

**Placer County Water Agency
Middle Fork American River Project
(FERC No. 2079)**

FINAL

**REC 3 – RESERVOIR RECREATION OPPORTUNITIES
TECHNICAL STUDY REPORT**



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1.0 INTRODUCTION

This report describes reservoir-based recreation opportunities associated with Placer County Water Agency's (PCWA's) Middle Fork American River Project (MFP or Project). The information presented in this report is based on studies conducted by PCWA in 2008 in accordance with the REC 3 – Reservoir Recreation Opportunities Technical Study Plan (REC 3 – TSP). The REC 3 – TSP was included in Supporting Document (SD) H of PCWA's Pre-Application Document (PAD) (PCWA 2007).

This report focuses on reservoir-based recreation opportunities associated with Hell Hole Reservoir, French Meadows Reservoir, and Ralston Afterbay. Reservoir-based recreation opportunities at these three water bodies were characterized using a combination of existing information, hydrologic data, facility diagrams available from PCWA and/or developed as part of this study, and GIS-based maps developed by PCWA. This information was supplemented with information developed through three other relicensing studies, as follows: (1) LAND 3 – Emergency Action and Public Safety TSP; (2) REC 1 – Recreation Use and Facilities Assessment TSP; and (3) REC 2 – Recreation Visitor Surveys TSP. Pertinent information about reservoir recreation opportunities developed through these three studies is summarized in this REC 3 – Technical Study Report (TSR), as appropriate. Additional information, including a detailed description of the study methods and results, is available in the following three reports:

- LAND 3 – Emergency Action and Public Safety TSR (PCWA 2009a);
- REC 1 – Recreation Use and Facilities Assessment TSR (PCWA 2009b); and
- REC 2 – Recreation Visitor Surveys TSR (PCWA 2009c).

2.0 STUDY OBJECTIVES

The REC 3 – TSP included five primary study objectives, as follows:

- Characterize existing recreation opportunities at Project reservoirs.
- Characterize the relationship between reservoir water surface elevation (WSE) and current and future Project reservoir-based recreation opportunities (activities and experience).
- Characterize existing and future reservoir WSE-related operational constraints.
- Identify access and safety concerns at Project reservoirs.
- Develop information regarding reservoir-based recreation user conflicts at Project reservoirs.

Figure REC 3-1 shows the REC 3 – TSP study objectives and the study elements and activities that relate to each of the study objectives. It also shows how information developed through the REC 3 – TSP has been or will be documented.

3.0 STUDY IMPLEMENTATION

With one exception, the REC 3 – Reservoir Recreation Opportunities Technical Study was primarily conducted in 2008 and 2009. The exception involves recreation use data, which PCWA began collecting in 2007 as part of the REC 1 – Recreation Use and Facilities Assessment TSP (PCWA 2007). Specific study elements that have been completed, outstanding study elements, and any deviations or proposed modifications to the REC 3 – TSP are discussed in the following subsections.

3.1 STUDY ELEMENTS COMPLETED

The REC 3 – Reservoir Recreation Opportunities TSP (PCWA 2007) identified four study elements. The following summarizes the work completed to date, organized by study element.

Recreation Opportunities

- Characterized existing reservoir recreation opportunities by location and type of activity. This information was developed, in part, through the visitor surveys conducted as part of the REC 2 – Recreation Visitor Surveys Technical Study Plan (TSP).
- Characterized future reservoir-related recreation demand with respect to recreation trends information. Recreation use relative to future trends (demand) will be discussed in more detail in the REC 1 – Recreation Use and Facilities Technical Study Report, which will be distributed in the fall of 2009.
- Characterized reservoir-based recreation opportunities at a variety of reservoir WSEs utilizing information developed through the REC 2 – Recreation Visitor Surveys TSP.

Reservoir Levels

- Summarized daily historical WSE data for Hell Hole and French Meadows reservoirs over the period of record, and averaged by water year type.
- Summarized daily and hourly WSEs at Ralston Afterbay.
- Summarized existing and future reservoir WSE-related operational constraints or requirements by water year type, if appropriate.
- Identified the design and functional reservoir elevation range for each existing boat ramp.
- Characterized the functionality of recreation support facilities and recreation opportunities over a range of existing reservoir WSE and future WSE associated with potential Project betterments using facility design drawings, information developed in consultation with the United States Department of Agriculture – Forest Service (USDA-FS), through site visits, and the results of surveys

conducted as part of the REC 2 – Recreation Visitor Surveys Technical TSP (PCWA 2007).

Access and Safety Conditions

- Identified and documented access points, type of access, and associated Project support facilities including condition. This information was primarily developed as part of the REC 1 – Recreation Use and Facilities Technical Study Plan.
- Identified and documented existing programs and measures aimed at protecting public health and safety; for example buoy lines, signage, alarms, and Placer County OES procedures. This information was primarily developed as part of the LAND 3 – Emergency Action and Public Safety TSP (PCWA 2007).
- Reviewed records and consulted with facility managers and resource management staff to identify safety concerns at the Project recreation facilities. This information was primarily developed as part of the LAND 3 – Emergency Action and Public Safety TSP (PCWA 2007).
- Reviewed and summarized records maintained by the Federal Energy Regulatory Commission (FERC) regarding the occurrence of accidents at MFP reservoirs. This information was developed as part of the LAND 3 – Emergency Action and Public Safety TSP (PCWA 2007).

User Conflicts

- Identified potential reservoir-based recreational user conflicts using the results of the surveys conducted as part of the REC 2 – Recreation Visitor Surveys Technical Study.
- Identified factors that directly or indirectly contribute to reservoir recreational user conflicts using the results of the surveys conducted as part of the REC 2 – Recreation Visitor Surveys Technical Study.

3.2 DEVIATIONS FROM THE REC 3 – TSP

The REC 3 – Reservoir Recreation Opportunities study was conducted as outlined in the REC 3 – TSP, with no deviations.

3.3 OUTSTANDING STUDY ELEMENTS

There are no outstanding study elements.

3.4 PROPOSED MODIFICATIONS TO THE REC 3 – TSP

There are no proposed modifications to the REC 3 – TSP.

4.0 EXTENT OF STUDY AREA

The study area includes Hell Hole Reservoir, French Meadows Reservoir, and Ralston Afterbay as they exist under current operating conditions. The study area also includes the new reservoir inundation area associated with the Hell Hole Reservoir Seasonal Storage Increase, which would seasonally raise the maximum operating WSE of Hell Hole Reservoir by a maximum of six feet.

5.0 STUDY APPROACH

Reservoir based recreation opportunities were characterized using a combination of existing information, hydrologic data, facility diagrams available from PCWA and/or developed as part of this study, and GIS-based maps developed by PCWA. In addition, information developed as part of the following three studies was utilized in this report:

- LAND 3 – Emergency Action and Public Safety TSP;
- REC 1 – Recreation Use and Facilities Assessment TSP;
- REC 2 – Recreation Visitor Surveys TSP.

Specific methods used to complete the study elements outlined in the REC 3 – TSP are described below. In order to cover all of the study element sub-topics, the methods discussion is organized by the following seven sections:

- Recreation Opportunities
- Reservoir Levels
- Reservoir Access
- Safety Conditions
- User Conflicts
- Existing and Future Operational Constraints
- Future Recreation Demand

5.1 RECREATION OPPORTUNITIES

Existing reservoir recreation opportunities were characterized using a variety of sources, including: (1) USDA-FS maps, information pamphlets, and reports; (2) PCWA facility drawings; (3) historic hydrologic information; and (4) use and facility information developed by PCWA as part of the REC 1 – Recreation Use and Facilities TSP (PCWA 2007). This information was supplemented using data developed as part of the REC 2 – Recreation Visitor Surveys TSP (PCWA 2007). The survey data was primarily used to characterize visitor preferences and experiences regarding specific recreation opportunities. In addition, it was used to develop information about the types of recreation activities that people participate in while visiting one of the Project reservoirs. Information about PCWA's recreation visitor surveys, including a detailed description of the survey methods and results, is available in the REC 2 – TSR (PCWA 2009c).

5.1.1 Recreation Activities

The results of the REC 2 – Recreation Visitor Surveys were used to identify the primary activities that people participate in when visiting a Project reservoir. Question 12 of Section A-1 asked survey respondents to identify the primary activity they engaged in, or expected to engage in, during their trip. The survey responses were organized by reservoir and are summarized in this report.

5.1.2 Reservoir-based Recreation Opportunities Relative to WSE

Project operations information and historic WSE's at Hell Hole Reservoir, French Meadows Reservoir, and Ralston Afterbay were compiled and used along with facility design drawings and maps to characterize reservoir-based recreation opportunities relative to WSE. In addition, the results of the REC 2 – Recreation Visitor Surveys were used in combination with WSE information to characterize the relationship between reservoir WSE and visitor opinions regarding WSE. The REC 2 – Recreation Visitor Surveys were conducted in 2008 from Memorial Day through Labor Day. Therefore, survey responses involving reservoir-based recreation opportunities were compared to WSE at each of the reservoirs over this time period. Methods pertaining to WSE are described further in the following section.

5.2 RESERVOIR LEVELS

Reservoir levels at Hell Hole Reservoir, French Meadows Reservoir and Ralston Afterbay were characterized using historical WSE data. The historic WSE data were then used to: (1) evaluate boat ramp functionality; (2) reservoir-based recreation opportunities relative to WSE; and (3) potential effects of the Hell Hole Seasonal Storage Increase betterment. Methods pertaining to each of these topics is discussed further in the following.

5.2.1 Historical Water Surface Elevations

Daily average WSE data for the period 1975 – 2007 was compiled and utilized to characterize operational conditions at Hell Hole and French Meadows Reservoirs. The historic WSE data were used to narratively describe operational conditions at these two reservoirs. In addition, the historic data were plotted to depict changes in WSE over the period of record during different water year types. The following plots were developed for both Hell Hole and French Meadows reservoirs:

- Box and Whisker plots showing the median, quartile, minimum, and maximum WSEs by month over the period of record.
- Average daily WSE by month for all of the water years in the period of record combined.
- Average monthly WSE for wet, above normal, below normal, dry, and critically dry water years.

Ralston Afterbay is not a storage reservoir and therefore is not operated like Hell Hole and French Meadows Reservoirs. Ralston Afterbay fluctuates on a daily basis. In addition, the fluctuation patterns differ by season depending upon electrical demand, water year type, and scheduled and emergency maintenance activities. Accordingly, the historic WSE data were used to characterize how WSEs at Ralston fluctuate on a daily and weekly basis, by season (winter, spring, summer, fall). Specifically, the WSE data were used to develop plots showing how water levels fluctuate on an hourly basis over a 24-hour period of each season, and over a week-long period of each season. The days and weeks that were plotted were randomly selected to illustrate typical patterns during each season. The hourly WSE data that was used to generate the plots was collected by PCWA for use in development of an operations model.

5.2.2 Design and Functional Elevation Ranges of Existing Boat Ramps

The MFP includes four boat ramps, as follows:

- Hell Hole Boat Ramp;
- French Meadows Boat Ramp;
- McGuire Boat Ramp; and
- Ralston Afterbay Car Top Boat Ramp.

Facility design drawings were used along with elevation data collected in the field to identify the design and functional WSE range for each of these existing boat ramps. First, the original facility design drawings for each of these boat ramps (excluding Ralston Afterbay Car Top Boat Ramp) were digitized and imported into a GIS data base. The GIS-based drawings were then updated and geo-referenced based on elevation and spatial data collected in the field using a sub-meter Global Positioning System (GPS) unit. The updated design drawings were combined with existing topographic, bathymetric, and WSE information to: (1) determine the functional WSE range of each boat ramp; and (2) produce maps showing plan views of each of the boat ramps relative to maximum WSE, minimum WSE, and typical operating WSE.

The boat ramp elevations were used along with historic WSE information (1975 – 2007) to determine how often the boat ramps would be functional during different water year types. Recreation use at Hell Hole and French Meadows Reservoir is generally limited to the peak recreation season (Memorial Day to Labor Day). Therefore, the evaluation focuses on this time period. However, the hydrographs included in this report can be used along with the boat ramp elevation data to generally assess boat ramp functionality during any time of the year, during any water year type.

5.2.3 Reservoir-based Recreation Opportunities Relative to WSE

Reservoir-based recreation opportunities relative to WSE were characterized using: (1) facility design drawings and facility elevation information; (2) bathymetric maps of Hell Hole and French Meadows Reservoir; (3) field observations; and (4) the results of the REC 2 – Recreation Visitor Survey. The relationship between reservoir opportunities

and WSE differs by reservoir. Therefore, the analyses presented in this report focus on different issues at different reservoirs. For example, at Hell Hole Reservoir, the analysis focuses on the following three topics:

- The functionality of Hell Hole Boat Ramp;
- Navigation through the Narrows; and
- Access to Upper Hell Hole Campground.

At French Meadows Reservoir, the analysis focuses on:

- The functionality of French Meadows and McGuire Boat Ramps;
- Obstacles (e.g., tree stumps) and shallow water depths at the upper end of the reservoir;
- McGuire Beach; and
- Access to Poppy Campground.

At Ralston Afterbay, the discussion focuses on:

- The functionality of the Ralston Afterbay Car Top Boat Ramp.

Section A-6 of the REC 2 – Recreation Visitor Surveys included specific questions that were designed to determine whether WSE affects recreation opportunities or experience. For example, Question 7 asked survey participants whether their recreation experience was negatively affected by reservoir water surface level. In addition, Question 6 asked survey participants to rate WSE-related factors such as “access to shoreline”, “adequacy of reservoir water depths”, and “presence of debris or obstacles” using an acceptable scale. The responses to these questions were tabulated by reservoir and are summarized in this TSR. In addition, the responses were analyzed against WSE on the days that the surveys were conducted to determine whether a relationship between response and WSE exists. With the exception of French Meadows Reservoir, no relationship between survey responses and WSE was evident. At French Meadows Reservoir, a higher percentage of respondents indicated they were negatively affected by reservoir WSE. Therefore, at French Meadows reservoir, the survey responses were plotted against WSE to determine whether negative survey responses increased at a particular WSE.

5.2.4 Range of WSE's with Potential Project Betterments

PCWA is currently considering one potential Project betterment/improvement referred to as the Hell Hole Seasonal Storage Increase Betterment. The other betterments that were originally presented in the PAD (PCWA 2007) are no longer under consideration.

Supporting Document C (SD C) of the PAD (PCWA 2007) included a detailed description of the Hell Hole Seasonal Storage Increase betterment/improvement. However, the information presented in the PAD has been refined since the PAD was

issued. The original concept described in the PAD included the installation of up to 10 foot-high crest gates on the existing dam spillway. The revised concept includes the installation of six foot-high crest gates. This would ensure that the new inundation area does not extend beyond the current FERC Project boundary.

Facility design drawings were used along with elevation data collected in the field to characterize the effect of higher WSEs associated with the Hell Hole Seasonal Storage Increase on the recreation opportunities and support facilities at Hell Hole Reservoir. This betterment would have no effect on recreation opportunities or support facilities outside of the Hell Hole Reservoir area. Furthermore, it would have no effect on developed facilities that are not contiguous to Hell Hole Reservoir (e.g., Hell Hole Campground, Big Meadows Campground or Hell Hole Vista). Therefore, the characterization focuses on the following three topics:

- General recreational opportunities at Hell Hole Reservoir;
- Access to Upper Hell Hole Campground including the ability to navigate “the Narrows”; and
- The functionality of Hell Hole Boat Ramp, the only developed access point on Hell Hole Reservoir.

This document does not address operational changes that may occur as a result of this betterment. Operational changes associated with this betterment are generally described in Supporting Document C of the PAD (PCWA 2007). Specific operational changes that may occur as a result of this betterment are currently being incorporated into PCWA’s operations model. This model will be used to support discussions and negotiations regarding new protection, mitigation, and enhancement (PM&E) measures.

5.3 RESERVOIR ACCESS

GIS-based land jurisdiction and ownership information available from the USDA-FS and from Placer and El Dorado counties was used to characterize access conditions around each of the Project reservoirs and to quantify the amount of shoreline that is publicly accessible.

In addition, information developed as part of the REC 1 – Recreation Use and Facilities TSP (PCWA 2007) was used to identify and characterize the developed facilities that provide access to each of the Project reservoirs. This REC 3 – TSR provides an overview of the facilities for contextual purposes but does not include a detailed facility assessment. All of the Project recreation facilities, including their amenities and condition, will be discussed in detail in the REC 1 – Recreation Use and Facilities TSR (PCWA 2009b).

5.4 SAFETY CONDITIONS

Public safety was evaluated as part of the LAND 3 – TSP (PCWA 2007) and is described in detail in the LAND 3 – Emergency Action and Public Safety TSR (PCWA

2009a). Pertinent information from the LAND 3 – TSR was used to address specific topics identified in the REC 3 – TSP, as described in the following sub-sections.

5.4.1 Existing Programs and Measures

Information developed as part of the LAND 3 – Emergency Action and Public Safety TSP (PCWA 2007) was used to describe and summarize PCWA’s existing public health and safety programs and measures, including for example buoy lines, signage, and alarms. As required, the summary contained in the REC 3 – TSR specifically focuses on programs and measures that pertain to Hell Hole Reservoir, French Meadows Reservoir, and Ralston Afterbay, and the developed Project recreation facilities in these areas. Placer County OES procedures are not discussed in this report but are described in detail in the LAND 3 – Emergency Action and Public Safety TSR (PCWA 2009a).

5.4.2 Safety Concerns at Project Recreation Facilities

PCWA consulted with facility managers and resource management staff to identify any safety concerns at the Project recreation facilities located in the Hell Hole Reservoir, French Meadows Reservoir, and Ralston Afterbay areas. Consultation included e-mail correspondence with Vicky Jowice and Jon Jue of the Eldorado National Forest (pers. comm. September 2009), and Ed Moore of the Tahoe National Forest (pers. comm. September 2009). None of the responses specifically pertained to reservoir recreation so they are not discussed in this report. Most of the safety concerns identified by the resources agencies pertain to developed recreation facilities such as campgrounds. Therefore, these safety concerns will be addressed in the REC 1 – TSR (PCWA 2009c).

PCWA also reviewed records of safety-related incidents that are maintained by the USDA-FS and by the Placer County Sheriff’s Department. These records were originally compiled and reviewed as part of the LAND 3 – Emergency Action and Public Safety TSP (PCWA 2007) and are documented in detail in the LAND 3 – Emergency Action and Public Safety TSR (PCWA 2009a). Any safety-related incidents that have occurred at Hell Hole Reservoir, French Meadows Reservoir, Ralston Afterbay, or one of the developed Project recreation facilities in these areas were reviewed and are summarized in this report, by reservoir area.

5.4.3 Accidents Reported to FERC

Title 18 of the Code of Federal Regulations (CFR 18), Part 12, Subpart B, §12.10 requires hydropower project licensees to report safety-related incidents or accidents to the FERC’s Regional Engineer. Specifically, §12.10(a) requires the licensee to report any conditions affecting the safety of a project or projects works, as defined in §12.3(b)(4). In addition, §12.10(b) requires the licensee to promptly report any drowning or other accident resulting in death or serious injury that occurs at any Project facility. Any accident report that has been filed with the FERC since 1980 may be accessed through the FERC’s e-library.

PCWA conducted a search of the FERC's e-library to identify any safety incidents or accidents that have occurred at any of the Project reservoirs or at any of the developed Project recreation facilities located in the vicinity of the reservoirs. Any records that were identified were reviewed and are summarized in this report, by reservoir area.

5.5 USER CONFLICTS

Potential reservoir-based user conflicts were assessed using the results of surveys conducted as part of the REC 2 – Recreation Visitor Surveys TSP. Specifically, survey participants who completed Section A-6 of the survey form (Reservoir Recreation) were asked whether their recreation experience was negatively affected by: (1) crowding; or (2) other factors taking place. The responses to these questions were organized and analyzed by reservoir to determine whether user conflicts are an issue at Hell Hole Reservoir, French Meadows Reservoir, or Ralston Afterbay.

5.5.1 Factors that Contribute to User Conflicts

Factors that contribute to user conflicts were assessed using the results of the surveys conducted as part of the REC 2 – Recreation Visitor Surveys TSP. Specifically, people who indicated that they were negatively affected by either crowding or other factors taking place were asked to explain their answer. Any comments provided by the survey respondents were reviewed to identify specific factors that contribute to user conflicts.

Reservoir Carrying Capacity

User conflicts on reservoirs may occur if use levels exceed the carrying capacity of the reservoir. Carrying capacity is generally related to reservoir surface area. Therefore, PCWA utilized daily average WSE data along with carrying capacity information available from existing literature along with recreation use information to identify the carrying capacity of each reservoir based on primary activities. The results were used to evaluate any user conflicts identified through the REC 2 – Recreation Visitor Surveys and to determine whether user conflicts should be expected.

Reservoir Surface Area

Reservoir surface area was determined using historic WSE information. At Hell Hole and French Meadows Reservoirs, historic WSE data for the peak recreation season (Memorial Day through Labor Day) was compiled and sorted by water year type. The data was then used to determine the lowest average WSE that occurred during the recreation season during each water type. The corresponding surface acreage was then determined using GIS-based software. The average low WSEs and corresponding surface areas were then summarized in tables for reference.

This same approach was used at Ralston Afterbay. However, at Ralston Afterbay, water levels can fluctuate hourly but generally do not fluctuate more than about 10 feet a day. Accordingly, at Ralston Afterbay the lowest average daily WSE that occurred during the peak recreation season (Memorial Day to Labor Day) was used.

Capacity Coefficients

A variety of existing literature sources contain carrying capacity information for reservoirs. PCWA reviewed these existing sources and identified four documents that contain carrying capacity information, as follows:

- Bosley, Holly E. Techniques for Estimating Boating Carrying Capacity: A Literature Review. August 2005.
- Haas, G., Aukerman, R., Lovejoy, V., and Welch D. Water Recreation Opportunity Spectrum (WROS) User's Guidebook. United States Department of the Interior, Bureau of Reclamation, Office of Program and Policy Services. July, 2004.
- Jaakson, R., Buszynki, M.D., and Botting, D. Carrying Capacity and Lake Recreation Planning (Part 1). The Michigan Riparian, pp. 11–12, 14. November 1989.
- Florida Department of Environmental Protection, Division of Recreation and Parks. Visitor Carrying Capacity Guidelines. Not dated.

The first document, Techniques for Estimating Boating Capacity (Bosley 2005), summarizes information developed by other sources and contains information most relevant to the MFP reservoirs. Among other things, Bosley's report includes the following carrying capacity requirements for various boating activities, which was originally documented in "Visitor Carrying Capacity Guidelines" by the Florida Department of Environmental Protection (undated).

Activity	Required Water/ Land Base	Area Requirements
Limited Power (10 HP or less)	Min. 200 acres of water, and ¼ acre of land/boat.	1 boat per 5–10 acres of water
Unlimited Power	Min. 600 acres of water and ¼ acre of land/boat.	1 boat per 10–20 acres of water
Water skiing	Min. 600 acre of land/boat.	1 boat per 20–50 acres of water
Sailing	Min. 200 acre of water, and ¼ acre of land/boat.	1 boat per 5–10 acres of water
No Power (still water)	Min. 50 acres of water and ¼ acres of land/boat.	1 boat per 5–10 acres of water

These area requirements are similar to those identified by Jackson et al (1990), as follows:

- 20 acres per boat for motorboat cruising;
- 20 acres per boat for water skiing;
- 10 acres per boat for fishing from a boat;

- 8 acres per boat for canoeing and kayaking; and
- 8 acres per boat for sailing.

Based on information developed as part of the REC 2 – Recreation Visitor Surveys, the primary reservoir-based recreation activity at Hell Hole Reservoir and French Meadows is fishing. The primary watercraft used for reservoir fishing is 10–20 foot long aluminum fishing boats. Therefore, a reservoir capacity coefficient of one boat per ten acres was used for the reservoir capacity assessments.

At Ralston Afterbay, visitors primarily utilize small motorized fishing boats and car top boats such as canoes and kayaks. According to Jackson et al (1990), canoes and kayaks require less surface area than fishing boats, specifically 8 acres per boat as opposed to 10 acres per boat. Since both types of boats may be on the afterbay at any one time, the more conservative coefficient of 10 acres per boat was used to assess the carrying capacity at Ralston Afterbay.

5.6 EXISTING AND FUTURE OPERATIONAL CONSTRAINTS

Detailed information about how the MFP is operated, including operational constraints, is available in Supporting Document B of PCWA's PAD (PCWA 2007). Information provided in PCWA's PAD was used to summarize specific existing and potential future reservoir WSE-related operational constraints or requirements. The discussion includes any requirements contained in the existing MFP FERC license.

5.7 FUTURE RECREATION DEMAND

PCWA compiled and reviewed a variety of existing information sources to develop information about potential future recreation use and trends. The search focused on two primary sources: (1) governmental agencies that manage outdoor recreation resources; and 2) peer-reviewed professional papers. Information about recreation participation rates and trends was found in the following reports:

- Outdoor Recreation Participation Report 2008. The Outdoor Foundation. 2008.
- 2006 National Survey of Fishing, Hunting, and Wildlife Associated Recreation U.S. Fish and Wildlife Service, 2006.
- National Survey on Recreation and the Environment. USDA Forest Service, 2000.
- The Latest on Trends in Nature-Based Outdoor Recreation. Cordell, Ken H. Forest History Today, Spring 1988.
- Outdoor Recreation Activity Trends: What's Growing, What's Slowing? Cordell, Ken, H. et. al., 2008.
- Nature-based Outdoor Recreation Trends and Wilderness. Cordell, H. Ken, Carter J. Betz, and Gary T. Green. International Journal of Wilderness. August 2008.

- Wilderness Recreation Participation: Projections for the Next Half Century. Bowker, J. M., D. Murphy, H. K. Cordell, D. B. K. English, J. C. Bergstrom, C. M. Starbuck, C. J. Betz, G. T. Green, and P. Reed. 2007. USDA Forest Service Proceedings RMRS-P-49. 2007.

In general, the information contained in the existing published literature is based on data collected nationally or on a State-wide basis. None of these reports contain information that specifically pertains to recreation at remote reservoirs such as those associated with the MFP. Therefore, the pertinent information presented in these seven reports was used to generally describe trends in outdoor recreation and future participation rates. Data produced by the State of California Department of Finance (<http://www.dof.ca.gov/research/demographic/reports/projections>) was also used to summarize anticipated trends in population growth and demographic changes as they pertain to the MFP.

6.0 RESULTS

The following sections describe the results of the REC 3 – Reservoir Recreation Opportunities study. In order to provide cohesive and comprehensive information about each reservoir, the results are first organized by reservoir and then by the following study elements.

- Recreation Opportunities
- Reservoir Levels
- Reservoir Access
- Safety Conditions
- User Conflicts

Two of the study element sub-topics pertain to all of the reservoirs: (1) Current and Future Operational Constraints; and (2) Future Recreation Demand. Accordingly, these topics are discussed separately at the end of this report.

6.1 HELL HOLE RESERVOIR

Hell Hole Reservoir is located in the Rubicon River Canyon at an elevation of 4,630 feet above mean sea level (MSL). The surrounding landscape is characterized by steep and rocky slopes, which are primarily composed of granite and covered by brush and mixed-conifer forest.

6.1.1 Recreation Opportunities

The Hell Hole Reservoir area provides a variety of recreation opportunities including fishing, camping, reservoir boating, hiking, picnicking, and sight seeing. These opportunities are supported by five developed Project recreation facilities, as follows:

Campgrounds

- Big Meadows Campground
- Hell Hole Campground
- Upper Hell Hole Campground

Day Use Facilities

- Hell Hole Vista
- Hell Hole Boat Ramp and associated parking areas

The locations of these recreation facilities are shown on Map REC 3-1, which also shows the locations of the primary MFP facilities and land ownership. As indicated, Big Meadows Campground, Hell Hole Campground and Hell Hole Vista are not located in the immediate vicinity of the reservoir. Upper Hell Hole Campground is located at the upper end of the reservoir (south shore) and is accessible by boat or via the Upper Hell Hole Trail (14E02.3). The Hell Hole Boat Ramp provides the primary access to the reservoir.

A limited amount of dispersed use occurs in the Hell Hole Reservoir area and camping in undeveloped areas is not prohibited. However, the steep terrain and sparse road access generally limits dispersed use to one undeveloped area referred to as Grey Horse. As shown on Map REC 3-1, Grey Horse is located at the upper end of the reservoir, northwest of Upper Hell Hole Campground and is accessible by the Hell Hole OHV Trail (14N09A). Neither Greyhorse nor the OHV trail are Project facilities.

In general, the Hell Hole Reservoir area is typically accessible from about May 1 to November 1. However, snow may limit access to the area until the end of May. Most recreation use occurs between Memorial Day and Labor Day, with the heaviest use occurring on weekends and holidays (PCWA 2009b).

Recreation Activities

The results of the REC 2 – General Visitor Surveys indicate that people primarily visit the Hell Reservoir Area to fish at Hell Hole Reservoir and to camp in a developed site, as explained in the following.

Of the 968 people who participated in the REC 2 – Recreation Visitor Surveys, a total of 255 were intercepted at one of the sites located in the Hell Hole Reservoir area and completed the General Background Section (Section A-1) of the survey form. Question 12 of Section A-1 asked these participants to identify the (one) main activity they participated in during their trip. A total of 152 people provided valid responses to the question, with the following results:

- Sixty people (39.5%) identified “reservoir fishing” as their primary activity;

- Forty-three people (28.3%) identified “camping in a developed site” as their primary activity; and
- All other responses were ≤ 5.9% and are shown on Table REC 3-1.

Reservoir Fishing

Fishing is allowed on the reservoir all year round but primarily occurs between May and November, when the area is accessible. Hell Hole Reservoir has been stocked extensively in the past with a variety of salmonid species including rainbow trout (e.g., Eagle Lake strain), brown trout, brook trout, cutthroat trout (and cutthroat-rainbow hybrids), lake trout, kokanee, and coho salmon (PCWA 2007). Recent management includes stocking of brown trout, rainbow trout (although official records of recent rainbow plants were not located), and kokanee (PCWA 2007).

A reservoir angler survey was conducted as part of the REC 2 – Recreation Visitor Surveys TSP (PCWA 2007). Based on the information collected as part of this effort, most anglers catch kokanee. A total of 451 fish were caught by the survey participants. Of these, 51.9% were kokanee, followed by brown trout (22.4%), rainbow trout (16.6%), and lake trout (8.0%). The reservoir angler survey, including the results of surveys conducted at Hell Hole Reservoir, is discussed in detail in the REC 2 – Recreation Visitor Survey TSR (PCWA 2009c). In addition, the results for Hell Hole Reservoir are summarized on Table REC 3-2.

Camping in Developed Sites

Camping is available at three developed campgrounds in the Hell Hole Reservoir area: Big Meadows Campground, Hell Hole Campground and Upper Hell Hole Campground. Neither Big Meadows Campground nor Hell Hole Campground are located in the immediate vicinity of the reservoir. Upper Hell Hole Campground is located at the upper end of Hell Hole Reservoir and is accessible by boat or via the Upper Hell Hole Trail (14E02.3). These campgrounds will be described in detail in the REC 1 – Recreation Use and Facilities TSR (PCWA 2009b).

Reservoir Boating

According to the USDA-FS, popular watercraft used on the reservoir includes small (10 to 14 foot) aluminum fishing boats equipped with outboard engines and some larger (20 foot) aluminum boats. Sailboats, kayaks and canoes are used on the reservoir but to a lesser extent. A minor amount of water skiing occurs at the reservoir. Jet skis are uncommon. There are no restrictions on the type or size of boats at Hell Hole Reservoir and, according to the USDA-FS no speed limits are imposed (USDA-FS 2006).

Specific Information about the types of boats used on Hell Hole Reservoir was collected through the REC 2 – Recreation Visitor Surveys. Specifically, Question 4 of Section A-6 asked the survey respondents who participated in boating activities to identify the type of boat they used. A total of 46 people answered this question, with the following results.

- 67.4% (31 people) used a fishing boat.
- 23.9% (11 people) used non-power boats (i.e., canoe, kayak, row boat, raft).
- 6.5% (3 people) used personal watercraft.
- 4.3% (2 people) used ski boats.

6.1.2 Reservoir Levels

Hell Hole Reservoir captures water from the Rubicon River and Five Lakes Creek, and also stores water conveyed from French Meadows Reservoir via the French Meadows-Hell Hole Tunnel. Hell Hole Reservoir has a gross storage capacity of 207,590 ac-ft. Additional information about the reservoir relevant to recreation is summarized below.

Hell Hole Reservoir Specifications^a

Water Surface Elevation	
Maximum Operating Water Surface	4,630 feet
Minimum Operating Water Surface ^b	4,340 feet
Area	
Area at Maximum Operating Water Surface	1247 acres
Area at Minimum Operating Water Surface ^b	188 acres
Depth	
Depth at Maximum Operating Water Surface	378 feet
Depth at Minimum Operating Water Surface ^b	88 feet
Shoreline	
Shoreline at Maximum Operating Water Surface	13.2 miles
Shoreline at Minimum Operating Water Surface ^b	6.6 miles

^aNote that this information has been updated since the PAD was issued in 2007 based on new information developed as part of the relicensing studies.

^bThe minimum water surface elevation has never been reached. The lowest recorded WSE is 4,421 feet.

Detailed information about the operation of the MFP and Hell Hole Reservoir is available in PCWA's PAD (PCWA 2007), and summarized below.

Historical Water Surface Elevations

Typical operation of the MFP results in the capture or diversion of water into Hell Hole reservoir during the winter and spring (filling period), and drawdown of the reservoir during the summer, fall, and early winter (release period). Operation of the MFP varies from year-to-year based on the timing and magnitude of spring runoff, which is influenced by the amount of the winter snow pack and ambient temperature conditions, as well as precipitation. Despite the year-to-year variation, the reservoir typically reaches its maximum storage for the year in June. Reservoir levels begin to decline in the summer and continue to decline until the late fall or winter. Reservoir levels are

typically at their lowest in December, January, and February, when the area is inaccessible due to snow.

This pattern is evident on the annual hydrographs included in Appendix A. Historical water surface elevations at Hell Hole Reservoir for the period 1975 – 2007 are depicted graphically in Appendix A, as follows.

- Figure A-1 is a “box and whisker” plot that shows the median, quartile, minimum, and maximum water surface elevations by month over the period of record.
- Figure A-2 shows average daily WSE by month for all of the water years in the period of record combined.
- Figure A-3 shows the average monthly WSE for wet, above normal, below normal, dry, and critically dry water years, respectively.

In all cases, the hydrographs show the maximum operating WSE of 4,630 feet, which is the same as the spillway crest elevation. Figures A-2 and A-3 also show the functional range of Hell Hole Boat Ramp (gray shading).

Design and Functional Elevation Ranges of Existing Boat Ramps

Hell Hole Boat Ramp is the only boat ramp at Hell Hole Reservoir. As shown on Map REC 3-1, Hell Hole Boat Ramp is located on the south west end of the reservoir, northwest of Hell Hole Dam. The ramp is accessible via Forest Route 2, which is also referred to as Eleven Pines Road and/or Forest Road 17N02.

The Hell Hole Boat Ramp area includes a boat ramp, a lower parking area referred to as the Hell Hole Boat Ramp Parking Area, and an upper parking area referred to as the Hell Hole General Parking Area. Single-unit, pre-cast concrete (CXT) disabled-accessible bathrooms are available in both parking areas. Potable water is not available at the boat ramp or in either parking area. An aerial view of Hell Hole Boat Ramp and associated parking areas is provided in Map REC 3-2.

An inventory of the amenities and features associated with the Hell Hole Boat Ramp and associated support facilities, including a condition assessment, was conducted on August 2, 2008, in consultation with a USDA-FS representative. The inventory and photographs of select facility amenities are available in the REC 1 – Recreation Use and Facilities Assessment TSR (PCWA 2009c). A brief overview of the Hell Hole Boat Ramp is provided in the following relative to WSE.

Hell Hole Boat Ramp

Hell Hole Boat Ramp and the associated parking areas were originally constructed in 1965, improved in 1986, and rehabilitated in 2000. Overall, Hell Hole Boat Ramp is in good condition, mainly due to the 2000 rehabilitation effort, which consisted of: (1) extending the upper end of the boat ramp; (2) repairing the rock masonry retaining wall that lines the edge of the boat ramp; and (3) replacing a portion of the lower end of the boat ramp, which had been undermined.

In its current configuration, Hell Hole Boat Ramp is approximately 1,000 feet long and about 25 feet wide and constructed of concrete. The concrete is rilled (grooved) for traction. The ramp is generally “U” shaped and is widened in the apex of the U to provide a low water turn around area. A 470 – foot long masonry retaining wall lines the upslope side of the ramp to prevent falling rocks from damaging the ramp. Rip-rap protects the down slope side of the lower part of the boat ramp from being undermined by waves. Appendix B includes photographs showing the boat ramp at various water levels.

Hell Hole Boat Ramp was designed to be functional at a range of WSE. The top of the boat ramp is situated at an elevation of 4,638 msl, eight feet higher than the current maximum operating WSE and spillway crest elevation. The lower end of the ramp terminates at an elevation of 4,530 feet. Therefore the functional range of the boat ramp is 4,530 – 4,637 feet. Note, however, that it is possible to launch a boat after the WSE declines below the bottom of the ramp due to the gently sloping nature of the reservoir bottom in the vicinity of the boat ramp.

The historic WSE data for water years 1975–2007 was used to evaluate the effect of WSE on boat ramp functionality. Specifically, the historic hydrologic data were used to determine when the average daily WSE at Hell Hole Boat Ramp is above the elevation of the bottom of the boat ramp (4,530 feet) and therefore “functional.” This evaluation was limited to the peak recreation season, defined for the purposes of this report as Memorial Day (May 25th) through Labor Day (September 7th).

Based on the hydrologic data, the WSE at Hell Hole Reservoir is always above 4,530 feet at the beginning of the recreation season, regardless of water year type. The table below shows the date during the recreation season when WSE falls below the bottom of the boat ramp. As indicated, the boat ramp is always functional during the peak recreation season, except during dry and critically dry water years when WSE can decline to below the bottom of the boat ramp by mid-August to early September, respectively.

Hell Hole Reservoir

Water Year Type	Date During Recreation Season that Average Daily WSE falls below Bottom of Boat Ramp (4,530 feet)
Wet Water Years (1980, 1982, 1983, 1984, 1986, 1995, 1996, 1997, 1998, 2006)	Boat ramp is functional during the entire recreation season.
Above Normal Water Years (1975, 1978, 1993, 1999, 2000, 2005)	
Below Normal Water Years (1979, 1985, 1989, 2002, 2003, 2004)	
Dry Water Years (1981, 1990, 1991, 2001, 2007)	August 15
Critically Dry/Extreme Dry Water Years (1976, 1977, 1987, 1988, 1992, 1994)	September 4

Boat ramp functionality with respect to WSE is also visually depicted on the Figure A-2 and A-3. Specifically, Figure A-2 shows boat ramp functionality with respect to all water year types and Figure A-3 shows boat ramp functionality by each of the five water year types. If needed, these figures can be used to assess boat ramp functionality over the entire year, by water year type.

Reservoir-based Recreation Opportunities relative to WSE

PCWA conducted recreation visitor surveys in 2008 from May 24th (Memorial Day weekend) through September 1 (Labor Day weekend). The water surface elevations during this time period are depicted on Figure REC 3-2 for reference. As indicated, in 2008 water levels at Hell Hole Reservoir were near their highest at the beginning of the survey period, peaking at the beginning of June. After peaking, water levels steadily declined through the end of the survey period. The water level on the last day of the survey period was about 4,560 feet msl.

