

**EXPEDITED RECONNAISSANCE STUDY**  
**Section 905(b) (WRDA 86)**  
**Boise River, Boise, ID**

**1. STUDY AUTHORITY**

a. This study is authorized by Section 414, Water Resources Development Act of 1999 which reads:

“The Secretary shall conduct a study to determine the feasibility of undertaking flood control on the Boise River in Boise, Idaho.”

The study is also authorized by a resolution passed by the Senate Committee on Public Works (Upper Snake River and Tributaries), on 19 March 1954.

b. The study received \$100,000 in fiscal year 2000 to conduct the reconnaissance phase.

**2. STUDY PURPOSE**

The purpose of the Reconnaissance Study is to determine whether there is a Federal interest in undertaking feasibility studies for flood control on the Boise River in the vicinity of Boise, Idaho and to review other water resource problems and needs within the Lower Boise River Basin for potential feasibility studies.

There is local interest in several areas including floodplain management, restoration of aquatic and riparian habitat, recreational safety and water quality improvement. State and local agencies and private groups are working somewhat independently to accomplish similar objectives. An integrated plan could pull together the related pieces of all of these efforts and allow for cost-effective implementation while encouraging public and private partnerships.

**3. LOCATION OF PROJECT/CONGRESSIONAL DISTRICT**

The study area is located on the Boise River in the vicinity of Boise, Idaho. A study area map is included (see Attachment 1). The Boise River is a tributary of the Snake River located entirely in Idaho. It is a snow-fed river with high flows in early summer months resulting from melting snowpack. The river flows a distance of approximately 64 miles from Lucky Peak Dam to the confluence with the Snake River and drops approximately 650 feet in elevation over this distance. Cities and towns within the basin include Boise, Garden City, Meridian, Eagle, Star, Nampa, Middleton, Caldwell, Notus, and Parma. These cities and towns lie within Ada and Canyon Counties which was recently named the fourth fastest growing urban area in the U.S.

The Corps of Engineers Lucky Peak Dam and reservoir is located on the Boise River, upstream of Boise, Idaho, along with Bureau of Reclamation's Anderson Ranch and Arrowrock projects. These three reservoirs are operated jointly for flood control and irrigation storage. These reservoirs were built between 1915 and 1955. A series of non-continuous non-Federal levees line the Boise River below Lucky Peak Dam, the lowermost

dam, through developed areas in downtown Boise, Garden City, Eagle, and Caldwell within Ada and Canyon counties. Although the reservoir system provides significant flood protection, reducing the 100-year natural discharge from 41,000 cubic feet per second (cfs) to 16,600 cfs, the levees in the downtown Boise and Garden City areas do not provide reliable protection even at this reduced flood level. Several emergency flood fights and rehabilitation projects have been completed since the 1970's. The channel through Boise is a very sensitive environmental zone which make channel and levee improvements and maintenance difficult.

The study area is located in Congressional Districts 1 and 2 which are currently represented by Congressman Simpson and Congressman Otter. Senator Craig and Senator Crapo also represent the basin area.

#### **4. DISCUSSION OF PRIOR STUDIES, REPORTS AND EXISTING WATER PROJECTS**

Numerous studies and reports of the Lower Boise River and Tributaries Basin have been completed by various Federal and state agencies, and local cities and counties. The following is a list of U.S. Army Corps of Engineers (Corps) studies and reports used in the preparation of this reconnaissance report and also studies from other agencies relevant to this report.

##### **a. Corps of Engineers Studies**

(1) The main reference for this report was the *Lower Boise River and Tributaries, Idaho Reconnaissance Study* completed by the Corps in 1995. This study identified several proposals for feasibility-level studies but was put in an inactive status due to lack of local sponsorship.

(2) *Design Memorandum No. 1, Justification Report, Flood Control Improvements, Boise Valley Project*, 15 October 1958. This report established the economic justification for intermittent Boise River levees from Boise, Idaho, to the mouth of the Boise River.

(3) *Design Memorandum No. 2, Boise Valley Flood Control Project, Boise River*, June 1963. This report found that intermittent levees were economically justified. However, due to the lack of continued sponsorship by Ada County, further studies were terminated.

