State of California
The Resources Agency
Department of Water Resources

RELATIONSHIP ASSESSMENT OF FISH/WILDLIFE MANAGEMENT AND RECREATION

FINAL

R-4

Oroville Facilities Relicensing
FERC Project No. 2100

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FERC Project No. 2100

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This report was prepared under the general direction of DWR staff. Opinions, findings, and conclusions expressed in this report are those of the authors. This report does not express the official position of DWR unless specifically approved by the Director or his designee.

REPORT SUMMARY

The main objective of this study is to identify the effects of fish and wildlife management on providing recreational opportunities within the study area. The California Department of Fish and Game (DFG), the California Department of Water Resources (DWR), and California Department of Parks and Recreation (DPR) are responsible for fish- and wildlife-related recreation management both in the study area and in California as a whole; however, DFG holds the principal jurisdiction for fish and wildlife management under the various applicable laws and codes. This study describes the range of current fish- and wildlife-related recreational opportunities available in the study area, mainly focusing on the 11,870-acre Oroville Wildlife Area (OWA) and the 28,000-acre Lake Oroville State Recreation Area (LOSRA), and summarizes agency roles. It also suggests fish and wildlife management actions to maintain or enhance those opportunities.

METHODOLOGY

During the scoping and issues identification phase of the Oroville Facilities relicensing effort (Federal Energy Regulatory Commission [FERC] Project No. 2100), several issues were raised regarding the role that agencies with management responsibility can play to enhance fish- and wildlife-based recreation in the LOSRA and OWA, including hunting, fishing, wildlife viewing, and nature study.

This study is designed to incorporate research, interviews, survey results, and site visits to accomplish the tasks outlined in the study plan. Research focuses on review of existing management plans, laws, codes, agreements, and reports to understand the managing agencies' goals and legal requirements.

STUDY AREA AND RECREATIONAL OPPORTUNITIES

The lands within the Project Area, including the OWA and the LOSRA, provide opportunities for hunting and fishing. Different regulations apply to each area. Fishing- and hunting-related facilities and access are diverse and located throughout the study area, although opportunities are more numerous in the OWA than in the LOSRA. Additionally, the Feather River Fish Hatchery provides interpretive programs to individuals and groups throughout the year. Visitors can study nature and view wildlife throughout the study area by using numerous trails to upland areas and boat launching facilities that provide access to surface waters.

Habitat

OWA wildlife habitat consists primarily of valley/foothill riparian, annual grassland, riverine, and lacustrine (lake-type) habitats, with a small area of blue oak–foothill pine. The Project area offers large areas of high quality wildlife habitat consisting primarily of lacustrine, blue oak–foothill pine, Sierran mixed conifer, ponderosa pine, and montane hardwood habitats.

When Oroville Dam was constructed, spawning grounds above the dam were made inaccessible to salmon and steelhead. DWR established the Feather River Fish Hatchery to compensate for this loss. A fish stocking program for Lake Oroville was later established to enhance the coldwater angling opportunities.

Loss of cover, which provides spawning and nursery habitat for warm-water fishes, is believed to be related to observed declines in standing crops of centrarchid species as a result of reduced food availability and higher predation upon young-of-year fishes in Lake Oroville. The goal of Lake Oroville fish habitat improvement activities is to enhance the year-class strength of warm-water sport fish through the addition of protective micro-cover and increased productivity of nursery areas (DWR 1995).

DEPARTMENT OF FISH AND GAME

Since DFG is the State agency primarily responsible for fish and wildlife management within the Project area, this study presents a summary of current DFG management practices. This study also includes a summary of the current locations for hunting, fishing, wildlife viewing, and nature study opportunities within the study area.

DFG's role in the OWA includes possessory interests and management responsibility, as "control and possession" of the OWA was transferred to DFG by DWR in stages over several years after Oroville Dam was constructed. Ideally, DFG manages wildlife areas to protect and enhance fish and wildlife habitat and the populations that depend on them, while allowing compatible recreation in the areas used by the public only to the extent that such uses do not interfere with the primary goals of fish and wildlife management. The OWA is managed under the guidelines set forth in the California Fish and Game Code, the California Code of Regulations (CCR), and the California Fish and Game Commission's policies. Additionally, under the California Fish and Game Code, DFG enforces fish and wildlife regulations throughout the State of California (including the LOSRA). The Davis–Dolwig Act of 1961 set forth provisions for fish and wildlife enhancement and recreation as "among the purposes of state water projects." Thus, it was under the guidance of the Davis-Dolwig Act that the OWA and the LOSRA were established for fish and wildlife enhancement and recreation, respectively.

The results of this study also include suggested methods for DFG to maintain and enhance fish- and wildlife-related recreation opportunities. Limitations currently inhibiting DFG management are summarized and recommendations are made for fish and wildlife management actions that may be needed. Additionally, this study identifies fish and wildlife management issues of other agencies such as the USFWS and the National Oceanic and Atmospheric Administration (NOAA) Fisheries as they relate to the study area. The results of this study may be used to validate the existing management structure or to formulate recommendations, including current and proposed funding and staffing of the fish and wildlife management agencies.

Current DFG staffing and funding levels, among other issues, may be interfering with or limiting effective and efficient fish and wildlife management. The OWA has recently operated at one-eighth to one-fifth of the budget of the three other staffed Wildlife Areas in the region. Because of limited staff and overall funding, fish and wildlife management and related law enforcement capabilities are limited. Visitor uses are not currently monitored or enforced specifically to benefit wildlife in the study area, although such management is identified in the 1978 OWA management plan.

Besides OWA-related expenditures, DFG also makes or shares expenditures within the Project Area in several areas. The activities supported by these expenditures include monitoring of the fishery, fish pathology, studying the benefits of the recreational fishery, genetic research, construction of fish habitat, evaluation of pollution in the fishery, operation of the management lands, fish population surveys, and law enforcement.

DEPARTMENT OF WATER RESOURCES

DWR also participates in fish and wildlife management, including fisheries and habitat management. For example, DWR has funded all of the Chinook salmon tagging for Lake Oroville, at a cost of approximately $245,000 to date. This DWR funding has resulted in increased reliability of Lake Oroville salmonid stocking, addressing one of the primary concerns of the local coldwater angling public. DWR also funds a contract with the Butte County Sheriff's Department for boat patrol on the Afterbay portion of the OWA. DWR has assisted DFG with fish rearing and stocking, and with developing management protocols at the Feather River Fish Hatchery.

DEPARTMENT OF PARKS AND RECREATION

LOSRA lands and facilities are managed primarily by DPR. Although LOSRA includes large areas of varied, high quality wildlife habitat, the area is managed primarily for the other recreational opportunities provided in the area, rather than for fish and wildlife. Wildlife management, while not a primary purpose, is within the scope of DPR authority as dictated by the California Public Resources Code, State Parks and Recreation Commission policies, and DPR Resource Management Directives.

HUNTING

The Project Area, mainly the LOSRA and the OWA, are popular hunting destinations. Hunting is permitted in the OWA from September 1 through January 31 during open seasons for authorized species. Hunting in the LOSRA is limited to certain areas but is permitted during the same times as in the OWA, and also during the spring turkey season. Hunting data were collected on two specific hunter surveys. Based on activity data, it is estimated that 3 percent of visitors participate in hunting within the OWA. Hunting within the entire Project area accounts for nearly 14,000 recreation days (RDs) each year (EDAW 2003b).

Respondents to the Hunter-Focused On-Site Survey respondents identified Thermalito Afterbay, South OWA (east and west of the Feather River), and North OWA (north of the Thermalito Afterbay outlet and south of State Route 162) as the most popular hunting areas. Respondents offered several reasons for choosing to hunt in the study area rather than in other public hunting areas in northern California, including:

- Proximity, accessibility, and no fees;
- Good habitat and game populations;
- Light to moderate crowding;
- Special events (e.g., junior hunts); and
- Recommendations from friends or family (EDAW 2003a).

While the majority of hunters indicated that they were satisfied, approximately 24 percent of respondents to the Hunter-Focused On-Site Survey indicated some degree of dissatisfaction with their hunting experience in the Lake Oroville area, including:

- Low game populations;
- Poor habitat (overgrowth by aquatic plants, lack of water/low water level);
- Negative encounters with other visitors;
- Unclean or unmaintained areas or facilities; and
- Lack of enforcement of hunting regulations (EDAW 2003b).

In addition, while the majority of respondents to the Hunter-Focused On-Site Survey felt that that the quality of hunting habitat was adequate, approximately 22 percent suggested that habitat could be improved. Nearly 70 percent indicated that lands for hunting were “too few” (EDAW 2003a).

FISHING

According to surveys recently conducted as part of the relicensing effort, bank fishing and boat fishing are the first and fifth most common primary activities of visitors to LOSRA, respectively, and the two most common primary activities of visitors to the OWA. Approximately 30 percent of survey respondents participated in bank fishing. Approximately 26 percent of survey respondents participated in boat fishing (EDAW 2003a). Fishing is permitted throughout the study area with the appropriate State-issued license, stamps, and cards as required under State law.

Salmon and black bass are the most frequently sought species; 22 percent of anglers listed each of these as the species they were fishing for on the day they were surveyed. Nine percent of respondents indicated they were fishing for trout (EDAW 2003a).

Approximately 20 percent of the survey respondents listed fishing as their primary reason for visiting the study area. Of the 27 percent of survey respondents to the On-Site Recreation Survey who listed bank or boat fishing as their primary activity, over half

were satisfied with their experiences in the Lake Oroville area. Approximately 30 percent indicated some degree of dissatisfaction with the fishing experience in the Lake Oroville area. Although many based their dissatisfaction on their failure to catch any fish, others were dissatisfied for several other reasons including:

- Low lake levels or low flows;
- Small fish size and low fish populations;
- Crowding in fishing areas;
- Unclean or unmaintained areas and facilities, including shorelines;
- Negative encounters with other visitors;
- Poor access to fishing areas; and
- Lack of enforcement of fishing regulations (i.e., people fishing illegally).

In addition, half of survey respondents felt that the number of fish cleaning stations is "about right," and approximately half of respondents felt that the number is "too low."

WILDLIFE VIEWING AND NATURE STUDY

The Project Area provides a wide variety of terrain and habitats that support diverse plant and wildlife communities. The quality and diversity of habitat and wildlife species throughout the study area provide extensive opportunities for nature study and wildlife viewing.

Recently-conducted surveys indicate that nature study and wildlife viewing are the primary activities of 0.8 percent and 0.5 percent, respectively, of respondents surveyed throughout the study area (EDAW 2003a). Additionally, 9 percent of visitors listed nature study and 12 percent listed wildlife viewing as an activity participated in during some part of their visits to the study area (EDAW 2003a).

CONCLUSIONS

In the course of this study, ten fish- and wildlife-related recreation issues were identified as areas for potential maintenance and enhancement actions by management. These issues and actions include:

- Updated Management Agency Structure and Coordination of Regulations: Efforts to coordinate plans, goals, and agency directives through programmatic agreements or memorandums of agreement (MOA) could enhance fish- and wildlife-related recreation. Amendment of the Fish and Game Code could provide for an exception at OWA for established use patterns, recognizing the specific recreation uses there. The transfer of management responsibility for the OWA from DFG to another agency, such as DPR or FRRPD if feasible, is another alternative that would require specific enforcement procedures be codified so that the law would be clear about which codes or rules apply to these areas and enforcement officers would be able to reference a specific code

section when issuing a citation. A third alternative, if implemented, would require that mining leases be terminated (or not renewed) and high-speed boating be prohibited.

- Management Plans: An updated management plan (or plans) is needed to guide the management of the OWA and the management of fish and wildlife throughout the study area; monitoring would likely be an element of plan implementation.

- Staffing and Funding: Staffing and funding, particularly in the OWA, has been identified as a challenge for fish and wildlife management in the study area. The topic of necessary funding is covered in more detail in Study R-5 – *Assessment of Recreation Areas Management*.

- Facilities, Operations and Maintenance: In general, within the Project area, recreation facilities are in good condition and visitors are generally satisfied with their experiences. Respondents to all surveys would like to see less litter throughout the Project area. Litter and illegal dumping are major issues within the OWA. Also, anglers and hunters have stated (in the On-Site Surveys) that there are too few visitor facilities within the OWA.

- Law Enforcement: Respondents to the On-Site and Mail-Back Surveys indicated that they would like to see an increase of routine patrols by existing staff in order to reduce illegal hunting and fishing activities, crime, and other undesirable activities. The multi-agency efforts to address these problems will require coordination for funding resources if they are to be maintained or enhanced in the future. However, within the OWA there are several issues such as illegal dumping and illegal long-term camping that will require actions on the part of area managers.

- Use Levels: On-Site and Hunter-Focused On-Site Survey respondents indicated that they felt slightly crowded at the location where they were surveyed. Periodic monitoring of use levels could help determine if more facilities or lands are needed and in what locations. Study R-8 – *Carrying Capacity* provides a detailed analysis of this issue.

- Land Use: There are few conflicting land uses within the Project area as a whole. However, within the OWA, issues such as high-speed boating on Thermalito Afterbay and gravel extraction will require management resolution in the future. Some possible alternatives are discussed under "Management Agency Structure."

- Access: Management actions that could maintain and improve access include monitoring existing access roads and boat launches and performing maintenance as necessary to maintain the level of access desired. Hunters and anglers

indicated that they would like earlier opening and later closing times during hunting and fishing seasons.

- Habitat: Habitat improvement and enhancement programs should be continued in order to maintain the current level of recreation opportunity. Many Hunter-Focused On-Site Survey respondents felt that the habitat for game species could be improved by adding more food plots and eliminating weeds such as the water primrose that are choking out areas of habitat.

- Water Levels: In order to maintain current recreation opportunities, managers should continue to coordinate modifications of access points, boat launches, and other related facilities in response to changing water levels. Continued habitat improvement programs will also help minimize the impacts of water level fluctuations and flow changes on fish and wildlife and associated recreation.

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ACRONYMS AND ABBREVIATIONS

4WD	four wheel drive
af	acre-feet
ALP	Alternative Licensing Procedures
BLM	U.S. Bureau of Land Management
BR	Boat ramp
Caltrans	California Department of Transportation
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CWA	Clean Water Act
DBW	California Department of Boating and Waterways
Delta	Sacramento–San Joaquin Delta
DFG	California Department of Fish and Game
DPR	California Department of Parks and Recreation
DUA	Day Use Area
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
ESA	Endangered Species Act
FPC	Federal Power Commission
FRRPD	Feather River Recreation and Park District
FRSA	Feather River Service Area
ISO	California Independent System Operator
LFC	Low Flow Channel
LOFEC	Lake Oroville Fish Enhancement Committee
LOSRA	Lake Oroville State Recreation Area
MOA	Memorandum of Agreement
maf	million acre-feet
msl	mean sea level
MW	megawatt
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	NOAA National Marine Fisheries Service
OHV	off-highway vehicle
ORAC	Oroville Recreation Advisory Committee
OWA	Oroville Wildlife Area
RD	Recreation Day
SR	State Route
SWC	State Water Contractors
SWP	California State Water Project
USACE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

1.0 INTRODUCTION

1.1 BACKGROUND INFORMATION

Lake Oroville is the second largest reservoir in California and the keystone of the California State Water Project (SWP), providing water supply, power generation, and flood control benefits. The Lake Oroville State Recreation Area (LOSRA), the Oroville Wildlife Area (OWA), and other area lands owned by the U.S. Forest Service (USFS) and U.S. Bureau of Land Management (BLM) provide a variety of recreational opportunities, with developed use areas such as trails and camping areas, as well as undeveloped and primitive use areas.

During the scoping and issues identification phase of the Oroville Facilities relicensing effort (Federal Energy Regulatory Commission [FERC] Project No. 2100), several issues were raised regarding the role that agencies with management responsibility can play to enhance fish- and wildlife-based recreation in the LOSRA and OWA, including hunting, fishing, wildlife viewing, and nature study. These agencies are the California Department of Fish and Game (DFG), the California Department of Parks and Recreation (DPR), and the California Department of Water Resources (DWR).

This study assesses the effectiveness of current and historic fish and wildlife management strategies in providing recreational opportunities within the study area. The recreational value of hunting, fishing, wildlife viewing, and nature study in the study area is assessed by examining current fish and wildlife conditions, regulations, and practices. The current management practices of DFG are presented, as DFG is the primary resource management agency responsible for fish and wildlife management in the study area. Issues associated with fish and wildlife management in the study area are also presented to examine the role that managing agencies can play in enhancing fish- and wildlife-based recreational opportunities within the study area over the term of the new license.

1.2 STUDY AREA

The study area includes Lake Oroville, Thermalito Diversion Pool, Thermalito Forebay, Thermalito Afterbay, the OWA, the lands and waters within and adjacent to (within one-fourth mile) the FERC Project Boundary, and adjacent lands, facilities, and roads (Figure 1.2-1).

1.3 DESCRIPTION OF FACILITIES

The Oroville Facilities are located on the Feather River at the foothills of the Sierra Nevada in Butte County, California. The Oroville Facilities were developed as part of the SWP, a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants.

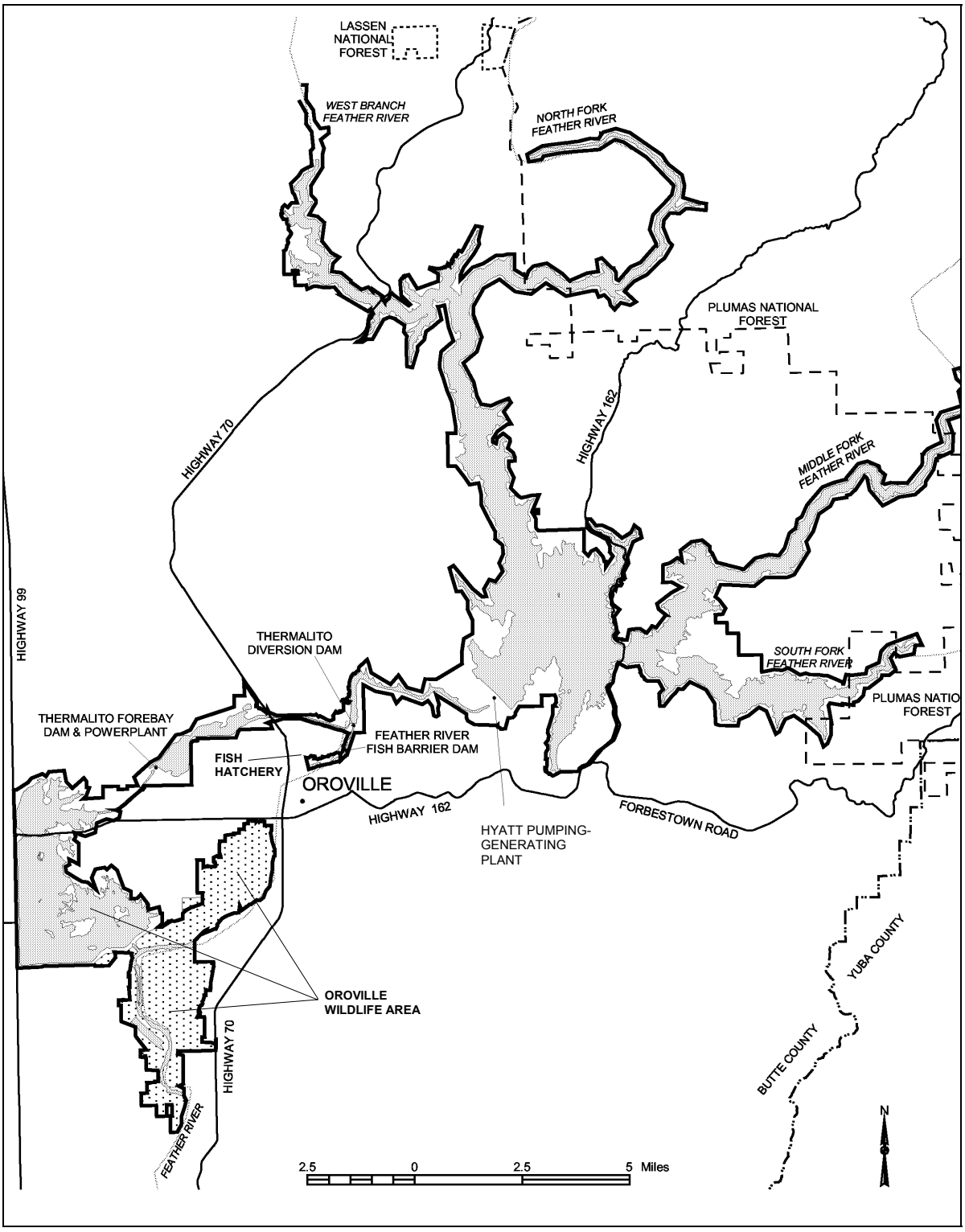

Figure 1.2-1. Oroville Facilities FERC Project 2100 Boundary.

The main purpose of the SWP is to store and distribute water to supplement the needs of urban and agricultural water users in Northern California, the San Francisco Bay area, the San Joaquin Valley, and Southern California. The Oroville Facilities are also operated for flood control power generation, to improve water quality in the Sacramento–San Joaquin Delta (Delta), enhance fish and wildlife, and provide recreation.

FERC Project No. 2100 encompasses 41,100 acres and includes Oroville Dam and Reservoir, three power plants (Hyatt Pumping-Generating Plant, Thermalito Diversion Dam Power Plant, and Thermalito Pumping-Generating Plant), Thermalito Diversion Dam, the Feather River Fish Hatchery and Fish Barrier Dam, Thermalito Power Canal, the OWA, Thermalito Forebay and Forebay Dam, Thermalito Afterbay and Afterbay Dam, transmission lines, and a relatively large number of recreational facilities. An overview of these facilities is provided in Figure 1.2-1. Oroville Dam, along with two small saddle dams, impounds Lake Oroville, a 3.5-million-acre-foot (maf) capacity storage reservoir with a surface area of 15,810 acres at its maximum normal operating level of 900 feet above mean sea level (msl).

The hydroelectric facilities have a combined licensed generating capacity of approximately 762 megawatts (MW). The Hyatt Pumping-Generating Plant is the largest of the three power plants with a capacity of 645 MW. Water from the six-unit underground power plant (three conventional generating and three pumping-generating units) is discharged through two tunnels into the Feather River just downstream of Oroville Dam. The plant has a generating and pumping flow capacity of 16,950 and 5,610 cubic feet per second (cfs), respectively. Other generation facilities include the 3-MW Thermalito Diversion Dam Power Plant and the 114-MW Thermalito Pumping-Generating Plant.

Thermalito Diversion Dam, 4 miles downstream of Oroville Dam, creates a tail water pool for the Hyatt Pumping-Generating Plant and is used to divert water into the Thermalito Power Canal. Thermalito Diversion Dam Power Plant is located on the left abutment of the Diversion Dam. The power plant releases a maximum of 615 cfs of water into the river.

The power canal is a 10,000-foot-long channel designed to convey generating flows of 16,900 cfs to Thermalito Forebay and pump-back flows to the Hyatt Pumping-Generating Plant. Thermalito Forebay is an off-stream regulating reservoir for the 114-MW Thermalito Pumping-Generating Plant. The Thermalito Pumping-Generating Plant is designed to operate in tandem with the Hyatt Pumping-Generating Plant and has generating and pump-back flow capacities of 17,400 cfs and 9,120 cfs, respectively. When in generating mode, the Thermalito Pumping-Generating Plant discharges into Thermalito Afterbay, which is contained by a 42,000-foot-long earthfill dam. Thermalito Afterbay is used to release water into the Feather River downstream of the Oroville Facilities, helps regulate the power system, provides storage for pump-back operations,

provides recreational opportunities, and provides local irrigation water. Several local irrigation districts also receive Lake Oroville water via Thermalito Afterbay. The Feather River Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. The flow over the dam maintains fish habitat in the low-flow channel (LFC) of the Feather River between the dam and the Thermalito Afterbay outlet, and provides attraction flow for the hatchery. The hatchery is an anadromous fish hatchery intended to compensate for salmon and steelhead spawning grounds made unreachable by construction of Oroville Dam. Hatchery facilities have a production capacity of 10 million fall-run salmon, 5 million spring-run salmon, and 450,000 steelhead annually (pers. comm., Kastner 2003). However, diseases have reduced hatchery production in some recent years.

The Oroville Facilities support a wide variety of recreational opportunities. They include boating (several types), fishing (several types), fully developed and primitive camping (including boat-in and floating sites), picnicking, swimming, horseback riding, hiking, off-road bicycle riding, wildlife watching, hunting, and visitor information sites with cultural and informational displays about the developed facilities and the natural environment. There are major recreation facilities at Loafer Creek, Bidwell Canyon, Spillway, Lime Saddle, and Thermalito Forebay. Lake Oroville has two full-service marinas, five car-top boat launch ramps, ten floating campsites, and seven two-stall floating toilets. There are also recreation facilities in the OWA, the Thermalito Afterbay, and at the Lake Oroville Visitors Center.

The OWA comprises approximately 11,000 acres southwest of Oroville that is managed for wildlife habitat and recreational activities. It includes the Thermalito Afterbay and surrounding lands (approximately 6,000 acres) along with 5,000 acres adjoining the Feather River. The latter acreage is adjacent to or straddles 12 miles of the Feather River, and includes willow- and cottonwood-lined ponds, islands, and channels. Recreational opportunities include dispersed recreation (hunting, fishing, and bird watching); recreational activities also take place at developed sites (the Monument Hill Day Use Area [DUA], model airplane grounds, and three boat launches on Thermalito Afterbay and two on the river) and in a primitive camping area. DFG's habitat enhancement program includes a wood duck nest-box program and dry land farming for nesting cover and improved wildlife forage. Limited gravel extraction also occurs in a few locations.

1.4 CURRENT OPERATIONAL CONSTRAINTS

Operation of the Oroville Facilities varies seasonally, weekly, and hourly, depending on hydrology and the objectives DWR is trying to meet. Typically, releases to the Feather River are managed to conserve water while meeting a variety of water delivery requirements, including flow, temperature, fisheries, diversion, and water quality. Lake Oroville stores winter and spring runoff for release to the Feather River as necessary for Project purposes. Meeting the water supply objectives of the SWP has always been the primary consideration for determining Oroville Facilities operation (within the regulatory

constraints specified for flood control, in-stream fisheries, and downstream uses). Power production is scheduled within the boundaries specified by the water operations criteria noted above. Annual operations planning is conducted for multi-year carryover storage. The current methodology is to retain half of the Lake Oroville storage above a specific level for subsequent years. Currently, that level has been established at 1.0 maf; however, this does not limit drawdown of the reservoir below that level. If hydrology is drier or requirements are greater than expected, additional water could be released from Lake Oroville. The operations plan is updated regularly to reflect forecast changes in hydrology and downstream operations. Typically, Lake Oroville is filled to its maximum operating level of 900 feet above msl in June and then lowered as necessary to meet downstream requirements, to a minimum level in December or January (approximately 700 msl). During drier years, the reservoir may be drawn down more and may not fill to desired levels the following spring. Project operations are directly constrained by downstream operational demands and flood management criteria as described below.