The REC 2 – Recreation Visitor Survey results did not identify any issues related to WSE at Hell Hole Reservoir. Survey participants were asked whether their recreation experience was negatively affected by reservoir water surface level. Sixty-one people who said they recreated at Hell Hole Reservoir answered this question. Of these, only four people (6.6%) said that their recreation experience was negatively affected by water surface level. These people were asked to explain their answer. However, none provided a comment.

Survey participants who completed Section A-6 (Reservoir Recreation) of the survey form were also asked to rate a variety of factors related to WSE using an acceptability scale, with the following results.

- 71.4% (50 of 70 people) said shoreline access is acceptable.
- 79.4% (54 of 68 people) said adequacy of water depths is acceptable.
- 80.3% (53 of 66 people) said presence of debris or obstacles is acceptable.

All of the survey responses regarding WSE were compared to the actual WSE on the day the surveys were conducted to determine whether there is a relationship between recreation experience and WSE. No relationship or pattern relative to WSE was evident.

Changes in WSE can potentially affect access to Upper Hell Hole Campground. Accordingly, Upper Hell Hole Campground, and reservoir access to the campground is discussed further in the following.

Upper Hell Hole Campground

Upper Hell Hole Campground is located on the southeast shore of the reservoir, about four miles from Hell Hole Boat Ramp (Map REC 3-3). The campground includes 13 sites. Each campsite can accommodate five persons-at-one-time (PAOT) so the entire campground can accommodate 65 overnight visitors. The campground is accessible by boat or by a four-mile long trail (14E02.3). Potable water is not available and none of the sites are considered disabled accessible. Two sets of pit toilets are available. This campground and all the amenities at each of the sites, including their condition, will be described in detail in the REC 1 – Recreation Use and Facilities TSR (PCWA 2009c).

The overall layout of Upper Hell Hole Campground is shown on Map REC 3-4. As indicated, the campground is generally spread across three levels created by the natural topography of the site. None of the campsites at Upper Hell Hole Campground are contiguous to the reservoir. Therefore, boat-in campers must tie their boats up at the shoreline and carry their gear to an open camp site. At maximum WSE, the closest campsites (Sites 1 and 3 on Map REC 3-4) are about 70 feet from the shoreline. The climb from the reservoir to the campground becomes longer and steeper as water levels recede.

Accessing Upper Hell Hole Campground by boat involves navigating through a natural constriction in the reservoir sometimes referred to as “the Narrows”. The Narrows is shown on Map REC 3-4 and a photograph of the entrance to the Narrows is included in Appendix C (Photo C-1). As indicated, the Narrows is defined by bedrock outcrops. As water level recedes, the constriction becomes narrower and shallower, which can make it difficult to navigate, especially in larger boats.

The Narrows was visited throughout the summer and early fall of 2008 to determine the WSE at which it is no longer navigable. The Narrows was generally navigable throughout the summer. However, as the reservoir levels receded, navigation became more difficult due to the presence of shallow bedrock outcrops and boulders. Furthermore, continuing up the reservoir after passing the Narrows became more challenging as water levels receded due to shallow water depths.

- During a field trip conducted on August 4, 2008, the Narrows was easily navigable in a 16-foot long aluminum, shallow bottom “duck boat” equipped with an outboard motor. After passing the Narrows, water depth was sufficient to continue on to Upper Hell Hole Campground and tie up on shore, relatively near the campground. However, landing was somewhat challenging due to shallow water depths. Photographs C-2 and C-3 in Appendix C show the Hell Hole Reservoir shoreline on August 4, 2008 as viewed from camp sites 1 and 2 respectively. The WSE on this date was 4,581 feet.
- During a field trip conducted on August 30, 2008 the Narrows was still navigable in a 12-foot long Zodiac boat equipped with an outboard motor. However, a certain amount of skill and patience was required to pass through the Narrows without damaging the engine propeller. After passing the Narrows, water depth was sufficient to continue on up the reservoir, but not as far up as Upper Hell Hole Campground. The WSE on this date was 4,561 feet.
- During another field trip conducted on October 24, 2008, the Narrows was navigated by a crew using a 12-foot long Zodiac boat equipped with an outboard motor. However, once past the Narrows, the crew could not continue on because the reservoir depth was too shallow. The WSE on this date was 4,530 feet. This is the same elevation as the bottom of the Hell Hole Boat Ramp. Accordingly, the Narrows would always be navigable during the same period that the boat ramp is functional.

Access to Upper Hell Hole Campground is partly dependent upon how much of the reservoir upstream of the Narrows is inundated. Specifically, boat-in campers must not only be able to pass through the Narrows, they must be able to boat to within a reasonable distance of the campground so that they can carry their gear to the campground without too much difficulty. As water levels recede, less of the reservoir area upstream of the Narrows is inundated and water depths decrease. As water depth decreases, boat-in campers may not be able to reach Upper Hell Hole Campground without walking across a portion of the bottom of the reservoir.

Based on field observations and detailed bathymetric data collected in October 2007 as part of the AQ 9 – Geomorphology TSP (PCWA 2007), a WSE of 4,600 feet would allow campers to boat through the Narrows and up the reservoir, to within about 200 feet of the campground. At this elevation, the walk would mainly be upslope, across bedrock. The 4,600 foot elevation contour is shown on Map REC 3-4. At lower WSEs the walk would be longer but, due to the morphology of the reservoir, would still primarily be across solid bedrock. At a WSE of about 4,580 feet the morphology of the reservoir bottom abruptly changes from solid bedrock to unconsolidated sediment (see detailed inset on Map REC 3-4). The 4,580 contour is shown on Map REC 3-4 for reference.

The REC 2 – Recreation Visitor Survey results indicate that boat-in access to the Upper Hell Hole Campground is generally acceptable (Table REC 3-3). People who completed Section A-6 of the REC 2 – Recreation Visitor Survey were asked to rate the access to boat-in campgrounds using an acceptability scale. Fifty-eight people who recreated at Hell Hole Reservoir answered this question. Of these, thirty-seven (63.8%)

said it was acceptable. Three people (5.3%) said it is not acceptable but did not provide any comments on the survey form that could be used to assess their answer. Water levels on the days these three respondents were intercepted were: 4,609 feet, 4,589 feet, and 4,575 feet MSL.

WSEs Associated with Potential Project Betterments

PCWA is currently considering one potential Project betterment referred to as the Hell Hole Seasonal Storage Increase Betterment. The purpose of this betterment is to seasonally increase the storage capacity of Hell Hole Reservoir. The betterment would utilize a portion of the existing flood control pool, above the present normal maximum operating water level, to store additional water during the spring and summer after the peak of the runoff period. The seasonal storage increase would be achieved by installing six foot high crest gate on the exiting dam spillway. The crest gates would be raised when needed to increase reservoir storage. Operation of the crest gates would seasonally increase the reservoir's inundation area within the existing flood pool by approximately 36 acres.

In general, a six-foot increase in the WSE would not adversely affect reservoir recreation opportunities or facilities, as summarized in the following.

- Raising the WSE by six feet would increase the surface area of the reservoir by approximately 36 acres. The increase in surface area is relatively small because the elevation increase is nominal relative to the overall size of the reservoir and because the slopes surrounding the reservoir are steep. Regardless, increasing the surface area of a reservoir is generally considered a benefit because it increases the recreation carrying capacity of the reservoir.
- Raising the WSE would make it easier for boat-in campers to access Upper Hell Hole Campground. At the current maximum WSE, boat-in campers must carry their camping gear about 70–75 feet up a relatively steep slope to get to the nearest site at Upper Hell Hole Campground. Raising the water surface elevation would decrease the distance between the reservoir and the campground, thereby making it easier for boaters to access the campground during the time that the reservoir is at full pool.
- Other than the Hell Hole Boat Ramp, none of the developed recreation facilities in the Hell Hole Reservoir area are contiguous to the reservoir. Therefore, with the exception of the Hell Hole Boat Ramp, raising the WSE would have no physical effect on the developed recreation facilities in the Hell Hole Reservoir area.
- As shown on Map REC 3-2, increasing the WSE by six feet would seasonally inundate about 50 feet of the upper end of Hell Hole Boat Ramp. However, the top of the boat ramp is currently situated at about 4,638 feet, which is eight feet above the current maximum operating WSE and two feet above the elevation of the maximum operating WSE that would occur with the betterment. Accordingly, the boat ramp would still be fully functional even with the Hell Hole Seasonal

Storage Increase. As shown on Map REC 3-2, raising the WSE would not inundate any of the boat ramp support facilities, for example the bathrooms or the parking areas.

This betterment may result in operational changes at Hell Hole Reservoir. Specific operational changes that may occur as a result of this betterment are currently being incorporated into PCWA's operations model. This model will be used to support discussions and negotiations regarding new PM&E measures.

6.1.3 Reservoir Access

Hell Hole Reservoir is encompassed by land managed by the USDA-FS and land owned by PCWA. At maximum operating WSE, the shoreline around Hell Hole Reservoir shoreline is about 13-miles long. Approximately 70 percent of the reservoir shoreline bisects land managed by the Eldorado National Forest - Georgetown Ranger District. The remaining 30 percent is owned by PCWA. Sierra Pacific Industries owns several parcels of land adjacent to the reservoir, outside of the FERC Project boundary. However, Sierra Pacific's land does not extend beyond the FERC Project boundary or under the reservoir. Land ownership in the Hell Hole Reservoir area is shown on Map REC 3-1.

In general, PCWA does not limit access to Hell Hole Reservoir or the shoreline around the reservoir. However, PCWA limits access to the immediate area surrounding specific Project facilities to protect public safety, as briefly described in the following.

- **Hell Hole Dam and Spillway.** A fence and gate prohibits vehicular access to the Hell Hole Dam and spillway area. However, pedestrian access across the dam is allowed. Specifically, pedestrians may cross through an opening in the fence, and cross the dam to access the trailhead to the Upper Hell Hole Campground Trail, which is located on the south side of the dam. Log booms prevent access to the spillway area from the reservoir.
- **Hell Hole – Middle Fork Tunnel Gatehouse.** PCWA accesses this facility via a Project access road referred to as the Hell Hole-Middle Fork Tunnel Gatehouse Road. This road is gated near its intersection with FR-2 to prevent vehicle access by the public. However, the public may walk along the road to access the reservoir. The gatehouse is not fenced.
- **French Meadows Powerhouse.** PCWA accesses this facility and the adjacent Hell Hole Substation via the French Meadows Powerhouse Road. This road is not gated and therefore can be used by the public. However, a gate located immediately west of the substation prohibits public access to the substation and powerhouse.

The primary access to Hell Hole Reservoir is the Hell Hole Boat Ramp, which is located at the west end of the reservoir, near Hell Hole Dam. Otherwise, there are no other facilities on the reservoir that are designed to facilitate access to the reservoir.

6.1.4 Safety Conditions

PCWA maintains a variety of programs and measures to ensure public health and safety, including visual and audible warnings (e.g., signs, bells, and sirens) and physical restraining devices (e.g., fences and log booms). These programs and measures are described in detail in the LAND 3 – Emergency Action and Public Safety TSR (PCWA 2009a). Existing programs and measures, safety concerns, and safety incidents that pertain specifically to Hell Hole Reservoir area are summarized below.

Existing Programs and Measures

PCWA utilizes the following audible and visual warning devices to warn the public of hazardous areas or potentially dangerous conditions in the Hell Hole Reservoir area:

- *Audible Warning Devices.* PCWA maintains security alarms at all powerhouses, including French Meadows Powerhouse located on Hell Hole Reservoir. The security alarm sounds in the event of an unauthorized entry into the powerhouse.
- *Signage.* PCWA and the USDA-FS maintain signs of various types to provide Project-related information to the public and to warn the public about potentially hazardous conditions or areas. Public safety signs were inventoried during field survey conducted in 2008 and are described in detail in the Land 3 – Emergency Action and Public Safety TSR. All of the signs located in the Hell Hole Reservoir area are summarized in Appendix D.
- *Log Booms.* PCWA maintains a log boom across the spillway at Hell Hole Reservoir. The purpose of the log boom is to prohibit access to the spillway area from the reservoir. A photograph of the log boom is provided in Appendix E (Photo E-1).

PCWA also utilizes the following physical restraining devices to restrict public access to hazardous areas in the Hell Hole Reservoir area.

- *Barrier Fences.* PCWA has erected two barrier fences in the Hell Hole Reservoir area, one surrounding the Hell Hole Dormitory Facility and the other surrounding the Hell Hole Dam General Parking Area (Photo E-2).
- *Slope Fences.* PCWA has installed a slope fence adjacent to the French Meadows Powerhouse and Switchyard to protect the public from falling rocks (Photo E-3).
- *Guard Rails.* Pedestrian access to the top of Hell Hole Dam is not restricted. Accordingly, the public may walk across the entire length of the dam. PCWA has installed guard rails along both sides of the top of the dam for public and worker safety purposes. A photograph of the guardrail is provided in Appendix E (Photo E-4).

Safety Concerns at Project Recreation Facilities

According to records maintained by the USDA-FS Eldorado National Forest, in 2006 and 2007 USDA-FS staff responded to a total of 43 incidents at Project facilities or other facilities located in the immediate area of Hell Hole Reservoir, as follows:

2006

- Big Meadows Campground – 4 law enforcement calls
- Hell Hole Boat Ramp – 5 law enforcement calls and 1 referral to another agency
- Hell Hole Campground – 7 law enforcement calls
- Hell Hole Dam – 2 law enforcement calls
- Hell Hole USDA Station – 2 law enforcement calls and 1 search and rescue call

2007

- Big Meadows Campground – 1 law enforcement call
- Hell Hole Boat Ramp – 4 law enforcement calls
- Hell Hole Campground – 4 law enforcement calls
- Hell Hole Dam – 2 law enforcement calls, 1 wildland fire call, and 1 referral to another agency
- Hell Hole USDA Station – 5 law enforcement calls, 1 referral to another agency and 1 miscellaneous call
- General area of French Meadows Powerhouse – 1 wildland fire call

According to records maintained by the Placer County Sherriff's Department, in 2006 and 2007 the Sheriff's Department responded to a total of 11 incidents in the Hell Hole Reservoir area, as follows.

2006

- Hell Hole Ranger Station – 1 missing juvenile call (found), 1 boat activity call (on Soda Springs-Riverton Road), 1 agency assist call (USDA-FS assist), and 1 incomplete 911 call

2007

- Hell Hole Ranger Station – 1 area check call (overdue campers located safe), 1 burglary call (burglary at ranger station), 1 welfare check (two overdue fishermen found safe), 2 Airops calls (flight checks), 1 law enforcement (called CDFG to assist with fight between hunters), and 1 incomplete 911 call.

Note that the Sherriff's Department recorded the locations of these incidents as "Hell Hole Ranger Station" so it is unclear where each incident occurred. Regardless, this summary provides examples of the types of incidents that have occurred in the Hell Hole Reservoir area.

Safety Accidents Reported to FERC

Since 1980, one accident has occurred at Hell Hole Reservoir that was reported to FERC. This accident was a drowning that occurred on June 11, 2009. As required, PCWA verbally reported this accident to FERC on June 12, 2009 and submitted written documentation on July 24, 2009. According to the report, the accident involved three men in a small boat overloaded with camping gear. The men launched from Hell Hole Boat Ramp. As they traveled to the upper end of Hell Hole Reservoir their boat began to take on water and capsized. Two of the men made it to shore but one did not. The two men camped out overnight and the next morning encountered some fishermen who, upon learning of the accident, called 911. As a result of the 911 call, a Placer County Sheriff's Department Search and Rescue helicopter and diving team was dispatched to Hell Hole Reservoir. Eldorado National Forest fire personnel later arrived to perform a ground search for the missing man on the perimeter area of the reservoir. Despite the search and rescue effort, the body was not found. In a letter dated August 10, 2009, the FERC acknowledged receipt of PCWA's report, stating that no further action by PCWA was required.

A review of the FERC's e-library indicates that no other reportable accidents have occurred in the Hell Hole Reservoir area.

6.1.5 User Conflicts

Potential reservoir-based user conflicts were assessed using the results of the surveys conducted as part of the REC 2 – Recreation Visitor Surveys TSP. Specifically, survey participants who completed Section A-6 of the survey form (Reservoir Recreation) were asked whether their recreation experience was negatively affected by (1) crowding; or (2) other factors taking place. The survey results are tabulated in Table REC 3-3 and summarized below.

- A total of 70 people provided information about crowding at Hell Hole Reservoir. Of these, only one person said their experience was negatively affected by crowding. This person was intercepted at Upper Hell Hole Campground and did not provide a comment explaining their response.
- A total of 64 people provided information about other activities taking place. Of these, only one person said that their experience was negatively affected by other activities taking place. This person was intercepted at Big Meadows Campground and did not provide a comment explaining their response.

Factors that May Contribute to User Conflicts

User conflicts on reservoirs are typically a result of heavy recreation use relative to

reservoir capacity. Therefore, reservoir capacity is discussed in the following.

Reservoir Carrying Capacity

At maximum operating WSE, Hell Hole Reservoir has a surface area of 1,247 acres. Accordingly, at full pool, the reservoir can accommodate a total of 125 boats at one time. This estimate is based on a carrying capacity coefficient of 1 boat per 10 acres, which is a conservative coefficient for both motorized fishing boats and car top boats such as canoes and kayaks (Bosley 2005, FDEP undated).

The lowest recorded WSE that occurred at Hell Hole Reservoir during the recreation season (Memorial Day – Labor Day) during each of the different water year types is summarized below, along with the corresponding surface area and carrying capacity. As indicated, carrying capacity has ranged from a low of 57 boats to a high of 86 boats during the recreation season.

Hell Hole Reservoir

Water Year Types	Lowest Recorded WSE during Peak Recreation Season (May 25 – Sept 7)	Associated Surface Area (Acres)**	Associated Carrying Capacity (boats)
Wet Water Years (1980–1984, 1986, 1995–1998, 2006)	4536	806	81
Above Normal Water years (1975, 1978, 1993, 1999, 2000, 2005)	4556	857	86
Below Normal Water Years (1979, 1985, 1989, 2002, 2003, 2004)	4545	828	83
Dry Water Years (1981, 1990, 1991, 2001, 2007)	4445	574	57
Critically Dry/Extreme Dry Water Years (1976, 1977, 1987, 1988, 1992, 1994)	4484	691	69

**Surface areas area based on elevation data that has been rounded to the nearest 5.

Vehicle count data collected in 2007 as part of the REC 1 – Recreation Use and Facilities TSP indicates that reservoir capacity far exceeds use, regardless of water year type, as explained in the following.

PCWA conducted vehicle counts for one year, from May 2007 through May 2008. Counts were conducted at all of the developed recreation facilities, including the Hell Hole Boat Ramp and associated parking areas. Among other things, the recreation technicians were instructed to count the number of vehicles present and to identify how many vehicles had boat trailers. The vehicle count logs were evaluated to determine how many vehicles with boat trailers were present at the Hell Hole Boat Ramp and both associated parking areas at any one time, with the following results:

Weekdays

Average: 4.3
Maximum: 13 (June 15, PM count)
Minimum: 0 (multiple days)

Weekend and Holidays

Average: 8.1
Maximum: 21 (May 27, AM count)
Minimum: 0 (multiple days)

Using the worst case scenario, there would have been a total of 21 boats on the reservoir at one time. Given this information, the number of boats that were on the reservoir at one time was well below capacity, even on the heaviest use day of the year.

6.2 FRENCH MEADOWS RESERVOIR

French Meadows Reservoir is located in the Middle Fork American River Canyon at an elevation of 5,262 feet above mean sea level (MSL). The surrounding landscape is characterized by moderately steep hillsides, which are densely vegetated with mixed conifer forest, interspersed with small areas of white fir and huckleberry oak and intermittent granitic outcrops. Hundreds of forested acres west of the dam were consumed in the Star Fire in 2001. Most of the burned area consists of a few patches of forest with large area of exposed bedrock and soil.

6.2.1 Recreation Opportunities

The French Meadows Reservoir area provides a variety of recreation opportunities including fishing, camping, reservoir boating, hiking, picnicking, and sight seeing. These opportunities are supported by ten developed Project recreation facilities, as follows:

Campgrounds

- Ahart Campground
- French Meadows Campground
- Lewis Campground
- Poppy Campground

Group Campgrounds

- Coyote Group Campground
- Gates Group Campground

Day Use Facilities

- French Meadows Boat Ramp
- French Meadows Picnic Area
- McGuire Boat Ramp
- McGuire Picnic Area

The locations of these recreation facilities are shown on Map REC 3-5, which also shows the locations of the primary MFP facilities and land ownership. As indicated, Ahart Campground, Gates Group Campground, Coyote Group Campground, and Lewis Campground are not located in the immediate vicinity of the reservoir. French Meadows Campground is located on the south shore of the reservoir, near the reservoir. Poppy Campground is located on the north shore of the reservoir and can only be reached by boat or by hiking along a short (.7-mile) segment of the Western States Trail. French Meadows and McGuire Boat Ramps provide the primary access to the reservoir. These boat ramps are located near French Meadows and McGuire Picnic Areas, which provide day use opportunities near the reservoir.

Camping in the French Meadows area is permitted only within the developed camping areas (TNF website 2006). The USDA-FS restricts overnight camping in undeveloped areas around the reservoir for resource protection. French Meadows lies within the boundaries of a State Game Refuge and no firearms are permitted.

Similar to Hell Hole Reservoir, the French Meadows Reservoir area is typically accessible from about May 1 to November 1. However, during some years snow may limit access to the area until the end of May. Most recreation use occurs between Memorial Day and Labor Day, with the heaviest use occurring on weekends and holidays (PCWA 2009b).

Recreation Activities

The results of the REC 2 – General Visitor Surveys indicate that most people visit the French Meadows Reservoir area to fish at French Meadows Reservoir and to camp in a developed site, as explained in the following.

Of the 968 people who participated in the REC 2 – Recreation Visitor Surveys, a total of 316 were intercepted at one of the sites located in the French Meadows Reservoir area and completed the Background Information Section (Section A-1) of the survey form. Question 12 of Section A-1 asked these participants to identify the (one) main activity they participated in during their trip. A total of 168 people provided valid responses to the question, with the following results:

- Eight-six people (51.2%) identified “camping in a developed site” as their primary activity.
- Thirty two people (19.0%) identified “reservoir fishing” as their primary activity.
- All other responses were \leq 4.8% and are shown on Table REC 3-4.

Reservoir Fishing

Fishing is allowed on the reservoir all year round but primarily occurs between May and October, when the area is accessible. French Meadows Reservoir contains rainbow and brown trout, which are planted by the CDFG throughout the season to enhance recreation fishing (USDA-FS 2006).

A reservoir angler survey was conducted as part of the REC 2 – Recreation Visitor Surveys TSP (PCWA 2007). Based on the information collected as part of this effort, most anglers catch rainbow trout at French Meadows Reservoir. The survey participants reported catching a total of 192 fish. Of these, 84.4% were rainbow trout, followed by lake trout (4.2%) and brown trout (5.7%). The reservoir angler survey, including the results of surveys conducted at French Meadows Reservoir, is discussed in detail in the REC 2 – Recreation Visitor Survey TSR (PCWA 2009c). In addition, the results for French Meadows Reservoir are summarized on Table REC 3-5.

Camping in Developed Sites

Camping is available at six developed campgrounds in the French Meadows Reservoir area: Ahart Campground, French Meadows Campground, Lewis Campground, Poppy Campground, Coyote Group Campground, and Gates Group Campground. With the exception of French Meadows and Poppy Campgrounds, none of these facilities are situated in the immediate vicinity of the reservoir. French Meadows campground is located on the south side of the reservoir and is readily accessible from FR-96. Poppy Campground is located on the north side of the reservoirs and is accessible by boat or via the Western States Trail (16E010). These campgrounds will be described in detail in the REC 1 – Recreation Use and Facilities TSR (PCWA 2009b).

Reservoir Boating

Popular watercraft used on the reservoir include 10–20-foot aluminum-fishing boats equipped with outboard engines. Jet skis, sailboats, canoes and kayaks are also used on the reservoir, but to a lesser extent. There are no restrictions on the type or size of boats at French Meadows Reservoir and no speed limits are imposed.

Specific information about the type of boats used on French Meadows Reservoir was collected through the REC 2 – Recreation Visitor Surveys. Specifically, Question 4 of Section A-6 asked the survey respondents who participated in boating activities to identify the type of boat they used. A total of 57 people answered this question, with the following results.

- 61.4% (35 people) used fishing boats
- 33.3% (19 people) used non-power boats (e.g., canoe, kayak, row boat, raft)
- 14.0% (8 people) used ski boats
- 8.8% (5 people) used personal watercraft

6.2.2 Reservoir Levels

French Meadows Reservoir captures water from the Middle Fork American River, and also stores water conveyed from the Duncan Creek Diversion via the Duncan Creek-Middle Fork Tunnel. Water captured in French Meadows Reservoir is conveyed to Hell Hole Reservoir via the French Meadows-Hell Hole Tunnel, passing through the French Meadows Powerhouse.

French Meadows Reservoir has a gross storage capacity of 134,993 ac-ft. Additional information about the reservoir relevant to recreation is summarized below.

French Meadows Reservoir Specifications^a

Water Surface Elevation	
Maximum Operating Water Surface	5,262 feet
Minimum Operating Water Surface ^b	5,125 feet
Area	
Area at Maximum Operating Water Surface	1,433 acres
Area at Minimum Operating Water Surface ^b	392 acres
Depth	
Depth at Maximum Operating Water Surface	214 feet
Depth at Minimum Operating Water Surface ^b	77 feet
Shoreline	
Shoreline at Maximum Operating Water Surface	10.5 miles
Shoreline at Minimum Operating Water Surface ^b	5 miles

^aNote that this information has been updated since the PAD was issued in 2007 based on new information developed as part of the relicensing studies.

^bNote that the minimum water surface elevation has never been reached. The lowest recorded WSE is 5,158 feet.

Detailed information about the operation of the MFP and French Meadows Reservoir is described in detail in PCWA's PAD (PCWA 2007), and summarized below.

Historical Water Surface Elevations

Typical operation of the MFP results in the capture or diversion of water into French Meadows Reservoir during the winter and spring (filling period), and drawdown of the reservoir during the summer, fall, and early winter (release period). Similar to Hell Hole Reservoir, operation of the MFP varies from year-to-year based on the timing and magnitude of spring runoff, which is influenced by the amount of the winter snow pack and ambient temperature conditions, as well as precipitation. Despite the year-to-year variation, the reservoir typically reaches its maximum storage for the year in June. Reservoir levels begin to decline in the summer and continue to decline until the late fall or winter. Reservoir levels are typically at their lowest in December, January, and February, when the area is inaccessible due to snow.

This pattern is evident on the annual hydrographs included in Appendix F. Historical water surface elevations at French Meadows Reservoir for the period 1975 – 2007 are depicted graphically in Appendix F, as follows.

- Figure F-1 is a “box and whisker” plot that shows the median, quartile, minimum, and maximum water surface elevations by month over the period of record.
- Figure F-2 shows average daily WSE by month for all of the water years in the period of record combined.
- Figure F-3 shows the average monthly WSE for wet, above normal, below normal, dry, and critically dry water years, respectively.

In all cases, the hydrographs show the maximum operating WSE of 5,262 feet. Figures A-2 and A-3 also show the functional range of French Meadows and McGuire Boat Ramps (gray shading).

Design and Functional Elevation Ranges of Existing Boat Ramps

There are two boat ramps at French Meadows Reservoir, French Meadows Boat Ramp and McGuire Boat Ramp. As shown on Map REC 3-6, French Meadows Ramp is located on the southeast shore of the reservoir and is accessible via Mosquito Ridge Road (FR 96). McGuire Boat Ramp is situated on the northeast shore of the reservoir and can be reached by taking FR 96 to Forest Road 42.2, which traverses the area north of French Meadows Reservoir, terminating at the McGuire Boat Ramp and Poppy Campground Trailhead Parking Areas.

A detailed inventory of the amenities and features associated with the French Meadows Boat Ramp and associated support facilities was conducted in consultation with USDA-FS representatives on July 23, 2008. A similar inventory and condition assessment of the McGuire Boat Ramp and associated support facilities was conducted in consultation with USDA-FS representatives on July 24, 2008. The inventories and representative photographs of select facility amenities are available in the REC 1 – Recreation Use and Facilities Assessment TSR (PCWA 2009b). A brief overview of the boat ramp is provided in the following relative to WSE.

French Meadows Boat Ramp

French Meadows Boat Ramp is located on the south shore of French Meadows Reservoir. The French Meadows Boat Ramp area includes a boat ramp and large parking area. A paved road connects the parking area to the boat ramp. A bathroom with flush toilets and sinks is available between the ramp and the parking area. In addition, potable water is available at a faucet located adjacent to the bathroom. The French Meadows Picnic Area is located immediately west of the French Meadows. The general layout of the French Meadows Boat Ramp, French Meadows Picnic Area, and the associated and parking areas is shown on Map REC 3-7.

French Meadows Boat Ramp is approximately 20 feet wide and approximately 600 feet long, as measured from the maximum normal operating WSE to the end of the ramp.

The ramp is constructed of concrete and includes three turn-around areas that may be used as water levels recede. The configuration of the boat ramp and turn-around areas is shown on Map REC 3-7. In addition, photographs of the boat ramp at various WSEs are included in Appendix G.

The boat ramp was designed to be functional at a wide range of water levels. The top of the ramp is at an elevation of about 5,262 feet MSL, which is the current maximum operating WSE. The lower end of the concrete ramp terminates at an elevation of 5,200 feet. Therefore the functional range of the boat ramp is 5,200 – 5,262 feet. Note, however, that it is possible to launch a boat after the WSE declines below the bottom of the ramp due to the gently sloping nature of the reservoir bottom in the vicinity of the boat ramp (Photos G-7 and G-8).

The historic WSE data for water years 1975–2007 was used to evaluate the effect of WSE on boat ramp functionality. Specifically, the historic hydrologic data were used to determine when the average daily WSE at French Meadows Boat Ramp is above the elevation of the bottom of the boat ramp (5,200 feet) and therefore “functional”. This evaluation was limited to the peak recreation season, defined for the purposes of this report as Memorial Day (May 25th) through Labor Day (September 7th).

Based on the hydrologic data, the WSE at French Meadows Reservoir is always above 5,200 feet at the beginning of the recreation season, regardless of water year type. The table below shows the date during the recreation season when WSE falls below the bottom of the boat ramp. As indicated, the boat ramp is always functional during the peak recreation season, except during critically dry water years when WSE can decline to below the bottom of the boat ramp by early-August.

French Meadows Reservoir

Water Year Type	Date During Recreation Season that Average Daily WSE falls below Bottom of Boat Ramp (5,200 feet)
Wet Water Years (1980, 1982, 1983, 1984, 1986, 1995, 1996, 1997, 1998, 2006)	Boat ramp is functional during the entire recreation season.
Above Normal Water Years (1975, 1978, 1993, 1999, 2000, 2005)	
Below Normal Water Years (1979, 1985, 1989, 2002, 2003, 2004)	
Dry Water Years (1981, 1990, 1991, 2001, 2007)	
Critically Dry/Extreme Dry Water Years (1976, 1977, 1987, 1988, 1992, 1994)	August 6

Boat ramp functionality with respect to WSE is also visually depicted on the Figure F-2 and F-3. Specifically, Figure F-2 shows boat ramp functionality with respect to all water year types and Figure F-3 shows boat ramp functionality by each of the five water year types. If needed, these figures can be used to assess boat ramp functionality over the entire year, by water year type.

McGuire Boat Ramp

McGuire Boat Ramp is located on the north shore of French Meadows Reservoir. The McGuire Boat Ramp area includes a concrete boat ramp and three large, relatively unimproved parking areas, one of which also serves as a parking area for the Poppy Campground trailhead. A paved road connects the parking areas to the boat ramp. Two bathrooms are available, one in the Poppy Trailhead parking area and one along the access road to the boat ramp. In addition, potable water is available at two faucets. The general layout of the McGuire Boat Ramp and parking areas associated and parking areas is shown on Map REC 3-8.

McGuire Boat Ramp is approximately 20 feet wide and approximately 800 feet long, as measured from the start of the boat ramp just above the high water turn around areas to the end of the concrete ramp. The ramp is constructed of concrete and includes four turn-around areas that may be used as water levels recede. The configuration of the boat ramp and turn-around areas is shown on Map REC 3-8. In addition, photographs of the boat ramp at various WSEs are included in Appendix H.

The boat ramp was designed to be functional at a wide range of water levels. The top of the ramp begins above the maximum operating WSE of 5,262 feet MSL. The lower end of the concrete ramp terminates at an elevation of 5,200 feet, which is the same elevation as the terminus of the French Meadows Boat Ramp. However, boat launching is still possible after the WSEs recede to below the bottom of the concrete ramp due to the gentle slope of the reservoir shoreline (Photo H-9).

The historic hydrologic data were evaluated to determine how often a WSE of 5,200 feet occurs. Since the bottom of McGuire Boat Ramp is located at the same elevation at the French Meadows Boat Ramp, the results are the same as those discussed above under French Meadows Boat Ramp.

Reservoir-based Recreation Opportunities relative to WSE

PCWA conducted recreation visitor surveys in 2008 from May 24th (Memorial Day weekend) through September 1 (Labor Day weekend). The water surface elevations at French Meadows Reservoir during this time period are depicted on Figure REC 3-3 for reference. As indicated, in 2008 water levels at French Meadows Reservoir were near their highest at the beginning of the survey period, peaking at the beginning of June. After peaking, water levels steadily declined through the end of the survey period. On the last day of the survey period, the WSE was about 5,207 feet.

The REC 2 – Recreation Visitor Survey results were evaluated to determine whether WSE at French Meadows Reservoir adversely affect reservoir-based recreation

opportunities. Specifically, survey participants were asked whether their recreation experience was negatively affected by reservoir water surface level. Eighty people who said they recreated at French Meadows Reservoir answered this question. Of these, 33 people (41.2%) said that their recreation experience was negatively affected by water surface level. Associated comments provided by the survey participants indicate that water level was too low.

Survey participants who completed Section A-6 (Reservoir Recreation) of the survey form were also asked to rate a variety of factors related to WSE using an acceptability scale, with the following results.

- 81.5% (75 of 92 people) said shoreline access is acceptable.
- 50.6% (43 of 85 people) said adequacy of water depths is acceptable.
- 66.7% (58 of 87 people) said presence of debris or obstacles is acceptable.

These responses indicate that shallow water depths and the presence of debris and obstacles are the primary reasons water level adversely affects recreation experience. Shoreline access does not appear to be an issue.

The relationship between recreation experience and WSE was further evaluated by plotting the recreation experience survey responses (yes/no) against WSE on the day the surveys were completed. The resulting plots (by count and by percent) are presented on Figure REC 3-4. As indicated, no obvious relationship or trend between the survey responses and WSE is evident. However, the number (and percentage) of people who indicated that their recreation experience was adversely affected by water surface level increases at water levels ranging between 5,215 and 5,220. This may be related to the topography of the reservoir. The upper end of the reservoir is characterized by a gently sloping bottom, interspersed with bedrock boulders and remnant tree stumps. Accordingly, the upper end of reservoir becomes very shallow and numerous tree stumps are exposed as water level recedes (Map REC 3-9). Conditions may be at their worst between elevations of 5,215 and 5,220 feet. Responses regarding recreation experience improved when WSE declined below 5,215 feet (Figure REC 3-2).

Changes in WSE can potentially affect the functionality of the McGuire Beach and access to Poppy Campground. Accordingly, these two topics are discussed further in the following.

McGuire Beach

McGuire Beach is located on the north shore of French Meadows Reservoir, near McGuire Picnic Area. The picnic area includes 10 picnic sites and a parking area. Other amenities include two bathrooms with flush toilets and sinks and a faucet with potable water. The general layout of the beach, picnic area and parking area is shown on Map REC 3-8. Photographs of the beach are included in Appendix I. A detailed inventory of the McGuire Picnic Area and Beach was conducted on July 24, 2008 in consultation with USDA-FS representatives. The inventory and photographs showing select facility

amenities are available in the REC 1 – Recreation Use and Facilities Assessment TSR (PCWA 2009b).

The beach is manmade. Conceptual design drawings developed in 1965 indicate that this beach was much larger in the past. Based on the design drawings, a substantial portion of the beach has eroded away. In its current condition it consists of a 12,500 square foot sand area located on natural topographic bench along the shore. The lower end of the beach is situated at an elevation of about 5,245 feet and the upper end of the beach is at 5,255 feet. Therefore, the beach is primarily functional at WSE's ranging from about 5,245–5,255 feet. Otherwise, the beach is submerged at high WSE's and is too far from the edge of water when the WSE's are low. It is not clear whether this beach receives any recreation use. During the visitor surveys, only two people were observed on the beach during the entire survey period. One of these people was interviewed. This person was accessing the reservoir shoreline to fish.

Poppy Campground

Poppy Campground is located on the north shore of the reservoir. It is accessible via boat or by a 0.7-mile long trail (16E10) that begins at the Poppy Campground trailhead parking area near McGuire Boat Ramp. The campground includes 12 sites. Each campsite can accommodate five persons-at-one-time (PAOT) so the entire campground can accommodate 60 overnight visitors. Potable water is not available and none of the sites are considered disabled accessible. Two sets of pit toilets are available. The campground is managed as a “pack it in/pack it out” campground. Therefore, garbage containers are not available. This campground and the amenities at each of the sites, including their condition, will be described in detail in the REC 1 – Recreation Use and Facilities Assessment TSR (PCWA 2009b).

The overall layout of Poppy Campground is shown on Map REC 3-9. As indicated, the campground is relatively small and generally confined to the slope that defines the north side of the reservoir. None of the campsites at Poppy Campground are contiguous to the reservoir. Therefore, boat-in campers must tie their boats up at the shoreline and carry their gear to an open camp site. At maximum WSE, the closest campsites are about 30–50 feet from the shoreline. The climb from the reservoir to the campground becomes longer and steeper as water levels recede.

The shoreline adjacent to Poppy Campground is relatively even and exposed, and accessing the campground from the reservoir does not involve negotiating any major constrictions. However, as water levels recede water depths decrease. As water depth decreases, boat-in campers may not be able to reach Poppy Campground without walking across a portion of the bottom of the reservoir.

The REC 2 – Recreation Visitor Survey results indicate that boat-in access to Poppy Campground is generally acceptable (Table REC 3-6). People who completed Section A-6 of the REC 2 – Recreation Visitor Survey were asked to rate the access to boat-in campgrounds using an acceptability scale. Sixty-nine people who recreated at French Meadows Reservoir answered this question. Of these, fifty-two (75.4%) said it was

acceptable. Three people (5.3%) said it is not acceptable. One person provided a comment stating the water level was too low. Water levels on the dates of these three respondents were intercepted were 5,220, 5,214, and 5,206 feet msl.

WSEs associated with Potential Project Betterments

PCWA is currently considering one potential Project betterment referred to as the Hell Hole Seasonal Storage Increase Betterment. This betterment does not require modifications to French Meadows Reservoir or any Project facilities at French Meadows Reservoir. Therefore, this betterment would not directly affect reservoir-based recreation opportunities at French Meadows Reservoir. However, this betterment may result in operational changes that could affect WSEs at French Meadows Reservoir. Specific operational changes that may occur as a result of this betterment are currently being incorporated into PCWA's operations model. This model will be used to support discussions and negotiations regarding new PM&E measures.

6.2.3 Reservoir Access

French Meadows Reservoir is encompassed by land managed by the USDA-FS and land owned by PCWA. At maximum operating WSE, the shoreline around French Meadows Reservoir shoreline is 10.5-miles long. Approximately 90 percent of the reservoir shoreline bisects land managed by the Tahoe National Forest – American River Ranger District. The remaining 10 percent is owned by PCWA. Land ownership in the French Meadows Reservoir area is shown on Map REC 3-5.