(4) *Review Report, Tributaries of the Boise River, Vicinity of Boise, Idaho*, April 1964. This report presented an overall plan for the protection of Boise and its suburban areas against floods from four principle tributary side drainages: Cottonwood Creek, Hulls Gulch, Crane Creek, and Stuart Gulch. Of the four side drainages investigated, it was determined that flood control projects were economically justified on Cottonwood Creek and Stuart Gulch. This report was the basis for the eventual authorization of the Cottonwood Creek and Stuart Gulch Projects by the Flood Control Act of 1966. Both projects were later deauthorized due to a lack of local interest.

(5) *Design Memorandum No. 1, Hydrology, Cottonwood Creek Dam and Reservoir, and Stuart Gulch Dam and Reservoir, Boise, Idaho*, July 1969. This report

included the hydrology analysis for the two projects, and was used as a basis for the design of the projects.

(6) *Design Memorandum No. 2, General Design Memorandum, Stuart Gulch Dam, Boise, Idaho*, October 1973. This report provided the general design for the Stuart Gulch Project, and recommended construction of the project. As indicated above, the project was later deauthorized due to a lack of local interest.

(7) *Levee Restudy on Boise River, Ada County, Idaho*, January 1976. This report presented alternatives considered to resolve flood problems and associated wildlife and recreation considerations along the Boise River in Ada County, Idaho.

(8) *Boise Valley Regional Water Management Study*, July 1977. The goal of this study was to develop water resource management plans for the Boise Valley Region that promoted general welfare through contributions to economic development, environmental quality, and regional development. Areas evaluated included water quality and wastewater management, flood damage reduction, water supply for the city of Boise, Idaho, and rehabilitating Barber Dam (due to instability). No recommendations were made for construction.

(9) *Flood Plain Management Report for Boise River, Idaho*, September 1982. This report was prepared by the Corps for the Idaho Department of Water Resources (IDWR), under the authority of Section 22, Public Law 93-251. The study identified measures of flood damage reduction implementable by local residence and problem areas where gravel removal or other structural actions might be possible. It addressed questions of how and why the channel has changed or is changing, and whether or not these changes might be induced by flow regulation. The study stemmed, in part, from a recommendation made in the earlier levee restudy report (January 1976) identified above. The report included a set of aerial mosaics of the study area showing the 10,000 cfs floodplain and floodway, existing levees, and an alternative levee system designed to control a 10,000-cfs flow.

(10) *Water Control Manual For Boise River Reservoirs*, April 1985 and revised in 1988. This manual was prepared in cooperation with U.S. Bureau of Reclamation (USBR). It was intended to be used for operation of the Lucky Peak Project, in conjunction with USBR's Arrowrock and Anderson Ranch Projects.

(11) *Flood Warning/Preparedness Planning Study, Boise Foothills, Ada County, Idaho*, December 1992. The initial study was conducted through the Corps' Floodplain Management Services Program, at the request of the city of Boise and Ada County, Idaho. The study was conducted as a cooperative effort in conjunction with the Corps, the National Weather Service (NWS), and the city of Boise. However, due to a lack of wide local interest, the study was never completed. A wrap-up report was prepared to document the studies that took place, and included a preliminary design, cost estimate, and economic analysis of the flood warning system.

b. Other Federal, State and Local Initiatives

(1) *Boise River Resource Management and Master Plan*, Boise Parks and Recreation Department, Boise City, December 1999. The primary goal of this plan is to protect and enhance public safety, health and resource preservation associated with recreational use of the river and its riparian area. In addition, the plan provides policies and a master plan that promotes sustainable recreational use and enjoyment of the portion of the river that is within the city limits of Boise. The major elements of the plan deal with public safety, recreation, wildlife and vegetation, river bank stabilization and hydrology, water quality and land mitigation.

(2) A new flood insurance study performed by the Federal Emergency Management Agency (FEMA) is currently being completed for Ada County which will bring changes to the floodplain of the rapidly developing area. Preliminary maps have been released to the communities and show significant changes to the floodplain as development has increased since the last maps were done ten years ago. The 90-day appeals period ended December 19, 2000, and FEMA is currently reviewing the appeals. FEMA currently has no plans for remapping the Canyon County area which is experiencing the same growth as Ada County.

