prone waters. Flood damage can also be prevented by means of non-structural measures that alter the way people use areas adjacent to bodies of water. Non-structural solutions include: floodplain evacuation, floodproofing, and floodway acquisition; solutions that can reduce the susceptibility of human activities to flood risk.

The Corps manages 383 major lakes and reservoirs and maintains approximately 8,500 miles of levees across the country. Corps flood control reservoirs are often designed and built for multiple-purpose uses, such as municipal and industrial water supply, navigation, irrigation, hydroelectric power generation, conservation of fish and wildlife, and recreation.

The estimated annual damages prevented from 1989 to 1998 by Corps flood control projects was $21.1 billion; cumulative flood damages prevented from 1928 to 1998 was $628 billion; cumulative flood control expenditures from 1928 to 1998 was $105 billion. Thus, flood damages prevented per dollar expended equaled $5.98. (These figures were adjusted for inflation.)

The Corps fights the nation's flood problems by providing detailed technical information on flood hazards and by constructing and maintaining structures. Under the Floodplain Management Services Program, the Corps provides, on request, flood hazard information, technical assistance, and planning guidance to other federal agencies, states, local governments, and private citizens.

Once officials know the flood-prone areas in their communities and how often floods would be likely to occur, they can take action to prevent or minimize damages to buildings and facilities by adopting and enforcing zoning ordinances, building codes, and subdivision regulations.

Shore and Hurricane Protection

Corps work in shore protection began in 1930, when Congress directed the Corps to study ways to reduce erosion along U.S. seacoasts and the Great Lakes. Hurricane protection work was added to the erosion control mission in 1955, when Congress directed the Corps to conduct investigations along the Atlantic and Gulf Coasts to identify problem areas and determine the feasibility of protection.

While each situation the Corps studies involves different considerations, Corps engineers always consider engineering feasibility and economic efficiency along with the proposed project's environmental and social impacts. Federal participation in a shore protection project varies, depending on shore ownership, use, and type, as well as on the frequency of conditions requiring shore protection. If there is no public use or benefit, the Corps will not recommend federal participation. Once a shore protection project is complete, non-federal interests assume responsibility for its operation and maintenance.

Eighty-two federal shore protection projects along the coasts of the Atlantic, Pacific, Gulf of Mexico, and the Great Lakes protect a total of 226 miles of shoreline. Total investment in these projects since 1950 has been $674 million, of which $405 million was provided by the federal government, the rest by non-federal sponsors.

Hydropower

The Corps has played a significant role in meeting the nation's electric power generation needs by building and operating hydropower plants in connection with its large multiple-purpose dams. The Corps involvement in hydropower generation began with the Rivers and Harbors Acts of 1890 and 1899, which required the Secretary of War and the Corps to approve the sites and plans for all dams and to issue permits for their construction. The Rivers and Harbors Act of 1909 directed the Corps to consider various water uses, including waterpower, when submitting preliminary reports on potential projects.

The Corps continues to consider the potential for hydroelectric power development during the planning process for all water resources projects involving dams and reservoirs. In most instances today, it is non-federal interests who develop hydropower facilities at Corps projects without federal assistance. The Corps, however, can plan, build, and operate hydropower projects when it is impractical for non-federal interests to do so.

Today, the more than 20,000 megawatts of capacity at Corps-operated powerplants provide approximately 24 percent of the nation's hydroelectric power, or 3 percent of its total electric energy supply.

Water Supply

Corps involvement in water supply dates back to 1853, when it began building the Washington Aqueduct, which, to this day, provides water to the nation's capital and some of its suburbs.

Elsewhere in the nation, the Water Supply Act of 1958 authorized the Corps to provide additional storage in its reservoirs for municipal and industrial water supply at the request of local interests who must agree to pay the cost.

The Corps also supplies water for irrigation under terms of the Flood Control Act of 1944. This act provided that the Secretary of War, upon the recommendation of the Secretary of the Interior, could allow use of Corps reservoirs for irrigation, provided that users agree to repay the government for the water.

The total storage capacity of major Corps reservoirs is 329.2 million acre-feet; active storage in these reservoirs is 218.7 million acre-feet of water. Of these totals, 9.52 million acre-feet are authorized for use in municipal or irrigation water supply.

Recreation

The Flood Control Act of 1944, the Federal Water Project Recreation Act of 1965, and language in specific project authorization acts authorize the Corps to construct, maintain, and operate public park and recreational facilities at its projects and to permit others to build, maintain, and operate such facilities. The water areas of Corps projects are open to public use for boating, fishing, and other recreational purposes.

Today, the Corps is one of the federal government's largest providers of outdoor recreational opportunities, operating more than 4,340 sites at its lakes and other water resources projects. More than 380 million visits were recorded at these sites in 1998; and the Corps estimates that 25 million U.S. citizens — one tenth of the population — visit a Corps project at least once in any given year. State and local park authorities and private interests operate an additional 1,800 recreation areas at Corps projects. Volunteers are an important part of the Corps' recreational program. In 1998, over 65,000 volunteers worked over one million hours at Corps recreation sites.

Environmental Quality

The Corps carries out its civil works program in compliance with environmental laws, executive orders, and regulations. Primary among these is the National Environmental Policy Act of 1969. This law requires federal agencies to study and consider the environmental impacts of their proposed actions.

Consideration of the environmental impact of a Corps project begins in the early stages and continues through design, construction, and operation of the project. The Corps must also comply with environmental laws and regulations in conducting its regulatory programs.

The National Environmental Policy Act procedures ensure that public officials and private citizens may obtain and provide environmental information before federal agencies make decisions concerning the environment. In selecting alternative project designs, the Corps strives to choose options with minimum environmental impact.

The Water Resources Development Act of 1986 authorizes the Corps to propose modifications of its existing projects — many of them built before current environmental requirements were in effect — for environmental improvement. The Water Resources Development Act of 1996 includes new authority for aquatic ecosystem restoration, expanding Corps participation to include new restoration efforts where there is no existing Corps project. The Corps' focus is on those ecological resources and processes that are directly associated with or directly dependent upon the hydrologic regime of the ecosystem and watershed. The Corps has made proposals under this authority that range from using dredged material to create nesting sites for waterfowl to modification of water control structures to improve downstream water quality for fish.

Corps staff members who specialize in such civil missions as natural and cultural resources, water quality, floodplain management, or toxic waste control, help the Corps meet its mission of compliance with more than 70 federal environmental statutes, plus numerous regulatory and state requirements. The civil works mission thus enables the Corps to go "beyond compliance" to take a leadership role in natural resources stewardship.

Regulatory Programs

Under Section 10 of the Rivers and Harbors Act of 1899, the Corps regulates construction and other work in navigable waterways. The Corps also has authority over the discharge of dredged or fill material into the "waters of the United States" — a term which includes wetlands and all other aquatic areas — under Section 404 of the Federal Water Pollution Control Act Amendments of 1972 (The Clean Water Act). Under these laws, those who seek to carry out such work must first receive a permit from the Corps.

The "Section 404" program is the principal way by which the federal government protects wetlands and other aquatic environments. The program's goal is to ensure protection of the aquatic environment while allowing for necessary economic development.

The permit evaluation process includes a public notice and a public comment period. Applications for complex projects may also require a public hearing before the Corps makes a permit decision. In its evaluation of applications, the Corps is required by law to consider all factors involving the public interest. These may include economics, environmental concerns, historical values, fish and wildlife, aesthetics, flood damage prevention, land use classifications, navigation, recreation, water supply, water quality, energy needs, food production, and the general welfare of the public.

The Corps has issued a number of nationwide general permits, mostly for minor activities that have little or no environmental impact. Individual Corps districts have also issued regional permits for certain types of minor work in specific areas. Individuals who propose work that falls under one of these general or regional permits need not go through the full standard individual permit process. However, many general permit authorizations do involve substantial effort by the Corps and often require project-specific mitigation for the activities authorized by the permit. The Corps districts have also issued State Program General Permits for work in states that have comprehensive wetland protection programs. These permits allow applicants to do work for which they have received a permit under the state program. These general permits reduce delays and paperwork for applicants and allow the Corps to devote most of its resources to the more significant cases while maintaining the environmental safeguards of the Clean Water Act.

In 1998, the Corps issued 7,504 individual permits and denied 199. Activities authorized though nationwide general permits totaled 41,879 in 1998. In that same year, activities authorized by regional permits totaled 40,404.

Emergency Response and Recovery

Throughout the nation's history, citizens have relied on the Army to respond to their needs in disasters. In a typical year, the Corps responds to more than 30 Presidential Disaster Declarations, plus numerous state and local emergencies. Emergency responses usually involve cooperation with other military elements (coordinated by the Director of Military Support) and federal agencies in support of state and local efforts. Engineering and contracting efforts by the Corps, however, often mean that troop units called on for emergency support can be returned to training sooner than would otherwise be possible.

The Corps provides emergency response to natural disasters under the Emergency Flood Control Funds Act of 1955, which covers flood control and coastal emergencies. The Corps also provides emergency support to other agencies, particularly the Federal Emergency Management Agency, under the Stafford Act, as amended.

The Chief of Engineers, acting for the Secretary of the Army, is authorized to carry out disaster preparedness work, advance measures, and emergency operations. Emergency operations may include: flood fighting; rescue and emergency relief activities; rehabilitation of flood control works threatened or destroyed by flood; and protection or repair of federally authorized shore protection works threatened or damaged by coastal storms. This act also authorizes the Corps to provide emergency supplies of clean water in cases of drought or contaminated water supply. After an immediate flooding emergency has passed, the Corps provides temporary construction and repairs to essential public utilities and facilities and makes available emergency access to the disaster area for a 10-day period, at the request of the governor and prior to a Presidential Disaster Declaration.

Under the Stafford Act and the Federal Response Plan, the Corps, as designated by the Department of Defense, is responsible for providing public works and engineering support in response to catastrophic earthquake or other major disaster. Under this plan, the Corps, in coordination with the Federal Emergency Management Agency, will work directly with state authorities in providing temporary repair and construction of roads, bridges, and utilities; temporary shelter; debris removal and demolition; water supply, *etc*. The Corps is the lead federal agency tasked by the Federal Emergency Management Agency to provide engineering, design, construction, and contract management in support of recovery operations.

Chapter 2. Authorization and Planning of Corps Water Resources Projects

The U.S. Army Corps of Engineers functions as an engineering consultant to Congress. Most Corps water resource projects are developed under specific congressional authorization. Corps water resources activities are normally initiated by non-federal interests, authorized by Congress, and funded by a combination of federal and non-federal sources. The Corps contracts for project construction under the civil works program. Completed projects are operated and maintained either by the Corps or by a non-federal sponsoring agency.

The Water Resources Development Act of 1986 made numerous changes in the way potential water resources projects are studied, evaluated, and funded. The major change was that the law specified greater non-federal cost sharing for most Corps water resources projects.

When local interests feel that a need exists for improved navigation, flood protection, or other water resources development, they may petition their representatives in Congress. A congressional committee resolution or an Act of Congress may then authorize the Corps to investigate the problems and submit a report with recommendations. Water resources studies, except studies of the inland waterway navigation system, are conducted in partnership with a non-federal sponsor, with the Corps and the sponsor jointly funding and managing the study.

For inland navigation and waterway projects, which are by their nature not "local," Congress, in the Water Resources Development Act of 1986, established an Inland Waterway Users Board, comprised of waterway transportation companies and shippers of major commodities. This board advises the Secretary of the Army and makes recommendations on priorities for new navigation projects such as locks and dams. Such projects are funded in part from the Inland Waterway Trust Fund, which, in turn, is funded by waterway fuel taxes.

Normally, the planning process for a water resources problem starts with a brief reconnaissance study to determine whether a project falls within Corps statutory authority and meets national priorities. Should that be the case, the Corps district where the project is located will carry out a full feasibility study to develop alternatives and select the best possible solution. Economic and engineering solutions to the problem and possible impact on the environment are also studied.

This study process might include public meetings to determine the views of local interests on the extent and type of improvements desired. Desires of local interests are fundamental not only because projects could affect the local area, but because the Water Resources Development Act of 1986 requires local interests to provide real estate and/or financial participation in the project.

The federal, state, and other agencies with interests in a project are partners in the planning process. All interested federal and non-federal agencies are contacted to obtain their views, to avoid conflict with their programs, and, if appropriate, to incorporate features of their programs into Corps projects.

Some studies may be confined to a small area with a comparatively simple solution. Other studies may involve an urban area or cover an entire river basin and require detailed analyses of navigation, flood control, erosion control, hurricane and flood protection, water supply, water quality control, hydroelectric power, major drainage, irrigation, recreation, or other purposes that may be deemed necessary to promote national welfare.

Before making recommendations to Congress for project authorization, the Corps ensures that the proposed project benefits will exceed costs, that its engineering design is sound, that the project best serves the needs of the people concerned, and that it makes the wisest possible use of the natural resources involved while adequately protecting the environment.

Once the Corps district completes its feasibility study, it submits a report, along with a final environmental impact statement, to higher authority for review and recommendations. After review and coordination with all interested federal agencies and the governors of affected states, the Chief of Engineers forwards the report and environmental statement to the Secretary of the Army, who obtains the views of the Office of Management and Budget before transmitting these documents to Congress.

Congress may then include the project in an authorization bill; enactment of the bill constitutes authorization of the project.

Before construction can get underway, however, both the federal government and the project sponsor must provide funds. A federal budget recommendation for a project is based on evidence of support by the state and the ability and willingness of a non-federal sponsor to provide its share of the project cost. Appropriation of money to build a particular project is usually included in the annual Energy and Water Development Appropriation Act, which must be passed by both Houses of the Congress and signed by the President.

After Congress provides construction funds, the Corps prepares plans and specifications, awards contracts, and supervises construction. Completed projects may be operated and maintained by the Corps or they may be transferred to another agency or to local interests.

A procedure to deauthorize projects was established by Section 12, Water Resources Development Act of 1974. Annually, the Secretary of the Army, acting through the Chief of Engineers, is required to provide Congress with a list of projects that have been authorized for at least 8 years and meet the criteria for deauthorization. Before the list is submitted to Congress, the Chief of Engineers obtains views of interested federal agencies, and instrumentalities, the governors of affected states, and concerned members of Congress.

Continuing Authorities

In addition to major water resources development projects authorized directly by Congress, the Corps may construct small projects and emergency work. The basic objective of the Continuing Authorities program is to allow the Corps to respond more quickly to problems or needs where the project scope and costs are small and where a large feasibility study is not needed. This work is performed under special continuing authorities established by Congress, with general funds appropriated annually. Continuing authority projects are subject to the same evaluation criteria and local cooperation requirements as projects authorized individually by Congress. The Chief of Engineers, under the direction of the Secretary of the Army and without further congressional authority, may authorize and construct those small projects that are complete in themselves and do not commit the United States to any additional improvement to ensure successful operation.

Continuing Authorities Related to Environmental Quality

Improving the Quality of the Environment (Section 1135 of Water Resources Development Act 1986, as amended). This authority provides for modifying the structure or operation of a Corps project to restore fish and wildlife habitat. The project must result in implementation or change to existing conditions, not in a report or study, and it must be clear that the modification will result in an improvement of the environment. Restoration of resources cannot go beyond pre-project conditions. The project benefits must be associated primarily with restoring historic fish and wildlife resources, and an increase in recreation may be one measure of value.

The program requires a non-federal sponsor, which can include public agencies, some private interests (if there is no requirement for support of future operation and maintenance), and some large national nonprofit organizations such as Ducks Unlimited or Nature Conservancy. Operation and maintenance associated with the project modification is the responsibility of the non-federal sponsor. The federal share of such projects may not exceed $5 million dollars.

Beneficial Uses of Dredged Material for Ecosystem Restoration (Section 204 of Water Resources Development Act of 1992, as amended). This is a continuing authority that allows the Corps to carry out ecosystem restoration and protection projects in connection with new or maintenance dredging of federal navigation projects. There is no per project limit, but nationally the program has an annual ceiling of $25 million.

Aquatic Plant Control (Section 103 of Water Resources Development Act of 1986). Under this authority the Corps may cooperate with non-federal agencies for authorized plant control on navigable waters (reservoirs, channels, harbors) not under the jurisdiction of the Corps or other federal agencies. The program is limited to $12 million dollars a year nationally.

Continuing Authorities Related to Flood Control and Flood fighting

Small Flood Control Projects (Section 205, Flood Control Act of 1948, as amended). Small flood control projects not specifically authorized by Congress may be constructed under authority given the Chief of Engineers. The federal share of such projects may not exceed $7 million dollars. The work must be a complete solution to the flood problem involved, so as not to commit the United States to additional improvements to ensure effective operation.

Snagging and Clearing (Section 3 of Public Law 14, River and Harbor Act of 1945). This act authorizes emergency work by the Corps to clear or remove unreasonable obstructions in navigable portions of rivers, harbors, and other waterways and tributaries in the interest of emergency navigation and flood control. The Corps is authorized to spend up to $500,000 at a single locality.

Continuing Authorities Related to Navigation

Small Navigation Projects (Section 107, 1960 River and Harbor Act, as amended). This legislation authorizes the Corps to construct small channel and harbor improvement projects not specifically authorized by Congress. The federal share in such projects may not exceed $4 million. These projects must be self-contained and not commit the United States to additional improvement to ensure successful operation.

Mitigation of Shore Damage Attributable to Navigation Works (Section 111, River and Harbor Act of 1968). This act authorizes the Corps to investigate, study, and construct projects for the prevention or mitigation of shore damage attributable to federal navigation works. Congressional authorization is required for construction of projects that exceed a first cost of $5 million dollars.

Continuing Authorities Related to Emergencies

Flood Fighting, Repair, and Rescue Work (Flood and Coastal Storm Emergencies of 1954, as amended). This law authorizes the Corps to engage in flood fighting and rescue operations and to repair or restore any flood control work threatened or destroyed by flood.

Emergency Streambank Protection (Section 14, Flood Control Act of 1946, as amended). Under this act the Corps is authorized to provide the repair, restoration, and modification of emergency streambank and shoreline protection to prevent damages to highways, bridge approaches and other public works. The Corps is authorized to spend up to $1 million dollars at a single locality.

Natural Disaster Assistance [The Stafford Act (Disaster Relief Act Amendments) of 1974]. Under this law, the Corps is authorized to cooperate with the Federal Emergency Management Agency to provide assistance to state and local governments in dealing with natural disasters. Such assistance includes work essential for the preservation and protection of life and property; conducting damage survey investigations; repairing, restoring or replacing public road facilities; and providing technical and engineering services. This law supersedes and incorporates provisions of Public Law 606, 91st Congress, as amended.

Other Continuing Authorities

Small Water Resources Development Projects (Section 201 of the Flood Control Act of 1965). This special authority can expedite the authorization of small projects. A resolution of the Committees on Public Works of the Senate and/or House of Representatives can authorize a project directly, rather than including the authorization in a water resources development bill. For such projects, the Corps is authorized to construct, operate, and maintain both single and multipurpose projects involving, but not limited to navigation, flood control, and shore protection. The estimated federal first cost of these projects must be less than $15 million.

Planning Assistance to States (Section 22 of the Water Resources Development Act of 1996). This act authorizes the Secretary of the Army, acting through the Chief of Engineers, to cooperate with any state in the preparation of comprehensive plans for the development, utilization, and conservation of the water and related resources of drainage basins located within the boundaries of that state. The Secretary is also authorized to submit to Congress reports and recommendations of appropriate federal participation in carrying out such plans. The federal share in such plans is limited to $500,000 annually in any one state.

Small Beach Erosion Control Projects (Section 103 of the River and Harbor Act of 1962, as amended). Small beach restoration and protection projects not specifically authorized by Congress are constructed under this authority. The federal share of the cost must not exceed $3 million for a single project, and the project must not be dependent on additional improvements for success.

Shoreline Erosion Control Demonstration Act of 1974 (Section 54 of the Water Resources Development Act of 1974). This act provides for the establishment of a national shoreline erosion control development and demonstration program.

Columbia River Treaty Fishing Access Sites (Review of Tribal Constitutions Act of 1988). The Secretary of the Army is directed to administer and improve certain sites to provide access for Indian treaty fishermen. Implementation of this law requires the Secretary to undertake a wide range of land management acquisition and development actions. These actions affect land along Bonneville, The Dalles, and John Day pools on the Columbia River in Oregon and Washington. The law directs the Secretary to transfer these lands, following their development, to the Secretary of the Interior for long-term management for treaty fishing use. The law provides a vehicle for the United States to satisfy its commitment to the Indian tribes which exercise treaty fishing rights in the Columbia River and whose fishing sites were inundated by construction of Bonneville Dam.

The history of this public law may be interpreted as providing that the specified fishing sites are to be restricted for the use of the Treaty Tribes. Many of these sites are within or adjacent to public recreation areas that have existed for many years. Agreement has been reached with the Treaty Tribes concerning public use of the recreation areas affected by the law. During the recreation season, the Treaty Tribes will share the use of these areas. Further negotiations are underway to deal with the period of time that follows. Negotiations will address use and management during this period and will lead to development plans for affected lands.

Chapter 3. Northwestern Division

The Pacific Northwest

The Pacific Northwest's topography ranges from high mountain ranges such as the Rocky Mountains, the Cascades, the Olympic Mountains, and the Coast Ranges, to the great basins of the interior. Climate of the Northwest is as varied as its topography. Weather systems and storms are borne inland from the Pacific Ocean by prevailing winds. While an abundance of rain and snow falls in the western part of the region, storm clouds are usually depleted when they reach the interior. This varied climate has created a broad mix of vegetation ranging from rain forests in the coastal region to semi-arid sagebrush and juniper-covered plateaus and plains in the mid and eastern parts of the region.

Washington and Oregon have more than 3,000 miles of tidal shoreline, including estuaries; beaches; tidelands; and rockbound shores on the Pacific Coast, the Strait of Juan de Fuca, and Puget Sound. Surface water totals 278 million acre-feet, with Canada providing 54 million acre-feet from streams flowing into the Columbia River. The Columbia River, with its major tributary, the Snake River, constitutes the most important drainage system in the Pacific Northwest. Columbia River flows stem from highlands in Canada, Washington, Oregon, Idaho, Montana, Wyoming, and Nevada.

The nearly 174 million acres of land in the region are classified by use. Pacific Northwest crop lands total 20,800,000 acres, while 85,800,000 acres are forests, and 58,700,000 acres are rangelands. Barren lands and mountain rock outcroppings account for 5 million acres, and 3.3 million acres are taken up with population concentration.

Leading sectors of the region's economy are agriculture, timber, and tourism. The Pacific Northwest's largest employers are service industries, manufacturing, and retailing. Major population centers are Seattle, Tacoma, and Spokane, Washington; Portland, Salem, and Eugene, Oregon; and Boise, Idaho. National projections estimate that the region's population will double in 50 years, with heaviest concentrations of people in a megalopolis stretching from Everett, Washington, to Eugene, Oregon.

Water has always been important in development of the Pacific Northwest and is one of the keys to the region's future. The region's tidal waters and many rivers and lakes are sources for power; transportation; water supplies for communities, commerce, and industry; irrigation; recreation; and fish and wildlife. This predicted growth is expected to bring heavy demand for water resources.

The Corps in the Pacific Northwest

In 1803, the Louisiana Purchase doubled the territorial holdings of the United States. The next year, President Jefferson dispatched Captain Meriwether Lewis and Lieutenant William Clark on their famous expedition to the Pacific Northwest. This was the first Army involvement in the region.

In 1824, Congress passed the General Survey Act, marking the beginning of the Corps' civil works program. Military engineers conducted explorations and surveys and laid out early stagecoach routes, military roads, and railroads. Army engineers active in the Pacific Northwest included John C. Fremont, George B. McClellan, and Washington Territory's first governor, Isaac Ingalls Stevens. Ulysses S. Grant and Philip Sheridan also drew assignments to the region.

During the Civil War, Army engineers continued their work in the Pacific Northwest. One of their efforts was removing hazards to navigation, such as rocks, snags, and sandbars, from the Snake River between what is now Pasco, Washington, and Lewiston, Idaho. This allowed sternwheelers to navigate the river, carrying gold from Idaho mines to federal coffers to help finance the war.

Later, Congress directed the Corps to design, construct and operate huge multi-purpose water resource development projects, including a series of hydroelectric power and flood control dams and navigation locks in the Northwest.

Designing, constructing, and operating civil works projects provides valuable practical experience and expertise in the Corps. This helps keep the Corps prepared for its missions of mobilizing civilian industry and ports of the nation should this country be threatened by war and of providing full engineering services to the Army and Air Force in peace and war.

Northwestern Division

The Corps has eight regional offices, called divisions, throughout the United States. These divisions manage Corps civil works activities accomplished by districts that are based on river basins rather than state boundaries.

On April 1, 1997, the North Pacific Division and the Missouri River Division were realigned and combined to form the Northwestern Division. The former headquarters offices of both divisions became regional headquarters through which the Northwestern Division Engineer directs all Corps water resources activities in an area that comprises more than one-quarter of the nation's land mass.

The two regional offices located in Portland, Oregon, and Omaha, Nebraska, provide direction and guidance for five subordinate district offices located in Kansas City, Missouri; Omaha, Nebraska; Portland, Oregon; Seattle, Washington; and Walla Walla, Washington. The regional offices coordinate technical policy and budgetary issues which cross district boundaries, as well as interface with other federal and state agencies, congressional leaders, interest groups and international commissions. The regional offices manage, coordinate, and analyze division-wide programs. The quality assurance role of the regional offices ensures that processes, procedures, and activities performed by the districts result in top quality products and services to Corps customers.

Northwestern Division's Water Management Division

The Water Management Division within the Northwestern Division is responsible for managing, as a system, the reservoirs in the Columbia River Basin. The Reservoir Control Center in the Water Management Division manages the day-to-day regulation of the projects in the Columbia River system for flood control, navigation, power generation, recreation, fish and wildlife management, and other purposes. Utilizing weather, stream flow, and project data, along with forecasts of future streamflow and operational conditions, the Reservoir Control Center develops regulation strategies and issues operating instructions to the operators of dams in the Columbia River Basin. The Water Management Division develops and implements operational plans for each project to balance the competing demands for water in the basin. This effort encompasses both federal and non-federal reservoirs in the Columbia River Basin that are owned and operated by various interests. Altogether, some 75 projects are involved. The Corps is specially empowered, through various congressional authorities, to operate non-Corps reservoirs during flood control operations.

The Reservoir Control Center is one of three main branches within the Water Management Division. The other branches are the Hydrologic Engineering Branch and the Power Branch, which specialize in hydropower planning, hydropower economics, flood control, water quality, and river forecasting. They prepare studies that establish reservoir operating plans and criteria, and make analyses to address concerns such as fishery survival and mitigation. Coordination for long-term planning includes consultation with the northwest electrical utility industry, environmental agencies, and other water resource agencies, and with regional entities such as the Northwest Power Pool, the Pacific Northwest Coordination Agreement, the Columbia River Treaty, and the Columbia River Water Management Group.

Another important function of the Water Management Division is to chair the "In-Season Technical Management Team," an adaptive management approach to implementing special Columbia River system operations during the juvenile salmon outmigration. The TMT is composed of federal managers from the National Marine Fisheries Service, the U.S. Bureau of Reclamation, Bonneville Power Administration, U.S. Fish and Wildlife Service, and the Corps, as well as representatives from the states of Oregon, Washington, Idaho, Alaska, Montana, and 13 sovereign Indian tribes. The TMT meets at least weekly during the migration season and provides a forum to receive recommendations from the federal fisheries agencies as well as state and tribal fishery interests.

Another critical mission occurs during periods of high runoff, during which the Water Management Division ensures that Corps responsibilities for flood control in the basin are being met. The Division also works with the Bonneville Power Administration to manage the Federal Columbia River Power System, which includes projects in the Columbia River Basin owned and operated by federal agencies. The Federal Columbia River Power System is operated to maximize production of hydroelectric power for the region and, when possible, for export power to other regions in the western United States. When low runoff occurs, the Water Management Division's work is critical since a careful balancing of all water uses is needed to minimize adverse impacts associated with drought conditions.

Northwestern Division Regional Issues

Comprehensive Basin Studies

The Northwestern Division is responsible for directing and overseeing basin-wide comprehensive studies undertaken by the Corps in the Pacific Northwest. The Division office also coordinates Corps input and involvement in interagency studies under the direction of other agencies or states. The most significant comprehensive basin-wide study is the Federal Columbia River Power System Operation Review.

As one of the most highly developed and complex river systems in the world, the Federal Columbia River Power System serves a broad spectrum of users. Through the SOR, the Corps, Bureau of Reclamation, and Bonneville Power Administration have evaluated the system of federal projects — many of which were authorized or constructed 20 or more years ago — to determine how best to meet today's needs and provide a long-term strategy for system operation.

The study team produced an Environmental Impact Statement describing the expected effects of alternative operation strategies for the Federal Columbia River Power System on all uses. Many of the system operating strategies in the SOR focus on anadromous fish recovery.

The SOR goals were to provide:

- A comprehensive review of Columbia River System operations including 14 major federal projects on the Columbia River and its major tributaries.

- A strategy for future operations in view of the needs of all users; and

- Support for a future federal decision on key power agreements — the Pacific Northwest Coordination Agreement and the Canadian Entitlement Allocation Agreements.

Early in the SOR, Endangered Species Act petitions and listings of endangered and threatened salmon species influenced the scope and direction of the review. The preferred system operation strategy alternative mirrors recommendations of the National Marine Fisheries Service and the U.S. Fish and Wildlife Service in their biological opinions on salmon recovery plans.

Lower Snake River Fish and Wildlife Compensation Plan

The Water Resources Development Act of 1976 authorized the Lower Snake River Fish and Wildlife Compensation Plan. The purpose of the plan was to mitigate losses caused to fishery resources and wildlife habitat attributed to construction and operation of the four lower Snake River lock and dam projects (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite).

Under the compensation plan, 10 chinook salmon and steelhead trout hatcheries were constructed in Idaho, Oregon, and Washington that will annually provide 27 million juvenile fish. These fish are released into the Snake River drainage for migration to the Pacific Ocean. As returning adults, these fish provide both sport and commercial fishing opportunities with more than four million pounds of fish going to the commercial fisheries. In addition to the anadromous fish, trout are reared and released in eastern Washington and Idaho tributary streams to provide additional sport fishing.

Initial project funding was received in fiscal year 1978. The estimated total cost of the compensation plan was $232 million.

Hatcheries and companion satellite facilities completed and operating in Idaho to enhance specified fish are the following: Clearwater Hatchery near Ahsahka for steelhead trout with its Crooked River Satellite near Grangeville; Red River Satellite near Elk City for spring chinook salmon; Dworshak National Fish Hatchery near Ahsahka for spring chinook salmon; Hagerman National Hatchery near Hagerman for steelhead trout; Magic Valley Hatchery near Buhl for steelhead trout; McCall Hatchery near McCall and its South Fork Satellite near Cascade for summer chinook salmon; Sawtooth Hatchery near Stanley and its East Fork Satellite near Clayton for spring chinook salmon; and Eagle Laboratory near Eagle.

Additional facilities are located in Oregon: Lookingglass Creek Hatchery near Elgin and its Imnaha Satellite near Imnaha for spring chinook salmon; and Irrigon Hatchery near Irrigon with its Wallowa Satellite near Enterprise, Little Sheep Creek Satellite near Joseph, and Big Canyon Satellite near Minam for steelhead trout. The Powell Satellite of the Clearwater Hatchery is located near Lolo, Montana, and rears spring chinook.

Washington locations are the following: Lyons Ferry Hatchery near Starbuck for steelhead trout, rainbow trout, and spring and fall chinook salmon; Satellite facilities are at Dayton Pond and Curl Lake near Dayton, and Cottonwood Creek near Anatone; and Tucannon Hatchery near Dayton for rainbow trout and spring chinook salmon.

The Lower Snake River Fish and Wildlife Compensation Plan authorized acquisition of an aggregate of lands in fee or easement for fisherman access, wildlife habitat, and hunting access. Off-project land acquisition is 100 percent complete. The Ahsahka, Myrtle Beach, and Magill Public Fishing areas have been developed. Hunting access development took place at Windmill, Revere, Shumaker, Pintler Creek, Harstock, Fisher Gulch, and Campbell areas.

Columbia River Treaty with Canada

The Columbia River Basin spans the boundaries between the United States and Canada. To address jurisdictional and operating problems, the United States and Canada signed the Columbia River Treaty in 1961. The pact provided for the construction of three dams in Canada — Mica, Hugh Keenleyside, and Duncan Dams — and for the United States to construct Libby Dam on the Kootenai River in Montana. The treaty provides that 15.5 million acre-feet of storage space be allocated for power production and 8.45 million acre-feet reserved for flood control storage in Canadian reservoirs.

The treaty ensures Canada will operate storage features to provide downstream flood control and optimum power generation in the Columbia River Basin. Libby Dam's reservoir, Lake Koocanusa, extends 42 miles into British Columbia. Canada assumed all costs of construction for that part of the reservoir. All four of the projects under the treaty are constructed and in operation.

In return for constructing and operating the three Canadian projects, Canada was paid a onetime, lump-sum payment of $64.4 million for 50 percent of the flood damages prevented in the United States during the 60-year life of the treaty. Canada also receives one-half of the power produced downstream in the United States as a result of the added Canadian storage.

Canada sold its share of this power to the United States for $254 million for a 30-year period. The Columbia Storage Power Exchange, a nonprofit United States corporation, was established for the purchase. Power is divided among 41 public and private utilities. Participants' shares range from 0.5 to 17.5 percent. These power allocation agreements phase out in stages from 1998 through 2003. After 2003, the United States is obligated to deliver this power to Canada.

Under the Columbia River Treaty, the Bonneville Power Administrator and the Northwestern Division Engineer are designated by Presidential Executive Order as the United States Entity. The British Columbia Hydro and Power Authority acts as the

Canadian Entity. Both have established operating and hydro-meteorological committees to develop and implement operating plans for Canadian storage and to collect real-time hydro-meteorological data needed to operate the system.