1.4.1 Downstream Operation

An August 1983 agreement between DWR and DFG, entitled "Agreement Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish & Wildlife" (DWR and DFG 1983) sets criteria and objectives for flow and temperatures in the LFC and the reach of the Feather River between Thermalito Afterbay and Verona. This agreement: (1) establishes minimum flows between Thermalito Afterbay outlet and Verona that vary by water year type; (2) requires flow changes under 2,500 cfs to be reduced by no more than 200 cfs during any 24-hour period (except for flood management, failures, etc.); (3) requires flow stability during the peak of the fall-run Chinook salmon spawning season; and (4) sets an objective of suitable temperature conditions during the fall months for salmon and during the later spring/summer for shad and striped bass.

1.4.1.1 In-Stream Flow Requirements

The Oroville Facilities are operated to meet minimum flows in the Lower Feather River as established by the 1983 agreement (see above). The agreement specifies that the Oroville Facilities release a minimum of 600 cfs into the Feather River from the Thermalito Diversion Dam for fisheries purposes. This is the total volume of flows from the diversion dam outlet, diversion dam power plant, and the Feather River Fish Hatchery pipeline.

Generally, the in-stream flow requirements below Thermalito Afterbay are 1,700 cfs from October through March, and 1,000 cfs from April through September. However, if runoff for the previous April through July period is less than 1,942,000 acre-feet (i.e., the 1911–60 mean unimpaired runoff near Oroville), the minimum flow can be reduced to 1,200 cfs from October to February and 1,000 cfs for March. A maximum flow of 2,500 cfs is not exceeded between October 15 and November 30 to prevent spawning in overbank areas that might later become dewatered.

1.4.1.2 Temperature Requirements

The Thermalito Diversion Pool provides the water supply for the Feather River Fish Hatchery. The hatchery temperature objectives are 52°F for September, 51°F for October and November, 55°F for December through March, 51°F for April through May 15, 55°F for the last half of May, 56°F for June 1–15, 60°F for June 16 through August 15, and 58°F for August 16–31. In April through November, a temperature range of plus or minus 4°F is allowed for objectives.

There are several temperature objectives for the Feather River downstream of the Thermalito Afterbay outlet. During the fall months, after September 15, the temperatures must be suitable for fall-run Chinook salmon. From May through August, the temperatures must be suitable for shad, striped bass, and other warm-water fish.

The National Oceanic and Atmospheric Administration Fisheries' National Marine Fisheries Service (NOAA Fisheries) has also established an explicit criterion for steelhead trout and spring-run Chinook salmon, memorialized in a biological opinion on the effects of the Central Valley Project and the SWP on Central Valley spring-run Chinook and steelhead. As a reasonable and prudent measure, DWR attempts to control water temperature at Feather River mile 61.6 (Robinson's Riffle in the LFC) from June 1 through September 30. This measure attempts to maintain water temperatures at less than or equal to 65°F on a daily average. The requirement is not intended to preclude pump-back operations at the Oroville Facilities needed to assist the State of California with supplying energy during periods when the California Independent System Operator (ISO) anticipates a Stage 2 or higher alert.

The hatchery and river water temperature objectives sometimes conflict with temperatures desired by agricultural diverters. Under existing agreements, DWR provides water for the Feather River Service Area (FRSA) contractors. The contractors claim a need for warmer water during spring and summer for rice germination and growth (i.e., minimum 65°F from approximately April through mid-May, and minimum 59°F during the remainder of the growing season), although there is no explicit obligation for DWR to meet the rice water temperature goals. However, to the extent practical, DWR does use its operational flexibility to accommodate the FRSA contractors' temperature goals.

1.4.1.3 Water Diversions

Monthly irrigation diversions of up to 190,000 af (July 2002) are made from the Thermalito Complex during the May through August irrigation season. The total annual entitlement of the Butte and Sutter County agricultural users is approximately 1.0 maf. After meeting these local demands, flows into the lower Feather River (and outside of the Project 2100 Boundary) continue into the Sacramento River and into the Delta. In the northwestern portion of the Delta, water is pumped into the North Bay Aqueduct. In

the south Delta, water is diverted into Clifton Court Forebay, where the water is stored until it is pumped into the California Aqueduct.

1.4.1.4 Water Quality

Flows through the Delta are maintained to meet Bay-Delta water quality standards arising from DWR's water rights permits. These standards are designed to meet several water quality objectives such as salinity, Delta outflow, river flows, and export limits. The purpose of these objectives is to attain the highest reasonable water quality, considering all demands being made on Bay-Delta waters. In particular, they protect a wide range of fish and wildlife including Chinook salmon, Delta smelt, striped bass, and the habitat of estuarine-dependent species.

1.4.2 Flood Management

The Oroville Facilities are an integral component of the flood management system for the Sacramento Valley. During the wintertime, the Oroville Facilities are operated under flood control requirements specified by the U.S. Army Corps of Engineers (USACE). Under these requirements, Lake Oroville is operated to maintain up to 750,000 af of storage space to allow for the capture of significant inflows. Flood control releases are based on the release schedule in the flood control diagram or the emergency spillway release diagram prepared by USACE, whichever requires the greater release. Decisions regarding such releases are made in consultation with USACE.

The flood control requirements are an example of multiple use of reservoir space. When flood management space is not required to accomplish flood management objectives, the reservoir space can be used for storing water. From October through March, the maximum allowable storage limit (the point at which specific flood releases would have to be made) varies from about 2.8 to 3.2 maf to ensure adequate space in Lake Oroville to handle flood flows. The actual encroachment demarcation is based on a wetness index, computed from accumulated basin precipitation. This allows higher levels in the reservoir when the prevailing hydrology is dry. When the wetness index is high in the basin (i.e., high potential runoff from the watershed above Lake Oroville), required flood management space is at its greatest to provide the necessary flood protection. From April through June, the maximum allowable storage limit is increased as the flooding potential decreases, which allows capture of the higher spring flows for use later in the year. During September, the maximum allowable storage decreases again to prepare for the next flood season. During flood events, actual storage may encroach into the flood reservation zone to prevent or minimize downstream flooding along the Feather River.

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2.0 NEED FOR STUDY

This study is needed to identify the relationship of fish and wildlife management on providing recreational opportunities within the study area. This study describes the range of current fish- and wildlife-related recreational opportunities available in the study area in the OWA and the LOSRA, and summarizes the legal authority under which DFG and other agencies operate.

This study is also needed to describe the relationship of agencies' respective responsibilities as they relate to recreation and fish and wildlife enhancement. Under the Davis-Dolwig Act, DWR is responsible for planning for fish and wildlife enhancements and recreational opportunities as a component of SWP facilities. The Act also stipulates the respective responsibilities of DFG and DPR for management of these resources at SWP facilities. However, the conditions of DWR's FERC license require DWR to meet the needs for fish and wildlife enhancements and associated recreational opportunities in conjunction with operation of the Oroville Facilities.

2.1 STATUTORY/REGULATORY REQUIREMENTS

As part of its relicensing requirements, FERC requires "a statement of the existing measures…to be continued or maintained…for the purposes of creating, preserving, or enhancing recreational opportunities at the project and in its vicinity" (Chapter 1, Subpart F, Section 4.51 of 18 Code of Federal Regulations [CFR]). Additionally, FERC requires that licensees cooperate with local, State, and federal agencies regarding lands adjacent to the study area (Part 2, Subchapter A, Chapter 1 of 18 CFR). This study assesses the relationship between fish and wildlife management and adequate recreational opportunities within the study area. Fish and wildlife-related recreation (including fishing, hunting, and wildlife viewing/nature study) is common throughout the study area. Therefore, this study meets the need for a description of how agencies are managing lands within the study area for the benefit of fish and wildlife, and evaluates opportunities to enhance related recreational activities.

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3.0 STUDY OBJECTIVE(S)

The main objective of this study is to identify the effects of fish and wildlife management on providing recreational opportunities within the study area. This study assesses the current range of hunting, fishing, wildlife viewing, and nature study opportunities currently provided within the study area. It also identifies some fish and wildlife management actions needed to help maintain or enhance recreational opportunities.

The application of the results from this study will assist DWR in assessing fish and wildlife management recreation-related needs within the study area and the relationship of agency management activities toward providing adequate recreation opportunities over the term of the new license. Management structure can influence the implementation and adaptation of recreation programs. Understanding this is important to developing and maintaining successful recreational programs.

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4.0 METHODOLOGY

This study incorporates research, interviews, surveys, and site visits to accomplish the tasks outlined in the R-4 Study Plan. Research focuses on review of existing management plans, laws, codes, agreements, and reports to understand the managing agencies' goals and legal requirements. This study assesses methods to maintain existing fish- and wildlife-related recreational opportunities by examining information from survey results and interviews with agency personnel.

4.1 EXISTING REPORT REVIEW

Existing agency reports and websites were reviewed for information relevant to the relationship between fish and wildlife management and recreation. The reports are listed in Table 4.1-1.

Table 4.1-1. Agency report references.

California Department of Fish and Game	• 1999-2000 Guide to California's State-Operated Hunting Areas. California Waterfowl Association and Bismuth Cartridge Co; • Hunting and Other Public Uses on State and Federal Areas; • Resident Annual Sportfishing License Sales by County. 1987-1998. (1999). Excel Database File. Sacramento, CA; • Resident Annual Hunting License Sales by County. 1987-1997; • 1997 and 1998 Hunt Results Comparison List. Wildlife Programs Branch; • Maps of Selected State and Federal Wildlife Areas/Refuges in California; • Fish and Game Fact Sheet. Public Affairs/Conservation Education; and • Lands Inventory Fact Sheet. Public Affairs/Conservation Education.
US Fish and Wildlife Service	• The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. 1999. Background, 1996 Survey Information, Survey Content, Reports and Products, Highlights and Trends; • 1996 National Survey of Fishing, Hunting and Wildlife-Associated Recreation. California; • 1996 National Survey of Fishing, Hunting and Wildlife-Associated Recreation; • 1991 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation; • 1985 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation; and • 1980–1995 Participation in Fishing, Hunting, and Wildlife Watching: National and Regional Demographic Trends.

Source: R-4 Study Plan 2001.

Research also included the review of the studies listed in Table 4.1-2 for information relevant to fish and wildlife management and recreation, as well as for information pertaining to this study and for consistency of research and analyses. Pertinent data were summarized and/or referenced where applicable to this study.

Table 4.1-2. Recreation reports reviewed for Study R-4.

Oroville Facilities Relicensing Study	Information Obtained
Study R-5 – *Assessment of Recreation Areas Management* (draft)	Overall recreation management, including lands and facilities management and how fish- and wildlife-based recreation management fits into the overall recreational opportunities available within the study area.
Study R-9 – *Existing Recreation Use*	The existing level of use at the OWA and the existing level of fish- and wildlife-related recreation in the study area.
Study R-10 – *Recreation Facility and Condition Inventory*	Existing facilities, specifically facilities in the OWA and fish- and wildlife-related facilities (public hunting blinds, fish cleaning stations, etc.).
Study R-11 – *Recreation and Public Use Impact Assessment*	Impacts associated with public uses, specifically impacts on fish and wildlife resources and impacts from fish- and wildlife-related recreation.
Study R-12 – *Projected Recreation Use*	Projected recreation use and trends, specifically projected use levels and trends associated with fish- and wildlife-related recreation.
Study R-13 – *Recreation Surveys*	Uses, user preferences, user satisfaction, and suggested improvements, specifically where associated with fish- and wildlife-related recreation.
Study L-1 – *Land Use* (draft) Study L-2 – *Land Management*	Reviewed and referenced for this study to ensure consistency with similar data presented herein.

4.2 INTERVIEWS

In addition to document review, interviews were conducted with DFG, DWR, DPR, the Oroville Recreation Advisory Committee (ORAC), Feather River Recreation and Park District (FRRPD), the California Department of Boating and Waterways (DBW), State Water Contractors (SWC), U.S. Fish and Wildlife Service (USFWS), and the Butte County Relicensing Team. These entities are involved to varying degrees in recreation development, management, advocacy, and/or planning in the study area. Interviews were conducted to gain a better understanding of current and past fish and wildlife recreation opportunities, as well as practices, resources, issues, and conflicts related to fish and wildlife management.

4.3 USE OF SURVEY DATA

To provide information for the several recreation studies being carried out as part of the relicensing effort, surveys were conducted throughout the study area between May 2002 and June 2003. Those who participated in the On-Site Surveys were asked to also respond to a follow-up Mail-Back Survey.

Recreational anglers were asked to fill out a fishing section in the On-Site Survey. Hunters were contacted between October 2 and April 3 and given a special Hunter-Focused On-Site Survey to capture information from upland game bird, waterfowl, and turkey hunters. Hunters who participated in the Hunter-Focused On-Site Survey were given a follow-up Mail-Back Survey. Those participating in wildlife viewing and nature

study were surveyed as part of the Recreation Visitor On-Site Survey and as part of the Mail-Back Survey. Table 4.3-1 lists the various surveys.

The majority of On-Site Surveys were administered during the summertime recreation season (Memorial Day to Labor Day). Because hunting seasons take place primarily between Labor Day and Memorial Day (fall, winter, and spring), the participation rate of hunters measured in the On-Site Surveys (0.8 percent) does not accurately account for hunter participation throughout the year. Information on hunter's experiences, satisfaction, and other parameters was collected through Hunter-Focused On-Site Surveys conducted during the hunting seasons.

Hunter recreation days are provided to give an indication of the amount of hunting participation taking place within the Project area. One recreation day (RD) represents participation in recreation at a site during a single day by one person for any length of time. In Relicensing Study R-9 – *Existing Recreation Use*, existing use is estimated in RDs to conform to FERC's preference in recreation measurement units.

Survey respondents provided information regarding their recreational activities, preferences, and satisfaction, along with additional comments on management issues and suggestions, some of which address fish- and wildlife-related activities and management. Complete survey results are detailed in Study R-13 – *Recreation Surveys;* however, certain results are summarized in this report to assist in providing insight and to assist in crafting potential strategies for enhancing fish- and wildlife-related recreation.

Table 4.3-1. Oroville Facilities Relicensing Surveys used for R-4 analysis

Survey Name	Response Group	Number of Total Respondents[1]
Recreation Visitor On-Site	General visitors	2,583
Mail-Back	General visitors	1,071
Hunter-Focused On-Site	Hunters	106
Hunter-Focused Mail-Back	Hunters	38

[1] *Number of respondents is provided at the bottom of each survey summary table to indicate how many of the total respondents answered a specific question.*
Source: EDAW 2003a-d.

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5.0 STUDY RESULTS

This chapter presents an overview of study results. Study area lands, access, and facilities are described to provide background on where hunting, fishing, wildlife viewing, and nature study are currently being accommodated. The various fish- and wildlife-related recreation opportunities are discussed in terms of agency regulations and species of fish and game. This chapter also describes management practices and authority, including policies, DFG staffing, and budgets. Methods to maintain and enhance existing fish- and wildlife-related recreation opportunities are discussed in Section 6.0, Conclusions.

5.1 STUDY AREA LANDS, ACCESS, AND FACILITIES

This report assesses the relationship between fish and wildlife management and recreation throughout the study area, which includes lands within the LOSRA, within the FERC boundary, and within the OWA (most of which is located within the FERC boundary). Since most hunting and fishing take place within the LOSRA and the OWA, the geographic focus of this report is divided into two primary subdivisions: the OWA and the LOSRA. The OWA (11,870 acres) includes portions of the Feather River and the Thermalito Afterbay. The LOSRA (28,000 acres) includes Lake Oroville, the Thermalito Diversion Pool, and Thermalito Forebay. The Feather River Fish Hatchery is not within the boundary of either the LOSRA or the OWA, but it is within the Project boundary. See Figure 5.1-1 (Project Area and Associated Recreation Sites) and Figure 5.1-2 (Oroville Wildlife Area) for geographic boundaries and facility locations.

5.1.1 Lands and Waters Used for Fish and Wildlife-Related Recreation

Hunting, fishing, wildlife viewing, and nature study are among the many recreational opportunities available within the Project Area, mainly the OWA and LOSRA. In addition to providing this variety of recreational opportunities, the LOSRA encompasses approximately 28,000 acres of diverse habitat for fish and wildlife.

Hunting areas include the entirety of the OWA and portions of the LOSRA. Hunting of all legal species is permitted throughout the OWA from September 1 to January 31 and during the special-draw spring turkey hunt; hunting of resident small-game species is permitted in some areas of the LOSRA.

Fishing areas include waters throughout the OWA (including Thermalito Afterbay), as well as Lake Oroville, Thermalito Forebay, Thermalito Diversion Pool, and the Feather River, excluding the length of the Feather River between the Fish Barrier Dam and the Table Mountain bicycle bridge.

Wildlife viewing and nature study occur at and near the Feather River Fish Hatchery and, less formally, throughout the entire study area.

5.1.1.1 Habitat

Terrain in the study area ranges from ruggedly mountainous in the north and east to very flat in the south and west. The range of terrain provide a wide variety of quality habitat which attract many wildlife species. OWA wildlife habitat consists primarily of valley/foothill riparian, annual grassland, riverine, and lacustrine (lake-type) habitats, with a small area of blue oak–foothill pine. The LOSRA offers large areas of high quality wildlife habitat consisting primarily of lacustrine, blue oak–foothill pine, Sierran mixed conifer, ponderosa pine, and montane hardwood habitats.

Following the removal of earthen materials for Oroville Dam, larger mined areas were revegetated naturally with cottonwood, willow, forbs, and grasses. Several vegetation improvement programs have been implemented over the years, including planting of specific vegetation, removal of invasive and excessively thick brush and aquatic plants, and soil improvement.

After the dam and reservoir were constructed, native vegetative cover was retained at several locations within the inundation zone, to enhance fish habitat. These habitat retention areas greatly improved angling quality, and enhanced the area for water-associated birds.

Water primrose is a native and invasive aquatic plant that is currently found along the margins and backwaters of the Feather River both upstream and downstream of the OWA. As noted by DWR, DFG, and survey respondents, water primrose has been increasing in abundance since the mid-1990s. Specifically, water primrose has invaded the areas of standing water to the east of the Feather River. Prior to the floods of 1997, which broke through the levee on the east side of the OWA, these areas experienced seasonal flooding. Since the floods, however, a small water flow has been passing through the area. This flow has since been dammed by beavers, creating several hundred acres of standing water. The abundance of water primrose in this area has increased dramatically and has spread to inundate many of the deeper, perennial, fish-bearing ponds as well (pers. comm., Atkinson 2003). Current mapping indicated primrose dominates 398 acres in this area (pers. comm., Bogener 2004). Approximately 80 percent of the fish-bearing ponds in this area are now covered with water primrose, and the abundance of water primrose continues to increase (pers. comm., Atkinson 2003).

Some minor habitat improvement projects are currently being implemented. The presence in the OWA of species or habitats protected under the State or federal Endangered Species Acts affect the location of future habitat improvement projects, which are generally restricted to locations outside vernal pool[1] and other wetland areas (see Section 5.2.1.3–Existing Management Activities).

[1] Vernal pools are wet areas that become seasonally inundated with water and support certain sensitive species of wildflowers and fairy shrimp.

Figure 5.1-1. Project Area Recreation Facilities.
[Insert 11x17]

Figure 5.1-1. Project Area Recreation Facilities.
[backside of 11x17]

Figure 5.1-2. Oroville Wildlife Area.
[insert 11x17]

Figure 5.1-2. Oroville Wildlife Area.
[backside of 11x17]

Additionally, reclamation plans (unrelated to existing license conditions) for certain mined areas have not yet been implemented, thus leaving large, disturbed areas that may have reduced value for fish and wildlife habitat and associated recreation.

5.1.1.2 Water Conditions

As with most deep lakes and reservoirs in areas with temperate climates, Lake Oroville stratifies thermally each year, meaning that warmer waters are located near the surface and colder waters are located at deeper elevations. This two-layered system provides an opportunity for both salmonid[2] and centrarchid[3] fisheries to flourish.

The Feather River LFC flows along the eastern edge of the OWA. Under an agreement with DFG, flows are regulated at a minimum of 600 cfs. LFC water temperatures vary from the 40s (°F) during winter to the upper 60s (°F) during summer.

Thermalito Diversion Pool is supplied by water from Lake Oroville's hypolimnion[4] and remains cold year-round, supporting a coldwater fishery.

Thermalito Forebay is supplied by water from the Diversion Pool via the Thermalito Power Canal, and therefore maintains cold temperatures throughout the year and hosts the same species found in the Diversion Pool.

Thermalito Afterbay is a large, relatively shallow reservoir with frequent water fluctuations and a high surface-to-volume ratio. Water temperatures can vary widely around Thermalito Afterbay in the summer, with water in the low 60s (°F) near the tailrace channel and water in the mid-80s (°F) in the backwater areas (DWR 2001a). The diverse temperature structure of Thermalito Afterbay provides suitable habitat for both warm-water and coldwater fish, including a popular largemouth bass fishery.

The Oroville Wildlife Area contains over 75 warm-water ponds and sloughs, along with vast complexes of emergent marsh and flooded cottonwood, willow, and sycamore trees. The OWA ponds are a dynamic environment influenced by rainwater and river stage that support many of the same warm-water species found in Lake Oroville. Some ponds are permanently inundated, while others are seasonal ponds. The OWA provides habitat for largemouth bass, bluegill, green sunfish, carp, black and white crappie, and white catfish. Due to the water temperatures in the OWA ponds, the ponds primarily provide habitat for warm-water fish (DWR 2002a).

[2] Of, belonging to, or characteristic of the family Salmonidae, which includes the salmon, trout, and whitefish.
[3] Small carnivorous freshwater percoid fishes of North America usually having a laterally compressed body and metallic luster, including crappies, black bass, bluegill, and pumpkinseed.
[4] The layer of water in a thermally stratified lake that lies at deeper levels, is non-circulating, and remains perpetually cold.

5.1.1.3 Public Access

The OWA provides access to the majority of the Feather River LFC, the most popular area for steelhead and salmon fishing on the river. There are 13 public access points to the OWA, including Thermalito Afterbay. An area-wide system of unimproved roads (some legal and others illegal) provides access to the northeastern and southern portions of the OWA and to an unimproved camping area located near the Thermalito Afterbay outlet entrance off of Larkin Road.

There are 16 major public access points to the LOSRA. Roads in the recreation area range from unimproved roads to multi-lane highways. These roads provide access to areas surrounding Lake Oroville, Thermalito Forebay, Thermalito Diversion Pool, and all branches of the Feather River. In addition, trail systems surround the northern and southern portions of Lake Oroville and the North Fork and Middle Fork Feather River, providing foot access to more remote areas.[5]

Fishing in the Diversion Pool takes place predominantly from the shore, primarily with artificial lures. Fishing in Thermalito Forebay occurs from both the shore and boats. In Lake Oroville, anglers often frequent the reservoir's quieter coves, where there are fewer water skiers, although fishing is common from the shore and throughout the reservoir. Anglers also seek the quieter ends of the reservoir's arms, which are far out of the way for most of the social boaters who are generally interested in being near other boaters.

5.1.2 Facilities Used for Wildlife-Related Recreation

Throughout the OWA, developed facilities are minimal. The primitive camping area is located near the Larkin Road access point (Thermalito Afterbay outlet)[6], and day use facilities (including trail access, boat launching, and parking areas) are located at the Larkin Road, Wilbur Road, and Monument Hill access areas. Restrooms are located at the camping area and day use areas (the Wilbur Road restroom facility is a portable toilet). No public telephones are available within the OWA. Fish and wildlife-related facilities also include hunting blinds located within the OWA. There is one fish cleaning station at the Monument Hill Boat Ramp (BR)/Day Use Area (DUA). There are several places to launch boats around Thermalito Afterbay.

A wide range of recreation facilities is available in the LOSRA, including fish cleaning stations, boat launches, concessions, day use areas, primitive and full hook-up campgrounds, boat-in camp grounds areas, floating campsites, swimming areas, hiking

[5] Detailed information regarding vehicular access and trails throughout the study area is presented in Study R-1 — *Vehicular Access Study*, and Study R-10 — *Recreation Facility and Condition Inventory*.
[6] Primitive camping was allowed at another interior OWA location, One Mile Pond, until March, 2004. The designation of this area was terminated due to the conflicts it presented with adjacent areas of the OWA being closed to nighttime use.

and equestrian trails, telephones, restrooms, and the Lake Oroville Visitors Center where extensive interpretive and educational programs are available.[7]

Additional fish- and wildlife-related facilities in the study area include the Feather River Fish Hatchery and associated interpretive programs. The hatchery was built in 1967 to compensate for salmon and steelhead trout spawning grounds lost due to the construction of the Oroville Dam. The hatchery was designed as a relatively compact facility where a large number of adult salmon and steelhead could be held and artificially spawned. Major features to guide fish from the Feather River to the hatchery include the Fish Barrier Dam and a fish ladder. Near the barrier, viewing windows allow visitors to watch the fish as they swim and leap up the ladder.

5.2 EXISTING MANAGEMENT STRUCTURE OF LANDS AND ACTIVITIES

This report assesses the relationship between fish and wildlife management and recreation throughout the study area. The main focuses for fish- and wildlife-related recreation within the study area are the OWA and the LOSRA. The OWA is controlled and managed by DFG, while the LOSRA is controlled and managed by DPR. The LOSRA includes Lake Oroville, Thermalito Diversion Pool, and Thermalito Forebay; the OWA includes portions of the Feather River and Thermalito Afterbay, where some recreational facilities are managed by DWR. The Feather River Fish Hatchery is within the boundary of neither the LOSRA nor the OWA; it is funded by DWR and managed by DFG.

The remaining portions of the Feather River and adjacent riverbanks within the study area are either owned or managed by the City of Oroville, the FRRPD, or are in private ownership. In addition to managing the OWA, DFG holds primary responsibility for fish and wildlife management within the State and therefore has jurisdiction to enforce fish and game laws on all lands within the study area (Figure 5.1-1).

Management of fish and wildlife resources within the study area affects the quality and quantity of recreation opportunities related to these resources. Agencies that influence planning and other governance of fish and wildlife management in the study area are:

- DFG;
- DPR;
- DWR;
- NOAA Fisheries;
- USFWS;
- USFS;
- BLM; and
- Butte County Sheriff and other law enforcement entities.

[7] An inventory of facilities within the LOSRA and OWA and a summary of their conditions is presented in Study R-10 – *Recreation Facility Inventory and Condition Report*.

Other factors that affect management by these agencies include US Bureau of Reclamation flood impacts; user preferences and behavior; SWP operations; and fish and wildlife population dynamics.

5.2.1 California Department of Fish and Game

DFG's mission is "to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public" (DFG 2003a). The California Fish and Game Code empowers DFG to carry out all code provisions via a number of management and regulatory avenues, including regulation of hunting and fishing, development of ecological reserves and management areas, review and permitting of proposed projects, and public education and habitat improvement programs.

5.2.1.1 Management Goals

DFG goals in managing the lands and facilities at wildlife areas are to maximize the amount and quality of habitat available for fish and wildlife, while also providing for use and enjoyment of the area by the public (DFG 1978; pers. comm., Atkinson 2003; pers. comm., Rischbieter 2003). Ideally, DFG manages wildlife areas to protect and enhance fish and wildlife habitats and the populations that depend on them, while allowing compatible recreation in the areas used by the public only to the extent that such uses do not interfere with the primary goals of fish and wildlife management.