(3) The Idaho Department of Water Resources is in the process of developing their Comprehensive State Water Plan for the Lower Boise River Basin. The draft plan is currently scheduled to be submitted to the Idaho Water Resources Board in 2002 and submitted to the Idaho legislature in 2003. This plan is focussing on water supply, water management, water use, floods, water quality, and land use changes and their effects on water. The plan will make recommendations for improving, developing, and conserving water resources.

(4) The Treasure Valley Hydrologic Project was proposed and developed by IDWR; United Water Idaho, Inc.; Ada and Canyon Counties; and the local cities to develop a better understanding of water resources in the Treasure Valley, and to evaluate changes in regional and local ground water conditions. This project is being conducted in three phases over a five year period. The project is currently in its third phase and is scheduled to be complete in 2001. Cooperators and participants in this project include IDWR, Idaho Water Resources Research Institute/ University of Idaho, United Water Idaho, U.S. Geological Survey (USGS), Boise State Department of Geosciences, and the U.S. Bureau of Reclamation.

(5) The Idaho Department of Environmental Quality recently completed the Lower Boise River Total Maximum Daily Load (TMDL) Subbasin Assessment as required under Section 303(d) of the Federal Clean Water Act. The TMDL was submitted to EPA and approved in December 1999. An implementation plan has not been developed.

(6) Through its PROJECT IMPACT grant with FEMA, Boise City is working with the University of Idaho and USGS on several initiatives:

- *Reevaluation of the Boise Basin hydrology to see if the additional years of flow record make a significant difference in the estimate of flood magnitude for a given return period.* The estimated 100-year flood flow of the regulated stream is 16,600 cubic feet per second (cfs). This report is scheduled to be completed by September 2001.
- *Development of animations of flooding adjacent to the Boise River for educational purposes which should be complete in the spring of 2001.*
- *Analyze characteristics of flow and flood risks around Eagle Island which is an area highly sought after for development.* Results will be incorporated into the animation model in the spring of 2001.
- *Analyze risks of Barber Dam failure.* Significant development is taking place just downstream of this county-owned dam, run of the river dam. This dam was constructed in 1906 to provide power to a nearby lumber mill. Ada County has since taken over ownership of the dam, and CHI Energy operates two power units rated at 3.2 megawatts under a lease agreement with the county. The Federal Energy Regulatory Commission (FERC) and IDWR will be reclassifying this dam from low risk to high risk based on the new development occurring just downstream of the dam. This analysis should be available in the spring of 2001.
- *Survey limited cross sections in Canyon County just downstream from Ada County to evaluate whether the channel is aggrading, degrading, or increasing in width.* Information should be available in the spring of 2001.

(7) *Boise River Wintering Bald Eagle Study, Boise River Corridor, Lucky Peak Dam to Ada/Canyon County Line*, Ada Planning Association Boise River Bald Eagle Task Force, 1994. This study made several recommendations to maintain critical habitat for bald eagles. Several locations along the Boise River were also identified as properties which should be protected for continued use by wintering bald eagles.

(8) Quadrant Consulting prepared the *Boise River Flow Split Study at Eagle Island* in 1997 for Boise River 2000 in order to determine the historic flows in the north and south channels and to determine the most cost effective method to effect a return to those flows. Records indicated that historically the flow split was approximately 70 percent in the north channel and 30 percent in the south channel. Recent USGS measurements at the 6,500 cfs flow level, showed that the north and south percentages were closer to 56 and 44, respectively, a considerable difference from the earlier 70-30 split. The south channel was experiencing a near 100-year event while the north channel was flowing at about average. The disproportionate levels were due in large part to an enormous gravel bar at the head of Eagle Island in the north channel which prevented a significant amount of water from entering the north channel and forced more water than it could handle into the south channel. The study further showed that for the past 15 to 20 years, the accumulation of gravel at this location came from upstream bank erosion, a direct result of bank instability. Gravel was removed from the channel to help the immediate problem, but a permanent solution was not developed.

