State of California
The Resources Agency
Department of Water Resources

EXISTING RECREATION USE

FINAL

R-9

Oroville Facilities Relicensing
FERC Project No. 2100

FEBRUARY 2004

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Oroville Facilities Relicensing
FERC Project No. 2100

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REPORT SUMMARY

This document presents the results of the Existing Recreation Use study, one of several recreation studies conducted to support the Oroville Facilities Relicensing (Federal Energy Regulatory Commission [FERC] Project No. 2100). The California Department of Water Resources (DWR) commissioned this study as part of the relicensing process for the preparation of a license application to be submitted to FERC for the Oroville Facilities. As part of the relicensing process, a series of related studies is being conducted to assess and evaluate recreation resources associated with the Oroville Facilities. This report presents the results of one of those studies: to estimate existing recreation use in the study area.

INTRODUCTION

This report is divided into seven sections. Section 1.0, Introduction, provides a list of the sites included within the study as well as background information on the Oroville Facilities. Section 2.0, Need for Study, addresses why the study is necessary to support relicensing. Section 3.0, Study Objective(s), describes the purpose of the study. Section 4.0, Methodology, discusses the data sources used in this study as well as the way that existing use, activity breakdowns of use, people-at-one-time (PAOT), vehicles-at-one-time (VAOT), campground occupancy, and trail use calculations were done. Section 5.0, Results and Discussion, describes the results of the study, including estimates of seasonal visitation, use by activity, PAOT, VAOT, campground occupancy, and trail use. Section 6.0, Conclusions, describes the conclusions drawn from the results regarding existing use within the Project area. Finally, Section 7.0, References, lists the sources and references used for this study.

Lake Oroville is the second largest reservoir in California, after Shasta Lake. The Oroville Facilities were developed as part of the State Water Project (SWP), a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants that stores and distributes water to supplement the needs of urban and agricultural water users in California. The Oroville Facilities support a variety of recreational opportunities, including boating (several types), fishing (several types), developed and primitive camping, picnicking, swimming, horseback riding, hiking, bicycling, wildlife watching, and hunting.

NEED FOR THIS STUDY

This study is needed to comply with FERC regulations requiring estimates of existing recreation use (both daytime and overnight visitation), as well as a description of the methods used to estimate use (Subpart F, §4.51 of 18 Code of Federal Regulations [CFR]). This study also will also contribute to FERC's direction regarding preparation of comprehensive recreation plans.

STUDY OBJECTIVES

The objectives of this study are to estimate existing project-related recreation use, both day and overnight use, at recreation facilities and dispersed recreation use areas within the study area. Use is estimated for both weekdays and weekends for specific areas and times of the year. The use level information from this report provides input into other recreation studies as well as information for a comprehensive recreation plan for the area.

METHODOLOGY

Several data sources were used to estimate existing recreation use, depending on the data available for each site. Data sources included DWR traffic counters, California Department of Parks and Recreation (DPR) campground information, observational data, other DPR data, and trail counters. Several aspects of existing use were calculated: seasonal visitation, amount of use by activity, PAOT, VAOT, campground occupancy, and trail use. Calculations for seasonal visitation depended on the data available for each site and measured the number of recreation days for the period between May 15, 2002, and May 14, 2003. Calculated visitation included the recreation season (May 15, 2002, to September 15, 2002) and the off-season (September 16, 2002, to May 14, 2003). Existing use was also subdivided by the amount of use by activity using observational data and professional judgment. Observational data were used to calculate average and maximum holiday and non-holiday PAOT and VAOT. Campground occupancy was determined based on the number of sites occupied out of the total number of sites available. Infrared trail counters were used to estimate use on segments of several trails within the Project area.

STUDY RESULTS AND DISCUSSION

Existing use is characterized in many ways. Visitation datasets catalog weekday and weekend visitor use in the recreation season and the off-season for the general study area and for each site within the study area (Section 5.1). Sites are grouped into general geographical areas including Lake Oroville, Diversion Pool, Thermalito Forebay, Thermalito Afterbay, the Oroville Wildlife Area (OWA), and additional sites both within and outside of the FERC boundary. Use is reported in recreation days, which is one person visiting for any length of time on one day. There were more than 1.7 million recreation days within the study area, with use nearly evenly split between the four-month recreation season and the eight-month off-season. Additionally, there was more total use on weekdays than on weekends in both seasons, except at the Thermalito Forebay, where there was more total use on weekends. However, all sites had more daily average recreation days in the recreation season than in the off-season, and most sites had higher daily averages on weekends than on weekdays.

Use at each site within the study area is also summarized by activity (Section 5.2). The percentage of use by activity and the number of recreation days per site per activity are

reported, as well as the most popular activities for each geographical area based on the number of recreation days for each activity. The most popular sites for each activity (based on the number of recreation days) are also reported. Although the activities participated in vary by type of site, most sites have at least some bank fishing, boating access, sightseeing, picnicking, or swimming use.

Both non-holiday and holiday PAOT and VAOT are discussed (Sections 5.3 and 5.4 respectively). Non-holiday PAOT and VAOT are reported in terms of average and maximum weekday and weekend values for both the recreation season and off-season. PAOT values are presented for only those sites where use occurs at the site and where accurate counts of people could be done. VAOT is reported for almost all sites. Holiday PAOT and VAOT are discussed in terms of average and maximum numbers. In general, PAOT and VAOT were lower in the off-season than in the recreation season and generally higher on holidays. The North Forebay Boat Ramp (BR)/Day Use Area (DUA), Thermalito Afterbay outlet, and Monument Hill BR/DUA had the highest PAOT numbers for both holidays and non-holidays. Bidwell Canyon BR/DUA/Marina, North Forebay BR/DUA, Lime Saddle BR/DUA/Marina, and Spillway BR had the highest VAOT numbers for both holidays and non-holidays.

Campground occupancy is discussed for all six developed campgrounds (Section 5.5). Average monthly occupancy rates, as well as average recreation season and off-season occupancy rates, are discussed for both weekdays and weekends. Graphs are also used to display the difference between weekday and weekend occupancy rates. Also reported are the number of days when campgrounds were at maximum capacity. In general, campgrounds had higher occupancy on weekends and during the recreation season than on weekdays and during the off-season. Most campgrounds had peak occupancy on recreation season weekends and low occupancy during the off-season. Three of six campgrounds did not reach maximum capacity. Loafer Creek Group Campground had the most days at capacity with 26 weekend days and six weekdays.

Both the total and daily average numbers of users at 10 locations in the Project area trail system are presented (Section 5.6). The data show that there was low to moderate use on trails throughout much of the year with peaks of 25–35 people per day. Trail use peaked in October and during special events and holidays in November.

CONCLUSIONS

The sites that contribute the most to overall use in the Project area are the Bidwell Canyon BR/DUA/Marina, Lime Saddle BR/DUA/Marina, and the Oroville Dam/Overlook DUA. The Lake Oroville area contributes about half of the use within the Project area, followed by the OWA, which contributes about 20 percent. At most sites, weekday use accounted for 50 to 69 percent of use, with corresponding 50 to 31 percent of use on weekends during the recreation season and off-season. Also discussed are the most popular activities within the Project area. The top five activities are boating, sightseeing,

bank fishing, picnicking, and swimming. A brief discussion of PAOT, VAOT, campground occupancy, and trail use is also included.

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ACRONYMS AND ABBREVIATIONS

af	acre-feet
BR	Boat Ramp
CFR	Code of Federal Regulations
cfs	cubic feet per second
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
ISO	Independent System Operator
maf	million acre-feet
msl	mean sea level
MW	megawatts
NOAA	National Oceanic and Atmospheric Administration
ORV	off-road vehicle
OWA	Oroville Wildlife Area
PAOT	people-at-one-time
PPV	people per vehicle
RD	recreation day
RV	recreational vehicle
SR	State Route
SVRA	State Vehicular Recreation Area
SWP	State Water Project
TA	Trailhead Access
USACE	U.S. Army Corps of Engineers
VAOT	vehicles-at-one-time

1.0 INTRODUCTION

A series of related studies is being conducted to assess and evaluate recreation resources associated with the Oroville Facilities Relicensing Project (FERC Project No. 2100). Within and adjacent to the Oroville Facilities Project area (the area within the Federal Energy Regulatory Commission [FERC] boundary), there are many recreation sites including boat ramps, campgrounds, day use areas, trails, and trailhead access sites. This report estimates the type and amount of existing Project-related recreation use at several sites.

1.1 BACKGROUND INFORMATION

Lake Oroville is the second largest reservoir in California, after Lake Shasta. Existing facilities at Lake Oroville offer a wide variety of recreational opportunities and experiences. Facilities include boat ramps, day use areas, marinas, campgrounds, trails, a visitor center, a shooting range, and an off-road vehicle (ORV) area. Recreational opportunities include boating, hiking, camping, picnicking, biking, horseback riding, swimming, fishing, hunting, ORV riding, and wildlife viewing.

1.1.1 Study Area

The study area encompasses Lake Oroville, the lands and waters within and adjacent to (within 0.25 mile) of the FERC project boundary. Sites included in this study are listed in Table 1.1-1 and shown in Figure 1.1-1. Sites not included in this study are the floating campsites and boat-in campsites. These are included in Relicensing Study R-7 – *Reservoir Boating*.

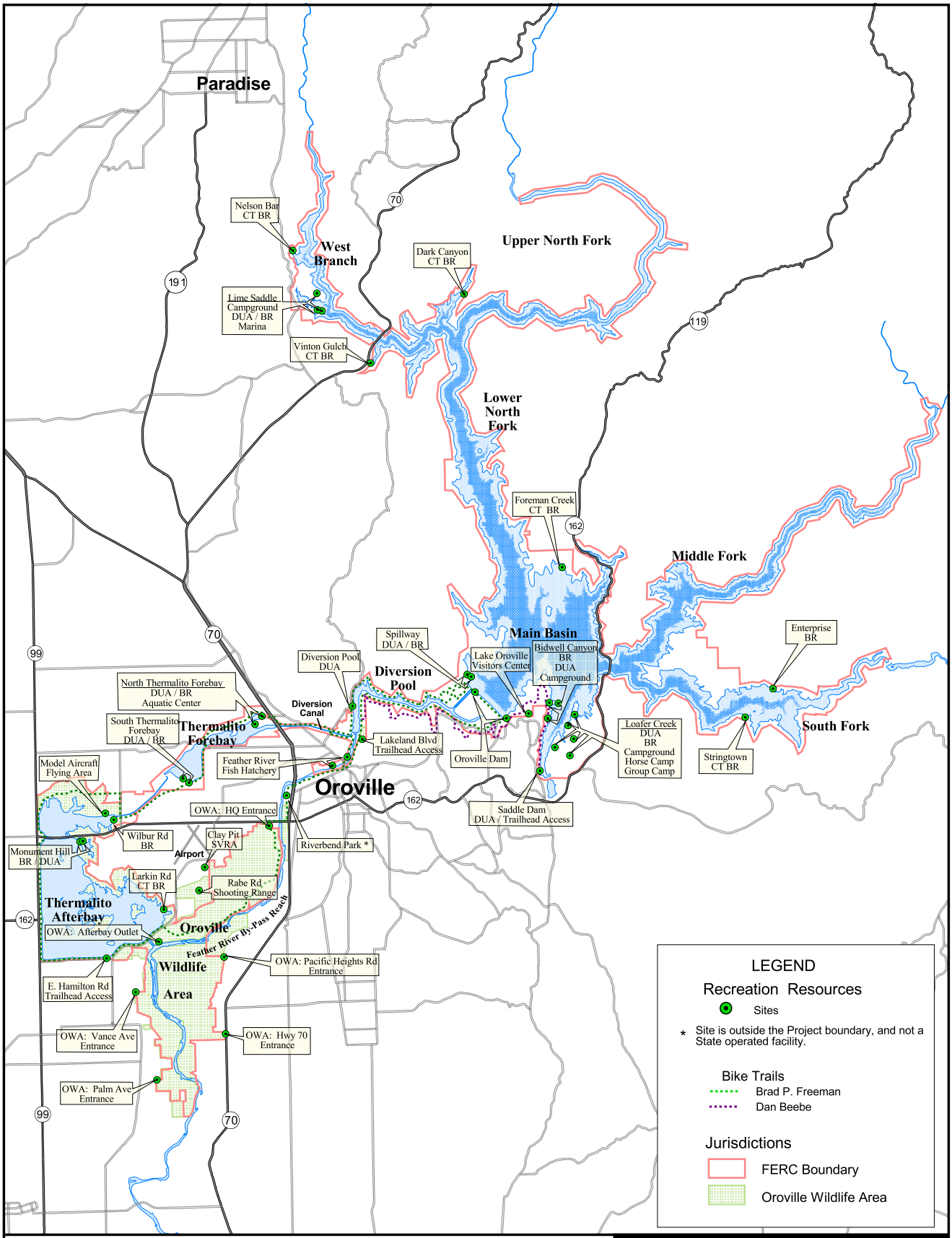
Table 1.1-1. Study area sites.

Lake Oroville	**Thermalito Forebay**
Bidwell Canyon Boat Ramp (BR)/Day Use Area (DUA)/Marina	North Thermalito Forebay BR/DUA
Bidwell Canyon Campground	South Thermalito Forebay BR/DUA
Loafer Creek BR	Oroville Wildlife Area (OWA)
Loafer Creek DUA	South OWA West Levee Road
Loafer Creek Campground	South OWA East Levee Road
Loafer Creek Group Campground	Thermalito Afterbay Outlet
Loafer Creek Equestrian Campground	Headquarters Entrance
Lime Saddle BR/DUA/Marina	**Diversion Pool**
Lime Saddle Campground	Diversion Pool DUA
Lime Saddle Group Campground	Lakeland Boulevard TA
Spillway BR/DUA	Powerhouse Road TA
Oroville Dam/Overlook DUA	**Other**
Foreman Creek Car-top BR	Feather River Fish Hatchery
Dark Canyon Car-top BR	Riverbend Park
Vinton Gulch Car-top BR	Clay Pit State Vehicular Recreation Area (SVRA)
Nelson Bar Car-top BR	Rabe Road Shooting Range
Stringtown Car-top BR	**Trails**
Saddle Dam Trailhead Access (TA)	Dan Beebe Trail
Enterprise BR	Brad Freeman Trail
Lake Oroville Visitors Center	Kelly Ridge Trail
Thermalito Afterbay	Loafer Creek Loop Trail
Wilbur Road BR	Roy Rogers Trail
Monument Hill BR/DUA	
Larkin Road Car-top BR	
East Hamilton Road TA	

Source: EDAW, Inc. 2003.

Figure 1.1-1. Project Area and Associated Recreation Sites

11 X 17 insert



Source: DWR GIS / EDAW 2003

1 0 1 2 3 4 5 6 Miles

Scale 1 : 142,560
1" = 2.25 miles

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

Oroville Facilities Relicensing
FERC Project No. 2100

Figure 1.1-1
(R-9)

Project Area and
Associated Recreation Sites

Prepared by: PJ -- EDAW, Inc. Date 2/10/04 P:\2000\0s016.gis\arcview\rec_acc.apr

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1.2 DESCRIPTION OF FACILITIES

The Oroville Facilities were developed as part of the State Water Project (SWP), a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. 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 and power generation, to improve water quality in the 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, Oroville Wildlife Area (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 cubic feet per second (cfs) and 5,610 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, four miles downstream of the 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 Powerplant is a 3-MW power plant located on the left abutment of the diversion dam. The power plant releases a maximum of 615 cfs of water into the river.

The Thermalito Power Canal is a 10,000-foot-long channel designed to convey generating flows of 16,900 cfs to the Thermalito Forebay and pump-back flows to the Hyatt Pumping-Generating Plant. Thermalito Forebay is an off-stream regulating reservoir for the 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. The Afterbay is used to release water into the Feather River downstream of the Oroville Facilities, and helps regulate the power system, provides storage for pump-back operations, provides recreational opportunities, and provides local irrigation water. Several local irrigation districts receive Lake Oroville water via the Afterbay.

The 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 of the Feather River between the dam and the Thermalito Afterbay outlet, and provides attraction flow for the hatchery. The hatchery is an anadramous 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 occasionally reduced hatchery production in recent years.

The Oroville Facilities support a wide variety of recreational opportunities. These opportunities 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, and hunting. There are also 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, 10 floating campsites, and seven two-stall floating toilets. There are also recreation facilities at the Lake Oroville Visitors Center, Thermalito Afterbay, and OWA.

The OWA comprises approximately 11,000 acres west of Oroville that is managed for wildlife habitat and recreational activities. It includes Thermalito Afterbay and surrounding lands (approximately 6,000 acres) along with 5,000 acres adjoining the Feather River. The 5,000-acre area is adjacent to or straddles 12 miles of the Feather River, and includes willow- and cottonwood-lined ponds, islands, and channels. Recreation areas include dispersed recreation (hunting, fishing, and bird watching), plus recreation at developed sites, including Monument Hill DUA, model airplane grounds, and three boat launches on the Afterbay and two on the river, and two primitive camping areas. The California Department of Fish and Game's (DFG) 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.

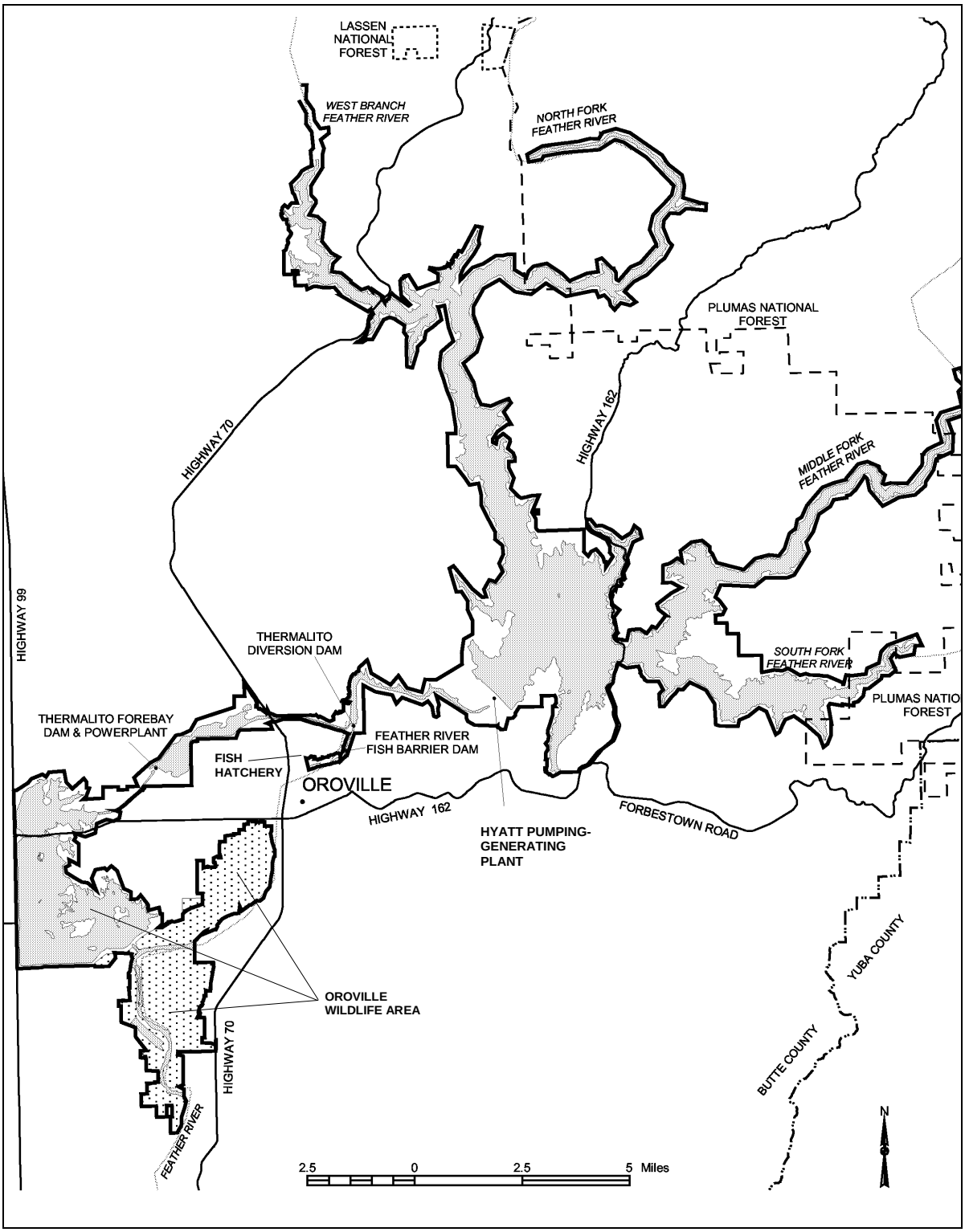

Figure 1.2-1. Oroville Facilities FERC Project 2100 boundary.

1.3 CURRENT OPERATIONAL CONSTRAINTS

Operation of the Oroville Facilities varies seasonally, weekly, and hourly, depending on hydrology and the objectives that the California Department of Water Resources (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, instream 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 multiyear 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 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.

1.3.1 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 low-flow channel and the reach of the Feather River between Thermalito Afterbay and Verona. This agreement: (1) establishes minimum flows between the 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 spring/summer for shad and striped bass.

1.3.1.1 Instream 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 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, the diversion dam power plant, and the Feather River Fish Hatchery pipeline.

Generally, the instream 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–July period is less than 1,942,000 acre-feet (af) (i.e., the 1911–1960 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 from October 15 through November 30 to prevent spawning in overbank areas that might become de-watered.

1.3.1.2 Temperature Requirements

The 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 last half of May, 56°F for June 1–15, 60°F for June 16–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 fish.

National Oceanic and Atmospheric Administration–Fisheries (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 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 low-flow channel) from June 1 through September 30. This measure attempts to maintain water temperatures 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 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), though 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 Feather River Service Area contractors' temperature goals.

1.3.1.3 Water Diversions

Monthly irrigation diversions of up to 190,000 af (July 2002) are made from the Thermalito Complex during the May–August irrigation season. The total annual entitlement of the Butte and Sutter County agricultural users is approximately 1.0 maf. After these local demands are met, flows into the lower Feather River (and outside of the Project 2100 boundary) continue into the Sacramento River and into the Sacramento-San Joaquin 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.

1.3.1.4 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 the 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.

1.3.2 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 the USACE, whichever requires the greater release. Decisions regarding such releases are made in consultation with the 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 (point at which specific flood release would have to be made) varies from about 2.8 maf 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

DWR is currently in the process of renewing its license for the Oroville Facilities. FERC is responsible for granting the license and requires the applicant, DWR, to assess various resources including recreation. This study complies with FERC regulations requiring estimates of existing and future recreation use at the project in terms of both daytime and overnight visitation, and provides a description of the methods used to estimate use (Subpart F, §4.51 of 18 Code of Federal Regulations [CFR]). This study will also help DWR meet FERC's direction regarding preparation of a comprehensive recreation plan.

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3.0 STUDY OBJECTIVE(S)

The Existing Recreation Use study estimates and describes existing project-related recreational use (both day and overnight use) at recreation facilities and dispersed recreation use areas, and focuses on activities within the study area. It includes a description of the methods used to estimate use, as required by FERC regulations (Subpart F, §4.51 of 18 CFR). Information from the existing use study is used to estimate weekday and weekend use for specific areas and times of the year. This study provides information about use levels as an input to a comprehensive recreation plan for the area, as well as information necessary for other recreation studies. The study provides data for the following recreation-related relicensing studies: *R8 – Carrying Capacity*; *R12 – Projected Recreation Use*; *R14 – Assessment of Regional Recreation and Barriers to Recreation*; and *R17 – Recreation Needs Analysis*. Information from this study regarding the utilization of existing facilities and the use of informal recreational areas associated with the project will be used in relicensing studies *R8 – Carrying Capacity* and *R17 – Recreation Needs Analysis* to help determine carrying capacity and need for additional facilities.

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4.0 METHODOLOGY

Estimates of the amount and types of recreation use occurring at each site in the Project area were based on the available data for that particular site. The primary data sources were traffic counters and field observations. The California Department of Parks and Recreation (DPR) provided campground site occupancy information and additional use data for sites where traffic counter data were unavailable. The recreation visitor surveys conducted for Relicensing Study R-13 – *Recreation Surveys* provided data on visitor group size, length of stay, and activities. Recreational use by activity was estimated based on observational data, existing use, and professional judgment. People-at-one-time (PAOT) and vehicles-at-one-time (VAOT) data relied upon observations. Campground occupancy was calculated based on site occupancy information from DPR. Trail use counters were used to measure use of select trail segments.

4.1 DATA SOURCES

This section describes how data from the sources listed above were obtained and used to develop estimates of existing use, use by activity, PAOT, VAOT, campground occupancy and trail use. Where appropriate, limitations of each data source are described.

4.1.1 Traffic Counter Data

The principal source of data for estimation of recreation use levels at recreation sites within the study area was a network of traffic counters installed by DWR at most of these sites. A total of 28 counters are currently installed at 26 sites (Table 4.1-1). The Feather River Fish Hatchery and the Wilbur Road BR have counters at each of their two entrances. Use of several portions of the OWA, where use is dispersed along several miles of levee roads and riverbank, is represented by count data from two separate entrances. An additional traffic counter is maintained at the Lake Oroville Visitors Center by DPR.

No counters have been installed at the Lime Saddle Campground, the Spillway BR/DUA, several trailheads, and the Model Aircraft Flying Area on the north side of Thermalito Afterbay. However, part of the traffic data collected at the left abutment of Oroville Dam represents traffic that crossed the dam to reach the Spillway BR/DUA. Camper registration data for Lime Saddle Campground was used to estimate use there. The Model Aircraft Flying Area is on a gated access road; periodic group and special-event use here was not determined.

Each traffic counter installation consists of a wire induction loop embedded in the road and connected to an electronic counter installed in a locked steel box mounted on a roadside post or in cement at ground level. The counters are triggered by the metal of

Table 4.1-1. Study area recreation sites with DWR traffic counters.

Lake Oroville State Recreation Area	
Major Recreation Areas	
1	Lime Saddle BR/DUA/Marina
2	Bidwell Canyon BR/DUA/Marina/Campground
3	Loafer Creek BR/DUA/Campgrounds
4	Oroville Dam (traffic going to Spillway BR/DUA is also counted)
Car-top BRs	
5	Nelson Bar
6	Vinton Gulch
7	Dark Canyon
8	Foreman Creek
9	Stringtown
Other Lake Oroville Sites	
10	Enterprise BR
11	Lake Oroville Visitors Center
Diversion Pool and Thermalito Forebay	
12	Thermalito Diversion Pool DUA
13	North Thermalito Forebay BR/DUA
14	South Thermalito Forebay BR/DUA
Thermalito Afterbay	
15	Monument Hill BR/DUA
16	Larkin Road Car-top BR
17	Wilbur Road BR (two counters)
Oroville Wildlife Area	
18	Headquarters Entrance
19	Thermalito Afterbay Outlet
20	Palm Avenue Entrance
21	Vance Avenue Entrance
22	State Route (SR) 70 Entrance
23	Pacific Heights Road Entrance
Additional Sites	
24	Feather River Fish Hatchery (two counters)
25	Clay Pit SVRA
26	Rabe Road Shooting Range

Source: DWR 2003.

each vehicle as it crosses the loop. Depending on the type of road (paved vs. unpaved) and traffic patterns at each site, the counters are installed to detect only entering, only exiting, or both entering and exiting traffic.
Calibration observations made during several four-hour visits to each counter site were used to estimate the average number of people in each counted vehicle and the percentage of non-recreation traffic (e.g., State-owned vehicles, service vehicles). The observations were also used to record the number of vehicles pulling trailers and the number of recreational vehicles (RVs) and other large vehicles entering. Shorter observations of traffic were also made with the counter box open and counter screen available so that the counter's response to each entering and/or exiting vehicle could be directly observed as a check on counter accuracy.