DFG also manages the Conservation Planning Program which, along with the California Environmental Quality Act (CEQA) Permitting Program and Species Conservation and Recovery Program, also promotes, coordinates, and provides policy guidance on the creation and implementation of large-scale, multi-species habitat conservation plans. This includes natural community conservation planning, habitat acquisition, mitigation and conservation banking, and federal conservation plan coordination.

DFG acquires wildlife areas "to protect and enhance habitat for wildlife species, and to provide the public with wildlife-related recreational uses." These lands provide habitat for a wide array of plant and animal species, including many listed as threatened or endangered (DFG 2003a).

DFG's overriding goal is to balance hunting, fishing, and land use with maintenance of species populations and ecological value. Management goals include:

- Field research, inventories, and censuses to assess plant and animal populations;
- Licensing and monitoring to assess hunting and fishing take;
- Enforcement of land use, hunting, and fishing regulations;
- Creation of refuges and protected areas;

- Creation of wildlife viewing opportunities that minimize impacts on wildlife and surrounding lands;
- Creation of conservation areas and conservation programs; and
- Educating the public about conservation, sustainability, and responsible hunting, fishing, and wildlife-associated recreation (DFG 2003a).

5.2.1.2 Organizational Structure

In order to further understand fish and wildlife management and the resulting effects on recreation, it is important to view DFG as a whole entity and how the OWA fits within the larger framework of the DFG. Government agencies operate at several levels of organization; this organizational complexity can influence the efficiency with which services are delivered. Currently, under the DFG Director, there are four main divisions that oversee the seven regions which correlate to geographic areas within the state. Under the divisions, regions oversee field offices which, in some cases, correspond to individual units such as the OWA. Figure 5.2-1 illustrates the organizational structure of DFG, highlighting how OWA fits within this framework.

Statewide, DFG manages 844,000 acres of land, which includes 108 State Wildlife Areas, 99 Ecological Reserves, and 166 public access sites. The 106 Wildlife Areas comprised approximately 648,954 acres as of September 2003 (DFG 2003a). Within Region 2 (the Sacramento Valley–Central Sierra region), there are a total of 26 State Wildlife Areas, although only three have staffed field offices. These include the Gray Lodge, Yolo Bypass, and Upper Butte Basin Wildlife Areas. Until March 2004, the OWA also had a staffed field office; however, due to budget cuts, the field office is no longer staffed. Wildlife Areas are managed under the Wildlife and Inland Fisheries Division through the Lands and Facilities Branch.

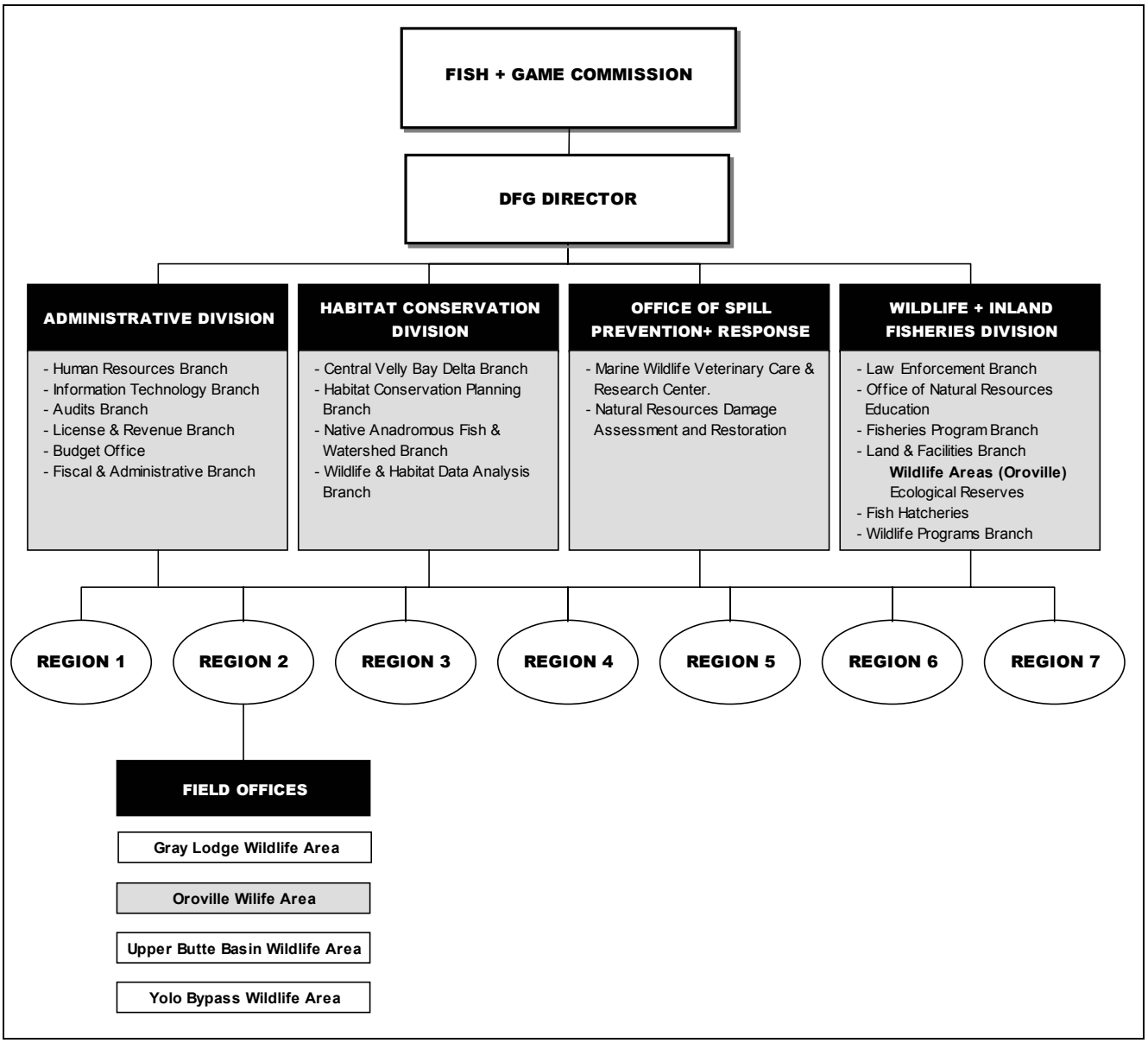
The mission of the Lands and Facilities Branch under the Wildlife and Inland Fisheries Division is to work in partnership with the DFG's Regions to ensure that the State's land and facilities are managed and maintained to provide optimal benefits for fish and wildlife and the public by:

- Developing uniform, Statewide policies relative to the acquisition, protection, maintenance, and enhancement of lands and facilities;
- Developing uniform guidelines for compatible public use and for the preparation of land management plans that focus on fish and wildlife needs and seek cooperative relationships with adjacent landowners;
- Providing budgetary assistance, engineering support and other technical assistance; and
- Fostering public use, knowledge, and enjoyment of lands and facilities through interpretive services and other activities (DFG 2003a).

In comparison, the Habitat Conservation Division manages the Native Anadromous Fish and Watershed Branch, which works to conserve and restore anadromous fisheries and

watershed health and which collects, analyzes, and disseminates information regarding anadromous species (DFG 2003a).

Figure 5.2-1. Department of Fish and Game organizational chart.



Source: DFG 2003.

DFG and the OWA

DFG management responsibilities at the OWA includes facilities management, maintenance (such as solid waste collection and removal), boundary posting, fencing and signage repairs, code enforcement, and patrolling for illegal uses such as dumping and off-highway vehicles (OHVs). DFG management actions also include habitat

enhancement and inventory and monitoring of vegetation and wildlife, including the monitoring of habitat improvement areas (pers. comm., Atkinson 2003).

The formation of the OWA and the various management agreements and associated addenda were executed over several decades following the construction of the Project facilities. There are several parcels of land that compose the present OWA; however, these were transferred for management purposes at different times and under different terms. The management of Thermalito Afterbay surface waters and adjoining lands was transferred to DFG under two separate agreements. The first agreement is for "recreational operation" and the second is for management under certain provisions of the California Administrative Code. In both cases, DFG assumed responsibility for the costs of Wildlife Area operation at the time the transfer agreements were executed. Additionally, DWR utilizes and leases portions of the OWA for sand and gravel extraction and retains this right on OWA lands. See Appendix A for further details regarding the history of the OWA.

Consistent with overall DFG management goals, the primary objectives of OWA management are to:

- Maintain and improve the fish and wildlife resources of the OWA for their intrinsic and ecological value;
- Maintain and improve the area's environmental quality and amenities; and
- Provide for the recreational, scientific, and educational use of the area (DFG 2003a).

DFG manages the OWA under the 1978 Oroville Wildlife Area Management Plan (DFG 1978), the California Fish and Game Commission's Hunting and Other Public Uses on State and Federal Lands California Regulations (DFG 2002b), and the California Fish and Game Code, Sections 1525–1530 (OLC 2003c). DFG, with limited assistance from DWR, works to achieve the objectives laid out in these documents through its lands, facilities, fish and wildlife management strategies and practices. Additionally, as DFG is the State agency responsible for enforcement of hunting and fishing regulations on all public and private lands, DFG coordinates with the other management agencies in the study area to ensure that regulations are enforced.

The OWA is unique within DFG; most wildlife areas are acquired with the specific intent "to protect and enhance habitat for wildlife species, and to provide the public with wildlife-related recreational uses," whereas the OWA was not actually acquired. While portions of the OWA are not owned by DFG, the agency is still responsible for meeting requirements set forth in FERC license orders issued to DWR for specific recreational uses and as a result of previous land uses such as mining. This situation further complicates land management within the decentralized organizational structure, making it more difficult for users and managers to reconcile what rules, programs, etc., apply to the unit and how to implement them.

Another unique aspect of the OWA, compared with other California State Wildlife Areas, is the ongoing gravel mining activity. Mining is not typically consistent with the California Fish and Game Code or with any of the management goals set forth by DFG for wildlife areas. The California Code of Regulations (CCR) states that "no person shall dig up or remove any humus, soil, sand, gravel, or rock" from any wildlife area. Leases providing for gravel extraction from the OWA are allowed generally due to legal agreements (developed prior to the designation as a wildlife area) that provide for this use, though some are a result of a land exchange between DFG and commercial gravel interests.

DFG and the LOSRA

DFG management in the LOSRA is limited to the enforcement of hunting and fishing regulations and the California Fish and Game Code, management of the fish stocking program, and participation in biological studies (pers. comm., Atkinson 2003). DFG also participates in some habitat improvement programs, the project management of wildlife and special-status species habitat, and related issues falling under Statewide DFG jurisdiction.

5.2.1.3 Existing Management Activities

DFG management at the OWA focuses most of its existing resources on cleaning up and trying to prevent illegal activities that commonly occur on the area. As a result, scarce resources are diverted from wildlife management to maintenance and public use enforcement. Nighttime uses, developed facilities, and some other public uses are limited in the OWA so as to maintain and enhance wildlife populations.

Wildlife management in the OWA consists of a combination of habitat improvement programs, visitor use monitoring, and control of undesirable species. Current wildlife management activities are limited to minor habitat improvement projects. Improvements include planting of approximately 75 acres of foraging and nesting habitat annually, with some planted in the fall and some in the spring. In addition, wood duck nest boxes have been installed in several locations within the OWA to promote waterfowl nesting, and cover has been planted for quail, rabbits, and other upland wildlife (pers. comm., Stone 2003).

Following reservoir construction, native vegetative cover was retained at 18 inundated locations along the perimeter of Lake Oroville (totaling 1,300 acres, approximately) with the purpose of preserving and enhancing fish and wildlife. DFG and DPR have worked with other agencies and volunteer groups to revitalize these habitat areas. In conjunction with fish stocking programs a FERC order to formulate and implement a fisheries management plan that would benefit a diverse angling community, DWR began conducting fish habitat improvement projects in 1994. DWR's habitat improvement efforts more than doubled the amount of habitat improvement work previously conducted by DFG at Lake Oroville (DWR 2002b). In addition, these efforts

significantly increased community involvement by organizing and encouraging local volunteers, local high schools, fishing and nature clubs, and additional government agencies to participate in improvement projects.

Table 5.2-1 lists some of the specific management activities DFG conducts. Fulfilling the agency's goals at the OWA is challenging because of inherent conflicts between DFG's mission and current activities and uses. All categories of management activities are currently limited or nonexistent at the OWA because of staff and funding limitations (which are further described in Sections 5.2.1.5 and 5.2.1.6) and land use conflicts.

Table 5.2-1. Statewide DFG management activities.

Habitat and Wildlife Conservation	Review timber harvest plans and a variety of projects that may affect fish and wildlife. Protect water quality: spill prevention and response, pollution control, etc. Habitat resource assessment: biology/botany studies, surveys, censuses, sampling; GIS database management. Habitat improvement projects. Buy/improve lands to protect, restore, and enhance habitat. Research plant/animal populations to determine guidelines for sustainable take limits.
Law Enforcement	Enforce hunting, fishing, and habitat regulations.
Hunting and Fishing	Selling/managing fishing/hunting licenses: 2.4 million fishing licenses and 344,000 hunting licenses annually. Fish stocking: raising and stocking over 57 million fish annually. Tracking annual hunting and fishing takes, setting bag limits and number of licenses to be sold. Management of the hunter education program.
Watchable Wildlife	Support wildlife viewing, photography, and nature study opportunities. Support docket-led tours, nature trails, education programs, interpretive displays. Management of volunteers, education programs, restoration programs, wildlife protection activities, and surveys.

Source: DFG 2003.

5.2.1.4 OWA Wildlife Area Management Plan

The 1978 Oroville Wildlife Area Management Plan presents goals that focus on improving habitat and minimizing impacts by OWA users. The density, location, and variety of vegetation are important factors influencing productivity and diversity of the wildlife populations in the OWA, thus making habitat management a key aspect of wildlife management.

Wildlife management guidelines for the OWA are also outlined in DFG's 1978 Oroville Wildlife Area Management Plan, which includes 11 general programs to benefit wildlife in the area (Table 5.2-2).

Table 5.2-2. OWA Management Plan programs for wildlife benefit.

Vegetation Habitat	• Promotion of openings in thick brush to improve herbaceous growth • Promotion of evergreen cover • Promotion of food-producing trees and shrubs • Planting of herbaceous species to increase food production • Development of high-ground areas to serve as refuge islands during flooding • Provision of better nesting habitat and reproduction sites • Control of vegetation and reduction of undesirable species
Water Supply	• Promotion of better water distribution and quality
Species Control	• Control of animal populations to eliminate undesirable species • Stocking of desired wildlife species • Chemical treatment of "rough fish" (i.e., undesirable fish) when needed

Source: DFG 1978.

The 1978 Oroville Wildlife Area Management Plan recommends several public use management efforts to maintain wildlife populations (Table 5.2-3). Shortly after the creation of this plan, staffing and funding levels were reduced; subsequently, the guidelines have not been fully implemented (pers. comm., Atkinson 2003).

Table 5.2-3. OWA 1978 Management Plan Public Use Guidelines.

Guideline	2003 Implementation Status
Determine maximum use levels compatible with wildlife and fisheries objectives, and develop methods to control user numbers when necessary	This is not being implemented due to a lack of staffing and funding.
Identify and eliminate destructive uses and activities incompatible with wildlife and fisheries objectives	Destructive uses have been identified but have not been eliminated due to a lack of staffing and funding. Management response includes litter pick-up.
Monitor appropriate uses to determine resource use	This is being implemented at a low level. DWR has conducted some surveys to determine resource uses.
Encourage uses oriented toward the study and enjoyment of natural resources	This is being implemented on an informal basis. DFG is not providing facilities or programs but educational uses such as school field trips are taking place.
Develop policies for potential commercial use of area resources such as sand and gravel, where such use would have significant long-term benefits to fish and wildlife and short-term negative impacts on recreation	Areas that have had gravel extraction present an opportunity for revegetation efforts but are the gravel contractor's responsibility.

Sources: DFG 1978; pers. comm., Stone; pers. comm. Atkinson 2003.

5.2.1.5 Staffing Levels

According to DFG policies, staffed State Wildlife Area staffing should include approximately one field staff member for each thousand acres of land managed (pers. comm., Atkinson 2003). Staff at the 11,870-acre OWA until 2004 included one area manager (working approximately one-third time at the OWA and two-thirds time at other areas and also serving as the Acting Lead Lands Supervisor for the entire Sacramento Valley–Central Sierra Region), one assistant manager, one laborer, and two seasonal aides (pers. comm., Atkinson 2003). This level of staffing has declined in 2004, with no staff in the field office (pers. comm., Atkinson 2004). In addition to DFG management, the Butte County Sheriff's Office patrols the surface of Thermalito Afterbay and river reaches within Butte County under agreement with DWR. Land areas around Thermalito Afterbay are also patrolled by security officers contracted by DWR (DWR 2003).

5.2.1.6 Budget

Current DFG staffing and funding contributes to limitations of fish- and wildlife-related management and recreation. DFG is generally funded by the sale of fishing and hunting licenses and federal matching grants based on these license sales. While the land within the OWA is owned by the State of California, DWR transferred possession and control to DFG in 1968 for operation as a State Wildlife Area. Under that agreement, DFG is responsible to manage and bear the costs of the OWA, except as noted. DWR is ultimately accountable for the overall financial and managerial responsibilities associated with the OWA under FERC guidelines. Table 5.2-4 is a summary of actual expenditures for operation of five wildlife areas in DFG Region 2. This table does not include the expenditures of cooperating agencies, identified above, whose patrols have been implemented to compensate for the lack of DFG staff.

The six wildlife areas are prescribed by the California Fish and Game Code as one of three types of hunting areas: "A," "B," or "C." A "Type A" area designation requires hunters to have a one-day, two-day, or a Type "A" Season Permit/Pass. A "Type B" area designation requires hunters have a Type "A" or a Type "B" Season Pass. A "Type C" area designation does not require hunters to have a permit or a pass (other than a valid California hunting license and any required stamps) for most areas. Type "A" areas have the most facilities while Type "C" areas have the least number of facilities (DFG 2003b). The DFG staffing policy described above applies to all three types of staffed wildlife areas (pers. comm., Atkinson 2004).

The OWA and the Spenceville Wildlife Area combined operated at one-eighth to one-fifth of the budget of each of three other staffed wildlife areas in the region when comparing dollars spent per acre. The DFG combined the budgets for the OWA and the Spenceville Wildlife Area in 1986 as a result of budget cuts (pers. comm., Atkinson 2004). Of the four units (OWA and Spenceville are considered one unit in terms of budget), OWA and Spenceville is the largest at 23,457 acres, while Yolo is 15,830 acres, Upper Butte Basin is 9,376 acres, and Gray Lodge is 8,400 acres. However, it

should be noted that all the latter Wildlife Areas are "Type A" units with significant facilities; Oroville/Spenceville are the only "Type C" units in this comparison.

Table 5.2-4. Comparative summary of DFG expenditures for Region 2 Wildlife Areas.

Wildlife Area	Acreage	Wildlife Area Type	Fiscal Year 2001–02 Expenditures				
			Personnel	Operations & Maintenance	Miscellaneous	Total	Spending per Acre
Gray Lodge	8,400	A	$504,177	$547,043	$306,291	$1,357,511	$162
Oroville / Spenceville	11,870 / 11,587	C	$256,917	$139,178	$86,428	$482,523*	$21
Upper Butte Basin	9,376	A	$430,078	$663,398	$140,383	$1,233,859	$132
Yolo Bypass	15,830	A	$219,681	$868,682	$536,847	$1,625,210	$103

**Approximately $325,000 is spent annually at OWA by DFG.*
Sources: pers. comm., Atkinson 2003, 2004; DFG 2003b.

DFG currently dedicates approximately $52,990 of Sport Fish Restoration Funds per year to wildlife-related recreation activities associated with the OWA. All of these expenditures made by DFG within the Project area are directly or indirectly supporting the purpose of recreational fisheries (pers. comm., Atkinson 2004).

DFG makes financial expenditures within the OWA under several categories (Table 5.2-4). These include monitoring of the fishery, fish pathology, studying the benefits of the recreational fishery, genetic research, construction of fish habitat, evaluation of pollution in the fishery, operation of the management lands, fish population surveys, and law enforcement.

DWR also spends up to $20,000 per year on a matching basis with DFG for mosquito abatement costs associated with the Wildlife Area. DWR also has a contract for law enforcement on Thermalito Afterbay with the Butte County Sheriff's Department for approximately $166,000 annually. Otherwise, DFG assumed responsibility for all costs associated with OWA operation and maintenance at the time that the respective transfer agreements were executed.

Table 5.2-5 describes DWR and DFG expenditures for wildlife-related recreation activities for the period 1989–2000. Within the Project Area, the two agencies spent a total of approximately $1.8 million (2003 dollars) on fish and wildlife management over the eleven years. The 1993–99 Sport Fishing Study accounted for approximately 64 percent of the total expenditure, at a total cost of $1.15 million.

5.2.2 California Department of Water Resources

While DWR is ultimately responsible for compliance with the recreation-related terms and conditions of FERC License No. 2100, DWR has transferred day-to-day management responsibilities for the LOSRA to DPR, consistent with the Davis-Dolwig Act. DWR directly manages Project water and power facilities. As mentioned previously, DWR has transferred most OWA management responsibilities to DFG, consistent with the Davis–Dolwig Act. DWR, pursuant to a request by USFWS, is currently preparing a bald eagle Management Plan for lands around Lake Oroville (pers. comm., Bogener 2003).

5.2.3 California Department of Parks and Recreation

As mentioned, LOSRA lands and facilities are managed primarily by DPR. Section 5019.56 of the California Public Resources Code states that "consideration shall be given to the compatibility of design with the surrounding scenic and environmental characteristics" during planning and management of State Recreation Areas. Although LOSRA includes large areas of varied, high quality wildlife habitat, the area is managed primarily for the other recreational opportunities provided in the area, rather than for fish and wildlife (pers. comm., Feazel 2002). During the period of 1970 to 2000, the LOSRA experienced a decrease in visitation of roughly 8 percent in spite of the State population increase of 72 percent during that same period (DWR 2001b).

Table 5.2-5. DWR and DFG wildlife-related programs/projects, recreation activities and expenses within the Project Area (1989–2000).

Funding Period	Project	DWR Funding			DFG Funding		
		Annual	Total	Adjusted to 2003*	Annual	Total	Adjusted to 2003*
1989–93	Construction of Habitat Structures	NA	NA	NA	$15,000	$75,000	$103,050
1993–99	Sport Fish Study	$85,000	$510,000	$612,000	$75,000	$450,000	$540,000
1998–2001	Sacramento Contamination Study	NA	$500,000	$550,000	NA	NA	NA
1999–2000	Analysis of Largemouth Bass	NA	NA	NA	$14,500	$14,500	$16,095
TOTAL		**$85,000**	**$1,010,000**	**$1,162,000**	**$104,500**	**$539,500**	**$659,145**
Total Spent by DWR and DFG		**Total DWR and DFG Expenditures between 1989 and 2000**			**Total Expenditures Adjusted to 2003***		
		$1,549,500			**$1,821,145**		

**Expenditures adjusted to year 2003 (based on CPI-California). NA = Not applicable.*
Source: pers. comm., Meinz 2003.

DPR is the primary recreation operator of the LOSRA. However, dissection of specific DPR expenditures for operation at LOSRA is difficult for several reasons. Most significantly, LOSRA is one of 13 widely-separated units in DPR's Northern Buttes District. Since the Department's reorganization in 1993, Department budgeting has

been performed at the District level, rather than at the park unit level. Many of the costs of providing services and goods to LOSRA are a variable fraction of the budget of the District as a whole. An estimate of DPR expenditures for Fiscal Years 1996/1997 through 1999/2000, which includes an estimate of the pro-rata share of District staff support to LOSRA, totals $9,810,000 in actual dollars spent. This total includes several major non-recurring appropriations for deferred facility maintenance, and should not be construed as a basis for calculating a normal operating average. The figure includes the salaries of Park Rangers, maintenance workers, and seasonal staff assigned specifically to LOSRA (annually, varying numbers of these positions may be vacant for some period of time). It also includes maintenance and resource project costs, equipment and supply purchases, and service costs that have been specifically coded to the LOSRA unit. However, some equipment and supply purchases, and service costs, are for the District as a whole (pers. comm., Feazel 2002).

Wildlife management, while not a primary purpose, is within the scope of DPR authority as dictated by the California Public Resources Code, State Parks and Recreation Commission policies, and DPR Resource Management Directives (pers. comm., Rischbieter 2003).

5.2.4 California Department of Boating and Waterways

The Department of Boating and Waterways (DBW) constructs various projects at LOSRA that are related to boating and the facilities that support boating, including boat ramps and piers which are used for boating and fishing. Piers and docks are also used by some visitors for wildlife viewing. Fishing is participated in by many boaters (26.4 percent of boaters listed “boat fishing” as their primary activity).

DBW’s budget includes expenditures for boat-in facilities, parking area construction and improvements, boat-launch ramp construction and improvements, floating restrooms, restrooms, and general renovation of facilities. The total funds expended for completed projects from 1975 to 1999 were $4,467,800. Between 2000 and 2002, DBW budgeted a total of $2,795,400 for facility renovation projects to be completed at LOSRA; this includes $2,354,000 at the Spillway, $37,400 at Lime Saddle and $404,000 at Lake Oroville (DBW 2002). Thus, between 1975 and 2002, DBW budgeted and spent $7,263,200 for the purpose of constructing and upgrading facilities that support boating at LOSRA between 1975 and 2002 (these totals have not been adjusted to account for inflation; DBW 2003). Further information on management budgeting in the Project area is provided in Study R-5 – *Assessment of Recreation Area Management*.

5.2.5 US Fish and Wildlife Service

USFWS is authorized to conserve, protect, and enhance the nation’s fish and wildlife resources. The agency’s mission is carried out through a variety of programs, including environmental reviews of FERC relicensing. USFWS provides technical evaluations for FERC of the impacts of hydroelectric power projects on fish and wildlife resources. As the regulatory powers of USFWS can dictate fish- and wildlife-related management and

recreation within the study area, a summary of the agency's jurisdiction is included herein (USFWS 2003).

Applicants for FERC licenses are required to consult with USFWS prior to and after project licensing so that USFWS may provide FERC with:

- Recommendations for the protection, mitigation of, damages to, and enhancement of fish and wildlife resources;
- Mandatory terms and conditions to provide for the protection and utilization of USFWS-managed lands upon which proposed hydropower projects may be located; and
- Mandatory prescriptions for fish passage.

Several acts authorize USFWS jurisdiction over the FERC relicensing, including the Federal Power Act, the Federal Endangered Species Act (ESA), the Fish and Wildlife Coordination Act, the National Environmental Policy Act (NEPA), the Migratory Bird Treaty Act, and the Clean Water Act (CWA). Issues under USFWS jurisdiction include fish and wildlife resource concerns: water quality, in-stream flows, reservoir water level fluctuations, fish entrainment and impingement at turbine intakes, fish passage, endangered species, and fish- and wildlife-related recreation.

