Table 5.1-1. Distance from Lake Oroville to other water bodies.

Water Body	Miles from Lake Oroville (Oroville, CA)
Black Butte Lake (Orland, CA)	43
Bucks Lake Recreation Area (Bucks Lake, CA)	48
Bullard's Bar Reservoir (Challenge, CA)	58
Butt Valley Reservoir (Caribou, CA)	59
Clear Lake (Clearlake, CA)	98
East Park Reservoir (Lodoga, CA)	72
Englebright Lake (Smartville, CA)	40
Folsom Reservoir (Folsom, CA)	71
Indian Valley Reservoir (Barkerville, CA)	87
Lake Almanor (Lake Almanor, CA)	95
Lake Berryessa (Napa, CA)	122
Lake Pillsbury (Potter Valley, CA)	135
Lake Spaulding (Camp Spaulding, CA)	83
Lake Tahoe (Tahoe City, CA)	122
Little Grass Valley Reservoir (La Porte, CA)	50
Shasta Lake (Shasta Lake, CA)	100
Stony Gorge Reservoir (Elk Creek, CA)	64
Trinity Lake (Trinity Center, CA)	160
Upper Feather River Reservoirs (Portola, CA)	115
Whiskeytown Lake (Whiskeytown, CA)	104

Source: EDAW 2004

5.1.1.3 Recreation Activities at Regional Lakes and Reservoirs

The type and number of recreation activities provided at each of the 22 regional water bodies and surrounding lands are provided in Table 5.1-2. Many other water bodies provide similar recreation opportunities.

5.1.1.4 Visitation at Regional Lakes and Reservoirs

Annual visitation varies by water body, with the Oroville Facilities ranking fourth in total visitation. The approximate visitation levels at the analyzed regional water bodies are listed in Table 5.1-3.

5.1.1.5 Popularity of Regional Lakes and Reservoirs

Based on responses to the Household Survey (conducted as part of Study R-13 – *Recreation Surveys*), Lake Oroville ranked fifth in visitor popularity (31.5 percent of respondents had visited Lake Oroville) among Northern California lakes, reservoirs, and rivers that offer recreational opportunities similar to Lake Oroville. Overall, Lake Tahoe was the Northern California water body identified as receiving the most visitation (63.5 percent of respondents had visited the site)[1].

[1] The Sacramento River and the American River are two popular recreation resources in the Northern California region that each received more visitation than Lake Oroville (49.3 and 31.8

Table 5.1-2. Popular recreation activities available at regional lakes and reservoirs.

Reservoir or Lake	Boating	PWC use	Water-skiing	Wind-surfing	Camping	Boat-in camping	Group camping	Picnicking	Swimming	Fishing	Hiking	Other	Number of activities at site (of 12)
Black Butte Lake	X	X	X	X	X		X	X	X	X	X		10
Bucks Lake Recreation Area	X	X	X		X		X	X	X	X	X		9
Bullard's Bar Reservoir	X	X	X		X	X		X	X	X	X		9
Butt Valley Reservoir	X				X			X	X	X	X		6
Clear Lake	X	X	X	X	X		X	X	X	X			9
East Park Reservoir	X			X	X		X	X	X	X	X	X	9
Englebright Lake	X	X	X		X	X	X	X	X	X			9
Folsom Reservoir	X	X	X	X	X			X	X	X			8
Indian Valley Reservoir	X				X	X		X	X	X	X	X	8
Lake Almanor	X	X	X		X		X	X	X	X			8
Lake Berryessa	X	X	X	X	X			X	X	X			8
Oroville Facilities	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**12**
Lake Pillsbury	X	X	X	X	X	X		X	X	X			9
Lake Tahoe	X	X	X	X	X	X	X	X	X	X	X	X	12
Shasta Lake	X	X	X		X		X	X	X	X	X		9
Lake Spaulding	X		X	X	X			X	X	X			7
Little Grass Valley Reservoir	X	X	X		X			X	X	X	X	X	9
Stony Gorge Reservoir	X	X	X	X	X		X	X	X	X			9
Trinity Lake	X	X	X		X	X	X	X	X	X			9
Upper Feather River Reservoirs:													
Antelope	X	X	X		X			X	X	X	X	X	9
Frenchman	X	X	X		X			X	X	X	X	X	9
Davis	X				X			X	X	X	X	X	7
Whiskeytown Lake	X	X	X	X	X			X	X	X			8
Number of sites offering activity (of 23)	**23**	**18**	**19**	**11**	**23**	**7**	**11**	**23**	**23**	**23**	**13**	**8**	**Average: 9**

Source: Stienstra 2000.

percent of respondents had visited the sites, respectively). However, recreation at these rivers has not been analyzed in detail as the sites do not provide reservoir-based recreation experiences comparable to Lake Oroville. In addition, a group of recreation resources described as "Other Lakes" were also recorded to receive more visitation than Lake Oroville (33.3 percent of respondents reported visiting "Other Lakes"), though the specific areas of visitation were not reported.

Table 5.1-3. Visitation at regional lakes and reservoirs.

Water Body	Approximate Annual Visitation
Upper Feather River Reservoirs:	
Antelope Lake	24,500
Frenchman Lake	240,000
Lake Davis	145,000
Lake Pillsbury	10,000
Little Grass Valley Reservoir	25,000
Lake Spaulding	27,600
Butt Valley Reservoir	37,500
Indian Valley Reservoir	less than 50,000
Stony Gorge Reservoir	50,000
East Park Reservoir	53,000
Bullard's Bar Reservoir	60,000
Bucks Lake Recreation Area	80,700
Clear Lake	100,000
Englebright Lake	105,000
Lake Almanor	185,600
Black Butte Lake	350,000
Trinity Lake	750,000
Whiskeytown Lake	750,000
Folsom Reservoir	1,000,000
Lake Oroville	**1,700,000**
Shasta Lake	2,000,000
Lake Berryessa	1,500,000 to 2,000,000
Lake Tahoe	4,400,000

Source: Study R-14 – Assessment of Regional Recreation and Barriers to Recreation

Folsom Reservoir was the next most visited reservoir after Lake Oroville (27.3 percent of respondents had visited the site), while Shasta Lake has been visited by 22.8 percent of respondents. The following provides detailed descriptions of these other most popular regional water bodies with recreation areas (see Study R-14 for additional details regarding the other analyzed water bodies).

Lake Tahoe

Lake Tahoe is located on the California-Nevada border in the Sierra Nevada Mountains. The lake is substantially larger than Lake Oroville, at 22 miles long and 12 miles wide, and has 72 miles of shoreline and 122,200 surface acres at an elevation of 6,225 feet. The land surrounding the lake consists of USDA Forest Service (USFS) property as well as several California and Nevada state parks. At Lake Tahoe, there are 15 marinas, 14 paved boat ramps, 23 developed beaches, and 2 undeveloped beaches. There are also 11 campgrounds and boat-in campsites on the lake, as well as additional campgrounds in the vicinity (Stienstra 2003). Popular summer activities include camping, boating, fishing, backpacking, hiking, biking, and horseback riding. Winter activities in the Lake Tahoe vicinity include downhill skiing, cross-country skiing, snowshoeing, snowboarding, and snowmobiling (Wildernet 2003).

Overall, approximately 4.4 million people visit the Lake Tahoe basin each year for a variety of tourist and recreation opportunities.

Folsom Lake

Folsom Lake is located at the base of the Sierra foothills northeast of Sacramento in the Folsom Lake State Recreation Area. The reservoir covers 12,000 acres and has 75 miles of shoreline (Stienstra 2000). Popular activities at Folsom Reservoir include boating (15 ramp lanes), water-skiing, personal watercraft (PWC) use, fishing, windsurfing, picnicking (190 sites), camping (two campgrounds with a total of 170 sites), and swimming. There is one full-service marina at the reservoir. The State Recreation Area (SRA) is managed by DPR and includes a vast network of horseback riding, hiking, and jogging trails (Stienstra 2000). Overall, Folsom Reservoir is estimated to host approximately 1 million recreation visitor days (RVDs) annually (DWR 2001).

Shasta Lake

Shasta Lake is a 29,500-acre reservoir, with 370 miles of shoreline, that is the largest reservoir in California and the keystone of the federal Central Valley Project. As such, Shasta Lake is one of the most popular water-based recreation areas in the State. One of three reservoirs within the Whiskeytown-Shasta-Trinity National Recreation Area, most of the recreation facilities at Shasta are operated by the USFS, with the exception of several private marina facilities that are operated under special use permits. Popular activities at the reservoir include non-motorized and motorized boating (notably house-boating), swimming, fishing, camping, picnicking, and hiking. There are 750 developed campsites (including group sites) at the reservoir in addition to many other primitive boat-in camping areas scattered around the shoreline. Other available recreation resources include an off-highway vehicle (OHV) area (DWR 2001). Overall, Shasta Lake experiences high visitation, particularly on summer weekends (DWR 2001; Stienstra 2000).

5.1.1.6 Regional Opportunities for Popular Recreation Activities

As reported in responses to visitor surveys regarding recreation activities pertinent to planning at Lake Oroville, the most popular recreation activities in the Central and Northern California region are, in order of popularity:

- Camping
- Hiking
- Fishing
- Sightseeing
- Picnicking
- Swimming
- Non-consumptive wildlife activities

- Power boating
- Mountain biking
- Bird hunting
- Big game hunting
- Horseback riding

While opportunities to pursue each of these activities exist at Lake Oroville, a number of the other regional lakes and reservoirs also offer opportunities to pursue these activities. Specific water bodies that are notably associated with particular popular activities are described in the following discussion. These activities are discussed in order of their popularity at Lake Oroville.

Fishing (Boat and Bank)

Licensed fishing opportunities are available at each of the regional lakes and reservoirs that were analyzed. Lake Oroville and Clear Lake are noted to provide some of the best bass fishing in the region.

Power Boating

Developed boat ramps are available at most of the regional lakes and reservoirs that were analyzed. In addition, marinas were available at nearly half of the studied areas. The recreation locations offering the largest boatable surface water acreages (over 25,000 acres) include Lake Tahoe, Clear Lake, Shasta Lake, and Lake Almanor. Lake Oroville, Lake Berryessa, Trinity Lake, and Folsom Reservoir each provides over 10,000 acres of boatable surface acreage.

Swimming and Sunbathing

Swimming and sunbathing opportunities are available at each of the studied lakes and reservoirs. There appears to be a latent demand for swimming and sunbathing access from shorelines at reservoirs and lakes in the region.

Horseback Riding

Among the regional lakes and reservoirs that were analyzed, opportunities for horseback riding are popular at Lake Oroville, Folsom Reservoir, Little Grass Valley Reservoir, and Lake Tahoe. Horseback riding opportunities are also provided within Northern California at several National Forests.

Camping

Opportunities for recreation vehicle (RV) and tent camping are offered at each of the regional lakes and reservoirs that were analyzed. Boat-in campsites are also provided at Lake Oroville, Bullard's Bar Reservoir, Englebright Lake, Indian Valley Reservoir, Lake Pillsbury, Lake Tahoe, Shasta Lake, and Trinity Lake.

Group Camping is available at Black Butte Lake, Bucks Lake Recreation Area, Clear Lake, East Park Reservoir, Englebright Lake, Lake Almanor, Lake Oroville, Lake Tahoe, Shasta Lake, Stony Gorge Reservoir, and Trinity Lake. Camping opportunities also exist in Northern California at several USFS facilities. Within Northern California, and throughout most Western states, floating campsites are only provided at Lake Oroville.

Picnicking

Picnicking is common at each of the regional lakes and reservoirs. Picnicking opportunities also exist in Northern California at several National Forest recreation sites east of Lake Oroville.

Hiking

Opportunities for hiking are available on many lands adjacent to most of the reservoirs. In addition, there are opportunities for hiking in Northern California at several USFS recreation areas, such as Plumas and Lassen National Forests, and on National Park Service (NPS)-managed lands such as Lassen Volcanic National Park.

Conclusions Regarding Regional Recreation Resources

Overall, many of the opportunities for recreational activities offered at Lake Oroville are also provided at other regional lakes and reservoirs. However, Lake Oroville offers a wide variety of recreational settings and opportunities. Lake Oroville is also the largest boatable surface acreage within a 50-mile radius of the Oroville area. In addition, the Oroville facilities are unique, among the other analyzed regional water bodies, in providing floating campsites and exceptional fishing in both the Feather River and Project reservoirs.

5.2 OVERALL RECREATION NEEDS IN THE STUDY AREA

This section synthesizes overall “big picture” needs for recreation activities in the study area, both existing needs (current to 2010) and potential future needs. Recreation activities or needs that are analyzed include:

- Camping (RV and tent)
- Day use/picnicking
- Boating (power and non-power)
- Swimming and sunbathing
- Interpretation and education (I&E)
- Trail use (non-motorized)
- Fishing (boat and bank)
- Open space-related activities (hunting, wildlife observation/photography)
- Programmatic-related (overall law enforcement, monitoring, etc.)

Under each of these activities, this analysis presents and considers several factors including:

- Summary of overall needs
- Supply
- Demand
- Capacity
- Suitability
- Operations and maintenance

Table 5.2-1 presents a summary of existing and potential future recreation resource needs by activity type that should be considered in the Oroville Facilities study area. The table presents these needs in a summarized fashion, with more detail provided for each need or proposed action in the following sections. The table is organized by activity type with overall recreation needs(s) identified by these types. Existing recreation needs or deficiencies (current to 2010) and potential future recreation needs (2011 to anticipated new license term) are then identified. Within these two timeframes (existing and future), the recreation needs are further divided into capital improvements, operations and maintenance/programmatic, and other considerations. Other considerations are considered enhancements that are of lesser priority compared to the other two categories. Finally, references to supporting relicensing study results or other references are provided for each identified recreation need by activity type.

Following Chapter 5.0, which summarizes the results of overall "big picture" needs by activity type, conclusions about site-specific needs are further defined in Chapter 6.0 of this study.

5.2.1 Overall Camping Needs in the Study Area

The overall camping needs in the study area are presented first. Subsequent sections provide the detailed analysis of overall camping supply, demand, capacity, suitability, and operations and maintenance factors to support these overall findings of need. Site-specific camping needs are discussed in Chapter 6.0.

Camping needs analyzed in the study area focus primarily on developed campgrounds (RV and tent) and group campgrounds, though primitive and dispersed campsites are also briefly discussed. Boat-in campgrounds and floating campsites are discussed separately in Section 5.2.3—Overall Boating Needs in the Study Area.

Camping-related needs were determined by comparing the existing supply of and demand for camping facilities, as well as reviewing camping-specific capacity, suitability, and operations and maintenance factors that affect recreational use in

the study area. The following relicensing studies investigated and evaluated camping-specific factors in the study area and were reviewed during this needs analysis:

- Study R-3 – *Assessment of the Relationship of Project Operations and Recreation* (see Sections 5.2 and 5.4)
- Study R-6 – *ADA Accessibility Assessment* (see Sections 5.1.3 and 6.0)
- Study R-8 – *Recreation Carrying Capacity* (see Sections 4.1.3, 5.2.2, 5.5.2.5, 6.0, 6.1, and 6.3)
- Study R-9 – *Existing Recreation Use* (see Sections 5.1, 5.2.2.3, 5.5, and 6.5; see Tables 5.1-1 through 5.1-3, 5.2-1 through 5.2-5, 5.2-10, and 5.5-1 through 5.5-3; see Figures 5.5-1 through 5.5-6)
- Study R-10 – *Recreation Facility Inventory and Condition* (see Section 5.1.1)
- Study R-11 – *Recreation and Public Use Impact Assessment* (see Section 5.2.2.2; see Tables 5.2-1, 5.2-4, and 5.2-5)
- Study R-12 – *Projected Recreation Use* (see Sections 5.1 through 5.3; see Tables 5.3-1 through 5.3-3)
- Study R-13 – *Recreation Surveys* (see Sections 5.1.1.5 through 5.1.1.7, 5.1.2.1, 5.1.2.6, 5.1.4, 5.3, and 5.4; see Tables 5.1-8 through 5.1-11, 5.1-15, 5.1-16, and 5.1-25)
- Study R-14 – *Assessment of Regional Recreation and Barriers to Recreation* (see Sections 5.1, 5.2, 5.3.1, 5.3.5, and 5.4; see Tables 5.3-2 through 5.3-4. 5.3-7, and 5.4-6)
- Study R-15 – *Recreation Suitability* (see Section 6.2)

A more detailed analysis of camping-related factors can be found in each of these reports listed above. A summary of applicable supply, demand, capacity, suitability, and operations and maintenance factors is presented to provide context for framing the analysis of overall camping-related needs in the study area. Chapter 6.0 relates these overall camping needs to specific existing and/or potential future developed recreation sites in the study area.

5.2.1.1 Overall Camping Needs in the Study Area

Based on a review of the factors and indicators summarized later in this analysis, overall camping needs and potential options to address these needs have been identified in the study area. These needs should not be assumed to be PM&E measures. Site-specific Project-related camping options are discussed in proposed Chapter 6.0. Overall existing and future camping needs and potential study area-wide and resource area-specific options to satisfy them are discussed below.

The factors and indicators that contributed the most in determining the overall camping needs in the study area are summarized in the following bullets.

Insert Table 5.2-1
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Table 5.2-1. Summary of Overall Existing and Potential Future Recreation Needs by Activity Type in the Oroville Facilities Area.

Recreation Activity Type / Programmatic	Overall Recreation Needs Identified by Activity Type and Programmatic Needs	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to New License Term)[1]			Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	
Camping (RV, tent, group)	Provide Adequate O&M - Continue to provide adequate O&M at developed recreation sites and use areas through the anticipated new license term		Continue to provide annual O&M at existing developed camping facilities			Continue to provide annual O&M at existing and potential future developed camping facilities		Study R-10, Section 5.1.1; FERC guidelines
	Provide Periodic Monitoring - Periodically monitor recreational use and visitor perceptions through the anticipated new license term, to determine when existing sites should be improved or enhanced, when new sites should be constructed, or when resource impacts require mitigation		Monitor use and impacts at existing developed campgrounds, as well as undeveloped camping areas			Continue to monitor use and impacts at existing and potential future developed campgrounds, as well as undeveloped camping areas		Study R-8, Sections 4.1.3 and 6.3; FERC guidelines; Resource protection
	Provide Adequate Camping Facilities - Provide additional camping capacity at Lake Oroville when the need is demonstrated by the proposed monitoring program				Consider providing approximately 75-100 additional RV/tent campsites and other group camps and related support facilities if and when needed, principally in the Lake Oroville resource area, to meet future needs based on monitoring results. Consider Loafer Creek and Lime Saddle Complexes as primary locations			Study R-8, Sections 4.1.3, 5.2.2, and 6.3; Study R-12, Section 5.3.1
	Provide For Accessibility - Continue to provide ADA-compliant facilities at developed recreation sites through the anticipated new license term. Modify as needed over the term of the new license as ADA guidelines are amended	Continue to provide ADA-compliant accommodations at all existing campgrounds, as guidelines are amended			Continue to provide ADA-compliant accommodations at all existing and new campgrounds, as guidelines are amended			Study R-6, Section 5.1.3, Section 6.0; FERC guidelines

Table 5.2-1. Summary of Overall Existing and Potential Future Recreation Needs by Activity Type in the Oroville Facilities Area.

Recreation Activity Type / Programmatic	Overall Recreation Needs Identified by Activity Type and Programmatic Needs	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to New License Term)[1]			Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	
	Provide Hardened Use Areas and Monitoring - Harden some existing dispersed use sites to minimize resource impacts and to provide additional visitor access. Monitor user impacts over the term of the anticipated new license and harden or close sites as necessary	Harden or close some existing primitive, undeveloped campsites to minimize resource impacts	Monitoring use and impacts at sensitive shoreline dispersed campsites and use areas commonly used for camping		Continue to harden or close some primitive, undeveloped campsites (if needed) to minimize resource impacts, based on monitoring results	Continue to monitor use and impacts at sensitive shoreline dispersed campsites and use areas commonly used for camping		FERC guidelines; Study R-11, Section 5.2.2.2, Tables 5.2-4 and 5.2-5; Study R-8, Section 6.1
Day Use / Picnicking	Provide Adequate O&M - Continue to provide adequate O&M at developed recreation sites and use areas through the anticipated new license term		Continue to provide annual O&M at existing developed day use/picnic facilities			Continue to provide annual O&M at existing and potential future developed day use/picnic facilities		FERC guidelines
	Provide Hardened Use Areas and Monitoring - Harden some existing dispersed use sites to minimize resource impacts and to provide additional visitor access. Monitor user impacts over the term of the anticipated new license and harden or close sites as necessary	Harden or close some existing dispersed shoreline day use sites to minimize resource impacts and to provide additional visitor access	Monitor use and potential resource impacts at sensitive dispersed shoreline day use sites; Monitor recreational use of existing developed day use facilities		Continue to harden or close some dispersed shoreline day use sites to minimize resource impacts and to provide additional visitor access, if needed, based on monitoring results	Continue to monitor use and potential resource impacts at sensitive dispersed shoreline day use sites; Continue to monitor recreational use of existing and potential future developed day use facilities		Study R-11, Section 5.2.2, Table 5.2-1; FERC guidelines; Resource protection
	Provide Adequate Shoreline Access / Day Use Facilities - Where feasible, provide new shoreline day use facilities including improved and/or new shoreline access areas and additional regulatory and information signs	Provide additional shoreline access and shoreline day use facilities in several resource areas			Continue to provide additional shoreline access and day use facilities in several resource areas, if needed, based on monitoring results			Study R-9, Sections 5.2.1 and 5.2.2; Study R-12, Sections 5.2.1.2, 5.2.2.3, and 5.3, Tables 5.3-1, 5.3-2, and 5.3-3; Study R-13, Sections 5.1.1.5, 5.1.1.6, 5.1.2.5, and Table 5.1-28
	Manage Public Use and Resources - Develop and implement additional measures related to managing resource impacts and enhancing visitor safety	Provide additional sanitation facilities (vault toilet buildings) in the OWA						Study R-13, Section 5.1.2, Table 5.1-28

Table 5.2-1. Summary of Overall Existing and Potential Future Recreation Needs by Activity Type in the Oroville Facilities Area.

Recreation Activity Type / Programmatic	Overall Recreation Needs Identified by Activity Type and Programmatic Needs	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to New License Term)[1]			Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	
	Provide For Accessibility - Continue to provide ADA-compliant facilities at developed recreation sites through the anticipated new license term. Modify as needed over the term of the new license as ADA guidelines are amended	Continue to provide ADA compliance at day use facilities, as guidelines are amended			Continue to provide ADA compliance at existing and potential future day use facilities, as guidelines are amended			Study R-6, Section 5.1.1; FERC guidelines; ADA compliance
	Consider Clustering Potential - Where feasible and cost-effective, cluster developed recreation facilities (e.g., picnic areas, trails, campgrounds, group camps, boat ramps, etc.) to provide increased synergy among recreation opportunities and to enhance visitor satisfaction			Consider incorporating additional picnicking facilities with other developed shoreline facilities to enhance the visitor experience				Professional judgment
Boating	Provide Adequate O&M - Continue to provide adequate O&M at developed recreation sites and use areas through the anticipated new license term		Continue to provide annual O&M at existing developed boating facilities			Continue to provide annual O&M at existing and potential future developed boating facilities		FERC guidelines
	Provide Periodic Monitoring - Periodically monitor recreational use and visitor perceptions through the anticipated new license term, to determine when existing sites should be improved or enhanced, when new sites should be constructed, or when resource impacts require mitigation		Monitor use of existing boating facilities and use areas			Continue to monitor use of existing and future boating facilities and use areas		FERC guidelines; Resource protection
	Provide Adequate Boating Facilities - Enhance existing boat ramps (specifically at Lake Oroville), among other actions	Provide additional parking at Lake Oroville boat ramps						Study R-17, Sections 5.5.1.1 and 5.5.1.4, Table 5.5-2

Table 5.2-1. Summary of Overall Existing and Potential Future Recreation Needs by Activity Type in the Oroville Facilities Area.

Recreation Activity Type / Programmatic	Overall Recreation Needs Identified by Activity Type and Programmatic Needs	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to New License Term)[1]			Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	
	Provide Adequate Boating Facilities - Enhance existing boat ramps (specifically at Lake Oroville), among other actions	Extend Lake Oroville developed boat ramps that have most frequently been unusable due to low reservoir pool level						Study R-7, Section 5.3.4, Table 5.3-4; Study R-3, Section 5.2.2.2, Table 5.2-2
	Provide Adequate Boating Facilities - Enhance existing boat ramps (specifically at Lake Oroville), among other actions	Install additional boarding docks at Lake Oroville boat ramps						Study R-7, Section 5.3.3
	Provide Adequate Boating Facilities - Enhance existing boat ramps (specifically at Lake Oroville), among other actions	Improve the condition of the Stringtown Car-top BR						Study R-3, Section 5.2.3.5; Study R-10, Section 5.1.4.16
	Provide Adequate O&M - Continue to provide adequate O&M at developed recreation sites and use areas through the anticipated new license term		Provide more frequent adjustment of Lake Oroville floating docks			Continue to provide more frequent adjustment of Lake Oroville floating docks		Field observations; Study R-7; Study R-10
	Provide Adequate O&M - Continue to provide adequate O&M at developed recreation sites and use areas through the anticipated new license term		Provide more frequent debris removal at Lake Oroville boat ramps			Continue to provide more frequent debris removal at Lake Oroville boat ramps		Field observations; Study R-7; Study R-10
	Provide For I&E - Obtain and provide real-time information on river flow and reservoir pool level and facility access		Provide boaters with additional information about Lake Oroville boat ramp closures, substitute boat ramp facilities, and reservoir pool levels					Study R-3, Section, 5.2.2.2, Tables 5.2-2 and 5.2-3; Study R-7, Section 5.4.9, Table 5.4-18
	Provide Adequate Boating Facilities - Enhance existing boat ramps (specifically at Lake Oroville), among other actions						Consider providing a potential new boater take-out, if feasible, or a seasonal concession-aire-run tow service in the Big Bend area of the Upper North Fork Arm of Lake Oroville for use by whitewater boaters during peak boating times	Study R-16, Section 6.1.3

Table 5.2-1. Summary of Overall Existing and Potential Future Recreation Needs by Activity Type in the Oroville Facilities Area.

Recreation Activity Type / Programmatic	Overall Recreation Needs Identified by Activity Type and Programmatic Needs	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to New License Term)[1]			Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	
	Provide For I&E - Obtain and provide real-time information on river flow and reservoir pool level and facility access						Consider obtaining and providing real time information on river flows below Poe Powerhouse (coordinate with PG&E) and providing Lake Oroville pool level data to the public	Study R-16, Section 6.1.1
	Manage Public Use and Resources - Develop and implement additional measures related to managing resource impacts and enhancing visitor safety	Relocate the existing water-ski course at the Thermalito Afterbay to a more appropriate location, such as near Bidwell Canyon marina						Study T-9; Resource protection
	Manage Public Use and Resources - Develop and implement additional measures related to managing resource impacts and enhancing visitor safety		Reduce current power boat speeds in sensitive areas, such as the Thermalito Afterbay					Study R-4, Section 5.2.7.4, Table 6.1-1
	Provide Adequate Boating Facilities - Enhance existing boat ramps (specifically at Lake Oroville), among others	Provide additional car-top boat launching facilities, such as at the Diversion Pool						Study R-1
	Provide Adequate Camping Facilities - Provide additional camping capacity at Lake Oroville when the need is demonstrated by the proposed monitoring program	Provide additional floating campsites on Lake Oroville where feasible						Study R-7, Section 5.2, Table 5.2-13
	Provide Adequate Boating Facilities - Enhance existing boat ramps (specifically at Lake Oroville), among other actions				Consider providing additional future boating facilities if needed to accommodate additional use and demand based on monitoring results			Study R-12, Sections 5.3.2 and 5.3.3, Tables 5.3-2 and 5.3-3; Study R-13, Section 5.1.2.6, Table 5.1-26
Swimming and Sunbathing	Provide Adequate O&M - Continue to provide adequate O&M at developed recreation sites and use areas through the anticipated new license term		Continue to provide annual O&M at existing developed swimming facilities			Continue to provide annual O&M at existing and new developed swimming facilities		FERC guidelines

Table 5.2-1. Summary of Overall Existing and Potential Future Recreation Needs by Activity Type in the Oroville Facilities Area.

Recreation Activity Type / Programmatic	Overall Recreation Needs Identified by Activity Type and Programmatic Needs	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to New License Term)[1]			Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	
	Provide Periodic Monitoring - Periodically monitor recreational use and visitor perceptions through the anticipated new license term, to determine when existing sites should be improved or enhanced, when new sites should be constructed, or when resource impacts require mitigation		Monitor use of existing swimming areas			Continue to monitor use of swimming areas		FERC guidelines
	Manage Public Use and Resources - Develop and implement additional measures related to managing resource impacts and enhancing visitor safety	Investigate and implement actions that would protect existing water quality and would help reduce summer bacteria levels at selected swim beaches (to levels within established DHS criteria)						Preliminary data from Environmental Work Group; Studies W-1 and W-3; Resource protection; Health and safety
	Provide Adequate Swimming Facilities - If feasible and cost-effective, provide or improve swimming opportunities. Consider various options to meet this need	Provide improved swimming opportunities in the southern part of Lake Oroville, such as at the Loafer Creek Complex; Investigate the feasibility of options						Study R-3, Section 5.2.5, Table 5.2-6
	Provide Adequate Swimming Facilities - If feasible and cost-effective, provide or improve swimming opportunities. Consider various options to meet this need						Consider actions in the future that would potentially provide improved swimming opportunities in the West Branch arm of Lake Oroville, such as at an exposed Lime Saddle Complex (Loafer Creek is a higher priority site and 2 locations may be unnecessary or cost prohibitive)	Study R-3, Section 5.3.; Study R-15, Section 5.3, Figure 5.3-1

Table 5.2-1. Summary of Overall Existing and Potential Future Recreation Needs by Activity Type in the Oroville Facilities Area.

Recreation Activity Type / Programmatic	Overall Recreation Needs Identified by Activity Type and Programmatic Needs	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to New License Term)[1]			Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	
	Provide Adequate Swimming Facilities - If feasible and cost-effective, provide or improve swimming opportunities. Consider various options to meet this need	Provide swimming area enhancements at some car-top boat ramps, or other shoreline access areas, to improve dispersed swimming opportunities at Lake Oroville and elsewhere						Study R-3, Sections 5.2.5.2 and 5.3.4, Table 5.3-2; Study R-11, Section 5.2.2.1, Tables 5.2-1, 5.2-2
	Provide For Accessibility - Continue to provide ADA-compliant facilities at developed recreation sites through the anticipated new license term. Modify as needed over the term of the new license	Provide actions to increase the level of ADA accessibility to swimming areas at Lake Oroville						Study R-6, Section 5.3.3.6
	Provide Adequate Swimming Facilities - If feasible and cost-effective, provide or improve swimming opportunities at Lake Oroville. Consider various options to meet this need	If feasible and cost-effective, provide warmer water swimming opportunities in the lower part of the Oroville Facilities area, such as the Thermalito Forebay; Investigate the feasibility of options						Study R-3, Sections 5.1.1.2 and 5.2.6.1, Table 5.1-3
	Provide Adequate Swimming Facilities - If feasible and cost-effective, provide or improve swimming opportunities at Lake Oroville. Consider various options to meet this need				Consider providing additional swimming opportunities if needed to help accommodate increased swimming demand based on monitoring			Study R-8, Sections 5.5.2.3 and 5.5.2.5; Study R-12, Sections 5.3.2 and 5.3.3, Tables 5.3-2 and 5.3-3
Interpretation and Education (I&E)	Provide Adequate O&M - Continue to provide adequate O&M at developed recreation sites and use areas through the anticipated new license term		Continue to provide annual O&M at existing I&E-related facilities while improving the maintenance of some existing signs and interpretative facilities			Continue to provide annual O&M at existing and new I&E-related facilities		Study R-10, Table 6.0-2; FERC guidelines
	Provide For I&E - As part of a proposed I&E Program, provide various program elements including kiosks, signs, and information dissemination		Developed and implement an expanded I&E Program; As part of the proposed I&E Program, develop a visitor education component					Study R-2, Section 6.4, Professional judgment, resource protection and integration

Table 5.2-1. Summary of Overall Existing and Potential Future Recreation Needs by Activity Type in the Oroville Facilities Area.

Recreation Activity Type / Programmatic	Overall Recreation Needs Identified by Activity Type and Programmatic Needs	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to New License Term)[1]			Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	
	Provide For I&E - As part of a proposed I&E Program, provide various program elements including kiosks, signs, and information dissemination	Provide new educational and informational / directional kiosks and signs as part of a proposed I&E Program						Study R-10, Table 6.0-2; Professional judgment
	Provide For Accessibility - Continue to provide ADA-compliant facilities at developed recreation sites through the anticipated new license term. Modify as needed over the term of the new license as ADA guidelines are amended	Continue to provide ADA compliance at existing I&E-related facilities, as guidelines are amended			Continue to provide ADA compliance at existing and new I&E-related facilities, as guidelines are amended			Study R-6, Table 6.0-1
	Provide For I&E - As part of a proposed I&E Program, provide various program elements including kiosks, signs, and information dissemination			Consider providing new and/or enhanced nature trail opportunities to enhance visitor education				Study R-10, Table 5.1-6, professional judgment
Trail Use (Non-motorized)	Provide Adequate O&M - Continue to provide adequate O&M at developed recreation sites and use areas through the anticipated new license term		Continue to provide annual O&M at existing non-motorized trails			Continue to provide annual O&M at existing and new non-motorized trails		FERC guidelines
	Provide Periodic Monitoring - Periodically monitor recreational use and visitor perceptions through the anticipated new license term, to determine when existing sites should be improved or enhanced, when new sites should be constructed, or when resource impacts require mitigation		Periodically monitor use and impacts of existing non-motorized trails and trailheads			Continue to periodically monitor use and impacts of existing and new non-motorized trails and trailheads		FERC guidelines; Resource protection
	Provide Adequate Public Access to Project Lands - As part of a proposed Comprehensive Non-Motorized Trails Program, improve trail-related opportunities on Project lands		Develop a proposed Comprehensive Non-Motorized Trails Program					Study R-13, Section 5.1.2.6

Table 5.2-1. Summary of Overall Existing and Potential Future Recreation Needs by Activity Type in the Oroville Facilities Area.

Recreation Activity Type / Programmatic	Overall Recreation Needs Identified by Activity Type and Programmatic Needs	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to New License Term)[1]			Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	
	Provide Adequate Public Access to Project Lands - As part of a proposed Comprehensive Non-Motorized Trails Program, improve trail-related opportunities on Project lands	Improve selected trails to help reduce impacts from existing undeveloped user-defined trails			Consider improving additional selected trails to help reduce impacts from newly created undeveloped user-defined trails, based on monitoring			Study R-11, Sections 6.1.2.3 and 6.2.1
	Provide Adequate Public Access to Project Lands - As part of a proposed Comprehensive Non-Motorized Trails Program, improve trail-related opportunities on Project lands	Based on a proposed new Comprehensive Non-motorized Trails Program, develop new trail improvements such as new loop trail linkages, trails connecting visitor use areas within a complex or to the shoreline, and trailheads						Study R-13, Section 5.1.2.6; Study R-12, Section 4.1.5, Tables 4.1-1, 4.1-2, 4.1-3, and 5.2-7
Fishing (Boat and Bank)	Provide Adequate O&M - Continue to provide adequate O&M at developed recreation sites and use areas through the anticipated new license term		Continue to provide annual O&M at existing fishing-related facilities and maintenance of shorelines			Continue to provide annual O&M at existing and potential future fishing-related facilities and maintenance of shorelines		FERC guidelines; Resource protection; Study R-17, Section 5.3
	Provide Periodic Monitoring - Periodically monitor recreational use and visitor perceptions through the anticipated new license term, to determine when existing sites should be improved or enhanced, when new sites should be constructed, or when resource impacts require mitigation		Periodically monitor use of existing fishing facilities; Monitor shoreline sanitation and accumulated litter along the shoreline; Monitor fishing activity, especially crowding and capacity at the Afterbay outlet			Continue to periodically monitor use of existing and new fishing facilities; Monitor shoreline sanitation and accumulated litter along the shoreline; Monitor fishing activity, especially crowding and capacity at the Afterbay outlet		Section 5.3 - Programmatic Needs; Professional judgment; Resource protection; FERC guidelines
	Provide Adequate Visitor Management - Provide additional visitor management and law enforcement presence, especially in the OWA and during specific seasons of use		Provide additional law enforcement to enforce fishing and other regulations, particularly in the OWA			Continue to provide additional law enforcement to enforce fishing and other regulations, particularly in the OWA		Study R-4, Table 6.1-1

Table 5.2-1. Summary of Overall Existing and Potential Future Recreation Needs by Activity Type in the Oroville Facilities Area.

Recreation Activity Type / Programmatic	Overall Recreation Needs Identified by Activity Type and Programmatic Needs	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to New License Term)[1]			Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	
	Provide For I&E - As part of a proposed I&E Program, provide various program elements including kiosks, signs, and information dissemination	Post additional regulatory and informational signs where needed, particularly in the OWA						Study R-4, Table 6.1-1
	Manage Public Use and Resources - Develop and implement additional measures related to managing resource impacts and enhancing visitor safety	Provide additional trash receptacles, particularly in the OWA, along the Feather River, and at any new shoreline access area; Post additional signs at trash receptacles along the Feather River that remind users to put fish waste in the river rather than the trash	Provide additional trash pick-up at sites where trash accumulation is considered a high or extreme concern					Study R-4, Table 6.1-1
	Provide Adequate Fishing Facilities and Shoreline Access - Where feasible, provide new shoreline fishing-related facilities including improved and/or new shoreline access areas and additional regulatory and information signs			Consider providing open areas for temporary grandstands for use by organizations during fishing tournaments at Lake Oroville				Professional judgment
	Provide Adequate Fishing Facilities and Shoreline Access - Where feasible, provide new shoreline fishing-related facilities including improved and/or new shoreline access areas and additional regulatory and information signs	Provide additional shoreline access for fishing at developed recreation facilities						Studies R-3, R-5; Study R-17, Section 5.2.6, Trail Needs
	Provide Adequate Boating Facilities - Enhance existing boat ramps (specifically at Lake Oroville), among other actions	Provide actions to help address the needs identified under the boating and day use sections, which will also help address boat angler and parking-related boater needs						Study R-17, Section 5.2.2, 5.2.3

Table 5.2-1. Summary of Overall Existing and Potential Future Recreation Needs by Activity Type in the Oroville Facilities Area.

Recreation Activity Type / Programmatic	Overall Recreation Needs Identified by Activity Type and Programmatic Needs	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to New License Term)[1]			Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	
	Provide Adequate Fishing Facilities and Shoreline Access - Where feasible, provide new shoreline fishing-related facilities including improved and/or new shoreline access areas and additional regulatory and information signs				Consider providing additional fish cleaning station(s), if monitoring shows fish waste is becoming a problem			Professional judgment; Resource protection
	Provide Adequate O&M - Continue to provide adequate O&M at developed recreation sites and use areas through the anticipated new license term		Continue to provide an adequate fishery management program over the anticipated new license term			Continue to provide an adequate fishery management program over the anticipated new license term		Study R-4, Table 6.1-1
	Provide For Accessibility - Continue to provide ADA-compliant facilities at developed recreation sites through the anticipated new license term. Modify as needed over the term of the new license as ADA guidelines are amended	Provide additional ADA-accessible fishing piers or platforms in selected areas						Professional judgment; ADA accessibility
Other Open Space Dependent Activities	Provide Adequate O&M - Continue to provide adequate O&M at developed recreation sites and use areas through the anticipated new license term		Continue to provide annual O&M of existing recreation-related open space areas on Project lands; Provide periodic pick-up of litter at dispersed use areas			Continue to provide annual O&M of existing recreation-related open space areas on Project lands; Provide periodic pick-up of litter at dispersed use areas		FERC guidelines; Professional judgment, resource protection
	Provide Periodic Monitoring - Periodically monitor recreational use and visitor perceptions through the anticipated new license term, to determine when existing sites should be improved or enhanced, when new sites should be constructed, or when resource impacts require mitigation		Periodically monitor recreation use and impacts on Project open space lands			Continue to periodically monitor recreation use and impacts on Project open space lands		Study R-11, Section 6.1.2.2; FERC guidelines; Resource protection

Table 5.2-1. Summary of Overall Existing and Potential Future Recreation Needs by Activity Type in the Oroville Facilities Area.

Recreation Activity Type / Programmatic	Overall Recreation Needs Identified by Activity Type and Programmatic Needs	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to New License Term)[1]			Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	
	Adequately Manage Project Open space Resources - Maintain existing public undeveloped open space land for hunting, wildlife observation, and other dispersed activities. Provide adequate public access to these public lands		Continue to maintain the natural setting of existing Project open space areas and access points			Continue to maintain the natural setting of existing Project open space areas and access points		FERC guidelines; Professional judgment; Public access to Project lands; Diversity of recreation settings/ opportunities
	Manage Public Use and Resources - Develop and implement additional measures related to managing resource impacts and enhancing visitor safety			Consider additional litter pick-up at target practice area(s)				Study R-11, Section 5.2, Table 5.2-1
	Provide Adequate O&M - Continue to provide adequate O&M at developed recreation sites and use areas through the anticipated new license term			Consider opening locked gates in the OWA earlier for hunters, during peak hunting days				Study R-4, Section 6.1.8, Table 6.1-1
	Manage Public Use and Resources - Develop and implement additional measures related to managing resource impacts and enhancing visitor safety			While an indirect resource need, consider additional funding for habitat improvement for improved hunting opportunities in the OWA				Study R-4, Section 5.2.7.3, Section 6.1.9, Table 6.1-1
	Provide Adequate Visitor Management - Provide additional visitor management and law enforcement presence, especially in the OWA and during specific seasons of use (e.g., fishing and hunting seasons)		Provide additional law enforcement (Wardens) during hunting seasons					Study R-4, Section 6.1.5, Table 6.1-1
	Provide For I&E - As part of the proposed I&E Program, provide various program elements including kiosks, signs, and information dissemination			Consider designation of additional wildlife viewing areas in the OWA			Consider designation of additional wildlife viewing areas in the OWA	Professional judgment

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Recreation Activity Type / Programmatic	Overall Recreation Needs Identified by Activity Type and Programmatic Needs	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to New License Term)[1]			Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	
	Provide Hardened Use Areas and Monitoring - Harden some existing dispersed use sites to minimize resource impacts and to provide additional visitor access. Monitor user impacts over the term of the anticipated new license and harden or close sites as necessary	Close sensitive areas to OHV-use by installing additional vehicle barriers and posting signs			If needed, continue to close sensitive areas to OHV-use by installing additional vehicle barriers and posting signs, based on monitoring			Study R-11, Section 6.1.2.1
	Manage Public Use and Resources - Develop and implement additional measures related to managing resource impacts and enhancing visitor safety		Continue to provide OHV access and use at the Clay Pit SVRA			Continue to provide OHV access and use at the Clay Pit SVRA		Study R-11, Section 6.2.1
Programmatic Needs	Clarify agency recreation-related management responsibilities		Clarify agency recreation-related management responsibilities					Studies R-4 and R-5
	Develop and implement a proposed Recreation Monitoring Program	Implement proposed Recreation Monitoring Program capital measures	Implement proposed Recreation Monitoring Program O&M measures		Implement proposed Recreation Monitoring Program capital measures	Implement proposed Recreation Monitoring Program O&M measures		FERC guidelines; Resource protection
	Implement additional programmatic recreation-related operations and maintenance actions including: (1) managing OHV use impacts, (2) managing litter accumulation and dumping, (3) managing user defined trails, and (4) managing dispersed site pioneering and creep		Implement proposed management actions			Implement proposed management actions		Studies R-4 and R-11; Resource protection; Resource integration
	Implement additional safety-related actions over time including: (1) improved incident and accident reporting, (2) improved visitor education and management control, and (3) other additional safety-related actions over time		Implement additional safety-related actions as needed			Implement additional safety-related actions as needed		Study R-2

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		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	
	Develop and implement a proposed Wildland Fire Evacuation Plan for the OWA		Implement proposed OWA Wildland Fire Evacuation Plan measures			Implement proposed OWA Wildland Fire Evacuation Plan measures		Study R-4
	Develop and implement a proposed Comprehensive Non-motorized Trails Program	Implement proposed Trails Program capital measures	Implement proposed Trails Program O&M measures		Implement proposed Trails Program capital measures	Implement proposed Trails Program O&M measures		Studies R-10, R-13 and R-14
	Develop and implement a proposed Interpretation and Education Program	Implement proposed I&E Program capital measures	Implement proposed I&E Program O&M measures		Implement proposed I&E Program capital measures	Implement proposed I&E Program O&M measures		Resource protection; Studies R-1, R-2, R-4, R-5, R-10, R-11, R-13, and W-3

[1]Capital improvements are actions with one time costs such as construction of a facility; operations and maintenance (O&M) actions are annual or periodic non-construction actions or costs; programmatic actions are program-related actions that address broader needs; and "other considerations" are lesser priority needs that may also be considered.

Back of Table 5.2-1

Information from the above recreation studies supports these conclusions. The detailed discussion supporting these findings are found in the later supply, demand, capacity, and suitability sections that provide a more thorough analysis of overall camping the study area.

- In general, most of the developed campground facilities in the study area are currently in good condition and do not require immediate improvements and/or enhancements. However, ongoing operations and maintenance improvements, Americans with Disabilities Act (ADA)-accessibility enhancements, and routine upgrades of recreation facilities will likely be needed over the anticipated term of the new license based on normal wear and tear associated with use and normal service life expectancy.

- Overall, most visitors to the study area feel that the number of existing camping facilities is generally adequate. Although the minority, a notably large percentage of visitors feel that there are not enough existing camping facilities in resource areas where there currently are none.

- Existing use at many of the campgrounds in the study area is not considered to be at or exceeding facility capacity. However, with projected increases in population and demand over the expected license term, many of these campgrounds may experience increases in use and additional campground facilities (estimated to be approximately 75-100 campsites in the Lake Oroville area) will likely be needed in the future (subject to demonstrated need through monitoring). Additional group camping facilities will also be needed in the future in the Lake Oroville area. Triggers are discussed in the following section.

- Some existing primitive, undeveloped camping areas currently exhibit ecological impacts related to recreation and public use. Several of these areas may require potential management actions to help protect ecological resources and to better accommodate visitor use at these sites without negatively impacting the desired visitor experience.

Boating-related and on-water camping needs (floating campsites) are discussed separately in Section 5.2.3 – Overall Boating Needs in the Study Area.

Study Area-Wide Camping Needs (Existing and Future)

The following overall camping-related needs should be considered at all of the developed campgrounds, as well as the undeveloped camping areas in the study area:

- Continue to provide annual O&M at existing and potential future developed camping facilities. The existing condition of developed

campgrounds in the study area is generally good. However, the term of the expected license is 30 to 50 years, and routine maintenance, as well as site improvements and enhancements, will likely be needed during this period of time. An annual O&M program is proposed. This program should describe O&M standards and guide the scheduling of routine and non-routine improvements and enhancements at developed campgrounds in the study area. This proposed O&M program would apply to all Oroville Facilities recreation sites. (Study R-10, Section 5.1.1; FERC guidelines)

- Periodically monitor use and impacts at existing and potential future developed campgrounds, as well as undeveloped camping areas. Recreational use and facility condition at the developed campgrounds and undeveloped camping areas in the study area should be monitored to determine when existing sites should be improved/enhanced, or when new sites should be constructed. A monitoring program should be developed that identifies threshold criteria or triggering mechanisms for new site construction. Preliminary threshold criteria (adapted from USFS, other federal agencies, and similar hydroelectric project recreation monitoring programs) may include: (1) a 60 percent recreation season weekday percent occupancy threshold, and (2) an 80 percent recreation season weekend percent occupancy threshold. Additionally, a third threshold of 100 percent occupancy on 15 percent of recreation season days (approximately 20 days) should be also considered. These capacity levels, if reached or exceeded for multiple years (3 out of 5 consecutive years), would ensure that the need is substantiated before actions would be taken. Professional judgment and anecdotal observations should also be considered before facility capacity-related management actions are taken. This information helps to account for environmental influences (e.g., poor weather, drought conditions, wildfires, etc.) that may affect recreational use in the study area. This proposed monitoring program would apply to all Oroville Facilities recreation sites. (Study R-8, Sections 4.1.3 and 6.3; FERC guidelines; Resource protection)

- Consider providing additional campsites, if needed, in the Lake Oroville resource area to meet future demand, based on future monitoring results. Based on the results of monitoring, consider providing additional camping (group, RV, and tent) capacity at one or more of the existing campgrounds if needed in the future. Based on estimates of projected use of existing campgrounds, approximately 75 to 100 new RV/tent campsites may potentially be needed in the Lake Oroville area in the future. Options to accommodate these additional campsites should be explored at Lake Oroville campgrounds (Loafer Creek and/or Lime Saddle) through infill and/or expansion. Group RV campsites should also be considered at one or more locations. Related campground support facilities should also expanded when needed. (Study R-8, Sections 4.1.3, 5.2.2, and 6.3; Study R-12, Section 5.3.1; Study R-13, Section 5.1.8)

- Continue to provide ADA-compliant accommodations at all existing and new campgrounds. As additional improvements are made to existing campgrounds and new sites are potentially developed, ADA-accessibility should be provided based on Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG), as amended. Under draft proposed ADAAG, at all campgrounds a minimum number of accessible campsites shall be provided in accordance with Table 5.2-2.

Table 5.2-2. Required minimum number of accessible campsites.

Number of Total Campsites	Minimum Number of Accessible Campsites
1	1
2 to 25	2
26 to 50	3
51 to 75	4
76 to 100	5
101 to 150	7
151 to 200	8

Source: Access Board 1999.

In addition, all site facilities (including restrooms, parking spurs, tent pads, picnic tables, fire rings, drinking fountains and water faucets, trash receptacles, and paths to other accessible facilities) at campsites designated as accessible must adhere to ADAAG, as amended. (Study R-6, Section 5.1.3 and Section 6.0; FERC guidelines)

- Harden or close some primitive, undeveloped sites and monitor visitor use at sensitive shoreline dispersed sites and use areas commonly used for camping. Visitor use at some dispersed campsites appears to be moderate to heavy, based on observed use and impacts such as vegetation damage, litter accumulation, soil compaction and erosion, and personal safety issues (Study R-11, Section 5.2.2.2, and Tables 5.2-4 and 5.2-5). However, some of these impacts may be from non-recreational squatters at some sites (e.g., undeveloped camping areas in the OWA). At sites that are heavily impacted by visitors, such as undeveloped camping areas in the OWA, site hardening is a management option that should be considered to protect ecological resources and to better accommodate visitor use at these sites without negatively impacting the desired visitor experience. Increased education, enforcement, and/or an on-site management presence are other options to consider to limit recreation-related impacts and improve visitor safety at dispersed campsites. Closing or relocating dispersed camping areas is another option to consider, for example, if other resource needs (such as

terrestrial, water quality, or cultural resources) are deemed incompatible with concentrated or overnight recreation use. (Study R-8, Section 6.1; Study R-11, Section 5.2.2.2, Tables 5.2-4 and 5.2-5; FERC guidelines)

Resource Area-Specific Camping Needs (Existing and Future)

Overall camping-related needs that should be considered at each of the resource areas are summarized below.

Lake Oroville

Existing estimates of projected demand at developed campgrounds in the Lake Oroville resource area indicate that most sites will be at or exceeding their facility capacity prior to the end of the anticipated new license term (assumed to be 2050 for planning purposes) (Study R-8, Section 5.2.2; Study R-12, Section 5.3.1). Expansion and/or the construction of newly developed campgrounds are management options that should be considered to ease this facility capacity constraint. By 2050, it is estimated that between 75 and 100 new RV/tent campsites may be needed in the Lake Oroville resource area to meet demand for camping based on current projections (up to approximately 100 new campsites may be needed if further clustering of activities and use areas extends visitors' stays or attracts more visitors; or, if engineering studies recommend that entire new loops be built at one time versus smaller unit additions that may not be cost effective). Additional RV group camps will also be needed. Potential new campsites would likely be phased in over the term of the anticipated new license based on the results of a use monitoring program; however, it is currently estimated that at least some of these potential new campsites will be needed as early as 2020. Improved and/or new campground amenities should also be considered over the term of the new license, including partial and/or full RV hookups, tent pads, campfire centers or amphitheaters, water spigots, trash receptacles, RV dump stations, and other related campground facilities. (Study R-8, Section 6.3)

Diversion Pool

Currently, there are no developed or undeveloped camping opportunities in this area (Study R-10, Section 5.1.1). It is anticipated that this area would continue to be managed for day use only through the anticipated new license term. However, opportunities for group overnight use may potentially be feasible nearby, south of the Lakeland Boulevard Trailhead Access above the Diversion Pool and outside the FERC boundary, and away from nearby urban land uses. (Study R-15, Section 6.2)

Low Flow Channel (Outside the OWA)

Similar to the Diversion Pool area, there are no existing developed or undeveloped camping opportunities in this area. It is anticipated that this area would continue to be managed for day use only. (Study R-10, Section 5.1.1)

Thermalito Forebay

Although there are currently no developed campgrounds in this area, RVs are permitted to spend the night within a portion of the parking area at the North Thermalito Forebay DUA designated as an "En Route" campground. (Study R-10, Section 5.1.1). Additional developed camping opportunities may be considered in the future at or adjacent to the existing day use facility, if demand warrants, or if other parties propose new non-Project concessionaire operations. (Study R-8, Section 5.5.2.5; Study R-15, Section 6.2)

OWA/Thermalito Afterbay

Similar to the Diversion Pool and Low Flow Channel areas, there are no existing developed or undeveloped camping opportunities in the Thermalito Afterbay area. It is anticipated that the Afterbay would remain day use only. (Study R-10, Section 5.1.1)

Currently, there are only undeveloped camping opportunities available in the OWA (Study R-10, Section 5.1.1). Existing undeveloped camping areas are heavily impacted by visitors (Study R-11, Tables 5.2-1 and 5.2-4). As a result, more formalized camping opportunities and site hardening are management options that should be considered to protect ecological resources and to better accommodate visitor use at these sites without negatively impacting the desired visitor experience. Increased visitor education, enforcement, and on-site management presence are visitor needs that should be considered at these undeveloped camping areas within the OWA to limit recreation-related impacts and improve visitor safety. Closing or relocating undeveloped camping areas is another option that has been considered and implemented in the OWA. It should be noted that the primitive camping area near One-Mile Pond has been closed. (Study R-8, Section 6.1)

5.2.1.2 Camping Supply Factors

The study area represents an important regional resource in terms of water-based resources and provides a significant amount of developed recreation sites and diverse opportunities. Important camping supply factors in the study area are summarized below including the number of existing campgrounds and campsites, the number of specific campground or camping-related site amenities (e.g., RV hookups, restrooms, showers, RV dump stations, etc.), existing ADA-

accessible camping-related facilities, group camping opportunities, and existing camping-related fees. In general, these factors are presented by resource area.

More detailed supply information and factors are provided in the following relicensing studies:

- Study R-6—*ADA Accessibility Assessment*
- Study R-10—*Recreation Facility Inventory and Condition*
- Study R-14—*Assessment of Regional Recreation and Barriers to Recreation*

Regional Supply

The study area provides multiple developed and primitive, undeveloped camping opportunities, many of which are unique in the region. The majority of developed camping opportunities provided in the study area are easily access by vehicle, can be easily accessed from a major highway, and are also not far from urban areas. While all of the regional lakes and reservoirs provide highly developed RV and tent camping facilities, many are in generally more rural areas that are not as easily accessed as camping facilities in the study area. Additionally, the study area provides some more primitive, undeveloped camping opportunities (primarily in the OWA) that are also in proximity to urban areas. More primitive, undeveloped camping opportunities exist in Northern California at several USFS-managed facilities, though most are not near urban areas and are generally more difficult to access. Road accessibility, travel time, and proximity are factors that set the study area apart from other regional recreation areas.

Group camping opportunities are provided at several developed campgrounds in the study area. Similar group camping opportunities can also be found at the following regional lakes and reservoirs:

- Black Butte Lake
- Bucks Lake Recreation Area
- Clear Lake
- East Park Reservoir
- Englebright Lake
- Lake Almanor
- Lake Tahoe
- Shasta Lake
- Stony Gorge Reservoir
- Trinity Lake

In terms of on-water or water-dependent camping opportunities, the study area provides multiple boat-in campsites. However, boat-in campsites are also provided at the following regional lakes and reservoirs:

- ∉ Bullard's Bar Reservoir
- ∉ Englebright Lake
- ∉ Indian Valley Reservoir
- ∉ Lake Pillsbury
- ∉ Lake Tahoe
- ∉ Shasta Lake
- ∉ Trinity Lake

Within California, floating campsites are only provided at Lake Oroville. Among regional reservoirs, equestrian campsites are found only at Lake Oroville and Little Grass Valley Reservoir. (Study R-14 – *Assess Regional Recreation Barriers to Recreation*)

Existing Study Area Developed Camping Opportunities

Existing developed camping opportunities are provided at multiple locations in the study area, including Lake Oroville and Thermalito Forebay. In total, there are approximately 256 campsites provided at 3 developed campgrounds in the study area (Figure 1.1-1). Nearly 36 percent (91) of the developed campsites in the study area have full hookups that can be used for RV camping. The remaining sites do not have hookups and can be used for either RV and/or tent camping. Additionally, there are also a total of 55 RV "en route" campsites provided at two developed recreation sites in the study area. These developed camping opportunities are discussed by resource area below.

Boating-related and on-water camping opportunities are discussed separately in Section 5.2.3—Overall Boating Needs in the Study Area.

Lake Oroville

The majority of developed camping opportunities, including three developed campgrounds, are provided at Lake Oroville. Developed camping opportunities at Lake Oroville are described below (Figure 1.1-1).

Bidwell Canyon Campground – This campground is located along the southern shoreline of Lake Oroville, east of Oroville Dam. A booth at the entrance to the Bidwell Canyon Complex is seasonally staffed for fee collection and provision of visitor information. The campground has 75 campsites for either RVs or tents, each with full hookups, 2 flush toilet restrooms, 6 showers, and potable water. Overall, the facilities at Bidwell Canyon Campground are in good condition.