In general, PCWA does not limit access to French Meadows Reservoir or the shoreline around the reservoir. However, PCWA limits access to the immediate area surrounding specific Project facilities to protect public safety, as briefly described in the following.

- **French Meadows Dam and Spillway.** Forest Route (FR) 96 crosses the top of the dam. Therefore, public access to the dam is not prohibited. A fence and gate prohibits public access to the French Meadows spillway area from FR 96 or the dam. Log booms prevent access to the spillway area from the reservoir.
- **French Meadows Dam Generator Building.** This structure is situated between the dam and the spillway, adjacent to the reservoir. It is enclosed in a fence to prohibit public access.
- **Duncan Creek-Middle Fork Tunnel Portal.** PCWA accesses this area via a short Project access road referred to as the Duncan Creek-Middle Fork Tunnel Portal Road. This road is gated near its intersection with FR-96 to prevent vehicle access by the public. However, the public may walk along the road to access the reservoir.
- **French Meadows – Hell Hole Tunnel Gatehouse and Radio Communications Tower.** These facilities are located along the south shore of the reservoir, just west of the French Meadows Picnic Area (Map REC 3-5). PCWA accesses this area via a short Project access road referred to as the French Meadows –Hell Hole Tunnel Gatehouse Road. This road is gated near

its intersection with FR-96 to prevent vehicle access by the public. However, the public may walk along the road to access the reservoir.

The primary access to French Meadows Reservoir is the French Meadows Boat Ramp located on the south side of the reservoir and the McGuire Boat Ramp located on the north side of the reservoir. There are no other facilities on the reservoir that are designed to facilitate access to the reservoir.

6.2.4 Safety Conditions

PCWA maintains a variety of programs and measures to ensure public health and safety, including visual and audible warnings (e.g., signs, bells, and sirens) and physical restraining devices (e.g., fences and log booms). These programs and measures are described in detail in the LAND 3 – Emergency Action and Public Safety TSR (PCWA 2009a). Existing programs and measures, safety concerns, and safety incidents that pertain specifically to French Meadows Reservoir area are summarized below.

Existing Programs and Measures

PCWA utilizes the following audible and visual warning devices to warn the public of hazardous areas or potentially dangerous conditions in the French Meadows Reservoir area:

- *Signage.* PCWA and the USDA-FS maintain signs of various types to provide Project-related information to the public and to warn the public about potentially hazardous conditions or areas. Public safety signs were inventoried during field survey conducted in 2008 and are described in detail in the Land 3 – Emergency Action and Public Safety TSR. All of the signs located in the French Meadows Reservoir area are summarized in Appendix D.
- *Log Booms.* PCWA maintains a log boom across the spillway at French Meadows Reservoir. The purpose of the log boom is to prohibit access to the spillway area from the reservoir. A photograph of the log boom is provided in Appendix J (Photo J-1).
- *Buoys.* A set of buoys has been installed around the perimeter of the McGuire Beach area. The purpose of the buoys is to delineate the beach area as water level fluctuates. Photographs of the beach and buoys are provided in Appendix J (Photo J-5 and J-6).

PCWA also utilizes the following physical restraining devices to restrict public access to hazardous areas in the French Meadows Reservoir area.

- *Public Safety Fences.* PCWA has erected fences around potentially hazardous areas. A gated fence prohibits access to the French Meadows Spillway Gates area. Similarly, a public safety fence surrounds the French Meadows-Hell Hole Tunnel Gatehouse. These fences are shown in Photos J-2 and J-3, respectively.

- *Gates.* PCWA has installed gates in certain locations to limit access onto Project roads. A locked gate prohibits vehicle access by the public access to the French Meadows – Hell Hole Tunnel Gate House area from FR 96. In addition, a gate prohibits vehicle access by the public to the Duncan Creek-Middle Fork Tunnel Portal area.
- *Guard Rails.* Vehicular and pedestrian access to the top of French Meadows Dam is not restricted. Accordingly, the public may drive or walk across the entire length of the dam. PCWA has installed guard rails along both sides of the top of the dam for safety purposes. A photograph of the guardrail is provided in Appendix J (Photo J-4).

Safety Concerns at Project Recreation Facilities

According to records maintained by the USDA-FS Tahoe National Forest, in 2006 and 2007 USDA-FS staff responded to a total of 29 incidents that occurred at Project facilities or other facilities located in the immediate area of French Meadows Reservoir, as follows:

2006

- Ahart Campground – 1 fire call
- Coyote Campground – 1 law enforcement call
- French Meadows Campground – 1 law enforcement call and 3 public assist calls
- Lewis Campground – 1 fire call and 1 law enforcement call
- French Meadows Area – 2 law enforcement calls and 1 public assist call
- French Meadows Dam – 2 public assist calls

2007

- Ahart Campground – 1 fire call and 2 law enforcement calls
- French Meadows Boat Ramp – 1 public assist call
- French Meadows Campground – 1 law enforcement call, 2 public assist calls, and 1 fire call
- Lewis Campground – 1 law enforcement call
- McGuire Picnic Area – 1 law enforcement call
- French Meadows Administrative Site – 1 law enforcement call
- French Meadows Area – 4 law enforcement calls and 1 public assist calls

According to records maintained by the Placer County Sheriff's Department, in 2006 and 2007 the Sheriff's Department responded to a total of 16 incidents in the French Meadows Reservoir area, as follows.

2006

- French Meadows Reservoir Area – 2 missing person calls (both found), 1 extra patrol call, 1 agency assist call (USFS requesting medical aide), 1 law information call (search and rescue advisement)
- French Meadows Campground – 1 assist call (contacted campground host)
- French Meadows Reservoir – 2 grand theft calls (kayak thefts at reservoir)

2007

- French Meadows Reservoir Area – 1 missing person call (subject located safe) 1 extra patrol call, 1 gun shot call (shots fired in Game Preserve), 1 welfare check (2 overdue fisherman returned safe), and 1 law information call (K9 team in area)
- French Meadows Campground – 1 foot patrol call (patrol check in campground) and 1 agency assist call (vehicle accident on FR 96)
- French Meadows dam – 1 extra patrol call (no additional info)

Safety Accidents Reported to FERC

A review of the FERC's e-library indicates that no reportable accidents have occurred in the French Meadows Reservoir area since 1980.

6.2.5 User Conflicts

Potential reservoir-based user conflicts were assessed using the results of the surveys conducted as part of the REC 2 – Recreation Visitor Surveys TSP. Specifically, survey participants who completed Section A-6 of the survey form (Reservoir Recreation) were asked whether their recreation experience was negatively affected by (1) crowding; or (2) other factors taking place. The survey results are tabulated in Table REC 3-6 and summarized below.

- A total of 86 people provided information about crowding at French Meadows Reservoir. Of these, only three people (3.5%) said their experience was negatively affected by crowding. These three people were intercepted at Coyote Group Campground, Gates Group Campground, and French Meadows Boat Ramp. None of these people provided explanatory comments regarding crowding.
- A total of 81 people provided information about other activities taking place. Of these, five people said that their experience was negatively affected by other activities taking place. These people were intercepted at French Meadows Campground (2), French Meadows Boat Ramp (1), McGuire Boat Ramp (1) and Lewis Campground (1). None of these respondents provided explanatory comments regarding other activities taking place.

Factors that Contribute to User Conflicts

Potential user conflicts were assessed with respect to the capacity of French Meadows Reservoir, and are discussed in the following.

Reservoir Carrying Capacity

At maximum operating water surface, French Meadows Reservoir has a surface area of 1,433 acres. Accordingly, at full pool, the reservoir can accommodate a total of 143 boats at one time. This estimate is based on a carrying capacity coefficient of 1 boat per 10 acres, which is a conservative coefficient for both motorized fishing boats and car top boats such as canoes and kayaks (Bosley 2005, FDEP undated).

The lowest recorded WSE that occurred at French Meadows Reservoir during the recreation season (Memorial Day – Labor Day) during each of the different water year types is summarized below, along with the corresponding surface area and carrying capacity. As indicated, carrying capacity has ranged from a low of 69 boats to a high of 112 boats during the recreation season.

French Meadows Reservoir

Water Year Types	Lowest Recorded WSE during Peak Recreation Season (May 25 – Sept 7)	Associated Surface Area (Acres)**	Associated Carrying Capacity (boats)
Wet Water Years (1980–1984, 1986, 1995–1998, 2006)	5208	1010	101
Above Normal Water years (1975, 1978, 1993, 1999, 2000, 2005)	5223	1118	112
Below Normal Water Years (1979, 1985, 1989, 2002, 2003, 2004)	5219	1083	108
Dry Water Years (1981, 1990, 1991, 2001, 2007)	5186	828	83
Critically Dry/Extreme Dry Water Years (1976, 1977, 1987, 1988, 1992, 1994)	5165	685	69

**Surface areas area based on elevation data that has been rounded to the nearest 5.

Vehicle count data collected in 2007 as part of the REC 1 – Recreation Use and Facilities TSP indicates that reservoir capacity far exceeds use, regardless of water year type, as explained in the following.

PCWA conducted vehicle counts for one year, from May 2007 through May 2008. Counts were conducted at all of the developed recreation facilities, including the French Meadows and McGuire Boat Ramps and associated picnic and parking areas. Among other things, the recreation technicians were instructed to count the number of vehicles present and to identify how many vehicles had boat trailers. The vehicle count logs

were evaluated to determine how many vehicles with boat trailers were present at these two boat ramps and associated parking areas at any one time, with the following results:

Weekdays

Average: 2.1
Maximum: 9 (June 19, AM count)
Minimum: 0 (multiple days)

Weekend and Holidays

Average: 4.5
Maximum: 13 (May 27, AM count)
Minimum: 0 (June 2 and August 19, both evening counts)

These values were used as a proxy to estimate the total number of boats that may have been on the reservoir at any one time. Using the worst case scenario, there would have been a total of 13 boats on the reservoir at one time. Given this information, the number of boats that were on the reservoir at one time was well below capacity, even on the heaviest use day of the year.

6.3 RALSTON AFTERBAY

Ralston Afterbay is located in the TNF at an elevation of approximately 1,179 feet above MSL. The landscape in the Ralston Area is characterized by moderate to steep slopes. The vegetation consists of mixed conifer stands interspersed with large black oaks, and predominant black oak stands.

Ralston Afterbay is located 29 road miles from Auburn and 12 miles from Foresthill. It can be accessed by taking Mosquito Ridge Road (FR 96) to Blacksmith Flat Road (FR23). Blacksmith Flat Road descends into the Middle Fork American River, traverses the north shore of Ralston Afterbay, and eventually ascends out of the canyon to Ralston Ridge. The Ralston Afterbay area does not experience heavy snow and is typically open year-round. Summer temperatures often exceed 100 degrees F.

6.3.1 Recreation Opportunities

Ralston Afterbay provides day use opportunities as primarily used for fishing and water-enhanced activities such as picnicking. These activities are supported by one developed Project recreation facility referred to as the Ralston Afterbay Picnic Area. The Ralston Afterbay area is shown on Map REC 3-10, which also shows the locations of the primary MFP facilities and land ownership. As indicated, the Indian Bar Rafter Access is located downstream of Ralston Afterbay Dam, adjacent to the Oxbow Powerhouse. This facility is used primarily by boaters and other day users recreating along the bypass reach. Therefore, it is not discussed in this report.

Ralston Afterbay Picnic Area is a day use facility and camping is not allowed. The picnic area consists of five picnic sites, each with a table and pedestal grill. A single-unit vault toilet is available but potable water is not available. A small, unimproved boat ramp referred to as the Ralston Afterbay Car Top Boat Launch is located adjacent to the picnic area.

Recreation Activities

The results of the REC 2 – General Visitor Surveys indicate that most people visit the Ralston Afterbay area to stream fish, reservoir fish, and participate in non-motorized boating activities. Of the 968 people who participated in the REC 2 – Recreation Visitor Surveys, a total of 58 were intercepted in the Ralston Afterbay area and completed the Background Information Section (Section A-1) of the survey form. Question 12 of Section A-1 asked these participants to identify the (one) main activity they participated in during their trip. A total of 31 people provided valid responses to the question, with the following results:

- Seven people (22.6%) identified “stream fishing” as their primary activity.
- Six people (19.4%) identified “reservoir fishing” as their primary activity.
- Four people (12.9%) identified “non-motorized reservoir boating (canoeing, kayaking, row boating) as their primary activity.
- All other responses were $\leq 9.7\%$ and are shown on Table REC 3-7.

Stream fishing is discussed in the REC 4 – Stream-based Recreation Opportunities TSR (PCWA 2009d) and is therefore not discussed further in this report.

Reservoir Fishing

A reservoir angler survey was conducted as part of the REC 2 – Recreation Visitor Surveys TSP (PCWA 2007). Based on the information collected as part of this effort, most anglers catch rainbow trout at Ralston Afterbay. The survey participants reported catching a total of 12 fish. Of these, 11 (91.7%) were rainbow trout and one was a brown trout. The reservoir angler survey, including the results of surveys conducted at Ralston Afterbay, is discussed in detail in the REC 2 – Recreation Visitor Survey TSR (PCWA 2009c). In addition, the results for Ralston Afterbay are summarized on Table REC 3-8.

Reservoir Boating

REC 2 – Recreation Visitor Survey participants were asked if they engaged in boating activities and, if so, were asked to identify the type of boat they used. Six people intercepted in the Ralston Afterbay area answered this question. All six people indicated that they used “non-power boats (i.e., canoe, kayak, row boat, raft, etc.). None identified any type of motorized boat. However, PCWA study crews have occasionally observed small motorized boats on the reservoir.

PCWA does not restrict boating on the afterbay, nor does it restrict the type or size of watercraft. However, the afterbay is generally too small to support large motorized boats or personal watercraft. In addition, access for large motorized boats is limited.

6.3.2 Reservoir Levels

Ralston Afterbay is formed by water that impounds behind Ralston Afterbay Dam. Ralston Afterbay captures water from the Middle Fork American River and the Rubicon River. In addition, it captures water conveyed from the Middle Fork Interbay and released to Ralston Afterbay via the Ralston Powerhouse. From Ralston Afterbay, water is transported to the Oxbow Powerhouse via the Ralston-Oxbow Tunnel and released downstream to the Middle Fork American River. Relative to Hell Hole and French Meadows Reservoirs, Ralston Afterbay is very small and has a gross storage capacity of 2,782 ac-ft. Additional information about the afterbay relevant to recreation is summarized below.

Ralston Afterbay Specifications^a

Water Surface Elevation	
Normal Maximum Operating Level ^b	1,175 feet
Normal Minimum Operating Level ^c	1,169 feet
Area	
Area at Maximum Normal Operating Level	77 acres
Area at Minimum Normal Operating Level	71 acres
Depth ^d	
Depth at Maximum Normal Operating Level	75 feet
Depth at Minimum Normal Operating Level	71 feet
Shoreline	
Shoreline at Maximum Normal Operating Level	4.4 miles
Shoreline at Minimum Normal Operating Level	4.3 miles

^aNote that this information has been updated since the PAD was issued in 2007 based on new information developed as part of the relicensing studies.

^bThe maximum WSE = 1,179 feet, which is the elevation of the top of the spill gates.

^cThe lower operating boundary is 1,167 feet. The spillway gate sills are at 1,149. During annual maintenance Ralston Afterbay is drawn down to 1,149 feet. Ralston Afterbay can be further drawn down using low level outlets.

^dThe elevation of the stream bed is 1,100 feet.

Detailed information about the operation of the MFP and Ralston Afterbay is available in PCWA's PAD (PCWA 2007), and summarized below.

Historical Water Surface Elevations

Oxbow Powerhouse frequently runs in tandem with Middle Fork and Ralston powerhouses. The capacity of Oxbow Powerhouse (1,025 cfs) is slightly higher than the present capacity of Ralston Powerhouse (924 cfs), which allows Oxbow

Powerhouse to utilize water supplied by Ralston Powerhouse as well as inflow from the Middle Fork American and Rubicon rivers. Ralston Afterbay also has sufficient operational storage capacity (about 1,200 ac-ft out of 2,782 ac-ft gross) to allow Oxbow Powerhouse to operate independently of Middle Fork and Ralston powerhouses for several hours at a time, depending on generation level. This independent operational flexibility is used, for example, to meet the ramping rate requirement downstream of Oxbow Powerhouse and to make releases for whitewater rafting without requiring operation of the Middle Fork and Ralston powerhouses. Because Ralston Afterbay is used primarily as a regulating facility, WSEs may fluctuate on a day-to-day or hour-to-hour basis. Ralston Afterbay does not follow a seasonal fill and release pattern like Hell Hole or French Meadows reservoirs.

Fluctuations at Ralston Afterbay occur daily throughout the year but the daily pattern varies depending upon season. To illustrate this point, hourly and daily WSE plots for representative winter, spring, summer, and fall week days were generated. These plots are included in Appendix K, identified as Figures K-1, K-2, K-3, and K-4, respectively. The Ralston Afterbay WSE fluctuation patterns vary with water year type, electrical demand, and MFP (and other neighboring hydropower projects) scheduled and emergency maintenance activities. The following is a general description to illustrate typical WSE fluctuation patterns at Ralston Afterbay.

As indicated in Figures K-3 through K-4, the biggest fluctuations in WSE typically occur during the summer and fall periods when the source of inflow is predominately due to Ralston Powerhouse generation. During a 24-hour period in the summer, WSEs in Ralston Afterbay are typically at their highest from midnight to about 7:00 AM. This occurs because Oxbow Powerhouse would have been generating at a low level for several hours and Ralston Powerhouse would have been generating at or near capacity for several hours, allowing the reservoir to fill. Around 7:00 AM, energy production releases through Oxbow Powerhouse begin to ramp up, while Ralston Powerhouse would not begin generating for several hours. Water levels in Ralston Afterbay decline as energy production continues and releases through Oxbow Powerhouse increase and Ralston Powerhouse remains offline. During the summer, WSEs in Ralston Afterbay are at their lowest levels in the day at about 2:00 PM when Oxbow Powerhouse would have been generating at its capacity for several hours and Ralston Powerhouse would have just begun to generate. At this point WSEs begin to rise in Ralston Afterbay as releases through Oxbow Powerhouse recede and Ralston Powerhouse is generating at full capacity. Water levels in Ralston Afterbay continue to rise through the remainder of the day until they peak at about 9:00 PM. The pattern is similar during the fall, except that the lowest WSE in Ralston occurs about 2 hours earlier, at about 12:00 PM. This is because releases during the summer are made about 2 hours later than would normally occur to accommodate commercial whitewater boating activities downstream of Oxbow Powerhouse. Commercial whitewater boating activities generally end during the last week of September.

Water levels in Ralston Afterbay also fluctuate during the spring, but fluctuations typically are not as regular or as large. During a 24-hour period in the spring, WSE in Ralston Afterbay were highest during the late afternoon, usually at about 6 PM. WSE

then recedes through the evening and are at their lowest at about midnight at which point WSE begins to increase. During the spring, accretion flows (run-off from the Middle Fork and Rubicon watersheds) contribute substantially more water to Ralston Afterbay than during the summer, which tends to attenuate fluctuations in Ralston Afterbay. Also, the Ralston and Oxbow powerhouses are run more synchronously because there is no whitewater rafting.

During the winter, regular daily fluctuations are generally minimal but fluctuations may occur over the course of days or weeks to allow for management of run-off resulting from winter storms (Figure Q-1). In general, WSEs in Ralston remain relatively stable during the winter, although not at full pool to allow the capture of run-off from winter storm events and to minimize reservoir spilling. If a large storm event is projected, Ralston Afterbay may be drawn down substantially in advance in preparation for high flows. Similar to the spring, the Ralston and Oxbow powerhouses are run more synchronously because there is no whitewater rafting.

To maintain Ralston Afterbay and protect system reliability, PCWA conducts an annual inspection, testing and maintenance of Project facilities. Annual maintenance in the Ralston Afterbay area occurs in the fall. During the fall maintenance period (3-6 weeks), Ralston Afterbay WSE is lowered considerably to allow access to the Project facilities.

Design and Functional Elevation Ranges of Existing Boat Ramps

There is one boat ramp at Ralston Afterbay referred to as the Ralston Afterbay Car Top Boat Ramp. The ramp is located immediately adjacent to the Ralston Picnic Area. The picnic area consists of five picnic sites, a bathroom, and a parking area. Four of the picnic sites are located in relative proximity to each other, and are readily accessible from the parking area. The fifth site is located near the river, connected to the other sites by a 350-foot long trail (Map REC 3-11). The general layout of the Ralston Picnic Area and Car Top Boat Ramp is shown on Map REC 3-11. As indicated, the boat ramp is situated between picnic Sites 1 and 2 and extends from the parking area to the Middle Fork American River arm of Ralston Afterbay.

An inventory of the amenities and features associated with these facilities, including a condition assessment, was conducted on July 23, 2008, in consultation with USDA-FS representatives. The inventory and photographs of select facility amenities are available in the REC 1 – Recreation Use and Facilities Assessment TSR (PCWA 2009b). A brief overview of the Ralston Afterbay Car Top Boat Ramp is provided in the following relative to WSE.

Ralston Afterbay Car Top Boat Ramp

The boat ramp is unimproved with a native surface. The ramp is relatively steep and extends from the picnic area to the Middle Fork American River arm of Ralston Afterbay. Since it is not constructed of concrete it has no obvious terminus. It is about 12–15 feet wide and approximately 95–125 feet long, depending upon water level.

Photographs of the boat ramp are included in Appendix L.

This ramp is intended to be used by people launching car top type boats such as kayaks and canoes. The ramp is not functional for tailored boats due to its steep grade, rough surface, the presence of a large rock in the middle of the ramp, and shallow water depths at the entry point. People with car top boats can use the ramp at any time, regardless of water level. However, during the maintenance outage water levels in Ralston Afterbay are very low and boaters must walk across the river bed to reach water.

According to the USDA-FS, most people utilize PCWA's Sediment Removal Access Point to access Ralston Afterbay (Map REC 3-10). This access point is also used as a take out by whitewater boaters running the Rubicon River. This ramp is not a Project recreation facility but PCWA does not prohibit its use by the public.

As shown on Map REC 3-10, the Sediment Removal Access Point is located at the apex of the confluence of the Middle Fork American and Rubicon Rivers, where water levels are typically much deeper than those at the Ralston Afterbay Picnic Area Car Top Boat Launch. It is easily accessible from FR 23 and parking is available in the adjacent turn out. Appendix L includes a photograph of the Sediment Removal Access Point (Photo L-5) taken during the maintenance outage. As indicated, the ramp is generally unimproved, but is not as steep as the Ralston Picnic Area Car Top Boat Ramp. In addition, access is not impeded by large rocks. As such, launching from a trailer is possible from this point, although 4WD is required to drive back out. Parking is available in the adjacent turnouts.

Reservoir-based Recreation Opportunities relative to WSE

The REC 2 – Recreation Visitor Survey results were evaluated to determine whether WSE at Ralston Afterbay adversely affects reservoir-based recreation opportunities. PCWA conducted recreation visitor surveys in 2008 from May 24th (Memorial Day weekend) through September 1 (Labor Day weekend). The water surface elevations at Ralston Afterbay during this time period are depicted on Figure REC 3-5 for reference.

As indicated on Figure REC 3-5, WSE at Ralston Afterbay fluctuates on a daily basis. This is because Ralston Afterbay is primarily used to regulate generation flows and is also managed to provide whitewater boating flows in the peaking reach. During the summer recreation period, WSE does not typically fluctuate more than about 6-feet a day. WSE may fluctuate as much as 10-feet over a week-long period, but is not drawn down below the lower operating boundary of 1,167 feet. During the survey period, WSE fluctuated within a 7-foot range, from a low of 1,170 feet on June 1st to a high of 1,177 feet, on May 25th, and August 13th. Typical WSE fluctuations at Ralston Afterbay during a representative summer day (June 24, 2008) and a typical summer week (June 22–28, 2008) are shown on Figure K-3 for reference.

Survey participants were asked whether their recreation experience was negatively affected by reservoir water surface level. Nine people who said they recreated at

Ralston Afterbay answered this question. Of these, one person said that their recreation experience was negatively affected by water surface level.

Survey participants who completed Section A-6 (Reservoir Recreation) of the survey form were also asked to rate a variety of factors related to WSE using an acceptability scale, with the following results.

- 66.7% (6 of 9 people) said shoreline access is acceptable.
- 44.4% (4 of 9 people) said adequacy of water depths is acceptable.
- 77.8% (7 of 9 people) said presence of debris or obstacles is acceptable.

These responses indicate that shallow or changing water depths may adversely affect reservoir opportunities at Ralston Afterbay. However, as indicated above, only one of these people said that their recreation experience was negatively affected by water surface level.

WSEs Associated with Potential Project Betterments

PCWA is currently considering one potential Project betterment referred to as the Hell Hole Seasonal Storage Increase Betterment. This betterment does not require modifications to Ralston Afterbay or any Project facilities at Ralston Afterbay. Therefore, this betterment would not directly affect reservoir-based recreation opportunities at Ralston Afterbay. However, this betterment may result in operational changes that could affect WSEs at Ralston Afterbay. Specific operational changes that may occur as a result of this betterment are currently being incorporated into PCWA's operations model. This model will be used to support discussions and negotiations regarding new PM&E measures.

6.3.3 Reservoir Access

Ralston Afterbay is encompassed by land managed by the USDA-FS and land owned by PCWA. In general, all of the land on the south side of the afterbay is owned by PCWA. The land along the north shore of the afterbay is managed by the USDA-FS, with the Middle Fork American River forming the boundary between the ENF and the TNF. At maximum operating WSE, the shoreline around Ralston Afterbay is approximately 4.4 miles long. Approximately 70 percent of the reservoir shoreline bisects land managed by the USDA-FS. The remaining 30 percent is owned by PCWA. Land ownership in the Ralston Afterbay area is shown on Map REC 3-10.

In general, PCWA does not limit access to Ralston Afterbay or the shoreline around the afterbay. However, PCWA limits access to the immediate area surrounding specific Project facilities to protect public safety, as briefly described in the following.

- **Ralston Afterbay Dam.** PCWA has installed gated fences across both the north and south sides of Ralston Afterbay Dam. The gates are locked to prohibit public access to the dam and spillway gate areas. Log booms prevent access to the dam and gate area from the reservoir.

- **Ralston Afterbay Dam Generator Building.** This facility is located immediately adjacent to the north end of the Ralston Afterbay Dam. This facility is enclosed in cyclone fencing to prevent public access.
- **Ralston – Oxbow Tunnel Intake.** PCWA accesses this facility via a Project access road referred to as the Ralston-Oxbow Tunnel Intake Road. This road is gated at its intersection with FR-23.2 to prevent vehicle access by the public. However, the public may walk along the road to access the reservoir. The intake area is not fenced.
- **Ralston Afterbay Boat Ramp.** PCWA accesses this facility via a short Project access road referred to as the Ralston Afterbay Road. The entrance to this road is located immediately adjacent to the dam. This road is gated near the dam to prevent vehicle access by the public. However, the public may walk along the road to access the reservoir. The boat ramp area is not fenced.
- **Ralston Afterbay Access Point.** This point is located on the south shore of the afterbay, about 400 feet east of the dam. PCWA accesses this facility via a short Project access road referred to as the Ralston Afterbay Access Point Road. The entrance to this road is located immediately adjacent to the dam. This road is not accessible to the public from the dam due the presence of gated fencing at each end of the dam. However, the access point and road can be accessed by the public from the afterbay.
- **Ralston Powerhouse and Switchyard.** The Ralston Powerhouse and Switchyard is located near the upper end of the Ralston Afterbay, between the Rubicon River and FR-23 (Blacksmith Flat Road). The powerhouse and switchyard are enclosed in a perimeter fence to prevent public access. Unpaved turnouts are available on either side of the powerhouse and are available for use by the public.

The only developed public access to Ralston Afterbay is the Ralston Car Top Boat Ramp, described above. Otherwise, there are no other facilities on the afterbay that are designed to facilitate recreation access to the afterbay.

Blacksmith Flat Road (FR-23) parallels the north side of the afterbay from its intersection with 23.2 to the Ralston Powerhouse, where it begins to ascend out of the canyon. The afterbay is easily accessible from FR 23 and parking is available in unpaved turnouts along the road. Relatively large turnouts are present both upstream and downstream of the Ralston Powerhouse. These turn outs are used by anglers and by whitewater boaters running the Rubicon River. The Ralston Afterbay Sediment Removal Access Point also provides access to the afterbay. This access point is open to the public but is not considered a developed recreation facility.

6.3.4 Safety Conditions

PCWA maintains a variety of programs and measures to ensure public health and safety, including visual and audible warnings (e.g., signs, bells, and sirens) and physical restraining devices (e.g., fences and log booms). These programs and measures are

described in detail in the LAND 3 – Emergency Action and Public Safety TSR (PCWA 2009a). Existing programs and measures, safety concerns, and safety incidents that pertain specifically to the Ralston Afterbay area are summarized below. Photographs of select safety features are included in Appendix M.

Existing Programs and Measures

PCWA utilizes the following audible and visual warning devices to warn the public of hazardous areas or potentially dangerous conditions in the Ralston Afterbay area:

- *Audible Warning Devices.* PCWA maintains security alarms at all powerhouses, including Ralston Powerhouse located on Ralston Afterbay. The security alarm sounds in the event of an unauthorized entry into the powerhouse.
- *Signage* – PCWA and the USDA-FS maintain signs of various types to provide Project-related information to the public and to warn the public about potentially hazardous conditions or areas. Public safety signs were inventoried during field survey conducted in 2008 and are described in detail in the Land 3 – Emergency Action and Public Safety TSR. All of the signs located in the Ralston Afterbay area are summarized in Appendix D.
- *Log Booms.* PCWA maintains log booms across the spillway at Ralston Afterbay. The purpose of the log boom is to prohibit access to the dam area from the reservoir. A photograph of the log boom is provided in Appendix M (Photo M-1).

PCWA also utilizes the following physical restraining devices to restrict public access to hazardous areas in the Ralston Afterbay area.

- *Public Safety Fences.* PCWA has erected fences around potentially hazardous areas. A fence with a locked gate prohibits access to the Ralston Afterbay Dam and a perimeter fence prohibits access to the adjacent Ralston Afterbay Dam Generator Building (Photo M-3). In addition, the Ralston Powerhouse is surrounded by a perimeter fence (Photo M-2).
- *Slope Fences.* PCWA has installed a slope fence adjacent to the Ralston Powerhouse Switchyard to protect the public from falling rocks (Photo M-2).
- *Gates.* PCWA has installed gates in certain locations to limit access onto Project roads. Locked gates prohibit public access to the Ralston Afterbay Road and Boat Ramp and the Ralston–Oxbow Tunnel Intake.
- *Guard Rails.* The public is not allowed on Ralston Afterbay Dam. However, PCWA has installed guard rails along both sides of the top of the dam for worker safety purposes. The guard rails are evident in Photo M-3.

Safety Concerns at Project Recreation Facilities

According to records maintained by the USDA-FS Tahoe National Forest, in 2006 and 2007 USDA-FS staff responded to a total of 9 incidents that occurred at Project facilities

or other facilities located in the immediate area of Ralston Afterbay, as follows:

2006

- At/near Ralston Powerhouse – 1 fire call and 1 public assistance call (radio tech).
- Oxbow/Ralston on TNF – 4 law enforcement calls.
- Oxbow/Ralston on ENF – 1 fire call.
- Ralston Picnic Area – 1 law enforcement call and 1 engineering call.

2007

- None reported

In addition, the USDA-FS Eldorado National Forest responded to one incident in the Ralston Afterbay area in 2006, a wildland fire call at Ralston Afterbay.

According to records maintained by the Placer County Sherriff's Department, in 2006 and 2007 the Sheriff's Department responded to one incident in the Ralston Afterbay area. This incident was recorded as a trespassing call and described as follows: "Juveniles with truck partially in the water near high water mark. No injuries. Vehicle in restricted area."

Safety Accidents Reported to FERC

A review of the FERC's e-library indicates that no reportable accidents have occurred in the Ralston Afterbay area since 1980.

6.3.5 User Conflicts

Potential reservoir-based user conflicts were assessed using the results of the surveys conducted as part of the REC 2 – Recreation Visitor Surveys TSP. Specifically, survey participants who completed Section A-6 of the survey form (Reservoir Recreation) were asked whether their recreation experience was negatively affected by (1) crowding; or (2) other factors taking place. The survey results for Ralston Afterbay are tabulated in Table REC 3-9 and summarized below.

- A total of 10 people provided information about crowding at Ralston Afterbay. Of these, nobody said crowding negatively affected their recreation experience.
- A total of nine people provided information about other activities taking place. Of these, two people said that their experience was negatively affected by other activities taking place. However, neither of these respondents provided comments explaining their comments.

Factors that Contribute to User Conflicts

Potential user conflicts were assessed with respect to the capacity of Ralston Afterbay, and are discussed in the following.

Afterbay Carrying Capacity

At the normal minimum WSE of 1,169 feet, Ralston Afterbay has a surface area of 71 acres. At the normal maximum operating WSE of 1,175 feet, Ralston Afterbay has a surface area of 71 acres. Accordingly, during the summer recreation period the afterbay can accommodate about 7 to 8 boats at one time. This estimate is based on a carrying capacity coefficient of 1 boat per 10 acres, which is a conservative coefficient for both motorized fishing boats and car top boats such as canoes and kayaks (Bosley 2005, FDEP undated).

Vehicle count data collected in 2007 and 2008 as part of the REC 1 – Recreation Use and Facilities TSP indicates that the capacity of Ralston Afterbay far exceeds use. Counts were conducted at the Ralston Afterbay Picnic Area and Car Top Boat Launch and at the Ralston Afterbay Sediment Removal Access Point. The recreation technicians were instructed to count the number of vehicles present and to identify how many vehicles had boat trailers.

The vehicle count logs were evaluated to determine how many vehicles with boat trailers were present at the Ralston Afterbay Picnic Area and at the Ralston Afterbay Sediment Removal Access Point at any one time, with the following results:

Weekdays

Average: 0.1
Maximum: 1 (5/31, 6/25)
Minimum: 0 (multiple days)

Weekend and Holidays

Average: 0.2
Maximum: 1 (multiple days)
Minimum: 0 (multiple days)

Using the worst case scenario, there would have been a total of one boat on the reservoir at one time. Given this information, the number of boats that were on the reservoir at one time was well below capacity, even on the heaviest use day of the year.

6.4 EXISTING AND FUTURE OPERATIONAL CONSTRAINTS

PCWA operates the MFP, including the Project reservoirs, in accordance with the FERC license, specific water rights permits, and other operating agreements. The following subsections describe PCWA's license and water rights requirements and other operating agreements related to on-going operations of the MFP. Additional information about PCWA's operating objectives and overall Project operations, is available in PCWA's PAD (PCWA 2007). A complete copy of the existing FERC license and amendments is available at PCWA's publicly-accessible Internet website

<http://relicensing.pcwa.net/> and at a Resource Library, located at the PCWA Business Center, 144 Ferguson Road, Auburn, California.

6.4.1 FERC License Requirements

PCWA's current license contains provisions that establish minimum pool requirements for Hell Hole and French Meadows reservoirs and Duncan Creek Diversion Pool. In addition, the license identifies minimum instream flow (MIF) requirements downstream of Project diversions. Table REC 3-10 summarizes the current minimum pool and MIF requirements.

Minimum storage requirements for Hell Hole and French Meadows Reservoirs are based on forecasted inflow to Folsom Reservoir and are summarized below. The existing FERC license does not include a minimum storage requirement for Ralston Afterbay.

Minimum Storage Requirements

Hell Hole Reservoir

Forecast/Folsom Reservoir ^a (ac-ft)	Minimum Pool Requirement (ac-ft)	Corresponding WSE ^b (feet msl)	Minimum Pool Requirement (ac-ft)	Corresponding WSE ^b (feet msl)
	June - September		October - May	
> 2,000,000	70,000	4,482	50,000	4,450
1,200,000 – 2,000,000	70,000	4,482	25,000	4,402
<1,200,000	26,000	4,404	5,500	4,341
French Meadows Reservoir				
> 2,000,000	60,000	5,197	50,000	5,186
1,200,000 – 2,000,000	60,000	5,197	25,000	5,152
<1,200,000	28,000	5,156	8,700	5,120

^aForecast/Folsom Reservoir = CDWR current year forecast of unimpeded run-off of the American River to Folsom Reservoir

^bWSEs are not included in the FERC license. These WSE's were determined using storage/elevation conversion tables and were included in this report at the request of the stakeholders.

The license also requires PCWA to annually submit accurate flow and storage records from Project gaging stations to the USGS. The two tainter gates in the French Meadow Spillway must also remain open annually from November 15 to April 1.

6.4.2 Water Rights

PCWA currently has five water rights permits and one license issued by the California State Water Rights Board (now the California State Water Resources Control Board - SWRCB) related to the MFP. The water rights permits allow for the diversion and storage of water for consumptive use, power production, and incidental recreation.

PCWA holds the necessary water rights to fully utilize all the capacity of MFP facilities. PCWA holds sufficient water rights to meet current and reasonably foreseeable future consumptive water demand in its western Placer County service area.

State Water Resource Control Board Permits

On January 10, 1963, the SWRCB issued four permits: Nos. 13855, 13856, 13857, and 13858 to PCWA for the MFP. These permits provide for direct diversion and off-stream storage of waters from Duncan Creek, Middle Fork American River, Rubicon River, and the North and South Forks of Long Canyon Creek. These permits were issued for two types of beneficial use: (1) power and incidental recreation; and (2) irrigation and incidental domestic, recreational, municipal, and industrial. Permit No. 18380 was issued to the PCWA for diversions to the Hell Hole Powerhouse. This permit was reissued as License No. 12644 on May 17, 1990. PCWA also received Permit No. 20754 on August 18, 1994 to allow for the diversion of additional water for operation of the Hell Hole Powerhouse.

These permits and license also require:

- Protection of water quality and aquatic species;
- Public access to Project lands and water;
- Minimum pool and minimum instream flow requirements as described in Table REC 3-10; and
- Minimum instream flows of 75 cfs below PCWA's American River Pump Station.

Key provisions of the permits relevant to the operations of the MFP are summarized in Table REC 3-11. These provisions will be included in PCWA's operations model, which will be used to develop PM&E measures.

6.4.3 Future Operational Constraints

PCWA anticipates that the relicensing process may result in changes to current license conditions. Changes to current license conditions may require some alteration to current MFP operations, including minimum storage requirements at the Project reservoirs. However, the type and extent of any such changes cannot be determined until the specific license conditions are identified. The following summarizes the primary considerations.

FERC License Protection Mitigation and Enhancement Measures

PCWA anticipates that the relicensing process may result in changes to required minimum instream flow releases and other current license conditions to further protect and enhance environmental resources affected by MFP operations. Changes to current license conditions may require some alteration to current MFP operations. However, the type and extent of any such changes cannot be determined until the specific license conditions are identified.

Changes in Consumptive Demand

By agreement with the U.S. Bureau of Reclamation, PCWA has voluntarily agreed to limit its withdrawal from the American River to 120,000 ac-ft of water per year to meet the consumptive demand of its western Placer County service area. To date, PCWA has utilized up to approximately 40,000 ac-ft of water per year. PCWA expects that population growth and net changes in consumptive use patterns will increase consumptive use in the future. Therefore, within the next FERC licensing period, the entire 120,000 ac-ft allocation will be required to serve PCWA's western Placer County service area.

6.5 FUTURE RESERVOIR-RELATED RECREATION DEMAND

Future recreation demand depends on several factors, including:

- The demographics, visitation patterns, and recreation activities associated with the people who currently use the Project area;
- Future population projections; and
- Trends in outdoor participation rates.

These topics are discussed in the following subsections.