The traffic counter calibration observations indicated that vehicles pulling trailers (commonly boat, ORV, and horse trailers) were being double-counted, which would represent a major source of error at many sites. Adjustments to counter data to correct for these over-counts were made based on the calibration observations and "snapshot" use monitoring observations, described in section 4.1.2. Non-recreation traffic was deducted from recreation use estimates based on the calibration data and management agency input.

Because of problems with the location and/or function of the counter loops, traffic counter data from three sites were not useable: North Thermalito Forebay DUA, Enterprise BR, and the Nelson Bar Car-top BR. At each of these sites, the counter error was observed to be high or there were insufficient data to determine the severity of the error during normal recreation use conditions.

At several other sites, the calibration observations indicated that some vehicles traveling down the center of the road in the opposite direction were unintentionally counted as traffic in the direction intended to be counted. Two of the sites where this occurred have gravel roads (i.e., no centerline). At some of these sites, a portion of visitors' vehicles were not counted at all, either because incoming traffic missed the counter loop or because visitors parked before encountering the loop. In each of these cases, the rate of error was judged to be small enough that the effect on use estimates could be minimized by adjusting the counter data based on our understanding of the errors. Further discussion of adjustments made to the traffic counter data can be found in Section 4.2.1.1.

4.1.2 Visitor Use Observation Data

"Snapshot" observations of visitor use by field staff at all recreation sites in the study area were scheduled from Memorial Day weekend, 2002 to Memorial Day weekend, 2003. Most of the observations were made in conjunction with visits to the sites for the purpose of contacting people to complete a visitor survey. The number of vehicles and vehicle-trailer combinations and, for most sites, the number of people present, were counted upon arrival to each site. Counts of people on-site were not

performed at developed campgrounds or at boat launches where other (non-boating) activities did not occur.

The primary purpose of these observations were to identify the activities occurring at day-use sites, show changes in the amount of activity throughout the day (traffic counter data provided only daily counts), and provide a comparison of weekday use to weekend and holiday use. These combined visitor survey and recreation use observation periods were scheduled to begin at three times of day: morning (between 8 and 9 a.m.), mid-day (between about noon and 1 p.m.), and afternoon (between about 4 and 5 p.m.). Observations were made on weekdays, weekends, and summer holidays. Most sites received 25–40 use observations over the year-long data collection period. Generally, more heavily-used sites received more counts.

Vehicle and vehicle/trailer observations distinguished between regular passenger vehicles and RVs, and between types of trailers (boat, horse, and ORV trailers). All people on-site were counted, with separate counts for common activities including bank fishing, swimming, picnicking, and other more site-specific activities like ORV use. Special counts were made at designated primitive camping areas in the OWA.

Complete or accurate counts of all visitors using a site were not possible at some locations and times. At locations where both boat launching and other shoreline use occurred (e.g., Monument Hill BR/DUA on the Afterbay), it was not possible to count boaters who were out on the water. At OWA sites, observations of vehicles parked at dispersed locations on and near the levee roads indicated that visitors were nearby, but these were typically anglers, not all of whom were visible to observers as they waded up or downstream or fished from the bank. Also, the North Forebay DUA hosted several hundred visitors during summer holidays, a level of use which made accurate counts difficult or impossible to obtain by the observers. On days such as July 4, 2002, when the parking area was full to capacity, several observers divided the area into sections and made their best attempt to obtain a count for each section. Observers also recorded the weather conditions and any other observations relating to recreation use such as site closure or usability. Appendix A contains the use observation data collection sheet. Table 4.1-2 lists the number of observations at each site in the recreation season, off-season, and on holidays.

4.1.3 DPR Campground Occupancy Data

DPR provided data on the number of campsites occupied each day between May 2002 and May 2003 at the Lime Saddle, Loafer Creek, and Bidwell Campgrounds. During the recreation season this information was compiled by DPR staff at the entrance kiosks at these locations, where campers register to use campsites. During the off-season, the information is based on receipts gathered from self-payment stations. Campsite occupancy data for the boat-in camps and floating camps (see Relicensing Study R-7 – *Reservoir Boating*) were provided with data for the Spillway BR, where campers using those facilities registered.

Table 4.1-2. Number of observations at Oroville Facility sites 2002/2003.

Site	Recreation Season			Off-Season		Total
	Holiday	Weekday	Weekend	Weekday	Weekend	
Lake Oroville						
Bidwell Canyon BR/DUA/Marina	4	7	4	4	11	30
Loafer Creek BR	2	4	4	1	5	16
Loafer Creek DUA	2	5	3	2	6	18
Lime Saddle BR/DUA/Marina	4	10	6	4	9	33
Spillway BR/DUA	3	6	7	2	5	23
Oroville Dam/Overlook DUA	3	6	9	2	6	26
Foreman Creek Car-top BR	3	7	3	2	5	20
Dark Canyon Car-top BR	1	2	2	4	6	15
Vinton Gulch Car-top BR	1	4	2	4	6	17
Nelson Bar Car-top BR	3	3	2	3	7	18
Stringtown Car-top BR	3	5	4	1	4	17
Saddle Dam TA	7	4	7	5	12	35
Enterprise BR	1	6	3	1	5	16
Diversion Pool						
Diversion Pool DUA	2	7	5	10	15	39
Lakeland Boulevard TA	2	9	6	6	12	35
Powerhouse Road TA	2	2	2	5	9	20
Thermalito Forebay						
North Thermalito Forebay BR/DUA	2	8	4	7	8	29
South Thermalito Forebay BR/DUA	3	7	6	2	5	23
Thermalito Afterbay						
Wilbur Road BR	2	8	6	5	4	25
Monument Hill BR/DUA	4	6	7	3	6	26
Larkin Road Car-top BR	1	5	6	4	4	20
East Hamilton Road TA	0	2	3	2	4	11
OWA						
South OWA West Levee Road	2	9	6	1	2	20
South OWA East Levee Road	2	3	5	0	4	14
Thermalito Afterbay Outlet	2	3	5	3	4	17
OWA Headquarters Entrance	3	3	7	2	4	19
Other						
Feather River Fish Hatchery	2	3	2	6	5	18
Riverbend Park	4	10	8	3	3	28
Clay Pit SVRA	2	5	3	2	2	14
Rabe Road Shooting Range	1	2	2	2	2	9

Note: Recreation season is from May 15, 2002, to September 15, 2002, and off-season is from September 16, 2002, to May 14, 2003.
Source: EDAW, Inc. 2003.

4.1.4 Other DPR Attendance Data

DPR also provided data on visitor attendance to the North Thermalito Forebay BR/DUA generated from its traffic counter there. These data served as a replacement for the unusable DWR counter data for that location. Data for the Lake Oroville Visitors Center were also provided by DPR and consisted of the daily number of vehicles, daily number of large groups, and total number of people in those large groups who visited the center.

4.1.5 Infrared Trail Use Counters

Between August 2002 and August 2003, as many as four infrared trail use counters were installed at one time on the trail system within the Project area. Where possible, the counters were installed at the base of trees, about 15–20 feet off the trail, to minimize the chance of vandalism or theft. The counters were triggered each time a trail user crossed the infrared beam aimed across the trail. The detection beam was aimed about 4–5 feet above the trail to ensure that trail hikers, bike riders, and equestrians would be detected, while small animals passing on the trail would not be detected. Data were downloaded from each counter once per month during most of the data collection period. Trail counter locations are illustrated in Figure 4.1-1.

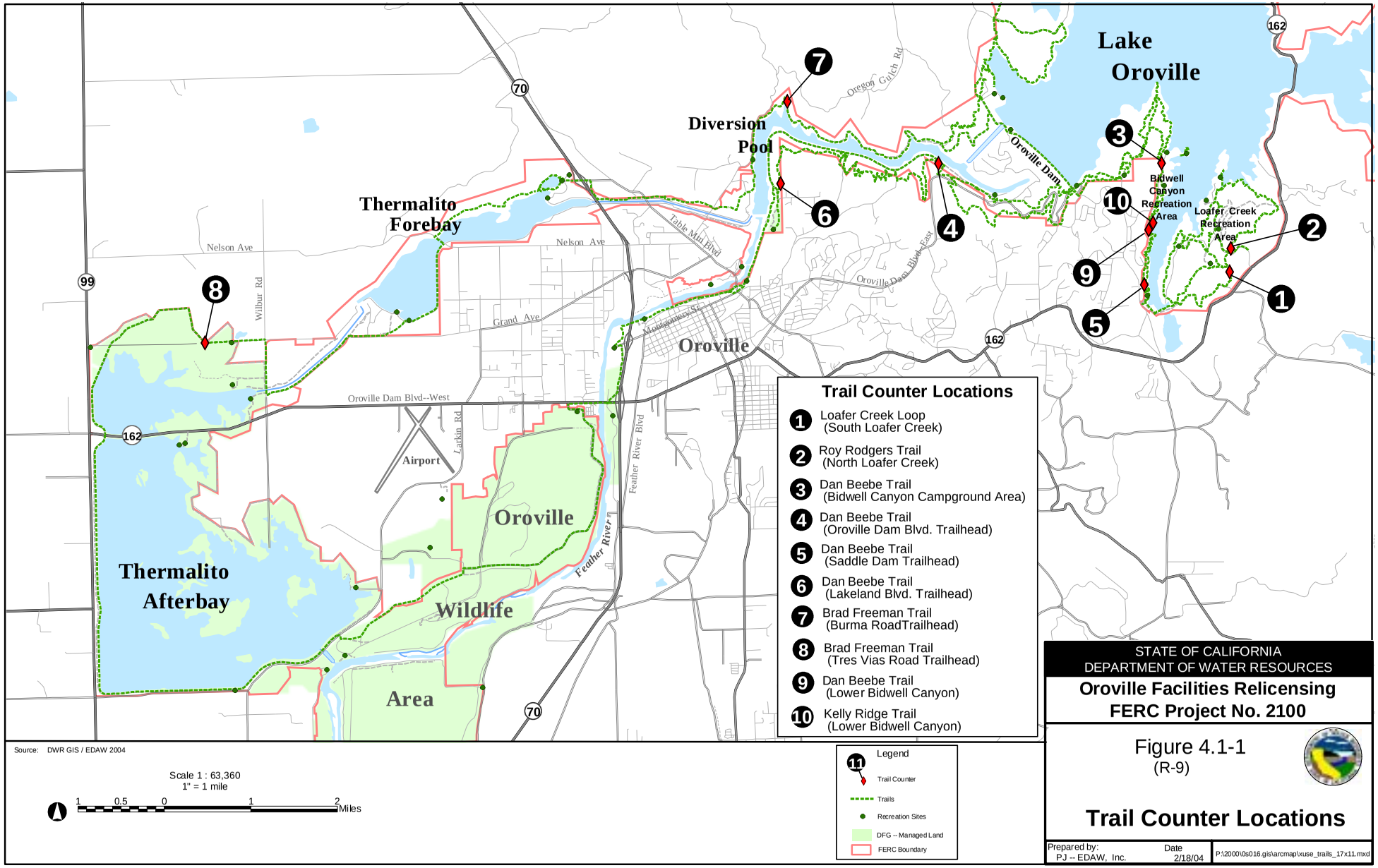
The trail use counters were installed in the field in three phases: Phase 1, late summer and fall 2002; Phase 2, winter and spring 2003; and Phase 3, summer 2003. Although four counters could not provide complete trail system coverage, installation locations were chosen by DWR to provide use data for a variety of trail segments within the Project area's extensive trail network. Other factors taken into consideration in choosing installation locations included the distance from a trailhead or parking area, for convenient access; the opportunity to record trail usage originating from more than one access point or direction; and the potential to capture a major portion of trail use for a particular area. Care was also taken to install the counters, where possible, at locations where the narrowness of the trail would reduce the likelihood that trail users would be side-by-side.

4.1.5.1 2002 Trail Counter Locations (Phase I)

Initially, two of the counters were installed in the Loafer Creek area (Figure 4.1-1): one on the Roy Rogers Trail north of the main entry road and the other on the Loafer Creek Loop, south of the entry road. These two locations are separated by about one-quarter mile. It is possible for users of these trails to cross both counters on the same outing, although most are expected to use one loop or the other. The Loafer Creek Loop trail connects to the nearby Loafer Creek Equestrian Campground, so many use counts are expected to come from horse riders. This trail is also close to the Loafer Creek Group

Figure 4.1-1. Trail Counter Locations

[11X17 Figure]



STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

Oroville Facilities Relicensing
FERC Project No. 2100

Figure 4.1-1
(R-9)

Trail Counter Locations

Prepared by: PJ -- EDAW, Inc.
Date 2/18/04
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Back of Figure 4.1-1

Campground. The Roy Rogers Trail receives use by bicyclists and hikers from the nearby campground, as well as equestrian use.

A third counter was placed at the head of the Kelly Ridge Trail, directly across from the entry road to the Big Pine Loop of the Bidwell Canyon Campground. The counter was placed 100 yards away from the roadway entry and before a split in the trail to record trail users coming or going from either path. Also, trail users who come to the Kelly Ridge area from the Saddle Dam TA would be recorded. The Kelly Ridge area is adjacent to a densely developed residential area, distinguishing this counter location from the settings of the other three locations.

A fourth counter was placed on the Dan Beebe Trail, about 0.5 mile west of a pullout and parking area on Oroville Dam Boulevard, across the Diversion Pool from the spillway of Oroville Dam. This trail runs along the south side of the Diversion Pool. This trail can also be accessed from trailhead parking areas to the east and west. The trail connects with the Lakeland Boulevard TA, an access point used by horse riders, bike riders, hikers, and runners from local schools.

4.1.5.2 2003 Trail Counter Locations (Phases II and III)

For Phase II, beginning in early 2003, all four counters were removed from their initial placements and reinstalled in new locations to provide data on use of additional trail sections. One counter was placed on the Dan Beebe Trail, a short distance up the trail (north) of the Saddle Dam TA. This location was intended to capture trail use originating at that trailhead access, which is used primarily by equestrians.

A second counter was placed just north of the Lakeland Boulevard TA on the Dan Beebe Trail, a short distance from the gated access road leading to the Diversion Pool. This location was intended to capture use of this fairly hilly and challenging section of the Dan Beebe Trail, which was used by all types of trail users. (Consideration was given to another counter placement on the Brad Freeman Trail nearby, on the old railroad grade alongside the Diversion Pool, but the open character and lack of trees in the area provided no good installation options.)

A third counter was placed on the Brad Freeman Trail just past the point where it crosses a small creek at the north end of Burma Road. The trail here was used primarily by bike riders and hikers, and runs on an old road bed just above the north shore of the Diversion Pool. At its east end, this trail section follows two steep winding routes uphill to the top of Oroville Dam.

The fourth counter was placed on the Brad Freeman Trail about 1,000 feet west of the TA at the terminus of Tres Vias Road, at the north end of Thermalito Afterbay. The trail here follows an old road bed and is flat to gently rolling. The area was used primarily by hunters during the fall and winter hunting seasons, but was also used by bike riders as

a link to the portion of the Brad Freeman Trail that encircles Thermalito Afterbay. Use of this trail segment was of particular interest because of the waterfowl brood areas on nearby lands adjacent to Thermalito Afterbay, which may be vulnerable to disturbance.

During Phase III, beginning in summer 2003, the counters placed near the Saddle Dam and Lakeland Boulevard TAs were moved to adjacent sections of trail in the lower Bidwell Canyon area, between the Saddle Dam TA and the Bidwell Canyon entrance station. One was installed on the Kelly Ridge Trail, which runs close to the Lake Oroville shoreline in that area. The second was installed roughly parallel to the first on the Dan Beebe Trail, which runs just uphill of the Kelly Ridge Trail. In hopes of preventing detection and theft of the counters, they were installed on the ground rather than in trees (as with previous installations) and camouflaged with rocks.

All counters were removed from the field in early September 2003.

4.1.5.3 Trail Counter Losses and Relocations

The counter placed on the Brad Freeman Trail near Burma Road was stolen in February 2003. The counter was replaced in early March but was stolen again in May 2003.

The counter near the Tres Vias Road TA of the Brad Freeman Trail was affected by a heavy infestation of ants on the tree in which it was mounted. After attempts to eradicate the ants and keep them off the counter lens were not successful, the counter was moved to a ground installation near the trailhead gate, about 1,000 feet away. (There were no other trees available in which to mount the counter.)

During late May 2003, the batteries were stolen from the counter installed near the Lakeland Boulevard TA of the Dan Beebe Trail. This did not cause loss of any previously recorded data, but the counter was removed from the field at that time and not reinstalled at that location.

4.1.5.4 Data Recorded by the Trail Counters

Each counter was programmed to record both the total number of crossings of the counter's infrared beam each hour, and the number of count "events," each of which corresponds to crossings that occur within a preset number of seconds of each other. For example, as the counters were programmed, five hikers who crossed the counter within 15 seconds of each other would be recorded as a single "event." Each "event" represents one user group. Any counts that were generated outside the 15-second lockout time would initiate another "event" count. The data do not indicate the number of users in a group, but only show how many separate groups have crossed the counter in the hour.

Early in the data collection period, data were downloaded from the counters every few weeks. Later, downloads occurred on a monthly basis.

4.2 ESTIMATING EXISTING USE

Several methods were employed to estimate existing use, depending on the data available for each site. Estimated existing use was calculated for the primary recreation season from May 15, 2002, to September 15, 2002, and for the off-season from September 16, 2002, to May 14, 2003. For each site during each season, the total number of recreation days was subdivided into weekday and weekend use. One recreation day (RD) represents participation in recreation at a site during a single day by one person for any length of time. Existing recreation use is estimated in RDs to conform to FERC's preference in recreation measurement units.

4.2.1 Use Estimates for Recreation Sites with Usable Traffic Counter Data

Estimating existing use at sites with usable traffic counter data was a two-step process of reviewing and revising the daily traffic counter data, then developing estimates of the number of people per vehicle (PPV). At many sites, different PPV values were developed for the recreation season and the off-season, and for weekdays and weekend days. Multiplying the number of entering vehicles by the calculated PPV value produced the daily RD estimate for each site.

4.2.1.1 Revisions to Traffic Counter Data

Traffic counter data were incomplete for some sites, with data gaps ranging in duration from one week to two months. These data gaps were filled by using average vehicle counts based on available counts for the periods immediately preceding and following the time period for which data was missing.

Counter values for sites where both entering and exiting vehicles were counted were divided by two to arrive at a figure for vehicles entering. For the few sites with counters at each of two entrances, the daily totals for the two counters were summed and then divided by two to produce a total number of entering vehicles.

The traffic counters were not generally programmed with a sufficient delay to prevent vehicles pulling trailers from being double-counted. This was a substantial source of error, particularly for sites with boat ramps, since many visitors brought boats with trailers to those sites. To adjust for this error, the total number of vehicles pulling trailers was estimated based on observational data and professional judgment, and the daily count total was reduced by half this amount. Table 4.2-1 lists the traffic counters, the error associated with each counter and the adjustments made to the counter data to correct for errors.

An additional adjustment was made to deduct the estimated percentage of traffic that was non-recreational vehicles from the calculated total. Non-recreational vehicles include DWR or DPR vehicles, other State or local government vehicles, and delivery or other work vehicles. Vehicle counts were reduced by 1 percent, 5 percent, or 10 percent, based on past DWR estimates, observational data, and professional judgment, to remove this traffic from the recreation use estimates.

The result of the above revisions and adjustments was an estimate of monthly total number of vehicles entering each site for each month in the year-long period described previously.

4.2.1.2 People-per-Vehicle Estimates

PPV estimates for most sites were determined from observations completed at DWR traffic counter locations during August and September 2002. Observers recorded the number of people in each vehicle entering over two four-hour periods, one on a weekday and one on a weekend. Average PPV was calculated and adjusted according to professional judgment for the recreation season and the off-season, and for weekdays and weekends. At sites where these observations were not done, PPV values used by DPR in its attendance calculations were used. For some low-use sites, too few vehicles were observed to obtain useful PPV data, or an unusually high number of non-recreation vehicles were observed. In these cases, survey data on group size and professional judgment were used to calculate PPV. Groups of five or less were averaged (assuming no more than five people in one vehicle) to determine a PPV number.

4.2.1.3 Use Estimates for Recreation Site Complexes with a Single Traffic Counter (Bidwell Canyon, Loafer Creek, and Oroville Dam/Spillway)

At Bidwell Canyon, the traffic counter counts all of the vehicles entering the Bidwell Canyon complex, but visitors could be going to the campground, marina, boat ramp, or day use area. Because boat launching is the dominant use in the area, the PPV numbers developed for the boat ramp were used to produce total RDs for the Bidwell Canyon complex. Campground RDs were calculated and subtracted from the complex's RD total, leaving the remainder as the number of RDs for the boat ramp, day use area, and marina. It was not possible to determine more site-specific RDs for the boat ramp, day use area, and marina because these three sites are directly adjacent to each other and share a large parking area.

Table 4.2-1. Adjustments made to traffic counter data to counter observed counting errors.

Traffic Counter Location	Traffic direction counted	Counting Errors Observed	Adjustments to Counter Data Required
Lake Oroville			
Bidwell Canyon Rec. Area	IN	Double counted vehicles with trailers	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (40 to 60%).
Oroville Dam	IN	Double counted vehicles with trailers	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (20 to 35%).
Lime Saddle	IN	Double counted vehicles with trailers; some exiting vehicles cross over loop	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (50 to 60%).
Loafer Creek Rec. Area	IN	Double counted vehicles with trailers	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (20 to 30%).
Enterprise Boat Ramp	IN	Exiting traffic passing down center of lane are counted (those staying to right are not counted); slow exit or stopping over loop during exit caused double counts; double counted trailers	DATA NOT USED – Unable to predict the number of exiting vehicles being counted (depends on how they exit area). Data for site was obtained from observational data.
Nelson Bar Car-top ramp	IN	Outgoing traffic passing near center of road is also counted, location of counter near restroom may also affect count; double counted trailers	DATA NOT USED – Appeared that many outgoing vehicles pass toward center of unmarked road and are counted, but could not determine percentage at time of observations. Data for site was obtained from observational data.
Dark Canyon Car-top ramp	OUT	Incoming vehicles are counted if cross over center line and touch loop, double counted trailers	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (50%).
Foreman Creek Car-top ramp	IN & OUT	Vehicles exiting to extreme far right of lane not counted; double counted vehicles with trailers	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (25 to 35%).
Vinton Gulch Car-top ramp	OUT	Incoming traffic that enters down center of gravel road is also counted, double counted trailers	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (10%).
Stringtown Car-top ramp	OUT	Incoming traffic that travel down center of road is also counted, double counted trailers, doesn't count traffic that parks in the parking lot above counter	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (25 to 30%).
Diversion Pool and Feather River			
Diversion Pool DUA	IN & OUT	Double counted trailers (small portion of traffic), doesn't count traffic that parks near the gate	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (5 to 10%).
Fish Hatchery (2 counters)	IN	Double counted vehicles with trailers (insignificant portion of traffic)	Use data as is (assume no trailers).
Thermalito Forebay			
North Forebay DUA and Aquatic Center	IN	incoming traffic crossing "stem" of counter loop is not counted, double counted trailers	DATA NOT USED – Unable to predict the number of vehicles not being counted. Used DPR traffic counter instead.

Table 4.2-1 (continued). Adjustments made to traffic counter data to counter observed counting errors.

Traffic Counter Location	Traffic direction counted	Counting Errors Observed	Adjustments to Counter Data Required
South Forebay DUA and Boat Ramp	IN	Slower moving incoming traffic is not counted; some entering traffic may miss loop (removal of median has altered traffic flow since 2002 observations), double counted trailers	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (15 to 20%).
Thermalito Afterbay			
Wilbur Rd BR (2 counters)	IN & OUT	At Hwy 162 entrance, vehicles entering or exiting very slowly were not counted, double counted trailers on both sides	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (80%).
Monument Hill Boat Ramp & DUA	IN & OUT	It is possible for exiting vehicles to miss the counter loop (loop extends only part way across lane, lane has been widened), double counted trailers	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (40 to 50%).
Larkin Road Car-top ramp	IN & OUT	It is possible for both entering and exiting vehicles to miss the counter loop (5-6 foot gap between loop and curb on each side), double counted trailers	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (50%).
Oroville Wildlife Area			
Headquarters entrance	IN & OUT	Double counted vehicles with trailers (insignificant portion of traffic)	Use data as is (assume no trailers)
Afterbay outlet entrance	IN & OUT	Double counted vehicles with trailers	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (10 to 15%)
Palm Ave entrance	IN & OUT	Double counted vehicles with trailers	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (15%)
Vance Road entrance	IN & OUT	Some vehicles exiting to far right of lane not counted; double counted vehicles with trailers	Subtract from count based on best estimate of the percentage of entering vehicles with trailers (15%)
Hwy 70 entrance	IN & OUT	Double counted trailers (insignificant portion of traffic)	Use data as is (assume no trailers)
Pacific Heights Road entrance	IN	Due to a pothole near the counter, some incoming traffic enters on the left side of the gravel road and misses counter; exiting traffic counted if exit down center of road; double counted vehicles with trailers (insignificant portion of traffic)	Use data as is (assume no trailers)

Note: The percentage adjustments for double counting consisted of one half of the best estimated percentage of vehicles with trailers entering site, which removes the over count due to trailers but retains the count of the tow vehicles . Where no adjustment is mentioned related to other observed errors, the errors were regarded as minor and no adjustment was made.
Source: EDAW, Inc. 2003.

The method for calculating RDs was similar for Loafer Creek: the traffic counter counted all of the vehicles entering the complex, each of which could go to the boat ramp, day use area, campground, group campground, or equestrian campground. Once again, the PPV number estimated for the boat ramp (from recreation visitor on-site survey data) was used for the entire complex. RDs for the three campgrounds were combined and subtracted from the RDs for the complex, leaving the remaining RDs for the boat ramp and DUA.

Recreation days for the Loafer Creek BR and Loafer Creek DUA were calculated separately. The day use area at this site is much more popular than the day use area at Bidwell Canyon, as it is the only formal swimming location on Lake Oroville and geographically separate from the boat ramp. Professional judgment was used to apportion RDs to the boat ramp and the day use area, taking into account when the day use area was available for swimming and when the boat ramp was open for launching. Once the boat ramp was closed, a higher percentage of use shifted to the day use area. (The swimming beach was also unusable, so use was probably composed of trail users, picnickers, bank fishermen, and a significant amount of sightseeing traffic.)

The Oroville Dam traffic counter counted all vehicles crossing the dam, including those that would continue on to Spillway BR/DUA. A percentage of the Oroville Dam total vehicle count for each month was subtracted for Spillway BR/DUA, based on professional judgment and comparison of observational data and counter data. The period when the boat ramp was closed (because of low water) was also taken into account.

4.2.2 Use Estimates for Sites with No Traffic Counters or Unusable Counter Data

For sites with no traffic counters or those with unusable traffic counter data (see Section 4.1.1), observational data were used to estimate existing use. Observations of the number of vehicles present were grouped into three time periods: observations made from 8 a.m. to noon, noon to 4 p.m., and after 4 p.m. Assuming an average turnover time of 4 hours, the number of vehicles counted during each time period was averaged, and the averages summed to develop a total daily vehicle count. Professional judgment was used to adjust this number for weekdays and weekends in the recreation season and the off-season. To calculate RDs, the total daily number of vehicles was multiplied by PPV for weekdays and weekends in the two seasons, and adjusted with input from counter calibration data, survey data, and professional judgment.

At the North Forebay DUA, data from a DPR traffic counter were used along with DPR fee payment information to determine RDs. Data collected by DPR were also used to estimate use at the Lake Oroville Visitors Center. Vehicle counts as well as the number and size of visitor groups (large school groups are common) were recorded by DPR.

In instances where group size was not recorded, an average group size of 35 was used, based on a recommendation from DPR (pers. comm., Hofer 2003). RDs at the Lake Oroville Visitors Center were estimated by multiplying the number of vehicles by the PPV value that DPR uses and adding the total number of people from the groups that toured the center. The DPR PPV value was used because no survey or observational data were available from this site.