USFWS is authorized to review FERC applications and provide comments, recommendations, terms and conditions, and prescriptions, and to coordinate with other agencies in doing so. USFWS reviews hydroelectric power projects annually and provides consultation on post-licensing studies and monitoring on projects. USFWS participates in the development of studies and review of applications and makes recommendations (USFWS 2003).

Fish and wildlife management and associated recreation management may be altered in order to comply with regulatory requirements mandated by USFWS. For example, USFWS has published a proposed rule to designate critical habitat for 4 vernal pool crustaceans and 11 vernal pool plants. Critical habitat for these species, Final Rule for which is likely to be adopted during 2004, may or may not include several areas within or in the vicinity of the study area. Under the ESA, USFWS has the responsibility to ensure against the "take" of threatened and endangered species, and under the CWA, USACE and the U.S. Environmental Protection Agency (USEPA), are responsible for the delineation and protection of wetlands, including vernal pools. In order to protect vernal pools within the study area and comply with USFWS, USACE, and USEPA regulations and guidelines, DWR developed a proposed land management plan for the protection of potential habitat for special-status species of fairy and tadpole shrimp.

The purpose of ESA is to conserve endangered and threatened species and the ecosystems upon which they depend. To this end, ESA provides for prohibitions on the "take" of endangered and threatened species. Section 7 of ESA establishes a policy

that all federal agencies will seek to conserve listed species by using their authority to carry out conservation programs for such species. Furthermore, each federal agency must ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any listed species. When listed salmon or steelhead may be affected by a federal action, the federal agency must consult with NOAA Fisheries.

The implementation of some of the recommendations in this report may require changes in recreational uses currently occurring in the study area or may require an alternate management protocol in order to ensure compliance. It may be necessary to increase enforcement provisions and staffing in order to implement species protection measures. Consultation with USFWS would be required for management decisions that could affect threatened and endangered species.

5.2.6 NOAA Fisheries

NOAA Fisheries is dedicated to protecting and preserving the nation's living marine resources through scientific research, fisheries management, enforcement, and habitat conservation. As the regulatory powers of NOAA Fisheries can dictate fish-related management and recreation within the study area, a summary of the agency's jurisdiction is included herein (NOAA Fisheries 2003a).

The NOAA Fisheries Office of Protected Resources implements ESA for marine and anadromous species, including the development, implementation, and monitoring of protection/conservation programs. NOAA Fisheries also develops and implements policies, procedures, and regulations for permits to take listed species according to ESA if necessary. Activities related to FERC relicensing include assessment of impacts on anadromous and marine fisheries, policy prescriptions for fisheries preservation, and recommendations and requirements for fish passage including fish ladders and bypass channels (NOAA Fisheries 2003a).

Specifically, NOAA Fisheries is responsible for protecting and managing a variety of marine animals, including Pacific salmon, sturgeon, lamprey, groundfish, halibut, and marine mammals and their habitats under the ESA (16 United States Code [USC] Section 1531 et seq.), the Federal Power Act, the Magnuson-Stevens Fishery Conservation and Management Act (16 USC Section 1801 et seq.), Reorganization Plan Number 4 of 1970, and other laws. Their regulatory requirements could have an effect on fisheries-related management and recreation (NOAA Fisheries 2003a).

The NOAA Fisheries Strategic Plan, which is carried out by the NOAA Fisheries, contains three goals:

- Rebuild and maintain sustainable fisheries;
- Promote the recovery of protected species; and
- Protect and maintain the health of coastal marine habitats (NOAA Fisheries 2003a).

To carry out these goals, NOAA Fisheries scientists study the life history, stock, size, and ecology of economically important fisheries to set annual harvest quotas. They also seek to reduce the impacts of human activities and environmental change on protected species while ensuring the viability of valuable fisheries. NOAA Fisheries' scientists evaluate threats to estuaries, reefs, and other fragile ecosystems by monitoring development, water and sediment contamination, water diversion for industrial agriculture, sedimentation, and dredging and filling activities (NOAA Fisheries 2003a).

In addition, NOAA Fisheries carries out a number of indefinite authorizations, in addition to annual, permanent ones. NOAA Fisheries monitors FERC relicensing activities to ensure that these actions are adhered to at FERC projects as listed below.

Relevant NOAA Fisheries annual and permanent or indefinite authorizations include:

Annual Authorizations:

- Anadromous Fish Conservation Act;
- Central, Western, and South Pacific Fisheries Development Act;
- ESA;
- Inter-jurisdictional Fisheries Act of 1986;
- Magnuson-Stevens Fishery Conservation and Management Act;
- Marine Mammal Protection Act;
- Marine Protection, Research, and Sanctuaries Act; and
- NOAA: Marine Fisheries Program Authorization Act.

Permanent or Indefinite Authorizations:

- Driftnet Impact Monitoring, Assessment, and Control Act of 1987;
- Fishermen's Protective Act of 1967; and
- Saltonstall-Kennedy Act.

In addition, NOAA Fisheries carries out a number of agreements, consultations, and trusteeships, some of which include:

- North Pacific Anadromous Stocks Convention Act of 1984;
- Northern Pacific Halibut Act of 1982;
- Pacific Salmon Treat Act of 1985;
- CWA;
- Coastal Wetlands Planning, Protection, and Restoration Act;
- Comprehensive Environmental Response, Compensation, and Liability Act;
- Federal Power Act;
- Fish and Wildlife Coordination Act; and
- NEPA (NOAA Fisheries 1995).

NOAA Fisheries and USFWS perform similar regulatory roles for different species, and therefore perform similar roles in the FERC relicensing process. NOAA Fisheries implements ESA for marine and anadromous species, and develops, implements, and monitors protection and conservation programs. NOAA Fisheries also develops and implements policies, procedures, and regulations for permits to take listed species according to ESA. NOAA Fisheries is responsible for several elements of FERC relicensing, including assessment of impacts on anadromous and marine fisheries, policy prescriptions for their preservation, and recommendations and requirements for fish passage (e.g. fish ladders, bypass channels). NOAA Fisheries may have a regulatory role in water-based recreation and management actions throughout the study area as they relate to marine fisheries (NOAA Fisheries 2003b). See Appendix B for further background on NOAA Fisheries.

5.2.7 Interagency Management

Interagency management programs include fisheries management, wildlife habitat improvement, and law enforcement. Coordination of information, such as the results of wildlife surveys conducted by DWR, is also shared between agencies. DWR and DPR also coordinate to construct new facilities in areas where management is shared. The public could benefit from additional interagency coordination.

As a result of the 1993 Amended Recreation Plan, new day use facilities were constructed at Thermalito Afterbay by DWR in coordination with DFG (DWR 1993). New facilities have led to increased use levels that may not be fully compatible with a designated wildlife area (pers. comm. Atkinson 2003).

In general, some interagency efforts involving DWR and DFG have benefited the public when they were directed by FERC or stipulated in an agreed-upon plan. However, without such pre-planning or clear direction, a tendency for uncoordinated or inefficient efforts may result.

5.2.7.1 Fisheries Management

Fisheries management throughout the study area includes extensive fish stocking, habitat improvement, and regulatory programs. Fish stocking was initiated in 1968 to develop sport fisheries in the newly-completed Lake Oroville. Habitat improvement programs were begun years later to combat the detrimental effects of Lake Oroville's frequent water level fluctuations on the reservoir's warm-water fisheries. In addition, regulatory programs, including bag and size limits, seasonal closures, and lure restrictions, were implemented more recently to further enhance fish size and population in the reservoirs throughout the study area. The FERC Order of October 1, 1992, requires that the Recreation Plan for the LOSRA include a fish stocking plan; the Fisheries Management Plan was included in the 1993 Amended Recreation Plan (DWR 1993). Since the development of the Fisheries Management Plan, Lake Oroville has been managed to make optimum use of available habitat and forage for both warm-

water and coldwater fisheries. In 1994, DFG designated Lake Oroville as a "Trophy Black Bass Water" (DFG 2004).

In 1993, DWR began implementing fish habitat enhancement projects, gathering biological and fisheries data, partnering with DFG on fish rearing and stocking programs, and developing management protocols that would promote a multi-species warm-water–coldwater fishery with the general goal of benefiting a diverse angling community" (DWR 2002b). These activities were made a part of the FERC License requirements in a FERC License Order issued on September 22, 1994; since then, DWR has played a crucial role in their funding, implementation, and success. Since active DWR involvement began in 1993, the average amount of salmonid stocking has increased by 17 percent, from 25,300 to 29,700 pounds per year (DWR 2000). In addition, DWR has funded all of the Chinook salmon tagging for Lake Oroville, at a cost of approximately $245,000 to date. DWR funding has resulted in increased reliability of Lake Oroville salmonid stocking, addressing one of the primary concerns of the local coldwater angling public.

Fish Stocking Programs

Management of Lake Oroville's fishery has been the responsibility of DFG since the completion of Oroville Dam in 1967. When Oroville Dam was constructed, spawning grounds in the portion of the Feather River below the previously-built Pacific Gas and Electric Company Dams were made inaccessible to salmon and steelhead. DWR, DFG, and USFWS established the Feather River Fish Hatchery and Lake Oroville's fish stocking programs to compensate for the loss of this and other tributary spawning habitat. In 1972, DFG stationed a fisheries biologist at Oroville, whose primary duty was to study the Lake Oroville fisheries. After completion of some initial studies, the resident biologist was reassigned in 1979 as a result of budgetary constraints. DFG's regional office continued to manage Lake Oroville fisheries, but at a much reduced level. A full-time fisheries biologist was once again stationed at Lake Oroville by DWR in 1993 to respond to Lake Oroville's fishery needs. Fish stocking and stocking studies from 1995 through 1999 are detailed in a series of reports that DWR issued to FERC. These reports were required in FERC License Orders dated August 28, 1995, and May 10, 1999. They were filed every 90 days and include a summary of biological data, stocking schedules, hatchery production reports, cost estimates, funding appropriations, stocking objectives, habitat improvements, and research results (DWR 1999).

Fish populations in Lake Oroville are the result of impounding several species found in the Feather River when the dam was constructed, intentional and accidental introductions. Since that time, exploitation by anglers, and effects of diseases have decimated some of the planted fish. Fish stocking in the study area dates back to the reservoir's completion. The Feather River Fish Hatchery was constructed in 1967, the same year that threadfin shad were introduced into Lake Oroville to provide forage for game fish. Rainbow trout, brown trout, and kokanee salmon were first stocked shortly thereafter in 1968 (Table 5.2-6). The early fish fauna was dominated by suckers,

threadfin shad, squawfish, carp, and hardhead, making up the majority of the reservoir's biomass. Since that time, pond smelt entered the reservoir from the watershed, likely the major forage fish through the 1980s. Stocking of game fish continued as well; brown trout were stocked annually until 2000 and may be stocked again in the future. Rainbow trout were stocked through 1988 but were largely unsuccessful because of the disease *Ceratomyxa shasta*. Kokanee salmon were stocked periodically until the late 1970s, and silver salmon were stocked from 1969 through 1978. Chinook salmon were first stocked in 1976, and until 2000, made up the majority of fish stocked in Lake Oroville. Beginning in 2002, silver salmon were reintroduced after Chinook salmon stocking was suspended because of disease concerns (pers. comm., See 2003).

Table 5.2-6. Fish stocking at Lake Oroville (1967–present)

Year	Species
1967	Threadfin shad
1968–late 1970s	Kokanee salmon
1969–1978	Silver salmon
1968–1988	Rainbow trout
1968–present	Brown trout
1976–2000	Chinook salmon*
2002–present	Silver salmon

** The majority of these fish were stocked.*
Source: pers. comm., See 2003.

The Feather River Fish Hatchery currently rears spring-run Chinook salmon, fall-run Chinook salmon, and steelhead rainbow trout (DWR 2001a). As shown in Table 5.2-7, the hatchery has a maximum capacity of 12 million fall-run salmon eggs, 7 million spring-run salmon eggs, and 1 million steelhead eggs, and a corresponding maximum annual production of 10 million fall-run salmon, 5 million spring-run salmon, and 450,000 steelhead (pers. comm., Kastner 2003). Spring-run and fall-run Chinook are reared at the hatchery until grown and transported to the eastern end of San Pablo Bay for release, while steelhead are reared to the yearling stage and released into the Feather River (DWR 2001a).

Table 5.2-7. Feather River Fish Hatchery rearing capacity and mitigation goals.

Species	Maximum capacity (# of eggs)	Maximum annual production (# of fish)	Annual mitigation goal (# of fish)
Spring-run Chinook salmon	7,000,000	5,000,000	2,000,000
Fall-run Chinook salmon	12,000,000	10,000,000	8,000,000
Steelhead rainbow trout	1,000,000	450,000	400,000
Total	**20,000,000**	**15,450,000**	**10,400,000**

Source: DWR 2001

The hatchery has an annual mitigation goal to plant a total of 8 million fall-run Chinook salmon at approximately 30 fish per pound, 2 million spring-run Chinook salmon at approximately 30 fish per pound, and 400,000 yearling steelhead at approximately 3–4 fish per pound throughout California and the California coast. In addition, hatchery enhancement goals include the planting of an additional 2.6 million Chinook salmon (at approximately 30 fish per pound). Until 2000, the hatchery also sought to provide sufficient fertilized eggs to produce 3 million 30-pound fall-run Chinook salmon at the Mokelumne River Fish Facility (DWR 2001a).

Since 1993, DWR has assisted DFG with fish rearing and stocking, and with developing management protocol at the Feather River Fish Hatchery. This assistance includes funding for the hatchery and assistance with the tagging and selection of species for the inland stocking program in lake Oroville. The two agencies currently work together to maintain fish stocking programs at Lake Oroville, with DWR providing funding and conducting biological and fisheries research, and DFG operating and maintaining hatchery and rearing facilities, making stocking recommendations, and carrying out stocking programs. The Feather River Fish Hatchery contributes approximately 20 percent of the ocean sport and commercial catch of Chinook salmon on the California coast (DWR 2001a). The hatchery currently accommodates an annual production of between 8 and 12 million fish, depending on the number of fish collected to provide eggs and smolt, the presence of diseases, and the year's production needs (pers. comm., Kastner 2003).

Fish Survey/Studies

In conjunction with fish stocking and habitat improvement programs, angler and fish population surveys and tagging studies were conducted at Lake Oroville from July 1993 through June 1999 to characterize the recreational fishery and evaluate the Chinook salmon stocking program (pers. comm., See 2002). The fish population study, carried out as a joint effort by DWR and DFG, required stocking of a set number of yearlings each year from 1993 to 1995, and monitoring of fish populations at different stocking rates. Following 1995, data from the previous 3 years were to be used in determining stocking rates. Although the program was delayed for 1 year because of losses in the hatchery during 1994, the study was successfully completed on a delayed schedule. Based on the study results, the appropriate stocking rate for Lake Oroville is approximately 150,000 yearlings and 100,000 fingerlings annually. Following a disease outbreak at the hatchery, the study results were rescinded, and the fish stocking program is currently in an experimental period to address the disease outbreak and reassess stocking recommendations (pers. comm., See 2002).

In addition to fish population studies, DWR conducted angler surveys and catch studies. These studies showed that angler efforts were directed primarily at black bass (63 percent) and coldwater species (33 percent), of which spotted bass and Chinook salmon were the predominant species caught by anglers.

Coldwater fishery studies focused on Lake Oroville's Chinook salmon population. Based on the number of tagged Chinook salmon released and recaptured, the salmon fishery is maintained by stocking. Studies showed that Chinook salmon growth rates appeared to be related to Chinook salmon densities, with growth decreasing as the number of salmon stocked increased; Chinook salmon reached or exceeded "target lengths" of 305 millimeters at 18 months and 381 millimeters at 24 months when 170,000 or fewer yearling equivalents were stocked (DWR 2000).

Black bass were the predominant warm-water species studied; they were also the predominant warm-water species caught during the study, with catch rates exceeding 0.5 bass per hour on average. Spotted bass were the most abundant black bass species reported and observed caught during angling surveys and captured during electrofishing. Spotted bass demonstrated good condition factors in all years, and condition did not appear related to the prey abundance index. No relationship was observed between Chinook salmon stocking rates and black bass populations or condition (DWR 1999).

During spawning, when fish reach the end of the ladder, they swim into a gathering tank where a mechanical sweep moves the fish into the spawning building. The spawning building contains tranquilizing, sorting, and preparation tanks, as well as hatchery incubators and egg jars where fertilized eggs are placed during the incubation period. Following incubation and hatching, young fish (fingerlings and yearlings) are held in rearing channels, which consist of concrete-lined raceways blocked off in intervals to form 48 individual pools 100 feet long and 10 feet wide. Fish are held in raceways until they reach the appropriate size for planting, at which time the salmon and steelhead are transported for planting in the Bay–Delta and locations downstream on the Feather River, respectively (DWR 2001a).

5.2.7.2 Fish Habitat Improvement Programs

Lake Oroville can fluctuate more than 100 feet in elevation during the course of a "normal" year, with occasional drawdown in excess of 200 feet. The reservoir's large water level fluctuations, steep slopes, and poor soils hinder the establishment of rooted aquatic vegetation in the littoral zone and restrict the encroachment of terrestrial vegetation into the fluctuation zone. This loss of cover, which provides spawning and nursery habitat for warm-water fishes, is believed to be related to observed declines in standing crops of centrarchid species as a result of reduced food availability and higher predation of young-of-year fishes. The goal of Lake Oroville fish habitat improvement activities is to enhance the year-class strength of warm-water sport fish through the addition of protective micro-cover and increased productivity of nursery areas (DWR 1995).

DWR involvement in fish habitat improvement programs at Lake Oroville began through voluntary participation in individual improvement and enhancement projects during the 1980s, most of which were initiated by DFG, DPR, and local groups such as bass clubs

and the Boy Scouts, and little of which was documented (pers. comm., See 2002). A continuing DWR fish habitat improvement program was developed in 1993 and finalized as a result of FERC's Order dated September 22, 1994. This order required DWR to increase its fish habitat improvement efforts and to prepare a fish habitat improvement plan through 1998.

The Lake Oroville Fisheries Habitat Improvement Plan, carried out by DWR in conjunction with DFG and local volunteers and organizations, was later extended for an additional year to coincide with a 1-year extension of the fishery study, and DWR completed its FERC-ordered fish habitat improvement requirements during the spring of 1999 (DWR 2000). At the close of 1999, DWR decided to continue its habitat improvement activities through at least 2004. However, because no new habitat improvement plan was ordered by FERC, a new plan was not developed (pers. comm., See 2002). Nevertheless, DWR continues to implement habitat improvement programs, primarily consisting of the construction of brush shelters and planting of willow and buttonbush trees. Brush shelters are constructed, habitat-enhancing reefs that are anchored to the lakebed within the reservoir fluctuation zone (See and Baker 2003). They consist of various materials including discarded Christmas trees, trees and brush cut from the upland areas adjacent to and near Lake Oroville, and artificial habitat structures made of plastic.

As detailed in DWR's habitat improvement plans, improvement projects at Lake Oroville fall almost exclusively into two categories: construction of brush shelters and planting of flood-resistant vegetation (DWR 1995; DWR 2000). Brush shelters make up the majority of habitat improvement projects. Since 1993, brush shelters have been constructed on several locations in Lake Oroville, utilizing 6,400 used Christmas trees and several thousand manzanita and oak (DWR 2002b). Three zones were identified as targets for brush shelters within the Lake Oroville fluctuation zone. The upper zone extends from full pool down to 850 feet, the middle zone extends from 850 to 830 feet, and the lower zone extends from 830 to 750 feet. The majority of brush shelter projects were targeted in the 820- to 865-foot range, and no projects were planned above 880 feet.

During the same time period, 21,900 willow and buttonbush trees were also planted at various locations around the reservoir. Both brush shelters and willow trees provide the desired micro-cover within the fluctuation zone, which primarily benefits juvenile black bass. However, because the survival of these trees is highly variable as a result of water level fluctuations and soil conditions, brush shelters have been pursued as a reliable habitat improvement technique. The range for willow planting is much narrower than that for brush shelter projects, and is dependent upon soil type, slope, exposure, and the availability of additional watering.

In addition, other experimental techniques were researched, including seeding selected areas of the fluctuation zone with grasses, improving spawning habitat, increasing soil

moisture to enhance vegetation growth, and using different species and/or planting techniques of water-tolerant vegetation. None of these experiments was successful enough to be implemented on a continual basis.

Throughout the history of habitat enhancement in the study area, projects were located throughout Lake Oroville's shorelines and banks, including Lime Saddle, Vinton Gulch, Kennedy Ravine, Foreman Creek, Spillway Recreation Area, Bidwell Canyon, Miners Ranch Saddle Dam, Loafer Creek, and McCabe Cove areas. Locations of specific project sites were determined by the water level and reservoir conditions in each year; it was not feasible to determine where future projects would be implemented because of the relatively high frequency of unpredictable or uncharacteristic fluctuations.

5.2.7.3 Wildlife Habitat Improvement Program

In 1993, a memorandum of agreement (MOA) was created for "Development and Management of Thermalito Afterbay Brood Ponds and Surrounding Habitat." This MOA was created between DWR, DFG, and the California Waterfowl Association to implement a plan for the development, operation, and maintenance of brood ponds and surrounding habitat to enhance wildlife at Thermalito Afterbay as part of the Central Valley Joint Venture Implementation Plan (DWR 2003b). DWR constructed three brood ponds, one per year following the MOA dated August 17, 1993 (DWR 2003i). The MOA is being further implemented by DFG in cooperation with the California Waterfowl Association through the "upland cover enhancements" program at Thermalito Afterbay. This includes the planting of an average of 40–60 acres with native and non-native herbaceous vegetation each fall for the purpose of enhancing upland nesting habitat for ducks, pheasant, and other ground-dwelling species that require taller, denser vegetation (pers. comm., Bogener 2003).

5.2.7.4 Law Enforcement

Because of limited staff and overall funding, fish- and wildlife-related law enforcement capabilities are relatively limited. Law enforcement is typically necessary in hunting areas to prevent poaching and other violations. Due to limited patrols, poaching and other activities that do not comply with hunting and fishing regulations may be taking place within the Project area. Safety-related and other incidents are discussed in detail in Study R-2 – *Recreation Safety Assessment*. The following list summarizes issues identified by agency staff.

- Camping—Users frequently do not abide by the camping limit of 7 consecutive days and 14 days in any calendar year in the OWA (pers. comm., Flores 2003; pers. comm., Sherman 2003). In addition, fires in the OWA are restricted to gas stoves in the designated camping area only; this restriction is frequently violated (pers. comm., Atkinson 2003).

- Hunting—It is suspected that users are not abiding by hunting regulations, including seasons, hours, and bag limits (pers. comm., Hotchkiss 2002).

- Fishing—It is suspected that users are not abiding by fishing regulations, particularly bag limits and gear restrictions (pers. comm., Rischbieter 2003).

- Boating—Boaters on Thermalito Afterbay are not traditionally required to abide by the 5 mph speed limit. Use of powerboats (including water skiing) and personal watercraft at speeds greater than 5 mph is technically not allowed by DFG. Thermalito Afterbay is patrolled by the Butte County Sheriff's Office, but it does not enforce the boating speed restriction specified in Title 14 of the Fish and Game Code. Boating speeds are not enforced on the Thermalito Afterbay due to conflicting management goals; in this case, DWR's goal is to provide recreational boating opportunities and DFG's goal is to limit activities inconsistent with wildlife management, enhancement, and protection (pers. comm., Atkinson 2003).

- Vandalism and Litter—Litter and dumping is prohibited but is widespread in the OWA (pers. comm., Hotchkiss 2003).

- Dogs—Except for dog training activities in designated areas between July 1 and March 15, dogs are to be leashed; not all dog owners are complying with this restriction (pers. comm., Atkinson 2003).

- Alcohol Use—Possession and use of alcohol are common in the OWA, but are prohibited outside of designated parking areas under the CCR (pers. comm., Atkinson 2003; OLC 2003e).

Additionally, visitors entering the Monument Hill or Larkin Road facilities see two entry signs. One sign states that the area is part of the OWA and managed by DFG with all the regulations that apply to such areas. The second sign is a DWR sign that states the name of the use area. Each sign describes agency regulations, some of which conflict with regulations posted on the other sign. The combination of these two signs can confuse visitors with regard to what activities are permitted, and may hinder their understanding that the primary purpose of the OWA is for fish and wildlife enhancement.

Other law enforcement needs relate to the protection of endangered species. Lack of law enforcement personnel can affect the management of fish- and wildlife-related resources and can thereby influence the quality and perpetuation of recreation related to those resources.

5.3 FISH AND WILDLIFE-RELATED RECREATION OPPORTUNITIES

This section describes the opportunities for hunting, fishing, wildlife viewing, and nature study that are available within the study area. The siting, development, and maintenance of camping areas, access roads, and other facilities invariably requires

consideration of impacts on fish and wildlife in the area. Although proposed in the 1978 OWA management plan, visitor uses are not currently monitored nor are staff allocated there for the specific purpose of benefiting wildlife in the OWA. Elsewhere in the study area, DWR, DFG, and DPR have coordinated to varying degrees on several wildlife and fishery enhancement programs to improve related recreation opportunities.

5.3.1 Hunting

This section describes the regulations, permits, licenses, and species pertaining to hunting. Hunter characteristics are also presented and supported by results from surveys conducted as part of the relicensing recreation studies.

5.3.1.1 Regulations

Regulations governing hunting and other uses at the OWA are detailed in Title 14 of the *California Code of Regulations (CCR), Sections 550 and 551*, and reprinted by DFG in the pamphlet entitled "Hunting and Other Public Uses on State and Federal Areas" (OLC 2003a; DFG 2002b). DFG publishes additional pamphlets detailing specific regulations associated with freshwater sport fishing and hunting of mammals and furbearers, resident and migratory upland game birds, and waterfowl (DFG 2002c, 2002f, 2002g). Regulations for hunting and other activities on the OWA are detailed in Appendix A – Project Area Hunting Regulations and History.

Regulations governing hunting within the LOSRA are provided in 1*4 CCR Sections 250–260.2*, and *Section 4506* (OAL 2003). LOSRA hunting regulations are also listed in the DFG regulation pamphlets cited above (DFG 2002 b-f). LOSRA hunting regulations are summarized in Table 5.1-2.

5.3.1.2 Permits and Licenses

Hunting is permitted throughout the OWA with a valid license and the appropriate equipment, stamps, and tags. As prescribed by the California Fish and Game Code, the OWA is a Type "C" hunting area, which does not require an entry permit or pass for hunting during open seasons, except during spring turkey season, when entry permits are issued by special drawing.

Hunting is permitted throughout the LOSRA, with the exception of several specific areas. No hunting is allowed within 300 yards of any designated campground, building, or dock, for example, nor on the surface of Lake Oroville. Further descriptions of off-limit areas are described in Appendix A (Table A).