6.5.1 Current Recreation Visitors

Demographic information regarding the people who currently visit the Project area, including area of origin, age, and ethnicity information, was collected as part of the REC 2 – Recreation Visitor Surveys. In addition, information regarding visitation patterns was collected as part of the REC 2 – Recreation Visitor Surveys (PCWA 2009c). Detailed information about the surveys is available in the REC 2 – Recreation Visitor Surveys. Information pertinent to this discussion is summarized below.

Area of Origin

Survey participants were asked to identify their place of residence by zip code. The majority of respondents intercepted in the Hell Hole Reservoir, French Meadows Reservoir, and Ralston Afterbay areas primarily reside in Placer, Sacramento, and El Dorado counties, as summarized in the following:

Area	Placer County (%)	Sacramento County (%)	El Dorado County (%)	Other (%)
Hell Hole Area	23.8	23.4	18.9	33.9
French Meadows Area	32.4	28.4	7.4	31.8
Ralston Afterbay Area	35.7	25.0	0.0	39.3
Combined	29.2	26.0	11.4	33.4

Age of Visitors

Survey participants were asked to identify the year they were born. The average age of the survey respondents intercepted in the Hell Hole Reservoir, French Meadows Reservoir, and Ralston Afterbay areas ranged from 42 to 43.4 years, as summarized in the following:

Area	Average Age	Standard Deviation
Hell Hole Area	43.4	13.4
French Meadows Area	42	13.9
Ralston Afterbay Area	42	12.2
Combined	42.6	13.5

Group Age Categories

Survey participants were asked to identify the number of people in their group and their age categories (under 18 or over 18). As summarized below, the ratio of adults to minors in each group was approximately 4 to 1.

Area	Under 18 (%)	18 or over (%)
Hell Hole Area	19.4	80.6
French Meadows Area	20.5	79.5
Ralston Afterbay Area	18.3	81.7
Combined	19.9	80.1

Ethnicity

Survey participants were asked to identify the cultural or ethnic group they most closely identify with. As summarized below, the majority of survey respondents intercepted in the Hell Hole Reservoir, French Meadows Reservoir, or Ralston Afterbay areas identified themselves as Caucasian, followed by Hispanic or Latino, and Asian.

Area	Caucasian (%)	Hispanic or Latino (%)	Asian (%)	Other-Combined (%)
Hell Hole Area	92.8	2.8	0.4	4.0
French Meadows Area	84.7	4.3	3.0	8.0
Ralston Afterbay Area	82.5	3.5	7.0	7.0
Combined	88.1	3.8	2.3	5.8

Frequency of Visits

Survey participants who completed the Form B survey instrument were asked to

indicate how many years they have been recreating in the Project area. Responses ranged from 14.1 to 17.3 years, as summarized in the following:

Area	Average # of Years	Standard Deviation
Hell Hole Area	17.3	12.4
French Meadows Area	17.3	15.0
Ralston Afterbay Area	14.1	11.4
Combined	16.5	13.4

Form B survey participants were also asked to indicate how many times per year they visited the Project area. Responses ranged from 3.4 to 5.2 times per year, as summarized in the following:

Area	Average # of Times per Year	Standard Deviation
Hell Hole Area	4.6	4.3
French Meadows Area	3.4	3.3
Ralston Afterbay Area	5.2	4.4
Combined	4.2	4.0

Recreation Activities

Survey participants were asked to indicate the primary activity that they engaged in during their trip to the Hell Hole Reservoir, French Meadows Reservoir, or Ralston Afterbay areas. As summarized below, survey respondents intercepted at Hell Hole and French Meadows Reservoirs most frequently identified “reservoir fishing” and “camping in a developed site” as primary activities. People intercepted at Ralston Afterbay identified “stream fishing” and “reservoir fishing.”

Area	Primary Activities	Percent of Respondents
Hell Hole Area	Reservoir fishing	39.5
	Camping in a developed site	28.3
French Meadows Area	Camping in a developed site	51.2
	Reservoir fishing	19.0
Ralston Afterbay Area	Stream fishing	22.6
	Reservoir fishing	19.4
Combined	Camping in a developed site	36.8
	Reservoir fishing	27.9

6.5.2 Population Projections

The California Department of Finance develops population estimates and projections for California as a whole, and for each of the individual counties. As discussed above,

most of the people who visit one of the three Project reservoirs reside in Placer County, Sacramento and El Dorado Counties. Information available from the California Department of Finance was reviewed to determine how the population of these three counties is expected to change over time. Specifically, two reports completed by the Department of Finance (2007 and 2009) were used to: (1) identify the population of each of these counties in 2008; (2) identify the projected population in 2050; and (3) estimate the change in population over the 42 year period, by county. The January 1, 2008 population data available from the Department of Finance was used because it can be compared to recreation use data that was collected by PCWA in 2007 and 2008.

County	2008 Population	2050 Population	Percent Change
Placer County	333,766	751,208	125%
Sacramento County	1,418,763	2,176,508	53%
El Dorado County	178,860	314,126	76%
Combined	1,931,389	3,241,842	68%

As indicated, for the three counties (Placer, Sacramento, and El Dorado) combined, the total population is expected to increase by 68% between 2008 and 2050.

The 2008 population data does not include a proportional breakdown by ethnic group. However, this type of breakdown is available for 2010, and for each decade thereafter. Therefore, 2010 projections were used to estimate changes in both Caucasian and non-Caucasian groups from 2010 through 2050. The non-Caucasian population in these three counties is expected to grow faster than the Caucasian population, as summarized below.

County	Caucasian		% Change	Non-Caucasian		% Change
	2010	2050		2010	2050	
Placer County	271,819	462,590	70%	75,724	288,618	281%
Sacramento County	746,974	769,393	3%	704,892	1,407,115	100%
El Dorado County	158,918	244,765	54%	30,390	69,361	128%
Combined	1,177,711	1,476,748	25%	811,001	1,765,094	118%

As indicated, in 2010, Caucasians are expected to make up a larger proportion of the population in Placer, Sacramento, and El Dorado counties than non-Caucasians. However, as summarized above, the Caucasian population is expected to increase 25% by 2050 and the non-Caucasian population is expected to increase by 118% over the same time period. Therefore, by 2050, the proportions are expected to reverse with non-Caucasians making up 54% of the population and Caucasians making up 46% of the population.

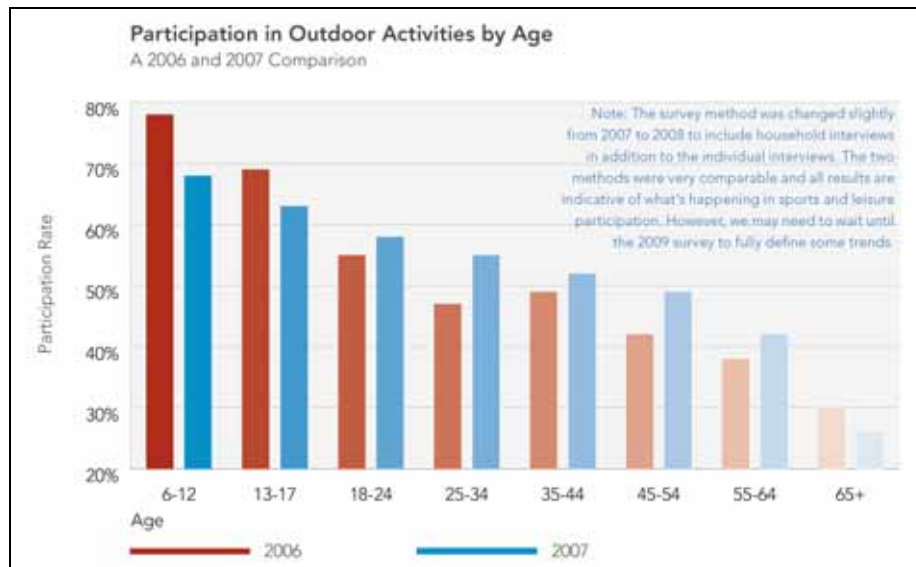
6.5.3 Trends in Outdoor Recreation Participation Rates

Information about current trends in outdoor recreation participation rates are summarized below based on information contained in the existing literature.

Outdoor Recreation Participation Report 2008 (The Outdoor Foundation, 2008).

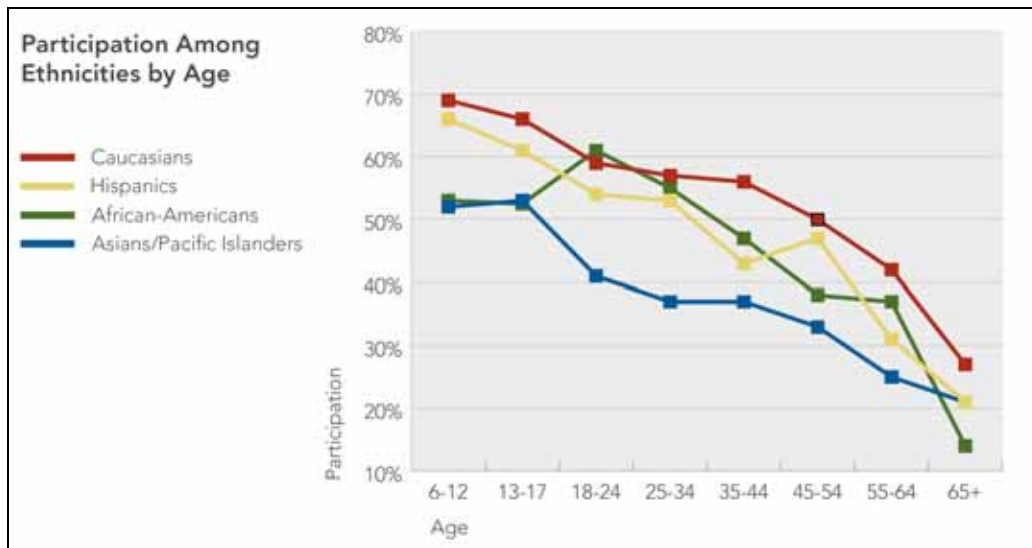
The information contained in this report is based on a nationwide survey of individuals and households commissioned by a partnership of associations and foundations, including: The Outdoor Foundation, National Golf Foundation, Sporting Goods Manufacturers Association, and SnowSports Industries America. The survey was conducted in 2008 and included 40,794 on-line interviews.

The article includes the following graphic showing outdoor recreation activity participation rates by age group.



As indicated, participation in outdoor activities steadily declines with age. According to the REC 2 – Recreation Visitor Survey results, the ratio of adults to youths in the groups intercepted in the Project area is about 4 to 1.

This Outdoor Education Foundation report also includes the following graph showing outdoor participation rates among different ethnic groups by age:



As indicated, participation in outdoor activities is highest for Caucasians in all age groups and lowest for Asians, particularly among children.

According to the REC 2 – Recreation Visitor Survey data, most people who currently recreate at one of the Project reservoirs are Caucasian. However, as indicated by the California Department of Finance statistics, populations in the counties where MFP visitors reside are expected to grow substantially over the next 40 years, with non-Caucasians accounting for most of the growth. Accordingly, the proportion of Caucasians to non-Caucasians recreating in the Project area may change over time, with non-Caucasians potentially making up a larger percentage of visitors.

2006 National Survey of Fishing, Hunting, and Wildlife Associated Recreation (USFWS 2006).

This report presents the results of the National Survey of Fishing, Hunting, and Wildlife-Associated Survey. This survey has been conducted regularly since 1955 and is one of the oldest and most comprehensive continuing recreation surveys. The survey collects information on the number of anglers, hunters, and wildlife watchers, including: 1) how often they participate; and 2) how much they spend on their activities in the United States. The results are reported by state.

Among other things, this report provides information about how the numbers of people who hunt, fish, and watch wildlife in California has changed over time. Overall the number of people who fish in California has declined over time. Between 1996 and 2001, the number of anglers in California decreased about 10 percent. Between 2001 and 2006, the number of anglers decreased another 29 percent. The number of hunters decreased substantially (47%) between 1996 and 2001, but increased slightly between 2001 and 2006. The number of people who watched wildlife in California (away from home) decreased between 2001 and 2006 but increased between 2001 and

2006. This trend is consistent with information contained in other existing information sources.

The REC 2 – Recreation Visitor Survey data indicates that most people who recreate in the Hell Hole and French Meadows Reservoir areas primarily fish and camp in developed sites. In the Ralston Afterbay area, the number of people who primarily fish is the same as the number of people who primarily watch wildlife.

The Latest on Trends in Nature-Based Outdoor Recreation (Cordell, H. Ken. 2008) and Outdoor Recreation Activity Trends: What’s Growing, What’s Slowing? (Cordell, Ken, H. et. al. 2008).

These articles provide an overview of outdoor recreation trends in the United States in general, and nature-based recreation activities specifically. The information presented in these two articles is similar and relies mainly on data obtained from the National Survey on Recreation and the Environment (NSRE). The NSRE is a national survey conducted by the USDA-FS in coordination with the University of Georgia and the University of Tennessee.

Cordell’s articles provide statistics for overall growth in outdoor recreation activities and for specific activities based on a comparison of data collected from 1999–2001 and 2005–2008. In addition, he provides conclusions regarding overall trends in outdoor recreation participation. Information and statistics that may be pertinent to the MFP reservoirs are summarized below.

- According to Cordell, nature-based recreation has grown in general but preferred activities have changed. For example, some forms of hunting and fishing have declined in popularity, as have mountain biking, rafting, and horseback riding on trails. Conversely, nature viewing, photography, and nature study have grown strongly. The growth in the latter has offset the declines in the former, resulting in a net increase in nature-based recreation.
- From 1999 to 2008, the total number of people who participated in one or more of 60 outdoor activities grew by 4.4 percent. However, participation in some activities decreased while participation in other activities increased, as summarized in the following:

Activity	Percent Change in Participants 1999–2001 to 2005–2008
Coldwater fishing	- 2.1
Primitive camping	- 2.0
Picnicking	- 1.4
Use of personal watercraft	- 4.1
Sailing	- 6.5
Windsurfing	- 19.1
Developed camping	2.7
Canoeing	2.3
Motor boating	3.9
Swimming in lakes, ponds, etc.	4.0
Waterskiing	5.5

According to the REC 2 – Recreation Visitor Survey results, reservoir fishing (coldwater fishing) and developed camping are the most popular activities at the MFP reservoirs.

7.0 LITERATURE CITED

- Bosley, Holly E. Techniques for Estimating Boating Carrying Capacity: A Literature Review. August 2005.
- Bowker, J. M., D. Murphy, H. K. Cordell, D. B. K. English, J. C. Bergstrom, C. M. Starbuck, C. J. Betz, G. T. Green, and P. Reed. 2007. Wilderness Recreation Participation: Projections for the Next Half Century. 2007. USDA Forest Service Proceedings RMRS-P-49. 2007.
- Cordell, Ken H. 1988. The Latest on Trends in Nature-Based Outdoor Recreation. Forest History Today. Spring 1988.
- Cordell, H. Ken, Carter J. Betz, and Gary T. Green. 2008. Nature-based Outdoor Recreation Trends and Wilderness. International Journal of Wilderness. August 2008.
- Cordell, Ken H., Betz, Carter J., Green, Gary T., and Mou, Shela H. 2008. Outdoor Recreation Activity and Trends: What's Growing, What's Slowing? IRIS Internet Research Information Series. September 2008.
- Florida Department of Environmental Protection, Division of Recreation and Parks. Visitor Carrying Capacity Guidelines. Not dated.
- Haas, G., Aukerman, R., Lovejoy, V., and Welch D. Water Recreation Opportunity Spectrum (WROS) User's Guidebook. United States Department of the Interior, Bureau of Reclamation, Office of Program and Policy Services. July, 2004.

Jaakson, R., Buszynki, M.D., and Botting, D. Carrying Capacity and Lake Recreation Planning (Part 1). *The Michigan Riparian*, pp. 11–12, 14. November 1989.

Placer County Water Agency (PCWA) 2007. Pre-Application Document. Middle Fork American River Project. FERC Project No. 2079.

PCWA 2009a. LAND 3 – Emergency Action and Public Safety Technical Study Report.

PCWA. 2009c. REC 2 – Recreation Visitor Surveys Technical Study Report.

PCWA. 2009d. REC 4 – Stream-based Recreation Opportunities Technical Study Report.

State of California, Department of Finance. 2007. Population Projections for California and Its Counties 2000–2050, by Age, Gender and Race/Ethnicity, Sacramento, California. July 2007.
<http://www.dof.ca.gov/research/demographic/reports/projections/p-3/>

State of California, Department of Finance, E-1 population Estimates for Cities, Counties and the State with Annual Percent Change — January 1, 2008 and 2009. Sacramento, California, May 2009.
<http://www.dof.ca.gov/research/demographic/reports/estimates/e-1/2008-09/>

The Outdoor Foundation. 2008. Outdoor Recreation Participation Report 2008.

United States Department of Agriculture Forest Service (USDA-FS). 1988. Eldorado National Forest Land and Resource Management Plan. United States Department of Agriculture. Placerville, California. December 1988.

USDA-FS. 1990. Tahoe National Forest Land and Resource Management Plan. United States Department of Agriculture. Nevada City, California. March 1990.

USDA-FS. 2000. American's Participation in Outdoor Recreation: Results from National Survey on Recreation and the Environment (NSRE).

USDA-FS. 2005. Tahoe National Forest Land and Resource Management Plan As Amended. Pacific Southwest Region. United States Department of Agriculture. Nevada City, California.

USDA-FS. 2001. USDA-FS Boating Regulation brochure.

USDA-FS. 2006. Tahoe and Eldorado National Forest Website.

U.S. Fish and Wildlife Service. 2006. 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

Reports in Preparation

PCWA. 2009b. REC 1 – Recreation Use and Facilities Technical Study Report.

TABLES

Table REC 3-1. General Visitor Survey Results – Section A-1 – Background Section – Hell Hole Reservoir Area.

The Hell Hole Reservoir Area includes the following developed Project recreation facilities and DCUAs identified by the stakeholders:

Campgrounds

- Big Meadows Campground
- Hell Hole Campground
- Upper Hell Hole Campground

Day Use Areas

- Hell Hole Boat Ramp and Associated Parking Areas
- Hell Hole Vista

DCUAs

- Area on west side of Hell Hole Reservoir, between dam and Hell Hole Boat Ramp
- Grey Horse Area

Q-1. Did you engage in any of the following activities during your visit?

Total # of Respondents	Activity	Frequency	Percent
255	Camping at a developed site	166	65.1
	Fishing	126	49.4
	Reservoir recreation	84	32.9
	Day use or camping in undeveloped areas	29	11.4
	Day use along a stream/river	13	5.1
	Day use at a developed site	12	4.7

Analytical Note: Multiple responses were accepted.

Q-2. What type of vehicle did you drive to this area?

Total # of Respondents	Type of Vehicle	Frequency	Percent
247	Car/SUV/Truck	222	89.9
	Camper/RV	18	7.3
	Motorcycle	3	1.2
	Other	4	1.6

Table REC 3-1. General Visitor Survey Results – Section A-1 – Background Section – Hell Hole Reservoir Area (continued).

Q-3. How many people were in your vehicle?

Total # of Respondents	Average # of people	Standard Deviation	Range (min.-max.)	Total # of People	Frequency	Percent
250	2.7	1.7	1-18	1	31	12.4
				2	122	48.8
				3	35	14.0
				4 or more	62	24.8

Q-4. How many people in your group are in the following age categories?

Total # of Respondents	Age Category	Percent
250	Under 18	19.4%
	18 or over	80.6%

Q-5. How many and what types of vehicles and trailers did your **group** bring?

Total # of Respondents	Vehicle or Trailer	Frequency ¹	Percent ¹	Average # per group ²
242	Car/pickup/SUV	218	90.1	1.8
	Boat trailer	83	34.3	1.2
	Towed/Trailer Vehicle	22	9.1	1.2
	Motor home/RV	13	5.4	1.2
	Travel trailer	7	3.0	1.0
	OHV	6	2.5	1.0
	Motorcycle	3	1.2	2.3
	Utility trailer	2	0.8	1.0
	Horse trailer	1	0.4	1.0
	Other	3	1.2	1.0

¹Includes all responses.

²Includes only responses that provided the number of vehicles in their group.

Table REC 3-1. General Visitor Survey Results – Section A-1 – Background Section – Hell Hole Reservoir Area (continued).**Q-6.** Your place of residence (zip code):

Total # of Respondents	County in California	Frequency	Percent
244	Placer	58	23.8
	Sacramento	57	23.4
	El Dorado	46	18.9
	Alameda	14	5.7
	Nevada	9	3.7
	Sonoma	9	3.7
	Yolo	9	3.7
	Contra Costa	8	3.3
	San Mateo	7	2.9
	Santa Clara	4	1.6
	Santa Cruz	4	1.6
	Sutter	3	1.2
	Fresno	2	0.8
	Mendocino	2	0.8
	Merced	2	0.8
	San Joaquin	2	0.8
	Marin	1	0.4
	San Diego	1	0.4
	San Francisco	1	0.4
	Location outside of California	Frequency	Percent
Washoe, NV	4	1.6	
Georgia	1	0.4	

Analytical Note: Counties were determined using zip codes provided by the respondent.

Q-7. What year were you born?

Total # of Respondents	Average Age (years)	Standard Deviation	Age Range (min.-max.)	Age Categories (years)	Frequency	Percent
237	43.4	13.4	17-82	24 or younger	23	9.7
				25-39	61	25.7
				40-64	140	59.1
				65 or older	13	5.5

Analytical Note: Ages were determined using birth years provided by the survey respondent.

Table REC 3-1. General Visitor Survey Results – Section A-1 – Background Section – Hell Hole Reservoir Area (continued).

Q-8. Which cultural or ethnic group do you most closely identify with?

Total # of Respondents	Cultural or Ethnic Group	Frequency	Percent
250	White/Caucasian	232	92.8
	Hispanic or Latino	7	2.8
	American Indian or Alaskan Native	2	0.8
	Asian	1	0.4
	Black/African American	1	0.4
	Native Hawaiian or Pacific Islander	1	0.4
	Other/Multi-racial	6	2.4

Q-9. What is your primary spoken language?

Total # of Respondents	Primary Language	Frequency	Percent
213	English	212	99.5
	Russian	1	0.5

Table REC 3-1. General Visitor Survey Results – Section A-1 – Background Section – Hell Hole Reservoir Area (continued).

Q-10. Identify the reasons why you chose this area to recreate?

Total # of Respondents	Primary Reason	Frequency	Percent
175	Scenic quality of the area	46	26.3
	Lack of crowding	31	17.7
	Recreational activities/opportunities in the area	30	17.1
	Close to home	26	14.9
	Access to lake/reservoir	18	10.3
	Access to river/stream	5	2.9
	Cost of facility access fee	2	1.1
	Presence of on-site manager/host	0	-
	Other	17	9.7

Analytical Note: Respondents were asked to indicate one primary reason for visiting the area. Eighty respondents either did not answer the question or provided multiple primary reasons. These responses were considered invalid and omitted from the analysis. Therefore the analysis is based on the 175 respondents who correctly answered the question.

Total # of Respondents	Secondary Reason	Frequency	Percent
178	Lack of crowding	75	42.1
	Access to lake/reservoir	62	34.8
	Scenic quality of the area	61	34.3
	Recreational activities/opportunities in the area	47	26.4
	Close to home	44	24.7
	Cost of facility access fee	29	16.3
	Access to river/stream	24	13.5
	Presence of on-site manager/host	1	0.6
	Other	9	5.1

Analytical Note: Multiple responses were accepted. Therefore the sum of the percentages exceeds 100%.

Table REC 3-1. General Visitor Survey Results – Section A-1 – Background Section – Hell Hole Reservoir Area (continued).

Q-11. How important are each of the following facilities or amenities when choosing this area to recreate?

Facility/Amenity	Total # of Respondents	Possible Answers	Frequency	Percent
Developed campsites	240	Very Important	53	22.1
		Important	75	31.2
		Somewhat Important	53	22.1
		Not Important	59	24.6
Developed picnic sites	225	Very Important	30	13.3
		Important	49	21.8
		Somewhat Important	62	27.6
		Not Important	84	37.3
Flush restrooms	234	Very Important	36	15.4
		Important	42	17.9
		Somewhat Important	67	28.6
		Not Important	89	38.0
Drinking water	235	Very Important	73	31.1
		Important	66	28.1
		Somewhat Important	39	16.6
		Not Important	57	24.3
RV dump station	224	Very Important	12	5.4
		Important	21	9.4
		Somewhat Important	44	19.6
		Not Important	147	65.6
Boat launch ramps	238	Very Important	115	48.3
		Important	47	19.7
		Somewhat Important	26	10.9
		Not Important	50	21.0
River put-in/take-out	210	Very Important	32	15.2
		Important	39	18.6
		Somewhat Important	44	21.0
		Not Important	95	45.2
Hiking trails	233	Very Important	58	24.9
		Important	82	35.2
		Somewhat Important	48	20.6
		Not Important	45	19.3

Table REC 3-1. General Visitor Survey Results – Section A-1 – Background Section – Hell Hole Reservoir Area (continued).

Q-11. How important are each of the following facilities or amenities when choosing this area to recreate (continued)?

Facility/Amenity	Total # of Respondents	Possible Answers	Frequency	Percent
OHV Trails	222	Very Important	37	16.7
		Important	36	16.2
		Somewhat Important	34	15.3
		Not Important	115	51.8
Mountain bike trails	222	Very Important	18	8.1
		Important	34	15.3
		Somewhat Important	55	24.8
		Not Important	115	51.8
Fishing access trails	234	Very Important	79	33.8
		Important	63	26.9
		Somewhat Important	32	13.7
		Not Important	60	25.6
Equestrian trails	219	Very Important	12	5.5
		Important	25	11.4
		Somewhat Important	37	16.9
		Not Important	145	66.2
Interpretive/ educational exhibits/information	212	Very Important	20	9.4
		Important	33	15.6
		Somewhat Important	55	25.9
		Not Important	104	49.1
Other	4	Very Important	4	100.0
		Important	-	-
		Somewhat Important	-	-
		Not Important	-	-

Table REC 3-1. General Visitor Survey Results – Section A-1 – Background Section – Hell Hole Reservoir Area (continued).

Q-12. Identify the activities you engaged in, or expect to engage in, during your trip to this area.

Total # of Respondents	Primary Activity	Frequency	Percent
152	Reservoir fishing	60	39.5
	Camping in developed site	43	28.3
	OHV travel/use	9	5.9
	Camping in undeveloped site	8	5.3
	Hiking/walking	5	3.3
	Relaxing	4	2.6
	Stream swimming/water-play/sun bathing	4	2.6
	Picnicking in developed sites	3	2.0
	Reservoir swimming/water-play/sun bathing	3	2.0
	Driving for pleasure on roads	2	1.3
	Non-motorized reservoir boating (canoeing, kayaking, row boating)	2	1.3
	Stream fishing	2	1.3
	Whitewater boating (rafting, kayaking, canoeing)	2	1.3
	Hunting	1	0.7
	Picnicking in undeveloped sites	1	0.7
	Sports/games/field activities	1	0.7
Other	2	1.3	

Analytical Note: Respondents were asked to indicate one primary activity. A total of 103 respondents either did not answer the question or provided multiple primary reasons. These responses were considered invalid and omitted from the analysis. Therefore the analysis is based on the 152 respondents who correctly answered the question.

Table REC 3-1. General Visitor Survey Results – Section A-1 – Background Section – Hell Hole Reservoir Area (continued).

Q-12. Identify the activities you engaged in, or expect to engage in, during your trip to this area (continued).

Total # of Respondents	Secondary Activity	Frequency	Percent
152	Relaxing	56	36.8
	Hiking/walking	52	34.2
	Viewing wildlife, scenery photography, etc.	43	28.3
	Reservoir swimming/water-play/sun bathing	42	27.6
	Reservoir fishing	41	27.0
	Camping in developed site	36	23.7
	Picnicking in developed sites	21	13.8
	Stream fishing	18	11.8
	Picnicking in undeveloped sites	17	11.2
	Stream swimming/water-play/sun bathing	15	9.9
	Camping in undeveloped site	13	8.6
	Bicycling on paved surfaces	8	5.3
	Mountain biking	8	5.3
	Non-motorized reservoir boating (canoeing, kayaking, row boating)	8	5.3
	OHV travel/use	8	5.3
	Driving for pleasure on roads	7	4.6
	Personal water craft (jet skiing)	5	3.3
	Visiting historical/cultural sites	5	3.3
	Whitewater boating (rafting, kayaking, canoeing)	5	3.3
	Wood cutting	3	2.0
	Hunting	2	1.3
	Sports/games/field activities	2	1.3
	Water skiing, wake boarding	2	1.3
	Gold panning/dredging	1	0.7
Plant gathering (berries, mushrooms, grasses, etc.)	1	0.7	
Sailing	1	0.7	
Other	2	1.3	

Analytical Note: Multiple responses were accepted. Therefore the sum of the percentages exceeds 100%.

Table REC 3-1. General Visitor Survey Results – Section A-1 – Background Section – Hell Hole Reservoir Area (continued).

Q-13. Please rate the availability and adequacy of the following information resources.

Information Resources	Total # of Respondents	Possible Answers	Frequency	Percent
Interpretive/educational information	220	Acceptable	78	35.5
		Somewhat Acceptable	55	25.0
		Not Acceptable	24	10.9
		Not Applicable	63	28.6
Recreation visitor information	228	Acceptable	96	42.1
		Somewhat Acceptable	63	27.6
		Not Acceptable	28	12.3
		Not Applicable	41	18.0
Safety/warning information	218	Acceptable	119	54.6
		Somewhat Acceptable	54	24.8
		Not Acceptable	17	7.8
		Not Applicable	28	12.8
Reservoir water surface elevation information	218	Acceptable	93	42.7
		Somewhat Acceptable	56	25.7
		Not Acceptable	29	13.3
		Not Applicable	40	18.3
River/stream flow information	211	Acceptable	72	34.1
		Somewhat Acceptable	57	27.0
		Not Acceptable	27	12.8
		Not Applicable	55	26.1
Other	1	Acceptable	1	100.0
		Somewhat Acceptable	-	-
		Not Acceptable	-	-
		Not Applicable	-	-

Q-14. How would you rate your overall recreation experience?

Total # of Respondents	Possible Answers	Frequency	Percent
240	Very Satisfied	134	55.8
	Satisfied	94	39.2
	Somewhat Satisfied	10	4.2
	Unsatisfied	1	0.4
	Very Unsatisfied	1	0.4

Table REC 3-1. General Visitor Survey Results – Section A-1 – Background Section – Hell Hole Reservoir Area (continued).

Q-15. Are there additional recreation facilities, amenities, or opportunities that would improve your recreation experience?

Total # of Respondents	Possible Answers	Frequency	Percent
188	Yes	56	29.8
	No	132	70.2

Of the 56 people who said “yes”, fifty-two provided comments which are summarized below by category. Some respondents provided comments that described multiple categories; therefore the total number of comments exceeds the total number of respondents.

Facility/Amenity	# of Comments	Percent of Total
Restrooms	14	23.0
Road/Parking Improvement	14	23.0
Camping	5	8.2
Boat Ramps/Docks	3	4.9
More Developments	3	4.9
More Trails/Better Access	3	4.9
Showers	3	4.9
Signage/Additional Information	3	4.9
Cost/Fees	2	3.3
Unsatisfactory Fishing	2	3.3
Campfires	1	1.6
Drinking Water	1	1.6
Longer Season	1	1.6
Low Water Levels	1	1.6
More Law Enforcement	1	1.6
Picnic Tables	1	1.6
Safety/Emergency Services	1	1.6
Too Crowded/Disruptive People	1	1.6
Trash Disposal	1	1.6
TOTAL	61	100.0

Table REC 3-2. Reservoir Angler Survey Results – Hell Hole Reservoir.

Q-1. A total of 968 people participated in the general visitor survey. Of these, 213 people completed all or a portion of Section A-7 - Fishing. A total of 101 respondents indicated they fished at Hell Hole Reservoir. Their responses are tabulated below.

Q-2. Primary fishing location.

-Refer to Table REC 2-34. General Visitor Survey Results – Form A – Section A-7 – Fishing.

Q-3. If river/stream fishing, what reach of river/stream was your primary fishing location?

-Refer to Table REC 2-34. General Visitor Survey Results – Form A – Section A-7 – Fishing.

Q-4. How many total hours have you spent fishing during your visit at your primary fishing location?

Total # of Respondents	Hours	Frequency	Percent	Mean	Standard Deviation
83	1	3	3.6	10.8	8.6
	2	2	2.4		
	3	3	3.6		
	4	5	6.0		
	5	6	7.2		
	6	10	12.0		
	7	4	4.8		
	8	13	15.7		
	10	11	13.3		
	11	1	1.2		
	12	3	3.6		
	15	1	1.2		
	16	8	9.6		
	18	1	1.2		
	20	6	7.2		
	24	2	2.4		
	30	2	2.4		
	36	1	1.2		
56	1	1.2			

Analytical Note. Eighteen of the 101 respondents did not provide a valid response to this question. Therefore the total number of respondents = 83.

Table REC 3-2. Reservoir Angler Survey Results – Hell Hole Reservoir (continued).

Q-5. From where did you fish?

Total # of Respondents	Location	Frequency	Percent
101	From a boat	80	79.2
	From the shoreline	27	26.7

Analytical Note. Multiple responses were accepted.

Q-6. What gear type(s) did you use today?

If fishing from a boat:

Total # of Respondents	Gear	Frequency	Percent
80	Troll lures	69	87.3
	Troll bait	43	54.4
	Cast lures	21	26.6
	Cast bait	11	13.9
	Fly fish	2	2.6

Analytical Note. Multiple responses were accepted.

If fishing from the shore:

Total # of Respondents	Gear	Frequency	Percent
27	Cast lures	19	70.4
	Cast bait	17	63.0
	Fly fish	4	14.8

Analytical Note. Multiple responses were accepted.

Table REC 3-2. Reservoir Angler Survey Results – Hell Hole Reservoir (continued).

Q-7. Please indicate the number and type of fish you caught and the number and type of fish released.

Total # of Respondents	Type of Fish	Number of Fish Caught		Total Number of Fish Caught	Percent
		Kept	Released		
78	Rainbow Trout	28	47	75	16.6
	Lake Trout	16	20	36	8.0
	Brown Trout	43	58	101	22.4
	Kokanee	204	30	234	51.9
	Other	5	0	5	1.1
	Not Sure	0	0	0	0

Analytical Note. Twenty-three of the respondents did not provide a valid response to this question. Therefore the total number of respondents = 78. All of the “other” fish that were caught were identified as Mackinaw (lake trout).

Catch per unit effort based on responses to Q-4 and Q-7.

Total # of Respondents	Mean Number of Fish Caught per Hour	Standard Deviation
70	0.6	0.7

Analytical Note. Seventy of the respondents provided sufficient information to determine catch per unit effort. Specifically, 70 respondents provided valid responses for both number of hours fished and number of hours caught.

Table REC 3-2. Reservoir Angler Survey Results – Hell Hole Reservoir (continued).

Q-8. Please rate your satisfaction with the following factors regarding your fishing experience at the primary fishing location identified above.

Factor	Total # of Respondents	Possible Answers	Frequency	Percent
Number of fish caught	92	Acceptable	40	43.5
		Somewhat Acceptable	31	33.7
		Not Acceptable	21	22.8
Variety of fishing locations	85	Acceptable	60	70.6
		Somewhat Acceptable	22	25.9
		Not Acceptable	3	3.5
Variety of fish species	86	Acceptable	63	73.3
		Somewhat Acceptable	19	22.1
		Not Acceptable	4	4.7
Size of fish	84	Acceptable	44	52.4
		Somewhat Acceptable	27	32.1
		Not Acceptable	13	15.5
Road access to fishing areas	86	Acceptable	52	60.5
		Somewhat Acceptable	21	24.4
		Not Acceptable	13	15.1
Trail access to fishing areas	68	Acceptable	39	57.4
		Somewhat Acceptable	21	30.9
		Not Acceptable	8	11.8

Q-9. How would you rate your overall fishing experience at the primary fishing location identified above?

Total # of Respondents	Possible Answers	Frequency	Percent
98	Very Satisfied	41	41.8
	Satisfied	36	36.7
	Somewhat Satisfied	18	18.4
	Unsatisfied	3	3.1
	Very Unsatisfied	0	0

Table REC 3-3. General Visitor Survey Results – Section A-6 – Reservoir Recreation – Hell Hole Reservoir Area.

Q-1. A total of 72 people intercepted at one of the sites located in the Hell Hole Reservoir Area indicated that they recreated at a reservoir and therefore completed Section A-6.

Q-2. Name of primary reservoir used.

Reservoir	Frequency	Percent
Hell Hole Reservoir	72	39.8

Analytical Note: Percent is derived from the total number of people surveyed in the project area that identified reservoir recreation as a primary activity and filled out Section A-6.

Q-3. How many hours did you, or will you, spend at the reservoir?

Total # of Respondents	Average # of Hours	Standard Deviation	Range (Min. – Max.)
63	18.7	25.62	1-120

Q-4. If you engaged in boating activities during your visit, what type of boat did you use?

Total # of Respondents	Type of Boat	Frequency	Percent
46	Ski boat	2	4.3
	Fishing boat	31	67.4
	Pontoon boat	0	-
	Sail boat	0	-
	Personal watercraft	3	6.5
	Non-power boats (i.e., canoe, kayak, row boat, raft, etc)	11	23.9

Analytical Note: Multiple responses were accepted. Therefore the sum of the percentages exceeds 100%.

Q-5. If applicable, check the name of the launch facility(s) you used.

Total # of Respondents	Launch Facility	Frequency	Percent
55	Hell Hole Boat Ramp	54	98.2
	Other (Backside)	1	1.8

Analytical Note: Two respondents also indicated that they used the French Meadows Boat Ramp in addition to the Hell Hole Boat Ramp. Since both respondents indicated that the primary reservoir used was Hell Hole, their responses are only included in the analysis of the Hell Hole Reservoir Area.

Table REC 3-3. General Visitor Survey Results – Section A-6 – Reservoir Recreation – Hell Hole Reservoir Area.

Q-6. Please rate the following factors at the reservoir identified above.

Factor	Total # of Respondents	Possible Answers	Frequency	Percent
Access to shoreline	70	Acceptable	50	71.4
		Somewhat Acceptable	16	22.9
		Not Acceptable	4	5.7
Parking availability	70	Acceptable	59	84.3
		Somewhat Acceptable	10	14.3
		Not Acceptable	1	1.4
Parking area condition	70	Acceptable	58	82.9
		Somewhat Acceptable	12	17.1
		Not Acceptable	0	-
Condition of boat ramp	65	Acceptable	56	86.2
		Somewhat Acceptable	9	13.8
		Not Acceptable	0	-
Boat ramp access	65	Acceptable	53	81.5
		Somewhat Acceptable	12	18.5
		Not Acceptable	0	-
Restroom condition	65	Acceptable	48	73.8
		Somewhat Acceptable	13	20.0
		Not Acceptable	4	6.2
Restroom cleanliness	65	Acceptable	49	75.4
		Somewhat Acceptable	14	21.5
		Not Acceptable	2	3.1
Availability of trash disposal	67	Acceptable	54	80.6
		Somewhat Acceptable	11	16.4
		Not Acceptable	2	3.0
Drinking water availability	62	Acceptable	29	46.8
		Somewhat Acceptable	16	25.8
		Not Acceptable	17	27.4
Adequacy of reservoir water depths	68	Acceptable	54	79.4
		Somewhat Acceptable	9	13.2
		Not Acceptable	5	7.4
Presence of debris or obstacles	66	Acceptable	53	80.3
		Somewhat Acceptable	12	18.2
		Not Acceptable	1	1.5
Access to boat-in campgrounds	58	Acceptable	37	63.8
		Somewhat Acceptable	18	31.0
		Not Acceptable	3	5.2

Table REC 3-3. General Visitor Survey Results – Section A-6 – Reservoir Recreation – Hell Hole Reservoir Area.