4.2.3 Campground Use

The starting point for campground use estimates was daily DPR data on campsite occupancy. For each day in the recreation season and the off-season, the number of campsites occupied was multiplied by the average number of campers per site to obtain a RD estimate. All calculations were based on a subdivision of the data into weekend and weekday data.

The average number of campers per site was calculated from campers' on-site survey responses on group size. All respondents with a group size of eight or less (the maximum number of people allowed at one site) were used in this calculation. Adjustments to these averages were made based on professional judgment. At the group campgrounds, DPR data on the total number of people at the group campground were used when available. Otherwise, an average group size of 15 was used; based on a recommendation from DPR staff familiar with the facilities' use (pers. comm., Hofer 2003).

4.3 EXISTING USE BY ACTIVITY

After existing-use estimates were developed for all the Study Area recreation sites, those results were further categorized by activity. Activities used for this analysis included bank fishing, boating, camping, sightseeing, hunting, ORV use, picnicking, shooting, swimming, trail use, and "other." By reviewing observational data about the number of people participating in each activity and the number of vehicles with boat trailers (representing boaters who were generally not on-site to be counted), estimates were made about the percentage of use at each site for each activity. Professional judgment and informal observations made over the course of the field data collection period were used where necessary.

Campground use was considered to be 100 percent camping activity, although it is acknowledged that campers may engage in other activities like boating, fishing, and trail use. Similarly, use measured at trailheads was considered to be 100 percent trail use, although visitors using trails and trailheads may also engage in activities such as bank fishing or picnicking. There was not enough information to further break down trail use into different types such as biking, horseback riding, or hiking.

4.4 PEOPLE-AT-ONE-TIME

Both non-holiday and holiday PAOT estimates were calculated. Estimates of PAOT were made based on instantaneous counts throughout the year. The mean number of PAOT and the maximum number of PAOT observed at selected recreation sites are reported for both weekdays and weekends during the recreation season and the off-season. Observational data were used to make the PAOT calculations. Although data were collected at several times of the day, only the peak use periods were used for PAOT calculations. For most sites, the peak use was early to mid-afternoon (about 12pm to 4pm), however at some sites there was equally high use during the morning period (8am to 12pm).

PAOT was calculated only at those sites that provide day-use opportunities and where an accurate number of people at the site could be counted; access points or places of dispersed use were not included. The sites for which PAOT was not calculated include campgrounds; trailhead accesses; boat ramps with very little use other than boat launching (e.g., Spillway, Wilbur Road, Bidwell Canyon, Loafer Creek, and Lime Saddle); and sites where use is very dispersed or the site is so large that the number of people at the site could not be counted accurately (e.g., South OWA West Levee Road, South OWA East Levee Road, OWA Headquarters Entrance, and Clay Pit SVRA). Table 4.4-1 lists those sites that were included and excluded.

4.5 VEHICLES-AT-ONE-TIME

Both non-holiday and holiday VAOT were calculated. Estimates of VAOT were made based on instantaneous counts during both the recreation season and off-season. The average and maximum number of VAOT observed at recreation sites are reported for both weekdays and weekends during the recreation season and off-season. Reported VAOT numbers are for the total number of vehicles at the site, including vehicles with trailers and RVs. Observational data were used to make the VAOT calculations. Although data were collected at several times of the day, only the peak use periods were used for VAOT calculations. For most sites, the peak use was early to mid-afternoon (about 12pm to 4pm), although at some sites, there was equally high use during the morning period (8am to 12pm). VAOT was calculated for all sites except the Lake Oroville Visitors Center and dispersed use sites.

Table 4.4-1. Sites included and excluded from PAOT calculations.

Included Sites	Excluded Sites
Loafer Creek DUA	Bidwell Canyon BR/DUA/Marina
Dark Canyon Car-top BR	Bidwell Canyon Campground
Vinton Gulch Car-top BR	Loafer Creek BR
Nelson Bar Car-top BR	Loafer Creek Campground, Group Campground, and Equestrian Campground
Foreman Creek Car-top BR	Lime Saddle Campground and Group Campground
Stringtown Car-top BR	Lime Saddle BR/DUA/Marina
Enterprise BR	Spillway BR/DUA
Oroville Dam/Overlook DUA	Saddle Dam TA
Diversion Pool DUA	Lake Oroville Visitors Center
North Thermalito Forebay BR/DUA	Wilbur Road BR
South Thermalito Forebay BR/DUA	East Hamilton Road TA
Monument Hill BR/DUA	South OWA West Levee Road
Larkin Road Car-top BR	South OWA East Levee Road
Riverbend Park	OWA—Headquarters Entrance
Feather River Fish Hatchery	Lakeland Boulevard TA
OWA—Thermalito Afterbay Outlet	Powerhouse Road TA
Rabe Road Shooting Range	Clay Pit SVRA

Source: EDAW, Inc. 2003.

4.6 CAMPGROUND OCCUPANCY

Campground occupancy was calculated based on the DPR campground information. The number of sites occupied was divided by the total number of sites at the campground to obtain the percent occupancy. Weekday and weekend percent occupancy for each campground was calculated for the recreation season, the off-season, and for each month. For this purpose, weekdays included Sunday through Thursday, and weekends included Friday, Saturday, and holidays. Sundays are not included in the weekend counts as most people camp on Friday and Saturday nights and return home on Sunday. The number of 100 percent occupancy days was also calculated for each campground.

4.7 TRAIL USE

Trail usage for ten segments of the Oroville-area trail system where counters were installed was summarized by month. The data contained hourly counts of both individuals and groups passing the counter location. Trail use data were obtained for three to six month periods at each of the ten sites (Figure 4.1-1). The analysis focused exclusively on data for the 12 hours between 6 a.m. and 6 p.m.

5.0 RESULTS AND DISCUSSION

This section provides compiled data on existing use including visitation, activities that occur at each site, people-at-one-time (PAOT), vehicles-at-one-time (VAOT), campground occupancy, and trail use. Visitation data is discussed for the entire study area and for specific geographic areas; for weekdays and weekends; and for the recreation season (May 15, 2002, through September 15, 2002) and the off-season (September 16, 2002, through May 14, 2003). Estimates of use by activity, estimates of recreation days (RDs) per activity, overall summaries of activities for each area, and top locations for participation in each activity are included. PAOT and VAOT are discussed for both holidays and non-holidays. Campground occupancy rates are discussed for all six campgrounds, as well as the number of days maximum capacity was reached at each campground. The total and average numbers of users on several trail segments are reported for part of 2002 and part of 2003.

5.1 VISITATION

Existing use was estimated for both weekdays and weekends for two seasons: the recreation season and the off-season. The recreation season was from May 15, 2002, to September 15, 2002. The off-season was from September 16, 2002, to May 14, 2003. Visitation is reported in RDs. An RD consists of a visit by one person to a recreation area for any portion of a single day. Visitation is discussed first for the entire study area and then by geographic area: Lake Oroville, Diversion Pool, Thermalito Forebay, Thermalito Afterbay, OWA, and additional sites.

It is important to note that visitation at several Lake Oroville sites was probably affected by low water conditions on the reservoir during much of the 2002 recreation season. Compared to pool levels during the previous 12 years (1990 to 2001), the reservoir elevation was approximately 20 to 50 feet below average through most of that summer. By mid-summer, use of several boating and swimming facilities was impaired and some facilities were unusable. The pool level returned to full-pool by May, 2003 as the data collection period for this study ended.

5.1.1 Study Area

There were a total of about 1.73 million RDs in the study area between May 15, 2002, and May 14, 2003 (Table 5.1-1). Use was split between the four-month recreation season and the eight-month off-season; 56 percent of use occurred in the recreation season (960,000 RDs) and 44 percent of use occurred in the off-season (768,000 RDs). In total, there was more weekday use than weekend use in both seasons. In the recreation season, 59 percent of use occurred on the weekdays (565,000 RDs) and 41 percent occurred on the weekends (395,000 RDs). In the off-season, 64 percent of use

Table 5.1-1. Visitation (recreation days) in the Oroville Facilities study area.[1]

Area	Recreation season			Off-season			Combined Seasons Total (Daily Avg.)
	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	
Lake Oroville	314,063 (3,739)	204,409 (5,110)	518,472 (4,181)	256,692 (1,484)	136,019 (2,000)	392,711 (1,630)	911,183 (2,496)
Bidwell Canyon Complex	83,606 (995)	49,759 (1,244)	133,365 (1,076)	58,100 (336)	26,244 (386)	84,344 (350)	217,709 (596)
Loafer Creek Complex	34,108 (406)	29,633 (741)	63,741 (514)	18,346 (106)	7,457 (110)	25,803 (107)	89,544 (245)
Lime Saddle Complex	71,824 (855)	41,212 (1,030)	113,036 (912)	32,417 (187)	16,767 (247)	49,184 (204)	162,220 (444)
Diversion Pool	4,312 (51)	2,743 (69)	7,055 (57)	8,251 (48)	5,297 (78)	13,548 (56)	20,603 (56)
Thermalito Forebay	37,113 (442)	41,124 (1,028)	78,237 (631)	36,722 (212)	20,761 (305)	57,483 (239)	135,720 (372)
Thermalito Afterbay	33,501 (399)	28,333 (708)	61,834 (499)	19,554 (113)	11,980 (176)	31,534 (131)	93,368 (256)
Oroville Wildlife Area	110,483 (1,315)	80,635 (2,016)	191,118 (1,541)	73,974 (428)	53,370 (785)	127,344 (528)	318,462 (872)
Additional Sites within FERC boundary	47,518 (566)	25,412 (635)	72,930 (588)	72,940 (422)	33,335 (490)	106,275 (441)	179,205 (491)
Feather River Fish Hatchery	44,478 (530)	21,412 (535)	65,890 (531)	68,320 (395)	26,185 (385)	94,505 (392)	160,395 (439)
Dispersed Use Sites[2]	3,040 (36)	4,000 (100)	7,040 (57)	4,620 (27)	7,150 (105)	11,770 (49)	18,810 (52)
Additional Sites Outside FERC boundary	17,835 (212)	12,293 (307)	30,128 (243)	22,636 (131)	16,381 (241)	39,017 (162)	69,145 (189)
Total for Study Area	**564,825 (6,724)**	**394,949 (9,874)**	**959,774 (7,740)**	**490,769 (2,837)**	**277,143 (4,076)**	**767,912 (3,186)**	**1,727,686 (4,733)**

[1] *These calculated values are rounded when reported in the text to avoid conveying unwarranted precision.*
[2] *Dispersed sites include: Old Nelson Bar, Parrish Cove, Nelson Avenue Bridge over Thermalito Forebay, Highway 162 Overlook, Canyon Creek Bridge, South Wilbur Road TA, Tres Vias Road TA, and Toland Road TA. Also included in these totals are "other dispersed use sites" which includes any dispersed use occurring within the study area at sites other than those that are known dispersed sites.*
Sources: DPR 2003; DWR 2003; EDAW, Inc. 2003.

occurred on weekdays (490,808 RDs) and 36 percent occurred on weekends (277,000 RDs).

Lake Oroville had the highest daily average number of RDs in both seasons (recreation season: 4,181; off-season: 1,630) and dispersed use sites (within the FERC boundary) had the lowest (recreation season: 57; off-season: 49). All sites had higher daily averages in the recreation season than in the off-season and most had higher daily averages on weekends than on weekdays.

5.1.2 Lake Oroville

Most of the existing recreational use in the study area occurred in the Lake Oroville area. This area includes all recreational sites at the reservoir, including three of the main use areas—the Bidwell Canyon complex, the Loafer Creek complex, and the Lime Saddle complex. These three sites encompass the campgrounds and marinas and some of the major boat ramps in the study area. The Lake Oroville Visitors Center and Spillway BR/DUA are also included in the Lake Oroville area and receive a large amount of use.

Reported study period RDs at Lake Oroville sites are shown in Table 5.1-2. The Bidwell Canyon complex, consisting of the BR/DUA/Marina and campground, received the highest amount of use, about 24 percent of the total use at Lake Oroville sites. The Bidwell Canyon BR/DUA/Marina contributed about 90 percent of the complex's total use and was the Lake Oroville site with the greatest amount of use. The high number of houseboats moored at the marina also contributed to the high amount of use at this complex. The site with the second largest amount of use was Oroville Dam/Overlook DUA, which received an estimated 189,765 RDs over the recreation season and off-season. The dam was popular for walkers and for sightseers who drove across the dam and back. The Lime Saddle complex is third in terms of existing use with the BR/DUA/Marina contributing about 95 percent of the total use at the complex.

The Lake Oroville Visitors Center is fourth in terms of use, with an estimated 93,553 RDs over the recreation season and off-season. The visitors center was a popular place for large groups to visit, including many school groups, which contributed to its high estimated use. Spillway BR/DUA also received a large amount of use with an estimated 80,516 RDs over the two seasons. The car-top boat ramps had an estimated combined total of 63,748 RDs over the two seasons. Nelson Bar Car-top BR had the most use followed by Foreman Creek Car-top BR. Among car-top boat ramps, Dark Canyon and Vinton Gulch Car-top BRs had the lowest use. The sites with the least amount of use at Lake Oroville were the Lime Saddle Group Campground, which was closed for the entire off-season; Loafer Creek Equestrian Campground; and Saddle Dam TA.

Generally, more use occurred around Lake Oroville during the four-month recreation season than in the remainder of the year (off-season). In total, 57 percent of use at

Lake Oroville sites occurred during the recreation season and 43 percent occurred during the off-season. There were some exceptional sites that received more off-season use than recreation season use: Loafer Creek DUA, Oroville Dam, Vinton Gulch Car-top BR, Saddle Dam TA, and the Lake Oroville Visitors Center. Over the course of the two seasons, Loafer Creek DUA was not usable for swimming, but it did become usable in late April 2002, which increased use at this site.

Oroville Dam had sightseeing traffic year-round, and it is understandable that this site would have more use during the eight month off-season than during the recreation season. Because use at Vinton Gulch is dependent on high reservoir levels, much of the use occurred in the spring when the reservoir is higher, leading to higher use in the off-season than in the recreation season. Saddle Dam TA is a site used mainly by equestrians; at Lake Oroville it is very hot in the summer, typically resulting in decreased trail use. During the fall and spring the weather is cooler, making it more conducive to horse riding, and therefore use increased at Saddle Dam TA in the off-season. Lake Oroville Visitors Center received more use during the off-season because of the frequency of tours by school groups.

In general, use at Lake Oroville sites was cumulatively higher for weekdays than weekends. It should be noted that weekday use includes five days of potential use, compared to two potential use days on weekends. Average weekday and weekend use may therefore be better suited for comparing visitor activity on weekends and weekdays. Saddle Dam TA and Enterprise BR had slightly higher total use numbers for weekends than for weekdays, because the use at these sites is primarily on the weekends.

In terms of the daily average number of recreation days, Lake Oroville sites tended to have much higher daily averages in the recreation season than in the off-season (Table 5.1-3). During the recreation season, daily averages at sites ranged between 7 RDs (Lime Saddle Group Campground and Saddle Dam TA) and 945 RDs (Bidwell BR/DUA/Marina). Off-season daily averages at sites ranged between 2 RDs (Loafer Creek Group Campground) and 436 RDs (Oroville Dam/Overlook DUA). Generally, Lake Oroville sites also had higher weekend daily averages than weekend averages.

Table 5.1-2. Estimated total use (recreation days) at Lake Oroville sites.

Lake Oroville Site	Recreation season			Off-season			Combined Seasons Total
	Weekday Total	Weekend Total	Season Total	Weekday Total	Weekend Total	Season Total	
Bidwell Canyon Complex	83,606	49,759	133,365	58,100	26,244	84,344	217,709
Bidwell Canyon BR/DUA/Marina	73,886	43,323	117,209	53,981	24,267	78,248	195,457
Bidwell Canyon Campground	9,720	6,436	16,156	4,119	1,977	6,096	22,252
Loafer Creek Complex	34,108	29,633	63,741	18,346	7,457	25,803	89,544
Loafer Creek BR	13,393	11,767	25,160	2,876	1,210	4,086	29,246
Loafer Creek DUA	5,780	5,271	11,051	13,166	4,804	17,970	29,021
Loafer Creek Campground	11,085	9,983	21,068	1,545	918	2,463	23,531
Loafer Creek Group Campground	3,300	2,145	5,445	225	150	375	5,820
Loafer Creek Equestrian Campground	550	467	1,017	534	375	909	1,926
Lime Saddle Complex	71,824	41,212	113,036	32,417	16,767	49,184	162,220
Lime Saddle Campground	3,160	2,680	5,840	1,221	699	1,920	7,760
Lime Saddle Group Campground	495	425	920	—*	—	—	920
Lime Saddle BR/DUA/Marina	68,169	38,107	106,276	31,196	16,068	47,264	153,540
Spillway BR/DUA	19,490	21,528	41,018	20,879	18,619	39,498	80,516
Oroville Dam/Overlook DUA	58,469	26,310	84,779	71,192	33,794	104,986	189,765
Foreman Creek Car-top BR	4,977	3,680	8,657	3,793	1,963	5,756	14,413
Dark Canyon Car-top BR	2,407	1,861	4,268	1,547	1,194	2,741	7,009
Vinton Gulch Car-top BR	1,959	1,268	3,227	1,921	1,585	3,506	6,733
Nelson Bar Car-top BR	8,400	6,000	14,400	6,488	3,060	9,548	23,948
Stringtown Car-top BR	4,200	4,410	8,610	1,672	1,363	3,035	11,645
Saddle Dam TA	420	500	920	1,730	2,040	3,770	4,690
Enterprise BR	2,100	4,000	6,100	1,298	2,040	3,338	9,438
Lake Oroville Visitors Center	22,103	14,248	36,351	37,309	19,893	57,202	93,553
Total	*314,063*	*204,409*	*518,472*	*256,692*	*136,019*	*392,711*	*911,183*

** This site was closed during the off-season.*
Note: Recreation season is from May 15, 2002, to September 15, 2002, and off-season is from September 16, 2002, to May 14, 2003. Weekends include holiday use. Car-top boat ramps and Enterprise BR include the shoreline area around the boat ramp, not just the boat ramp. All values are in recreation days (RD's).
Sources: DPR 2003; DWR 2003; EDAW, Inc. 2003.

Table 5.1-3. Estimated daily average use (recreation days) at Lake Oroville sites.

Lake Oroville Site	Recreation season			Off-season			Combined Seasons Daily Avg.
	Weekday Daily Avg.	Weekend Daily Avg.	Season Daily Avg.	Weekday Daily Avg.	Weekend Daily Avg.	Season Daily Avg.	
Bidwell Canyon Complex	995	1,244	1,076	336	386	350	596
Bidwell Canyon BR/DUA/Marina	880	1,083	945	312	357	325	535
Bidwell Canyon Campground	116	161	130	24	29	25	61
Loafer Creek Complex	406	741	514	106	110	107	245
Loafer Creek BR	159	294	203	17	18	17	80
Loafer Creek DUA	69	132	89	76	71	75	80
Loafer Creek Campground	132	250	170	9	14	10	64
Loafer Creek Group Campground	39	54	44	1	2	2	16
Loafer Creek Equestrian Campground	7	12	8	3	6	4	5
Lime Saddle Complex	855	1,030	912	187	247	204	444
Lime Saddle Campground	38	67	47	7	10	8	21
Lime Saddle Group Campground	6	11	7	—*	—	—	3
Lime Saddle BR/DUA/Marina	812	953	857	180	236	196	421
Spillway BR/DUA	232	538	331	121	274	164	221
Oroville Dam/Overlook DUA	696	658	684	412	497	436	520
Foreman Creek Car-top BR	59	92	70	22	29	24	39
Dark Canyon Car-top BR	29	47	34	9	18	11	19
Vinton Gulch Car-top BR	23	32	26	11	23	15	18
Nelson Bar Car-top BR	100	150	116	38	45	40	66
Stringtown Car-top BR	50	110	69	10	20	13	32
Saddle Dam TA	5	13	7	10	30	16	13
Enterprise BR	25	100	49	8	30	14	26
Lake Oroville Visitors Center	263	356	293	216	293	237	256
Total	*3,739*	*5,110*	*4,181*	*1,484*	*2,000*	*1,630*	*2,496*

** This site was closed during the off-season.*
Note: Recreation season is from May 15, 2002, to September 15, 2002, and off-season is from September 16, 2002, to May 14, 2003. Weekends include holiday use. Car-top boat ramps and Enterprise BR include the shoreline area around the boat ramp, not just the boat ramp. All values are in recreation days (RDs).
Sources: DPR 2003; DWR 2003; EDAW, Inc. 2003.

5.1.3 Diversion Pool

Sites located around the Diversion Pool include the Diversion Pool DUA, which is the area around Burma Road; Lakeland Boulevard TA; and Powerhouse Road TA. The Diversion Pool DUA made up most of the use at this site.

The existing use for sites located around the Diversion Pool is included in Table 5.1-4. The Diversion Pool DUA had the highest use of the three sites, with about three times as much use as the other two sites combined with an estimated 14,571 RDs (a daily average of 40 RDs) over the recreation season and off-season. About 34 percent of the total use occurred during the recreation season, whereas 66 percent of total use took place during the off-season. At the Diversion Pool DUA and the Powerhouse Road TA, there was greater cumulative use during weekdays than weekend days. At Lakeland Boulevard TA, there was slightly more total weekend use than weekday use. At the Diversion Pool DUA, the daily average number of RDs was higher in the recreation season than in the off-season. At Lakeland Boulevard TA and Powerhouse Road TA, the daily average number of RDs was higher in the off-season than in the recreation season.

Table 5.1-4. Existing use at Diversion Pool sites.

Site	Recreation season			Off-season			Combined Seasons Total (Daily Avg.)
	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	
Diversion Pool DUA	3,682 (44)	2,143 (54)	5,825 (47)	5,829 (34)	2,917 (43)	8,746 (36)	14,571 (40)
Lakeland Boulevard TA	420 (5)	500 (13)	920 (7)	1,384 (8)	1,700 (25)	3,084 (13)	4,004 (11)
Powerhouse Road TA	210 (3)	100 (3)	310 (3)	1,038 (6)	680 (10)	1,718 (7)	2,028 (6)
Total	*4,312 (51)*	*2,743 (69)*	*7,055 (57)*	*8,251 (48)*	*5,297 (78)*	*13,548 (56)*	*20,603 (56)*

Note: Recreation season is from May 15, 2002, to September 15, 2002, and off-season is from September 16, 2002, to May 14, 2003. Weekends include holiday use. All values are in recreation days (RDs).
Sources: DWR 2003; EDAW, Inc. 2003.

5.1.4 Thermalito Forebay

There are two recreation sites at the Thermalito Forebay: one at the north end and one at the south end. Of the total use at the Forebay, the North Thermalito Forebay BR/DUA accounted for a little more than 60 percent of use, with an estimated 86,065 RDs (average of 236 RDs per day) over the two seasons (Table 5.1-5). The South

Thermalito Forebay BR/DUA had an estimated 49,655 RDs (average of 136 RDs per day) over the two seasons. There was more estimated use during the recreation season than during the off-season at both sites. About 58 percent of the total use at the Forebay was in the recreation season and 42 percent was in the off-season. At both sites, there was more total use on the weekdays than on the weekends, except during the recreation season at the North Thermalito Forebay BR/DUA. This is probably because of the extremely large amount of use this site received on weekends and holidays (which are included in weekend use). This is reflected in the daily average number of RDs on recreation season weekends (700), which is more than three times larger than the daily average for recreation season weekdays (217). Large groups tend to picnic at this site, and swimming is also available; both factors contribute to this site's high weekend use. At both Forebay sites, the daily RD average was higher in the recreation season and on weekends than in the off-season or on weekdays.

Table 5.1-5. Existing use (RDs) at Thermalito Forebay sites.

Site	Recreation season			Off-season			Combined Seasons Total (Daily Avg.)
	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	
North Thermalito Forebay BR/DUA	18,228 (217)	27,987 (700)	46,215 (373)	26,728 (154)	13,122 (193)	39,850 (165)	86,065 (236)
South Thermalito Forebay BR/DUA	18,885 (225)	13,137 (328)	32,022 (258)	9,994 (58)	7,639 (112)	17,633 (73)	49,655 (136)
Total	*37,113 (442)*	*41,124 (1,028)*	*78,237 (631)*	*36,722 (212)*	*20,761 (305)*	*57,483 (239)*	*135,720 (372)*

Note: Recreation season is from May 15, 2002, to September 15, 2002, and off-season is from September 16, 2002, to May 14, 2003. Weekends include holiday use. All values are in recreation days (RDs).
Sources: DPR 2003; DWR 2003; EDAW, Inc. 2003.

5.1.5 Thermalito Afterbay

There are four recreation sites located around Thermalito Afterbay: Wilbur Road BR, Monument Hill BR/DUA, Larkin Road Car-top BR, and East Hamilton Road TA. Of these sites, Monument Hill BR/DUA contributed about 60 percent of the total use at the Afterbay throughout both seasons, with an estimated 56,767 RDs (average 167 RDs per day) over the two seasons (Table 5.1-6). Larkin Road Car-top BR contributed about 25 percent of total use at the Afterbay and Wilbur Road BR contributed about 13 percent. The East Hamilton Road TA had extremely low use, less than one percent of the total use at Thermalito Afterbay. Three of the four sites had more use in the

recreation season than in the off-season; the recreation season received about 66 percent of the total use whereas the off-season received about 34 percent of total use. East Hamilton Road TA had more use in the off-season than in the recreation season. At all four sites, the weekday estimated use totals were higher than the weekend totals. The daily average number of recreation days was higher in the recreation season and on weekends than in the off-season and on weekdays for Wilbur Road BR, Monument Hill BR/DUA, and Larkin Road Car-top BR. East Hamilton Road TA had slightly higher daily averages in the off-season than in the recreation season.

Table 5.1-6. Existing use (recreation days) at Thermalito Afterbay sites.

Site	Recreation season			Off-season			Combined Seasons Total (Daily Avg.)
	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	
Wilbur Road BR	4,220 (50)	3,681 (92)	7,901 (64)	3,027 (17)	1,709 (25)	4,736 (20)	12,637 (35)
Monument Hill BR/DUA	20,984 (250)	16,889 (422)	37,873 (305)	11,880 (69)	7,014 (103)	18,894 (78)	56,767 (156)
Larkin Road Car-top BR	8,192 (98)	7,663 (192)	15,855 (128)	4,301 (25)	2,917 (43)	7,218 (30)	23,073 (63)
East Hamilton Road TA	105 (1)	100 (3)	205 (2)	346 (2)	340 (5)	686 (3)	891 (2)
Total	*33,501 (399)*	*28,333 (708)*	*61,834 (499)*	*19,554 (113)*	*11,980 (176)*	*31,534 (131)*	*93,368 (256)*

Note: Recreation season is from May 15, 2002, to September 15, 2002, and off-season is from September 16, 2002, to May 14, 2003. Weekends include holiday use. Larkin Road Car-top BR and Wilbur Road BR include the shoreline area around the boat ramp, not just the boat ramp. All values are in recreation days (RDs).
Sources: DWR 2003; EDAW, Inc. 2003.

5.1.6 Oroville Wildlife Area

The OWA is a large area without significant development, except for the Afterbay sites discussed above. The Thermalito Afterbay outlet is the only somewhat-developed access point, with some dispersed camping and a designated boat ramp. Near the Headquarters entrance is an informal boat ramp; however, the estimated use for this site includes an estimation of use both at the boat ramp and use from visitors continuing into the OWA on the levee road. The estimate for the South OWA West Levee Road is an estimation of use for the portion of OWA south of the Thermalito Afterbay outlet and on the west side of the Feather River. Use was estimated here by combining traffic counter information from the Palm Avenue and Vance Avenue entrances, which are the only two entrances to OWA on the west side of the river below the outlet. The estimate for the South OWA East Levee Road is for the portion of the OWA south of the Afterbay outlet on the east side of the Feather River. Use was estimated here by combining

traffic counter information from the Pacific Heights and SR 70 entrances, which are the only two entrances to OWA on the east side of the river.

