

# CHAPTER I

## INTRODUCTION

In 2000, the United States Department of the Interior, Bureau of Reclamation, Mid-Pacific Region (Reclamation), reinitiated a feasibility-scope investigation focusing on evaluating the potential of enlarging Shasta Dam. The dam would be enlarged primarily for increased water supply reliability and water quality improvement, with the potential to consider limited hydropower generation and flood damage reduction. This investigation is being conducted at the direction of Congress and supports other and ongoing Federal interests within the study area described below.

A Mission Statement Milestone Report (MSMR) for the Shasta Lake Water Resources Investigation (SLWRI) was completed in March 2003. The MSMR outlines the resource problems, study objectives, and mission statement for the SLWRI, and sets forth several concepts to address the identified problems.

### PURPOSE AND NEED FOR ACTION

The purpose of the SLWRI is to develop an implementable plan primarily involving modifying Shasta Dam and Reservoir to promote increased survival of anadromous fish populations in the upper Sacramento River; promote increased water supply reliability to the Central Valley Project (CVP); and to the extent possible through meeting these objectives, include features to benefit other identified ecosystem, flood control, and related water resources needs.

### STUDY AREA LOCATION AND DESCRIPTION

The primary study area for the SLWRI is Shasta Dam and Reservoir; inflowing rivers and streams, including the Sacramento River, McCloud River, Pit River, and Squaw Creek; and the Sacramento River downstream to about the Red Bluff Diversion Dam (RBDD). **Plate 1** is a map showing the primary study area within the Sacramento River Basin. **Plate 2** shows the Shasta Reservoir area. The RBDD was chosen as the downstream boundary of the primary study area because it is the point at which releases from Shasta Dam begin to have a negligible effect on Sacramento River water temperatures, and the river landscape changes to a broader, alluvial stream system.

Due to the potential influence of a modification of Shasta Dam on other programs and projects in the Central Valley, an extended study area includes areas that could be affected by a potential enlargement of Shasta Dam and Reservoir. The extended study area primarily includes the Sacramento River watershed, American River Basin, Sacramento-San Joaquin River Delta (Delta), and San Joaquin River Basin. California's Central Valley is home to more than 4 million people and a wide variety of fish and wildlife, including about 180 special-status plant and animal species. The river basins provide drinking water to over two-thirds of Californians. The robust economy of this region centers on an agricultural industry that is a major source of reliable, high-quality crops marketed to the nation and the world.

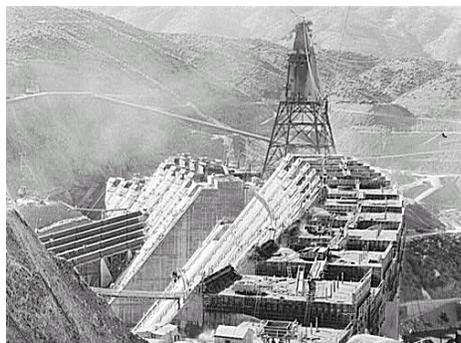
Shasta Dam and Reservoir are located on the upper Sacramento River in Northern California, as shown in **Figure I-1**, about 9 miles northwest of the City of Redding (see **Plate 1**); the entire

reservoir is within Shasta County. Shasta Lake has about 400 miles of shoreline. The reservoir controls runoff from about 6,420 square miles. The four major tributaries to Shasta Lake are the Sacramento River, McCloud River, Pit River, and Squaw Creek, in addition to numerous minor tributary creeks and streams.

- **Upper Sacramento River** – The upper Sacramento River drains an area of roughly 430 square miles. Its headwaters include portions of Mount Shasta and the Trinity and Klamath mountains. It flows south for approximately 40 miles before entering Shasta Lake.
- **McCloud River** – The McCloud River basin drains an area of about 600 square miles. Its headwaters are at Colby Meadows near Bartle. The river flows southwesterly for approximately 50 miles to its terminus at Shasta Lake.
- **Pit River** – The Pit River watershed is located in northeastern California and southeastern Oregon. The north and south forks of the Pit River drain the northern portion of the watershed. The north fork of the Pit River originates at the outlet of Goose Lake and the south fork originates in the south Warner Mountains at Moon Lake in Lassen County. The Pit River is joined by the Fall River in Shasta County. The Pit River has 21 named tributaries, totaling about 1,050 miles of perennial stream and encompassing approximately 4,700 square miles.
- **Squaw Creek** – The Squaw Creek watershed is located east of Shasta Lake and drains 103 square miles. It flows to the southwest through generally steep terrain.