Q-6. Please rate the following factors at the reservoir identified above (continued).

Factor	Total # of Respondents	Possible Answers	Frequency	Percent
Adequacy of law enforcement personnel	55	Acceptable	39	70.9
		Somewhat Acceptable	10	18.2
		Not Acceptable	6	10.9

Q-7. Was your recreation experience **negatively** affected by:

Factor	Total # of Respondents	Possible Answers	Frequency	Percent
Crowding	70	Yes	1	1.4
		No	69	98.6
Other activities taking place	64	Yes	1	1.6
		No	63	98.4
Reservoir water surface level	61	Yes	4	6.6
		No	57	93.4

Q-8. How would you rate your overall experience at the reservoir identified above?

Total # of Respondents	Possible Answers	Frequency	Percent
69	Very Satisfied	46	66.7
	Satisfied	20	29.0
	Somewhat Satisfied	2	2.9
	Unsatisfied	0	-
	Very Unsatisfied	1	1.4

Table REC 3-3. General Visitor Survey Results – Section A-6 – Reservoir Recreation – Hell Hole Reservoir Area.

The following table summarizes the primary activities identified by the subset of 37 people who provided valid information to Question 12 of Section A-1 and completed Section A-6 of the survey form.

Section A-1 – Background Information

Q-12. Identify the activities you engaged in, or expect to engage in, during your trip to this area.

Total # of Respondents	Primary Activity	Frequency	Percent
37	Camping in developed site	13	35.1
	Reservoir fishing	13	35.1
	Camping in undeveloped site	3	8.1
	Picnicking in developed sites	2	5.4
	Non-motorized reservoir boating (canoeing, kayaking, row boating)	1	2.7
	OHV travel/use	1	2.7
	Relaxing	1	2.7
	Reservoir swimming/water-play/sun bathing	1	2.7
	Sports/games/field activities	1	2.7
	Whitewater boating (rafting, kayaking, canoeing)	1	2.7

Table REC 3-4. General Visitor Survey Results – Section A-1 – Background Section – French Meadows Reservoir Area.

The French Meadows Reservoir area includes the following developed Project recreation facilities and DCUAs identified by the stakeholders:

Campgrounds

- Ahart Campground
- French Meadows Campground
- Lewis Campground
- Poppy Campground

Group Campgrounds

- Coyote Group Campground
- Gates Group Campground

Day Use Areas

- French Meadows Picnic Area
- French Meadows Boat Ramp
- McGuire Picnic Area
- McGuire Boat Ramp (Including Poppy Trailhead Parking Area)

DCUAs

- Area near bridge over the Middle Fork American River, upstream of French Meadows Reservoir;
- Area near French Meadows-Hell Hole Tunnel Gatehouse;
- Area immediately downstream of French Meadows Dam (both sides of river); and
- Area located immediately northwest of French Meadows Dam.

Q-1. Did you engage in any of the following activities during your visit?

Total # of Respondents	Activity	Frequency	Percent
316	Camping at a developed site	262	82.9
	Reservoir recreation	153	48.4
	Fishing	116	36.7
	Day use along a stream/river	25	7.9
	Day use at a developed site	16	5.1
	Day use or camping in undeveloped areas	12	3.8

Analytical Note: Multiple responses were accepted.

Table REC 3-4. General Visitor Survey Results – Section A-1 – Background Section – French Meadows Reservoir Area (continued).

Q-2. What type of vehicle did you drive to this area?

Total # of Respondents	Type of Vehicle	Frequency	Percent
306	Car/SUV/Truck	267	87.3
	Camper/RV	27	8.8
	Motorcycle	5	1.6
	Multiple Vehicles	2	0.7
	Other	5	1.6

Q-3. How many people were in your vehicle?

Total # of Respondents	Average # of people	Standard Deviation	Range (min.-max.)	Total # of People	Frequency	Percent
305	2.8	1.6	1-16	1	30	9.8
				2	140	45.9
				3	56	18.4
				4 or more	79	25.9

Q-4. How many people in your group are in the following age categories?

Total # of Respondents	Age Category	Percent
305	Under 18	20.5%
	18 or over	79.5%

Q-5. How many and what types of vehicles and trailers did your **group** bring?

Total # of Respondents	Vehicle or Trailer	Frequency ¹	Percent ¹	Average # per group ²
306	Car/pickup/SUV	272	88.9	2.6
	Boat trailer	51	16.7	1.1
	Motor home/RV	44	14.4	1.5
	Towed/Trailered Vehicle	23	7.5	1.3
	Travel trailer	21	6.9	1.7
	Motorcycle	15	4.9	1.5
	Utility trailer	11	3.6	1.1
	OHV	7	2.3	1.8
	Horse trailer	0	-	-
	Other	4	1.3	1.0

¹Includes all responses.

²Includes only responses that provided the number of vehicles in their group.

Table REC 3-4. General Visitor Survey Results – Section A-1 – Background Section – French Meadows Reservoir Area (continued).

Q-6. Your place of residence (zip code):

Total # of Respondents	County in California	Frequency	Percent
299	Placer	97	32.4
	Sacramento	85	28.4
	El Dorado	22	7.4
	Santa Clara	9	3.0
	Santa Cruz	9	3.0
	Contra Costa	8	2.7
	Alameda	7	2.3
	San Joaquin	6	2.0
	San Francisco	5	1.7
	Butte	4	1.3
	Nevada	3	1.0
	Solano	3	1.0
	Sonoma	3	1.0
	Yolo	3	1.0
	Napa	2	0.7
	San Luis Obispo	2	0.7
	San Mateo	2	0.7
	Amador	1	0.3
	Fresno	1	0.3
	Lake	1	0.3
	Marin	1	0.3
	Monterey	1	0.3
	Orange	1	0.3
	San Diego	1	0.3
	Shasta	1	0.3
	Siskiyou	1	0.3
	Sutter	1	0.3
	Yuba	1	0.3
		Location outside of California	Frequency
	Germany	1	0.3

Analytical Note: Counties were determined using zip codes provided by the respondent.

Table REC 3-4. General Visitor Survey Results – Section A-1 – Background Section – French Meadows Reservoir Area (continued).

Q-7. What year were you born?

Total # of Respondents	Average Age (years)	Standard Deviation	Age Range (min.-max.)	Age Categories (years)	Frequency	Percent
282	42.0	13.9	17-77	24 or younger	29	10.3
				25-39	104	36.9
				40-64	133	47.2
				65 or older	16	5.7

Analytical Note: Ages were determined using birth years provided by the survey respondent.

Q-8. Which cultural or ethnic group do you most closely identify with?

Total # of Respondents	Cultural or Ethnic Group	Frequency	Percent
300	White/Caucasian	254	84.7
	Hispanic or Latino	13	4.3
	Asian	9	3.0
	American Indian or Alaskan Native	5	1.7
	Native Hawaiian or Pacific Islander	3	1.0
	Black/African American	2	0.7
	Other/Multi-racial	14	4.7

Q-9. What is your primary spoken language?

Total # of Respondents	Primary Language	Frequency	Percent
275	English	262	95.3
	Multiple	4	1.5
	Russian	3	1.1
	Spanish	2	0.7
	Other	4	1.5

Table REC 3-4. General Visitor Survey Results – Section A-1 – Background Section – French Meadows Reservoir Area (continued).

Q-10. Identify the reasons why you chose this area to recreate?

Total # of Respondents	Primary Reason	Frequency	Percent
192	Scenic quality of the area	58	30.2
	Close to home	32	16.7
	Lack of crowding	28	14.6
	Access to lake/reservoir	25	13.0
	Recreational activities/opportunities in the area	21	10.9
	Access to river/stream	8	4.2
	Presence of on-site manager/host	1	0.5
	Cost of facility access fee	0	-
	Other	19	9.9

Analytical Note: Respondents were asked to indicate one primary reason for visiting the area. A total of 124 respondents either did not answer the question or provided multiple primary reasons. These responses were considered invalid and omitted from the analysis. Therefore the analysis is based on the 192 respondents who correctly answered the question.

Total # of Respondents	Secondary Reason	Frequency	Percent
194	Access to lake/reservoir	71	36.6
	Scenic quality of the area	63	32.5
	Lack of crowding	61	31.4
	Close to home	41	21.1
	Recreational activities/opportunities in the area	39	20.1
	Access to river/stream	32	16.5
	Cost of facility access fee	19	9.8
	Presence of on-site manager/host	8	4.1
	Other	6	3.1

Analytical Note: Multiple responses were accepted. Therefore the sum of the percentages exceeds 100%.

Table REC 3-4. General Visitor Survey Results – Section A-1 – Background Section – French Meadows Reservoir Area (continued).

Q-11. How important are each of the following facilities or amenities when choosing this area to recreate?

Facility/Amenity	Total # of Respondents	Possible Answers	Frequency	Percent
Developed campsites	295	Very Important	122	41.4
		Important	88	29.8
		Somewhat Important	60	20.3
		Not Important	25	8.5
Developed picnic sites	267	Very Important	67	25.1
		Important	81	30.3
		Somewhat Important	70	26.2
		Not Important	49	18.4
Flush restrooms	289	Very Important	93	32.2
		Important	74	25.6
		Somewhat Important	72	24.9
		Not Important	50	17.3
Drinking water	285	Very Important	139	48.8
		Important	74	26.0
		Somewhat Important	50	17.5
		Not Important	22	7.7
RV dump station	265	Very Important	32	12.1
		Important	30	11.3
		Somewhat Important	35	13.2
		Not Important	168	63.4
Boat launch ramps	276	Very Important	76	27.5
		Important	60	21.7
		Somewhat Important	34	12.3
		Not Important	106	38.4
River put-in/take-out	251	Very Important	32	12.7
		Important	54	21.5
		Somewhat Important	52	20.7
		Not Important	113	45.0
Hiking trails	271	Very Important	74	27.3
		Important	105	38.7
		Somewhat Important	54	19.9
		Not Important	38	14.0

Table REC 3-4. General Visitor Survey Results – Section A-1 – Background Section – French Meadows Reservoir Area (continued).

Q-11. How important are each of the following facilities or amenities when choosing this area to recreate (continued)?

Facility/Amenity	Total # of Respondents	Possible Answers	Frequency	Percent
OHV Trails	250	Very Important	34	13.6
		Important	33	13.2
		Somewhat Important	43	17.2
		Not Important	140	56.0
Mountain bike trails	261	Very Important	38	14.6
		Important	51	19.5
		Somewhat Important	77	29.5
		Not Important	95	36.4
Fishing access trails	285	Very Important	110	38.6
		Important	77	27.0
		Somewhat Important	39	13.7
		Not Important	59	20.7
Equestrian trails	247	Very Important	22	8.9
		Important	19	7.7
		Somewhat Important	37	15.0
		Not Important	169	68.4
Interpretive/ educational exhibits/information	248	Very Important	24	9.7
		Important	42	16.9
		Somewhat Important	63	25.4
		Not Important	119	48.0
Other	6	Very Important	5	83.3
		Important	1	16.7
		Somewhat Important	-	-
		Not Important	-	-

Table REC 3-4. General Visitor Survey Results – Section A-1 – Background Section – French Meadows Reservoir Area (continued).

Q-12. Identify the activities you engaged in, or expect to engage in, during your trip to this area.

Total # of Respondents	Primary Activity	Frequency	Percent
168	Camping in developed site	86	51.2
	Reservoir fishing	32	19.0
	Relaxing	8	4.8
	Picnicking in developed sites	6	3.6
	Reservoir swimming/water-play/sun bathing	6	3.6
	Hiking/walking	5	3.0
	OHV travel/use	3	1.8
	Stream fishing	3	1.8
	Stream swimming/water-play/sun bathing	3	1.8
	Camping in undeveloped site	2	1.2
	Non-motorized reservoir boating (canoeing, kayaking, row boating)	2	1.2
	Driving for pleasure on roads	1	0.6
	Gold panning/dredging	1	0.6
	Mountain biking	1	0.6
	Picnicking in undeveloped sites	1	0.6
	Sports/games/field activities	1	0.6
	Viewing wildlife, scenery photography, etc.	1	0.6
	Visiting historical/cultural sites	1	0.6
	Water skiing, wake boarding	1	0.6
	Whitewater boating (rafting, kayaking, canoeing)	1	0.6
Other	3	1.8	

Analytical Note: Respondents were asked to indicate one primary activity. A total of 148 respondents either did not answer the question or provided multiple primary reasons. These responses were considered invalid and omitted from the analysis. Therefore the analysis is based on the 168 respondents who correctly answered the question.

Table REC 3-4. General Visitor Survey Results – Section A-1 – Background Section – French Meadows Reservoir Area (continued).

Q-12. Identify the activities you engaged in, or expect to engage in, during your trip to this area (continued).

Total # of Respondents	Secondary Activity	Frequency	Percent
169	Reservoir swimming/water-play/sun bathing	71	42.0
	Relaxing	67	39.6
	Hiking/walking	65	38.5
	Reservoir fishing	52	30.8
	Viewing wildlife, scenery photography, etc.	52	30.8
	Stream swimming/water-play/sun bathing	42	24.9
	Stream fishing	32	18.9
	Camping in developed site	31	18.3
	Picnicking in developed sites	25	14.8
	Mountain biking	20	11.8
	Bicycling on paved surfaces	19	11.2
	Non-motorized reservoir boating (canoeing, kayaking, row boating)	18	10.7
	Driving for pleasure on roads	17	10.1
	Visiting historical/cultural sites	12	7.1
	Sports/games/field activities	11	6.5
	Gold panning/dredging	10	5.9
	Camping in undeveloped site	9	5.3
	OHV travel/use	9	5.3
	Picnicking in undeveloped sites	9	5.3
	Hunting	8	4.7
	Rock hounding	8	4.7
	Wood cutting	5	3.0
	Water skiing, wake boarding	4	2.4
	Horseback riding	2	1.2
	Personal water craft (jet skiing)	1	0.6
	Plant gathering (berries, mushrooms, grasses, etc.)	1	0.6
Sailing	1	0.6	
Whitewater boating (rafting, kayaking, canoeing)	1	0.6	
Other	6	3.6	

Analytical Note: Multiple responses were accepted. Therefore the sum of the percentages exceeds 100%.

Table REC 3-4. General Visitor Survey Results – Section A-1 – Background Section – French Meadows Reservoir Area (continued).

Q-13. Please rate the availability and adequacy of the following information resources.

Information Resources	Total # of Respondents	Possible Answers	Frequency	Percent
Interpretive/educational information	265	Acceptable	89	33.6
		Somewhat Acceptable	81	30.6
		Not Acceptable	18	6.8
		Not Applicable	77	29.1
Recreation visitor information	278	Acceptable	130	46.8
		Somewhat Acceptable	81	29.1
		Not Acceptable	17	6.1
		Not Applicable	50	18.0
Safety/warning information	269	Acceptable	140	52.0
		Somewhat Acceptable	75	27.9
		Not Acceptable	15	5.6
		Not Applicable	39	14.5
Reservoir water surface elevation information	270	Acceptable	92	34.1
		Somewhat Acceptable	85	31.5
		Not Acceptable	39	14.4
		Not Applicable	54	20.0
River/stream flow information	264	Acceptable	77	29.2
		Somewhat Acceptable	86	32.6
		Not Acceptable	40	15.2
		Not Applicable	61	23.1
Other	1	Acceptable	1	100.0
		Somewhat Acceptable	-	-
		Not Acceptable	-	-
		Not Applicable	-	-

Q-14. How would you rate your overall recreation experience?

Total # of Respondents	Possible Answers	Frequency	Percent
303	Very Satisfied	169	55.8
	Satisfied	122	40.3
	Somewhat Satisfied	10	3.3
	Unsatisfied	1	0.3
	Very Unsatisfied	1	0.3

Table REC 3-4. General Visitor Survey Results – Section A-1 – Background Section – French Meadows Reservoir Area (continued).

Q-15. Are there additional recreation facilities, amenities, or opportunities that would improve your recreation experience?

Total # of Respondents	Possible Answers	Frequency	Percent
222	Yes	77	34.7
	No	145	65.3

Of the 77 people who said “yes”, seventy provided comments which are summarized below by category. Some respondents provided comments that described multiple categories; therefore the total number of comments exceeds the total number of respondents.

Facility/Amenity	# of Comments	Percent of Total
Restrooms	22	28.9
Drinking Water	10	13.2
Low Water Levels	7	9.2
Signage/Additional Information	7	9.2
More Developments	5	6.6
Picnic Tables	4	5.3
Additional Campsite Storage	3	3.9
Boat Ramps/Docks	3	3.9
More Trails/Better Access	3	3.9
Showers	3	3.9
Safety/Emergency Services	2	2.6
Trash Disposal	2	2.6
Camping	1	1.3
Road/Parking Improvement	1	1.3
N/A	3	3.9
TOTAL	76	100.0

Table REC 3-5. General Visitor Survey Results – Reservoir Angler Survey Results – French Meadows Reservoir.

Q-1. A total of 968 people participated in the general visitor survey. Of these, 213 people completed all or a portion of Section A-7- Fishing. A total of 63 respondents indicated they fished at French Meadows Reservoir. Their responses are provided below.

Q-2. Primary fishing location.

-Refer to Table REC 2-34. General Visitor Survey Results – Form A – Section A-7 – Fishing.

Q-3. If river/stream fishing, what reach of river/stream was your primary fishing location?

-Refer to Table REC 2-34. General Visitor Survey Results – Form A – Section A-7 – Fishing.

Q-4. How many total hours have you spent fishing during your visit at your primary fishing location?

Total # of Respondents	Hours	Frequency	Percent	Mean	Standard Deviation
58	1	2	3.4	7.8	5.8
	2	4	6.9		
	3	6	10.3		
	4	8	13.8		
	5	3	5.2		
	6	5	8.6		
	7	1	1.7		
	8	10	17.2		
	9	4	6.9		
	10	6	10.3		
	12	3	5.2		
	15	1	1.7		
	20	3	5.2		
	25	1	1.7		
30	1	1.7			

Analytical Note. Five of the 63 respondents did not provide a valid response to this question. Therefore the total number of respondents = 58.

Table REC 3-5. General Visitor Survey Results – Reservoir Angler Survey Results – French Meadows Reservoir (continued).

Q-5. From where did you fish?

Total # of Respondents	Location	Frequency	Percent
60	From a boat	33	55.0
	From the shoreline	35	58.3

Analytical Note. Multiple responses were accepted.

Q-6. What gear type(s) did you use today?

If fishing from a boat:

Total # of Respondents	Gear	Frequency	Percent
33	Troll lures	27	81.8
	Troll bait	15	45.5
	Cast lures	7	21.2
	Cast bait	9	27.3
	Fly fish	2	6.1

Analytical Note. Multiple responses were accepted.

If fishing from the shore:

Total # of Respondents	Gear	Frequency	Percent
35	Cast lures	17	48.6
	Cast bait	28	80.0
	Fly fish	1	2.9

Analytical Note. Multiple responses were accepted.

Table REC 3-5. General Visitor Survey Results – Reservoir Angler Survey Results – French Meadows Reservoir (continued).

Q-7. Please indicate the number and type of fish you caught and the number and type of fish released.

Total # of Respondents	Type of Fish	Number of Fish Caught		Total Number of Fish Caught	Percent
		Kept	Released		
52	Rainbow Trout	111	51	162	84.4
	Lake Trout	8	0	8	4.2
	Brown Trout	8	3	11	5.7
	Kokanee	0	0	0	0
	Other	0	0	0	0
	Not Sure	0	11	11	5.7

Analytical Note. Eleven of the 63 respondents did not provide a valid response to this question. Therefore the total number of respondents = 52.

Catch per unit effort based on responses to Q-4 and Q-7.

Total # of Respondents	Mean Number of Fish Caught per Hour	Standard Deviation
50	0.5	0.5

Analytical Note. Fifty of the respondents provided sufficient information to determine catch per unit effort. Specifically, 50 respondents provided valid responses for both number of hours fished and number of hours caught.

Table REC 3-5. General Visitor Survey Results – Reservoir Angler Survey Results – French Meadows Reservoir (continued).

Q-8. Please rate your satisfaction with the following factors regarding your fishing experience at the primary fishing location identified above.

Factor	Total # of Respondents	Possible Answers	Frequency	Percent
Number of fish caught	59	Acceptable	28	47.5
		Somewhat Acceptable	19	32.2
		Not Acceptable	12	20.3
Variety of fishing locations	55	Acceptable	37	67.3
		Somewhat Acceptable	15	27.3
		Not Acceptable	3	5.5
Variety of fish species	55	Acceptable	28	50.9
		Somewhat Acceptable	21	38.2
		Not Acceptable	6	10.9
Size of fish	58	Acceptable	27	46.6
		Somewhat Acceptable	23	39.7
		Not Acceptable	8	13.8
Road access to fishing areas	57	Acceptable	37	64.9
		Somewhat Acceptable	18	31.6
		Not Acceptable	2	3.5
Trail access to fishing areas	52	Acceptable	31	59.6
		Somewhat Acceptable	17	32.7
		Not Acceptable	4	7.7

Q-9. How would you rate your overall fishing experience at the primary fishing location identified above?

Total # of Respondents	Possible Answers	Frequency	Percent
60	Very Satisfied	26	43.3
	Satisfied	19	31.7
	Somewhat Satisfied	10	16.7
	Unsatisfied	5	8.3
	Very Unsatisfied	0	0

Table REC 3-6. General Visitor Survey Results – Section A-6 – Reservoir Recreation – French Meadows Reservoir Area.

Q-1. A total of 94 people intercepted at one of the sites located in the French Meadows Reservoir area identified reservoir recreation as their primary recreation activity and completed Section A-6 of the survey form.

Q-2. Name of primary reservoir used.

Reservoir	Frequency	Percent
French Meadows Reservoir	94	51.9

Analytical Note: Percent is derived from the total number of people surveyed in the project area that identified reservoir recreation as a primary activity and filled out Section A-6.

Q-3. How many hours did you, or will you, spend at the reservoir?

Total # of Respondents	Average # of Hours	Standard Deviation	Range (Min. – Max.)
88	17.6	35.4	2-300

Q-4. If you engaged in boating activities during your visit, what type of boat did you use?

Total # of Respondents	Type of Boat	Frequency	Percent
57	Ski boat	8	14.0
	Fishing boat	35	61.4
	Pontoon boat	0	-
	Sail boat	0	-
	Personal watercraft	5	8.8
	Non-power boats (i.e., canoe, kayak, row boat, raft, etc)	19	33.3

Analytical Note: Multiple responses were accepted. Therefore the sum of the percentages exceeds 100%.

Q-5. If applicable, check the name of the launch facility(s) you used.

Total # of Respondents	Launch Facility	Frequency	Percent
60	French Meadows Boat Ramp	49	81.7
	McGuire Boat Ramp	11	18.3

Table REC 3-6. General Visitor Survey Results – Section A-6 – Reservoir Recreation – French Meadows Reservoir Area (continued).

Q-6. Please rate the following factors at the reservoir identified above.

Factor	Total # of Respondents	Possible Answers	Frequency	Percent
Access to shoreline	92	Acceptable	75	81.5
		Somewhat Acceptable	14	15.2
		Not Acceptable	3	3.3
Parking availability	93	Acceptable	81	87.1
		Somewhat Acceptable	11	11.8
		Not Acceptable	1	1.1
Parking area condition	93	Acceptable	81	87.1
		Somewhat Acceptable	12	12.9
		Not Acceptable	0	-
Condition of boat ramp	79	Acceptable	63	79.7
		Somewhat Acceptable	15	19.0
		Not Acceptable	1	1.3
Boat ramp access	81	Acceptable	70	86.4
		Somewhat Acceptable	9	11.1
		Not Acceptable	2	2.5
Restroom condition	86	Acceptable	68	79.1
		Somewhat Acceptable	13	15.1
		Not Acceptable	5	5.8
Restroom cleanliness	88	Acceptable	68	77.3
		Somewhat Acceptable	16	18.2
		Not Acceptable	4	4.5
Availability of trash disposal	87	Acceptable	69	79.3
		Somewhat Acceptable	12	13.8
		Not Acceptable	6	6.8
Drinking water availability	80	Acceptable	50	62.5
		Somewhat Acceptable	20	25.0
		Not Acceptable	10	12.5
Adequacy of reservoir water depths	85	Acceptable	43	50.6
		Somewhat Acceptable	27	31.8
		Not Acceptable	15	17.6
Presence of debris or obstacles	87	Acceptable	58	66.7
		Somewhat Acceptable	21	24.1
		Not Acceptable	8	9.2
Access to boat-in campgrounds	69	Acceptable	52	75.4
		Somewhat Acceptable	14	20.3
		Not Acceptable	3	4.3

Table REC 3-6. General Visitor Survey Results – Section A-6 – Reservoir Recreation – French Meadows Reservoir Area (continued).

Q-6. (continued)

Factor	Total # of Respondents	Possible Answers	Frequency	Percent
Adequacy of law enforcement personnel	80	Acceptable	52	65.0
		Somewhat Acceptable	22	27.5
		Not Acceptable	6	7.5
Other	1	Acceptable	-	-
		Somewhat Acceptable	-	-
		Not Acceptable	1	100.0

Q-7. Was your recreation experience **negatively** affected by:

Factor	Total # of Respondents	Possible Answers	Frequency	Percent
Crowding	86	Yes	3	3.5
		No	83	96.5
Other activities taking place	81	Yes	5	6.2
		No	76	93.8
Reservoir water surface level	80	Yes	33	41.2
		No	47	58.8

Q-8. How would you rate your overall experience at the reservoir identified above?

Total # of Respondents	Possible Answers	Frequency	Percent
91	Very Satisfied	52	57.1
	Satisfied	32	35.2
	Somewhat Satisfied	7	7.7
	Unsatisfied	0	-
	Very Unsatisfied	0	-

Table REC 3-6. General Visitor Survey Results – Section A-6 – Reservoir Recreation – French Meadows Reservoir Area (continued).

The following table summarizes the primary activities identified by the subset of 50 people who provided valid information to Question 12 of Section A-1 and completed Section A-6 of the survey form.

Section A-1 – Background Information

Q-12. Identify the activities you engaged in, or expect to engage in, during your trip to this area.

Total # of Respondents	Primary Activity	Frequency	Percent
50	Camping in developed site	19	38.0
	Reservoir fishing	12	24.0
	Hiking/walking	3	6.0
	Non-motorized reservoir boating (canoeing, kayaking, row boating)	2	4.0
	Relaxing	2	4.0
	Reservoir swimming/water-play/sun bathing	2	4.0
	Stream swimming/water-play/sun bathing	2	4.0
	Gold panning/dredging	1	2.0
	Sports/games/field activities	1	2.0
	Viewing wildlife, scenery, photography, etc.	1	2.0
	Visiting historic/cultural sites	1	2.0
	Water skiing/wakeboarding	1	2.0
	Whitewater boating (rafting, kayaking, canoeing)	1	2.0
	Other	2	4.0

Table REC 3-7. General Visitor Survey Results – Section A-1 – Background Section – Ralston Afterbay Area.

The Ralston Afterbay area includes the following developed Project recreation facilities and DCUAs identified by the stakeholders:

Day Use Areas

- Indian Bar Rafter Access and General Parking
- Ralston Picnic Area
- Ralston Picnic Area Cartop Boat Ramp

DCUAs

- Ralston Afterbay Sediment Disposal Area;
- Areas along Middle Fork American River, between Ralston Picnic Area and the new gage;
- Area at confluence of North Fork of the Middle Fork American River and Middle Fork American River;
- Indian Bar, Willow Bar, and Junction Bar Areas; and
- Shoreline area surrounding Ralston Afterbay.

Q-1. Did you engage in any of the following activities during your visit?

Total # of Respondents	Activity	Frequency	Percent
58	Day use along a stream/river	41	70.7
	Fishing	19	32.8
	Reservoir recreation	14	24.1
	Day use or camping in undeveloped areas	9	15.5
	Day use at a developed site	2	3.4
	Camping at a developed site	0	-

Analytical Note: Multiple responses were accepted.

Q-2. What type of vehicle did you drive to this area?

Total # of Respondents	Type of Vehicle	Frequency	Percent
58	Car/SUV/Truck	52	89.7
	Camper/RV	2	3.4
	Motorcycle	0	-
	Other	4	6.9

Table REC 3-7. General Visitor Survey Results – Section A-1 – Background Section – Ralston Afterbay Area (continued).

Q-3. How many people were in your vehicle?

Total # of Respondents	Average # of people	Standard Deviation	Range (min.-max.)	Total # of People	Frequency	Percent
56	4.0	3.5	1-20	1	3	5.4
				2	20	35.7
				3	13	23.2
				4 or more	20	35.7

Q-4. How many people in your group are in the following age categories?

Total # of Respondents	Age Category	Percent
57	Under 18	18.3%
	18 or over	81.7%

Q-5. How many and what types of vehicles and trailers did your **group** bring?

Total # of Respondents	Vehicle or Trailer	Frequency ¹	Percent ¹	Average # per group ²
55	Car/pickup/SUV	48	87.3	1.4
	Boat trailer	6	10.9	.0
	Towed/Trailer Vehicle	2	3.6	1.0
	Motor home/RV	1	1.8	4.0
	Motorcycle	1	1.8	-
	OHV	1	1.8	1.0
	Travel trailer	1	1.8	-
	Utility trailer	1	1.8	-
	Horse trailer	0	-	-
	Other	2	3.6	1.0

¹Includes all responses.

²Includes only responses that provided the number of vehicles in their group.

Table REC 3-7. General Visitor Survey Results – Section A-1 – Background Section – Ralston Afterbay Area (continued).**Q-6.** Your place of residence (zip code):

Total # of Respondents	County in California	Frequency	Percent
56	Placer	20	35.7
	Sacramento	14	25.0
	Alameda	4	7.1
	Solano	4	7.1
	Santa Cruz	3	5.4
	San Mateo	2	3.6
	Amador	1	1.8
	Contra Costa	1	1.8
	Del Norte	1	1.8
	El Dorado	1	1.8
	Nevada	1	1.8
	San Francisco	1	1.8
	Stanislaus	1	1.8
	Yolo	1	1.8
	Location outside of California	Frequency	Percent
	Oregon	1	1.8

Analytical Note: Counties were determined using zip codes provided by the respondent.

Q-7. What year were you born?

Total # of Respondents	Average Age (years)	Standard Deviation	Age Range (min.-max.)	Age Categories (years)	Frequency	Percent
55	42.0	12.2	14-66	24 or younger	3	5.5
				25-39	24	43.6
				40-64	27	49.1
				65 or older	1	1.8

Analytical Note: Ages were determined using birth years provided by the survey respondent.

Table REC 3-7. General Visitor Survey Results – Section A-1 – Background Section – Ralston Afterbay Area (continued).

Q-8. Which cultural or ethnic group do you most closely identify with?

Total # of Respondents	Cultural or Ethnic Group	Frequency	Percent
57	White/Caucasian	47	82.5
	Asian	4	7.0
	Hispanic or Latino	2	3.5
	Native Hawaiian or Pacific Islander	2	3.5
	American Indian or Alaskan Native	1	1.8
	Black/African American	1	1.8
	Other/Multi-racial	0	-

Q-9. What is your primary spoken language?

Total # of Respondents	Primary Language	Frequency	Percent
43	English	40	93.0
	Multiple	1	2.3
	Other	2	4.7

Q-10. Identify the reasons why you chose this area to recreate?

Total # of Respondents	Primary Reason	Frequency	Percent
32	Scenic quality of the area	7	21.9
	Access to lake/reservoir	5	15.6
	Access to river/stream	5	15.6
	Close to home	5	15.6
	Lack of crowding	4	12.5
	Recreational activities/opportunities in the area	2	6.2
	Cost of facility access fee	0	-
	Presence of on-site manager/host	0	-
	Other	4	12.5

Analytical Note: Respondents were asked to indicate one primary reason for visiting the area. Twenty six respondents either did not answer the question or provided multiple primary reasons. These responses were considered invalid and omitted from the analysis. Therefore the analysis is based on the 32 respondents who correctly answered the question.

Table REC 3-7. General Visitor Survey Results – Section A-1 – Background Section – Ralston Afterbay Area (continued).

Q-10. Identify the reasons why you chose this area to recreate (continued)?

Total # of Respondents	Secondary Reason	Frequency	Percent
32	Access to river/stream	11	34.4
	Lack of crowding	11	34.4
	Close to home	9	28.1
	Recreational activities/opportunities in the area	9	28.1
	Scenic quality of the area	8	25.0
	Access to lake/reservoir	7	21.9
	Cost of facility access fee	6	18.8
	Presence of on-site manager/host	2	6.2
	Other	1	3.1

Analytical Note: Multiple responses were accepted. Therefore the sum of the percentages exceeds 100%.

Q-11. How important are each of the following facilities or amenities when choosing this area to recreate?

Facility/Amenity	Total # of Respondents	Possible Answers	Frequency	Percent
Developed campsites	48	Very Important	10	20.8
		Important	12	25.0
		Somewhat Important	6	12.5
		Not Important	20	41.7
Developed picnic sites	47	Very Important	10	21.3
		Important	8	17.0
		Somewhat Important	11	23.4
		Not Important	18	38.3
Flush restrooms	47	Very Important	17	36.2
		Important	5	10.6
		Somewhat Important	9	19.1
		Not Important	16	34.0
Drinking water	50	Very Important	17	34.0
		Important	9	18.0
		Somewhat Important	10	20.0
		Not Important	14	28.0

Table REC 3-7. General Visitor Survey Results – Section A-1 – Background Section – Ralston Afterbay Area (continued).

Q-11. How important are each of the following facilities or amenities when choosing this area to recreate (continued)?

Facility/Amenity	Total # of Respondents	Possible Answers	Frequency	Percent
RV dump station	43	Very Important	4	9.3
		Important	4	9.3
		Somewhat Important	6	14.0
		Not Important	29	67.4
Boat launch ramps	47	Very Important	14	29.8
		Important	12	25.5
		Somewhat Important	4	8.5
		Not Important	17	36.2
River put-in/take-out	48	Very Important	15	31.2
		Important	13	27.1
		Somewhat Important	6	12.5
		Not Important	14	29.2
Hiking trails	47	Very Important	15	31.9
		Important	15	31.9
		Somewhat Important	9	19.1
		Not Important	8	17.0
OHV Trails	43	Very Important	9	20.9
		Important	6	14.0
		Somewhat Important	6	14.0
		Not Important	22	51.2
Mountain bike trails	44	Very Important	5	11.4
		Important	3	6.8
		Somewhat Important	11	25.0
		Not Important	25	56.8
Fishing access trails	50	Very Important	25	50.0
		Important	6	12.0
		Somewhat Important	5	10.0
		Not Important	14	28.0
Equestrian trails	45	Very Important	5	11.1
		Important	7	15.6
		Somewhat Important	9	20.0
		Not Important	24	53.3

Table REC 3-7. General Visitor Survey Results – Section A-1 – Background Section – Ralston Afterbay Area (continued).

Q-11. How important are each of the following facilities or amenities when choosing this area to recreate (continued)?

Facility/Amenity	Total # of Respondents	Possible Answers	Frequency	Percent
Interpretive/ educational exhibits/information	46	Very Important	8	17.4
		Important	6	13.0
		Somewhat Important	11	23.9
		Not Important	21	45.7
Other	1	Very Important	1	100.0
		Important	-	-
		Somewhat Important	-	-
		Not Important	-	-

Q-12. Identify the activities you engaged in, or expect to engage in, during your trip to this area.

Total # of Respondents	Primary Activity	Frequency	Percent
31	Stream fishing	7	22.6
	Reservoir fishing	6	19.4
	Non-motorized reservoir boating (canoeing, kayaking, row boating)	4	12.9
	Whitewater boating (rafting, kayaking, canoeing)	3	9.7
	Camping in undeveloped site	2	6.5
	Relaxing	2	6.5
	Reservoir swimming/water-play/sun bathing	2	6.5
	Picnicking in developed sites	1	3.2
	Picnicking in undeveloped sites	1	3.2
	Stream swimming/water-play/sun bathing	1	3.2
	Water skiing, wake boarding	1	3.2
Other	1	3.2	

Analytical Note: Respondents were asked to indicate one primary activity. A total of 27 respondents either did not answer the question or provided multiple primary reasons. These responses were considered invalid and omitted from the analysis. Therefore the analysis is based on the 31 respondents who correctly answered the question.

Table REC 3-7. General Visitor Survey Results – Section A-1 – Background Section – Ralston Afterbay Area (continued).

Q-12. Identify the activities you engaged in, or expect to engage in, during your trip to this area (continued).

Total # of Respondents	Secondary Activity	Frequency	Percent
31	Stream swimming/water-play/sun bathing	10	32.3
	Reservoir swimming/water-play/sun bathing	9	29.0
	Relaxing	8	25.8
	Reservoir fishing	8	25.8
	Viewing wildlife, scenery photography, etc.	8	25.8
	Picnicking in developed sites	7	22.6
	Hiking/walking	5	16.1
	Stream fishing	5	16.1
	Camping in undeveloped site	4	12.9
	Picnicking in undeveloped sites	4	12.9
	Driving for pleasure on roads	3	9.7
	Hunting	2	6.5
	Rock hounding	2	6.5
	Camping in developed site	1	3.2
	Gold panning/dredging	1	3.2
	Non-motorized reservoir boating (canoeing, kayaking, row boating)	1	3.2
	OHV travel/use	1	3.2
	Sailing	1	3.2
Whitewater boating (rafting, kayaking, canoeing)	1	3.2	

Analytical Note: Multiple responses were accepted. Therefore the sum of the percentages exceeds 100%.

Table REC 3-7. General Visitor Survey Results – Section A-1 – Background Section – Ralston Afterbay Area (continued).

Q-13. Please rate the availability and adequacy of the following information resources.

Information Resources	Total # of Respondents	Possible Answers	Frequency	Percent
Interpretive/educational information	45	Acceptable	15	33.3
		Somewhat Acceptable	13	28.9
		Not Acceptable	2	4.4
		Not Applicable	15	33.3
Recreation visitor information	49	Acceptable	19	38.8
		Somewhat Acceptable	11	22.4
		Not Acceptable	4	8.2
		Not Applicable	15	30.6
Safety/warning information	46	Acceptable	28	60.9
		Somewhat Acceptable	6	13.0
		Not Acceptable	5	10.9
		Not Applicable	7	15.2
Reservoir water surface elevation information	46	Acceptable	16	34.8
		Somewhat Acceptable	12	26.1
		Not Acceptable	5	10.9
		Not Applicable	13	28.3
River/stream flow information	46	Acceptable	17	37.0
		Somewhat Acceptable	14	30.4
		Not Acceptable	5	10.9
		Not Applicable	10	21.7
Other	0	Acceptable	-	-
		Somewhat Acceptable	-	-
		Not Acceptable	-	-
		Not Applicable	-	-

Q-14. How would you rate your overall recreation experience?

Total # of Respondents	Possible Answers	Frequency	Percent
57	Very Satisfied	29	50.9
	Satisfied	23	40.4
	Somewhat Satisfied	5	8.8
	Unsatisfied	0	-
	Very Unsatisfied	0	-

Table REC 3-7. General Visitor Survey Results – Section A-1 – Background Section – Ralston Afterbay Area (continued).

Q-15. Are there additional recreation facilities, amenities, or opportunities that would improve your recreation experience?

Total # of Respondents	Possible Answers	Frequency	Percent
41	Yes	11	26.8
	No	30	73.2

Of the 11 people who said “yes”, nine provided comments which are summarized below by category. One respondent provided a comment that described multiple categories; therefore the total number of comments exceeds the total number of respondents.