Estimated existing use in the OWA is summarized in Table 5.1-7. Use of the OWA is fairly evenly split amongst the four areas. The South OWA West Levee Road contributed about 29 percent to the total amount of use; the South OWA East Levee Road and the Thermalito Afterbay outlet contributed about 27 percent each; and the Headquarters Entrance contributed slightly less, about 17 percent. At all sites, there was more use in the recreation season than in the off-season. The recreation season accounted for about 60 percent of total use and the off-season accounted for 40 percent of the total use. At both levee roads and at the outlet, there was more total weekday use than weekend use. However, at the Headquarters Entrance, there was more total weekend use than weekday, apparently because of the substantially greater use of this site by local people (especially fishermen) on the weekends. This can be seen in the difference between the daily average number of RDs for recreation season weekends (415), which is more than 2.5 times greater than the daily average for recreation season weekdays. At all four sites, the average number of RDs per day was higher in the recreation season than in the off-season; generally the recreation season averages are twice the off-season daily averages. All four sites had higher daily averages on weekends than on weekdays, with the Headquarters entrance having the largest difference between weekend and weekday averages.

Table 5.1-7. Existing use (recreation days) at Oroville Wildlife Area sites.

Area	Recreation season			Off-season			Combined Seasons Total (Daily Avg.)
	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	
South OWA West Levee Road	35,561 (423)	24,650 (616)	60,211 (486)	18,223 (105)	13,003 (191)	31,226 (130)	91,437 (251)
South OWA East Levee Road	28,169 (335)	17,952 (449)	46,121 (372)	23,850 (138)	15,918 (234)	39,768 (165)	85,889 (235)
Thermalito Afterbay Outlet	33,620 (400)	21,428 (536)	55,048 (444)	20,507 (119)	9,411 (138)	29,918 (124)	84,966 (233)
Headquarters Entrance	13,133 (156)	16,605 (415)	29,738 (240)	11,394 (66)	15,038 (221)	26,432 (110)	56,170 (154)
Total	*110,483 (1,315)*	*80,635 (2,016)*	*191,118 (1,541)*	*73,974 (428)*	*53,370 (785)*	*127,344 (528)*	*318,462 (872)*

Note: Recreation season is from May 15, 2002, to September 15, 2002, and off-season is from September 16, 2002, to May 14, 2003. Weekends include holiday use. All values are in recreation days (RDs).
Sources: DWR 2003; EDAW, Inc. 2003.

5.1.7 Additional Sites

Use was also estimated at dispersed sites as well as at four additional sites. These additional sites are discussed in two groups: the sites within the FERC boundary and those additional sites outside of the FERC boundary.

5.1.7.1 Additional Sites Within the FERC Boundary

Additional study sites within the FERC boundary include the Feather River Fish Hatchery and the aforementioned dispersed use sites. Dispersed use was separated into two groups: sites where dispersed recreational activities were known to occur and "other dispersed sites" (to encapsulate any other dispersed use that may occur in the study area other than at known dispersed sites). The two groups of dispersed use accounted for all dispersed use within the study area.

Feather River Fish Hatchery

The Feather River Fish Hatchery received a large amount of visitation, with more use in the off-season (60 percent of total use) than in the recreation season because of the timing of the salmon runs (Table 5.1-8). Many visitors went to the Feather River Fish Hatchery to view the fish going by as they swim upstream; the major salmon runs are in the fall and spring, and therefore contribute to the larger amount of use in the off-season. Total weekday use was higher than weekend use at the fish hatchery in both seasons. The average number of RDs per day was about the same between weekdays and weekends in both seasons. Daily averages were higher for the recreation season than the off-season.

Table 5.1-8. Existing use (recreation days) at the Feather River Fish Hatchery.

Site	Recreation season			Off-season			Combined Seasons Total (Daily Avg.)
	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	
Fish Hatchery	44,478 (530)	21,412 (535)	65,890 (531)	68,320 (395)	26,185 (385)	94,505 (392)	160,395 (439)

Note: Recreation season is from May 15, 2002, to September 15, 2002, and off-season is from September 16, 2002, to May 14, 2003. Weekends include holiday use. All values are in recreation days (RDs).
Sources: DWR 2003; EDAW, Inc. 2003.

Dispersed Use Sites

There is relatively little dispersed use in the study area (Table 5.1-9). The known dispersed use sites include Old Nelson Bar (across the water from Nelson Bar Car-top BR), Parrish Cove, Nelson Avenue Bridge over the Thermalito Forebay, Highway 162 Overlook, Canyon Creek Bridge, South Wilbur Road TA, Tres Vias Road TA, and Toland Road TA. There were an estimated 16,650 RDs over the study period at these eight areas, combined. Based on field observations, dispersed use outside of these

sites was estimated to be substantially less. There were an estimated 2,160 RDs over both seasons for dispersed use not at the previously mentioned sites. Total use was higher in the off-season because of the accumulation of use over the longer off-season versus the shorter recreation season. Total weekday use was also higher than total weekend use because of the higher number of days included in weekday use. Generally, the average daily number of RDs was the same for recreation and off-season weekdays and recreation and off-season weekends. The daily RD averages were higher on weekends than on weekdays.

Table 5.1-9. Existing use (recreation days) at dispersed use sites.

Site	Recreation season			Off-season			Combined Seasons Total (Daily Avg.)
	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	
Dispersed Use sites	2,720 (32)	3,600 (90)	6,320 (51)	3,980 (23)	6,350 (93)	10,330 (43)	16,650 (46)
Other Dispersed Use sites	320 (4)	400 (10)	720 (6)	640 (4)	800 (12)	1,440 (6)	2,160 (6)
Total	*3,040 (36)*	*4,000 (100)*	*7,040 (57)*	*4,620 (27)*	*7,150 (105)*	*11,770 (49)*	*18,810 (52)*

Note: Recreation season is from May 15, 2002, to September 15, 2002, and off-season is from September 16, 2002, to May 14, 2003. Weekends include holiday use. Dispersed sites include: Old Nelson Bar, Parrish Cove, Nelson Avenue Bridge over Thermalito Forebay, Highway 162 Overlook, Canyon Creek Bridge, South Wilbur Road TA, Tres Vias Road TA, and Toland Road TA. "Other Dispersed Use Sites" includes any dispersed use occurring within the study area at sites other than those that are known dispersed sites (which are listed under "Dispersed Use Sites"). All values are in recreation days (RDs).
Source: EDAW, Inc. 2003.

5.1.7.2 Additional Sites Outside of the FERC Boundary

There are three sites outside of the FERC boundary for which use was estimated: Riverbend Park, Clay Pit SVRA, and Rabe Road Shooting Range. Existing use was estimated for these sites because they are located near other study area sites.

Riverbend Park had a moderate amount of use with about 58 percent in the recreation season (Table 5.1-10). The daily average numbers of RDs for weekdays and weekends at Riverbend Park were about 2.5 times larger in the recreation season than in the off-season. Total weekday use was higher than total weekend use for both seasons for all three sites. The Clay Pit SVRA had the least amount of use of the three sites with an estimated 18,324 RDs (average of 50 RDs per day) over the recreation season and off-season. Rabe Road Shooting Range had slightly more use than the SVRA. Both sites had more total use in the off-season. Higher total use in the off-season at the Rabe Road Shooting Range was due to the accumulation of use over the longer off-season.

At the SVRA, the higher total use in the off-season was due to average daily weekend visitation being nearly twice as high in the off-season as in the recreation season.

Table 5.1-10. Existing use (recreation days) at additional sites outside the FERC boundary.

Site	Recreation season			Off-season			Combined Seasons Total (Daily Avg.)
	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	Weekday Total (Daily Avg.)	Weekend Total (Daily Avg.)	Season Total (Daily Avg.)	
Riverbend Park	10,500 (125)	7,000 (175)	17,500 (141)	8,650 (50)	4,080 (60)	12,730 (53)	30,230 (83)
Clay Pit SVRA	3,262 (39)	2,188 (55)	5,450 (44)	5,817 (34)	7,057 (104)	12,874 (53)	18,324 (50)
Rabe Road Shooting Range	4,073 (48)	3,105 (78)	7,178 (58)	8,169 (47)	5,244 (77)	13,413 (56)	20,591 (56)
Total	*17,835 (212)*	*12,293 (307)*	*30,128 (243)*	*22,636 (131)*	*16,381 (241)*	*39,017 (162)*	*69,145 (189)*

Note: Recreation season is from May 15, 2002, to September 15, 2002, and off-season is from September 16, 2002, to May 14, 2003. Weekends include holiday use. All values are in recreation days (RDs).
Sources: DWR 2003; EDAW, Inc. 2003.

5.2 EXISTING USE BY ACTIVITY

The amount of use by activity was also estimated. Activities included in these estimates were bank fishing, boating access, camping, sightseeing, hunting, picnicking, swimming, and trail use. The term "boating access" is used because boating activities do not literally occur at the site; the site provides access for boaters to the body of water where boating activities actually take place. Boating activities are discussed in Relicensing Study R-7 – *Reservoir Boating*. Sightseeing included activities such as driving for pleasure, touring sites, or looking around. Picnicking also includes the activities of resting and relaxing. Estimates of use by activity include the amount of use per activity occurring at each site (grouped by general area) and the most popular locations for each activity.

5.2.1 Activities by General Area

This section describes the activities that occur at each site within the study area. Sites are grouped by area—Lake Oroville, Diversion Pool, Thermalito Forebay, Thermalito Afterbay, OWA, and additional sites both within and outside of the FERC boundary. These are the same areas used to describe seasonal visitation. Also included is a brief overview of the amount of use of each activity within the geographical area.

5.2.1.1 Activities at Lake Oroville Sites

Table 5.2-1 shows all of the sites around Lake Oroville and the breakdown of use by activity at each site. At the six campgrounds, camping accounted for all of the use. Boating access was the main activity at Bidwell Canyon BR/DUA/Marina (80 percent of use at the site), with some fishing, sightseeing, picnicking, and swimming use as well (5 percent each). At Loafer Creek BR, boating access accounted for all of the use. The two main activities at the Loafer Creek DUA were picnicking and swimming (45 percent each), as it is the only designated swimming area on Lake Oroville. The main activity at Lime Saddle BR/DUA/Marina was boating access, accounting for 90 percent of the use at the site; bank fishing and picnicking accounted for the rest of the use. The majority of use at Spillway BR/DUA was also boating access activities (85 percent) with some sightseeing, picnicking, and swimming use (5 percent each). There is also some "en route" camping available at this site, consisting of overnight RV spaces in the parking lot. However, use of this camping opportunity was negligible and therefore not included as an activity at this site. More than half of the use at the Oroville Dam/Overlook DUA was sightseeing, as many people drove across the dam and back. At this site, there was also some bank fishing and picnicking use as well as walking, jogging, and bicycling across the dam, which is accounted for under the category "other" in Table 5.2-1.

The car-top boat ramps had varying amounts of use for activities such as bank fishing, boating access, sightseeing, picnicking, and swimming. Most of the use at Dark Canyon Car-top BR, for instance, was boating access, whereas most of the use at Vinton Gulch Car-top BR was bank fishing. Most of the use at Nelson Bar Car-top BR was bank fishing (40 percent) and sightseeing (30 percent). Use at Stringtown Car-top BR was distributed more evenly among the different activities, with bank fishing, picnicking, and swimming each accounting for 20 percent of the total use at the site, and boating access accounting for 30 percent. Use was also more widely distributed among the activities at Enterprise BR, including boating access (40 percent of use), picnicking (20 percent), swimming (20 percent), bank fishing (10 percent), and sightseeing (10 percent). At Saddle Dam TA, trail use accounted for all of the visitation. Touring the visitors center and the lookout tower are the main uses of the Lake Oroville Visitors Center (listed as sightseeing in Table 5.2-1).

Table 5.2-1. Use by activity at Lake Oroville sites.

Activities	# of Recreation Days at Site	Percent of Activity at Site	Activities	# of Recreation Days at Site	Percent of Activity at Site
Bidwell Canyon BR/DUA/Marina			**Loafer Creek DUA**		
Bank fishing	9,777	5	Bank fishing	1,452	5
Boating access	156,438	80	Boating access	1,452	5
Camping			Camping		
Sightseeing	9,777	5	Sightseeing		
Hunting			Hunting		
Picnicking	9,777	5	Picnicking	13,059	45
Swimming	9,777	5	Swimming	13,059	45
Trail use			Trail use		
Other			Other		
Bidwell Canyon Campground			**Loafer Creek Campground**		
Bank fishing			Bank fishing		
Boating access			Boating access		
Camping	22,252	100	Camping	23,531	100
Sightseeing			Sightseeing		
Hunting			Hunting		
Picnicking			Picnicking		
Swimming			Swimming		
Trail use			Trail use		
Other			Other		
Loafer Creek BR			**Loafer Creek Group Campground**		
Bank fishing			Bank fishing		
Boating access	29,245	100	Boating access		
Camping			Camping	5,820	100
Sightseeing			Sightseeing		
Hunting			Hunting		
Picnicking			Picnicking		
Swimming			Swimming		
Trail use			Trail use		
Other			Other		
Loafer Creek Equestrian Campground			**Lime Saddle BR/DUA/Marina**		
Bank fishing			Bank fishing	7,677	5
Boating access			Boating access	138,187	90
Camping	1,924	100	Camping		
Sightseeing			Sightseeing		
Hunting			Hunting		
Picnicking			Picnicking	7,677	5
Swimming			Swimming		
Trail use			Trail use		
Other			Other		

Table 5.2-1 (continued). Use by activity at Lake Oroville sites.

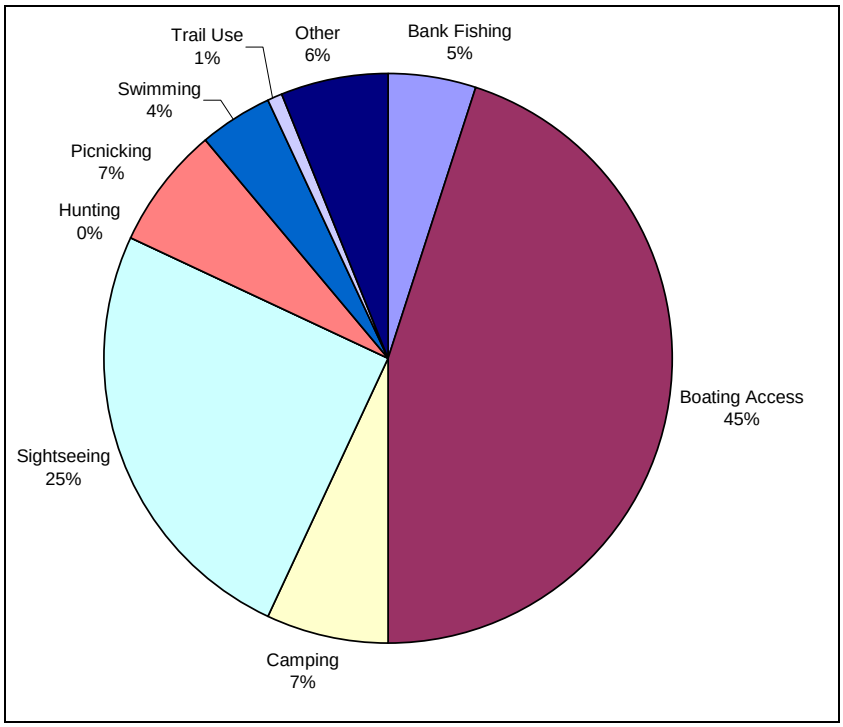
Activities	# of Recreation Days at Site	Percent of Activity at Site	Activities	# of Recreation Days at Site	Percent of Activity at Site
Lime Saddle Campground			**Spillway BR/DUA**		
Bank fishing			Bank fishing		
Boating access			Boating access	68,347	85
Camping	7,760	100	Camping	91	<1
Sightseeing			Sightseeing	4,026	5
Hunting			Hunting		
Picnicking			Picnicking	4,026	5
Swimming			Swimming	4,026	5
Trail use			Trail use		
Other			Other		
Lime Saddle Group Campground			**Oroville Dam/Overlook DUA**		
Bank fishing			Bank fishing	9,488	5
Boating access			Boating access		
Camping	920	100	Camping		
Sightseeing			Sightseeing	104,371	55
Hunting			Hunting		
Picnicking			Picnicking	18,977	10
Swimming			Swimming		
Trail use			Trail use		
Other			Other	56,930	30
Foreman Creek Car-top BR			**Nelson Bar Car-top BR**		
Bank fishing	2,162	15	Bank fishing	9,579	40
Boating access	4,324	30	Boating access	2,395	10
Camping			Camping		
Sightseeing	2,162	15	Sightseeing	7,184	30
Hunting			Hunting		
Picnicking	2,883	20	Picnicking	2,395	10
Swimming	2,883	20	Swimming	2,395	10
Trail use			Trail use		
Other			Other		

Table 5.2-1 (continued). Use by activity at Lake Oroville sites.

Activities	# of Recreation Days at Site	Percent of Activity at Site	Activities	# of Recreation Days at Site	Percent of Activity at Site
Dark Canyon Car-top BR			**Stringtown Car-top BR**		
Bank fishing	701	10	Bank fishing	2,329	20
Boating access	4,205	60	Boating access	3,494	30
Camping			Camping		
Sightseeing	701	10	Sightseeing	1,165	10
Hunting			Hunting		
Picnicking	701	10	Picnicking	2,329	20
Swimming	701	10	Swimming	2,329	20
Trail use			Trail use		
Other			Other		
Vinton Gulch Car-top BR			**Saddle Dam TA**		
Bank fishing	4,040	60	Bank fishing		
Boating access	673	10	Boating access		
Camping			Camping		
Sightseeing	673	10	Sightseeing		
Hunting			Hunting		
Picnicking	673	10	Picnicking		
Swimming	673	10	Swimming		
Trail use			Trail use	4,690	100
Other			Other		
Enterprise BR			**Lake Oroville Visitors Center**		
Bank fishing	944	10	Bank fishing		
Boating access	3,775	40	Boating access		
Camping			Camping		
Sightseeing	944	10	Sightseeing	93,553	100
Hunting			Hunting		
Picnicking	1,888	20	Picnicking		
Swimming	1,888	20	Swimming		
Trail use			Trail use		
Other			Other		

Sources: DPR 2003; DWR 2003; EDAW, Inc. 2003.

Within the Lake Oroville area overall, boating access was the activity with the greatest amount of use (Figure 5.2-1). Boating access use accounted for 45 percent of the use at Lake Oroville sites. The second most popular activity was sightseeing, accounting for one-quarter of total use at Lake Oroville sites. Other activities only had a relatively small amount of use, including camping (7 percent), picnicking (7 percent), bank fishing (5 percent), swimming (4 percent), and trail use (1 percent). There was no hunting use at Lake Oroville sites although hunting use occurs at several undeveloped areas around Lake Oroville. "Other" use, mainly walking or biking across Oroville Dam, accounted for six percent of the total use at Lake Oroville sites.



Sources: DPR 2003; DWR 2003; EDAW, Inc. 2003.

Figure 5.2-1. Use by activity at the Lake Oroville area.

5.2.1.2 Activities at Diversion Pool Sites

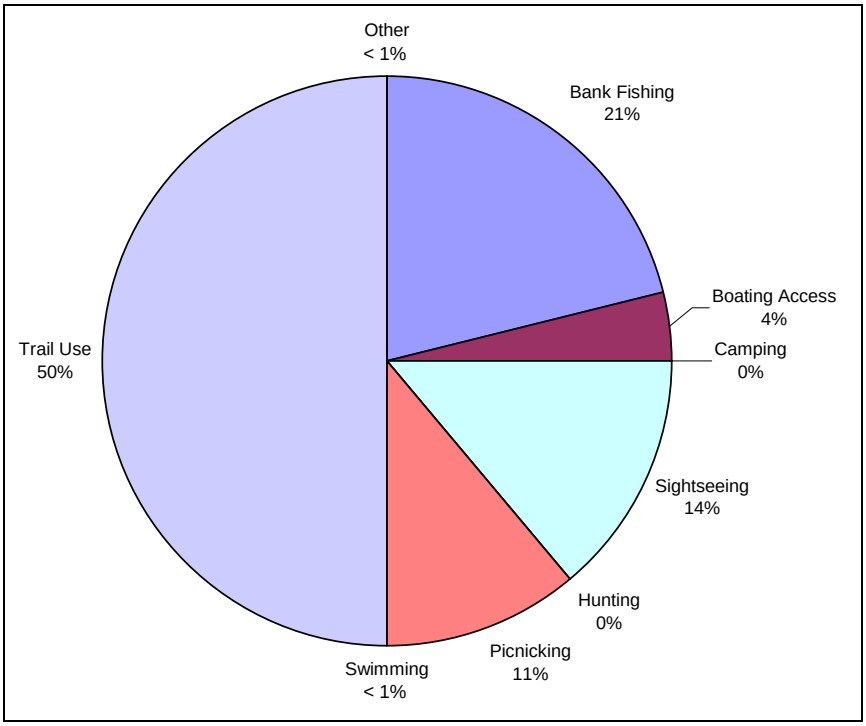
Use at the Diversion Pool DUA is distributed amongst several activities (Table 5.2-2). Use of the trails and bank fishing were the two most common activities at this site (each 30 percent of use at the site). There are two trails accessible from the Diversion Pool area: the Dan Beebe Trail and the Brad Freeman Trail. Use of these trails included hiking, horseback riding, and bicycling. Other popular activities included sightseeing (20 percent of use at the site), picnicking (15 percent), and boating access (5 percent). As with the other TAs, trail use was the predominant use of the Lakeland Boulevard and Powerhouse Road TAs, accounting for virtually all use at these two sites.

Overall, trail use was the most common use at Diversion Pool sites, accounting for 50 percent of the use at this area (Figure 5.2-2). Bank fishing was the second most popular activity in the Diversion Pool area with 21 percent of total use, followed by sightseeing (11 percent), and picnicking (11 percent). There was very little boating access use at this area (4 percent) and no camping, hunting, or observed swimming use.

Table 5.2-2. Use by activity at Diversion Pool sites.

Activities	# of Recreation Days at Site	Percent of Activity at Site	Activities	# of Recreation Days at Site	Percent of Activity at Site
Diversion Pool DUA			**Lakeland Boulevard TA**		
Bank fishing	4,371	30	Bank fishing		
Boating access	729	5	Boating access		
Camping			Camping		
Sightseeing	2,914	20	Sightseeing		
Hunting			Hunting		
Picnicking	2,186	15	Picnicking		
Swimming	n/a	<1	Swimming		
Trail use	4,371	30	Trail use	4,004	100
Other			Other	n/a	<1
Powerhouse Road TA					
Bank fishing					
Boating access					
Camping					
Sightseeing					
Hunting					
Picnicking					
Swimming					
Trail use	2,028	100			
Other	n/a	<1			

Sources: DWR 2003; EDAW, Inc. 2003.



Sources: DWR 2003; EDAW, Inc. 2003.

Figure 5.2-2. Use by activity in the Thermalito Diversion Pool area.

5.2.1.3 Activities at Thermalito Forebay Sites

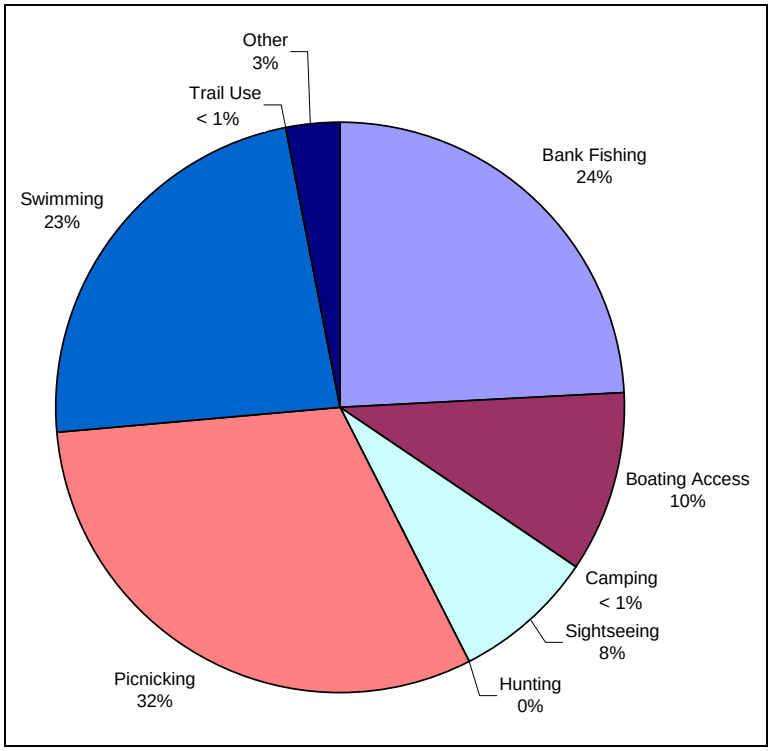
Use by activity of the two sites located on Thermalito Forebay is shown in Table 5.2-3. Use at both sites was distributed amongst several activities. The North Thermalito Forebay BR/DUA had more picnicking, swimming, and other use (walking) than the South Thermalito Forebay BR/DUA because of the extensive facilities located at the North Thermalito Forebay site. The North Thermalito Forebay BR/DUA has a swimming beach and 117 picnic tables. The South Thermalito Forebay site had more bank fishing and boating access than the North Thermalito Forebay BR/DUA. The South Thermalito Forebay allows motorboats and PWCs, whereas only non-motorized boating is allowed at the North Thermalito Forebay. Therefore the South Thermalito Forebay had more boating access use because there is a larger motorized boating user group than non-motorized boating. The North Thermalito Forebay BR/DUA does have “en route” camping, consisting of RV spaces in the parking lot, allowing RVs to park for the night. Use of this type of camping was negligible at this site.

Table 5.2-3. Use by activity at Thermalito Forebay sites.

Activities	# of Recreation Days at Site	Percent of Activity at Site	Activities	# of Recreation Days at Site	Percent of Activity at Site
North Thermalito Forebay BR/DUA			**South Thermalito Forebay BR/DUA**		
Bank fishing	17,213	20	Bank fishing	14,897	30
Boating access	4,303	5	Boating access	9,931	20
Camping	39	<1	Camping		
Sightseeing	8,607	10	Sightseeing	2,483	5
Hunting			Hunting		
Picnicking	30,084	35	Picnicking	12,414	25
Swimming	21,516	25	Swimming	9,931	20
Trail use	n/a	<1	Trail use		
Other	4,303	5	Other		

Sources: DPR 2003, DWR 2003; EDAW, Inc. 2003.

At the Thermalito Forebay, use was generally split between bank fishing, picnicking, and swimming (Figure 5.2-3). These three activities received almost 80 percent of the use at the area. Picnicking was the most popular activity with 32 percent of the total use at the Thermalito Forebay, followed by bank fishing with 24 percent and swimming with 23 percent. There was some boating access use (10 percent), sightseeing use (8 percent), and "other" use (3 percent) – mostly walking around the North Thermalito Forebay BR/DUA. There was negligible camping, no hunting, and no observed trail use at this area.



Sources: DPR 2003, DWR 2003; EDAW, Inc. 2003.

Figure 5.2-3. Use by activity in the Thermalito Forebay area.