Northwest Power Planning Council

In December 1980, Congress passed the Pacific Northwest Electric Power Planning and Conservation Act, which established the Northwest Power Planning Council. The Council is composed of two members each from Idaho, Montana, Oregon, and Washington states. The members are appointed by the governors of their state and charged with preparing and adopting a regional conservation and electric power plan. The Council's charter also puts fish and wildlife considerations on an equitable basis with power planning and other purposes for which hydroelectric facilities were developed.

In December 1994, the Council passed amendments to its Fish and Wildlife Plan that called upon the region to implement certain actions for Columbia and Snake River salmon. The amendments, called the "Strategy for Salmon," laid out a number of actions for the Corps, including operational changes to the hydro system and physical changes to the dams. Many of these actions also appeared in a Biological Opinion issued in 1995 by the National Marine Fisheries Service under the Endangered Species Act concerning listed Snake River salmon species. The Corps, while attempting to respond to Council plans, has a legal mandate to fulfill Endangered Species Act requirements and has placed higher priority on the measures contained in the Biological Opinion.

Anadromous Fish

The Columbia River Basin provides habitat for five species of anadromous salmon and for steelhead. Anadromous fish hatch in fresh water rivers and tributaries, migrate to and mature in the ocean, and return to their place of origin as adults to spawn. Salmon generally live 2 to 3 years in the ocean before returning to spawning areas.

A number of factors have contributed to the current depressed state of salmon stocks in the Columbia River Basin. These factors include the adverse effects of dams, logging, mining, cattle grazing, and pollution on spawning and rearing habitat. Another factor is the increased competition for food and the spread of disease from hatchery stocks. Dams impede the migration of salmon from their upriver rearing areas to the ocean and as they return as adults to spawn. Over harvesting also contributes to the decline of salmon runs. This includes over-harvesting in the 1800s and since then by incidental ocean take and sport and commercial fishery in the Basin. Poor ocean conditions, which have also brought coastal salmon and steelhead stocks into decline, also affect salmon in the Columbia River Basin. All of these factors have combined to lessen survival chances of the wild salmon stocks.

Despite regional efforts to stop declines in numbers of salmon and steelhead in the Columbia River Basins, three species of salmon have been listed under the Endangered Species Act. Effective December 20, 1991, the National Marine Fisheries Service listed Snake River sockeye salmon as endangered; effective May 22, 1992, Snake River spring/summer and fall chinook salmon were listed as threatened species. In August 1994, in an emergency action, NMFS changed the status of the two listed chinook salmon species to endangered. On August 11, 1997, NMFS listed the upper Columbia steelhead as endangered and Snake River steelhead as threatened under the Endangered Species Act.

The Corps' eight hydroelectric dams on the lower Columbia and Snake Rivers are widely believed to be a major factor in the decline in the numbers of wild Snake River salmon stocks. Besides physically impeding fish migration, the dams create reservoirs that alter water velocities and temperatures, interfering with juvenile migration patterns and improving conditions for predators.

Adult fish ladders have been built into each of the eight lower Snake and Columbia River dams. These allow adult fish to follow a series of graduated steps and pools to scale the 100-foot-rise in elevation from the tailrace to the forebay of the dams. The ladders have proved effective.

In the years since the dams have been in operation, many improvements have been made to juvenile fish passage routes at the dams. There are a number of ways for juvenile fish to pass the dams: over the spillways, through juvenile bypass systems, in specially designed barges, and through the turbines.

Under the Endangered Species Act, the Corps prepares a biological assessment of the effects on listed species of planned operation of the Federal Columbia River Power System. Following consultations between NMFS and the Corps, NMFS issues a Biological Opinion.

In its March 2, 1995, Biological Opinion for 1995 and future years, NMFS found that the planned operation of the Federal Columbia River Power System would jeopardize the continued existence of the three listed Snake River salmon species. Accordingly, the Biological Opinion provided reasonable and prudent alternative measures to avoid jeopardy.

On March 10, 1995, Major General Ernest J. Harrell, then Division Engineer for the North Pacific Division, signed a record of decision documenting the Corps' intent to implement the measures in the Biological Opinion.

The Biological Opinion calls for a variety of actions and studies for improving conditions for salmon migration throughout the Columbia River Basin. During the 1995 operating year, the Corps implemented operational measures such as flow augmentation, spills, juvenile fish transport, and lowered reservoir levels, as contained in the Biological Opinion. A team of representatives from five federal agencies (the U.S. Fish and

Wildlife Service, National Marine Fisheries Service, Bureau of Fisheries, Bonneville Power Administration, and the Corps) monitored river and fish conditions and recommended adjustments to operations during the migration season.

In accordance with the Biological Opinion, extended submerged screens have been installed in the existing juvenile bypass systems at Lower Granite and Little Goose Dams on the lower Snake River and at McNary on the Lower Columbia River, to increase the percentage of juvenile fish guided away from the turbine intakes and up through the bypass channels.

Construction of a conventional juvenile bypass system at Ice Harbor Dam on the lower Snake River was completed in 1996. The Biological Opinion calls for more juvenile fish barges to be constructed and enlarged exits to be installed on existing barges. Passive Integrated Transponder (PIT) Tag monitoring facilities were installed at John Day Dam in 1997 and at Bonneville Dam in 1999.

For the long term, the NMFS Biological Opinion calls for evaluation and implementation of further improvements to the existing fish bypass systems, as well as a study of alternative structural configurations at the dams such as reservoir drawdowns and surface bypass systems. The Corps is evaluating natural river and spillway crest level drawdowns of the four lower Snake River reservoirs — Lower Granite, Little Goose, Lower Monumental, and Ice Harbor. The idea behind drawdowns is to increase the velocity of the river by decreasing the cross-sectional size of the reservoirs.

Drawdown of the John Day pool to minimum operating level during the juvenile fish migration season and the study of a spill crest level drawdown at John Day are also requested in the Biological Opinion.

Other studies focus on improved gas abatement during spill; refined turbine design to reduce turbulence and negative pressures; and light and sound generation, as well as physical barriers, to guide fish.

Research efforts are continuing concurrently, including evaluation of in-river migration versus transport of juvenile fish, study of juvenile fish survival and travel time through the reservoirs, and various aspects of fish behavior.

Anadromous Fish Evaluation Program (AFEP)

The Corps recently restructured its research program, formerly the Fish Passage Development and Evaluation Program, to assure that salmon studies are fully coordinated internally and with regional entities and programs. These include the Pacific Salmon Coordinating Committee (a regional federal agency team); NMFS Biological Opinion; Northwest Power Planning Council's Fish and Wildlife Program; states; and tribes. Research focuses on improved fish passage and survival through the dams and reservoirs.

Under the new structure, a Corps AFEP Coordination Team oversees the program and provides command and control, program management, quality assurance, and regional interface for all anadromous fish evaluations.

A Technical Coordination Team provides a process for interfacing with federal and state fishery agencies, tribes, and other interested parties to assure that they have adequate opportunity for review and to provide recommendations throughout the development and implementation of AFEP studies. The team will also coordinate scientific peer review of AFEP proposals, test fish needs, and study results.

Columbia River System Configuration Study

The Corps completed Phase I of its System Configuration Study. This study evaluated alternative physical and structural modifications that could be made to the lower Columbia and Snake River water resources projects to improve anadromous fish passage. Several structural and operational modifications will be implemented and evaluated further on the lower Snake River dams under the System Configuration Study Phase II. These modifications, with implementation timelines, will be incorporated into an updated NMFS Biological Opinion.

Measures implemented include: enlarging juvenile transport barge exits on existing barges; acquiring additional transport barges to provide direct-loading capability from all transport facilities; overhauling the Lower Granite juvenile fish facility; installation of picketed lead fences in channel entrances to guide adult migrating fish; and fish ladder temperature control mechanisms.

The other major portion of the System Configuration Study Phase II is the Lower Snake River Juvenile Migration Feasibility Study. This is a multifaceted study that will evaluate the merits of drawing down the lower Snake River reservoirs and the utilization of new surface collection technology. Many believe that attempting to return the river to a more natural condition by increasing flows during the juvenile outmigration time period would significantly increase juvenile survival and hence recovery of the listed species. Preliminary biological benefit and economic cost information will be assembled this year and presented to NMFS and the region to assist in determining which, if any, specific drawdown option to pursue with detailed engineering and design. Ongoing and new research will be conducted to address key uncertainties associated with in-river and reservoir mortality, predation, and transport benefits and impacts, such as delayed mortality and homing impacts on returning adults.

Surface bypass is a relatively new technology that holds promise of more efficiently bypassing juvenile fish at the dams. Surface bypass systems would intercept the fish within the upper portion of the water column where they normally migrate and allow them to bypass the dams without plunging deep under the water to pass through turbines. There is also a potential for less spill water with these systems. (Spill is water sent over the dams and thus not used for hydropower generation). In 1995, the Corps installed and tested several types of surface bypass guidance systems at Ice Harbor and the Dalles Dam. A prototype surface collector was tested at Lower Granite Dam in 1996.

The final feasibility report will present a comprehensive analysis of surface collection and drawdown, as compared to the methods currently utilized (with improvements that will have been implemented by that time) to aid in moving juvenile salmon downstream. The report will recommend implementing the action, or combination of actions, showing the greatest potential benefit to the Endangered Species Act-listed species, in consideration of overall biological and economic benefits, costs, and impacts.

Northwestern Division's Fish Management Division

To increase the Corps' responsiveness to salmon issues in the region, the Fish Management Division (formerly the Pacific Salmon Coordination Office) within the Northwestern Division was established in 1994. The Fish Management Division focuses on internal coordination on salmon issues, as well as improved communication and coordination with regional, state, and federal agencies; tribes; organizations; and the general public. The office provides oversight and strategic planning of Corps' activities to ensure timely completion of actions and studies for salmon restoration.

Because of regional interest in actions to aid the migration of salmon and steelhead past the dams operated by the Corps, the Fish Management Division publishes "Salmon Passage Notes," available on the Internet at: http://www.nwd.usace.army.mil/ps/.

Chapter 4. The State of Idaho

Idaho is a state with elevation extremes. The highest point in the state is Mount Borah at 12,662 feet above sea level in the Lost River Range. The lowest elevation is 738 feet found in the Clearwater Valley near Lewiston. Idaho's physical relief is dominated by the Northern Rocky Mountains. One of the largest granite batholiths in North America is exposed in the Sawtooth Mountains of central Idaho. There are 22 major mountain ranges in Idaho. Most important are the Bitterroot, Lost River, Owyhee, Beaverhead, Lemhi, Clearwater, Centennial, Caribou and Seven Devils ranges. Hells Canyon, formed by the Snake River cutting through the Seven Devils Range between Idaho and Oregon, is the deepest river gorge on the North American continent. The canyon is 7,900 feet deep. The Clearwater Mountains form the largest concentrated mountain range, extending 125 miles from the St. Joe River south to the Salmon River. The 14,000-square-mile Snake River Plain, part of the Columbia Plateau, extends in a crescent across southern Idaho from east to west. The plain slopes downward from the high, central wilderness mountains and the Continental Divide in the northeast.

Idaho, with more than 93,000 river miles, has more miles of river than any other state in the United States. The predominant river in Idaho is the Snake River, rising in Yellowstone National Park in Wyoming and flowing for 1,000 miles in an arc-like course through southern Idaho. Important tributaries are the Boise, Clearwater, Salmon, Payette, Owyhee, Weiser, Big Wood, and Bruneau Rivers. The Salmon River, known as the "River of No Return" because of its difficult passage, is the nation's longest free-flowing river that rises and flows within a single state. The extreme southeast portion of the state features the Bear River, which begins in Utah, flows into Wyoming, back to Utah, back to Wyoming, then to Idaho, and finally returns to Utah where it flows into the Great Salt Lake. The Kootenai and Clark Fork Rivers in the north flow into the Columbia River. Associated with the Snake River in its course through southern Idaho is the Snake River Aquifer, one of the largest in the world.

More than 2,000 lakes add to the 880 square miles of water surface in Idaho. Coeur d'Alene, Pend Oreille, and Priest Lakes in the north are the largest. Jackson Lake on the Snake River in Wyoming was constructed primarily to provide irrigation water for Idaho. Dworshak Dam on the North Fork of the Clearwater River impounds the state's largest man-made reservoir. Dworshak Reservoir is 53 miles long, has a surface area of 17,090 acres, and stores 3,468,000 acre-feet of water when full with an active storage of 2,016,000 acre-feet.

Idaho's relatively high average temperature, about 46 degrees Fahrenheit, is due to the nearness of the Pacific Ocean, warm chinook winds from the Columbia Valley, and the Rocky Mountains blocking cold northeast winds from Canada. Precipitation levels vary because of the topography. In the mountainous reaches of the Clearwater, Payette, Boise, Salmon, and Priest River Basins, 40 to 50 inches of water annually fall in the form of rain and snow. In the arid plains of southern Idaho, less than 10 inches of precipitation is recorded annually.

Native Americans of many tribes, most prominently the Kutenai, Salish, Coeur d'Alene, Nez Perce, and Shoshoni, inhabited Idaho when Lewis and Clark explored the area in 1805. Idaho was part of disputed territory that passed to the United States when Britain relinquished its claims in the Northwest in 1846. In 1860 when gold was discovered, the area, then part of Washington Territory, experienced an influx of settlers. It was only in that year, 1860, that Idaho's oldest town, Franklin, was founded. Mormons from Utah also helped settle the state. Idaho became the 43rd state of the union in 1890.

The state is sparsely populated with an average of about 12 persons per square mile. The urban population is just over one-half of the total. The federal government manages 63 percent of the land in Idaho. The Frank Church River of No Return Wilderness is the largest wilderness area in the 48 continuous states, comprised of 2.3 million acres of rugged, unspoiled backcountry.

The manufacturing sector has only recently exceeded agriculture as Idaho's leading source of personal income. Agriculture is second in importance, with irrigation being an essential factor in farming in the state. Crops include wheat, sugar beets, apples, corn, barley, and hops. Idaho is number one in the nation in producing potatoes and commercial trout.

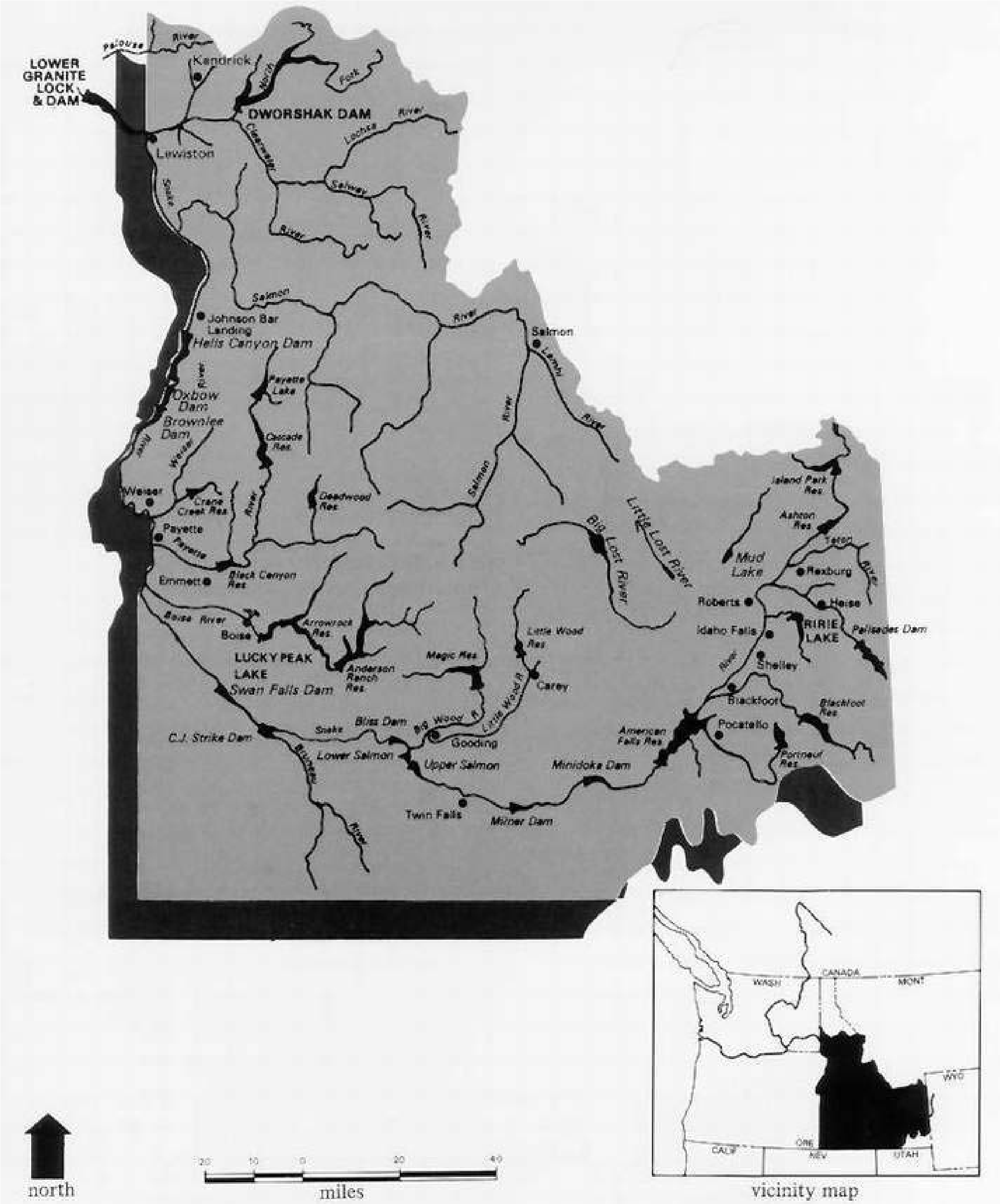
As winter sports became more popular in the nation in the late 20th century, tourism became a major economic resource for Idaho. Tourism now ranks third among Idaho's major industries. Streams, lakes, mountains, and forests provide fishing, camping, hunting, and boating sites. The nation's largest elk herds draw hunters from all over the world. Sun Valley attracts thousands of visitors each year to its swimming and skiing facilities.

World War II military requirements accelerated the state's growth with development of food processing, which is now fourth among revenue producing industries for the state.

Idaho is also dependent upon mining and lumbering. The state produces more than one-third of all silver mined in the United States. Lead, antimony, and molybdenum are also extracted. Idaho's nickname is “the gem state” in recognition of fact that 72 different types of precious and semi-precious stones are found in the state.

The Snake River Basin holds most of the state's population, reaffirming the importance of rivers to population distribution. The 21 counties bordering the river hold 81 percent of the 1.3 million total population of Idaho. The land area of Idaho is 52,910,000 acres, generally equaling that of Great Britain and ranking the state geographically as 13th largest in the United States.

Chapter 5. Snake River Main Stem and Minor Tributaries



Snake River Main Stem

The Columbia-Snake Rivers Inland Waterway

Discovered by Captain Robert Gray in 1792, the Columbia River has been a commercial waterway since the early 19th century. Fur traders of the Northwest Company, Astoria Pacific Fur Company, and the Hudson's Bay Company used the river regularly. Ocean going vessels penetrated to Vancouver, Washington, and also to Portland and Oregon City, Oregon, via a tributary, the Willamette River. By the mid-19th century, river steamers were plying sections of the Columbia River upstream from Vancouver, but rapids blocked commerce into the interior.

At first rapids were bypassed using wagon portages and then railways, until the Corps constructed the Cascade Canal and Locks in 1896. The old canal is now under the waters of Lake Bonneville (the lake formed behind Bonneville Dam). The Dalles-Celilo Canal, constructed in 1915, is also under water, flooded when The Dalles Dam was completed. When gold was discovered in Idaho in 1862, steamers began traveling from The Dalles, Oregon, on the Columbia River to Lewiston, Idaho, on the Snake River. Steamboats occasionally made trips beyond Lewiston on the Clearwater River to the Orofino mines. Before construction of Grand Coulee Dam, the upper Columbia River was navigable in some seasons to Kettle Falls, 700 miles above the mouth of the river.

Bonneville Dam was the first of the multipurpose projects authorized by Congress for construction by the Corps on the lower Columbia River. It was the first of a series of eight locks and dams constructed between the Portland-Vancouver area and Lewiston, Idaho. Barge navigation on the Snake River to Lewiston became a reality when a series of four dams with locks, originally authorized by Congress in 1945, were completed in 1975. The four locks and dams were: Ice Harbor, Lower Monumental, Little Goose and Lower Granite. When, in 1975, the reservoir filled behind Lower Granite Lock and Dam, a new, deepened, slack water channel was formed, and Idaho was linked with the sea.

The Columbia-Snake rivers inland waterway now extends from the Pacific Ocean to Lewiston, Idaho, a distance of 465 miles. After traveling about 145 miles upstream from the mouth of the Columbia River, barges encounter Bonneville Lock and Dam. From this point, the barges are lifted about 340 feet by the four Columbia River locks at Bonneville, The Dalles, John Day, and McNary and about 398 feet by the four Snake River locks — a total lift of 738 feet.

Shallow-draft, fast-water conditions continue for commercial navigation on the Snake River above Lewiston to Johnson Bar Landing in Hells Canyon.

Lower Granite Lock and Dam, Lower Granite Lake

Lower Granite Lock and Dam, is the farthest upstream of the four locks and dams on the lower Snake River below Lewiston, Idaho. Lower Granite Lock and Dam backs up water to the Lewiston-Clarkston area, providing slackwater navigation and increased commercial traffic to this area of the Snake River.

Congress authorized the Lower Granite Project in 1945 for navigation and power generation. Other authorized project purposes include recreation, irrigation, and fish and wildlife management. The dam is 32 miles west of Lewiston, Idaho, and 107.5 miles upstream from the confluence of the Snake and Columbia Rivers.

Construction started in 1965, and the lock and dam became operational 10 years later. All general construction at the dam itself, at the recreation sites, and along the Lewiston Levee System was completed in 1984.

The dam has a structural height of 254 feet and a hydraulic height of 100 feet from normal tailwater to normal high pool. Its total crest length is 3,200 feet. The combined structure consists of a single-lift navigation lock, spillway, powerhouse, and adult and juvenile fish bypass facilities.

Power from the first of three 135,000-kilowatt, turbine-driven generators went online in April 1975. Installation of three additional units of equal capacity was completed in 1978, bringing the total powerplant capacity to 810,000 kilowatts. During the 1999 fiscal year, the six generating units at the project generated 3.14 billion kilowatt hours of electrical power. Power generation through September 1999 was 64.43 billion kilowatt hours. Revenues from the sale of power by Bonneville Power Administration are returned to the U.S. Treasury to repay, with interest, construction costs as well as operation and maintenance costs of the project.

Lower Granite Lake extends 39 miles up the Snake River from Lower Granite Dam to Asotin, Washington, and 4.6 miles up the Clearwater River from its confluence with the Snake River at Lewiston. Much of the lake is in a deep gorge bounded by steep, rocky slopes rising up to 1,700 feet above the surface. At full pool, the lake has a surface area of 8,900 acres and an average width of 2,000 feet.

Lower Granite Dam is considered a run-of-the-river dam, and only enough active storage capacity is included in the lake design to provide ponding to support daily power generating operations. The lake’s normal authorized operating level under generating conditions is between elevations 733 and 738 above feet mean sea level at the confluence of the Snake and Clearwater Rivers.

Lower Granite Lake was filled in February 1975, and the navigation lock went into operation in June of the same year. The lake provides a minimum 14-foot-deep commercial navigation channel to the ports of Wilma and Clarkston in Washington and to the Port of Lewiston in Idaho. Traffic through the navigation lock consists primarily of grains and other agricultural produce, petroleum products, fertilizer, wood products, and miscellaneous cargo. Total traffic amounted to 2,226,112 tons during calendar year 1998.

Through September 1999, construction costs for the project totaled $374,836,315, and operation and maintenance costs totaled $147,436,033. The Lower Granite Project included construction of levees in the Clarkston-Lewiston area. Approximately $16,746,000 in potential flood damage has been prevented since the levees became functional. More information about Lower Granite Lock and Dam is available in the Walla Walla District's Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=91.

Lewiston Levees and Lower Granite Lake Recreation

Nine miles of levees were constructed along the banks of the Snake and Clearwater rivers, encompassing essentially the entire length of the waterfront of Lewiston and north Lewiston. The design included a series of collector ponds and pumping plants for interior drainage. The Corps initiated extensive landscape architectural development of the levees as a national pilot project for levee beautification efforts. Beautification was intended as an integral feature of the Lewiston Levees. The work included sculpturing the topography, developing ponds and lawns, planting trees and shrubs, providing park furniture, placing interpretive displays, and paving trails. The area is now known as the Lewiston Levee Parkway.

In 1988, the Secretary of the Interior designated the Clearwater and Snake River National Recreation Trail. The 16-mile trail is a paved walkway extending along the levees and adjacent portions of project lands in both Idaho and Washington connecting several recreational areas including the Lewiston Levee Parkway, Kiwanis Park, and Hells Gate State Park. The trail then crosses the Interstate Bridge and passes through Swallows Park, ending at the boat ramp area next to the Corps' Eastern Operating Area and Resource Office at Clarkston, Washington. The Digital Project Notebook found on the Web at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=238 covers the Lewiston levees.

In addition to the Lewiston Levee Parkway, recreational opportunities can be found in the Idaho portion of the Lower Granite Lake at Clearwater Park along the North Lewiston Levee, as well as several boat ramps, Hells Gate State Park, and North Lewiston Community Park. Lower Granite Lake offers visitors 16 day-use/picnic sites, six sites with camping, 12 boat launch ramps, and four swimming areas. Total recreation visitation to Lower Granite Lake for fiscal 1999 was 989,700.

Lower Granite Lake Fish and Wildlife Management

Public lands associated with the Lower Granite Project total about 9,000 acres. Of this total, about 200 acres have been classified as intensively managed wildlife areas. Habitat development is in progress at a number of sites to replace habitat inundated by the reservoir or destroyed by relocation of roads and railroads. Habitat developments in

Idaho are at the Goose Pasture Habitat Management Unit along the Clearwater River and the Hells Gate Habitat Management Unit along the Snake River.

Major improvements include irrigation, tree and shrub plantings, nesting areas, and plots planted with wildlife feed crops. The Corps also maintains and protects wildlife habitat throughout the rest of the public lands associated with the Lower Granite Project. Only a relatively small land area above the lake level is available for recreational access or wildlife habitat development because of the steep and rugged slopes near the reservoir.

The annual salmon and steelhead runs up the Snake River and its tributaries are an important resource for Idaho. Lower Granite Dam includes facilities for juvenile (downstream migration) and adult (upstream migration) fish passage. The adult fish passage facilities consist of an auxiliary water supply system and a series of entrances across the downstream face of the dam providing access to an interior channel leading to a fish ladder. The fish ladder provides a route over the dam to proceed upstream.

The juvenile fish passage facilities consist of submersible traveling screens upstream of each power intake that direct fish into a collection channel. The juveniles may then be routed into downstream collection facilities or bypassed directly into the river below the dam. At the collection facilities, the juvenile fish are distributed to either a tank truck or fish barge for transport below Bonneville Dam as part of the Corps' Juvenile Fish Transportation Program. Juvenile spring chinook salmon and steelhead trout are sampled and tagged for research and monitoring. Extended-length screens installed in 1996 further improved guidance of fish. Modifications to the fish passage facilities are made almost yearly in order to improve bypass efficiency.

The Corps is testing innovative systems at Lower Granite Lock and Dam that allow juvenile fish to pass the dam at more shallow depths than previous systems allowed. One such "surface bypass system" is the Removable Spillway Weir. The purpose of the RSW is to pass juvenile salmon and steelhead over a raised spillway crest similar to a waterfall. Existing spillways use gates that are 50 feet below the water surface at the dam face. Fish pass through the deep gates under high pressure and velocities. The prototype weir will allow fish to pass the dam over the weir under lower velocities and lower pressures. The theory behind this new passage system is that it will be a more efficient and less stressful passage route for the juvenile fish. The weir will be fitted into spillway #1 at Lower Granite. The structure is designed to be "removable" by controlled descent to the bottom of the dam forebay. This allows the capability to return the spillway to original flow capacity during major flood events, then to be raised to operating position after the flood event. The weir weighs over two million pounds, and is 115 feet tall, 83 feet wide, and 61 feet deep in the upstream to downstream dimension. Installation of the Removable Spillway Weir is planned for summer of 2001 with testing in spring of 2002.

Improved anadromous fish runs are due, in part, to improved fish bypass facilities at the dams, new hatchery construction, and the Corps' Juvenile Fish Transportation Program.

In 1982, about 1,942,000 juvenile fish were collected at Lower Granite Dam. Of this number, 1,852,000 were transported downstream. By 1999, collection at Lower Granite had swelled to 5,879,114 migrants with 5,466,071 fish transported. In 1999, the grand total of juvenile salmon and steelhead collected at all Corps facilities on the Snake and Columbia Rivers amounted to 24,794,071; of these 19,359,379 or 78 percent were transported. In 1999, 15,878 spring chinook (spring/summer) salmon and 78,867 steelhead trout returned to upstream spawning grounds or their hatcheries of origin via fish ladders at the Lower Granite Lock and Dam.

Lower Granite Lake Sedimentation

Sediment accumulation in Lower Granite Lake continues to reduce the designed capability of the Lewiston Levee System for flood protection and adversely impacts authorized navigation. Sedimentation was considered during the Lewiston Levee design, but a decision on a long-term solution was delayed for lack of data until after levee construction. Interim dredging has stabilized the flood protection problem since 1986 but a long-term solution is needed.

The Walla Walla District is preparing a Dredged Material Management Plan. The plan will outline the dredging and disposal options for all five of the navigable reservoirs within the District, including Lower Granite Lake. The DMMP study is exploring levee and in-stream structural modifications, reservoir operation changes, dredged material disposal methods, disposal site options, and beneficial uses of dredged material. The study seeks the least cost, most environmentally sound method of regaining and maintaining adequate flood protection and navigation for the future.

Due to the sensitive nature of the aquatic environment in Lower Granite Lake, an advisory working group composed of federal and state agencies was formed in conjunction with studying the sedimentation issue. The key element of this phase of the Dredged Material Management Plant Study was a multi-year prototype involving in-water placement of sediment with environmental monitoring. Agencies in the working group were primarily concerned about the effects of relocating sediments on anadromous fish. The third and last year in which sediments were placed in-water for biological testing was 1992. Biological monitoring was completed in 1994.

The final phase of the Dredged Material Management Plan Study restarted in fiscal 1997. The final phase is evaluating alternatives, including raising the existing levees to various heights in combination with dredging, and using both in-water and on-land disposal methods. The final plan is scheduled for completion in 2001.

Lewiston-Clarkston Bridge

Following completion of the Colombia-Snake rivers inland waterway in 1975, navigation increased with greater use of the lift span on the existing bridge over the Snake River between the Clarkston, Washington, and Lewiston, Idaho. More frequent openings of the bridge caused interruptions to heavy vehicle traffic and to vital intercity medical, police, and fire services.

A new high-level bridge upstream of the existing bridge was authorized in the Water Resources Development Act of 1976. The bridge was opened to traffic in 1984. Federal construction costs on the project through September 1999 were $23,409,832. Walla Walla District and the contractor, T. Y. Linn International, received a national "Excellence in Highway Design" award in 1987 from the Federal Highway Administration for design and construction of the bridge. Details about the Lewiston-Clarkston Bridge are given on the Digital Project Notebook from the Walla Walla District at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=79.

Asotin Dam

In conjunction with the design of Lower Granite Dam, the Corps investigated construction of a dam near Asotin, Washington across the Snake River to Idaho. This project was deauthorized in 1975. A fuller description of the proposed project is provided in the Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=4.

Navigation - Lewiston to Johnson Bar Landing

The Hells Canyon reach of the Snake River is considered navigable under terms of the Rivers and Harbors Act of 1899. Congress authorized work by the Corps on this 92-mile reach of the Snake River between Lewiston and Johnson Bar Landing in 1902 and again in 1910 and 1935. The Corps undertook projects to improve the waterway. These ranged from removal of various obstructions in the navigation channel to installation of navigation markers along the canyon walls. In 1949, a wing dam was constructed from the bank into the stream to provide greater depth over Temperance Creek Rapids, about eight miles downstream from Johnson Bar.

This section of the Snake River from Lewiston upstream to the Johnson Bar Landing remains the primary means of access for many Hells Canyon residents. Commercial jet boats operating on the waterway regularly provide mail service and cargo transport. River launches transport animal feed, household goods, and groceries upstream and wool and other miscellaneous cargo downstream. In addition, numerous operators offer recreational white water excursions. Pleasure boating, fishing, and rafting are important uses by private individuals. Nearly 4,000 people are transported annually into the canyon reach on sightseeing expeditions. More information about the Corps' efforts to maintain navigation in this reach of the Snake River can be found in the Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=78.

Snake River Flood Protection and Floodfighting

The Walla Walla District has undertaken numerous small flood protection and floodfighting operations along the Snake River and its minor tributaries since 1949. The District has also completed several studies related to flood control along the Snake River. Information about these activities is available in the Digital Project Notebook index (http://www.nww.usace.army.mil/dpn/dpn_projectindex.asp) under “Snake River,” “Asotin Creek,” “Cassia Creek,” “Little Canyon Creek,” “Mill Slough,” and “Upper Snake River.”

Hells Canyon, Oxbow, and Brownlee Dams (Idaho Power Company)

Hells Canyon, Oxbow, and Brownlee Dams were constructed and are operated under a common Federal Power Act license by the Idaho Power Company. The three-dam complex is operated as a system primarily for power production. Installed generating capacity is 1,166,000 kilowatts.

Hells Canyon Dam on the Snake River is upstream of Johnson Bar at River Mile 247. The Hells Canyon Dam is a concrete gravity structure with a maximum structural height of 330 feet and a generating capacity of 391,000 kilowatts. Hells Canyon Dam was completed in 1968.

Completed in 1961 and located at River Mile 273 of the Snake River, Oxbow Dam is a 205-foot-high rockfill structure with an installed power-generating capacity of 190,000 kilowatts.

Both Hells Canyon and Oxbow Dams have minimal active storage capacity and serve primarily to re-regulate power releases from upstream generating capacities.