Loafer Creek Campground – This campground is near the southern shoreline of the main basin of Lake Oroville. The campground has 137 campsites for either RV or tent use. The campsites each have a table, fire ring with grill, tent pad, shade trees, and nearby drinking water. The Loafer Creek Complex has a staffed entrance booth for visitor information and fee collection, a total of 20 flush

toilets, 16 showers with hot water, 12 gray water sumps, and a telephone. The campground is generally in good condition. Associated group and equestrian campsites are discussed in a subsequent section.

Lime Saddle Campground – This campground is located on the western shoreline of the West Branch of the North Fork arm of Lake Oroville. The campground has 44 individual campsites, 16 with full hookups for RVs. An entrance kiosk, 2 telephones, an RV dump station, 6 restrooms, 4 showers, numerous water spigots and gray water sumps, and 6 dumpsters are all also available at the campground. The Lime Saddle Campground, which opened in July 2001, is generally in good condition. An associated 6-unit group campsite is discussed in a subsequent section.

Spillway RV "En Route" Campground – At the Spillway Boat Ramp (BR)/DUA, 40 parking spaces are reserved in the upper parking area for RV "en route" camping. Other than a parking space, the RV "en route" campsites offer no other site amenities commonly found at developed campgrounds. Such facilities can also be used by groups. The RV "en route" campsites are in good condition.

Thermalito Forebay

Limited developed opportunities for camping are provided at the Thermalito Forebay.

North Thermalito Forebay RV "En Route" Campground – At the North Thermalito Forebay BR/DUA, 15 parking spaces are reserved in the parking area for RV "en route" camping. Other than a parking space, the RV "en route" campsites offer no other site amenities commonly found at developed campgrounds. Such facilities can also be used by groups. The RV "en route" campsites are in good condition.

There are no existing developed camping facilities at the Diversion Pool, Low Flow Channel, Thermalito Afterbay, or the OWA.

Existing Study Area Primitive Camping Opportunities

There are an undefined number of primitive, dispersed campsites in the study area. The identified primitive sites used for camping are primarily located in the OWA. Primitive, undeveloped camping areas (Areas C, F, and G) within the OWA are discussed below.

OWA

The designated camping areas within the OWA are on either side of the Afterbay outlet, close to the Feather River (Figure 1.1-1). There are an undetermined number of campsites available at Area C and Area F of the Afterbay outlet area.

Located on the north side of the Afterbay outlet, Area C is accessed via Larkin Road. In addition to primitive campsites, this area also provides an unimproved one-lane boat ramp, a two-stall ADA-accessible vault toilet building, and several trash receptacles. Area F is located on the south side of the Afterbay outlet. This area consists of an undeveloped boat ramp, an ADA-accessible vault toilet building, and several trash receptacles, in addition to several primitive campsites. Area G, adjacent to One-Mile Pond, was closed in March 2004 due to resource and staffing concerns.

Lake Oroville

Several other dispersed sites were also identified in the study area, some of which appear to be used for primitive camping (not legal in the LOSRA) or day use. These sites are generally located around the Lake Oroville shoreline and include:

- Old Nelson Bar Road dispersed site
- Ponderosa Dam dispersed site
- Bidwell Bar Bridge dispersed site
- Canyon Creek Bridge dispersed site
- McCabe Cove
- State Route (SR) 162 dispersed site
- Parrish Cove
- West Branch Bridge dispersed site

Existing Group and Equestrian Camping Facilities in the Study Area

There are eight designated group campsites and one equestrian campground in the study area. All of these sites are located at Lake Oroville and are briefly described below (Figure 1.1-1).

Lime Saddle Group Campground

This campground is split into two group camping areas, named Pinecone and Acorn. There is a central parking lot that accommodates 16 vehicles and contains an island with a restroom/shower building and a picnic table. The Pinecone and Acorn group sites offer a total of six campsites, three of which are ADA-accessible. Each area also has a trash receptacle, a large barbecue, a water fountain/spigot, and a shade structure with three picnic tables. In general, all of the facilities at the Lime Saddle Group Campground are in good condition.

Loafer Creek Group Campground

This group campground is adjacent to the Loafer Creek Campground and consists of six group campsites, each of which can accommodate approximately 25 people. Each campsite consists of several tables, a sink with running water,

shade trees, five large tent pads, water spigots, and parking spaces for eight vehicles. The group campsites share a restroom facility with eight flush toilets and eight showers. Overall, the Loafer Creek Group Campground is in good condition.

Loafer Creek Equestrian Campground

This campground is relatively unique in the study area in that it provides opportunities specifically for equestrian-based camping. The site is located adjacent to the Loafer Creek Campground and consists of 15 designated sites, each with trailer parking, a fire ring with cooking grill, and a table. Additionally, each campsite has a corral to feed and secure horses. The campsites share a restroom building with two flush toilets and two showers, a horse washing area that can accommodate two horses at a time, an equestrian exercise ring, corrals with feeders, and direct access to the Dan Beebe Trail. In general, the Loafer Creek Equestrian Campground facilities are in good condition.

There are no existing group and/or equestrian camping facilities at the Diversion Pool, Low Flow Channel, Thermalito Forebay, Thermalito Afterbay, or the OWA.

Existing ADA-Accessible Camping Facilities in the Study Area

ADA-accessibility improvements have been completed at all of the developed campgrounds in the study area. Specific ADA-accessible camping facilities are listed below by resource area and site.

Lake Oroville

Most of the developed campgrounds at Lake Oroville have ADA-accessible campsites and other facilities including (Figure 1.1-1):

- **Bidwell Canyon Campground** – There are four ADA-accessible campsites at this campground. Other ADA-accessible facilities at this campground include restrooms and paths.
- **Loafer Creek Campground** – There are seven ADA-accessible campsites at this campground. Other ADA-accessible facilities at this campground include restrooms, parking, paths, and showers.
- **Loafer Creek Group Campground** – None of the group campsites are ADA-accessible. ADA-accessible site facilities include restrooms, paths, and some picnic tables.
- **Loafer Creek Equestrian Campground** – None of the campsites at this campground are ADA-accessible. Other site facilities that are ADA-accessible include restrooms, showers, and paths.
- **Lime Saddle Campground** – There are three ADA-accessible campsites at this campground. Other ADA-accessible facilities at this campground include restrooms, showers, paths, and a telephone.

- **Lime Saddle Group Campground** – There are three ADA-accessible campsites between the two group campsites at this campground. Other ADA-accessible site facilities include restrooms, showers, picnic tables, and paths.
- **Spillway RV "En Route" Campground** – There are no ADA-accessible facilities associated with the campground portion of the Spillway recreation site.

Thermalito Forebay

The North Thermalito Forebay recreation site provides the only developed camping opportunities in this area. However, none of the facilities associated with the RV "en route" campground at this site are ADA-accessible.

OWA

The camping opportunities within the OWA are characterized as primitive and lack developed facilities. However, there are ADA-accessible vault toilet buildings at both Areas C and F.

There are no existing camping facilities (therefore, no ADA-accessible facilities) at the Diversion Pool, Low Flow Channel, or Thermalito Afterbay.

Existing Camping-Related Amenities at Study Area Campgrounds

Several of the developed campgrounds in the study area have additional facilities and amenities that may help increase the appeal of the site to existing and potential visitors. These additional site facilities and amenities are listed by site below.

- **Bidwell Canyon Campground** – Amphitheater adjacent to the boat ramp parking area at this site.
- **Loafer Creek Campground** – RV dump station and a campfire center at this site.
- **Lime Saddle Campground** – RV dump station at this site.

These sites also have additional facilities and use areas (e.g., boat ramps, picnic areas, trail access, etc.) that are discussed separately throughout the supply discussions in Section 5.0.

Existing Camping-Related Fees in the Study Area

DPR collects fees at each of the three developed campgrounds, the group campgrounds, and the equestrian campground at Lake Oroville. Current fees are listed below by site. Fees are expected to increase in July 2004.

- **Bidwell Canyon Campground** – During the off-season and the recreation season, camping is $16 and $20 per night, respectively, at this site.
- **Loafer Creek Campground** – During the off-season and the recreation season, camping is $10 and $14 per night, respectively, at this site.
- **Loafer Creek Group Campground** – During both the off-season and recreation season, camping fees at this group campground are $36 per night.
- **Loafer Creek Equestrian Campground** – Nightly fees at this site are $14 and $17 during the off-season and recreation season, respectively.
- **Lime Saddle Campground** – During the off-season and the recreation season, camping is $16 and $20 per night, respectively, at this site.
- **Lime Saddle Group Campground** – During both the off-season and recreation season, camping fees at this group campground are $36 per night.
- **Spillway RV "En Route" Campground** – During both the off-season and recreation season, RV parking fees at this site are $10 per night.
- **North Thermalito Forebay "En Route" Campground** – During both the off-season and recreation season, RV parking fees at this site are $10 per night.

The primitive campsites within the OWA have no fee associated with their use. However, there is a 14-day stay limit posted (7 consecutive days and no more than 14 days per calendar year).

5.2.1.3 Camping Demand Factors

Important camping demand factors to consider are summarized below. Some of the camping demand factors are more general and pertain to the larger region (Northern California), while others are more resource-area specific. More detailed camping demand information is provided in the following relicensing studies:

- Study R-9—*Existing Recreation Use*
- Study R-12—*Projected Recreation Use*
- Study R-14—*Assessment of Regional Recreation and Barriers to Recreation*

Regional Demand

Regional demand for camping opportunities likely influences and will continue to influence camping participation in the Oroville Facilities study area. As such, it is important to review available national and regional demand estimates.

In the Pacific Region (including California), participation in both developed and primitive camping are expected to increase at a faster rate than population growth (Bowker et al. 1999). According to results from the Central and Northern

California Outdoor Recreation and Market Analysis, camping is currently one of the most popular activities in the region (Tierney et al. 2002). According to the California Outdoor Recreation Plan, there is high latent demand for camping in both developed sites and primitive areas. Additionally, public support for government funding is high for additional developed and primitive camping opportunities (DPR 2002a).

Over the next 50 years, demand for camping is projected to increase substantially, and participation in camping is anticipated to increase at an average rate of 1 percent per year. Campgrounds and sites in proximity to water will likely be in highest demand, particularly given the increasing demand for water-based recreation activities in general (Kakoyannis and Stankey 2002). However, there are no existing plans to significantly expand developed camping opportunities at the 22 regional reservoirs and lakes investigated in Study R-14—*Assessment of Regional Recreation and Barriers to Recreation*. If demand for camping increases as anticipated, these other regional reservoirs and lakes will likely be deficient in the future in terms of providing an adequate supply of developed camping opportunities. In the future, this may result in latent demand in the region and the Oroville Facilities study area for developed camping opportunities.

Study Area-Specific Demand

Activity participation surveys were conducted at Lake Oroville in 2002. Both tent and RV camping were among the top 15 activities (out of 42 activities) reported by respondents to the activity participation surveys. Approximately 4.1 percent of respondents indicated they participated in tent camping, while 2.2 percent indicated they participated in RV camping in the study area.

As expected, camping was the primary activity observed at all of the developed campgrounds in the study area during field observations in 2002 and 2003. Unauthorized camping was generally not observed at any of the other undeveloped recreation sites in the study area during Study R-9 field observations in 2002 and 2003. However, some dispersed camping was observed at several of the undeveloped camping areas in the OWA. Additionally, camping participation in the study area is currently highest during the recreation season, especially on weekends and holidays.

Of potential visitors who participated in the Household Survey (Study R-13—*Recreation Surveys*), “campgrounds” was the most frequent answer (12 percent) for respondents who stated that a facility would motivate them to visit Lake Oroville for the first time (in an open-ended question). Since there are available campgrounds at Lake Oroville, this response does not necessarily indicate that more campgrounds should be constructed, only that this is a motivating factor for recreationists to visit.

It should be noted that expanding existing developed campgrounds or building new facilities can both satisfy existing demand and may generate new demand (new facilities can create new opportunities and may stimulate use) (Loomis and Walsh 1997). As such, demand forecasts should be updated periodically. Additionally, key considerations for new and/or enhanced camping facilities should include maintaining or improving the visitor experience while not degrading the cultural resources and ecological and social conditions in the area.

Demand among existing visitors to the study area for additional camping opportunities and facilities was investigated as a component of Study R-13—*Recreation Surveys*. On average in the study area, survey respondents indicated that there were "too few" shower facilities at campgrounds (45 percent), campsites with RV hookups (42 percent), screening between campsites (40 percent), group campsites (38 percent), and campgrounds (31 percent). However, 77 percent of respondents from the Lake Oroville resource area felt that the number of campgrounds is "about right."

At the Low Flow Channel, Thermalito Forebay, Thermalito Afterbay, and OWA, between 36 and 70 percent of respondents felt that there are not enough campgrounds. There is currently no camping at the Thermalito Afterbay or on the Low Flow Channel. There is some "en route" RV camping at the Thermalito Forebay and dispersed camping at designated areas in the OWA. The OWA had the largest percentage of respondents (70 percent) who felt that there was not enough camping available in the area. Over one-half of respondents at the Thermalito Afterbay felt there are not enough developed camping facilities available. Very few respondents in the study area felt that there are "too many" campgrounds.

More than one-third of Lake Oroville resource area respondents felt that there are not enough of campsites with RV hookups (38 percent). The OWA had the highest percent of respondents that felt there are not enough of campsites with RV hookups (84 percent). At the Low Flow Channel, Thermalito Forebay and Thermalito Afterbay, 33 to 47 percent of respondents felt that the number of campsites with RV hookups is "too few." Very few respondents in the study area felt that there were "too many" campsites with RV hookups.

Thirty-three percent of Lake Oroville resource area respondents felt the existing number of group campsites was not enough. Approximately 50 percent of respondents at the OWA, Thermalito Afterbay, and Low Flow Channel felt the number of group campsites was not enough. Very few respondents (less than 4 percent) in the study area felt that the number of group campsites was "too many."

5.2.1.4 Camping Capacity Factors

Four recreation capacity indicator variables were investigated at each of the campgrounds in the study area. These capacity indictor variables included ecological capacity, spatial capacity, facility capacity, and social capacity. It was determined whether each capacity type was "below," "approaching," "at," or "exceeding" capacity based on a quantitative and qualitative assessment of the capacity indicator variables at each recreation site. An overall assessment of recreation carrying capacity, including identification of capacity limiting factors, was also completed at each site as a component of Study R-8 – *Recreation Carrying Capacity*. A more detailed description of the recreational capacity of the study area is provided in Study R-8.

Important camping capacity factors to consider are summarized below by resource area. A summary of camping capacity factors is not provided for the Diversion Pool, Low Flow Channel, or Thermalito Afterbay because there are no developed or undeveloped camping opportunities in these resource areas.

Lake Oroville

Ecological, spatial, facility, and social camping capacity factors in this resource area are addressed below.

Ecological Capacity

In general, recreational use of developed campgrounds at Lake Oroville does not appear to have a widespread impact on the ecological integrity of the resource area. Most observed ecological concerns (e.g., soil erosion, trash accumulation, etc.) tended to be minor and localized. Potential ecological concerns at many of the developed recreation facilities in the study area are minimal due to the presence of hardened facilities, routine maintenance, and on-site management, among other factors. As a result, ecological capacity is considered below capacity and not a limiting factor at the developed campgrounds in this resource area.

Spatial Capacity

Overall, spatial capacity is considered to be a limiting factor at the developed campgrounds in the Lake Oroville area. Individually, spatial capacity is considered at capacity at three of the four campgrounds in this resource area. The Loafer Creek area campgrounds (including the campground, group campground, and equestrian campground), while currently considered to be approaching their spatial capacity, are the only camping areas that could either be significantly expanded and/or redesigned to include additional site facilities to accommodate increased recreational use. However, adjacent lands at Lime Saddle Campground and Bidwell Canyon Campground could also likely be used for potential campground expansion (but may be more difficult and/or expensive

to develop than Loafer Creek Campground), and both the Bidwell Canyon Campground and the Spillway RV "En Route" Campground could likely be redesigned to increase use density. Areas identified in Section 5.2.1.5 below may be suitable for new campground development in the future, if demand warrants their construction.

Facility Capacity

In general, developed campgrounds in the study area experience higher levels of use during the recreation season, with use declining and leveling out during the fall and winter months before rising again in the spring. For all campgrounds in the study area, occupancy was higher in the recreation season than in the off-season. Also, percent occupancy was higher at all of the campgrounds during weekends compared to weekdays during the recreation season (Study R-9 – *Existing Recreation Use*).

Overall, existing facility capacity at the campgrounds in the Lake Oroville area is considered to be below capacity. However, considering existing and future percent occupancy constraints, as well as respondent perceptions of needed campground facilities (Section 5.2.1.3), facility capacity at the developed campgrounds in the Lake Oroville resource area is considered to be a limiting factor.

Nearly all of the developed campgrounds in the Lake Oroville area are currently considered to be below their facility capacity. The two campgrounds that are not well below their facility capacity are the Bidwell Canyon Campground, which is approaching its facility capacity, and the Loafer Creek Group Campground, which is at its facility capacity. However, facility capacity is a limiting factor at all developed campgrounds in the Lake Oroville area, except the Spillway RV "En Route" Campground, because of either existing and/or future percent occupancy constraints.

Social Capacity

Overall, developed campgrounds in the Lake Oroville area are considered below their social capacity. On an individual basis, most of the developed campgrounds were either below or approaching their social capacity. On both an annual and recreation season basis, the mean perceived crowding score for all of the developed campgrounds was 2.7 on a 9-point scale (with 1 indicating "not at all crowded" and 9 indicating "extremely crowded")(Shelby and Heberlein 1986). This score is relatively low and indicates that visitors to these campgrounds generally do not feel crowded. Given the low aggregate crowding scores at developed campgrounds in the Lake Oroville area, social capacity is not a limiting factor at this time.

Thermalito Forebay

Ecological, spatial, facility, and social camping capacity factors in this resource area are described below.

Ecological Capacity

In general, recreational use of North Thermalito Forebay RV "En Route" Campground, the only developed camping site in this area, does not appear to have a widespread impact on the ecological integrity of the area. As a result, ecological capacity is considered below capacity and not a limiting factor at this site or in this resource area.

Spatial Capacity

Overall, spatial capacity is considered below capacity and not a limiting factor at the North Thermalito Forebay RV "En Route" Campground. Adjacent areas to this site may be suitable for new campground development in the future, if demand warrants their construction (Section 5.2.1.5).

Facility Capacity

The North Thermalito Forebay RV "En Route" Campground currently receives very little use. As a result, existing facility capacity at this site is considered below capacity. Additionally, facility capacity is not a limiting factor, nor is it anticipated to be a limiting factor in the future at this site.

Social Capacity

Overall, social capacity at the North Thermalito Forebay RV "En Route" Campground is considered below capacity based on relatively low perceived crowding scores. As such, social capacity is not a limiting factor at this site.

OWA

Ecological, spatial, facility, and social camping capacity factors in this part of the study area are described below.

Ecological Capacity

In general, recreation and public use-related ecological impacts tended to be more pronounced in the OWA compared to other resource areas. This is due to the lack of hardened facilities in the OWA, resulting in some ecological impacts. As a result, ecological capacity is considered to be at capacity within the OWA, including the primitive, undeveloped camping areas. Additionally, ecological capacity is a limiting factor at this time. If use continues as it is currently, further negative ecological impacts to habitat are expected.

Spatial Capacity

According to the results of Study R-15—*Recreation Suitability Analysis*, most of the lands within the OWA are characterized as low suitability in terms of potential future recreation development. This is due to the sensitive ecological resources that are found with this resource area. As a result, while there may be areas within the OWA that could be developed for recreation (including camping), spatial capacity is considered to be at capacity and a limiting factor at this time.

Facility Capacity

Field observations indicate that less than 1 percent of observed visitors were camping in the OWA; visitor survey results also point to the fact that camping is not a popular activity in the OWA. According to completed visitor surveys, tent and RV camping each accounts for less than 2 percent of responses regarding the primary activity of visitors to the OWA. Given this very low level of camping participation within the OWA, facility capacity is not considered a limiting factor at this time, nor will it likely be a limiting factor in the future.

Social Capacity

The annual mean perceived crowding score for recreation sites within the OWA, including primitive camping areas, was approximately 5.2 (on a scale of 1 to 9, with 9 indicating "extremely crowded"); during the recreation season, the score was slightly higher at about 5.4. These crowding scores are some of the highest in the study area and indicate that visitors to the OWA feel moderately crowded. Based on these higher crowding scores, recreation sites within the OWA are considered to be at their social capacity. As such, social capacity is also considered a limiting factor at primitive, undeveloped camping areas within the OWA.

Overall Camping Capacity Summary

Overall, spatial and facility capacities are the primary limiting factors at the developed campgrounds in the study area. While all of the capacity indicator variables, except spatial, were below capacity, existing and future percent occupancy constraints are considered facility capacity limitations at several of the campgrounds in the study area. Future capacity-related decision-making will likely need to focus on alternative management strategies than spatial/facility expansion at existing campgrounds because facility and spatial capacity are related (i.e., excess spatial capacity is needed to expand the physical area of a site and increase the facility capacity). Potential ecological impacts and social concerns should also continue to be monitored, especially as use of Oroville Facilities developed campgrounds increases in the future.

While some of the campgrounds have substitute sites that could potentially relieve capacity concerns at specific sites, geographical constraints likely limit the

amount of use that could potentially be transferred from one site to another. As a result, while some substitute sites may ease capacity constraints at similar type sites (e.g., Bidwell Canyon and Loafer Creek campgrounds), they likely have a minimal effect on easing overall capacity constraints at campgrounds at this time. Additionally, the specialized use campgrounds (i.e., group and horse campgrounds) generally do not have substitute sites and RV "en route" campsites have limited appeal to traditional campground visitors.

5.2.1.5 Camping Suitability Factors

Important public camping suitability factors to consider are summarized below. A more detailed investigation of recreation development suitability is provided in Study R-15—*Recreation Suitability Analysis*. Several areas were identified as potentially suitable for additional recreation site development, including new and/or expanded campground facilities. These areas were identified on the Composite Recreation Suitability figures in Study R-15 (Figures 5.3-1 through 5.3-8). Significant findings are summarized below by resource area.

Lake Oroville

The following areas were identified for potential camping-related development:

- Lands adjacent to and north of the existing Lime Saddle Campground;
- Lands adjacent to and south of the Bidwell Canyon Campground;
- Lands adjacent to the existing Loafer Creek Campground (including the group and equestrian campsites); and
- A large inland area east of the existing Craig Saddle Boat-in Campgrounds (BICs).

Diversion Pool/Low Flow Channel

Only one area was identified for potential camping-related development in these locations. This area includes lands south of the existing Lakeland Boulevard Trail Access. This area was included for both resource areas because the site is located at the southern end of the Diversion Pool and the northern end of the Low Flow Channel.

Thermalito Forebay

The following areas were identified for potential camping-related development:

- Lands adjacent to the existing North Thermalito Forebay BR/DUA/RV "En Route" Campground; and
- Lands adjacent to the existing South Thermalito Forebay BR/DUA.

Thermalito Afterbay

Only one area was identified for potential camping-related developed in this location. This area includes lands along the northern shoreline of the Thermalito Afterbay. However, following the release of Study R-15—*Recreation Suitability Analysis*, additional sensitive habitat mapping has become available that may further limit the suitability of this area.

OWA

The following areas were identified for potential camping-related development:

- Lands near the Afterbay outlet;
- Lands near the OWA headquarters entrance; and
- Lands along the west side of the Feather River within the OWA.

Other potentially suitable lands were also identified in Study R-15—*Recreation Suitability Analysis*, however, only those listed above could likely be used for camping-related recreation development. Additionally, potentially suitable areas for new and/or expanded BIC and floating campsite development are discussed separately in Section 5.2.3—Overall Boating Needs in the Study Area.

5.2.1.6 Camping Operations and Maintenance Factors

Important public camping O&M factors to consider are summarized below. In general, these factors apply to the entire study area and are not resource area-specific. A more detailed analysis of existing O&M in the study area is provided in the following relicensing studies:

- Study R-10—*Recreation Facility Inventory and Condition;*
- Study R-11—*Recreation and Public Use Assessment;* and
- Study R-3—*Assessment of the Relationship of Project Operations and Recreation*.

Overall, all of the developed camping facilities in the study area are in good condition. No major camping facility maintenance, repair, and/or replacement is anticipated at this time. However, considering the anticipated term of the new license (30 to 50 years for planning purposes), ongoing maintenance, as well as the repair and replacement of campground facilities, will likely be needed in the future.

Overall, the condition of primitive, undeveloped camping areas, especially within the OWA, is variable. None of the primitive, undeveloped camping areas have hardened site facilities (e.g., designated campsites, constructed fire pits and grills, restrooms, etc.) that help to limit visitor impacts. As a result, many of the identified primitive, undeveloped camping areas display more observed

ecological impacts than the developed campgrounds in the study area. Commonly observed ecological impacts at these undeveloped camping areas include soil erosion and compaction, trash accumulation, sanitation issues, vegetation damage, user-defined trails, and riparian and other shoreline impacts.

5.2.2 Overall Day Use/Picnicking Needs in the Study Area

The overall day use/picnicking needs in the Oroville Facilities study area are presented first. Subsequent sections provide the detailed analysis of overall day use/picnicking supply, demand, capacity, suitability, and operations and maintenance factors to support these overall findings of need. Site-specific day use/picnicking needs are further defined in Chapter 6.0. The following relicensing studies were consulted to determine the overall day/use picnicking needs within the study area:

- Study R-6 – *ADA Accessibility Assessment* (see Section 5.3.2, Table 5.3-2; Section 6.0, Table 6.0-1)
- Study R-8 – *Recreation Carrying Capacity* (see Sections 5.4.1, 5.4.2, 5.5.1, 5.5.2, Tables 5.4-1 and 5.5-1)
- Study R-9 – *Existing Recreation Use* (see Sections 5.2, 5.3, and 5.4; Tables 5.1-2 through 5.1-6 and 5.2-1 through 5.2-5)
- Study R-10 – *Recreation Facility and Condition* (see Section 5.1.3)
- Study R-11 – *Recreation and Public Use Impact Assessment* (see Section 5.2; Tables 5.2-1 through 5.2-5)
- Study R-12 – *Projected Recreation Use* (see Sections 5.2.2.3 and 5.3)
- Study R-13 – *Recreation Surveys* (see Section 5.1.2; Table 5.1-28)
- Study R-14 – *Assess Regional Recreation and Barriers to Recreation* (see Section 5.3)
- Study R-15 – *Recreation Suitability Analysis* (see Sections 5.3, 6.1, and 6.2; see Tables 5.3-1 through 5.3-6)

5.2.2.1 Overall Day Use/Picnicking Needs

In general, study area day use facilities are in good condition. However, there are resource areas within the study area that do not have formalized day use facilities. Additionally, day use activities are expected to increase in popularity over the anticipated term of the new license; this may lead to a need for new or expanded day use facilities.

Based on a review of the factors and indicators summarized later in this section, overall day use/picnicking needs have been identified in the study area. These needs should not be assumed to be proposed PM&E measures. Site-specific project-related day use/picnicking needs are discussed in Chapter 6.0.

The factors and indicators that contributed the most in determining the overall day use/picnicking needs in the study area are summarized in the following

bullets. Information from the above recreation studies supports these conclusions. The detailed discussion supporting these findings is found in the later supply, demand, capacity, and suitability sections that provide a more thorough analysis of overall day use/picnicking in the study area.

- Day use facilities are generally in good overall condition throughout the study area.
- The eastern portion of Lake Oroville lacks existing formalized day use / picnicking facilities.
- Attractive day use areas with shoreline access are desired, though in limited supply at Lake Oroville.
- There are currently no day use facilities at the Diversion Pool along the southern shoreline.
- There are obstacles to linking the Lakeland Boulevard Trail Access site with the shoreline of the Diversion Pool.
- The Thermalito reservoirs provide substitute shoreline access when the pool level is low at Lake Oroville and shoreline day use areas there become less desirable.

Overall existing and future day use/picnicking needs are listed below.

Existing Day Use/Picnicking Needs

Provide additional sanitation facilities (vault toilet buildings) in the OWA. Additional vault toilet buildings should be provided in the OWA, especially in areas that receive greater levels of recreation use. This would help control potential impacts to resources. Vault toilet buildings could be provided across from the Afterbay outlet in the area accessed by the Pacific Heights Entrance and/or in other areas near the river popular with anglers. (Study R-13, Section 5.1.2, Table 5.1-28)

Harden some existing dispersed and undeveloped areas to prevent impacts and provide additional visitor access. Some sites and areas were noted for having ecological impacts related to recreation use, in particular the Saddle Dam DUA near Lake Oroville and portions of the OWA. (Study R-11, Section 5.2.2, Table 5.2-1)

Provide additional shoreline access and shoreline day use facilities in several resource areas when needed. In general, there are areas in the study area that have few day use facilities. In addition, shoreline-accessible day use facilities were cited as being desired by recreation users of Lake Oroville. New and expanded day use facilities are likely necessary during the term of the anticipated new license. Consider providing new day use facilities at the Diversion Pool via the Lakeland Boulevard trail/road route. Additionally, day use facilities could be considered along Lake Oroville, especially along the north arm (near Lime Saddle) and eastern sides of the reservoir. Additional day use facilities could

also be provided at Thermalito Afterbay. It is projected that 190 new parking spaces (for day use and boating combined) are currently needed, primarily at the Bidwell Canyon BR/DUA/Marina Complex. It is anticipated that 50-60 additional parking spaces (for day use and boating combined) will be needed in 2021-2030. (Study R-9, Sections 5.2.1 and 5.2.2; Study R-12, Sections 5.2.1.2, 5.2.2.3, and 5.3, Tables 5.3-1, 5.3-2, and 5.3-3; and Study R-13, Sections 5.1.1.5, 5.1.1.6, 5.1.2.6, Table 5.1-28)

Future Day Use/Picnicking Needs

Continue to provide annual O&M and additional improvements, if needed, at day use and picnic facilities. The condition of developed day use areas in the study area is generally good. However, since the anticipated term of the new license is 30 to 50 years, routine maintenance, as well as site improvements and enhancements, will likely be needed during this period of time. A proposed O&M program should be implemented that describes O&M standards and guides the scheduling of routine and non-routine improvements and enhancements at developed day use facilities in the study area. (FERC guidelines)

Continue to provide ADA compliance at new day use facilities. Currently, study area DUAs are programmatically compliant with ADAAG, as amended. As improvements are made to existing day use areas and new sites are potentially developed, ADA-accessibility should be provided based on ADAAG, as amended. According to Study R-6 – *ADA Accessibility Assessment*, all of the day use facilities are compliant with ADAAG at this time. (FERC guidelines; ADA compliance; Study R-6, Section 5.1.1)

Periodically monitor day use areas and facilities in the future. Future periodic monitoring of day use areas and facilities within the study area will allow area managers to concentrate resources on those areas receiving more recreation use or on newly-popular outdoor recreation activities. See Section 5.3 for discussion of programmatic needs for the entire study area. (FERC guidelines; Resource protection)

Consider incorporating additional picnic facilities with other developed facilities to enhance the visitor experience. If new boating or swimming facilities are developed, consider adding additional picnic facilities to meet projected increases in day use in the study area. When considering new facilities or expanding additional facilities, consider combining facilities related to day use with camping or swimming opportunities. This would provide multiple recreation opportunities for users to visit a site and may extend visit duration. (Professional judgment)

5.2.2.2 Day Use/Picnicking Supply Factors

Day use activities include picnicking, sightseeing, sunbathing, resting/relaxing, Frisbee golf, among others. The day use areas within the study area provide a

wide variety of recreation opportunities to visitors and residents. Factors used to define supply include number of picnic tables and shade shelters, available parking spaces, and facility condition. Also, the location of these facilities based on resource area is assessed and areas with deficiencies are noted. In general, study area day use facilities are in good condition, and all of the facilities are compliant with ADAAG, as amended. There are limited needs for upgrading day use facilities.

The following items are reviewed in this section:

- Regional context
- Distribution of facilities
- Access to shoreline
- Condition of facilities
- ADA compliance
- Geographic area

Regional Context

In general, formal or informal day use opportunities are available at all of the reservoirs in the region. Day use facilities are also available in USFS-managed lands east of the Oroville Facilities study area. Additionally, local jurisdictions add to the supply of day use facilities in this region, such as Bidwell Park in Chico.

Distribution of Day Use Facilities

Most of the day use facilities are along the south end of Lake Oroville, near Lime Saddle, at Riverbend Park (Low Flow Channel), and along Thermalito Forebay. Areas with limited day use facilities include the east side of Lake Oroville, the Diversion Pool, and the OWA; in addition, there is only one developed day use site along the Thermalito Afterbay.

Access to Shoreline

One of the reasons that individuals come to the Oroville Facilities is the attraction of the water or shoreline. Given the steep slope and annual drawdown of Lake Oroville, access to the shoreline can be a barrier to recreation use at the reservoir. Additionally, only Loafer Creek DUA provides good shoreline access, although it is limited to times of higher pool levels. The other day use facilities at Lake Oroville do not provide good shoreline access. Shoreline access is much more available below Oroville Dam along the Diversion Pool, Low Flow Channel, and Thermalito Forebay and Afterbay. This is due to several day use facilities, road and trail access, gentler slopes, and relatively stable water levels.

Condition of Facilities

The condition of study area day use facilities is generally very good. Recent upgrades as a part of the "Interim Projects" have improved the condition of some day use facilities. Day use areas with new ADA-accessible toilet buildings include South Forebay DUA and Saddle Dam DUA. Additionally, there are picnic area upgrades being completed at the Feather River Fish Hatchery. There are only limited concerns related to the existing condition of recreation facilities.

ADA Compliance

Study R-6 – *ADA Accessibility Assessment* found that day use facilities within the study area are programmatically compliant.

Resource Area

This section summarizes the supply of day use and picnicking facilities by major resource area within the study area. The study area provides a breadth of day use opportunities, from highly developed sites with relatively high use during the recreation season (North Forebay DUA and Loafer Creek DUA), to areas with lower use and more opportunities to experience quiet (Diversion Pool DUA).

Lake Oroville

There are several developed areas around Lake Oroville that provide developed recreation opportunities. Additionally, there are other areas around the reservoir that provide informal day use access. In general, the formalized day use facilities are along the south end of the reservoir (Bidwell Canyon, Loafer Creek, and Spillway DUAs) and in the vicinity of Lime Saddle. The Loafer Creek DUA is the most expansive site with shoreline access, although attractive only at higher pool levels (see Section 5.2.4). There are limited formal day use facilities along the eastern side of the reservoir. The following recreation sites provide day use facilities (Figure 1.1-1):

- Lime Saddle DUA
- Loafer Creek DUA
- Lake Oroville Visitors Center
- Oroville Dam Overlook DUA
- Saddle Dam DUA
- Spillway DUA

There are other informal access areas, in particular near car-top boat ramps. It is important to note that access to the shoreline is an issue at Lake Oroville DUAs; this is especially true when the pool level is low. Additionally, day use occurs at or near car-top boat ramps (including Foreman Creek and Nelson Bar), and at

dispersed use sites and areas along Lake Oroville (see Relicensing Study R-11 – *Recreation and Public Use Impact Assessment*).

Bidwell Canyon DUA – The Bidwell Canyon DUA (Figure 1.1-1) is located along the southern shore of the reservoir, a short distance from Oroville Dam. Amenities at the site include a visitor information station and fee collection booth (at the entrance to the Bidwell Canyon Complex), 21 picnic tables, shade trees, and the Bidwell Bar Historical Bridge and Tollhouse. Day use at this site is primarily associated with the area adjacent to the bridge and the small island (Wyk Island) accessed by the bridge. Parking is provided for 279 car/trailer combinations in conjunction with the adjacent boat ramp (12 spaces are ADA accessible), along with 8 flush toilets (2 are ADA accessible), drinking water, a telephone, 20 trash receptacles, and fish cleaning station and a gray water sump. In general, the facilities are in good condition.

Lime Saddle DUA – Located on the western shoreline of the West Branch of the North Fork arm of Lake Oroville, the Lime Saddle area (Figure 1.1-1) is a major facility at the reservoir. Amenities at the site include a staffed entrance kiosk where information is provided and fees are collected. The DUA overlooks the boat ramp and marina and provides 13 picnic tables (4 are ADA accessible), 7 sun shelters, and shade trees. In addition, 4 ADA accessible flush toilets, drinking water, a telephone, and 11 trash receptacles are available. The Lime Saddle parking area provides 45 single-vehicle parking spaces (3 are ADA accessible) and 131 car/trailer spaces (7 are ADA accessible). Additional parking is provided in an overflow lot with approximately 70 car/trailer combination spaces. Overall, the Lime Saddle DUA facilities are in good condition; however, some of the picnic tables along the short trail out to the viewpoint are in fair or poor condition.

Loafer Creek DUA – The Loafer Creek DUA (Figure 1.1-1) is adjacent to the other Loafer Creek attractions and shares the same visitor information and fee collection booth. Amenities at the site include 30 picnic tables, 17 barbecue grills, shade trees, a playground, and a swimming area with a beach. In addition, 10 ADA accessible flush toilets, drinking water, a telephone, 3 trash receptacles, and 2 showers are available. A parking area provides 251 vehicle parking spaces (5 are ADA accessible). Overall, the Loafer Creek DUA facilities are in good condition.

Lake Oroville Visitors Center – Located east of Oroville Dam on Kelly Ridge, the 10,000-square foot Visitors Center (Figure 1.1-1) features interpretive exhibits on the engineering and construction of the Lake Oroville hydropower facilities as well as the historical native culture and natural resources of the Lake Oroville vicinity. A 47-foot viewing tower at the center provides panoramic views of Lake Oroville and its surroundings. The center provides opportunities for picnicking and sightseers. In association with the Visitors Center, the following are available for use by individual visitors and large groups: 18 picnic tables (10

are ADA accessible), shade trees and sun shelters, drinking fountains, a gift shop, a telephone, 6 ADA accessible toilets, 6 trash receptacles, 90 vehicle parking spaces, and 17 parking spaces for car/trailer combinations or buses. Overall, the Visitors Center facilities are in good condition.

Oroville Dam Overlook DUA – Located on the southwest shoreline of Lake Oroville, the crest of Oroville Dam (Figure 1.1-1) is used for driving and sightseeing, walking, jogging, bicycling, and rollerblading. Eight picnic tables, 4 flush toilets (1 is ADA accessible), 1 drinking fountain, 1 trash receptacle, and approximately 20 parking spaces are available at the east end of dam. There are also approximately 400 additional parking spaces located on the dam (2 are ADA accessible) and additional parking spaces and picnic tables at the west end of the dam crest road; however, parking on the dam and at the west end has not been allowed under heightened security conditions. Overall, the visitor day use facilities at the dam are in good condition.

Saddle Dam DUA – Saddle Dam DUA provides a trail access point for users in the area. The site has recently been hardened and a vault toilet building has been added. There are concerns related to soil erosion and user-defined trails.

Spillway DUA – The Spillway DUA (Figure 1.1-1) is located adjacent to the western abutment of Oroville Dam. Amenities at the site include 6 picnic tables with sun shelters overlooking the boat ramp and main basin of the reservoir, irrigated lawn, and shade trees. In addition, 6 flush toilets (2 are ADA accessible), drinking water, and 7 trash receptacles are available. Parking is provided in conjunction with the boat ramp; 118 vehicle parking spaces (8 are ADA accessible), 350 vehicle/trailer combination parking spaces (8 are ADA accessible) are in an upper lot adjacent to the DUA. Overall, the Spillway DUA facilities are recently renovated and in good condition.

Diversion Pool

In general, there are limited formalized day use facilities at the Diversion Pool. The Diversion Pool DUA provides informal shoreline access.

Diversion Pool DUA – A vault toilet building and 2 gravel car-top/hand launch points are available along the shoreline. There are no picnic tables in the vicinity of the Diversion Pool DUA (Figure 1.1-1). Overall, the area is in good condition.

Low Flow Channel

The Low Flow Channel incorporates both Project lands and non-Project lands between the Fish Barrier Dam and the Afterbay outlet. Riverbend Park provides day use opportunities; there are also day use facilities at the Feather River Fish Hatchery.

Feather River Fish Hatchery – A visitor area on the north bank of the Feather River provides viewing access for the Feather River Fish Hatchery (Figure 1.1-1) and fish ladder. The facilities include a landscaped parking lot for 100 vehicles, 2 flush toilets, a table, a telephone, trash receptacles, an observation platform overlooking the Diversion Dam, and observation areas providing views of the fish ladder, the hatchery gathering and holding tanks, and the interior of the hatchery spawning building. Amenities at the site include designated parking spaces, restrooms, and wheelchair ramps that provide access to the observation platform and viewing areas. An additional parking area, and additional pedestrian access to the hatchery complex, is located on the west side of Table Mountain Boulevard. Overall, the visitor facilities at the hatchery are in good condition.

Riverbend Park – Riverbend Park (Figure 1.1-1) is a recently developed park on the west side of the city of Oroville along the Feather River. The park is not within the FERC boundary, but may serve as an attraction to visitors to the area. In general, there are two areas within the park that provide day use facilities. The first is near the entrance to the park; this area provides several picnic sites dispersed between the main parking area and the river. The second area is along the fishing ponds on the south side of the park. There are restroom facilities adjacent to both of these areas. Additionally, the area near the entrance provides a paved loop trail with benches and exercise stations along the route and a formal Frisbee golf course. The trail links the area to the downtown business district (outside the FERC boundary) and to the OWA (within the FERC boundary).

Thermalito Forebay

Thermalito Forebay has 2 formal day use areas; both facilities provide picnicking facilities and access to the shoreline. North Thermalito Forebay DUA is located in this geographic region and provides extensive day use facilities. South Thermalito Forebay provides less extensively developed day use facilities along the shoreline.

North Thermalito Forebay DUA – Located on the northern portion of the Thermalito Forebay (Figure 1.1-1), amenities at this site include a visitor information and fee collection booth; a large area of irrigated lawn and mature shade trees with 117 picnic tables, 37 barbecue grills, and 21 sun shelters; and a swimming beach. In addition, 7 portable toilets (1 is ADA accessible), 6 flush toilets (4 are ADA accessible), drinking water, a telephone, and 18 trash receptacles are available. Parking is provided in 251 vehicle parking spaces (3 are ADA accessible) and 25 vehicle/trailer combination parking spaces (1 is ADA accessible). Overflow parking is also available. The Butte Sailing Club (BSC) spearheaded development of an Aquatic Center at North Thermalito Forebay. The BSC and other users generally access the Forebay from the center via two 2-lane boat ramps shared with other North Thermalito Forebay users. Overall,

the facilities are in good condition, although maintenance of an interpretive display is needed.

South Thermalito Forebay DUA – Located on the southern portion of the Forebay (Figure 1.1-1), amenities at this site include a self-registration pay station, 10 picnic tables, 10 barbecue grills, and shade trees. In addition, a fish cleaning station, a new ADA vault toilet, and 6 trash receptacles are available at the site. Parking is provided in a graded and graveled, unmarked, parking area near a 2-lane boat ramp. Overall, the facilities are in good condition.

Thermalito Afterbay

There is 1 developed day use area at Thermalito Afterbay. Additionally, there are informal day use access areas along the water body, including areas near SR 162.

Monument Hill Boat Ramp and DUA – Located on the eastern shoreline of Thermalito Afterbay (Figure 1.1-1), amenities at the Monument Hill DUA include 10 picnic tables, 9 barbecue grills, a swimming beach, and a 2-lane boat ramp. In addition, 4 flush toilets and 8 trash receptacles are available. The parking area for the site provides 10 vehicle parking spaces (1 is ADA accessible) and 39 vehicle/trailer combination spaces (3 are ADA accessible). Additional parking is available in a large gravel overflow lot. Overall, the Monument Hill DUA facilities are in good condition.

Larkin Road Car-top Boat Ramp – The Larkin Road Car-top Boat Ramp is located on the southeastern portion of Thermalito Afterbay. The area provides an unpaved boat ramp and shoreline access for day use. There is a vault toilet building at this site as well.

OWA

The OWA has limited formal day use facilities; there are vault toilet buildings near the camping areas. Otherwise, most day use in this region is at dispersed or primitive areas.

Afterbay Outlet DUA – The Afterbay outlet (Figure 1.1-1) is a popular day use area, primarily for anglers. There are limited day use facilities at this site. However, vault toilet buildings are available in conjunction with the primitive camping areas.

5.2.2.3 Day Use/Picnicking Demand Factors

Important public day use/picnicking demand factors to consider are summarized below. In many cases, it is difficult to determine demand specifically for day use areas when they are in proximity to boat ramps. This is especially true at sites

where the day use areas and the boat ramps share a parking lot, including Lime Saddle DUA, Bidwell Canyon DUA, and Monument Hill DUA. Additional information about existing recreation demand is available in Study R-9 – *Existing Recreation Use*. More information concerning projected demand is available in Study R-12 – *Projected Recreation Use*.

Existing Recreation Use

The Oroville Dam Overlook DUA had the highest recreation use estimate (189,765 recreation days [RDs]) of all of the DUAs. Existing estimated recreation use is also high at the Feather River Fish Hatchery (160,395 RDs) and the Lake Oroville Visitors Center (93,553 RDs). The majority of this use is attributed to sightseeing.

A majority (92.9 percent) of survey respondents in the OWA stated that there were too few group picnic sites. Respectively, 66.6 percent and 66.7 percent of the respondents at Lake Oroville and the Diversion Pool stated that there were too few shoreline day use areas. A majority (74.2 percent) of survey respondents in the OWA also stated that there were too few restrooms in the OWA.

Activity Participation

Sightseeing was the second most popular activity, with more than 400,000 RDs and 26 percent of the total use within the study area. The most popular recreation sites for sightseeing are the Feather River Fish Hatchery (152,375 RDs), the Oroville Dam Overlook DUA (104,371 RDs), and the Lake Oroville Visitors Center (93,553 RDs).

Picnicking was fourth in terms of percent contribution to total use, with about 9 percent (155,000 RDs). There was some picnicking use at every geographic area within the FERC boundary. The most popular sites for picnicking are North Thermalito Forebay BR/DUA (30,084 RDs), Oroville Dam Overlook DUA (18,977 RDs), Loafer Creek DUA (13,059 RDs), South Thermalito Forebay BR/DUA (12,414 RDs), and Bidwell Canyon BR/DUA/Marina.

Projected Recreation Use

Study R-12 – *Projected Recreation Use* categorized future activity demand in the study area into these categories: high, moderate, low, and declining. According to this study, future demand for picnicking in the study area is expected to be moderate (with an annual increase in participation of 1.1 percent), and high for sightseeing (annual increase of participation of 1.8 percent).

Overall, during the projected term of the new license, recreation use is projected to increase significantly. In fact, most day use areas are projected to see a doubling of attendance by 2050.

5.2.2.4 Day Use/Picnicking Capacity Factors

As a part of Study R-8 – *Recreation Carrying Capacity*, four capacity types (spatial, facility, ecological, and social) were evaluated at study area day use areas. Day use areas adjacent to boat ramps were evaluated separately from day use areas not adjacent to boat ramps. Overall, day use areas were determined to be approaching capacity, with spatial capacity being the limiting factor. The overall capacity priority for these areas was determined to be moderate. Additionally, boat ramps and day use areas were determined to be approaching capacity, with facility capacity and spatial capacity being the limiting factors, and the overall capacity priority was determined to be moderate. The overall capacity priority at all study area day use areas is low or moderate.

Spatial Capacity

Overall, spatial capacity is considered to be a limiting factor at the DUAs in the study area. Overall, spatial capacity is considered to be approaching capacity and a limiting factor at boat ramps and day use areas in the study area at this time.

Facility Capacity

Overall, existing facility capacity at developed day use areas in the study area is considered below capacity. Overall, existing facility capacity at boat ramps and day use areas in the study area is considered to be approaching capacity. One constraint noted at day use areas near boat ramps was the lack of single vehicle parking spaces or designated areas. At many sites, single vehicles were parked in vehicle-with-trailer spaces, thus reducing the ability of the site to accommodate boaters' needs.

Ecological Capacity

Ecological capacity was not identified as a concern at DUAs in the study area. Most observed ecological concerns tended to be minor and localized (e.g., soil erosion, trash accumulation, etc.).

Overall, ecological capacity is not considered to be a limiting factor because of the relatively minor recreation-related ecological impacts observed at most of the developed campgrounds. Potential ecological impacts should continue to be monitored, however, especially as use of study area developed campgrounds increases in the future. Additionally, existing ecological capacity-related

management decisions should be considered a higher priority at more primitive, undeveloped OWA use areas.

Social Capacity

Overall, day use areas and other recreation area facilities in the study area are considered to be below their social capacity. On an annual and recreation season basis, the mean perceived crowding score (Shelby and Heberlein 1986) for all of the day use areas and other recreation area facilities was 2.9 and 3.0, respectively, on a scale of 1 to 9 (with 9 being "extremely crowded"; Study R-13 – *Recreation Surveys*). These scores are relatively low and indicate that visitors to these sites generally do not feel crowded though some are beginning to feel slightly crowded. Given the low aggregate crowding scores at day use areas and other recreation area facilities in the study area, overall social capacity is not a limiting factor at this time. On an annual and recreation season basis, the mean perceived crowding score for all of the boat ramps and day use areas on Lake Oroville was 3.2 and 3.4, respectively. At boat ramps and day use areas on the Thermalito Forebay and Afterbay, the mean perceived crowding score was 3.0 overall and 3.1 during the recreation season.

Overall Day Use/Picnicking Capacity

Overall, spatial capacity is the primary limiting factor at the developed day use areas and other recreation area facilities in the study area because of a lack of expansion potential at existing sites included in this site-type category. Overall, both spatial and facility capacities are the primary limiting factors at the boat ramps and day use areas in the study area.

Facility capacity was identified as a limiting factor at Lime Saddle BR/DUA, Loafer Creek BR/DUA, Monument Hill DUA/BR, and North Thermalito Forebay DUA/BR. Multiple capacity factors were determined to be limiting factors at the following sites: Lake Oroville Visitors Center (spatial and facility), Oroville Dam Overlook DUA, and Bidwell Canyon BR/DUA (spatial and facility). Ecological capacity and social capacity were not identified as a limiting factor at any DUA in the study area.

Bidwell Canyon BR/DUA is projected to need additional parking spaces by 2010. Lime Saddle BR/DUA is projected to need new parking spaces by 2030. Oroville Dam Overlook DUA is projected to need additional parking by 2050.

5.2.2.5 Day Use/Picnicking Suitability Factors

Additional facilities could be provided within existing facilities, by expanding existing facilities, or at new sites. Study R-15 – *Recreation Suitability Analysis* identified the locations listed below for potential recreation site expansion or new facilities. In large part, most existing developed recreation sites could either be expanded or add additional day use facilities within the existing site, if necessary.

Based on this GIS-based recreation suitability analysis, areas deemed suitable for potential future recreation site development were identified. Some of the locations that may be considered for potential recreation site expansion include:

- Lands near Lime Saddle BR, Parrish Cove, and Lime Saddle Campground;
- Lands adjacent to the Loafer Creek and Bidwell Canyon facilities;
- Lands near the west end of the Diversion Pool, close to the Lakeland Boulevard Trail Access;
- Lands adjacent to the North and South Thermalito Forebay recreation facilities;
- Lands on the north side of Thermalito Afterbay;
- Lands near the OWA Headquarters entrance; and
- Lands along the west side of the Feather River in the OWA.

Additionally, the following existing recreation sites may be appropriate for expansion and/or infill:

- Loafer Creek DUA
- Diversion Pool DUA
- North Forebay BR/DUA
- South Forebay BR/DUA
- Larkin Road Car-top BR
- Wilbur Road BR

5.2.2.6 Day Use/Picnicking Operations and Maintenance Factors

As a part of Study R-10 – *Recreation Facility and Condition Inventory*, the existing condition of study area facilities was evaluated. Study R-11 – *Recreation and Public Use Impact Assessment* evaluated the ecological impacts of recreation use at study area recreation sites and areas. In general, day use facilities and use areas were in good condition and showed few ecological impacts related to recreation use.

Overall, day use facilities are generally in good condition at study area recreation sites and areas. Over the term of the new license, it is likely that all day use facilities will be in need of replacement. The condition of the facilities should be monitored to determine when the facilities are in need of repair or replacement.

However, one site, Saddle Dam DUA is of particular concern with respect to public use impacts (Study R-11 – *Recreation and Public Use Impact Assessment*). The prevalence of user-defined trails at this site is a high concern and has resulted in soil erosion in the vicinity of the site. These trails may lead to erosion and gullying, given the steepness of the site. To address the general concern, additional site hardening and/or erosion control-related trail

improvement measures could be considered at the parking lot and along short access trails. However, it is also important to note that some of the erosion at this site is due to normal operations in the reservoir inundation zone.

5.2.3 Overall Boating Needs in the Study Area

The overall boating needs in the study area are presented first. Subsequent sections provide the detailed analysis of overall boating supply, demand, capacity, suitability, and operations and maintenance factors to support these results. Site-specific boating needs are further defined in Chapter 6.0. Boating facility needs analyzed in the study area include boat launches, ramps, docks, and parking for vehicles with trailers, among other boating facilities.

Information about boating facilities, recreation management, existing use, and effects of Project operations is summarized primarily from the following relicensing studies.

- Study R-2 – *Recreation Safety Assessment* (see Sections 5.1.1, 5.2.1, and 5.3.1; Tables 5.2-1, 5.2-2, 5.2-3, 5.2-4, 5.2-7, 5.3-1, 5.3-2, 5.3-3, and 5.3-4)
- Study R-3 – *Assessment of the Relationship of Project Operations and Recreation* (see Sections 5.2.2, 5.2.3, 5.2.4, 5.3.2, and 5.3.3; Tables 5.2-2, 5.2-3, 5.2-4, 5.2-5, 5.3-1, and 5.3-2)
- Study R-7 – *Reservoir Boating* (see entire report, especially Chapters 5.0 and 6.0)
- Study R-8 – *Recreation Carrying Capacity* (see Sections 5.3 and 5.5; Tables 5.3-1 and 5.5-1)
- Study R-9 – *Existing Use* (see Sections 5.1.2, 5.1.4, 5.1.5, 5.1.6, 5.2.1.1, 5.2.1.2, 5.2.1.3, 5.2.1.4, and 5.2.1.5; Tables 5.1-2, 5.1-5, 5.1-6, 5.1-7, 5.2-1, 5.2-2, 5.2-3, 5.2-4, and 5.2-5)
- Study R-10 – *Recreation Facility Inventory and Condition* (see Sections 5.1.2 and 5.1.4; Tables 5.1-2 and 5.1-4)
- Study R-12 – *Projected Use* (see Sections 5.3.2 and 5.3.3; Tables 5.3-2 and 5.3-3)
- Study R-14 – *Assessment of Regional Recreation and Barriers to Recreation* (see Sections 5.3.1, 5.3.2, 5.3.5, 5.4.2, 5.4.3, and 5.5.5; Table 5.5-10)
- Study R-15 – *Recreation Suitability Analysis* (see Section 5.3; Figures 5.3-4 through 5.3-8)
- Study R-16 – *Whitewater and River Boating* (see Section 6.1.1 and 6.1.3).

The factors and indicators that contributed the most in determining the overall boating needs in the study area are summarized in the following bullets. Information from the above recreation studies supports these conclusions. The detailed discussion supporting these findings is found in the later supply,

demand, capacity, and suitability sections that provide a more thorough analysis of overall boating in the study area.

- Boat launching and marina facilities on the study area reservoirs provide good access to the water at all but the most extreme low water periods and are generally in good condition; however, some maintenance issues exist (debris and silt accumulation) as the Lake Oroville pool level fluctuates.
- Boating conditions on the reservoirs are typically safe, and boaters have ample room for boating activity at current use levels.
- Parking facilities are frequently inadequate for the two marinas on Lake Oroville, causing parking capacity problems at peak use times at the associated boat ramps.
- Low water access to Lake Oroville at Loafer Creek is frequently inadequate, requiring Loafer Creek visitors to travel to other boat launch facilities.
- Developed boat launching is frequently not available on the east side of Lake Oroville due to the Enterprise boat ramp being unusable at moderate to low pool levels.
- Most major boat ramps on Lake Oroville do not have a sufficient number of boarding docks, making boat launching and retrieval more difficult and diminishing capacity at peak use periods.
- Access to services such as refueling, food and beverages, and bait and tackle are often not convenient for boaters while out on the reservoir.
- Boat launching access to the Feather River is relatively difficult and generally inadequate.
- High boating speeds in portions of the Thermalito Afterbay may be causing wildlife impacts.
- Water-skiing may be causing potential impacts in the Thermalito Afterbay, particularly on an existing water-ski course where boat speeds are high and inconsistent with wildlife goals in the area.
- Floating campsites are popular and occupancy is greater than 85 percent during the summer months.

5.2.3.1 Overall Boating Needs

Based on a review of the factors and indicators summarized later in this analysis, overall boating needs have been identified for the study area. These needs should not be assumed to be proposed PM&E measures. Site-specific Project-related boating needs are discussed in Chapter 6.0.

Existing Boating Needs

Boating is a high-demand, highly visible activity in the study area. The supply, demand, and capacity information discussed later in this analysis does not suggest that a need currently exists for significant additional boating facilities at

this time; however, some needs are identified below. Boating access is available to Lake Oroville year-round most years, and the Spillway Boat Ramp retains unused launching capacity even during periods of peak demand that occur during summer holidays (Memorial Day and Labor Day weekends, and Independence Day).

Boating is strongly affected by changes in reservoir pool level, which has aesthetic effects as well as effects on the function of larger boat ramps and car-top boat ramps. While reservoir level is not within the control of recreation managers, certain adaptations have been and continue to be made to reduce the effects of reservoir drawdown on recreational boating. In particular, multi-level ramps have been constructed to respond to different water-level conditions, and several boat ramps have recently been extended to provide access at lower pool levels. Three of the major boat ramps currently provide access at very low pool levels (695 to 702 feet). Pool levels below which these ramps are usable are not likely to occur most years. Periods when these extremely low pool levels might occur are likely to be limited to brief periods within the winter months.