**Figure I-1 – Shasta Dam and Reservoir are located north of Redding on the Sacramento River.**



**Figure I-2 – Shasta Dam under construction, looking from east to west.**

Most of the outflow from Shasta Dam travels south in the Sacramento River to the Delta. From the Delta, flows mingle with runoff primarily from the San Joaquin River watershed and flow to the Pacific Ocean through San Francisco Bay. The total drainage area of the Sacramento River at the Delta is about 26,300 square miles. The average annual runoff volume to the Delta from the Sacramento River watershed is about 17.2 million acre-feet (MAF). This represents about 62 percent of the total 27.8 MAF inflow to the Delta.

Shasta Dam was constructed from September 1938 to June 1945. Storage of water in Shasta Lake began in December 1943. Gates, valves, and other items of finish work, deferred during World War II, were completed following the war and the project was placed in full operation in April 1949. Approximately 37 miles of the Union Pacific Railroad (UPRR) main line to Portland, Oregon, and 21 miles of U.S. Highway 99 (I-5) were relocated around the reservoir during this period. When constructed, Shasta Dam was the second highest and second largest concrete dam in the world. It was exceeded only by Boulder Dam (Hoover Dam) in height and by Grand Coulee Dam in volume; however, many dams now rank above it in both respects.

Shasta Reservoir delivers about 55 percent of the total annual water supply developed by the CVP. The Shasta Dam and Reservoir project was constructed by Reclamation as an integral element of the CVP for six purposes: irrigation water supply, municipal and industrial (M&I) water supply, flood control, hydropower generation, fish and wildlife conservation, and navigation. Shasta Lake also supports vigorous water-oriented recreation. For flood control, Reclamation operates the facility in accordance with guidelines provided by the United States Army Corps of Engineers (Corps). All outflows from Shasta Dam flow into and through Keswick Reservoir, located about 5 miles west of Redding. Keswick Reservoir also receives inflows from Whiskeytown Reservoir on Clear Creek.



**Figure I-3 – Today, Shasta Dam (shown here), and Friant Dam on the upper San Joaquin River, are two of the primary features of the CVP.**

## STUDY AUTHORIZATION

On August 30, 1935, in the Rivers and Harbors Bill, an initial amount of Federal funds was authorized for constructing Kennett (now Shasta) Dam. Fundamental authorization for the SLWRI derives from the 1980 Public Law (PL) 96-375. This law authorized the Secretary of the Interior to engage in feasibility studies relating to (1) enlarging Shasta Dam and Reservoir, or constructing a replacement dam on the Sacramento River and (2) using the Sacramento River to convey water from an enlarged dam. The Central Valley Project Improvement Act (CVPIA) of 1992 (PL 102-575) is another piece of legislation pertinent to the SLWRI because of its

influence on water supply deliveries, river flows, and related environmental conditions in the primary and extended study areas.

## **PURPOSE AND SCOPE**

The primary purpose of this Initial Alternatives Information Report (IAIR) is to describe the formulation of initial alternatives to address planning objectives established for the SLWRI. From these initial alternatives, detailed alternative plans will be developed in the remainder of the feasibility study.

The scope of the report includes the following topics:

- Description of existing and likely future water resources and related conditions in the study area, and related problems, needs, and opportunities being addressed in the study.
- Development of planning objectives to address identified problems, needs, and opportunities, and a Mission Statement to support these planning objectives.
- Identification of the planning constraints, guiding principles, and criteria for the feasibility study.
- Identification and evaluation of individual water resources management measures to address each of the planning objectives.
- From the identified management measures, formulation of a set of concept plans that represent a range of actions that could address the planning objectives.
- From the concepts, identification of a recommended set of initial alternatives to be further developed in the feasibility study.
- Identification of potential major future actions for the feasibility study.

This IAIR will be used as an initial component of the feasibility report. Conclusions and recommendations regarding further evaluations are expected to evolve as the study progresses.

## **REPORT ORGANIZATION**

In addition to this chapter, the IAIR is organized into five sections:

1. Chapters II, III, and IV highlight related studies, projects, and programs; define existing and projected future without-project water resources and related conditions; and describe fundamental problems being addressed in the investigation.
2. Chapter V describes the plan formulation process; defines planning objectives for the investigation; identifies planning constraints, principles, and criteria; and includes the Mission Statement for the investigation.
3. Chapter VI describes potential resources management measures that could address the planning objectives and highlights those measures carried forward for inclusion into concept plans.

4. Chapters VII and VIII describe the formulation of concept plans and identification of initial alternatives for further development in the feasibility study.
5. Chapters IX through XII include special topics, information on study management and public involvement, future actions needed to complete interim documents and the final feasibility report, and a summary of findings.

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