Brownlee Dam, at Mile 285 of the Snake River, is just downstream of the Powder River confluence. Brownlee Dam, completed in 1959, is a 395-foot-high rockfill structure with a total reservoir capacity at full pool of 1,420,062 acre-feet. The reservoir capacity is sufficient to provide for multiple project uses, including hydropower, flood control, navigation, recreation, and fisheries mitigation. Installed power generating capacity is 585,000 kilowatts.

The Federal Power Commission (formerly the Federal Energy Regulatory Commission) licenses these three Idaho Power projects under a common license. The terms of this Federal Power Act license includes provisions for downstream flood control and navigation. Operating regulations for flood control and navigation were established by the Walla Walla District of the U.S. Army Corps of Engineers and were incorporated into a water control manual for the Idaho Power Company projects.

During spring runoff, up to 975,318 acre-feet of active storage space is made available in Brownlee Reservoir for flood control regulation on the lower Snake and Columbia Rivers. Flood control regulation is coordinated with the Corps Reservoir Control Center in Portland, Oregon.

The navigation provisions in the license agreements specify the minimum flows that must be maintained in the Snake River reach below Johnson Bar. The minimum flows benefit mail and freight deliveries above Asotin, Washington, and recreational users in the Hells Canyon reach of the Snake River. In years of extremely low-flow, such as 1988, the Corps has granted exceptions to the minimum release restrictions, but agreements were reached with Idaho Power to configure remaining releases to minimize the impact on mail service and private and commercial boating interests. In a review of Federal Energy Regulatory Commission licenses, the Federal Power Commission decided not to make any changes in the minimum release requirements.

Idaho Power Company is a member of the Northwest Power Pool, and the company also has made agreements with the Bonneville Power Administration to provide special releases benefiting the Water Budget Fishery Mitigation Program at Lower Granite Dam. Releases for water budget purposes are coordinated with releases from Dworshak Dam and Reservoir on the North Fork of the Clearwater River.

Swan Falls Dam (Idaho Power Company)

Swan Falls Dam near Murphy, Idaho, a power project on the Snake River at River Mile 457, is owned by the Idaho Power Company. Swan Falls, built in 1901 by the Trade Dollar Mining Company to supply electricity to the mining town of Silver City, Idaho, was the first powerplant on the Snake River. Idaho Power acquired the project in 1916. The original powerplant, which has now been converted into a hydropower history and education museum, had a power capacity of 10,400 kilowatts of electricity. Between 1985 and 1987, Idaho Power rebuilt the deteriorated spillway. In 1994, a new powerhouse was completed with two turbine generating units providing a generating capacity of 25,000 kilowatts. The reservoir behind the dam covers 1,525 acres and can hold up to 7,425 acre-feet of water.

C. J. Strike Dam (Idaho Power Company)

C. J. Strike Dam, an Idaho Power Company project on the Snake River near Grandview at River Mile 494, was completed in 1952. The project has a power capacity of 82,800 kilowatts. The reservoir above the plant covers 7,500 acres and can hold up to 247,000 acre-feet of water.

Bliss Dam (Idaho Power Company)

Bliss Dam, a power project on the Snake River at River Mile 560, is owned by the Idaho Power Company. Completed in 1950, the project has a power capacity of 75,000 kilowatts. The reservoir above the plant covers 255 acres and can hold up to 8,415 acre-feet of water.

Lower and Upper Malad Dams (Idaho Power Company)

The original Malad plant, built in 1911, was located on the Malad River at River Mile 0.2. The Lower and Upper Malad powerplants were re-developed as part of Idaho Power's post-World War II construction program. The Lower Malad plant is now located at River Mile 571.2 of the Snake River and uses water diverted from the tributary Malad River to generate up to 13,500 kilowatts of electricity. The Upper Malad Project includes a concrete gravity diversion dam at River Mile 2.1 of the Malad River. The Upper Malad powerplant has a generating capacity of 8,270 kilowatts.

Lower Salmon Dam (Idaho Power Company)

Lower Salmon Dam, an Idaho Power Company project on the Snake River near Hagerman at River Mile 573, was built originally in 1910 and rebuilt in 1949. The project has a power capacity of 60,000 kilowatts. The reservoir above the plant covers 748 acres and holds up to 10,900 acre-feet of water.

Upper Salmon Dam (Idaho Power Company)

The Upper Salmon Project, which consists of two plants, is located at River Mile 580 on the Snake River nine miles upstream from the Lower Salmon project. The Upper Salmon Project is owned by the Idaho Power Company. The project produces a total of 34,500 kilowatts. The 50-acre reservoir upstream of the plants can hold up to 600 acre-feet of water.

Salmon Falls Dam and Reservoir (Salmon River Canal Company)

Salmon Falls Dam and Reservoir is located approximately 38 miles south of Twin Falls, Idaho on Salmon Falls Creek, a northerly flowing tributary of the Snake River. The Salmon River Canal Company was formed in 1910 to build and operate the dam and reservoir. It is a non-profit company whose primary purpose is to deliver irrigation water to its shareholders on the irrigation project known as Salmon Tract.

Salmon Tract is known for its fertile soils and excellent crops that are grown under a combination of sprinkler and gravity irrigation systems. Approximately 300 miles of canals deliver water to 25,000 acres served by the Salmon River Canal Company.

Salmon Falls Dam is a concrete gravity dam 223 feet high with a crest length of 450 feet. Salmon Falls Reservoir has a surface area of approximately 3,400 feet and a storage capacity of over 186,000 acre-feet.

The primary purpose of Salmon Falls Reservoir is irrigation but additional benefits are derived from recreation uses. Twin Falls County Parks and the U.S. Bureau of Land Management have developed park sites along the shoreline of the reservoir with facilities for boaters, hunters, fisherman, and campers.

Thousand Springs Dam (Idaho Power Company)

Located at River Mile 585 on the Snake River, the Thousand Springs powerplant was built in 1912 and updated in 1921 by the Idaho Power Company. It has a generating capacity of 8,800 kilowatts.

Clear Lake Power Plant (Idaho Power Company)

Nestled in the east end of southern Idaho's Hagerman Valley at River Mile 593 of the Snake River, Clear Lake Power Plant, built in 1937, is owned by Idaho Power Company. The plant has a generating capacity of 2,500 kilowatts and uses underground springs from the Snake River Plain Aquifer to supply the water used to generate power.

Clear Lakes Study

During the early 1980s the Walla Walla District was asked by the Idaho Department of Water Resources to examine low-head hydropower sites on the Snake River. One of the sites investigated was the Clear Lakes site, on the Snake River at River Mile 594, north of Buhl, Idaho. The Corps' study considered low dams of four different heights (35, 45, 55, and 65 feet) and determined that development of the Clear Lakes site for hydropower was not economically feasible. The Digital Project Notebook give more information about the study at:
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=27.

Shoshone Falls Dam (Idaho Power Company)

The Shoshone Falls Power Plant, originally built in 1907 and rebuilt in 1921, owned by Idaho Power, is on the Snake River near Twin Falls, Idaho, at River Mile 615. The plant has a generating capacity of 12,500 kilowatts. The 86-acre reservoir above the plant can hold up to 1,500 acre-feet of water.

Twin Falls Dam (Idaho Power Company)

The Twin Falls Plant was built in 1935 as part of a development phase during the Great Depression. The project was updated in 1995. The plant, with a total generating capacity of 52,737 kilowatts is located on the Snake River at River Mile 618. The 85-acre reservoir above the plant can hold up to 955 acre-feet of water.

Milner Dam (Idaho Power Company)

Built in 1992, Milner Power Plant is Idaho Power Company's most recent hydropower development. The plant is located at Milner Dam, which is owned by Milner Dam, Inc. The project is near Burley, Idaho, at River Mile 640 of the Snake River. The dam has been in operation as an irrigation project since 1905. The Milner Power Plant has generating capacity of 59,448 kilowatts. The reservoir above the dam covers 4,000 acres and can hold up to 39,000 acre-feet of water.

Minidoka Dam (U.S. Bureau of Reclamation)

Minidoka is a Bureau of Reclamation project on the Snake River at River Mile 675. The project serves flood control, electric power, and irrigation purposes. Completed in 1906, the project has usable storage of 210,000 acre-feet and a power producing capacity of 27,700 kilowatts of electricity. The reservoir, named Lake Walcott, extends 26 miles up the Snake River.

Raft River Study

The Raft River joins the Snake River about 14 miles above Minidonka Dam. Flooding sometimes occurs in the vicinity of Bridge, Idaho, where the stream gradient of the Raft River is relatively flat. The Corps has studied possible storage and flood control projects. These are discussed in the Walla Walla District's Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=144.

Eastern Snake Plain Aquifer Recharge (Idaho Department of Water Resources and U.S. Bureau of Reclamation)

In December 1999 a report, "Feasibility of Large-Scale Managed Recharge of the Eastern Snake Plain Aquifer System," was issued by the Idaho Department of Water Resources and the Bureau of Reclamation. The report summarizes studies and pilot projects relating to the recharging of the Eastern Snake Plain Aquifer, which has been declining in water level since the 1950s. Key objectives of a managed recharge plan would be to restore ground-water levels in the central part of the Eastern Snake River Plain and to restore spring discharges in the Thousand Springs and American Falls, Idaho, reaches of the Snake River. Managed discharge would divert water from the Snake River and tributaries below American Falls Reservoir to depressions in the land surface generally north of the Twin Falls, Idaho, area. Diverted water carried by irrigation canals would pond in the depressions and infiltrate into the aquifer.

The report concludes that managed recharge is the Eastern Snake Plain Aquifer is economically feasible. The report points out that there are uncertainties that would have to be addressed before large-scale managed recharge could be initiated. Uncertainties pointed out in the report include the costs associated with mitigating impacts on hydropower production; environmental impacts; and how managed discharge would be integrated into basin-wide water resources management.

The feasibility report is available from the Idaho Department of Water Resources.

American Falls Dam and Reservoir (U.S. Bureau of Reclamation and Idaho Power Company)

The Bureau of Reclamation operates American Falls Dam. The original American Falls earthfill dam at River Mile 715 of the Snake River was completed in 1927. Because of deterioration, the U.S. Bureau of Reclamation reconstructed the dam between 1976 and 1978 with financing by the reservoir users and the Idaho Power Company. The reservoir behind the dam extends across the river to form the largest reservoir on the Snake, covering 58,078 acres; the reservoir can hold up to 1,671,300 acre-feet of water. Idaho Power built a new hydropower plant on the west side of the river with three generators with a total generating capacity of 92,340 kilowatts.

Blackfoot Area Flood Protection

The Blackfoot Area Levees provide bank protection at a critical location along the left bank of the Snake River about seven miles southwest of Blackfoot, Idaho. The project prevents a potential breakthrough of the Snake River across irrigated farmlands into the Blackfoot River. Project work was completed in 1958 at a federal cost of $43,000. Total operation and maintenance costs for the project through September 1999 were

$209,403. Through 1995, the Blackfoot Area Levees on the Snake River prevented an estimated $53,196,000 in flood damages since construction. The Blackfoot Levees are covered in the Walla Walla District's Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=12.

For the past 10 years, the Snake River has been threatening the Fort Hall National Historic Landmark located on the left Bank of the Snake River near Blackfoot, Idaho. A project to project the landmark was proposed by the Corps and accepted by local interests, funding has been received, and the project is currently awaiting finalization of local sponsorship. Details about the project are available in the Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=164.

Shelley Area Revetment

The Shelley Area Revetment provides improvements four miles downstream of Shelly, Idaho, consisting of bank sloping reinforced with dumped stone revetments along the left bank of the Snake River. The project provides protection for the Firth, Idaho, area against a breakthrough by the Snake River into a feeder canal of the Blackfoot Irrigation District. The revetment also prevents damage to the canal and surrounding agricultural areas. Through 1995, the structure has prevented $5,168,000 in flood damages. The project is covered on the Walla Walla District Web site in the Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=154.

Heise-Roberts Area Flood Control

The Heise-Roberts Area Levee Project consists of channel clearing, alignment changes, levee construction, and bank protection along a 22-mile reach of the Snake River between Heise and the mouth of Henrys Fork in eastern Idaho. The levees can contain river discharges of up to 33,000 cubic feet per second and prevent flooding and erosion damage primarily on irrigated farmland. The project was completed in 1954 at a federal cost of $1,576,000. Through 1995, $9,539,000 in flood damages have been prevented by the Heise-Roberts Area Levees. Further details on the project are available in the Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=55.

The Heise-Roberts Levee Extension provides protection along the Snake River between Henrys Fork and Roberts, Idaho, and was an extension upstream of the Heise-Roberts Area Levees. Improvements included channel clearing, levees, and bank protection. The project provides protection against flood damage to lands used for row crops and general irrigated farming. The project was completed in 1968, at a federal cost of $3,402,958. Flood damages amounting to $16,782,000 have been prevented through 1995. More information about the Heise-Roberts Levee Extension can be found on the Digital Project Notebook provided by the Walla Walla District at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=56.

Jackson and Palisades Dams (U.S. Bureau of Reclamation)

The Jackson and Palisades Dams and Reservoirs are operated by the Bureau of Reclamation as a system to provide additional flood protection to the Heise area. System operations for flood control are stipulated under provisions of Section 7 of the Flood Control Act of 1944. Flood control regulation is coordinated with the Corps of Engineers, and the operation policies are incorporated into a Water Control Manual for the two projects. The storage space in Palisades Reservoir and Jackson Lake is made available on a forecast basis during the spring runoff for flood control downstream to American Falls Reservoir.

Jackson Dam, in Wyoming, is a 70-foot-high concrete gravity dam with earth embankment wings. It was constructed in stages, beginning in 1907. The current active reservoir capacity of 847,000 acre-feet was reached with additions to the dam in 1919. Restrictions on the use of the active capacity of the reservoir were imposed in 1978 due to concerns over the seismic stability of the earthfill embankment. The restrictions were removed in 1988, following the completion of major improvements to both the earthfill embankment and the concrete spillway section.

Palisades Dam is a 270-foot-high, compacted earthfill structure on the Snake River seven miles upstream from the town of Irwin, Idaho. The dam was completed in 1957 with an active reservoir capacity of 1.2 million acre-feet (maximum capacity 1.4 MAF). The dam is 2,100 feet long.

Releases at the two projects are scheduled to evacuate and refill reservoir space without exceeding 20,000 cubic feet per second at the Heise gauging station, as far as practicable. Extraordinarily large floods are regulated with the intent of not exceeding 30,000 cubic feet per second at the Heise gauge.

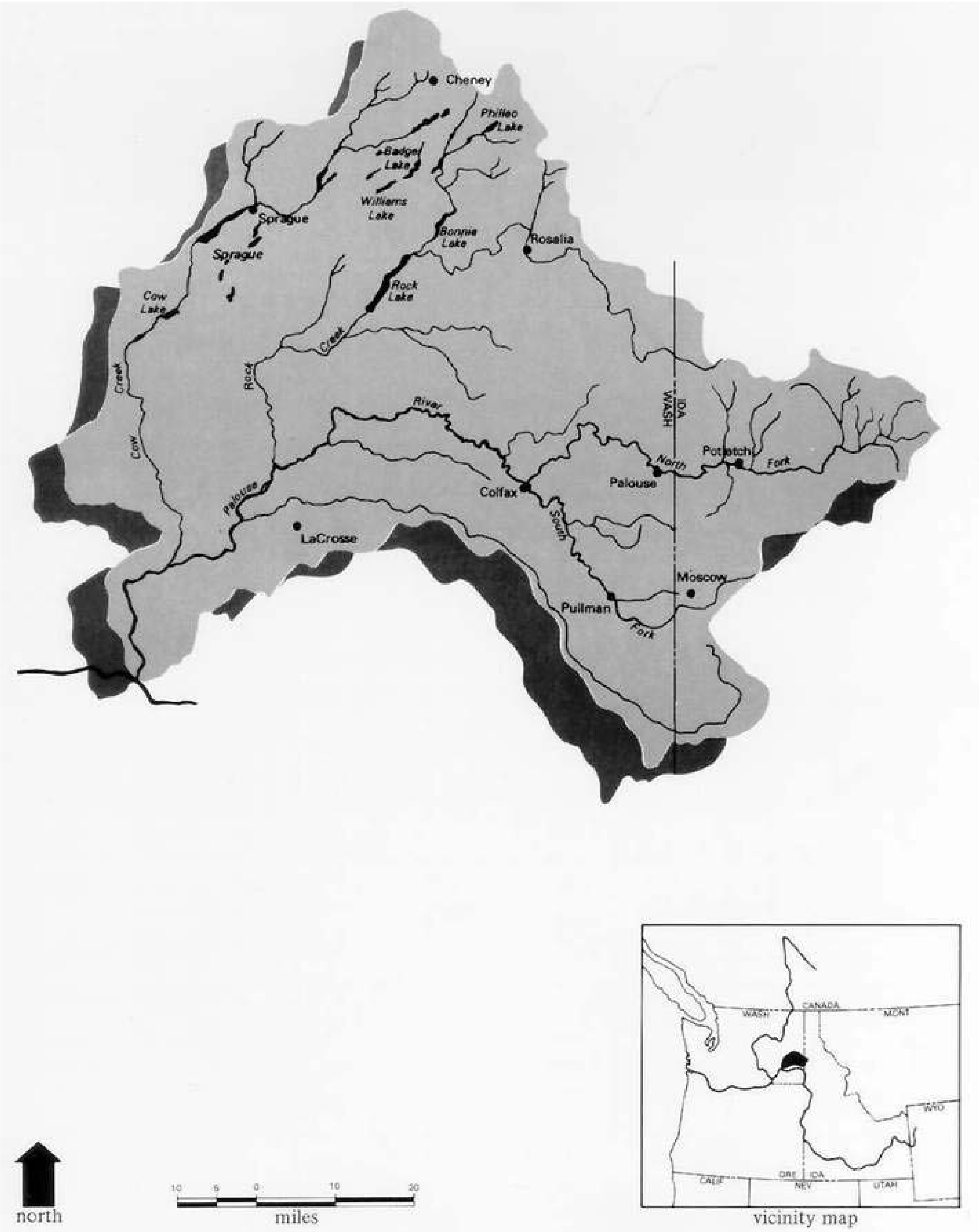
At times of the year when flood regulation is not necessary, the Jackson and Palisades projects are operated primarily to provide irrigation water to Idaho. Palisades Dam powerplant, which underwent modifications in 1990 to further increase its capacity, is capable of generating 176,564 kilowatts. Power generation is incidental to both flood control regulation and irrigation releases.

Before construction of Palisades Dam, discharges from Jackson Lake were reduced to zero during autumn and winter to conserve water supplies for irrigation. During the spring, sustained high releases aggravated bank erosion problems. With Palisades Dam in place, the Bureau of Reclamation is able to meet irrigation and flood control requirements and maintain minimum streamflows without regulating Jackson Lake outflows for this purpose. The coordinated operation of the two projects eliminates most of the previous problems.

Minimum streamflows from the Jackson-Palisades system are scheduled to benefit recreation, such as rafters, and fish and wildlife, while continuing to meet irrigation contracts and municipal flow rights at the Idaho Falls Hydroelectric Plant.

Waterfowl nesting and hatching along the Snake River downstream of Palisades Dam have been enhanced by stabilized river flows and riverine conditions. Fly-fishing float trips and recreational rafting have become popular on all reaches of the Snake River above Idaho Falls. Snowmobiling and ice fishing are popular winter sports on the lake and project lands behind Palisades Dam.

Chapter 6. Palouse River Basin



Palouse River Basin Studies

The Palouse River Basin Study was authorized in 1949 by resolutions of the House and Senate committees on public works. The study has been confined principally to the upper basin above Colfax, Washington.

The Palouse River originates in the mountains of northwestern Idaho and flows west and southwest to its confluence with the Snake River. It drains about 2,800 square miles of northwestern Idaho and eastern Washington. Flood damages come from snowmelt or heavy rains in the Potlatch and Moscow, Idaho, areas.

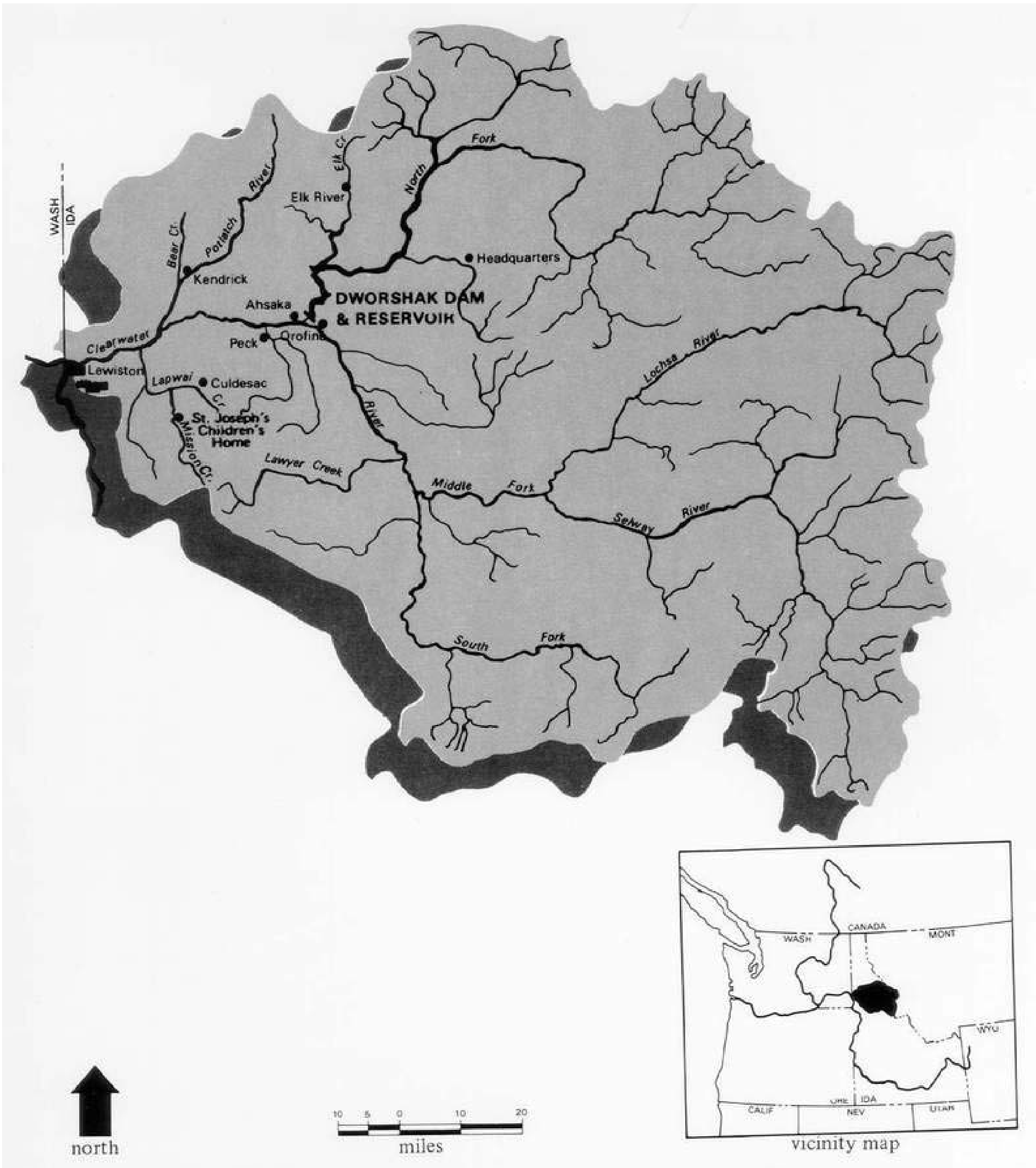
Comprehensive basin studies authorized in 1949 considered water quality control, flood control, irrigation, erosion and sediment control, municipal water supply, fish and wildlife enhancement, and recreation. The Corps coordinated its studies with the U.S. Bureau of Reclamation, Environmental Protection Agency, U.S. Soil Conservation Service (now renamed Natural Resource Conservation Service), U.S. Bureau of Outdoor Recreation, the U. S. Forest Service, and other fish and wildlife agencies.

The Pullman-Moscow Water Resources Committee was formed in 1966 and was re-instituted in 1987 to investigate a source of supplemental municipal water supply. The group monitors groundwater levels and usage and promotes water conservation and research. Committee participants are the city of Pullman, Washington; the city of Moscow, Idaho; Washington State University at Pullman; the University of Idaho at Moscow; Whitman County, Washington; and Latah County, Idaho. Past studies investigating municipal water supply alternatives indicated the possibility of multipurpose development on the North Fork of the Palouse River with transfer of water via a pipeline to the Pullman-Moscow area.

In April 1988, the Corps resumed studies of the river with the Upper Palouse River Basin Study, which emphasized flood protection, and supplemental water supply needs in the Pullman-Moscow area. The study also considered possible benefits like hydropower production, water-based recreation, water quality enhancement, and streamflow maintenance.

In March 1989, the Corps published, "Reconnaissance Report, Palouse River Basin, Idaho and Washington." The report considered a variety of alternatives ranging from upstream storage dams to water supply pipelines from various sources. It appeared that pumping water from the Snake River is the least costly plan for meeting water supply needs but a multipurpose reservoir built upstream near Laird Park, east of Moscow, also appeared feasible. Currently, no local sponsor is prepared to pursue feasibility studies, therefore no further study by the Corps is recommended at this time. More information on the Upper Palouse River Basin Study is available at the Walla Walla District's "Digital Project Notebook" at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=118.

Chapter 7. Clearwater River Basin



Clearwater River Basin Studies

U.S. Army Corps of Engineers' studies of the Clearwater River Basin were undertaken under the authority of Congress as outlined in the document, "Columbia River and Tributaries, Northwestern United States" issued in 1956. The Corps investigated potential storage developments on the north and south forks of the Clearwater River and on tributaries of the Clearwater River. Many potential sites were identified in the Clearwater River Basin that could be developed to help meet the region's growing need for energy. Three projects, Kooskia High Dam, the Elkberry Project, and the Bruce's Eddy Dam (later renamed the Dworshak Dam) were identified for early consideration. Seventeen possible sites for dams were identified for the future.

The Bruce's Eddy site was developed by the Corps (see below under Dworshak Dam and Reservoir). In 1988, it was concluded that hydropower generation alone would not justify Corps participation in site development of any of the other Clearwater River Basin sites, but investigations also considered opportunities to reduce flood damages and augment streamflows to assist anadromous fish. The Corps concluded, however, it was not economically feasible to develop any of the remaining dam sites.

More information about the Corps' studies of the Clearwater River Basin is available on the Walla Walla District's Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=29.

Clearwater River Basin Flood Protection

Emergency levee and channel improvement work has been accomplished at various times throughout the Clearwater River Basin. Corps projects were completed on Mission Creek, Lapwai Creek, Cottonwood Creek, and Big Canyon Creek — all tributaries of the Clearwater River.

Revetted levees were constructed in 1949 along the right bank of the Clearwater River near Orofino and up the right bank of Orofino Creek. In addition, channel improvements on the creek were accomplished at various times under emergency authorities. The Orofino Creek flood potential was defined in a 1972 report, but reconnaissance reports in 1962, 1968, and 1974 concluded that further structural measures, including levees, flood walls, upstream storage, and channel improvements were not economically feasible.

Information about these small-scale projects can be found by looking under "Clearwater," "Big Canyon," "Cottonwood Creek," "Lapwai Creek," and "Orofino Creek" in the Digital Project Notebook provided by the Walla Walla District at: http://www.nww.usace.army.mil/dpn.

Lewiston Orchards Project (U.S. Bureau of Reclamation)

Beginning in 1906, private interests constructed the Lewiston Orchards Project for irrigation purposes. The Bureau of Reclamation has rehabilitated most of the project facilities. Project features include Webb Creek Diversion Dam, Soldiers Meadow Dam, Sweetwater Diversion Dam, three additional small dams, feeder canals, three small storage reservoirs, Lake Waha (a natural lake), a domestic water-treatment plant, and a system for distributing irrigation water. Water from Webb and Sweetwater Creeks, both streams in the Clearwater River Basin, are diverted into this system. The Lewiston Orchards Project has an active storage capacity of 5,400 acre-feet and provides irrigation for 3,792 acres.

Mission Creek Levee

The Corps constructed a levee along the right bank of Mission Creek, a tributary of the Clearwater River, and enlarged the creek's channel. This project was located near the St. Joseph Children's Home, 20 miles southeast of Lewiston, Idaho. Construction was authorized under the authority of the Flood Control Act of 1956. The project was completed in 1965 at a federal cost of $54,538. An estimate of damages prevented by the project is impossible since no gauge is available to determine flows applicable to this site. The project is discussed in the Walla Walla District's Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=113.

Lapwai Creek Project

The Lapwai Creek Project was authorized under the Flood Control Act of 1962. The project consists of a levee, riprap, and channel enlarging and realignment through the village of Culdesac, Idaho, along Lapwai Creek, a tributary of the Clearwater River. The project prevents damages to homes, streets, bridges, business properties, and Culdesac's water system. Construction was completed in 1971 at a federal cost of $176,833. The project had prevented $493,000 in flood damages through 1995. Details of the project are provided in the Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=70.

Potlatch River Levee

Floods of the Potlach River historically caused extensive damage and loss of human life. The Flood Control Act of 1950 authorized construction of a revetted levee along the right bank of the Potlatch River, a tributary of the Clearwater River, through a portion of the village of Kendrick, Idaho. The project was completed in 1959 at a federal cost of $60,000. This improvement provides protection against overbank flow and inundation of the business district and other sections of the town. An estimate of damages prevented by the project is unavailable since no gauge is in place to determine flows applicable to this site. The Walla Walla District's Digital Project Notebook describes the project at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=69.

Bear Creek Levee and Improvements

The Flood Control Act of 1962 authorized construction of flood control improvements along the left bank of Bear Creek. The channel was improved and a revetted levee was built to protect private dwellings and property of the Kendrick Consolidated School District. Construction was completed in 1969 at a federal cost of $133,518. An estimate of damages prevented by the project is not possible since no gauge is in place to measure flows applicable to this site. The Digital Project Notebook covers this project at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=5.

Dworshak Dam and Reservoir

Dworshak Dam is in northern Idaho on the North Fork of the Clearwater River, 1.9 miles above its confluence with the Clearwater River. Rising in the Bitterroot Mountains, the North Fork of the Clearwater River is a major flood-producing stream, and the Dworshak Project is an important unit in the Columbia Basin flood control system. In addition to flood control, Dworshak generates electrical power, provides public recreation benefits, and facilitates flow augmentation and temperature moderation for anadromous fish species listed under the Endangered Species Act. Dworshak Reservoir's 53-mile length formerly provided navigation benefits through transportation of marketable logs from area timber lands to a log-handling facility at the dam. Changes in water management strategies to conserve listed fisheries stocks no longer allow use of existing log handling facilities.

The maximum structural height of Dworshak Dam is 717 feet with a crest length of 3,287 feet. Construction of the project started in 1963, and it became operational for flood control in 1972. It is the highest straight-axis concrete gravity dam in the Western Hemisphere and the 22nd highest dam in the world. Only two other dams in the United States exceed its height. Flood damages downstream prevented since the construction of Dworshak Dam amounted to $737,000 through 1995.

At normal full pool elevation of 1,600 feet mean sea level, Dworshak Reservoir is 53 miles long, has 184 miles of shoreline, and covers an area of 19,824 acres. Total storage capacity is 3,453,000 acre-feet, of which 2,000,000 acre-feet are allocated to joint use (active storage) purposes.

The active storage space is regulated according to guidelines specified in the "Water Control Manual for Dworshak Reservoir." As a consequence of implementation of the Endangered Species Act, and in response to a 1995 Biological Opinion by the National Marine Fisheries Service, the reservoir is lowered approximately 80 feet from early July through late August. Lowering the reservoir moderates warm downstream river temperatures and augments flow, helping to conserve anadromous fisheries stocks listed as endangered. During the fall and winter, additional withdrawals are sometimes necessary to create storage capacity for spring runoff. The reservoir is refilled during the spring, conserving floodwaters and supporting flood damage reduction.

Water quality at Dworshak Reservoir is considered excellent. Concentrations of suspended solids are low and sedimentation in the reservoir is minimal. Water is released from the reservoir through multilevel gates at the powerhouse intakes. Selecting the depth at which release occurs can vary the temperature of water to be released from the reservoir. By this means, downstream water temperatures most suitable for fish production at the Dworshak National Fish Hatchery and the Clearwater National Fish Hatchery are provided.

Initial power installation at Dworshak Dam consisted of two 90,000 and one 220,000-kilowatt turbine generating units for a total installed capacity of 400,000 kilowatts. The three existing hydropower generators came online in 1973. Space is available for three additional 220,000-kilowatt generators for increased power-peaking capability. A study investigating the adding a fourth turbine was placed on inactive status in 1981 when local opposition developed and the Governor of Idaho withdrew state support for expansion. The Digital Project Notebook discusses the 1990 deauthorization of generators 5 and 6 of Dworshak Dam
(at http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=42).

All Dworshak Dam and Reservoir project lands have been acquired except those required to replace the loss of wildlife browse areas from inundation by the reservoir. Additional off-site mitigation was acquired to satisfy these losses.

Total federal expenditures on the Dworshak Dam and Reservoir Project through September 1997 were $457,151,576, with $327,428,197 for new construction work and $129,669,379 for operation and maintenance. Average annual revenues from power generation are about $39 million. Revenues from the sale of power by Bonneville Power Administration are returned to the U.S. Treasury to repay, with interest, construction costs as well as operation and maintenance costs of the project.

Dworshak Reservoir Recreation

Implementation of new water management strategies requiring release of water from the reservoir to implement the Endangered Species Act for listed fish species has impacted recreation benefits of the Dworshak Reservoir. Facilities can sometimes be difficult to use during summer drawdowns. Recreation visitation diminished by nearly 50 percent during the 1990s.

At full pool, Dworshak Reservoir offers a variety of recreational opportunities, including canoeing, sailing, motor boating, water skiing, fishing, and sightseeing. Within the

30,000 acres of public lands around the reservoir, the Corps provides numerous opportunities for developed and primitive camping, picnicking, hiking, and hunting.