(9) *Boise and Payette Rivers Diversion Upgrade Project, An Inventory of Irrigation Diversion and Cost/ Benefit Analysis for Modifying 10 Diversions & A Conceptual Design for Two Diversion Structures*, 1997-1998. Quadrant Consulting, Inc., McLaughlin Water Engineers, Inc. and ResourceSystems, Inc.

(10) *Boise River Wildlife and Fish Habitat Study, Wetland Inventory and Management Guidelines*,. Resource Systems, Inc., 1983. This study was prepared to help Boise City and Ada County make planning decisions concerning fish and wildlife habitat along the Boise River.

## 5. PLAN FORMULATION

### a. Identified Problems:

(1) Much of the increase in potential flood damage has resulted from rapid development within historic flood plain areas, rather than seasonal operation of the upstream flood control reservoirs. The Boise Metropolitan area and its foothills have experienced rapid growth and development over the past several years. The floodplain continues to grow and develop about 3 percent per year, which is projected to continue over the next twenty years. Land use along the Boise River Basin is also changing from agricultural to urban encroachment. Ada and Canyon counties have just recently been named as the nation's fourth fastest growing urban area. These conditions have and will continue to impact flood protection and water resources. Residents continue to live under the misconception that since three Federal reservoir projects are upstream they are protected from catastrophic flooding.

(2) The reservoir system on the Boise River provides a reduction in natural flows even at the 500-year flood level. The regulated 100-year flow for the Boise River at the Glenwood Bridge is 16,600 cfs. Minor flooding along the lower Boise River starts occurring when flows at Glenwood Bridge exceed 4500 cubic feet per second (cfs), a flow frequency of about once in two years. Major flooding begins occurring at 7200 cfs, or once in ten years. Flood damages increase sharply above the 10,000 cfs level. The reservoirs are operated to a target flood control flow of 6500 cfs, approximately a three-year flood event, when possible. Unseasonably warm or wet weather conditions in the late winter or early spring have caused this target flow to be exceeded. However, without the three upstream reservoirs, this three year event would produce a flow of 15,600 cfs, nearly equal to a 100-year flood event. Several emergency flood fights and rehabilitation projects have been completed along the river since the 1970's. In 1983, there was a heavy snowpack with unseasonably warm weather conditions. This forced early evacuation of the upstream reservoirs to meet the flood control curve. The flow reached 9,500 cfs in the lower river, measured at Glenwood Bridge. In 1997, the reservoir was within two days of filling and causing major flooding in the basin. The basin has not seen significant flooding problems since 1943 when flows reached 21,000 cfs. This was prior to construction of Lucky Peak Dam. The 1943 flood caused significant flooding on Eagle Island, which has changed from agricultural use to residential.

(3) In-river recreation is extremely popular on the lower Boise River throughout the year; however, recreationalists are hampered with manmade obstacles such as diversion

structures across the river. In recent years, the water delivery organizations have expressed interest in improving methodologies for diverting water and allowing for safe passage of recreationalists.

(4) Since construction of the three projects upstream of Boise for flood control and irrigation, the configuration and use of the floodplain has changed significantly. Urban development has encroached into the natural floodplain. This has substantially reduced the natural qualities and riparian habitat along the river. The natural fluvial process has been modified so that the river can no longer sustain an environment for regeneration of cottonwood trees which are extremely vital in maintaining wintering areas for bald eagles and a wide variety of other fish and wildlife. The regulated streamflows cause water levels to rise and fall more rapidly than natural saturation flows required for cottonwood regeneration.

b. Alternative Plans:

- 1) Alternative 1 – No Action. Development will continue to encroach into the floodplain. Residents will continue to live under the misconception that since the three Federal projects are upstream they are protected from catastrophic flooding.
- 2) Alternative 2 – Address environmental restoration near the Walling Ditch along the Boise River. This abandoned side channel could be reconnected to the Boise River offering excellent fisheries habitat.
- 3) Alternative 3 – Address flooding problems along the Boise River in the vicinity of River Mile 56.5 to 58.5. Boise City is concerned with repetitive minor flooding that occurs in this area which is not considered to be within the limits of the 100-year FEMA-designated floodplain.
- 4) Alternative 4 - Address problems associated with gravel deposition and the split flows at the head of Eagle Island. Repetitive minor flooding occurs in this area. Environmental considerations are also of importance in this area as it is home to a large blue heron rookery.
- 5) Alternative 5 – Address environmental concerns in the Barber Pool area. This area serves as important habitat for overwintering bald eagles, deer, and other wildlife.
- 6) Alternative 6 – Address potential setback areas and potential wetlands sites along the Boise River that may provide additional flood protection and habitat improvement areas.
- 7) Alternative 7 – Address additional flood control storage by diverting flood waters through the existing canal system to the Snake River.
- 8) Alternative 8 – Address bank stability problems and the effects of spring release flows along the Boise River.