5.2.1.4 Activities at Thermalito Afterbay Sites

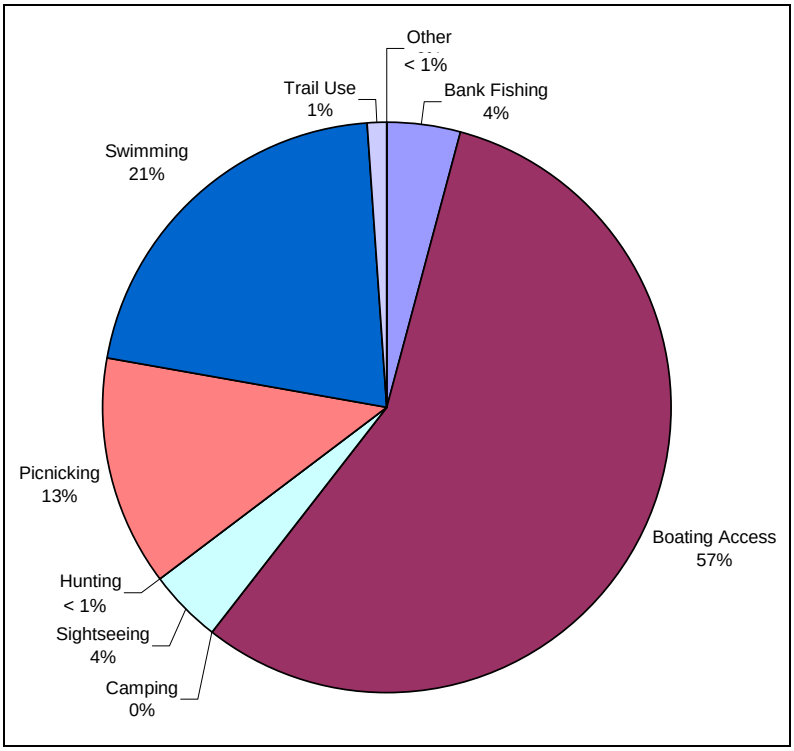
Table 5.2-4 shows a breakdown of use by activity of the sites located around the Thermalito Afterbay. The sole observed use of the Wilbur Road BR was boating access. Monument Hill BR/DUA and Larkin Road Car-top BR were both popular for boating access (50 percent of use at each site). A range of boats launched from both sites included fishing boats, powerboats, and personal watercraft. Swimming was also a popular activity (25 percent of use at each site); there is a small beach area at Monument Hill BR/DUA. There was also some picnicking, bank fishing, and sightseeing use at both sites. At the East Hamilton Road TA, all of the use appeared to be trail use.

Table 5.2-4. Use by activity at Thermalito Afterbay sites.

Activities	# of Recreation Days at Site	Percent of Activity at Site	Activities	# of Recreation Days at Site	Percent of Activity at Site
Wilbur Road BR			**Larkin Road Car-top BR**		
Bank fishing			Bank fishing	1,154	5
Boating access	12,637	100	Boating access	11,537	50
Camping			Camping		
Sightseeing			Sightseeing	1,154	5
Hunting	n/a	<1	Hunting	n/a	<1
Picnicking			Picnicking	3,461	15
Swimming			Swimming	5,769	25
Trail use			Trail use		
Other			Other	n/a	<1
Monument Hill BR/DUA			**East Hamilton Road TA**		
Bank fishing	2,838	5	Bank fishing		
Boating access	28,384	50	Boating access		
Camping			Camping		
Sightseeing	2,838	5	Sightseeing		
Hunting	n/a	<1	Hunting	n/a	<1
Picnicking	8,515	15	Picnicking		
Swimming	14,192	25	Swimming		
Trail use			Trail use	891	100
Other	n/a	<1	Other		

Sources: DWR 2003; EDAW, Inc. 2003.

In the Thermalito Afterbay area in total, boating access use was the activity with the most use (57 percent) (Figure 5.2-4). Swimming was the second most popular activity at the Thermalito Afterbay, accounting for 21 percent of total use at the area. Picnicking also received a fair amount of use with 13 percent of total use in the Thermalito Afterbay area. There was a small amount of sightseeing and bank fishing use (both 4 percent) as well as trail use (1 percent) at the area. There was no camping or observed hunting use at these access sites.



Sources: DWR 2003; EDAW, Inc. 2003.

Figure 5.2-4. Use by activity in the Thermalito Afterbay area.

5.2.1.5 Activities at Oroville Wildlife Area Sites

Both the South OWA West Levee Road and the South OWA East Levee Road were popular bank fishing areas (60 and 70 percent of site use, respectively; Table 5.2-5). This was a popular activity because these levee roads run adjacent to the Feather River and provide river access. These are two of the sites where hunting occurs in the Project area, but hunting accounted for only five percent of the use at both sites. There was also some sightseeing, picnicking, and swimming use at both sites. There was some boating access activity in the South OWA West Levee Road area because there are undeveloped boat ramps near the Vance Avenue and Palm Avenue entrances to OWA.

At the Thermalito Afterbay outlet, fishing was the primary activity, accounting for 60 percent of use at the site. During the salmon runs, the site may become extremely crowded with fishermen because of the high concentration of fish around the outlet flow structure. Driving through the area was also popular (20 percent of use at the site) as were boating access and picnicking (10 percent of use). There is a designated boat ramp at the Thermalito Afterbay outlet, but it is very steep and often difficult to use for boat launching, which limited the amount of boating access activity at the site. Primitive camping is available near the outlet and at two areas around the South OWA

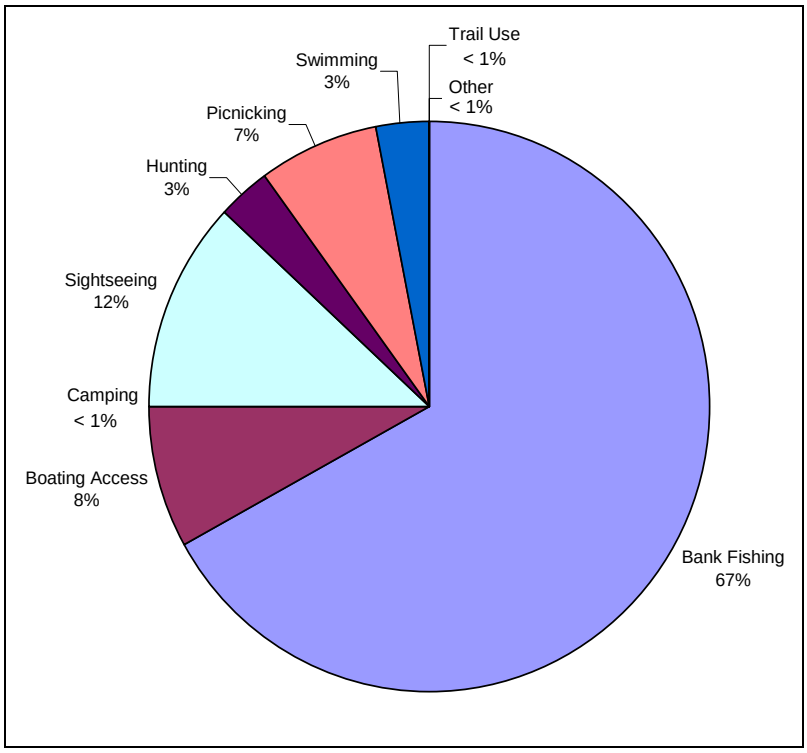
West Levee Road; however, these campers were generally there for the fishing and were recorded under this activity. The OWA Headquarters Entrance site was used mainly by local people for fishing (85 percent of use at the site). There was minor boating access, sightseeing, picnicking, and swimming use at this site.

Table 5.2-5. Use by activity at Oroville Wildlife Area sites.

Activities	# of Recreation Days at Site	Percent of Activity at Site	Activities	# of Recreation Days at Site	Percent of Activity at Site
South OWA West Levee Road			**Thermalito Afterbay Outlet**		
Bank fishing	54,863	60	Bank fishing	50,980	60
Boating access	13,716	15	Boating access	8,497	10
Camping	n/a	<1	Camping	n/a	<!
Sightseeing	9,144	10	Sightseeing	16,993	20
Hunting	4,572	5	Hunting		
Picnicking	4,572	5	Picnicking	8,497	10
Swimming	4,572	5	Swimming		
Trail use			Trail use	n/a	<1
Other	n/a	<1	Other	n/a	<1
South OWA East Levee Road			**OWA Headquarters Entrance**		
Bank fishing	60,122	70	Bank fishing	47,745	85
Boating access			Boating access	2,809	5
Camping			Camping		
Sightseeing	8,589	10	Sightseeing	2,809	5
Hunting	4,294	5	Hunting	n/a	<1
Picnicking	8,589	10	Picnicking	1,685	3
Swimming	4,294	5	Swimming	1,123	2
Trail use			Trail use	n/a	<1
Other	n/a	<1	Other	n/a	<1

Sources: DWR 2003; EDAW, Inc. 2003.

In aggregate, bank fishing was the most popular activity in the OWA, accounting for two-thirds of use (Figure 5.2-5). Sightseeing was the second most popular activity with 12 percent of total use at OWA. There was also relatively minor boating access (8 percent), picnicking (7 percent), swimming (3 percent), and hunting use (3 percent). There was no camping or trail use at the OWA.



Sources: DWR 2003; EDAW, Inc. 2003.

Figure 5.2-5. Use by activity in the Oroville Wildlife Area.

5.2.1.6 Activities at Additional Sites

As with seasonal visitation, the breakdown of use by activity for additional sites is described in two groups: sites within the FERC boundary and those outside of the FERC boundary.

Additional Sites Within the FERC Boundary

Table 5.2-6 shows the breakdown of use by activity at additional sites within the FERC boundary, including the Feather River Fish Hatchery, known dispersed sites, and other dispersed sites. The primary use of the Feather River Fish Hatchery was viewing the fish in the fish ladder, which is included in Table 5.2-6 as sightseeing (95 percent of use at the site). Most people went to the fish hatchery to view the salmon runs in the fall and spring. The secondary use of the Feather River Fish Hatchery was picnicking (5 percent of use at the site).

Table 5.2-6. Use by activity at additional sites within the FERC boundary.

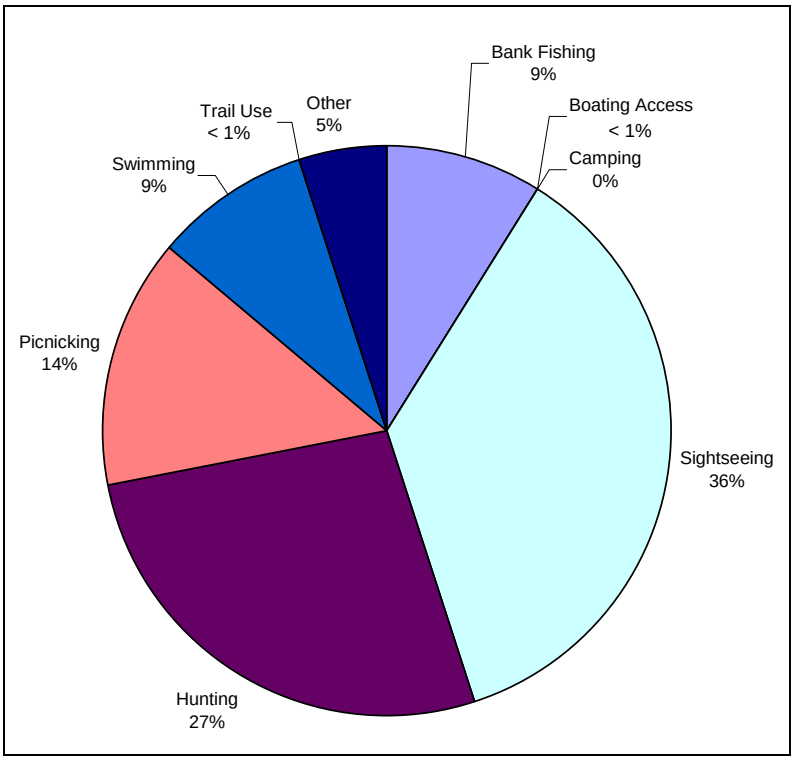
Activities	# of Recreation Days at Site	Percent of Activity at Site	Activities	# of Recreation Days at Site	Percent of Activity at Site
Feather River Fish Hatchery			**Dispersed Sites**		
Bank fishing			Bank fishing	1,665	10
Boating access			Boating access	n/a	<1
Camping			Camping		
Sightseeing	144,356	95	Sightseeing	4,995	30
Hunting			Hunting	4,995	30
Picnicking	16,040	5	Picnicking	2,498	15
Swimming			Swimming	1,665	10
Trail use			Trail use	n/a	<1
Other			Other	833	5
Other Dispersed Sites					
Bank fishing	108	5			
Boating access					
Camping					
Sightseeing	1,728	80			
Hunting					
Picnicking	108	5			
Swimming	108	5			
Trail use					
Other	108	5			

Sources: DWR 2003; EDAW, Inc. 2003.

It is estimated that use at the eight known dispersed areas (Old Nelson Bar, Parrish Cove, Nelson Avenue Bridge over the Thermalito Forebay, Highway 162 Overlook, Canyon Creek Bridge, South Wilbur Road TA, Tres Vias Road TA, and Toland Road TA) consisted mainly of sightseeing (30 percent of use at the site) and hunting (30 percent of use). Other dispersed use activities include picnicking, bank fishing, and swimming. A small amount of "other" use was estimated to account for any unknown dispersed activities. It is assumed that use at other dispersed sites (those sites that are unknown and not accounted for in the dispersed use sites category) was primarily sightseeing (80 percent of use at the sites). It was estimated there was also minor bank fishing, picnicking, and swimming use (each 5 percent of use at the sites). There was also some estimated "other" use, probably consisting primarily of walking (5 percent of use at the sites).

The Feather River Fish Hatchery accounted for 89 percent of use at additional sites within the FERC boundary. Therefore, to describe in useful detail the use that occurred at other sites within the FERC boundary, Figure 5.2-6 excludes the use at the Feather River Fish Hatchery. Sightseeing was the major use at the eight dispersed-use areas,

accounting for 36 percent of total dispersed use. The second most popular dispersed use activity was hunting (27 percent of total dispersed use). Picnicking was the third most popular use at dispersed areas, accounting for 14 percent of total dispersed use. There was also some bank fishing, swimming (both 9 percent of total dispersed use), and "other" use (5 percent). There was no observed boating access, camping, or observed trail use at dispersed areas.



Source: EDAW, Inc. 2003.

Figure 5.2-6. Use by activity at dispersed use sites.

Additional Sites Outside of the FERC Boundary

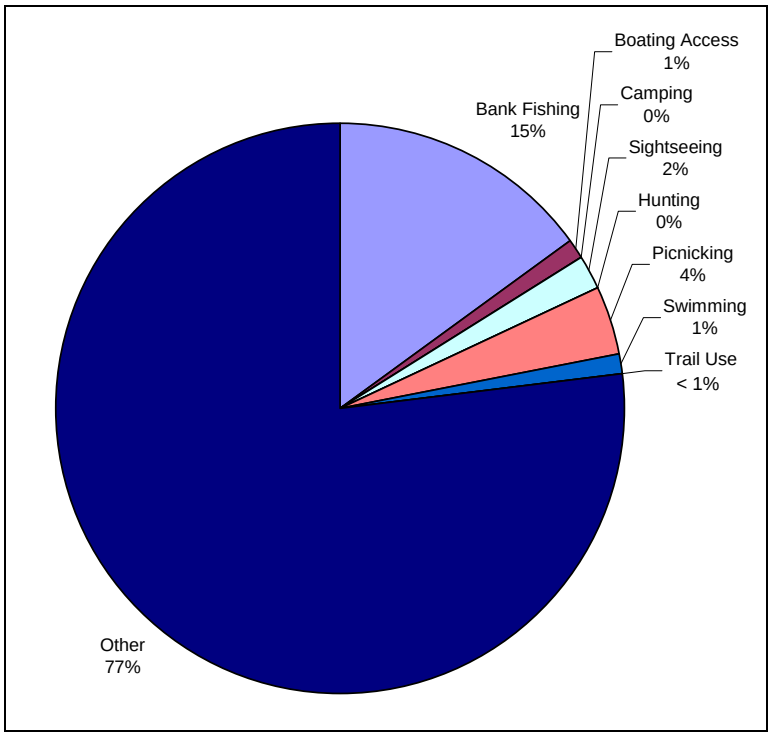
There are three sites included within the study area that are outside of the FERC boundary: Riverbend Park, Clay Pit SVRA, and the Rabe Road Shooting Range. Table 5.2-7 shows the breakdown of use by activity for these three sites. At Riverbend Park, the two primary activities were bank fishing along the Feather River (40 percent of use at the site) and "other" uses, which included walking, using the exercise stations, and playing frisbee golf (40 percent of use at the site). There was also some boating access, sightseeing, picnicking, and swimming use at this site. The Clay Pit SVRA is dedicated to vehicular recreation and thus all of the use was ORV use (under "other" use). Similarly, the Rabe Road Shooting Range is dedicated to shooting, and therefore this was the only activity at this site (under "other" use).

Table 5.2-7. Use by activity at additional sites outside of the FERC boundary.

Activities	# of Recreation Days at Site	Percent of Activity at Site	Activities	# of Recreation Days at Site	Percent of Activity at Site
Riverbend Park			**Clay Pit SVRA**		
Bank fishing	4,432	40	Bank fishing		
Boating access	332	3	Boating access		
Camping			Camping		
Sightseeing	554	5	Sightseeing		
Hunting			Hunting		
Picnicking	1,108	10	Picnicking		
Swimming	222	2	Swimming		
Trail use	n/a	<1	Trail use		
Other	4,432	40	Other	9,669	100
Rabe Road Shooting Range					
Bank fishing					
Boating access					
Camping					
Sightseeing					
Hunting					
Picnicking					
Swimming					
Trail use					
Other	8,313	100			

Sources: DWR 2003; EDAW, Inc. 2003.

As Figure 5.2-7 shows, “other” use was the largest activity at sites outside of the FERC boundary, accounting for 77 percent of total use at these sites. This included playing frisbee golf or using the exercise stations at Riverbend Park, ORV use at Clay Pit SVRA, or shooting at the Rabe Road Shooting Range. Bank fishing was the next most popular activity, accounting for 15 percent of total use at these additional sites. At these sites, there was also relatively minor boating access, sightseeing, picnicking, and swimming use. There was no camping, hunting, or observed trail use at these additional sites outside of the FERC boundary.



Sources: DWR 2003; EDAW, Inc. 2003.

Figure 5.2-7. Use by activity at additional sites outside of the FERC boundary.

5.2.2 Most Popular Sites for Each Activity

The following tables show the five most popular sites for each activity. Popularity of activity at a given site is determined by the estimated number of RDs for that activity (based on the total number of RDs and the percentage of activity – Section 5.2.1).

5.2.2.1 Most Popular Bank Fishing Sites

Table 5.2-8 shows the most popular bank fishing sites. The four sites within the OWA area were the most popular bank fishing sites, accounting for almost 70 percent of the bank fishing use within the study area. The Feather River is a popular area for bank fishing due to the relatively easy access provided by levee roads adjacent to the river. The Thermalito Afterbay outlet was a very popular fishing location during the salmon and steelhead runs because of the high concentration of fish around the outlet structure. During these runs, this site is referred to as a "combat" fishing area because there can be more than 200 fishermen at the site during peak times (pers. comm., See 2004). The Headquarters Entrance site was very popular with local fishermen familiar with fishing holes near this site and around the Riverbend Park fish ponds across from the Headquarters site. The North Thermalito Forebay BR/DUA was the fifth most popular bank fishing site.

Table 5.2-8. Most popular bank fishing sites.

Site	Percent of Activity Across Study Area	Recreation Days During Study Period
South OWA East Levee Road	19	60,122
South OWA West Levee Road	18	54,863
Thermalito Afterbay Outlet	17	50,980
OWA Headquarters Entrance	15	47,745
North Thermalito Forebay BR/DUA	6	17,213

Source: EDAW, Inc. 2003.

5.2.2.2 Most Popular Boating Access Sites

The five most popular boating access sites are listed in Table 5.2-9. Use at the marinas at Lime Saddle and Bidwell Canyon was included with use at the BR/DUAs at these sites; the marinas share parking with the BR and DUA, making it impossible to separate the number of marina users from the number of BR/DUA users. Four of the top five boating access sites are located on Lake Oroville; the fifth most popular site, Monument Hill BR/DUA, is located on Thermalito Afterbay.

Bidwell Canyon BR/DUA/Marina was the most popular, accounting for almost one-third of the boating access use within the study area. At this location, both the boat ramp and the adjacent marina received heavy use (500 houseboats are moored at the marina). Lime Saddle BR/DUA/Marina was the second most popular site for launching boats, accounting for 27 percent of the boating access use within the study area. Like Bidwell Canyon, this site also has both boat ramp and marina use, but there was not as much marina use at Lime Saddle as there is at Bidwell Canyon. Spillway BR/DUA, which does not have a marina, was the third most popular boating access site. Loafer Creek BR was the fourth most popular boating access site, followed by Monument Hill BR/DUA.

Table 5.2-9. Most popular boating access sites.

Site	Percent of Activity Across Study Area	Recreation Days During Study Period
Bidwell Canyon BR/DUA/Marina	31	156,366
Lime Saddle BR/DUA/Marina	27	138,186
Spillway BR/DUA	14	68,347
Loafer Creek BR	6	29,246
Monument Hill BR/DUA	6	28,384

Source: EDAW, Inc. 2003.

5.2.2.3 Most Popular Camping Sites

Table 5.2-10 shows the five most popular camping sites. As there are only six campgrounds located within the study area, only one campground is not listed in the table (Lime Saddle Group Campground). There was some "en route" camping at Spillway BR/DUA and North Thermalito Forebay BR/DUA. This camping consists of RV spaces in the parking lots, allowing RVs to park for the night. Use of this type of camping was minimal and is not listed in the table. The two most popular camping locations, Loafer Creek Campground and Bidwell Canyon Campground, accounted for almost 75 percent of the camping use within the study area. The Loafer Creek Campground is the largest campground within the study area, and both campgrounds have central locations; they are close to the city of Oroville and many of the other project facilities. Lime Saddle Campground was the third most popular camping location. Although this campground is newly constructed, it is farther away from other project facilities and the city of Oroville, which may contribute to lower usage at the site. The Loafer Creek Group Campground and Loafer Creek Equestrian Campground were the fourth and fifth most popular camping sites, respectively. These campgrounds have far fewer campsites and therefore cannot accommodate as many people as the larger Loafer Creek Campground and Bidwell Canyon Campground.

Table 5.2-10. Most popular camping sites.

Site	Percent of Activity Across Study Area	Recreation Days During Study Period
Loafer Creek Campground	38	23,531
Bidwell Canyon Campground	36	22,252
Lime Saddle Campground	12	7,760
Loafer Creek Group Campground	9	5,820
Loafer Creek Equestrian Campground	3	1,926

Source: EDAW, Inc. 2003.

5.2.2.4 Most Popular Sightseeing Sites

The five most popular sites for sightseeing are listed in Table 5.2-11. The Feather River Fish Hatchery ranked first with 35 percent of the total sightseeing use across the study area. The fish hatchery received a large amount of use from people driving through the site as well as visitors who tour the facility and view the fish ladder. The Oroville Dam/Overlook DUA accounted for 24 percent of the total sightseeing use within the study area. The majority of use of the Oroville Dam/ Overlook DUA consisted of visitors driving across the dam and back, viewing the immense dam and spectacular view of Lake Oroville. The Lake Oroville Visitors Center was the third most popular site for sightseeing with 21 percent of the sightseeing use within the study area. The main use of the visitors center is touring the center, which includes a lookout tower that provides a view of the reservoir. The top three sites accounted for almost 80 percent of the sightseeing use within the study area. The fourth most popular sightseeing site was

the Thermalito Afterbay outlet with 4 percent of the total activity use. The Bidwell Canyon BR/DUA/Marina was the fifth most popular sightseeing site with 2 percent of the total activity use.

Table 5.2-11. Most popular sightseeing sites.

Site	Percent of Activity Across Study Area	Recreation Days During Study Period
Feather River Fish Hatchery	35	152,375
Oroville Dam/Overlook DUA	24	104,371
Lake Oroville Visitors Center	21	93,553
Thermalito Afterbay Outlet	4	16,993
Bidwell Canyon BR/DUA/Marina	2	9,773

Source: EDAW, Inc. 2003.

5.2.2.5 Most Popular Hunting Sites

There are two geographic areas where most hunting occurs within the study area: the Thermalito Afterbay and the OWA. While hunting is allowed in many parts of LOSRA, hunting use is generally limited to three sites within the study area. These three sites are listed in Table 5.2-12. Hunters used some of the known dispersed sites to access hunting areas (sites used include Tres Vias Road TA, Toland Road TA, and South Wilbur Road TA). The known dispersed sites account for the most hunting use within the study area, with 36 percent of the total hunting use. The second and third most popular hunting sites were the South OWA West Levee Road and the South OWA East Levee Road, respectively. These two sites together accounted for 64 percent of the hunting use within the study area.

Table 5.2-12. Most popular hunting sites.

Site	Percent of Activity Across Study Area	Recreation Days During Study Period
Dispersed Sites	36	4,995
South OWA West Levee Road	33	4,572
South OWA East Levee Road	31	4,294

Note: "Dispersed sites" includes the South Wilbur Road TA, the Toland Road TA, and the Tres Vias Road TA.
Source: EDAW, Inc. 2003.

5.2.2.6 Most Popular Picnicking Sites

Table 5.2-13 shows the most popular picnicking sites. The North Thermalito Forebay BR/DUA was the most popular site, with 19 percent of the total activity use throughout the study area. This site is very close to the city of Oroville and provides a picnicking area that is capable of handling large groups. The Oroville Dam/Overlook DUA was the second most popular site, with 12 percent of the total picnicking use in the study area. A limited amount of picnicking remained available after the portion of the DUA nearest to the dam spillway was closed in the fall of 2002 because of security concerns. Loafer Creek DUA was the third most popular site for picnicking, accounting for eight percent of the picnicking use within the study area. The fourth most popular site was the South Thermalito Forebay BR/DUA, also accounting for eight percent of the picnicking use within the study area, but it also supported fewer RDs than Loafer Creek DUA. The fifth most popular picnicking site was the Bidwell Canyon BR/DUA/Marina.

Table 5.2-13. Most popular picnicking sites.

Site	Percent of Activity Across Study Area	Recreation Days During Study Period
North Thermalito Forebay BR/DUA	19	30,084
Oroville Dam/Overlook DUA	12	18,977
Loafer Creek DUA	8	13,059
South Thermalito Forebay BR/DUA	8	12,414
Bidwell Canyon BR/DUA/Marina	6	9,773

Source: EDAW, Inc. 2003.

5.2.2.7 Most Popular Swimming Sites

Table 5.2-14 lists the most popular swimming sites. The most popular site was the North Thermalito Forebay BR/DUA, which accounted for 21 percent of the study area's swimming use. Monument Hill BR/DUA was the second most popular area, with 14 percent of the total activity use across the study area. Monument Hill, located on Thermalito Afterbay, has a small beach area used by swimmers and personal watercraft users. Loafer Creek DUA, the only designated swimming area on Lake Oroville, was the third most popular area with 13 percent of the total swimming use in the study area. The fourth most popular swimming site was the South Thermalito Forebay BR/DUA and the fifth was Bidwell Canyon BR/DUA/Marina.

Table 5.2-14. Most popular swimming sites.

Site	Percent of Activity Across Study Area	Recreation Days During Study Period
North Thermalito Forebay BR/DUA	21	21,516
Monument Hill BR/DUA	14	14,192
Loafer Creek DUA	13	13,059
South Thermalito Forebay BR/DUA	10	9,931
Bidwell Canyon BR/DUA/Marina	10	9,773

Source: EDAW, Inc. 2003.

5.2.2.8 Most Popular Trail Use Sites

Table 5.2-15 shows the five most popular trail use sites, which include all four TAs within the study area and the Diversion Pool DUA. As discussed here, trail use includes day use trailheads only and does not include campground-based use. Saddle Dam TA was the most popular trail use site, accounting for almost 30 percent of the total trail use within the study area. The Diversion Pool DUA, which accesses both the Dan Beebe Trail and the Brad Freeman Trail, was the second most popular site with 27 percent of the total trail use within the study area. Lakeland Boulevard TA was the third most popular site with 4,004 RDs, accounting for 25 percent of the trail use in the study area. Powerhouse Road TA was the fourth most popular trail use site, followed by East Hamilton Road TA.

Table 5.2-15. Most popular trail use sites.

Site	Percent of Activity Across Study Area	Recreation Days During Study Period
Saddle Dam TA	29	4,690
Diversion Pool DUA	27	4,371
Lakeland Boulevard TA	25	4,004
Powerhouse Road TA	13	2,028
East Hamilton Road TA	6	891

Source: EDAW, Inc. 2003.