Game species may be taken in the LOSRA only during their respective open seasons or portions thereof falling within the period September 15 through January 31, and between February 1 and September 14 for wild turkeys only, as provided in DFG hunting regulations. Some furbearer seasons are extended into February or March

(pers. comm., Bogener 2004). No waterfowl or deer hunting is permitted anytime within the LOSRA. See Appendix A (Table A) for further details regarding hunting.

5.3.1.3 Species

Waterfowl and upland game hunting are permitted in the OWA including Thermalito Afterbay and Forebay (within the OWA or LOSRA boundaries). The OWA provides a year-round home for at least 128 species of birds and 12 species of mammals. Common game birds include the mourning dove, California quail, wild turkey, and ring-necked pheasant. Habitat in the Project area attracts a variety of species of birds and is used as a winter habitat for two herds of black-tailed deer.

The OWA including Thermalito Afterbay is managed to provide habitat for nesting and wintering waterfowl. Thermalito Forebay (not within the OWA boundaries) provides resting and foraging habitat for open-water and diving waterfowl species. Waterfowl in the study area include mallard, gadwall, American widgeon, wood duck, cinnamon teal, Canada goose, ruddy duck, bufflehead, scaup, ring-necked duck, common goldeneye, and common merganser. Pheasants are restricted to lower elevations (pers. comm., Bogener 2004).

5.3.1.4 Hunter Characteristics

The LOSRA and the OWA are popular hunting destinations with an estimated annual 13,900 RDs within the Project area (DWR 2004). While this represents only 0.8 percent of primary activities selected by On-Site Survey respondents, there are several reasons for this low percentage. Hunting took place for only four months during the off-season survey data collection period, October through January. Most of the surveys were collected between May and September. Hunters were contacted primarily through the Hunter-Focused On-Site and Hunter-Focused Mail-Back Surveys and were not intended to be represented fully in the On-Site Survey collection effort (EDAW 2003a).

The majority of hunting activities within the Project area occur within the OWA, including Thermalito Afterbay. The Hunter-Focused On-Site Survey results are presented in this section. The majority of Hunter-Focused Mail-Back Survey results are presented to compare hunter preferences and satisfaction with those of anglers and wildlife viewers.

Hunter-Focused On-Site Survey

The majority of Hunter-Focused On-Site Survey respondents (78.4 percent) considered themselves to be regular visitors, which was defined in the survey as visiting three or more times per year (Table 5.3-1). Approximately nine percent of respondents considered themselves to be occasional visitors (defined as visiting 1–2 times per year) and only 1 percent of visitors considered themselves to be infrequent visitors (visiting less than 1 time per year). Eleven percent of respondents were first-time visitors.

Table 5.3-1. OWA Hunter visitation frequency.

Visitation Frequency	Percentage of Respondents
Regular visitor	78.4
Occasional visitor	9.3
Infrequent visitor	1.0
First visit	11.3

Note: There were 97 respondents.
Source: EDAW 2003b (Hunter-Focused On-Site Survey).

Since the main hunting seasons are in the fall and winter, it is logical that more hunters visit the Lake Oroville area and the OWA during the fall and winter (76 and 72 percent respectively). However, respondents could mark more than one season, and the survey results show that about 50 percent of Hunter-Focused On-Site Survey respondents also visit these areas in non-hunting seasons, which may indicate they live in the area or participate in other activities at the lake or in the OWA (Table 5.3-2).

Table 5.3-2. Seasonal use at the Lake Oroville Area/Oroville Wildlife Area.

Season of visitation	Percentage of Respondents
Spring	51.0
Summer	52.0
Fall	76.0
Winter	72.0

Note: There were 106 respondents. Respondents could mark more than one season.
Source: EDAW 2003b (Hunter-Focused On-Site Survey).

Hunter-Focused On-Site Survey respondents tended to hunt in small groups of generally between one and four people, mostly adults. The average group size was 2.7 people. Approximately half of On-Site Survey respondents hunt in the Thermalito Afterbay sub-unit most often, and approximately half hunt in the OWA most often (Table 5.3-3). Within the OWA areas, 19.1 percent of respondents hunt in the south OWA area on the east side of the Feather River, 15.7 percent hunt in the north OWA area and 14.6 percent of respondents hunt in the south OWA area on the west side of the Feather River most often.

Table 5.3-3. Area where hunters within the OWA go most often to hunt.

Area	Percentage of Respondents
Thermalito Afterbay subunit	50.6
North OWA (area south of Hwy 162/Oroville Dam Boulevard but north of Afterbay outlet)	15.7
South OWA – west of the Feather River (area south of the Thermalito Afterbay outlet)	14.6
South OWA – east of the Feather River (area west of Pacific Heights Road)	19.1

Note: There were 89 respondents.
Source: EDAW 2003b (Hunter-Focused On-Site Survey).

Over 80 percent of Hunter-Focused On-Site Survey respondents believe that access to the OWA is adequate (Table 5.3-4).

Table 5.3-4. Adequacy of access to the OWA.

Is access to the OWA adequate?	Percentage of Respondents
Yes	83.2
No	16.8

Note: There were 101 respondents.
Source: EDAW 2003b (Hunter-Focused On-Site Survey).

Hunter-Focused On-Site Survey respondents were also asked why they chose to hunt at the OWA or other Lake Oroville areas (Table 5.3-5). Approximately 28 percent of respondents indicated the reason was the proximity or location of the hunting area, presumably because it is close to where they live and therefore convenient for them to visit.

Table 5.3-5. Why Hunters chose to hunt at the OWA or other Lake Oroville area.

Reason	Percentage of Respondents
Proximity/location	27.8
Good hunting/habitat	18.6
Good access	16.5
Availability	13.4
Hunting there is free	12.4
Low hunting pressure	10.3
Familiar with the area	10.3
Good chances of getting game	8.2
There for the Junior hunt	7.2
Other	3.1

Note: There were 97 respondents. Respondents' comments could contain more than one reason.
Source: EDAW 2003b (Hunter-Focused On-Site Survey).

Other popular reasons for choosing to hunt at the OWA or other Lake Oroville area included the good hunting opportunities and habitat offered (18.6 percent of respondents) as well as the easy access to the hunting areas (16.5 percent of respondents). Approximately 13 percent of respondents chose to hunt at these areas because of the availability of the area, meaning that anyone can hunt there; hunters do not have to be chosen in a lottery, which is the case at other wildlife refuges. Respondents also visit these areas because they are free (12.4 percent of respondents), not too crowded (10.3 percent of respondents), and because they are familiar with the area and have been going there for several years (10.3 percent of respondents).

Hunter-Focused On-Site Survey respondents were asked about what species they were hunting for in particular (Table 5.3-6). Over half of respondents were hunting for ducks (55.7 percent). Other popular species to hunt were pheasant (38.7 percent), geese (24.5 percent), and quail (20.8 percent). Relatively few respondents were hunting for

dove (9.4 percent), deer (4.7 percent), or turkey (2.8 percent). It should be noted however, that surveys were not conducted on the opening days of the deer and turkey seasons, as they were for the other species.

Table 5.3-6. Species hunted for within the OWA and Lake Oroville area.

Species	Percentage of Respondents who responded that they hunt for that species
Ducks	55.7
Geese	24.5
Pheasant	38.7
Quail	20.8
Dove	9.4
Deer	4.7
Turkey	2.8

Note: There were 106 respondents. Respondents could list more than one species.
Source: EDAW 2003b (Hunter-Focused On-Site Survey).

In general, most hunters did not take very many animals, at least not at the time of filling out the survey (Table 5.3-7). Duck hunters were the most successful with about half bagging between one and three birds. The average number of ducks taken was between one and two ducks (1.63). The average number of animals taken, if at least one had been bagged, was the highest for ducks at 3.2 ducks. Pheasant hunters were the second most successful group of hunters, with about 40 percent bagging one or two birds.

Table 5.3-7. Number of animals OWA hunters took on the day they were surveyed.

	Percentage of respondents that took the following number of animals							Avg # of animals taken	Avg # of animals taken if bagged at least one
	0	1	2	3	4	5	>5		
Ducks	49.2	13.6	10.2	10.2	5.1	5.1	6.8	1.6	3.2
Geese	88.5	7.7	3.8	0.0	0.0	0.0	0.0	0.2	1.3
Pheasant	58.5	26.8	12.2	0.0	2.4	0.0	0.0	0.6	1.5
Quail	72.7	9.1	13.6	0.0	0.0	0.0	4.5	0.7	2.7
Dove	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deer	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turkey	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Note: Respondents included 30 duck hunters, 3 geese hunters, 41 pheasant hunters, 22 quail hunters, 10 dove hunters, 5 deer hunters, and 3 turkey hunters.
Source: EDAW 2003b (Hunter-Focused On-Site Survey).

The average number of pheasants taken per hunter was between zero and one, or between one and two birds if at least one bird had been bagged. Quail hunters were the third most successful group of hunters with around 30 percent of hunters bagging

one or two birds. Quail hunters had the second highest average number of animals taken if at least one had been bagged, with between two and three birds (2.67). None of the dove, deer, or turkey hunters had taken any animals at the time of survey; however, there were only 18 respondents that were hunting these particular species.

The Hunter-Focused On-Site Survey respondents in general did not feel overwhelmingly crowded. The mean crowding score was between "slightly crowded" and "moderately crowded" (3.81 on a scale from 1 to 9), indicating that hunters do feel there is some crowding, but it is not severe at this point in time (Table 5.3-8).

The vast majority of respondents (94 percent) did not have encounters with other users that they felt put them at risk (Table 5.3-8). Of the six respondents who did have an encounter they felt put them at risk, four of the six said this encounter occurred because hunters were too close together (Table 5.3-9). This reinforces that crowding is not a major issue at this point, but has led to a few encounters perceived as imposing risk and may warrant monitoring.

Table 5.3-8. Encounters that OWA hunters felt put them at risk on day surveyed.

On this trip, did you have any encounters with other users that put you at risk?	
Response	**Percentage of Respondents**
Yes	6.0
No	94.0

Note: There were 100 respondents.
Source: EDAW 2003b (Hunter-Focused On-Site Survey).

Table 5.3-9. Description of encounters that respondents felt put them at risk within the OWA on the day surveyed.

Description of Encounter	Percentage of Respondents
Hunters too close together	66.7 (4 of 6)
Fisherman too close to decoy	16.7 (1 of 6)
Unsafe hunters	16.7 (1 of 6)

Note: Respondents include only those that responded that they had an encounter which put them at risk. There were 6 respondents.
Source: EDAW 2003b (Hunter-Focused On-Site Survey).

In terms of hunting regulations, almost 90 percent of Hunter-Focused On-Site Survey respondents felt that they were knowledgeable about the regulations for the OWA and Lake Oroville area. Of the 10 respondents that felt they were not knowledgeable about the regulations, half felt this was due to the regulations not being easily available (Table 5.3-10). Of the ten, two (20 percent) felt that they did not know about the regulations because the regulations change yearly, or felt they did not know the specific regulations for the OWA or Lake Oroville area.

Table 5.3-10. Reasons hunters gave for lack of knowledge about hunting regulations within the OWA and Lake Oroville area.

Reasons Respondents Were Not Knowledgeable About Hunting Regulations	Percentage of Respondents
Regulations not easily available	50.0 (5 of 10)
Regulations change yearly	20.0 (2 of 10)
Don't know area specific regulations	20.0 (2 of 10)
Other	10.0 (10f 6)

Note: There were 10 respondents.
Source: EDAW 2003b (Hunter-Focused On-Site Survey).

The majority of Hunter-Focused On-Site Survey respondents (85 percent) felt the hunting regulations for the OWA and Lake Oroville allow a quality hunting experience while 15 percent did not (Table 5.3-11). Of the respondents who felt the regulations do not allow a quality experience, almost 40 percent felt that the opening and closing times were not sufficient. Respondents felt that earlier opening and later closing times were necessary to allow hunters to set up and have a better experience. Other reasons include low bird populations (23 percent), the area is too crowded (15 percent), and more hunting areas are needed around the lake (7 percent).

Table 5.3-11. Reasons hunters gave as to why regulations do not allow a quality experience within the OWA and Lake Oroville area.

Reason Hunting Regulations Do Not Allow a Quality Experience	Percentage of Respondents
The opening and closing times are not sufficient	38.0
Bird populations are too low	23.0
The area is too crowded	15.0
Need more hunting areas around the lake	7.0
Other	23.0

Note: There were 13 respondents. Respondent comments could contain more than one reason.
Source: EDAW 2003b (Hunter-Focused On-Site Survey).

In general, most respondents (75 percent) were satisfied with their hunting experience. Of the 14 respondents (Table 5.3-12) that were not satisfied (25 percent), their reasons were mainly due to lack of birds/catch (57 percent), or they felt that habitat needs improvement (50 percent). Respondents also felt that the water levels were too low and this caused their dissatisfaction (21 percent). Other reasons for dissatisfaction included inadequate access and other hunters using at-risk practices (14 percent each).

Table 5.3-12. Why respondents were not satisfied with their hunting experience.

Reason Not Satisfied	Percentage of Respondents
Lack of birds/did not catch any birds	57.0
Habitat needs improvement	50.0
Water level too low	21.0
Access inadequate	14.0
Other hunters were unsafe	14.0
Other	14.0

Note: Respondents included only those that answered that they were not satisfied with their hunting experience. Respondents' comments could contain more than one reason. There were 14 respondents.
Source: EDAW 2003b (Hunter-Focused On-Site Survey).

At the end of the Hunter-Focused On-Site Survey, respondents were invited to write any additional comments (45 total) that they might have. Almost 30 percent of the respondents (the largest group) who wrote a comment mentioned that they had a good experience or believed that management was doing a good job and that they had a good time hunting. Twenty-two percent of respondents that gave a comment mentioned things management could do to improve hunting opportunities including: cleaning up or improving habitat and weeds, planting food plots, or stocking more game. Thirteen percent of respondents felt the daily opening time should be earlier to allow hunters to set up or felt there were other regulations that could be changed. Some respondents felt that access could be improved (11 percent), water levels should be higher (9 percent), or more turkey hunting opportunities should be provided (7 percent). A few respondents made comments that mentioned other issues with management (7 percent) or that the area is too crowded (4 percent). Table 5.3-13 lists the "other" comments that respondents made.

Table 5.3-13. Hunter-Focused On-Site Survey open-ended additional comments.

Comment	Percentage of Respondents
Had a good experience, think management is doing a good job	29.0
Clean up habitat/weeds/plant food plots/stock more game	22.0
Think opening time should be earlier/other regulations should be changed	13.0
Provide better access	11.0
Water levels should be higher	9.0
Provide more turkey hunting opportunities	7.0
Other issues with management (patrol more, devise a quail management plan, install permanent bathrooms)	7.0
Area is too crowded/problems with other hunters	4.0
Other (shooting area is too dangerous, don't sell the water, keep OWA free of charge to hunt in, more public hunting areas)	13.0

Note: There were 45 respondents. Comments could fit into more than one category.
Source: EDAW 2003b (Hunter-Focused On-Site Survey).

Another question asked for input related to the need for improvements at the Oroville Wildlife Area. Responses were provided by 85 of 116 total Hunter-Focused Survey

respondents. A total of 108 responses were submitted by the 85 respondents, since many of the survey respondents provided multiple answers. Table 5.3-14 shows percentage distribution of comments that relate to each listed category. Comments are grouped according to one of six potential improvement areas:

- Water levels;
- Park access;
- Facilities;
- Grounds;
- Wildlife population; and
- Hunting regulations.

Table 5.3-14. Hunter's suggested improvements at the OWA.

Responses	Percentage of Responses
Water levels:	**11.0**
Maintain high water levels in Afterbay	6.0
Maintain consistent water levels	5.0
Park access:	**32.0**
Extend hours of entry	6.0
Open for entire duration of archery season	2.0
Install key access at gates	4.0
Permit bicycle access	2.0
Permit quad access	1.0
Improve overall access	4.0
Improve road conditions and parking	5.0
No improvements/Restrict vehicle access	5.0
Restrict boat launching to Afterbay bridge area	1.0
Restrict all-terrain vehicles, horseback riding, dog training	1.0
Close roads along [Highway] 162	1.0
Facilities:	**13.0**
Improve bathroom and cleaning facilities	2.0
More bathroom facilities for women	1.0
Improve boat launch ramps	2.0
Label duck ponds and blinds	1.0
Add free blinds for public use	1.0
Set up trap shoot range	1.0
Remove litter/ add trash bins	5.0
Grounds:	**24.0**
Improve natural habitat	22.0
Acquire more land for hunting	2.0

Table 5.3-14. Hunter's suggested improvements at the OWA.

Responses	Percentage of Responses
Wildlife Population:	**15.0**
Stock game species	7.0
Close park for 1 year	1.0
Remove animal predators	3.0
Doe tags	2.0
Open limited turkey season	2.0
Hunting Regulations:	**9.0**
Permit use of rifles and handguns during deer season	1.0
Assign blinds or start areas for hunting	2.0
Limit number of hunters	2.0
Increase Game Warden patrol	4.0

Note: There were 85 respondents. Responses total more than 100 percent due to rounding.
Source: EDAW 2003b (Hunter-Focused On-Site Survey).

Of the 85 respondents, 22 percent requested that improvements to the habitat of game species be implemented at the Oroville Wildlife Area.

Eleven percent of total respondent comments recommended that water levels at OWA be maintained at more consistent levels, and more than half of these comments favor the maintenance of higher water levels.

5.3.2 Fishing

The LOSRA and the OWA offer a wide variety of fishing opportunities for almost every type of angler. The LOSRA offers fishing in all of its reservoirs, and the OWA provides access to Thermalito Afterbay, approximately 75 warm-water ponds, and the LFC of the Feather River. The Feather River at the Thermalito Afterbay outlet, located within the OWA, is one of the most popular seasonal fishing spots in Butte County, hosting tens of thousands of anglers each year (DWR 2001a).

5.3.2.1 Regulations

Most of the Feather River is open to fishing during certain periods each year. Fishing along the Feather River from the Fish Barrier Dam downstream to the Table Mountain bicycle bridge is prohibited year round. Licensing, permit information, requirements, and special regulations are detailed in *14 CCR Sections 1.04–8.0*, and reprinted in the DFG pamphlet "Freshwater Sport Fishing: California Regulations" (OAL 2003; DFG 2002a). Lake Oroville is also subject to special regulations prohibiting the take of black bass between 12 and 15 inches in length, and there is a bag limit of 5 black bass per day.

5.3.2.2 Permits and Licenses

Fishing is permitted throughout the study area, except immediately below the Fish Barrier Dam, with the appropriate State-issued license, stamps, and cards as required under State law. Fishing in a number of reaches of the Feather River is also governed by special regulations. In addition to a basic fishing license, a steelhead trout catch report–restoration card is required for take of any steelhead trout, defined as any rainbow trout that is 16 inches or larger and found in anadromous waters. Moreover, a striped bass stamp has been required for the take of striped bass.[8]

5.3.2.3 Species

Anglers target both warm-water and coldwater species. Warm-water anglers tend to fish closer to the surface and seek out shallower areas where waters are warmer, while coldwater anglers fish deeper waters where temperatures stay cooler. There is excellent sport fishing for Chinook salmon, steelhead trout, American shad, striped bass, and channel catfish in the OWA. In addition, anglers can fish for largemouth and smallmouth bass, bluegill, crappie, brown bullhead, and carp.

The diverse temperature structure of Thermalito Afterbay has provided suitable habitat for both warm-water and coldwater fish, including a popular largemouth bass fishery. Other fish species include smallmouth bass, rainbow trout, brown trout, red-ear sunfish, bluegill, black crappie, channel catfish, and carp. Fishing in Thermalito Afterbay occurs both from the shore and from boats.
The two-layered temperature (warm/cold) structure of Lake Oroville provides an opportunity for both salmonid and centrarchid fisheries to flourish. The reservoir's warm-water fishery includes spotted bass, largemouth bass, smallmouth bass, redeye bass, bluegill, green sunfish, black crappie, white crappie, channel catfish, and white catfish. Spotted bass are among the most commonly caught fish in Lake Oroville. The coldwater fishery consists primarily of brown trout and silver salmon, with smaller populations of rainbow and lake trout. Chinook salmon was an important coldwater species until stocking was ceased in 2002 and replaced by stocking of silver salmon. The salmon population has increased over the last few years to the highest sustained levels in Lake Oroville's history. Catch rates have also shown a steady increase in recent years (DWR 2000).

Thermalito Forebay is supplied by water from the Diversion Pool via the Thermalito Power Canal, and therefore maintains cold temperatures throughout the year and hosts the same species found in the Diversion Pool. In addition, Thermalito Forebay is managed by DFG as a put-and-take trout fishery, where catchable trout are stocked biweekly. Rainbow and brook trout are the primary fish planted, although surplus inland Chinook salmon yearlings are occasionally stocked as well.

[8] The striped bass stamp will be replaced in 2004 with a Bay–Delta Restoration Stamp, required for fishing in Central Valley anadromous waters.

Thermalito Diversion Pool is supplied by water from Lake Oroville's hypolimnion and remains cold year-round, supporting a coldwater fishery dominated by rainbow trout, brook trout, brown trout, and Chinook salmon. Warm-water fish such as largemouth bass, bluegill, and green sunfish have also been observed in low numbers in backwater areas, and other warm-water fish that live in Lake Oroville are believed to be present.

5.3.2.4 Activities

Anglers tend to fish with lures and bait, although some anglers on the Feather River fly-fish during the late fall and spring. As mentioned previously, throughout the area fishing takes place from shore and from boats.

Several trophy salmonids are caught in the Diversion Pool each year, their large size related to the relatively abundant food supply of forage fish entrained in the discharge from Lake Oroville through the Hyatt Pumping-Generating Plant.

In the last few years, private businesses, organizations, and clubs have sponsored approximately 44 bass fishing tournaments at Lake Oroville, several of which have become annual events and have been repeated for years (DWR 2001a).

5.3.2.5 Angler Characteristics

According to studies conducted in 1996 by California State University–Chico (Guthrie et. al. 1997) and surveys recently conducted as part of the relicensing effort, bank fishing and boat fishing are the first and fifth most common primary activities of visitors to LOSRA, respectively, and the two most common primary activities of visitors to the OWA (EDAW 2003a).

On-Site Survey

Results from the On-Site Survey relevant to angling are summarized in Tables 5.3-15 through 5.3-21. Respondents were asked which seasons they visited the study area. The highest use by both bank anglers and boat anglers is during the summer, and the lowest use is during the winter. However, a substantially greater percentage of boat anglers than bank anglers visit the study area during the spring, fall, and winter (Table 5.3-18).

Table 5.3-15. Angler use by season within the Project area.

Season	Percent of Respondents Who Visit During Each Season	
	Bank Anglers	Boat Anglers
Spring	41.3	75.4
Summer	76.8	82.8
Fall	49.7	70.7
Winter	25.5	53.9

Note: Respondents could select more than one season. There were 392 bank angler respondents and 256 boat angler respondents.
Source: EDAW 2003a (Recreation Visitor On-Site Survey).

Survey respondents to the fishing section of the Recreation Visitor On-Site Survey were asked which species they fish for in the study area. Salmon and black bass are the two most commonly-sought species, with about 40 percent of the fishing survey respondents fishing for one of these species. White sturgeon, green sturgeon, and shad are the least-commonly-sought species, with less than one percent of respondents fishing for these species (Table 5.3-16).

Table 5.3-16. Percent of anglers fishing for each species within the Project area.

Species	Percentage of Respondents
Salmon	21.8
Black Bass	21.8
Trout	9.2
Steelhead	6.0
Catfish	5.4
Striped Bass	3.5
Sunfish	3.4
Crappie	2.5
White Sturgeon	0.7
Green Sturgeon	0.6
Shad	0.6
Other	2.8
No Preference	0.9

Note: Respondents could choose more than one species. There were 1,071 respondents.
Source: EDAW 2003a (Recreation Visitor On-Site Survey).

These survey respondents were also asked the species and size of fish they had caught during their visit and the number of fish that they released (Table 5.3-17). Black bass was the most commonly caught species. The second most commonly caught species was salmon. The remaining species were caught in much fewer numbers. The majority of the fish caught were released, however, a lower percentage of catfish, crappie, trout, salmon, and striped bass were released than other fish. No green or white sturgeon were released, as very few were caught.

In addition, anglers who caught trout, salmon, and steelhead were asked to identify whether their catch had clipped adipose fins. A clipped adipose fin indicates a fish that was raised in a hatchery facility, whereas fish reared in the wild do not exhibit a clipped adipose fin. Few respondents answered this question, and a large percentage of those who did, answered that they were unsure of whether the adipose fin of their catch was clipped or not.

Table 5.3-17. Number of fish caught by size and species.

Species	Size (Inches)					Total	Released
	0–5	6–11	12–20	21–30	31+		
Black Bass	136	658	1311	100	1	2206	1881
Sunfish	154	66	26	1	0	247	112
Catfish	105	22	87	9	8	231	88
Crappie	9	37	7	0	0	53	19
Trout	11	107	120	0	31	269	81
Salmon	32	9	179	164	218	602	211
Steelhead	19	19	53	49	9	149	137
Striped Bass	32	27	28	18	0	105	15
Shad	2	30	0	0	0	32	26
Green Sturgeon	0	0	0	0	4	4	0
White Sturgeon	0	1	2	0	3	6	0
Other	2	28	107	2	0	139	147

Note: There were 427 respondents who caught one fish of any species in any size category.
Source: EDAW 2003a (Recreation Visitor On-Site Survey).

Respondents to the fishing section of the Recreation Visitor On-Site Survey were asked whether they had ever hired a fishing guide in the study area, and if so, where they had fished with the guide. Of the 928 people who responded to this question, 8.2 percent answered that they had hired a fishing guide in the study area. The areas where respondents most commonly fished with guides included the main basin of Lake Oroville and the OWA, followed by Thermalito Afterbay and Thermalito Forebay. Table 5.3-18 summarizes the areas fished with guides.

Table 5.3-18. Areas within the Lake Oroville area fished with guides

Area Fished	Percentage of Guided Respondents
Main Basin	31.6
OWA	31.6
Afterbay	25.0
Forebay	22.4
Lower North Fork	15.8
South Fork	15.8
Upper North Fork	11.8
West Branch	9.2
Diversion Pool	9.2
Middle Fork	9.2

Note: Respondents could select more than one area. There were 76 respondents.
Source: EDAW 2003a (Recreation Visitor On-Site Survey).

Respondents were asked their knowledge and perception of existing fishing regulations. Of those who responded, 87.9 percent indicated that they felt knowledgeable about fishing regulations, while 12.1 percent indicated that they did not feel knowledgeable

about regulations. The vast majority of respondents (91.3 percent) felt that the existing regulations allow for a quality fishing experience, and an even greater percentage (94.5 percent) of respondents who felt knowledgeable about regulations also felt that they allow for a quality experience.

Though there have been over 40 fishing tournaments held at Lake Oroville over the past few years, only 10 percent of the respondents to the fishing section of the On-Site Survey had participated in a tournament held at the study area.

5.3.3 Wildlife Viewing and Nature Study

As detailed in Section 5.1, the LOSRA and OWA provide a wide variety of terrain and habitats that support diverse plant and wildlife communities. The quality and diversity of habitat and wildlife species throughout the study area provide extensive opportunities for nature study and wildlife viewing.