In many instances, management is already conducting many of the needed maintenance practices at boat ramps. Visitor comments and responses to surveys and assessment of facility conditions, however, indicate that recreation managers should consider the following facility improvements and consider increasing resources dedicated to the following practices:

Provide additional parking at Lake Oroville boat ramps. Expanded parking should be provided at the developed Lake Oroville boat ramps where parking capacity was found to be exceeded during many summer weekends and holidays. The need is most urgent at Bidwell Canyon BR/Marina, where inadequate marina parking is reducing capacity at the ramp. Suitable space is available for an expansion, assuming an existing campground loop can be relocated nearby. In addition, separate designated parking for single vehicles should be considered.

Expanded parking at the Lime Saddle BR and Marina (shared parking) is also needed. Given the lower frequency of parking capacity problems, this site should receive second priority after Bidwell Canyon. Although suitable sites appear to be available at each site, further analysis would be necessary to fully evaluate any site proposed for expanded parking. (Study R-17, Sections 5.5.1.1 and 5.5.1.4, Table 5.5-2)

Extend Lake Oroville developed boat ramps that have most frequently been unusable due to low reservoir pool level. Extend the two boat ramps that have been unusable for a substantial portion of many summer boating seasons: the Loafer Creek and Enterprise ramps. If extension of the existing ramps is found to be infeasible due to topographic, engineering, or biological or cultural resource constraints, consideration should be given to constructing new low-water ramps

in the vicinity of the existing ramps. (Study R-7, Section 5.3.4, Table 5.3-4; Study R-3, Section 5.2.2.2, Table 5.2-2)

Install additional boarding docks at Lake Oroville boat ramps. Given the importance of boarding docks in making boaters' use of the ramps efficient, enjoyable, and safe, consideration should be given to adding new docks where feasible. The evaluation of boat ramp facilities conducted for Study R-7 – *Reservoir Boating* noted that several boat ramps do not have a sufficient number of floating boarding docks to meet recognized standards, given the number of launch lanes. Additional docks or temporary moorage was among boaters' strongest desires related to potential additional or improved facilities. (Study R-7, Section 5.3.3)

Improve the condition of the Stringtown Car-top BR. Currently, the Stringtown Car-top BR is in poor condition due to erosion and crumbling of the old asphalt road that extends through the inundation zone. Usability as well as aesthetic conditions could be improved by repair or replacement of the road. If repair is infeasible, removal of the remaining asphalt should be considered. (Study R-3, Section 5.2.3.5; Study R-10, Section 5.1.4.16)

Provide more frequent adjustment of Lake Oroville floating docks. Because partial grounding of docks during summer reservoir drawdown, in particular, has decreased the usability of docks, additional attention should be given to adjustment of floating dock cables and dock placement. This can prevent damage to the docks as well as preserve functionality as the pool level changes. (Field observations; Study R-10; Study R-7)

Provide more frequent debris removal at Lake Oroville boat ramps. Remove floating woody debris that accumulates at some ramps during periods of high water (typically spring and early summer). Remove sand and mud deposits from ramps as pool elevation decreases. (Field observations; Study R-10; Study R-7)

Provide boaters with additional information about Lake Oroville boat ramp closures, substitute boat ramp facilities, and reservoir pool levels. Boaters could better plan their trips and adjust to ramp closures through provision of additional information on closures and potential substitute sites. Recreation management should consider publishing information about boat ramp closures, in particular at Enterprise, Loafer Creek, and car-top ramps, on the Internet, and posting signs advising boaters of suitable substitute sites for closed ramps at entrances to the LOSRA and at the closed sites. (Study R-3, Section, 5.2.2.2, Tables 5.2-2 and 5.2-3; Study R-7, Section 5.4.9, Table 5.4-18)

Continue to provide annual O&M at existing and potential future developed boating facilities. Continue routine maintenance of ramps and floating docks to address normal wear and damage from use and weather. Additionally, continue

routine maintenance, cleaning, and servicing of restrooms and trash receptacles. (FERC guidelines)

Provide periodic monitoring of boating facilities and use areas. Over the term of the new license, periodically monitor use and impacts of boaters in the Oroville Facilities area based on a proposed monitoring program. Use this information to determine when existing sites should be improved or enhanced, when new sites should be constructed, if any, or when resource impacts require mitigation. (FERC guidelines; Resource protection)

Relocate the existing water-ski course at the Thermalito Afterbay to a more appropriate location, such as near Bidwell Canyon marina. A water-ski course has been established in the Thermalito Afterbay for some time. Use of the course, particularly by higher speed boats, is inconsistent with wildlife and habitat protection goals in this area. PWC use also is occurring here. Evaluate alternatives for reestablishing the water-ski course in an appropriate location. Options include a cove in Lake Oroville near the Bidwell Canyon Marina, or possibly a location at the South Thermalito Forebay. Assess the pros and cons of each potential location, including getting input from water-ski clubs and other affected parties. (Study T-9; Resource integration)

Reduce current power boat speeds in sensitive areas, such as the Thermalito Afterbay. Higher boating speeds by powerboats and PWC on the Thermalito Afterbay are inconsistent with wildlife and habitat protection goals in this area. Enforce the boating speed limit (maximum of 5 mph) on the Thermalito Afterbay north of SR 162. Evaluate the need for related signage, marker buoys, and additional law enforcement if a speed reduction recommendation is implemented. (Study R-4, Section 5.2.7.4, Table 6.1-1)

Provide car-top boat launching facilities, such as at the Diversion Pool. Examine options to enhance car-top boat launching at the Diversion Pool, potentially via the Lakeland Boulevard access road to the south shoreline, or by improving existing gravel facilities on the north shoreline (Diversion Pool DUA). (Study R-1)

Provide additional floating campsites on Lake Oroville. Floating campsites are very popular on Lake Oroville as occupancy is over 85 percent during summer months. Additional floating campsites are needed to allow more users to enjoy these amenities, particularly at lower pool levels. (Study R-7, Section 5.2, Table 5.2-13)

Future Boating Needs

Consider providing additional future boating facilities, if needed, to accommodate additional use and demand based on monitoring results. Increased demand for boating access through the term of the anticipated new license will likely require additional boating facilities. Use projections for the years 2011 through 2020

indicate that use of the main Lake Oroville boat ramps and marinas will increase. Three ramps are currently considered high capacity priorities, and seven are considered moderate priorities for capacity. A proposed recreation monitoring program that periodically assesses boating demand and concerns should be implemented.

As demand for boating activities is expected to increase, expansion of existing high priority facilities, expansion of suitable substitute sites, or development of new facilities should be considered. Any potential options will require further engineering analysis and environmental permitting. (Study R-12, Sections 5.3.2 and 5.3.3, Tables 5.3-2 and 5.3-3; Study R-13, Section 5.1.2.6, Table 5.1-26)

Consider providing a potential new boater take-out if, feasible, or a seasonal concessionaire-run tow service, in the Big Bend area of the Upper North Fork arm of Lake Oroville for whitewater boaters during peak boating times. The Big Bend Run is currently desirable for boating at lower pool elevations; however, boaters are still required to paddle several miles to reach a suitable take-out. Paddlers currently take out at Dark Canyon Car-top BR, an 8-9 mile distance from the end of the typical run. The North Fork Feather River has few areas suitable for development of a take-out closer to the put-in at PG&E's Poe Powerhouse due to steep shorelines and lack of road access. Recreation managers should nevertheless consider investigating possible take-out sites closer to the put-in. Alternatively, possible arrangements to provide a seasonal concessionaire-run tow service from the end of the run to Dark Canyon Car-top BR should investigated. (Study R-16, Section 6.1.3)

Consider providing real time information on river flows and reservoir pool levels below Poe Powerhouse. Additional real-time information on flow rates potentially could facilitate additional whitewater recreation use of the Big Bend Run. By providing flow information on areas that may be boatable, river boaters would be better able plan their trip. This would require the cooperation of PG&E, hydroelectric project operators of the Poe Project upstream from the Project 2100 boundary. (Study R-16, Section 6.1.1)

5.2.3.2 Boating Supply Factors

Components of public boating supply are summarized below:

- Number, location, capacity, and services of public boating facilities;
- Condition of public boating facilities; and
- Number, location, and services of private boating facilities.

The reservoirs within the FERC boundary provide abundant boatable surface water acreage. At maximum operating storage levels, the surface of Lake Oroville covers 15,819 acres. The Oroville Facilities also include three reservoirs

downstream of Lake Oroville: Thermalito Afterbay covers 4,300 acres, Thermalito Forebay covers 630 acres, and the Diversion Pool covers 320 acres.

Lake Oroville generally provides two types of settings for boating, as defined by the Recreation Opportunity Spectrum (ROS). The ROS contains five classes of settings. Most of the reservoir provides settings that conform to the "rural natural" class, with primarily natural shoreline background and a moderate level of use, but with recreation facilities, residences, roads and bridges, and other human developments apparent. Several coves and the typically long and narrow arms of the reservoir provide settings in the "semi-primitive" class, with predominantly or completely natural appearing landscape, less frequent encounters with other watercraft, and little or no facilities or other types of human development. The areas closest to major facilities would be classed as "urban/natural" given the predominantly modified landscape, constant encounters with other watercraft, and shoreline accessible to land-based users.

Because downstream recreation developments are relatively few in relation to reservoir size, Thermalito Forebay and Afterbay provide a predominantly "rural natural" setting. The Diversion Pool, with only minimal facilities, mostly undisturbed shoreline, and exclusively non-motorized use, could be considered a "semi-primitive" setting, although the area is comparatively small and dams and transmission lines are in view from some locations.

The Feather River below the Diversion Pool provides about 13 miles of primarily flat-water river boating within the study area, with intermittent small rapids. More challenging whitewater boating opportunities in the study area exist only during low reservoir levels, when the upper part of the Upper North Fork Feather arm of Lake Oroville is dewatered and the original river channel is exposed.

Lake Oroville Boating Facilities

Lake Oroville accounts for the majority of boating use in the study area and provides the bulk of the facilities (Figure 1.1-1). The facilities currently available are as follows:

Five Lake Oroville developed boat ramps and associated marinas:

- Bidwell Canyon BR/DUA and Marina
- Lime Saddle BR/DUA and Marina
- Spillway BR/DUA
- Loafer Creek BR
- Enterprise BR

Five Lake Oroville car-top boat ramps:

- Stringtown Car-Top BR

- Foreman Creek Car-Top BR
- Dark Canyon Car-Top BR
- Nelson Bar Car-Top BR
- Vinton Gulch Car-Top BR

Lake Oroville Developed Boat Ramps and Associated Marinas

There are four large boat ramps that provide access to the Lake Oroville at high, moderate, and low pool levels including Bidwell Canyon BR and Loafer Creek BR (both located at the south end of the main basin), Spillway BR (also located on the main basin, near the northwest end of Oroville Dam), and Lime Saddle BR (located on the northwest portion of the reservoir, on the West Branch arm) (Figure 1.1-1). All but the Loafer Creek BR provide year-round access to the water most years, with the exception of occasional periods of very low water during the winter. All have large paved parking areas with space for several hundred vehicles and boat trailers. Enterprise BR, on the South Fork arm of the reservoir, is a smaller ramp that is usable only at moderate and high pool levels.

The Lake Oroville boat ramps with DUAs represent the major developed boating facilities on the reservoir. Boat launching is the primary use at each site. The adjacent DUA facilities generally receive a low to moderate amount of use by boaters and non-boaters.

There are two full-service marinas on the reservoir – one at Lime Saddle and one at Bidwell Canyon. Each provides several hundred mooring buoys for long-term rental, primarily used to moor houseboats, along with a smaller number of covered and uncovered boat slips. In addition, the marinas offer small convenience stores, gas pumps, holding tank pump-out facilities, and boat rentals. Bidwell marina also offers a small snack bar/restaurant and bar.

Overall, the boat ramps and associated facilities throughout the Lake Oroville area are in good condition and meet most standards for the design of such facilities, except as noted below.

- Bidwell Canyon BR – does not meet standards for the provision of designated vehicle-only parking spaces (only vehicle/trailer spaces are provided) and for the number of boarding docks and total boarding dock length (one 60-foot dock is provided).
- Lime Saddle BR – does not meet the standard for the number of boarding docks provided (one dock is provided).
- Spillway BR – the three boarding docks provided do not meet the standard for the number and total length of boarding docks provided (however, the facility was observed to function well with little waiting to launch or retrieve boats, even at peak holiday use periods).
- Loafer Creek BR – does not meet standards in the provision of designated vehicle-only parking spaces (only vehicle/trailer spaces are

provided), the number of boarding docks, and total boarding dock length (one 60-foot dock is provided).
- Enterprise BR – does not meet the standard for the number of boarding docks provided (no boarding dock is provided).

Lake Oroville Car-Top Boat Ramps

There are also five car-top boat ramps on Lake Oroville that provide access for hand-launching small watercraft such as canoes and kayaks and, to a lesser extent, small trailer-launched boats. Three of these facilities (Vinton Gulch Car-top BR, Dark Canyon Car-top BR, and Nelson Bar Car-top BR) are located on the West Branch arm of the reservoir (Figure 1.1-1). Foreman Creek Car-top BR is located on the north shore of the main basin, and Stringtown Car-top BR is located on the south side of the South Fork arm (Figure 1.1-1). Generally, these sites consist of old asphalt roadbeds that terminate at the reservoir. Most include modest improvements such as improved parking and vault toilet buildings. The car-top boat ramps receive moderate to low recreation use, depending on the pool elevation. Non-boating shoreline activities, rather than launching of boats, are the primary use of the car-top ramps most times of year. Activities such as swimming, bank fishing, and picnicking are common at each of these sites.

Overall, the car-top boat ramp facilities are in good condition, with the exception of the Stringtown facilities, which are only in fair condition due to the deterioration of the asphalt road. Generally, the trash receptacles at the car-top boat ramp facilities are in need of maintenance. At low to moderate reservoir levels, the Nelson Car-Top BR is not usable for trailers, and use is also impaired for hand-launching. With the exception of Foreman Creek Car-Top BR, all the facilities have vault toilets and at least some parking spaces. The vault toilet building at Dark Canyon Car-Top BR was destroyed by vandals and has not been replaced.

Downstream Reservoir Boating Facilities

Although boating use levels are low to moderate compared to Lake Oroville, boat access is available to the three downstream reservoirs in the study area year-round through the use of four developed launch ramps and one car-top ramp. Boat ramp facilities include the following:

- North Thermalito Forebay BR/DUA
- South Thermalito Forebay BR/DUA
- Monument Hill BR/DUA (Thermalito Afterbay)
- Wilbur Road BR (Thermalito Afterbay)
- Larkin Road Car-top BR (Thermalito Afterbay)

The Diversion Pool DUA provides informal access to the water, primarily for small non-motorized watercraft. Boaters generally hand-launch canoes and kayaks from a point where Burma Road passes close to the shoreline, about ½

mile upstream of the Diversion Dam. No formal boat ramps exist on the Diversion Pool; however, at least two sites are used for launching. In addition to non-motorized craft, small hand-launched fishing boats with electric motors are occasionally used on the Diversion Pool. Gas-powered boats are not permitted on this reservoir.

Thermalito Forebay is served by two- and three-lane boat ramps with floating docks at both the North and South Thermalito Forebay DUAs. These facilities provide access for trailer and car-top boats, with moderate-sized parking areas. Only non-motorized boats are permitted on the North Forebay. Both ramps are lightly used at most times. Most use of the facilities consists of bank fishing, picnicking, and swimming (activities supported by the adjacent DUAs) rather than boating.

Thermalito Afterbay is served by several boat launches along the eastern shore of the reservoir. These include two primary two-lane paved boat ramps with floating docks (Wilbur Road BR, and Monument Hill BR), one unpaved car-top boat ramp (Larkin Road Car-top BR) and a few undeveloped launch sites that primarily serve the launching of sailboards. The Wilbur Road boat ramp is primarily used by boating anglers during the summer and by waterfowl hunters during the fall and winter hunting seasons. The Monument Hill boat ramp and Larkin Road car-top ramp are primarily used during the summer by boaters with PWC and other pleasure boaters and boating anglers. Waterfowl hunters also use both ramps during the fall and winter hunting seasons.

All of the above facilities are generally in good condition. Recent upgrades to restrooms and to improve ADA accessibility have been made at most of the facilities.

Feather River Boating Facilities

No developed boating facilities currently exist on the Feather River within the study area, which includes the upstream low-flow channel section and the downstream high flow section. The Thermalito Afterbay outlet, where water that has been routed through Thermalito Forebay and Afterbay is returned to the river, is the dividing point between the two sections. Little motorized boating use appears to occur on most of the river. Car-top boats may be hand-launched from the shoreline at the upstream end of the Low Flow Channel within the Fish Hatchery area and from Bedrock Park and Riverbend Park (both outside the FERC boundary). Two gravel ramps within the OWA provide access for car-top and small trailer-launched fishing boats to the Low Flow Channel; unimproved riverbank gravel bars provide similar access downstream of the outlet. A private campground across the river from the OWA (outside the FERC boundary) provides a small concrete boat ramp.

Other Boating Facilities (Boat-in Campgrounds, Floating Campsites, and Floating Restrooms)

Boaters can camp at four primitive boat-in campgrounds distributed around the main body of Lake Oroville. Each campground provides several sites, each with a picnic table and a fire ring or pole stove, vault toilet buildings, and trash receptacles. The length and steepness of the walk between the annually receding shoreline and the campsites discourage use when the pool level is more than about 50 feet below full pool. Study R-3 – *Assessment of the Relationship of Project Operations and Recreation* provides more details on the effects of reservoir level on recreation opportunities.

Ten floating campsites are anchored in various coves around Lake Oroville. Each is a two-story structure that can accommodate up to 15 people, with living space and amenities such as a gas cooking grill, camp table, sink, restroom, storage, and sleeping areas.

To preserve water quality and to provide convenience for boaters, DPR maintains seven floating restrooms on Lake Oroville. The restrooms are strategically placed across the reservoir, and are mounted on floating docks where several boats can moor simultaneously. Each floating restroom has two individual vault toilets. Overall, the restrooms are in good condition.

American with Disabilities Act Accessibility of Boating Facilities

Study R-6 – *ADA Accessibility Assessment* provides a detailed description of compliance with ADA guidelines for recreation facilities. This section summarizes those results for boating facilities in the study area.

Parking and land-side restrooms generally meet ADAAG accessibility criteria at the developed boat ramps and marinas. ADAAG provides exceptions that do not require accessible routes to boarding docks (and the gangways accessing boarding docks) to meet maximum slope and other requirements. These exceptions recognize the difficulty in meeting ADA-accessibility needs, along with the need for sufficient slope for boat launching and retrieval and the difficulty posed by extreme pool level fluctuation. Similar exceptions apply to access routes to the marinas. Due to these exceptions, a facility may be considered compliant, although the ramp, dock, or marina are not accessible. At the time of the assessment, all boat ramps were either compliant or expected to become compliant by the end of 2003. However, additional ADA upgrades may be considered improve access to marina stores and restrooms.

The boat-in campsites, floating campsites, and floating restrooms are not ADA-accessible.

Boating Supply Conclusions

In general, boating facilities are numerous and are generally in good condition. They are distributed throughout the study area, except for the North Fork and the Middle Fork arms of Lake Oroville, where road access is minimal. The facilities are situated in areas generally closer to main access routes and the city of Oroville.

Reservoir pool level fluctuation affects the number of launch lanes available to access Lake Oroville considerably, reducing the available number from 33 lanes at full pool (900 feet msl) down to about 850 feet msl, to 17 lanes at 800 feet msl (a pool elevation common during late summer and fall in low water years). At pool elevations below 725 feet, which occur only during the lowest water years and generally during the fall and winter, three of the developed ramps each provide two launch lanes. These three facilities successively close at pool elevations below 702 through 695 feet.

Reservoir drawdown also affects accessibility of some car-top boat ramps, as the old asphalt roads that serve as ramps are degraded at points deeper in the inundation zone and banks become steep and difficult to ascend. Capacity limitations of the boating facilities are discussed in Section 5.2.3.4. Operations and maintenance are discussed in Section 5.2.3.6.

5.2.3.3 Boating Demand Factors

Important factors affecting demand for public boating are summarized below. More detail on boating use and demand for recreation can be found in:

- Study R-9 – *Existing Recreation Use;*
- Study R-7 – *Reservoir Boating;*
- Study R-14 – *Assessment of Regional Recreation and Barriers to Recreation;* and
- Study R-16 – *Whitewater and River Boating.*

As discussed in Study R-14 – *Assessment of Regional Recreation and Barriers to Recreation,* several factors affect demand for recreation in the study area:

- Proximity and Access: the ability of potential visitors to quickly and easily access a given boating facility;
- Availability of Information: The ready availability of public information about the study area and its facilities and conditions;
- General Conditions: Reservoir level, climactic conditions, and other factors;
- Facilities: Availability and condition of facilities needed for boating activities; and

- Special Events: Sailing events, boat races, fireworks displays, and other events.

Aspects of current and future demand in the study area include the following:

- Current amount and pattern of use of boating facilities;
- Amount and location of projected future demand for public boating facilities; and
- Existing utilization of private boating facilities.

Boating is a high-demand activity, and boating demand is projected to continue to increase over the anticipated term of the new license at a high rate.

Statewide Demand for Boating Activities

The *California Outdoor Recreation Plan*, last published in 1993 and 2002, provides estimated levels of Statewide latent demand and support for public funding for certain common activities. Latent demand was defined as high for those activities that would increase most if additional facilities were provided. The data, based on public surveys, indicates low latent demand for power boating and non-power boating, and low public support for government funding for both. *Projections of Outdoor Recreation Participation to 2050* (Bowker et al. 1999) takes a broader view in projecting future use for various activities for the Pacific Region (which includes California, Oregon, Washington, Alaska, and Hawaii). The projections forecast a 69 percent increase in motorboating by 2020, and a 209 percent increase by 2050. It is possible that the Statewide assessment of low latent demand and low support for government funding are because there are adequate facilities for the amount of current boater demand.

Existing Boating Use Within the Study Area

Boating has been an important activity at the Oroville Facilities since its construction. Consequently, attendance records indicate that boating facilities have historically received a large proportion of the total recreation use of the Project, and this remains true today. Recreation use data for the Oroville Facilities for the period of May 15, 2002 through May 14, 2003 indicate that the Bidwell Canyon Boat Ramp/Marina was the most visited site, with over 190,000 RDs total. Three of the top five recreation sites in attendance were boat ramp/marina facilities. The four primary developed boat ramps and associated marinas together accounted for about 27 percent of the total recreation use of the Oroville Facilities. Combined use of those sites, along with Enterprise BR and the five Lake Oroville car-top boat ramps, accounted for about one-third of all annual attendance. Boating is also the predominant activity at Thermalito Afterbay recreation sites.

Although boating occurs year-round at the Oroville Facilities, demand for boating facilities is much higher during the 4-month summer (mid-May to mid-September) peak recreation season that during the non-peak season. From 60 to 70 percent of use of most of the developed boat ramps occurred during the recreation season. Average daily use of the developed boat ramps during the recreation season was approximately 2.0 to 4.5 times as high as during the off-season. Daily use is highest on weekends and holidays.

Lake Oroville Boat Traffic Levels During the Peak Season

Counts of boats using the study area reservoirs conducted during the peak summer boating period (May 15 to September 15) provide an indication of the overall level of demand for boating on the reservoirs. Counts were conducted during peak hours of 2:00 to 6:00 PM and included all boats in use on the reservoir, whether they were active or beached. The average peak season weekend count was 421 boats. The average holiday count (conducted during the Memorial Day, Independence Day, and Labor Day holiday weekends) was almost double that (816 boats).

The Project reservoirs below Lake Oroville received much lighter use compared to Lake Oroville, relative to the area of water available. Average peak season weekend counts were less than 1 boat on the Diversion Pool, 5 boats on Thermalito Forebay, and 36 boats on Thermalito Afterbay. Average holiday weekend counts were 1 boat on the Diversion Pool, 10 boats on Thermalito Forebay, and 43 boats on Thermalito Afterbay.

Existing Use of Boating Facilities

Study R-9 – *Existing Recreation Use* provides data for each boat ramp in terms of overall visitation (recreation days or RDs). Additionally, the study provides data on the number of vehicles and boat trailers using the parking areas, which provides an indication of the number of visitors using the sites to access the water at a particular time. Study R-12 – *Projected Recreation Use* provides unconstrained projections of demand for sites in the study area.

Lake Oroville Developed Boat Ramps

Location and availability of boating amenities (associated with marinas) appear to be the key determinants of demand for developed boat ramps. Boat ramps and marinas on Lake Oroville account for the two highest use sites in the study area, with a combined average of 2,000 RDs each weekend day of the recreation season at the 2 boat ramp/marina complexes (Bidwell Canyon and Lime Saddle). An average of 177 vehicles with boat trailers were counted on weekend afternoons at the Bidwell Canyon BR, and an average of 78 were counted at Lime Saddle BR during the recreation season. Demand for parking exceeded

supply on some weekends and holidays at these ramps. The following section discusses capacity issues in greater detail.

Overall use was significantly lower at Spillway BR, where there is no marina, with average daily weekend use in the recreation season of about 540 RDs. However, an average of 101 vehicles with boat trailers were counted on weekends afternoons. The demand for parking did not come close to exceeding supply at Spillway BR, even during peak use periods.

Loafer Creek BR had an average of 300 RDs on recreation season weekend days, despite being closed due to low water beginning in late July 2002. An average of about 66 vehicles with boat trailers were counted on weekend afternoons at the ramp while it remained open. Demand for parking did not exceed supply at any time. Enterprise BR had a low amount of use, in part because it was unusable for launching most of the study period.

Lake Oroville Car-top Ramps

Use of the Lake Oroville car-top ramps is relatively low, although as a group, the 5 sites accounted for over 63,000 recreation days (about 4 percent of the total in the FERC boundary) during the May 2002 to May 2003 period. Sixty percent or more of use at the car-top ramps occurred during the summer recreation season. Average daily recreation season use was about 2.5 to 3.0 times greater than off-season use. Most of these sites averaged only about 25–70 RDs per day during the recreation season and about 10–25 RDs per day during the off-season. As discussed above, much of this use was for non-boating activities such as bank fishing, swimming, and picnicking.

Boat-in Camps

Recreation use levels at BICs were provided by DPR. The results were provided in R-7 – *Reservoir Boating*; in general, use of the floating campsites was relatively high during the summer season. Occupancy was greater than 85 percent during weekdays and greater than 90 percent during the weekends.

Thermalito Forebay, Thermalito Afterbay, and Feather River Boat Ramps

Measurement of overall use of the North and South Thermalito DUAs and boat ramps did not consistently permit the separation of use of the boat ramps from non-boating use of the areas, such as picnicking, bank fishing, and swimming. However, counts of vehicles with boat trailers indicate that use of the ramps was low, ranging from 0 to 11 at North Thermalito Forebay and from 0 to 6 at South Thermalito Forebay. Car-top boats, such as canoes and kayaks, are also launched at the North Forebay ramps, which would not be indicated by the counts of vehicles with trailers. Use is higher during occasional sailing club events operating from the North Forebay ramps.

Measurement of use of the Monument Hill BR/DUA, the largest boat ramp facility on the Thermalito Afterbay, also did not consistently permit the separation of use of the boat ramp from the DUA and beach. However, much of the use of the area was observed to be boating-related. Average weekend use during the 2002 recreation season was about 400 RDs per day. An average of 24 vehicles with boat trailers were counted at the site during summer weekends and holidays peak use hours, and as many as 47 vehicles with trailers were present on holiday afternoons.

Use of the Wilbur Road BR averaged about 92 RDs each weekend day of the recreation season. An average of about 8 and as many as 15 vehicles with boat trailers were counted at the site during summer weekends and holidays peak use hours.

Use of the Larkin Road Car-top BR was somewhat higher, with weekend use during the recreation season averaging over 190 RDs. An average of about 6 and a maximum of 16 vehicles with boat trailers were counted at the site during summer weekends and holidays peak use hours.

Boating use of the Feather River within the FERC boundary is low. The only boat access facilities on the river are undeveloped gravel ramps and informal riverbank launch sites. No more than a few boat vehicles with boat trailers were observed at these sites at most times.

Upper North Fork Feather River (Big Bend Run)

The Big Bend whitewater run in the Upper North Fork Feather River contributes a nominal number of RDs to the Lake Oroville area total. It is primarily used by local boaters, who prefer to boat the run when reservoir levels descend to 730 or less during the fall. This condition does not occur in many years, and when it does occur, it is generally during the winter months, when cold weather discourages most boaters.

Boaters' Opinions Regarding Adequacy of Boating Facilities

Surveys conducted in 2002 and 2003 asked respondents about their opinion of the adequacy of the number of different type of boating-related facilities. A high proportion of visitors responding that there were too few of a facility may be an indication that latent demand exists (i.e., demand is exceeding supply).

Only "docks or temporary moorage" were judged by a majority (about 52 percent) to be too few in number. About 43 percent felt the number of boat-in campsites was not adequate. (It should be noted that the boat-in campsites were never near capacity during the study period, primarily due to difficult access from the water during moderate and low water levels.) A lower perception of need was

expressed in relation to boat-in fuel docks, boat ramps, and marinas, with about 35-38 percent indicating there were too few at present, while over 60 percent felt the number provided was about right. Further analysis indicated that boater perception of the need for more boat ramps was primarily associated with parking capacity limits and effects of low water on ramp lanes available at two particular ramps. The perception for a need for more boat-in fuel docks may be in part due to the inconvenience of reaching the fuel pumps at their current marina locations.

Boating Demand Conclusions

Boating demand is affected by several factors, including ease of access and proximity of facilities, conditions at the recreation site, the availability and condition of facilities, the availability of information regarding recreation opportunities, and special events that attract visitors. Based on observations of use of the boating facilities and boaters' perceptions of the need for additional facilities, current demand for recreation opportunities is largely being met. However, the high projected growth in demand for boating activities could potentially create capacity constraints related to boating facilities. Section 5.2.3.4 addresses boating capacity factors.

5.2.3.4 Boating Capacity Factors

Factors that potentially constrain boating capacity must be considered in determining need. Boating capacity factors are described in detail in Study R-7 – *Reservoir Boating* and are summarized in this section as follows:

- Facility capacity and utilization rates for boating facilities;
- Physical/spatial capacity for boating facilities;
- Social capacity and perceived crowding for boating facilities;
- Ecological capacity and impacts of boating facilities; and
- Determination of which capacity factors are limiting factors for utilization.

General Boating Facility Capacity Factors

In general, boating facilities at the Oroville Facilities receive their highest level of use during summer weekends and holidays. Launching of boats typically peaks from mid-morning to early afternoon. It is at these times when the capacity of the facilities is most relevant to this analysis. Large special events such as fishing tournaments may also strain capacity of Lake Oroville facilities during the off-season, when lower pool levels reduce the number of launch lanes available at specific facilities and reservoir-wide.

Several interrelated factors can limit the capacity of boating facilities to provide boaters access to the Project reservoirs. The facility capacity of developed boat ramps is limited by the amount of parking available for boaters' vehicles and

trailers; when no parking is available for arriving boaters, the facility has reached its capacity and boaters will be turned away. Physical space available for parking, rather than facility capacity, may be limiting at less developed or undeveloped boat ramps (such as car-top ramps) where vehicles park along road sides or in designated or undesignated areas within the inundation zone.

Study R-10 – *Recreation Facility and Condition Inventory* assessed all recreation facilities at the Oroville Facilities and provided information on parking at boating facilities. Each of the four major boat ramps on Lake Oroville provides from 131 to 350 vehicle/boat trailer parking spaces. The Lime Saddle and Spillway BRs also provide designated parking spaces for cars; these vehicles park in vehicle/trailer spaces at the Bidwell Canyon and Loafer Creek ramps. Additional parking becomes available at the Bidwell Canyon and Spillway boat ramps as the reservoir is drawn down.

The social capacity of a boat ramp relates to the number of boaters who may use the facility without a level of crowding or conflict with other boaters that makes use of the facility undesirable. Regardless of the amount of parking available, the number of boaters who may access the water is limited by the capacity of the boat ramp and associated facilities, such as boarding docks for boat launching and retrievals. The design of the facilities, the skill of boaters in using the ramp, and their readiness and other factors can affect social capacity. Boaters encountering crowding or long waits to launch or retrieve a boat at a launch ramp may indicate that the social capacity of the ramp is being exceeded. Even when parking is not full, boaters may encounter these conditions if more boaters desire to use a ramp at one time than can be efficiently accommodated. Boaters were asked as part of Study R-13 – *Recreation Surveys* to indicate whether they typically had to wait to use the boat ramp they use most often and, if so, the average number of minutes they had to wait.

Ecological capacity relates to unacceptable levels of impacts to environmental resources at boat ramps. Impacts may include degradation of shoreline vegetation, potential water pollution from fuel and other petroleum products, and shoreline erosion.

Boating Facility Capacity

Boat ramps and associated marinas are some of the most popular developed recreation sites in the study area. Similar to many other developed recreation sites in the study area, these sites experience higher levels of use during the recreation season, especially on weekends and holidays. In general, most of these sites are currently considered below their facility capacity based on percent occupancy of parking spaces during the recreation season. While existing and future parking needs are a constraint at several of the boat ramps and marinas, reservoir pool level also constrains facility capacity at many of these sites due to narrowing of ramps and loss of launching lanes. In most years, the severest

effects occur during the fall and winter when boating demand is much lower than summer levels.

Study R-7 – *Reservoir Boating* indicates that two sites are currently experiencing high levels of use during weekends and holidays that would likely be considered at and/or exceeding facility capacity. At the Bidwell Canyon BR, the average summer 2002 count of 65 vehicles without trailers indicates that there were typically many such vehicles using vehicle-trailer spaces, as no designated vehicle-only spaces are provided. The average count of 178 vehicles with trailers indicates than there were, on average, 100 vehicle-trailer spaces for them to use. The combined counts indicate that there were typically unoccupied spaces remaining for arriving boaters to use. However, the maximum vehicle and trailer counts obtained on holidays indicate that the lot was at or above capacity. Vehicle counts are not available for most of the 2003 summer season, when reservoir levels were considerably higher than the previous summer, but observations at the site indicate that boaters were commonly turned away on weekends due to lack of parking.

A similar situation occurs at Lime Saddle BR, with insufficient designated single-vehicle parking spaces causing vehicle-trailer spaces to be used by single vehicles, limiting the capacity of the facility to accommodate boaters wanting to use the launch ramps. A large overflow lot at Lime Saddle BR near the ramp usually was sufficient to meet parking needs; thus, the available data do not indicate that parking capacity was often exceeded. However, like Bidwell Canyon BR, Lime Saddle BR also exceeded parking capacity on a holiday.

At both facilities, the capacity constraint was observed to be largely due to the lack or shortage of designated single-vehicle parking spaces for marina boaters and their guests. The predominance of large houseboats at the marinas would normally require additional parking spaces to support those facilities. The marina parking lot at Bidwell Canyon provides 168 parking spaces, with additional spaces available as the pool level decreases from full pool. The shared boat ramp/marina parking lot at Lime Saddle provides 45 single-vehicle spaces, with varying amounts of parking available in the overflow lot depending on the number of vehicles with trailers present.

At the less developed car-top BRs, especially those along the Lake Oroville shoreline, facility capacity is partly dependent on reservoir pool elevation. At these sites, there tends to be less parking capacity at higher reservoir pool elevations compared to lower elevations, with the result that parking capacity may be exceeded at sites that have minimal parking above the full pool level.

As discussed above, visitors were asked to evaluate the number of boat ramps and associated facilities provided in the study area. Slightly more than one-third of respondents felt there was a need for more boat ramps and more marinas. Perceptions of a need for a key amenity at boat ramps, docks, or temporary

moorage was substantially higher, with over 50 percent believing there were too few docks provided. Increasing the number of boarding docks has potential for increasing launching efficiency, and thus capacity, of ramps that currently have only a single dock.

Overall, existing facility capacity status of the boat ramps in the study area is considered to be below capacity, with ample capacity available at the Spillway BR even at peak use times. However, the parking capacity constraints described above cause a few of the developed boat ramps and car-top ramps to be considered "above" or "exceeding" capacity and thus a limiting factor.

Social Capacity for Boating Facilities

Social carrying capacity is the maximum amount of recreational use that can occur without impairing visitors' desired experience. The particular focus is on visitors' perceptions of feeling "crowded." For this study, data on boaters' perceptions of crowding are drawn from the boater section of the On-Site Survey. Boaters were asked to indicate how crowded they felt at the boat ramp, using a scale where 1 meant "not at all crowded" and 9 meant "extremely crowded" (Shelby and Heberlein 1986).

Visitors surveyed during the summer recreation season at Lake Oroville boat ramps rated crowding at those sites, on average, at 3.4 (3 = "slightly crowded"). Over 60 percent of boaters rated crowding at 3 or lower, while just 10 percent rated crowding as 7 (6 is defined as "moderately crowded") or higher. Results were slightly lower but similar for the Thermalito Forebay and Afterbay Boat Ramps, with an average rating of 3.1, over two-third of visitors rating crowding as 3.0 or lower, and 11 percent rating crowding as 7.0 or higher. Mean crowding scores for Lake Oroville Car-top Ramps was 2.9. Although not high, crowding scores at Lake Oroville boat ramps were probably increased due to the effects of very low late summer pool levels on individual ramp capacity. Also, the closure of Loafer Creek BR in late July 2002 transferred additional launching demand to the Bidwell and Spillway ramps.

An identical scale question was asked in relation to boaters' perception of crowding while out on the water. Boaters were also asked about potential boating-related problems they had experienced and encounters with other users on the water, as a means to assess what effects other boaters had on their recreation experiences. Responses to these questions do not relate directly to boating facilities, but do provide an indication of patrol and visitor safety needs out on the water, which are summarized at the programmatic level. Closely related to perceptions of crowding at ramps are boaters' experiences with having to wait to use the ramps. The visitor survey asked boaters if they typically had to wait to use the ramp they use most often and, if so, the average length of the wait.

Although a majority of boaters who indicated that they most frequently use the Bidwell Canyon and Lime Saddle boat ramps reported having to wait, the average length of wait was generally not excessive (9-11 minutes). The percent reporting having to wait at the Spillway and Loafer Creek boat ramps was 34 and 38 percent, respectively, with average again in the range of 9-11 minutes. Longer waits, as long as 25-40 minutes, were reported by a few boaters contacted at major ramps in the late summer and early fall of 2002. Extremely low water levels for that time of year, combined with launching pressure associated with fishing tournaments, contributed to these long wait times. Results were similar at the Spillway BR, Loafer Creek BR, and Monument Hill BR, while little waiting was reported at the Thermalito Forebay boat ramps.

Overall, boat ramps in the study area are considered to be below social capacity, based on the above data. Considered in aggregate, the crowding scores at boat ramps indicate that visitors perceive little crowding at these sites. In general, boaters often do not have to wait long to use the ramps; when waits are required, they do not typically appear to be lengthy. However, most of the primary boat ramps at Lake Oroville can be categorized as approaching or even exceeding their social capacity at limited times, specifically when low water levels occur during the summer boating season, as occurred during the 2002 season. With social capacity considered to be below capacity based on the aggregate crowding scores at boat ramps in the study area, it is not a limiting factor at this time.

Ecological Capacity for Boating Facilities

In general, recreational use of boat ramps at Lake Oroville does not appear to have a widespread impact on the ecological integrity of the study area. Most observed ecological concerns tended to be minor and localized (e.g., soil erosion, trash accumulation, etc.), although observed impacts at several sites were more pronounced.

Ecological capacity is considered a low concern at the major developed Lake Oroville boat ramps. Similar to other developed recreation facilities in the study area, ecological concerns at many of the boat ramps and day use areas are likely minimized by the presence of hardened facilities, routine maintenance, and on-site management, among other factors (boat ramps and day use areas without hardened facilities generally had more observed ecological impacts than those with hardened facilities).

As an example of the above statement, ecological capacity is considered a limiting factor at two boat ramps–Foreman Creek Car-top BR and Afterbay Outlet BR–where litter, erosion, vehicle use of shoreline areas, and other issues are of concern. However, these impacts cannot be attributed primarily to boaters or boating use. Although a minor amount of boat launching occurs, the

predominant activities at these sites are non-boating activities such as bank fishing and swimming.

Additionally, five other boat ramps (Enterprise BR, Wilbur Road BR, Larkin Road Car-top BR, Stringtown Car-top BR, and Vinton Gulch Car-top BR) are considered to be approaching their ecological capacity. The reasons for these conclusions relate to shoreline erosion and impacts to nearby shoreline areas by vehicles. However, ecological capacity is not considered a limiting factor at these facilities.

Overall, ecological capacity is considered to be approaching capacity at boat ramps, but is not considered a limiting factor at this time. Potential ecological impacts should continue to be monitored, however, especially at more primitive or unimproved facilities and if use of study area increases in the future. Additionally, existing ecological capacity-related management decisions should be considered a priority at the Foreman Creek Car-top BR and the Afterbay Outlet BR due to resource protection needs.

Boating Capacity Conclusions

Spatial and facility capacities are the primary limiting factors at the boat ramps in the study area.

Facility capacity is a limiting factor at the two major launch ramps associated with marinas, due to an insufficient amount of parking for marina boaters. Additional facility capacity limitations arise at the major ramps due to low water levels reducing the number of launch lanes. These limitations arise primarily when these low water levels occur during the summer boating season, as occurred in 2002. Low water levels during the non-summer months, when boating use is much reduced, do not appear to cause capacity problems unless they reach extreme levels.

Spatial capacity is a limiting factor due to the general lack of expansion potential at existing sites and the inability to accommodate additional facilities within the existing footprint of these sites. However, areas identified in the Study R-15 – *Recreation Suitability Analysis* as suitable for recreation development could potentially be used for new BR/DUAs and/or BRs in the study area, though shoreline conditions for boat ramps was not specifically investigated.

Ecological capacity appears to be a limiting factor at only two undeveloped boat ramps, but these capacity concerns cannot be attributed to boating use, which is low.

Given the existing high occupancy rates at the floating campsites, facility capacity is considered a limiting factor at this time and will likely continue to be a limiting factor in the future. However, facility capacity constraints may potentially

be reduced in the future by providing additional floating campsites in the study area. It should also be noted that use of the Lake Oroville floating campsites was lower in the mid-1990s, when fees for use were higher.

5.2.3.5 Boating Suitability Factors

The suitability of land in the study area for recreation and recreation facilities is discussed in Study R-15 – *Recreation Suitability Analysis.* Boating is discussed in detail in Study R-7 – *Reservoir Boating.* Relevant portions and summaries of these reports are provided in this section, including identification of areas potentially suitable for additional boating facility development and considerations associated with each area.

Existing road access and slope are two important factors in evaluating the suitability of sites for boating facility development. A facility should be situated near main highways to provide convenient access. While some degree of shoreline slope (12 to 15 percent) is advantageous for construction of a boat ramp, flatter ground is needed for parking and restrooms (0 to 15 percent). Other factors, including property ownership, landslide hazard, existing use, wetland/riparian status, and presence of special status species, were also considered in the suitability analysis study conducted for relicensing. In that analysis, land must have a favorable access road and a slope of less than 10 percent to be considered to have high suitability for development. Lesser slopes (0 to 8 percent) are also desirable to facilitate compliance with ADAAG.

Lake Oroville

Generally, the east side of Lake Oroville, which generally includes the Middle Fork and South Fork arms, provides few highly suitable areas. While there is no existing road access to the Middle Fork arm, road access is available to a few locations on the South Fork arm, specifically in the Craig Saddle and McCabe Cove areas. There is very little road access to the Upper North Fork, and steep slopes dominate the terrain. Shorelines and nearshore areas are steep in most areas adjacent to the South Fork arm as well. The suitability analysis suggests that there may be significant biological and cultural resource constraints in several areas that otherwise appear to have high suitability based on other factors. Any site would need to offer the potential for providing boat access to the reservoir at substantially lower pool levels than the Enterprise BR currently provides. Further analysis would be necessary to fully evaluate any site proposed for a new boat ramp. The west side of Lake Oroville generally has medium and high suitability only in and around areas where facilities currently exist. This provides some opportunity to expand facilities, but relatively few opportunities for developing new facilities. Floating campsites are placed where there is protection from significant winds.

Thermalito Diversion Pool, Forebay, and Afterbay

Only non-motorized and electric-motor boats are permitted on the Diversion Pool. Boaters currently can hand launch car-top boats onto the Diversion Pool from the shoreline where the Diversion Pool DUA access road (referred to locally as Burma Road) passes close by. Car-top boats can also be launched from the opposite shore below the old railroad grade. A gate generally prevents vehicle access to the latter area, requiring boats to be carried some distance to the shore from parking areas. The potential exists to propose opening the gate and improving the road to allow daytime vehicular access and the addition of primitive parking and day use facilities to the old railroad grade area, including car-top boat access. Other portions of the Diversion Pool shore are generally unsuitable for facility development due to lack of road access and steep slopes between the existing old roads and railroad beds (used as multiuse non-motorized trails) and the shoreline. Sensitive biological and cultural resources also exist in some portions of the area.

At Thermalito Forebay, the existing North and South Forebay DUA/BR facilities occupy most of the areas suitable for development on the reservoir. Both areas contain unused areas of ground that may be suitable for facility expansion, but these do not include shoreline areas. Much of the south shoreline consists of the earthen dam that forms the reservoir. The entire north shore is considered to be a sensitive biological resource due to the wetland and riparian vegetative communities present. The western end of the reservoir is the site of a power plant; the surrounding area is closed to public use for operations and security reasons.

Suitability for potential facility development is similarly constrained at the Thermalito Afterbay. The west and south shorelines consists of several miles of earthen dam. The entire north and east shores are considered to be sensitive biological resources due to the presence of wetland and riparian vegetative communities and sensitive wildlife species and associated buffer areas. Areas of the north shore in particular contain waterfowl brood ponds and are managed to enhance waterfowl reproduction.

Feather River/Low Flow Channel

The FERC boundary includes two segments of the Feather River below the Diversion Pool. The 1.5 miles below the Diversion Dam contains the ½-mile-long Fish Barrier Pool between the Diversion Dam and the Fish Barrier Dam, and about 1 mile of the river below the Fish Barrier Dam. The shorelines on both sides of the Fish Barrier Pool are steep and rocky, precluding most type of facility development. Below the Fish Barrier Dam, most of the southeast bank is owned by the city of Oroville and is outside the FERC boundary. Most of the northwest bank area is occupied by the Feather River Fish Hatchery. An undeveloped area

of riverside land exists immediately downstream of the Fish Hatchery but is identified as a sensitive biological resource.

The second segment of the Feather River within the FERC boundary flows through the OWA. Most of the east riverbank above the Thermalito Afterbay outlet is private property. The west and the east riverbanks for approximately 1 mile above the outlet are within the OWA. The riverbank in both areas is primarily steeply sloped gravel levees and floodplain deposited by historical river dredging operations. Gravel roads run along the tops of these levees and are used by visitors to access the river. All of these riverbank areas are identified as sensitive biological resources due to the presence of wetland and riparian vegetative communities and sensitive wildlife species and associated buffer areas. The historical dredger tailings represent a significant cultural resource as well.

Below the Thermalito Afterbay outlet, the riverbanks and adjacent land for 4 miles along both riverbanks and an additional 1 mile on the west bank are within the OWA and the FERC boundary. Most areas consist of steep gravel banks similar to the upstream segment and are within the floodplain, which severely limits the potential for development. Some areas are identified as sensitive biological resources due to the presence of wetland and riparian vegetative communities, sensitive wildlife species, and associated buffer areas. However, a 1-mile-long portion of the west bank beginning about ½ mile below the Afterbay outlet consists of relatively flat gravel bars without sensitive biological resource constraints. The area is accessible to vehicles entering the OWA at the Vance Road entrance. This area may offer the greatest opportunity for improving boating access to the lower river. A similar ½-mile section exists on the west bank at the farthest downstream end of the study area but is not currently accessible to vehicles.

Boating Suitability Conclusions

The majority of highly suitable land for recreation facility development at Lake Oroville is concentrated in the Loafer Creek and Craig Saddle areas, both in the southeast portion of the reservoir. The Loafer Creek area is currently the site of a recreation complex with several components; therefore, potential conflicts with existing uses and facilities need to be considered. However, at Loafer Creek DUA, the potential exists to upgrade an existing gated service road and convert it to a low pool level car-top ramp for use by the public. There is a moderate amount of moderately suitable and a limited amount of highly suitable land around many existing boat ramp facilities, near Spillway DUA, and in several other areas. There is little suitable land in the Middle and Upper North Forks due to steep slopes and landslide hazards, as well as lack of road access.

Downstream of Oroville Dam, the primary areas identified as highly suitable are near the Diversion Pool just west of the Diversion Dam, near the South

Thermalito Forebay DUA, and areas surrounding the northern portion of the Thermalito Afterbay. The area at the northernmost portion of the OWA is also identified as highly suitable.

5.2.3.6 Boating Operations and Maintenance Factors

A complete inventory of boating facilities is provided in Study R-10 – *Recreation Facility Inventory and Condition,* along with a description of their conditions. The effects of reservoir pool level on recreation are discussed in detail in Study R-3 – *Assessment of the Relationship of Project Operations and Recreation*. Study R-6 – *ADA Accessibility Assessment* addresses the compliance of recreational facilities with ADA standards. Information from these reports is compiled and summarized below regarding boating recreation operations and maintenance factors.

Boating Facility Maintenance Requirements

The primary maintenance requirements at the boat ramps and car-top ramps are routine maintenance of toilets and trash receptacles. The boarding docks provided at most ramps also require routine maintenance and inspection, as well as repositioning in response to fluctuations in reservoir pool levels.

A unique operations requirement at Foreman Creek Car-top BR is the marking of designated parking areas in the inundation zone. The parking areas are intended to keep vehicles from damaging sensitive cultural resources in the area, which become susceptible to vehicular damage as the pool level decreases.

Similar to the restrooms at the boat ramps, the 7 floating restrooms on the reservoir require regular cleaning, maintenance, and servicing. More frequent maintenance is needed during the summer boating season, when boating activity is greatest. This is also true for floating campsites; additionally, these facilities are periodically brought on shore for maintenance and upgrades.

As mentioned above, floating debris at the boat ramps can be a problem at Lake Oroville during the spring and early summer as a result of the reservoir pool rising and debris being flushed into the reservoir from tributaries. Floating debris out on the water also tends to be most prevalent at those times. Although most of the debris is small, even small debris can damage boat propellers and watercraft impellers if struck, and it can be a hazard to water-skiers and wake boarders. The occasional larger pieces of wood have the potential to cause the greatest damage or injury. Sand, rocks, and mud have also been observed to be deposited on several ramps during high water periods and require removal as the reservoir level recedes.

Servicing of the floating restrooms and floating campsites, and removal of floating debris out on Lake Oroville, are performed by DPR and require

specialized boats and other equipment and trained personnel. Maintenance of this equipment is part of overall maintenance needs for boating, and will increase if boating facilities or services are expanded.

Boating Operations and Maintenance Needs

Overall, maintenance of boating facilities was found to be adequate during data collection for Study R-10–*Recreation Facility Inventory and Condition*. Trash receptacles were found to need more frequent servicing at several of the car-top ramps, and at the Enterprise and Wilbur Road BRs. Vault toilet buildings at the boat-in camps were found to need more regular servicing. The old asphalt road that extends into the inundation zone at Stringtown, which is severely crumbling and eroding, requires substantial repair or replacement if vehicle access to low pool levels is to be maintained.

Finally, the marina facilities at Lime Saddle that were damaged by a December 2002 wind storm need replacement. However, this need is being addressed in the course of DPR negotiations for a new long-term lease with a concessionaire at Lime Saddle BR/DUA/Marina, which is currently underway.

Boating Operations and Maintenance Conclusions

Overall, maintenance needs related to boating facilities appear to be minimal the study area. However, consistent attention is required to maintain the boat ramps in a debris-free condition so that their function is not impaired. Several boaters complained in their survey responses about a perceived lack of attention to these needs. Observations of heavy amounts of floating debris at ramps were made at several locations, in particular when reservoir levels were rapidly rising. Large amounts of sand were also observed on the Enterprise ramp as pool levels receded during the summer. Floating debris on Lake Oroville is an ongoing concern, and its removal is an annual challenge for DWR and DPR, who perform this debris removal program. Floating debris problems are most severe during years with high spring and early summer reservoir pool levels. Consideration should be given to actions that would increase the capability to meet these ongoing maintenance needs, which have considerable ability to affect the quality of boating experiences.

5.2.4 Overall Swimming and Sunbathing Needs in the Study Area

The overall swimming and sunbathing needs in the study area are presented first. Subsequent sections provide the detailed analysis of overall swimming supply, demand, capacity, suitability, and operations and maintenance factors to support these overall findings of need. Site-specific swimming and sunbathing needs are further defined in Chapter 6.0.

Much of the swimming that occurs within the FERC boundary occurs from boats, but shoreline-based swimming (primarily by non-boaters) is also an important recreation activity and is addressed in this section. Swimming occurs nearly exclusively during the warmer summer recreation season defined herein as May 15 to September 15. The typical hot and dry summer weather in the Oroville area, with daily high temperatures in the 90s (°F), increases the demand for swimming opportunities.

Information about swimming and sunbathing facilities, existing and future use, facility capacity, effects of Project operations, and suitability for recreation development is summarized from the following relicensing studies:

- Study R-3 – *Assessment of the Relationship of Project Operations and Recreation* (see Sections 5.2.5, 5.2.6, and 5.3.4; Tables 5.2-6 and 5.3-2)
- Study R-8 – *Recreation Carrying Capacity* (see Section 5.5.2; Tables 5.5-2 through 5.5-6)
- Study R-9 – *Existing Recreation Use* (see Sections 5.2.1, 5.3.1, 5.3.2, 5.4.1, 5.4.2; Tables 5.2-1, 5.2-3, 5.2-4, 5.2-14, 5.4-1, and 5.4-2)
- Study R-10 – *Recreation Facility Inventory and Condition* (see Sections 5.1.4.3 through 5.1.4.6; Table 5.1-4)
- Study R-12 – *Projected Recreation Use* (see Sections 5.3.2 and 5.3.3; Tables 5.3-2 and 5.3-2)
- Study R-14 – *Assessment of Regional Recreation and Barriers to Recreation* (see Sections 5.2.4, 5.2.5, and 5.4.3; Tables 5.2-7, 5.2-8, 5.2-10, and 5.4-6)
- Study R-15 – *Recreation Suitability Analysis* (see Section 5.3-1; Figure 5.3-1)
- Water quality studies (excerpts)

The factors and indicators that contributed the most in determining the overall swimming needs in the study area are summarized in the following bullets. Information from the above recreation studies support these conclusions. The detailed discussion supporting these findings are found in the later supply, demand, capacity, and suitability sections that provide a more thorough analysis of swimming in the study area.

- Regional demand for swimming has been strong. Latent demand for swimming in the State has been categorized as high. Most of the swimming opportunities in an outdoor setting in the area are found in the study area, as there are few other reservoirs in the immediate vicinity.
- The swimming facility at Loafer Creek DUA provides good swimming opportunities for campers and day users at the south end of Lake Oroville during summers with sustained high reservoir pool levels and is in good condition; however, swimming opportunities at this site diminish or are eliminated as the reservoir pool level drops during the summer.

- Developed swimming opportunities do not exist at the north end of Lake Oroville (the West Branch arm) although several other types of recreation facilities there concentrate use and increase demand.
- Informal swimming opportunities exist at several locations around Lake Oroville but do not provide ideal conditions and become less desirable as the reservoir pool level falls.
- The swim beach at the North Thermalito Forebay DUA is very popular and functions well; however, water quality issues need resolution and additional warming of the water, particularly early in the summer, would benefit many swimmers.
- The Thermalito Afterbay provides one facility dedicated to swimming only, although both swimming along with PWC use occur at the beach provided at the Monument Hill DUA; flat shorelines and shallow, relatively warm water at the southeast end (near Larkin Road Car-top BR) may provide good opportunities for meeting additional swimming needs in this area.
- Few swimming opportunities are available on the Feather River/Low Flow Channel where the water temperature is colder; potential for providing warmer water swimming opportunities at small constructed facilities could be investigated but may conflict with fishery temperature goals.
- Water quality concerns exist at some study area swimming areas, requiring further monitoring to maintain water quality within State Department of Health Services (DHS) guidelines; visitor education may help alleviate some concerns.

5.2.4.1 Overall Swimming and Sunbathing Needs

Based on a review of the factors and indicators summarized later in this analysis, overall swimming and sunbathing needs have been identified in the study area. These needs should not be assumed to be potential PM&E measures. Site-specific Project-related swimming area options are discussed in Chapter 6.0. Overall swimming and sunbathing needs and potential options to satisfy them may include:

- Suggested maintenance and improvements for swimming facilities;
- Suggested increases in supply of swimming facilities; and
- Suggested compliance with ADA at swimming facilities.