5.3 PEOPLE-AT-ONE-TIME

PAOT is an instantaneous count of how many people are at a site at the time of the count. PAOT is intended to capture average and maximum use levels. Several monitoring counts were done at each site and the total number of people seen was recorded. PAOT was calculated for sites where most of the use occurs on-site (except campgrounds). PAOT was not calculated for sites that were considered access points,

such as trailhead accesses or major boat ramps where there was little shoreline activity and where the site was mainly a portal to the reservoir. The average and maximum PAOT were calculated for weekdays and weekends in the recreation season and the off-season. Monitoring counts were also performed on holidays such as Memorial Day, Independence Day, and Labor Day. Because of the high use of sites on the holidays, non-holiday and holiday PAOT were calculated separately. Weekend PAOT and recreation season PAOT were expected to exceed weekday PAOT and off-season PAOT, respectively. Nevertheless, the highest PAOT was sometimes observed on weekdays or in the off-season. Some sites do receive greater use in the off-season, often because of cooler weather or fish and game seasons.

5.3.1 Non-holiday PAOT

The average and maximum PAOT for weekdays and weekends in both the recreation season and off-season are listed in Table 5.3-1. On weekdays in the recreation season, the sites with the highest average PAOT were the North Thermalito Forebay BR/DUA (37 people), Thermalito Afterbay outlet (26 people), Nelson Bar Car-top BR (17 people), and Monument Hill BR/DUA (13 people). The North Thermalito Forebay BR/DUA had the highest maximum with 90 people, followed by the Thermalito Afterbay outlet with 41 people, and Monument Hill BR/DUA with 36 people. Sites with the lowest average PAOT on weekdays in the recreation season include the Feather River Fish Hatchery and the Diversion Pool with one person and the Oroville Dam/Overlook DUA and Vinton Gulch Car-top BR with two people. These four sites also had the lowest maximum PAOT for weekdays in the recreation season.

During weekends in the recreation season, the North Thermalito Forebay BR/DUA had the highest average and maximum PAOT. The average PAOT was 337 people, and the maximum was 423 people, significantly more than any other site. The site with the second highest average and maximum was the Thermalito Afterbay outlet with 42 people and 63 people, respectively. The PAOT for the North Thermalito Forebay BR/DUA for recreation season weekends was nine times higher than the weekday average, and the weekend maximum was more than four times higher than the weekday maximum. This shows that this site has an extreme influx of use on the weekends. During the recreation season, the average weekend PAOT at the Thermalito Afterbay outlet was approximately the same as the maximum weekday PAOT. As was the case with weekdays in the recreation season, sites with the lowest average weekend PAOT include the Feather River Fish Hatchery (two people), Diversion Pool (three people), and Oroville Dam/Overlook DUA (four people). The Feather River Fish Hatchery and Diversion Pool also had the lowest maximum weekend PAOT with four people and five people, respectively.

Table 5.3-1. Summary of non-holiday PAOT.

Site	Recreation season				Off-season			
	Weekday		Weekend		Weekday		Weekend	
	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.
Dark Canyon Car-top BR	2	15	6	8	1	3	3	6
Vinton Gulch Car-top BR	2	6	0*	0*	1	2	4	12
Nelson Bar Car-top BR	17	30	6	9	2	5	3	5
Foreman Creek Car-top BR	6	16	20	21	4	7	2	6
Stringtown Car-top BR	10	22	22	44	NA	NA	7	10
Enterprise BR	8	29	7	17	NA	NA	4	17
Loafer Creek DUA	6	24	10	24	0*	0*	5	14
Oroville Dam/Overlook DUA	2	4	4	15	4	8	10	20
Diversion Pool DUA	1	4	3	5	2	4	4	10
North Thermalito Forebay BR/DUA	37	90	337	423	8	21	28	92
South Thermalito Forebay BR/DUA	6	16	12	21	6	10	9	26
Monument Hill BR/DUA	13	36	36	54	3	4	8	17
Larkin Road Car-top BR	7	21	17	39	1	3	7	18
Riverbend Park	10	19	16	45	16	42	10	13
Feather River Fish Hatchery	1	2	2	4	3	9	3	10
OWA—Thermalito Afterbay Outlet	29	41	42	63	12	35	11	31
Rabe Road Shooting Range	6	11	6	8	12	20	5	6

** At the time of observations, no one was seen at the site. This does not indicate no use at the site.*
Note: "NA" means "not available."
Source: EDAW, Inc. 2003.

In general, PAOT is lower in the off-season than in the recreation season. Riverbend Park (a site outside of the FERC boundary) had the highest average and maximum off-season weekday PAOT with 16 people and 42 people, respectively. The Thermalito Afterbay outlet, which also had the second highest recreation season weekday and weekend PAOT, had the second highest off-season weekday average and maximum with 12 people and 35 people, respectively. This indicates that this site receives relatively high use in both the recreation season and the off-season. The Rabe Road Shooting Range had the third highest average and maximum off-season weekday PAOT with an average of 12 people and a maximum of 20 people. Sites with the lowest off-season weekday PAOT include Vinton Gulch Car-top BR, Dark Canyon Car-top BR, and Larkin Road Car-top BR, all of which had an average PAOT of one person. These sites also had the lowest maximums; Vinton Gulch Car-top BR had a maximum of two people, and Dark Canyon Car-top BR and Larkin Road Car-top BR had a maximum of three people. No off-season weekday counts were performed at Stringtown Car-top BR or Enterprise BR. Loafer Creek DUA had zero off-season weekday PAOT because the reservoir level was too low for swimming, which is usually the main activity at the site. The Oroville Dam Overlook DUA is the main location for sightseeing and picnicking on the dam, but it was closed to vehicles in September 2002. After that date, people

counted at this site included only pedestrians and bicyclists on the dam crest and near the dam entrance.

The North Thermalito Forebay BR/DUA had the highest off-season weekend PAOT with an average of 28 people and a maximum of 92 people. This was substantially higher than any other site. The second highest was the Thermalito Afterbay outlet with an average of 11 people and a maximum of 31 people. This shows that the North Thermalito Forebay BR/DUA receives significant use in the off-season, although use is substantially less in the off-season than in the recreation season. Sites with the lowest average PAOT for the off-season weekend include Foreman Creek Car-top BR with two people, and Nelson Bar Car-top BR, Dark Canyon Car-top BR, and the Feather River Fish Hatchery with three people. Foreman Creek Car-top BR had the lowest off-season weekend maximum with five people, followed by Dark Canyon Car-top BR, Stringtown Car-top BR, and the Rabe Road Shooting Range with six people maximum.

5.3.2 Holiday PAOT

Many sites received their peak use during holidays; therefore, holiday PAOT was calculated separately. Holidays included in the holiday PAOT calculations are Memorial Day (May 25–27, 2002), Independence Day (July 4–7, 2002), and Labor Day weekends (August 31–September 2, 2002). The site with the highest holiday average PAOT was the North Thermalito Forebay BR/DUA with 438 people (Table 5.3-2). The second highest holiday PAOT average was Monument Hill BR/DUA with 78 people, followed by the South Thermalito Forebay BR/DUA with 70 people and Thermalito Afterbay outlet with 45 people. The rest of the sites averaged between 15 and 30 PAOT on the holidays. Dark Canyon Car-top BR, Vinton Gulch Car-top BR, Diversion Pool DUA, and Larkin Road Car-top BR only had one holiday count, so an average was not calculated. There were no visitors observed during any of the holiday counts at Loafer Creek DUA; due to low water, the swim beach at the site was unusable during all three holiday count periods. The site with the lowest average holiday PAOT was the Feather River Fish Hatchery with one person.

The North Thermalito Forebay BR/DUA had a substantially-higher maximum holiday PAOT than any other site, with 977 people. The second highest maximum holiday PAOT was observed at the South Thermalito Forebay BR/DUA with 128 people, followed by Monument Hill BR/DUA with 108 people and the Thermalito Afterbay outlet with 84 people. Each of these sites appeared to be at or near full capacity at these times (Relicensing Study R-8 – *Carrying Capacity* provides more detailed analysis of capacity at recreation sites). The other sites had a maximum holiday PAOT of around 20–50 people.

Sites with the lowest maximum holiday PAOT include the Diversion Pool, which had an observed maximum of one person, and the Feather River Fish Hatchery, which had an observed maximum of six people. The Feather River Fish Hatchery had its peak use

during the salmon runs, which do not coincide with any of the holidays counted. Sites with a maximum holiday PAOT of zero include Vinton Gulch Car-top BR, Loafer Creek DUA, and Rabe Road Shooting Range. The Shooting Range and Vinton Gulch Car-top BR are low-use sites, with correspondingly low maximum holiday PAOT.

Table 5.3-2. Summary of holiday PAOT.

Site	Average Holiday PAOT	Maximum Holiday PAOT
Dark Canyon Car-top BR	NA	6
Vinton Gulch Car-top BR	NA	0*
Nelson Bar Car-top BR	16	31
Foreman Creek Car-top BR	19	25
Stringtown Car-top BR	15	23
Enterprise BR	23	53
Loafer Creek DUA	0*	0*
Oroville Dam/Overlook DUA	22	30
Diversion Pool DUA	NA	1
North Thermalito Forebay BR/DUA	438	977
South Thermalito Forebay BR/DUA	70	128
Monument Hill BR/DUA	78	108
Larkin Road Car-top BR	NA	19
Feather River Fish Hatchery	1	2
Riverbend Park	27	49
OWA—Thermalito Afterbay Outlet	45	84
Rabe Road Shooting Range	NA	0*

** At the time of observations, no one was seen at the site. This does not indicate no use at the site.*
Note: "NA" means "not available." Only one holiday count was done for "NA" sites and therefore an average could not be calculated.
Source: EDAW, Inc. 2003.

On Independence Day, several hundred spectators watch the fireworks over Lake Oroville each year from atop the Oroville Dam. The dam is closed to traffic on this day and observational data does not include this event because an accurate count was not possible.

5.4 VEHICLES-AT-ONE-TIME

VAOT is an instantaneous count of how many vehicles are at a site at the time of the count. Several monitoring counts were performed at each site and the total number of vehicles seen (including vehicles with trailers and RVs) was recorded. VAOT was done for almost all study area sites except the Lake Oroville Visitors Center and dispersed sites. The average and maximum VAOT were calculated for weekdays and weekends

in the recreation season and the off-season. Because of the high use of sites on holidays, non-holiday and holiday values were calculated separately (as done with PAOT). Weekend VAOT and recreation season VAOT were expected to exceed weekday VAOT and off-season VAOT, respectively. Nevertheless, the highest VAOT was observed on weekdays or in the off-season a limited number of times. Some sites, such as trailhead accesses, typically receive more use in the off-season.

5.4.1 Non-holiday VAOT

The average and maximum VAOT for weekdays and weekends in both the recreation season and off-season are listed in Table 5.4-1. On weekdays in the recreation season, Bidwell Canyon BR/DUA/Marina had the highest average VAOT with 83, followed by Lime Saddle BR/DUA/Marina with 52 vehicles. The marinas at both of these locations may contribute to the high weekday VAOT because of houseboaters visiting these sites and using their moored boats during the week. The South OWA West Levee Road had the third highest average weekday recreation season VAOT (43), followed by Spillway BR/DUA (32), and the Thermalito Afterbay outlet (20). Most other sites had an average of one to 12 vehicles during the weekdays in the recreation season. Bidwell Canyon BR/DUA/Marina had substantially more vehicles than any other site during the recreation season with 213 maximum VAOT. The second highest maximum weekday VAOT during the recreation season was at Lime Saddle BR/DUA/Marina with 76 VAOT. The South OWA West Levee Road had the third highest maximum weekday VAOT during the recreation season with 74 vehicles. Most other sites had three to 20 maximum VAOT on weekdays in the recreation season. Sites with the lowest weekday VAOT during the recreation season were Lakeland Boulevard TA and East Hamilton Road TA.

There were four sites with an average weekend recreation season VAOT of more than 100 vehicles: Bidwell Canyon BR/DUA/Marina (189), North Thermalito Forebay BR/DUA (143), Lime Saddle BR/DUA/Marina (126), and Spillway BR/DUA (106). These four sites also had the highest maximum weekend VAOT during the recreation season. These sites are some of the most-used sites in the study area during the recreation season and sustain a large increase in use on the weekends during this season. Most sites had an average of two to 40 VAOT on weekends in the recreation season and a maximum of two to 50 VAOT. As with weekday VAOT, Lakeland Boulevard TA and East Hamilton Road TA had the lowest weekend VAOT during the recreation season.

Table 5.4-1. Summary of non-holiday VAOT.

Site	Recreation season				Off-season			
	Weekday		Weekend		Weekday		Weekend	
	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.
Bidwell Canyon BR/DUA/Marina	83	213	189	228	10	17	54	161
Loafer Creek BR	12	17	82	126	NA	2	16	44
Loafer Creek DUA	4	8	4	8	1	1	2	7
Lime Saddle BR/DUA/Marina	52	76	126	183	19	30	38	79
Spillway BR/DUA	32	46	106	184	9	9	90	130
Oroville Dam/Overlook DUA	4	8	7	16	4	6	11	20
Foreman Creek Car-top BR	4	9	15	19	1	2	6	22
Dark Canyon Car-top BR	4	6	2	2	1	2	3	5
Vinton Gulch Car-top BR	1	4	1	1	0*	0*	3	6
Nelson Bar Car-top BR	11	17	3	3	1	2	3	9
Stringtown Car-top BR	6	12	15	25	NA	0*	5	6
Saddle Dam TA	2	4	1	3	~0	1	3	10
Enterprise BR	3	6	6	9	NA	0*	6	18
Diversion Pool DUA	2	5	2	4	2	4	4	10
Lakeland Boulevard TA	~ 0	3	~ 0	2	1	2	3	11
Powerhouse Road TA	2	3	1	1	1	2	2	5
North Thermalito Forebay BR/DUA	11	20	143	192	5	12	12	37
South Thermalito Forebay BR/DUA	6	11	6	10	4	5	5	11
Wilbur Road BR	3	15	9	14	1	2	1	1
Monument Hill BR/DUA	11	20	25	47	5	8	8	15
Larkin Road Car-top BR	5	9	13	26	1	3	5	12
East Hamilton Road TA	0*	0*	0*	0*	0*	0*	0*	0*
South OWA West Levee Road	43	74	63	86	NA	23	39	69
South OWA East Levee Road	6	8	13	20	NA	NA	6	8
Thermalito Afterbay Outlet	20	28	33	50	14	32	12	26
OWA Headquarters Entrance	3	5	9	20	10	18	11	20
Feather River Fish Hatchery	4	11	3	4	5	13	3	8
Riverbend Park	12	16	17	24	6	8	7	11
Clay Pit SVRA	1	1	2	2	1	1	2	3
Rabe Road Shooting Range	4	6	4	4	7	11	3	4

** At the time of observations, there were no vehicles at the site. This does not indicate no use at the site.*
Note: NA means "not available." If only one observational count was done, an average was not calculated.
Source: EDAW, Inc. 2003.

In general, VAOT is less in the off-season than in the recreation season. On off-season weekdays, the site with the highest average was Lime Saddle BR/DUA/Marina with 19 VAOT. All other sites had averages of one to 10 VAOT for off-season weekdays. There were four sites where only one off-season weekday count was performed and where averages were not calculated (Loafer Creek BR, Stringtown Car-top BR, Enterprise BR, and South OWA West Levee Road). No weekday off-season monitoring was performed at the South OWA East Levee Road. The three sites with the lowest average weekday VAOT in the off-season were Saddle Dam TA, East Hamilton Road TA, and Vinton Gulch Car-top BR (0). The Thermalito Afterbay outlet had the highest off-season weekday maximum with 32 VAOT. Lime Saddle BR/DUA/Marina had the second highest maximum with 30 VAOT, followed by the South OWA West Levee Road with 23 VAOT. Most other sites had one to 18 maximum VAOT. A few sites—Vinton Gulch Car-top BR, Stringtown Car-top BR, Enterprise BR, and East Hamilton Road TA—had a weekday maximum VAOT of zero in the off-season. Although instantaneous observations did not record any vehicles, traffic counters indicate very low use. During the off-season, the reservoir was low and there was relatively little use at these sites, where activities are primarily dependent on reservoir levels. East Hamilton Road TA was observed to have low use at all times of the year. Oroville Dam/Overlook DUA, which is the main picnic site on the dam, was closed to vehicles in September 2002.

Spillway BR/DUA had the highest average off-season weekend VAOT with 90 vehicles. Bidwell Canyon BR/DUA/Marina had the second highest average with 54 vehicles, followed by South OWA West Levee Road (39) and Lime Saddle BR/DUA/Marina (38). These four sites also had the highest weekend maximum VAOT in the off-season: 130, Bidwell Canyon BR/DUA had 161, Spillway BR/DUA had 130, Lime Saddle BR/DUA/Marina had 79, and South OWA West Levee Road had 69. Generally, the other sites had off-season weekend averages of two to 15 VAOT and maximums ranging from three to 40 VAOT. VAOT was higher on off-season weekends than at any other time for several sites, including Saddle Dam TA, Lakeland Boulevard TA, Powerhouse Road TA, and the Diversion Pool DUA. During the recreation season, the weather is often very hot in Oroville, but during the fall and the spring (off-season), the weather is cooler and more conducive to trail use, accounting for the higher off-season weekend VAOT at these sites. The OWA Headquarters entrance also has higher off-season VAOT than recreation season VAOT. This site is especially popular with local fishermen, many of whom visit this site in the off-season during the salmon runs, accounting for higher off-season VAOT.

5.4.2 Holiday VAOT

Many sites receive their peak use during the holidays; therefore, holiday VAOT was calculated separately. The same holidays included in PAOT were included in VAOT (Memorial Day, Independence Day, and Labor Day). Only one holiday observational count was performed at Dark Canyon Car-top BR, Vinton Gulch Car-top BR, Enterprise BR, and Larkin Road Car-top BR, and averages were not calculated for these sites. No

holiday observational counts were performed at the East Hamilton Road TA because of the lack of use at this site.

Table 5.4-2 shows average and maximum holiday VAOT. North Thermalito Forebay BR/DUA had the highest average VAOT on holidays, with 302 vehicles, followed closely by Bidwell Canyon BR/DUA/Marina with 296 vehicles. These averages were 100 vehicles more than the averages for any other site. The site with the third largest average VAOT on holidays was Lime Saddle BR/DUA/Marina with 195 vehicles.

Spillway BR/DUA had the fourth largest average VAOT on holidays with 119 vehicles. Most other sites had averages ranging from two to 30 VAOT on holidays.

The four sites with the highest average VAOT on holidays also had the highest maximum holiday VAOT. North Thermalito Forebay BR/DUA had the largest maximum VAOT on holidays with 481 vehicles; Bidwell Canyon BR/DUA/Marina had the second largest maximum with 367 vehicles. Lime Saddle BR/DUA/Marina had the third highest maximum holiday VAOT with 319 vehicles, followed by Spillway BR/DUA with 235 vehicles. With the exception of Spillway BR/DUA, parking lots at these sites appeared to be at or near full capacity at these times (Relicensing Study R-8 – *Carrying Capacity* provides more detailed analysis of capacity at recreation sites). Compared to non-holiday VAOT, these top four sites receive a substantial increase in use on the holidays.

Table 5.4-2. Summary of holiday VAOT.

Site	Average Holiday VAOT	Maximum Holiday VAOT
Bidwell Canyon BR/DUA/Marina	296	367
Loafer Creek BR	77	84
Loafer Creek DUA	6	10
Lime Saddle BR/DUA/Marina	195	319
Spillway BR/DUA	119	235
Oroville Dam/Overlook DUA	8	11
Foreman Creek Car-top BR	19	26
Dark Canyon Car-top BR	NA	9
Vinton Gulch Car-top BR	NA	1
Nelson Bar Car-top BR	9	19
Stringtown Car-top BR	13	15
Saddle Dam TA	3	6
Enterprise BR	NA	27
Diversion Pool DUA	3	3
Lakeland Boulevard TA	3	6
Powerhouse Road TA	0*	0*
North Thermalito Forebay BR/DUA	302	481
South Thermalito Forebay BR/DUA	15	25
Wilbur Road BR	15	19
Monument Hill BR/DUA	63	85
Larkin Road Car-top BR	NA	28
East Hamilton Road TA	NA	NA
South OWA West Levee Road	50	54
South OWA East Levee Road	11	14
Thermalito Afterbay Outlet	30	53
OWA Headquarters Entrance	10	26
Feather River Fish Hatchery	3	4
Riverbend Park	22	36
Clay Pit SVRA	2	4
Rabe Road Shooting Range	NA	9

** At the time of observations, there were no vehicles at the site. This does not indicate no use at the site.*
Note: NA means "not available." If only one holiday count was done, then an average was not calculated.
Source: EDAW, Inc. 2003.

5.5 CAMPGROUND OCCUPANCY

The percent occupancy of all six campgrounds was calculated for each month, and the rates were combined to obtain average recreation season and off-season occupancy rates for weekdays and weekends. Weekdays include Sunday through Thursday, and weekends include Friday, Saturday, and holidays. Sundays are not included in the weekend counts because it is assumed that most people camp on Friday and Saturday nights and return home on Sunday. The recreation season ran from May 15, 2002, to September 15, 2002. The off-season ran from September 16, 2002, to May 14, 2003.

Table 5.5-1 shows average weekday occupancy for all six campgrounds. For all of the campgrounds, occupancy was higher in the recreation season than in the off-season. Bidwell Canyon Campground had the highest weekday average occupancy rate in the recreation season with 33 percent. Loafer Creek Group Campground had the second highest occupancy rate with an average weekday recreation season occupancy rate of 29 percent. Lime Saddle Group Campground had the lowest occupancy rate with an average occupancy of only 2 percent on weekdays in the recreation season.

Table 5.5-1. Weekday occupancy of campgrounds.

Time Period	Percent Weekday Occupancy					
	Bidwell Canyon Camp-ground	**Lime Saddle Camp-ground**	**Lime Saddle Group Camp-ground**	**Loafer Creek Camp-ground**	**Loafer Creek Group Camp-ground**	**Loafer Creek Equestrian Camp-ground**
Recreation season Average	33	16	2	14	29	11
Off-season Average	11	6	0	2	1	4
Monthly Averages:						
May 2002 (15th–31st)	41	15	0	12	2	13
June 2002	26	14	2	13	25	7
July 2002	41	18	4	24	62	5
August 2002	36	21	4	14	30	4
September 2002	18	12	—*	4	17	17
October 2002	10	7	—	3	1	15
November 2002	8	4	—	1	0	4
December 2002	4	2	—	0	0	0
January 2003	4	1	—	0	0	4
February 2003	5	3	—	1	0	1
March 2003	14	4	—	2	0	0
April 2003	14	8	—	3	0	1
May 2003 (1st–15th)	22	16	—	6	0	5

** This site was closed during the off-season.*
Sources: DPR 2003; EDAW, Inc. 2003.

Bidwell Canyon Campground also had the highest occupancy rate in the off-season with average weekday occupancy of 11 percent. Off-season occupancy rates were much lower than during the recreation season, with all but Bidwell Canyon Campground at less than 10 percent average occupancy. Loafer Creek Group Campground had the lowest occupancy during the off-season, with one percent average occupancy. Bidwell Canyon Campground consistently had the highest occupancy rate during the recreation season. Loafer Creek Group Campground had the highest one-month average weekday occupancy with 62 percent in July 2002.

Average weekend percent occupancy for all six campgrounds is shown in Table 5.5-2. During the recreation season, Loafer Creek Group Campground had the highest weekend occupancy with an average of 82 percent. Bidwell Canyon Campground, which had the highest weekday average in the recreation season, had the second highest weekend average with 62 percent occupancy. Lime Saddle Group Campground had the lowest percent occupancy with an average of 14 percent on the weekends. Overall, the average weekend occupancy rates in the recreation season were significantly higher than the average weekday occupancy rates

In the off-season, the campground with the highest occupancy rate was Loafer Creek Equestrian Campground with an average of 23 percent occupancy on weekends. The lowest percent occupancy was at Loafer Creek Campground, with five percent average off-season occupancy. Overall, the weekend occupancy rates were much lower in the off-season than in the recreation season. As an example, Loafer Creek Group Campground had average weekend occupancy of 82 percent in the recreation season and an average of only eight percent in the off-season.

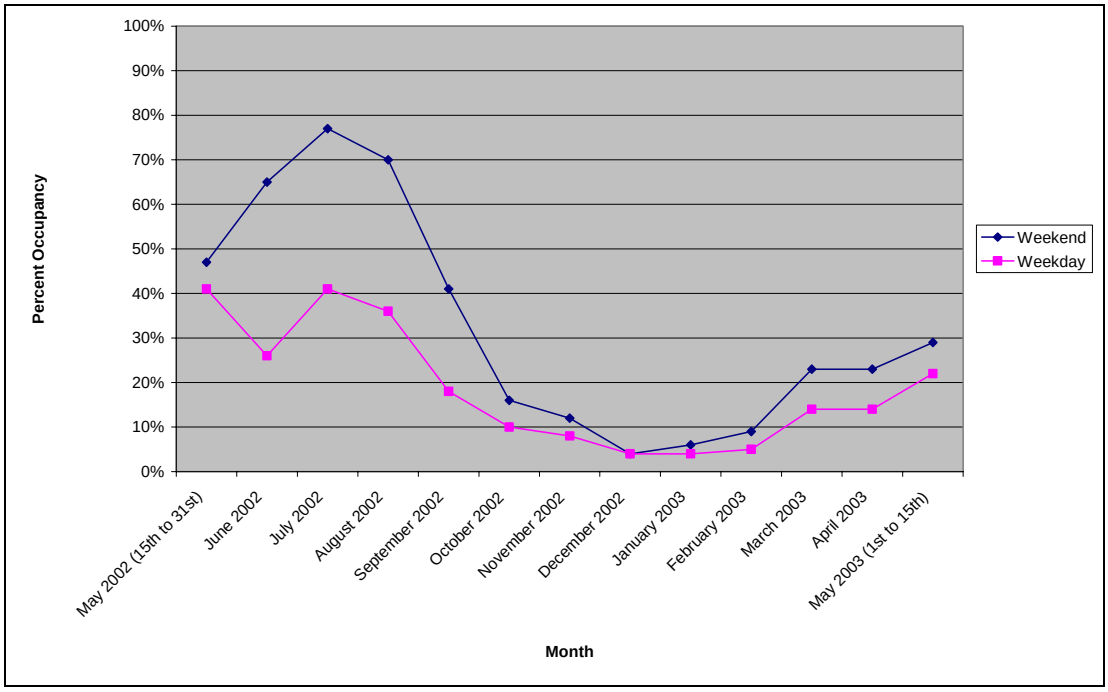
The monthly averages show that, in general, months during the recreation season had average weekend occupancy rates between 40 and 70 percent. Loafer Creek Group Campground had the two highest monthly averages, in August and July, with 98 percent and 96 percent weekend occupancy, respectively. These are very high averages, indicating that the campground was at or near capacity for most of the weekends in these two months. Also, the Loafer Creek Group Campground maintained occupancy rates of 63 percent or greater for the duration of the recreation season (from May 2002 through September 2002). Lime Saddle Group Campground had much lower monthly occupancy in the recreation season, ranging from 0 to 28 percent. Loafer Creek Equestrian Campground had the highest off-season monthly average with 51 percent average occupancy in April 2003.

Table 5.5-2. Weekend occupancy of campgrounds.