Recently-conducted surveys indicate that nature study and wildlife viewing are the primary activities of 0.8 percent and 0.5 percent of respondents (1.2 percent combined) surveyed throughout the study area, respectively (EDAW 2003a). However, 9 percent of visitors listed nature study and 12 percent listed wildlife viewing as an activity participated in (though not necessarily as a primary activity) during their visits to the study area (EDAW 2003a).

Respondents were asked during which seasons they visited the study area. The majority of respondents primarily participating in nature study and wildlife viewing visited the study area during the spring, summer, and fall, with the greatest percentage visiting during the summer. Visitation during the winter was slightly lower (Table 5.3-19). This seasonal distribution of use is similar to the pattern observed for other recreation activities.

Table 5.3-19. Nature study/wildlife viewer use by season.

Season	Percent of Respondents Who Visited the Lake Oroville Area During Each Season
Spring	60.0
Summer	83.3
Fall	53.3
Winter	43.3

Note: Respondents could select more than one season. There were 30 respondents.
Source: EDAW 2003a (Recreation Visitor On-Site Survey)

5.3.3.1 Activities

In addition to individual visitors, numerous groups visit the OWA to study nature and view wildlife. These groups come from elementary, middle, and high schools; from colleges and universities; and from other outdoor education programs. Guided tours of

the hatchery for groups are also popular. The Feather River Fish Hatchery allows visitors and school groups year round, but the artificial spawning operation occurs only on specified weekdays from September through mid-November. The hatchery also occasionally hosts special events such as the Salmon Festival, which is typically scheduled for the last Saturday in September (pers. comm., Rischbieter 2003).

5.3.3.2 Species

The OWA is a unique area, offering more species diversity than most other wildlife areas in California (pers. comm., Atkinson 2003). Illustrative of the extreme diversity, 171 species of birds, 35 species of mammals, 12 species of reptiles, and 4 species of amphibians have been recorded in the OWA. In addition, as noted earlier, a number of anadromous fish species are known to spawn in the Feather River below Oroville Dam and in the Feather River Fish Hatchery. Furthermore, riverine habitat in the OWA has one of the highest degrees of ecological functionality and provides some of the best opportunities for nature study in California (pers. comm., Atkinson 2003). LOSRA also provides a variety of high quality habitat, although to a lesser degree, and supports diverse bird, mammal, reptile, amphibian, and fish populations (DWR 2001a).

In addition to waterfowl and upland game birds, there are numerous furbearers within the study area, including badger, mink, beaver, raccoon, gray fox, weasel, muskrat, bobcat, opossum, and bear. Commercial and recreational harvest of these species within the study area is believed to be negligible (DWR 2001a).

Including candidate species, over a dozen State or federally-listed species have been observed in the vicinity of the study area (Study T-2 – *Project Effects on Special Status Species* describes current surveys of project wildlife in detail). Database and agency records indicate that southern bald eagle, peregrine falcon, and greater sandhill crane are known to occur within the area. Moreover, Aleutian Canada goose, bank swallow, Swainson's hawk, western yellow-billed cuckoo, California red-legged frog, giant garter snake, valley elderberry longhorn beetle, and vernal pool fairy shrimp have also been documented in the vicinity. In addition, BLM and/or USFS sensitive species occur in the study area. Database and agency records indicate that tricolored blackbirds, western burrowing owls, and southwestern pond turtles occur in the study area, and suitable habitat may exist for foothill yellow-legged frogs, western spadefoot toads, California horned lizards, and seven sensitive bat species (DWR 2001a).

The study area also provides habitat for a variety of culturally-important wildlife species, including wildlife that were used for food, clothing, shelter, tools, and ceremonial purposes by Native American tribes in the Oroville area. Deer, bear, and smaller mammals provided hides for clothing, tools, and food. Small game, including rabbits, duck, geese, quail, and other species, were used for food. Feathers from magpie, quail, and woodpeckers were used for ornamentation (DWR 2001a).

Salmon are culturally significant to members of the Maidu tribe presently living in the Oroville area. While no special rights for hunting or fishing exist for any Native Americans in California, Department of Fish and Game special permits are issued only to Maidu tribe members during the Oroville Salmon Festival each September. These permits allow ten salmon to be caught by the traditional method of spear fishing. Additionally, venison served with acorn pudding is a traditional Maidu meal enjoyed by some tribal families. This venison is acquired under available hunting licenses. Salmon is also caught under available fishing licenses. It appears that some Maidu families are making an effort to return to traditional practices (pers. comm., McCarthy 2004).

5.3.4 Comparison of Fish- and Wildlife-Related Recreation Opportunities

Survey results that compare the three types of wildlife-related recreation opportunities—hunting, fishing, and wildlife viewing/nature study—are discussed in this section. The results for each group are compared in terms of user characteristics for each group, visitor satisfaction, level of facilities, and preference for recreation opportunities. Fishing has been divided into two types: bank and boat fishing.

5.3.4.1 User Characteristics

Respondents to the surveys were asked to characterize their visit in terms of primary activity, frequency, time of day, and group size.

Primary Activity

Respondents to the On-Site Survey were asked their primary activity in the study area. Bank fishing was the most common primary activity among all survey respondents, with 16.6 percent of all respondents participating. Boat fishing was the fourth most common primary activity with 10.8 percent of respondents participating, while hunting and nature study/bird watching were the sixteenth (1.2 percent) and twenty-third (0.8 percent) most common primary activities, respectively (Table 5.3-20). As stated earlier, hunting participation is not fully represented in the On-Site Survey.

Table 5.3-20. Primary activity of visitors within the study area.

Activity	Percent of Respondents Participating as Primary Activity	Total Participants
Bank Fishing	16.6	393
Boat Fishing	10.8	255
Nature Study/Bird Watching	1.2	28
Hunting*	0.8	19

Note: There were 2,365 respondents.
**Hunting is more fully represented in the Hunter On-site and Hunter-Focused Mail-Back Surveys.*
Source: EDAW 2003a (Recreation Visitor On-Site Survey).

Frequency of Visits

The majority of respondents in each user group visit the study area regularly and only a small percentage of each user group indicated that they visit the study area infrequently, as shown in Table 5.3-21. Bank angler and nature study/bird watching respondents included the highest percentage of occasional visitors, while hunter respondents included the largest percentage of first-time visitors to the study area.

Table 5.3-21. Recreation visitor frequency of visits to the study area.

Visitation	Percent of Respondents			
	Bank Anglers	Boat Anglers	Hunters	Nature Study/Bird Watchers
Regularly	70.5	87.1	69.2	75.0
Occasionally	15.3	7.4	7.7	17.9
Infrequently	4.2	2.3	0.0	0.0
First Visit	9.9	3.2	23.1	7.1

Note: Regular visitation was considered 3 or more times per year, occasional visitation was 1-2 times per year and infrequent visitation was less than 1 time per year. Respondents include 353 bank anglers, 217 boat anglers, 13 hunters, and 28 nature study/bird watchers.
Source: EDAW 2003a (Recreation Visitor On-Site Survey).

Arrival and Departure Times

Respondents to the On-Site Survey were asked the time of their arrival and departure on the day they were surveyed. The majority of the boat anglers and hunters who responded to this question arrived in the morning, between 6:00 a.m. and 12:00 p.m., while only a slightly higher percentage of bank anglers arrived in the morning than the afternoon. A larger percentage of respondents who participated in nature study and bird watching arrived in the afternoon (12:00 p.m. to 6:00 p.m.) than in the morning. Respondents who participated in nature study and bird watching also included the highest percentage of individuals who arrived in the evening (6:00 p.m. to 12:00 a.m.). The majority of all user groups departed the study area in the afternoon. A higher percentage of bank anglers, hunters, and participants in nature study/bird watching departed in the morning than the evening, however, while a higher percentage of boat anglers departed in the evening than in the morning (Table 5.3-22).

Table 5.3-22. Recreation Visitor On-Site Survey respondent arrival and departure times within the study area.

	Percent of Respondents			
	Bank Anglers	Boat Anglers	Hunters	Nature Study/Bird Watchers
Arrival Time				
6:00 a.m. to Noon	47.8	54.7	66.7	36.8
Noon to 6:00 p.m.	45.9	40.2	33.3	47.4
6:00 p.m. to Midnight	6.3	5.0	0.0	15.8

Table 5.3-22. Recreation Visitor On-Site Survey respondent arrival and departure times within the study area.

	Percent of Respondents			
	Bank Anglers	Boat Anglers	Hunters	Nature Study/Bird Watchers
Departure Time				
6:00 a.m. to Noon	21.8	11.9	14.3	26.7
Noon to 6:00 p.m.	59.8	67.3	85.7	53.3
6:00 p.m. to Midnight	18.4	20.8	0.0	20.0

Note: Respondents include 268 bank anglers, 179 boat anglers, 9 hunters, and 20 nature study/bird watchers that gave arrival time and 234 bank anglers, 162 bank anglers, 6 hunters, and 15 nature study/bird watchers that gave departure times.
Source: EDAW 2003a (Recreation Visitor On-Site Survey).

Group Size

Survey respondents indicated that the majority of visitors visit alone or with one other adult (Table 5.3-23). Most groups do not include any children, though hunters and participants in nature study and wildlife viewing did indicate having a greater number of children participants than bank anglers or boat anglers. Bank anglers had the greatest average number of adults (3.45 per group). Nature study/bird watching had the greatest average number of children (1.40 per group).

Table 5.3-23. Recreation Visitor On-Site Survey study area group size.

	Percent of Respondents			
	Bank Anglers	Boat Anglers	Hunters	Nature Study/ Bird Watchers
Average Number of Adults	3.5	2.4	2.1	2.9
Average Number of Children	0.8	0.5	0.6	1.4
	Percentage of Responses			
Number of Adults in Group				
1	28.0	19.8	34.0	23.3
2	39.1	58.5	38.7	46.7
3	11.7	10.1	14.2	6.7
4 or more	21.2	11.7	25.4	23.3
Number of Children in Group				
0	71.9	79.7	60.4	50.0
1	9.2	12.5	25.5	13.3
2	7.1	3.5	9.4	26.7
3	5.4	1.6	1.9	0.0
4 or more	6.4	2.7	2.8	10.0

Note: Respondents included 392 bank anglers, 256 boat anglers, 106 hunters, and 30 nature study/bird watchers.
Source: EDAW 2003a,b (Recreation Visitor and Hunter-Focused On-Site Surveys).

5.3.4.2 Recreation Visitor Satisfaction

Respondents to the surveys were asked to characterize their overall satisfaction, perceptions of crowding, issues or problems as well as any additional comments.

Visitor Satisfaction Rating

All users' and the four activity subgroups' mean score for satisfaction fell between "somewhat satisfied" (6) and "satisfied" (7). The score for nature study/bird watchers is based on a very small number of respondents (Table 5.3-24). In general, visitors appeared to be satisfied with their most recent trip to the Lake Oroville Area.

Table 5.3-24. Recreation visitor overall satisfaction with recent trip to the Lake Oroville area.

	All Users	Bank Anglers	Boat Anglers	Hunters	Nature Study/Bird Watchers
Overall Satisfaction (Mean[1])	6.59	6.43	6.28	6.51	6.11

Satisfaction was rated from "Extremely Dissatisfied" (1); "Dissatisfied" (3); "Neither Satisfied or Dissatisfied" (5); "Somewhat Satisfied" (6) "Satisfied" (7); to "Extremely satisfied" (9).
Note: The number of respondents varies by respondent group. There were 1,044 respondents under All Users, 131 respondents under Bank Anglers, 116 respondents under Boat Anglers, 37 respondents under Hunters, and 9 respondents under Nature Study/Bird Watchers.
Source: EDAW 2003c,d (Mail-Back and Hunter-Focused Mail-Back Surveys).

Perceptions of Crowding

Survey respondents were asked their perception of crowding in the study area. Based on a scale of 1 to 9, with 1 indicating "Not at all crowded" and 9 indicating "Extremely crowded," the mean perception of crowding was calculated for each user group, as shown in Table 5.3-25. The overall perception of crowding for all user groups was in the range of "Slightly crowded," with a combined mean of 3.49. Respondents participating in nature study or bird watching had the lowest perceived level of crowding (mean = 2.96), while respondents participating in bank fishing had the highest perceived level of crowding (mean = 4.21). Respondents participating in bank fishing also had the highest percentage between "Moderately crowded" and "Extremely crowded."

Table 5.3-25. Recreation Visitor On-Site Survey respondent perception of crowding at the site visited on day surveyed.

	Mean	Percent Who Felt Moderately to Extremely Crowded
Bank Anglers	4.21	38.6
Boat Anglers	3.15	21.6
Hunters	3.81	30.1
Nature Study/Bird Watchers	2.96	22.2

Note: Respondent perception of crowding was ranked on a numerical scale of 1 to 9, with 1= Not at All Crowded; 3 = Slightly Crowded; 6 = Moderately Crowded; and 9 = Extremely Crowded. Respondents included 373 bank anglers, 245 boat anglers, 103 hunters, and 27 nature study/bird watchers.
Source: EDAW 2003a,b (Recreation Visitor On-Site and Hunter-Focused On-Site Surveys).

Issues or Problems Visitors Experienced

Recreation Mail-Back and Hunter-Focused Mail-Back Survey respondents were asked about issues or problems they may have experienced when they were at the study area (Table 5.3-26). In general, users of focus (bank anglers, boat anglers, hunters, and nature study/bird watchers) rated most issues between "not a problem" and "a slight problem." However each group had a few issues that were rated between "a slight problem" and "a moderate problem." No issues were identified as "a big problem."

For the group of all users, the most commonly selected problems were water condition issues, including exposed land during lower water levels (2.35), shallow areas during low water levels (2.25), and water level fluctuations (2.20). The bank anglers rated very different items between "a slight problem" and "a moderate problem." Their concerns dealt with the shoreline (as that is where their recreational activity takes place) and included litter along the shoreline (2.82) and sanitation along the shoreline (2.39).

Table 5.3-26. Mail-Back and Hunter-Focused Mail-Back Survey respondent rating of potential issues (mean score[1]) from most recent trip.

Potential Issues	All Users	Bank Anglers	Boat Anglers	Hunters	Nature Study/Bird Watchers
Management Responsibilities					
Litter along the shoreline	1.84	2.82	2.00	2.33	2.56
Sanitation along the shoreline	1.60	2.39	1.61	1.67	1.75
Cost to use facilities	1.20	1.19	1.24	NA	1.00
Overall safety and security	1.41	1.66	1.65	1.22	1.22
Availability of service/staffing	1.40	1.68	1.57	1.44	1.22
Adequate information/ warnings provided	1.32	1.46	1.42	1.43	1.00
Adequacy of landscaping of facilities	1.38	1.62	1.38	NA	1.50
Access to shoreline	1.78	1.57	1.86	1.41	1.63
Law enforcement presence	1.45	1.72	1.64	1.27	1.00
Encounters between trail users and other users	1.15	1.24	1.15	NA	1.00
Water Conditions					
Exposed land during lower water levels	2.35	1.71	2.47	NA	1.57
Shallow areas during low water levels	2.25	1.63	2.46	NA	1.57
Floating debris in the water	1.81	1.82	2.36	1.41	1.57
Quality of water	1.45	1.33	1.45	1.42	1.00
Water level fluctuations	2.20	1.73	2.50	2.00	1.86
User Interactions					
Numbers of watercraft	1.62	1.90	1.91	NA	1.38
Noise from boats and PWC	1.53	1.75	1.78	1.50	1.63
Boat speed or wake	1.58	1.80	1.90	1.27	1.14
Encounters between water skiers and others	1.37	1.39	1.69	NA	1.17
Encounters between pleasure boaters and boat anglers	1.39	1.68	1.90	NA	1.00

Table 5.3-26. Mail-Back and Hunter-Focused Mail-Back Survey respondent rating of potential issues (mean score[1]) from most recent trip.

Potential Issues	All Users	Bank Anglers	Boat Anglers	Hunters	Nature Study/Bird Watchers
Encounters between PWC users and other users	1.67	1.47	2.16	NA	1.67
Unsafe behavior by other users	1.70	1.84	2.00	1.39	1.75
Numbers of people at developed facilities	1.52	1.90	1.68	1.60	1.38
Use of alcohol by other users	1.41	1.68	1.43	1.34	1.13
Encounters between visitors and residents	1.14	1.36	1.16	NA	1.00

[1]Experiences were rated from (1) "not a problem", (2) "a slight problem", (3) "a moderate problem" , to (4) "a big problem.
Note: NA means Not Asked; these questions were not considered relevant on the Hunter Mail-Back survey for the hunting subgroup. The 1,071 total responses included 392 bank anglers, 256 boat anglers, 106 hunters, and 30 nature study/bird watching participants. Those that responded "not applicable" are not included in the table or percentages. Information is taken from the Recreation Mail-Back Surveys, except Hunter responses, which are taken from the Hunter Mail-Back Survey.
Source: EDAW 2003c,d (Mail-Back and Hunter Mail-Back Surveys).

Boat angler issues that scored between "a slight problem" and "a moderate problem" were mostly water-related and included the same three water condition issues as other users did. Their issues included exposed land during lower water levels (2.47), shallow areas during low water levels (2.46), floating debris in the water (2.36), water level fluctuations (2.50), and encounters between PWC (personal watercraft) users and other users (2.16). Two issues that boat anglers rated as "a slight problem" include litter along the shoreline and unsafe behavior by other users. Hunters had only one issue rated between "a slight" and "a moderate problem:" litter along the shoreline (2.33).

Hunters rated water level fluctuations as "a slight problem." The final subgroup, nature study/bird watchers, rated only litter along the shoreline item as between a slight and moderate problem (2.56). Litter along the shoreline was rated by the four activity subgroups as between "a slight problem" and "a moderate problem" (Table 5.3-26).

Additional Comments

Additional comments regarding the study area were provided by 326 survey respondents, many of whom provided multiple comments. Of the comments provided, 340 pertain to fish and wildlife management or recreation in the study area. The majority of these comments pertained to one of the eight issues summarized in Table 5.3-27.

The distribution of comments between the eight common issues varied between user groups, as shown in Table 5.3-27. The majority of comments from bank anglers pertained to the improvement of existing facilities and the construction of additional facilities, the improvement of environmental conditions, and the increase of patrols for safety, crime prevention, and regulatory enforcement.

Comments and suggestions related to facilities ranged from additional trash cans, restrooms, shade structures and trees, and fish cleaning stations, to improving existing restrooms, campgrounds, and day use facilities. Furthermore, comments related to environmental conditions focused on trash collection and removal, and the maintenance of the natural landscape, while comments related to patrols focused on the enforcement of fish and game regulations.

Responses by boat anglers and participants in nature study/bird watching also included similar comments regarding facilities and environmental conditions. In addition, boat anglers commented frequently on engineering considerations, particularly on the water levels in Lake Oroville and Thermalito Afterbay. The few hunters that submitted additional comments focused on facilities, crowding, engineering considerations, and habitat concerns.

Table 5.3-27. Survey respondents' additional comments.

Comment	Percentage of Responses			
	Bank Anglers	Boat Anglers	Hunters	Nature Study/Bird Watchers
Improve or construct additional facilities (restrooms, fish cleaning stations, campsites, boat ramps, etc.)	20.7	17.8	15.6	40.0
Improve area and environmental conditions (remove litter, remove debris, etc.), and maintain natural landscape	26.1	12.4	9.4	13.3
Improve access (roads, trails, boat launches) and allow additional access (remove gates, allow nighttime access)	8.6	6.2	21.9	0
Reduce crowding and address conflicts between user groups (equestrians and cyclists; anglers and PWC)	6.3	7.0	9.4	6.7
Address environmental/engineering concerns (flows, lake level, water temperature, etc.)	8.1	30.2	12.5	13.3
Increase fish stocking, habitat improvement, and fish and wildlife management	8.6	5.4	18.8	6.7
Increase patrols for safety, crime prevention, and enforcement of fish and game regulations	12.2	9.3	6.3	0
Amend regulations or improve regulatory signage (extend seasons, remove size/bag limits, increase boating regulations in some areas, etc.)	5.0	8.5	3.1	6.7
Other (reduce fees, fewer tournaments, etc.)	4.5	3.1	3.1	13.3

Note: There were 222 responses from bank anglers, 129 from boat anglers, 32 from hunters, and 15 from those who listed nature study/wildlife viewing as their primary activity.
Source: EDAW 2003a,c (Recreation Visitor On-Site and Mail-Back Surveys).

5.3.4.3 Level of Facilities

Survey respondents were asked to evaluate the level of facilities at the Project Area. The number of facilities were rated on a scale from "too few" to "too many." Table 5.3-28 shows percentages of responses for the category of "too few."

Table 5.3-28. Survey respondent's evaluation of too few facilities in the Lake Oroville area[1].

Facilities	Percent of Response				
	All Users	Bank Anglers	Boat Anglers	Hunters	Nature Study/Bird Watchers
Trail Use-Related					
Number of unpaved bike trails	30.1	30.0	38.5*	NA	25.0*
Number of hiking trails	29.6	35.1	33.3	NA	0.0*
Number of signs indicating trail locations	38.2	48.6	37.5	NA	40.0*
Number of paved bike trails	33.7	46.2	66.7*	NA	20.0*
Number of equestrian trails	26.8	13.0	27.3*	NA	0.0*
Camping-Related					
Presence of campground hosts	17.3	25.0	31.0	NA	0.0*
Number of campgrounds	31.0	53.8	51.4	42.9	33.3*
Number of campsites with RV hookups	42.6	53.3	63.6	NA	0.0*
Number of group campsites	38.0	48.5	47.6	16.7	0.0*
Screening between campsites	39.0	40.0	44.4	50.0	0.0*
Number of floating campsites	46.0	20.0	55.2	NA	0.0*
Number of shower facilities at campgrounds	44.2	60.5	44.4	NA	66.7
Boating-Related					
Number of boat ramps	37.0	29.7	46.7	14.3	0.0*
Number of docks or temporary moorage	51.4	36.8	68.5	33.3	20.0*
Number of boat-in primitive campsites	42.4	43.5	58.3	NA	50.0*
Number of boat-in campsites	43.8	37.5	54.9	NA	25.0*
Number of marinas	34.6	36.0	30.4	NA	0.0*
Number of boat-in gas stations	37.8	36.4	35.5	NA	0.0*
Fishing/Hunting-Related					
Number of fish cleaning stations	46.4	69.6	33.8	NA	50.0*
Quality of habitat for hunting	26.1	25.7	22.7	NA**	0.0*
Lands for hunting	42.2	57.1	51.3	68.6	33.3*
Other Activity-Related					
Number of group picnic sites	38.4	53.8	40.0	NA	0.0*
Amount of swim areas	48.3	51.7	49.1	NA	44.4*
Number of equestrian facilities	30.1	30.8	12.5	NA	0.0*
Number of developed day use or picnic areas along the shore	57.2	54.2	63.0	NA	28.6*
Number of interpretive programs/educational opportunities	45.7	48.5	45.5	NA	50.0*
Number of restrooms	40.0	59.8	42.4	38.5	0.0*

[1]Experiences were rated from "Too Few" (1), "About Right" (2), to "Too Many" (3). This table only shows "Too Few." Note: NA means not asked. Facility issues with NA in the hunter column were not asked on the Hunter Mail-Back survey because they did not relate to this specific subgroup. The 1,071 total responses included 392 bank anglers, 256 boat anglers, 106 hunters, and 30 nature study/bird watching participants. Those that responded "not applicable" are not included in the table or percentages.
**The number of respondents upon which these percentages are based were extremely low (less than 15).*
***See Table 5.3-14 for hunter results regarding habitat.*
Source: EDAW 2003c,d (Mail-Back and Hunter Mail-Back Surveys).

Of all respondents to the Mail-Back and Hunter-Focused Mail-Back Surveys, over half believed there are too few docks or too little temporary moorage, and too few developed day use or picnic areas.

Over 50 percent of boat anglers stated that there were too few campgrounds, campsites with RV hookups, floating campsites, boat-in primitive campsites, boat-in campsites, lands for hunting, and developed day use or picnic areas along the shore. Nearly 70 percent of boat anglers indicated that there were too few docks or temporary moorage.

Hunters indicated that there was too little screening between campsites (50 percent) and too little lands for hunting (69 percent). Nature study/bird watchers had so few respondents that their responses are not considered statistically valid. The scores from these activity subgroups were similar to the scores given by all users. The Hunter-Focused Mail-Back Survey did not ask about several facility issues as they were not considered applicable to the hunter subgroup. Scores from nature study/bird watchers were based on very few respondents. In general it appears that for most of the facilities, the majority of users, including bank anglers, boat anglers, hunters, and nature study/bird watchers did not indicate that there were too few facilities; however, a small minority feel there is some deficiency in the number of facilities currently provided.

5.3.4.4 Recreation Opportunity Preferences

Recreation Mail-Back and Hunter-Focused Mail-Back Survey respondents were asked for their preferences for some aspects of the opportunities and setting that contribute to the recreational experience at the Lake Oroville area (Table 5.3-29).

Table 5.3-29. Recreation opportunity preferences for the Lake Oroville area.

Recreation Opportunity	Mean Respondent Preference Score				
	All Users	Bank Anglers	Boat Anglers	Hunters	Nature Study/Bird Watchers
Experience solitude or affiliation with other groups[1]	3.5	3.5	3.35	2.61	2.67
Experience risk and challenge from the natural Environment[2]	2.51	2.76	2.41	3.54	2.89
Use of outdoor wilderness skills[2]	2.75	3.11	2.55	3.86	2.89
Sounds of civilization[3]	2.53	2.47	2.56	2.16	2.00
Landscape[4]	2.13	2.08	2.07	1.95	2.11

Note: Preferences were rated on the scales indicated below.
[1]1 = Solitude is extremely important; 2= Solitude is very important; 3= Solitude is important; 4 = Solitude and affiliation are equally important; 5 = Affiliation with other groups is extremely important.
[2]1 = Extremely important; 2 = Very important; 3 = Important; 4 = Somewhat important; 5 = Not important.
[3]1 = Absent; 2 = Rare; 3 = Unusual; 4 = Common; 5 = Dominant.
[4]1 = Totally natural in appearance; 2 = Predominantly natural in appearance; 3 = Modified on a small scale; 4 = Significantly modified.
There were between 1,014 and 1,047 All User respondents, 123 and 131 Bank Angler respondents, 115 to 118 Boat Angler respondents, 36 to 37 Hunter respondents, and 9 Nature Study/Bird Watcher respondents.
Source: EDAW 2003c,d (Mail-Back and Hunter-Focused Mail-Back Surveys).

These results indicate that hunters may have a slightly higher preference for risk and use of Outdoor Wilderness Skills. Solitude also appears to be very important to hunters. Recreation managers may want to consider these potential needs when providing opportunities for hunting.

As for the opportunity to experience solitude versus affiliation with other groups, the average score for all users (3.5), bank anglers (3.5) and boat anglers (3.35) fell between "solitude is important" and "solitude and affiliation are equally important." Hunters (2.61) and nature study/bird watchers (2.67) scored between "solitude is very important" and "solitude is important." Hunting and nature study/bird watching are better enjoyed in silence, which is usually associated with solitude rather than large groups. Hunting activities are generally safer in a solitary environment.
As for the opportunity to experience risk and challenge from the natural environment, the average scores for all users (2.51), bank anglers (2.76), boat anglers (2.41) and nature study/bird watching (2.89) fell between "very important" and "important." The average score for hunters (3.54) was between "important" and "somewhat important."