c. Evaluation of Alternatives: Since the beginning of the 905(b) efforts, Boise City has requested that environmental restoration needs near the Walling Ditch be addressed under the Corps Section 1135 Continuing Authorities Program. This area is immediately downstream of the Corps' Lucky Peak Dam. The City has also requested that the flooding problems along the Boise River in the vicinity of River Mile 56.5 to 58.5 be addressed under the Corps Section 205 Continuing Authorities Program.

Idaho State Parks and Recreation (IDPR) has requested help through the Corps' Planning Assistance to States program in developing a master plan for the Barber Pool area. This area is the largest contiguous wildlife habitat area remaining along the Boise River in the Boise metropolitan area. IDPR has also expressed interest in exploring opportunities for wetland development and flood plain preservation within Eagle Island State Park.

The Corps 1995 reconnaissance report identified additional flood storage capacity could be obtained by making modifications to the existing canal system and routing flood waters to the Snake River. Approximately 500 cfs could be routed through a modified system with an estimated construction cost of \$3 million. To date, locals have not been supportive of cost sharing a feasibility study to investigate this alternative.

For the basis of discussion of purposes of preparing the 905(b), the team examined an area along the Boise River between the Glenwood Bridge and the Ada/Canyon County line. This area includes Eagle Island which has experienced repetitive minor flooding in recent years. An interim feasibility study in this area would address concerns about potential flooding that may be aggravated by flow conditions at the upstream end of the island. Part of the river flow has shifted from the north channel to the south channel due in part to gravel deposition at the head of the island. Rapid new development in the area, the needs of the West Boise Wastewater Treatment Plant which discharges into the south channel, and the Pioneer Irrigation District's need for adequate water for irrigation diversions are all critical. The area also contains a large blue heron roost. Agencies with concerns in this area include Boise City, City of Eagle, Garden City, Ada County, the Community Planning Association of Southwest Idaho, Ada County Highway District, Ada City-County Emergency Management, Pioneer Irrigation District, Water District 63, Idaho Transportation Department, Boise River Flood Control District 10, and Boise River Flood Control District 11.

## **6. FEDERAL INTEREST**

Preliminary estimates indicate that up to \$65 million of damage from a 100-year event could occur within the current limits of the 100-year floodplain within Ada and Canyon (80% damages in Ada County). After applying annual expectancy for the 100 year event, an expected annual damage amount of \$563,000 for the 100 year event would merit an initial investment of over \$8,000,000 (breakeven investment where benefits=costs) in a flood protection device. It is considered highly likely that the identification of an economically feasible, environmentally acceptable project will result from feasibility investigations.



## 7. PRELIMINARY FINANCIAL ANALYSIS

The Corps and the Idaho Bureau of Disaster Services have recently formed a multi-agency Flood Mitigation Committee to help identify resources and funding to help reduce risks in the State of Idaho. This committee recognizes that flood reduction efforts are important to the Boise Metropolitan Area and will work with local agencies to help them identify cost sharing funds to perform feasibility studies. The Corps is currently working with Boise City, the Community Planning Association of Southwest Idaho (COMPASS), and the Idaho Department of Parks and Recreation for potential activities in the Lower Boise Basin. They understand that if they become potential sponsors, they will be responsible for 50% of the costs for the feasibility phase studies. Recent change in legislation allows that sponsor share can be provided in the form of in-kind services.

## 8. SUMMARY OF FEASIBILITY STUDY ASSUMPTIONS

There is sufficient Federal interest to warrant a Project Management Plan (PMP). This plan would consider flood protection measures to prevent future flood related damage. Alternatives will be designed to protect existing habitat and enhance where possible. Existing in-stream water uses will be maintained as well as the level of water quality as established by Idaho Water Quality Standards.