Time Period	Percent Weekend Occupancy					
	Bidwell Canyon Camp-ground	Lime Saddle Camp-ground	Lime Saddle Group Camp-ground	Loafer Creek Camp-ground	Loafer Creek Group Camp-ground	Loafer Creek Equestrian Camp-ground
Recreation season Average	62	48	14	51	82	33
Off-Season Average	17	10	0	5	8	23
Monthly Averages:						
May 2002 (15th–31st)	47	64	0	51	67	42
June 2002	65	45	17	40	63	16
July 2002	77	52	22	79	96	37
August 2002	70	44	28	58	98	19
September 2002	41	26	2	22	78	51
October 2002	16	9	—*	5	2	39
November 2002	12	3	—	1	0	18
December 2002	4	3	—	1	0	0
January 2003	6	3	—	1	0	2
February 2003	9	5	—	2	0	3
March 2003	23	11	—	5	0	4
April 2003	23	15	—	7	0	51
May 2003 (1st–15th)	29	23	—	11	0	42

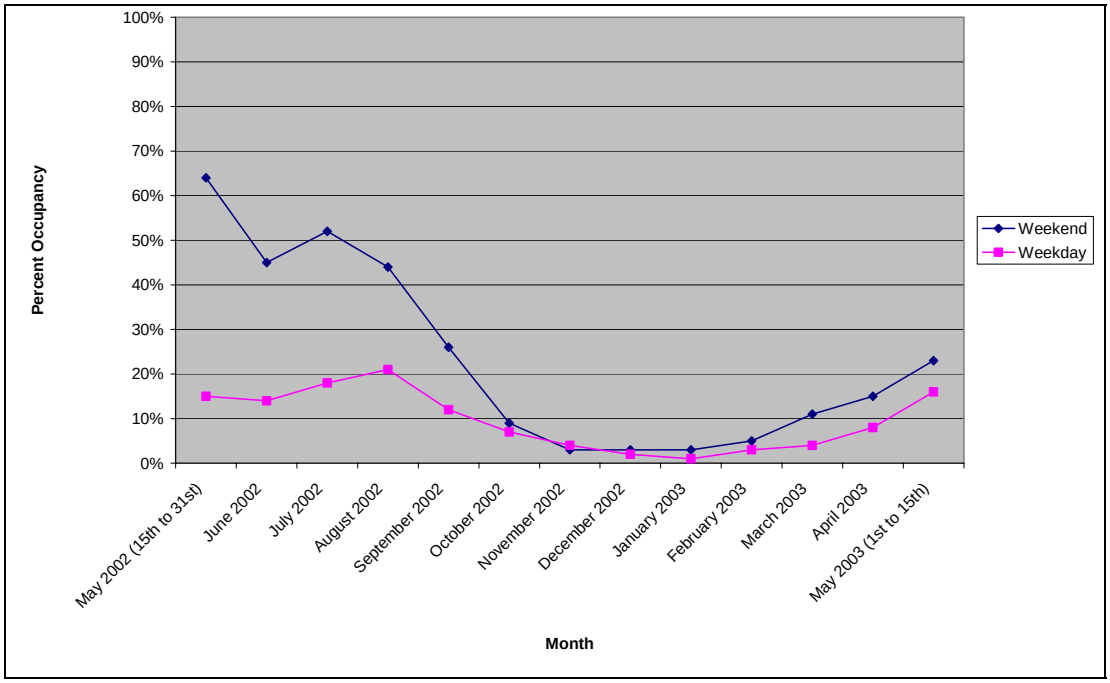
** This site was closed during the off-season.*
Sources: DPR 2003; EDAW, Inc. 2003.

Figures 5.5-1 through 5.5-6 show monthly occupancy rates from May 2002 to May 2003 for each campground. The graphs show that in general, the campgrounds have peak use in the recreation season months, with use declining and leveling out over the fall and winter months before rising again in the spring. The figures illustrate that there is a greater disparity between weekend and weekday occupancy during the recreation season than during the off-season. During the recreation season, there was a 20–40 percent difference between weekday and weekend occupancy. During part of the off-season (from October to February), the difference between weekday and weekend occupancy was five percent or less. The graphs also demonstrate that Bidwell Canyon Campground had relatively high weekday use in the recreation season: 26–41 percent occupancy from May to August. Loafer Creek Group Campground also had a peak in weekday occupancy in the recreation season with 60 percent occupancy in July. Loafer Creek Equestrian Campground (Figure 5.5-6) had several peaks in use from March through November, unlike the other campgrounds, which usually had peak occupancy in the recreation season only.



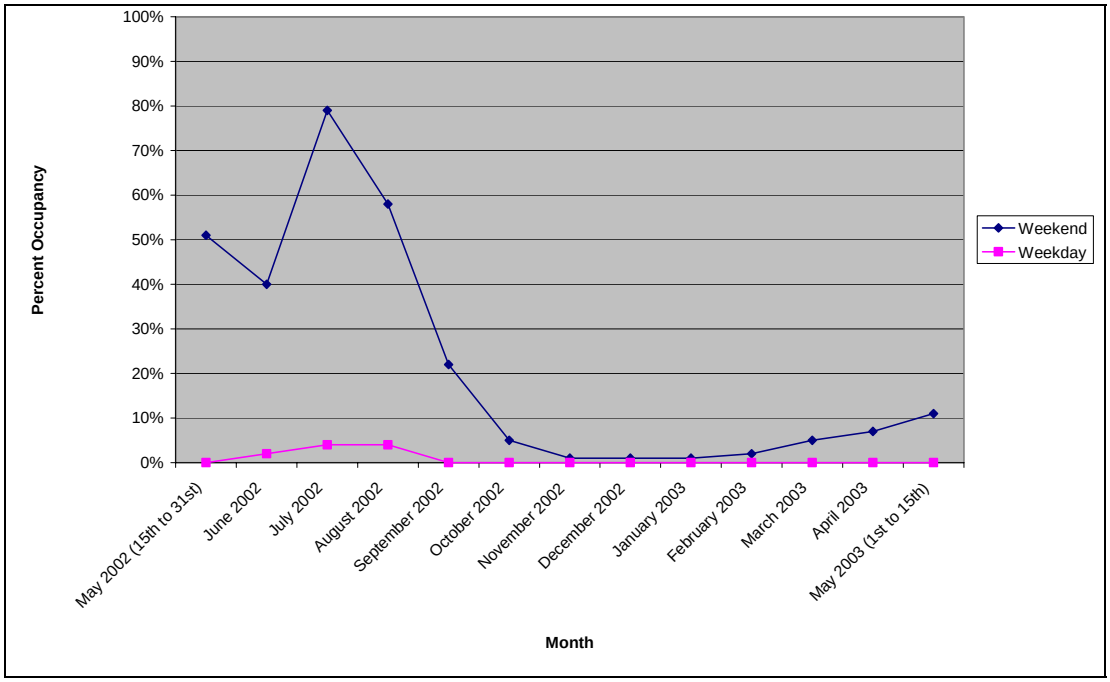
Sources: DPR 2003; EDAW, Inc. 2003.

Figure 5.5-1. Average monthly occupancy of Bidwell Canyon Campground.



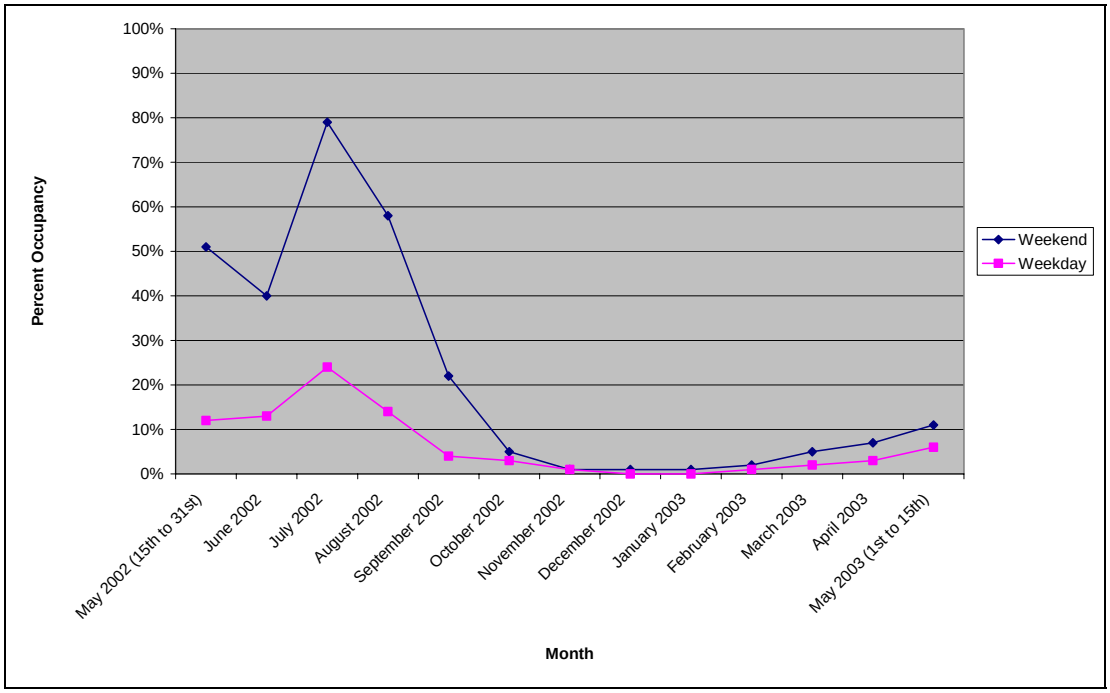
Sources: DPR 2003; EDAW, Inc. 2003.

Figure 5.5-2. Average monthly occupancy of Lime Saddle Campground.



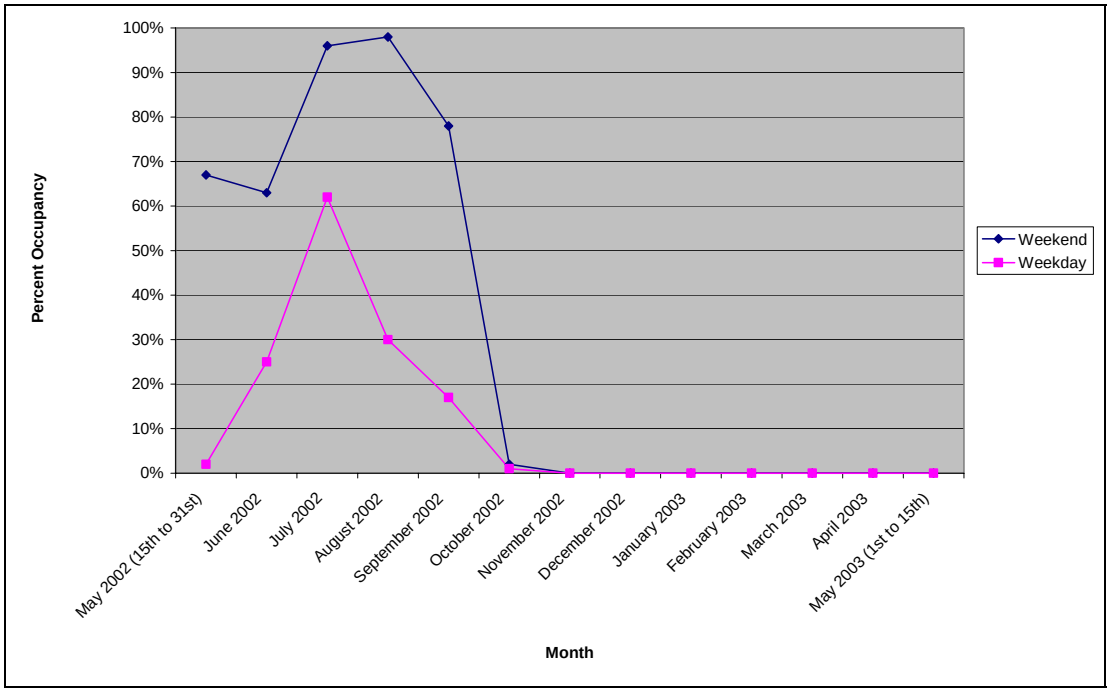
Sources: DPR 2003; EDAW, Inc. 2003.

Figure 5.5-3. Average monthly occupancy of Lime Saddle Group Campground.



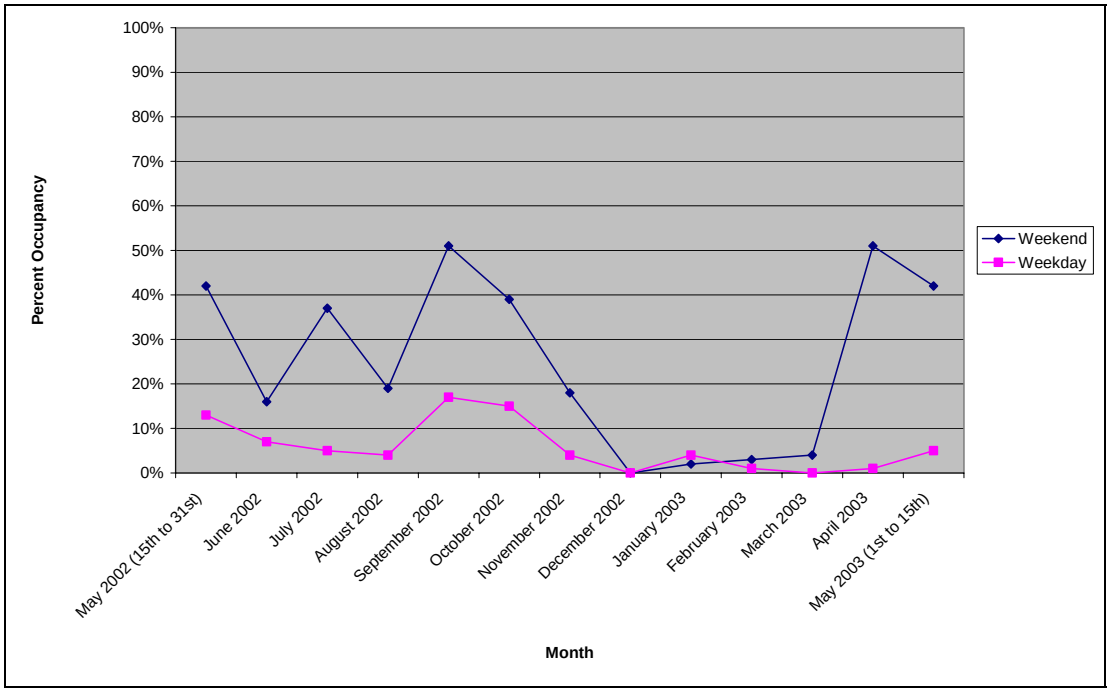
Sources: DPR 2003; EDAW, Inc. 2003.

Figure 5.5-4. Average monthly occupancy of Loafer Creek Campground.



Sources: DPR 2003; EDAW, Inc. 2003.

Figure 5.5-5. Average monthly occupancy of Loafer Creek Group Campground.



Sources: DPR 2003; EDAW, Inc. 2003.

Figure 5.5-6. Average monthly occupancy of Loafer Creek Equestrian Campground.

The number of days that campgrounds reached maximum capacity is another important aspect of campground occupancy. Table 5.5-3 shows the number of weekdays and weekends that each campground reached 100 percent occupancy.

Only three of the six campgrounds reached 100 percent occupancy during the study period (Table 5.5-3). Bidwell Canyon Campground had only one weekday and one weekend day when all sites were occupied, and both days occurred in the recreation season. Loafer Creek Equestrian Campground had three weekdays and four weekend days when all sites were occupied. These days occurred at the end of the recreation season and in the beginning of the off-season, when the temperature is cooler and more suitable for horses. The Loafer Creek Group Campground had the most days at maximum capacity. There were six weekdays when all sites were occupied, all of which occurred during the recreation season. The campground had a 26 weekend days when maximum capacity was reached, and weekend capacity was reached at least once in each month of the recreation season.

Table 5.5-3. Number of days campgrounds were at maximum capacity.

Campground	Weekdays		Weekends	
	Number of days at Maximum Capacity	Month(s) When Maximum Capacity Reached	Number of Days at Maximum Capacity	Month(s) When Maximum Capacity Reached
Bidwell Canyon Campground	1	July	1	June
Lime Saddle Campground	0	—	0	—
Lime Saddle Group Campground	0	—	0	—
Loafer Creek Campground	0	—	0	—
Loafer Creek Group Campground	6	July, August	26	May 2002, June, July, August, September
Loafer Creek Equestrian Campground	3	September, October	4	September, October, November

Sources: DPR 2003; EDAW, Inc. 2003.

5.6 TRAIL USE

This section summarizes data from passive infrared trail use counters that were placed at a total of ten locations on the Project area trail system between August 2002 and September 2003. Trail counter locations were shown in Figure 4.1-1. Four counters, programmed to store hourly counts, were operating simultaneously during most of that period. One count was recorded each time the infrared beam aimed across the trail

was crossed, and added to the total for the hour. For this analysis, the data have been truncated to include only the 12 hours between 6 a.m. and 6 p.m. The nighttime periods had large anomalous counts that were of unknown origin but were likely caused by animal activity on the trails or near the counters' infrared devices.

5.6.1 Summary of 2002 Trail Counter Data

Table 5.6-1 reports monthly total and average counts for the initial four trail counter locations, where data collection began on August 24 and ended December 31, 2002. The Bidwell Canyon section (Location #3) received the most use in every month of this period. From August through October, the Dan Beebe Trail near Oroville Dam Boulevard (Location #4) received the least use of the four locations. While the Roy Rogers Trail in the north part of the Loafer Creek area (Location #2) received the least use during November, the other three trail segments received substantial spikes in use. These increases were associated with an equestrian trail ride event and the Thanksgiving holiday period. The trail segment in the south Loafer Creek area (Location #1) received the least use during December, but trail use was low at all four locations during this period. Most trail use was recorded on weekends, although the Bidwell Canyon location received considerable weekday use as well, particularly during August and September.

The average number of individual trail users recorded each month was typically slightly more than twice the number of groups recorded, resulting in average group sizes between 1.5 and 1.8 people.

Table 5.6-1. Monthly summary of 6 a.m. to 6 p.m. trail counter data: 2002 counter locations (Phase 1).

Month	Location #1: Loafer Creek Loop (South Loafer Creek)		Location #2: Roy Rodgers Trail (North Loafer Creek)		Location #3: Dan Beebe Trail, Bidwell Canyon Campground		Location #4: Dan Beebe Trail, Oroville Dam Boulevard	
	Total Count	Daily Average	Total Count	Daily Average	Total Count	Daily Average	Total Count	Daily Average
August*	63	7.9	78	9.8	206	25.8	28	3.5
September	247	8.2	310	10.3	543	18.1	228	7.6
October	335	10.8	331	10.7	414	13.4	272	8.8
November	335	11.2	199	6.6	583	19.4	321	10.7
December	69	2.2	95	3.1	125	4.0	114	3.7

** The first full day of data from all four counters is for August 24, 2002; thus, the data pertain to the last eight days of the month only.*
Note: Locations #3 and #4 refer to the nearest developed site.
Source: EDAW, Inc. 2002.

5.6.1.1 Monthly Trail Use (2002)

Because counts were recorded for only eight days in August, three of the four trailheads showed fewer than 80 total users: 63 users on the Loafer Creek Loop Trail (Location #1), 78 users on the Roy Rogers Trail (Location #2), and 28 users on the Dan Beebe Trail near Oroville Dam Boulevard (Location #4). All three locations averaged fewer than ten users per day. However, the counter at Bidwell Canyon (Location #3) recorded 206 users, with a maximum of 59 counted on a single day and an average of about 26 per day.

In September, the daily average amount of use was about the same as in August at both of the Loafer Creek locations, with eight and ten users per day on the South and North Loops, respectively. The Bidwell Canyon location still recorded with 543 users for the month, and the largest daily average of about 18 users.

Use recorded at the Dan Beebe Trail location (near Oroville Dam Boulevard) remained the lowest of the four, although the daily average number of users doubled from August to September to nearly eight users per day. A maximum single-day count of 28–33 users was recorded at each of the four locations.

All but the Bidwell Canyon Trail counter recorded moderately increased user counts during October. The Loop Trail at Loafer Creek showed the biggest increase, rising from 247 user counts in September to 335 user counts in October, and increasing its average user count from about eight users per day in September to about 11 users per day in October. The total amount of use and average number of users per day was nearly the same for the Roy Rogers Trail. Average daily use recorded on the Dan Beebe Trail near Oroville Dam Boulevard was only slightly higher in October than in August and September, and it remained the least used trail section. Use dropped somewhat at the Bidwell Canyon location in October to 414 users, about 13 per day, but that location once again recorded the most use for the month. The maximum single-day count recorded at the Loafer Creek and Bidwell Canyon locations ranged from 52–57 users, while the maximum for the Dan Beebe Trail near Oroville Dam Boulevard was 28.

During November, user counts went down by about two-thirds for the Roy Rogers Trail, to just over six users per day, while use remained steady on the Loafer Loop Trail. At the Bidwell Canyon location, use rebounded to a level similar to that recorded in September, with more than 580 counter crossings recorded for the month. At the Dan Beebe Trail near the Oroville Dam Boulevard counter location, daily use increased moderately from the previous two months to just over 10 users per day. Several of the counters recorded maximum counts, well above the average for the month, on the day of an equestrian trail ride event (November 2, 2002). More than 160 users were counted on the Dan Beebe Trail near the Bidwell Canyon Campground, and nearly 70 were counted by the counter near Oroville Dam Boulevard. High counts were also recorded during the week of the Thanksgiving holiday, with 93 counted on the Loafer

Creek Loop Trail and 112 on the Dan Beebe Trail near the Bidwell Canyon Campground.

During December, use of all four trail segments fell sharply compared to previous months. Total user counts were less than 100 for both Loafer Creek trail locations and were only moderately higher at the two Dan Beebe Trail locations. Daily counts averaged between two and four trail users at all locations and no use was recorded most days during the second half of the month. Maximum daily counts were 17–24 trail users at each location.

5.6.2 Summary of 2003 Trail Counter Data

Table 5.6-2 reports monthly total and average counts for the second group of four trail counter locations, where the counters were reinstalled on January 3, 2003. The counters remained in these locations for at least five months at all four locations, and as long as eight months at one location. The counters at Locations #5 and #6 were moved to new sites for the last three to four months of data collection. Theft and other field problems resulted in loss of several weeks of data for Locations #7 and #8.

Table 5.6-2. Monthly summary of 6 a.m. to 6 p.m. trail counter data: 2003 counter locations (Phase 2).

Month	Location #5: Dan Beebe Trail, Saddle Dam TA		Location #6: Dan Beebe Trail, Lakeland Boulevard TA		Location #7: Brad Freeman Trail, Burma Road		Location #8: Brad Freeman Trail, Tres Vias Road TA	
	Total Count	Daily Average	Total Count	Daily Average	Total Count	Daily Average	Total Count	Daily Average
January[a]	39	1.4	20	0.7	No data[b]	No data[b]	3	0.3
February	26	0.9	31	1.1	No data[b]	No data[b]	14	0.5
March	150	4.8	44	1.4	49	2.5	9[c]	0.6[c]
April	282	9.4	214	9.3	196	6.5	No data[d]	No data[d]
May	359	11.6	60[e]	2.1[e]	82[f]	8.2[f]	14[g]	0.7[g]
June	337	11.2	No data	No data	No data[h]	No data[h]	6	0.2
July	No data	No data	No data	No data	No data[h]	No data[h]	9	0.3
August	No data	No data	No data	No data	No data[h]	No data[h]	2	0.1
September	No data	No data	No data	No data	No data[h]	No data[h]	0	0.0

[a] *Counters were placed in the field on January 3, 2003; first full day of data is for January 4.*
[b] *Data for January and February were lost when counter was stolen.*
[c] *Data for March are for first 14 days of month only. An ant infestation began causing miscounts on March 15.*
[d] *Most data for April were unusable because of the ant infestation of the installation site. Data from several 2- to 4-day periods when the infestation was temporarily controlled indicate that no trail users passed most days.*
[e] *Data for May do not include last 2 days of month because of theft of counter batteries.*
[f] *Data for May are for first 10 days of month only; counter theft caused loss of remaining data for month.*
[g] *Data for May are for last 21 days of month only; on May 10, 2003, counter was moved 1,000 feet to new site near trailhead gate after failure to eradicate ants at original location.*
[h] *Counter was stolen from field in mid-May and was not replaced.*
Source: EDAW, Inc. 2003.

5.6.2.1 Monthly Trail Use (2003)

The Dan Beebe Trail near the Saddle Dam TA (Location #5) received the most use during each month of this period except February. Use of the trails at all four locations was low through February, averaging one person or less per day. Use was low throughout the eight-month data collection period at the Tres Vias Road TA location of the Brad Freeman Trail (Location #8). However, use increased substantially at the other three locations during April. (Only intermittent data are available for Location #8 for April, but they suggest that use remained low that month.)

Trail use near the Saddle Dam TA continued to increase during May and stayed steady during June. Use also increased during May on the Brad Freeman Trail near Burma Road (Location #7). However, theft of the counter limited data to the first ten days of the month. In contrast, use of the Dan Beebe Trail near the Lakeland Boulevard TA (Location #6) declined to a level similar to what was recorded earlier in the year.

Most use was recorded on weekends. Daily counts were less than 20 users most days, but were as high as 33 or 34 users at Locations #5, #6, and #7 during April and May.

The average group size was between 1.5 and 2.0 people at most locations each month, but averages were more often between 1.0 and 1.5 people at the Brad Freeman Trail location near the Tres Vias Road TA.

Table 5.6-3 summarizes the data collected at two final locations (Locations #9 and #10) after the relocation of the counters at Locations #5 and #6 during June and July. (The counter at Location #7 was stolen and the counter at Location #8 was left in place.) The counters were installed near each other in the southern Bidwell Canyon area, one on the Dan Beebe Trail and the other on the Kelly Ridge Trail. These installation locations were approximately midway between Location #3 near the Bidwell Canyon Campground and Location #5 near the Saddle Dam TA.

The data indicate that use of these trails was moderate during June and July, averaging five to ten users per day. During August, use appears to have increased considerably at both locations, with 20–60 user counts most days. A few user counts at each location were much higher; the maximum daily user count on the Kelly Ridge Trail was 96 trail users and the maximum on the Dan Beebe Trail was 271 users. It is possible that some of these counts were caused by deer or other animals, although this may be expected to occur during earlier months as well. It is also possible that increased use of the nearby shoreline by campers and boaters, made possible by falling reservoir levels, accounts for short-term increased use of the trails.

Table 5.6-3. Monthly summary of trail counter data: 2003 locations (Phase 3).

Month	Location #9: Dan Beebe Trail, Lower Bidwell Canyon		Location #10: Kelly Ridge Trail, Lower Bidwell Canyon	
	Total Count	Daily Average	Total Count	Daily Average
June	176[a]	8.8[a]	No data	No data
July	119	4.3	121[b]	4.3[b]
August	1,015	35.0	736	23.7
September	14	1.3	188	17.1

[a] *First full day of data is for June 11, 2003.*
[b] *Counter was moved from previous location near Saddle Dam trailhead on July 3, 2003. First full day of data is for July 4, 2003.*
Source: EDAW, Inc. 2003.

6.0 CONCLUSIONS

This section discusses the distribution of use within the FERC Project 2100 boundary (Project area). Existing use numbers are synthesized to show the highest and lowest concentrations of use overall, during the recreation season and the off-season, and by weekday and weekend. Additional sites outside of the FERC boundary (Riverbend Park, Clay Pit SVRA, and Rabe Road Shooting Area) are not included in this analysis as they are not in the Project area and received less than one-half percent of total study area use. This section also discusses the most popular activities within the Project area along with a discussion regarding PAOT, VAOT, campground occupancy, and trail use. Information from this study will be used in relicensing studies *R8 – Carrying Capacity* and *R17 – Recreation Needs Analysis* to help determine carrying capacity of facilities and need for additional facilities.