Existing Swimming and Sunbathing Needs

The following swimming-related needs have been identified to meet existing swimming and sunbathing needs in the study area:

Investigate and implement actions that would protect existing water quality and would help reduce summer bacteria levels at selected swim beaches (to levels within established DHS criteria). Options to accomplish this may include: improving circulation of water into swim beach embayments to prevent

stagnation and increase flushing of contaminants; treating water with chemicals (chlorination) to reduce bacteria loads; coordinating with DHS and others to develop and implement a water quality monitoring program; educating visitors on methods to help maintain water quality; posting signs and notices at swim areas; and discouraging waterfowl from using beach areas during the summer to reduce the amount of waste deposited on the beach and in the water at swim beaches. Potential swim beaches and informal swim areas that should be addressed include the North Forebay Recreation Area, South Forebay Recreation Area, Loafer Creek DUA, Monument Hill BR/Car-top BR, Foreman Creek BR, Stringtown Car-top BR, and One-Mile Pond. (Preliminary data from Environmental Work Group, Water Quality Studies W1 and W3; Resource protection; Health and Safety)

Provide improved swimming opportunities in the southern part of Lake Oroville, such as at the Loafer Creek Complex. A preliminary assessment of suitable sites and options within the Project area indicates that a few options exist to enhance swimming opportunities in the south part of Lake Oroville. One option is the creation of a sub-impoundment at the Loafer Creek DUA cove (within Lake Oroville) to retain water in the cove when the Lake Oroville pool level falls to levels that would dewater the cove. This option would make the best use of the existing facilities in the area (restrooms and changing rooms, irrigated lawn areas, picnic sites, etc.). Another option is the creation of a separate new swim lagoon impoundment in the Loafer Creek Complex, unattached to Lake Oroville. It is likely that either of these two options would require substantial investment in initial construction and ongoing operations and maintenance. Detailed reviews of potential environmental and cultural resource impacts of construction and operation of such impoundments would also be required. In addition, further engineering feasibility study and permitting would be required. Other less costly options to consider include a swimming pool and/or a water play area. Any of these options pursued at the Loafer Creek Complex would serve campers at the Loafer Creek and Bidwell Canyon campgrounds, and would be reasonably close by car to local residents in the greater Oroville community. (Study R-3, Section 5.2.5, Table 5.2-6)

Provide swimming area enhancements at some car-top boat ramps, or other undeveloped shoreline access areas, to improve dispersed swimming opportunities at Lake Oroville and elsewhere. Inadequate parking and steep, muddy shorelines limit the usability of many sites for swimming. Provision of sand where feasible and sustainable could increase shoreline usability, and reduce shoreline erosion, thereby reducing turbidity of the water. On Lake Oroville, the Foreman Creek Car-top Boat Ramp provides some advantageous conditions for swimming (good road access, shallow waters, full summer season usability) but has no vault toilet building. At Thermalito Afterbay, the Larkin Road Car-top BR provides similar advantages, but would benefit from development of a sandy swim beach separate from the ramp area. This action would separate boating/PWC activity from swimming and could help prevent continued shoreline

degradation. Other sites may also have potential. (Study R-3, Sections 5.2.5.2 and 5.3.4, Table 5.3-2; Study R-11, Section 5.2.2.1, Tables 5.2-1, 5.2-2)

Provide actions to increase the level of ADA accessibility to swimming areas at Lake Oroville. At Lake Oroville, the ADA assessment of the Loafer Creek Complex indicated that additional work is needed to make travel routes and picnic facilities accessible. In particular, steep asphalt trails linking the Loafer Creek DUA parking area to the swim beach and associated facilities presents a substantial barrier to use by some physically disabled persons. (Study R-6, Section 5.3.3.6)

If feasible and cost-effective, provide warmer water swimming opportunities in the lower part of the Oroville Facilities, such as the Thermalito Forebay. The potential to provide warmer water at the swim beach at the North Forebay DUA, by modifying circulation or other method, should be considered. A first step would be investigation of possible engineering solutions, if any. If a feasible and cost-effective solution is validated, then the solution should be implemented. (Study R-3, Sections 5.1.1.2 and 5.2.6.1, Table 5.1-3)

Continue to provide annual O&M at existing and potential future swimming facilities. Continue to provide adequate annual O&M at swimming areas. Periodically monitor recreation use at swimming facilities over the new license term. (FERC guidelines)

Provide periodic monitoring of swimming facilities. Over the term of the new license, periodically monitor use and impacts of swimming in the Oroville Facilities area based on a proposed monitoring program. Use this information to determine when existing sites should be improved or enhanced. Provide appropriate monitoring of water quality at swimming areas to protect water quality and public health and safety. (FERC guidelines; Resource protection; Public health and safety)

Future Swimming Needs

Consider actions in the future that would potentially provide improved swimming opportunities in the West Branch arm of Lake Oroville, such as at an expanded Lime Saddle Complex. A preliminary assessment of suitable sites and options within the Project area indicates that a few options exist to enhance swimming opportunities in the West Branch arm of Lake Oroville. Given that an improved swimming area or facility at Loafer Creek, as discussed previously, could potentially enhance use of existing infrastructure and would serve a potentially larger number of campers and local residents, any potential actions undertaken in the Lime Saddle area should follow Loafer Creek in priority. In the future, however, one option at the Lime Saddle Complex is the potential creation of a small impoundment at Parrish Cove. Such a facility could be readily accessible to Lime Saddle area campers and other day use visitors and residents of the

nearby community of Paradise. This could help meet the relatively underserved swimming opportunity needs in the vicinity of the West Branch arm of Lake Oroville. Detailed reviews of potential environmental and cultural resource impacts of construction and operation of this option would be required. Engineering feasibility study and permitting would also be required. Other less costly options that should also be considered include a swimming pool and/or a water play area. (Study R-3, Section 5.3.; Study R-15, Section 5.3, Figure 5.3-1)

Consider providing additional future swimming opportunities, if needed, to help accommodate increased swimming demand based on monitoring or potential changes in Project operations. A high level of public interest in swimming opportunities within the study area, in particular from non-boaters who are dependent on shoreline swimming facilities, and the expected continued strong regional and study area growth in demand for swimming, should lead to continued high demand for swimming facilities. As such, additional swimming opportunities may be needed in the future based on monitoring results.

Potential future Project operational changes that may affect water levels in Lake Oroville or water temperatures in the downstream reservoirs or the Feather River can have important consequences for swimming opportunities. Potential actions that decrease summer water levels in Lake Oroville may be detrimental to public swimming opportunities. Potential actions that decrease water temperatures in the downstream reservoir or the Feather River may also be detrimental to swimming opportunities. Conversely, in each case, increased pool levels and increased water temperature would likely benefit swimming. Final Project operational regimes should address potential effects on swimming, if needed. At this tie, no new significant operational effects on swimming are known. (Study R-8, Sections 5.5.2.3 and 5.5.2.5; Study R-12, Sections 5.3.2 and 5.3.3, Tables 5.3-2 and 5.3-3)

5.2.4.2 Swimming Supply Factors

Overall, facilities and opportunities for swimming are limited within the study area. This is due to two Oroville Facilities operations factors: Lake Oroville pool level fluctuation or drawdown, and water temperatures downstream of Oroville Dam. These factors greatly limit the supply of suitable sites for swimming in the study area. (Suitability factors are discussed in more detail in a subsequent section.)

The one existing swimming facility on Lake Oroville is severely affected by the drawdown of the reservoir during most summers. Decreasing pool level also negatively affects swimming at other less developed or undeveloped recreation areas, as the water becomes more distant and the exposed shoreline used to access the water becomes less usable. For these reasons, the supply of swimming opportunities on Lake Oroville is low, despite its size and the number of recreation facilities, at moderate to low reservoir pool levels.

Water temperature is also a factor. The primary location for warmwater swimming is Lake Oroville, where surface water temperatures are in the mid-70s to low 80s (°F) during most of the summer. Water temperatures in the reservoirs downstream of Lake Oroville and in the Feather River are generally substantially colder than in Lake Oroville, because the water that flows through those areas originates in the cold, deepwater layer of Lake Oroville. The water released into the Diversion Pool from Lake Oroville is generally about 45-50 °F year-round. During the summer, the water warms to varying degrees as it flows through the downstream reservoirs and the Feather River, but remains below typically comfortable swimming temperatures in most areas below Oroville Dam.

Lake Oroville Swimming Facilities and Opportunities

The only developed swimming facility at Lake Oroville is at the Loafer Creek DUA (Figure 1.1-1). In addition to a sandy beach area and adjacent lawn, the facility provides a building with restrooms, showers, and dressing rooms; a playground area; drinking fountains; and several picnic sites, with a total of 30 tables and 17 barbecue grills beneath mature shade trees. Some of the picnic sites are ADA-accessible. Parking is provided for 251 vehicles, 5 of which are ADA-accessible spaces. Overall, the facilities were in good condition, although a DPR ADA assessment of the facility noted that the restroom/shower/dressing room building was in need of renovation to meet ADAAG, as amended.

The cove area is unusable for swimming at reservoir elevations below about 860-850 feet because the small cove on which the facility sits becomes dewatered below that pool elevation. This condition occurs most summers at Lake Oroville, with the facility being unusable by about mid-June most years, making it usable only for the first month of the 4-month peak season. The facility was unusable for swimming during the entire summer for 6 out of 13 years prior to 2003 (1990 to 2002).

Swimming also occurs at car-top ramps on Lake Oroville (Figure 1.1-1). At high pool levels, swimmers access the water from the old roads that terminate in the reservoir at these sites. As the reservoir level decreases, several of these sites provide access to a broad area of shoreline and the water. The Foreman Creek and Stringtown Car-top BRs, in particular, provide these types of swimming opportunities. Access from the shoreline becomes more difficult and less desirable at most car-top ramps at reservoir levels below about 800 feet, due to the steepness of the shore areas. The shorelines and near-shore waters also become increasingly muddy at lower pool levels, decreasing the desirability of swimming at these areas. Amenities at these areas are limited to vault toilet buildings (at most sites), trash receptacles, and parking.

Additional limited swimming opportunities are available at some developed areas and dispersed use sites on the reservoir. Swimmers can access the shore near

the Bidwell Canyon DUA, the Bidwell Canyon Campground, and the Spillway DUA (from picnic sites overlooking the Spillway BR), particularly when pool levels are relatively high. Local residents swim from the Enterprise BR and the surrounding shoreline, particularly when low water levels have made the ramp unusable for launching. Finally, swimmers access the water from the undeveloped dispersed use sites on the east shore of McCabe Cove.

Non-boating visitors using the northern portion of Lake Oroville, specifically the West Branch arm of the reservoir, have few swimming opportunities. The North Forebay DUA swim area is more than a 12-mile drive from the primary West Branch recreation area at Lime Saddle. The three car-top ramps in the area (at Dark Canyon, Vinton Gulch, and Nelson Bar) do not provide good swimming opportunities. The area near the Lime Saddle BR/Marina is dominated by boat launching activities and long-term boat moorings, has steep shorelines, and so also does not provide good opportunities. However, the undeveloped Parrish Cove area is situated between the Lime Saddle BR/Marina and DUA and the Lime Saddle Campground and provides good shoreline access at high and moderate pool levels.

Thermalito Diversion Pool, Forebay, and Afterbay Swimming Facilities and Opportunities

Coldwater temperatures in the Diversion Pool, generally below 60 °F throughout the summer, discourage swimming there. Reports of swimmers getting hypothermia were received by the Oroville Police Department, despite posted warning signs. Access is available to the water from the gravel road that runs along the shore within the Diversion Pool DUA. The only amenity provided is a vault toilet.

The North Forebay DUA (Figure 1.1-1) is the site of the largest swim beach in the study area that is usable throughout the recreation season, due to steady water levels in the Forebay. The beach is on a shallow embayment connected by a narrow channel to the main body of the reservoir, allowing some warming of the water. Mid-summer water temperatures at the surface of the embayment were in the low 70s °F; the water 1 meter and more below the surface remained in the low 60s °F. Unlike at Lake Oroville swim areas, the swim beach provides a large area of shallow water (less than 1 meter deep) that is conducive to swimming and wading by children. The swim beach is adjacent to a large picnic area with irrigated lawn and several dozen picnic sites with pole grills situated beneath shade trees and shade structures. The area also provides an outdoor shower and flush toilets, some of which are ADA-accessible. The parking lot provides 190 car spaces, including 6 ADA-accessible spaces. Additional parking is available in an overflow area and a second parking lot near the North Forebay boat ramp and Aquatic Center.

Some swimming occurs from a sandy shore area within the South Forebay DUA (Figure 1.1-1). The facility also provides several picnic sites with pole grills and a vault toilet building. Parking is undesignated. Water temperature in the South Forebay remains cold throughout the summer, with peak temperatures measured near the surface and away from shore in the upper 50s and low 60s. The shallow near-shore waters used by swimmers may warm somewhat above these temperatures.

Two recreation facilities on the Thermalito Afterbay provide swimming opportunities. The small beach adjacent to the Monument Hill BR/DUA provides picnic tables and sandy shoreline and is popular with swimmers as well as users of PWC, despite cool water temperatures. Peak summer surface water temperatures in the area were found to be in the low to mid 60s. The parking area above the swim beach provides 10 car parking spaces (1 ADA-accessible), and a large gravel lot near the beach provides room for several dozen more vehicles. The DUA also has a vault toilet building and a few shaded picnic sites.

The Larkin Road Car-top BR does not provide a beach or picnic tables but is popular with PWC users (Figure 1.1-1). Some swimming and wading occurs near shore from the gravel ramp and nearby informal launch sites. A vault toilet building is provided. This facility is close to the Afterbay outlet, where the highest water temperatures in the Afterbay are found. Summer surface water temperatures were as high as the low 70s near the outlet.

Feather River/Low Flow Channel Swimming Facilities and Opportunities

There are swimming opportunities at a few developed and undeveloped sites along the Feather River, primarily on the Low Flow Channel between the Fish Barrier Dam and the SR 162 bridge, about 2.5 miles downstream. Maximum daily water temperatures in this stretch of the river are generally in the mid 50s to low 60s.

On the south bank of the river, a small side channel pool has been constructed at Bedrock Park using a flashboard dam (Figure 1.1-1). The pool was observed to be frequently clogged with aquatic vegetation and has had water quality problems. The park provides restrooms and shaded picnic sites. The adjacent Riverbend Park provides informal riverbank access to swimmers. Some swimmers use an old cement boat ramp (not open to public use for launching) to access the water. (Both parks are outside the FERC boundary, and are managed by the Feather River Recreation and Park District [FRRPD].) Downstream of Riverbend Park, within the OWA, a small number of swimmers access the riverbank from undeveloped boat launch areas and gravel bars. The river gradually warms with increasing distance from Lake Oroville; maximum summer water temperatures were in the high 60s to low 70s downstream of the Afterbay outlet.

5.2.4.3 Swimming Demand Factors

This section discusses Statewide regional demand and existing and future demand for swimming. Major factors in determining demand include survey responses and published demand data.

Statewide and Regional Demand

Regional demand for swimming has been strong, both in terms of number of participants and total participation, in the region (Cordell 1999). Latent demand for swimming in the State (in lakes, rivers, and the ocean) has been categorized as high by DPR (DPR 1998).

The hot, dry summer weather typical of the Oroville area would be expected to result in a high level of demand for swimming opportunities in the region as visitors and residents attempt to stay cool during hot summer months. Most of the swimming opportunities in the region are in the Oroville Facilities study area, as there are few other reservoirs immediately nearby. Community and private swimming pools in the area meet some of this demand, although the recreation experience of swimming in a pool versus a lake, reservoir, or river is not identical.

Existing Swimming Demand

Swimming (not including swimming from a boat) was the fifth most popular activity in the FERC boundary during the relicensing study period, contributing about 6 percent of total use. Total swimming use at the Oroville Facilities was estimated to be about 101,000 RDs out of an estimated total of about 1.7 million RDs.

The North Forebay DUA was the most-visited day use recreation area, outside of the Lake Oroville Visitors Center and the Oroville Dam/Dam Overlook DUA, with over 86,000 estimated RDs. A large portion of North Forebay visitors during the summer are swimmers. The facility is particularly popular with families and large groups who bring children to go swimming. As appears to be the case historically, some Lake Oroville visitors may have come to this facility because swimming opportunities on the reservoir for non-boaters were limited by low water conditions.

Swimming activity at the Loafer Creek DUA was greatly reduced by low water during the study period, with a total estimated use of about 29,000 RDs. The area was unusable for swimming through most of the relicensing study period, returning to usability only the last few weeks of the study period in late April and May 2003. Much of the estimated use was by sightseers, picnickers, and trail users rather than swimmers. Informal observations during the summer of 2003 indicate that use of the site was high once the cove had refilled. The proximity of the Loafer Creek Campground, which are within walking distance and connected

by trails to the DUA, increases demand for swimming at the site. The Loafer Creek Campground and group sites are not on the shoreline and so do not offer direct swimming opportunities. The Bidwell Canyon Campground is located nearby but also does not offer direct swimming opportunities; however, it is close to a boat ramp and marina.

Similarly, the 50-site Lime Saddle Campground increases demand for swimming in the West Branch area. Like the Loafer Creek Campground, the campsites are not on the shoreline and so do not provide swimming opportunities.

When Oroville area recreation visitors were asked in the Visitor Survey if there were activities not offered in the Lake Oroville area that they would like to do, beach access and swimming areas was the top response category by a wide margin. Although two swim facilities currently exist in the study area (as previously described under Supply), the respondents were apparently responding to the lack of developed facilities available on Lake Oroville (with the Loafer Creek DUA beach not being usable).

Survey respondents also had several opportunities to provide written comments on any topic. Many of the comments expressed disappointment in the few existing opportunities for non-boaters to access the reservoirs to swim and a desire to have more facilities provided.

Telephone surveys were used to ask residents of several regional metropolitan areas if warmwater swimming and beach areas, among several other facilities, would motivate them to visit the Lake Oroville area for the first time or more often. About 30 percent of those who had never visited the area said such facilities would motivate a first visit, and about 38 percent of past visitors said such facilities would motivate more visits. In both cases, swim facilities ranked high among the types of facilities listed.

Future Swimming Demand

Study R-12 – *Projected Recreation Use* estimated future demand for swimming in the study area to have a moderate rate of increase. About 75 percent of the visitors surveyed at the North Forebay DUA were from Butte County, which is projected to have one of the fastest rates of growth in the region over the next 45 years. This suggests that demand for use of that primary swimming facility will have strong growth in the future. Expected continued moderate to high levels of occupancy of the Loafer Creek campgrounds, coupled with the absence of other swim facilities on Lake Oroville, is expected to drive continued high demand for use of the Loafer Creek DUA swim beach.

5.2.4.4 Swimming Capacity Factors

The following are the major factors in determining capacity in the study area:

- Facility capacity and utilization rates for swimming facilities;
- Physical/spatial capacity for swimming facilities;
- Social capacity/perceived crowding at swimming facilities;
- Ecological capacity/impacts of swimming facilities; and
- Determination of which capacity factors are limiting factors for utilization.

The most detailed facility and social capacity information is available for the developed DUAs with swim beaches: the Loafer Creek and North Forebay DUAs. Facility limits, such as shoreline area and parking provided, are likely to be the most limiting factors at these developed areas, rather than physical space constraints. The design of the facilities and provision of sand shore areas is likely to limit ecological impacts.

Spatial and ecological capacity may be of most interest at the undeveloped car-top ramps and similar areas. At these areas, space for undesignated parking and shoreline access and impacts to unmodified shorelines (no sand provided) may potentially limit the amount of use the areas can handle.

Loafer Creek DUA

As reported above, use of the Loafer Creek DUA was substantially reduced during the relicensing study period, due to low reservoir levels making the area unsuitable for swimming most of that time. Therefore, most study observations of facility utilization or perceived crowding are not useful to address capacity in the swim area. However, the area was visited during June 2003, on a day when the beach and associated lawn and picnic areas were receiving substantial use (perhaps 100-150 people were on site). This visit did not reveal parking capacity problems, although a vehicle count was not conducted. The 251 spaces provided in the parking area would appear to be more than adequate to support the design capacity of the beach and other amenities, if a people-per-vehicle load factor of 2.5 is assumed. Also, some users of the area would be expected to arrive on foot from the Loafer Creek campgrounds.

North Forebay DUA

The North Forebay DUA received a moderate to high level of use during summer weekends and holidays, yet ample parking was available at most times. The single exception to this occurred on the Independence Day holiday, when parking was filled to capacity (including gravel overflow areas) and some visitors parked along the road outside the entrance kiosk. Visitors' perceptions of crowding (Shelby and Heberlein 1986) were higher than most other recreation areas but were not extreme, with 57 percent of summer season visitors rating crowding at 3 or less on a nine-point scale (1 = not at all crowded, 9 = extremely crowded). About 16 percent rated crowding at 7 or higher. These perceptions may be more related to competition for picnic sites rather than crowding on the swim beach.

Car-top Boat Ramps

Generally, use of the car-top boat ramp areas is light. The two areas most commonly used by swimmers, Foreman Creek and Stringtown, offer a large area of shoreline for swimmers to disperse themselves at most pool levels. At the highest pool levels (near full pool), swimming use at these and other car-top ramps and similar sites is limited primarily to the ramp (old road) itself, and space for shoreline access becomes constrained. However, this circumstance does not occur every year, and does not persist for long when it does occur.

Shoreline use by swimmers may increase erosion of the shoreline in the inundation zone and increase turbidity of the water in near-shore areas. However, this potential ecological impact should be viewed in the context of the constant erosion of reservoir sediments from the shoreline due to the normal pool fluctuations, coupled with the effect of waves and boat wakes on the shore. Also, other shoreline activities such as boat beaching, picnicking, and angling may have similar effects that cannot be differentiated from swimming effects.

5.2.4.5 Swimming Suitability Factors

There are two major factors in determining suitability for swimming facilities:

- The availability of adequate water levels and gently sloping shoreline and reservoir bottom (bathymetry) for a beach and shallow near-shore swimming; and
- Summer water temperatures that provide comfortable conditions for swimming (generally at least 70 °F, and preferably 75 °F or higher).

Few locations in the study area meet both of these suitability criteria. The average Lake Oroville summer drawdown of about 75 feet results in severe challenges to provide swimming facilities that are functional at the moderate or low pool levels that are likely to exist by mid-summer most years. The gradual reservoir bathymetry desirable for swim areas results in the dewatering of reservoir areas that may otherwise be suitable for a swim area early in the annual drawdown cycle, as occurs many years at the Loafer Creek DUA swim beach. Most areas of the shoreline are characterized by fairly steep topography; this characteristic extends to the reservoir bottom near the high water elevation where swimming would occur.

One of the few areas with gently sloping shoreline near shore and within the upper part of the inundation zone is Foreman Creek Car-top BR. The area is also suitable in terms of road access with its proximity to SR 162 and the paved access road leading to the shoreline. The area with appropriate slope extends well out into the reservoir, providing the possibility for a swim area that would retain water at moderate and low reservoir pool levels. However, the area is

known to contain sensitive resources within the inundation zone, which become increasingly vulnerable to disturbance as the reservoir level decreases.

As discussed in the Supply section, the study area reservoirs and Feather River downstream of Lake Oroville generally have substantially colder summer water temperatures than Lake Oroville and so do not provide warmwater swimming opportunities. On the other hand, portions of the Thermalito Forebay and Afterbay provide the shallow water, steady pool levels, and relatively flat shore areas suitable for swimming facilities. Currently, the needs of the Feather River Fish Hatchery and Feather River coldwater fish species drive operational constraints related to water temperature. These water temperature limits result in the cold temperatures of the Thermalito Forebay and Afterbay.

Agricultural diverters of water from the Thermalito Afterbay are interested in warmer water than what is currently provided. It is possible that solutions may be found to provide warmer water in the Thermalito Afterbay while continuing to meet the needs of the coldwater fish species. The Engineering and Operations Work Group of the Oroville relicensing collaborative is investigating possible operational or physical changes to meet this need. Any actions that result in warmer water in the Thermalito Afterbay could enhance opportunities to provide warmwater swimming there.

5.2.4.6 Swimming Operations and Maintenance Factors

The two swim beaches within the study area are within existing DUAs; the operations and maintenance factors related to these areas are subsumed by those of the DUA as a whole. Section 5.2.2 of this report addresses operations and maintenance factors for DUAs.

A factor of particular importance at public swim areas is maintaining water quality. A major concern is excessive levels of bacteria, which can potentially cause illness. Water quality testing to measure bacteria levels was completed at seven study area swim beaches and other areas where swimming occurs. Sites tested include: the Loafer Creek DUA and Foreman Creek and Stringtown car-top ramps at Lake Oroville, the North and South Forebay DUAs and Monument Hill DUA on the downstream reservoirs, and Bedrock Park on the Feather River (Figure 1.1-1). Water contact recreation (swimming and wading) and wildlife (primarily waterfowl) are believed to be the primary potential sources of bacterial contamination at these locations.

Preliminary results indicate that at least one location, the North Forebay DUA swim beach, has bacteria levels of concern. Ten of 11 samples taken at the swim beach between June and September 2003 exceeded health guidelines for *Enterococcus* bacteria. The source of the contamination is thought to be the high number of geese and other waterfowl that reside in the area throughout the

summer. Also, 1 of 11 samples collected at the Bedrock Park swim area during the same period exceeded health guidelines for *Enterococcus* bacteria.

In the long-term, however, it would seem prudent to consider monitoring all public swim beaches for potential contamination and to maintain water quality within established DHS criteria. Options to consider to help protect and maintain good water quality in public swimming areas may include:

- Improving general water circulation into and out of swim beach embayments;
- Treating water with chemicals (such as chlorine) to reduce bacteria
- Reducing the number of waterfowl using swim areas;
- Developing appropriate monitoring programs to test water quality per DHS criteria;
- Educating visitors about appropriate behaviors; and
- Posting signs and notices at swim beaches.

5.2.5 Overall Interpretation and Education Needs in the Study Area

The overall interpretation and education (I&E) needs in the study area are presented first. Subsequent sections provide the detailed analysis of overall interpretation and education supply, demand, capacity, suitability, and operations and maintenance factors to support these overall findings of need. Site-specific I&E needs are further defined in Chapter 6.0.

I&E facility and program needs that were considered in the study area include brochures, signs (including road signs) and kiosks, viewpoints, nature trails, hydroelectric facility and other resource interpretation, reservoir boating access and hazard information, water quality and cultural/wildlife resource educational programs, campfire talks, and visitor contact centers, among others. Other topics may also be added via a proposed I&E Program in the future.

The following relicensing studies were consulted to synthesize some of the overall I&E needs in the study area:

- Study R-1 – *Vehicular Access* (see Report Summary, Section 5.2.1.7, Table 6.3-1)
- Study R-2 – *Recreation Safety Assessment* (see Sections 5.1.2, 6.3, and 6.4)
- Study R-4 – *Relationship Assessment of Fish/Wildlife Management and Recreation* (see Section 5.3.3)
- Study R-5 – *Recreation Areas Management Assessment* (see Section 5.3.2.5)
- Study R-6 – *ADA Accessibility Assessment* (see Table 6.0-1)
- Study R-8 – *Recreation Carrying Capacity* (see Sections 5.4.2, 5.4.2.2, and 5.4.2.3)

- Study R-9 – *Existing Recreation Use* (see Table 5.1-2)
- Study R-10 – *Recreation Facility and Condition* (see Report Summary; see Sections 5.1.3.2, 5.1.3.3, 5.1.3.5, 5.1.3.6, 5.1.3.1, 5.1.4.5, 5.1.4.6, 5.2.1.8, and 5.1.5.9; Tables 5.1-1, 5.1-3, 5.1-4, 5.1-6, and 6.0-2)
- Study R-11 – *Recreation and Public Use Impact Assessment* (see Section 5.2.1.1)
- Study R-12 – *Projected Recreation Use* (see Table 5.3-1)
- Study R-13 – *Recreation Surveys* (see Tables 5.1-8, 5.1-28, 5.1-29, and 5.2-14)
- Study R-14 – *Assess Regional Recreation and Barriers to Recreation* (see Sections 6.2 and 6.3.1, Tables 5.3-8 and 5.3-9)

5.2.5.1 Overall Interpretation and Education Needs

Based on a review of the factors and indicators summarized later in this analysis, overall I&E needs have been identified in the study area. These needs should not be assumed to be proposed PM&E measures. Site-specific I&E needs are discussed in Chapter 6.0.

The factors and indicators that contributed the most in determining the overall interpretation and education needs in the study area are summarized in the following bullets. Information from the above recreation studies supports these conclusions. The detailed discussion supporting these findings is found in the later supply, demand, capacity, and suitability sections that provide a more thorough analysis of overall interpretation and education in the study area.

- I&E facilities and programs have the potential to enhance visitor experiences and modify visitor behavior to increase human safety and to protect natural and cultural resources;
- Two of the five resource areas in the study area (the OWA and Thermalito Forebay) currently provide negligible or minimal I&E-related facilities;
- Forty-five percent of study area survey respondents, overall, and 74 percent of those visiting the OWA felt that there were too few I&E facilities;
- The State has determined that there is a high latent demand for I&E opportunities Statewide, and providing public education of the importance of parks, natural resources, and cultural heritage should be a high priority; and
- Though not a pervasive problem, there are incidents of visitor behavior that may place the visitor or others at risk, accidents, and some lack of awareness of rules and regulations.

Overall I&E-related needs to satisfy these needs are listed below.

<u>Continue to provide annual O&M at existing and potential future I&E-related facilities while improving the maintenance of existing signs and similar interpretative facilities</u>. Continue to provide annual O&M at existing and potential

future I&E facilities. Consider improving existing signs and/or interpretative informational displays at sites where these facilities were found to be in need of maintenance. (Study R-10, Table 6.0-2; FERC guidelines)

Developed and implement an expanded I&E Program. The study area is currently lacking a comprehensive I&E Program. Potential components of an I&E Program may include:

- Facilities;
- Services and programs;
- Themes, messages, and stories;
- Design details and aesthetic guidelines for future I&E facilities;
- Optional: Environmental graphics and communication component; and
- Optional: Logo/graphic of the Oroville Facilities/city of Oroville identity branding.

Engaging in a planning process to create a comprehensive I&E Program for the Oroville Facilities will allow recreation area managers to collaborate with other stakeholders and systematically approach I&E-related needs. This process could be conducted in concert with a local planning effort for I&E-related needs in the overall Lake Oroville area. Interpretation regarding cultural resources could include coordination with local Tribes. The local Historical Society could also be included in the planning process. Groups representing other resources could also provide input including wildlife, vegetation, water quality, safety, fisheries, and geology. (Professional judgment; Resource protection and integration)

As part of a proposed I&E Program, develop a visitor education component. An educational component of the I&E Program should be developed that focuses on educating recreationists, especially boaters, hunters, and anglers, about the various rules and regulations in effect at the Oroville Facilities. The goal would be to increase awareness and compliance with the boating, hunting, and fishing rules in the area. (Study R-2, Section 6.4)

Provide new educational and informational/directional kiosks and signs as part of a proposed I&E Program. Consider the addition of I&E facilities in the study area to meet current and future demand. Most of the existing developed sites in the study area are suitable for potential I&E facilities such as signboards, panels, and kiosks. These new I&E facilities could be used to better educate and inform the public about resource protection and stewardship, safety issues, and rules and regulations. (Study R-10, Table 6.0-2; Professional judgment)

Continue to provide ADA compliance at existing and potential new I&E facilities, as guidelines are amended. ADAAG should be followed for existing and any new I&E facilities. This may include exhibits, parking areas, paths to facilities, toilet/restrooms, and any other facilities provided in conjunction with I&E facilities.

Existing I&E facilities should be accessible where feasible. (Study R-6, Table 6.0-1)

Consider providing new and/or enhanced nature trail opportunities to enhance visitor education. Where appropriate, consider self-guided nature trails at or near existing developed recreation sites. Areas of opportunity to consider include existing trails near the Feather River Nature Center on the Low Flow Channel and the OWA for new or formalized trails. (Study R-10, Table 5.1-6; Professional judgment)

Consider providing a multi-resource interpretive component of the proposed I&E Program. As part of the I&E Program, consider providing a multi-resource oriented program that interprets the various resources and available facilities in the Oroville Facilities study area and better disseminates information to the public.

New visitor contact and/or museum/interpretive facilities may also be considered. This program component could interpret the natural and cultural resources in the study area, including geology, history, wildlife, plant ecology, hydrology, fisheries, and Native American cultures. Facilities to interpret these resources may include signboards, panels, and kiosks, at a minimum. This program may consider various operations for associated facilities such as development of a new visitors center to replace or augment the existing one, a satellite visitors center, an environmental learning center, and/or campground activity centers. Further study and review of these options are proposed as part of a future I&E program. (Study R-10, Table 6.0-2; Professional judgment)

5.2.5.2 Interpretive and Education Facilities Supply Factors

The supply of I&E facilities are summarized below (based on research conducted for Study R-10 – *Recreation Facility and Condition*). A number of activities are related to participation in I&E activities. For the purposes of this report, I&E includes wildlife viewing and nature study. Activities which may lead to participation in I&E include hiking, biking, equestrian activities, and field trips. Those participating in other activities within the FERC boundary, such as boating, hunting and fishing, may also participate in I&E activities.

The following discussion presents the location and type I&E facilities within the FERC boundary. These recreation sites are shown on Figure 1.1-1.

Location and Description of I&E-Related Facilities

Lake Oroville

Oroville Dam Overlook DUA – The overlook provides views of the reservoir and the earth-fill dam, with the city of Oroville in the distance. Located on the

southwest shoreline of the reservoir, the crest of Oroville Dam is used for sightseeing, walking, jogging, bicycling, and other recreation activities. The developed day use area facilities are located on the east and west ends of the dam. The day use areas consist of picnic tables, flush toilets, and a drinking fountain. Parking along the road across the top of the dam (400 spaces) and at the west end is now closed for security reasons.

Lake Oroville Visitors Center – Located east of Oroville Dam on Kelly Ridge, the 10,000 square-foot, award-winning Lake Oroville Visitors Center features exhibits on the engineering and construction of the hydropower facilities (Figure 1.1-1). Interpretive displays explain how Lake Oroville and the associated facilities in the FERC boundary distribute water and electrical power to their destinations (DWR 2003). Additionally, there are interpretive displays on the native culture and the natural resources of the area (DPR 2000). The Visitors Center hosts individual visitors as well as large groups such as K-12 school field trips. In addition to the informational displays inside the Visitors Center, there is a 47-foot viewing tower that provides a panoramic view of Lake Oroville and its surroundings. The Visitors Center is ADA accessible (except for the tower) and has 18 picnic tables (10 are ADA accessible), shade trees and sun shelters, drinking fountains, a gift shop, a telephone, 6 toilets (all ADA accessible), parking for 90 vehicles, and 17 spaces for either single vehicles, vehicle/trailer combinations, or buses. The facility is in good condition.

Chaparral Interpretive Trail –The Chaparral Interpretive Trail can be accessed from the parking area of the Lake Oroville Visitors Center, which offers 107 parking spaces, restrooms, and trash receptacles. A 0.2-mile portion of the trail has been selected by DPR to be made ADA-accessible. The accessibility project will involve paving unpaved portions of the trail and installing interpretive signage. The work has been planned, but is not yet scheduled for construction. The trail is in good condition.

Amphitheatres – There is an outdoor amphitheater/campfire center at the Loafer Creek Campground. The site has a stage and fire circle and seats about 70 people. The site is not ADA accessible as there are no wheelchair seats, no accessible parking spaces, and the site surface does not meet ADA standards.

At the Lime Saddle Group Campground area, there is a fire ring with seating around it available as an amphitheater-type facility. At the Bidwell Canyon recreation complex, specifically on Wyk Island, there is a stage with electrical power available and seating for about 50 people.

Diversion Pool

Diversion Pool DUA –There are no I&E facilities at the Diversion Pool. There are some directional signs leading visitors to the Diversion Pool DUA.

Low Flow Channel/Feather River

Feather River Fish Hatchery – Anadromous fish migrate up the Feather River and are stopped at the Fish Barrier Dam, just downstream of the Diversion Pool and Dam. Salmon climb up the fish ladder into the Feather River Fish Hatchery where DFG selects fish for breeding. (Study R-10, Section 5.1.3.2)

On the north bank of the Feather River is a park-like visitor area with a landscaped parking lot, restrooms, and an observation platform overlooking the Diversion Dam and its curtain of water. There is an area with windows into the fish ladder that make it possible to observe fish as they swim up the ladder.

The Feather River Fish Hatchery is accessible to persons with physical disabilities. Accessibility features include designated parking stalls, restrooms, and wheelchair ramps. The ramps provide access to the viewing platform, viewing window, and the gathering tank at the top of the fish ladder. Windows are provided along the spawning building to allow visitors to watch the spawning process.

On the west side of Table Mountain Boulevard is an additional parking area and pedestrian access to the hatchery complex. Visitor observation areas have been established that provide views of the fish ladder, the gathering and holding tanks, and the interior of the hatchery's spawning building. These facilities are in good condition.

Thermalito Forebay

Aquatic Center – In 1995, DWR constructed the Aquatic Center at North Forebay DUA. The site is accessed using the same road (Garden Drive) and entrance as the North Forebay DUA. The 1,200-square-foot facility was constructed to provide BSC and other area sailing and rowing clubs with a boathouse and an area for holding educational classes (DWR 2000b). The BSC and other facility users generally access Thermalito Forebay using one of the two 2-lane boat ramps shared with other North Thermalito Forebay DUA users. The site is in good condition but lacks some utility services that were never completed when the facility was developed.

North Thermalito Forebay Boat Ramp and Day Use Area – The North Thermalito Forebay covers 300 surface acres of the entire 630-acre Thermalito Forebay and hosts non-motorized boating and other recreational activities (DWR 2003). There is a staffed visitor information and fee collection booth. The DUA has signboards with interpretive panels that were recently relocated and updated.

South Thermalito Forebay Boat Ramp and Day Use Area – Power boating, limited to about 330 acres of the Thermalito Forebay's 630-acre pool, and fishing are the South Forebay's main recreation uses (DWR 2003). Shoreline swimming

also takes place at this DUA. The DUA has signboards with interpretive panels that were recently relocated and updated.

Thermalito Afterbay and OWA

There are no significant I&E facilities at the Thermalito Afterbay and OWA. There are directional signs to some recreation sites and some regulatory signs at some recreation sites, such as at Monument Hill DUA/BR. Regulations, maps, and information are posted on bulletin boards at the 6 main OWA entrances.

Overall Study Area

Open Space and View Points – Wildlife viewing and nature study occur at a variety of locations including key viewpoints located throughout the study area. The OWA provides a large area of open space for bird viewing and other nature study. Wildlife viewing and nature study may take place at both developed facilities and in undeveloped or dispersed areas.

Greenline Highway Tour – As a self-guided scenic route, a green line was painted on roads leading to the Oroville Dam beginning at Montgomery Street and SR 70. This line passes historic sites both inside and outside of the FERC boundary. The line has faded in some areas.

Directional Signs – There are many directional signs within the FERC boundary and vicinity assisting visitors in finding their way to the Oroville Facilities recreation sites.

5.2.5.3 Interpretation and Education Demand Factors

One of the main purposes for providing interpretive and educational programs as part of the programs offered at a large hydropower project is to positively affect recreationists' behavior and experiences. Research has shown that interpretive signs and programs can be used as a tool to help modify visitor behavior, increasing safety, and protecting natural and cultural resources (Manning 2003). Additionally, information that assists visitors in understanding the reasons for reservoir drawdown may help to decrease perceived dissatisfaction among visitors whose satisfaction may be adversely affected by diminished reservoir levels. Education programs that instruct area children and adults regarding safety, resource protection, local history, project operation, and the importance of citizen participation can assist in shaping positive behavior and attitudes. Isolated I&E-related projects have addressed some of the needs for I&E but have also left gaps in cultural interpretation and other topics of concern.

Important public I&E demand factors to consider include Statewide demand, regional demand, and demand in the FERC boundary, which includes projected

future demand, safety, and public use impacts, and vehicular access. These topics are summarized below.

Statewide Demand for Interpretation and Education

DPR collected Statewide information about public demand and support in 1997. Table 5.2-3 shows results indicating a high latent demand for I&E activities such as attending outdoor cultural events, visiting museums and historic sites, as well as nature study and wildlife viewing. There is also a moderate to high level of public support for funding these activities.

Table 5.2-3. 1997 Statewide latent demand and public funding support for I&E activities.

Activity	Latent Demand	Public Funding Support
Attending outdoor cultural events, like concerts, theater, etc., in outdoor settings	High	Moderate
Visiting museums, historic sites	High	High
General nature study, wildlife viewing	High	High

Source: DPR 1998.

Visitor Education Needs

The California Outdoor Recreation Plan (DPR 2002) outlines six top issues for recreation managers within the State to consider. These issues indicate a need for visitor education. Specifically, the State suggests a need to educate the public and decision-makers of the importance of providing and funding parks and outdoor recreation, the pressures on the State's natural resources, and the State's rich and diverse cultural heritage. Interpretive programs and visitor education can be used to inform and involve visitors of these issues.

Regional Demand for I&E

Factors affecting regional demand for I&E include proximity, information, conditions, facilities, and special events. In general, recreationists tend to visit areas close to their home (within 60 miles). I&E facilities and activities are not expected to draw large numbers of visitors from the region, except for those who live in close proximity. Public information provided at visitor or information centers and kiosks can enable regional visitors (non-locals) to find recreational opportunities.

Conditions such as weather can affect the number of sightseers and others visiting I&E-related facilities. Typically, good weather conditions correspond to the recreation season (late May to early September), except for some of the

hottest weather and low reservoir levels in late summer that may not be conducive to sightseeing and other I&E-related activities. Demand for I&E-related facilities and programs may peak when special events take place. Non-local visitors may need information and assistance in finding their way around the area.

Study Area Demand

Existing Use at Visitors Center and Fish Hatchery

The Lake Oroville Visitors Center and Feather River Fish Hatchery are two of the most-used sites within the study area. Over the studied recreation season and off-season (between May 15, 2002 and May 14, 2003), the Visitors Center received more than 93,000 RDs (10 percent of Lake Oroville sites), and the Fish Hatchery received more than 160,000 RDs (10 percent of all study area sites). Frequently, sightseeing involves visiting sites that have interpretive displays such as those at the Visitors Center and the Fish Hatchery.

Projected Use at Visitors Center and Fish Hatchery

The Lake Oroville Visitors Center and the Feather River Fish Hatchery are projected to receive increased use in upcoming years. Based on current use and growth factors outlined in Study R-12 – *Projected Recreation Use*, use is expected to grow by 260 percent at the Lake Oroville Visitors Center and by 228 percent at the Feather River Fish Hatchery by 2050. This indicates that there will be increased demand in the next license term for additional I&E-related facilities.

Visitor Opinions

Recent surveys indicate that nature study and wildlife viewing are the primary activities of just 0.8 percent and 0.5 percent of survey respondents throughout the study area. However, 8.8 percent of visitors listed nature study and 11.9 percent listed wildlife viewing as an activity participated in during their visits to the study area. Only 0.3 percent of Study R-13 – *Recreation Surveys* on-site respondents indicated that their primary activity within the study area was to attend educational events. Furthermore, 2.4 percent of respondents indicated that they expected to attend educational events. Approximately 22 percent of those surveyed at on-site locations indicated that they were participating in sightseeing while on their trip.

Currently, interpretive programs such as interpretive displays, informational tours, and campfire storytelling are offered at one or more of the following locations: the Lake Oroville Visitors Center, Feather River Fish Hatchery, and at the amphitheaters at the Loafer Creek, Lime Saddle, and Bidwell Canyon Campgrounds. Although more than 50 percent of On-Site Survey respondents at Lake Oroville, Diversion Pool, Low Flow Channel, and Thermalito Forebay felt

the number of interpretive and educational programs was "about right," approximately 40 to 46 percent of respondents felt the number of interpretive programs was "too few." The majority of respondents at the Thermalito Afterbay and OWA felt the number of interpretive programs was "too few" (53 and 74 percent, respectively). This indicates that a significant portion of respondents within the study area would like more interpretive programs and educational opportunities.

Nearly 80 percent of Mailback Survey (Study R-13 – *Recreation Surveys*) respondents considered the information and warnings provided to be adequate, while just under 9 percent considered it to be a moderate to big problem. It is likely that some informational and warning signs are needed at certain locations such as at the OWA.

Over 22 percent of those participating in nature study and/or bird watching felt moderately to extremely crowded, with an overall average feeling slightly crowded. Crowding is more likely to occur during holiday weekends and during the recreation season. While 22 percent is a minority, it indicates that more space or dispersed visitor use may measurably enhance nature study and wildlife viewing activities.

Safety Issues Regarding I&E Demand

Study R-2 – *Recreation Safety Assessment* identifies visitor education as a component of visitor safety. Some recreation users expressed complaints on the On-site Survey that boat operators followed too close, did not obey speed regulations (no wake zones), used alcohol while boating, did not wear personal floatation devices (PFDs), and had conflicts with PWC users. Area managers (DPR, DFG, and Butte County Sheriff's Office) also mentioned these issues.

According to the Hunter and On-site Surveys, about 10 to 20 percent of the users were not aware of relevant hunting and fishing regulations.

According to the Oroville Police Department, there have also been cases of hypothermia (in particular along the Feather River below the dam), even on very warm days.

Daily fluctuations in water depth at Thermalito Afterbay can potentially create grounding hazards for boaters. Thermalito Afterbay can have daily fluctuations of up to 8 feet; however, daily fluctuations of 3 to 4 feet are much more common. These fluctuations are a result of normal Project operations. There are areas along the reservoir that are boatable one day, but the next day the water depth may be much shallower. There have been incidents where boats have run into submerged objects in areas they had boated on the day before with no problems. There is currently signage placed along the shoreline warning boaters about fluctuations, but some shallow areas do not have buoys. Safety issues also arise

from visitors ignoring posted signs and regulations, and other manifestations of operator error.

These observations suggest that more could be done to better educate visitors on rules, regulations, and safety. Regulatory fishing and hunting signs are discussed in more detail in Overall Fishing Needs and Open Space Needs, respectively.

Public Use Impact

The following issues likely warrant additional visitor education due to existing impacts. As use increases in the future, these issues may increase in level of concern if there is no corresponding increase in visitor education. Visitor education and awareness could potentially help modify user behavior, which would have beneficial effects on the environment and the user experience.

Soil Compaction and Erosion

Soil compaction was a moderate concern at several sites. Educating visitors to stay within hardened areas could help minimize erosion and soil loss.

Trash Accumulation and Dumping

Trash accumulation was a moderate concern at several developed sites, particularly during the summer data collection period. Common litter types at recreation sites include cans, bottles, cigarette butts, and fishing-related materials (e.g., bait containers, fishing line, bobbers). In general, there was very little trash accumulation at recreation sites during the winter data collection period, as use was lower and off-season site upkeep appeared very good. Some developed sites were noted as having some trash during the summer data collection; however, there are regular and well-organized clean-up efforts at developed sites. Trash accumulation was cited as an extreme impact at the Rabe Road Shooting Range (gun shells and other trash). Additionally, trash accumulation was noted as a high concern at the following developed recreation sites: Afterbay Outlet Campground and DUA, Foreman Creek Car-top BR, and Saddle Dam DUA. Educating people about proper disposal of litter, pack-it-in/pack-it-out programs, and/or not to dump debris could help minimize this impact.

User-Defined Trails

The prevalence of user-defined trails at developed recreation sites was noted as a moderate concern. There were many sites with user-defined trails; however, they most often were used to access recreation area facilities such as restrooms or shoreline areas. The Saddle Dam DUA was noted as having high concern related to the prevalence of user-defined trails. Educating people to stay on

established trails and not to cut across open areas could help minimize this impact.

Swimming and Water Quality

Water quality concerns were noted at the North Forebay DUA and Bedrock Park swimming areas and the need to better monitor water quality at all public swimming areas in the study area. Educating the public about proper methods to swim and not contaminate the water would help preserve swim area water quality and help maintain the water within DHS criteria.

Vehicular Access Information

Vehicular access is partly dependent on clear, well-placed, consistent signage. A survey of the study area indicates that there is a need for additional signs within and leading to the OWA and to some of the car-top boat ramps.

Old signs or a lack of signs at several entrances to the OWA and Afterbay Outlet BR, such as at Palm Avenue, Vance Avenue, and SR 162 at the DFG headquarters, do not present clear direction for drivers. There are no directional signs at key locations along the route to Dark Canyon Car-top BR, making the site difficult to find. There is no signage for the Larkin Road Car-top BR on SR 70, SR 162, or SR 99. There are two entry points to the Wilbur Road Car-top BR. The dirt road from the south (SR 162) is not signed but may not be appropriate for directional signage.

There are also no directional signs on Hurleton Road nor on Forbestown Road for Stringtown Car-top BR, making it difficult for visitors to locate the site. The sign on Stringtown Road is too far past the intersection for clear direction when coming from the east.

Poor directional signage may affect the ability to locate Vinton Gulch Car-top BR. There is no directional sign on SR 70. There is a poor directional sign on Cherokee Road, making it difficult for visitors to find the turn into the site if they aren't familiar with the roads.

In summary, there appears to be demand and need for an improved signage program to assist visitors in adequately locating recreation and public access sites at the Oroville Facilities.

5.2.5.4 Interpretation Capacity Factors

Due to the potentially dispersed nature of I&E and related activities such as nature study, capacity is not generally a limiting factor. However, at some specific sites, such as the Feather River Fish Hatchery and the Lake Oroville Visitors Center, capacity could be an issue at certain times such as during large

events or when large groups are visiting. An effective I&E Program is likely needed to educate and redirect visitors to sites other than those that will exceed capacity in the future.

Lake Oroville Visitors Center

Overall, existing recreation use at the Lake Oroville Visitors Center is considered to be approaching capacity. Of the four capacity types, only spatial capacity is considered to be at capacity. Existing recreation use at this site is considered to be approaching facility capacity and below ecological and social capacities. However, both spatial and facility capacities are currently considered limiting factors due to expansion and percent occupancy constraints. Considering the capacity indicator types in aggregate, capacity-related decisions at this site should be a moderate management priority.

Feather River Fish Hatchery

Overall, existing recreation use at the Feather River Fish Hatchery is considered to be approaching capacity based on use levels during fall and spring salmon and steelhead runs. Currently, spatial capacity is considered to be exceeding capacity and a limiting factor due to the lack of expansion potential at this site. As a result, future capacity-related decision-making at this site will likely need to focus on management strategies other than spatial expansion. The remaining capacity types are either approaching (facility and social capacities) or below (ecological) capacity at this time. Considering the four capacity types in aggregate, capacity-related decisions at the Feather River Fish Hatchery should be a moderate management priority at this time.

Oroville Dam Overlook DUA

Overall, existing recreation use at the Oroville Dam Overlook DUA is considered to be approaching capacity. Currently, spatial capacity is considered to be a limiting factor due to the lack of expansion potential at this site. As a result, future capacity-related decision-making at this site will likely need to focus on management strategies other than spatial expansion. The remaining capacity types are all below capacity at this time. However, facility capacity is also considered a limiting factor because of existing security concerns and predicted future percent occupancy constraints at this site. Considering the four capacity types in aggregate, capacity-related decisions at this site should be a moderate management priority at this time.

5.2.5.5 Interpretation Suitability Factors

Existing developed recreation sites and areas are generally suitable for expanded or new I&E activities and programs. Developed areas that have dominant uses serve as logical places for related I&E programs. For example,

boat ramps and other high traffic areas are a logical location for interpretive panels or other outreach programs regarding boating safety. Certain types of signage or structures may be appropriate for certain types of facilities. Kiosks and signs would be most appropriately located where pedestrians will see them, such as at boat ramps, campgrounds, day use areas, trailhead accesses, and other entrances to sites. Typically, there is likely to be higher interest in I&E-related facilities at designated sites.

Hydroelectric facility interpretation is best suited for areas around the dam, the Visitors Center, and shoreline areas where Project operations are visible. Educational programs, such as Ranger or campfire talks, are best suited for major sites and campgrounds where events would be well-attended. Boating hazard and safety information would be most useful at boat ramps, including car-top boat ramps.

An additional or new visitors center that provides a variety of information (including topics such as locating recreation facilities, boating safety, and Project operations) could potentially be located elsewhere. Potential locations should be convenient to major roads, and may or may not be outside of the FERC Project boundary. Riverbend Park and North Forebay DUA near SR 70 are potential new sites that may be suitable for expansion or replacement of existing visitor information facilities at Kelly Ridge.

Areas that were mined during the Gold Rush or supported mining would be suitable locations for historic information such as interpretive signs with news articles from that era. The historic Bidwell Bar Bridge would be a suitable location for additional interpretive information regarding other historical and cultural information.

Foreman Creek and Enterprise BRs currently have sensitive resources that are in need of protection. These and other areas would be suitable locations for educational and interpretive signs and programs to facilitate resource protection.

5.2.5.6 Interpretation Operations and Maintenance Factors

Outdated displays and aging sign boards require replacement and maintenance on a regular basis, in part due to vandalism and damage from sun and the elements. As previously stated, directional signs were also absent or in need of improvement at Dark Canyon, Vinton Gulch, and Stringtown Car-top BRs. Otherwise, existing I&E facilities are generally in good condition but will require periodic replacement.

5.2.6 Overall Trail Needs in the Study Area

The overall trail-related needs in the study area are presented first. Subsequent sections provide the detailed analysis of overall camping supply, demand,

capacity, suitability, and operations and maintenance factors to support these findings of need. Site-specific trail-related needs are further discussed in Chapter 6.0.

Only non-motorized recreational trail facility needs were analyzed in the study area. The studies that contribute to this analysis of non-motorized trail needs include:

- Study R-8 – *Recreation Carrying Capacity* (see Section 5.6)
- Study R-9 – *Existing Recreation Use* (see Sections 5.6, 6.2, and 6.6; Tables 5.2-15 and 6.2-1)
- Study R-10 – *Recreation Facility Inventory and Condition* (see Section 5.1.6; Table 5.1-6)
- Study R-11 – *Recreation and Public Use Impact Assessment* (see Sections 5.2.2.1, 5.2.2.2, 5.3, 6.1.2.3, 6.2.1, and 6.2.3; Tables 5.2-1, 5.2-2, 5.2-3, 5.2-4, 5.2-5, and 5.3-1)
- Study R-12 – *Projected Recreation Use* (see Section 4.1.5; Tables 4.1-1, 4.1-2, 4.1-3, and 5.2-7)
- Study R-15 – *Recreation Suitability Analysis* (see Sections 5.1.2.6 and 5.1.6; Tables 5.1.47 through 5.1-50)

5.2.6.1 Overall Trail-Related Needs

Based on a review of the factors and indicators in the analysis summarized later in this section, preliminary overall trail-related needs have been identified in the study area. These needs should not be assumed to be proposed PM&E measures. Specific trail-related needs and segments that may be considered are discussed in Section 6.2.

The factors and indicators that contributed the most in determining the overall trail-related needs in the study area are summarized in the following bullets. Information from the above recreation studies supports these conclusions. The detailed discussion supporting these findings is found in the later supply, demand, capacity, and suitability sections that provide a more thorough analysis of overall trail-related needs in the study area.

- There has been a lack of comprehensive baseline trail information in the study area;
- The linear nature of trails and the access provided by trails necessitates coordination with other resources and agencies as well as a review of the overall study area and cross resource/activity impacts;
- There is concern with user-defined trails and their impacts on soil erosion and vegetation;
- There is demand and public support for more trails, trail facilities, and trail-related activities; and

- Some survey respondents felt that there were too few trails and trail-related facilities; for example, 30 percent of Lake Oroville and Thermalito Afterbay users and nearly half of OWA users felt that there were too few hiking trails provided.

Trail-related needs are listed below.

Existing Non-motorized Trail-related Needs

Develop a proposed Comprehensive Non-Motorized Trails Program. The study area currently lacks an overall trails program. The program should identify trail users (and potential trail user conflicts), potential trails to develop (including those with cost-sharing potential), trail alignments, trailheads and parking, trail events, ADA-related requirements, resource-related restrictions, signage program, cost schedule, operations and maintenance requirements, and monitoring. (Study R-13, Section 5.1.2.6)

Improve selected trails to help reduce impacts from undeveloped user-defined trails. Provide increased hardening and erosion control improvements at Saddle Dam Trailhead Access and associated trails to help reduce impacts from user-defined trails. Develop trail improvements at some dispersed areas to further reduce user-defined trail impacts. (Study R-11, Sections 6.1.2.3 and 6.2.1)

Based on a proposed new Comprehensive Non-Motorized Trails Program, develop and manage new trail improvements such as new loop trail linkages, trails connecting visitor use areas within a complex or to the shoreline, and trailheads. Consider new non-motorized trail development and trailheads at suitable locations in the study area. Potential new trail routes to consider include trails near Thermalito Forebay, Thermalito Afterbay, Lime Saddle area, and OWA. (Study R-13, Section 5.1.2.6; Study R-12, Section 4.1.5, Tables 4.1-1, 4.1-2, 4.1-3, and 5.2-7)

Continue to provide annual O&M at non-motorized trails. In general, the existing trails are in good condition. To meet future demand, continued and additional maintenance will be needed as trail use continues to increase and if any new trails are built. (FERC guidelines)

Periodically monitor use and impacts of existing and potential future non-motorized trails and trailheads. A monitoring program that periodically assesses trail-related use, impacts, and concerns should be implemented. Future growth in demand for trail-related activities, potential user group conflicts, impacts of user-defined trails, and facility capacity (mainly trailhead parking) should be monitored during the new license term. Based on monitoring results, appropriate actions should be taken as needed in the future. (FERC guidelines; Resource protection)

Future Non-motorized Trail-related Needs

Future needs related to facilities should be based on the findings of a trail use monitoring program developed as part of a proposed Comprehensive Non-Motorized Trails Program. As trail use increases in a proposed future, both facility and social carrying capacity may be approached. If conflicts become more prevalent and users experience more crowding, additional trails may need to be built, use designations may need to be altered, or other selected use restrictions enacted. Also, as the population of the city of Oroville grows, those desirable Project features nearest residential areas (such as the North Thermalito Forebay) may see even greater trail use. Thus, this growth could put more pressure to build new trails to accommodate this localized demand.

5.2.6.2 Trail-related Supply Factors

This section summarizes important factors affecting the supply of public non-motorized trails, including trail condition, as compiled from Study R-10 – *Recreation Facility Inventory and Condition*. The supply factors considered include trails and trailhead access within specific geographic areas, trails that span the study area, informal trails, and regional trails.

The study area provides several multi-use trails and associated trailhead access points in a variety of settings. The three main uses on study area trails are hiking/walking, biking, and equestrian use. Most of the trails in the study area are in good condition and only a few are ADA accessible; however, several have ADA-accessible facilities at access points.

Most of the trails in the study area are located at the south end of Lake Oroville; however, some trails span the entire study area. Additionally, there are trailheads at the Thermalito Afterbay and the Diversion Pool and mostly informal trails within the OWA. Within the study area, most fire roads within the LOSRA are open to biking, hiking, and equestrian use.

Trails that Span the Study Area

There are two trails that cross more than one geographic area within the study area, the Brad P. Freeman Trail and the Dan Beebe Trail (Figure 1.1-1).

Brad P. Freeman Trail

The Brad P. Freeman Trail provides 41 miles of scenic off-road recreation and circles the North and South Thermalito Forebay, Thermalito Afterbay, the Diversion Pool and the crest of Oroville Dam, and crosses the OWA. About 30 miles of trail is relatively flat, but includes rolling terrain. Steep grades are present within the few miles of trail near either end of Oroville Dam. Although the trail is designated multi-use (except for the portion in the OWA), the trail is

primarily used for mountain biking (including downhill and cross-country races). The trail is in good condition but is not ADA-accessible.