As for the opportunity to use outdoor wilderness skills, the average scores for all users (2.75), boat anglers (2.55), and nature study/bird watchers (2.89) are between "very important" and "important." The average scores for hunters (3.86) and bank anglers (3.11) are slightly higher and range between "important" and "somewhat important."

In terms of setting preferences, the average scores for the preference for the sounds of civilization for all users and the four activity subgroups all range between "rare" and "unusual," indicating that visitors generally prefer a setting that is quieter. The average scores for the preference for landscape appearance for all visitors and the four activity subgroups are in between "predominantly natural in appearance" and "modified on a small scale." This reinforces that visitors, including bank anglers, boat anglers, hunters and nature study/bird watchers, generally prefer a more natural setting to a developed one.

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6.0 CONCLUSIONS

This section presents conclusions and recommendations, derived from analysis of information presented in Section 5, to maintain and enhance fish- and wildlife-related recreational opportunities within the study area. There are a variety of actions that can potentially be implemented to maintain and enhance these opportunities. Some actions may require interim steps to ensure optimum results over time. Given the long and complex management history of the study area's lands and facilities, and depending upon which (if any) actions are proposed by DWR, it will likely be necessary to prepare a phasing plan for management action items.

Recreation participation in the future will depend on demographic trends as well as availability of lands and facilities. Additionally, recreation will be affected by emerging new technologies, developments in recreation equipment, changes in visitors' tastes and preferences for recreation, shifts in the amount of free time, and disposable income. These factors may affect attendance as well as popularity of activities (EDAW 2003e).

This report was prepared under the general direction of DWR staff. Opinions, findings, and conclusions expressed in this report are those of the authors. This report does not express the official position of DWR unless specifically approved by the Director or his designee.

6.1 RECOMMENDATIONS TO MAINTAIN AND ENHANCE EXISTING FISH- AND WILDLIFE-RELATED RECREATIONAL OPPORTUNITIES

The following conclusions and assumptions are relevant in understanding the recommendations described later in this section:

- Periodic monitoring and subsequent adaptive management of the Project Area is expected by the agencies involved;
- Fish and wildlife-related land management in the study area is complex and sometimes contradictory, thus inhibiting the ability to maintain and plan for optimal recreational use;
- Land management planning and implementation has implications for all resources and may require regulatory approval;
- Most fish- and wildlife-related management and recreation in the study area is currently DFG's responsibility; therefore, many solutions revolve around that agency. However, a continued partnership between all stakeholders will be needed, with DWR taking the lead to ensure compliance with FERC license requirements; and
- Lack of data and documentation of the study area and its land- and human-based components has caused severe limitations for land managers, hindering their ability to address the full suite of issues that have arisen over time.

Current user survey data indicate a general satisfaction with the recreational related component of fish and wildlife management activities. DWR's overall responsibility for compliance with recreation-related license requirements continues to be met under the existing management structure. However, future demand pressures for recreation will likely stress the current arrangements and warrant discussion of the following recommendations.

Table 6.1-1 summarizes the key issues and recommendations that, if implemented, would improve the maintenance and enhancement of fish- and wildlife-related recreation in the study area. Actions, if implemented, would be based on need established in part through monitoring and subsequent adaptive management. Analysis of issues gathered from surveys and interviews with agency personnel are also included in this section.

6.1.1 Management Agency Structure

The overall structure of DFG affects the management of individual units such as the OWA. The compartmentalized organization of the various divisions and branches can cause gaps in management direction.

DFG's management role is additionally complicated by the need to comply with other agencies' requirements, especially as the OWA is subject to written agreement with DWR and subject to DWR's FERC orders. Such complications result in further fragmentation of decision-making and regulatory processes. Users and managers alike may have some confusion regarding which rules and programs apply to which management units, and how those rules and programs should be implemented.

For example, the Wildlife and Habitat Data Analysis Branch in the Habitat Conservation Division may be undertaking actions or studies that could be applicable to the OWA. The OWA, however, is managed under a separate division (the Wildlife and Inland Fisheries Division) and may not fully benefit from efforts in the Habitat Conservation Division.

Coordination of plans, goals, and agency directives could enhance fish- and wildlife-related recreation opportunities. Adequate staffing and funding will be necessary to ensure that plans are implemented effectively and coordination takes place on a timely basis (see Section 6.1.3).

The OWA was created in a unique way, through the development of the FERC Project 2100 Facilities. The California Fish and Game Code, therefore, has not been uniformly applied to the operation of and activities at OWA. At least three alternatives are available to managers to help resolve ongoing conflicts of Code and help eliminate user confusion. First, an amendment to the Fish and Game Code could provide for an exception at OWA for established use patterns. Such an amendment would recognize existing and specific recreation uses there.

Table 6.1-1. Summary of issues and recommended management actions.

Category	Location	Issues and Constraints Summary	Potential Impacts to Fish- and Wildlife-Related Recreation	Potential Management Actions
Management Agency Structure	Study Area	• Compartmentalization leading to overlaps or gaps in management direction. • Lack of implementation of programs intended for a particular location.	• Quality and quantity of recreation opportunities.	• Coordinate inter-agency management directives and activities, including development of programmatic agreements. • Convene periodic meetings of agency staff and develop MOA to improve coordination and to facilitate implementation. • Document the Project Area to enhance the agencies' ability to coordinate and address the full suite of issues that arise over time. • See Management Plans category below.
	OWA	• DFG has jurisdiction over OWA while DWR retains ownership.	• Visitors may violate regulations due to failure to understand which regulations are in effect in which area.	• Consider transfer of OWA management to DPR or FRRPD. • See Management Plans category below.
		• Lack of wildlife-specific regulation and monitoring of visitor uses.	• Quality and quantity of recreation opportunities.	• Develop and implement wildlife recreation monitoring plan. • Develop wildlife-specific regulations for visitor use as described in management plan.

Table 6.1-1. Summary of issues and recommended management actions.

Category	Location	Issues and Constraints Summary	Potential Impacts to Fish- and Wildlife-Related Recreation	Potential Management Actions
Management Plans	Study Area	• Limited and/or outdated management plans for the OWA. • Limited and/or outdated fish and wildlife management plans for LOSRA. • Lack of comprehensive, holistic plan for study area. • Lack of implementation of existing plans.	• Quality and quantity of recreation opportunities.	• Implement adaptive management practices based on a consistent monitoring program. • Create or update management plans for specific areas to serve as an authoritative source for regulation and program plans for each area. • Update management plan to include relevant FERC license articles from the anticipated new license. • Develop a coordinated “comprehensive” management plan detailing the overall management goals and policies of the OWA with fish- and wildlife-specific goals, particularly relating to visitor use, habitat improvement, and facilities management. • Develop a detailed fish and wildlife management plan for the Oroville facilities, to be implemented in conjunction with the updated recreation plans for LOSRA, the Oroville Facilities, and the OWA, and approved by USACE and USFWS.

Table 6.1-1. Summary of issues and recommended management actions.

Category	Location	Issues and Constraints Summary	Potential Impacts to Fish- and Wildlife-Related Recreation	Potential Management Actions
Staffing and Funding	OWA	• DFG has few resources available for fish and wildlife management. • OWA operated at one-eighth to one-fifth of the budget of the three other staffed wildlife areas in the region.	• Quality of visitor experience.	• Request commensurate funding between State Wildlife Areas. • Pursue Federal, State, and private grants to supplement State appropriations. • Consider hiring a grants coordinator. • Increase or establish fees for the most popular activities and facilities. • Reduce waste management costs by working with volunteers such as a friends group. • Conduct additional review of agency budgets.
Existing Facilities[1]	OWA and LOSRA	• Facilities: Some survey respondents (anglers and hunters) stated desire for additional facilities to support their activities. • Operations and Maintenance: Some survey respondents (anglers and hunters) stated a perceived need for more frequent maintenance of facilities they use to support their activities.	• Quality of visitor experience.	• Continue routine maintenance of existing facilities, including routine cleaning, trash collection, and trash removal. • Maintain existing facilities in a fully functional condition to maximize their use and benefit. • Develop additional facilities as appropriate, particularly restrooms, trash receptacles, and boat launch facilities based on monitoring of use levels. • Post signage to deter dumping and littering. • Recruit friends group or other users to participate in litter pickup. • Consider contracting waste management services. • Encourage use of less popular areas through signage and incentives. • Also refer to Staffing and Funding category.

Table 6.1-1. Summary of issues and recommended management actions.

Category	Location	Issues and Constraints Summary	Potential Impacts to Fish- and Wildlife-Related Recreation	Potential Management Actions
Law Enforcement	OWA and LOSRA	• Additional patrols are needed in both the OWA and LOSRA to address unauthorized activity, crime, and public safety issues • Regulations are potentially being violated in several wildlife-related recreation management areas including camping, hunting, fishing, boating, vandalism, litter, dog use, alcohol use outside of designated areas use, OHV use, and protection of endangered species (see Section 5.2.7).	• Safety of visitor experience. • Viability of species and habitat for future recreational uses.	• Provide clear signage of regulations including allowable uses and times. • Increase routine patrols by existing staff in order to reduce illegal hunting and fishing activities, crime, and other undesirable or unsafe activities. • Increase staffing at the OWA and LOSRA specifically to increase patrols. • Increase the staffing and resources available to the local DFG Game Warden to address illegal hunting and fishing activities at the OWA and LOSRA. • Develop volunteer watch system to increase self-policing as appropriate. • Consider providing “hotline” for law enforcement reporting
Visitor Use Levels	OWA	• Increased use may not be compatible with State Wildlife Area goals. • Funding level low compared to use level—management activity focused on visitor impact maintenance.	• Quality of visitor experience.	• Develop systematic and consistent monitoring program. • Recruit and train volunteers to participate in use monitoring. • Increase fees to balance visitation and available management. • Consider providing additional hunting lands or allow hunting on additional lands within the study area, if needed to help alleviate perceived crowding in popular hunting areas. • Also refer to Facilities category.
	OWA and LOSRA	• Respondents prefer solitude; 9% of respondents are concerned about crowding. • Risk factors associated with encounters between anglers and PWC users; and between hunters.		

Table 6.1-1. Summary of issues and recommended management actions.

Category	Location	Issues and Constraints Summary	Potential Impacts to Fish- and Wildlife-Related Recreation	Potential Management Actions
Land Uses	OWA	• Uses within OWA conflict with regulations: – Mining; – Motorboating.	• Quality of habitat potentially affects future viability of species and related recreation. • Motorboating is not consistent with State Wildlife Area designation and could be eliminated from the Thermalito Afterbay.	• Replace existing signage and provide additional signage and information for visitors regarding acceptable and unacceptable uses and activities. • Implement management actions to help resolve conflicts related to land use and visitor activities. • Amend regulations to allow conflicting uses as exceptions. • Discourage all land use and visitor activities from the OWA and LOSRA that conflict with the overall management goals of both areas. • Transfer management responsibility for OWA from DFG to another agency such as DPR or FRRPD.
Public Access	OWA and LOSRA	• Deferred maintenance on access roads, trails and boat launches. • Restricted entry and hunter access times and effects on fishing and hunting opportunities. • Additional access points may be needed. • Conflicting signage.	• Quality of visitor experience. • Amount of time recreation opportunity is available.	• Monitor access roads and boat launches and repair to support desired use level. • Provide additional signage and information for visitors regarding acceptable and unacceptable uses and activities. • Develop additional access points and boat launches, if necessary. • Amend entry restrictions to allow access from 2 hours prior to sunrise to 2 hours after sunset.

Table 6.1-1. Summary of issues and recommended management actions.

Category	Location	Issues and Constraints Summary	Potential Impacts to Fish- and Wildlife-Related Recreation	Potential Management Actions
Fish and Wildlife Habitat	OWA and LOSRA	• Continued fish stocking activities and fish and wildlife habitat improvement programs are needed. • Loss of spawning and nursery habitat for warm-water fishes due to reduction in cover.	• Quality of habitat potentially affects future viability of species and related recreation. • Fish- and wildlife-related recreation is dependent on species presence and sustainability.	• Maintain existing fish and wildlife habitat and continue habitat improvement programs throughout OWA and LOSRA. • Facilitate coordination between State agencies, volunteers, and special interest groups.
	OWA east of Feather River	• Water primrose has negatively impacted habitat for warm-water fishes and for waterfowl.	• Quality of habitat potentially affects future viability of species and related recreation. • Shoreline access inhibited for anglers. • Reduction in abundance of larger fish.	• Develop best management practices for water primrose removal. • Work with volunteer groups and users to identify and remove water primrose in high priority locations. • Work with nearby homeowners to encourage removal on private property and reduce introduction of species to lake.
Water Levels and Flows	OWA and LOSRA	• Some surveyed anglers and hunters have described how changes in water level and river flows influence their activities.	• Lake access from the bank. • Availability of boat ramps. • Relationship to boating hazards. • Access to fishing areas.	• Continue habitat enhancement • Integrate public information about the constraints of water supply and flood management operation of the facilities with public information detailing seasonal recreation opportunities.

A second option could be the transfer of management responsibility for the OWA from DFG to another agency such as DPR or FRRPD. The new managing agency would also likely face issues such as availability of funding and staff resources. The feasibility of such a transfer would require further examination; it would also likely require that specific enforcement authorities and procedures be codified so that the law is clear about which codes or rules apply to these areas. A third option could be to terminate (or not renew) the mining leases and to prohibit high-speed boating (and enforce the prohibition) in the OWA.

The following recommendations could serve to resolve the conflicts and complexity of managing lands at OWA, thereby enhancing fish- and wildlife-related recreation opportunities in the study area:

- Consider transfer of management authority of the Thermalito Afterbay from DFG to DPR for management as part of the LOSRA; or under another agency's jurisdiction, such as the Feather River Recreation and Parks District (FRRPD). Such a transfer may have federal and/or State regulatory implications based on USFWS (Central Valley Habitat Joint Venture) policy (pers. comm. Atkinson 2003);
- Consider reducing or prohibiting certain established uses within the OWA, to ensure compatibility with DFG's mission and code;
- Consider developing memorandum of agreements (MOA) between agencies in order to clarify discrepancies in policies and practices; and
- Compile state of the art, consolidated documentation of the Project Area and its land- and human-based components to enhance the agencies' ability to coordinate and address the full suite of issues that arise over time.

6.1.2 Management Plans

DWR is currently in the process of drafting a new Oroville Facilities Recreation Plan as part of relicensing. DPR is concurrently in the process of updating the LOSRA General Plan. Adaptive management practices based on consistent monitoring may assist in implementation of these management plans. In contrast, fish and wildlife management plans for some parts of the study area are relatively outdated, based on the degree they reflect current management activities. The last such plan for the OWA was issued in 1978. Before that, a report was prepared in 1968 for the "Oroville Borrow Area."

Management plans serve several purposes, including the collection and compilation of resource data to establish a baseline and planning for future resource management and recreational use. Without a baseline database of resource and use data, it will be more difficult to assess the status of the resources over time and more difficult to ascertain what effect, if any, visitor use is having on the resources in the future. Updated management plans are needed to guide management activities. One plan should guide the management of the OWA and the other, management of fish and wildlife throughout

the Project. These plans would encompass the study area holistically to ensure a balance between resource protection and recreational use across agency-managed boundaries. Individual studies and field enhancements within the study area have traditionally been agency-based efforts, prepared for the purpose of satisfying a particular agency's requirements.

A comprehensive, multi-agency approach could result in a joint plan for managing fish and wildlife resources and their associated recreation. Data collected during the Alternative Licensing Process could serve as the basis for a comprehensive plan to address current issues related to resource management and visitor experience. This would serve to enhance recreational opportunities by providing clear direction for future resource needs, facility improvements, enforcement, land use conflicts, and funding requirements. It would also make efficient use of the wealth of contemporary information collected during the current relicensing.

6.1.3 Staffing and Funding

DFG has focused its limited resources for the OWA on managing visitor impact on the area (to the extent possible) through facilities maintenance and waste management. Resources for even such limited visitor use management and maintenance may be inadequate, and resources for wildlife management and development of new facilities are extremely scarce (pers. comm., Atkinson 2003).

Adequate agency staffing and funding, particularly in the OWA, has been a significant challenge for fish and wildlife management in the study area. Each DFG-staffed unit is best managed with one area manager and one full-time staff member per 1,000 acres in order to meet DFG goals. In the OWA, the area manager is also assigned to other Wildlife Areas and serves as the Acting Lead Lands Supervisor for the entire Sacramento Valley-Central Sierra Region. In addition, the OWA has recently had two full-time staff members managing a total of 11,870 acres; however, as of 2004, there is no permanent on-site staff.

A thorough review of agency budgets and alternative funding sources, including creative partnerships, is essential to maintaining fish- and wildlife-related recreation in the study area. The work that is currently taking place between DWR, DFG, and the California Waterfowl Association is a good example of a creative partnership that maximizes limited funding and human resources.

There are examples of other types of partnerships that may help offset DFG budget shortfalls. One model is used by USFWS for wildlife refuges whereby a "friends" group is formed by interested and knowledgeable members in the community to plan and complete stewardship projects and address related management issues. The friends groups become an integral part of the decision-making process, thereby building consensus and trust between agency staff and recreational users as well as other stakeholders.

Another possibility for raising funds would be to establish fees at the OWA, including Thermalito Afterbay, and/or increase recreation use fees at other locations.

Funding alternatives such as grants may also be needed to offset agency-wide budget reductions. A grants coordinator could be assigned to assess the many options for securing grants and to then prepare and write applications for grants. There are numerous federal and some State sources for grants for fish- and wildlife-related land management. A listing of funding sources for grants and funding will be provided in Study R-5 – *Assessment of Recreation Areas Management*.

6.1.4 Recreation Facilities, Operations, and Maintenance

Within the Project area, recreation facilities are in generally good condition (Study R-10 – *Recreation Facility Condition and Inventory Report*) and approximately 70 percent of visitors are generally satisfied with their experiences (Study R-13 – *Recreation Surveys*).

For the minority who were dissatisfied (approximately 12 percent), respondents to the On-Site and Mail-Back Surveys identified the state of existing facilities as one of the causes of dissatisfaction within the Lake Oroville area. In contrast, the majority of survey respondents (all users) considered the number of facilities to be adequate. In the Recreation Mail-Back Survey, all four activity subgroups (bank anglers, boat anglers, hunters, and nature study/bird watchers) rated litter along the shoreline as a slight to moderate problem (EDAW 2003b and c). Dumping of litter is reportedly one of the main maintenance problems within the OWA (pers. comm., Atkinson 2003).

Several of the strategies mentioned previously may help alleviate some perceived need for facilities and maintenance. A friends group might help recruit volunteers to participate in lake-cleanup days, and would help generate a stewardship ethic among users. Signage and monitoring at frequent dumping sites might deter some violators. Grants are available for improvement and development of facilities. Partnership with a friends group might increase success rate of grant applications. Finally, attempts to redirect some use from popular areas to less-used areas with signage, events, incentives, or fees might alleviate pressure on facilities at popular areas.

6.1.5 Law Enforcement

Some OWA visitors are violating camping restrictions by staying longer than allowed and by having open fires. It is suspected that illegal hunting is also taking place within the OWA. Illegal fishing may also be occurring throughout the study area. Boating speeds are not being enforced on the Thermalito Afterbay due to conflicting management goals, overlapping jurisdictions, and lack of staff. Vandalism, littering, off-leash dogs, use of alcohol outside of designated areas, and use of OHVs are currently occurring within the OWA but are prohibited. Some respondents to the On-Site and Mail-Back Surveys indicated that additional patrols are needed in both the OWA and

LOSRA to address unauthorized activity, crime, and public safety issues (up to 12 percent).

Because of limited staff and general budget shortages, fish- and wildlife-related law enforcement capabilities have been severely limited. In order to enhance law enforcement activities, an increase in staffing and funding at the OWA and LOSRA—specifically to increase patrols—would be necessary. By increasing the staffing and resources available to the local Game Warden, illegal hunting, fishing, and other activities at the OWA and LOSRA could also be addressed. Signage should also be updated to provide clear guidelines regarding allowable uses and times.

Many recreation areas and waterways (outside the Lake Oroville area) have volunteer watchdog groups which provide information to law enforcement agencies. While these groups typically have little or no real enforcement authority, their presence, often in easily identifiable uniforms, can help deter would-be lawbreakers. These patrols can also provide interpretation of regulations and restrictions. While some staff time would be needed to provide training and oversight, volunteers would eventually be able to take on much of this responsibility as well. Finally, a hotline could be created which visitors could call to leave a message to report unsafe or illegal behavior. While DFG currently lacks sufficient resources to respond to each call, such a system would both engage visitors in self-policing as well as providing a perceived deterrent.

6.1.6 Visitor Use Levels

Construction of day use facilities at Thermalito Afterbay by DWR, consistent with the FERC-approved Amended Recreation Plan (DWR 1993), was carried out with the informal consent of DFG. New facilities have led to increased use levels that may not be fully compatible with a designated State Wildlife Area (pers. comm., Atkinson 2003).

DFG efforts at OWA are limited to visitor use management rather than fish and wildlife management partly because the OWA's free access policy attracts more users than DFG's funding and staffing constraints allow it to manage. Even moderate use levels in an environment of limited fish and wildlife management may create impacts to resources which are incompatible with the goals and priorities of OWA management.

Respondents to the On-Site and Mail-Back Surveys indicated that the study area is only slightly to moderately crowded and also stated a preference for solitude. Nine percent of On-Site Survey respondents identified crowding as a cause for concern and dissatisfaction with the study area, meaning that current use levels may be negatively affecting a few visitors' recreation experiences at certain times and places. This illustrates that continued monitoring of use levels could help management respond to changes in use patterns and help maintain or improve the recreation experience in the future.

Generally, use of facilities does not exceed capacity. Nearly 30 percent of those respondents who offered a comment indicated that they had a good experience hunting and felt management was doing a good job. Thirty percent of Hunter-Focused On-Site Survey respondents indicated that they felt moderately to extremely crowded at the location where they were surveyed. Of the 106 respondents to the Hunter-Focused On-Site Survey, only six indicated that they felt "at risk" due to hunters being too close together. Boat anglers, as a group, rated encounters between PWC users and other users as a slight to moderate problem. Crowding may not currently be a major issue, but it has been linked to causing some incidents perceived as putting people at risk and should be monitored. Periodic monitoring could determine whether or not crowding is an issue, during what seasons, and at what locations. As noted in Study R-9 – *Existing Recreation Use*, a rigorous and consistent visitor use monitoring system would have some general benefits. This would help assess crowding, use trends, and need for adjustments to maintenance priorities.

Periodic monitoring and subsequent adaptive management of the Project Area is expected by the agencies involved. Volunteers could assist in monitoring of visitor use levels. Fees could also be implemented at popular locations in order to help manage visitation and support additional management activities or facilities as needed.

Future development of additional day use, parking, camping, access points, and other facilities at areas and facilities that are experiencing some crowding (such as popular hunting and bank fishing sites), as needed based on monitoring, could enhance user experiences. Acquisition of additional hunting lands, or allowing hunting on additional lands within the study area, could alleviate perceived crowding in popular hunting areas. Maintenance of existing facilities, including routine cleaning, trash collection, and trash removal could alter the perception of crowding among visitors. Development of additional facilities as needed (based on monitoring), particularly rest room facilities, trash receptacles, and boat launches could also alleviate potential future crowding. Future facility capacity is addressed in Study R-8 – *Carrying Capacity*.

6.1.7 Land Uses

Conflicting codes and legal agreements are causing confusion and misunderstanding regarding the management and enforcement on lands within the OWA where land uses conflict. Several existing uses within the OWA, such as mining operations and motor-boating, conflict with regulations governing the activities allowed within a State Wildlife Area and impact fish and wildlife resources. Mitigation agreements associated with these land uses may be difficult to implement and enforce. Incomplete information on signs in some areas, and/or lack of signs in others, may confuse visitors as to what types of use are appropriate at the OWA.

The primary land use at the OWA is conservation; however, mining lease agreements and established high-speed boating popularity make management under the California Fish and Game Code difficult. The Code expressly prohibits these uses, but their

established presence makes management and enforcement challenging. Other State Wildlife Areas are typically not confronted with these same challenges.

Resolution of conflicts in goals, policies, and laws could clarify for managers and visitors what activities are allowed at which places and at what times. Review of legislation, agreements, MOAs, and regulations governing land use and visitor activities in State Recreation Areas and State Wildlife Areas as a part of this report has been the first step toward this resolution. Additional review by decision makers, with the goal of amending and/or clarifying these documents, would be a next step toward resolution. Minimizing other incompatible uses occurring within the OWA and LOSRA could be furthered by providing additional signage and information for visitors regarding acceptable and unacceptable uses and activities.

6.1.8 Public Access

The OWA is currently open from one hour prior to sunrise to one hour after sunset, and shooting is limited to one-half hour prior to sunrise to one-half hour after sunset. Some hunters and anglers feel that this time restriction limits their recreational activities, as the early morning and late evening hours are some of the best times to hunt and fish. Of the 15 percent of hunters surveyed who felt regulations do not allow a quality experience, 38 percent attributed their discontent to insufficient opening and closing times. These hunters feel that the time restriction, which allows at most one-half hour between the time of entry and the legal shooting hours, does not allow enough time to enter, park, hike in, and get set up. Furthermore, the legal fishing time for salmon and steelhead in the Feather River is one hour prior to sunrise to one hour after sunset; anglers abiding by the OWA access restriction are not able to use the beginning and end of legal fishing hours as this time is spent entering, parking, and accessing the Feather River. Some users would also like additional nighttime access.

Some On-Site and Mail-Back Survey respondents have indicated that the existing access roads and boat launches, particularly unpaved boat launches, are less than adequate and require maintenance. Some visitors have also indicated a desire for additional access points. Nearly 9 percent of angler respondents specifically mentioned the need to improve roads, trails, and boat launches. Also, all but two of the boat launches in the OWA are informal and unpaved, and 47 percent of boat anglers responded that more boat ramp facilities are needed. Most of the roads in the OWA are unpaved, very rough, and some require a four-wheel-drive (4WD) vehicle. A few hunters (5 percent) commented on the condition of roads leading into the OWA, though an equal number commented that vehicle access should be restricted.

Conflicting, incomplete, and inadequate signage also impacts accessibility and visitor compliance. Roads and access points in the OWA sometimes lack adequate directional signage, which may increase perceived crowding, litter, and need for maintenance at known or popular sites.

Management solutions to maintain and improve public access include periodically monitoring existing access roads and boat launches and performing maintenance as necessary to maintain the appropriate level of access. Prompt opening of all gated access points at or prior to the designated time would facilitate public access.

Through coordinated monitoring, management should determine if and when development of additional access points and boat launches is needed. Allowing access from two hours prior to sunrise to two hours after sunset would help increase daily access. Entrance signs should be updated to provide clear guidelines regarding access and use restrictions.