Facility/Amenity	# of Comments	Percent of Total
Restrooms	2	20.0
Unsatisfactory Fishing	2	20.0
Camping	1	10.0
Drinking Water	1	10.0
Environmental	1	10.0
More Trails/Better Access	1	10.0
Picnic Tables	1	10.0
Too Crowded/Disruptive People	1	10.0
TOTAL	10	100.0

Table REC 3-8. General Visitor Survey Results – Reservoir Angler Survey Results – Ralston Afterbay.

Q-1. A total of 968 people participated in the General Visitor Survey. Of these, 213 people completed all or a portion of Section A-7 - Fishing. Six respondents indicated they fished at Ralston Afterbay. Their responses are tabulated below.

Q-2. Primary fishing location.

-Refer to Table REC 2-34. General Visitor Survey Results – Form A – Section A-7 – Fishing.

Q-3. If river/stream fishing, what reach of river/stream was your primary fishing location?

-Refer to Table REC 2-34. General Visitor Survey Results – Form A – Section A-7 – Fishing.

Q-4. How many total hours have you spent fishing during your visit at your primary fishing location?

Total # of Respondents	Number of Hours	Frequency	Percent	Mean	Standard Deviation
5	1	1	20.0	7.4	5.1
	6	2	40.0		
	9	1	20.0		
	15	1	20.0		

Analytical Note. One of the six respondents did not provide a valid response to this question. Therefore the total number of respondents = five.

Q-5. From where did you fish?

Total # of Respondents	Location	Frequency	Percent
6	From a boat	2	33.3
	From the shoreline	4	66.7

Table REC 3-8. General Visitor Survey Results – Reservoir Angler Survey Results – Ralston Afterbay (continued).

Q-6. What gear type(s) did you use today?

If fishing from a boat:

Total # of Respondents	Gear	Frequency	Percent
2	Troll lures	2	100.0
	Troll bait	0	0
	Cast lures	2	100.0
	Cast bait	2	100.0
	Fly fish	0	0

Analytical Note. Multiple responses were accepted.

If fishing from the shore:

Total # of Respondents	Gear	Frequency	Percent
4	Cast lures	1	25.0
	Cast bait	4	100.0
	Fly fish	1	25.0

Analytical Note. Multiple responses were accepted.

Table REC 3-8. General Visitor Survey Results – Reservoir Angler Survey Results – Ralston Afterbay (continued).

Q-7. Please indicate the number and type of fish you caught and the number and type of fish released.

Total # of Respondents	Type of Fish	Number of Fish Caught		Total Number of Fish Caught	Percent
		Kept	Released		
5	Rainbow Trout	5	6	11	91.7
	Lake Trout	0	0	0	0
	Brown Trout	0	1	1	8.3
	Kokanee	0	0	0	0
	Other	0	0	0	0
	Not Sure	0	0	0	0

Analytical Note. One of the six respondents did not provide a valid response to this question. Therefore the total number of respondents = five.

Catch per unit effort based on responses to Q-4 and Q-7.

Total # of Respondents	Mean Number of Fish Caught per Hour	Standard Deviation
4	0.6	0.5

Analytical Note. Only four of the respondents provided sufficient information to determine catch per unit effort. Specifically, four respondents provided valid responses for both number of hours fished and number of hours caught.

Table REC 3-8. General Visitor Survey Results – Reservoir Angler Survey Results – Ralston Afterbay (continued).

Q-8. Please rate your satisfaction with the following factors regarding your fishing experience at the primary fishing location identified above.

Factor	Total # of Respondents	Possible Answers	Frequency	Percent
Number of fish caught	4	Acceptable	3	75.0
		Somewhat Acceptable	1	25.0
		Not Acceptable	0	0
Variety of fishing locations	4	Acceptable	3	75.0
		Somewhat Acceptable	1	25.0
		Not Acceptable	0	0
Variety of fish species	5	Acceptable	4	80.0
		Somewhat Acceptable	1	20.0
		Not Acceptable	0	0
Size of fish	5	Acceptable	3	60.0
		Somewhat Acceptable	1	20.0
		Not Acceptable	1	20.0
Road access to fishing areas	5	Acceptable	4	80.0
		Somewhat Acceptable	1	20.0
		Not Acceptable	0	0
Trail access to fishing areas	5	Acceptable	4	80.0
		Somewhat Acceptable	1	20.0
		Not Acceptable	0	0

Q-9. How would you rate your overall fishing experience at the primary fishing location identified above?

Total # of Respondents	Possible Answers	Frequency	Percent
6	Very Satisfied	3	50.0
	Satisfied	2	33.0
	Somewhat Satisfied	1	16.7
	Unsatisfied	0	0
	Very Unsatisfied	0	0

Table REC 3-9. General Visitor Survey Results – Section A-6 – Reservoir Recreation – Ralston Afterbay Area.

Q-1. Fourteen people intercepted in the Ralston Afterbay Area identified reservoir recreation as their primary recreation activity. Of these, eleven people completed Section A-6 of the survey form.

Q-2. Name of primary reservoir used.

Reservoir	Frequency	Percent
Ralston Afterbay	11	6.1

Analytical Note: Percent is derived from the total number of people surveyed in the project area that identified reservoir recreation as a primary activity and filled out Section A-6.

Q-3. How many hours did you, or will you, spend at the reservoir?

Total # of Respondents	Average # of Hours	Standard Deviation	Range (Min. – Max.)
10	10.4	11.0	1-30

Q-4. If you engaged in boating activities during your visit, what type of boat did you use?

Total # of Respondents	Type of Boat	Frequency	Percent
6	Ski boat	0	-
	Fishing boat	0	-
	Pontoon boat	0	-
	Sail boat	0	-
	Personal watercraft	0	-
	Non-power boats (i.e., canoe, kayak, row boat, raft, etc)	6	100.0

Q-5. If applicable, check the name of the launch facility(s) you used.

Total # of Respondents	Launch Facility	Frequency	Percent
6	Ralston Cartop Boat Ramp	6	100.0

Table REC 3-9. General Visitor Survey Results – Section A-6 – Reservoir Recreation – Ralston Afterbay Area (continued).

Q-6. Please rate the following factors at the reservoir identified above.

Factor	Total # of Respondents	Possible Answers	Frequency	Percent
Access to shoreline	9	Acceptable	6	66.7
		Somewhat Acceptable	3	33.3
		Not Acceptable	0	-
Parking availability	9	Acceptable	8	88.9
		Somewhat Acceptable	1	11.1
		Not Acceptable	0	-
Parking area condition	9	Acceptable	8	88.9
		Somewhat Acceptable	1	11.1
		Not Acceptable	0	-
Condition of boat ramp	8	Acceptable	7	87.5
		Somewhat Acceptable	1	12.5
		Not Acceptable	0	-
Boat ramp access	8	Acceptable	8	100.0
		Somewhat Acceptable	0	-
		Not Acceptable	0	-
Restroom condition	9	Acceptable	4	44.4
		Somewhat Acceptable	3	33.3
		Not Acceptable	2	22.2
Restroom cleanliness	9	Acceptable	4	44.4
		Somewhat Acceptable	3	33.3
		Not Acceptable	2	22.2
Availability of trash disposal	9	Acceptable	4	44.4
		Somewhat Acceptable	2	22.2
		Not Acceptable	3	33.3
Drinking water availability	9	Acceptable	3	33.3
		Somewhat Acceptable	0	-
		Not Acceptable	6	66.7
Adequacy of reservoir water depths	9	Acceptable	4	44.4
		Somewhat Acceptable	4	44.4
		Not Acceptable	1	11.1
Presence of debris or obstacles	9	Acceptable	7	77.8
		Somewhat Acceptable	2	22.2
		Not Acceptable	0	-
Access to boat-in campgrounds	7	Acceptable	2	28.6
		Somewhat Acceptable	2	28.6
		Not Acceptable	3	42.9
Adequacy of law enforcement personnel	8	Acceptable	3	37.5
		Somewhat Acceptable	3	37.5
		Not Acceptable	2	25.0

Table REC 3-9. General Visitor Survey Results – Section A-6 – Reservoir Recreation – Ralston Afterbay Area (continued).

Q-7. Was your recreation experience **negatively** affected by:

Factor	Total # of Respondents	Possible Answers	Frequency	Percent
Crowding	10	Yes	0	-
		No	10	100.0
Other activities taking place	9	Yes	2	22.2
		No	7	77.8
Reservoir water surface level	9	Yes	1	11.1
		No	8	88.9

Q-9. How would you rate your overall experience at the reservoir identified above?

Total # of Respondents	Possible Answers	Frequency	Percent
10	Very Satisfied	7	70.0
	Satisfied	3	30.0
	Somewhat Satisfied	0	-
	Unsatisfied	0	-
	Very Unsatisfied	0	-

Section A-1 – Background Information

The following table summarizes the primary activities identified by the subset of 6 people who provided valid information to Question 12 of Section A-1 and completed Section A-6 of the survey form.

Q-12. Identify the activities you engaged in, or expect to engage in, during your trip to this area.

Total # of Respondents	Primary Activity	Frequency	Percent
6	Non-motorized reservoir boating (canoeing, kayaking, row boating)	3	50.0
	Camping in undeveloped site	2	33.3
	Reservoir swimming/water-play/sun bathing	1	16.7

Table REC 3-10. Minimum Pool and Minimum Instream Flow Requirements.

Facility	License Requirement		
Minimum Pool Requirements			
French Meadows Reservoir	<u>Forecast / Folsom Reservoir</u> ¹ > 2,000,000 ac-ft 1,200,000 – 2,000,000 ac-ft < 1,200,000 ac-ft The spillway gates (tainter gates) must remain open from Nov. 15 to April 1 of each year.	Minimum Pool (ac-ft) <u>June-Sept</u> <u>Oct-May</u> 60,000 50,000 60,000 25,000 28,000 8,700	
		Hell Hole Reservoir	<u>Forecast / Folsom Reservoir</u> ¹ > 2,000,000 ac-ft 1,200,000 – 2,000,000 ac-ft < 1,200,000 ac-ft Minimum Pool (ac-ft) <u>June-Sept</u> <u>Oct-May</u> 70,000 50,000 70,000 25,000 26,000 5,500
		Duncan Creek Diversion Pool	Maintain water surface elevation at 5,259 feet elevation.
		Minimum Stream Maintenance Flow	
Duncan Creek Diversion Dam	<u>Forecast / Folsom Reservoir</u> ¹ > 1,000,000 ac-ft < 1,000,000 ac-ft	<u>Release (cfs)</u> lesser of 8 or natural flow lesser of 4 or natural flow	
French Meadows Dam	Beginning of operations to March 17, 1981:		
	<u>Forecast / Folsom Reservoir</u> ¹ > 1,000,000 ac-ft	<u>Release (cfs)</u> 8 at all times Except that total releases shall not exceed 5,800 ac-ft	
	< 1,000,000 ac-ft	4 at all times Except that total releases shall not exceed 2,900 ac-ft	
March 18, 1981, and thereafter – no limitation of total release.			
Hell Hole Dam	Beginning of operations to March 17, 1981:		
	<u>Forecast / Folsom Reservoir</u> ¹ > 1,000,000 ac-ft	<u>Release (cfs)</u> 20 June 1 – July 25 15 July 26 – Aug 5 10 Aug 6 – Oct 31 14 Nov 1 – Jan 31 20 Feb 1 – May 31 Except that total releases shall not exceed 11,000 ac-ft.	
	< 1,000,000 ac-ft	8 June 1 – Dec 1 6 Jan 1 – March 25 8 March 26 – May 31 Except that total releases shall not exceed 5,500 ac-ft.	
	March 18, 1981, and thereafter:		
<u>Forecast / Folsom Reservoir</u> ¹ > 1,000,000 ac-ft	<u>Release (cfs)</u> 20 May 15 – Dec 14 10 Dec 15 – May 14 No limitation of total release.		
< 1,000,000 ac-ft	10 June 1 – Oct 14 6 Oct 15 – May 31 No limitation of total release.		

Table REC 3-10. Minimum Pool and Minimum Instream Flow Requirements (continued).

Facility	License Requirement	
Minimum Stream Maintenance Flow (continued)		
South Fork Long Canyon Diversion Dam	Forecast / Folsom Reservoir ¹ > 1,000,000 ac-ft < 1,000,000 ac-ft	Release (cfs) lesser of 5 or natural flow lesser of 2.5 or natural flow
North Fork Long Canyon Diversion Dam	Releases to maintain streamflow of 2 cfs or the natural flow, whichever is less, shall be made at all times.	
Middle Fork Interbay	Forecast / Folsom Reservoir > 1,000,000 ac-ft < 1,000,000 ac-ft	Release (cfs) lesser of 23 or natural flow lesser of 12 or natural flow
Oxbow Powerhouse	Releases at Oxbow Powerhouse shall be 75 cfs at all times as measured downstream of the confluence with the North Fork of the Middle Fork. Such releases shall not cause vertical fluctuations (measured in representative section) greater than 3 feet per hour.	

¹Forecast/Folsom Reservoir = CDWR current year forecast of unimpeded run-off of the American River to Folsom Reservoir.

Table REC 3-11. Summary of Water Rights Permits.

Permit/ License No.	Type of Use	Source	Direct Diversion		Off-Stream Storage	
13855	Power/ Incidental Recreation	Duncan Creek to French Meadows Reservoir	150 cfs	Jan 1 - Dec 31	25,000 ac-ft 400 cfs max	Nov 1 - Jul 1
		Middle Fork American at French Meadows Reservoir	290 cfs	Jan 1 - Dec 31	95,000 ac-ft	Nov 1 - Jul 1
		Rubicon River at Hell Hole Reservoir	657 cfs	Jan 1 - Dec 31	129,000 ac-ft	Nov 1 - Jul 1
		South Fork Long Canyon to Hell Hole Reservoir or Middle Fork Power Plant	400 cfs	Jan 1 - Dec 31		
		North Fork Long Canyon to Hell Hole Reservoir or Middle Fork Power Plant	100 cfs	Jan 1 - Dec 31		
		Middle Fork American River at Middle Fork Interbay	1,000 cfs	Jan 1 - Dec 31		
		Middle Fork Am. River at Ralston Afterbay	1,225 cfs	Jan 1 - Dec 31		
13856	Irrigation, and Incidental Domestic, Recreational, Municipal and Industrial	Duncan Creek to French Meadows Reservoir			25,000 ac-ft 400 cfs max	Nov 1 - Jul 1
		Middle Fork American River to French Meadows Reservoir			95,000 ac-ft	Nov 1 - Jul 1
		Rubicon River to Hell Hole Reservoir	657 cfs	Jan 1 - Dec 31	129,000 ac-ft	Nov 1 - Jul 1
13857	Power/ Incidental Recreation	Duncan Creek	50 cfs	Jan 1 - Dec 31		
		Middle Fork American River to French Meadows Reservoir	110 cfs	Jan 1 - Dec 31	10,000 ac-ft	Nov 1 - Jul 1
		Rubicon River at Hell Hole Reservoir	155 cfs	Jan 1 - Dec 31	36,000 ac-ft	Nov 1 - Jul 1
		South Fork Long Canyon to Hell Hole Reservoir			13,000 ac-ft 830 cfs max	Nov 1 - Jul 1
		North Fork Long Canyon to Hell Hole Reservoir			7,000 ac-ft 830 cfs max	Nov 1 - Jul 1
		Middle Fork American River to Ralston Afterbay	705 cfs	Jan 1 - Dec 31		
13858	Irrigation, and Incidental Domestic, Recreational, Municipal and Industrial	North Fork American River	800 cfs	Nov 1 - Jul 1		
		Middle Fork American River to French Meadows Dam			10,000 ac-ft	Nov 1 - Jul 1
		Rubicon River at Hell Hole Reservoir			36,000 ac-ft	Nov 1 - Jul 1
		South Fork Long Canyon to Hell Hole Reservoir			13,000 ac-ft 830 cfs max	Nov 1 - Jul 1
		North Fork Long Canyon to Hell Hole Reservoir			7,000 ac-ft 830 cfs max	Nov 1 - Jul 1

Table REC 3-11. Summary of Water Rights Permits (continued).

Permit/ License No.	Type of Use	Source	Direct Diversion		Off-Stream Storage	
13855- 13858	Power/ Incidental Recreation Irrigation, and Incidental Domestic, Recreational, Municipal and Industrial	To French Meadows Reservoir			Maximum 133,700 ac-ft	
		To Hell Hole Reservoir			Maximum 208,400 ac-ft	
207541/ 126442	Power/ Incidental Recreation	Hell Hole Reservoir	40 cfs ²	All Year		
		Hell Hole Reservoir	40 cfs ²	All Year		
		Hell Hole Reservoir	Maximum 17,640 ac-ft/yr.			

¹Also known as Permit 20750.

²Permit 20754 and License 12644 are additive.

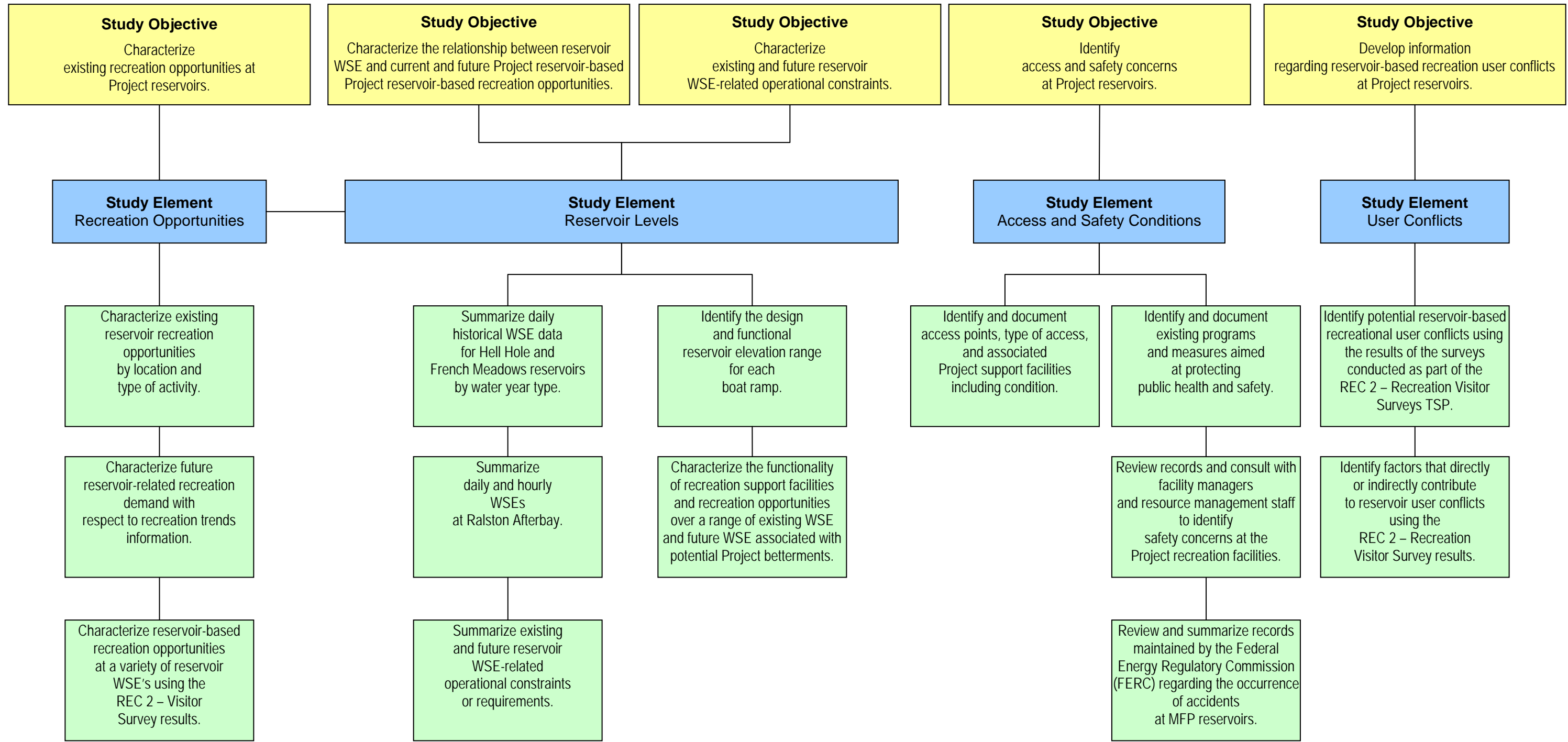
Source:

(a) State of California Water Rights Board (SWRCB). Decision D-1104. Decision Approving Applications in the Matter of Application 18084, 18085, 18086, and 18087. November 21, 1962.

SWRCB. Permit Number 20754 issued 8-18-1994.

FIGURES

Figure REC 3-1. REC 3 – Reservoir Recreation Opportunities Study Objectives and Related Study Elements.



All of these study elements were completed in 2008 and are documented in the REC 3 – Reservoir Opportunities Technical Study Report.

Figure REC 3-2. WSEs at Hell Hole Reservoir During 2008 Survey Period.

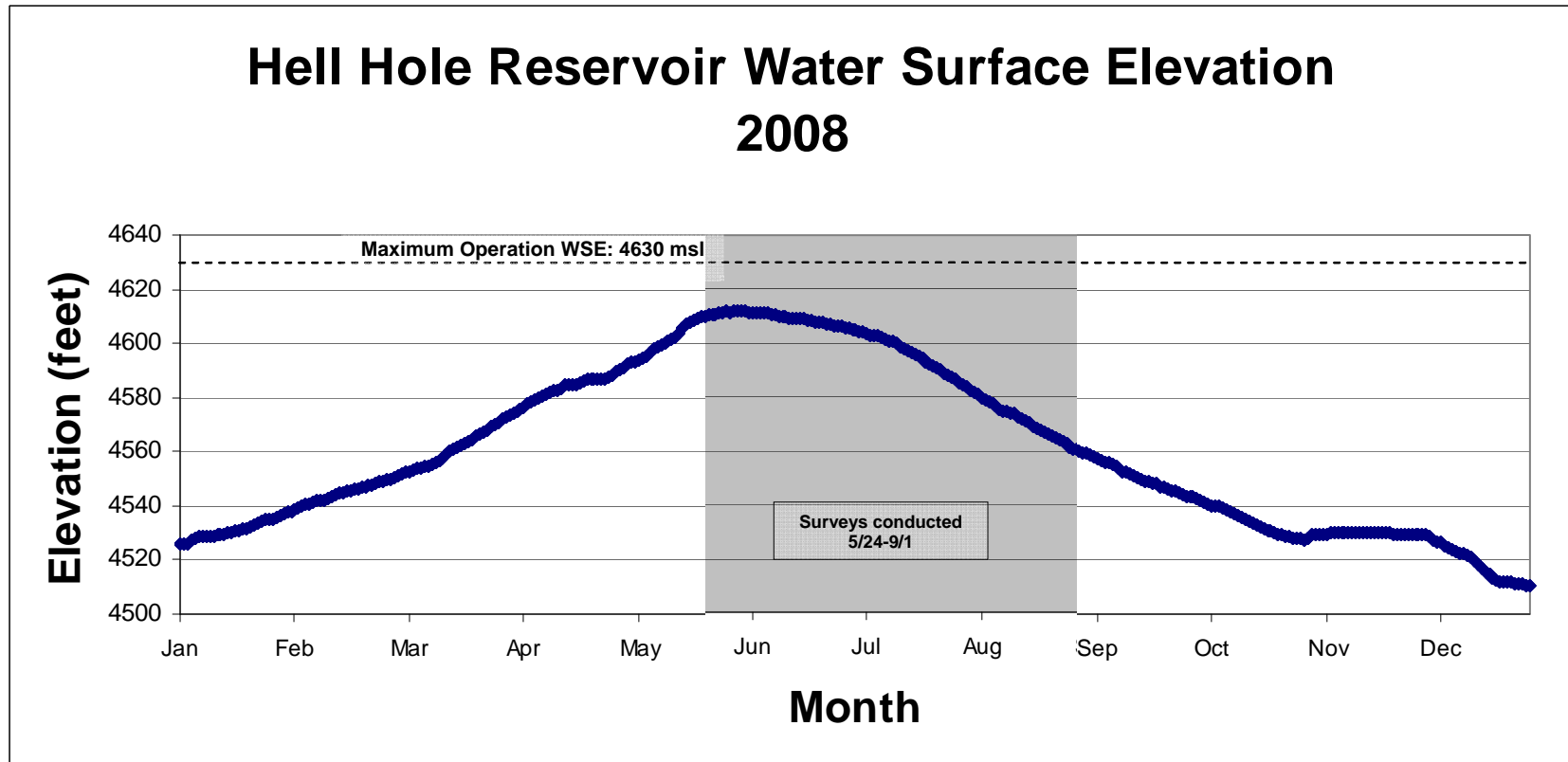


Figure REC 3-3. WSEs in at French Meadows Reservoir during 2008 Survey Period.

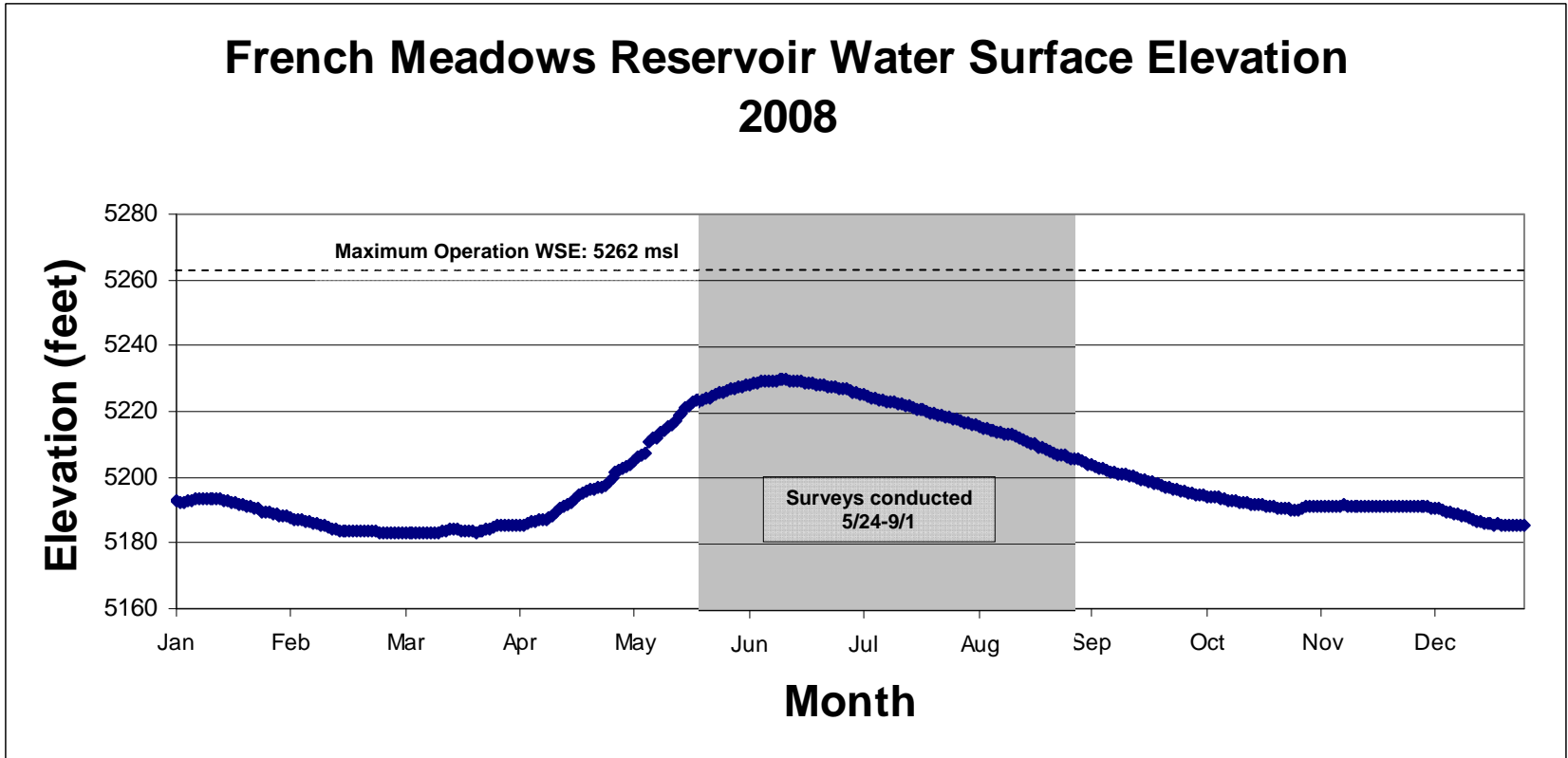


Figure REC 3-4. Recreation Experience Responses Relative to WSE at French Meadows Reservoir.

Question 7.

Was your recreation experience negatively affected by reservoir water surface level?

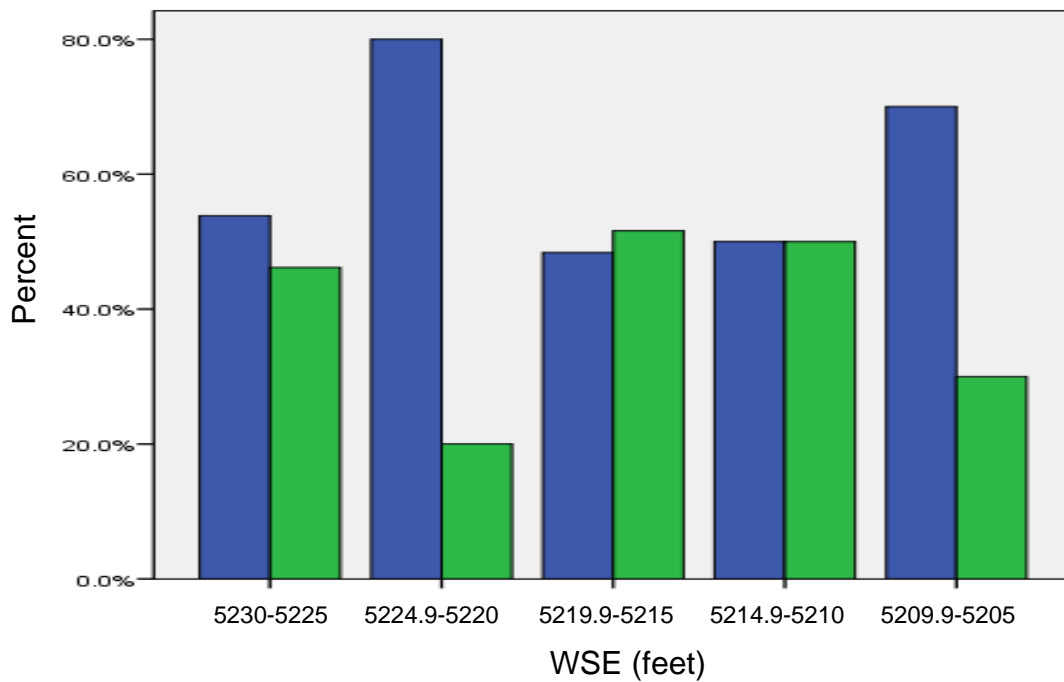
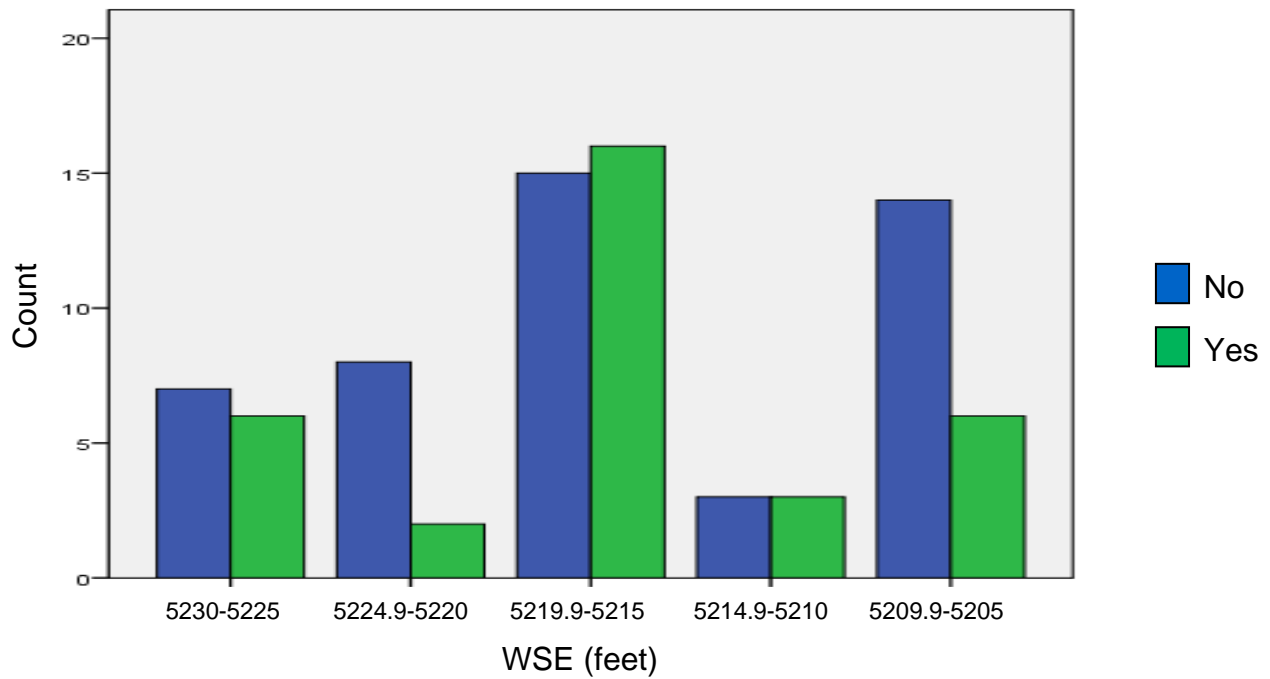
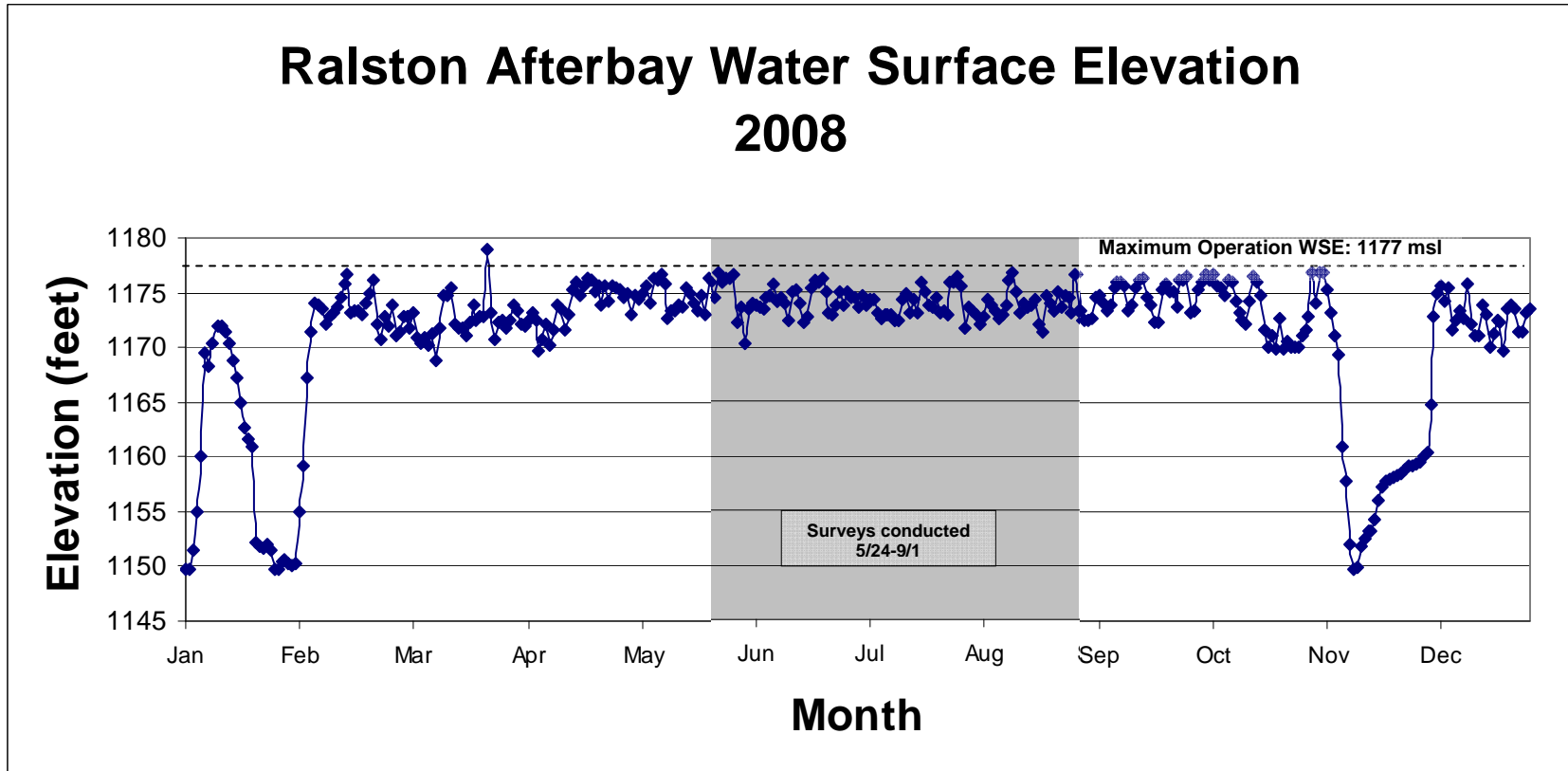


Figure REC 3-5. WSEs at Ralston Afterbay during 2008 Survey Period.



MAPS

APPENDIX A

**Historical Water Surface Elevations at Hell Hole Reservoir
(WYs 1975 – 2007)**

Figure A-1. Box and Whisker Plot showing Median, Quartile, Minimum, and Maximum WSEs by Month (WYs 1975–2007).

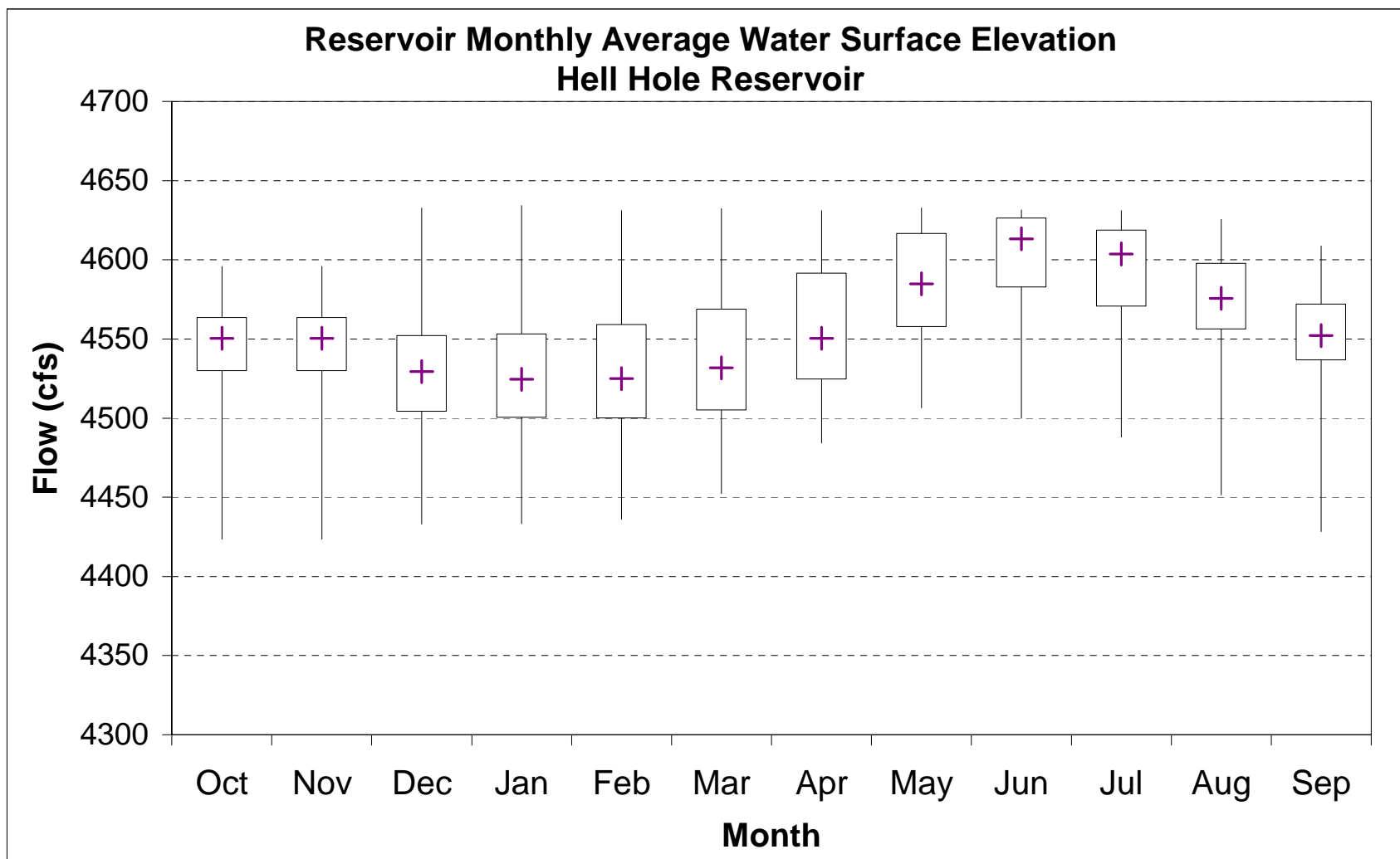


Figure A-2. Monthly Average WSE at Hell Hole Reservoir for all Water Year Types (WYs 1975–2007).