Dworshak State Park (formerly Freeman Creek) and Dent Acres are two major developed areas with recreational facilities, including campgrounds, shelters, swimming beaches, hiking trails, and day use areas. A group camp was completed in 1987 and opened in the spring of 1988. This area provides sleeping cabins, restrooms with showers, and a lodge with commercial kitchen facilities. In 1989, the Idaho state legislature appropriated funds to the Idaho State Department of Parks and Recreation to operate Dworshak State Park. The Corps approved a lease agreement June 12, 1989.

Boat launching ramps are available at all reservoir recreation sites accessible by road. In 1995, new docks and a fueling facility were constructed at the Big Eddy Marina, replacing the facilities damaged in a 1992 windstorm. The replacement facilities accommodate 98 vessels.

To facilitate recreation opportunities and protect project and adjacent private and state industrial timber lands, nearly 100 primitive mini-camps are dispersed across the reservoir's shoreline. They provide unique access to project lands and waters for hunting, fishing, and solitude.

The visitor center at the top of Dworshak Dam provides informative slide programs and displays. Guided tours of the dam and powerhouse start at the visitor center. On average, approximately 125,000 recreation visitors use the project each year.

Dworshak Historic and Cultural Resources

The North Fork of the Clearwater River has a rich history. Traces of this history remain and are protected by the Corps. The Nez Perce Tribe (Nee Me Poo) used the area for sustenance and religious purposes before European culture arrived. Later, the area was important for bootleggers, homesteaders, and loggers. The river was an important transportation corridor in moving logs to market. A survey of cultural resources by the Nez Perce Tribe revealed over 400 significant sites and isolated findings in the drawdown-zone alone. It is possible that additional, yet undiscovered cultural resources sites could found across the project. Dozens of homesteads remain on project lands. All sites require monitoring and protection to comply with laws and regulations, including the National Historic Preservation Act.

Dworshak Fish Compensation

The North Fork of the Clearwater River has historically supported large runs of steelhead trout and lesser runs of chinook salmon.

In 1910, Washington Water Power Company constructed a dam on the Clearwater River that blocked chinook salmon runs. Fish ladders were inadequate during times when the salmon migrated upstream; although they worked fairly well for steelhead trout. In the 1960s, the U.S. Fish and Wildlife Service constructed Kooskia National Fish Hatchery to help restore chinook salmon runs. By the early 1970s, only 1,000 to 1,750 chinook salmon per year migrated upstream over the Washington Water Power Dam.

When Lower Granite Dam on the Snake River was nearing completion, a decision was made to remove the Washington Water Power Dam. It was removed in 1974. As part of the Lower Snake River Fish and Wildlife Compensation Plan (see Chapter 3), spring chinook salmon and steelhead trout runs are to be restored in the Clearwater River.

Construction of Dworshak Dam and Reservoir also blocked access for fish to the North Fork of the Clearwater River. Dworshak National Fish Hatchery, the largest steelhead trout hatchery in the world, was constructed by the Corps to mitigate fishery losses on the North Fork of the Clearwater River. In the early 1980s, facilities to produce 70,000 pounds of spring chinook salmon (1.8 million fish) were added at Dworshak National Fish Hatchery. The hatchery is presently producing 2.3 million steelhead trout annually. The steelhead smolts are released in the middle or South Fork of the Clearwater River.

The Clearwater National Fish Hatchery was completed in 1992, adding another 91,300 pounds of spring chinook salmon production in addition to 350,000 pounds of steelhead trout in the Clearwater Basin. The hatchery water supply (from Dworshak Reservoir) contract was completed in 1992.

Since operation of Dworshak National Fish Hatchery began in 1970, the facility has experienced fish culture problems because of the soft water used in rearing. Addition of appropriate mineral ions during critical rearing periods solved most of the soft-water problems.

Because of fish production losses due to disease, Dworshak National Fish Hatchery is unable to accomplish its intended levels of mitigation without the use of other fish rearing facilities. In 1982, Infectious Hematopoietic Necrosis (IHN) began to cause severe losses in steelhead trout production at Dworshak. The IHN at Dworshak, subsequently identified as the “Dworshak” strain of IHN, had, by 1990, resulted in an accumulative total loss in excess of 14 million, or 67 percent, of the steelhead fry in the nursery. Yearly losses from 1982 to 1990 ranged from 25 to 98 percent; totaling 19.5 million fish from an initial 42.5 million eyed eggs. During those same years, another 8.6 million eggs from positive (infected) IHN parents had to be destroyed. It is strongly suspected that the Dworshak National Fish Hatchery became contaminated with IHN when water was pumped into the hatchery; the water having been contaminated from IHN-infected fish in the river at or above the main pump intake.

In an effort to manage around the IHN disease and meet Dworshak’s mitigation goals, a large percentage of Dworshak’s steelhead trout are transferred to Kooskia National Fish

Hatchery (Kooskia) and to Hagerman National Fish Hatchery (Hagerman) for early rearing purposes. These fish are returned to Dworshak for subsequent rearing. The use of Kooskia began in 1982 and the use of Hagerman began in 1988. The Dworshak steelhead trout support programs at Kooskia and Hagerman were intended to be temporary measures until a permanent solution to Dworshak problems could be implemented. However, the ongoing disease problem at Dworshak has required the continued use of these facilities at the expense of other programs that could be put in place at Kooskia and Hagerman. The U.S. Fish and Wildlife Service estimates the annual cost of these programs to be $48,000.

The April 1990 discovery of the “chinook” or “Lyons Ferry” strain of IHN in Dworshak chinook smolts has serious and far-reaching implications. The Lyons Ferry strain of IHN, which primarily affects chinook salmon, has caused significant mortalities at other hatcheries. Combined with the current losses in chinook salmon production from bacterial kidney disease, production losses due to chinook IHN could seriously impact the chinook salmon program at Dworshak. Maintaining the current level of chinook salmon production at Dworshak is important because of the current status of the chinook salmon on the Endangered Species List.

Starting in 1993, early rearing water for Dworshak has been taken from the Clearwater Fish Hatchery water supply. Thus far, this has been an effective means of dealing with the IHN problem at Dworshak. Losses to IHN in 1993 through 1995 were at acceptable levels, indicating that this modification was a success.

Dworshak Hatchery is in need of rehabilitation to correct safety problems, reduce operation and maintenance costs, and to assure that the hatchery can continue to meet the Corps’ mitigation goals. Changes in operation to meet the Biological Opinion of the National Marine Fisheries Service require additional modification at the hatchery to provide correct temperatures for fish production. Funding is being sought under the Columbia River Fish Mitigation Program, which was established to meet Biological Opinion requirements.

Dworshak Wildlife Compensation

The North Fork Clearwater River drainage also is important for wildlife because it supports significant herds of white-tailed deer, mule deer, Rocky Mountain elk, and lesser numbers of ruffled grouse, cougar, black bear, and other game species. The U.S. Fish and Wildlife Service identified loss of winter range, primarily for Rocky Mountain elk and secondarily for white-tailed deer, as the greatest impact on wildlife of the construction of Dworshak Dam and Reservoir

To offset this loss, several successful attempts have been made to develop mitigation lands that could be managed for winter range. Intensive development of wildlife mitigation lands includes harvesting the usable timber, hand-cutting brush or mechanically crushing it down, burning brush and slash, replanting and reseeding desirable vegetation, and fertilizing. This work reduces plant succession and increases the production of brush preferred for deer and elk winter feed. Some standing timber is left to provide thermal cover and visual breaks along roads, a buffer along the reservoir, and protection along streams. The result is a mosaic of brush fields and timber lands similar to that which naturally occurs after lightning-caused spot fires.

The Corps obtained title to 5,120 acres adjacent to Dworshak Project lands at the junction of the North Fork and Little North Fork Rivers. These lands, along with 3,900 acres of existing project lands, were developed for winter range. In 1982, the Corps entered into a cooperative agreement with the Idaho Department of Fish and Game whereby winter range would be developed to varying degrees upon the remaining 27,000 acres of project lands surrounding the reservoir.

To date, some 9,113 acres are being managed specifically for elk habitat. A mitigation goal was proposed by the Idaho Department of Fish and Game to provide sufficient browse to sustain 915 elk through a 100-day winter period.

The Idaho Department of Fish and Game has indicated by letter to the Corps that the Corps' mitigation responsibility for elk, based on production of browse, has been satisfied, provided the Corps maintains all existing mitigation areas for the purpose for which they were designed. Since the mitigation agreement based on browse production was completed, significant clearcutting of timber has occurred on lands surrounding Corps land at Dworshak. Many of these areas provided thermal cover for elk, which is one of the necessary components for winter range. Many of these same areas now are contributing toward the sustenance browse requirement. The Corps is revisiting their stewardship of mitigation and other project lands and is working with stakeholders to revise its mitigation strategy. In the landscape context of industrial timber lands, the Corps' remaining forests still provide a critical role in overwintering elk survival. However, the application of ecosystem stewardship over all project lands demands regional consensus and more active management. This consensus will be articulated in a new Master Plan and Supplemental Project Environmental Impact Statement that are currently in progress

The Bonneville Power Administration has administered a wildlife loss assessment under the Northwest Power Planning Council's fish and wildlife program. The assessment was conducted by an interagency team using the Habitat Evaluation Process. Losses were identified and mitigation plans developed for elk in addition to other HEP evaluation species. Based on this loss assessment, in March 1992 the Idaho Department of Fish and Game signed a Wildlife Mitigation Agreement for Dworshak Dam with Bonneville Power Administration and the Nez Perce Tribe. Under the agreement, Bonneville Power Administration acquired the 60,000-acre Pene lands and the timber rights to 130 acres of old growth in the Buck Creek drainage. Upon completion of the National Environmental Policy Act process, the Bonneville Power Administration will transfer the deeds to these properties to the Idaho Department of Fish and Game. The Bonneville Power Administration also will deposit funds in the Dworshak Wildlife Mitigation Trust Fund to provide for river otter mitigation projects being administered by the Nez Perce Tribe and annual operation and maintenance of the Pene lands.

A discussion of Dworshak Dam and Reservoir can be found on the Walla Walla District's Internet site in the Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=43.

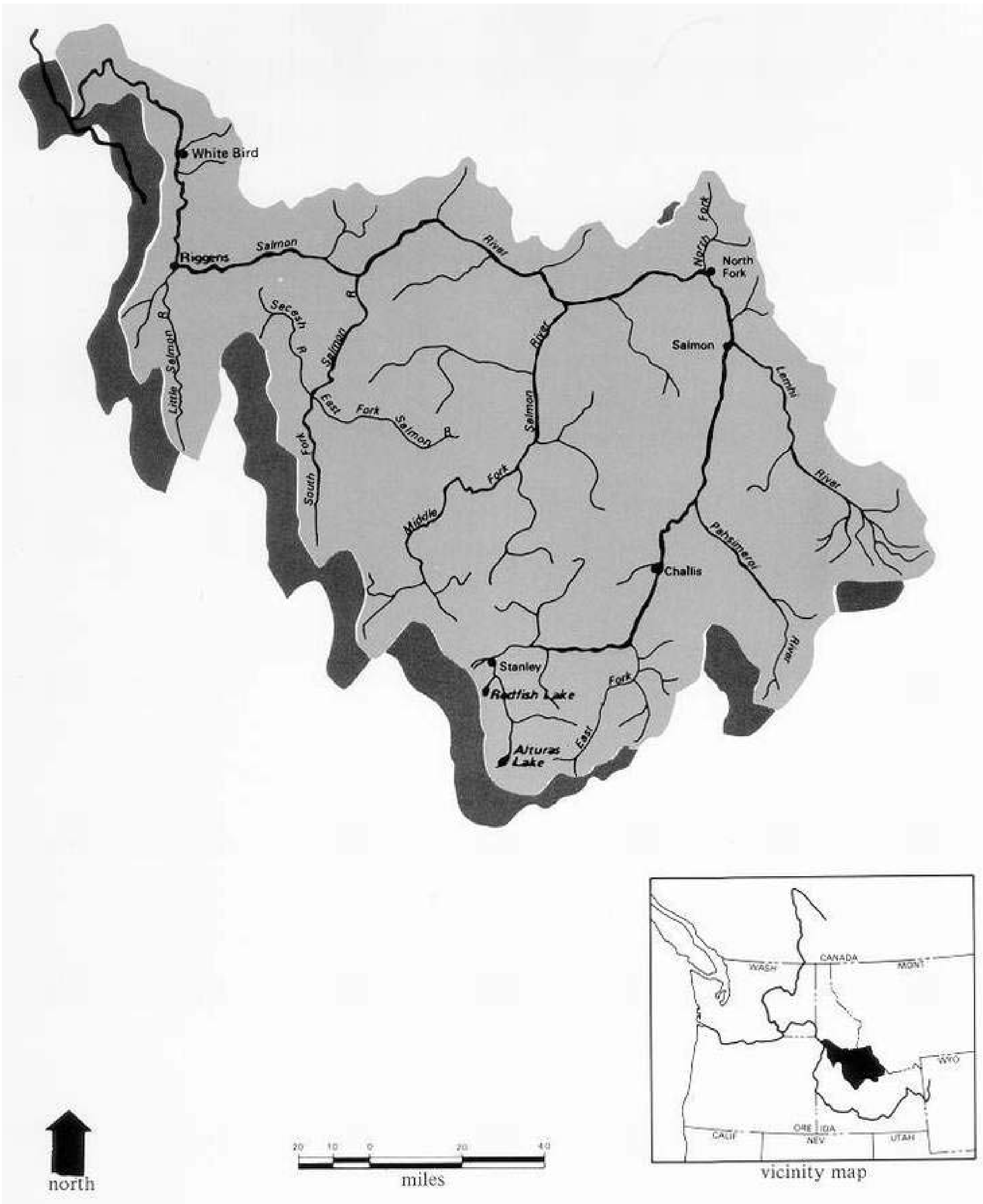
Lawyers Creek Studies

Lawyers Creek originates near Craigmont, Idaho, and flows in an easterly direction for about 35 miles before it joins the Clearwater River at Kamiah, Idaho. As Lawyers Creek emerges from the canyon where it originates under flood conditions, it carries a very large amount of debris and bedload materials. The creek's channel in the lower reach has a very limited capacity and will flood at discharges as low as 500 cubic feet per second. The Corps studied Lawyers creek in 1960 and again in 1984 and developed a play to construct a channel for Lawyers Creek capable of withstanding high-velocity flows and stabilizing bedload movement. The city of Kamiah, Lewis County and Idaho County have indicated willingness to sponsor the proposed project. More information about the studies and proposed project is available in the Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=76 and http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=75.

South Fork Clearwater River Levees

Both the Corps and local interests under emergency authorities constructed levees protecting Stites and Kooskia along the South Fork of the Clearwater River. The Flood Control Act of 1950 authorized channel and levee improvements and levee construction along a total of 15 miles of the South Fork. A study in 1973 concluded that remaining structural work was not economically feasible. The Water Resources Development Act of 1986 deauthorized the South Fork Project. The Walla Walla District's Digital Project Notebook can be consulted for further information on this project at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=173.

Chapter 8. Salmon River Basin



Tomanovich-Salmon City Levees

The Tomanovich-Salmon city levees were authorized under the Flood Control Act of 1950. The flood protection project includes channel improvements and right bank levees with revetments extending along the Salmon River from just upstream of the city of Salmon, Idaho, down to the city's sewage treatment plant area. Construction on the project was completed in 1955. To 1999, total federal expenditures have been $128,635; through 1995, the project has prevented flood damages estimated at $2,359,000. Access to further details about the project are available via the Walla Walla District's "Digital Project Notebook" at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=177.

Salmon River Flood Damage Reduction Study

Ice jam flooding continues to be a problem for the city of Salmon, Idaho, and in the rural areas along the Salmon River for 26 miles downstream and for several miles upstream from Salmon. Rural flooding is also a problem several miles upstream from Salmon along the Lemhi River.

The first field studies were completed in 1951, and the first levees were constructed in 1954. Emergency work in 1955 included cutting a pilot channel through the Dump Creek debris cone, which acts as an obstruction to the Salmon River downstream from Salmon. However, additional sediment soon refilled the pilot channel. Reports in 1957 and 1961 concluded that further channelization or levee work to control ice jam flooding was not economically feasible. The U.S. Forest Service conducted a number of studies in the 1970s, examining sedimentation in Dump Creek and other tributaries of the Salmon River. Some Forest Service data was used in a 1981 Corps reconnaissance study that reviewed the overall ice jamming problem. Again, the Corps concluded that a channelization project at Dump Creek was not economically justified.

In 1982, after experiencing one of the more damaging ice jam floods on record, Lemhi County requested that the Corps reexamine the situation, and Walla Walla District called on the services of the Corps Cold Regions Research and Engineering Laboratory in an attempt to gain a better understanding of the ice jam phenomenon.

The results of this study were published in a 1984 report. That report is the basis for a 1986 detailed project report and environmental impact statement that again examined various channelization and levee formats and permanent evacuation of the floodplain. Field studies included an examination of a severe 1984 ice-jamming event.

Channelization of the Dump Creek alluvial fan and the nearby Deadwater slackwater area was found to be feasible but in conflict with the Wild and Scenic Rivers designation of the proposed work area. The options favored by the report, levees along the Lemhi

River or a combination of levees and floodplain evacuation, were not supported by local sponsors. Therefore, the report recommended no further action at this time.

The Cold Regions Research and Engineering Laboratory conducted research and gathered data on ice jamming characteristics in the Salmon River to determine if a low cost facility, intended to induce ice jams upstream from the city of Salmon, is technically possible. The research was part of a Flood Control Act of 1948, Section 205, Small Flood Control Projects, feasibility study. However, due to loss of local sponsorship, further studies were terminated.

More information on Salmon River Flood Reduction Studies may be found at the Walla Walla District's "Digital Project Notebook" at:
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=150,
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=375, and
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=77.

Whitebird Creek Levees at Whitebird

The Flood Control Act of 1950 authorized channel improvements, levees, and revetments in the vicinity of the town of Whitebird, Idaho, along 3.5 miles of Whitebird Creek, upstream from its confluence with the Salmon River. Emergency levee construction and channel work accomplished in 1948 completed the project within the scope of the original authorization, and a 1957 study concluded that additional structural work is not economically feasible. Additional project work was deauthorized as part of the Water Resources Development Act of 1986. Details about this project are given at the "Digital Project Notebook" site provided by the Walla Walla District at:
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=207 and
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=261.

Salmon River Multipurpose Studies

In 1956 Congressional resolutions by the Committees on Public Works of the U.S. Senate and the U.S. House of Representatives (in the House document, "Columbia River and Tributaries, Northwestern United States") authorized the Corps to study multipurpose projects on the Salmon River. Corps studies considered regional needs for flood control, power, irrigation, and fish concerns. Various projects identified potential damsites on the Salmon River. These included the Crevice Project, the Freedom Project, and the Pahsimeroi Project. On the Lemhi River, potential damsites were identified at Texas Creek, Bear Creek, Yearian Creek, Agency Creek, and Indianola. At least 35 potential damsites on the Middle Fork of the Salmon River were identified and 23 on the South Fork of the Salmon. The Round Valley site on the Little Salmon River was also identified as the site with potential for a dam. More information about Salmon River multipurpose studies may be found on the Internet at the Walla Walla District's "Digital Project Notebook" at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=148.

Since the Salmon River was designated as a Wild and Scenic River, no further studies of multipurpose projects have been undertaken.

Salmon River Aquatic Ecosystem Restoration

A feasibility study under the Water Resources Development Act of 1996, Section 206, Aquatic Ecosystem Restoration, is being conducted on a 14-mile reach of the Salmon River near Challis, Idaho. The study is being conducted in partnership with the Custer Soil and Water Conservation District, the Bonneville Power Administration, the University of Idaho, the Idaho Department of Fish and Game, the Upper Salmon Basin Watershed Project, and others. One of the major goals of the study is to meet specific habitat needs for Snake River spring/summer chinook salmon, steelhead, and bull trout listed under the Endangered Species Act. Chinook salmon use the Round Valley reach of the Salmon River as a holding area for adults and a rearing area for juveniles with a small amount of spawning occurring. Steelhead use the area as a holding area for adults and a rearing area for juveniles with significant spawning occurring within the reach. Bull trout likely pass through the area seasonally with some adults and juveniles spending the winter in the area.

Habitat and natural river functioning have been impeded by various human-induced practices since settlement in the valley. In addition to improving habitat conditions for fish, the partners in this restoration effort wish to restore, to the extent possible, natural floodplain functioning to provide a healthy, functional river system. To accomplish this, private landowners will need to become an integral part of the project by providing lands where a variety of restoration measures can be implemented.

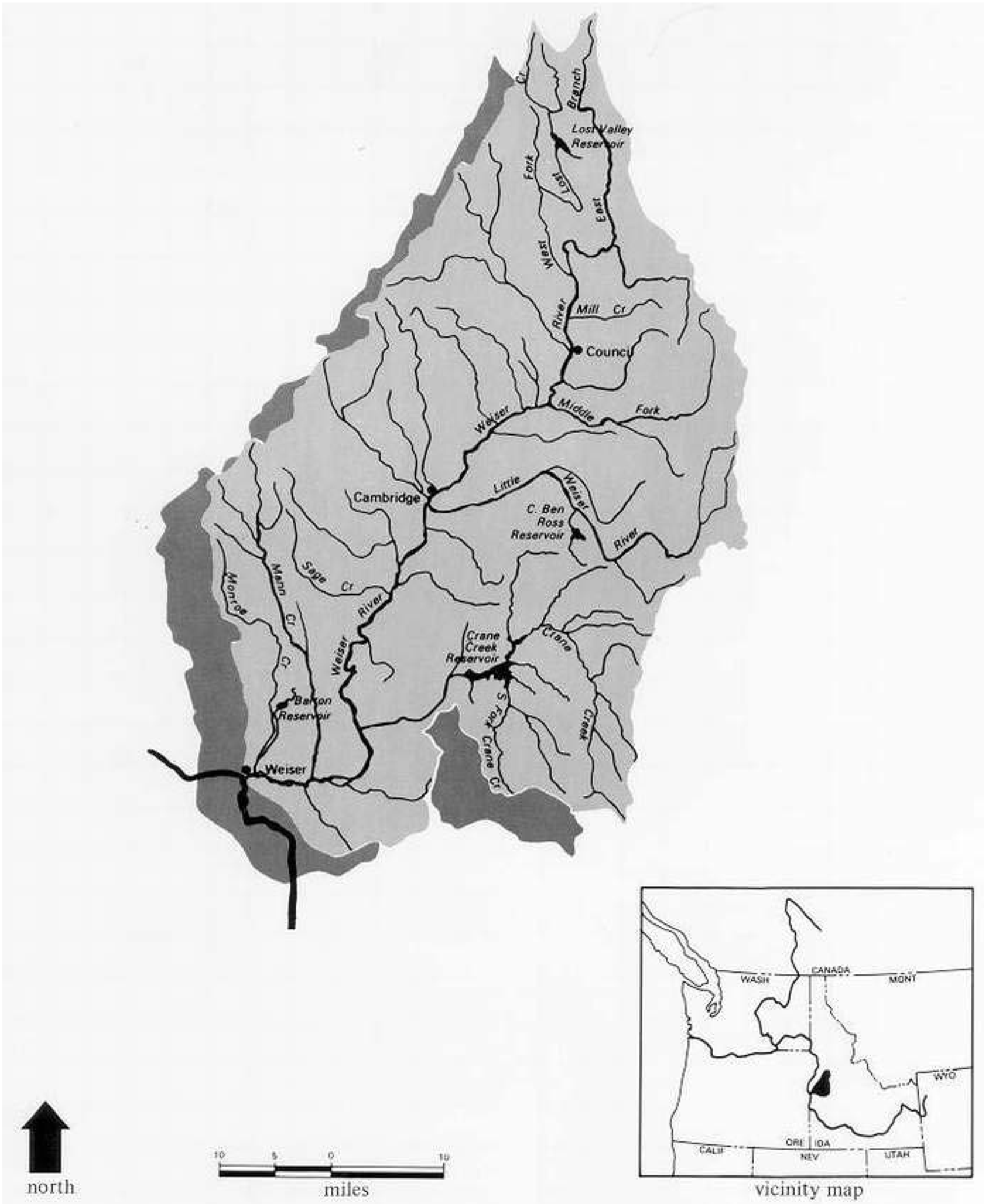
The University of Idaho has conducted conceptual hydraulic modeling of the 14-mile reach that visually demonstrates floodplain areas prone to inundation under various flow levels. This modeling will be used to develop site-specific plans on individual parcels of land. The intent will be to satisfy the landowners' needs, preventing bank erosion, while providing environmental benefits and fair compensation to the landowners for the use of their lands. Restoration measures may include revegetation of banks, construction of bank barbs, building special fencing in the river, opening of side channels for periodic flooding, and removing or breaching dikes.

The feasibility portion of the Salmon River Aquatic Ecosystem Restoration Project is expected to be completed in late winter of 2002 with construction beginning during the summer of 2002. Construction is likely to occur over the course of several years, as different landowners become partners in the project.

Graves Creek Flood Control Project

This flood control project is located on Graves Creek near Cottonwood, Idaho. Graves Creek is a tributary of Rock Creek, which is a minor tributary of the Salmon River. Channel reconstruction of Graves Creek was completed in 1951. Additional information about the project may be found in the Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=53.

Chapter 9. Weiser River Basin



Weiser River Basin

Weiser River Flood Protection

Historically, flooding of the Weiser River causes flood damages over a large portion of the river's length. Extensive emergency work, as well as snagging and clearing, was accomplished at selected locations in the Weiser River Basin, but the work has had limited effectiveness in providing flood protection. Information about these small projects can be accessed under "Weiser River" on the Web in the Walla Walla District's Digital Project Notebook at:
http://www.nww.usace.army.mil/dpn/dpn_projectindex.asp - W.

The Flood Control Act of 1950 authorized flood protection works along the 60-mile reach of the Weiser River downstream of the town of Council and along the lower reaches of the Little Weiser River and Mann Creek. The authorized work would provide protection at selected locations with levees, bank protection, and channel improvements. A report in 1955 concluded that proposed work in the Weiser, Midvale, and Cambridge areas was feasible, but a 1960 report found economic justification for only the proposed levees in the vicinity of the town of Weiser.

Following the 1960 report, the Weiser River Flood Reduction Project was proposed as a Section 205 Flood Reduction Project to reduce flooding damages from the Weiser River near Weiser, Idaho. A Corps' feasibility study focused on the portion of the river that crosses through the south edge of the town of Weiser. During flooding, water pools on the south side of the river behind the U.S. Highway 95 embankment and a Union Pacific Railroad embankment. The pooling behind the embankments tends to expand the area of damage on the south side of the river. Flooding on the north side of the river is less extensive in area, but previously caused damage to the city of Weiser's water treatment plant. According to local officials, there has been some flooding of this area seven times in the past 25 years and three of those flood events caused extensive damages. The flood prone areas at Weiser include public facilities, businesses, and some private residences.

The initial phase of the Weiser River Flood Reduction Project feasibility study determined there is a federal interest in the project. For purposes of federal interest calculations, the Corps assumed a project consisting of drainage structures through the existing railroad embankment for passing floodwaters around commercial areas thus reducing ponding effects. The feasibility study investigated a variety of flood protection methods including storage projects and ecosystem restoration projects that would return developed portions of the floodplain back to a natural system.

Originally, Washington County, Idaho, provided a "Letter of Intent" indicating that the county would be the local sponsor for the Weiser River Flood Reduction Project. Subsequently, County interest in a small flood control project diminished with some local groups advocating a more comprehensive solution to the flooding problem, such as a dam storage project. Currently, there are segments of the local community that strongly support water storage projects, but there is no widespread community support for these types of projects. There is a continuing effort by several local groups to build public support for the water storage project and, if the support develops, then the project would continue as a General Investigation study by the Corps.

Weiser River Basin Study

The Weiser River Basin Study, which is part of the Upper Snake River Basin Study, was accomplished in cooperation with the Idaho Department of Water Resources. As part of the study, 49 reservoir storage sites in the basin were identified and reviewed. Five sites were selected for reconnaissance-level studies: Galloway, Goodrich, Vista, Tamarack sites, and an enlargement of the existing Lost Valley Project. Further study of all sites, except Galloway, was eventually discontinued due to lack of economic feasibility or federal interest.

Preliminary investigations of the Galloway site indicated that reservoir storage sizes in the range of 600,000 acre-feet to 1,200,000 acre-feet were feasible. A technical report released in August 1990 evaluated a plan for a 900,000 acre-foot reservoir to control flooding in the lower reaches of the Weiser River. Reservoir storage space could also augment downstream river flows in the Snake and Columbia Rivers to benefit anadromous fish survival, generate hydropower on site, improve the systems hydropower generation capability during periods of adverse water conditions in critical periods, and provide recreation opportunities.

The plan outlined in the 1990 technical report was economically feasible, and Idaho indicated a desire to act as the non-federal sponsor. Fishery agencies indicated a strong interest in developing Galloway to supplement the existing Northwest Power Planning Council fish flow augmentation operation in the Snake River Basin. It was determined, however, that there were no insurmountable impediments to non-federal development of the Galloway site; therefore, the Weiser River Basin Study was terminated in August 1990.

More information about the Weiser River Flood Reduction Project and the Weiser River Basin Study is available on the Digital Project Notebook at the Walla Walla District Internet site at:
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=202.

Little Weiser River Environmental Restoration Project Study

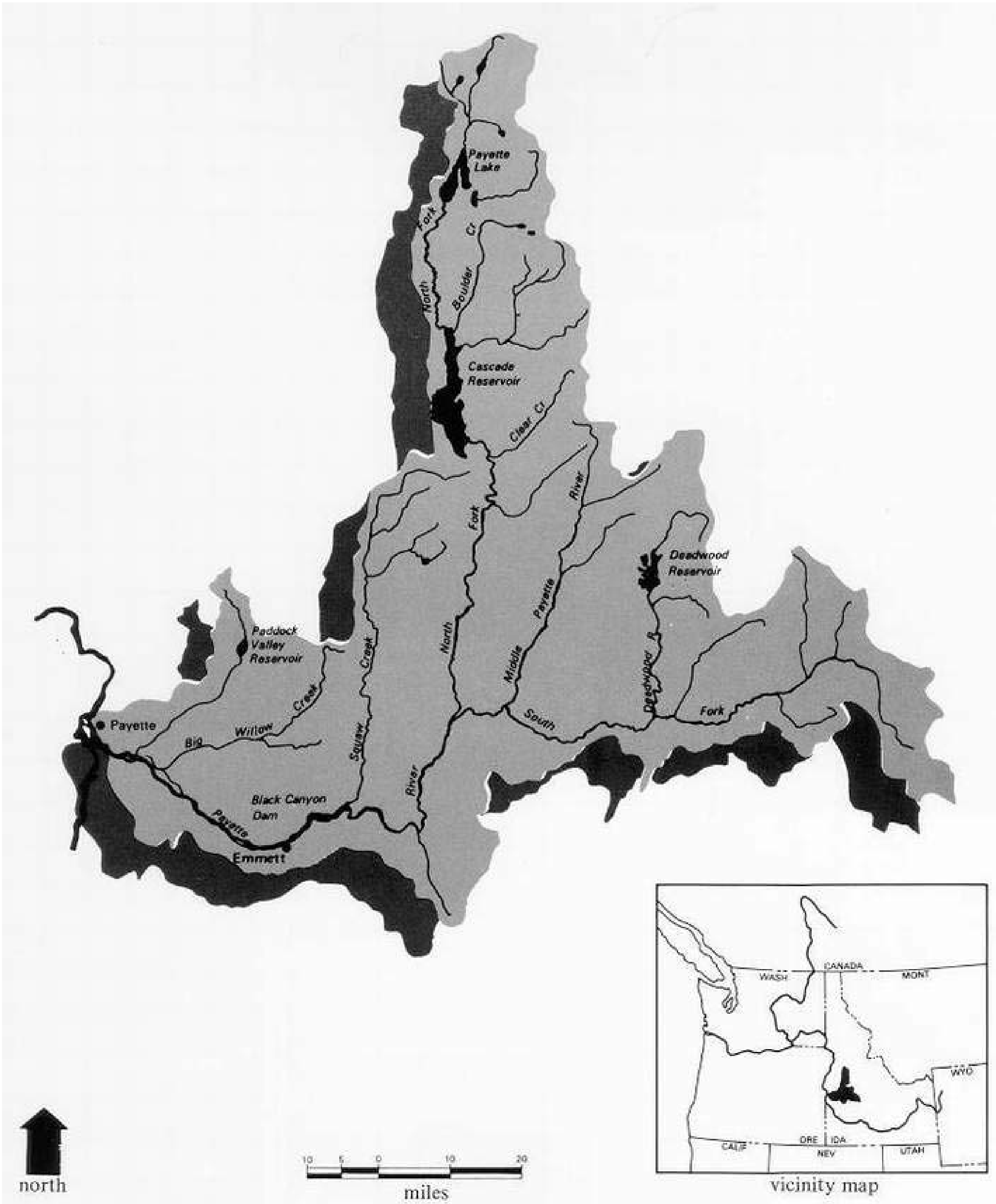
Section 1135 of the Water Resource Development Act of 1986 provides authority for modifying Corps projects to restore fish and wildlife habitat. A Section 1135 project is being studied on the Little Weiser River near Cambridge and upstream approximately 15 miles to Indian Valley. On the Little Weiser River, spring flows are eroding unstable banks, creating sand and gravel bars that block the channel, and subjecting riparian areas and fields to erosion and deposition. As a result of this channel erosion, fish and wildlife habitat along the stream has been destroyed and degraded. In the past, the stream had a well-vegetated riparian zone and supported trout and salmon populations.

Channel snagging and clearing work by the Corps in 1965 and 1978 contributed to the channel degradation. Temporary rock and gravel irrigation diversions also disturb the stability of the river. These problems will continue until some means are found to stabilize the channel. The channel capacity is limited and it is likely that erosive flows and flooding will occur quite frequently. The Corps is evaluating methods to stabilize the channel to prevent movement of materials and channel erosion in order to prevent further loss of riparian habitat, maintain channel capacity, and restore fish and wildlife habitat. Measures that are being investigated to meet these objectives include: creation of stream meanders, permanent irrigation diversions, installation of rock vortex weirs, streambank stabilization, and restoration of riparian vegetation. Details about this environmental restoration project may be found in the Digital Project Notebook provided at the Walla Walla District's Internet site at:
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=82.