## 9. FEASIBILITY PHASE MILESTONES

The following table presents a preliminary schedule of major milestones that would be associated with the feasibility study.

Milestone Schedule

Milestone	Approximate Date
Execute Feasibility Cost Sharing Agreement	October 2001
Initiate Feasibility Phase Study	November 2001
Engineering Appendix	
Surveys and Mapping	January 2002
Hydrology and Hydraulic Studies Report	May 2002
Geotechnical Studies Report	March 2002
Site Development Analysis Report	April 2002
Structural Designs Studies Report	April 2002
Engineering and Design Analysis Report	June 2002
Socioeconomic Studies Report	
Economic Analysis Report	April 2002
Social Studies Report	March 2002
Ability to Pay Report	April 2002
Financial Analysis Report	April 2002
Real Estate Analysis / Documents	July 2002
Environmental Studies / Report	
Environmental Assessment Package	August 2002
Mailing List	January 2002
Ensure Design and Construction Methods	May 2002
EA and FONSI	August 2002

Fish and Wildlife Coordination Act Report	June 2002
HTRW Studies / Report	March 2002
Cultural Resources Report	June 2002
Cost Estimates	July 2002
Public Involvement Documents	August 2002
Plan Formulation and Evaluation Report	March 2002
Draft Report Documentation	February 2003
Final Report Documentation	May 2003
Washington Level Report Approval	November 2003
Management Documents	October 2003
Project Management Plan	October 2003
Programs and Project Management Documents	October 2003

## 10. FEASIBILITY PHASE COST ESTIMATE

A preliminary cost estimate to perform the feasibility study is \$697,500 and the duration is expected to be approximately 24 months. These estimates will be refined in the PMP.

### Feasibility Study Cost Estimate Summary

Milestone	Cost
Engineering Appendix/Report	\$140,000
Socioeconomic Studies/Report	75,000
Real Estate Analysis/documents	30,000
Environmental Studies/Report	87,500
Fish and Wildlife Coordination Act Report	8,000
HTRW Studies/Reports	8,000
Cultural Resources Report	5,000
Cost estimates	7,500
Public Involvement Documents	10,000
Plan Formulation and Evaluation Report	30,000
Draft Report Documentation	35,000
Final Report Documentation	5,000
Washington Level Report Approval	13,500
Planning and Engineering Management Documents	45,000
Project Management Plan (PMP)	4,000
Programs and Project Management Documents	45,000
Quality Control Plan	10,000
Contingency (25%)	139,000
<b>TOTAL FEASIBILITY PHASE STUDY COST</b>	<b>\$697,500</b>
<b>TOTAL FEDERAL SHARE</b>	<b>\$348,750</b>
<b>TOTAL SPONSOR SHARE</b>	<b>\$348,750</b>

## **11. RECOMMENDATIONS**

Now that there is a local presence in Boise, the local community is showing a renewed interest in understanding Corps programs and how they might be applied to assist the locals in addressing concerns with the Lower Boise River and its associated drainages. While there are many local and state agencies with responsibilities associated with the river, no one agency has the lead. Several of these agencies have been developing information that would be necessary for an overall basin-wide plan. The Community Planning Association of Southwest Idaho has approved expenditure of initial funds to begin a river planning process. The Board, which is made up of mayors, city council members, county commissioners, and highway district commissioners, will be considering a proposal to permanently fund a position to facilitate regional cooperation on flooding and other water issues in February 2001.

The Walla Walla District recognizes all of the local efforts as positive towards developing a comprehensive plan for the Boise River and building local partnerships. To that end, the District recommends that they continue to work with potential sponsors to address flooding and environmental restoration concerns on local levels while working towards a more comprehensive plan. This can be done through existing programs and interim feasibility studies. The District is currently working with Boise City on an ecosystem restoration project and a small flood control project.

## **12. POTENTIAL ISSUES EFFECTING INITIATION OF FEASIBILITY PHASE**

There are no presently known potential issues that would effect the initiation of the feasibility phase.