Dan Beebe Trail

The Dan Beebe Trail is a 14.3-mile loop trail covering an elevation range from 200 to 1,000 feet above msl. The trail is a multi-use trail with the exception of Sycamore Hill, which is open to equestrians and hikers only. The trail can be accessed at the Loafer Creek Equestrian Campground or from Oroville Dam Boulevard at a point near the dam. Joggers and hikers commonly use the trail, which winds past the reservoir and provides scenic vistas and an opportunity to access undeveloped open space. The vast majority of the trail is not paved, making it ideal for joggers seeking a softer surface on which to run. The trail is in good condition. The trail was surveyed in 1999 as part of the Universal Trail Assessment Process (UTAP) but was found to not meet ADA-related requirements. The Dan Beebe Trail is not schedule for improvement at this time due to irregular ground surfaces and steep grades (pers. comm., McBride 2003).

Informal Trails

Informal trail use generally occurs on dirt roads, some of which are fire roads, and some are user-created or abandoned/closed roads that offer shoreline access. The main areas where this occurs are the Thermalito Afterbay opposite of Wilbur Road BR on the north side of SR 162, in the Craig Saddle area, and the Foreman Creek Car-top BR area. At the Afterbay, it is generally anglers that use the fire roads for shoreline access. At Foreman Creek, there are several spur roads that are closed to driving that offer shoreline access for anglers. There are also user-defined footpath trails, which generally lead to the shoreline at several locations. Resource concerns in the Foreman Creek area may limit dispersed use in the future.

Regional Trails

Regionally, two important trails pass just outside of the FERC boundary. These include the Beckwourth Trail and the Feather Falls Trail. The Beckwourth Trail was part of the California Trail system of wagon roads and pack trails that led emigrants west in the late 1800s. Remnants of the original Beckwourth Trail can be seen between Reno and Lake Oroville (100 miles). Feather Falls, the sixth highest waterfall in the U.S. at 640 feet, is located on the Fall River, which runs into the Middle Fork Feather River less than 1 mile from the northeast extent of Lake Oroville. The Feather Falls Trail covers 4.5 miles from the trailhead to the falls, through the Feather Falls Scenic Area in the Plumas National Forest.

Lake Oroville Trails

Most of the trails at Lake Oroville are located in the Bidwell Canyon and Loafer Creek areas; however, there is also a trail in the Spillway area (Potter's Ravine Trail).

Bidwell Canyon Trail

The 4.9-mile, multi-use Bidwell Canyon Trail can be accessed from the Bidwell Canyon BR parking area (279 spaces). The Bidwell Canyon Trail (managed by DPR) meets ADA-accessibility requirements and is in good condition. The trail is considered to be in a foothill setting and provides a rural experience.

Chaparral Interpretive Trail

The Chaparral Interpretive Trail can be accessed from the parking area of the Lake Oroville Visitors Center, which offers 107 parking spaces, restrooms, and garbage receptacles. A 0.2-mile portion of the trail has been selected by DPR to be made ADA accessible. The accessibility project will involve paving the unpaved portions of the trail and installing interpretive signage. The work has been planned but is not yet scheduled for construction. The Lake Oroville Visitors Center has 107 parking spaces, restrooms, and garbage receptacles. The trail is in good condition.

Kelly Ridge Trail

The Kelly Ridge Trail is a 4.9-mile multi-use trail that parallels the Dan Beebe Trail. The trail can be accessed from parking areas at the Lake Oroville Visitors Center (107 spaces) or the Bidwell Canyon DUA (279 spaces), where restrooms and garbage receptacles are available.

Loafer Creek Day Use/Campground Trail

The Loafer Creek Day Use/Campground Trail is 1.7 miles in length. The first 1.2 miles of the Loafer Creek Day Use/Campground Trail (managed by DPR) meets ADA accessibility requirements. The use designation on this trail is hiking-only. The trail is considered to be in a foothill setting and to provide a rural experience. The Loafer Creek area provides parking spaces for 443 vehicles and restrooms, and garbage receptacles are available at the DUA, campground, and boat ramp.

Loafer Creek Loop Trail

The Loafer Creek Loop Trail is a 3.2-mile trail allowing for multiple uses. The trail may be used for any type of activity on even-numbered calendar days. Use is limited to equestrians and hiking on odd-numbered calendar days. The first 0.2

mile of the Loafer Creek Loop Trail (managed by DPR) meets ADA accessibility requirements. The trail is considered to be in a foothill setting and to provide a rural experience. The Loafer Creek area provides parking spaces for 251 vehicles and restrooms, and garbage receptacles are available at the DUA.

Potter's Ravine Trail

The Potter's Ravine Trail is an 8.2-mile multi-use trail accessed from the Spillway BR/DUA, located on the north side of Oroville Dam. The trail is not ADA accessible. There are plans to further expand the trail 4 miles farther north up to the Bloomer BICs. Restrooms, 118 car parking spaces, and 350 car/trailer parking spaces are available in the upper lot of Spillway BR/DUA.

Roy Rogers Trail

The 4-mile Roy Rogers Trail can be accessed from Loafer Creek facilities, including from the campground, equestrian campground, boat ramp parking, and day use area. The trail is not ADA accessible but is in good condition. The Loafer Creek area provides parking for 251 vehicles. Restrooms and trash receptacles are provided at the Loafer Creek DUA, campground, and boat ramp.

Wyk Island Trail

The Wyk Island Trail is a hiking trail that can be accessed from the parking area for the Bidwell Canyon BR by crossing the historic Bidwell Bar Suspension Bridge that connects Wyk Island to the parking area. The 0.2-mile trail (managed by DPR) meets ADA accessibility requirements. The trail follows the shoreline of the small island and is considered to be in a foothill setting and to provide a rural experience, although reservoir views are dominated by the Bidwell Marina and houseboat mooring field. The Bidwell Canyon BR provides 279 parking spaces, restrooms, and trash receptacles.

Saddle Dam Trailhead Access

The Saddle Dam Trailhead Access connects to the Dan Beebe Trail as well as the Loafer Creek Loop Trail and Roy Rogers Trail. Located on the southeast side of Kelly Ridge, the access site includes a graded and graveled parking area that accommodates approximately 40 car/trailer combinations. The parking area provides access to the reservoir's shoreline at high water levels, as well as a place to off-load horses and access the equestrian trail. In addition, a vault toilet building and a trash receptacle are provided at the site. The facilities are in good condition. The toilets are ADA-accessible.

Diversion Pool

The Brad P. Freeman and Dan Beebe Trails run along side the Diversion Pool, but there are no trails that are solely located within the Diversion Pool area. However, there are two trailheads located on the south side of the Diversion Pool.

Powerhouse Road Trailhead Access

The Powerhouse Road Trailhead Access provides access to the Brad P. Freeman Trail. The site is located below Oroville Dam, downstream of the Oroville Powerhouse. Parking is available along the gravel road. This is an undeveloped access point with no facilities provided.

Lakeland Boulevard Trailhead Access

The Lakeland Boulevard Trailhead Access is located south of the Diversion Dam and Pool, and upstream from the Low Flow Channel of the Feather River. The site is unpaved and provides parking for trail access that is commonly used by equestrians. There is no developed shoreline access at the site. The gate to the site is locked from sunset to dawn. Although there is an equestrian staging area, portable toilets, and some picnic tables at this site, Lakeland Boulevard Trailhead Access is considered an undeveloped site and therefore is not scheduled to be upgraded to be ADA-accessible (pers. comm., Feazel 2003). DWR has contacted Union Pacific Railroad regarding obtaining an easement for a small piece of land adjacent to the trailhead access, to improve opportunities for development of shoreline recreation access at the Diversion Pool.

Thermalito Afterbay

The Brad P. Freeman Trail runs around the north, south, and west sides of the Thermalito Afterbay, but there are no trails that are solely located within the Afterbay area. The three trailheads in this area are located on the south side of the Afterbay (East Hamilton Road) and the north side of the Afterbay (Toland Road and Tres Vias Road).

East Hamilton Road Trailhead Access

The East Hamilton Road Trailhead Access provides connection to the Brad P. Freeman Trail segment atop Thermalito Afterbay dam. Approximately five parking spaces are available in a small gravel parking lot at the access site. In addition, a picnic table is provided at the site. Facilities at this site are not ADA-accessible. There are no scheduled improvements because this access point has not been selected as a priority to meet ADAAG, as amended.

Toland Road Trailhead Access

The Toland Road Trailhead Access provides connection to the Brad P. Freeman Trail. The trailhead at the access site is gated. Parking is available along the roadside. This is an undeveloped site with no facilities provided.

Tres Vias Road Trailhead Access

The Tres Vias Road Trailhead Access provides connection to the Brad P. Freeman Trail. The site consists of a dirt parking lot and dirt road/trail at the Thermalito Afterbay. This is an undeveloped site with no facilities.

Oroville Wildlife Area

Within the OWA, bicycling and walking/hiking are permitted, but only on roads open to motor vehicles. There is only one designated trail that runs through the OWA, the Brad P. Freeman Trail which runs along levees surrounding the Thermalito Afterbay and roads through the western portion of the OWA north of the Afterbay outlet. In addition to the designated trail, informal walking paths exist where visitors may access the Feather River from the three primary unpaved boat launch sites in the OWA. These trails are not maintained and are not ADA-accessible. There are vault toilets within the OWA at the designated camping area. Parking within the OWA is undesignated.

5.2.6.3 Trail-related Demand Factors

This section summarizes important factors of demand for public non-motorized trails. The factors discussed include Statewide demand, existing trail use within the study area, and survey respondents perceptions about the number of existing trails/trail facilities. Future demand for trails is also discussed.

Statewide, there is latent demand for trail uses as well as support for public funding. Currently, trail use is not a dominant use within the study area; however, there is some demand for more hiking, biking, and equestrian trails/trail facilities. Demand for the three main trail uses (hiking/walking, biking, equestrian) are all expected to increase in the future.

Statewide Demand for Trail Uses

Statewide demand for different types of trail use can be found in *Public Opinions and Attitudes on Outdoor Recreation in California* 1997 published by DPR. This document states the latent demand and public support for recreational walking, trail hiking, horseback riding, bicycling on paved surfaces, and mountain biking not on paved surfaces (Table 5.2-4). Recreational walking and trail hiking had high latent demand as well as high public support for funding of new facilities.

Table 5.2-4. Statewide trail use latent demand and public funding support.

Trail use	Latent demand	Public Funding Support
Walking (recreational)	High	High
Trail hiking	High	High
Horseback riding	Moderate	Low
Bicycling (on paved surfaces)	Moderate	Moderate
Mountain biking (not on paved surfaces)	Low	Low

Source: DPR 1998.

Horseback riding had moderate latent demand, but low public funding support. Bicycling on paved surfaces had moderate latent demand and moderate public support versus mountain biking (not on paved surfaces), which had low latent demand and low public funding support.

Existing Trail Use within the Study Area

About 7 percent of Recreation Visitor On-Site Survey respondents listed biking, hiking, or horseback riding as their primary activity. Of these activities, horseback riding was the most popular, with about 4 percent of total respondents listing this as their primary activity. In terms of participation, hiking had the highest percent of respondents that said they participated in this activity (17 percent), followed by road biking (7 percent), and mountain biking and horseback riding (6 percent each).

Study R-9 – *Existing Recreation Use* reported total recreation use within the FERC boundary by activity. Trail use was eighth out of nine activities in terms of contribution to total use. Of total recreation use within the FERC boundary, only 1 percent was estimated to be from trail use (just under 16,000 RDs out of a total 1.7 million RDs). Hunting was the only activity with less estimated use.

Existing utilization of trails was determined for specific segments of trails within the study area as part of Study R-9 – *Existing Recreation Use*. Generally, trail use is relatively low. Trail use data show that the highest trail use occurred in October, with about 50-60 people using trails within the FERC boundary on peak days. This is an average of 5 people per hour, a relatively low level of use. The lowest trail use occurred from mid-December through mid-March, with no use recorded on many days and peak daily use of 10 or fewer people. The trailhead accesses were some of the lowest contributing sites to overall use in the study area. Of the four trailhead accesses, Saddle Dam had the most RDs with about 4,600, followed by Lakeland Boulevard with about 4,000 RDs. Powerhouse Road Trailhead Accesses had about 2,000 RDs, and East Hamilton Road had less than 900 RDs (the smallest amount for any site within the study area).

According to the On-Site Survey (trail use section), most trail users at Lake Oroville, Low Flow Channel, Thermalito Forebay, Thermalito Afterbay, and OWA were hikers/walkers (65 to 82 percent of respondents). Most trail users at the Diversion Pool were equestrians. Biking had the second largest group of trail users at the Diversion Pool, Low Flow Channel, Thermalito Forebay, Thermalito Afterbay, and OWA (9 to 25 percent of respondents). At Lake Oroville, the second largest group of trail users was equestrians, with 15 percent of respondents, followed closely by bikers with 11 percent.

Of the On-site Survey trail use section respondents, the majority have used the trails in the study area before. Lake Oroville and Thermalito Forebay had the highest percentage of first-time users with 36 and 32 percent of respondents, respectively. About one-quarter of respondents from the OWA were first-time trail users. At the Diversion Pool, Low Flow Channel, and Thermalito Afterbay, about 18 percent of respondents were first-time trail users.

Survey Respondents Perceptions About the Number of Trails/Trail Facilities

Mailback Survey respondents were questioned regarding the number of trails and trail facilities including: unpaved bike trails, hiking trails, trail signs, paved bike trails, equestrian trails, and equestrian facilities. Although most respondents from all geographic sub-areas felt the number of trails/trail facilities was adequate, as Table 5.2-5 shows, there is a portion of respondents that felt there are not enough trails/trail facilities for hiking, biking, or equestrian use. This demonstrates that there is some demand for more hiking, biking, and equestrian trails/trail facilities. This is especially true at the OWA where generally 50 percent or more of respondents felt there were not enough trails/trail facilities.

Table 5.2-5. Recreation Mailback Survey respondent opinions regarding the number of trails and trail facilities

Trail/Trail facility	Percent of respondents that marked "too few"					
	Lake Oroville	Diversion Pool	Low Flow Channel	Thermalito Forebay	Thermalito Afterbay	OWA
# of unpaved bike trails	32.6	31.8	8.0	20.9	26.3	51.9
# of hiking trails	30.4	25.9	17.4	20.8	30.4	48.5
# of trail signs	39.2	41.4	11.5	28.0	37.0	70.0
# of paved bike trails	34.8	20.0	16.0	28.6	38.9	59.1
# of equestrian trails	28.1	42.9	7.7	13.3	31.3	28.6
# of equestrian facilities	25.2	50.0	13.3	19.4	41.2	61.1

Source: EDAW 2003 (Mailback Survey).

Future Demand

Demand for all trail uses is expected to increase over the term of the new license. In Study R-12 – *Projected Recreation Use*, projections of future use were based on activities and their estimated future demand. Hiking and walking

are expected to have high demand, while biking and horseback riding are expected to have moderate future demand. Regional activity projections (Cordell 1999) suggest that hiking, biking, and horseback riding will grow within the Pacific region over the next 50 years (California, Oregon, Washington, Alaska, and Hawaii).

5.2.6.4 Trail-related Capacity Factors

Important public non-motorized trail-related capacity factors to consider are summarized below. Factors considered include facility, spatial, social, and ecological capacity (Study R-8 – *Recreation Carrying Capacity*).

Overall, the study area trails receive relatively low use and, therefore, are probably not approaching facility carrying capacity. There is also some potential for trail expansion and, therefore, the area is not approaching spatial capacity. Perceived crowding is low and few respondents mentioned encounters that put them at risk, demonstrating that social carrying capacity is not currently being approached. Although there are some ecological impacts occurring at a few sites, most trails have few impacts and are not approaching ecological carrying capacity.

Facility Capacity

Generally, facility capacity is not a practical measure of recreation capacity for trails. Ideally, trail facility capacity should be commensurate with the ROS setting type of the area where the trail is located. However, in most recreation research and management, social capacity tends to offer more setting-specific quantitative capacity values than facility capacity. Study R-9 *Existing Recreation Use* found trailhead accesses to be some of the lowest-use sites within the FERC boundary. As previously mentioned, Study R-9 also reviewed data from trail counters and found that even on peak days, trail use averaged about 5 people per hour, a relatively low level of use. Due to this low use on study area trails and trailheads, it is unlikely that the facility capacity of trails is being met, even at peak times.

Facility capacity is also limited by number of parking spaces at trailheads, but based on monitoring data this currently does not appear to be a limiting factor. Many study area trail users access the trails from places other than the trailheads including campgrounds or nearby neighborhoods, which relieves capacity constraints at trailhead accesses.

Spatial Capacity

The spatial capacity of trails is generally measured through the ability to add linear distance to existing trails and/or through the ability of an area to accommodate new trail development. Although the *Recreation Suitability Analysis* did not specifically investigate potential areas for new trails due to GIS

pixel size and macro-scale of some of the GIS data layers, several areas could accommodate more miles of trails (see Suitability section). This indicates that the spatial capacity of trails is not being approached at this time.

Social Capacity

Variables that demonstrate if social carrying capacity is being approached include the perception of crowding on trails and encounters with other trail users. If many people perceive the trails to be crowded and have numerous encounters with other trails users that put them at risk, then social carrying capacity is probably being approached. However, in this case, the vast majority of respondents did not feel crowded and did not have encounters or conflicts with other trail users that put themselves at risk.

Perceptions of Crowding on Trails

Both the perception of crowding by geographic area and by trail user type are described below. Generally, most respondents do not feel crowded.

Trail users were asked in the Recreation Visitor On-site Survey to rate their perception of crowding on the trails on a scale of "not at all crowded" (1) to "extremely crowded" (9). It appears that most trail users did not feel crowded. At least 50 percent of respondents at each resource area felt "not at all crowded" (1) at the trail they used during the surveyed trip to the study area. At each resource area, 69 to 96 percent of respondents felt between "slightly crowded" (3) and "not at all crowded" (1). Less than 15 percent of respondents at all resource areas felt between "moderately" (6) and "extremely crowded" (9).

When crowding is evaluated by type of trail user (hikers, bikers, etc.), the most frequent score from each user group was "not at all crowded" (1). About 70 to 90 percent of respondents in each user group felt between "not at all crowded" (1) and "slightly crowded" (3). The equestrian user group had the lowest percentage of respondents who felt between "moderately crowded" (6) and "extremely crowded" (9) with 2 percent; the "Other" user group (e.g., disc golfers, runners, ATVs) had the highest percentage with 18 percent. These results demonstrate that most users, across all user groups, do not feel crowded on study area trails.

Encounters On Trails That Put Respondents At Risk

As with crowding, encounters both by geographic area and by trail user type are described below. Generally, there were very few encounters at any resource area and most respondents of all trail user types had few encounters that put them at risk.

Very few respondents (across resource areas) had an at-risk encounter with another trail user. The Thermalito Forebay and Diversion Pool had the highest

percent of respondents that had an encounter, with about 8 and 9 percent of respondents, respectively. The Thermalito Afterbay had the lowest percent of respondents that had an encounter, with about 1 percent of respondents.

Of those who did have an at-risk encounter, most respondents did not list with whom they had an encounter. Of the respondents that did list the trail user they had an encounter with, "other" trail users had the highest percentage of encounters at the Low Flow Channel, Thermalito Forebay, Thermalito Afterbay, and the OWA. At the Thermalito Afterbay, respondents only reported encounters with other trail users. At the OWA, respondents only reported encounters with hikers/walkers and other trail users.

Another way to review encounters that put respondents at risk is by looking at which types of trail users had such encounters. Very few of any type of trail user had a potential at-risk encounter. Equestrians had the most, with about 13 percent of respondents, followed by bikers with about 8 percent of respondents, and hikers/walkers with about 6 percent of respondents.

When reviewing encounters with whom by trail user type, it appears that equestrians had the most encounters with bikers, with about 8 percent of respondents, versus less than 1 percent of biker or hiker/walker. Equestrians also had more encounters with hikers/walkers than the other user groups (about 5 percent) compared to 3 and 4 percent of total hiker/walker and biker respondents, respectively. Bikers and hikers/walkers had between 1 and 2 percent of respondents that had encounters with equestrians. Six percent of equestrians had encounters with other equestrians. About 2 to 3 percent of bikers, hikers/walkers, or equestrians had "other" encounters, which consisted of encounters with animals, cars/all-terrain vehicles (ATVs), anglers, disc golf players, runners/joggers, swimmers, rock climbers, homeless people, and picnickers.

Additionally, Mailback Survey respondents were questioned regarding encounters between trail users and other users. An overwhelming majority of respondents at each resource area felt that such encounters were "not a problem" (about 81 to 92 percent of respondents). Less than 10 percent of respondents at each resource area felt that such encounters were a "moderate" or "big problem."

As the preceding data show, the majority of respondents (at any area or by trail type) did not have an encounter which they felt put themselves at risk, nor do most respondents feel that encounters between trail users and other users is a problem. This, along with most respondents feeling "not at all crowded," demonstrates that the trails are not reaching social carrying capacity.

Ecological Capacity

Trail impact information can demonstrate if trails are reaching or exceeding ecological capacity. In general, recreational use of trails at Lake Oroville does not appear to have a widespread impact on the ecological integrity of the area. Study R-11 – *Recreation and Public Use Impact Assessment* found that all trails showed some signs of erosion typical of trails in semi-arid areas, but did not identify significant vegetation damage, wetland, or riparian impacts as concerns on the trails. The trails surveyed for impacts include the Brad P. Freeman, Dan Beebe, Lime Saddle Loop, Loafer Creek Loop, and Roy Rogers Trails.

- **Brad P. Freeman Trail** – In general, the Brad P. Freeman trail is in good condition. Soil erosion was noted as a moderate concern along this trail, particularly along its western end where it has not been hardened.

- **Dan Beebe Trail** – Recreation and public use impacts along the Dan Beebe Trail are generally minimal; however, soil erosion was noted along the trail route.

- **Loafer Creek Loop and Roy Rogers Trails** – Soil erosion was noted as a moderate concern along these trails.

Although the designated trails are generally in good condition with no impacts of high concern, user-defined trails are a problem at some sites. Saddle Dam Trailhead Access has user-defined trails that go in many directions, and use along some of these trails has led to soil erosion. The prevalence of many user-defined trails is of high concern at dispersed recreation sites and use areas within the FERC boundary. Dispersed sites rarely see management attention and intervention, and users have created trails to reach the shoreline that are often too steep or near the shore; thus, erosion is prevalent in some areas.

5.2.6.5 Trail-related Suitability Factors

Trails are unique among recreation facilities in that they can be placed almost anywhere. However, some areas would be better for trails than others due to steepness, access, and connectivity. Some factors that are important to trail suitability include ability to follow the elevation grade, ease of access, parking capacity, connectivity to existing sites and trailheads, and range of difficulty. The suitability for additional trail development at each geographic area is discussed in this section.

Lake Oroville

Generally, the forks of Lake Oroville have low trail suitability due to private ownership, difficulty of access, and/or steepness. Although connections to the Beckwourth Trail on the Middle Fork and Pacific Crest Trail and Feather Falls on

the South Fork could be done, trails on the reservoir forks and around the reservoir would be extremely difficult and costly to construct. They may also support little use due to the difficulty in accessing the trails and long length of trails, along which it would be difficult to provide facilities for water or overnight camping. There are trails more suited for this kind of recreation opportunity in the adjacent Plumas and Lassen National Forests.

Shoreline trails with consistent water access would also be difficult to create around Lake Oroville due to the annual reservoir pool drawdown. However, the Lime Saddle area, specifically Parrish Cove, would be suitable for additional trails to connect to existing sites and facilities as well as offer shoreline access. The area around Parrish Cove is of gentle to moderate slope and therefore would be suitable for additional shoreline access.

Thermalito Forebay and Afterbay

In terms of connecting trails, the Thermalito Forebay and Afterbay are suitable for trail connections and creating loop trails. Currently, the Brad P. Freeman Trail encompasses both reservoirs, but these areas could accommodate trails that loop around each reservoir separately. Around the North Forebay, a trail could run along the top of the dam as it does along the South Forebay; however, a crossing over the Thermalito Power Canal would be required to complete the loop. Vegetation constraints would have to be considered along the north side of the South Forebay if that trail alignment were chosen. Security issues at the Thermalito Power Plant would need to be addressed. Additionally, crossings over the power plant's tail channel and Nelson Avenue would be necessary. However, all of the mentioned crossings would be feasible due to the small, fixed width of the tail channel, Power Canal, and Nelson Avenue, as well as the stable bank on both sides of the water channels.

A loop around the Afterbay would require the trail to cross SR 162 on the east side of Afterbay. Currently, the Brad P. Freeman Trail crosses SR 162 on the west side of the Afterbay. Although sensitive wildlife species and habitat (in particular waterfowl brood areas) may be concerns around the east side of the Afterbay, existing fire roads could be upgraded for trail use, thus reducing concerns about wildlife habitat and vegetation.

Diversion Pool

The Diversion Pool currently has trails along both sides, but they do not connect. However, connecting the trails would require either permanent or seasonal trail bridges, which would have to be able to accommodate peak flows from Lake Oroville. High flows at the spillway during a January 1997 flood event washed away part of the Brad P. Freeman Trail across from the spillway. A crossing over the Diversion Pool at this location would need to be high enough over the water

to accommodate such flood flows out of the spillway. To complete the loop, a crossing would also be needed at the downstream end of the Diversion Pool. The span across the water is fairly wide at both points where crossings would be needed. Additionally, it would be difficult and possibly require new roads to provide access for construction equipment to the shoreline areas where bridges would be necessary. Vehicle access is currently not provided to the old road bed and railroad bed that run parallel to the north and south shores of the Diversion Pool.

OWA

The OWA currently has only one designated trail. There are many informal trails that could be suitable for upgrading to formal trails. Due to the presence of wildlife in the OWA, interpretive trails would also be suitable. There are already several access points and roads that cross the area, eliminating any need to create additional access points. Constraints to providing trails may include hunting activity, sensitive habitat, and cultural resource areas.

5.2.6.6 Trail-related Operations and Maintenance Factors

Trail maintenance in the LOSRA is performed by DPR in conjunction with a number of user groups and volunteer organizations, and with limited assistance from DWR. Policies and etiquette regarding use of multi-use trails are managed by the California State Parks Mounted Assistance Unit and Bicycle Patrol Unit, which patrols trails throughout the study area.

Trails in the study area are currently in good condition. At least 90 percent of respondents contacted at Lake Oroville, Diversion Pool, Low Flow Channel, Thermalito Forebay, and Thermalito Afterbay were satisfied with the condition of trails. The OWA had the highest percentage of dissatisfied respondents, with 23 percent. Overall, it seems that existing operations and maintenance of the trails is generally sufficient, with some additional attention needed in the OWA.

Dissatisfied survey respondents were asked to give their reasons for dissatisfaction with the condition of the trails. However, many of the reasons given do not relate to trail condition. The only reasons that directly relate to the condition of the trails are litter problems, trails needing maintenance, and dust from trail-grading machines. Litter was the number one reason for dissatisfaction for OWA respondents, as well as 20 percent of Low Flow Channel dissatisfied respondents.

5.2.7 Overall Fishing-Related Needs in the Study Area

The overall fishing needs in the study area are presented first. Subsequent sections provide the detailed analysis of overall fishing supply, demand, capacity,

suitability, and operations and maintenance factors to support these findings of need. Site-specific fishing needs are further defined in Chapter 6.0.

Sites mentioned can be found on Figure 1.1-1. The relicensing studies that contributed to this analysis of fishing-related needs include:

- Study R-2 – *Recreation Safety Assessment* (see Section 6.2)
- Study R-4 – *Relationship Assessment of Fish/Wildlife Management and Recreation* (see Sections 5.1, 5.1.1.2, 5.1.1.3, 5.1.2, 5.2.7.1, 5.3.2.2, 5.3.2.3, 5.3.2.7, and 5.3.4.2; Tables 5.1-4, 5.1-7, 5.2-9, 5.3-3,.3-16, and 5.3-20)
- Study R-8 – *Recreation Carrying Capacity* (see Section 5.5.2)
- Study R-9 – *Existing Recreation Use* (see Table 5.1-7)
- Study R-10 – *Recreation Facility Inventory and Condition* (see Table 5.1-4)
- Study R-11 – *Recreation and Public Use Impact Assessment* (see Sections 4.4.2.9, 5.2.2.1, and 5.2.2.2, Tables 5.2-1, 5.2-2, 5.2-3, and 5.2-4)
- Study R-12 – *Projected Recreation Use* (see Sections 4.1.1 and 5.2.3, Table 5.2-9)
- Study R-13 – *Recreation Surveys* (see Sections 5.1.2.6, 5.1.2.7, 5.1.5.3, 5.3.8.2, and, Tables 5.1-4, 5.1-27, 5.1-29, 5.3-3, and 5.3-22)
- Study R-16 – *Whitewater and River Boating* (see Sections 5.2.3.2 and 5.2.3.3)

5.2.7.1 Overall Fishing-Related Needs

Based on a review of the factors and indicators summarized later in this analysis, overall fishing-related needs have been identified for the study area. These needs should not be assumed to be proposed PM&E measures. Site-specific project-related fishing needs are discussed in Chapter 6.0. Overall fishing–related needs are discussed below.

The factors and indicators that contributed the most in determining the overall fishing needs in the study area are summarized in the following bullets. Information from the above recreation studies supports these conclusions. The detailed discussion supporting these findings is found in the later supply, demand, capacity, and suitability sections that provide a more thorough analysis of overall fishing needs in the study area.

- Illegal fishing may be occurring along the Feather River, especially at the Afterbay outlet.
- There are concerns with periodic high visitor use levels at the Afterbay outlet and the effects of overcrowding.
- There are concerns regarding trash accumulation and litter along the shoreline of the waters within the study area.

- There is some demand for more fishing facilities and shoreline access. About one-third of survey respondents felt that shoreline access at Lake Oroville was a moderate to big problem.

Overall existing and future fishing needs are below.

Existing Fishing Needs

Law Enforcement

Provide additional law enforcement to enforce fishing and other regulations, particularly in the OWA. Currently, there are reports of illegal fishing practices occurring on the Feather River within the OWA, and there are not enough patrols or staff to minimize or alleviate these practices. Provide additional patrols to help stop illegal fishing practices. Enforce the closure of the concrete flanks of the Afterbay outlet structure, commonly violated by anglers. This may force the overcrowding occurring at the site to disperse to the banks of the river on both sides of the Afterbay outlet and on the east side of the Feather River, across from the Afterbay outlet. Additional patrols could also curb disruptive behavior that currently happens during peak times at the Afterbay outlet. Also see Section 5.2.9, Programmatic Needs. (Study R-4, Table 6.1-1)

Post additional regulatory and informational signs, where needed, particularly in the OWA. Due to high fishing use in the OWA and to help deter anglers from fishing illegally, the area should be considered for additional signage detailing illegal fishing practices and consequences of participating in these practices. Also, posting signs encouraging users to put debris (including fishing line and tackle packaging) in the trash receptacles may encourage users not to litter, thus providing a cleaner, more pleasing environment in which to recreate. (Study R-4, Table 6.1-1)

Maintenance

Continue to provide annual O&M at existing and potential future fishing-related facilities and maintenance of shorelines. Though many areas do not currently show problems with shoreline sanitation or litter along the shoreline, problems may develop in the future as overall recreation use increases. Due to the impact that litter can have on the recreational experience of bank anglers, periodic maintenance should be considered and appropriate actions taken if needed. (Also see Section 5.3, Programmatic Needs; FERC guidelines; Professional judgment; Resource protection.)

Periodically monitor use of existing fishing facilities; monitor shoreline sanitation and litter conditions; and monitor fishing activity, especially crowding and capacity at the Afterbay outlet. Currently, the Afterbay outlet area appears to be exceeding capacity at peak times. If additional patrols are implemented, the site

should have additional monitoring to see if capacity is still being exceeded. If it is, additional management actions should be considered. (Also see Section 5.3, Programmatic Needs; Professional judgment; Resource protection; FERC guidelines)

Provide additional trash pick-up at sites where trash accumulation is considered a high or extreme concern. Trash accumulation at a site, in addition to litter along the shoreline, can negatively affect the bank fishing experience and encourage users to continue littering, thus causing more negative impacts to the site and the recreational experiences occurring at the site. As a result, provide additional trash pick-up in selected areas. (Study R-4, Table 6.1-1)

Provide additional trash receptacles, particularly in the OWA, along the Feather River, and at any new shoreline access area. Due to the high use at the OWA, additional trash receptacles are needed to help stop littering and maintain a cleaner, more positive environment in which to fish. Additional trash receptacles may also be considered along the Feather River at access sites where there appears to be a litter accumulation problem. Any new shoreline access areas should also be considered for additional trash receptacles, to help prevent the development of littering at these sites. (Study R-4, Table 6.1-1)

Post additional signs at trash receptacles along the Feather River that remind users to put fish waste in the river rather than the trash. Although users should be encouraged to use the trash receptacles, for fisheries purposes (returning nutrients back to the river), it is better if anglers put fish waste back into the river and not into the trash receptacles. Therefore, improved signs should be posted to encourage and remind anglers to do this. (Study R-4, Table 6.1-1)

Fishing Facilities

Provide additional ADA-accessible fishing piers or platforms. Bank fishing is the most popular primary activity within the study area, and fishing is the second most common reason for visiting the study area. ADA-accessible fishing opportunities are few, so increasing these opportunities in the study area with additional ADA-accessible fishing piers or platforms is needed. Suitable locations may include the South Forebay BR/DUA, Diversion Pool, One-Mile Pond in the OWA, and/or other existing campgrounds and day use areas. Of these areas, the South Forebay is the only area with other ADA-accessible facilities (vault toilet building) and therefore appears to be a good option. (Professional judgment; ADA-accessibility)

Provide additional shoreline access for fishing at developed recreation facilities. Potential areas for additional shoreline access include Lime Saddle, North Forebay, and Loafer Creek. Currently, there is no formalized shoreline access for Lime Saddle visitors. The shoreline in the Parrish Cove area is only moderately sloped and therefore the most suitable location for shoreline access.

Trails from Parrish Cove to both the Lime Saddle BR and Lime Saddle Campground could be provided to allow all area users access to the shoreline. Currently, there is limited shoreline at the North Forebay available to bank anglers, primarily at the North Forebay DUA. The north shoreline is suitable for additional access via spur trails, and perhaps small piers to protect shoreline vegetation, off of the existing Brad P. Freeman trail, which runs along that side of the Forebay. (Studies R-3, R-5; also see Section 5.2.6, Trail Needs)

Continue to provide an adequate fishery management program over the anticipated new license term. In general, good recreational fishing opportunities exist in the study area. To help meet future demand, continued, expanded, or new fishery management and habitat improvement programs may be needed to maintain and enhance the sport fishery. Continue to cooperate with DFG to provide fishery management programs that benefit Oroville Facilities anglers. Additionally, provide information (signs, brochures) to the public detailing the location of public shoreline fishing access opportunities. (Study R-4, Table 6.1-1)

Boating Needs

Provide actions that will help address the needs identified under the boating section of this study; this will also help address boat angler and associated parking-related needs. As there are many boat anglers within the study area, consider the needs identified as Overall Boating Needs in the study area. Because fishing often also involves use of boat ramps and day use areas, needs related to parking at these sites should be addressed. (Study R-17, Sections 5.2.2 and 5.2.3; also Study R-17)

Consider providing areas for temporary grandstands for use by event organizations during fishing tournaments at Lake Oroville. To help support and encourage fishing tournaments at Lake Oroville, temporary grandstands may be considered for use at Bidwell Canyon and Lime Saddle. These two areas have space constraints for providing permanent facilities, but temporary facilities could allow tournaments to provide grandstand seating for spectators and participants. Tournament organizers could pay for this event amenity; however, suitable locations for grandstands are needed. (Professional judgment)

Future Fishing Needs

Fishing Facilities

Consider providing additional fish cleaning stations if monitoring shows fish waste is becoming a problem. The two developed sites with running water and no fish cleaning stations are the North Forebay BR/DUA and Loafer Creek BR. Although fish waste has not been observed to be a problem at these sites, fishing use is expected to increase in the future, especially at North Forebay BR/DUA if additional shoreline access is offered. Therefore, monitoring will be important in

determining if fish waste becomes a problem at these sites and if additional fish cleaning stations should be considered. (Professional judgment; Resource protection)

5.2.7.2 Fishing Supply Factors

This section discusses important public fishing supply factors for each geographic area, including the type of fishing occurring, any fishing facilities, specific locations to fish, and species of fish available.

Fishing areas include Lake Oroville, Diversion Pool, Thermalito Forebay, Thermalito Afterbay, and waters throughout the OWA and the Feather River, excluding the closed length of the Feather River between the Fish Barrier Dam and the Table Mountain bicycle bridge. The study area also includes a fish hatchery on the Low Flow Channel of the Feather River (Figure 1.1-1).

Fishing is permitted throughout the study area with the appropriate State-issued license, stamps, and cards as required under State law, although fishing in a number of reaches of the Feather River is governed by special regulations.

Fish stocking and habitat improvement projects occur throughout the study area. Recent surveys also indicate that the species most sought by anglers include black bass, salmon, and trout, and the species most commonly caught include black bass, salmon, steelhead, striped bass, trout, and sunfish. In general, both user-defined and formal trails that access shoreline within the study area are commonly used by anglers. Boat ramps are the primary facilities used by boat anglers, with the majority of boat fishing taking place in the off-season (fall, winter, spring). Currently, boating facilities used by boat anglers at each geographic area, including Lake Oroville, provide year-round access. Lake Oroville is generally lower in the off-season; however, boat ramps are normally available even when the reservoir is at lower pool levels. (See the Boating Needs section for supply information on boat ramps.)

Lake Oroville

Lake Oroville provides opportunities for both bank and boat fishing. Popular bank fishing locations include the car-top boat ramps and alongside the major boat ramps. Boat anglers often frequent the reservoir's quieter coves or the ends of the reservoir's arms, where there are fewer boaters. The reservoir is considered a very good bass fishing spot and hosts several fishing tournaments each year. Tournaments are held at Spillway BR, Bidwell Canyon BR, and Lime Saddle BR. Grandstands are available at Spillway BR/DUA for tournament use. Additionally, there are fish cleaning stations at Bidwell Canyon BR/DUA, Lime Saddle BR/DUA, and Spillway BR/DUA.

The two-layered temperature (warm/cold) structure of Lake Oroville provides an opportunity for both warmwater and coldwater fisheries to flourish. The reservoir's warmwater fishery includes spotted bass, largemouth bass, smallmouth bass, redeye bass, bluegill, green sunfish, black crappie, white crappie, channel catfish, and white catfish. Spotted bass are among the most commonly-caught fish in Lake Oroville. The coldwater fishery consists primarily of brown trout and silver salmon, with smaller populations of rainbow and lake trout. Chinook salmon was an important coldwater species until stocking was ceased in 2002 and replaced by stocking of silver salmon. The salmon population has increased over the last few years to the highest sustained levels in Lake Oroville's history. Catch rates have also shown a steady increase in recent years.

Diversion Pool

Shoreline fishing is more common than boat fishing at the Diversion Pool. Burma Road runs along the north side of the Diversion Pool, allowing for easy bank fishing access. Diversion Pool remains cold year-round, supporting a coldwater fishery dominated by rainbow trout, brook trout, brown trout, and Chinook salmon. Warmwater fish such as largemouth bass, bluegill, and green sunfish have also been observed in low numbers in backwater areas, and other warmwater fish that live in Lake Oroville are believed to be present.

Thermalito Forebay

Anglers fish from both the shoreline and by boat at Thermalito Forebay. The two most popular fishing locations at the north end of the Forebay are the North Forebay BR/DUA and the Nelson Road bridge (which separates the north and south parts of the forebay). The North Forebay BR/DUA has an ADA accessible fishing pier near the Aquatic Center. The most popular fishing location at the south portion of the Forebay is the South Forebay BR/DUA, which has a fish cleaning station. The rest of the Thermalito Forebay shoreline is not accessible to fishing. The Thermalito Forebay is supplied by water from the Diversion Pool via the Thermalito Power Canal, and hosts the same species found in the Diversion Pool. In addition, the Forebay is managed by DFG as a put-and-take trout fishery, where catchable trout are stocked biweekly. Rainbow and brook trout are the primary fish planted, although surplus inland Chinook salmon yearlings have been occasionally stocked as well.

Thermalito Afterbay

Both boat and bank fishing take place at the Thermalito Afterbay. Most fishing occurs at the Monument Hill BR/DUA, which has a fish cleaning station, and Larkin Road Car-top BR. Anglers also use informal shoreline access provided by dirt roads at other points. The diverse temperature structure of the Afterbay has provided suitable habitat for both warmwater and coldwater fish, including a

popular largemouth bass fishery. Other fish species include smallmouth bass, rainbow trout, brown trout, redear sunfish, bluegill, black crappie, channel catfish, and carp.

OWA

The OWA provides opportunities for bank fishing along the Feather River and along the shoreline of ponds. Levee roads allow for easy bank fishing access throughout most of the OWA. There is excellent sport fishing for Chinook salmon, steelhead trout, American shad, striped bass, and channel catfish in the OWA. In addition, anglers can fish for largemouth and smallmouth bass, bluegill, crappie, brown bullhead, and carp.

The Afterbay outlet, within the OWA, is probably the most heavily used fishing area on the Feather River below the Oroville Dam, especially during July, August, and September. Anglers are attracted to this well-known location by the high concentration of fish in the 30-foot deep hole created by the high outlet flows (pers. comm., Huber 2003).

Feather River Fish Hatchery (Low Flow Channel)

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

5.2.7.3 Fishing Demand Factors

Important public fishing demand factors to consider include Statewide demand, existing and future demand in the study area, as well as demand for fishing facilities and survey results (i.e., Study R-9 – *Existing Recreation Use*, Study R-12 – *Projected Recreation Use*, and Study R-13 – *Recreation Surveys*).

Statewide Demand

DFG data indicate that the overall number of fishing licenses sold in California has decreased over the last 6 years by 16 percent (DFG 2004). Fishing license sales to California residents have decreased by almost 16 percent since 1996. One-year non-resident license sales have decreased by over 9 percent in the last 7 years, and non-resident one-day license sales have decreased the most, almost 27 percent.

To some degree of contrast, *Public Opinions and Attitudes on Outdoor Recreation in California* (DPR 1997) states that freshwater fishing has a high latent demand. It also states that there is moderate public funding support for freshwater fishing.

Existing Demand

According to surveys recently conducted as part of the relicensing effort, bank fishing and boat fishing are the first and fourth most common primary activities of visitors to the study area, respectively, and the two most common primary activities of visitors to the OWA. Approximately 30 percent of survey respondents participated in bank fishing. Approximately 26 percent of survey respondents participated in boat fishing. Fishing was also the second most frequent reason people chose to visit the Lake Oroville area.

Study R-9 – *Existing Recreation Use* estimated total recreation use within the study area by activity. Bank fishing was the third most popular activity in the study area, especially at the car-top boat ramps and in the OWA. Bank fishing accounted for about 316,000 RDs, equaling about 18 percent of total use in the area. Boat fishing was included under boating, the most popular activity in the study area, with over 500,000 RDs and about 29 percent of total use in the area.

Future Demand

Study R-12 – *Projected Recreation Use* projected recreation demand through 2050 by activity. Bank and boat fishing are expected to have relatively low future demand. This level of demand is consistent with regional activity projections for fishing within the Pacific region (California, Oregon, Washington, Alaska, and Hawaii) over the next 50 years (Cordell 1999).

Demand for Fishing Facilities

The majority of respondents at the Diversion Pool, Low Flow Channel, and OWA feel there are not enough fish cleaning stations, especially at the OWA where almost 90 percent of respondents felt there are not enough stations. About 32 to 44 percent of respondents at Lake Oroville, Thermalito Forebay, and Thermalito Afterbay felt there are not enough fish cleaning stations. These results show that there is some demand for more fish cleaning stations, especially along the Low Flow Channel and OWA where there are currently no stations.

Access to the shoreline is vital for bank anglers. Lake Oroville was the only area with a significant portion of respondents that felt shoreline access was a problem. When questioned about shoreline access, the most frequent response at all geographic sub-areas was “not a problem.” Lake Oroville had the highest percent of respondents that felt access to the shoreline was a “moderate” to “big problem” with 33 percent of respondents; all other areas had 13 percent or less.

These results show that there is some demand for more shoreline access at Lake Oroville.

There is no specific demand information for tournament facilities or ADA-accessible fishing piers or platforms. As for tournament facilities, "fishing events" had the highest response from Similar Site Survey respondents regarding the special event that would motivate them to visit the Lake Oroville area more often (37 percent of respondents). Although this does not specifically indicate demand for tournament facilities per se, it does indicate that there is some demand for more fishing events, such as tournaments, which benefit from facilities such as event grandstands. ADA-accessible fishing piers or platforms are difficult to provide throughout much of the study area, due to steep shorelines and water level fluctuations, both on the reservoir and the Feather River.

5.2.7.4 Fishing Capacity Factors

Important public bank fishing capacity factors to consider include facility capacity, spatial capacity, social capacity, and ecological capacity (Study R-8 – *Recreation Carrying Capacity*, Study R-11 – *Recreation and Public Use Impact Assessment*, and Study R-16 – *Whitewater and River Boating*). Because boat anglers use boat ramps as access points and recreate on the water, capacity discussion in the Boating Needs section is better suited for boat fishing. The capacity information in this section relates primarily to bank fishing.

Facility Capacity

In terms of fishing, facility capacity relates to parking at shoreline access areas and capacity at fishing facilities such as fish cleaning stations and ADA-accessible fishing piers or platforms. Parking capacity only appears to be an issue at Nelson Bar Car-top BR and Stringtown Car-top BR. At high reservoir levels, the parking lot at Nelson Bar Car-top BR is inundated, and therefore parking is very limited. At Stringtown Car-top BR, the parking lot is very small, and therefore parking is limited. As the reservoir level recedes, more undesignated parking opens up along the ramp. However, providing additional parking at these sites may be difficult due to spatial and topographic limitations. At other sites where bank fishing occurs, parking does not appear to be an issue. See Section 5.2.2 (Day Use) for more specific parking capacity information.

The two areas where fish cleaning stations are currently located (Lake Oroville and Thermalito Forebay) had the lowest percent of respondents that felt the number of fish cleaning stations was "too few." This indirectly indicates that the fish cleaning stations are probably not reaching capacity. The ADA accessible fishing pier at North Forebay BR/DUA has not been observed to be approaching capacity, even at peak use times.

Spatial Capacity

Fishing is generally a dispersed activity, unless a site is extremely popular and spatial capacity is generally not a practical measure of recreation capacity for fishing. Almost all fishing areas in the study area have not been observed approaching their facility capacity for anglers, with the exception of the Afterbay outlet. Anglers crowd onto the concrete flanks of the Afterbay outlet structure, the nearby shore, and in boats to fish for salmon in August, during peak use. At peak times, there can be up to 25 boats on the water and 150 people on shore, which can cause disruptive behavior due to congestion and competition (pers. comm., Huber 2003). Currently, fishing from the concrete flanks is not allowed; however, due to lack of enforcement and the popularity of the site, anglers often breach the fence, disregard the sign, and crowd onto the flanks to fish. During peak times, the Afterbay outlet is likely exceeding its spatial capacity due to the limited space available at the outlet structure and nearby shoreline.

Social Capacity

Perceived crowding at fishing areas is a good estimate of whether social capacity is being approached. If most anglers feel crowded, then social capacity is probably being reached. However, in this case, it appears that the majority of angler survey respondents do not feel crowded, except at the OWA, which is probably due to responses from the Afterbay outlet.

Respondents surveyed at the Diversion Pool felt the least amount of crowding, with 80 percent of respondents indicating that they were “not at all crowded” (1) on a 9-point scale (Shelby and Heberlein 1986). Most respondents at Lake Oroville, Low Flow Channel, Thermalito Forebay, and Thermalito Afterbay also felt minimal crowding. The most frequent crowding score at these areas was “not at all crowded,” (1) and about 63 to 76 percent of respondents felt between “slightly crowded” (3) and “not at all crowded” (1).

Respondents contacted in the OWA felt the most crowded; the most frequent crowding score was “moderately crowded” (6). The OWA had the highest percent who felt between “moderately crowded” (6) and “extremely crowded” (9), with about 54 percent. The OWA also had the highest percent of respondents who felt “extremely crowded” (9), with 16 percent.

The high crowding scores for the OWA are likely due to crowding at the Afterbay outlet. The extreme popularity of this particular site for salmon and steelhead fishing in the summer makes this location very crowded both on the banks and on the water. During peak times, the Afterbay outlet is likely exceeding its social capacity, hence the disruptive behavior that ensues from having too many anglers in one place. DFG has cited the Afterbay outlet area as having recreation safety issues. There is currently only one State Game Warden

assigned part-time to DFG-managed lands in Butte County (Study R-2 – *Recreation Safety Assessment*).

Ecological Capacity

Study R-11 – *Recreation and Public Use Impact Assessment* reviewed recreation and public use impacts at sites in the study area. Although the impacts of fishing were not specifically reviewed, potential impacts from bank fishing include soil erosion and compaction, trash accumulation, and damage to riparian areas and the shoreline. Not all of these impacts can be solely attributed to anglers. However, at bank fishing locations such as the Afterbay outlet and car-top boat ramps, a portion of the impacts could be attributed to bank anglers (though not quantifiable) because they spend most of their time recreating along the shoreline. Boat fishing is more likely to impact the water due to oil/gas discharge from boats. See Section 5.2.3 (*Boating Needs)* for ecological impacts from boating/boat fishing.

In Study R-11 – *Recreation and Public Use Impact Assessment*, three sites (which offer bank fishing opportunities) were found to have a high concern for soil erosion, and two sites (with bank fishing opportunities) had high concern for soil compaction. The three sites with soil erosion concerns are the Afterbay Outlet Campground/DUA, Foreman Creek Car-top BR, and Vinton Gulch Car-top BR; the two sites with soil compaction concerns are the Afterbay Outlet Campground/DUA and West Branch Bridge Dispersed Area (Figure 1.1-1). Trash accumulation impacts are discussed later in this section under Operations and Maintenance. No sites were found to have a high concern for damage to riparian areas. Two sites were found to have a high concern for water/shoreline impact. These sites were the OWA Headquarters Entrance Dispersed Use Area and OWA – Pacific Heights Road/SR 70 Entrances Dispersed Use Area. Although some of these impacts may be from bank anglers, the amount is not certain.

5.2.7.5 Fishing Suitability Factors

Important public fishing suitability factors to consider include suitability for fishing facilities such as fish cleaning stations, ADA-accessible fishing piers and platforms, and event/tournament facilities, as well as additional areas suitable for shoreline access.

Fishing Cleaning Stations

In terms of fishing facilities, there are not many other areas suitable for fish cleaning stations. Fish cleaning stations require a running water source and septic or sewer disposal systems, and several of the sites that already have a developed water source offer a fish cleaning station. The exceptions would be Loafer Creek and North Forebay BR/DUAs.

ADA Accessible Fishing Piers and Platforms

Currently, the only ADA accessible fishing pier or platform is located at the North Forebay BR/DUA. Other areas suitable for such a pier or platform include South Forebay BR/DUA, Diversion Pool, and One-Mile Pond in the OWA. The South Forebay BR/DUA is suitable for a pier due to a relatively flat shoreline area on the small peninsula near the DUA. The site does have ADA-accessible restrooms or toilets, but the ground surfaces along the shoreline are not considered ADA-accessible (gravel). The Diversion Pool is suitable for a pier or platform where Burma Road runs close to the water's edge, but the entry road is gravel and the site does not have any other ADA-accessible facilities. Additionally, One-Mile Pond is suitable for an ADA fishing pier or platform because the water level is fairly consistent and the surrounding area is flat. However, the entry road is gravel, and there are no other ADA-accessible facilities at the site. There may also be sensitive habitat constraints at this site.

The rest of the shoreline in the OWA on the Feather River is not suitable due to fluctuation in water levels and steep shorelines. Lake Oroville is not suitable for such a pier or platform due to reservoir elevation fluctuation and steep shorelines. The Thermalito Afterbay is generally not suitable due to spatial limitations and generally has sensitive habitat constraints as well.

Tournament Event Facilities

As for fishing tournament facilities, Spillway BR/DUA has permanent grandstands available at the north end of the parking lot. The other two locations where tournaments take place (Bidwell Canyon BR and Lime Saddle BR) have limited space but may also accommodate a compact grandstand facility (similar to the one at Spillway). They would not be suitable for large permanent event grandstands.

Additional Shoreline Access

The north side of the North Forebay would be suitable for additional bank fishing shoreline access, along with Parrish Cove located near Lime Saddle BR/DUA.

Currently, there is good shoreline access at the Diversion Pool, Low Flow Channel, and OWA. Lake Oroville is not particularly suitable for providing more shoreline access due to steep shorelines, except for Parrish Cove near Lime Saddle where the shoreline is fairly flat and there is no formal access to this area right now. Currently, bank anglers at Lake Oroville have access to many parts of the shoreline where steepness is not an issue. The Thermalito Afterbay does have shoreline access; however, some parts are accessed via dirt roads, and more formalized access could be suitable for this area, depending on sensitive habitat constraints. At the Thermalito Forebay, the Brad P. Freeman Trail runs along the north side of the North Forebay BR/DUA. This area would be suitable

for additional shoreline access by adding spur trails from the Brad P. Freeman Trail to the shoreline. (Also see Section 5.2.6.5, Trail Needs.)

5.2.7.6 Fishing Operations and Maintenance Factors

Important fishing-related operations and maintenance factors to consider include issues on the Feather River, shoreline condition, and trash accumulation.

Feather River Issues

Study R-16 – *Whitewater and River Boating* found that some survey respondents indicated that the flow between the Fish Barrier Dam and the Afterbay outlet on the Feather River was too low and suggested that the low flow negatively affected fish populations and fishing in this stretch of the Feather River.

Respondents also mentioned that fish snagging was a problem on this section of the river. Snagging is not legal in California. When snagging (also called "foul-hooking"), anglers drag a hook through the water to catch a fish. The fish does not take any bait, it is caught by the hook externally. This is apparently common on the Feather River because there are so many fish, making it easy to catch fish in this manner. It is difficult for State Game Wardens to prosecute snagging because it is an easy technique to mask. Wardens are more successful at prosecuting anglers for keeping a fish that has not been caught in the mouth. One respondent also felt that there was too much discarded fishing line in the water.

A couple of respondents also mentioned unruly bank anglers at the Afterbay outlet, probably due to the overcrowding of the site at peak times, which can result in a tense situation where fights and other hostile behavior has occurred. See Section 5.3 (Programmatic Needs) for more information on law enforcement.

Shoreline Condition and Litter Accumulation

Apart from the Low Flow Channel and the OWA, 84 to 93 percent of respondents at the other geographic areas felt that litter along the shoreline was either "not a problem" or a "slight problem." At the Low Flow Channel, about 41 percent of respondents felt that litter was a "moderate" to "big problem." The majority of respondents at the OWA (74 percent) felt the presence of litter along the shoreline was a "moderate" to "big problem."

It appears that regular pickup of litter along the shoreline or provision of trash receptacles on the Low Flow Channel and in the OWA may not currently be adequate. If there is a significant amount of litter along the shoreline, this can detract from the bank fishing experience by negatively affecting the setting in which fishing takes place.

In terms of shoreline sanitation, again the OWA appears to have a problem. About 58 percent of respondents from the OWA rated sanitation along the shoreline as a "moderate" to "big problem." This further indicates that possibly more trash receptacles and/or more trash pick up may be necessary. The Low Flow Channel had the second highest percent of respondents that indicated that shoreline sanitation was a "moderate" to "big problem" (24 percent). Shoreline sanitation can be particularly important for an activity such as bank fishing, which occurs solely at the shoreline.

The presence of litter detracts from the recreational setting and therefore makes the recreational fishing experience less enjoyable than it would be if the site were clean and free of litter. Table 5.2-6 lists the sites, which offer bank fishing opportunities, that were found in Study R-11 – *Recreation and Public Use Impact Assessment* to have a high or extreme level of concern regarding trash accumulation. There were also over a dozen sites with a moderate concern for trash accumulation.

Table 5.2-6. Sites where trash accumulation is of high or extreme concern.

Site*	Level of concern
OWA – Headquarters entrance dispersed use area	Extreme
Afterbay Outlet Campground/DUA	High
Foreman Creek Car-top BR	High
Old Nelson Bar Road dispersed site	High
OWA – Pacific Heights/SR 70 entrances dispersed use area	High
OWA – Palm Ave entrance dispersed use area	High
Canyon Creek bridge dispersed site	High
McCabe Cove dispersed use site	High

** Only those sites that offer bank fishing opportunities are listed.*
Source: Study R-11.

5.2.8 Overall Open Space-Dependent Recreation Needs in the Study Area

The overall open space-dependent needs in the study area are presented first. Subsequent sections provide the detailed analysis of overall open space-dependent supply, demand, capacity, suitability, and operations and maintenance factors to support these overall findings of need. Site-specific open space-dependent needs are further defined in Chapter 6.0.

The study area includes large areas of undeveloped open space that may be used for a variety of recreational purposes. General open space-dependent recreation activities on these lands that are assessed in this needs analysis include:

- Hunting and target practice

- Wildlife viewing, outdoor photography, and nature study
- OHV use
- Dispersed pedestrian use and shoreline access

These undeveloped open space lands also provide an important outdoor setting from which to enjoy other more developed recreational activities, such as RV and tent camping, picnicking, swimming, power boating, etc. These facility-dependent activities are discussed in other sections of this study. However, it is the general open space character of these lands that forms the basis for the recreation experience enjoyed by an estimated 1.7 million visitors annually to the Oroville Facilities.

This recreation setting varies greatly within the study area, from the remote upper canyon arms of Lake Oroville, to the relatively busy marinas at Lake Oroville, to the quiet solitude found along the Diversion Pool, to the urban setting along portions of the Low Flow Channel, to the wide-open vistas of the Thermalito Forebay and Afterbay, to the semi-primitive wildlands of the OWA. Very few hydroelectric projects can claim such a diverse variety of outdoor recreational settings.