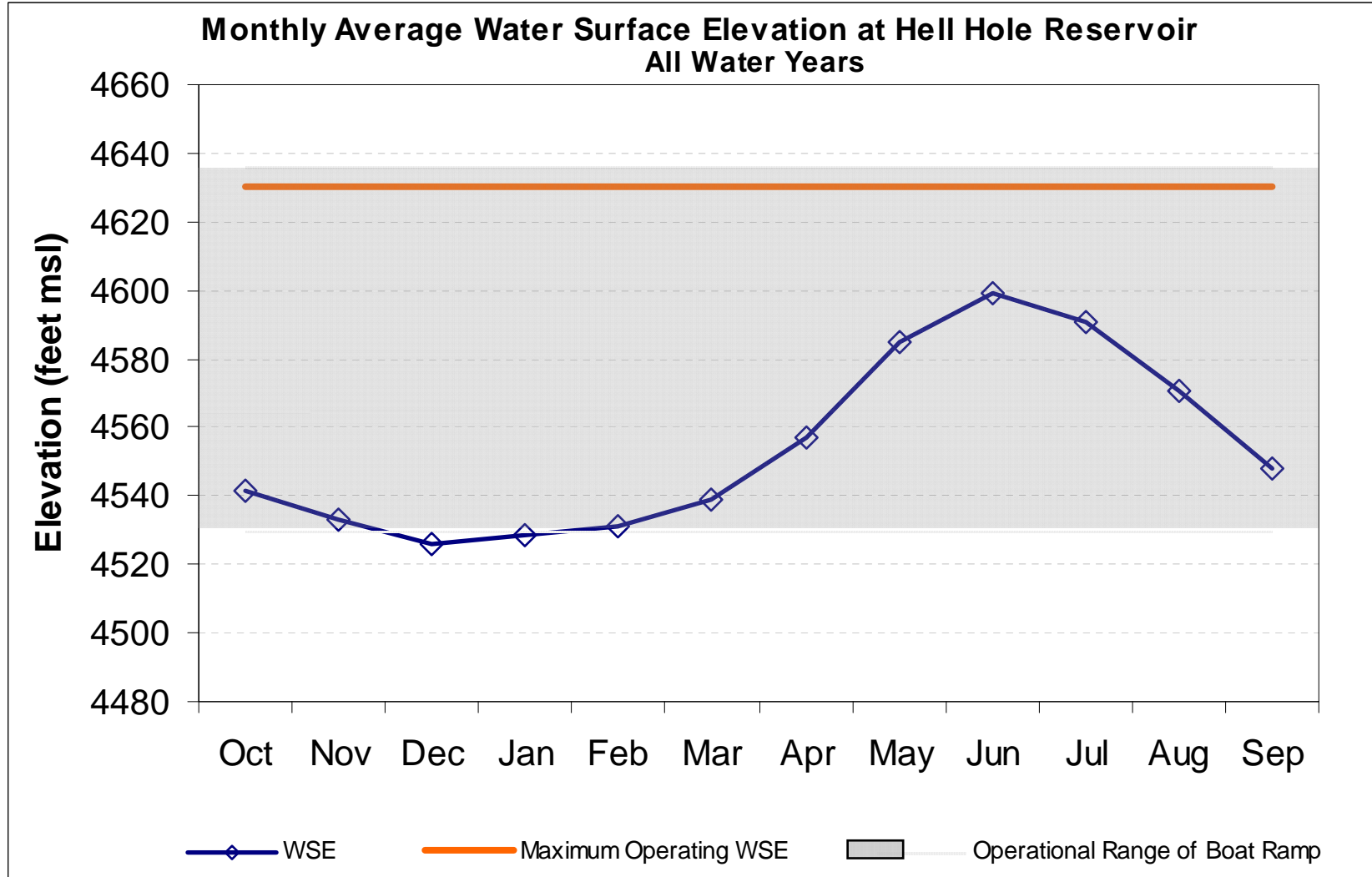
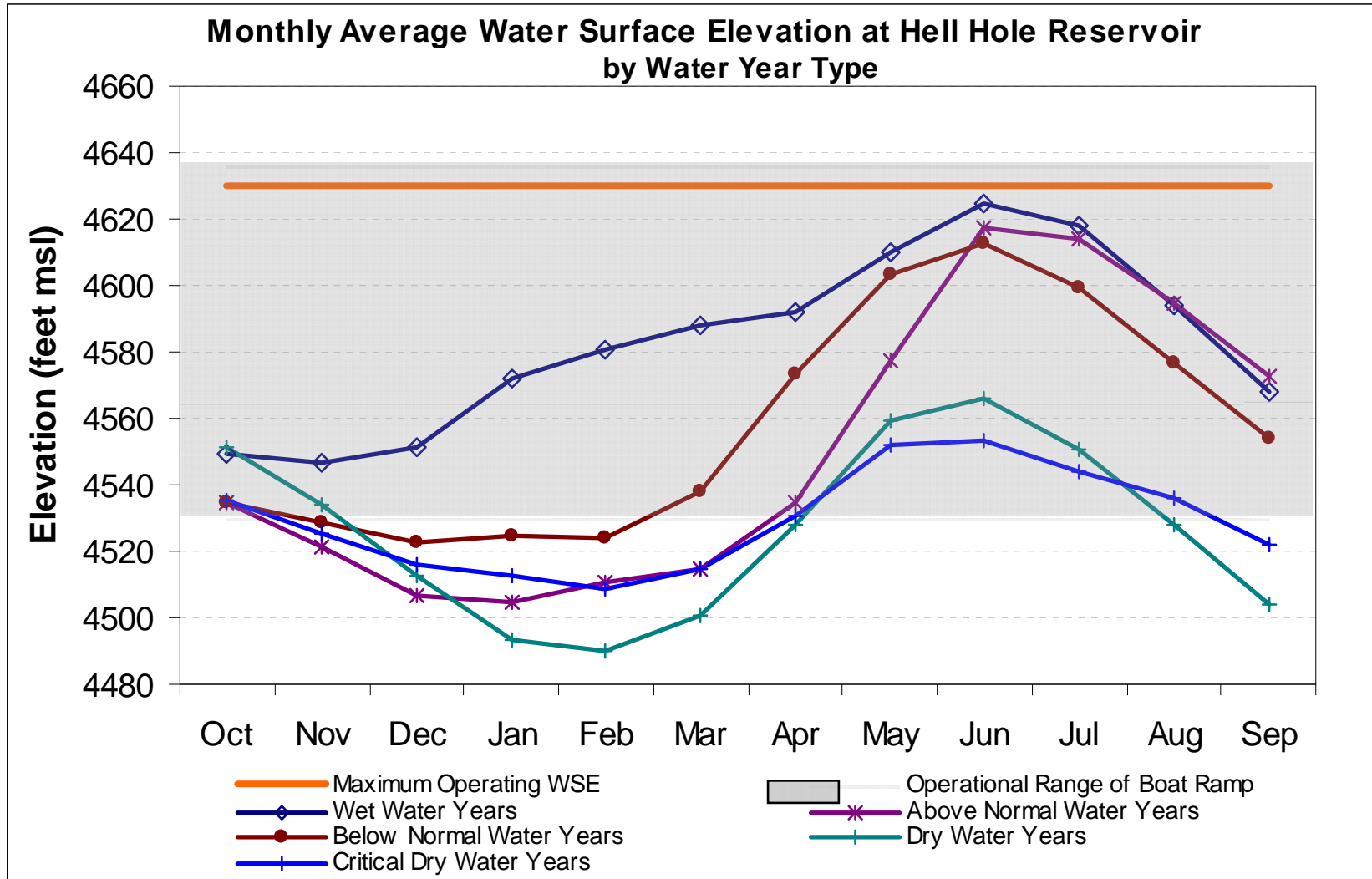


Figure A-3. Monthly Average WSE at Hell Hole Reservoir by Water Year Type.



APPENDIX B

Photographs of Hell Hole Boat Ramp at Various WSEs



Photo B-1. Top of Hell Hole Boat Ramp as viewed from near Hell Hole Boat Ramp Parking Area. Reservoir is almost at maximum operating WSE of 4,630 feet. Note transition from top of concrete ramp to asphalt pavement (date of photo unknown, WSE ~ 4,628).



Photo B-2. Hell Hole Boat Ramp with dam and spillway in background. (July 20, 2004, WSE = 4,596).



**Photo B-3. View of Hell Hole Boat Ramp as viewed from Ramp
(August 4 2008, WSE = 4,581 ft)**



**Photo B-4. Hell Hole Boat Ramp as viewed from Hell Hole Boat Ramp Parking Area
(August 20, 2008, WSE = 4,568 ft)**



Photo B-5. View of Hell Hole Boat Ramp as viewed from edge of Hell Hole Boat Ramp Parking Area (October 5, 2009, WSE = 4,547 ft)



Photo B-6. Bottom End of Boat Ramp (October 13, 2008, WSE = 4,536 ft)

APPENDIX C

Photographs of the Upper Hell Hole Campground Area



Photo C-1. View of the entrance to the Narrows looking east (August 4, 2008 – WSE = 4,581 ft)



Photo C-2. View of Hell Hole Reservoir looking north from Upper Hell Hole Campground, Campsite 1 (August 4, 2008 – WSE = 4,581 ft)



Photo C-3. View of Hell Hole Reservoir looking northwest from Upper Hell Hole Campground, Campsite 2 (August 4, 2008 – WSE = 4,581 ft)

APPENDIX D

Public Safety Signs Associated with the MFP

Appendix D. Public Safety Signs Associated with the MFP (Source: LAND 3 - Emergency Action and Public Safety TSR).

Location ¹	Type of Sign ²	Quantity	Materials ³	Dimensions	Condition ⁴	Wording/ Graphics	Remarks	Accessibility Notes	Photo #	
Hell Hole Reservoir Area										
Hell Hole Dam and Powerhouse Road	Gate leading to road	Warning	1	Painted regular plywood sign mounted on steel chain link fence	18" x 36"	Fair	DANGER SLIDE AREA AHEAD DO NOT ENTER	Red lettering on yellow background. Bullet holes present.	Accessible by foot or vehicle- clear and visible, gravel ground	1
	Gate leading to road	Regulatory	1	Painted aluminum sign mounted on steel chain link fence	18" x 20"	Poor	UNAUTHORIZED VEHICLES WILL BE TOWED AWAY AT OWNERS EXPENSE	Black lettering on white background. Bullet holes present.	Accessible by foot or vehicle- clear and visible, gravel ground	2
	Gate leading to road	Regulatory	1	Painted aluminum sign mounted on steel chain link fence	18" x 12"	Poor	NO PARKING ANY TIME	Red lettering on white background. Bullet holes present.	Accessible by foot or vehicle- clear and visible, gravel ground	3
	Gate leading to road	Hazard	1	Painted aluminum sign mounted on steel chain link fence	12" x 36"	Poor	Red and white stripes (no wording)	Bullet holes present, faded in color	Accessible by foot or vehicle- clear and visible, gravel ground	
	Right side of gate leading to road	Trail Identification	1	Painted and engraved wooden post	81" x 3.5"	Good	HELL HOLE TRAIL 14E022	White lettering on brown background, vertical lettering	Accessible by foot or vehicle- clear and visible, gravel ground	
Hell Hole Powerhouse to Rubicon River Gage and Weir below Hell Hole Dam Communication Line/Powerline	Top of powerline poles along road to Hell Hole Powerhouse	Caution	2	Plastic signs mounted on top of wooden powerline poles	4" x 20" (Est.)	Fair	HIGH VOLTAGE	Clear cut-out lettering on yellow background	Hard to read, top of pole	
	On steel bar across powerline poles outside of Hell Hole Powerhouse	Caution	1	Plastic sign mounted on horizontal steel pole connecting powerline poles	4" x 20" (Est.)	Good	HIGH VOLTAGE	Clear cut-out lettering on yellow background	At top of pole, hard to read and unnoticeable	
Hell Hole Powerhouse	On building wall above front entrance	Warning	1	Sticker sign mounted on cement wall of building	7" x 10"	Good	DANGER HIGH VOLTAGE INSIDE UNAUTHORIZED PERSONS KEEP OUT PLACER COUNTY WATER AGENCY POWER SYSTEMS DIVISION	White lettering on red and black background, black lettering on white background	Hard to get to, easy to read, gravel underfoot	4
	On gate leading into tunnel at back of Hell Hole Powerhouse	Warning	1	Painted aluminum sign mounted on steel gate	7" x 10"	Good	DANGER FOLLOW CONFINED SPACE ENTRY PROCEDURE BEFORE ENTERING	White lettering on red and black background, black lettering on white background	Not very visible, only clear if heading into tunnel	5
Hell Hole - Middle Fork Tunnel Gatehouse and Intake	On sliding door front of Hell Hole - Middle Fork Tunnel Gatehouse	Regulatory	1	Painted aluminum sign mounted on aluminum door	7" x 10"	Poor	NO TRESPASSING	Brown lettering on black background. Faded and damaged, needs replacement.	Gravel underfoot, barely readable, no public vehicle access	
Hell Hole - Middle Fork Tunnel Gatehouse Road	Front of gate to Gatehouse Road	Regulatory	1	Painted aluminum sign mounted on metal gate	18" x 12"	Good	AUTHORIZED VEHICLES ONLY	Black lettering on white background	Very clear, good visibility, seen from road	6
Operator Cottages and Shop	Gate in front of driveway to Operator Cottages	Hazard	1	Painted aluminum sign mounted on metal gate	8" x 48"	Good	Red and white stripes (no wording)		Clear and visible along road	
	Gate in front of driveway to Operator Cottages	Road Identification	1	Painted aluminum sign mounted on metal gate	8" x 48"	Good	20775 SODA SPRINGS RIVERTON ROAD	Black lettering on white background	Clear and visible along road	7
Hell Hole Dam General Parking Area Barrier Fence	Next to fence by trail leading to Hell Hole Boat Ramp	Directional	1	Painted and engraved redwood board mounted on wooden post	21" x 35"	Good	TRAIL TO BOAT LAUNCHING RAMP USE HANDRAILS --> EL DORADO National Forest	White lettering on brown background	Clear, visible, paved underfoot	8
Dormitory Facility	Left side of driveway to Dormitory Facility	Part 8	1	Painted aluminum sign mounted on steel post	26" x 38"	Good	PLACER COUNTY WATER AGENCY MIDDLE FORK AMERICAN RIVER DEVELOPMENT A WATER CONSERVATION AND HYDRO ELECTRIC PROJECT COMPLETED 1967 DORMITORY	Black lettering on white background	Good visibility, easy to read, gravel underfoot	
	Front gate of fence surrounding Dormitory Facility	Regulatory	1	Painted aluminum sign mounted on steel chain link fence	12" x 18"	Good	NO TRESPASSING	Black lettering on white background	Good visibility, easy to read, gravel underfoot	
Hell Hole Staging Areas	Perimeter fence by helipad	Regulatory	3	Painted aluminum sign mounted on steel chain link fence	8" x 11"	2-Poor 1-Fair	CLOSED AREA... UNITED STATES FOREST SERVICE PLACER COUNTY WATER AGENCY	Black lettering on yellow background	Very small print, hard to read, gravel underfoot	
French Meadows Powerhouse Road	Right side of beginning of French Meadows Powerhouse Road	Part 8	1	Painted aluminum sign with wooden border mounted on steel post	26" x 38"	Good	MIDDLE FORK AMERICAN RIVER DEVELOPMENT A WATER CONSERVATION AND HYDRO ELECTRIC PROJECT COMPLETED 1967 FRENCH MEADOWS POWERHOUSE	Black lettering on white background	Clear visibility, on gravel road	

Appendix D. Public Safety Signs Associated with the MFP (Source: LAND 3 - Emergency Action and Public Safety TSR) (continued).

Location ¹	Type of Sign ²	Quantity	Materials ³	Dimensions	Condition ⁴	Wording/ Graphics	Remarks	Accessibility Notes	Photo #	
Hell Hole Reservoir Area (continued)										
French Meadows Powerhouse and Switchyard	South side in gravel in front of French Meadows Powerhouse	Warning	1	Painted aluminum sign mounted on steel post	14" x 20"	Good	WARNING WATER LEVEL MAY SUDDENLY RISE IN THIS AREA AT ANY TIME PLACER COUNTY WATER AGENCY	Black lettering on yellow background, sign bent but readable	Clear visibility, on gravel road	
	South side of French Meadows Powerhouse perimeter fence	Warning	1	Painted aluminum sign mounted on steel chain link fence	10" x 14"	Good	DANGER HIGH VOLTAGE KEEP OUT	White lettering on red and black background, black lettering on white background	Clear visibility, gravel underfoot	
	South side of French Meadows Powerhouse perimeter fence	Warning	1	Painted aluminum sign mounted on steel chain link fence	14" x 20"	Good	DANGER HIGH VOLTAGE	White lettering on red and black background, black lettering on white background	Clear visibility, gravel underfoot	
	South side of French Meadows Powerhouse perimeter fence	Warning	1	Painted aluminum sign mounted on steel chain link fence	7" x 14"	Good	DANGER HIGH VOLTAGE DO NOT ENTER	Red lettering on white background	Clear visibility, gravel underfoot	
Hell Hole Substation	All 4 sides of Hell Hole Substation perimeter fence	Warning	4	Painted plastic sign mounted on steel chain link fence	7" x 14"	Good	DANGER HIGH VOLTAGE	White lettering on red and black background, black lettering on white background	Clear visibility, gravel underfoot	
	Southeast side of Hell Hole Substation in parking area	Warning	1	Painted aluminum sign mounted on steel post	14" x 20"	Good	WARNING WATER LEVEL MAY SUDDENLY RISE IN THIS AREA AT ANY TIME PLACER COUNTY WATER AGENCY	Black lettering on yellow background	Clear visibility, gravel underfoot	
French Meadows Powerhouse and Switchyard to Hell Hole-Middle Fork Tunnel Gatehouse Communication Line/ Powerline	Top of powerline poles next to substation	Caution	2	Plastic signs mounted on top of wooden powerline poles	4" x 10" (Est.)	Fair	HIGH VOLTAGE	Clear cut-out lettering on yellow background	Top of pole, hard to read	
French Meadows Powerhouse Penstock and Butterfly Valve House	Gate to road leading to valve house	Regulatory	1	Painted aluminum sign mounted on metal gate	18" x 12"	Good	AUTHORIZED VEHICLES ONLY	Black lettering on white background	Visible and clear from road	
South Fork Long Canyon Area										
South Fork Long Canyon Diversion Dam	On side of pipes by South Fork Long Canyon Diversion Pool	Informational	1	Sticker sign mounted on side of metal pipe	2" x 8"	Poor	STREAM FLOW MEASURING STATION	Black lettering on yellow background, faded and flaking	Accessible to anyone on dam- hard to read	
	Beginning of South Fork Long Canyon Diversion and Drop Inlet Road leading to South Fork Long Canyon Diversion Dam	Part 8	1	Painted aluminum sign mounted on steel post	24" x 36"	Good	PLACER COUNTY WATER AGENCY MIDDLE FORK AMERICAN RIVER DEVELOPMENT A WATER CONSERVATION AND HYDRO ELECTRIC PROJECT COMPLETED 1967 SOUTH FORK LONG CANYON DAM	Black lettering on white background	Easily seen by road, good visibility	9
North Fork Long Canyon Area										
North Fork Long Canyon Diversion Dam	Beginning of North Fork Long Canyon Diversion Road leading to North Fork Long Canyon Diversion Dam	Part 8	1	Painted aluminum sign mounted on steel post	24" x 36"	Good	PLACER COUNTY WATER AGENCY MIDDLE FORK AMERICAN RIVER DEVELOPMENT A WATER CONSERVATION AND HYDRO ELECTRIC PROJECT COMPLETED 1967 NORTH FORK LONG CANYON DAM	Black lettering on white background	Clear- slightly under vegetation, but still visible from road	
	On 3 trees both sides at beginning of road	Regulatory	3	Painted aluminum signs mounted on incense cedar trees	9" x 11"	Good	BOUNDARY STATE GAME REFUGE HUNTING PROHIBITED DEPARTMENT OF FISH AND GAME	Black lettering on yellow background	Clear- slightly under vegetation, but still visible from road	
	Side of gaging station on west side of river	Informational	1	Painted plastic sign mounted on aluminum tank	8.5" x 10.5"	Poor	STREAM FLOW MEASURING STATION - U.S. GEOLOGICAL SURVEY IN COOPERATION WITH CA DEPARTMENT OF WATER RESOURCES	Black lettering on yellow background	Faded, hard to read, but easy to find	10
	Side of gaging station on east side of river	Informational	1	Sticker sign mounted on aluminum tanks	3" x 8"	Poor	STREAM FLOW MEASURING STATION	Black lettering on yellow background, faded and flaking	Poor, hard to read and high up	11

Appendix D. Public Safety Signs Associated with the MFP (Source: LAND 3 - Emergency Action and Public Safety TSR) (continued).

Location ¹	Type of Sign ²	Quantity	Materials ³	Dimensions	Condition ⁴	Wording/ Graphics	Remarks	Accessibility Notes	Photo #	
French Meadows Reservoir Area										
French Meadows- Hell Hole Tunnel Gatehouse	West door of French Meadows- Hell Hole Tunnel Gatehouse	Regulatory	1	Painted aluminum sign mounted on steel door	7" x 11"	Poor	NO TRESPASSING	Silver lettering on black background, visible signs of wear	Good access but poor contrast	
	North area of lot	Regulatory	1	Painted aluminum sign mounted on steel post	20" x 20"	Poor	VEHICLE TRAVEL PROHIBITED ALONG LAKESHORE	White lettering on brown background, post is good, sign is bent/ warped	Good contrast and fair access but with some tripping hazards nearby	12
	Fallen snag at north area of lot	Regulatory	1	Painted aluminum sign mounted on wooden pole	7" x 11"	Poor	NO CAMPING HERE	Black lettering on yellow background, fallen pole	Barely noticeable, needs remount	
	West entrance to lot	Regulatory	1	Painted aluminum sign mounted on live tree	7" x 11"	Poor	NO CAMPING HERE	Black lettering on yellow background, bent with gunfire damage	Good contrast, fair access	
Radio Communications Tower near French Meadows- Hell Hole Tunnel Gatehouse	Radio Communications Pole	Regulatory	1	Painted aluminum sign mounted on wooden powerline pole	7" x 11"	Good	NO CAMPING HERE	Black lettering on yellow background, partially obstructed by dangling wires	Good contrast and access	13
French Meadows Spillway	South access gate of French Meadows Spillway flood gates control platform	Regulatory	1	Painted aluminum sign mounted on steel chain link fence	5" x 24"	Fair	NO TRESPASSING	White lettering on blue background, paint flaking	Good contrast and access	
	North access gate of French Meadows Spillway flood gates control platform	Regulatory	1	Painted aluminum sign mounted on steel chain link fence	8" x 10"	Poor	NO TRESPASSING	White lettering on black background, extensive wear/fading	Fair contrast	14
French Meadows Dam Generator Building	At FR96 turnout near French Meadows Dam Generator Building	Part 8	1	Painted steel sign mounted on steel post	22" x 36"	Fair	WELCOME TO THE FRENCH MEADOWS RESERVOIR RECREATIONAL AREA RECREATION FACILITIES ARE WITHIN THE MIDDLE FORK AMERICAN RIVER PROJECT OWNED BY THE PLACER COUNTY WATER AGENCY UNDER FEDERAL ENERGY REGULATORY COMMISSION LICENSE NUMBER 2079. RECREATION FACILITIES ARE OWNED OPERATED AND MAINTAINED BY THE U.S. FOREST SERVICE. FOR FURTHER RECREATION INFORMATION, PLEASE CONTACT: U.S.F.S FORESTHILL RANGER STATION, FORESTHILL, CALIFORNIA, OR PLACER COUNTY WATER AGENCY, FORESTHILL, CALIFORNIA ALL FACILITIES ARE OPEN TO THE PUBLIC WITHOUT	Black lettering on white background, gunfire damage, flaking paint	Good contrast	
	At FR96 turnout near French Meadows Dam Generator Building	Informational	1	MDO plywood sign mounted on PTFD posts	40" x 84"	Fair	FRENCH MEADOWS RECREATION AREA TAHOE <i>National Forest</i> U.S. DEPARTMENT OF AGRICULTURE	Yellow lettering on brown background, flaking paint and gunfire damage	Fair contrast	15
	Just north of FR96 turnout near French Meadows Dam Generator Building	Informational	1	Bronze embossed plaque mounted on granite boulder	15" x 24"	Fair	PLACER COUNTY WATER AGENCY Middle Fork American River Development FRENCH MEADOWS RESERVOIR...	Bronze embossed lettering and graphic of Placer County and seal, signs of missing plaque below	Good contrast	
	Access gate to French Meadows Dam Generator Building	Regulatory	1	Painted aluminum sign mounted on steel chain link fence	5" x 24"	Good	NO TRESPASSING	White lettering on blue background	Good contrast	
Duncan Creek- Middle Fork Tunnel Portal	At Duncan Creek- Middle Fork Tunnel Portal	Warning	1	Painted aluminum sign mounted on cement wall	24" x 24" (Est.)	Good	WARNING WATER MAY BE DISCHARGED IN THIS AREA AT ANY TIME IT IS EXTREMELY DANGEROUS - KEEP AWAY PLACER COUNTY WATER AGENCY	Black lettering on yellow background	Good contrast	16
Middle Fork American River Gage and Weir below French Meadows Dam	Door of gaging station building	Informational	1	Painted plastic sign mounted on aluminum tank	6" x 11"	Good	STREAMFLOW MEASURING STATION - U.S. GEOLOGICAL SURVEY	Black lettering on yellow background	Good contrast	17
	Opposite outside walls of gage trolley	Warning	2	Painted/ stenciled sign on side of steel structure	9" x 12"	Fair	WARNING NO TRESPASSING	Red lettering on black background, stenciled	Fair contrast	
French Meadows Dam and Outlet Works	South wall of dam discharge house	Unknown (missing)	1	Unknown sign, removed from side of cement wall	12" x 14"	N/A	Unknown, no graphics or wording	Removed or missing sign	N/A	

Appendix D. Public Safety Signs Associated with the MFP (Source: LAND 3 - Emergency Action and Public Safety TSR) (continued).

Location ¹	Type of Sign ²	Quantity	Materials ³	Dimensions	Condition ⁴	Wording/ Graphics	Remarks	Accessibility Notes	Photo #	
Duncan Creek Area										
Duncan Creek Gage and Weir above Diversion Dam	Trolley outside basket wall at gaging station	Regulatory	1	Painted/ stenciled sign on side of steel structure	8" x 12"	Poor	WARNING NO TRESPASSING	Red lettering on black background, overlapping with sign below	Poor contrast	
	Opposite outside walls of trolley basket at gage station	Regulatory	2	Painted/ stenciled sign on side of steel structure	5" x 30"	Fair	NO TRESPASSING	Yellow lettering on black background	Fair contrast	18
	South face of gaging station building	Regulatory	1	Painted/ stenciled sign on side of steel structure	5" x 30"	Fair	NO TRESPASSING	Yellow lettering on silver background	Fair contrast, somewhat blurry	
Duncan Creek - Middle Fork Tunnel Intake	On faceplate of generator at Duncan Creek - Middle Fork Tunnel controls platform	Warning	1	Sticker sign mounted on metal equipment	2" x 8"	Good	CAUTION LIVE TERMINALS WITHIN	White lettering on red background, primarily intended for workers	Good contrast but viewable only at close range	19
Duncan Creek Gage and Weir below Diversion Dam	Main access door of gaging station building	Informational	1	Painted plastic sign mounted on aluminum tank	6" x 11"	Good	STREAMFLOW MEASURING STATION - U.S. GEOLOGICAL SURVEY	Black lettering on yellow background	Good contrast	
Middle Fork Interbay Area										
Middle Fork Powerhouse Butterfly Valve House to Radio Repeater near Hell Hole- Middle Fork Tunnel Surge Tank Communication Line/Powerline	Electrical box on power pole near Middle Fork Powerhouse Butterfly Valve House	Warning	1	Sticker sign mounted on metal equipment	2" x 8"	Good	GE HEAVY DUTY SAFETY SWITCH DANGER!	White lettering on black background and white lettering on red background. Likely intended primarily for workers.	Small and viewable up-close only	20
	Electrical box on power pole near Middle Fork Powerhouse Butterfly Valve House	Warning	1	Paper label attached to metal equipment	3" x 4"	Good	DANGER EQUIPMENT LOCKED OUT	White lettering on red and black background, and black lettering on white background with red hazard stripes, likely intended for workers	Good contrast but small and viewable up-close only	
Middle Fork Powerhouse to Middle Fork Powerhouse Butterfly Valve House Communication Line/Powerline	Top of power poles network extending from Middle Fork Powerhouse Butterfly Valve House to switchyards	Caution	2 per pole	Plastic signs mounted on top of wooden powerline poles	4" x 12"	Good	HIGH VOLTAGE	Clear cut-out lettering on yellow background	Adequate	
Middle Fork Powerhouse Penstock and Butterfly Valve House Road		Warning	1	Painted aluminum sign on metal pole	6" x 12" (Est.)	Fair	WARNING HIGH VOLTAGE ELECTRIC LINE BURIED BELOW CALL BEFORE YOU DIG PCWA...	Orange and white lettering on blue background; paint is peeling	Good contrast and viewable up close	21
Middle Fork Powerhouse Upper Switchyard	Main access gate and fence along perimeter	Regulatory	1	Painted aluminum sign mounted on steel chain link fence	5" x 24"	Good	NO TRESPASSING	White lettering on blue background, faded	Fair contrast and good access	
	Main access gate and fence along perimeter	Warning	1	Painted aluminum sign mounted on steel chain link fence	7" x 15"	Fair	DANGER HIGH VOLTAGE DO NOT ENTER	Red lettering on white background, gunfire damage	Good contrast and access	22
Middle Fork Powerhouse to Middle Fork- Ralston Tunnel Intake and Gatehouse Communication Line/Powerlines	Mounted on power pole #321	Informational	1	Written aluminum sign mounted on wooden powerline pole	3" x 15"	Fair	RADIO 20' --> PG&E	Handwritten lettering with black marker on silver background, intended for workers	Fair contrast and good access	
	Mounted on power pole #327	Caution	2	Plastic signs mounted on top of wooden powerline poles	4" x 12" (Est.)	Good	HIGH VOLTAGE	Clear cut-out lettering on yellow background	Fair contrast	
Middle Fork Powerhouse Lower Switchyard	Near main access gate at culvert	Regulatory	1	Steel/Aluminum on chain link fence	20" x 20"	Fair	UNAUTHORIZED VEHICLES WILL BE TOWED AWAY AT OWNERS EXPENSE	Black lettering on white background, peeling paint and vegetation overgrowth	Fair contrast and access - ditch prevents close access	
	Near main access gate at culvert	Warning	2	Painted aluminum sign mounted on steel chain link fence	10" x 15"	Good	DANGER HIGH VOLTAGE KEEP OUT	White lettering on red and black background, black lettering on white background	Good contrast and fair access - ditch prevents close access	
	On main access gate	Warning	1	Painted aluminum sign mounted on steel chain link fence	7" x 15"	Good	DANGER HIGH VOLTAGE	Red lettering on white background, flaking paint	Good contrast and access	
	On main access gate	Regulatory	2	Painted aluminum sign mounted on steel chain link fence	5" x 24"	Good	NO TRESPASSING	White lettering on blue background, faded	Fair contrast and good access	
	On perimeter fence near main gate	Warning	1	Painted aluminum sign mounted on steel chain link fence	15" x 20"	Good	WARNING WATER LEVEL MAY SUDDENLY RISE IN THIS AREA AT ANY TIME PLACER COUNTY WATER AGENCY	Black lettering on yellow background	Good contrast and access	
	On perimeter fence north of main gate	Warning	1	Painted aluminum sign mounted on steel chain link fence	7" x 10"	Good	DANGER HIGH VOLTAGE UNAUTHORIZED PERSONNEL KEEP OUT	White lettering on red and black background, black lettering on white background	Good contrast and access	23
	Above Middle Fork Powerhouse discharge into Interbay	Warning	1	Painted aluminum sign mounted on steel railing	24" x 42" (Est.)	Good	EXTREME DANGER KEEP AWAY	White lettering on green background, intended primarily for boaters and fishermen	Good contrast	

Appendix D. Public Safety Signs Associated with the MFP (Source: LAND 3 - Emergency Action and Public Safety TSR) (continued).

Location ¹	Type of Sign ²	Quantity	Materials ³	Dimensions	Condition ⁴	Wording/ Graphics	Remarks	Accessibility Notes	Photo #	
Middle Fork Interbay Area (continued)										
Middle Fork Interbay Dam and Powerhouse Road and Interbay Access Points	Start of the road	Warning	1	Painted aluminum sign mounted on steel poles	15" x 20"	fair	WARNING THIS ROAD IS STEEP CROOKED AND HAZARDOUS NO TRAILERS OR BOATING PERMITTED NO OVERNIGHT CAMPING PERMISSION TO PASS REVOCABLE AT ANY TIME	Red and white lettering on blue background, flaking paint	Fair contrast and good access	
Middle Fork Interbay Dam	Top of stairs at southwest end of Middle Fork Interbay Dam	Warning	1	Painted aluminum sign mounted on steel mesh fence	15" x 20"	Good	WARNING WATER LEVEL MAY SUDDENLY RISE IN THIS AREA AT ANY TIME PLACER COUNTY WATER AGENCY	Black lettering on yellow background	Good contrast and access	
	West side of Middle Fork Interbay Dam top on each access gate of floodgates control platform	Regulatory	2	Painted aluminum sign mounted on steel chain link fence	12" x 19"	Good	NO TRESPASSING	Black lettering on white background	Good contrast and access	
	Northeast end of Middle Fork Interbay Dam at portal to boat launch	Warning	1	Painted aluminum sign mounted on steel pole	14" x 22"	Fair	WARNING SPILLWAY GATES MAY SUDDENLY OPEN AT ANY TIME IT IS EXTREMELY DANGEROUS PLACER COUNTY WATER AGENCY	Black lettering on yellow background, words may have been painted over	Good contrast and access	24
	Near PCWA plaque at Road 96.17 turnout	Warning	1	Painted aluminum sign mounted on steel pole	15" x 20"	Good	WARNING WATER LEVEL MAY SUDDENLY RISE IN THIS AREA AT ANY TIME PLACER COUNTY WATER AGENCY	Black lettering on yellow background	Good contrast and access	
	At Road 96.17 turnout just west of dam	Informational	1	Bronze embossed plaque mounted on stone	15" x 24"	Good	PLACER COUNTY WATER AGENCY Middle Fork American River Development INTERBAY...	Bronze plaque with embossed lettering and graphic of Placer County and seal, type of monument	Good contrast and access	
Ralston - Oxbow Area										
Middle Fork - Ralston Tunnel Surge Shaft, Tank, and Storage Building	On road-side (FR23) perimeter fence of Tank Storage Building	Regulatory	1	Painted aluminum sign mounted on steel chain link fence	4" x 24"	Good	NO TRESPASSING	White lettering on blue background	Easily visible and readable from road	25
	On road-side (FR23) wall of storage tank inside perimeter fence	Warning	2	Sticker sign mounted on aluminum tanks	10" x 14" (Est.)	Good	DANGER...	White lettering on red and black background, black lettering on white background	Couldn't read rest of sign besides "danger," poor visibility	
Ralston Powerhouse and Switchyard	Ralston Powerhouse and Switchyard	Warning	3	Painted aluminum signs mounted to steel chain link fence (2) and cement column (1)	14" x 20"	Good	WARNING WATER LEVEL MAY SUDDENLY RISE IN THIS AREA AT ANY TIME PLACER COUNTY WATER AGENCY	Black lettering on yellow background	Easily readable from a distance, clear area underfoot	26
	North gate area along FR23	Hazard	8	Painted aluminum signs mounted on steel posts	36" x 12"	Good	Red and white stripes (no wording)	Blocking public entrance to powerhouse	Along road, easy to see	
	North side of perimeter fence	Site Identification	1	Painted redwood board mounted on steel railing	24" x 12" (Est.)	Good	RALSTON POWER HOUSE	White painted lettering engraved on brown wooden background	Fairly small to see from road, not accessible by foot	
	Back to back off water side of Ralston Powerhouse	Warning	2	Painted aluminum sign mounted on side of building	24" x 36" (Est.)	Good	EXTREME DANGER KEEP AWAY	White lettering on green background	Readable from boat, not road	27
	North side of perimeter fence	Part 8	1	Painted aluminum sign attached to steel chain link fence	24" x 36"	Good	PLACER COUNTY WATER AGENCY MIDDLE FORK AMERICAN RIVER DEVELOPMENT A WATER CONSERVATION AND HYDRO ELECTRIC PROJECT COMPLETED 1967 RALSTON POWERHOUSE	Black lettering on white background	Readable on foot or vehicle, on side of gravel road	
	North side of perimeter fence	Warning	1	Painted aluminum sign attached to steel chain link fence	10" x 24"	Good	EXTREME DANGER PLEASE STAY OUT	White lettering on blue background	Readable on foot or vehicle, on side of gravel road	28
	North side of perimeter fence	Road Identification	1	Painted aluminum sign attached to steel chain link fence	12" x 18"	Good	9200 BLACKSMITH FLAT ROAD	Black lettering on white background	Readable on foot or vehicle, on side of gravel road	

Appendix D. Public Safety Signs Associated with the MFP (Source: LAND 3 - Emergency Action and Public Safety TSR) (continued).