6.1.9 Fish and Wildlife Habitat Enhancement

The amount and quality of habitat also impacts fish- and wildlife-related recreation opportunities. Ongoing habitat improvement activities include fish habitat improvement projects in Lake Oroville and waterfowl and upland game habitat improvement projects in the OWA. The greatest habitat issue in the study area, however, is the degradation of aquatic habitat due to the invasion of water primrose (pers. comm., See 2002).

The recent invasion of water primrose impacts fish and wildlife habitat, as well as associated fish- and wildlife-related recreational opportunities. The proliferation of water primrose has had negative impacts on recreational fisheries by reducing angler access and effectiveness, as well as apparently reducing the abundance of larger fish through impacts to foraging success and availability of cover. In addition, hunters have reported a dramatic decline in the abundance of waterfowl in areas where water primrose has substantially increased. This declining presence of waterfowl is presumably due to the reduction in open water, aerial access to open water, and areas for waterfowl swimming (Pers. comm., See 2002). However, USFWS considers primrose as giant garter snake habitat; this may limit ability to treat large areas or maintain effective control (pers. comm., Bogener 2004). Development of best management practices for the management of water primrose in the area should be considered. If necessary, volunteers could also be recruited for water primrose removal work sessions.

Continuation of existing habitat improvement and enhancement programs is necessary in order to maintain the current level of recreation opportunity. While three-quarters of the hunters were satisfied with their experiences, 25 percent expressed some dissatisfaction. Of those who were dissatisfied with their experiences, half felt that the habitat for game species needs improvement. These hunters provided suggestions including adding more food plots and eliminating weeds (including the water primrose) that are choking out areas of habitat.

Vernal pools located in the OWA, primarily in the vicinity of Thermalito Afterbay and One Mile Pond, support species of concern. Habitat development is not allowed within vernal pools.

In order to enhance fish and wildlife habitat beyond current levels, as envisioned by the existing Management Plan, habitat improvement activities throughout the Project Area would need to be increased. An increase in wildlife habitat improvement activities, particularly the planting of quality forage throughout the OWA, would serve to enhance habitat. Coordination between State agencies, volunteers, and special interest groups would also serve to enhance fish and wildlife habitat within the study area for activities such as weed pulling, planting, and other habitat enhancement activities.

6.1.10 Water Levels and Flows

Some specific comments provided by Recreation Mail-back and Hunter-Focused Mail-back Survey respondents related to water levels and flows in the Project area. On average, anglers and hunters responding to the Mail-Back Survey rated several water condition issues (including exposed land during lower water levels, shallow areas during low water levels, and water level fluctuations) as slight to moderate problems. These issues are discussed in more detail in Study R-3 – *Assessment of the Relationship of Project Operations and Recreation*; Study F-3.1 – *Evaluation of Project Effect on Fish and Their Habitat within Lake Oroville, its Upstream Tributaries, the Thermalito Complex and Oroville Wildlife Area*; Study F-3.2 – *Evaluation of Project Effect Non-salmonid Fish in the Feather River Downstream of the Thermalito Diversion Dam*; and Study F-10 – *Evaluation of Project Effects on Salmonids and their Habitat in the Feather River Below the Fish Barrier Dam*.

In order to maintain current recreation opportunities, managers should continue to coordinate modifications of access points, boat launches, and other related facilities in response to changing water levels. Continued habitat improvement programs will also help minimize the impacts of water level fluctuations and flow changes on fish and wildlife and associated recreation. Public education about operation of the Oroville Facilities for water supply and flood control, in the context of seasonal recreation opportunities, may help hunters and anglers to plan their use of the Project Area appropriately.

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APPENDIX A

PROJECT AREA HUNTING REGULATIONS AND HISTORY

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APPENDIX A – PROJECT AREA HUNTING REGULATIONS AND HISTORY

Table A-1. OWA Regulations: Title 14 of the California Fish and Game Code.

Oroville Wildlife Area General Regulations	
Regional Manager's Authority	The regional manager shall have the authority to regulate public use of the OWA where such use is not provided for in CCR Title 14.
Entry Restrictions	DFG may limit the number of persons entering the OWA during any period for safety reasons, to reduce crowding, or to provide for the limited take of a species. In addition, DFG may close portions of the OWA or close the area entirely to public entry or to specific activities. Entry is allowed from 1 hour before sunrise to 1 hour after sunset on some portions of the OWA. Entry permits are required for spring turkey hunting only, and are issued by special drawing. All entry restrictions must be obeyed.
Organized Events	Any person organizing an event or gathering to be conducted on OWA property shall obtain a use permit from the appropriate regional manager, and such events or gatherings shall be compatible with wildlife area objectives.
Motor Vehicles	No person shall drive, operate, leave, place, or stop any motor driven vehicle or trailer anywhere in the OWA except on public or established roads or on designated jeep trails and such other areas as designated by the DFG. No person shall drive a vehicle carelessly in willful disregard of the rights or safety of others, or without due caution or at a speed or in a manner likely to endanger any person, property, or wildlife. In addition, all traffic signs and rules must be obeyed. No off-highway vehicles (OHVs) are allowed in the OWA at any time.
Boats	DFG may restrict the use of boats, including placing restrictions on boat and motor size and type and boat speeds, within the OWA to protect natural resources or provide for the orderly operation of hunting and fishing programs in the wildlife area. Specific regulations include: (1) Boats must be launched from designated launch sites; (2) Boats must be removed from the water when instructed to do so by a DFG employee; (3) Boat speeds shall not exceed 5 miles per hour.
Vandalism and Litter	No person shall tamper with, damage, or remove any property not his own when such property is located within the OWA, and no person shall leave, deposit, drop, bury, or scatter bottles, broken glass, feathers, hides, wastepaper, cans, sewage, or other rubbish in the OWA, except in designated receptacles. Where no receptacles are provided, all rubbish must be removed from the area and disposed of elsewhere. In addition, no person shall import and deposit any rubbish or toxic substance into the OWA.
Trees and Minerals	No person shall dig up, cut, damage, or remove any trees, shrubs, vines, plants, or wood from the OWA, except that vegetation may be cut and used for the purpose of building blinds, unless otherwise directed by the area manager. In addition, no person shall dig up or remove any humus, soil, sand, gravel, or rock from the OWA.
Bottles and Artifact Collecting	No person shall collect or remove bottles or artifacts, or otherwise disturb the soil to locate or remove bottles or artifacts, from the OWA.
Camping and Unattended Personal Property	Camping is permitted only in designated areas, and is limited to not more than 7 consecutive days and not more than 14 days total in any calendar year, except by written permission of the Regional Manager. Personal property may be left at camping areas only, and decoys may not be left in the field overnight. Fires are allowed in portable gas stoves and at designated campsites only.
Dogs and Field Trials	Dog training is allowed in designated areas and only from July 1 through March 15.

Table A-1. OWA Regulations: Title 14 of the California Fish and Game Code.

Pesticides	No person, other than authorized government employees, shall apply any pesticide within the OWA.
Livestock and Horses	No person shall permit any livestock to trespass on OWA property, except under authorized grazing permits issued by DFG. Recreational use of horses is permitted only on roads open to vehicles and within 25 feet of the exterior boundary fences.
Fish and Frogs	Fish and frogs may not be taken for commercial purposes.
Ejection	DFG may eject any person from the OWA for violation of any area regulations, or for disorderly conduct, intoxication, or when a department employee determines that the general safety or welfare of the area or person thereon is in danger.
Oroville Wildlife Area Hunting Regulations	
Method of Take	No rifles or pistols may be used or possessed on OWA property, except at the designated target practice area. All legal firearms and archery equipment may be possessed and discharged at the target practice area, which is open from sunrise to sunset all year. Only paper and clay targets may be used, and must be removed by the user when leaving the area.
Hunt Days	Hunting is permitted daily from September 1 through January 31 during open seasons for authorized species (all legal species) and during the spring turkey season. (Note: These dates apply only to the OWA, not to other wildlife areas; some seasons open before September 1, but hunting is not permitted at OWA prior to this date.)
Authorized Species	All legal species.

Source: DFG 2002b.

Table A-2. LOSRA hunting regulations.

Hunt Days	Hunting is permitted from September 15 through January 31, and during spring turkey season.
Species Restrictions	Hunting is restricted to resident small-game species only, including rabbits, hares, squirrels, turkey, quail, and pheasant. No waterfowl, wild turkey, or deer hunting is permitted at any time, and game species may be taken during their respective open seasons or portions thereof falling within the LOSRA hunt season.
Area Restrictions	Hunting is permitted in all areas <u>except</u>: • Lands surrounding the west branch of the reservoir and adjacent lands upstream of the Highway 70 bridge; • Lands surrounding the main body of the reservoir downstream from Foreman Point and Bidwell Bar bridge; • Lands surrounding the Thermalito Forebay north and south, and adjacent LOSRA lands; • Lands surrounding the Thermalito Diversion Pool and adjacent LOSRA lands; • All areas within 300 yards of any designated campground, building, or dock; and • The water surface of Lake Oroville.
Method of Take	Resident game may be taken only with: (1) shotguns 10 gauge or smaller, using shot shells only and incapable of holding more than three shells in the magazine and chamber combined; shot size must be BB or smaller; (2) Muzzle-loading shotguns; (3) Falconry; (4) Bow and arrow; (5) Air rifles firing pellets and powered by compressed air or gas; and (6) Dogs.

Source: California Fish and Game Code Section 260.2; California Administrative Code Section 4506; DPR n.d.

To understand the current management conditions for lands that DFG manages within the study area, principally the OWA, it is important to know the history of the OWA's creation pursuant to the construction of Oroville Dam. Although it is not owned in fee by DFG, the OWA is managed under the guidelines set forth in the California Fish and Game Code, the CCR, and the California Fish and Game Commission's regulations (pers. comm., Atkinson 2003). The following limited chronology of the Oroville facilities provides an overview of the creation of the OWA (Table A-3).

Table A-3. Oroville Wildlife Area chronology.

Year	Key Development and Events
1951	Oroville Reservoir is authorized by the Legislature as part of the Feather River Project under the State Water Code (Chapter 1441, Section 12260).
1957	DWR is issued a 50-year license by the Federal Power Commission (FPC) to construct and operate the Oroville Facilities.
1961	Construction begins on Oroville Dam. California passes the Davis-Dolwig Act (Water Code Section 11900 et seq.)
1962	Construction begins on the Feather River Fish Barrier Dam. In response to DFG's study of the Oroville Division of the SWP, DWR declares that the public interest and necessity require acquisition of the Oroville Borrow Area for fish and wildlife enhancement and recreation, as provided in the Davis-Dolwig Act (DFG 1978).
1963	Construction begins on the Thermalito Diversion Dam. DWR initiates materials removal from the OWA for construction of Oroville Dam. DFG biologists, under contract with DWR during the materials removal phase, are influential in preserving some of the area's wildlife values and creating ponds, lakes, and islands (DFG 1978).
1964	Construction begins on the Hyatt Pumping-Generating Plant. Construction begins on the Thermalito Pumping-Generating Plant. The Feather River Fish Barrier Dam is completed.
1965	Construction begins on the Thermalito Forebay Dam. Construction begins on the Thermalito Afterbay Dam.
1966	Bulletin No. 117-6 Water Resources Recreation Report for Oroville Reservoir, Thermalito Forebay and Afterbay.
1967	Oroville Dam is completed. The Hyatt Pumping-Generating Plant is completed. The Feather River Fish Hatchery is completed.
1968	Agreement for Transfer to DFG the Materials Borrow Area at Oroville Division dated August 12, 1968. This agreement transfers "control and possession" of real property to DFG for the "purpose of operating and maintaining a public fish and wildlife management areas and providing for associated recreation of such real property." Bulletin No. 117-18 Water Resources Recreation Report for Oroville Borrow Area. Thermalito Diversion Dam is completed. Thermalito Forebay Dam is completed. Thermalito Afterbay Dam is completed. Operation of the Thermalito Pumping-Generating Plant begins.
1969	The Thermalito Pumping-Generating Plant is completed.
1970	DFG begins to improve habitat in the OWA by introducing additional tree and shrub species in deficient areas (DFG 1978).

Table A-3. Oroville Wildlife Area chronology.

Year	Key Development and Events
1973	Agreement between DWR and DFG regarding Recreational Operation of the Thermalito Afterbay dated August 23, 1973 (DWR and DFG 1973). This agreement transfers to DFG management of the Thermalito Afterbay water surface and adjoining State shore lands as may be necessary for access and use during waterfowl hunting season.
1974	Addendum No. 1 dated May 10, 1974 to the Agreement to Transfer to DFG the Materials Borrow Area at Oroville Division dated August 12, 1968. This addendum includes a series of legal descriptions for parcels associated with the August 12, 1968, transfer. DFG improves the planting and maintenance techniques used in habitat improvement programs at the OWA to increase plant survival (DFG 1978).
1977	An additional 100 acres of land is transferred from DWR to DFG by agreement, "for the purpose of developing a Wildlife Habitat area and Warm-water Fisheries" (September 26, 1977). The FPC is replaced by FERC (FERC 1992).
1978	The Oroville Wildlife Area Management Plan is completed.
1980	Land now known as the Clay Pit State Vehicle Recreation Area (220 acres) is approved by FERC for withdrawal from its jurisdiction.
1985	Construction begins on the Thermalito Diversion Dam Powerplant.
1986	Agreement between DWR and DFG Regarding Management of the Thermalito Afterbay dated January 24, 1986 (DWR and DFG 1986). This addendum transfers an easement to DFG for management of the Thermalito Afterbay water surface and adjoining lands. This is in addition to the August 23, 1973, agreement to allow for management under provisions of Title 14, Division 1, and part 2, Chapter 8, Section 550 of the California Administrative Code. Addendum No. 2 dated June 13, 1986, is a series of legal descriptions for parcels associated with the August 12, 1968, transfer.
1987	Amendment No. 1 dated May 8, 1987. Gravel Extraction and Processing Plant Agreement between DWR and Matthews Ready Mix. The Thermalito Diversion Dam Powerplant is completed.
1990	Amendment No. 2 to "Agreement to Transfer to DFG Materials Borrow Area." DWR and DFG make a second amendment to the 1968 transfer of the Oroville Borrow Area and the 1987 amendment to same. Under this amendment, 112 acres within the OWA are transferred to DWR for lease to Robinson and Sons for gravel extraction, and 280 acres are conveyed to DFG by Robinson and Sons to become part of the OWA. A lease between DWR and Robinson and Sons is signed at the same time (November 19, 1990).
1991	Lease from DWR to Robinson and Sons land in the OWA for sand and gravel extraction.
1994	FERC order requiring DWR to file a detailed map of the OWA with a detailed description of how the wildlife area is operated and maintained.
1995	Lake Oroville Fisheries Habitat Improvement Plan submitted to FERC by DWR.
1999	Lake Oroville Fish Stocking Study—90-day report submitted to FERC by DWR.
2002	Clarification to 1991 lease between DWR and Robinson and Sons including transfer of lease to Granite Construction Company. Palm Avenue Pit Reclamation Plan prepared by DWR. This is a plan to reclaim a portion of this mined site located at the southern end of OWA.

Below is a summary of sand and gravel leases that DWR holds on OWA lands:

- Lease and Agreement between DWR and Mathews Ready Mix (June 22, 1987)

This lease and agreement (DWR and Mathews Ready Mix 1987) provides for the lease "on an exclusive and irrevocable basis for sand and gravel extraction and processing purposes that certain property *in the Oroville Wildlife Area*, County of Butte, State of California." for a term of 50 years. The leased area includes 51.75 acres, 23.18 acres of which was to be used as a plant site, silt pond, and buffer zone and 28.57 acres of which was to be used for sand and gravel extraction. Payment for the lease consists of the lessee executing and delivering the grant deed for a 100+/- acre parcel together with a 60-foot access easement to DWR.

The description of the leased area is unclear from the agreement, as the figure is of very poor quality.

- Lease and Agreement between DWR and Robinson and Sons (June 18, 1991)

This lease and agreement (DWR and Robinson and Sons 1991) provides for the lease "on the exclusive and irrevocable basis for sand and gravel extraction purposes that certain property *in the Oroville Wildlife Area*, County of Butte, State of California…" for a term of 50 years. The leased area includes 112.06 acres. Payment for the lease consists of the lessee executing and delivering the grant deed for a 280+/- acre parcel together with a 60-foot access easement to DWR. At the conclusion of the lease term but consistent with the use of the premises made by the lessee, the extraction area or areas shall be left in a general condition such as to facilitate ponding for waterfowl. The description of the leased area is unclear from the agreement, but it is clear that this agreement is for an area different from that leased to Matthews Ready Mix.

- Lessor's Consent (April 2000)

This agreement is for the "Asset Purchase and Sale Agreement" between Robinson and Sons and Granite Construction Company for the transfer of the lease agreement between DWR and Robinson and Sons to Granite Construction Company. All terms of the above described lease apply to the lease between Granite Construction Company and DWR.

California Department of Fish and Game
Section 1525 of the California Fish and Game Code gives DFG the authority to establish wildlife areas throughout the State:

For the purpose of propagating, feeding and protecting birds, mammals, and fish, and establishing wildlife management areas or public shooting grounds the department, with the approval of the commission, may do all of the following:

(a) Accept, on behalf of the state, donations of birds, mammals, and fish, and of money given or appropriated. Those donations shall be used for the purposes for which they are accepted, and, as nearly as may be, for the purpose indicated by the donor. (b) Acquire, by purchase, lease, rental or otherwise, and occupy, develop, maintain, use and administer, land, or land and non-marine water, or land and non-marine water rights, suitable for state game farms, wildlife management areas, or public shooting areas (OLC 2003b).

Furthermore, Section 1528 states:

Multiple recreational use of wildlife management areas is desirable and that use shall be encouraged by the Commission. Except for hunting and fishing purposes, only minimum facilities to permit other forms of multiple recreational use, such as camping, picnicking, boating, or swimming, shall be provided (OLC 2003b).

CCR Sections 550 and 551 further detail the regulations by which DFG manages wildlife areas throughout the State, and detail regulations specific to the OWA, as noted in Table 5.1-1 above (OAL 2003). In conjunction with the California Fish and Game Code, California Fish and Game Commission guidelines, and the CCR, the 1978 Oroville Wildlife Area Management Plan outlines the management policies and goals by which DFG strives to manage the OWA. The primary objectives of OWA management, as detailed in the management plan, are to maintain and improve the OWA's fish and wildlife resources for their intrinsic and ecological value; to maintain and improve the area's environmental quality and amenities; and to provide for the recreational, scientific, and educational use of the area (DFG 1978).

In addition to the California Fish and Game Code, the California Public Resources Code specifies DFG authority over hunting and fishing in all State Park units where hunting and fishing are permitted, which includes the LOSRA. Section 5001.3 of the California Public Resources Code states:

The Legislature finds and declares that it is in the public interest to permit hunting, fishing, swimming, trails, camping, campsites, and rental vacation cabins in certain state recreation areas, or portions thereof, when it is found by the State Park and Recreation Commission that such multiple use of state recreation areas would not threaten the safety and welfare of other state recreation area users. Hunting shall not be permitted in any unit now in the state park system and officially opened to the public on or before June 1, 1961, or in any unit hereafter acquired and designated by the commission as a state park, state marine (estuarine) reserve, state marine (estuarine) park, state reserve, state marine (estuarine) conservation area, or state marine (estuarine) cultural preservation area, and may only be permitted in new recreational areas and state marine (estuarine) recreational management areas that are developed for that use. Whenever hunting or fishing is permitted in a state recreation area or state marine (estuarine) recreational management area, and whenever fishing is permitted in a state

park, state marine (estuarine) park, state marine (estuarine) cultural preservation area, or state marine (estuarine) conservation area, the Department of Fish and Game shall enforce hunting and fishing laws and regulations as it does elsewhere in the state (OLC 2003c).

CCR Section 260.2 defines the hunting regulations for the LOSRA, as detailed above in Section 5.3.1.1. Although Section 5001.3 of the California Public Resources Code assigns the responsibility for enforcing hunting and fishing laws and regulations to DFG, all such regulations can be enforced by any peace officer of the State of California, including California park rangers (pers. comm., Atkinson 2003).

The OWA was created after DWR's Director declared "a public interest and necessity" in acquiring the Oroville Borrow Area (the clay source for the construction of Oroville Dam) for fish and wildlife enhancement and recreation. In addition, the Davis-Dolwig Act of 1961 (California Water Code Section 11900) states:

The Legislature finds and declares it to be necessary for the general public health and welfare that preservation of fish and wildlife be provided for in connection with the construction of state water projects.…The Legislature further finds and declares it to be the policy of this State that recreation and the enhancement of fish and wildlife resources are among the purposes of State water projects.… (OLC 2003d)

Subsequently, control and possession of approximately 5,300 acres was transferred from DWR to DFG for creation of the OWA (DWR and DFG 1968). In addition to the 5,300 acres originally transferred to DFG, control and possession of additional areas, including the Thermalito Afterbay, has been subsequently transferred to DFG for inclusion in the OWA. As discussed further in Study LU-1, the State of California holds fee-title ownership to all State lands within the FERC boundary. DWR has effectively transferred certain specific interest rights on substantial portions of project land to other State departments (i.e., DPR and DFG) under agreements for "transfer of control and possession," a legal document that basically gives the receiving department a specific right or interest to carry out specific terms of use that are not in conflict with DWR's underlying control of the lands for the State Water Resources Development System (pers. comm., Leong 2003). The OWA currently includes 11,870 acres of diverse habitat and provides a variety of fishing, hunting, wildlife viewing, and nature study opportunities. Figure 5.1-2 illustrates the extent of the OWA.

The Feather River Fish Hatchery, operated by DFG with funding from DWR and the State Water Contractors (SWC), was opened in 1967 to compensate for the loss of salmon and steelhead spawning and nursery grounds as a result of the construction of Oroville Dam. The hatchery currently processes more than 20,000 returning adult salmon per year (pers. comm., Brightwell 2004). Hatchery facilities have a production capacity of 10 million fall-run salmon, 5 million spring-run salmon, as well as 450,000

steelhead annually (pers. comm., Kastner 2003). Diseases have occasionally reduced hatchery production in recent years, however.

The Davis-Dolwig Act also provided for the creation of the LOSRA in conjunction with the design and construction of Oroville Dam and the Oroville Facilities:

"The Legislature further finds and declares it to be necessary for the general public health and welfare that facilities for the storage, conservation, or regulation of water be constructed in a manner consistent with the full utilization of their potential for…recreation…The legislature further finds and declares…that the acquisition of real property for [recreation] be planned and initiated concurrently with and as a part of the land acquisition program for other purposes of state water projects… (OLC 2003d)."

APPENDIX B

NOAA FISHERIES BACKGROUND

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APPENDIX B – NOAA FISHIERIES BACKGROUND

In a letter dated May 28, 2003, and prepared by the Habitat Conservation Division of the Southwest Region of NOAA Fisheries, the following Resource Goals and Objectives are outlined for the purpose of ensuring compliance with NOAA Fisheries regulations as part of the relicensing effort:

RESOURCE GOALS

1. Protect, conserve, enhance, and recover native anadromous salmonids and their habitats by providing access to historic habitats and by restoring fully functioning habitat conditions.

2. Identify and implement measures to enhance, protect, mitigate, or minimize the direct, indirect, and cumulative impacts to native anadromous salmonid resources, including related spawning, rearing, and migration habitats and adjoining riparian habitats.

RESOURCE OBJECTIVES

If passage for anadromous fish is made available into the upper Feather River, some or all of the following objectives may be promoted to facilitate the protection, mitigation, or enhancement of anadromous fish species, and their associated terrestrial ecosystems. Other objectives may be promoted as new information and legislation becomes available.

- Flows—Implement scheduled flows in the Feather River and regulated tributaries to the benefit of native anadromous salmonids and their habitats. This includes providing a range or schedule of flows necessary to: (a) Optimize suitable habitat; (b) Stabilize flows during spawning and incubation of in gravel forms; (c) Facilitate the efficient migration of spawning adults, safe and timely emigration of smolts, and movement of rearing juveniles between feeding and sheltering areas; (d) Ensure redd placement in viable areas; and (e) Preserve channel forming processes, riparian habitat protection, and maintenance movement of forage communities. This also includes impacts of flood control, irrigation, or other project structures or operations that act to displace individuals or their forage or destabilizes, scours, or degrades physical, chemical, or biological quality of habitat.

- Water Quality—Modify project structures or operations necessary to mitigate direct, indirect, or cumulative water temperature and quality impacts associated with project structures and operations or enhance water temperature and quality conditions in salmonid habitat.

- Water Availability—Coordinate operations with other projects, programs, or initiatives, and/or use water transfers, water exchanges, water purchases, or other forms of agreements to maximize potential benefits to anadromous salmonids that are affected by limited water supplies.

- Fish Passage—Provide passage for anadromous fish to the Feather River above Oroville Dam as necessary, to restore access to historic spawning, rearing, and migration habitats within or near the project. Access into the project may include passive or active structures or devices that provide upstream and/or downstream passage. Passage within or near the project boundary may include modifications to project facilities and operations necessary to ensure the safe, timely, and efficient passage of upstream migrating adults, downstream passage of emigrating juveniles, and passage necessary for juveniles to access habitat necessary for the seasonal movement of rearing juveniles to feeding and shelter habitats.

- Channel Maintenance—Implement flow regimes and non-flow related measures necessary to mitigate and minimize direct, indirect, and cumulative impacts of project facilities and operations on sediment movement and deposition, river geometry, and channel characteristics. This includes impacts on stream competence, capacity, floodplain conductivity, bank stability and extent, duration, and repetition of high flow events. In addition, this includes impacts on habitat diversity and complexity such as pool riffle sequencing and instream cover.

- Hatchery Operations—Minimize and mitigate the impact of hatchery facilities and/or operations (e.g., fish stocking) on native, anadromous salmonids. This includes the direct, indirect, and cumulative impacts of hatchery product on anadromous salmonids and the direct, indirect, and cumulative impacts of hatchery facilities and operations on salmonids and their habitats.

- Predation—Minimize and mitigate the impact of project structures or operations that either have in the past or continue to introduce predators, create suitable habitat for predators, harbor predators, or are conducive to the predation of native anadromous salmonids.

- Riparian Habitat—Protect, mitigate, or minimize direct, indirect, and cumulative impacts on, and enhance riparian habitat and habitat functions necessary to mitigate and minimize direct, indirect, and cumulative impacts of project facilities and operations.

- Flow Ramping—Modify project structures or operations necessary to minimize impacts of flow fluctuations associated with increases of decreases in project discharges. Flow modifications may be necessary to provide passage at

artificial or natural barriers (e.g., Seneca Falls, a partial barrier for salmonids at low flow).

- Coordination—In developing alternatives for relicensing, include a full range of alternatives for modifying project and non-project structures and operations to the benefit of anadromous salmonids and their habitats, while minimizing conflicts with operational requirements and other beneficial uses. This includes developing alternatives for greater coordination with other stakeholders and water development projects to ensure that, at a minimum, project structures and operations are consistent with ongoing and future fishery restoration efforts and potentially enhance these efforts.

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