The results from several relicensing recreation studies were used when compiling this analysis, including:

- Study R-4 – *Relationship Assessment of Fish/Wildlife Management and Recreation* (see Sections 5.0 and 6.0)
- Study R-8 – *Recreation Carrying Capacity* (see Section 5.1)
- Study R-9 – *Existing Recreation Use* (see Sections 5.1.7.2, 5.2.1, and 5.2.2)
- Study R-10 – *Recreation Facility and Condition* (see Section 5.1.3)
- Study R-11 – *Recreation and Public Use Impact Assessment* (see Sections 5.2.1, 5.2.2, 6.1, and 6.2)
- Study R-12 – *Projected Recreation Use* (see Sections 5.2.2.3 and 5.3)
- Study R-13 – *Recreation Surveys* (see Sections 5.1.3 and 5.2)
- Study R-15 – *Recreation Suitability Analysis* (see Section 5.1; Tables 5.1-1 through 5.1-3)

5.2.8.1 Overall Open Space-Dependent Recreation Needs

Based on a review of the factors and indicators summarized in the analysis presented later in this section, overall open space-related needs have been identified in the study area. These needs should not be assumed to be proposed PM&E measures. Site-specific open space needs are discussed in Chapter 6.0.

The factors and indicators that contributed the most in determining the overall open space-dependent needs in the study area are summarized in the following bullets. Information from the above recreation studies supports these

conclusions. The detailed discussion supporting these findings is found in the later supply, demand, capacity, and suitability sections that provide a more thorough analysis of overall open space-dependent needs in the study area.

- The vast majority of respondents to all areas within the study preferred settings that were predominantly to totally natural (66 to 75 percent), and settings where the typical sights and sounds of man were absent, rare, or unusual (70-83 percent).
- There are large land areas available for general open space use within the study area, particularly around Lake Oroville.
- Hunting is an important activity in the OWA, and this area provides a unique opportunity to hunt on public lands in the Sacramento Valley.
- The Rabe Road Shooting Range (not in the FERC boundary) provides study area residents and visitors interested in target shooting with a unique opportunity to shoot near an urban area. The shooting range is provided with no user fees required.
- Wildlife viewing, outdoor photography, and nature study are projected to increase in popularity, and additional facilities are likely needed to accommodate use over time.
- The Clay Pit State Vehicular Recreation Area (SVRA) (not in the FERC boundary) provides OHV users with an opportunity to ride in the vicinity of Oroville. This is the most desirable site in the study area for OHV use, as the area was previously disturbed as a borrow pit for the construction of Oroville Dam and therefore the impacts caused by such use are not pronounced.
- OHV use within the fluctuation zone of Lake Oroville, and in the OWA, creates concerns about potential damage to sensitive resources.

Given the relative popularity of open space-dependent recreation in the study area, it is important to continue to provide these opportunities. In addition to providing recreation opportunities, open space areas provide habitat for wildlife species and relatively undisturbed lands for flora as well. In general, open space-dependent activities have fewer management requirements than do developed recreation areas. Overall open space-dependent needs and potential options to satisfy these needs are listed below.

Undeveloped Open Space Land for Public Use – Existing and Future Needs

Continue to provide annual O&M of recreation-related open space areas on Project lands; provide periodic pickup of litter at dispersed use areas; and periodically monitor recreation use and impacts on Project open space lands. Currently, an adequate supply of land for open space-related activities appears to exist in most areas of the study area. As surrounding private lands develop over time, however, the quantity and quality of the remaining open space may be reduced in some areas. Consider focusing future recreation development only in highly suitable areas while retaining the remaining areas as open space. This

will help retain semi-primitive natural setting for outdoor recreation activities such as hunting, wildlife viewing, nature study, and photography. If needed in the future based on monitoring results, provide additional O&M for open space areas such as litter pick-up and debris removal. (FERC guidelines; Professional judgment; Resource protection)

Continue to maintain the natural setting of existing Project open space areas and access points. Currently, there are a few formal and informal open space access points in the study area. Some of these access points are small parking areas adjacent to bridges to provide viewing and access to the shoreline. It is suggested that these formal and informal areas be maintained to allow for open space-dependent activities. The Diversion Pool provides recreation opportunities for those seeking solitude and quiet. While providing limited day use facilities may be appropriate, it is recommended that facilities and use levels do not change the natural undeveloped setting of the area or displace existing user groups. (FERC guidelines; Professional judgment; Public access to Project lands; Diversity of recreation settings/opportunities)

Hunting and Target Practice – Existing and Future Needs

In general, there are few existing needs related to hunting and target practice in the study area. Target practice is appropriate at the Rabe Road Shooting Range given the level of impact that occurs in the vicinity of the shooting range.

Consider additional litter pick-up at target practice area(s). Located outside of the FERC boundary, the Rabe Road Shooting Range was noted as being of extreme concern related to trash accumulation. By providing additional trash receptacles, periodic trash pick-up, visitor education, and periodic management presence, the impacts related to the litter accumulation could be reduced. (Study R-11, Section 5.2, Table 5.2-1)

Consider opening locked gates in the OWA earlier for hunters during peak hunting days. Some hunters mentioned that the gates at entrances of hunting areas in the OWA were closed when they wanted to access the site. During the hunting season, staff could open the gates early on popular hunting days. This would not be necessary during other times of the year. (Study R-4, Section 6.1.8, Table 6.1-1)

Provide additional law enforcement (Wardens) during hunting seasons. There is usually only one Warden with law enforcement responsibilities that periodically patrols the OWA. Given the relatively high level of use and size of the OWA, additional Wardens at peak use times would likely lead to fewer at-risk encounters, a decrease in illegal hunting, and a decrease in other fishing and hunting infractions. (Study R-4, Section 6.1.5, Table 6.1-1)

While an indirect resource need, consider additional funding for habitat improvement for improved hunting opportunities in the OWA. The OWA provides public hunting access in the Sacramento Valley, where much of the hunting lands are private. DFG staff and some hunter survey respondents mentioned that there is a need to improve the habitat in the OWA to improve the quality of the hunting. Damage to habitat has occurred due to fire and flooding that has rotted the trunks and roots of trees and caused many trees to die. (Study R-4, Section 5.2.7.3, Section 6.1.9, Table 6.1-1)

Wildlife Viewing, Outdoor Photography, and Nature Study – Existing Need

Consider designation of additional wildlife viewing areas in the OWA. Due to increasing demand for wildlife viewing and photography through the term of the new license, additional wildlife viewing opportunities should be provided. Consider providing approximately one to five ADA-accessible Watchable Wildlife sites in the OWA. A wildlife viewing area can be as little as a turn-out along a road with signage to a fully developed platform with interpretive signs. Areas in the proximity of existing roads are most appropriate. This limits the impacts by not building new roads. (Professional judgment)

OHV Use – Existing and Future Needs

Close sensitive areas to OHV-use by installing additional vehicle barriers and posting signs. Overall, OHV use is not allowed in the study area unless it is on designated roads or areas. Some areas in the OWA and along Lake Oroville, particularly the drawdown zone, receive illegal off-road use. Impacts related to OHV use are of high concern at several dispersed use sites and areas, especially the OWA and Lake Oroville drawdown zone. This is a concern as soil and vegetation damage has occurred, especially considering that OHV-use is prohibited in the OWA. OHV use should be prevented in certain sensitive areas by creating vehicle barriers, and increasing the frequency of enforcement and public awareness activities. By closing off access to OHVs in these areas, the impacts related to their use are minimized. These impacts were noted at all dispersed use areas in the OWA, Old Nelson Bar Road, and the SR 162 dispersed sites. OHV use impacts should be monitored over time and appropriate actions taken as new OHV-related impacts occur. Special restrictions are especially needed in the Lake Oroville drawdown zone at Enterprise BR/DUA and at Foreman Creek. (Study R-11, Section 6.1.2.1)

Continue to provide OHV access and use at the Clay Pit SVRA. The Clay Pit SVRA outside the FERC boundary provides a unique opportunity to residents and visitors in the study area. The area was previously disturbed when Oroville Dam was being built. Additionally, by allowing OHV use in the area, the impacts related to their use are concentrated and more easily managed. (Study R-11, Section 6.2.1)

Dispersed Pedestrian Use and Shoreline Access – Existing and Future Need

Provide periodic pick-up and/or monitoring of litter at dispersed use areas. Litter accumulation was noted at several study area dispersed use areas. Periodic trash pick-up and management presence would help reduce impacts related to the improper disposal. (Study R-11, Section 6.1.2.2)

5.2.8.2 Open Space-Dependent Recreation Supply Factors

Important public open space-dependent recreation supply factors to consider are summarized in this section. These factors include items such as the location and amount of undeveloped public open space, areas where the public can participate in their desired activities, and the quality of the overall recreational setting and experience. Supply-related topics discussed in this section include:

- Location and quantity of general undeveloped open space land for public use;
- Areas for hunting and target practice;
- Areas for wildlife viewing, outdoor photography, and nature study;
- Areas for OHV use; and
- Areas for dispersed pedestrian use and shoreline access.

Undeveloped Open Space Land for Public Use

The study area is very large and contains a significant quantity of undeveloped open space that is mostly available for general public use. Approximately 70,400 acres of land and water area are found within the study area (FERC boundary plus ¼ mile buffer), with 41,141 acres within the FERC boundary itself. Approximately half (20,900 acres) of the area within the FERC boundary is undeveloped open space land and is potentially available for use by the general public. However, steep slopes that are common within the study area, particularly around Lake Oroville, also generally limit public access to a much smaller area. Approximately 12.4 percent of the study area is classified as highly to moderately suitable for recreation use, of which approximately 6,800 acres are within the FERC boundary and 1,900 acres are outside the FERC boundary (Study R-15 – *Recreation Suitability Analysis*). Some Oroville Facilities are closed to public access; these include the Hyatt Pumping-Generating Plant, Thermalito Diversion Dam & Power Plant, and Thermalito Forebay Dam & Power Plant. Additionally, parts of Oroville Dam (particularly near the Spillway), and lands adjacent to the Thermalito Power Canal are closed to public access.

Much of the long shoreline of Lake Oroville is steep and remote, limiting general public use along the canyon arms. During annual periods of reservoir drawdown, the shoreline of Lake Oroville also limits general public use, except for selected areas. In contrast, the study area below Oroville Dam is much more accessible

to the general public due to proximity to the city of Oroville and the gentler slopes and more abundant road access. Trails are also provided in many areas to facilitate public access. The public may access Oroville Facilities land in most areas, except where there are resource protection, security, and/or safety concerns.

Hunting and Target Practice

Hunting occurs in the entirety of the OWA, as well as portions of LOSRA, and is primarily managed by DFG within the study area. Duck, pheasant, and geese are the primary game hunted in the study area, with fewer individuals hunting quail, dove, and turkey (Hunter Focused On-Site Survey). In addition to waterfowl and upland game birds, numerous furbearers inhabit the study area, including badger, mink, beaver, raccoon, gray fox, weasel, muskrat, bobcat, opossum, and bear. Commercial and recreational harvest of these species within the study area is believed to be negligible (DWR 2001).

Hunting in the LOSRA is limited to certain areas but is permitted during the same times as in the OWA, and also during the spring turkey season. The Thermalito Afterbay area was the hunting area favored by most survey respondents, followed by the south end of the OWA east of the Feather River, the north end of the OWA between the Thermalito Afterbay outlet and SR 162, and the south end of the OWA west of the Feather River.

In 1993, a memorandum of agreement (MOA) was created for "Development and Management of Thermalito Afterbay Brood Ponds and Surrounding Habitat." This MOA was created among DWR, DFG, and the California Waterfowl Association to implement a plan for the development, operation, and maintenance of brood ponds and surrounding habitat to enhance wildlife at Thermalito Afterbay (Study R-4 – *Relationship Assessment of Fish/Wildlife Management and Recreation*). DWR constructed three brood ponds, one per year following the 1993 MOA agreement. The MOA is being further implemented by DFG in cooperation with the California Waterfowl Association through the "upland cover enhancements" program at Thermalito Afterbay. The program involves planting approximately 300 to 400 acres of native and non-native grasses each fall to enhance upland habitat for mallard, doves, pheasant, and other species that require taller, denser vegetation (pers. comm., Bogener 2003).

The Rabe Road Shooting Range (Figure 1.1-1) adjacent to the Clay Pit SVRA and inside the OWA provides hunters and other shooting enthusiasts with a safe location for target practice. Located outside of the FERC boundary, this facility includes a primitive shooting and target range, ADA-accessible vault toilet building, and gravel parking area for about 20 vehicles. This facility will accommodate many shooters at one time. Because of its regular use and only monthly maintenance, empty shotgun shells, target debris, and other trash are concentrated in this area. Use at this facility occurs year-round.

Wildlife Viewing, Outdoor Photography, and Nature Study

Much of the study area, except where too steep, is available for wildlife viewing, outdoor photography, and nature study. The study area provides a variety of terrain and habitats that support diverse plant and wildlife communities. The OWA habitat consists primarily of valley/foothill riparian, annual grassland, riverine, and lacustrine (lake-type) habitats, with a small area of blue oak-foothill pine. The LOSRA offers large areas of high quality wildlife habitat consisting primarily of lacustrine, blue oak-foothill pine, Sierran mixed conifer, Ponderosa pine, and montane hardwood habitats. As such, visitors engage in wildlife viewing, nature study, and outdoor photography throughout the study area.

The study area also provides habitat for a variety of culturally important wildlife species, including wildlife that were used for food, clothing, shelter, tools, and ceremonial purposes by Native American tribes in the Oroville area (DWR 2001).

The OWA is a unique portion of the Oroville Facilities area, offering more species diversity than most other wildlife areas in California (pers. comm., Atkinson 2003). In addition, a number of anadromous fish species spawn in the Feather River below Oroville Dam and in the Feather River Fish Hatchery. Furthermore, riverine habitat in the OWA has one of the highest degrees of ecological functionality and provides some of the best opportunities for nature study in California (pers. comm., Atkinson 2003). LOSRA also provides a variety of high quality habitat, although to a lesser degree, and supports diverse bird, mammal, reptile, amphibian, and fish populations (DWR 2004).

The Feather River Fish Hatchery is of particular interest for visitors conducting nature study. The facility offers general viewing access to individuals and groups year-round, as well as conducting artificial spawning operations on specified weekdays from September through mid-November. In addition, the hatchery occasionally hosts special events such as the Salmon Festival, which is typically scheduled for the last Saturday in September (pers. comm., Rischbieter 2003).

Nature study and education are a focus at the Feather River Nature Center facility located along the southern bank of the Feather River in downtown Oroville along the Low Flow Channel. This facility is located along a river-edge trail (Brad P. Freeman Trail) and provides immediate access to the shoreline. Indoor and outdoor nature-related exhibits are located at this facility. Bedrock Park and Riverbend Park, operated by the FRRPD, also provide opportunities for nature study and viewing wildlife and fish. Other nature study, interpretation and education, and trail-related discussion is found in other sections of this study (e.g., Section 5.2.5).

OHV Use

There are at least 16 primary points of public access within the LOSRA. These roads, some of which are used for OHV riding, range from unimproved roads to multi-lane highways. The roads provide vehicular access to locations surrounding Lake Oroville, Thermalito Forebay and Afterbay, Diversion Pool, and to each branch of the Feather River.

Organized OHV use within the study area is concentrated at the Clay Pit SVRA located adjacent to the OWA (Figure 1.1-1). The land depression where the facility is located was created when clay was mined to build Oroville Dam. The site receives use by motorcycle, all-terrain vehicle (ATV), and dune buggy riders. A paved parking area at this facility accommodates approximately 20 vehicles.

Dispersed OHV use also occurs illegally throughout the study area but is limited by steep topography in many areas. In general, illegal OHV activity is concentrated in the Thermalito Afterbay and OWA areas. OHV riders often use old fire access roads and other routes including transmission line right-of-way access roads.

Dispersed Pedestrian Use and Shoreline Access

The general public may access much of the study area on foot, except where there are closure requirements due to resource protection, safety, and security. Signs and fencing are used to manage general access to specific areas. Shoreline access is allowed in most areas; however, the annual reservoir drawdown at Lake Oroville limits shoreline access due to the steep bank of the shoreline. Several dispersed use areas were identified as a part of Study R-11 – *Recreation and Public Use Impact Assessment*. Many of these sites are accessed by old roads that used to access or cross the Feather River before the area was inundated. The following are some of the identified sites:

- Old Nelson Bar Road Dispersed Site
- Parrish Cove Dispersed Site
- West Branch Bridge Dispersed Site
- Canyon Creek Bridge Dispersed Site
- Bidwell Bar Bridge Dispersed Site
- Ponderosa Dam Dispersed Site
- McCabe Cove Dispersed Site

Much of the study area, except where too steep, is available for food gathering, such as blackberries and other edible plants. The study area also provides habitat for a variety of culturally important species used for food by Native American Tribes in the Oroville area (Study R-4 – *Relationship Assessment of Fish/Wildlife Management and Recreation*). However, this is not a significant activity, in terms of amount of participation, within the study area.

The Oroville area and the Feather River is historically known for its gold rush days. Gold still exists along the riverbanks of the Feather River and its tributaries, although it is much reduced in quantity. Gold dredging piles from long ago still exist within the OWA. Occasional gold panning occurs along the banks of the Low Flow Channel and in other widespread areas within the study area, including the remote arms of Lake Oroville.

Because of the past geologic activity in the Sierra Nevada, the study area is also a rich resource for rock collecting. Much of the study area, except where too steep to access, is available for this activity, particularly the remote arms of Lake Oroville. However, this is not a significant activity within the study area.

5.2.8.3 Open Space-Dependent Recreation Demand Factors

Important public open space-dependent recreation demand factors to consider are summarized in this section. These types of factors include items such as the desire for undeveloped public open space and participation rates for selected activities. Demand-related topics discussed in this section include:

- Overall demand for general undeveloped open space land for public use;
- Demand for hunting and target practice;
- Demand for wildlife viewing, outdoor photography, and nature study;
- Demand for OHV use; and
- Demand for dispersed pedestrian use and shoreline access.

Undeveloped Open Space Land for Public Use

The demand for general undeveloped open space is dependent upon a variety of factors, such as the availability of open lands near where a person lives, the quality of that open space, participation in various activities related to open space, desire for solitude, cost, access and travel times, and other personal preferences. The study area is within a region of vast amounts of natural open space, both in the Sierra Nevada and its foothills, as well as other lakes and reservoirs in the Northern California region. Visitors to the study area have many choices when deciding where to spend time in the outdoors. Visitor decision-making as to where one goes is also dependent upon proximity and available time. As such, the study area is in close proximity to the city of Oroville and receives a lot of use from these close-by visitors (Study R-13 – *Recreation Surveys* identified more than half of the respondents as Butte County residents).

Survey respondents rated the overall scenery of the study area as generally appealing. On a scale of 1 to 9 (with 1 being “extremely unappealing” and 9 being “extremely appealing”), responses fell in three ranges. The most appealing resource area was the Diversion Pool (7.5). The next most appealing areas, as far as scenery, were the Low Flow Channel, Lake Oroville, and Thermalito

Forebay (6.6 to 6.4). Lastly, the Thermalito Afterbay and the OWA were rated lower (5.7 to 5.8), but still in what is regarded as the acceptable range.

Visitors were asked about their preference for solitude that is linked to the kind of open space that is available, as well as one's encounters with other visitors and various sights and sounds. About half of the survey respondents (48.1 to 54.3 percent) in all resource areas, except the Thermalito Afterbay, rated a strong preference for solitude with this value (either extremely important or important). Survey respondents at Thermalito Afterbay rated solitude as being less important (only 35.1 percent said it was extremely important to important) compared to visitors in the other resource areas.

In a related question, survey respondents were asked about their preference related to the sights and sounds of civilization. The majority of respondents (69.9 to 83.3 percent) in all resource areas indicated that they desired typical urban sights and sounds to be absent, rare, or unusual, and not commonplace.

Along these same lines, the landscape that a majority of survey respondents preferred (66.0 to 74.8 percent) in all resource areas was one that was totally natural to predominately natural. Visitors to the Low Flow Channel that runs through downtown Oroville and in the Thermalito Afterbay had the lowest preference for this (66.0 to 68.1 percent, respectively). Visitors at Lake Oroville had the strongest preference (74.8 percent).

Reservoir pool level drawdowns or fluctuations are typical in most hydroelectric projects (except run-of-river projects) in the United States and the Oroville Facilities are no exception. Such operational requirements do sometimes affect the overall quality of the outdoor recreation experience. In general, the majority of visitors to the study area did not perceive a big problem due to land exposed during low water. Visitors to the study area were asked to indicate whether land exposed during lower pool levels was perceived to be a problem or not. Survey respondents had varied conclusions by resource area.

A large majority of survey respondents indicated that the land exposed at times in the drawdown zone was not a problem, or a slight problem, at several of the resource areas in the study area including the OWA (86.3 percent), Thermalito Forebay (77.0 percent), Low Flow Channel (70.0 percent), and Diversion Pool (63.7 percent). Survey responses were more evenly divided at the Thermalito Afterbay (54.1 percent indicating little or no problem) and Lake Oroville (only 45.5 percent indicating little or no problem). The more negative responses at Lake Oroville, with a slight majority indicating that there is a moderate to big problem there, reflects the large annual drawdowns that are required for project operations and/or flood control purposes.

Hunting and Target Practice

While hunting is not a high-frequency recreation activity participated in within the study area (Study R-13 – *Recreation Surveys*), hunting participation occurred in five of the six resource areas (all but the Diversion Pool). Based on survey results, most of the hunting participation was engaged in by visitors to the OWA (6.9 percent) and the Thermalito Afterbay area (5.1 percent).

An estimated 3 percent of visitors participated in hunting within the OWA (based on user counts). Hunting within the entire study area accounts for nearly 14,000 RDs each year (Study R-9 – *Existing Recreation Use*); however, projected future demand for hunting in the study area is expected to decrease by 0.8 percent annually (Cordell 1999, DPR 1998).

Results from Study R-13 – *Recreation Surveys* revealed that the majority of respondents felt that the presence of quality hunting habitat was "about right" within the study area. Survey respondents (Hunter Focused On-Site Survey) stated that their primary reasons for hunting at the OWA included:

- Its good habitat and game populations;
- Proximity and easy access;
- Free entry;
- Light to moderate crowding; and
- Programs offered in the area (such as junior hunts).

Duck, pheasant, and geese are the primary game hunted in the study area, with fewer individuals hunting quail, dove, and turkey (Hunter Focused On-Site Survey).

Demand for hunting is declining all along the West Coast. This activity is expected to decline 4 percent from 1995 to 2020 and decline 19 percent from 1995 to 2050. In general, hunting license sales tend to vary by county, timeframe, and species; however, a downward trend has occurred over the last several years as habitat has been lost and the number of hunters has declined as a percentage of all recreationists.

The Rabe Road Shooting Range within the OWA receives use year-round; however, use levels are not anticipated to reach or exceed capacity.

Wildlife Viewing, Outdoor Photography, and Nature Study

Wildlife viewing, photography, and nature study are all popular activities in the study area (Study R-13 – *Recreation Surveys*). Survey respondents listed nature study, bird watching, and photography as an activity that they participated in at all of the resource areas, but primarily at the Diversion Pool (14-18 percent), Low Flow Channel (16-22 percent), and Thermalito Forebay (12-20 percent).

Photography was also popular at Lake Oroville (17 percent). Recently conducted surveys indicate that nature study and wildlife viewing are the primary activities of less than 1 percent of the respondents surveyed; 9 percent of visitors listed nature study and 12 percent listed wildlife viewing as an activity participated in during their visits to the study area. Although projected future demand numbers specifically for wildlife viewing, nature study and photography in the area are not available, projected numbers for related activities such as walking and sightseeing are expected to increase annually by 1.8 percent.

Future demand for these activities is anticipated to increase. Non-consumptive wildlife activities such as these is expected to increase 58 percent from 1995 to 2020, and 114 percent from 1995 to 2050.

OHV Use

Demand for OHV use is anticipated to increase in the future, but moderately compared to many other activities such as water-based activities, non-motorized trail use, and interpretation and education. The Clay Pit SVRA is the only place in the study area where OHV use is allowed and managed.

Use at the Clay Pit SVRA has averaged about 5,200 visitors annually over the last 27 years for motorcycle, ATV, and dune buggy use. OHV use does occur in other resource areas; however, this use is prohibited.

Dispersed Pedestrian Use and Shoreline Access

There is extensive pedestrian and equestrian use of the study area. Public access via trails is discussed in Section 5.2.6 of this study. To summarize a few points here, hiking and walking are the two dominant means of getting around the study area. When not in a vehicle or watercraft, most visitors are on foot. Hiking and walking as a primary type of trail use ranged from 65.3 to 81.8 percent within all resource areas, except for the Diversion Pool (14.8 percent hiked or walked). In the Diversion Pool area, equestrian use was the dominant means of getting around (64.8 percent), followed by bicycling (20.4 percent). The Brad P. Freeman Trail extends through this area. In addition, most visitors surveyed did not feel crowded at all during their visit. In the Diversion Pool area, 74.5 percent of trail user respondents did not feel crowded at all, followed by those at Lake Oroville (63.6 percent) and the Low Flow Channel (62.0 percent). The number of respondents who did not feel crowded at all were lower at Thermalito Forebay (53.1 percent), Thermalito Afterbay (50.4 percent), and OWA (46.9 percent).

Litter accumulation, a common problem related to dispersed recreation at many hydroelectric projects, was not a reason for dissatisfaction in most resource areas of the Oroville Facilities (Study R-13 – *Recreation Surveys*). However,

accumulated litter was a large reason for dissatisfaction in two resource areas, those being the OWA (57.1 percent) and the Low Flow Channel (25.0 percent).

Improved shoreline accessibility, another common topic at many hydroelectric projects, was not a widespread reason for dissatisfaction based on survey responses at the Oroville Facilities. However, it was a reason for dissatisfaction for 25.0 percent of Low Flow Channel survey respondents, followed by Lake Oroville (11.4 percent) and Thermalito Afterbay (9.1 percent) survey respondents.

Food gathering is an infrequent activity in the study area and is anticipated to continue as such in the future, dependent upon the seasonal availability of food sources such as blackberries. Despite the low frequency, the activity is widespread and occurs throughout the study area. Survey participants did not list this as an activity that they participated in, however, this activity is know to occur on a seasonal basis. Rock collecting and gold panning are activities that visitors participated in at all resource areas, although they are not primary activities.

Adequate access to the shoreline, an important recreation opportunity at reservoirs, was generally viewed as not being a problem to only being a slight problem by a large majority of survey respondents (86.8 to 90.7 percent) in all but one resource area the study area. However, perhaps expected due to the large annual drawdown at Lake Oroville, survey responses in this resource area were more mixed. While about two-thirds (66.8 percent) of Lake Oroville respondents did not think shoreline access was a significant problem, the remaining third (33.2 percent) thought that access to the shoreline was a moderate to big problem (Study R-13 – *Recreation Surveys*).

Finally, anglers often access the undeveloped shoreline in several areas in search of suitable fishing sites. These sites often have suitable fish habitat, have fewer other users, and do not have fees. Regardless, this represents another use of open space in the study area.

5.2.8.4 Open Space-Dependent Recreation Capacity Factors

Open space-dependent recreation capacity factors to consider are summarized in this section. These factors include items such as the capacity of undeveloped public open space to accommodate dispersed recreation activities and the analysis of four capacity types (ecological, spatial, facility, and social). Other capacity issues related to open space use may include impacts from vehicular access into open space areas, potential ecological impacts of users in open space areas such as dispersed recreation sites, and perceived crowding or social capacity. Capacity-related topics discussed in this section include:

- General undeveloped open space land capacity for public use;

- Hunting and target practice capacity;
- Wildlife viewing, outdoor photography, and nature study capacity;
- OHV use capacity; and
- Dispersed pedestrian use and shoreline access capacity.

Undeveloped Open Space Land for Public Use

Several factors relate to the overall capacity of undeveloped open space to adequately accommodate public recreation use. Such areas can adequately accommodate use if sensitive resources are adequately protected, use levels remain low enough so as not to create resource damage or perceptions of crowding, and adequate levels of public safety are maintained.

For the most part, public use in the study area (excluding on-water boating) is focused at several scattered developed facilities that can accommodate higher public use levels. However, away from these facilities, general public use in the OWA has created some capacity problems due to a lack of hardened/developed facilities, a scattered primitive roadway system with multiple dispersed use areas and access points, evidence of dumping and litter accumulation, a lack of management presence providing adequate control, and intense periods of high public use for bank fishing.

As a result, overall general public use in the study area is not at capacity; however, the OWA does have some capacity problems related to public use that should be addressed.

Hunting and Target Practice

DFG, who specifically manages the OWA, is also responsible for managing fishing and hunting activities within the study area. This management includes permitting and licensing, timing of hunting periods and game limits, game and related habitat management, and other resource management activities. Capacity for each specific hunting area or region is generally controlled by DFG. DPR and DWR coordinate with DFG to help maintain visitor safety throughout the study area.

Study R-13 – *Recreation Surveys* analyzed visitors' perception of social capacity at study area recreation sites; however, general open space capacity and use were addressed in specific hunter-focused surveys (Study R-4 – *Relationship Assessment of Fish/Wildlife Management and Recreation*). Respondents to the Hunter-Focused On-Site Survey generally identified the crowding level in the study area as "light to moderate" and considered the crowding level to be a good reason for choosing to hunt in this area instead of other public hunting areas in Northern California.

However, approximately 24 percent of respondents to the Hunter-Focused On-Site Survey indicated some degree of dissatisfaction with their hunting experience in the Lake Oroville area, including negative encounters with other visitors. In addition, while the majority of respondents to the Hunter-Focused On-Site Recreation Survey felt that that the quality of hunting habitat was adequate, approximately a quarter of respondents (22 percent) suggested that habitat could be improved. Nearly 70 percent indicated that lands for hunting were generally too few (Study R-4 – *Relationship Assessment of Fish/Wildlife Management and Recreation*).

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

The Rabe Road Shooting Range near the OWA has adequate physical capacity to accommodate the number of target practice shooters who desire to shoot here. However, significant trash and debris has accumulated at this site, and the details and frequency of maintenance should be reviewed.

Wildlife Viewing, Outdoor Photography, and Nature Study

Overall, use levels in these open space-related activities do not appear to be approaching capacity. However, retaining natural open space lands in the study area for these activities is important into the future. As surrounding private lands are developed over time, fewer open space areas will be available for public use.

OHV Use

While OHV riding occurs throughout the study area, it is the primary activity of only a small percentage of visitors to the study area. Smaller numbers of users may be found at Lake Oroville and the Thermalito Forebay. However, despite the small numbers of OHV riders, the impacts can potentially be greater. It should be noted that their use is prohibited in areas outside of the SVRA.

Impacts related to OHV use are of high concern at several dispersed use sites in the study area, especially in the OWA. This is a concern in the OWA as extensive soil and vegetation damage has occurred here, especially considering that OHV use is prohibited. OHV use should be more actively prevented in sensitive areas.

Use at the Clay Pit SVRA is contained within the already-disturbed pit area. As such, significant impacts from motorcycle, ATV, and dune buggy use are minimal in this setting. This site has additional capacity for increased use.

Dispersed Pedestrian Use and Shoreline Access

Dispersed pedestrian use occurs where there are no developed or hardened site facilities. Capacity in these areas is often defined by ecological impacts that users may potentially cause in these open space areas. Impacts related to dispersed use generally include soil compaction, user-defined trails, litter accumulation, dumping, and damage to vegetation.

While dispersed recreation sites were generally not investigated to the same level of detail as developed recreation sites, in terms of overall recreation capacity, ecological capacity was nonetheless researched at the 12 dispersed use areas identified in the study area (Study R-11 – *Recreation and Public Use Impact Assessment*). Dispersed recreation sites and use areas have a higher percentage of ecological concerns compared to developed recreation sites. This is especially true in the OWA. Of the 12 identified dispersed use areas, four are located within the OWA and three are categorized as areas of high concern. Common ecological concerns at the identified dispersed recreation sites and use areas in the study area include trash accumulation, vegetation damage, wetland and/or riparian impacts, user-defined trails, OHV use, and water/shoreline impacts. However, considering the study area in its entirety, 12 dispersed sites and use areas is a relatively small number of sites for such a large area. Additionally, similar to developed recreation sites, the observed ecological impacts at identified dispersed sites and use areas tended to be localized and generally do not pose a risk to the overall ecological integrity of the study area.

Shoreline access is generally unconstrained and available at many locations in the study area. One exception is at Lake Oroville during periods of large drawdowns where the steep and bare shoreline limits public access to the water, particularly during late summer. Facilities, such as boat launches, are extended down to lower pool levels at Lake Oroville. However, pedestrian shoreline access can become limited by distance, topography, and mud.

5.2.8.5 Open Space-Dependent Recreation Suitability Factors

Open space-dependent recreation suitability factors to consider are summarized in this section. These factors include items such as the suitability of undeveloped public open space for use by various activities and access to Oroville Facilities lands and waters. Suitability-related topics discussed in this section include:

- ∉ General undeveloped open space land for public use;
- ∉ Suitable areas for hunting and target practice;
- ∉ Suitable areas for wildlife viewing, outdoor photography, and nature study;
- ∉ Suitable areas for OHV use; and
- ∉ Suitable areas for dispersed pedestrian use and shoreline access.

Undeveloped Open Space Land for Public Use

Study R-15 – *Recreation Suitability Analysis* provides an analysis of recreation site development suitability using GIS-based technology to identify and assess areas of opportunity and constraint for potential recreation development in the study area, if needed. However, some information revealed in the GIS analysis is helpful to determining where suitable lands for open space public use might exist. The Summary of Opportunity maps (Figures 5.1-1 through 5.1-3 of Study R-15) reveal areas of public land ownership that are accessible to the public for open space uses such as hunting, wildlife viewing, and nature study. Suitable areas should also be set apart from developed areas, recreation sites, and facilities. Many such areas exist in or near the study area.

Hunting and Target Practice

In general, areas suitable for hunting are those that have the appropriate target species to be hunted and are safe and away from development. Study R-15 – *Recreation Suitability Analysis* did not directly address the suitability of areas specifically for hunting. However, the target species are primarily located in the OWA, and most lands of the OWA and Thermalito Afterbay are undeveloped, making them ideal. Additionally, hunters need access points to reach safe hunting grounds. The road system inside the OWA and Thermalito Afterbay provides adequate access.

Target practice is most suitable in the Rabe Road Shooting Range, as the activity can cause significant noise, safety, and other environmental impacts if conducted outside of such a site.

Wildlife Viewing, Outdoor Photography, and Nature Study

These activities may take place anywhere on public lands in the study area (Figures 5.1-1 through 5.1-3 of Study R-15 – *Recreation Suitability Analysis*). Additionally, users generally seek areas with favorable slope; however, not all users have this criterion. Different geographic regions within the study area provide a variety of opportunities given the varying ecosystems.

OHV Use

Study R-15 – *Recreation Suitability Analysis* did not directly access address suitability for OHV use in the study area. However, OHV use is most appropriate away from sensitive environmental or cultural resources such as at the Clay Pit SVRA.

Dispersed Pedestrian Use and Shoreline Access

Locations of dispersed use are typically determined by user desire and site accessibility. Several high or moderately suitable areas along the shoreline provide opportunities for dispersed shoreline use. Such areas include car-top BRs, areas along trails, most of the Diversion Pool, the southern shoreline of the Low Flow Channel through downtown Oroville, portions of the Thermalito Forebay and Afterbay, and the OWA.

5.2.8.6 Open Space-Dependent Recreation Operations and Maintenance Factors

Open space-dependent recreation O&M-related factors to consider are summarized in this section. These factors include items such as maintenance issues related to public use of undeveloped public open space and maintaining the quality of the overall recreational setting and experience. Major operations and maintenance-related topics discussed in this section include:

- O&M of general undeveloped open space land for public use;
- O&M of areas for hunting and target practice;
- O&M of areas for wildlife viewing, outdoor photography, and nature study;
- O&M of areas for OHV use; and
- O&M of areas for dispersed pedestrian use and shoreline access.

Undeveloped Open Space Land for Public Use

In general, general open space lands do not have significant O&M needs related to recreation impacts. Most impacts are found at defined day use sites with good access. Periodic visits by DPR, DWR, and DFG staff to survey open space areas for user impacts occur now. This should occur in the future as well. Perhaps of greater concern in the future are fuel-load management practices in these areas (see Study L-5 – *Fuel Load Management Evaluation*).

Hunting and Target Practice

At the Afterbay and OWA, hunters and anglers indicated that they would like earlier gate openings and later gate closings during hunting and fishing seasons. This could be accomplished relatively easily for short periods of time. Also, based on survey results and interviews with area managers, it appears that there is a lack of funding within the OWA for maintenance, habitat improvement activities, and law enforcement activities related to fishing and hunting. Attendance monitoring and surveying is also minimal at this time.

Habitat improvement and enhancement programs should be continued to maintain the current level of recreation opportunity. Many Hunter On-Site Survey respondents felt that the habitat for game species could be improved by adding

more food plots and eliminating weeds such as the water primrose that are choking out areas of habitat.

Wildlife Viewing, Outdoor Photography, and Nature Study

In general, there are only a few facility O&M factors to consider related to wildlife viewing, outdoor photography and nature study. The Feather River Nature Center in Oroville is outside of the FERC boundary and is maintained by a group of volunteers and other organizations. This facility is old, and portions of the facility need maintenance. Riverbend Park and Bedrock Park, operated by the FRRPD, are generally maintained well; however, a few facilities need maintenance. The Feather River Fish Hatchery is well-maintained; however, the signage and messages are old.

OHV Use

OHV use has caused some impacts at a few dispersed sites, such as in the OWA, which are not being corrected due to limited management presence. Use within the Clay Pit SVRA is generally being managed well.

Dispersed Pedestrian Use and Shoreline Access

Within the OWA, there are several O&M issues such as illegal dumping and illegal long-term camping (over 14 days) that are not being fully corrected or managed.

In general, within the study area, pedestrian access sites are in pretty good condition and visitors are generally satisfied with their experiences. However, respondents to all surveys would like to see less litter throughout the study area. Litter is a major issue within the OWA (pers. comm., Atkinson 2003).

5.3 OVERALL PROGRAMMATIC RECREATION RESOURCE NEEDS

Overall existing and future Oroville Facilities-wide programmatic needs are summarized below. These needs are for recreation sites and use areas within the FERC boundary as a whole, and are not necessarily site- or activity-specific needs. These overall programmatic needs for the Oroville Facilities study area include:

- Clarify agency recreation-related management responsibilities;
- Develop and implement a proposed recreation monitoring program;
- Implement additional programmatic recreation-related operations and maintenance actions;
- Implement additional safety-related actions over time;

- Develop and implement a proposed Wildland Fire Evacuation Plan for the OWA;
- Develop and implement a proposed Comprehensive Non-motorized Trails Program; and
- Develop and implement a proposed Interpretation and Education Program.

Site-specific programmatic recreation resource needs are further defined in Chapter 6.0.

5.3.1 Clarify Agency Recreation-related Management Responsibilities

The specific State agency responsibilities of DWR, DPR, DFG, and Department of Boating and Waterways (DBW) for the management, operation, construction, maintenance, and funding of recreation and recreation-related projects in the Oroville Facilities area can be ambiguous at times. In addition, the responsibilities of other agencies including USFS, BLM, and Feather River Recreation and Parks District (FRRPD) are often not clearly defined within the study area. Because responsibilities are not always clearly defined, issues may sometimes not be addressed by the appropriate agency or in a timely and efficient manner. Some suggestions to better clarify agency management roles include:

- Consider reassessing the geographic boundaries of LOSRA and OWA, as well as the FERC Boundary;
- Consider clearly defining the boundaries of lands managed by federal agencies; transfer lands from federal to State control and/or ownership where possible and desirable; and
- Consider clarifying the specific areas, facilities, and activities to be managed, maintained, and/or funded by each agency or district, and develop memoranda of agreement defining each agency's responsibilities (including responsibilities on federally owned land).

There is also an overwhelming sense of the need for greater local public involvement in future recreation development, management, or operation within the study area. This need has led to occasional controversy between various State agencies and user groups. Some suggestions that should be considered regarding this issue include:

- Consider creating a new Recreation Advisory Committee (or similar entity) to provide additional stakeholder of input and feedback regarding future development and management of recreation resources within the study area; and
- Consider pursuing new cooperative arrangements with other non-governmental organizations to help facilitate additional public involvement in recreation resource management within the study area.

Current funding does not appear to be adequate to meet operations, maintenance, and other recreation-related needs at LOSRA and OWA. In addition, discrepancies in funding responsibilities defined under the Davis-Dolwig Act and FERC Orders specific to the Oroville Facilities have contributed to past and current funding issues. The following are suggestions to consider for improving the funding to better manage recreation resources within the Oroville Facilities area:

- Consider clarifying the funding responsibilities of relevant State agencies (DWR, DPR, DFG, and DBW) and address discrepancies between FERC-defined and State-defined funding obligations;
- Consider developing a coordinated annual budget for each State agency involved in the Oroville Facilities;
- Consider coordinating, identifying, and pursuing additional potential funding sources including cost-sharing, grants and other reimbursements from State, federal, and private sources; and
- Consider identifying and pursuing potential avenues for collaboration with volunteer groups and activity-specific "friends" organizations to help reduce recreation resource funding needs.

Current staffing levels at LOSRA are typically adequate in providing the overall desired programs, patrols, and management activities desired for each unit. However, at certain peak times and on a site-specific basis, staffing is inadequate and increased staffing should be considered. In addition, increasing recreation demand during the new license term will likely put more pressure on recreation resources and their management. Thus, additional staffing will likely be warranted in the future.

5.3.2 Develop and Implement a Proposed Recreation Monitoring Program

It is suggested that a new Recreation Monitoring Program be developed and implemented. The new monitoring program would track visitation levels at facilities and use areas, monitor the condition of facilities and dispersed use areas and associated resource impacts, and monitor site and facility capacity, among others. In addition, a periodic recreation survey could be used to track changing visitor perceptions and needs over time. Capacity threshold triggers should be established that would determine when appropriate management actions should take place (such as expand existing campgrounds, develop new day use areas, or redirect visitors to other underutilized facilities). The program should contain key monitoring indicators and standards that would be tracked at periodic intervals as appropriate, such as annually for paid fee receipts or vehicle counters, every six years during FERC Form 80 filings for overall capacity levels, or every 10 to 15 years for larger efforts such as visitor surveys. Key considerations for the development of monitoring indicators and standards are discussed below.

Monitoring indicators should:

- Reflect important issues that should be monitored;
- Use specific variables that are indicative and realistic of field conditions;
- Allow one to define desired conditions and assess the effectiveness of management practices;
- Be measurable and responsive to possible management actions; and
- Be easily and economically measurable.

Monitoring standards should:

- Be refined based on field conditions prior to full implementation;
- Use a judgmental process;
- Not be idealistic goals, but conditions that can be achieved over time;
- Be a statement of existing conditions, desired or status quo; and
- Be expressed in terms of probabilities (allows for some variability).

Some examples of monitoring indicators that could be tracked as a part of the Recreation Monitoring Program are:

- Campground and day use site capacity;
- Boating use levels and type by reservoir zone;
- Condition of recreation facilities;
- Visitor crowding perceptions and user conflicts; and
- Site pioneering and creep (development and expansion of dispersed sites in sensitive resource areas).

The Recreation Monitoring Program would allow resource managers to concentrate time and budget resources where there is the greatest need. It would also alert resource managers if there were new user groups or changing trends or values among visitors or residents who use the recreation resources in the Oroville Facilities area.

5.3.3 Implement Additional Programmatic Recreation-related Operations and Maintenance Actions

Overall, developed recreation facilities in the Oroville Facilities area are in good physical condition and most sites exhibit limited impacts to the surrounding area. Maintenance of these facilities is generally regular and appears to be effective with only a few exceptions. However, over the term of the new license, most existing facilities will need to be repaired, replaced, and/or upgraded. It is suggested that an operations and maintenance (O&M) program be developed and implemented to ensure adequate ongoing maintenance and replacement of both existing as well as future recreation facilities and sites. Over the anticipated new license term, many changes or events may potentially occur.

Examples of regular scheduled O&M of recreation facilities and use areas include:

- Providing periodic roving maintenance patrols who would look for and address dumping and other problems within dispersed use areas;
- Providing regular litter pick-up during the recreation season and periodic pick-up during the off-season;
- Maintaining the cleanliness and sanitation of restrooms, vault toilet buildings, and portable toilets;
- Maintaining camping and day use facilities such as tent pads, picnic tables, water faucets, etc;
- Clearing and maintaining trails for safe passage and removing hazard trees in constructed facility areas;
- Maintaining boating facilities such as boat ramps, docks, marker buoys, and parking areas; and
- Maintaining fishing-related facilities such as fish cleaning stations and fishing access points.

Examples of non-regular O&M of recreation facilities include:

- Replacing water, electrical and septic systems as these infrastructure components reach the end of their effective service life;
- Replacing roofing material and siding when needed;
- Replacing facilities damaged by fire, vandalism, wind storms, or other events;
- Modifying facilities to comply with changing laws and regulations, such as ADAAG, as amended; and
- Closing and replacing sites due to resource protection needs, such as endangered species listings or for any safety issues that may arise.

5.3.3.1 Managing OHV Use Impacts

Resource impacts related to dispersed OHV use is a concern at several dispersed sites and use areas, especially within the OWA. This is a particular concern within the OWA as extensive soil and vegetation damage has occurred, especially considering that OHV use is prohibited in this area. These types of existing impacts suggest the need for a programmatic, Project-wide response to OHV-related impacts, but with a focus on the OWA and Thermalito Afterbay areas where most illegal OHV use is occurring.

Minimizing or preventing OHV user impacts in certain sensitive areas may be emphasized by:

- Erecting and maintaining new vehicle barriers where appropriate, posting new signs, and monitoring;

- Increasing the frequency of enforcement patrols with citations per appropriate law enforcement ordinances;
- Restoring damaged areas quickly; and
- Implementing a public awareness program (as part of the I&E Program).

To the extent possible, OHV riders should be directed to the Clay Pit SVRA located outside the FERC boundary where this activity is appropriately managed. This site provides a unique opportunity for OHV users and concentrates OHV-related impacts in one already-disturbed area rather than dispersing those impacts over a larger area.

5.3.3.2 Managing Litter Accumulation and Dumping

The accumulation of litter and debris, including dumping, has been identified as a concern at several dispersed sites and use areas, particularly within the OWA. Trash removal occurs less regularly, if at all, in several dispersed areas. This concern is not unique to the Oroville Facilities study area, but is typical of many hydroelectric projects. Possible management responses to this problem include:

- Providing additional periodic litter pick-up and removal within dispersed areas, such as the OWA and Thermalito Afterbay;
- Implementing a focused public awareness campaign including a “pack-it-in / pack-it-out” program (as part of the I&E Program);
- Implementing a program to minimize the dumping of debris and car abandonment including the quick removal of this debris;
- Increasing the frequency of enforcement patrols with citations per appropriate law enforcement ordinances; and
- Providing additional trash receptacles and dumpsters in litter-prone areas and maintaining those new facilities.

5.3.3.3 Managing User Defined Trails

The prevalence of user-defined trails is a concern throughout the study area due to associated erosion, vegetation damage, and access and potential disturbance to sensitive cultural resource sites, particularly at dispersed sites and use areas. Dispersed sites rarely see management attention and intervention, and users have created trails to reach shorelines and other destinations that are often too steep or near the shore; thus, erosion is accelerated.

At more popular dispersed sites, new developed hardened trails with proper slope and drainage control should be considered to help reduce the impacts at these sites. Focus should be placed on protecting sensitive resources near trails. Regular monitoring and management attention should be given to high priority sites.

5.3.3.4 Managing Dispersed Site Pioneering and Creep

Undeveloped dispersed sites can become a problem over time unless they are managed and controlled, particularly in sensitive areas such as the OWA and Thermalito Afterbay. Such sites tend to creep (get larger in size over time) and can appear and multiply (pioneering) unless they are regularly monitored and appropriate actions are taken to limit this activity. Squatters, as well as uninformed recreationists, may create these sites. Impacts may potentially include sanitation problems, erosion, vegetation impacts, fire hazards, and impacts to sensitive resources. Access to these dispersed sites may be by any means, including boat, vehicle, horse, bike, or on foot. These dispersed sites rarely see management attention and intervention. As such, focus should be placed on protecting dispersed areas with sensitive resources. Regular monitoring and management attention should be given to high priority sites.

5.3.4 Implement Additional Safety-related Actions Over Time

The first priority for additional safety-related actions and visitor management controls is currently within the OWA. However, other resource areas will also likely need additional law enforcement, marine patrols, and/or improved communications over the term of the anticipated new license. This section discusses the overall need for:

- Improved incident and accident reporting;
- Improved visitor education and management control; and
- Other additional safety-related actions over time.

5.3.4.1 Improved Incident and Accident Reporting

A review of incident and accident reports in the study area has revealed that agencies or first responders may respond to an incident, but may not fully inform other responsible agencies of the event. As a result, reporting by the different agencies is often inconsistent and incomplete. Coordinating incident and accident reporting should allow for a comprehensive analysis of safety-related accidents and incidents over the term of the anticipated new license. One entity should be responsible for collecting and analyzing the data provided by several agencies and responders. This role could be coordinated by the Area Control Center (ACC) operated by DWR. DWR could request that all area public safety agencies provide a periodic report of accidents and incidents that were related to the Oroville Facilities to the ACC. A comprehensive list of incidents and accidents could allow area land managers to identify significant recreation safety-related issues and trends and to prioritize them over time.

5.3.4.2 Improved Visitor Education and Management Control

Improved visitor education and management control is needed in the Oroville Facilities study area. Complaints were voiced by visitors about boat operators following too close, boat operators not obeying speed regulations (no wake zones), alcohol use while boating, boaters not wearing Personal Flotation Devises (PFDs) as required, and conflicts between boaters and PWC users. Area mangers and law enforcement (DPR, DFG, and Butte County Sheriff's Office) have also mentioned these problems as issues that should be addressed. Additionally, about 10-15 percent of the survey respondents were not aware of relevant hunting and fishing regulations. Finally, per the Oroville Police Department, cases of swimmers getting hypothermia (in particular along the Feather River below the dam) continue to occur despite posted warnings.

As a result, it is suggested that visitor education and visitor management should be reemphasized within a new I&E Program. The updated I&E Program should build off of existing programs and should highlight visitor safety such as: (1) the importance of wearing PFDs while boating; (2) the dangers of alcohol use while boating; (3) providing additional signage informing recreational users of regulations, especially those related to PWC operation, hunting, and fishing; and (4) additional signage warning potential swimmers of cold water at access points along the Low Flow Channel and the Diversion Pool.

5.3.4.3 Other Additional Safety-related Actions Over Time

The overall need for improved communications, additional law enforcement, and/or marine patrols is discussed in this section by resource area.

Lake Oroville

In general, it does not appear that Lake Oroville has the same number of boating-related issues as other large reservoirs in California. However, assuming there is an increase in boating (as projected over time) at Lake Oroville, additional marine patrols may be necessary. Additional land-based law enforcement patrols may also be needed over the anticipated new license term. These needs should be monitored and addressed over time.

Cellular phone coverage limitations were generally isolated to Lake Oroville as other resource areas generally have favorable terrain for cellular phone coverage. Cellular phone coverage was noted as being poor or intermittent at some recreation areas and reservoir zones. This lack of coverage in a few areas could potentially increase response time if boaters and other visitors could not reach appropriate authorities in a timely manner in the event of an accident or other emergency. To improve cellular phone coverage and quality at recreation sites and areas with poor or intermittent coverage, consider alerting cellular phone service providers as to the limitations of their service coverage and

cooperate with them to help improve coverage over time.

Floating debris (most commonly logs) from the Feather River collects in Lake Oroville and creates a potential hazard for boaters on the reservoir. Currently, DPR and DWR collect this debris by boat. The frequency, location, timing, and effectiveness of this ongoing effort should be assessed with changing conditions and adapted as needed over time.

Diversion Pool, Low Flow Channel, and Thermalito Forebay

In general, there are limited concerns related to public safety in the Diversion Pool area. A large majority (75.0 to 85.0 percent) of R-13 – *Recreation Surveys* survey respondents in these areas stated that law enforcement presence, overall safety, and security were not a problem. One issue that was previously noted was swimmers ignoring posted signs and occasional swimmers suffering from hypothermia, even on very warm summer days. Additional visitor education is apparently needed due to the cold water in the Diversion Pool and Low Flow Channel. Additional posted signs may need to be installed.

Thermalito Afterbay

A safety-related issue identified in the Thermalito Afterbay was the effect of daily water fluctuations on boating safety. Thermalito Afterbay has theoretical daily fluctuations of up to 8 feet; however, daily fluctuations of less than 4 feet are much more common. These fluctuations are a result of operations of the Oroville Facilities. There are areas along the reservoir that are boatable one day, but the next day the water depth may be much shallower. There have been incidents where boats have run into submerged objects in areas they had boated on the day before with no problems. Signage is currently placed along the shoreline warning boaters about these pool level fluctuations; however, some shallow areas do not have buoys. Safety issues have arisen from visitors ignoring posted signs and regulations, and other manifestations of operator error. As a result, additional buoys placed in potentially hazardous boating areas that currently do not have marker buoys could help boaters identify potentially shallow areas in the Thermalito Afterbay. Additionally, hazard maps and brochures could be posted and made available at boat ramps.

OWA

The OWA has the greatest number of recreation-related safety issues compared to the other resource areas. The Afterbay outlet area, in particular, has had several incidents of conflicts between anglers competing for limited space. Wildland fires have occurred within the OWA over the past few years and it has been noted that this area does not have a fire evacuation plan. In addition, illegal dumping, squatters and dispersed site impacts, OHV impacts, and litter accumulation is problematic in the OWA.

The Afterbay outlet area is a very popular fishing area with limited primitive camping available nearby. This area has been mentioned by DFG as having safety issues that need to be addressed. One issue cited is that the water flow from the Afterbay outlet into the Feather River can be a potential drowning hazard, particularly during higher flows. There have been reports of conflicts between anglers resulting in actions as extreme as gunshots being fired. There is currently only one State Game Warden assigned part-time to DFG-managed lands in Butte County. Providing additional land-based DFG patrols in the OWA should be considered. These patrols could concentrate on the Afterbay outlet area, especially during the fishing season. Additional patrols may also dissuade illegal dumping that occurs in the area.

5.3.5 Develop and Implement a Proposed Wildland Fire Evacuation Plan for the OWA

A fire evacuation plan is being developed for the Lime Saddle area as a part of a DPR fire management plan for LOSRA. However, the OWA is lacking such a plan and over 318,000 visitors annually are estimated to come to the OWA. Even though there have been occasional wildfires in the OWA, there is currently no evacuation plan for recreational users. A fire evacuation plan for recreational users in the OWA should be developed.

An evacuation plan can be an important visitor management program element in potential wildfire areas that receive significant recreational use. Special attention should be paid to the Afterbay outlet area, as a significant portion of the OWA recreational use occurs there. The complexity of the existing road network within OWA, and the level of dispersed use in this area suggest the need for clearly communicating available evacuation routes to the public. Alternatively, consider closing the OWA to public use during periods of high or extreme fire hazard.

5.3.6 Develop and Implement a Proposed Comprehensive Non-motorized Trails Program

A proposed Comprehensive Non-motorized Trails Program is needed for the study area. In the spring of 2002, DPR designated most of the non-motorized trails in the study area as multiple-use, consistent with other DPR-managed trails in the State. Previously, 17 miles of trail were hiking/equestrian use only and did not allow biking. Some trail users in the study area would prefer that these trails return to their previous limited use designations. However, most non-motorized trail survey respondents did not have encounters with other trail users they felt put them at-risk. The future trails program should further explore whether conflicts due to the new multiple-use designation are occurring. If significant conflicts are occurring, the future plan should outline management strategies to help address safety and/or user experience challenges, as well as minimize these challenges from occurring on other trails.

Another non-motorized trail issue is the potential to complete trail opportunities/ loops within the study area. The Thermalito Forebay, Thermalito Afterbay, and Diversion Pool are areas where trails surround all or part of the water body, but do not connect. In addition, the Lime Saddle area is an area where trail connections are lacking between sites. The campgrounds, boat ramp, marina, or day use area are not connected through any formal trails. Trails and the future trails program are further discussed in Section 5.2.6 and 6.2 of this study.

5.3.7 Develop and Implement a Proposed Interpretation and Education Program

Like the new trails program discussed above covering the study area, a new comprehensive Interpretation and Education (I&E) Program is also needed for the Oroville Facilities study area. This topic is further discussed in Section 5.2.5 of this study. Recommended I&E Program components may include:

- I&E-related facilities;
- I&E-related services and programs;
- I&E themes, messages and stories;
- Design details and aesthetic guidelines for future I&E developments;
- Optional: Environmental graphics and communication component; and
- Optional: Logo/graphics of the Oroville Facilities / city of Oroville identity branding.

In creating a comprehensive I&E Program specifically for this area, recreation and other multi-resource managers should collaborate to define a program that meets multiple resource objectives. This process could be conducted in parallel with other local planning efforts in the Oroville area. Interpretation regarding cultural resources would include coordination with local tribes. The local historic society could also be included in the planning process. ADAAG, as amended, should be followed for all existing and new I&E facilities. This may include exhibits, parking areas, paths to facilities, toilet/restrooms, and any other facilities provided in conjunction with I&E facilities.

6.0 CONCLUSIONS

This section presents the conclusions of this study and identifies public recreation needs on a site-by-site basis in the study area. A summary of a proposed program for trails is presented in Section 6.2 and a summary of other programmatic actions are discussed in Section 6.3. While the previous section discusses overall "big picture" recreation needs in the Oroville Facilities study area, this section identifies how these "big picture" needs may be accommodated or addressed more specifically on a site-by-site basis by resource area. Both existing and potential future needs have been identified. It should be noted that the needs identified in this chapter of this study are not proposed PM&E measures that are typically defined in a recreation plan or settlement. The PM&E measures for this Project will be identified in the Oroville Facilities RMP and/or Settlement Agreement.

6.1 RECREATION NEEDS ON A SITE-BY-SITE BASIS

Public recreation needs are organized and presented below for each resource area within the study area, and then by recreation site or use area. Unless specified otherwise, it is assumed that the general character and overall level of development at each site will be consistent with the existing conditions and type of desired recreation experience.