Mann Creek Dam (U.S. Bureau of Reclamation)

This Bureau of Reclamation project provides 11,100 acre-feet of water in Mann Reservoir for irrigation of over 5,000 acres in the area of Mann Creek and Monroe Creek, both tributaries of the Weiser River. The 148-foot high earth and rockfill dam is located 13 miles northeast of Weiser, Idaho. The dam was constructed as Spangler Dam, and its name was officially changed to Mann Dam upon completion in 1967.

Chapter 10. Payette River Basin



Payette River Basin

Payette River and Tributaries Survey

Floodflows that result from snowmelt in the late spring overtop stream banks in the lower Payette River Valley about every 2 years. There are six locations in the lower Payette Valley where bank erosion threatens to allow major changes to the course of the main channel of the river. A survey of the river and its tributaries was authorized by the River and Harbor Act of 1936 and was completed in 1942. A plan of improvement was proposed that consisted of a storage project on the South Fork of the Payette River, near Garden Valley, Idaho. The initial cost of the project was extremely high and the proposed project was never pursued. Details on the survey and proposed project can be found on the Walla Walla District's Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=124.

Payette River Valley Flood Protection

A number of emergency flood protection projects were undertaken in the Payette River valley. More information about these projects may be found at: http://www.nww.usace.army.mil/dpn in the Walla Walla District's Digital Project Notebook by searching "Payette River."

The Flood Control Act of 1950 authorized the Payette Valley Flood Protection Project. The project as proposed consisted of channel rectification, bank protection, and levees at 17 separate locations. These works were to extend along the Payette River from Black Canyon Dam near Emmett, Idaho, downstream 38 miles to the Snake River. The flood protection works would prevent damage to irrigated farm and dairy lands. Due to lack of economic justification and with the concurrence of local authorities, this project was deauthorized in October 1978. The Payette Valley Flood Protection project is detailed in the Digital Project Notebook at the Walla Walla District's Internet Site at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=128.

As authorized by Section 205 of the Flood Control Act of 1948, the Corps completed a small flood control project study of the area around River Mile 3 of the Payette River, near Payette, Idaho. Flooding occurs in the area quite frequently because of inadequate channel capacity. Four alternate plans were outlined, but a detailed report prepared in 1975 indicated that flood protection through the construction of levees in this area was not economically feasible and that floodplain zoning ordinances should be established in the area. The Walla Walla District's Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=125 provides more information on this study.

Subsequent to the flood protection studies mentioned above, the Corps prepared a Flood Management Report for the Payette River. The Flood Management Report was prepared at the request of the Idaho Department of Water Resources to permit coordination of work by various individuals and agencies along the Payette River.

The primary purpose of the report was to establish proposed levee alignments in the river reach extending from Black Canyon Dam downstream to the mouth of the river. The levees are intended to contain the 50-year-flood discharge of 28,000 cubic feet per second. The report was completed in 1982.

Cascade Power Plant (U.S. Bureau of Reclamation and Iddaho Power Company)

The Original Cascade Power Plant was built in 1926 on a Payette River diversion. In 1948, the Bureau of Reclamation completed construction of an earthfill dam at River Mile 40.2 on the North Fork of the Payette River. The dam is 785 feet at the crest and is operated primarily for irrigation purposes. A new Idaho Power Company plant with a generating capacity of 12,420 kilowatts was completed in 1984 to use the dam's potential for power production. The reservoir behind the Bureau of Reclamation dam covers 27,000 acres and can hold 703,200 acre-feet of water. Power generation is tied to seasonal reservoir releases, which the U.S. Bureau of Reclamation controls. Several archeological sites that require professional study have been located within the Cascade area.

Black Canyon Diversion Dam (U.S. Bureau of Reclamation

Black Canyon Diversion Dam, built by the Bureau of Reclamation to divert water for irrigation purposes, is a concrete gravity type structure completed in 1924. The dam is located five miles northeast of Emmett, Idaho, on the Payette River. Over the years, the dam has experienced considerable deterioration due to freeze-thaw action and has been modified to address uplift pressure concerns and instability issues.

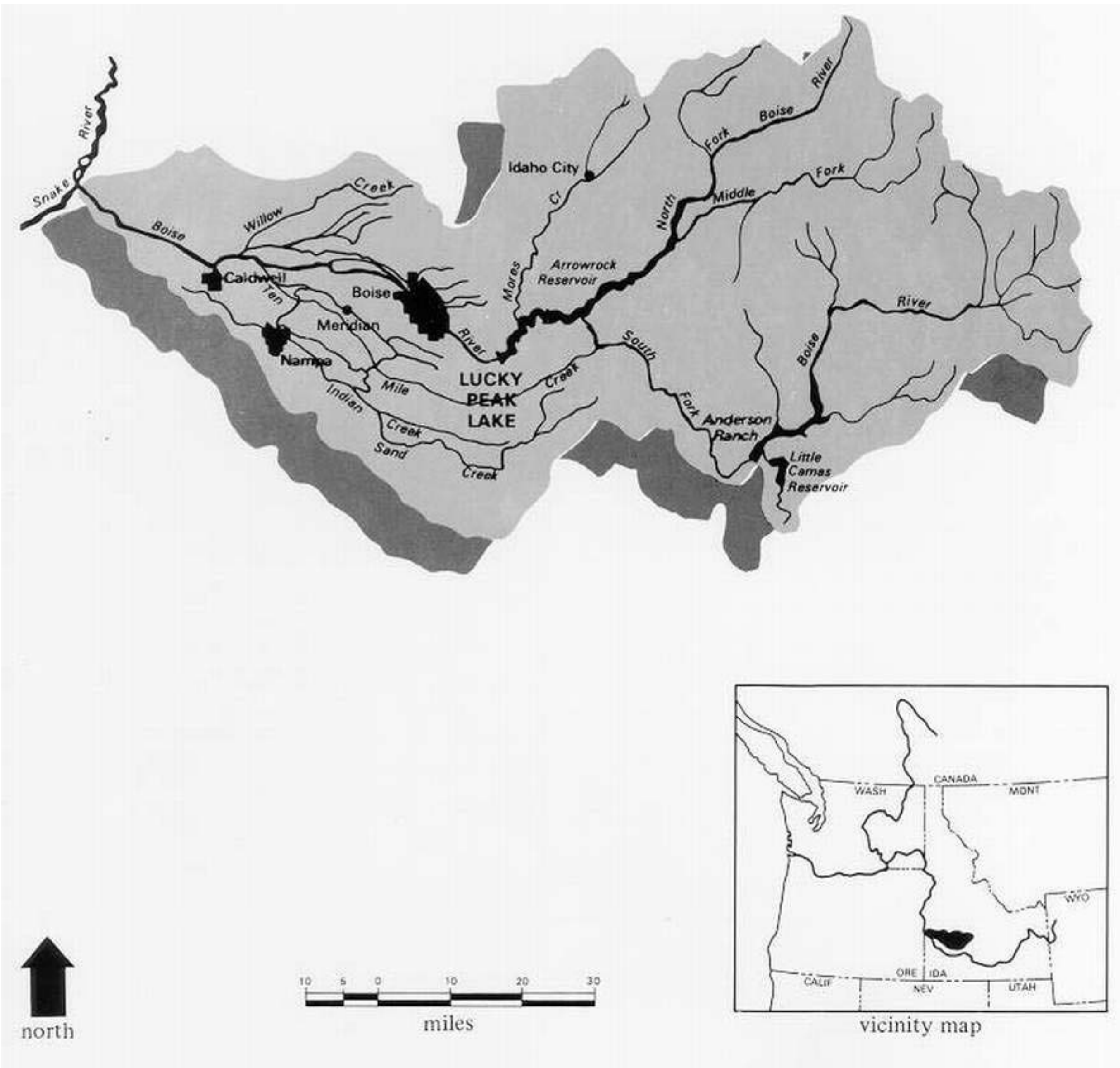
Deadwood Dam (U.S. Bureau of Reclamation)

The Bureau of Reclamation's Deadwood Dam is located in on the Deadwood River about 25 miles above its confluence with the South Fork of the Payette River. The dam is a concrete arch structure with a height of 165 feet and a crest length of 749 feet. Both the upstream and downstream faces of the dam have undergone substantial freeze-thaw damage. The dam, completed in 1931, was primarily constructed for irrigation storage purposes.

Deadwood Reservoir is 3.5 miles long and covers 3,180 acres. The reservoir is located within the Boise National Forest. The U.S. Forest Service manages recreational opportunities around the area. Among the facilities available are camping spaces and picnic areas.

Deadwood, Cascade, and Black Canyon Dams form the Payette Division of the Bureau of Reclamation's Boise Project and are operated for irrigation and flood control purposes in concert with structures in the Boise River Basin (see Chapter 11).

Chapter 11. Boise River Basin



Boise River Basin

Boise River Valley Flood Control

Flood problems have existed for many years along the Boise River. Numerous small projects on the Boise River involving channel improvements, bank revetment, snagging and clearing, and emergency repair of existing protective works have been accomplished over the years in response to flood emergencies. Emergency work provided increased protection to Boise and certain valley farmlands and permitted more effective operation of Lucky Peak Dam. More information about these small projects can be found at the Walla Walla District's Digital Project Notebook under "Boise River" at: http://www.nww.usace.army.mil/dpn.

The Flood Control Act of 1950 authorized channel improvements, levees, and revetments along the Boise River from the city of Boise to the mouth of the Boise River. Initial studies by the Corps concluded that structural alternatives were feasible but Canyon County withdrew as sponsor. The Canyon County portion of the project was deauthorized in 1967.

A 1976 restudy of the Ada County portion of this section of the Boise River concluded that the proposed structural improvements are no longer economically feasible, although some limited work in combination with nonstructural solutions appeared to have potential. There was no interest in further flood control studies, and the Water Resources Development Act of 1986 deauthorized the project.

The Digital Project Notebook at the Walla Walla District's Internet site at http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=19 provides more information on proposed flood control projects in Canyon and Ada Counties.

Cottonwood Creek Dam

The Flood Control Act of 1966 authorized an earthfill flood retention dam on Cottonwood Creek, a tributary of the Boise River, at the east city limits of Boise. The project was intended to protect urban and residential areas from recurring flash floods. Studies and design memoranda were last revised in 1977, but the local sponsor withdrew support in 1979. The Water Resources Development Act of 1986 deauthorized the project. The proposed Cottonwood Creek Project is detailed in the Walla Walla District's Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=37.

Stuart Gulch Dam

Like the Cottonwood Creek drainage, other portions of the Boise area also are vulnerable to flash floods. The Flood Control Act of 1966 authorized the Stuart Gulch

Dam to protect an area in the foothills just north of the city of Boise. Studies and design memoranda were last revised in 1973, but after the local sponsor withdrew support for the project, it was deauthorized in 1979. A study was conducted on the feasibility of instituting a flood warning system for the portions of Ada County and the city of Boise that may be subject to flooding. The study was reclassified from active to inactive status on September 19, 1995. The Stuart Gulch Dam Project is covered in the Walla Walla District's Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=175.

Lucky Peak Dam and Lake

Lucky Peak Dam and Lake is a Corps project in the mountains of southwestern Idaho on the Boise River, ten miles southeast of the city of Boise. Lucky Peak Dam was constructed primarily for flood control along the main stem of the Boise River. In conjunction with two upstream reservoirs, Arrowrock and Anderson Dam, Lucky Peak Project provides a high degree of flood protection in a 60-mile area extending from Lucky Peak downstream through the city of Boise to the mouth of the Boise River. The project's authorized project purposes are flood control, irrigation, recreation, fish and wildlife management, and streamflow maintenance.

Lucky Peak Dam is a rolled earthfill structure about 340 feet high and 1,700 feet long. The structure was originally completed in 1955 with major additions completed in 1988. It has an intake tower, two outlet tunnels, a powerhouse, and a 600-foot spillway. At full pool, the lake behind the dam is about 12 miles long with a surface area of approximately 3,000 acres. The reservoir has a storage capacity of 307,043 acre-feet, of which 264,371 acre-feet are allocated to joint use (active storage) purposes.

During a detailed investigation of the outlet capacity and the potential for adding hydropower to the original 1955 Lucky Peak Project, the need for a second outlet became apparent. The Corps was authorized to construct such an outlet.

In 1980, the Federal Energy Regulatory Commission issued a license to the Boise Project Board of Control to construct an 87-megawatt power plant at the existing Lucky Peak Project. The licensee completed the construction of the powerhouse project and the first power came on-line in 1988. The Boise Board of Control project included relining of the original outlet tunnel and construction of a second outlet works for Lucky Peak Dam. The construction project also included measures to improve recreation and operational facilities. Through an agreement with the Board of Control, Seattle City Light operates the 101,250-kilowatt-capacity powerhouse and markets the power. Controlled discharge of impounded water is accomplished by means of two outlets. The original outlet is now a steel-lined, concrete pressure tunnel 22 feet in diameter connecting a 260-foot intake tower with a recently constructed powerhouse. Any water not routed through the powerhouse is dispersed into a rock-stilling basin. During construction of the powerhouse and relining of the first outlet, the second steel-lined outlet was bored through the downstream left bank abutment. This outlet is 12 feet in diameter, has a separate intake works, and water is released through two cone valves.

Following construction of the second outlet by the Boise Board of Control, the Corps project to construct a second outlet, being unnecessary, was deauthorized. The Digital Project Notebook provided by the Walla Walla District discusses the Lucky Peak Project second outlet: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=96.

Lucky Peak Lake storage is regulated in conjunction with Arrowrock and Anderson Ranch Reservoirs upstream on the Boise River. These two projects were constructed by the Bureau of Reclamation before construction of Lucky Peak Dam by the Corps. The three reservoirs are operated as an integral system under the guidelines of the "1985 Joint Water Control Manual - Boise River." It is the intent of the flood control regulations to limit river flows at the Glenwood gauge near Boise to 6,500 cubic feet per second for all but the largest flood discharges. The operating plan also is designed to keep a full pool at Lucky Peak Lake as long as possible during the summer recreation season.

Through September 1995, federal expenditures for Lucky Peak Project have totaled $19,648,081 for construction and $23,461,524 for operation and maintenance. Since 1961, flood damages prevented have been estimated at more than $470,387,000.

Lucky Peak Recreation and Fish and Wildlife Management

A total land area of 4,288 acres is contained within the boundaries of the Lucky Peak Project. Project lands are designed for multiple uses, including operations, recreation, and wildlife. The project lies within the Idaho Department of Fish and Game's Boise River Wildlife Management Area, a major game range in the state. The operation, recreation, and wildlife activities of the project are guided by the updated Lucky Peak Master Plan, which was approved in July 1988.

Recreation facilities at Lucky Peak Lake consist of 20 picnic/day-use areas, four boat launch ramps, and three swimming areas. In fiscal year 1999, there were 750,900 visits to Lucky Peak Lake.

The Sandy Point and Spring Shores Units of Lucky Peak State Park are operated by the Idaho Department of Parks and Recreation. Lucky Peak State Park receives the highest visitation of any state park in Idaho. The Corps operates the remainder of the recreation areas. Recreation uses include boating, water-skiing, fishing, swimming, and picnicking.

Numerous improvements of the recreation facilities were accomplished during construction of the Boise Project Board of Control hydropower additions during the 1980s. Parking facilities and a boat ramp were expanded at the Barclay Bay-Turner Gulch site. The access road to the Barclay Bay-Turner Gulch site was relocated to provide additional parking and increased safety. Expansion at the Sandy Point Unit of Lucky Peak State Park included additional trees and lawn, a new amphitheater, extension of the bike path from the Discovery Unit to the Sandy Point Unit, and measures to improve the appearance and water quality at the swimming beach.

The Idaho Department of Parks and Recreation has replaced the marina docks at the Spring Shores Unit of Lucky Peak State Park. The Idaho Department of Parks and Recreation, in cooperation with the Corps, had substantially completed a remodel of the Spring Shores State Park Unit, including marina and restrooms upgrades. All remaining work, including landscaping, should be completed in approximately 2002.

A project land interchange was completed in 1988 between the Corps and the U.S. Forest Service. The interchange eliminated dual jurisdiction on lands within the Lucky Peak Project. This consolidation of land management responsibilities maximizes the overall benefits derived from the project.

More information about Lucky Peak Dam and Lake is available in the Walla Walla District's Project Notebook on the web at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=95.

Arrowrock, Anderson Ranch, Hubbard, Deer Flat, and the Boise River Diversion Dams (U.S. Bureau of Reclamation)

Arrowrock and Anderson Ranch Dams are upstream of Lucky Peak Dam. Hubbard, Deer Flat, and the Boise River Diversion Dams are down river of Lucky Peak Dam. These projects were authorized primarily for irrigation. Arrowrock and Anderson Ranch Dams function secondarily for power production. All of these projects are owned and operated by the Bureau of Reclamation.

After construction of Lucky Peak Dam, operation of these projects was integrated to benefit flood control during spring runoff and irrigation at other times. Hydropower remains a secondary use. Other important functions of these projects are streamflow maintenance, recreation, and fish and wildlife benefits. Lake Lowell and its associated facilities, the Boise River Diversion Dam, Hubbard Dam, and the New York Canal, are included in the interagency agreement specifying operational criteria for the Boise River Reservoir System. Also operated in concert and included in the larger Boise Project are Cascade and Black Canyon Dams on the Payette River and the Deadwood Dam on the Deadwood River. These three dams were covered in Chapter 10 of this publication.

The Boise River Diversion Dam is about seven miles southeast of Boise, Idaho. The dam, originally built to supply power for the construction of Arrowrock Dam, diverts water into the New York Canal. The power plant consists of three 500-kilowatt units that began operation in 1912.

Hubbard Dam, an earthfill structure with a height of 23 feet and a crest length of 6,000 feet, was constructed by private concerns in 1902. The Boise Project Board of Control currently operates the dam, which is administered by the Bureau of Reclamation. Located ten miles southwest of Boise, Hubbard Dam provides an offstream storage reservoir with a capacity of 4,060 acre-feet into which flow is diverted from the New York Canal.

Lake Lowell is formed by the three Deer Flat Dams. Deer Flat Upper Dam is 73 feet high, Deer Flat Middle Dam is 14 feet high, and Deer Flat Lower Dam is 49 feet high. These three earthfill dams enclose the lake waters in a natural offstream depression. The Lake Lowell has a storage capacity of 190,000 acre-feet. The main source of water for the lake is diversion from the Boise River into the 40-mile long New York Canal at the Boise River Diversion Dam.

Deer Flat Upper Dam was completed in 1908, and modified in 1911 and 1938, while Deer Flat Lower Dam was completed in 1908 and modified in 1909, 1913, and 1938. Both the Upper and Lower dams were again improved in 1991 under the Safety of Dams Modification program. Construction on Middle Deer Flat Dam was completed in 1911.

Arrowrock Dam is on the Boise River, 15 miles east of Boise and immediately upstream from Lucky Peak Lake. It consists of a concrete arch structure with a structural height of 350 feet. Crest length is 1,150 feet. No power production facilities were included in the project. Arrowrock Dam saw three periods of construction. The dam was first completed in 1912 as one of the first Bureau of Reclamation projects. A second section was built in 1913, and major work was done in 1937 to repair deterioration due to climatic conditions.

Arrowrock Reservoir has a total storage capacity of 298,230 acre-feet of which 286,600 acre-feet are allocated to joint-use (active storage) purposes. The U.S. Forest Service administers project lands. Recreational opportunities are somewhat limited due to the mode of operation of the project and its relative isolation.

Anderson Ranch Dam is on the South Fork of the Boise River about 43 miles southeast of Boise. The dam is a 456-foot-high, rolled earth and rockfill structure. Crest length is 1,350 feet. Anderson Ranch Dam includes a hydroelectric power plant with installed capacity of 27,000 kilowatts. The lake behind the dam has a total gross capacity of 503,682 acre-feet of which 418,178 acre-feet are allocated to joint use (active storage) purposes.

The Bureau of Reclamation completed construction on Anderson Ranch Dam in 1950. Recreation facilities around Anderson Ranch Reservoir include three campgrounds and five boat launching ramps. Existing facilities are generally primitive, but all sites are accessible by road. The lake is noted for large catches of trout. Annual visitors total more than 30,000. The excellent trout fishing available downstream from Anderson Ranch Dam is a result of stabilized river flows and intensive efforts on the part of the

Idaho Department of Fish and Game. The Bureau of Reclamation attempts to maintain minimum stream flows through the South Fork reach below Anderson Ranch Dam.

One goal of the operational plan for the Boise River reservoirs is to maintain the Lucky Peak Lake recreational pool as late into the summer recreation and irrigation seasons as possible due to its proximity to the city of Boise. This is accomplished at the expense of recreational opportunities at Arrowrock by drafting water first from Arrowrock Reservoir. During very dry years, irrigation demands also require drafting both Anderson Ranch Reservoir and Lucky Peak Lake below full pool levels before the end of the normal recreation season.

South Fork Boise River Flood Control

The South Fork Boise River above Anderson Ranch Reservoir is unregulated. The river reached a 40-year flood peak in May 1983 damaging a bridge and an existing levee, as well as severely eroding banks. In 1985, the Corps completed repairs, snagging and clearing, and channel realignment along the South Fork Boise River near Pine, Idaho. Details are given in the Digital Project Notebook at the Walla Walla District Internet site at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=172.

Boise River Floodplain Management Report

The Floodplain Management Report for the Boise River was prepared by the Walla Walla District at the request of the Idaho Department of Water Resources to permit coordination of work by various individuals and agencies along the Boise River. The primary purpose of the report was to establish proposed levee alignments in the river reach extending from Boise downstream to the mouth of the river. The report was completed in 1979 and revised in 1982.

Boise Valley Regional Water Management Study

Since the 1950s, Ada County and the area around Boise, Idaho, have been growing in population. Census figures for the year 2000 indicate that Ada County, which includes the capital city of Boise, contains 23 percent of the state's population. From 1990-2000, Ada County accounted for 32 percent of the state's population growth. The city of Boise and Ada County are experiencing problems common to most rapidly growing urban areas.

The Boise Valley Regional Water Management Study was one of nine studies initiated in fiscal 1972 as part of the Corps' urban studies program. The water management study was carried out under the joint leadership of the Ada County Council of Governments, Canyon County Development Council, and the Corps.

The study included development of wastewater facility plans for the Nampa-Caldwell area and area-wide wastewater plans for the Boise Valley to meet stringent requirements of the Clean Water Act. The area-wide plans included treatment and disposal of wastes from septic tanks, municipal wastewater and storm runoff, and agricultural feedlot sources.

Other features of the study were flood damage reduction measures for Caldwell, the Boise foothills, and the Boise River floodplain; improvements in water supply facilities for the city of Boise; reduction of sedimentation and pollution from irrigation operations; and proposals to rehabilitate Barber Dam. The study was completed in 1977.

Lower Boise River and Tributaries Study

A reconnaissance study, the "Lower Boise River and Tributaries Study," was initiated in fiscal 1994 to evaluate the water resource problems in the Lower Boise River. The purpose of the study was to review water resource problems, needs, and opportunities in the Lower Boise River Basin. The study area encompassed the entire Boise Valley from Lucky Peak Dam to the mouth of the Boise River. The study focused on problem areas along the main river channel and side drainages northeast of Boise, Idaho.

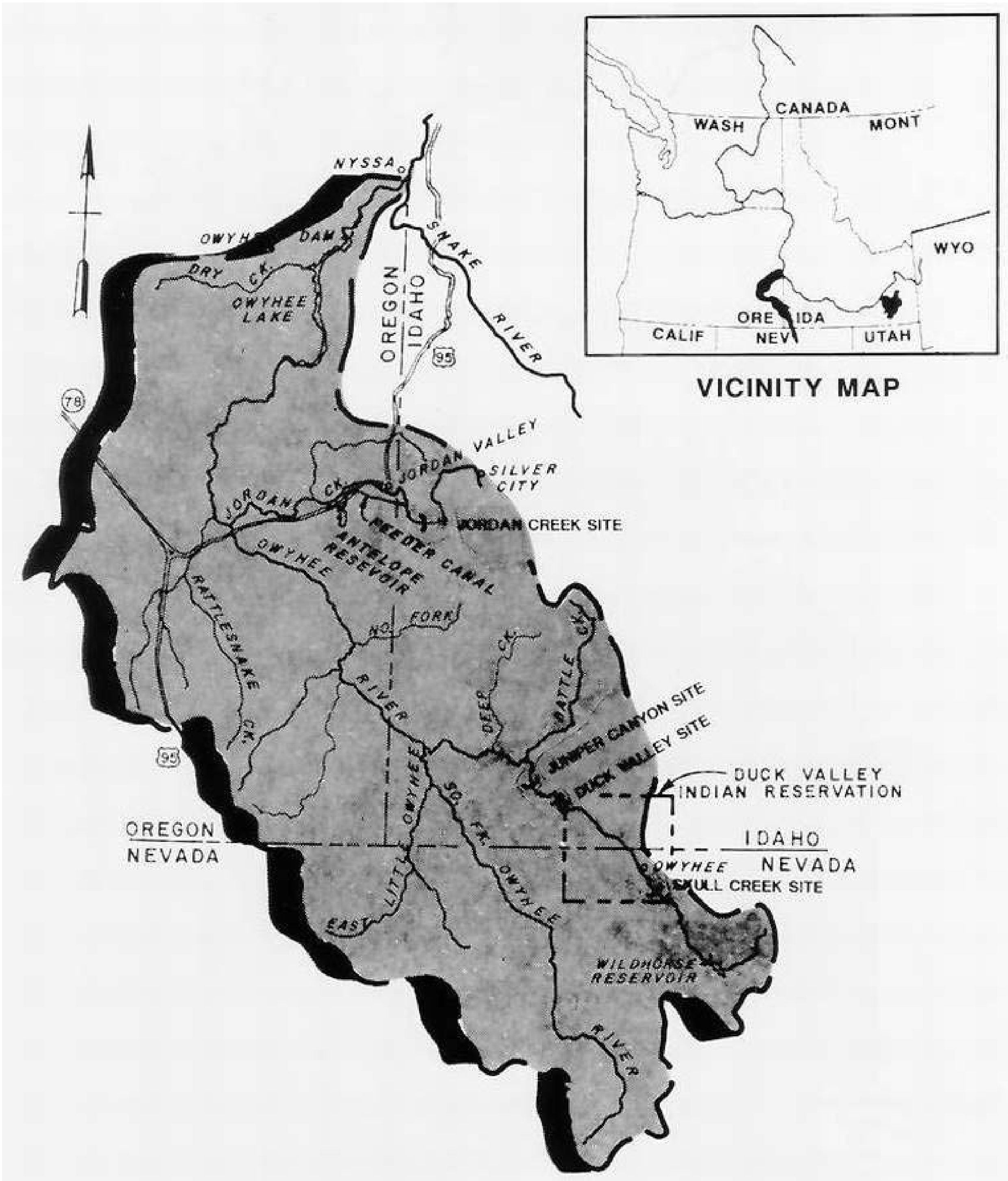
Problems identified in the "Lower Boise River and Tributaries Study" included continued flooding in the Boise area. Because of weather conditions, target flow has been exceeded 13 times since construction of the Lucky Peak Project in 1954. Seven emergency floodfights and five rehabilitation projects have occurred since 1971. Flash floods are common in the canyons of tributaries to the Boise River in the foothills near the city of Boise. High levels of groundwater and seepage into the sewer systems are problems. Rapid metropolitan growth of Boise has caused loss of surface water for irrigated cropland. Temporary gravel dams required for irrigation impede use of the Boise River for recreation purposes. Riparian habitat is being lost as urban development encroaches on the natural floodplain. Quality of water returned to the river after irrigation is a concern. The last problem identified by the study was that of water supply. There is no single municipal water supply for the city of Boise, and Boise County experiences a water shortage during low-water years.

The Lower Boise River and Tributaries Study outlined various alternatives related to the identified water resources problems. For the flooding issue, the results of no action were outlined. The study identified diversion of water into the Snake River as an alternative to mitigate flooding problems. The study also explored environmental restoration alternatives including: flood easements precluding development along the Boise River; flushing flows to be released from Lucky Peak Lake; recontouring the floodway in the lower Boise River floodplain; and raising Barber Pool to contain periodic flooding. The study identified reallocation of irrigation water stored in Lucky Peak Lake to municipal needs as the primary solution to the area water supply problem.

The Lower Boise River and Tributaries Study findings and recommendations were issued in a report, dated May 1995. An overall sponsor has not been identified for a feasibility study, which would be the next step. An initiative called “Boise River 2000,” a clearinghouse for water resource-related problems and solutions in the basin, is working to develop sponsorship for future planning efforts.

More about the Lower Boise River and Tributaries Study can be found on the Walla Walla District’s Digital Project Notebook at:
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=87.

Chapter 12. Owyhee River Basin



The Owyhee River is one of the more important southern tributaries to the Snake River. It drains a high plateau of about 11,300 square miles. About 6,200 square miles of the Owyhee River Basin lie within Oregon, with 2,800 square miles in Idaho, and 2,300 square miles in Nevada. The principal tributaries of the Owyhee River are the North Fork, East Fork (or Middle Fork), South Fork, Jordan Creek, and Blue Creek.

Except for a few scattered ranches in the small valley areas, development of the Owyhee River Basin has been limited to the Duck Valley Indian Reservation, the Jordan Creek Basin, and the large land area below Owyhee Reservoir in Oregon. The most significant water resources developments in the Owyhee River Basin are in Oregon and Nevada. In addition to the U.S. Bureau of Reclamation's Owyhee Reservoir, principal existing irrigation storage projects include Antelope Reservoir in the Jordan Valley in Oregon and Wild Horse Reservoir in Nevada on the Duck Creek Indian Reservation.

Additional storage in the basin could provide irrigation water, augment flows for fish, and generate hydropower as well as reduce flood damages.

Blue Creek Storage Projects

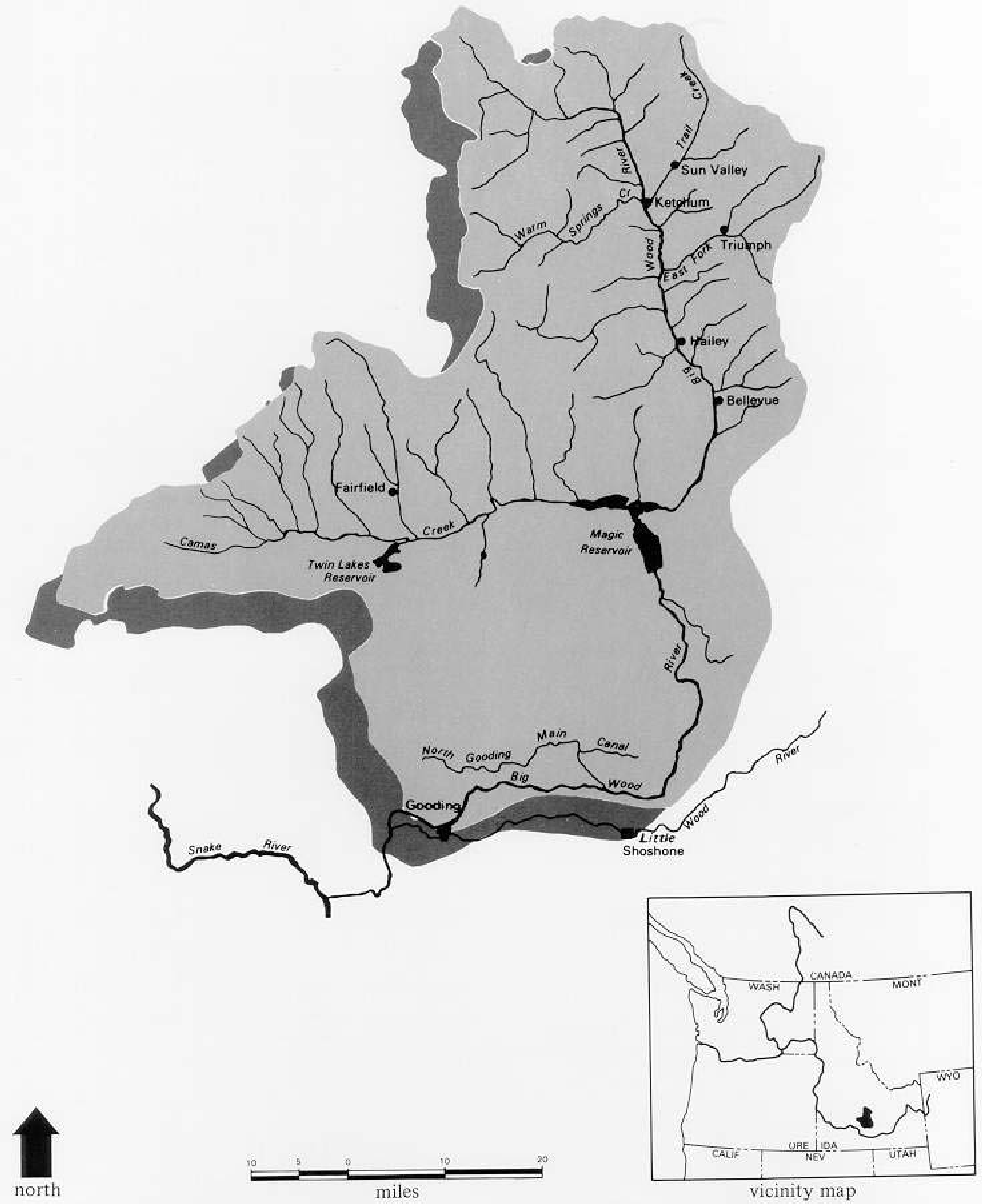
Blue Creek runs south through southwestern Idaho to meet the Owyhee River just north of the Nevada border. Several small locally developed water storage projects impound Blue Creek and its tributaries. These projects include Mountain View Lake, Blue Creek Reservoir, and Little Blue Creek Reservoir. Mountain View Lake is on the Duck Valley Indian Reservation. These projects provide water for irrigated croplands in the area.