6.1 USE DISTRIBUTION

Table 6.1-1 gives a summary of the existing recreation use within the Project area and the percent of the total use that occurs at each site. The sites that contributed the most to total use were the Bidwell Canyon BR/DUA/Marina, Lime Saddle BR/DUA/Marina, and Oroville Dam/Overlook DUA. These three sites accounted for about 30 percent of the total use in the Project area and about 60 percent of the use at Lake Oroville. Bidwell Canyon BR/DUA/Marina and Lime Saddle BR/DUA/Marina contributed more use in the four-month recreation season than in the eight-month off-season; the opposite was true for Oroville Dam/Overlook DUA. The Lake Oroville Visitors Center had twice as much use in the off-season as in the recreation season; as a result, this site was the third most used Lake Oroville site. Lime Saddle BR/DUA/Marina had about one-half the use in the off-season that it had in the recreation season. Generally, at similar reservoir-based recreation areas, 70 percent or more of the total use occurs during the recreation season (pers. comm., Wegge 2003). However, the Oroville Facilities are very close to the cities of Oroville, Chico, and Paradise and therefore receive a substantial amount of local use in the off-season.

There were a few sites that contributed relatively few RDs to total use: the Lime Saddle Group Campground, Loafer Creek Equestrian Campground, the trailhead accesses, and other dispersed use sites. The aforementioned campgrounds are fairly small and therefore cannot accommodate the amount of use that the larger campgrounds receive. In addition, the Lime Saddle Group Campground was closed for the entire off-season, reducing the amount of potential use at this site. The trailhead accesses are generally low-use sites. There was very little dispersed use because access to areas within the Project boundary away from developed sites is difficult due to steep topography and private ownership. It is difficult to access remote parts of the Project area where dispersed use could occur, and therefore there was little of this type of use; most use occurs at developed or designated sites.

Table 6.1-1. Distribution of existing use (recreation days) by site and general area.

Sites Grouped by General Area	Combined Seasons Total	% of Total for Study Area	Recreation season Total	% of Total for Study Area	Off-season Total	% of Total for Study Area
LAKE OROVILLE SITES	**911,183**	**54.9**	**518,472**	**55.8**	**392,711**	**53.9**
Bidwell Canyon Complex	217,709	13.1	133,365	14.3	84,344	11.6
Bidwell Canyon BR/DUA/Marina	195,457	11.8	117,209	12.6	78,248	10.7
Bidwell Canyon Campground	22,252	1.3	16,156	1.7	6,096	0.8
Loafer Creek Complex	89,544	5.4	63,741	6.9	25,803	3.5
Loafer Creek BR	29,246	1.8	25,160	2.7	4,086	0.6
Loafer Creek DUA	29,021	1.7	11,051	1.2	17,970	2.5
Loafer Creek Campground	23,531	1.4	21,068	2.3	2,463	0.3
Loafer Creek Group Campground	5,820	0.4	5,445	0.6	375	0.1
Loafer Creek Equestrian Campground	1,926	0.1	1,017	0.1	909	0.1
Lime Saddle Complex	162,220	9.8	113,036	12.2	49,184	6.7
Lime Saddle Campground	7,760	0.5	5,840	0.6	1,920	0.3
Lime Saddle Group Campground	920	0.1	920	0.1	—*	—
Lime Saddle BR/DUA/Marina	153,540	9.3	106,276	11.4	47,264	6.5
Spillway BR/DUA	80,516	4.9	41,018	4.4	39,498	5.4
Oroville Dam/Overlook DUA	189,765	11.4	84,779	9.1	104,986	14.4
Foreman Creek Car-top BR	14,413	0.9	8,657	0.9	5,756	0.8
Dark Canyon Car-top BR	7,009	0.4	4,268	0.5	2,741	0.4
Vinton Gulch Car-top BR	6,733	0.4	3,227	0.3	3,506	0.5
Nelson Bar Car-top BR	23,948	1.4	14,400	1.5	9,548	1.3
Stringtown Car-top BR	11,645	0.7	8,610	0.9	3,035	0.4
Saddle Dam TA	4,690	0.3	920	0.1	3,770	0.5
Enterprise BR	9,438	0.6	6,100	0.7	3,338	0.5
Lake Oroville Visitors Center	93,553	5.6	36,351	3.9	57,202	7.8
DIVERSION POOL SITES	**20,603**	**1.2**	**7,055**	**0.8**	**13,548**	**1.9**
Diversion Pool DUA	14,571	0.9	5,825	0.6	8,746	1.2
Lakeland Boulevard TA	4,004	0.2	920	0.1	3,084	0.4
Powerhouse Road TA	2,028	0.1	310	0.0	1,718	0.2

Table 6.1-1 (continued). Distribution of existing use (recreation days) by site and general area.

Sites Grouped by General Area	Combined Seasons Total	% of Total for Study Area	Recreation season Total	% of Total for Study Area	Off-season Total	% of Total for Study Area
THERMALITO FOREBAY SITES	**135,720**	**8.2**	**78,237**	**8.4**	**57,483**	**7.9**
North Thermalito Forebay BR/DUA	86,065	5.2	46,215	5.0	39,850	5.5
South Thermalito Forebay BR/DUA	49,655	3.0	32,022	3.4	17,633	2.4
THERMALITO AFTERBAY SITES	**93,368**	**5.6**	**61,834**	**6.7**	**31,534**	**4.3**
Wilbur Road BR	12,637	0.8	7,901	0.8	4,736	0.6
Monument Hill BR/DUA	56,767	3.4	37,873	4.1	18,894	2.6
Larkin Road Car-top BR	23,073	1.4	15,855	1.7	7,218	1.0
East Hamilton Road TA	891	0.1	205	0.0	686	0.1
OROVILLE WILDLIFE AREA SITES	**318,462**	**19.2**	**191,118**	**20.6**	**127,347**	**17.5**
South OWA West Levee Road	91,437	5.5	60,211	6.5	31,227	4.3
South OWA East Levee Road	85,889	5.2	46,121	5.0	39,768	5.5
Thermalito Afterbay Outlet	84,966	5.1	55,048	5.9	29,918	4.1
Headquarters Entrance	56,170	3.4	29,738	3.2	26,432	3.6
ADDITIONAL SITES	**160,395**	**9.7**	**65,890**	**7.1**	**94,505**	**13.0**
Feather River Fish Hatchery	160,395	9.7	65,890	7.1	94,505	13.0
DISPERSED USE	**18,810**	**1.1**	**7,040**	**0.8**	**11,770**	**1.6**
Dispersed Use Sites	16,650	1.0	6,320	0.7	10,330	1.4
Other Dispersed Use Sites	2,160	0.1	720	0.1	1,440	0.2
TOTAL	**1,658,540**		**929,646**		**728,895**	

**This site was closed during the off-season.*
Note: Recreation season is from May 15, 2002, to September 15, 2002, and off-season is from September 16, 2002, to May 14, 2003. Dispersed sites include Old Nelson Bar, Parrish Cove, Nelson Avenue Bridge over Thermalito Forebay, Highway 162 Overlook, Canyon Creek Bridge, South Wilbur Road TA, Tres Vias Road TA, and Toland Road TA. "Other Dispersed Use Sites" includes any dispersed use occurring within the study area at sites other than those that are known dispersed sites (which are listed under "Dispersed Use Sites"). All values are in recreation days (RDs).
Sources: DPR 2003; DWR 2003; EDAW, Inc. 2003.

Not all geographic areas within the Project area received the same level of use. Table 6.1-2 shows how the different areas rank in terms of their percent contribution to total use, recreation season use, and off-season use. Sites around Lake Oroville account for 55 percent of the total use within the Project area year-round. The Lake Oroville area has the largest number of sites within the Project area, including the three sites that contribute the largest amount of use within the Project area. The area with the second greatest contribution to use is the OWA, which contributes about 20 percent of use within the Project area. Although this area is undeveloped, it is a very popular area for bank fishing because of the easy access to the Feather River provided by the levee roads. In combined recreation season and off-season use, the Feather River Fish Hatchery ranks as the third largest contributor; in the recreation season, however, it ranks fourth. This site received a substantial amount of sightseeing use from both individual visitors and tour groups. The hatchery contributed nearly twice the level of use in the off-season as in the recreation season. This is when the salmon runs occurred and thus when most people came to view the fish swimming upstream. The Thermalito Forebay contributed about eight percent of the use within the Project area, making it the fourth most used area (third during the recreation season). As for the Thermalito Afterbay, it ranked fifth in terms of contribution to use, with slightly more than five percent of the Project area's total use. The Diversion Pool and dispersed use sites only contributed about one percent each to use within the Project area, and thus rank sixth and seventh out of the seven geographical areas.

Table 6.1-2. Ranking of areas by percent contribution to existing use.

Ranking	Percent Contribution		
	Combined Season Use	Recreation Season Use	Off-Season Use
1. Lake Oroville	54.9	55.8	53.9
2. OWA	19.2	20.6	17.5
3. Feather River Fish Hatchery*	9.7	7.1	13.0
4. Thermalito Forebay	8.2	8.4	7.9
5. Thermalito Afterbay	5.6	6.7	4.3
6. Diversion Pool	1.2	0.8	1.9
7. Dispersed Use	1.1	0.8	1.6

* *In the recreation season, this site is ranked fourth.*
Sources: DPR 2003; DWR 2003; EDAW, Inc. 2003.

Use not only differs by season, but by weekday and weekend. Table 6.1-3 shows the percentage breakdown of weekday and weekend use in both the recreation season and the off-season at each site. Generally, in both seasons there was either the same amount or more total weekday use than total weekend use, and most sites did not differ in the ratio of weekday/weekend use between the two seasons. In total, the ratio of total weekday use to total weekend use was 60:40 in the recreation season and 64:36

in the off-season in the Project area. All sites had higher daily averages in the recreation season than in the off-season and most have higher daily averages on weekends than on weekdays (although there were lower daily averages on weekdays, there are more weekdays than weekend days, leading to more total weekday use than total weekend use).

In the recreation and off-seasons, most sites have between 50 and 70 percent weekday use and corresponding 30–50 percent weekend use. North Thermalito Forebay BR/DUA (recreation season) and Enterprise BR (both seasons) are exceptions, with less than 40 percent total weekday use. These two sites had a substantial amount of weekend use as shown by the average number of RDs per day. In the recreation season, North Thermalito Forebay BR/DUA had a weekday daily average of 217 RDs and a weekend daily average of 700 RDs, over three times larger than the weekday daily average. Enterprise BR had a weekday daily average of 25 RDs in the recreation season and a weekend daily average which is four times larger at 100 RDs. In the off-season, Enterprise BR had a weekday daily average of eight RDs and a weekend daily average of 30 RDs, almost four times larger than the weekday daily average.

In general, most sites did not differ in the ratio of weekday/weekend use between the recreation season and the off-season. At sites where the weekend to weekday usage ratio differed by ten percent or less, off-season weekday use accounted for this change. There were three sites that differed by more than 10 percent: the Loafer Creek BR (17.2 percent difference), the Loafer Creek DUA (21 percent difference), and the North Thermalito Forebay BR/DUA (27.7 percent difference). These sites had more total weekday use in the off-season than in the recreation season. As shown by the daily averages for off-season weekends, weekend use at these sites was 2 to 16 times higher in the recreation season than in the off-season. Therefore, with more weekdays than weekend days and less weekend use, more use accumulates at these sites on the weekdays in the off-season.

Table 6.1-3. Percent use at each site by weekday and weekend for the recreation season and the off-season.

Sites	Recreation season			Off-season		
	Total RDs for Season	% Weekday Use	% Weekend Use	Total RDs for Season	% Weekday Use	% Weekend Use
LAKE OROVILLE SITES	**518,472**	**60.6**	**39.4**	**392,711**	**65.4**	**34.6**
Bidwell Canyon Complex	133,365	62.7	37.3	84,344	68.9	31.1
Bidwell Canyon BR/DUA/Marina	117,209	63.0	37.0	78,248	69.0	31.0
Bidwell Canyon Campground	16,156	60.2	39.8	6,096	67.6	32.4
Loafer Creek Complex	63,741	53.5	46.5	25,803	71.1	28.9
Loafer Creek BR	25,160	53.2	46.8	4,086	70.4	29.6
Loafer Creek DUA	11,051	52.3	47.7	17,970	73.3	26.7
Loafer Creek Campground	21,068	52.6	47.4	2,463	62.7	37.3
Loafer Creek Group Campground	5,445	60.6	39.4	375	60.0	40.0
Loafer Creek Equestrian Campground	1,017	54.1	45.9	909	58.7	41.3
Lime Saddle Complex	113,036	63.5	36.5	49,184	65.9	34.1
Lime Saddle Campground	5,840	54.1	45.9	1,920	63.6	36.4
Lime Saddle Group Campground	920	53.8	46.2	—*	—	—
Lime Saddle BR/DUA/Marina	106,276	64.1	35.9	47,264	66.0	34.0
Spillway BR/DUA	41,018	47.5	52.5	39,498	52.9	47.1
Oroville Dam/Overlook DUA	84,779	69.0	31.0	104,986	67.8	32.2
Foreman Creek Car-top BR	8,657	57.5	42.5	5,756	65.9	34.1
Dark Canyon Car-top BR	4,268	56.4	43.6	2,741	56.4	43.6
Vinton Gulch Car-top BR	3,227	60.7	39.3	3,506	54.8	45.2
Nelson Bar Car-top BR	14,400	58.3	41.7	9,548	68.0	32.0
Stringtown Car-top BR	8,610	48.8	51.2	3,035	55.1	44.9
Saddle Dam TA	920	45.7	54.3	3,770	45.9	54.1
Enterprise BR	6,100	34.4	65.6	3,338	38.9	61.1
Lake Oroville Visitors Center	36,351	60.8	39.2	57,202	65.2	34.8
DIVERSION POOL SITES	**7,055**	**61.1**	**38.9**	**13,548**	**60.9**	**39.1**
Diversion Pool DUA	5,825	63.2	36.8	8,746	66.6	33.4
Lakeland Boulevard TA	920	45.7	54.3	3,084	44.9	55.1
Powerhouse Road TA	310	67.7	32.3	1,718	60.4	39.6

Table 6.1-3 (continued). Percent use at each site by weekday and weekend for the recreation season and the off-season.

Sites	Recreation season			Off-season		
	Total RDs for Season	% Weekday Use	% Weekend Use	Total RDs for Season	% Weekday Use	% Weekend Use
THERMALITO FOREBAY SITES	**78,237**	**47.4**	**52.6**	**57,483**	**63.9**	**36.1**
North Thermalito Forebay BR/DUA	46,215	39.4	60.6	39,850	67.1	32.9
South Thermalito Forebay BR/DUA	32,022	59.0	41.0	17,633	56.7	43.3
THERMALITO AFTERBAY SITES	**61,834**	**54.2**	**45.8**	**31,534**	**62.0**	**38.0**
Wilbur Road BR	7,901	53.4	46.6	4,736	63.9	36.1
Monument Hill BR/DUA	37,873	55.4	44.6	18,894	62.9	37.1
Larkin Road Car-top BR	15,855	51.7	48.3	7,218	59.6	40.4
East Hamilton Road TA	205	51.2	48.8	686	50.4	49.6
OROVILLE WILDLIFE AREA SITES	**191,118**	**57.8**	**42.2**	**127,344**	**58.1**	**41.9**
South OWA West Levee Road	60,211	59.1	40.9	31,226	58.4	41.6
South OWA East Levee Road	46,121	61.1	38.9	39,768	60.0	40.0
Thermalito Afterbay Outlet	55,048	61.1	38.9	29,918	68.5	31.5
Headquarters Entrance	29,738	44.2	55.8	26,432	43.1	56.9
ADDITIONAL SITES	**65,890**	**67.5**	**32.5**	**94,505**	**72.3**	**27.7**
Feather River Fish Hatchery	65,890	67.5	32.5	94,505	72.3	27.7
DISPERSED USE	**7,040**	**43.2**	**56.8**	**11,770**	**39.3**	**60.7**
Dispersed Use Sites	6,320	43.0	57.0	10,330	38.5	61.5
Other Dispersed Use Sites	720	44.4	55.6	1,440	44.4	55.6
TOTAL	**929,646**	**58.8**	**41.2**	**728,895**	**64.2**	**35.8**

** This site was closed during the off-season.*
Note: Recreation season is from May 15, 2002, to September 15, 2002, and off-season is from September 16, 2002, to May 14, 2003.
All values are in recreation days (RDs).
Sources: DPR 2003; DWR 2003; EDAW, Inc. 2003.

6.2 MOST POPULAR ACTIVITIES WITHIN THE PROJECT AREA

As Table 6.2-1 shows, boating access was the activity with the most RDs. Boating access accounted for more than 500,000 RDs, equaling about 30 percent of the total activity use within the Project area. This demonstrates that boating was the most popular activity in the Project area, and includes boat fishing, personal watercraft use, motorboating, houseboating, and water skiing. There are boat ramps at 16 of the 36 recreation sites, and a few other sites have undeveloped boat ramps, allowing for boating access at every geographical area within the Project area.

Sightseeing was the second most popular activity with more than 400,000 RDs and 26 percent of the total use within the Project area. There was some sightseeing activity at every geographic area within the Project area; however, it was at sites such as the Lake Oroville Visitors Center, Oroville Dam/Overlook DUA, and the Feather River Fish Hatchery (where sightseeing is the main use) that gave this activity such a high number of RDs.

Table 6.2-1. Ranking of activities in the Project area based on percent contribution to total use in Project area.

Activity	Percent contribution to total use in Project area	Number of RDs
1. Boating access	30.4	505,004
2. Sightseeing	26.5	439,179
3. Bank fishing	18.3	304,100
4. Picnicking	9.3	155,007
5. Swimming	6.1	100,896
6. Camping	3.8	62,339
7. Other	3.7	62,173
8. Trail use	1.0	15,984
9. Hunting	0.8	13,861
Total	**100**	**1,658,540**

Sources: DPR 2003; DWR 2003; EDAW, Inc. 2003.

Bank fishing was the third most popular activity with about 300,000 RDs, equaling about 18 percent of total use in the Project area. Bank fishing was especially popular at the car-top boat ramps and in the OWA. Picnicking was fourth in terms of percent contribution to total use, with about nine percent (155,000 RDs). There was some picnicking use at every geographic area in the Project area. Swimming, which occurred most at Loafer Creek DUA on Lake Oroville and at Thermalito Forebay and Thermalito Afterbay, was the fifth most popular activity, contributing about six percent of total use in the Project area. Camping was the sixth most popular activity with just under four percent of total use, followed closely by "other" use, which consists mainly of walking on

top of Oroville Dam and around North Thermalito Forebay BR/DUA. Trail use and hunting had the lowest percentage contribution to total use in the Project area (about 1 percent each).

6.3 PEOPLE-AT-ONE-TIME

Only a few sites fluctuate significantly between everyday use and holiday use based on PAOT observations: North Thermalito Forebay BR/DUA, South Thermalito Forebay BR/DUA, and Monument Hill BR/DUA. These sites had considerably more use on holidays than on non-holiday days. North Thermalito Forebay BR/DUA had 6–20 times as many people on the holidays (on average) as other sites. On average, North Thermalito Forebay BR/DUA had 8–80 times as many people as other sites on non-holidays.

6.4 VEHICLES-AT-ONE-TIME

At most sites, average VAOT on holidays was equivalent to or greater than the average non-holiday VAOT during the recreation season. Two sites—Bidwell Canyon BR/DUA/Marina and North Thermalito Forebay BR/DUA—had a substantial increase in the number of vehicles on holidays compared with non-holidays. These two sites had at least 100 more vehicles on holidays than on average weekends during the recreation season. Bidwell Canyon BR/DUA/Marina and North Thermalito Forebay BR/DUA/Marina had 2–30 times more vehicles than other sites on holidays (average) and 2–90 times more vehicles on non-holidays.

6.5 CAMPGROUND OCCUPANCY

All campgrounds had higher occupancy rates on weekends than on weekdays. Most also had peak occupancy rates in the recreation season and declining use in the off-season; however, the Loafer Creek Equestrian Campground had peak occupancy at the beginning and near the end of the off-season, possibly because of cooler weather or special equestrian events. The Loafer Creek Group Campground had the highest weekend occupancy rates, with every month in the recreation season at more than 65 percent occupancy, including two months with almost 100 percent weekend occupancy. Although both the Loafer Creek Equestrian Campground and Loafer Creek Group Campground reached maximum capacity on a few occasions, the Loafer Creek Campground and Lime Saddle Campgrounds did not reach maximum capacity on any days.

6.6 TRAIL USE

The trail counter data indicated that overall use of most trail sections was highest during October, with about 50–60 people using the trails on peak days. Sixty trail users during

one 12-hour daily count period is equivalent to an average of five per hour, a relatively low level of use. The highest use on individual days was recorded during parts of November, first during an annual equestrian trail ride event during the first week of the month and later during the Thanksgiving holiday period. From 100 to 160 trail users were recorded using certain trail sections on a single day at those times. Peak daily use during the remainder of November was 25–30 people per day, and slightly less during the first half of December.

The lowest use of the trails was recorded during the three-month period of mid-December through mid-March, with no use recorded on many days and peak use of ten or fewer people. Use increased somewhat during the spring period of mid-March through May, with as many as 30–35 people using the selected trails sections on peak days. Use declined during the summer months of June and July when the typical peak use was 15–30 people per day.

A search of the literature provided few comparable sites to help place these results into a suitable context. Data was not available for individual trails on the nearby Plumas National Forest. However, data from two other sites outside the region suggest the use levels measured in the Project area are somewhat lower than is typical. Trail use at Pinnacles National Monument in central California during 2002 (hikers only) ranged between 50 and 100 users per day for most trails, throughout most months of the year. Trail use for all multiple-use trails in the Hoosier National Forest in Indiana averaged between about 75 and 100 users per day during 2002 and 2003.

The sections of trails receiving the highest use were those in the Saddle Dam and Bidwell Canyon areas, where trail users can access the trails from several locations. Use was low to moderate most of the year at most other locations on the trail system, including trails in the Loafer Creek area and on the north and south sides of the Diversion Pool. Use was very low on the Brad Freeman Trail at the north end of the Thermalito Afterbay area, the only location in that general portion of the Project area where a counter was installed.

6.7 COLLECTION OF DATA RELATED TO EXISTING USE

Data sources used to estimate existing use include DWR traffic counters, DPR campground data, observational data, survey data, and other DPR data. Some data collection methods and equipment provided incomplete or inaccurate data, resulting in compromised accuracy and reliability. Incomplete traffic counter data, malfunctioning traffic counters, and improperly-completed data collection forms present opportunities for improving data collection methods. Improvements in data-collection protocols and standards have already been undertaken to help provide more accurate use estimates. Further data collection protocol revisions could include a formal schedule for traffic counter download; periodic maintenance, calibration, and--if necessary--reinstallation of

traffic counters; data collection training for agency staff; and scheduled reviews of data collection efforts. An improved data collection protocol could also include a description of the data collection process and content.

Regular inspection and maintenance of traffic counters, including download of counter data, could help prevent or minimize data loss due to equipment malfunction. Reinstallation of some counters to minimize double counting and inconsistent direction-of-travel counting will make the information more useful for estimating recreation use. Counters that do not cross both lanes of traffic tally all traffic in one direction, along with partial (erratic) traffic in the opposite direction. This error was difficult to estimate, rendering some counter data unusable. All of the traffic counters should consistently and accurately be triggered by traffic in either one lane or both.

Other traffic-counter related concerns include:

- The stem of the counter at North Thermalito Forebay does not work properly;
- The location of the Diversion Pool DUA and Stringtown Car-top BR counters may need to be reconsidered because vehicles could park above the counter and thus never cross the counter, slightly underestimating use;
- A counter at the Spillway BR/DUA would be useful in estimating existing use at the Spillway and at Oroville Dam; and
- All counters at locations where trailers may be crossing the counter should be set with a delay to avoid double counting trailers.

Since the discovery of the traffic counter problems, DWR has reset counters with a delay to avoid double counting trailers, and replaced the North Thermalito Forebay counter. DWR has also replaced counter loops to tally traffic in both directions at sites where all traffic in one direction and only partial traffic in the opposite direction was being counted. Due to overlapping data collection efforts, DWR and DPR should continue to coordinate attendance data collection to meet reporting responsibilities in the most efficient and accurate manner possible.

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7.0 REFERENCES

7.1 DOCUMENTS AND LITERATURE CITED

DPR (California Department of Parks and Recreation). 2003. Monthly Visitor Attendance Reports.

DWR (California Department of Water Resources). 2003. Data from traffic counters.

DWR and DFG. 1983. Agreement Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish & Wildlife. Sacramento, CA.

7.2 PERSONAL COMMUNICATIONS

Hofer, M., State Park Ranger I, Lake Oroville State Recreation Area, Northern Buttes District, California Department of Parks and Recreation, Oroville, California; personal communication with A. Lienemann, Environmental Planner, EDAW, San Francisco, California; October 2003.

Kastner, A., Hatchery Manager, Feather River Fish Hatchery, California Department of Fish and Game, Oroville, California; personal correspondence with I. Ferguson, Environmental Planner, EDAW, San Francisco, CA; July 2003.

See, E., Fisheries Biologist, California Department of Water Resources, Oroville, California; personal correspondence with A. Lienemann, Environmental Planner, EDAW, San Francisco, CA; February 2004.

Wegge, T., Principal, TCW Economics, Sacramento, California; personal correspondence with J. Vogel, Sr. Environmental Planner, EDAW, San Francisco, California; December 2003.

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APPENDIX A

Existing Use Data Collection Form

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Use Monitoring Data Collection Form

Staff name: _____

Location: _____

Day and Date: _____

Arrival Time: _____:_____ am / pm

Departure Time: _____:_____ am / pm

Weather Conditions: _____

_____

VEHICLES:

# of vehicles (cars/trucks): _____
# of RV's: _____

VEHICLES WITH TRAILERS:

# of vehicles with horse trailers: _____
# of RV's with horse trailers: _____

# of vehicles with boat trailers: _____
# of RV's with boat trailers: _____

# of vehicles with ORV trailers: _____
# of RV's with ORV trailers: _____

(a) RECREATION SITES

1.1	Dark Canyon Car Top BLR
1.2	Vinton Gulch Car Top BLR
1.3	Lime Saddle Campground
1.4	Lime Saddle DUA
1.5	Lime Saddle Boat Launch
1.6	Nelson Bar Car Top BLR
2.1	Goat Ranch Boat-in Camp
2.2	Bloomer Boat-in Camp
2.3	Foreman Crk. Boat-in Camp
3.1	Foreman Crk. Car Top BLR
3.2	Craig Saddle Boat-in Camp
3.3	Stringtown Car Top BLR
3.4	Enterprise Boat Launch Ramp
3.5	Loafer Creek Boat Launch
3.6	Loafer Creek Campground
3.7	Loafer Creek Eq. Camp
3.8	Loafer Creek DUA
4.1	Spillway DUA
4.2	Spillway Boat Launch Area
4.3	Oroville Dam/Overlook DUA
4.4	Kelly Ridge DUA
4.5	Bidwell Canyon Boat Launch
4.6	Bidwell Canyon DUA
4.7	Bidwell Canyon Campground
4.8	Saddle Dam DUA
5.1	Powerhouse Rd Trail Access
5.2	Lakeland Blvd. Trail Access
5.4	Feather River Fish Hatchery
5.5	Diversion Pool DUA
5.6	Forebay North DUA
5.7	Forebay South Boat Launch
5.8	Forebay South DUA
5.9	Riverbend Park/Fish Ponds
6.1	Wilbur Road Afterbay DUA
6.2	Model Airplane Facility
6.3	Monument Hill Afterbay DUA
6.5	Larkin Road Cat Top BLR
6.6	E. Hamilton Rd Trail Access
6.7	OWA: Afterbay Outlet
6.8	OWA: Clay Pit Shooting Area
6.9	OWA: Clay Pit ORV Area
6.10	OWA: HQ Entrance

Day Use Area/Car Top Launch Area Activities:

Activity	Count
Picnickers	
Swimmers	
Bank anglers	
General area use (relaxing in grassy areas, sunning, games, sports)	
Other…. Describe:	
TOTAL # OF PEOPLE ON-SITE:	

Camping Area Use:

Use Indicators for OWA camp areas	Count
a. number of camping groups	
b. number of RV's present	
c. number of tents present	
Use indicators for **Boat-in Camps**	
a. number of boats on shore (not including day-users boats)	
b. number of sites occupied	

NOTES:

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