Table 6.1-1 presents a summary of conclusions regarding existing and potential future recreation resource needs on a site-by-site basis that should be considered in the Oroville Facilities study area. The table presents these identified needs in a summarized fashion, with more detail provided for each proposed action and site in the following sections. The table is organized by resource area and site with a reference number defined for each recreation need. Existing recreation needs or deficiencies (current to 2010) and potential future recreation needs (2011 to anticipated license term) are identified for each site, if any. Within these two timeframes (existing and future), recreation needs are further divided into capital improvements, operations and maintenance/programmatic needs, and other considerations. Other considerations are potential enhancements that are of lesser priority compared to the other two categories. For each specific recreation need by site, the overall need or deficiency being addressed is also identified. Finally, references to supporting relicensing study results or conclusions are provided for each identified recreation need by site.

Appendix A graphically depicts site plans of the existing conditions at each recreation site and use area in the study area, as well as a summary of identified recreation needs by site.

The recreation needs identified in Chapter 6.0 and Table 6.1-1 should not be assumed to be proposed PM&Es.

6.1.1 Lake Oroville

This section discusses specific needs at the various public recreation sites and facilities in the Lake Oroville resource area.

In addition to capital improvements listed below for each site in this resource area, there is inevitably the need for ongoing annual maintenance and periodic monitoring once any facilities are constructed.

6.1.1.1 Bidwell Canyon Campground / BR / DUA / Marina Complex

Summary of Relevant Site Information

The Bidwell Canyon Complex facilities include 2 boat ramps (an upper and lower ramp), 1 day use area, 1 RV/tent campground with 75 campsites, and 1 marina. Within the Bidwell Canyon Complex, parking is provided for 279 vehicle/trailer combinations (12 spaces are ADA accessible) and 168 vehicles (8 spaces are ADA accessible). Additional parking for about 35 vehicle/trailer combinations is available on the upper ramp at low pool levels. The lower ramp, used below reservoir pool elevations of about 745 feet, provides undesignated parking for about 50 vehicle/trailer combinations. Overflow parking for about 30 vehicles is available near the entrance kiosk. Existing visitation at the complex has been estimated to total 217,709 RDs annually, while it is projected that visitation at the complex in 2050 will total 464,600 RDs annually. It is estimated that by 2020, recreation season weekend percent occupancy at the Bidwell Canyon Campground will exceed 80 percent, a level of use considered to be exceeding the facility capacity of this site. Parking at the Bidwell Canyon BR/DUA/Marina is at or exceeding capacity now. Potential expansion of the Bidwell Canyon facilities is limited by spatial capacity.

Existing Facility and Use Area Needs

- No additional campsites at the Bidwell Canyon Campground are needed in the near term, except for potential relocation of existing campsites (approximately 50) nearby to provide space for marina parking needs. In general, all of the existing campground facilities at this site are in good condition and do not require significant improvements and/or enhancements at this time. Additionally, existing percent occupancy at this site does not warrant potential expansion in the short-term. However, the relocation of existing campsites is proposed as noted below due to immediate marina area parking expansion needs. (Current to 2010) (Study R-10, Section 5.1.1; Study R-8, Section 5.2.2.1; Study R-7, Sections 5.5.1.1 and 6.2)

- Continue to periodically monitor use levels at the Bidwell Canyon BR/DUA/Campground/Marina Complex. Occupancy at the Bidwell

Insert Table 6.1-1
21 Pages, 11x17 (odd numbered only)

Table 6.1-1. Summary of Existing and Potential Future Recreation Needs on a Site-by-Site Basis in the Oroville Facilities Area.

Area/Site Location & Programmatic Needs	Reference Number	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to License Term)[1]			Overall Long-term Need or Current Deficiency Being Addressed During the Anticipated New License Term	Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
Lake Oroville									
Bidwell Canyon BR / Campground / DUA / Marina Complex	OR-1 OR-1a	No additional campsites at the Bidwell Canyon Campground are needed in the near term, except for potential relocation of existing campsites (approximately 50) nearby to provide space for marina parking needs						Provide adequate camping, day use and boating facilities	Study R-10, Section 5.1.1; Study R-8, Section 5.2.2.1; Study R-7, Sections 5.5.1.1 and 6.2
	OR-1b		Provide continued annual O&M; Continue to periodically monitor use levels at the Bidwell Canyon BR/DUA/ Campground/Marina Complex			Provide continued annual O&M; Continue to periodically monitor use levels at the Bidwell Canyon BR/DUA/ Campground/Marina Complex		Provide adequate annual O&M; Provide periodic monitoring	Study R-8, Sections 5.2.2.1 and 6.3; FERC guidelines
	OR-1c	Provide approximately 190 new vehicle parking spaces for use by Bidwell Canyon BR/DUA/Marina visitors						Provide adequate boating and day use facilities	Study R-7, Section 5.5.1.1; Study R-8, Section 5.5.2.1
	OR-1d	Reconstruct a new water-ski course near the Bidwell Canyon Marina, or other suitable location						Provide adequate boating facilities; Provide for resource protection	Study T-9; Resource integration
	OR-1e			Consider modifying the existing group use meeting hall (currently used for DPR storage) as a new campground activity facility				Provide adequate camping facilities; Provide for I&E	Professional judgment; Study R-13, Section 5.1.8

Table 6.1-1. Summary of Existing and Potential Future Recreation Needs on a Site-by-Site Basis in the Oroville Facilities Area.

Area/Site Location & Programmatic Needs	Reference Number	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to License Term)[1]			Overall Long-term Need or Current Deficiency Being Addressed During the Anticipated New License Term	Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
	OR-1f		Provide more frequent adjustment of the boarding dock(s) at the boat ramp as needed					Provide adequate annual O&M; Provide adequate boating facilities	Study R-7; Study R-10; Field observations
	OR-1g	Provide an additional boarding dock(s) if feasible to maximizing boat launching capacity						Provide adequate boating facilities	Study R-7, Section 5.3.3
	OR-1h		Provide increased debris removal at boat ramps and adjacent facilities					Provide adequate annual O&M; Provide adequate boating facilities	Field observations; Studies R-7 and R-10
	OR-1i			Consider providing upgrades to ADA accessibility at the marina				Provide enhanced accessibility	Study R-6, Table 5.3-3
	OR-1j		Provide boaters with additional information about substitute boating facilities and changing access conditions			Provide boaters with additional information about substitute boating facilities and changing access conditions		Provide for I&E	Study R-3, Section 5.2.2.2, Tables 5.2-2, 5.2-3, R7 – Section 5.4.9, Table 5.4-18
	OR-1k			Consider providing temporary event grandstand space for use by concessionaires or event organizers during fishing tournaments			Consider providing temporary event grandstand space for use by event organizers during fishing tournaments	Provide enhanced fishing opportunities; Provide for I&E	Professional judgment
	OR-1l				Consider constructing new Bidwell Canyon campsite capacity elsewhere due to spatial capacity constraints at Bidwell Canyon, such as nearby Loafer Creek, and when monitoring results demonstrate a clear need			Provide adequate camping facilities	Study R-8, Section 5.5.1.1

Table 6.1-1. Summary of Existing and Potential Future Recreation Needs on a Site-by-Site Basis in the Oroville Facilities Area.

Area/Site Location & Programmatic Needs	Reference Number	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to License Term)[1]			Overall Long-term Need or Current Deficiency Being Addressed During the Anticipated New License Term	Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
Loafer Creek BR / DUA / Campground / Group Campground / Equestrian Campground Complex	OR-2								
	OR-2a	Provide ADA-accessibility enhancements at the Loafer Creek Group and Equestrian Campgrounds						Provide for accessibility	Study R-6, Sections 5.3.1.3 and 6.0; Table 6.0-1
	OR-2b	Provide 2 new group RV campsites with utilities at the Loafer Creek Complex						Provide adequate camping facilities	Study R-8, Section 5.2.2.3
	OR-2c		Provide continued annual O&M; Periodically monitor use and impacts at the Loafer Creek boat ramp, DUA and campgrounds			Provide continued annual O&M; Periodically monitor use and impacts at the Loafer Creek boat ramp, DUA and campgrounds		Provide adequate annual O&M; Provide periodic monitoring	Study R-8, Sections 5.2.2.3, 5.5.2.3, and 6.3; FERC guidelines
	OR-2d	Conduct a feasibility study of potential swim facility options to provide improved swimming opportunities at Loafer Creek DUA during the primary 4-month recreation season						Provide adequate swimming facilities; Provide adequate shoreline access	Study R-3, Section 5.2.5, Table 5.2-6
	OR-2e			Consider providing a new campground activity facility				Provide adequate camping facilities; Provide for I&E	Professional judgment; Study R-13, Section 5.1.8
	OR-2f	Provide improved shoreline access and ADA-accessibility to the day use area and swimming beach, and cove						Provide for accessibility; Provide adequate shoreline access	Study R-6, Section 5.3.3.6

Table 6.1-1. Summary of Existing and Potential Future Recreation Needs on a Site-by-Site Basis in the Oroville Facilities Area.

Area/Site Location & Programmatic Needs	Reference Number	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to License Term)[1]			Overall Long-term Need or Current Deficiency Being Addressed During the Anticipated New License Term	Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
	OR-2g	Provide low-water reservoir boating access in the Loafer Creek area to 750 feet msl						Provide adequate boating facilities	Study R-7, Section 5.3.4, Table 5.3-4; Study R-3, Section 5.2.2.2, Table 5.2-2
	OR-2h		Provide more frequent adjustment of the boarding dock(s) at the boat ramp as needed			Provide more frequent adjustment of the boarding dock(s) at the boat ramp as needed		Provide adequate annual O&M; Provide adequate boating facilities	Professional judgment; Field observations
	OR-2i	Provide additional boarding dock(s) if feasible to maximize launching capacity						Provide adequate boating facilities	Study R-7, Section 5.3.3
	OR-2j		Provide boaters with additional information about substitute boating facilities and changing reservoir conditions			Provide boaters with additional information about substitute boating facilities and changing reservoir conditions		Provide for I&E	Study R-3, Section 5.2.2.2, Tables 5.2-2, 5.2-3; Study R7 – Section 5.4.9, Table 5.4-18
	OR-2k		Provide increased debris removal at boat ramps and adjacent facilities			Provide increased debris removal at boat ramps and adjacent facilities		Provide for public health and safety; Provide adequate annual O&M; Provide adequate boating facilities	Professional judgment; Field observations
	OR-2l				Consider constructing approximately 50 new campsites and re-evaluating the current mix of campsite types based on monitoring results			Provide adequate camping facilities	Study R-8, Sections 5.2.2.3 and 6.3
	OR-2m				Consider providing a new fish cleaning station if fish waste becomes a problem			Provide adequate resource protection; Provide enhanced fishing opportunities	Professional judgment; Resource protection
	OR-2n				Consider providing 2 additional group campsites in the Loafer Creek Complex if needed based on monitoring results			Provide adequate camping facilities	Study R-8, Section 5.2.2.3

Table 6.1-1. Summary of Existing and Potential Future Recreation Needs on a Site-by-Site Basis in the Oroville Facilities Area.

Area/Site Location & Programmatic Needs	Reference Number	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to License Term)[1]			Overall Long-term Need or Current Deficiency Being Addressed During the Anticipated New License Term	Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
	OR-2o				Consider providing additional parking at the boat ramp when monitoring results demonstrate a need			Provide adequate boating facilities	Study R-17, Sections 5.5.1.1, 5.5.1.4, Table 5.5-2
Lime Saddle BR / DUA / Campground / Marina Complex	OR-3								
	OR-3a		Provide continued annual O&M; Periodically monitor use levels and impacts at the Lime Saddle Complex			Provide continued annual O&M; Periodically monitor use levels and impacts at the Lime Saddle Complex		Provide adequate annual O&M; Provide periodic monitoring	Study R-8, Section 6.3; FERC guidelines
	OR-3b	Upgrade existing picnic tables and shade structures while maintaining views at Lime Saddle DUA						Provide adequate day use facilities	Professional judgment
	OR-3c	Restore the Lime Saddle Marina that was damaged by a wind storm, cooperating with DPR and the concessionaire						Provide adequate annual O&M; Provide adequate boating facilities; Provide for public health and safety	Study R-10, Table 6.0-2
	OR-3d			Consider providing temporary event grandstand space during fishing tournaments for use by event organizers			Consider providing temporary event grandstand space during fishing tournaments for use by event organizers	Provide for I&E; Provide enhanced fishing opportunities	Professional judgment
	OR-3e		Provide more frequent adjustment of the boarding dock(s) at the boat ramp as needed			Provide more frequent adjustment of the boarding dock(s) at the boat ramp as needed		Provide adequate annual O&M; Provide adequate boating facilities	Professional judgment; Field observations
	OR-3f			Consider upgrades to ADA-accessibility at marina				Provide enhanced accessibility	Professional judgment; ADA accessibility
	OR-3g	Provide additional boarding dock(s) if feasible to maximize launching capacity						Provide adequate boating facilities	Study R-7, Section 5.3.3

Table 6.1-1. Summary of Existing and Potential Future Recreation Needs on a Site-by-Site Basis in the Oroville Facilities Area.

Area/Site Location & Programmatic Needs	Reference Number	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to License Term)[1]			Overall Long-term Need or Current Deficiency Being Addressed During the Anticipated New License Term	Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
	OR-3h	Provide a new courtesy dock for use by Lime Saddle Campground visitors below the campground in Parrish Cove, connected by a foot trail to the upper campground						Provide adequate shoreline access; Provide adequate boating facilities	Professional judgment
	OR-3i		Provide increased debris removal at boat ramps and adjacent facilities			Provide increased debris removal at boat ramps and adjacent facilities		Provide for public health and safety; Provide adequate annual O&M; Provide adequate boating facilities	Professional judgment; Field observations
	OR-3j		Provide boaters with additional information about substitute boating facilities and changing reservoir conditions			Provide boaters with additional information about substitute boating facilities and changing reservoir conditions		Provide for I&E	Study R-3, Section 5.2.2.2, Tables 5.2-2, 5.2-3; Study R-7, Section 5.4.9, Table 5.4-18
	OR-3k				Consider constructing approximately 25 to 50 new RV/tent campsites and other complex improvements if needed based on monitoring results			Provide adequate camping facilities	Study R-10, Section 5.1.1; Study R-8, Section 5.2.2.2 and 6.3
	OR-3l						Consider providing a new campground activity facility, if and when the campground is expanded in the future	Provide adequate camping facilities; Provide for I&E	Professional judgment; Study R-13, Section 5.1.8
	OR-3m				Consider providing 1 new group RV campsite with utilities at the Lime Saddle Complex based on monitoring results, if needed in the future			Provide adequate camping facilities	Study R-8, Section 5.2.2.2; Study R-12, Sections 5.2.2.3 and 5.2.3

Table 6.1-1. Summary of Existing and Potential Future Recreation Needs on a Site-by-Site Basis in the Oroville Facilities Area.

Area/Site Location & Programmatic Needs	Reference Number	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to License Term)[1]			Overall Long-term Need or Current Deficiency Being Addressed During the Anticipated New License Term	Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
	OR-3n				Consider providing a new shoreline day use area at Parrish Cove that is linked by trail access to the Lime Saddle Campground and Lime Saddle BR/DUA /Marina			Provide adequate shoreline access; Provide adequate day use facilities	Study R-12, Sections 5.2.2.3 and 5.3
	OR-3o						Consider providing new swimming opportunities in the future at Lime Saddle during the primary 4-month recreation season; conducting a feasibility study of costs, benefits, and options (Loafer Creek is a higher priority site for potential swimming facilities)	Provide adequate swimming facilities where feasible and cost effective; Provide adequate shoreline access where feasible	Study R-3, Section 5.3; Study R-5, Section 5.3, Figure 5.3-1
	OR-3p				Consider constructing 50-60 vehicle parking spaces at the Lime Saddle BR/DUA/Marina, consider the adjacent PG&E property			Provide adequate boating and day use facilities	Study R-7, Section 5.5.1.1, Table 5.5-2
Spillway BR / DUA	OR-4 OR-4a		Provide continued annual O&M; Periodically monitor recreation use levels at the Spillway Complex			Provide continued annual O&M; Periodically monitor recreation use levels at the Spillway Complex		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
	OR-4b	Review RV "En Route" camping at this site due to low use and modify facilities or operations, as needed						Provide adequate camping facilities	Study R-8, Section 5.2.2.6; Study R-9, Section 5.2.1.1, Table 5.2-1
	OR-4c		Provide more frequent adjustment of the boarding docks at the boat ramp as needed			Provide more frequent adjustment of the boarding docks at the boat ramp as needed		Provide adequate annual O&M; Provide adequate boating facilities	Professional judgment; Field observations

Table 6.1-1. Summary of Existing and Potential Future Recreation Needs on a Site-by-Site Basis in the Oroville Facilities Area.

Area/Site Location & Programmatic Needs	Reference Number	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to License Term)[1]			Overall Long-term Need or Current Deficiency Being Addressed During the Anticipated New License Term	Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
	OR-4d		Provide increased debris removal at boat ramps and adjacent facilities			Provide increased debris removal at boat ramps and adjacent facilities		Provide for public health and safety; Provide adequate annual O&M; Provide adequate boating facilities	Professional judgment; Field observations
	OR-4e		Provide boaters with additional information about substitute boating facilities and changing reservoir conditions			Provide boaters with additional information about substitute boating facilities and changing reservoir conditions		Provide for I&E	Study R-3, Section 5.2.2.2, Tables 5.2-2, Table 5.2-3; Study R-7 – Section 5.4.9, Table 5.4-18
	OR-4f	Extend the boat ramp length below 695 feet msl (when possible)			Extend the boat ramp length below 695 feet msl (when possible)			Provide adequate shoreline access; Provide adequate boating facilities	Study R-7, Section 5.3.4, Tables 5.3-4 and 5.3-5
	OR-4g			Consider providing a floating concessionaire-run store and gas dock at the Spillway BR to serve boaters				Provide adequate boating facilities	Professional judgment; Study R-13, Section 5.1.2.6, Table 5.1-26
Enterprise BR	OR-5 OR-5a	Construct 5-10 family picnic sites						Provide adequate shoreline day use facilities	Professional judgment
	OR-5b	Extend the boat ramp length to 750 feet msl to provide a greater likelihood of full summer-season usability						Provide adequate shoreline access; Provide adequate boating facilities	Study R-7, Section 5.3.4, Table 5.3-4; Study R-3, Section 5.2.2.2, Table 5.2-2
	OR-5c	Provide a boarding dock at the boat ramp						Provide adequate boating facilities	Study R-7, Section 5.3.3
	OR-5d		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
Nelson Bar Car-top BR	OR-6 OR-6a		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines

Table 6.1-1. Summary of Existing and Potential Future Recreation Needs on a Site-by-Site Basis in the Oroville Facilities Area.

Area/Site Location & Programmatic Needs	Reference Number	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to License Term)[1]			Overall Long-term Need or Current Deficiency Being Addressed During the Anticipated New License Term	Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
Vinton Gulch Car-top BR	OR-7								
	OR-7a	Provide additional directional signs as a component of a proposed I&E Program						Provide for I&E	Professional judgment
	OR-7b		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
Dark Canyon Car-top BR	OR-8								
	OR-8a	Providing additional directional signs as a component of a proposed I&E Program						Provide for I&E	Professional judgment
	OR-8b	Replace the vault toilet building that was vandalized						Provide for public health and safety; Provide for resource protection; Provide adequate day use and boating facilities	Professional judgment
	OR-8c		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
Foreman Creek Car-top BR	OR-9								
	OR-9a	Provide additional visitor education regarding the preservation of cultural and other sensitive resources at the site as a component of the proposed I&E Program						Provide for I&E; Provide for resource protection	Professional judgment
	OR-9b		Provide continued annual O&M and periodic monitoring; Provide increased trash pick-up			Provide continued annual O&M and periodic monitoring; Provide increased trash pick-up		Provide adequate annual O&M; Provide periodic monitoring	Study R-4, Table 6.1-1; FERC guidelines

Table 6.1-1. Summary of Existing and Potential Future Recreation Needs on a Site-by-Site Basis in the Oroville Facilities Area.

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		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
	OR-9c	Improve shoreline conditions and provide other basic day-use amenities to facilitate use of the area, including swimming						Provide adequate day use facilities and shoreline access	Study R-3, Section 5.2.3.4
Stringtown Car-top BR	OR-10 OR-10a	Provide additional directional signs as a component of a proposed I&E Program						Provide for I&E	Professional judgment
	OR-10b	Repair or replace the crumbling asphalt road and eroding road bed within the inundation zone						Provide adequate annual O&M; Provide adequate boating facilities; Provide for resource protection	Study R-3, Section 5.2.3.5; Study R10, Section 5.1.4.16
	OR-10c		Provide continued annual O&M and periodic monitoring; Periodically monitor water quality at this location that is used for swimming			Provide continued annual O&M and periodic monitoring; Periodically monitor water quality at this location that is used for swimming		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines; Resource protection; Preliminary data from the Environmental Work Group; Studies W-1 and W-3
Lake Oroville Visitors Center	OR-11 OR-11a				Consider providing additional parking capacity in the future			Provide for I&E; Provide adequate day use facilities	Study R-8, Section 5.4.2.1, Table 5.4-1; Study R-12, Sections 5.3.1.4 and 5.3.2, Table 5.3-2
	OR-11b						Consider alternative uses and locations for the Visitors Center as part of the proposed I&E Program	Provide for I&E; Provide for resource protection	Study R-10, Table 6.0-2
	OR-11c		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines

Table 6.1-1. Summary of Existing and Potential Future Recreation Needs on a Site-by-Site Basis in the Oroville Facilities Area.

Area/Site Location & Programmatic Needs	Reference Number	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to License Term)[1]			Overall Long-term Need or Current Deficiency Being Addressed During the Anticipated New License Term	Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
Saddle Dam Trailhead Access	OR-12 OR-12a	Construct short developed trails to access the shoreline						Provide adequate shoreline access	Study R-11. Sections 6.1.2.3, 6.2.1
	OR-12b		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
Bloomer Area BICs	OR-13 OR-13a		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
Goat Ranch BIC	OR-14 OR-14a		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
Foreman Creek BIC	OR-15 OR-15a		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
Craig Saddle BIC	OR-16 OR-16a		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
Oroville Dam Overlook DUA	OR-17 OR-17a				Consider constructing 30-50 additional vehicle parking spaces			Provide for I&E; Provide adequate day use facilities	Study R-8, Section 5.4.2.3, Table 5.4-1; Study R-12, Sections 5.3.1 and 5.3.2, Table 5.3-2
	OR-17b		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
Floating Campsites	OR-18 OR-18a	Provide two or three additional floating campsites on Lake Oroville						Provide adequate boating and camping facilities; Provide adequate shoreline access	Study R-7, Section 5.2, Table 5.2-13

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		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
	OR-18b		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
Upper North Fork Arm Below Poe Powerhouse	OR-19 OR-19a						Consider providing a future boater take-out, if feasible, or a potential non-motorized watercraft tow service for whitewater boaters who run the North Fork Feather River from the PG&E Poe Powerhouse to the Lake Oroville flatwater	Provide adequate shoreline access; Provide adequate boating facilities	Study R-16, Section 6.1.3
	OR-19b						Consider obtaining and providing real time river flow data below the PG&E Poe Project powerhouse (coordinate and obtain from PG&E) and providing Lake Oroville reservoir pool level data for use by whitewater boaters; Provide this information to the public via the Internet, flow phone, or other means	Provide for I&E	Study R-16, Section 6.1.3
	OR-19c		Provide periodic monitoring			Provide periodic monitoring		Provide periodic monitoring	FERC guidelines

Table 6.1-1. Summary of Existing and Potential Future Recreation Needs on a Site-by-Site Basis in the Oroville Facilities Area.

Area/Site Location & Programmatic Needs	Reference Number	Existing Recreation Needs or Deficiencies (Current to 2010)[1]			Potential Future Recreation Needs (2011 to License Term)[1]			Overall Long-term Need or Current Deficiency Being Addressed During the Anticipated New License Term	Reference to Supporting Study Results and Other References
		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
Diversion Pool									
Diversion Pool DUA	DP-1 DP-1a	Construct additional day use facilities including approx. 5-10 new picnic tables with pole grills and a gravel car-top boat ramp near the vault toilet building along the Diversion Pool along the Burma Road						Provide adequate day use and boating facilities; Provide adequate shoreline access	Professional judgment; Study R-13, Section 5.1.2.6, Table 5.1-28.
	DP-1b		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
	DP-1c	Consider providing an ADA-accessible fishing pier or platform						Provide for accessibility; Provide enhanced fishing opportunities	ADA accessibility; Professional judgment
Lakeland Blvd. Trail Access Area	DP-2 DP-2a	Provide a new southern shoreline day use/picnic site with car-top boat launching at the Diversion Pool and direct road access from the Lakeland Boulevard Trailhead Access area						Provide adequate day use and boating facilities; Provide adequate shoreline access	Professional judgment
	DP-2b		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	
	DP-2c	Provide expanded trailhead facilities at the Lakeland Boulevard Trailhead Access site to access the Diversion Pool						Provide adequate shoreline access	Professional judgment

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		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
Low Flow Channel / Feather River									
Feather River Fish Hatchery	FR-1 FR-1a		Provide continued annual O&M and periodic monitoring; Also, potential I&E-related enhancements would be considered here under the proposed I&E Program			Provide continued annual O&M and periodic monitoring; Also, potential I&E-related enhancements would be considered here under the proposed I&E Program		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines; see proposed I&E program
Riverbend Park	FR-2 FR-2a		Continue to coordinate with the FRRPD and other interested parties in the planning, design, and construction of Riverbend Park					Provide enhanced shoreline access; Provide for I&E; Provide for resource protection; Provide adequate day use facilities	Professional judgment
Thermalito Forebay									
North Thermalito Forebay BR / DUA / Aquatic Center / "En-Route" Campground	TF-1 TF-1a		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
	TF-1b	Evaluate options to potentially warm the water for enhanced swimming opportunities and help protect water quality in the swim area						Provide adequate swimming facilities; Provide for public health and safety; Enhance swimming opportunities	Study R-3, Sections 5.1.1.2, 5.2.6.1, Table 5.1-3
	TF-1c	Provide new non-motorized trail loop opportunities in the Thermalito Forebay area as a component of the proposed trails program						Provide adequate shoreline access	Study R-13, Section 5.1.2.6

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		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
	TF-1d	Provide additional shoreline trail access points						Provide adequate shoreline access	Study R-3, Report Summary; Study R-4, Table 6.1-1
	TF-1e			Consider providing basic improvements to the Aquatics Center to complete the facility for basic needs				Provide for I&E; Provide enhanced boating opportunities	Professional judgment; Field observations
	TF-1f				Consider providing a fish cleaning station if waste problems are encountered			Provide for resource protection; Provide enhanced fishing opportunities	Professional judgment; Resource protection
	TF-1g				Consider options for camping in the future to potentially replace current RV "En Route" camping at this site			Provide adequate camping facilities	Study R-8, Section 5.2.2.5; Study R-9, Section 5.2.1.3 and Table 5.2-3
South Thermalito Forebay BR / DUA	TF-2 TF-2a	Provide an ADA accessible fishing pier or platform						Provide for accessibility; Provide enhanced fishing opportunities	FERC guidelines; professional judgment; Study R-6
	TF-2b		Provide continued annual O&M and periodic monitoring; Provide periodic water quality monitoring			Provide continued annual O&M and periodic monitoring; Provide periodic water quality monitoring		Provide adequate annual O&M; Provide periodic monitoring	Study W-3, selected data on sites with water quality concerns; FERC guidelines
	TF-2c	As a component of a proposed Comprehensive Non-Motorized Trails Plan, provide new trail opportunities in the South Thermalito Forebay area						Provide adequate shoreline access	Study R-13, Section 5.1.2.6
	TF-2d	Provide improved day use and swimming facilities at the South Forebay to enhance visitor use of the area						Provide adequate day use and swimming facilities	Professional judgment; Resource protection

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		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
Thermalito Afterbay									
Wilbur Road BR	TA-1 TA-1a	As a component of the proposed I&E Program, provide a directional sign(s)						Provide for I&E	Study R-1, Table 6.3-1
	TA-1b		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
	TA-1c		Reduce boat speeds on the Thermalito Afterbay					Provide for resource protection	Study R-4, Section 5.2.7.4; Resource integration
	TA-1d				Consider constructing 5-10 additional vehicle parking spaces			Provide adequate boating and day use facilities	Study R-7, Section 5.5.1.1, Table 5.5-2
Larkin Road Car-top BR	TA-2 TA-2a	Construct 5-10 new family picnic tables with shade structures at this site						Provide adequate day use facilities	Professional judgment
	TA-2b	As a component of the proposed I&E Program, provide new directional signs						Provide for I&E	Professional judgment
	TA-2c		Reduce boat speeds on the Thermalito Afterbay					Provide for resource protection	Study R-4, Section 5.2.7.4
	TA-2d		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
	TA-2e	Provide a swim beach area and other day-use enhancements						Provide adequate day use and swimming facilities	Study R-11, Section 5.2.2.1, Table 5.2-2
Monument Hill BR / DUA	TA-3 TA-3a		Reduce boat speeds on the Thermalito Afterbay					Provide for resource protection	Study R-4, Section 5.2.7.4
	TA-3b		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines

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		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
Model Aircraft Flying Area	TA-4 TA-4a		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
Clay Pit SVRA	TA-5 TA-5a		Manage the Clay Pit SVRA to accommodate continued OHV use			Manage the Clay Pit SVRA to accommodate continued OHV use		Provide adequate visitor management; Provide for resource protection	Study R-11, Section 6.1.2
Oroville Wildlife Area									
OWA Afterbay Outlet BR / DUA / Campsites	WA-1 WA-1a	Evaluate the practice of allowing undeveloped camping in the OWA and implement actions						Provide adequate camping facilities; Provide for resource protection; Provide adequate annual O&M	Professional judgment; Resource protection
	WA-1b		Provide increased visitor management and enforcement in the OWA to enforce fishing and other use restrictions			Provide increased visitor management and enforcement in the OWA to enforce fishing and other use restrictions		Provide adequate visitor management; Provide for resource protection	Study R-4, Table 6.1-1
	WA-1c	As a component of the I&E Program, provide additional directional signs						Provide for I&E	Study R-10, Table 6.0-2
	WA-1d		Provide continued annual O&M and periodic monitoring			Provide continued annual O&M and periodic monitoring		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines
	WA-1e		Evaluate options to provide additional revenue for new services or facilities in the OWA					Provide adequate visitor management; Provide for resource protection; Resolve long-term funding and management issues	Study R-5, Section 6.2.1.4; Professional judgment

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		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
OWA River, Pond Access, and General Dispersed Sites	WA-2								
	WA-2a	Provide additional trash receptacles and signage, particularly along the river, at access points where trash accumulation appears to be a problem	Provide additional trash pickup, particularly along the river, at access points where trash accumulation appears to be a problem					Provide adequate annual O&M; Provide for resource protection	Study R-4, Table 6.1-1; Study R-11, Sections 6.1 and 6.2
	WA-2b	As part of the I&E Program, post both regulatory and educational signs detailing illegal fishing practices and consequences of using these practices						Provide for I&E; Provide for resource protection	Study R-4, Table 6.1-1
	WA-2c		Provide more enforcement at these sites to enforce fishing and other regulations			Provide more enforcement at these sites to enforce fishing and other regulations		Provide adequate visitor management; Provide for resource protection	Study R-4, Table 6.1-1
	WA-2d		Provide continued annual O&M; As a component of a recreation monitoring program, provide periodic monitoring to assess future needs, particularly the Afterbay outlet area			Provide continued annual O&M; As a component of a recreation monitoring program, provide periodic monitoring to assess future needs, particularly the Afterbay outlet area		Provide adequate annual O&M; Provide periodic monitoring	FERC guidelines; Resource protection
	WA-2e	Erect vehicular barriers to selected areas in the OWA						Provide for resource protection	Study R-11, Section 6.1.2.1
	WA-2f		Open locked gates in the OWA earlier during the peak use hunting season to accommodate hunters			Open locked gates in the OWA earlier during the peak use hunting season to accommodate hunters		Enhance hunting opportunities	Study R-4, Section 6.1.8, Table 6.1-1

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		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
	WA-2g			Consider locating and operating 2 ADA-accessible Watchable Wildlife sites within the OWA as part of the proposed I&E Program				Provide for accessibility; Provide for I&E	Professional judgment; ADA accessibility
	WA-2h						Consider constructing 2 additional ADA-accessible Watchable Wildlife sites within the OWA	Provide for accessibility; Provide for I&E	Professional judgment; ADA accessibility
Rabe Road Shooting Range	WA-3 WA-3a		Continue to provide this site as a public shooting range			Continue to provide this site as a public shooting range		Provide adequate visitor management; Provide for resource protection	Study R-11, Section 6.2.1
	WA-3b		Provide more trash receptacles and provide additional litter pick-up at this site			Provide more trash receptacles and provide additional litter pick-up at this site		Provide adequate annual O&M; Provide for resource protection	Study R-11, Section 6.2.1
Dispersed Use Sites - General									
	DU-1	Provide more trash receptacles at dispersed use areas, where needed	Provide continued annual O&M; Provide more trash pick-up and provide additional scattered litter pick-up at dispersed use areas, where needed			Provide continued annual O&M		Provide adequate annual O&M	Study R-11, Sections 6.1 and 6.2
	DU-2		Provide periodic monitoring; Periodically monitor study area for potential new dispersed use sites			Provide periodic monitoring; Periodically monitor study area for potential new dispersed use sites		Provide periodic monitoring	FERC guidelines; Professional judgment; Resource protection
Programmatic Needs									
	P-1		Clarify agency recreation-related management responsibilities and long-term funding					Provide adequate annual O&M; Address long-term funding problems; Provide clarity of responsibilities of agencies	Studies R-4 and R-5

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		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
	P-2	Develop a proposed Recreation Monitoring Program; Implement proposed capital measures	Develop a proposed Recreation Monitoring Program; Implement proposed O&M-related measures		Continue to implement proposed Recreation Monitoring Program - capital measures	Continue to implement proposed Recreation Monitoring Program - O&M-related measures		Provide periodic monitoring	FERC guidelines; Resource protection
	P-3		Implement additional programmatic recreation-related operations and maintenance actions including: (1) managing OHV use impacts, (2) managing litter accumu-lation and dumping, (3) managing user defined trails, and (4) managing dispersed site pioneering and creep			Continue to implement proposed management actions		Provide for resource protection; Provide adequate annual O&M; Provide adequate visitor management	Studies R-4 and R-11; Resource protection; Resource integration
	P-4		Implement additional safety-related actions over time including: (1) improved incident and accident reporting, (2) improved visitor education and management control, and (3) other additional safety-related actions over time			Continue to implement additional safety-related actions as needed		Provide for adequate public health and safety	Study R-2
	P-5		Develop a proposed Wildland Fire Evacuation Plan for the OWA; Implement the proposed OWA Wildland Fire Evacuation Plan measures			Continue to implement a proposed OWA Wildland Fire Evacuation Plan		Provide for adequate public health and safety; Provide for resource protection	Study R-4
	P-6	Develop a proposed Comprehensive Non-motorized Trails Program; Implement proposed Trails Program capital measures	Develop a proposed Comprehensive Non-motorized Trails Program; Implement proposed Trails Program O&M measures		Continue to implement proposed Trails Program capital measures	Continue to implement proposed Trails Program O&M measures		Provide adequate shoreline access; Provide for resource protection	Studies R-10, R-13 and R-14

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		Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations	Capital Improvements	Operations and Maintenance / Programmatic	Other Considerations		
	P-7	Develop a proposed I&E Program; Implement proposed capital measures	Develop a proposed I&E Program; Implement proposed O&M measures		Continue to implement proposed I&E Program capital measures	Continue to implement proposed I&E Program O&M measures		Provide for I&E	Resource protection; Studies R-1, R-2, R-4, R-5, R-10, R-11, R-13, and W-3

[1]Capital improvements are actions with one time costs such as construction of a facility; operations and maintenance (O&M) actions are annual or periodic non-construction actions or costs; programmatic actions are program-related actions that address broader needs; and "other considerations" are lesser priority needs that may also be considered.

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Canyon Complex should be monitored to determine when/if improved/enhanced facilities should be constructed. A recreation monitoring program would identify threshold criteria or triggering mechanisms for any new facility construction. Established threshold criteria should be reached or exceeded for multiple years (3 out of 5 consecutive years) to ensure that the need is substantiated before potential actions are taken. (Current to 2050) (Study R-8, Sections 5.2.2.1 and 6.3; FERC guidelines)

- Provide approximately 190 new vehicle parking spaces for use by Bidwell Canyon BR/DUA/Marina visitors. The greatest current need related to boating is for additional marina parking at Bidwell Canyon. This site was identified as being at or exceeding capacity and additional parking is needed. The limited amount of parking currently available (which is least when the reservoir is at or near full pool and boating activity is highest) results in competition for parking at the boat ramp and loss of parking capacity for boaters' vehicles and trailers. Boaters seeking to use the launch ramp are frequently turned away by mid-morning on summer weekends due to a lack of available parking. New facilities should be constructed per DPR/DBW standards. This parking need could likely be accommodated by converting the adjacent Big Pine campground loop into a larger BR/DUA/Marina parking area and also widening the loop road through the new site. However, this action would necessitate relocation of the existing Big Pine Campground loop capacity elsewhere. One option, subject to further detailed analysis and engineering study, would be to relocate the displaced campground loop adjacent to the Gold Flat loop and/or boat storage yard at Bidwell Canyon. In that way, the campground capacity remains in the immediate area where needed most. The new campground loop should be completed prior to expansion of the BR/DUA/Marina parking area if possible. Parking capacity should continue to be monitored over time. If additional parking capacity is needed in the future, consider other potential areas such as the knoll between the boat ramp and the existing parking lot. (Current to 2010) (Study R-7, Section 5.5.1.1; Study R-8, Section 5.5.2.1)

- Reconstruct a new water-ski course near the Bidwell Canyon Marina, or other suitable location. An existing water-ski course at the Thermalito Afterbay should be relocated to a more suitable location to avoid potential ongoing impacts to sensitive wildlife and habitat. A cove adjacent to the Bidwell Canyon Marina appears to be suitable for a replacement location, subject to further review of alternative sites. Other sites may also be evaluated with input from water-ski groups, residents, and other interested parties. Existing facilities (booms, buoys, etc.) would be relocated and appropriate permitting received. (Current to 2010) (Study T-9; Resource integration)

- Consider modifying the existing group use meeting hall (currently used for DPR storage) as a new campground activity facility. This underutilized and centrally located meeting facility could be renovated to become a campground activity facility that is currently lacking at this complex. The activity facility could help extend the seasonal use of the campground and enhance visitor enjoyment. Programs related to the proposed I&E Program could also be based here. (Current to 2010) (Professional judgment; Study R-13, Section 5.1.8)

- Provide more frequent adjustment of the boarding dock(s) at the boat ramp as needed. Partial grounding of the floating dock due to reservoir draw down has at times lessoned the functionality of the dock and may cause damage. The floating dock is important to the efficient and enjoyable use of the ramp by boaters. (Current to 2050) (Study R-7; Study R-10; Field observations)

- Provide additional boarding dock(s) if feasible to maximizing boat launching capacity. The existing single floating dock at Bidwell Canyon is fewer than is standard for a boat ramp of this size. Additional docks will improve boat launching/retrieval efficiency and boost overall boat ramp capacity. (Current to 2010) (Study R-7, Section 5.3.3)

- Provide increased debris removal at boat ramps and adjacent facilities. Removing floating woody debris that accumulates at the boat ramp during periods of high water (typically spring and summer), as well as removing sand and mud deposits from the ramp as the pool level decreases, will enhance boaters' access, experience, and safety. (Current to 2050) (Field Observations; Study R-7; Study R-10)

- Provide boaters with additional information about substitute boating facilities and changing access conditions. The effects of reservoir draw down on the boaters' experience could be ameliorated by providing information about options for boat launching throughout the year. Consider publishing and distributing information about boat ramp closures or other restrictions on the Internet, sign boards, and possibly other media. (Current to 2050) (Study R-3, Section 5.2.2.2; Tables 5.2-2 and 5.2-3; Study R-7, Section 5.4.9; Table 5.4-18)

- Consider providing upgrades to ADA accessibility at the marina. Although accessible routes to the marina are not required, potential access upgrades appear feasible to improve access to marina amenities, such as restrooms and the store. (Current to 2010) (Study R-6, Table 5.3-3)

- Consider providing temporary event grandstand space for use by concessionaires or event organizers during fishing tournaments. Provide an area(s) that could be used for event grandstands that are temporary.

The grandstands could be installed and removed by concessionaires or event organizers. (Current to 2050) (Professional judgment)

Future Facility and Use Area Needs

- Consider constructing new Bidwell Canyon campsite capacity elsewhere due to spatial capacity constraints at Bidwell Canyon , such as nearby Loafer Creek, and when monitoring results demonstrate a clear need. Based on projected use estimates and triggers, Bidwell Canyon Campground may require additional new campsites in order to meet anticipated future demand. However, with the proposed relocation of the Big Pine campground loop to the south, it does not appear that there is adequate space to create another new loop immediately nearby. As a result, the additional capacity would need to be accommodated at Loafer Creek (see Future Facility and Use Area Needs for Loafer Creek, in Section 6.1.1.2 for combined capacity needs of both sites), or potentially farther away at Lime Saddle, or some combination. A brief discussion on threshold triggers is provided in Section 5.2.2. (Anticipated 2011 – 2020) (Study R-8, Section 5.5.1.1)

6.1.1.2 Loafer Creek Campground / BR / DUA / Group Campground / Equestrian Camp Complex

Summary of Relevant Site Information

The Loafer Creek Complex facilities include 1 boat ramp, 1 day use area with swimming beach (usable at higher pool levels only), 1 RV/tent campground with 137 campsites for tents and RVs, 75 tent campsites, 1 group campground with 6 campsites, and 1 equestrian campground with 15 campsites. Within the Loafer Creek Complex, the DUA parking area provides 251 vehicle parking spaces (5 are ADA accessible) and the boat ramp provides192 vehicle/trailer combination spaces (6 are ADA accessible). Existing visitation at the complex has been estimated to total 89,544 RDs annually, and it is projected that visitation at the complex in 2050 would total 177,380 RDs annually. It is estimated that by 2040, recreation season weekend percent occupancy at the Loafer Creek Campground will exceed 80 percent, a level of use considered to be exceeding the facility capacity of this site. Use of the group campground is currently considered to be exceeding recreation season weekend capacity, and it is estimated that by 2050 recreation season weekend percent occupancy at this site will exceed 150 percent (assuming no additional facilities are constructed and use is theoretically allowed to continue beyond 100 percent).

Existing Facility and Use Area Needs

- Provide ADA-accessibility enhancements at the Loafer Creek Group and Equestrian Campgrounds. Currently, only some site facilities (paths,

restrooms, showers, etc.) meet ADA-accessibility guidelines at the Loafer Creek Group and Equestrian campgrounds. A portion of the campsites and parking area could be improved to meet ADA-accessibility guidelines at both locations. Additionally, other site facilities, such as hitching posts, corrals, and trash receptacles, could be improved to meet some ADA-accessibility requirements. (Current to 2010) (Study R-6, Sections 5.3.1.3 and 6.0; Table 6.0-1)

- Provide 2 new group RV campsites with utilities at the Loafer Creek Complex. Based on existing use and a current Statewide deficit of RV camping facilities with future growth predicted, an additional 2 group campsites are needed to meet current demand. These two new group RV campsites could be phased and should be developed to DPR standards, including necessary utility, sewer, water, and road infrastructure, as well as ADA-accessibility guidelines. (Current to 2010) (Study R-8, Section 5.2.2.3)

- Periodically monitor recreation use and impacts at the ramp, DUA and campgrounds. Occupancy of the Loafer Creek campgrounds (including the RV/tent campground, group campground, and equestrian campground), boat ramp, and DUA should be monitored to determine when or if improved/ enhanced or new facilities should be constructed. A recreation monitoring program should be developed to identify threshold criteria or triggering mechanisms for new campsite construction. The established threshold criteria should be reached or exceeded for multiple years (3 out of 5 consecutive years) to ensure that the need is substantiated before potential actions are taken. (Current to 2050) (Study R-8, Sections 5.2.2.3, 5.5.2.3, and 6.3; FERC guidelines)

- Conduct a feasibility study of potential swim facility options to provide improved swimming opportunities at Loafer Creek DUA during the primary 4-month recreation season. The swim beach at Loafer Creek DUA functions well when the reservoir pool level is sufficiently high to leave water in the cove. Unfortunately, the amount of time that this occurs is infrequent and may not routinely occur on a year-to-year basis. Lower reservoir pool levels that make the area unusable for swimming are a result of hydrologic and operational factors that are not expected to change substantially in the future. Although construction and operations and maintenance costs may be relatively high, there are a number of possible options to provide enhanced swimming opportunities at Loafer Creek DUA. One option is to create a sub-impoundment at the Loafer Creek DUA that would serve to keep water levels at the existing beach facility at or near the full pool elevation of Lake Oroville. Water would be retained as the pool level dropped. Another option would be to create a separate swim lagoon impoundment that is unattached to Lake Oroville. Other less costly options may also be considered, such as a swimming

pool and/or a water play area. The feasibility of any of these options would also depend upon future analysis of costs (capital and annual O&M) and potential impacts (or benefits) to environmental and cultural resources, such as water quality, wildlife, and archaeological resources. In addition, permitting would need to be explored. (Current to 2010) (Study R-3, Section 5.2.5, Table 5.2-6)

- Consider providing a new campground activity facility. This larger complex lacks a campground activity facility that would enhance visitor enjoyment, help extend the seasonal use of the campground, and be used as part of the proposed I&E Program. (Current to 2010) (Professional judgment; Study R-13, Section 5.1.8)

- Provide improved shoreline access and ADA-accessibility to the day use area, swimming beach, and cove. Provide hardened paths with an acceptable grade from the adjacent parking area and restrooms down to the lower picnic area and swimming cove/beach. Should this facility be reconstructed or relocated, the new facility should be ADA-accessible for swimming. Provide bank fishing sites in the cove area where feasible, one of which would be ADA-accessible. (Current to 2010) (Study R-6, Section 5.3.3.6)

- Provide low-water reservoir boating access in the Loafer Creek area to 750 feet msl. The Loafer Creek BR has been closed due to low reservoir pool level a large amount of time during the summer boating season. When the Loafer Creek BR is dewatered (below 775 feet msl), boaters camping at Loafer Creek are required to drive several miles to the Bidwell Canyon BR or Spillway BR. As an alternative, upgrade (widen, regravel and regrade) an existing service road near the Loafer Creek DUA that extends to an area available for use as a car-top boat ramp at 750 feet msl (or lower if feasible). This alternative car-top boat ramp would be opened to the public during periods when the main boat ramp is dewatered. Conduct engineering, environmental, and permitting feasibility studies as needed. (Current to 2010) (Study R-7, Section 5.3.4, Table 5.3-4; Study R-3, Section 5.2.2.2, Table 5.2-2)

- Provide more frequent adjustment of the boarding dock(s) at the boat ramp as needed. Partial grounding of the floating dock due to reservoir draw down has at times lessoned the functionality of the dock and may cause damage. The floating dock is important to the efficient and enjoyable use of the ramp by boaters. (Current to 2050) (Professional judgment; Field observations)

- Provide additional boarding dock(s) if feasible to maximize launching capacity. The existing single floating dock at Loafer Creek is fewer than is standard for a boat ramp of this size. Additional docks will improve boat

launching/retrieval efficiency and boost boat ramp capacity. (Current to 2010) (Study R-7, Section 5.3.3)

- Provide boaters with additional information about substitute boating facilities and changing reservoir conditions. The effects of reservoir draw down on the boaters' experience could be ameliorated by providing information about options for boat launching throughout the year. Consider publishing and distributing information about ramp closures or restrictions on the Internet, sign boards, and via other media. (Current to 2050) (Study R-3, Section 5.2.2.2, Tables 5.2-2 and 5.2-3; Study R-7, Section 5.4.9, Table 5.4-18)

- Provide increased debris removal at boat ramps and adjacent facilities. Removing floating woody debris that accumulates at the boat ramp during periods of high water (typically spring and summer), as well as removing sand and mud deposits from the ramp as the pool level decreases, will enhance boaters' access, experience, and safety. (Current to 2050) (Professional judgment; Field observations)

Future Facility and Use Area Needs

- Consider constructing approximately 50 new campsites and re-evaluating the current mix of campsite types, based on monitoring results. Based on projected use estimates and threshold triggers, additional new campsites may be needed at the Loafer Creek Campground in order to meet anticipated future demand here, as well as demand previously identified at the nearby Bidwell Canyon Campground. In general, it is more cost efficient to build entire new campground loops at once than to build a few new campsites periodically (as needed) due to required infrastructure. As such, a larger new campground loop with approximately 50 campsites should be considered in 1 or more phases to address needs at both Bidwell Canyon and Loafer Creek areas. At the same time, reevaluate other existing campsites and potentially convert basic campsites to RV campsites due to increased demand for RV sites. Consider adding utilities for hookups and pavement/spur extensions based on demonstrated needs. These potential new campsites should be developed to DPR standards, including necessary utility, sewer, water, and road infrastructure, as appropriate, as well as ADA-accessibility guidelines. (Anticipated 2011 – 2020) (Study R-8, Sections 5.2.2.3 and 6.3)

- Consider providing a new fish cleaning station if fish waste becomes a problem. The site currently has a developed water system and therefore could potentially support a station. If monitoring shows that fish waste is becoming a problem, or capacity is being exceeded, consider adding a fish cleaning station. (Anticipated 2011-2020) (Professional judgment; Resource protection)

- Consider providing 2 additional group campsites in the Loafer Creek Complex if needed based on monitoring results. Demand for existing group campsites is high and a current Statewide deficit of RV group camping facilities suggests that this demand will continue, particularly for RV group campsites with hookups. It is possible that future demand will result in a need for additional group campsites beyond those already proposed under current needs. As a result, consider developing 2 new group camps in the Loafer Creek Complex. A potential area to consider is converting the southern portion of the existing day use area to group camp use. These facilities should be built to DPR standards, including necessary utility, sewer, water, and road infrastructure, as well as ADA-accessibility guidelines. These group camps may or may not have full hookups, depending upon the demonstrated need at the time. Equestrian horse camp capacity should also be reassessed, with the potential for constructing additional sites west of the existing equestrian campground if monitoring results show a demonstrated need in the future. (Anticipated 2021-2030, subject to monitoring results) (Study R-8, Section 5.2.2.3)

- Consider providing additional parking at the boat ramp when monitoring results demonstrate a need. Provide approximately 40 additional parking spaces at the Loafer Creek BR parking area by expanding the existing lot. Construction would be based on periodic monitoring of use levels and reaching capacity based on threshold triggers. (Anticipated 2031-2040) (Study R-17, Sections 5.5.1.1 and 5.5.1.4, Table 5.5-2)

6.1.1.3 Lime Saddle Campground / BR / DUA / Marina / Group Campground Complex

Summary of Relevant Site Information

The Lime Saddle Complex facilities include 1 boat ramp, 1 day use area, campground with 28 car/tent sites individual campsites and 16 RV sites, a group campground with 6 campsites, and a marina. Within the Lime Saddle Complex, a parking area provides 45 single-vehicle parking spaces (3 are ADA accessible) and 131 vehicle/trailer spaces (7 are ADA accessible). Additional parking is provided in an overflow lot with approximately 70 vehicle/trailer combination spaces. Existing visitation at the complex has been estimated to total 162,220 RDs annually, and it is projected that visitation at the complex in 2050 would total 348,580 RDs annually. It is estimated that by 2040, recreation season weekend percent occupancy at the Lime Saddle Campground will be at or exceed 80 percent, a level of use considered to be exceeding the facility capacity of this site. However, since the facility is fairly new, visitation levels could increase sooner as more visitors discover the site or if other clustered facilities, as proposed, result in additional use levels or extend visitor stays.

Existing Facility and Use Area Needs

- No additional campsites are needed at the Lime Saddle Campground or Group Campground in the near future. In general, all of the existing campground facilities at this site are new and in good condition and do not require significant improvements and/or enhancements at this time. Additionally, existing percent occupancy at this site does not warrant potential expansion in the short-term based on threshold triggers. However, since this new facility may not have been discovered by most visitors, use trends are expected to increase in the future. (Current to 2010) (Study R-10, Section 5.1.1; Study R-8, Section 5.2.2.2)

- Periodically monitor recreation use levels at the Lime Saddle Complex. Recreational use at the Lime Saddle campgrounds (including the campground and group campground) and BR/DUA/Marina should be monitored to determine when/if improved/enhanced or new campsites and related facilities should be constructed. A recreation monitoring program is proposed that identifies threshold criteria or triggering mechanisms for new campsite construction. The established threshold criteria should be exceeded for multiple years (3 out of 5 consecutive years) to ensure that the need is substantiated before potential actions are taken. (Current to 2050) (Study R-8, Section 6.3; FERC guidelines)

- Upgrade existing picnic tables and shade structures while maintaining views at Lime Saddle DUA. The picnicking facilities along the viewpoint area are not up to the standards of other day use facilities in the study area. Develop new facilities to DPR standards. (Current to 2010) (Professional judgment)

- Restore the Lime Saddle Marina that was damaged by a wind storm, cooperating with DPR and the concessionaire. Work with DPR and the concessionaire to reconstruct the damaged marina as part of a new concessionaire contract for the marina. The concessionaire is currently operating the marina with limited facilities but plans to expand. Use reconstruction as an opportunity to improve boat dock capacity, add a low water shuttle system, and an improved marina store/gas dock facility. (Current to 2010) (Study R-10, Table 6.0-2)

- Consider providing temporary event grandstands space during fishing tournaments for use by event organizers. Provide an area(s) that could be used for event grandstands that are temporary. The grandstands could be installed and removed by concessionaires or event organizers. (Current to 2050) (Professional judgment)

- Provide more frequent adjustment of the boarding dock(s) at the boat ramp as needed. Partial grounding of the floating dock (due to reservoir

drawdown) has at times lessoned the functionality of the dock and may cause damage. The floating dock is important to the efficient and enjoyable use of the ramp by boaters. (Current to 2050) (Professional judgment; Field observations)

- Provide additional boarding dock(s) if feasible to maximize launching capacity. The existing single floating dock at the Lime Saddle Boat Ramp is fewer than is standard for a boat ramp of this size. Additional docks will improve boat launching/retrieval efficiency, and will boost boat ramp capacity. (Current to 2010) (Study R-7, Section 5.3.3)

- Provide a new courtesy dock for use by Lime Saddle Campground visitors below the campground in Parrish Cove, connected by a foot trail to the upper campground. Temporary docking is needed near the campground due to the long distance from the boat ramp/marina to the campground. The courtesy dock could be linked with a future trail around Parrish Cove connecting the various facilities and use areas in the complex. (Current to 2010) (Professional judgment)

- Provide increased debris removal at boat ramps and adjacent facilities. Removing floating woody debris that accumulates at the boat ramp during periods of high water (typically spring and summer), as well as removing sand and mud deposits from the ramp as the pool level decreases, will enhance boaters' access, experience, and safety. (Current to 2050) (Professional judgment; Field observations)

- Provide boaters with additional information about substitute boating facilities and changing reservoir conditions. The effects of reservoir draw down on the boaters' experience could be ameliorated by providing information about options for boat launching throughout the year. Consider publishing and distributing information about ramp closures or restrictions on the Internet, sign boards, and via other media. (Current to 2050) (Study R-3, Section 5.2.2.2, Tables 5.2-2 and 5.2-3; Study R-7, Section 5.4.9, Table 5.4-18)

- Consider upgrading ADA-accessibility at the marina. Although access routes to the marina are not necessarily required to be accessible, potential upgrades are likely feasible to improve access to marina amenities, such as restrooms and store. (Current to 2010) (Professional judgment; ADA-accessibility)

Future Facility and Use Area Needs

- Consider constructing approximately 25 to 50 new RV/tent campsites and other complex improvements, if needed, based on monitoring results. Based on projected use estimates, an additional 25 new campsites may

be needed at the Lime Saddle Campground in order to meet anticipated future demand in future years. In general, it is more cost efficient to build a new camp loop than to construct a few sites every few years. As such, a larger new campground loop with 25 sites should be considered at this site when the need is demonstrated. As knowledge of the new campground increases in the future and if other associated day use facilities are added as proposed, use levels could increase faster and capacity could be reached sooner. The potential exists to need up to 25-50 new campsites at this location in later years, an expansion that could consume most of the remaining buildable area. These potential new campsites should be developed to DPR standards, including necessary utility, sewer, water, and road infrastructure, as well as to ADA-accessibility guidelines. Additionally, a new campground complex maintenance yard should be constructed with shop and storage facilities to support the larger complex. (Anticipated 2031 – 2040) (Study R-8, Sections 5.2.2.2 and 6.3)

- Consider providing a new campground activity facility. A new campground activity facility could help extend the seasonal use of the campground and enhance visitor enjoyment. Programs related to the proposed I&E Program could also be based here. This potential facility may be considered if and when the Lime Saddle Campground is expanded based on monitoring. (Anticipated 2031-2040) (Study R-13, Section 5.1.8)

- Consider providing 1 new group RV campsite with utilities at the Lime Saddle Complex based on monitoring results, if needed in the future. The group campsite at Lime Saddle is new and currently receives little use. However, demand for group RV facilities across the State is high and current use levels at Lime Saddle are expected to rise in the future. Based on current estimates of use, group site capacity at Lime Saddle group would not need to be expanded. But current use levels are expected to increase once the site becomes known by the public or it begins to serve as overflow from other group sites. As a result, need for a second group camp at Lime Saddle can be expected during the anticipated term of the new license. This new group RV campsite should be developed to DPR standards, including necessary utility, sewer, water, and road infrastructure, as well as to ADA-accessibility guidelines. This projection is based on current estimates, subject to periodic monitoring. (Anticipated 2031-2040) (Study R-8, Section 5.2.2.2; Study R-12, Sections 5.2.2.3 and 5.2.3)

- Consider providing a new shoreline day use area at Parrish Cove that is linked by trail access to the Lime Saddle Campground and Lime Saddle BR/DUA /Marina. Consider providing picnic facilities (10 family picnic sites, 1 group picnic site with pole grills) at Parrish Cove. Swimming and bank fishing already occurs at this site (at appropriate pool levels);

therefore, the site would have multiple activity opportunities. Develop these facilities to DPR standards. (Anticipated 2031-2040) (Study R-12, Sections 5.2.2.3 and 5.3)

- Consider providing new swimming opportunities at Lime Saddle during the primary 4-month recreation season; conducting a feasibility study of costs, benefits, and options. (Loafer Creek is a higher priority site for potential swimming.) Periods of low reservoir pool levels make Parrish Cove, the undeveloped swimming area in the Lime Saddle area, generally unusable for swimming. Low pool levels are a result of hydrologic and operational factors that are not expected to change substantially in the future. Although capital and annual O&M costs may be high, consideration should be given to a number of possible options to provide enhanced swimming opportunities at Lime Saddle. Loafer Creek should be considered a higher priority compared to Lime Saddle. If swimming facilities are provided at both Loafer Creek and Lime Saddle, then one option would be to create a sub-impoundment at Parrish Cove that would serve to keep water levels at the existing beach facility at or near the full pool elevation of Lake Oroville. Another option at Lime Saddle would be to create a separate swim lagoon impoundment farther upslope at Parrish Cove that is unattached to Lake Oroville. Other less costly options at Lime Saddle may also be considered, such as a swimming pool and/or water play area. The feasibility of any of these options would also depend upon future analysis of potential impacts to environmental and cultural resources, such as water quality, wildlife, and archaeological resources. In addition, permitting would need to be explored. (Anticipated 2031-2040) (Study R-3, Section 5.3; Study R-15, Section 5.3, Figure 5.3-1)

- Consider constructing 50-60 vehicle parking spaces at the Lime Saddle BR/DUA/Marina. This area is projected to exceed parking capacity in the future. Although boaters wanting to use the boat ramp are turned away less frequently than at Bidwell Canyon, at some peak use times no vehicle/trailer spaces are available due to use by cars primarily belonging to marina boaters and guests. Future rehabilitation and improvement of the Lime Saddle Marina (expected after a new long-term contract arrangement is made between DPR and a marina operator) may increase demand for the existing parking. If acquired by DWR, the adjacent PG&E property could potentially be used for additional parking. (Anticipated 2021-2030) (Study R-7, Section 5.5.1.1, Table 5.5-2)

6.1.1.4 Spillway BR / DUA

Summary of Relevant Site Information

The Spillway BR/DUA facilities include 2 boat ramps (an upper and lower ramp) and a day use area. Within the Spillway Complex, 350 vehicle/trailer spaces (8 are ADA accessible) and 118 vehicle parking spaces are provided (8 are ADA accessible), including 40 reserved "en route" RV parking spaces. The lower ramp is in use at reservoir pool levels below about 820 feet msl and provides an additional 264 vehicle/trailer spaces. Existing visitation at the complex has been estimated to total 80,516 RDs annually, and it is projected that visitation at the complex in 2050 would total 177,090 RDs annually.