## **13. VIEWS OF OTHER RESOURCE AGENCIES**

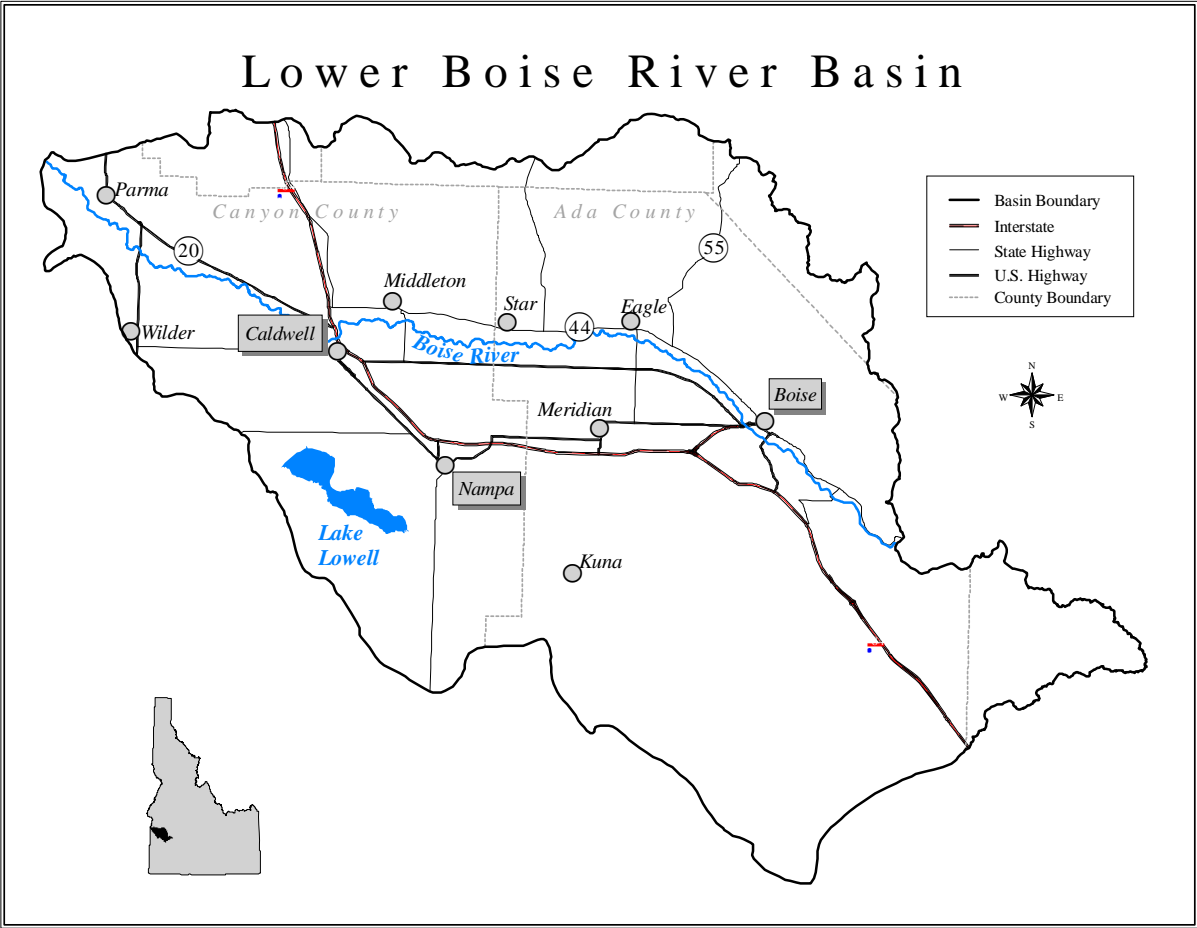
Idaho Fish and Game is supportive of efforts to improve habitat in the Boise River Basin. Idaho Department of Water Resources is in the process of completing the state-directed comprehensive plan for the Lower Boise River and will be making recommendations to the Idaho Water Resources Board in 2002 and submitted to the Idaho legislature in 2003. This plan will make recommendations for improving, developing, and conserving water resources.

## **14. PROJECT AREA MAP**

See Attachment 1.

/s/

RICHARD P. WAGENAAR  
LTC, EN  
Commanding



Attachment 1.