Owyhee River Basin Interim Study

As part of the Upper Snake River Basin Study, the Corps investigated three potential dam sites on the East Fork of the Owyhee River: a site about five miles downstream of Juniper Canyon, a site just downstream of the Duck Valley Indian Reservation, and the Skull Creek site on the Duck Valley Indian Reservation. Preliminary investigations of the three multipurpose storage sites on the East Fork were completed in January 1988. The Corps also examined a dam site on Jordan Creek about 12 miles upstream from Jordan Valley in Idaho and the possibility of enlarging Antelope Reservoir and its feeder canal for flood storage. The Jordan Valley study was in response to a request from Oregon Representative Robert F. Smith on behalf of the Jordan Valley Irrigation District and other concerned local citizens.

These investigations were released as the "Owyhee River Basin Interim Study". The report concluded that none of the alternatives studied on the East Fork of the Owyhee or Jordan Creek were economically feasible. The report recommended no federal involvement at that time.

Chapter 13. Big Wood River Basin



Big Wood River Basin

Big Wood River Basin Studies

The Big Wood River originates in the Sawtooth Mountains of south-central Idaho and flows generally south and west. Its principal tributaries are Camas Creek, which enters the river from the west below Hailey, Idaho, and the Little Wood River, which joins the Big Wood from the east at Gooding, Idaho. From the confluence of the Big and Little Wood Rivers to the Snake River, a distance of about 10 miles, the stream is known as the Malad River. Major and minor impoundments in the Big Wood River Basin have been constructed primarily for irrigation purposes. Flood damage occurs especially in the vicinities of Hailey-Ketchum, Gooding-Shoshone, the Carey Valley, and near Fairfield, Idaho.

The Big Wood River and Tributaries Study was authorized by resolutions adopted in 1948 and 1952 by the U.S. Senate Committee on Public Works. The study was intended to review prior reports on the Snake River Basin and to determine the feasibility of flood protection on both the Big Wood River and the Little Wood River. A Senate Resolution of September 1976 expanded the study authority to include water supply and wastewater management.

Reports were prepared under the above authority and under various small project authorities in 1950, 1953, 1957, 1961, 1965, and 1976. Identified water resources needs were flood protection, supplemental irrigation water, water-oriented recreation, and increased streamflow during low-flow periods.

Lower and Upper Malad Projects

The Lower and Upper Malad powerplants were re-developed as part of Idaho Power's post-World War II construction program. The original plant, built in 1911, was located on the Malad River at River Mile 0.2. The Lower Malad Project is now located at River Mile 571.2 of the Snake River and uses water diverted from the Malad River to generate up to 13,500 kilowatts of electricity. The Upper Malad Project includes a concrete gravity diversion dam at River Mile 2.1 of the Malad River. Upper Malad Dam has a generating capacity of 8,270 kilowatts.

Devil Creek Project

In 1969, the Malad Valley Irrigation Company completed the Devil Creek Project for flood control and irrigation purposes. The project is located on Devil Creek, a tributary of Malad River, seven miles northeast of Malad City. Total water storage capacity of the project is 4,450 acre-feet, with 2,000 acre-feet of storage reserved for flood control. The project provides flood protection for agricultural areas along Devil Creek, the Malad River, and a portion of Malad City. It also helps prevent overtopping of Crowther Dam in Malad City.

Big Wood River Flood Control

The Corps has conducted various small flood control studies and projects along the Big Wood River. Information about these activities may be found in the Walla Walla District's Digital Project Notebook index under "Big Wood River" at: http://www.nww.usace.army.mil/dpn/dpn_projectindex.asp.

Magic Dam and Reservoir

Magic Reservoir is one of the major impoundments in the Big Wood River Basin. The reservoir is at the confluence of Camas Creek and the Big Wood River below Hailey, Idaho. At full pool, the reservoir is five miles long and 1.5 miles wide and can hold a maximum of 191,500 acre-feet of water. Magic Dam was completed in 1910. In 1916 the dam was raised an additional 10 feet.

Irrigation of adjacent lands in the fertile Camas Prairie is the primary purpose of Magic Dam and Reservoir. Power generation, flood control, and recreation are secondary purposes of the project. The Big Wood River Canal Company operates the dam, reservoir, and its canal system. The U.S. Bureau of Land Management manages several boat ramps and camping facilities on the shore of Magic Reservoir.

Soldier Creek Environmental Restoration Project Study

Section 1135 of the Water Resources Development Act of 1986 provides authority for modifying Corps projects to restore fish and wildlife habitat. The Corps is studying an environmental restoration project under Section 1135 on Soldier Creek, which originates in the Soldier Mountains, approximately 15 miles northwest of the city of Fairfield, Idaho. Soldier Creek flows generally in a southeast direction to its confluence with Camas Creek, a tributary of the Big Wood River. The Soldier Creek drainage basin has an area of 58.9 square miles.

Over time, Soldier Creek has experienced a loss of fish and wildlife habitat, erosion of the channel, sediment deposition in the lower riparian zone, and some flooding along the main channel. Runoff has become concentrated in Soldier Creek while other streams have been cut off. The deeply incised channel of Soldier Creek has eliminated bank storage and the high water table that existed in the riparian areas along the stream. In the past, these bank storage areas helped to provide perennial flow of the creek. As a result, Soldier Creek often dries up early in the summer, and much of the riparian vegetation along the stream has died. This condition was aggravated by Corps clearing and snagging projects in 1957 and 1960.

The once thriving trout fishery in this area is now much diminished. Loss of the riparian vegetation and perennial stream flows in the Soldier Creek stream complex has resulted in greatly reduced populations of all bird and animal species in the area. Other tributary streams to Camas Creek have suffered similar conditions, and the combined effects on the Camas Prairie have affected most local species. For example, the area was formerly an excellent nesting area for sandhill cranes. Sandhill cranes have taken on special importance since conservationists are employing them as surrogate parents to endangered whooping cranes. Whooping crane eggs placed in the nests of sandhill cranes are hatched out, and the whooping cranes migrate with the sandhill cranes.

The Soldier Creek Environmental Restoration Project proposes improvements to stabilize the channel, reduce flooding, and restore fish and wildlife habitat including:

Construction of a rock structure to divert water during high flow periods into three adjacent creek channels.

Installation of rock weirs.

Installation of a diversion structure and diversion channel to disperse high flows through an abandoned gravel pit. The pit would serve as a sediment trap and would allow restoration of a badly eroded channel section.

Pit bank shaping to restore wetland habitat.

Replanting riparian vegetation with native plants on 100 acres along stream channels.

The Soldier Creek Environmental Restoration Project Study is covered in the Digital Project Notebook at:
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=171.

Little Wood River Flood Control

The Little Wood River originates in the Sawtooth National Forest high on the southern slopes of the Pioneer Mountains. Over the years, the Little Wood River has been the focus of several small flood control projects and studies undertaken by the Corps. Projects in the Hailey and the Carey areas were rejected either due to the lack of economic feasibility or the lack of a local sponsor. The Little Wood River Flood Control Project was deauthorized in 1965. Work in the Hailey area has been limited to channel clearing and emergency flood fights. The Walla Walla District Digital Project Notebook provides information on these activities, which are listed in the index under, "Little Wood River" at:
http://www.nww.usace.army.mil/dpn/dpn_projectindex.asp.

The Flood Control Act of 1950 authorized channel improvements on the Little Wood River at Gooding and Shoshone. The Gooding Area Unit improvements included stream control structures, channel enlargement, and a diversion dam in the old channel for flow dispersion into a lava sink. Construction was completed in 1954 at a federal cost of $86,126. An estimate of damages prevented by the project is unavailable since the gage has been discontinued. This flood control project is discussed in the Digital Project Notebook provided by the Walla Walla District at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=47.

The city of Shoshone cancelled sponsorship of the Shoshone Area Unit of the flood control project. The proposed unconstructed Shoshone area portion of the project is discussed in the Walla Walla District's Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=156.

Dietrich and Milner-Gooding Canal Diversions Project

The Corps continued to study flooding problems on the Little Wood River in the vicinity of Gooding and Shoshone, Idaho, and published a feasibility report in 1976 with a proposed new flood control plan. The Dietrich Canal, near Shoshone, and the Milner-Gooding Canal, near Gooding were constructed by private interests in the 1930s for irrigation purposes. The Corps' feasibility report recommended construction of diversions via the Dietrich and Milner-Gooding Canals to route floodwaters into offstream ponding facilities in the adjacent lava fields. The floodwaters eventually would be dissipated through percolation and evaporation. The canals would be enlarged and modified to accommodate floodflows. The Corps concluded that none of the proposed actions were economically justifiable at the time. The Walla Walla District's Digital Project Notebook discusses the proposed project at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=38.

The Water Resources Development Act of 1986 specifically authorized the Dietrich and Milner-Gooding Canal Diversions Project. Studies were initiated in fiscal year 1990 to review the 1976 feasibility report in light of needs and developments that had taken place since the report's publication. A reevaluation study was completed in July 1992. Although the reevaluation found the project to be economically feasible, further studies were terminated due to lack of local support.

In 1994 the Idaho Water Resources Board provided a letter of intent to act as the sponsor for the Dietrich and Milner-Gooding Canal Diversions Project. To the basic purpose of flood control, the Board added groundwater recharge as a project goal. On the basis of the Board's letter, the project was reclassified to active status. This project, which diverts water into the lava fields for dispersion, could be part of managed recharge of the Eastern Snake Plain Aquifer (see chapter 5), a concept being studied by the Idaho Water Resources Board and others. Information on the project reevaluation may be found on the Digital Project Notebook provided by the Walla Walla District at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=85.

Little Wood River Dam and Reservoir (Little Wood River Irrigation District and U.S. Bureau of Reclamation

Little Wood River Dam is on the Little Wood River, about 11 miles northwest of Carey in south central Idaho. The dam is a 129-foot-high earthfill structure with a crest length of approximately 3,100 feet. The dam was constructed in 1936 as a project of the Works Progress Administration. The Little Wood River Irrigation District and the Bureau of Reclamation operate the project cooperatively. In 1960, the Bureau raised the dam by 35 feet to its current elevation.

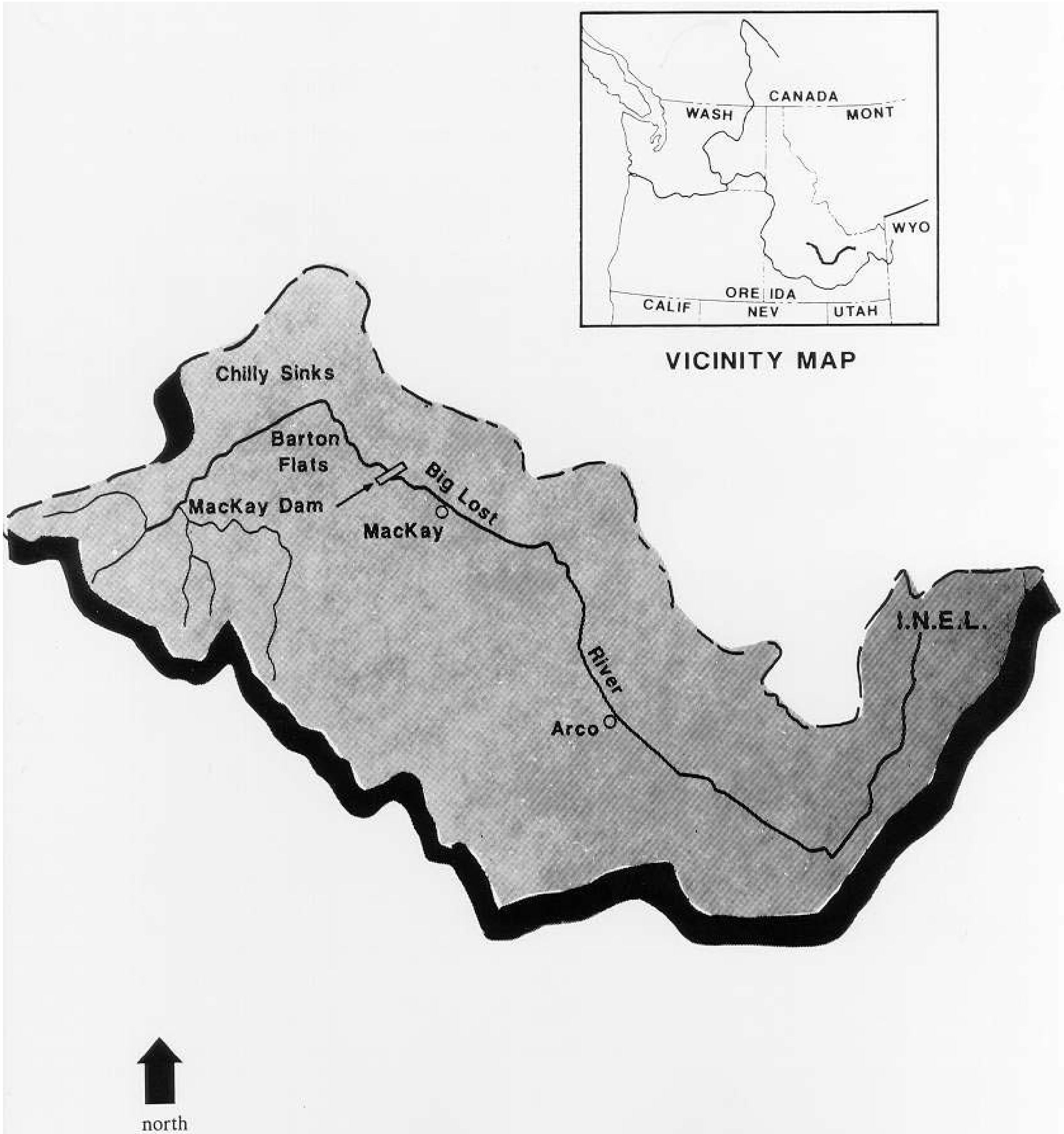
A small hydropower generation plant with a 3,000-kilowatt capacity is installed in the single outlet tube of the Little Wood River Dam. The reservoir behind the dam has a total capacity of 30,000 acre-feet, all of which is available for the joint purposes of flood control, irrigation, and fish and wildlife habitat.

The Corps is responsible for establishing flood control procedures for the Little Wood River Project under Section 7 of the Flood Control Act of 1944. Regulation procedures are contained in the project's "Water Control Manual." It is the intent of the flood control regulations to restrict reservoir releases so that discharges at the Carey gauging station do not exceed 1,200 cubic feet per second during all but the largest floods.

Flood protection is provided along the Little Wood River from the project downstream below Carey to the Blaine-Lincoln county line. Only floods resulting from winter and spring runoff are controlled. At other times of the year, the reservoir is operated for irrigation.

In general, the Little Wood Reservoir is also maintained as a conservation pool for fish stocking purposes. Recreation facilities include two access roads, a campground, picnic area, and boat ramp. About 4,000 visitors use the facilities annually. Fishing is the major activity.

Chapter 14. Big Lost River Basin



Big Lost River Basin

Big Lost River Basin Studies

The Big Lost River Basin is located in the central portion of Idaho, north of the Snake River Plain. The Big Lost River and its tributaries rise in the Sawtooth and Lost River mountain ranges. After flowing generally southeast, the Lost River and several other nearby creeks and rivers disappear into the lava fields northwest of Idaho Falls, Idaho. The waters of these "lost" streams flow under the Snake River Plain only to reappear as springs over 100 miles southwest in the Thousand Springs area beyond Twin Falls, Idaho.

The Corps conducted studies of the Big Lost River Basin under authority of 1954 U.S. House document, "Columbia River and Tributaries, Northwestern United States." The studies evaluated alternatives that would: reduce flooding and bank erosion along the Big Lost River; and conserve and use the available water supply on the best lands possible avoiding excessive groundwater losses.

Damaging floods occur frequently in the 28-mile reach between Mackay Dam and the town of Arco, Idaho, when river flows exceed channel capacity. The flood of May-June 1967 was the largest on record and inundated some 7,000 acres. It caused $800,000 in damages. Smaller, frequent floods have damaged agricultural lands, bridges, roads, and Idaho National Engineering Laboratory property downstream of Arco. Twelve major floods have occurred since 1943. In 1983, the Borah Peak Earthquake, a major earthquake of 7.3 magnitude and 14th largest ever recorded in the contiguous United States, was centered in the Big Lost River Basin. The earthquake caused land subsidence and increased the potential for future flooding problems. In 1986 and several other years, losses from floods have exceeded $1 million.

On November 25, 1986, a citizens group requested Corps involvement with local interests to study flooding and water resources issues in the Big Lost River Basin. The citizens group included the U.S. Soil Conservation Service, the Butte Soil Conservation District, Butte County Commissioners, Custer County Commissioners, and the Big Lost River Irrigation District. The Idaho National Engineering Laboratory was also very interested in the study.

In addition to flood control, the Corps' 1986 Big Lost River Basin study also considered the potential for benefits due to increased water supplies and hydropower generation with each alternative solution. The flow of the Big Lost River is often erratic due to loss of water into two major sink areas along the channel (Chilly and Darlington Sinks). Irrigation water delivery is sometimes undependable due to time lag through the sink areas. Some 24,000 acres would be available for irrigation if additional water supplies were developed. Increased water supplies could also be used for streamflow maintenance, fish and wildlife enhancement, and recreation.

The 1986 study investigated the following alternatives: enlarge the capacity of Mackay Reservoir; enlarge the emergency spillway capacity of Mackay Dam; regulate the existing capacity of Mackay Reservoir for flood control; construct a new dam on Antelope Creek (a tributary of the Big Lost River); examine the opportunities for upstream storage above Mackay Dam; divert flood flows into the Chilly Sinks and Barton Flats areas; divert flood flows into an irrigation channel, the U.C. Canal, and extend the canal to desert areas of the Snake River Plain, building levees to protect specific sites. The study showed that diversion of flood flows into the Chilly Sinks and Barton Flats areas would be the most economical solution. More information on the 1986 study may be found in the Walla Walla District's Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=9.

Based on the favorable results shown in the 1986 study, the Corps initiated a feasibility study in May 1989. On January 8, 1990, Butte County signed a letter of intent to enter into a Local Cooperation Agreement assuming a favorable and acceptable project. A final feasibility report released in September 1991 concluded that developing storage and diverting flood flows into the Chilly Sink and Barton Flats areas were not economically justified at the time. The feasibility study is discussed in the Walla Walla District's Digital Project Notebook at:
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=8.

Mackay Dam and Reservoir

Mackay Dam is on the Big Lost River near the town of Mackay, Idaho. Mackay Dam, built by private interests, primarily for irrigation purposes, was started in 1906 and completed in 1930 following a tumultuous history of controversy over water rights. Controversy over water use still persists in the Big Lost River Basin to this day, particularly in periods of prolonged drought.

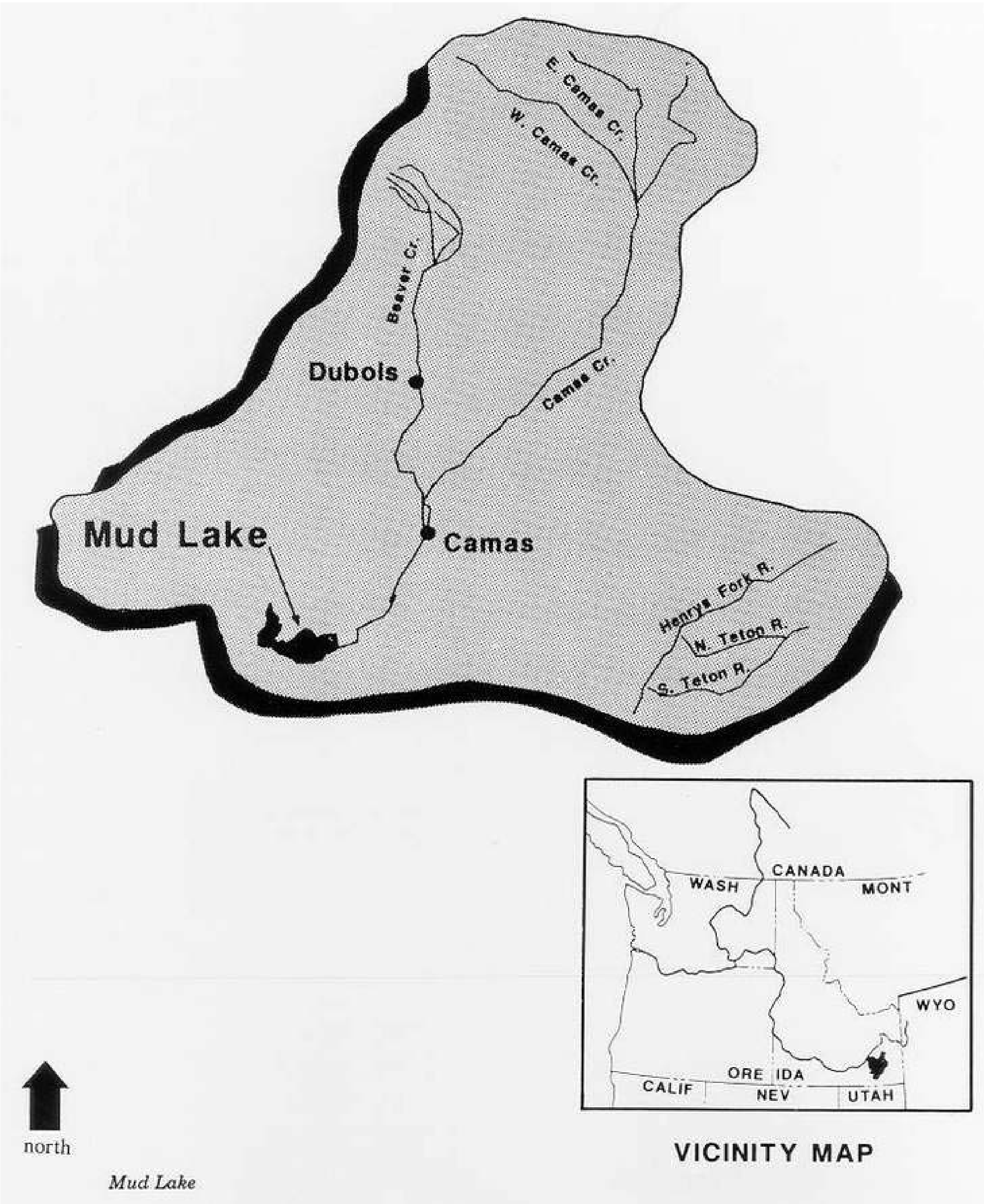
Mackay Dam is a rock and earthfill structure with a height of 70 feet. Original plans were to build a dam 120 feet high, but construction was stopped because of leakage through the embankment. In 1956, the dam was raised by 5 feet in order to increase the reservoir storage capacity.

The Big Lost Irrigation District manages Mackay Dam and Reservoir. The District was formed in 1920, and in 1936 it purchased the assets of the Utah Construction Company, including Mackay Dam and Reservoir along with the right to store a specified amount of the Big Lost River's flow in the reservoir. Approximately 80,000 acres of farmland in the Lost River Valley, including the historic area called the Cary Act Flats, are fed by a system of canals managed by the Big Lost Irrigation District.

Mackay Reservoir, the only storage project on the Big Lost River, can be used to mitigate flood damages by impounding a limited amount of floodwater within the maximum storage capacity of the reservoir, which is approximately 44,368 acre-feet of water. About 43,500 acre-feet are available in Mackay Reservoir for active storage. The irrigation canal system can also be used on a limited basis to divert floodwaters.

There was concern that a major flood could exceed the spillway capacity of Mackay Dam and cause a dam failure. The downstream flood resulting from a dam failure would cause considerable damage to the towns of Mackay and Arco and to the nearby Idaho National Engineering Laboratory facilities. A concern existed that in the event of a dam failure and major flood, the East Snake Plain Aquifer could be contaminated with radioactive waste from the Idaho National Engineering Laboratory. However, recent studies by the Corps indicate that spillway capacity of Mackay Dam is adequate.

Chapter 15. Camas Creek (Mud Lake)



Camas Creek runs through the Mud Lake area, a closed basin 20 miles west and 50 miles north of Idaho Falls in Jefferson County, Idaho. Mud Lake is formed by a ten-mile-long embankment constructed many years ago by local farmers to confine Camas Creek waters. The impoundment makes it possible to farm the land and provide water elevation so that irrigation canals can deliver water to farms. The capacity of the lake is 45,000 acre-feet. The embankment protects farmland that was improved by leveling and drainage and developed with homes, farm buildings, private and county roads, and local businesses. Over 20,000 acres of cropland are irrigated with water from the lake. The area is a major supplier of livestock feed for Idaho, Montana, and other states.

A flood emergency channel, an extension of the Owsley Canal, can serve as an outlet for Mud Lake but is dependent upon canal company lift pumps. In past years, the lake has risen to dangerous levels due to above-average inflow to the basin. This resulted in prolonged flood-fight activities by local interests, the state of Idaho, and the Corps. Even with substantial flood-fight efforts, the existing embankment nearly failed in the spring of 1984 when the water level reached a gauge height of 10.7 feet.

Camas Creek Flood Protection Studies

Previous studies by the Corps indicated that extensive improvement of the Mud Lake embankment to bring it up to Corps design standards was not economically feasible. Thus, the solution to the flood problem appeared to involve either intercepting flows above the lake allowing seepage of those waters into the ground, or pumping water from the lake into an enlarged Owsley Canal or nearby Jefferson Canal.

The Corps reconnaissance study determined that four alternatives would have viable benefit-to-cost ratios. The four alternatives are:

(1) Wildlife Refuge Enlargement. The area north of Camas Creek between the state and federal wildlife refuges is flooded during high runoff years. This alternative considers the possibility of purchasing or leasing this frequently flooded land and constructing a dike along the county road on the south side of the area. This area could store approximately 22,000 acre-feet of floodwaters, when needed, and also could be managed to provide wildlife and irrigation benefits.

(2) Jefferson Canal Diversion Pond. Additional pumps installed in Mud Lake could be used to transport water from the lake to a disposal area west of the lake on Idaho National Engineering Laboratory land via the existing Jefferson Canal. A dike would be required around the disposal area to prevent flooding of adjacent cropland, and a canal would be needed from Mud Lake to the pump site to ensure water availability to the pumps when the gauge height reaches 8 feet.

(3) Lone Tree Dam. Around 1920, the Lone Tree Dam was built on Camas Creek upstream of Mud Lake to store irrigation water. The reservoir would not hold water due to fractures or lava tubes in the basalt under the reservoir, and the dam was breached in 1924. If the dam were rebuilt, water could be impounded during high runoff years and be allowed to percolate into the groundwater table.

(4) Western Diversion. In 1969, under "Operation Foresight," the Corps constructed a diversion from Camas Creek, just above the old Lone Tree Reservoir, along a former irrigation ditch to the east of Camas Creek. This diversion infiltrates water at approximately 500 cubic feet per second into the basalt formation, which eventually returns to Camas Creek as groundwater inflow. The study proposed constructing a similar structure to the west of Camas Creek that could divert an additional 500 cubic feet of water per second.

A meeting was held on February 1, 1990, with Mud Lake water users and the Jefferson Soil and Water Conservation District on the subject of project sponsorship. Local people expressed considerable interest in a project, particularly concerning the Lone Tree Dam alternative. However, local interests asked that further action be delayed until the U.S. Geological Survey completed a groundwater study.

More information about the proposed flood prevention study is available in the Digital Project Notebook at:
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=114.

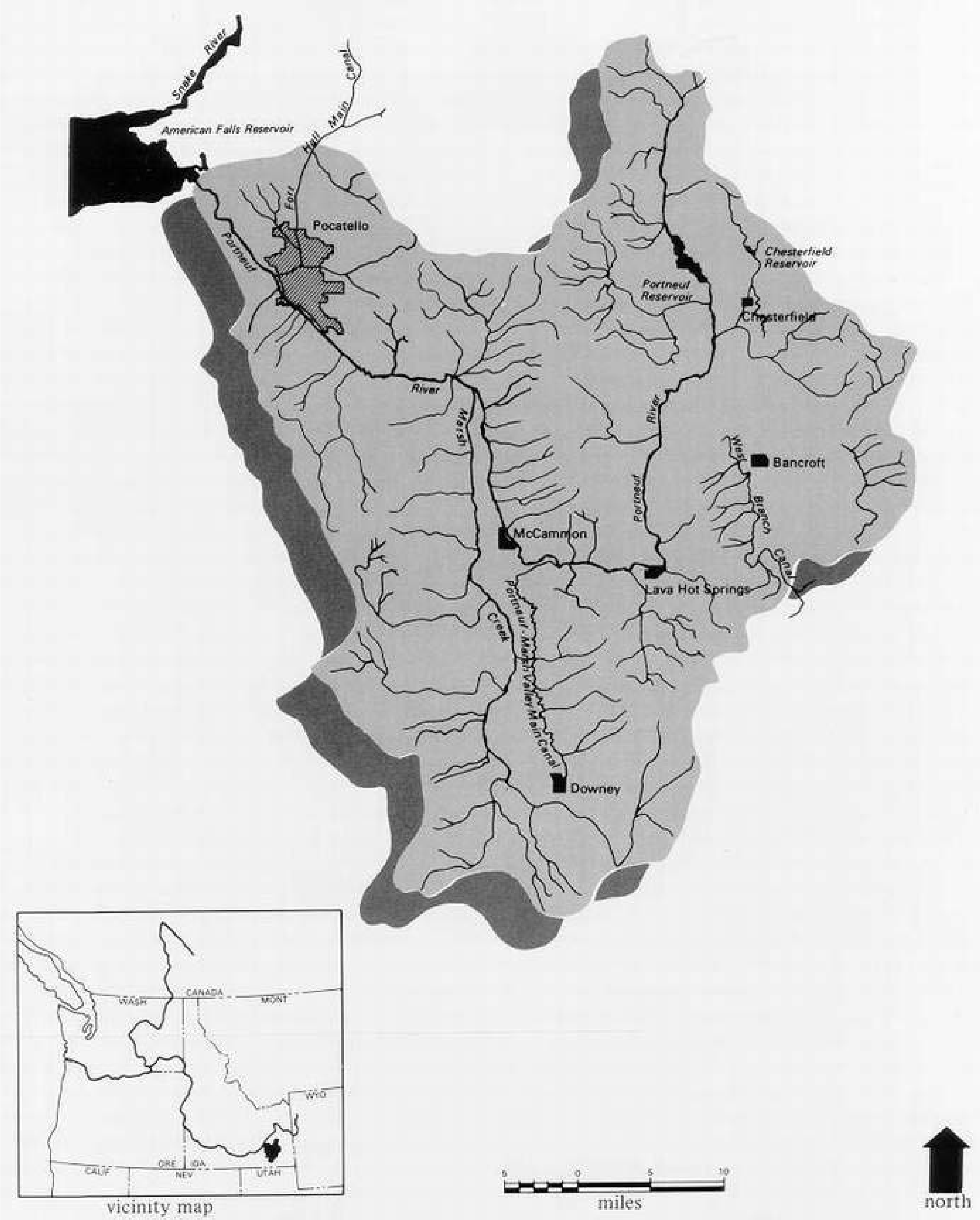
Camas Creek Storage Study

Later studies in the Camas Creek Basin focused on storage. Because Camas and its tributary, Beaver Creek, contribute to the water supply of the Mud Lake area, as well as irrigate part of the lands in the respective basins, water-usage problems are complicated. Favorable storage sites are not available, and surrounding lands are very porous and have high water demands.

Corps study of the situation up to 1997, found only three sites in the Camas/Beaver Creek Basins suitable for possible additional storage: Frazier Dam, Modoc Creek (a smaller tributary of Camas Creek), and Camas Creek below Kilgore. If storage were provided at either Frazier Dam or Modoc Creek, several miles of pipeline would be required to transport water to irrigable areas on Camas and Beaver Creeks. Providing storage on Camas Creek would eliminate the need for a pipeline, but the resulting project would be less effective for irrigation of the higher lands.

Due to financial concerns of the local sponsor, there is currently no activity toward renewing studies of the Camas Creek Basin or toward implementing a storage project. More information on the storage study can be found on the "Digital Project Notebook" at the Walla Walla District's Internet at:
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=23.

Chapter 16. Portneuf River Basin



Portneuf River Basin

The Portneuf River rises in the Fort Hall Indian Reservation in the southeast quadrant of Idaho near the town of Blackfoot, Idaho. The river runs south and then east before turning north to bisect the Caribou National Forest before running through the city of Pocatello, Idaho, and on to meet the Snake River at the upper end of the American Falls Reservoir.

Portneuf River Basin Studies

Study of the Portneuf River Basin to determine needs for flood control and related improvements was requested by resolution of the U.S. House of Representatives Public Works Committee in 1964. Interest in flood protection became active due to record floods in 1962 and 1963. Damages from erosion and siltation were severe throughout the Portneuf River Basin. The Bannock County Commissioners and Pocatello Chamber of Commerce, as well as numerous individuals, requested investigations of multipurpose storage projects and an organized land treatment program.

In 1969, a Corps report concluded that a dam on Marsh Creek, a tributary of the Portneuf River, would be economically feasible. However, more than one-half of the project benefits would have been for recreation. Projects with such a distribution of benefits have little likelihood of authorization by Congress. Thus, the study was suspended.

The Portneuf River Basin has been subject to significant growth, which might modify the economic feasibility of a project in the area. In 1986, study of the Portneuf River Basin was resumed as part of the Upper Snake River Basin Study. Major concerns in this study included basin-flooding problems in the winter and spring, water shortages during the summer and fall, and poor water quality in Marsh Creek and in the Portneuf River below Lava Hot Springs.

The 1986 study considered two alternative plans for diversion of water from nearby Bear River to the Portneuf River Basin and six alternatives without Bear River diversions. All of the alternatives included dams as part of the systems studied. None of the alternatives were determined to be economically feasible. The McCammon diversion and powerplant alternative was the closest to having economic justification with a benefit-to-cost ratio of 0.9 to 1. Benefits would be derived primarily from power generation. The Marsh Creek dam site alternative had a benefit-to-cost ratio of 0.8 to 1. In 1988, the study conclusion reconfirmed the earlier study findings that a large part of the benefits for the project would be derived from recreation. The study also concluded that economic feasibility was lacking for the projects proposed; consequently, the study was terminated.

Pocatello Levees and Channel Project

This project included removal of obstructions, channel improvements, and levees in two units at Pocatello and Inkom, Idaho, on the Portneuf River and along Marsh Creek. The project was authorized under the Flood Control Act of 1950.