Existing Facility and Use Area Needs

- Periodically monitor recreation use levels at the Spillway Complex. Recreational use at the Spillway BR/DUA should be monitored to determine when/if improved/enhanced facilities should be constructed. A recreation monitoring program is proposed that identifies threshold criteria or triggering mechanisms for new facility construction. Threshold criteria should be exceeded for multiple years (3 out of 5 consecutive years) to ensure that the need is substantiated before potential actions are taken. (Current to 2050) (FERC guidelines)

- Review RV "En Route" camping at this site due to low use and modify facilities or operations, if needed. Management options that may be considered at this site include: (1) continue RV "en route" camping as is, (2) discontinue RV "en route" camping and use the area to increase parking capacity, or (3) develop more formalized RV camping opportunities, including RV campsites with hookups. This latter option appears to have merit since the current facility designation is used little and parking capacity is not a problem. Consider an option of developing 10 self-contained RV campsites with picnic tables, electrical service, buffer landscaping, signs, and barriers. These sites have the potential for group reservation use as well. (Current to 2010) (Study R-8, Section 5.2.2.6; Study R-9, Section 5.2.1.1, Table 5.2-1)

- Provide more frequent adjustment of the boarding docks at the boat ramp as needed. Partial grounding of floating docks due to reservoir draw down has at times lessoned the functionality of the dock and may cause damage. The floating docks are important to the efficient and enjoyable use of the ramp by boaters. (Current to 2050) (Professional judgment; Field observations)

- Provide increased debris removal at boat ramps and adjacent facilities. Removing floating woody debris that accumulates at the boat ramp during

periods of high water (typically spring and summer), as well as removing sand and mud deposits from the ramp as the pool level decreases, will enhance boaters' access, experience, and safety. (Current to 2050) (Professional judgment; Field observation)

- Provide boaters with additional information about substitute boating facilities and changing reservoir conditions. The effects of reservoir draw down on the boaters' experience could be ameliorated by providing information about options for boat launching throughout the year. Consider publishing and distributing information about boat ramp closures or restrictions on the Internet, sign boards, and via other media. (Current to 2050) (Study R-3, Section 5.2.2.2, Tables 5.2-2 and 5.2-3; Study R-7, Section 5.4.9, Table 5.4-18)

- Extend the boat ramp length below 695 feet msl (when possible). At a minimum, one of the boat ramps at Lake Oroville (such as the centralized Spillway BR) should be extended. One or two of the ramp lanes should be extended when reservoir pool levels get very low (below 695 feet msl). Other boat ramps that may potentially be extended include Lime Saddle and Bidwell Canyon, which currently extend to 702 feet msl and 700 feet msl, respectively. (Current to 2050) (Study R-7, Section 5.3.4, Tables 5.3-4 and 5.3-5)

- Consider providing a floating concessionaire-run store and gas dock at the Spillway BR. Boat travel times to other marinas and other boat ramps can be long. Since this boat ramp is proposed for further extension and has a large year-round capacity, a floating concessionaire-run store and gas dock is proposed at this boat ramp. Other related boating services or facilities may also be considered; however, the area is constrained at low pool levels and full marina services and expansion are unlikely (Current to 2010) (Professional judgment; Study R-13, Section 5.1.2.6, Table 5.1-26)

Future Facility and Use Area Needs

- No other future needs have been identified for this site other than those being continued and previously noted above. Continue to provide annual O&M and monitoring.

6.1.1.5 Enterprise BR

Summary of Relevant Site Information

The Enterprise BR facilities include 1 boat ramp and parking for 40 vehicles/trailer combinations. Existing visitation at the site has been estimated to total 9,438 RDs annually, and it is projected that visitation at the site in 2050 would total 19,270 RDs annually.

Existing Facility and Use Area Needs

- Construct 5-10 family picnic sites. There are limited day use facilities along the east side of the reservoir. Constructing day use facilities at this site will create a new opportunity for visitors to this portion of the reservoir. Develop these facilities to DPR standards. Implement an I&E Program (see Section 5.2.5) to limit user impacts on surrounding sensitive resources. (Current to 2010) (Professional judgment)

- Extend the boat ramp length to 750 feet msl to provide a greater likelihood of full summer-season usability. Lengthen the existing boat ramp to provide improved boater access to lower reservoir pool levels. Alternatively, construct a separate new boat ramp on the east side of the reservoir. (The east side generally refers to the Middle Fork and South Fork arms of the lake.) Cultural resources are known to exist in the Enterprise BR area. Extension of the ramp may prevent disturbance of these cultural resources by boaters launching from the shoreline beyond the ramp when the ramp is unusable. An evaluation of biological and cultural resource and engineering constraints would need to be completed to fully evaluate the suitability of the area for ramp extension. (Current to 2010) (Study R-7, Section 5.3.4, Table 5.3-4; Study R-3, Section 5.2.2.2, Table 5.2-2)

- Provide a boarding dock at the boat ramp. A floating dock is important to the efficient and enjoyable use of the ramp by boaters. (Current to 2010) (Study R-7, Section 5.3.3)

Future Facility and Use Area Needs

- No future needs have been identified for this site, except to continue to provide annual O&M and monitoring.

6.1.1.6 Nelson Bar Car-top BR

Summary of Relevant Site Information

Nelson Bar Car-top BR facilities include 1 boat ramp (essentially an old road that predates the reservoir) and parking for approximately 30 to 50 vehicle/trailer combinations. Existing visitation at the site, which is more for shoreline access (fishing) than for boat launching, has been estimated to total 23,948 RDs annually, and it is projected that visitation at the site in 2050 would total 47,480 RDs annually. Facility capacity is currently considered a limiting factor at the site because during times of lower pool levels, the boat ramp is unusable.

Existing Facility and Use Area Needs

- No existing needs have been identified for this site/facility, except to provide continued annual O&M and monitoring.

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M and monitoring.

6.1.1.7 Vinton Gulch Car-top BR

Summary of Relevant Site Information

Vinton Gulch BR facilities include 1 boat ramp (an old road that predates the reservoir) and undesignated parking for approximately 10 vehicle/trailer combinations. Existing visitation at the site has been estimated to total 6,733 RDs annually, and it is projected that visitation at the site in 2050 would total 11,930 RDs annually.

Existing Facility and Use Area Needs

- Provide additional directional signs as a component of a proposed I&E Program. Additional directional signs on SR 70 and Cherokee Road are needed. Poor directional signage may affect the ability of visitors to locate Vinton Gulch Car-top BR. There is no directional sign on SR 70. There is a poor directional sign on Cherokee Road, making it difficult for visitors to find the turn into the site if they aren't familiar with the roads. (Current to 2010) (Professional judgment)

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M and monitoring.

6.1.1.8 Dark Canyon Car-top BR

Summary of Relevant Site Information

Dark Canyon BR facilities include 1 boat ramp (an old road that predates the reservoir) and parking for approximately 15 to 30 vehicle/trailer combinations. Existing visitation at the site has been estimated to total 7,009 RDs annually, and it is projected that visitation at the site in 2050 would total 14,820 RDs annually. Spatial capacity is currently considered a limiting factor at the site.

Existing Facility and Use Area Needs

- Providing additional directional signs as a component of a proposed I&E Program. Directional signs should be added at key locations along the route to Dark Canyon Car-top BR. There are no directional signs at key locations along the route to Dark Canyon Car-top BR, making the site difficult to find. (Current to 2010) (Professional judgment)

- Replace the vault toilet building that was vandalized. Replace the vault toilet building that was destroyed by vandals with a new one. (Current to 2010) (Professional judgment)

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.1.9 Foreman Creek Car-top BR

Summary of Relevant Site Information

Foreman Creek facilities include 1 boat ramp (an old road that predates the reservoir) and gravel parking areas for approximately 15 to 30 vehicle/trailer combinations (approximately 15 roadside spaces are available at high pool levels). Existing visitation at the site has been estimated to total 14,413 RDs annually, and it is projected that visitation at the site in 2050 would total 29,200 RDs annually. Ecological, spatial, and facility capacity are currently considered limiting factors at the site. Of special concern are cultural resources exposed at the site during the annual reservoir drawdown, particularly at low pool levels.

Existing Facility and Use Area Needs

- Provide additional visitor education regarding the preservation of cultural and other sensitive resources at the site as a component of the proposed I&E Program. This program could include a kiosk with interpretive and informational panels or other additional interpretive programs. I&E enhancements would be coordinated with appropriate entities, such as Indian Tribes and DPR. No vehicles should be allowed in the draw down zone except in designated locations. Information about the protection of water quality within swimming areas should be provided to visitors. (Current to 2050) (Professional judgment)

- Provide increased trash pick-up. Trash at the site and along the shoreline degrades the recreational experience, especially for on-site activities such as bank fishing. This site was found to have a high concern regarding trash accumulation. The proposed I&E program (see Section 5.2.5)

should feature litter control to limit user impacts at the site. (Current to 2050) (Study R-11, Section 6.2.1) (Study R-4, Table 6.1-1; FERC guidelines)

- Improve shoreline conditions and provide other basic day-use amenities to facilitate use of the area, including swimming. The undeveloped Foreman Creek area provides one of the few areas on Lake Oroville with road access and gently sloped shorelines that could potentially be developed to provide needed swimming access. Muddy shorelines reduce the usability of the area for swimming and could potentially be improved with the addition of a sandy beach. However, providing sand is problematic, considering the range of water surface fluctuation. Other basic amenities such as a vault toilet building, trash receptacle, and picnic tables would further enhance use for swimmers and others. (Current to 2010) (Study R-3, Section 5.2.3.4)

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.1.10 Stringtown Car-top BR

Summary of Relevant Site Information

Stringtown facilities include 1 boat ramp (an old road that predates the reservoir) and parking for approximately 6 vehicle/trailer combinations. Additional undeveloped parking becomes available as the reservoir pool level recedes. Existing visitation at the site has been estimated to total 11,645 RDs annually, and it is projected that visitation at the site in 2050 would total 22,980 RDs annually. Spatial capacity and facility capacity are currently considered limiting factors at the site.

Existing Facility and Use Area Needs

- Provide additional directional signs as a component of a proposed I&E Program. Directional signs could be added at key locations along the route to Stringtown Car-top BR. There is no directional sign on Hurleton Road or on Forbestown Road for Stringtown Car-top BR, making it difficult for visitors to locate the site. The sign on Stringtown Road is too far past the intersection for clear direction when coming from the east. (Current to 2010) (Professional judgment)

- Repair or replace the crumbling asphalt road and eroding road bed within the inundation zone. The old road used for access to the shore and boat launching is in poor condition. Repair or replacement of the road would

improve vehicle access and boat launching. It would also enhance the aesthetic setting and shoreline access/swimming/bank fishing opportunities. (Current to 2010) (Study R-3, Section 5.2.3.5; Study R-10, Section 5.1.4.16)

- Periodically monitor water quality at this location that is used for swimming. (Current to 2050) (Resource protection; Preliminary Data from Environmental Work Group; Studies W-1 and W-3)

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.1.11 Lake Oroville Visitors Center

Summary of Relevant Site Information

Visitors Center facilities include an interpretive center, a viewing tower, and parking for 90 vehicles and 17 vehicle/trailer combinations. Current visitation at the center has been estimated to total 93,553 RDs annually, and it is projected that visitation at the complex in 2050 would total 241,850 annually. Spatial capacity is a limiting factor at the site. In addition, it is estimated that by 2050, recreation season weekend percent occupancy at the Lake Oroville Visitors Center will exceed 80 percent. Additionally, off-season percent occupancy will also likely reach and/or exceed this level of percent occupancy by 2050. This level of use is considered to be exceeding the facility capacity of this site.

Existing Facility and Use Area Needs

- No existing needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

Future Facility and Use Area Needs

- Consider providing additional parking capacity in the future. Expand the parking area by adding approximately 20-25 spaces based on monitoring results. (Anticipated 2041-2050) (Study R-8, Section 5.4.2.1, Table 5.4-1; Study R-12, Sections 5.3.1.4 and 5.3.2, Table 5.3-2)

- Consider alternative uses and locations for the Visitors Center. As part of the proposed I&E Program, other uses for the current facility may become a need, such as additional meeting rooms, curation area, administrative space, gathering space, or environmental learning center. When these needs become a high priority, consider alternative locations for the visitors center. Potential locations may include other sites closer to SR 70 where many visitors first reach the Oroville area, such as the Montgomery Street

exit or at the North Thermalito Forebay DUA. (Anticipated 2011 to 2050) (Study R-10, Table 6.0-2)

6.1.1.12 Saddle Dam Trailhead Access

Summary of Relevant Site Information

The Saddle Dam area includes trail access and parking for approximately 40 vehicles and a vault toilet building. Existing visitation at the site has been estimated to total 4,690 RDs annually, and it is projected that visitation at the site in 2050 would total 9,050 RDs annually.

Existing Facility and Use Area Needs

- Construct short developed trails to access the shoreline. Currently, there are many short steep trails that access the shoreline. Erosion was noted at this site as gullies have appeared. It is suggested that short developed trails with appropriate slopes be built at this site to access the shoreline and decrease the impacts related to erosion. (Current to 2010) (Study R-11, Sections 6.1.2.3 and 6.2.1)

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.1.13 Bloomer Area BICs

Summary of Relevant Site Information

Bloomer area facilities include the Bloomer Cove BIC with 5 individual campsites, the Bloomer Knoll BIC with 6 individual campsites, the Bloomer Point BIC with 25 individual campsites, and the Bloomer Group BIC with 1 group campsite that has a 75-person capacity. Pool level significantly influences access to these sites, with steep access routes discouraging most use at pool levels below 850 ft. As such, facility capacity at the boat-in campsites is considered to be below capacity, but it is currently considered a limiting factor for the sites due to facility access constraints.

Existing Facility and Use Area Needs

- No existing needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.1.14 Goat Ranch BIC

Summary of Relevant Site Information

The Goat Ranch facilities include one BIC with five individual campsites. Despite typically low percentage occupancy of the site, facility capacity is a limiting factor at the site due to limited access at low reservoir levels (steep access routes discourage most use at pool levels below 850 ft).

Existing Facility and Use Area Needs

- No existing needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.1.15 Foreman Creek BIC

Summary of Relevant Site Information

The Foreman Creek facilities include one BIC with 26 individual campsites. Despite typically low percentage occupancy of the site, facility capacity is considered a limiting factor at the site due to limited access at low reservoir pool levels (steep access routes discourage most use at pool levels below 850 ft).

Existing Facility and Use Area Needs

- No existing needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.1.16 Craig Saddle BIC

Summary of Relevant Site Information

The Craig Saddle facilities include one BIC with 18 individual campsites. Despite typically low percentage occupancy of the site, facility capacity is a limiting factor at the site due to limited access at low reservoir pool levels (steep access routes discourage most use at pool levels below 850 ft).

Existing Facility and Use Area Needs

- No existing needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.1.17 Oroville Dam Overlook DUA

Summary of Relevant Site Information

The Oroville Dam Overlook day use and overlook facilities include picnic table, restrooms, and informational displays. Roadside parking for approximately 20 vehicles (seasonally closed due to security reasons) is available at the east end of the dam and a similar number of spaces are available near the picnic sites and a monument to the dam builders at the west end of the dam crest road (2 are ADA accessible). There are also approximately 400 additional parking spaces located on the dam; however, parking at the west end and on the dam has not been allowed under heightened security conditions. Existing visitation at the dam has been estimated to total 189,765 RDs annually, and it is projected that visitation at the complex in 2050 would total 466,790 annually. By 2050, however, it is anticipated that percent occupancy will reach and/or exceed 80 percent during recreation season weekends. This level of use would be considered to exceed the facility capacity of this site.

Existing Facility and Use Area Needs

- No existing needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

Future Facility and Use Area Needs

- Consider constructing 30-50 additional vehicle parking spaces. This site is projected to exceed capacity and require additional parking capacity.

(Anticipated 2041-2050) (Study R-8, Section 5.4.3.2, Table 5.4-1; Study R-12, Sections 5.3.1 and 5.3.2, Table 5.3-2)

6.1.1.18 Floating Campsites

Summary of Relevant Site Information

The 10 floating campsites anchored in the southern part of Lake Oroville, available by reservation only, provide a unique camping opportunity to boaters. Each campsite is a two-story structure with living space and amenities such as a gas grill, table, sink, storage areas, and sleeping areas. Each site also contains a restroom. Several boats can be tied up alongside each floating campsite, each of which can accommodate up to 15 people. The facilities are very popular during the summer boating season with nearly 80 percent occupancy recorded during the months of June through August 2002 and May and June 2003. The campsites are generally anchored in more sheltered coves and with restricted speed zones marked by buoys and out-of-the-flow of boat traffic. Several locations around the reservoir may be able to accommodate campsites, expanding this unique boating and camping opportunity.

Existing Facility and Use Area Needs

- Provide two or three additional floating campsites on Lake Oroville. Suitable protected coves not already occupied by floating campsites or floating restrooms would need to be identified, in particular in the central and northern arms of the reservoir. Although it is important to provide sufficient spacing and privacy between floating campsites, some coves currently with one or two campsites may be able to accommodate an additional campsite. Coves for houseboat moorage also need to be considered. Another important location consideration is maintenance needs. All boat-based maintenance is currently conducted out of the Bidwell Marina, but extension of this capability to the Lime Saddle Complex would make potential installation in the northern part of the reservoir more operationally efficient. (Current to 2010) (Study R-7, Section 5.2, Table 5.2-13)

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.1.19 Floating Restrooms

Summary of Relevant Site Information

The seven floating restrooms anchored in several areas of Lake Oroville provide a convenience for boaters and also protects water quality. Each floating restroom provides two stalls and space for several boats to tie up while boaters use the facility. The facilities are well used, in particular during the summer boating season. Generally, boats were not observed to have to wait to use the facilities, and surveyed boaters did not voice complaints about waiting, maintenance, or any other issue related to the facilities.

Existing Facility and Use Area Needs

- No existing needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.1.20 Upper North Fork Arm Below Poe Powerhouse

Summary of Relevant Site Information

The Upper North Fork arm of Lake Oroville extends from the Big Bend Dam, downstream about 12 miles to the confluence with the West Branch Feather River arm. This narrow segment of the reservoir, referred to as the "Big Bend" area, is used by reservoir boaters and, during certain periods of reservoir drawdown, by whitewater kayakers. (This section is concerned with the segment only when it is available for whitewater boating; reservoir boating is addressed elsewhere.) During some years, generally during the late summer, fall, and winter, reservoir drawdown exposes 4-5 miles of the original river (more in lower water years), and a whitewater run becomes available. Paddlers can put in from a gravel bar at the PG&E Poe Hydroelectric Project Powerhouse, about ½ mile upstream from the breached Big Bend Dam and the FERC boundary.

Whitewater paddlers have indicated they will paddle the Big Bend run if the Lake Oroville elevation is 730 ft or below (170 feet below full pool), a condition that occurred in only 7 of the 15 years between 1988 and 2002. In some of those years, this condition did not occur until the winter, when fewer paddlers are interested in paddling the run. At the 730 ft pool elevation, paddlers have about 6 miles of whitewater to run and about 8 miles of flatwater paddling afterwards to the take-out at Dark Canyon Car-top BR (about 2 miles up the West Branch arm). At a pool elevation of 650 feet, a level rarely reached, paddlers have about

7 miles of whitewater to run and about 7 miles of flatwater paddling to the take-out. The Upper North Fork arm has no facilities, and only two four-wheel drive roads provide vehicle access to or near the reservoir shoreline. Paddlers have expressed an interest in development of additional take-out locations or, given the lack of adequate road access, a water shuttle service from the end of the run to Dark Canyon Car-top BR.

Existing Facility and Use Area Needs

- No existing needs have been identified for this use area that are a high priority, except to provide for periodic monitoring.

Future Facility and Use Area Needs

- Consider providing a future boater take-out if feasible, or a potential non-motorized watercraft tow service for whitewater boaters who run the North Fork Feather River from the PG&E Poe Powerhouse to the Lake Oroville flatwater. During low reservoir pool elevations (730 ft or lower) that may occur between September and November, when boaters are most interested in the run, explore the feasibility of developing a new boater take-out or providing a tow service for boaters if demand warrants and this option is cost effective. This could potentially be a concessionaire-run service operated out of Lime Saddle Marina. (Current to 2050) (Study R-16, Section 6.1.3)

- Consider obtaining and providing real time river flow data below the PG&E Poe Project Powerhouse on the Upper North Fork arm; consider actions to increase whitewater boaters' awareness of sources for reservoir pool level data. Along with reservoir pool elevation data, the flow level of the North Fork River is important information for whitewater kayakers to consider when deciding whether to paddle the run or not (when reservoir drawdown allows the river to be run). The flow of water released from PG&E's Poe Powerhouse and entering the Upper North Fork arm is controlled by PG&E, and PG&E is the source for the flow information. Consider requesting that PG&E provide easily accessible sources of information, such as a flow phone number, printed data, or Internet data on current water releases from the Poe Powerhouse and flows into the Upper North Fork arm of Lake Oroville and publicizing the sources of information.

  Because reservoir pool level is a key decision factor for kayakers to decide whether or not to paddle the Big Bend Run on the Upper North Fork arm, it is important that area paddlers are aware of where they can obtain that information. Efforts should be made to ensure that local paddling clubs, paddling publications, and other interested groups are aware of websites (such as the California Data Exchange Center website) that contain daily reservoir elevation information. Consideration should

also be given to the development and publicizing of non-electronic sources of the information, for example flow phone information lines or print media sources. (Anticipated as lesser priority 2011 to 2050) (Study R-16, Section 6.1.3)

6.1.2 Diversion Pool

This section discusses specific needs at the various public recreation sites and facilities in the Diversion Pool resource area.

In addition to capital improvements listed below for each site in this resource area (that is part of the Oroville Facilities), there is inevitably the need for ongoing maintenance once any facilities are constructed.

6.1.2.1 Diversion Pool DUA

Summary of Relevant Site Information

The Diversion Pool facilities include shoreline trail and road access and a vault toilet building. There is also a portable toilet at the Lakeland Boulevard Trailhead Access. Visitation in 2002/2003 at the Diversion Pool has been estimated to total 20,603 RDs annually, and it is projected that visitation at the complex in 2050 would total 37,610 RDs annually. Overall, spatial capacity is a limiting factor at the Diversion Pool DUA.

Existing Facility and Use Area Needs

- Construct additional day use facilities including approximately 5-10 new picnic tables with pole grills and a gravel car-top boat ramp near the vault toilet building along the Diversion Pool along the Burma Road. Design the day use areas to maintain the semi-primitive experience found in this scenic area. Provide I&E Program facilities as appropriate. Develop these facilities to DPR standards. (Current to 2010) (Professional judgment; Study R-13, Section 5.1.2.6, Table 5.1-28)

Future Facility and Use Area Needs

- Consider providing an ADA-accessible fishing pier or platform. Provide a fishing access site for persons with physical disabilities in a location along the Diversion Pool shoreline where fishing success is relatively good. Assess potential sites with input from anglers who use the area. (Current to 2010) (ADA-accessibility; Professional judgment)

6.1.2.2 Lakeland Boulevard Trailhead Access

Summary of Relevant Site Information

The Lakeland Boulevard site provides trail access and unpaved parking, commonly used by equestrians. Visitation in 2002/2003 at the site has been estimated to total 4,004 RDs annually, and it is projected that visitation at the site in 2050 would total 7,300 RDs annually.

Existing Facility and Use Area Needs

- Provide a new southern shoreline day use/picnic site with car-top boat launching and direct road access from the Lakeland Boulevard Trailhead Access area. Provide vehicular access and gravel parking off Lakeland Blvd. Regrade and regravel the existing road. Secure an easement along the right-of-way from Union Pacific Railroad if possible. Provide a shoreline day use site with 5-10 picnic tables, pole stoves, gravel hand-launch car-top boat ramp, and fencing along the railroad right-of-way as appropriate. (Current to 2010) (Professional judgment)

- Provide expanded trailhead facilities at the Lakeland Boulevard Trailhead Access site to access the Diversion Pool. Improvements to be provided at the trailhead include roadway and parking area regrading and regraveling, new signage, and new vault toilet building. Provide separate roadway and trail access to the proposed day use site along the southern shoreline of the Diversion Pool. These potential improvements would be further defined in the proposed Comprehensive Non-Motorized Trails Program. (Current to 2010) (Professional judgment)

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.3 Low Flow Channel / Feather River

This section discusses specific needs at the various public recreation sites and facilities along the Low Flow Channel between the Fish Barrier Dam and Afterbay outlet. Portions of this resource area are inside and outside the FERC boundary.

In addition to capital improvements listed below for each site in this resource area (that is part of the Oroville Facilities), there is inevitably the need for ongoing maintenance once any facilities are constructed.

6.1.3.1 Feather River Fish Hatchery

Summary of Relevant Site Information

The Feather River Fish Hatchery facilities include observation areas, a viewing platform, and parking for 100 vehicles. Existing visitation at the site has been estimated to total 160,395 RDs annually, and it is projected that visitation at the complex in 2050 would total 367,000 RDs annually. Overall, spatial capacity is currently exceeded at the Fish Hatchery visitor area. Little or no potential exists to increase the physical area of this site. Also, the existing site is built-out and cannot accommodate additional site facilities. As such, spatial capacity is considered a limiting factor at this time.

Existing Facility and Use Area Needs

- No existing needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring. Potential I&E related enhancements would be considered under the proposed I&E Program.

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring. Potential I&E related enhancements would be considered under the proposed I&E Program.

6.1.3.2 Riverbend Park

Summary of Relevant Site Information

Riverbend Park is owned and managed by the FRRPD and provides day use amenities outside of the FERC boundary, but may serve visitors in the area. Existing visitation at the site has been estimated to total 30,230 RDs annually, and it is projected that visitation at the complex in 2050 would total 52,230 RDs annually. Spatial capacity is considered to be approaching capacity at the park; however, space remains available for the addition of facilities.

Existing Facility and Use Area Needs

- Continue to coordinate with the FRRPD and other interested parties in the planning, design, and construction of Riverbend Park. (Current to 2010) (Professional judgment)

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility.

6.1.4 Thermalito Forebay

This section discusses specific needs at the various public recreation sites and facilities at Thermalito Forebay. In addition to capital improvements listed below for each site in this resource area (that is part of the Oroville Facilities), there is inevitably the need for ongoing maintenance once any facilities are constructed.

6.1.4.1 North Thermalito Forebay BR / DUA / Aquatic Center / "En-Route" Campground Complex

Summary of Relevant Site Information

The North Thermalito Forebay Complex includes two paved boat ramps, a day use area, and an Aquatic Center. "En-route" RV camping is permitted with 15 RV parking spaces, but no additional amenities are provided other than those available to day use visitors. The Aquatics Center was never fully completed. Water quality and temperature concerns (related to swimming) have been expressed. Within the complex, parking is provided in 251 vehicle parking spaces (9 are ADA accessible) and 25 vehicle/trailer combination parking spaces (1 is ADA accessible). Overflow parking is available near the day use area. Existing visitation at the complex has been estimated to total 86,065 RDs annually, and it is projected that visitation at the complex in 2050 would total 151,070 RDs annually. Existing recreational use of the complex is considered to be below capacity based on percent occupancy of parking for vehicle/trailer combinations, although facility capacity is over 80 percent occupancy on recreation season holidays. Recreation season weekend capacity is expected to reach and/or exceed 80 percent occupancy (for vehicle/trailer combinations) by 2050. As such, facility capacity is currently considered a future limiting factor due to parking capacity constraints.

Existing Facility and Use Area Needs

- Evaluate options to potentially warm the water for enhanced swimming opportunities and help protect water quality in the swim area. The swim facilities have benefited from some recent upgrades; most (including parking, restrooms, some picnic sites, and an outdoor shower) are ADA accessible. The area is very popular with visitors, in part due to the large turf area with shaded picnic areas and associated amenities. Therefore, actions to address the apparent water quality issues at the beach should be a priority. Options to consider might include operational changes to increase the circulation of water into the swim area embayment, chemical treatment of the water to control bacteria, and/or reduction in the number

of waterfowl using the area. It should be noted that increased circulation of water from the main body of the North Forebay may decrease the water temperature at the swim beach. Exclusion of waterfowl from the beach itself, or a reduction of their use of the beach, may be sufficient to reduce bacterial loads. Further explore the feasibility of operational and engineering solutions that may increase the water temperature for swimmers while protecting water quality. Options may include: (1) providing pumped water or modified water circulation to allow more warming of the swim cove water; (2) providing a water "play feature" (such as a shallow stream with small boulders) with landscaping; or (3) constructing one or more swimming or wading pools (particularly if water quality concerns restrict swimming in the Forebay cove). (Current to 2010) (Study R-3, Sections 5.1.1.2 and 5.2.6.1, Table 5.1-3)

- Provide new non-motorized trail loop opportunities in the Thermalito Forebay area as a component of the proposed trails program. Consider new non-motorized trail development and trailheads at suitable locations in the North Thermalito Forebay area. (Current to 2010) (Study R-13, Section 5.1.2.6)

- Provide additional shoreline trail access points. More shoreline could be accessed by adding small spur trails to the waters edge from the existing Brad P. Freeman Trail, possibly leading to fishing access platforms with trash receptacles and signage. (Current to 2010) (Study R-3, Report Summary; Study R-4, Table 6.1-1)

- Consider providing basic improvements to the Aquatics Center to complete the facility for basic needs. The Aquatics Center was never fully completed to address the basic needs of users. Provide utility extensions and hookups at this facility that were previously initiated but never completed. Provide additional covered boat storage. Consider providing non-motorized watercraft rentals for general public use from the Aquatic Center facility via a concessionaire. Several other potential uses for this facility have been suggested relating to needs of specialized boating organizations, clubs, universities, etc. Since space is available, these types of specialized organizational needs may potentially be accommodated at this site. However, such facilities or services would be constructed and operated by others, not the licensee. (Current to 2010) (Professional judgment)

Future Facility and Use Area Needs

- Consider providing a fish cleaning station. The site currently has a developed water system and therefore could potentially support a new fish cleaning station. If monitoring shows that fish waste is becoming a

problem, consider adding a fish cleaning station at this location. (Anticipated 2011-2020) (Professional judgment; Resource protection)

- Consider options for camping; potentially replace current RV "En Route" camping at this site. RV "en route" camping in this location should be reevaluated since RV camping here is minimal. Management options that may be considered at this site include: (1) continue RV "en route" camping as is, (2) discontinue RV "en route" camping, or (3) develop more formalized RV camping opportunities, possibly including campsites with hookups. This latter option may include a solution similar to the Spillway area (see Section 6.1.1.4) with a small self-contained RV camping area of approximately 10 or more sites. Alternatively, another solution may include developing a separate RV camping area with approximately 25 campsites with picnic tables, shade ramadas, shower/restroom facilities, and landscaping. A potential location for this facility is overlooking the Power Canal to the south. (Anticipated 2011 to 2020) (Study R-8, Section 5.2.2.5; Study R-9, Section 5.2.1.3 and Table 5.2-3)

6.1.4.2 South Thermalito Forebay BR / DUA

Summary of Relevant Site Information

The South Thermalito Forebay facilities include a day use area with picnic tables and pole grills, a two-lane boat ramp, a vault toilet building, and a graded and graveled, unmarked parking area. Existing visitation at the site has been estimated to total 49,655 RDs annually, and it is projected that visitation at the complex in 2050 would total 85,930 RDs annually.

Existing Facility and Use Area Needs

- Provide an ADA accessible fishing pier or platform. Bank fishing is the most popular primary activity within the study area and fishing is the second most common reason for visiting the study area; however, ADA accessible fishing opportunities are limited. The South Forebay is the only suitable area with other ADA accessible facilities (restrooms); therefore, it is a good option for an ADA accessible fishing pier or platform. The new facility should be located where fishing is relatively good. Anglers who use the area should be consulted for potential locations. (Current to 2010) (FERC guidelines; Professional judgment; Study R-6 results)

- Provide periodic water quality monitoring. Because this area is used for swimming and wading and is also frequented by numerous waterfowl, water quality should be monitored. No water quality issues have been identified currently, perhaps due to adequate circulation of the water and coldwater temperatures. However, the potential exists for future problems. (Current to 2050) (Study W-3, selected data on sites with water quality concerns)

- As a component of a proposed Comprehensive Non-Motorized Trails Plan, provide new trail opportunities in the South Thermalito Forebay area. Consider new non-motorized trail development and trailheads at suitable locations. (Current to 2010) (Study R-13, Section 5.1.2.6)

- Provide improved day use and swimming facilities at the South Forebay to enhance visitor use of the area. The current day use area is relatively hot and barren. As a result, enhancements are needed to meet long-term day use/swimming needs including developing a sandy swim beach (current swim area is barren and rocky), providing additional landscaping and shade trees, constructing additional picnic tables (5-10) with pole grills/stoves, and paving parking areas. Nearby vernal pools should be fenced to protect these sensitive resources. These enhancements would further complement a newly installed vault toilet building and a fish cleaning station. (Current to 2010) (Professional judgment; Resource protection)

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.5 Thermalito Afterbay

This section discusses specific needs at the various public recreation sites and facilities along Thermalito Afterbay. In addition to capital improvements listed below for each site in this resource area (that is part of the Oroville Facilities), there is inevitably the need for ongoing maintenance once any facilities are constructed.

6.1.5.1 Wilbur Road BR

Summary of Relevant Site Information

The Wilbur Road site provides a 2-lane boat ramp and parking for 14 car/trailer combinations, and a vault toilet building. Existing visitation at the site has been estimated to total 12,637 RDs annually, and it is projected that visitation at the complex in 2050 would total 27,340 RDs annually. During holiday weekends, parking occupancy is currently over 100 percent. By 2020, parking occupancy at this site is projected to exceed the 80 percent weekend capacity threshold. As such, facility capacity is considered a limiting factor because of existing holiday and future weekend percent occupancy constraints.

Existing Facility and Use Area Needs

- As a component of the proposed I&E Program, provide a directional sign(s). Directional sign(s) should be added at the entrance to Wilbur Road BR. (Current to 2010) (Study R1, Table 6.3-1)

- Reduce boat speeds on the Thermalito Afterbay. Higher boating speeds by power boats and PWC on the Thermalito Afterbay are inconsistent with wildlife and habitat protection goals in this area. Enforce the boating speed limit (maximum of 5 mph) on Thermalito Afterbay north of SR 162. The facility is the only boat access on that portion of the Afterbay although boats also enter the proposed speed restriction area from south of SR 162. Evaluate the need for related signage at the Wilbur Road Boat Ramp, marker buoys, and additional law enforcement if a speed reduction recommendation is implemented. (Current to 2010) (Study R-4, Section 5.2.7.4; Resource integration)

Future Facility and Use Area Needs

- Consider constructing 5-10 additional vehicle parking spaces. This site is projected to exceed capacity and require additional parking capacity. (Anticipated 2011-2020) (Study R-7, Section 5.5.1.1, Table 5.5-2)

6.1.5.2 Larkin Road Car-top BR

Summary of Relevant Site Information

The Larkin Road site provides a car-top boat ramp and a paved parking lot for approximately 30 to 50 vehicles, and a vault toilet building. Existing visitation at the site has been estimated to total 23,073 RDs annually, and it is projected that visitation at the complex in 2050 would total 44,890 RDs annually. By 2050, it is projected that recreation season weekend parking occupancy will exceed 80 percent occupancy. As a result, facility capacity is considered a limiting factor due to future parking capacity constraints.

Existing Facility and Use Area Needs

- Construct 5-10 new family picnic tables with shade structures at this site. Developing Larkin Road as a day use site provides additional shoreline access in the study area. The site already receives informal day use. Construct these facilities to DPR standards. (Current to 2010) (Professional judgment)

- As a component of a proposed I&E Program, provide new directional signs. Directional signs should be added at key locations along the route to Larkin

Road Car-top BR. There is no signage for the Larkin Road Car-top BR on SR 70, SR 162 or SR 99. (Current to 2010) (Professional judgment)

- Reduce boat speeds on the Thermalito Afterbay. Higher boating speeds by power boats and PWC on the Thermalito Afterbay are inconsistent with wildlife and habitat protection goals in this area. Enforce the boating speed limit (maximum of 5 mph) on Thermalito Afterbay north of SR 162. The facility is not within that portion of the Afterbay, but boaters launching here may enter the proposed speed restriction area from south of SR 162. Therefore, signage should be considered at the Larkin Road Car-top BR if a speed reduction recommendation is implemented. (Current to 2010) (Study R-4, Section 5.2.7.4)

- Provide a swim beach area and other day-use enhancements. This area is currently used informally for swimming. Addition of a beach area and other day use amenities such as picnic tables and shade structures could separate swimming and boating uses, reduce unconfined shoreline use and resulting degradation, and enhance opportunities for swimmers and others. (Current to 2010) (Study R-11, Section 5.2.2.1, Table 5.2.2)

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.5.3 Monument Hill BR / DUA

Summary of Relevant Site Information

The Monument Hill facilities include a day use area, a 2-lane boat ramp, parking for 10 single vehicles and 39 car/trailer combinations, an additional graded and graveled parking area approximately 60 by 60 yards in area, and a restroom with flush toilets. Existing visitation at the site has been estimated to total 56,767 RDs annually, and it is projected that visitation at the complex in 2050 would total 110,440 RDs annually. Existing recreational use at the site is considered to be below capacity based on percent occupancy, although facility capacity is nearing 80 percent occupancy on recreation season holidays. Recreation season weekend capacity is not expected to reach and/or exceed 80 percent occupancy by 2050. However, without the overflow parking area, this site would likely be considered approaching and/or at capacity on recreation season weekends. As such, while facility capacity is currently below capacity based on existing percent occupancy, facility capacity is currently considered a limiting factor at the site.

Existing Facility and Use Area Needs

- Reduce boat speeds on the Thermalito Afterbay. Higher boating speeds by power boats and PWC on the Thermalito Afterbay are inconsistent with wildlife and habitat protection goals in this area. Enforce the boating speed limit (maximum of 5 mph) on Thermalito Afterbay north of SR 162. The facility is not within that portion of the Afterbay, but boaters launching here may enter the proposed speed restriction area from south of SR 162. Therefore, signage should be considered at the Monument Hill Boat Ramp if a speed reduction recommendation is implemented. (Current to 2010) (Study R-4, Section 5.2.7.4)

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.5.4 Model Aircraft Flying Area

Summary of Relevant Site Information

The Model Aircraft Flying Area site provides model aircraft runway facilities, a vault toilet building, picnic tables, and parking for 20 vehicles. Visitation counts did not take place at this site because of the remote location and because the site is often closed to general public use.

Existing Facility and Use Area Needs

- No existing needs have been identified at this site.

Future Facility and Use Area Needs

- No future needs have been identified at this site, except to provide annual O&M if appropriate and monitoring.

6.1.5.5 Clay Pit SVRA

Summary of Relevant Site Information

The Clay Pit SVRA provides 220 acres of land for ORV use managed by DPR outside of the FERC boundary, as well as a staging area for loading and unloading vehicles. Existing visitation at the site has been estimated to total 18,324 RDs annually, and it is projected that visitation at the site in 2050 would total 25,610 RDs annually. Ecological capacity is currently a limiting factor at the site due to the number and severity of observed ecological impacts at this site.

Spatial capacity is also currently considered a limiting factor at the site because of expansion constraints.

Existing Facility and Use Area Needs

- Manage the Clay Pit SVRA to accommodate continued OHV use. OHV use potentially can lead to ecological impacts. These potential impacts include soil compaction, soil erosion, and damaged vegetation. By concentrating OHV use in the Clay Pit, the area that is impacted is limited. Additionally, the area that is being used was previously disturbed when the Oroville Dam was built. (Current to 2050) (Study R-11, Section 6.1.2)

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.6 Oroville Wildlife Area

This section discusses specific needs at the various public recreation sites and facilities in the OWA. In addition to capital improvements listed below for each site in this resource area (that is part of the Oroville Facilities), there is inevitably the need for ongoing maintenance once any facilities are constructed.

6.1.6.1 OWA Afterbay Outlet BR / DUA / Campground

Summary of Relevant Site Information

The OWA Afterbay outlet complex includes 1 gravel boat ramp, 1 day use area, a designated camping area with an undesignated number of primitive campsites, and a general parking area for approximately 40 vehicles. Existing visitation at the OWA has been estimated to total 318,462 RDs annually, and it is projected that visitation at the complex in 2050 would total 507,260 RDs annually. Existing utilization of this site was approximately 67 percent during recreation season weekdays and rose to over 100 percent on weekends. During holidays, percent occupancy at this site was also at and/or exceeding 100 percent (Study R-9—*Existing Recreation Use*). Ecological, facility, and social capacity are currently primary limiting factors at this site, and spatial capacity may be a limiting factor in the future. Ecological capacity is currently a limiting factor due to the number and severity of observed ecological impacts at this site. Facility capacity is a limiting factor because of very high levels of existing and future anticipated use. Social capacity is a limiting factor at this site due to the high mean perceived crowding score.

Existing Facility and Use Area Needs

- Evaluate the practice of allowing undeveloped camping in the OWA and implement actions. Management options that may be considered include: (1) continue to allow camping as is, (2) close some or all camping areas, (3) provide some hardened camping-related facilities (access roads, designated campsites, garbage receptacles, restrooms, vegetative screening, etc.) to help limit potential ecological impacts, and (4) construct a small, more primitive developed campground within the OWA that maintains the setting characteristics of the area. (Current to 2010) (Professional judgment; Resource protection)

- Provide increased visitor management and enforcement in the OWA to enforce fishing and other use restrictions. Although illegal fishing may be occurring on the Feather River throughout the OWA, the Afterbay outlet site contains the greatest concentration of fishing activity and therefore should be a priority for enforcement efforts. Currently there are not enough patrols or staff to stop illegal practices, such as fish snagging and fishing illegally fishing from the outlet structure. Consider providing for more staff and patrols to stop these illegal practices. Additional patrols could also curb disruptive behavior which currently happens during peak times at the Afterbay outlet. (Current to 2010) (Study R-4; Table 6.1-1)

- As a component of the I&E Program, provide additional directional signs. Directional signs should be added at key locations along the route to the Afterbay Outlet BR. (Current to 2010). (Study R-10, Table 6.0-2)

- Evaluate options to provide additional revenue for new services or facilities in the OWA. New user fees, or other revenue mechanisms such as stewardship passes, should be considered within the OWA to help State agencies offset some of the costs of managing and providing new services or facilities to large numbers of visitors. (Current to 2010) (Professional judgment; Study R-5, Section 6.2.1.4)

Future Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.6.2 OWA River, Pond Access, and General Dispersed Sites

Summary of Relevant Site Information

The OWA contains several unimproved sites on or near levee-top roads that provide river and pond access to anglers and others. For example, a gravel parking and launching area exists near the river just beyond the OWA shop and

office complex at the north end of the OWA (the site is referred to informally as the OWA Headquarters Entrance). Similar sites exist in other portions of the OWA on both sides of the river. Utilization of these sites is low most of the year but is often high during the peak of the steelhead and salmon fishing seasons. Anglers generally disperse from these sites along the river banks and at nearby riffles in the river known to provide particularly good fishing opportunities. Given their undeveloped character and dispersed nature of use, it is difficult to apply facility, spatial, social, or ecological capacities to these sites. However, ecological capacity may be viewed as a limiting factor where severe ecological impacts such as litter and erosion are observed. Social capacity may be a limiting factor if competition for parking close to preferred angling sites becomes a problem for visitors.

- Provide additional trash receptacles, trash pickup, and signage, particularly along the river, at access points where trash accumulation appears to be a problem. The OWA Headquarters Entrance site in particular was found to have an extreme level of concern regarding trash accumulation. Trash at the site and along the shoreline degrades the recreational experience, especially for on-site activities such as bank fishing. Due to the high amount of bank fishing use at these sites, signage encouraging users to properly dispose of fishing line and tackle packaging may reduce littering. On the other hand, it is better if anglers put fish waste back into the river and not into the trash receptacles. Consider posting signs at trash receptacles that remind users not to put fish waste in the trash, but in the river (such signage exists at the Afterbay outlet site). (Current to 2010) (Study R-11, Sections 6.1 and 6.2; Study R-4, Table 6.1-1)

- As part of a proposed I&E Program, post both regulatory and educational signs detailing illegal fishing practices and consequences of using these practices. Studies found that illegal fishing practices may be occurring along the Feather River. Due to the shoreline access these sites provide and the amount of use they receive at peak times, additional signage that defines illegal fishing practices and the consequences of using these practices is needed. (Current to 2010) (Study R-4, Table 6.1-1)

- Provide more enforcement at these sites to enforce fishing and other regulations. Illegal fishing may be occurring at these sites and there are not enough patrols or staff to stop these practices, especially during peak fishing season. Provide more staff and patrols to stop fish snagging and other illegal practices. (Current to 2050) (Study R-4, Table 6.1-1)

- As a component of a recreation monitoring program, provide periodic monitoring to assess needs, particularly at the Afterbay outlet. Specifically, periodically monitor crowding and capacity. Currently the Afterbay outlet area appears to be exceeding capacity at peak times. If additional patrols are implemented, the site should be considered for additional monitoring to see if

capacity is still being exceeded. If it is, then additional management actions should be considered such as site hardening or site closure. (Current to 2050) (FERC guidelines; Resource protection)

- Erect vehicular barriers to selected areas in the OWA. Some areas in the OWA receive extensive OHV use even though their use is not permitted. It is suggested that barriers be provided to more clearly exclude OHVs from sensitive resource areas. (Current to 2010) (Study R-11, Section 6.1.2.1)

- Open locked gates in the OWA earlier during the peak use hunting season to accommodate hunters. Hunters mentioned that the gates to enter hunting areas in the OWA were closed when they wanted to access the site. During the hunting season, staff could open the gates early on popular hunting days. This would be a lower priority during other times of the year. (Current to 2050) (Study R-4, Section 6.1.8, Table 6.1-1)

- Consider locating and operating 2 ADA-accessible Watchable Wildlife sites within the OWA as part of a proposed I&E Program. Areas to view and understand wildlife in the OWA could be improved. The OWA provides a relatively large tract of public land along a river within the Sacramento Valley. While there are many undeveloped wildlife viewing opportunities, there are few developed sites that would allow visitors to observe wildlife and learn about their habitats. (Current to 2010) (Professional judgment; ADA-accessibility)

Future Facility and Use Area Needs

- Consider constructing 2 additional ADA-accessible Watchable Wildlife sites within the OWA. Wildlife viewing is projected to increase over the term of the new license. Public lands in the Sacramento Valley are in lesser supply (compared to lands in the Sierra Nevada); therefore, it is likely that demand will increase for wildlife viewing in the OWA. (Anticipated 2021 to 2030) (Professional judgment; ADA-accessibility)

6.1.6.3 Rabe Road Shooting Range

Summary of Relevant Site Information

The Rabe Road facilities, managed by DFG and located outside the FERC boundary, include an unstaffed public shooting area with unmarked backstops, a graded and graveled parking area, picnic tables, and a vault toilet building. Existing visitation at the site has been estimated to total 20,591 RDs annually, and it is projected that visitation at the complex in 2050 would total 28,780 RDs annually. Ecological capacity is currently considered a limiting factor at the range due to the number and severity of observed ecological impacts at the site.

Spatial capacity is also currently considered a limiting factor at the site due to expansion constraints.

Existing Facility and Use Area Needs

- Continue to provide this site as a public shooting range. The Rabe Road Shooting Range provides a unique public recreation opportunity in the study area. By continuing to allow target shooting in this area, it allows area land managers to better manage this activity in one location, rather than at dispersed locations. (Current to 2050) (Study R-11, Section 6.2.1)

- Provide more trash receptacles and provide additional litter pick-up at this site. This site was identified as having an extreme level of trash accumulation (mostly bullet shell casings and destroyed targets). More trash receptacles and periodic site cleanup would hopefully encourage users to dispose of more of their refuse. (Current to 2010) (Study R-11, Section 6.2.1)

Future Facility and Use Area Needs

- No future needs have been identified for this site/facility, except to provide continued annual O&M if appropriate and monitoring.

6.1.7 Dispersed Use Sites – General

6.1.7.1 Summary of Relevant Site Information

The study area is very large and contains a significant quantity of undeveloped lands that are mostly accessible and available for public use. Except where access is too steep, or where there are closure requirements due to resource protection, safety, and security, these lands are available for dispersed use activities. These activities may include wildlife viewing, outdoor photography, nature study, and OHV use.

There are at least 16 primary points of vehicular public access within the LOSRA. These roads, some of which are used for OHV riding, range from unimproved roads to multi-lane highways. In general, dispersed OHV activity in the study area is concentrated in the Thermalito Afterbay and OWA areas (which is illegal); however, organized legal OHV use is concentrated at the Clay Pit SVRA.

There is also extensive pedestrian and equestrian use of the study area. There are numerous informal trails that lead from access points and developed recreation sites to shoreline areas where dispersed sites allow swimming, fishing, and other activities to take place.

Hunting occurs in the entirety of the OWA, as well as portions of LOSRA. Hunting in the LOSRA is limited to certain areas but is permitted during generally the same seasons as in the OWA.

The vast majority of respondents to all areas within the study preferred outdoor settings that were predominantly to totally natural (66 to 75 percent), settings where the typical sights and sounds of man were absent, rare, or unusual (70 to 83 percent). Undeveloped dispersed use sites provide these types of recreation settings.

Overall general public use in the study area does not appear to be at capacity; however, the OWA does have some selected capacity problems related to public use that will need to be addressed in the future.

Hunting use in the area is expected to decline in the future, whereas non-consumptive wildlife uses are expected to increase. Demand for OHV use is anticipated to increase, but only moderately compared to many other activities.

6.1.7.2 Existing Facility and Use Area Needs

- Provide more trash receptacles and regular trash pick-up and provide additional scattered litter pick-up at dispersed use areas where needed. Trash accumulation was identified as an issue of high concern at study area dispersed use sites and areas. The most critical sites include Ponderosa Dam, Canyon Creek, McCabe Cove, and West Branch Bridge. By providing trash receptacles and regular trash pick-up at dispersed parking areas (where appropriate), there is likely to be less accumulation at the site. Additionally, periodic trash pick-up will decrease the visual and ecological impacts associated with their accumulation. Trash pick-up could be provided by volunteer groups or DPR or DFG staff; local non-profit conservation agencies could also be contracted to do the litter pick-up. (Current to 2050) (Study R-11, Sections 6.1 and 6.2)

6.1.7.3 Future Facility and Use Area Needs

- Periodically monitor the study area for potential new dispersed use sites. Dispersed sites and use areas should be monitored to assess resource impacts. Additionally, new dispersed sites and use areas are sometimes indicators of increased demand. (Anticipated 2011 to 2050) (FERC guidelines; Professional judgment; Resource protection)

6.2 NON-MOTORIZED TRAIL PROGRAM NEEDS

In total, there are about 75 miles of non-motorized trails available in the study area. All trails are available for hiking/walking. Of the total 75 miles, about 64.5 miles are available for biking and about 38.5 miles are available for equestrian

use. Designated trails for hiking/biking/equestrian use total about 37 miles, followed by hiking/biking (about 28 miles). There are about 9 miles of hiking-only trails, and 1.6 miles of hiking/equestrian-only trail at Sycamore Hill on the Dan Beebe Trail.

Most study area trails are multi-use trails (hiking, biking, equestrian use). Exceptions include the Roy Rogers and Loafer Creek Loop Trails, which have specific uses on certain days, a portion of the Brad P. Freeman Trail is hiking/biking only, the Sycamore Hill segment of the Dan Beebe Trail is hiking/equestrian only, and the Chaparral and Wyk Island Trails are hiking only.

The study area also provides several access trailheads. All fire roads within the LOSRA are also open to biking, hiking, and equestrian use. Within the OWA, bicycling and equestrian use are permitted, but only on roads open to vehicles.

In the spring of 2002, DPR designated most of the non-motorized trails in the study area as multiple-use. Previously, 17 miles of trails were hiking/equestrian use only and did not allow biking. Some trail users in the study area would prefer that these trails return to their previous use designations. However, most non-motorized trail survey respondents did not have encounters with other trail users that they felt put them at-risk. It is unknown if trail users had encounters that they felt lessened their trail-related recreation experience. It is proposed that a future Comprehensive Non-Motorized Trails Program further explore whether conflicts due to multiple-use designation are occurring. If significant conflicts are occurring, the future Comprehensive Non-Motorized Trail Program should outline management strategies to address perceived user safety issues and/or user experience effects. Trail use restrictions or designations, trail locations, trail O&M, and I&E needs would be addressed.

Another issue is the potential to complete trail opportunities/loops within the study area. The Thermalito Forebay, Thermalito Afterbay, and Diversion Pool are areas where trails surround all or part of the waterbodies but do not connect. In addition, the Lime Saddle area is an area where trail connections are lacking between sites. The campgrounds, boat ramp, marina, or day use area are not connected through any formal trails. The future Non-Motorized Trails Program will consider new trail routes in these areas with input from stakeholders and others.

6.2.1 Trail Operations and Maintenance Considerations

Although trails are in generally good condition now, expanded trail maintenance may be needed in the future if trail use increases and/or additional trails are built. Routine trail maintenance should be continued and monitored for effectiveness.

6.2.2 Trail Construction Considerations

There are no segments of trails that are in need of major maintenance or reconstruction at this time. Areas for potential new non-motorized trail construction include but are not limited to the Lime Saddle area, Thermalito Forebay, Thermalito Afterbay, and the OWA. These trail segments would need to be further examined in the proposed Comprehensive Non-Motorized Trails Plan and are briefly discussed below (Figures 6.2-1 and 6.2-2).

6.2.2.1 Lime Saddle Area

Although there are several recreation facilities in the Lime Saddle area, including a campground, group campground, boat ramp, day use area, and marina, there are little or no designated trails. Potential trails in this area could connect the various facilities and, if possible, provide enhanced shoreline access. Although the topography at the Lime Saddle area is very steep, Parish Cove is a potential area that could offer some relatively flat shoreline access (until the reservoir elevation lowers enough to dewater the cove). The Bidwell and Loafer Creek Complexes have trails connecting sites, and the Lime Saddle Complex should be considered for these types of trails as well. A trail in this area from the campground to the boat ramp, passing around Parrish Cove, would be about 1.5 miles.

6.2.2.2 Thermalito Forebay

The Thermalito Forebay is a potential area for a loop trail. The neighborhood around the forebay is expanding, which may put more pressure on the area for recreational trails in the future. Additionally, the area is easily accessed from SR 70 and receives substantial use. Currently, there are trails surrounding the swimming portion of the North Forebay BR/DUA, and the Brad P. Freeman Trail runs along the north side of the North Forebay and the east and south sides of the South Forebay. The south side of the North Forebay and the north and west sides of the South Forebay have no such public trail access. A loop trail could be constructed, which would run along the levee on the south side of the North Forebay and along the northwest side of the South Forebay. Trail crossings would have to be built at Nelson Avenue, the Thermalito Power Canal, and the tail channel. Any potential security issues at the Thermalito Power Plant would need to be addressed. Building a new loop trail would in effect create two loops, one around the North Forebay and one around the South Forebay. The trail along the north side of the North Forebay would be about 3 miles, and the trail along the west side of the South Forebay would be about 1.9 miles long. Additionally, small spur trails to the water's edge from the Brad P. Freeman Trail along the north side of the North Forebay could be built to provide shoreline access for anglers. The Forebay is an excellent place to provide shoreline access because the shoreline is less steep and the water level more stable than Lake Oroville.