Construction of the Pocatello Unit of the project was completed in 1968 at a federal cost of $6,456,032 and an estimated non-federal cost of $481,700 for rights-of-way, two new bridges, and relocation of utilities. More than $2,184,000 in flood damages had been prevented by the project through 1995. A limitation of 5 years on project authorization ended on October 14, 1969, for the Inkom-Marsh Creek Unit of the project. Since no local sponsor had come forward, that portion of the project was deauthorized. More information about the project is available in the Walla Walla District's Digital Project Notebook at:
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=137 for the Pocatello Unit and, for the Inkom-Marsh Creek unit at:
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=136.

Portneuf River and Tributaries Flood Control Projects and Studies

The Corps has undertaken several flood control studies and small projects along the Portneuf River and its tributaries. These activities are covered in the Walla Walla District's Digital Project Notebook pages accessible via the index under, "Portneuf River," "Pocatello Creek," and "Rapid Creek" at:
http://www.nww.usace.army.mil/dpn/dpn_projectindex.asp.

Portneuf River Environmental Restoration Project

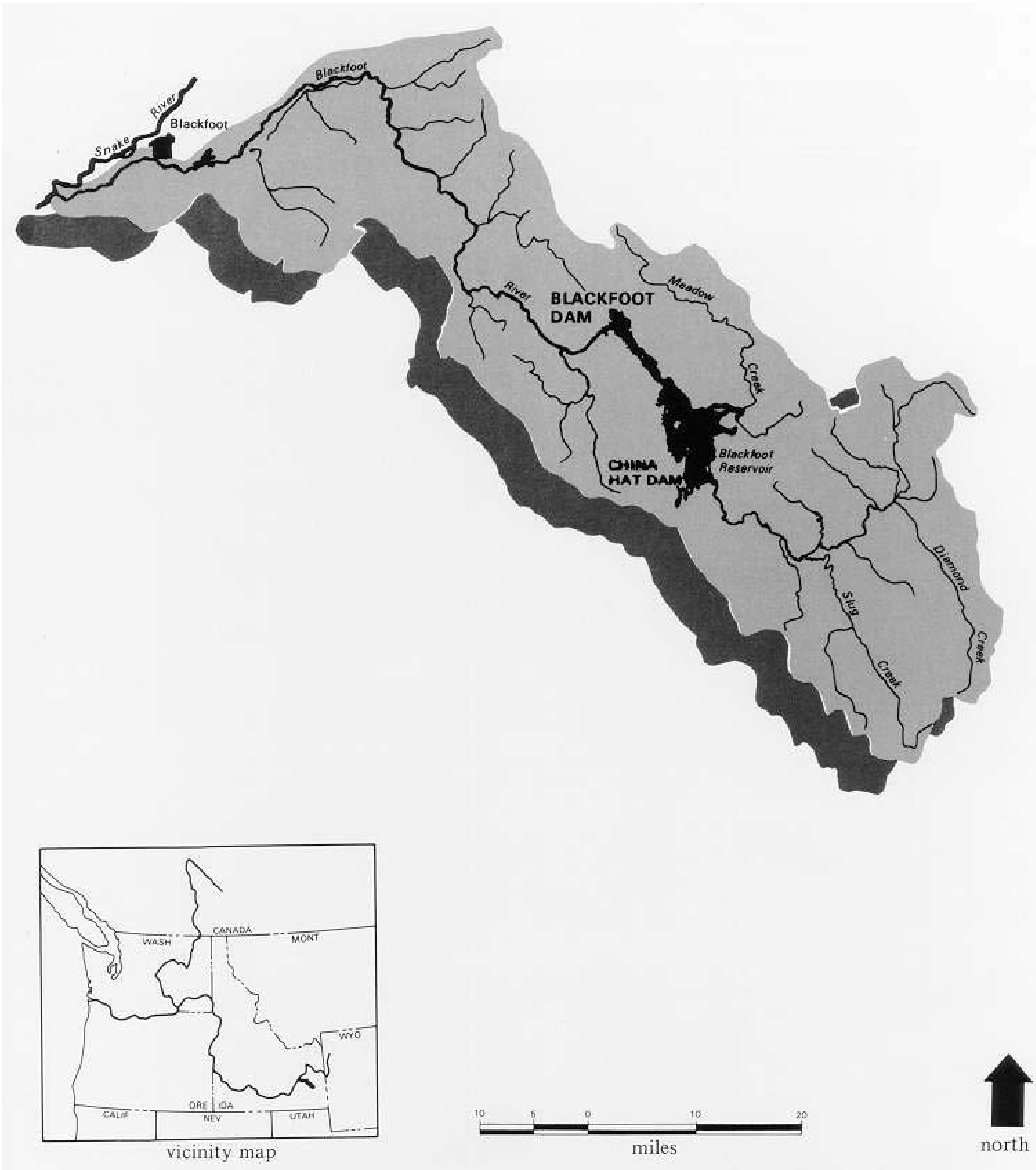
Section 1135 of the Water Resources Development Act of 1986 provides authority for modifying Corps projects to restore fish and wildlife habitat. An environmental restoration project under Section 1135 was studied on the Portneuf River at Pocatello. In the late 1960s, the Corps constructed the Pocatello Levees and Channel Project for flood control on the Portneuf through the city of Pocatello, Idaho. That project consisted of straightening a 6.2-mile section of the river and construction of a 1.5-mile rectangular, concrete channel as well as a 4.7-mile revetted levee. The project resulted in the elimination of fish and wildlife habitat, including wetlands. Also, passage into City Creek was blocked for spawning of trout and warm water game fish.

Based on a cursory evaluation, it is estimated that 4.1 miles of river and 144 acres of riparian habitat have been lost as a result of the construction of the Pocatello Levees and Channel Project. The greatest amount of habitat was lost due to placement of the concrete channel.

In an effort to restore fish habitat, low-flow channels could be provided. This would include modifying the existing concrete channel floor in some areas and constructing small secondary low-flow channels adjacent to the concrete channel. The existing channel would be used to pass high flows while the low-flow side channels would allow for the establishment of vegetation for riparian zones and some wetlands. The Corps also evaluated widening and laying back-side slopes of the non-concrete channel sections to allow habitat development. The modification of the entrance to City Creek to allow fish migration was also considered by the study. In other areas, instream habitat improvements were proposed.

In 1997, the Corps prepared a final report on the proposed environmental restoration project. At this time, the project has been terminated, however, due to lack of local sponsorship. The project is discussed in the Walla Walla District's Digital Project Notebook at:
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=141.

Chapter 17. Blackfoot River Basin



Blackfoot River Basin

Blackfoot Levees

The Flood Control Act of 1950 authorized the Blackfoot Levees. The project includes channel improvements, levees, and replacement of inadequate and restrictive irrigation and bridge structures to prevent flood damages to part of the city of Blackfoot, Idaho, and adjacent irrigated agricultural lands. Construction was completed in 1964 at a federal cost of $391,143. Flood damages prevented by the project have amounted to $870,000 through 1999. More information about the project is available at the Walla Walla District's "Digital Project Notebook" at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=14.

Blackfoot Dam and Reservoir Modifications

Blackfoot Reservoir is on the Blackfoot River about 40 miles southeast of the city of Blackfoot. The project is owned and operated by the Bureau of Indian Affairs. The reservoir provides irrigation water to land on the Fort Hall Indian Reservation. The Flood Control Act of 1962 authorized the Corps to make modifications to the Blackfoot Dam in order to incorporate flood control as a project function.

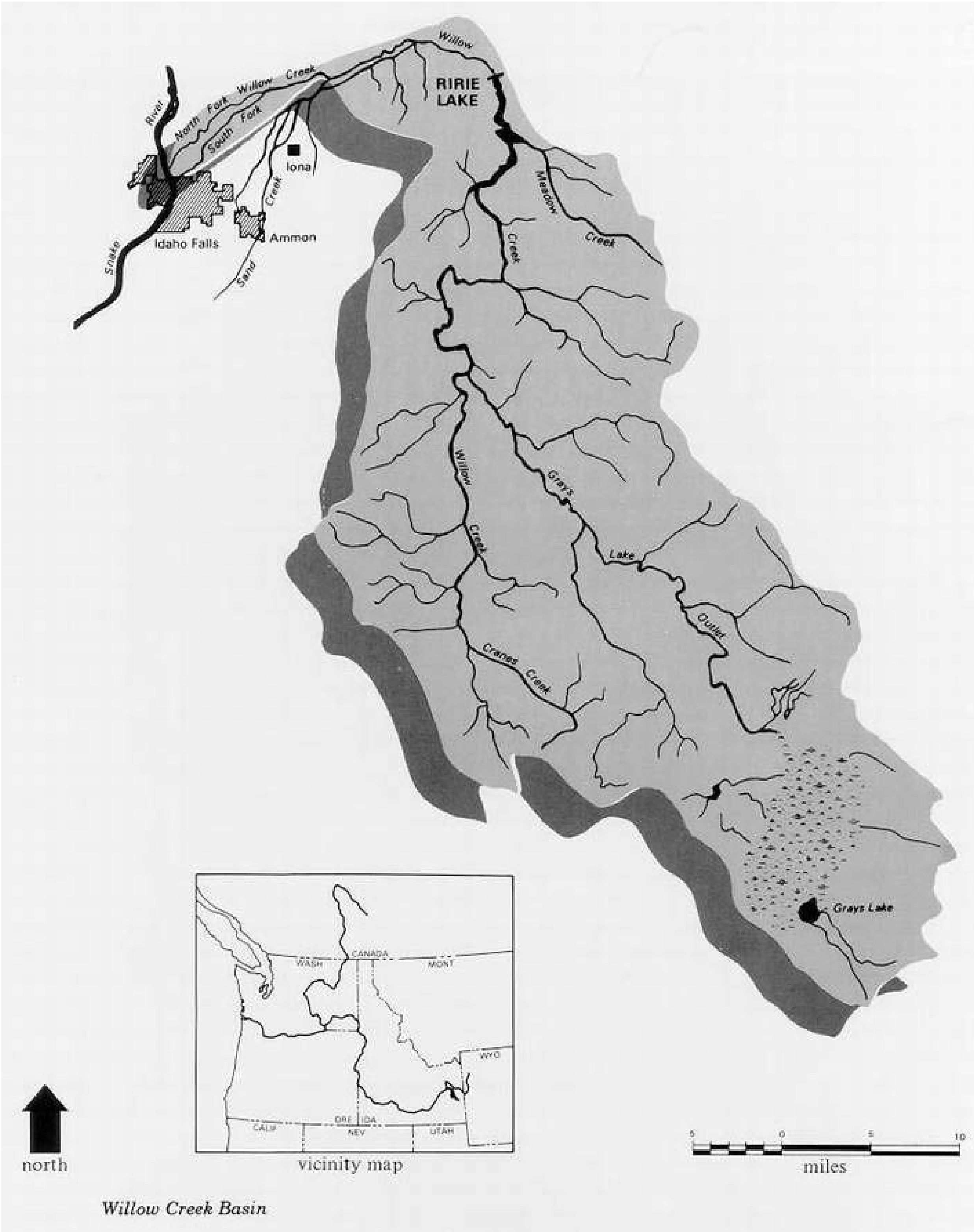
The Corps completed a Design Memorandum in 1969 that proposed modifying the spillway and outlet works at Blackfoot Dam, raising the operating pool elevation, and also raising the upstream China Hat Dam 10 feet. By 1974, intense local opposition developed as it became evident that the higher operating pools proposed in the dam modification plans would inundate summer homes recently constructed in the area. The local sponsor then withdrew support for the modifications.

In a 1978 report, the Corps revised the modification plans proposing that the spillway and outlet be reconstructed so the normal operating pool could be maintained at its historic level. The reconstruction would still serve the need to improve dam safety, but new flood control capability would be reduced. China Hat Dam would be raised 2 feet instead of the previously proposed 10 feet. These modified proposals gained public acceptance from the concerned agencies and private groups. However, Corps higher authority disapproved construction since the modifications would be essentially a correction for dam safety rather than flood control as authorized.

The Bureau of Indian Affairs then pursued funding on its own, and the Corps agreed to accept the Bureau of Indian Affairs' request to design and construct the proposed modifications. Construction work was completed in 1986 at a cost of $7.4 million. The authority to make future modifications primarily to benefit flood control was withdrawn by the Water Resources Development Act of 1986.

More details about the Blackfoot Dam and Reservoir modifications are available on the "Digital Project Notebook" on the Walla Walla District's Internet site at:
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=13 and
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=162.

Chapter 18. Willow Creek Basin



Willow Creek rises in the Blackfoot Mountains southeast of Idaho Falls, Idaho. The creek is met by one major tributary, Grays Lake Outlet, which drains water from the Grays Lake, a natural body of water, and from the extensive marshy area around the lake. Willow Creek flows generally north and finally east to meet the Snake River at Idaho Falls.

Willow Creek Basin Survey

A basin survey was authorized in 1954 by resolutions of the U.S. Senate Committee on Public Works and the U.S. House of Representatives Public Works Committee. The survey assessed water resources needs and problems in the lower Willow Creek Basin. A primary objective of the survey was investigation of flood damage reduction along Sand Creek, a tributary that joins Willow Creek not far upstream from Idaho Falls. The survey, completed in 1963, found that channels in the lower Willow Creek Basin had low, eroding banks; that they meander considerably; and that they were badly overgrown with vegetation. In addition, channels in the survey area were obstructed by inadequate irrigation structures, bridges, and debris. As a result, inundation of large areas occurs frequently during periods of high water with considerable damage to agriculture. The survey study is discussed on the Digital Project Notebook provided on the Walla Walla District's Internet site at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=209.

Ririe Dam and Lake (Corps, Walla Walla District and U.S. Bureau of Reclamation)

The Ririe Dam and Lake Project is on Willow Creek in southeast Idaho, about three miles southeast of the town of Ririe and northeast of Idaho Falls, Idaho. The project was initially recommended in the 1961 Upper Snake River Basin Report. The Flood Control Act of 1962 provided formal authorization for Ririe Dam and Lake. The authorization included construction of the dam and construction of channel improvements on Willow Creek from the dam downstream to the Snake River confluence. The Corps was responsible for the project design and construction. Construction began in 1967, and the reservoir was filled in 1975. Project operation was transferred to the Bureau of Reclamation in 1976. Construction contracts for downstream channel work, recreational facilities, and miscellaneous deficiencies were completed in 1980.

Ririe Dam is a 253-foot rockfill structure with a crest length of 1,070 feet. It is equipped with an outlet conduit discharging into the natural Willow Creek channel. From the dam, Willow Creek carries the discharge water about 14 miles to collection and diversion works. Water necessary for irrigation needs is diverted to the Sand Creek and the natural Willow Creek drainages. Excess floodwaters are conveyed down a separate man-made channel directly west from the diversion works for 7.8 miles and discharged into the Snake River.

At maximum full pool, Ririe Dam creates a reservoir extending about 12 miles upstream on the main stem of Willow Creek with a shoreline of about 32 miles and a surface area of 360 acres. The total storage capacity is 100,500 acre-feet. Of this total, 80,500 acre-feet are assigned to the joint use of flood control and irrigation, and 10,000 acre-feet are assigned to exclusive flood control space. The remaining capacity is dead or inactive space used as a conservation pool.

During the winter and spring runoff, the active capacity is used primarily for flood control regulation. The project provides flood protection to Idaho Falls, Iona, Ammon, and surrounding farmlands. Flood control procedures are incorporated into the project "Water Control Manual." It is the intent of the flood control regulations to restrict reservoir releases to a maximum of 1,900 cubic feet per second, preferably 1,200 cubic feet per second, during all but the largest of floods.

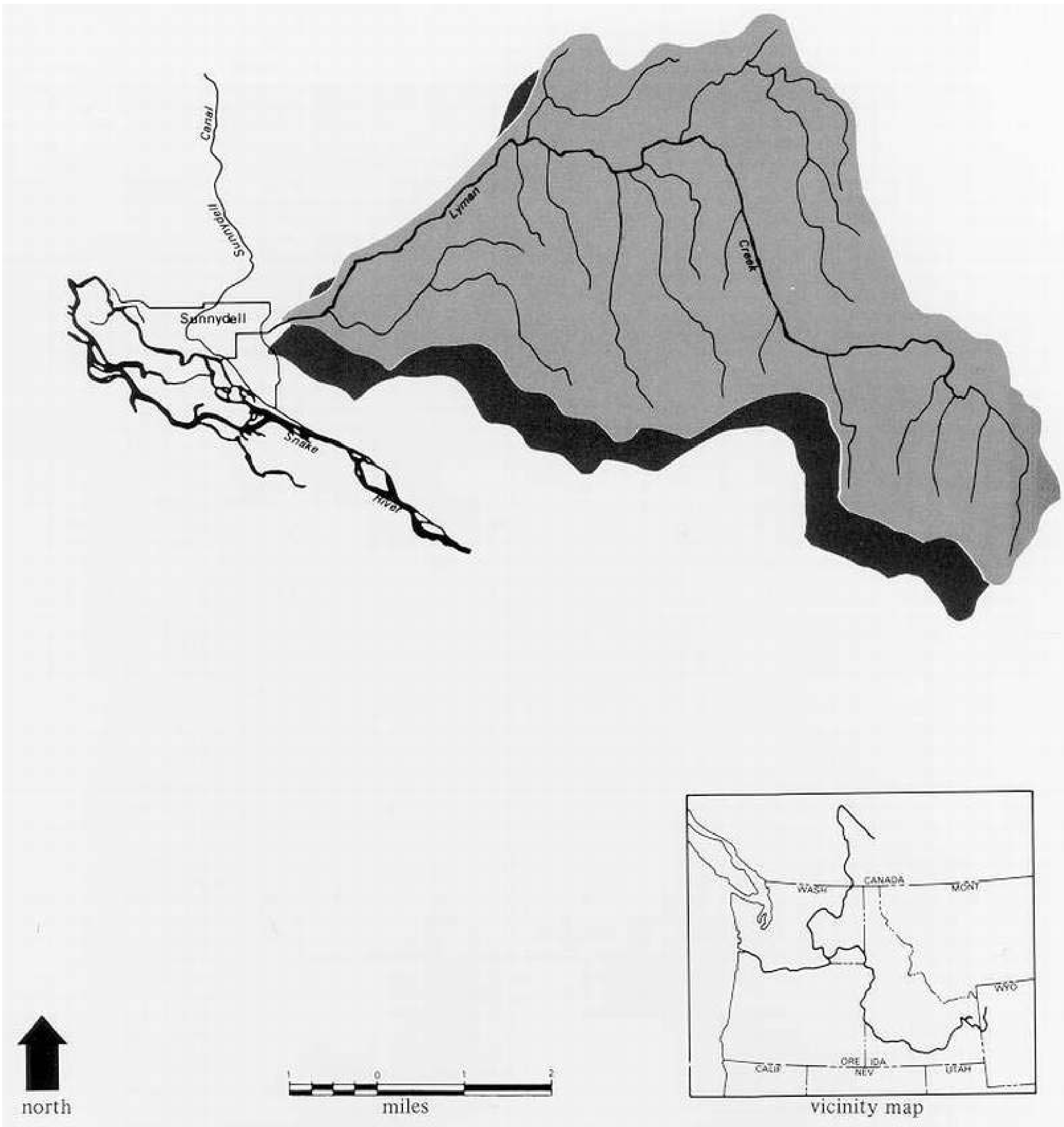
Once the danger of spring runoff flooding is past, the 80,500 acre-feet of joint use space in the reservoir is filled for irrigation storage. The remaining 10,000 acre-feet of active capacity are retained as exclusive flood control space for control of flash floods.

Other authorized uses include recreation, fish and wildlife mitigation, and minimum streamflow maintenance. Recreation activities include an access road and five designated recreation areas. Juniper Park, adjacent to the project headquarters visitor center, is the main recreation area. The reservoir is annually stocked with fish. Remaining project lands are managed as wildlife and waterfowl mitigation areas. Minimum streamflows are maintained downstream of the dam except when ice blocks the channels.

The loss of wildlife habitat associated with the construction of Ririe Dam and Teton Dam in Wyoming led to the establishment of the Tex Creek Wildlife Management Area. In 1976 and 1977, the Corps and the Bureau of Reclamation purchased 11,000 acres of critical big game winter range in the Tex Creek area just east of Idaho Falls, Idaho. The Idaho Department of Fish and Game eventually assumed additional critical areas while the Bureau provided an extra 9,600 acres. Today the Tex Creek Wildlife Management Area encompasses more than 28,700 acres. The area is managed with an emphasis on big game.

Construction costs for the Ririe Dam and Lake Project through 1988 were $39,677,448. Flood damages prevented since spring 1975 are estimated to exceed $5,528,000 through 1995. The Ririe Dam and Lake Project is included in the Walla Walla District's Digital Project Notebook at:
http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=146.

Chapter 19. Lyman Creek Basin



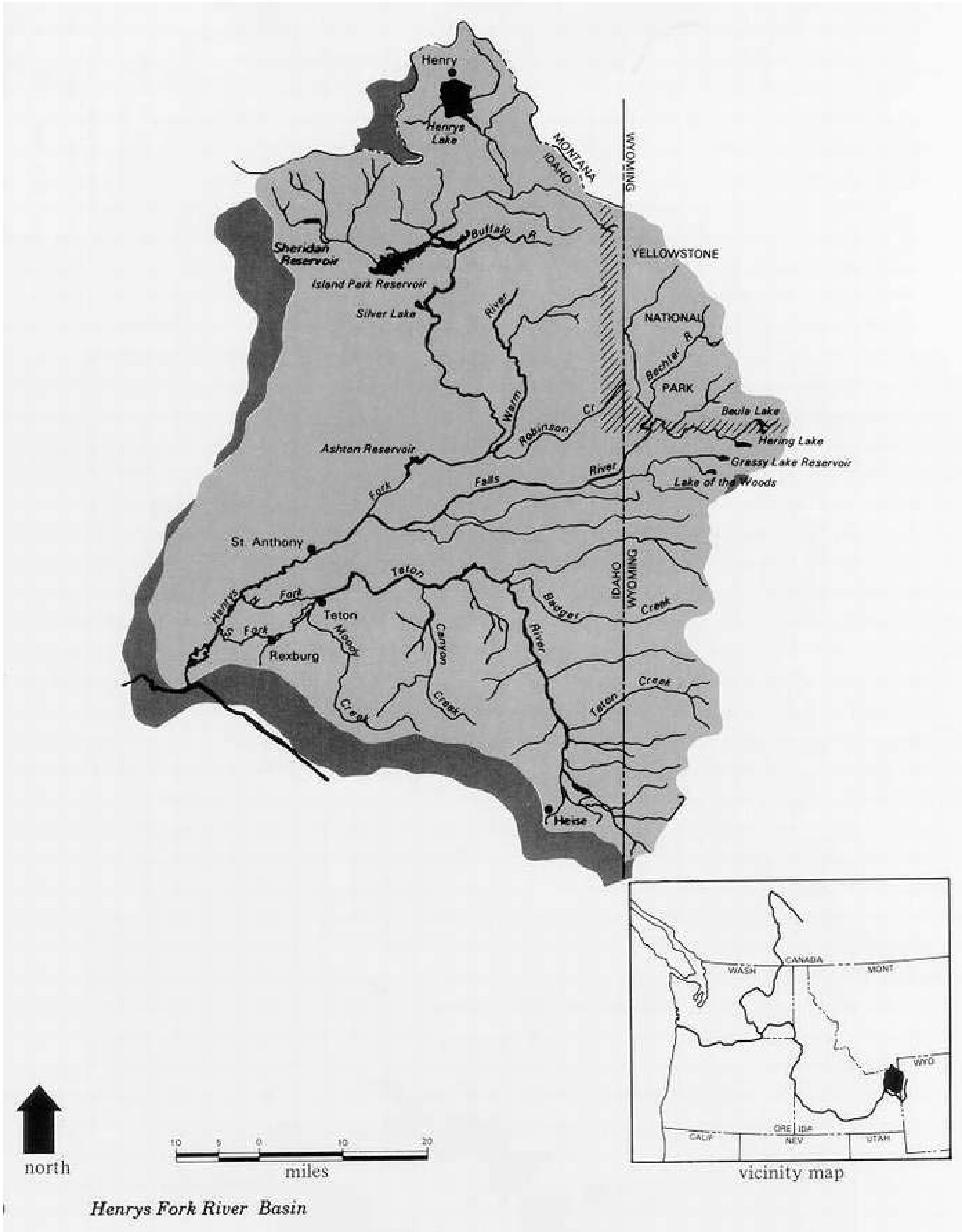
Lyman Creek Basin

Lyman Creek Levees

Lyman Creek is a tributary of the Snake River that flows southwest into the Snake near the town of Sunnydale, Idaho (near Rexburg, Idaho). Channel and levee works divert Lyman Creek flows into the Snake River to prevent flooding of farms, homes, irrigation canals, buildings, roads, and bridges. The Lyman Creek Levees, authorized under Section 205 of the Flood Control Act of 1948, as amended, was completed in 1971 at a federal cost of $230,315. The estimated dollar value of damages prevented by the project are unavailable since maintenance of a gauge on the creek has been discontinued.

The "Digital Project Notebook" provided by the Walla Walla District provides more information about the Lyman Creek Levees at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=97.

Chapter 20. Henrys Fork River Basin



Henrys Fork River Basin

The Henrys Fork River, formerly called the North Fork of the Snake River, has its headwaters in Big Springs in Idaho near the point at which the states of Idaho, Montana, and Wyoming meet. Big Springs emits 92,000 gallons of water per minute, year round. The water accumulates in Henrys Lake, a natural body of water now augmented with a dam, and then flows out of the lake southward. The Teton River is the largest tributary of the Henrys Fork River. The Teton River joins the Henrys Fork River from the east just north of the city of Rexburg, Idaho,

Henrys Fork River Basin Study

A study of Henrys Fork River Basin was authorized by a 1954 resolution of the U.S. House of Representatives Public Works Committee. Flood control, water storage for irrigation, and recreation are principal needs in the basin. Floodwaters that could be used downstream escape from the basin without being put to use. Adequate storage capacity in the basin would supply irrigation needs and alleviate flooding problems. The Corps considered seven sites in the study: four storage sites (Bechler Meadows, Mountain Ash, Tetonia, and Teton Canyon) and three local flood control projects (Henrys Fork, Teton River, and Moody Creek).

The Henrys Fork River Basin Study was completed in 1986, but further activities were suspended, due to lack of funds. The Digital Project Notebook provided by the Walla Walla District provides more information about the study at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=58.

Henrys Fork Basin Plan

In 1993, the Idaho Legislature passed the Henrys Fork Basin Plan as a framework to deal with issues of water resources management in the basin. The plan calls for an innovative consensus-building process so that all parties with interests in the watershed could be included in decision-making. Over 25 federal, state, and local agencies were found to have interests in water resources in the basin. In the winter of 1993-1994, the Henrys Fork Watershed Council was organized and chartered by the Idaho legislature. The Council features a citizens' group, a technical team, and an agency roundtable. The Council shares information and manages water resources in the Henrys Fork Basin.

Island Park Dam and Reservoir (U.S. Bureau of Reclamation

The Island Park Dam and Reservoir, built and managed by the Bureau of Reclamation, operates in concert with structures on the upper Snake River, and was designed primarily for irrigation storage and, secondarily, for flood control. The dam is located 38 miles north of Ashton, Idaho, on the Henrys Fork River. It is an earthfill structure

91 feet high and about 1,580 feet long with a dike extending an additional 7,870 feet. Construction on the dam was completed in 1939. The spillway and outlet works were rehabilitated in 1980.

In 1995, under the Clinton Administration's "Reinventing Government" Initiative, the Bureau of Reclamation began consideration of transfer of the Island Park Dam and Reservoir to a private entity. Subsequently, the Fremont-Madison Irrigation District began looking at taking ownership of the Island Park Project. Public meetings were held regarding the proposed transfer in 1998. As of the end of 1999, issues related to the possible transfer were still being examined by the Henrys Fork Watershed Council and by federal, state, and local agencies and organizations.

Henrys Lake

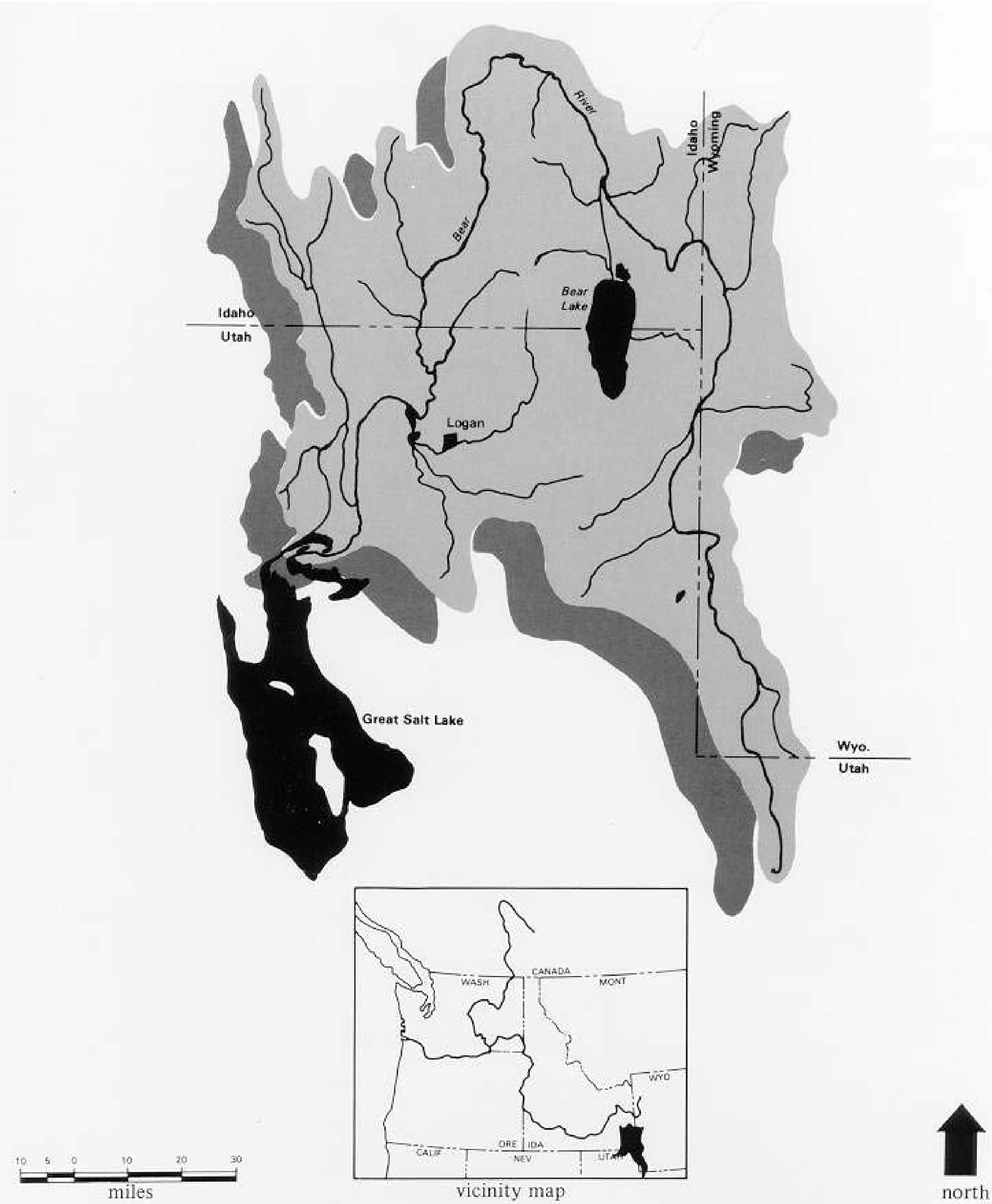
The dam on Henrys Lake was constructed in 1922 by the North Fork Reservoir Company. The dam raised the level of water in the natural lake. The North Fork Reservoir Company has rights to the water above the natural lake level, and this water can be used for irrigation in the Ashton and St. Anthony, Idaho, area. In non-drought years, water from Henrys Lake is not heavily tapped, and carryover is maximized while water from the Island Park Reservoir is used first. Henrys Lake has developed into a world-class trout fishing lake.

Teton River (Corps, Walla Walla District and U.S. Bureau of Reclamation)

The Corps was authorized to complete channel improvements, levees, and revetments along ten miles of the Teton River from its mouth below Rexburg to the canyon reach above the town of Teton, Idaho, but the proposed structural work was found to be not economically feasible. The Water Resources Development Act of 1986 deauthorized the project. More information is available about the Teton River Project on the Walla Walla District's Digital Project Notebook at: http://www.nww.usace.army.mil/dpn/dpn_project.asp?project_id=176.

In the years since the failure of the Bureau of Reclamation's Grand Teton Dam in 1976, four cost studies by the Bureau have considered rebuilding the dam, but have found that it would be too costly. The flood caused by the dam's failure changed the nature of the river and its environment. It destroyed cottonwood forests, causing numerous landslides, and created a series of long, slow moving pools and short, steep rapids. In 1997, the Bureau began a study of the river and wildlife to determine what, if any, improvements should be made along the Teton River if a dam were not rebuilt.

Chapter 21. Bear River Basin



Bear River Basin

The Bear River originates in the highlands of the Uintas Wilderness Area in northeastern Utah. The river meanders for 500 miles in and out of Utah, Wyoming, and Idaho before eventually returning to Utah to empty its waters into the Great Salt Lake only 90 miles from its place of origin. Thus the river creates a completely enclosed watershed of approximately 7,600 square miles known as the Bear River Basin.

Bear River Basin Survey (Corps, Sacramento District)

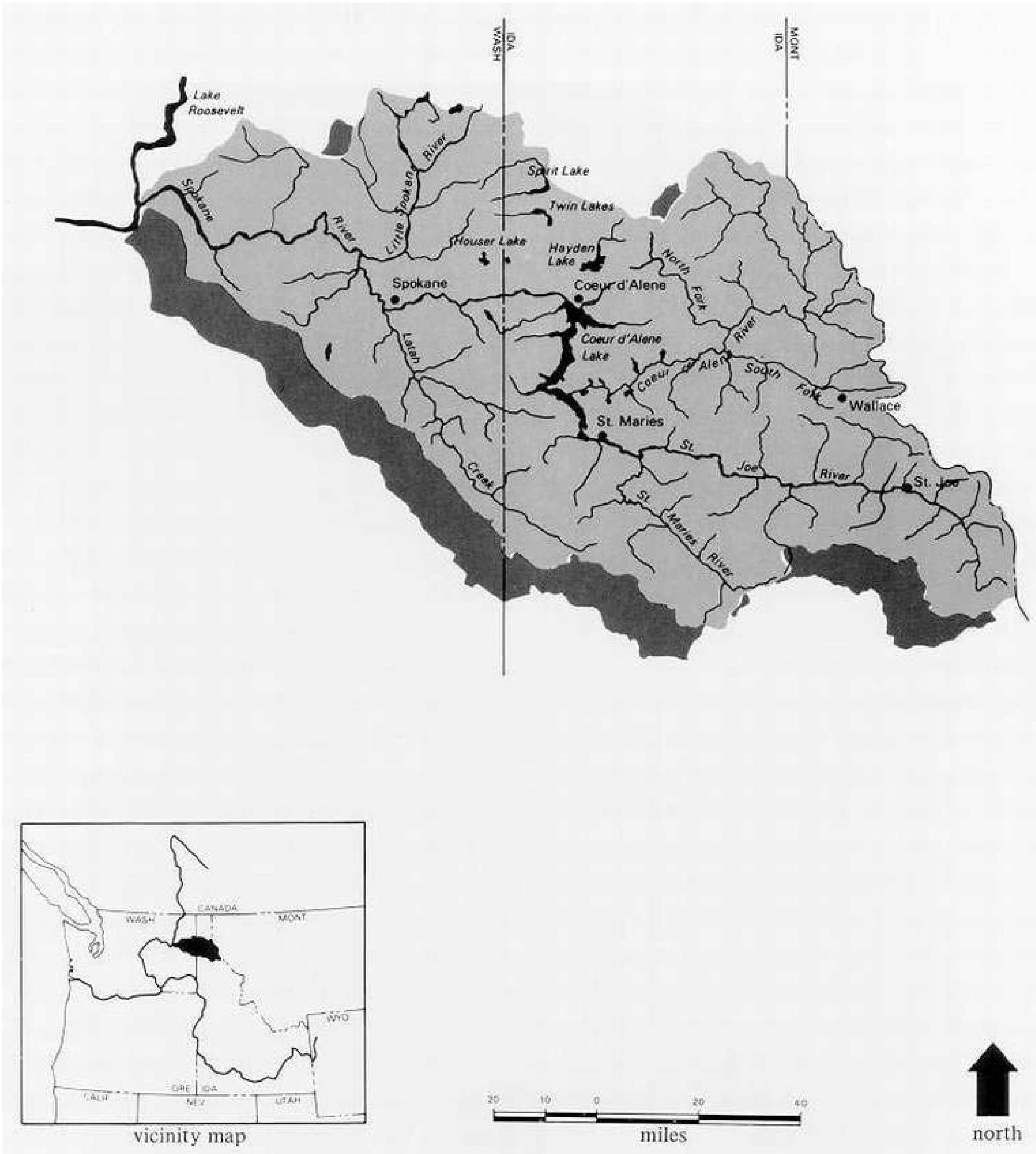
A survey study of the Bear River Basin in Utah, Wyoming, and Idaho was authorized in 1938 to develop a program for preventing flood damage, providing additional water supply, and alleviating drainage problems. The study was started in 1947 but was suspended in 1951 pending completion of U.S. Bureau of Reclamation studies of water resources.

Sacramento District completed a general investigation study of the basin in March 1989 in conjunction with associated studies by the states of Utah, Wyoming, and Idaho. The conclusion of the study was that a reservoir project on the Bear River near Oneida Narrows, Idaho, did not meet Corps' criteria for agricultural water supply and flood control. No further studies were recommended.

Current Efforts (Corps, Sacramento District)

In the late 1990s, the Sacramento District was working with local entities in Franklin County, Idaho, who have requested floodplain management services analysis and potential aquatic ecosystem restoration on the Cub River, a tributary of the Bear River in southeast Idaho.

Chapter 22. Spokane River Basin



Spokane River Basin

The Spokane River Basin is in northern Idaho and eastern Washington. Principal rivers in this 6,640-square-mile basin are the St. Joe River and its tributary the St. Maries River and the Coeur d'Alene River. The St. Joe and Coeur d'Alene both flow into Coeur d'Alene Lake. The Spokane River, outlet for the lake, flows westerly 100 miles out of Idaho and into Washington to Franklin D. Roosevelt Lake on the Columbia River. Above Coeur d'Alene Lake, the basin is a mountainous, forested region. Below the lake, the Spokane River occupies a deep valley along the edge of a rolling plateau with little forest cover. The major portion of the floodplain is agricultural land.

Coeur d'Alene Lake Levees (Corps, Seattle District)

The Coeur d'Alene Lake Levees Project includes a system of levees and floodwalls on the Spokane River and Coeur d'Alene Lake to protect a portion of the city of Coeur d'Alene from frequent floods. The project was completed in 1941. Federal costs totaled $152,872.

St. Maries-St. Joe River Levees (Corps, Seattle District)

The St. Maries-St. Joe River Levees Project provides for levees and floodwalls at the town of St. Maries along the St. Joe River. The levees extend downstream below the Potlatch Lumber Company. The project was completed in 1942 at a federal cost of $357,700. Damages prevented by this work through fiscal 1995 were estimated at $3,222,000.

Under the "Columbia River and Tributaries Study" authorization of 1954, the Corps studied the feasibility of a multipurpose project in the St. Maries River-St. Joe River Basin and local flood damage reduction projects near the city of St. Maries, Idaho. Investigations took place in 1987 and 1988. No feasible multipurpose project acceptable to the state of Idaho was identified.

Spokane River and Tributaries Study (Corps, Seattle District)

In 1965 and 1966, the U.S. Senate and House of Representatives requested the Spokane River and Tributaries Study to determine the advisability of improvements for flood control and other purposes along the Spokane River and its tributaries. Water resource problems and needs identified by the study included flood control, water quality, navigation, irrigation, recreation, and fish and wildlife enhancement. The Spokane River and Tributaries Study indicated that following projects might be beneficial: (1) flood control improvement projects along Hangman (Latah) Creek, near Tenseo; (2) navigation measures on the St. Joe River; (3) a multipurpose storage site at Enaville on the Coeur d'Alene River; and (4) improvement of the Coeur d'Alene Lake outlet. All of these proposals, however, proved to be not economically feasible.

In 1973, the Spokane River and Tributaries Study was expanded to place emphasis on urban problems in the metropolitan Spokane area and to include study of runoff and flood control, water supply, regional water quality, wastewater management, and related water resources needs. The urban study was completed in 1976 and transmitted in a report to Congress in 1978. The report provided the Spokane area with a long-range plan for water resources management along with recommendations for sewage sludge management, flood damage prevention, urban runoff, and protection of the area's water supply resources.

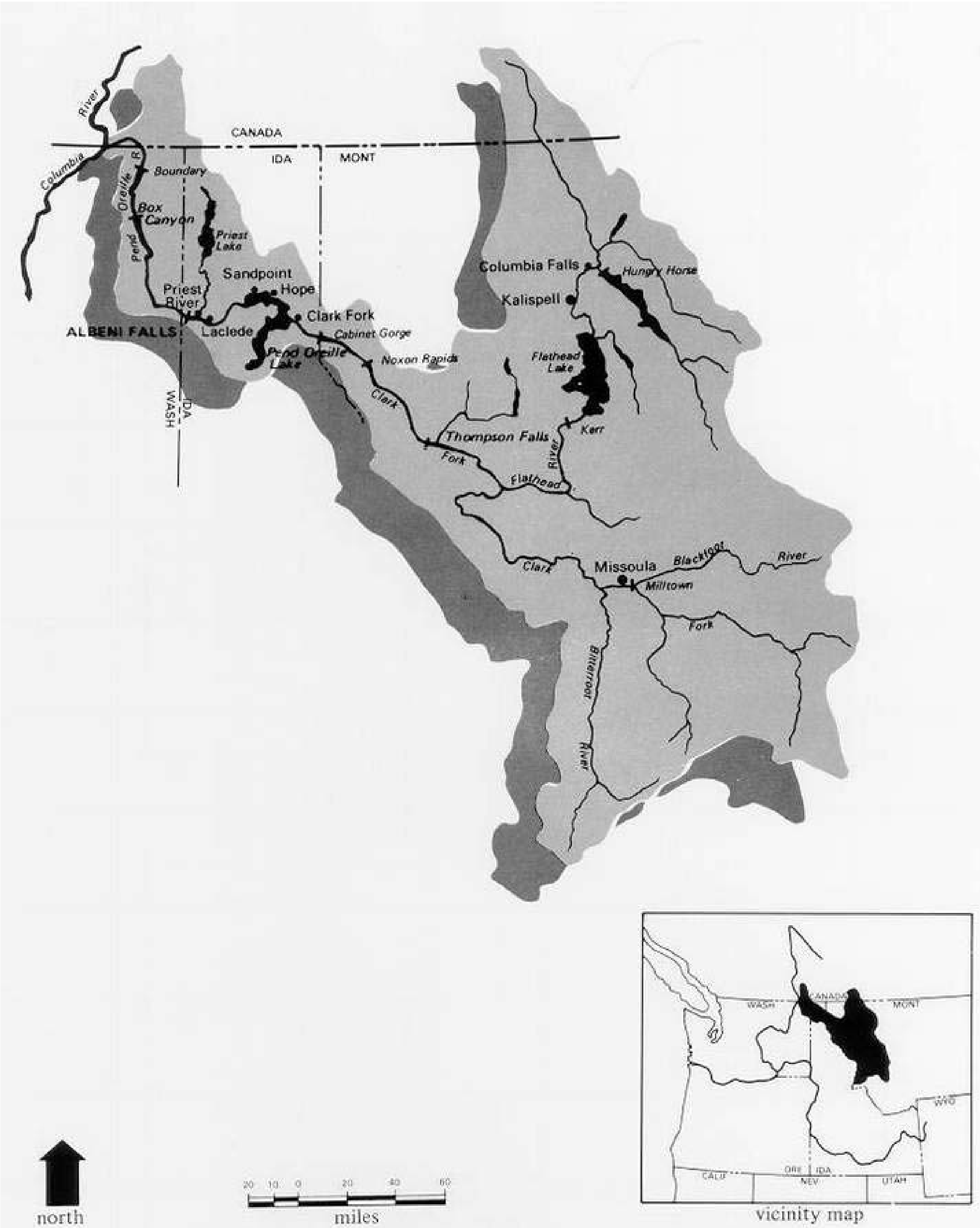
Placer Creek Flood Control Project (Corps, Seattle District)

Placer Creek is a tributary of the Coeur d'Alene River. Debris-laden floodwaters from Placer Creek at Wallace, Idaho, have periodically caused heavy damage to the city and suburbs.

In 1968, the Corps recommended construction of a 5,000-foot-long flood control channel through Wallace to the south fork of the Coeur d'Alene River and a debris basin at the upstream end of the channel.

Construction of the project was completed in 1983, at a cost of $5,865,000. The project included 3,700 feet of reinforced concrete channel with a 560-foot-long debris basin at the upstream end. Shoshone County, Idaho, and the city of Wallace were local sponsors. Flood damages prevented through fiscal 1995 totaled $1,566,000.

Chapter 23. Pend Oreille River Basin



The principal rivers in the Pend Oreille River Basin rise in the Rocky Mountains in Montana. Major tributaries include the Blackfoot, Bitterroot, and Flathead Rivers. These rivers join the Clark Fork River, which flows northwest into the panhandle of Idaho and empties into Lake Pend Oreille. The Pend Oreille River is the outlet for Lake Pend Oreille and flows northwest to meet the Columbia River near the border between Washington and Canada. Priest Lake is a large, natural lake in northern Idaho. The outlet for the Priest Lake, Priest River, flows into the Pend Oreille River. The Pend Oreille River Basin covers an area of approximately 26,000 square miles in western Montana, northern Idaho, northeastern Washington, and southern British Columbia. The drainage area is generally mountainous and heavily timbered. Some agricultural development exists in the valleys.

Albeni Falls Dam and Reservoir (Corps, Seattle District)

The Albeni Falls Dam and Reservoir is a multipurpose project on the Pend Oreille River between Priest River, Idaho, and Newport, Washington. Major purposes of the project are power generation and regulation of streamflow for downstream hydroelectric projects. Navigation, flood control, conservation, and recreation are other important project purposes.

Construction of Albeni Falls Dam began in 1951. The Corps completed the spillway and upstream cofferdam for the powerhouse and for regulation of Lake Pend Oreille in June 1952. The project’s three generators were placed in operation in 1955. The Albeni Falls Dam and Reservoir Project includes a low, concrete gravity dam; a gated spillway; and a powerhouse with an installed generating capacity of 42,600 kilowatts. Power generation at Albeni Falls Dam for 1995 was 215,781 megawatts. Revenue from the sale of power by the Bonneville Power Administration generated at the project in 1995 was $3,090,050. A portion of these power revenues is returned to the U.S. Treasury to repay the interest and principal on construction costs and to help pay for project operation and maintenance costs.

The Albeni Reservoir, consisting of the upper reach of Pend Oreille River, all of Lake Pend Oreille, the lower reaches of the Clark Fork River, and several smaller tributary streams, has a usable storage capacity of 1,153,000 acre-feet. The dam and reservoir are operated to control release of water in close coordination with other hydropower plants on the Clark Fork-Pend Oreille-Columbia River system. Storage releases from the Albeni Falls Reservoir aid navigation on the lower Columbia River by maintaining higher river stages during the low-water season. The project also provides recreation and flood control.

Total federal expenditures for the Albeni Falls Dam and Reservoir Project through 1995 were $31,741,561, which includes $137,000 in Public Works Acceleration Act funds and $971,947 for recreation facilities at completed projects. Through fiscal 1995, Albeni Falls Dam had prevented an estimated $9,116,000 in flood damages.

Albeni Falls Dam and Lake Pend Oreille Recreation

Recreation areas developed by the Corps at Albeni Falls Dam and Lake Pend Oreille include a Vista Area at the dam site, four fully developed campgrounds with associated day use facilities, one-day use area, and several sites that provide access to the water and/or primitive camping. Campgrounds, and their day use components, are generally open from mid-May through mid-September. The vista area at the dam is open year-round. Other access points and the Trestle Creek Day Use Area remain open throughout the year with access limited only by snowfall.

The Vista Area at Albeni Falls Dam is located two miles east of the Washington-Idaho border on U.S. Highway 2. A new visitor center was constructed here in late 1995 and became fully operational during the 1996 recreation season. The building houses interpretive exhibits, accessible rest rooms, and is the starting point for tours of the dam during the summer months. Picnic facilities are located on the grounds surrounding the center.

Priest River, Riley Creek, Springy Point, and Albeni Cove Recreation Areas are fully developed facilities built and operated by the Corps to provide a variety of recreation opportunities including camping, picnicking, swimming, boat launching, trailer parking, drinking water, and rest rooms. Priest River, Riley Creek, and Springy Point Recreation Areas provide hot showers and recreation vehicle dump stations. Priest River and Riley Creek Recreation Areas have picnic shelters and playgrounds located in the day use portions of the parks. Trestle Creek Day Use Area is a small recreation area that provides a boat launch, parking area, picnic area, swimming beach, and vault rest rooms.

Other public facilities and access points are located on Corps lands licensed to the Idaho Department of Fish and Game. These include Morton Slough Recreation Area, which provides a boat launch, parking area, and vault rest room. Overnight camping is allowed at the site. Johnson Creek Recreation area also provides boat launch ramps, parking, vault rest rooms, and areas for overnight camping. Public launch ramps are also provided by the Corps or the state of Idaho at the Corps' Drift Yard and at the mouth of the Pack River.

Clark Fork and Flathead River Basin Studies (Corps, Seattle District)

Resolutions adopted in 1954 by the U.S. Senate and House of Representatives Public Works Committees authorized studies of the Clark Fork and Flathead River Basins to determine if any modifications of existing projects or any plans for improvements should be made.

The studies found that the principal flood problems in the basins exist along the upper Flathead River. As a result of public planning efforts begun in 1968, the Corps issued a report in 1974 that recommended levees for the suburban areas of Evergreen and Day Acres, Montana, near Kalispell, Montana. Floodplain zoning for the remainder of the upper Flathead Basin was also recommended in the report. Engineering and design studies were initiated in 1978; these were discontinued in 1981 due to lack of local sponsorship.

In 1979, the Corps completed a study evaluating six potential hydropower sites on the lower Flathead (below Flathead Lake) and Clark Fork Rivers. The study concluded that no further consideration of hydropower projects for the area was warranted because of unsuitable foundation conditions at possible dam sites.

Lightning Creek Levee (Corps, Seattle District)

The Flood Control Act of 1950 authorized construction of a 4,000-foot-long levee on the left bank of Lightning Creek, a tributary of the Clark Fork River. The levee was constructed near the mouth of Lightning Creek to prevent flooding of the town of Clark Fork, Idaho. The Lightning Creek Levee Project was completed in 1959 at a federal cost of $42,730 and turned over to the town of Clark Fork for maintenance. Flood damages prevented through fiscal 1995 were estimated at $350,000.

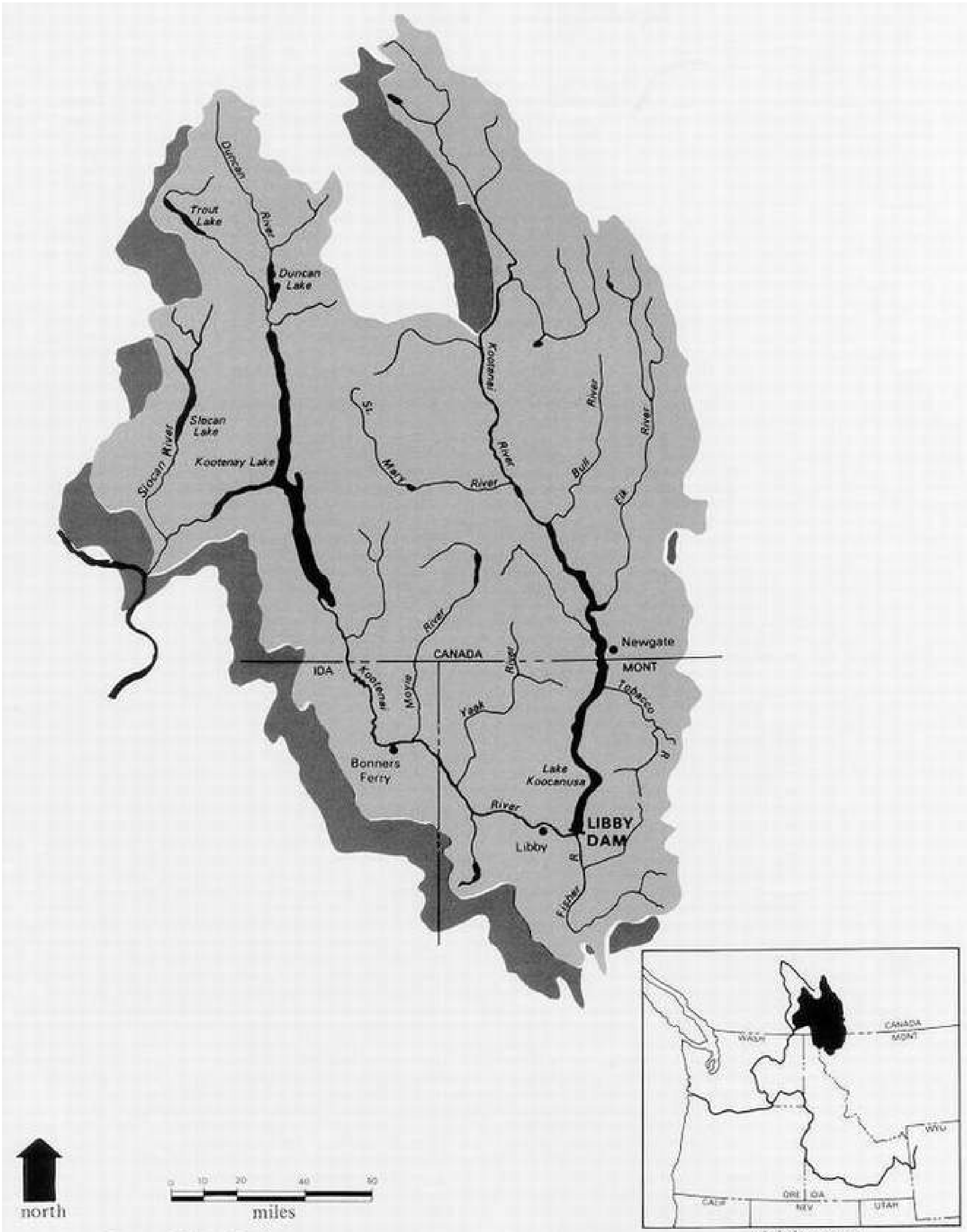
Priest Lake Outlet Structure Study (Corps, Seattle District)

The Priest River flows from Priest Lake into the Pend Oreille River near Albeni Falls Dam. The Idaho Department of Water Resources requested that the Corps, under the authority of Section 22 of the Water Resources Development Act of 1974, conduct an evaluation of various summer and early fall operating alternatives for the Priest Lake outlet structure in Bonner County, Idaho.

The objective of the Idaho Department of Water Resources was to define an operation that would optimize current and potential lake and river uses. The primary factors that the Corps evaluated included: hydropower, river recreation, concerns of lake property owners, recreation, and fish habitat in Priest River.

The Idaho Department of Water Resources and the Corps chose three outlet structure operation alternatives for the Corps to investigate. The Corps' study was completed in November 1992. The Corps' report concluded that all three operation alternatives would increase and stabilize flows in the river during the late summer and early fall periods. In terms of operational feasibility, Alternative One best met the flow and lake level objectives. Alternative One would have kept the outlet flow between 200 cubic feet per second and 1,000 cubic feet per second from July to the end of October. The Corps concluded that Alternative One would not adversely impact lakeshore residents. No further action on this project has been taken due to lack of local sponsorship.

Chapter 24. Kootenai River Basin



Kootenai River Basin

The Kootenai River Basin covers large areas of southeastern British Columbia, northwestern Montana, and northern Idaho. The Kootenai River is primarily a Canadian stream with three-fourths of its drainage area and two-thirds of its length in British Columbia. From the standpoint of total basin area, the Kootenai is the third largest tributary of the Columbia, draining an area of 19,300 square miles.

The Kootenai Basin is largely mountainous. The only extensive areas adaptable to agriculture without clearing are along the Tobacco River and the broad floodplain of the Kootenai, extending north from Bonners Ferry, Idaho, to Kootenai Lake, British Columbia. This floodplain is the most important agricultural area in the basin. It consists of about 73,000 acres of fertile, deep, alluvial soil, about 50,000 acres of which are protected from high waters by levees.

Non-federal levee systems, constructed in the United States section of the Kootenai Flats and the lowlands along the Kootenai River, protect 34,437 acres of land, including 190 acres in the community of Bonners Ferry, Idaho. Leveed areas in the flats are vulnerable to damage from river action and seepage during high river stages.

Libby Dam and Lake Koocanusa (Corps, Seattle District)

In 1975, the Corps completed Libby Dam, a large multipurpose project on the Kootenai River, 14 miles east of Libby, Montana. Libby Dam stands 422 feet tall and is 3,055 feet long at the crest. Libby Dam's architectural design is the strongest and most massive type of dam built today. The structure is designed to use its weight to hold back the force of the water. It is heavy, functional, and safe. Libby Dam is made up of 47 monolith sections each of which are basically individual dams. Each monolith is designed to stand by itself. The Libby Dam Project eliminated frequent flooding by the Kootenai River in northern Idaho, as well as in areas of Montana and British Columbia. Through fiscal 1995, Libby Dam had prevented an estimated $56,599,000 in flood damages.

Beyond Libby Dam, the Kootenai River passes through Libby, Montana, and flows east towards Bonners Ferry, Idaho. Then, the river runs north into Canada where it enters the Columbia River near Castlegar, British Columbia. The Kootenai River contributes almost 20 percent of the total water in the lower Columbia River. Libby Dam releases water to 16 other dams on the Kootenai and Columbia Rivers. Planned releases from Lake Koocanusa help to provide reliable water flow for hydropower, navigation, fisheries, and irrigation in the upper Columbia River Basin.

Construction of Libby Dam's powerhouse began in May of 1972 and continued through 1975 with the completion of the fourth turbine generator. In 1976, construction began on four additional turbines and a re-regulating dam about ten miles downstream from Libby Dam. However, a court decision found that Congress did not authorize the re-regulating dam. Accordingly, all work on the re-regulating dam was terminated. However, since the courts decided that the four additional generators at the Libby Dam powerhouse were authorized, their construction continued through September 1981. In the fiscal 1982 appropriation, Congress limited further work to only one additional generator. Power from this turbine generator was available in 1985. Libby Dam's powerhouse now contains five turbines, each with a capacity of 120 megawatts, for a peak generating capacity of 600 megawatts.

Libby Dam's reservoir, Lake Koocanusa, is a total of 90 miles long and extends 42 miles into British Columbia, Canada. The lake has a maximum storage capacity of 5,809,000 acre-feet with approximately 4,934,000 acre-feet of water available in active storage. Since Libby Dam backs up water 42 miles into Canada, a treaty was established between the governments of Canada and the United States before the dam was built. This treaty is known as the Columbia River Treaty, and it paved the way for cooperative development of the Columbia River Basin while simultaneously aiding future negotiations between the two countries. Surprisingly, Koocanusa is not an Indian name. Mrs. Alice Beers from Rexford, Montana, won a contest in 1971 to name the reservoir that was formed by Libby Dam. She combined the first three letters from KOOtenai River, the first three letters of CANada and USA to make up the name Koocanusa.

Libby Dam Project Fish and Wildlife Management

The Murray Springs Fish Hatchery was built in 1978 by the Corps to mitigate for fishery losses in the Kootenai River caused by construction of Libby Dam. The Corps pays for the operation and maintenance of the fish hatchery by the Montana Department of Fish, Wildlife, and Parks. Fish raised at the hatchery are planted into many of the lakes and streams in Lincoln County, Montana, as well as in Lake Koocanusa.

You can catch a variety of fish from the Kootenai River or Lake Koocanusa. Sport fish include rainbow trout; west slope cutthroat; brook trout; kokanee salmon (blueback); ling (burbot); whitefish; and kamloops (a strain of rainbow trout). Resource agencies, including the Corps, proposed a test program in June 1993 to develop data on white sturgeon spawning in the Kootenai River. The U.S. Fish and Wildlife Service listed Kootenai River white sturgeon as an endangered species on October 6, 1994.

The Corps purchased 2,400 acres of land to help replace the winter range flooded by Lake Koocanusa. These lands, located near Eureka and Libby, Montana, were deeded over to the state of Montana in 1982. Today, the Natural Resource Section at Libby Dam Project is active in bald eagle management and in the stewardship of approximately 1,070 acres of Corps-owned land.

In 1989, the Libby Dam Project was designated by the Montana, Department of Fish, Wildlife, and Parks, as an official Watchable Wildlife Area. The area consists of the Downstream Natural Area and the David Thompson Bridge below the powerhouse. Viewing opportunities abound for deer, coyotes, river otter, moose, raccoons, bald eagles, great blue heron, geese, ducks, trumpeter swans, osprey, hawks, songbirds, and sea gulls.

Libby Dam and Lake Koocanusa Recreation Areas

Recreation areas developed by the Corps at Libby Dam and Lake Koocanusa include a visitor center at the dam site; day use areas; and developed, primitive, and boat-access campgrounds.

Souse Gulch Day Use Area, just upstream from Libby Dam, provides picnicking, trails, boat launch, boat moorage dock, water, and restrooms. Several dispersed recreation sites are downstream from Libby Dam. These include: Alexander Creek, Dunn Creek Flats, and Blackwell Terrace Recreation Areas. These Corps-operated sites offer boat access to the river, primitive camping, and excellent fishing.

Other recreations areas adjacent to Lake Koocanusa include Peck Gulch, Rexford Beach, Yarnell Islands, Tobacco Plains, and Gateway Recreation Areas, and also McGillivray and Cripple Horse Campgrounds. These sites provide a variety of different recreation opportunities including camping, boat launching, swimming, and picnicking. Peck Gulch, Rexford Beach, Tobacco Plains, and Gateway Recreation Areas were developed by the Corps and are now operated by the U.S. Forest Service. Cripple Horse Campground was jointly developed by private industry, the U.S. Forest Service, and the Corps; it is operated by private industry.

Acronyms

AFEP	Anadromous Fish Evaluation Program
Corps	U.S. Army Corps of Engineers
DMMP	Dredged Material Management Plan
IHN	Infectious Hematopoietic Necrosis (a disease of fish)
NMFS	National Marine Fisheries Service
PIT-tag	Passive Integrated Transponder Tag
SOR	System Operation Review
RSW	Removable Spillway Weir
TMT	In-Season Technical Management Team

Glossary

acre-foot	A volume of water equivalent to 1 acre of land covered to a depth of 1 foot.
active storage	The amount of water stored in a reservoir that is actually available for release for use in irrigation, hydropower generation, navigation, etc.; contrasted to total storage.
alluvial	Of, pertaining to, or composed of sediment deposited by flowing water, as in a riverbed, floodplain, or delta.
anadromous fish	Fish that migrate up rivers from the sea to breed in fresh waters, as salmon do.
appropriation	The setting aside of money by Congress, through legislation, for a specific use.
aquifer	A subsurface zone that yields economically important amounts of water to wells.
authorization	House and Senate Public Works Committee resolutions or specific legislation that provides the legal basis for conducting studies or constructing projects. The money necessary for accomplishing the work is not a part of the authorization, but must come from an appropriation by Congress.
bank and channel stabilization	The process of preventing bank erosion and channel degradation.
bankfull elevation	The maximum height of water that can be contained in a stream without overtopping the banks.
basin	(1) Drainage area of a lake or stream, such as a river basin. (2) A naturally or artificially enclosed harbor for small craft, such as a yacht basin.
breakwater	A wall built into the water to protect a shore area, harbor, anchorage, or basin from the action of waves.
channel	A natural or artificial waterway connecting two bodies of water or containing moving water.
concrete-gravity structure	A type of concrete structure in which resistance to overturning is provided by its own weight.

confluence	The place where streams meet.
crest length	The length of a dam measured along its top from end to end.
dam	A barrier constructed across a valley for impounding water or creating a reservoir.
degree of protection	The amount of protection that a flood control measure is designed for, as determined by engineering feasibility, economic criteria, and social, environmental, and other considerations.
dike	An embankment to confine or control water.
diversion channel	(1) An artificial channel constructed around a town or other point of high potential flood damages to divert floodwater from the main channel to minimize flood damages. (2) A channel carrying water from a diversion dam.
earthfill dam	A dam, the main section of which is composed principally of earth, gravel, sand, silt, and clay.
flood capacity	(1) The flow carried by a stream or floodway when the water level is full to the height of the banks (at bankfull elevation). (2) The storage capacity of the flood pool at a reservoir.
floodplain	Valley land along the course of a stream that is subject to inundation during periods of high water that exceed normal bankfull elevation.
flood proofing	Techniques for preventing flood damage to the structure and contents of buildings in a flood hazard area.
groundwater	All subsurface water.
habitat	The total of the environmental conditions that affect the life of plants and animals.
headwaters	(1) The upper reaches of a stream near its source. (2) The region where ground water emerges to form a surface stream. (3) The water upstream of a structure.
impervious blanket	A covering of relatively waterproof soils, such as clays, through which water percolates at about one millionth of the speed with which it passes through gravel.

left or right bank of river	The left hand or right hand bank of a stream when the observer faces downstream.
levee	A dike or embankment, generally constructed close to the banks of the stream, lake, or other body of water, intended to protect the land side from inundation or to confine the streamflow to its regular channel.
low flow augmentation	The increase of water flows to more desirable volumes above the prevailing stream flows.
mouth of river	The exit or point of discharge of a stream into another stream, a lake, or the sea.
navigable waters of the United States	Those “waters of the United States” subject to the ebb and flow of the tide and/or those that are presently used, have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.
penstock	A sluice or gate used to control a flow of water.
reach	A continuous or extended part of a stream or other watercourse.
reservoir	A pond, lake, tank, basin, or other space, either natural or created in whole or in part by the building of a structure such as a dam, which is used for storage, regulation, and control of water.
revetment	(1) A facing of stone, concrete, or sandbags to protect a bank of earth from erosion. (2) A retaining wall.
revetted levee	a stone or concrete faced embankment raised to prevent a river from overflowing.
riprap	A layer, facing, or protective mound of randomly placed stones to prevent erosion, scour, or sloughing of a structure or embankment. It may also be the stone material used.
riparian	Relating to the bank of a natural course of water; the habitat found along the bank of a natural course of water.
rock dike	An embankment built principally of rock.

rockfill dam	A dam, the main section of which is composed principally of large rock or stone.
run-of-the-river	operating on the flow of the river without modification by upstream storage.
setback levee	a levee that is constructed away from the water's edge.
shoal	a place in any body of water where the water is especially shallow.
sill	(1) a horizontal beam forming the bottom of the entrance to a navigation lock. (2) also, a low, submerged dam-like structure built to control riverbed scour and current speeds.
slackwater	still water in a river.
spillway	a waterway or dam or other hydraulic structure used to discharge excess water to avoid overtopping of a dam.
stage	the elevation of the water surface above or below an arbitrary measurement point.
standard project flood	a flood that may be expected from the most severe combination of meteorological and hydrological conditions that are reasonably characteristic of the geological region involved excluding extremely rare combinations.
storage	The water held in a reservoir.
tailwater	the water immediately below, downstream of, a structure, usually a dam.
total storage	all of the water that can be stored in a reservoir (also called "gross storage"); contrasted to active storage.
tributary	a stream or other body of water that contributes its water to another stream or body of water.
wetlands	areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support — and that under normal circumstances do support — a prevalence of vegetation typically adapted for life in saturated soil conditions.

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