Location ¹	Type of Sign ²	Quantity	Materials ³	Dimensions	Condition ⁴	Wording/ Graphics	Remarks	Accessibility Notes	Photo #	
Ralston - Oxbow Area (continued)										
Ralston Powerhouse and Switchyard (continued)	All along perimeter fence	Warning	14	Painted aluminum sign mounted on steel chain link fence	7" x 10"	Good	DANGER HIGH VOLTAGE UNAUTHORIZED PERSONNEL KEEP OUT	White lettering on red and black background, black lettering on white background	Readable on foot or vehicle, on side of gravel road	
	Painted on cement block inside perimeter fence	Hazard	3	Painted stickers on side of cement block	36" x 60" (Est.)	Good	DIESEL NO SMOKING FLAMMABLE	Red painted lettering on white background, no public access	Inside perimeter fence, visible from right outside fence	29
	South side of Ralston Powerhouse attached to cable box going across river	Regulatory	2	Painted aluminum sign mounted on steel gate	7" x 10" (Est.)	Good	NOTICE NO TRESPASSING	White lettering on brown background	Readable from road, good clear visibility	
Ralston Powerhouse Slope Fence	On ladder leading up to power lines and slope fence	Regulatory	1	Painted aluminum sign mounted on steel ladder	7" x 10"	Poor	NO TRESPASSING	Red lettering on white background, faded and not functional	Right next to road, but not clearly visible, weather damaged, hard to see and almost unreadable	
	On ladder leading up pipeline and slope fence	Regulatory	1	Painted aluminum sign mounted on steel ladder	7" x 10"	Poor	NO TRESPASSING	Brown lettering on black background, faded and not functional	¼ way up ladder- only seen if already climbing, almost unreadable	
Ralston Afterbay Dam	Fence closing off access across Ralston Afterbay Dam	Regulatory	1	Painted aluminum sign mounted on steel chain link fence	4" x 24"	Good	NO TRESPASSING	White lettering on blue background	Clear and readable, on paved ground	
Ralston Afterbay Dam Road and Access Point	South bank of afterbay	Warning	1	Painted aluminum sign mounted on steel ladder	12" x 10"	Fair	DANGER NO BOATS BEYOND THIS POINT	White and black lettering on re, black, and white background. Sign is twisted and bent.	Fairly small to see from within the afterbay	
Ralston Afterbay Dam Generator Building	South side of perimeter fence of Ralston Afterbay Dam Generator Building	Regulatory	1	Painted aluminum sign mounted on steel chain link fence	4" x 24"	Good	NO TRESPASSING	White lettering on blue background	Readable, gravel underfoot, clear area	
	Gravel parking area in front of Ralston Afterbay Dam Generator Building	Warning	1	Painted aluminum sign mounted on steel pole	14" x 22"	Good	WARNING WATER MAY BE DISCHARGED IN THIS AREA AT ANY TIME. IT IS EXTREMELY DANGEROUS PLACER COUNTY WATER AGENCY	Black lettering on yellow background	Accessible by road or foot, gravel, clear area	
	East side on door of building inside perimeter fence	Safety	1	Sticker sign mounted on metal door	18" x 24" (Est.)	Good	FLAMMABLE NO SMOKING OR OPEN FLAME PERMITTED WITHIN 25 FEET	White lettering on red background and black lettering on white background	Inside perimeter fence, easily visible and readable	30
Ralston - Oxbow Tunnel Intake	Railing around Ralston - Oxbow Tunnel Intake	Warning	1	Painted aluminum sign mounted on metal railing	10" x 14"	Good	DANGER DO NOT ENTER IF LOW OXYGEN ALARM SOUNDS	White lettering on red and black background, black lettering on white background	Visible and readable only if already on tunnel structure	31
Oxbow Powerhouse and Switchyard	South side of perimeter fence	Road Identification	1	Painted aluminum sign mounted on steel chain link fence	12" x 18"	Good	9600 BLACKSMITH FLAT ROAD	Black lettering on white background	Readable by road or foot, gravel underfoot, clear area	
	South side of perimeter fence	Regulatory	2	Painted aluminum sign mounted on steel chain link fence	4" x 24"	Good	NO TRESPASSING	White lettering on blue background	Readable by road or foot, gravel underfoot, clear area	
	South side of perimeter fence	Warning	3	Painted aluminum sign mounted on steel chain link fence	7" x 10"	Good	DANGER HIGH VOLTAGE UNAUTHORIZED PERSONNEL KEEP OUT	White lettering on red and black background, black lettering on white background	Readable by road or foot, gravel underfoot, clear area	
	Side of outlet tunnel by rafting put in	Warning	1	Painted aluminum sign mounted on cement side of tunnel	14" x 20"	Good	WARNING WATER LEVEL MAY SUDDENLY RISE IN THIS AREA AT ANY TIME PLACER COUNTY WATER AGENCY	Black lettering on yellow background	Seen only if at rafting put in point, but easily visible and clear to read	
Indian Bar Rafting Access and General Parking	East side of boat launch, near boat launch toilet	Warning	1	Painted aluminum sign on steel post	15" x 20" (Est.)	Good	WARNING WATER LEVEL MAY SUDDENLY RISE IN THIS AREA AT ANY TIME PLACER COUNTY WATER AGENCY	Black lettering on yellow background. Post is slightly rusted.		
	Near parking area, west of parking area toilet	Warning	1	Painted aluminum sign on steel post mounted in barrier rock	15" x 20" (Est.)	Good	WARNING WATER LEVEL MAY SUDDENLY RISE IN THIS AREA AT ANY TIME PLACER COUNTY WATER AGENCY	Black lettering on yellow background. Post is slightly rusted.		
	At top of Indian Bar Rafting Access and General Parking Access Road	Warning	1	Painted aluminum sign on steel post, with steel cross bars	15" x 20" (Est.)	Fair	WARNING WATER MAY BE DISCHARGED IN THIS AREA AT ANY TIME IT IS EXTREMELY DANGEROUS PLACER COUNTY WATER AGENCY	Black lettering on yellow background. Post and cross bars are rusted. Paint is flaking.	Lettering may not be visible to visually impaired.	

Appendix D. Public Safety Signs Associated with the MFP (Source: LAND 3 - Emergency Action and Public Safety TSR) (continued).

Location ¹	Type of Sign ²	Quantity	Materials ³	Dimensions	Condition ⁴	Wording/ Graphics	Remarks	Accessibility Notes	Photo #	
Ralston - Oxbow Area (continued)										
Drivers Flat Road	Before gate	Regulatory	1	Painted aluminum sign on steel post	12" x 18" (Est.)	Poor	CAMPFIRES NOT ALLOWED DUE TO EXTREME FIRE DANGER	White lettering on brown background. Bullet holes	32	
	Before gate	Caution	1	Painted aluminum sign on steel post	12" x 18" (Est.)	Good	ROUGH ROAD VEHICLES WITH LOW CLEARANCE NOT RECOMMENDED	Black lettering on white background	32	
	Before gate	Informational/ Educational	1	Metal signs posted on MDO Plywood message board	36" x 36" (Est.)	Good	RATTLESNAKE, MOUNTAIN LION, AND POISON OAK WARNING SIGNS; KEEP DOG ON LEASH SIGN	Brown lettering on white or tan background posted on message board.	33	
Area of confluence of North Fork of the Middle Fork American River and Middle Fork American River	On beach area under bridge at confluence	Informational/ Educational	1	Painted foam board mounted to PTDF posts	48" x 96"	Good	KIDS DON'T FLOAT GIVE THEM SOMETHING THAT WILL - LIFE VEST LOAN PROGRAM BORROW AND RETURN	Black, green, and red lettering on white background, no life vests present, provided by local clubs	Easily seen along shore or in water, good clear printing	34

¹Refer to Map LAND 3-2 for Project facility locations.

²Types of signs: Informational, Warning, Directional, Caution, Road/ Site Identification, Hazard, Regulatory, or Informational/ Educational

³Materials Abbreviations: PTDF - Pressure Treated Douglas Fir; MDO Plywood - Medium Density Overlay Plywood

⁴Condition: **Poor** - Sign is no longer functional or it is so damaged it should be replaced; **Fair** - Sign is functional but needs repairs or maintenance (flaking paint, fading, damaged mounts); **Good** - Sign is new or in good, undamaged condition

APPENDIX E

Photographs of Select Safety Features in the Hell Hole Reservoir Area



Photo E-1. View of log boom near spillway at Hell Hole Reservoir.



Photo E-2. View of barrier fence surrounding Hell Hole General Parking Area.



Photo E-3. View of slope fence adjacent to French Meadows Powerhouse.



Photo E-4. View of guard rails along top of Hell Hole Dam.

APPENDIX F

Historical Water Surface Elevations at French Meadows Reservoir (WYs 1975 – 2007)

Figure F-1. Box and Whisker Plot showing Median, Quartile, Minimum, and Maximum WSEs by Month (WYs 1975–2007).

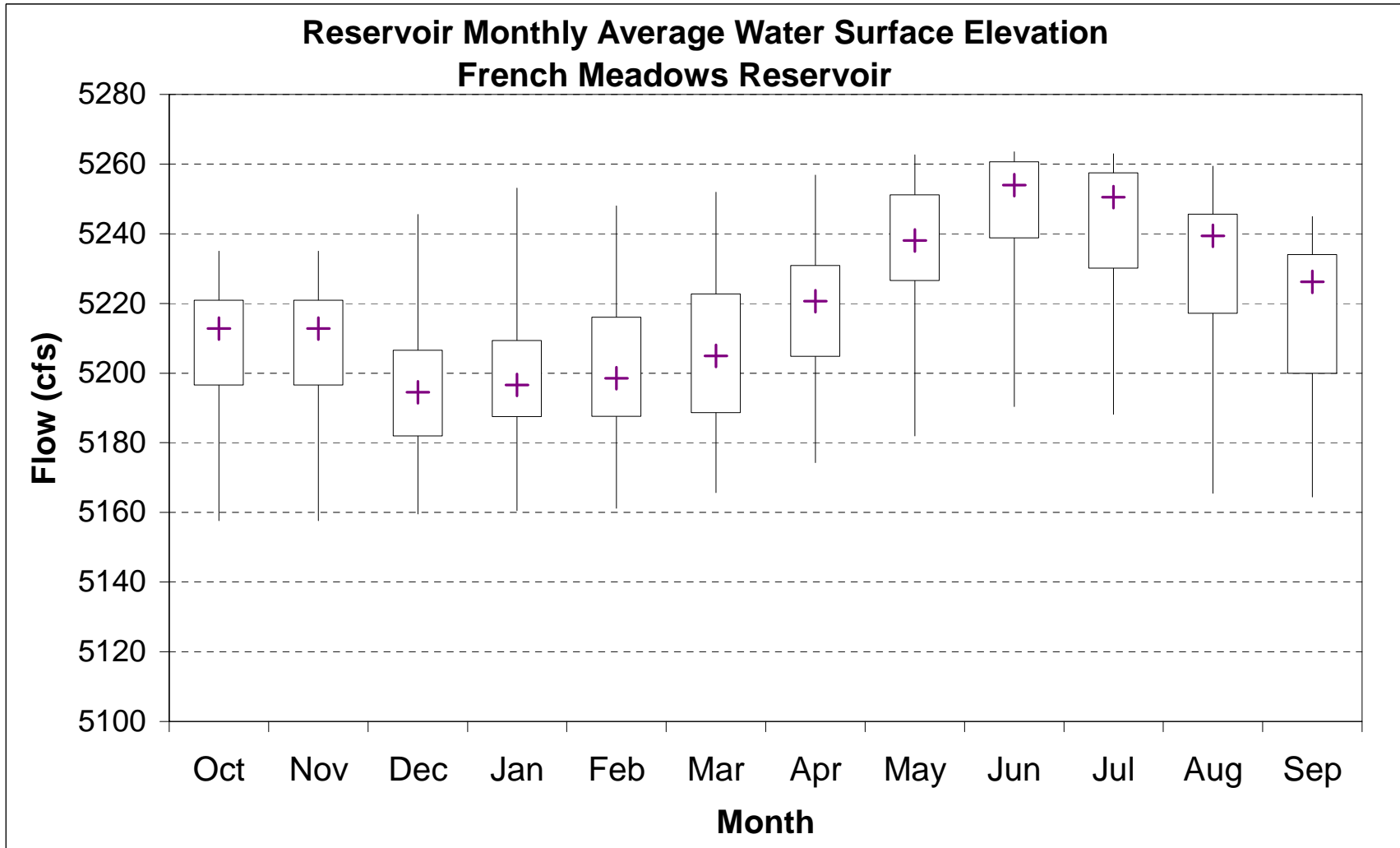


Figure F-2. Monthly Average WSE at French Meadows Reservoir for all Water Year Types (WYs 1975–2007).

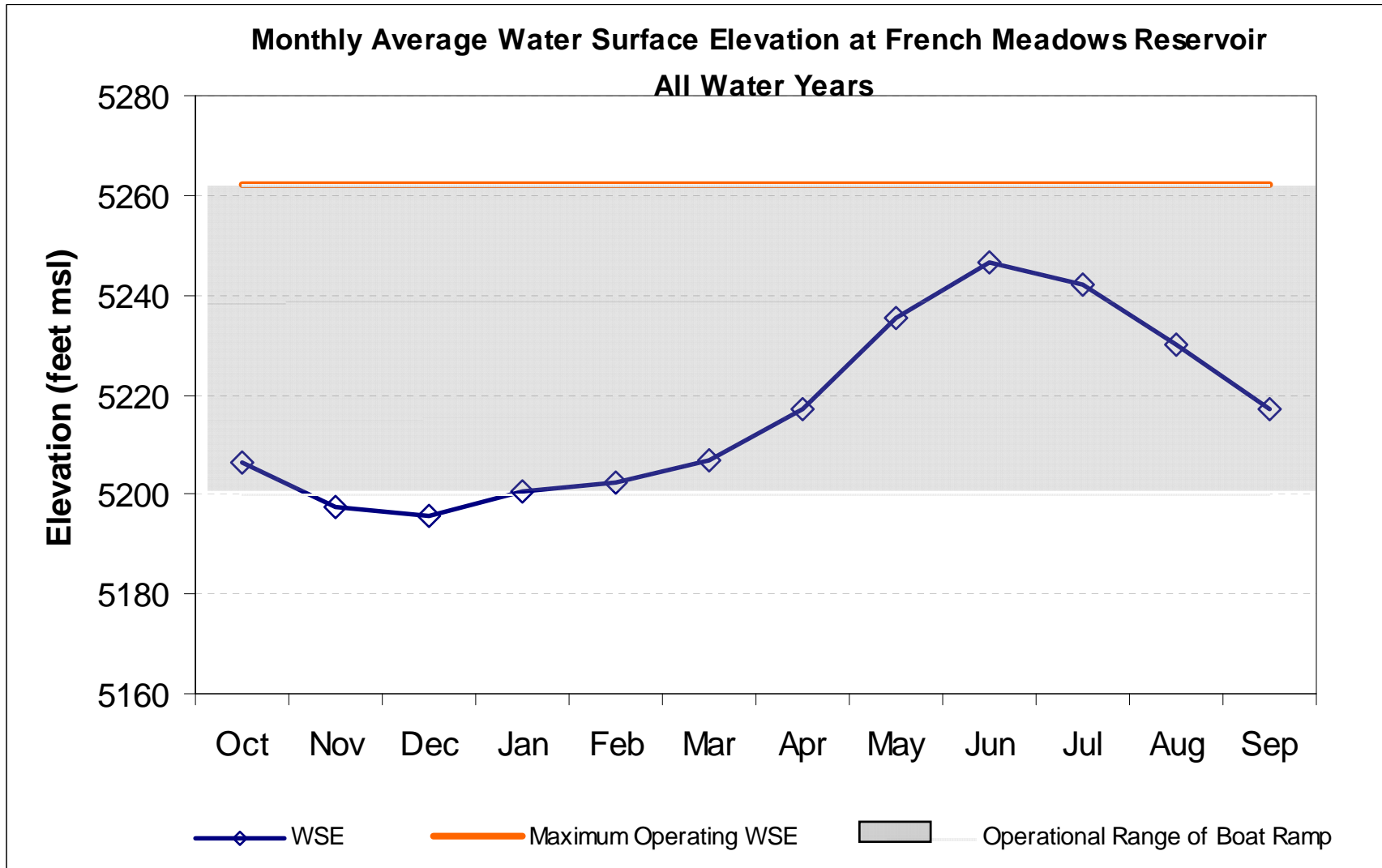
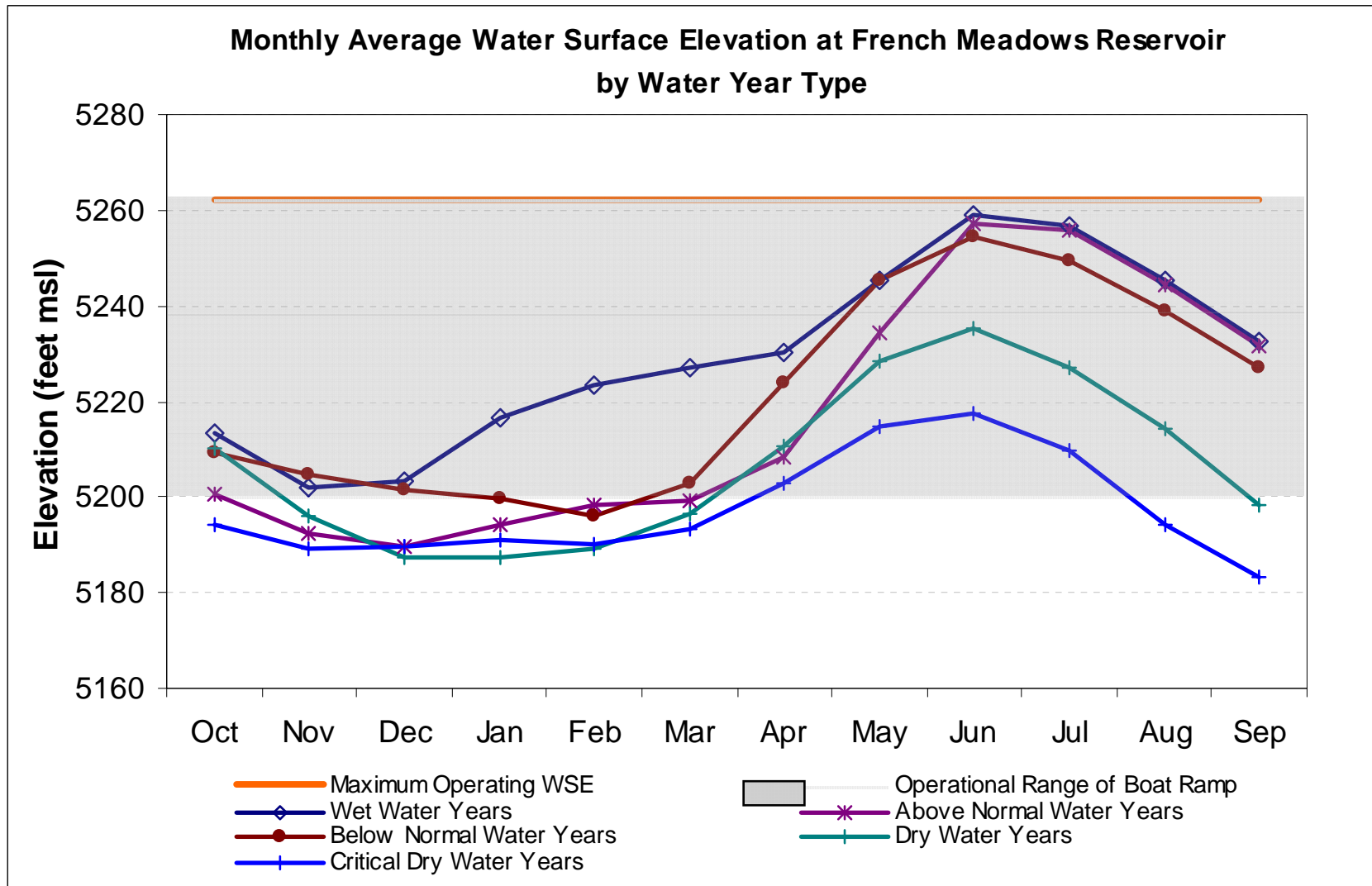


Figure F-3. Monthly Average WSE at French Meadows Reservoir by Water Year Type.



APPENDIX G

Photographs of French Meadows Boat Ramp at Various WSEs



Photo G-1. French Meadows Boat Ramp on July 23, 2008 (WSE = 5,220 ft).

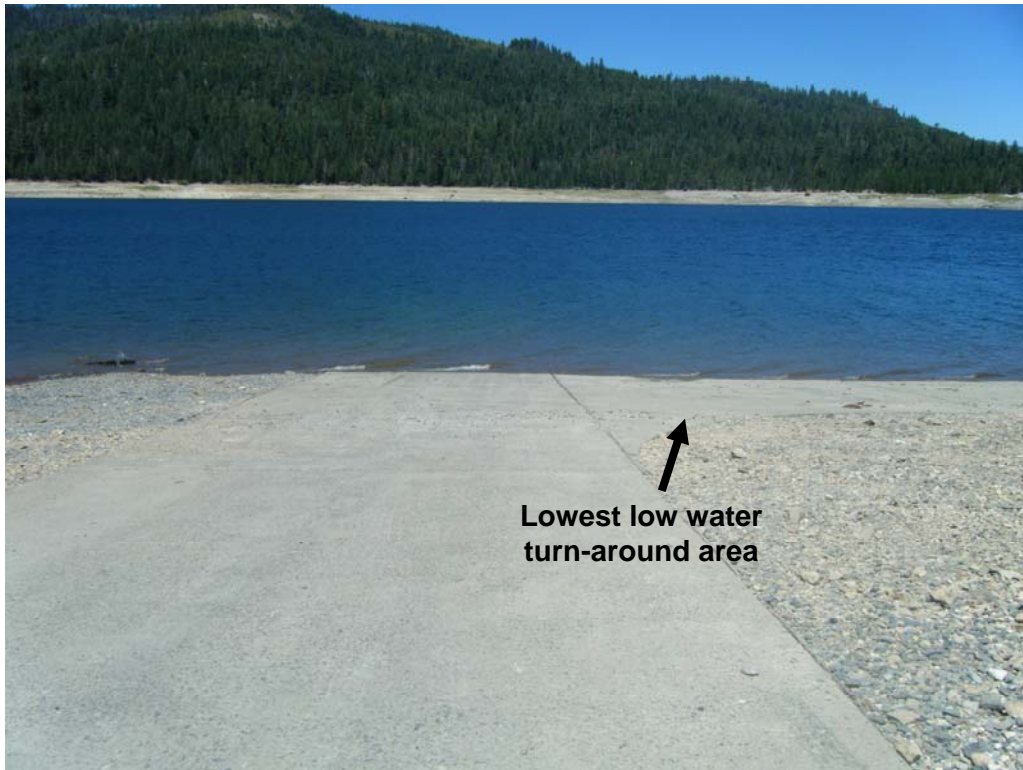


Photo G-2. French Meadows Boat Ramp on August 2, 2008 (WSE = 5,216 ft).



Photo G-3. View of reservoir from French Meadows Boat Ramp on August 2, 2008 (WSE = 5,216 ft).

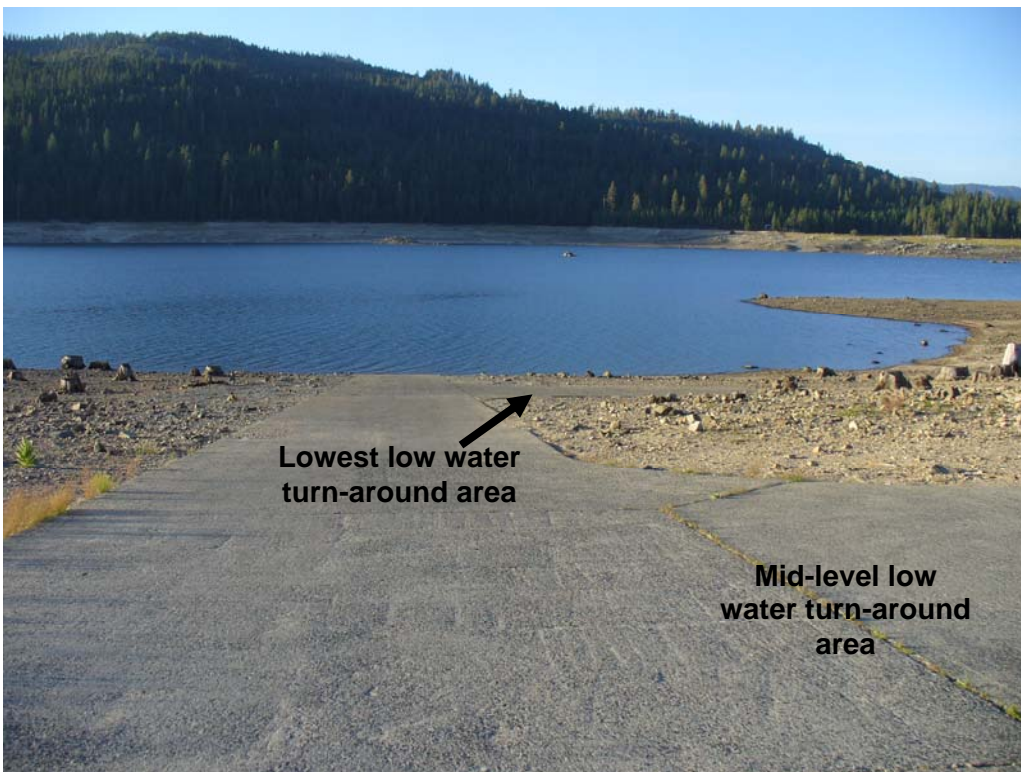


Photo G-4. French Meadows Boat Ramp on September 4, 2008 (WSE = 5,204 ft).



Photo G-5. French Meadows Boat Ramp on September 24, 2008 (WSE = 5,198 ft). The concrete ramp terminates at 5,200 feet.



Photo G-6. View of reservoir from French Meadows Boat Ramp on September 24, 2008 (WSE = 5,198 ft).



Photo G-7. French Meadows Boat Ramp on October 14, 2008 (WSE = 5,193 ft).



Photo G-8. French Meadows Boat Ramp on October 14, 2008 (WSE = 5,193 ft). Note that boat launching is still possible after the WSE declines below the end of the concrete ramp due to the compacted substrate and shallow slope of shoreline.

APPENDIX H

Photographs of McGuire Boat Ramp at Various WSEs



Photo H-1. McGuire Boat Ramp on June 17, 2008 (WSE = 5,229 ft).



Photo H-2. McGuire Boat Ramp on July 23, 2008 (WSE = 5,220 ft).



Photo H-3. McGuire Boat Ramp on July 23, 2008 (WSE =5,220 ft).



Photo H-4. McGuire Boat Ramp on August 2, 2008 (WSE = 5,216 ft).



Photo H-5. McGuire Boat Ramp on September 24, 2008 (WSE = 5,198 ft).



Photo H-6. McGuire Boat Ramp on September 24, 2008 (WSE = 5,198 ft). View is looking west, toward French Meadows dam from low water turn around area.



Photo H-7. McGuire Boat Ramp on September 24, 2008 (WSE = 5,198 ft).



Photo H-8. McGuire Boat Ramp on September 24, 2008 (WSE = 5,198 ft). Note that end of concrete ramp is at 5,200 feet.



Photo H-9. McGuire Boat Ramp on October 14, 2008 (WSE = 5,193 ft).

APPENDIX I
Photographs of McGuire Beach



Photo I-1. Trail to McGuire Beach with sign (7/24/08).



Photo I-2. McGuire Beach as viewed from trail on July 24, 2008 (WSE = 5,220 ft).



Photo I-3. McGuire Beach on July 24, 2008 (WSE = 5,220 ft).



Photo I-4. View of French Meadows Reservoir from McGuire Beach on July 24, 2008 (WSE = 5,220 ft).

APPENDIX J

Photographs of Select Safety Features in the French Meadows Reservoir Area



Photo J-1. View of log boom near spillway at French Meadows Reservoir.



Photo J-2. View of public safety fence and railing surrounding French Meadows Spillway Gates area.



Photo J-3. View of safety fence surrounding the French Meadows Dam Generator Building.



Photo J-4. View of guard rail along top of French Meadows Dam.

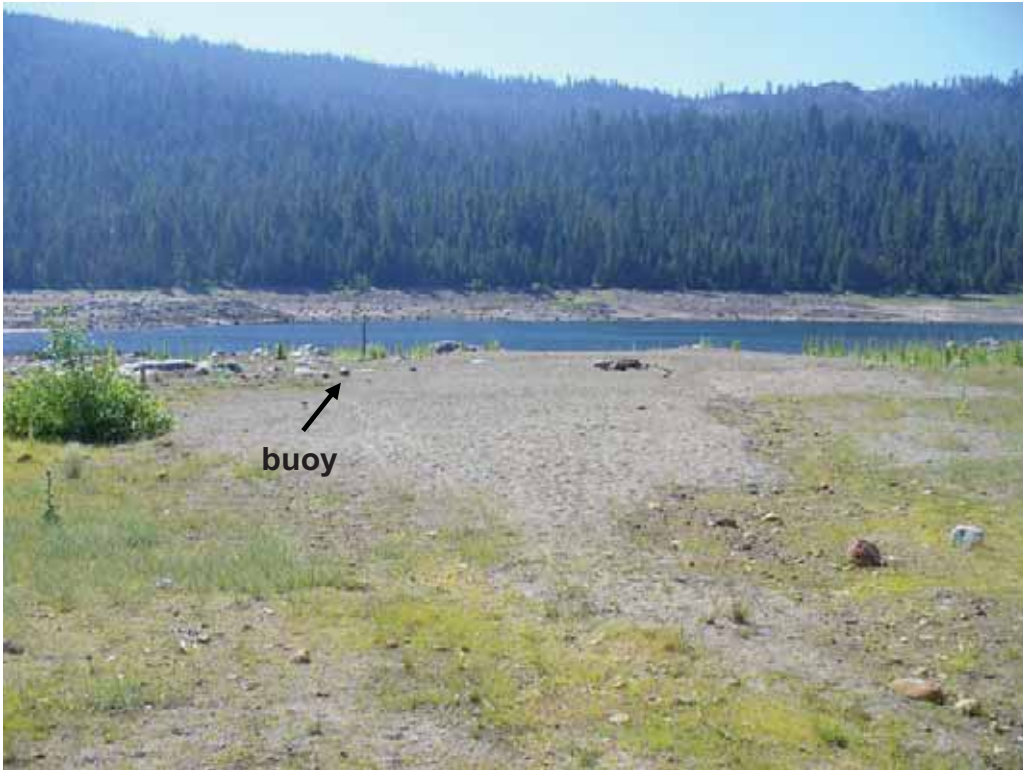


Photo J-5. View of McGuire Beach with French Meadows Reservoir in the background.



Photo J-6. Example of steel buoy at McGuire Beach.

APPENDIX K

Daily and Seasonal Water Level Fluctuations at Ralston Afterbay

Figure K-1. Water Surface Elevations at Ralston Afterbay – Winter.

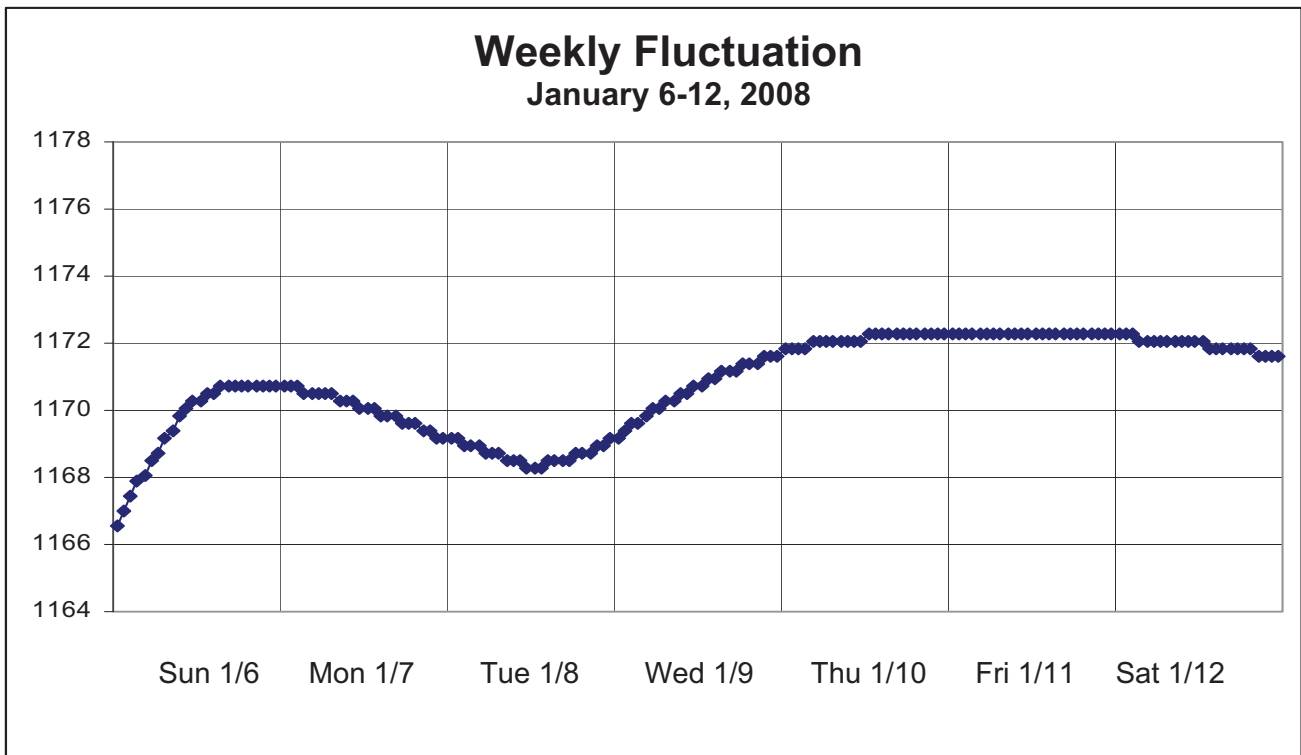
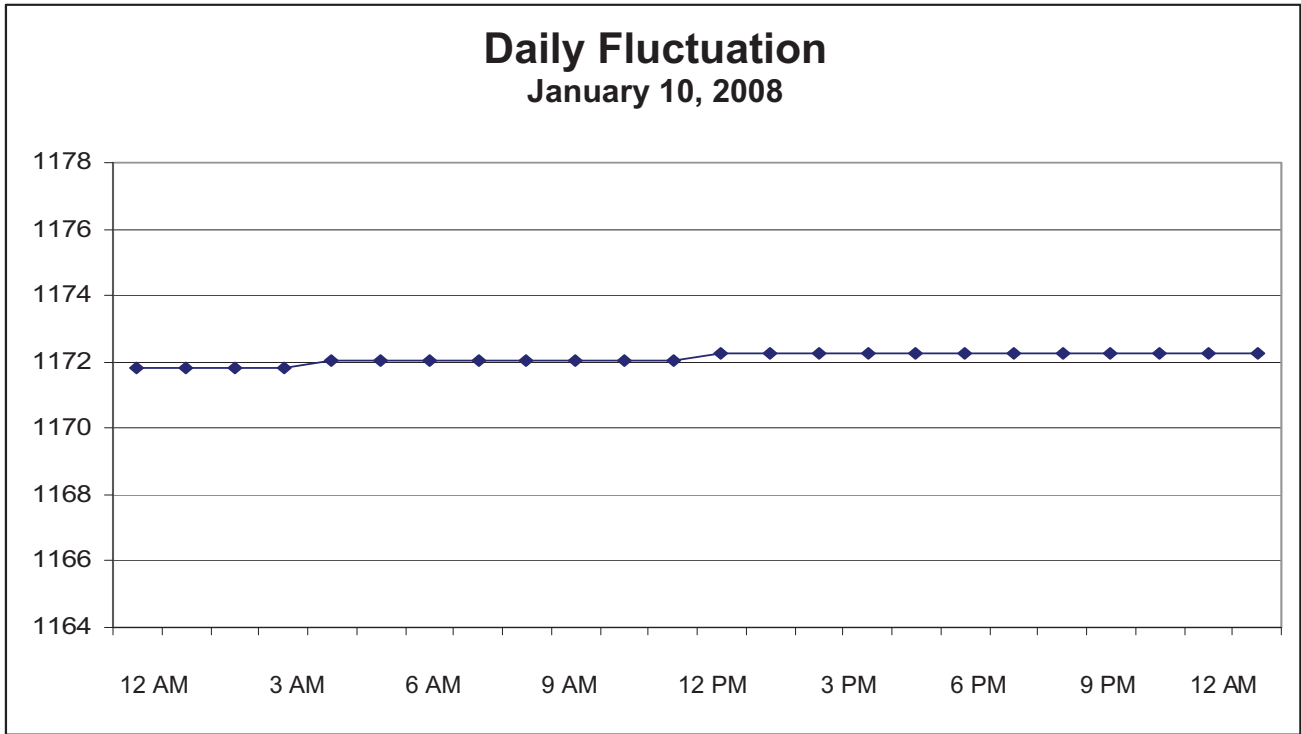


Figure K-2. Water Surface Elevations at Ralston Afterbay – Spring.

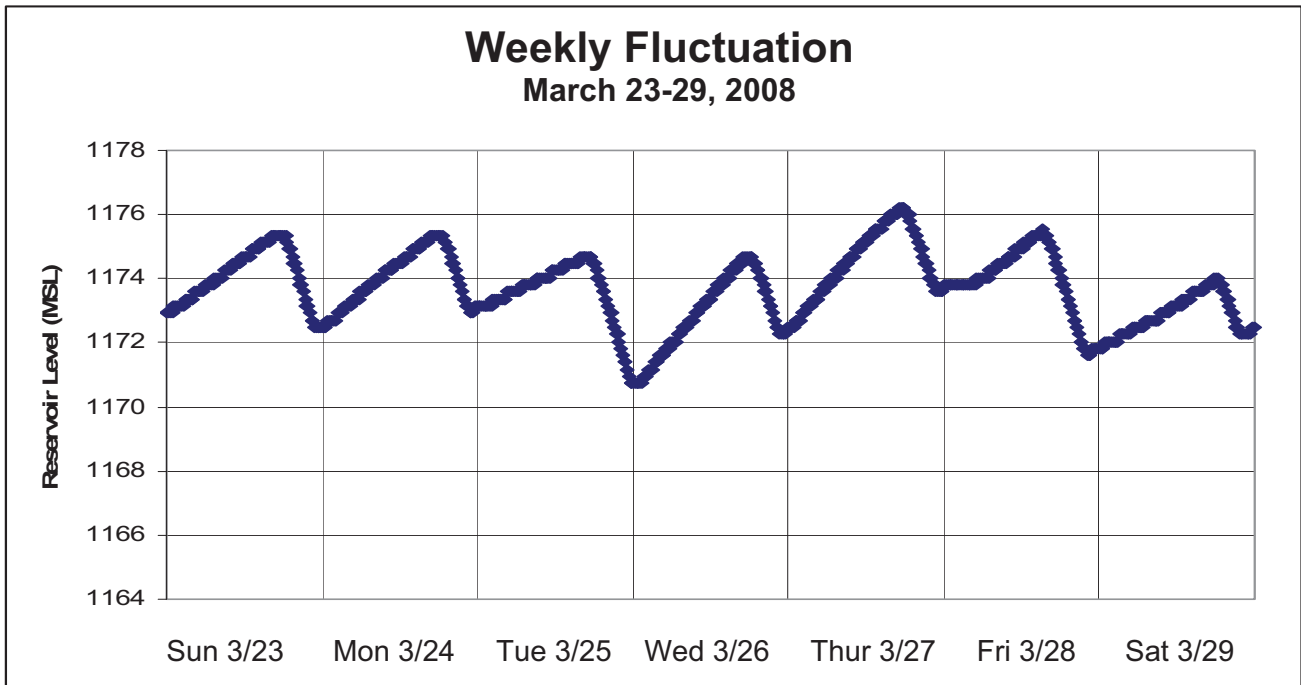
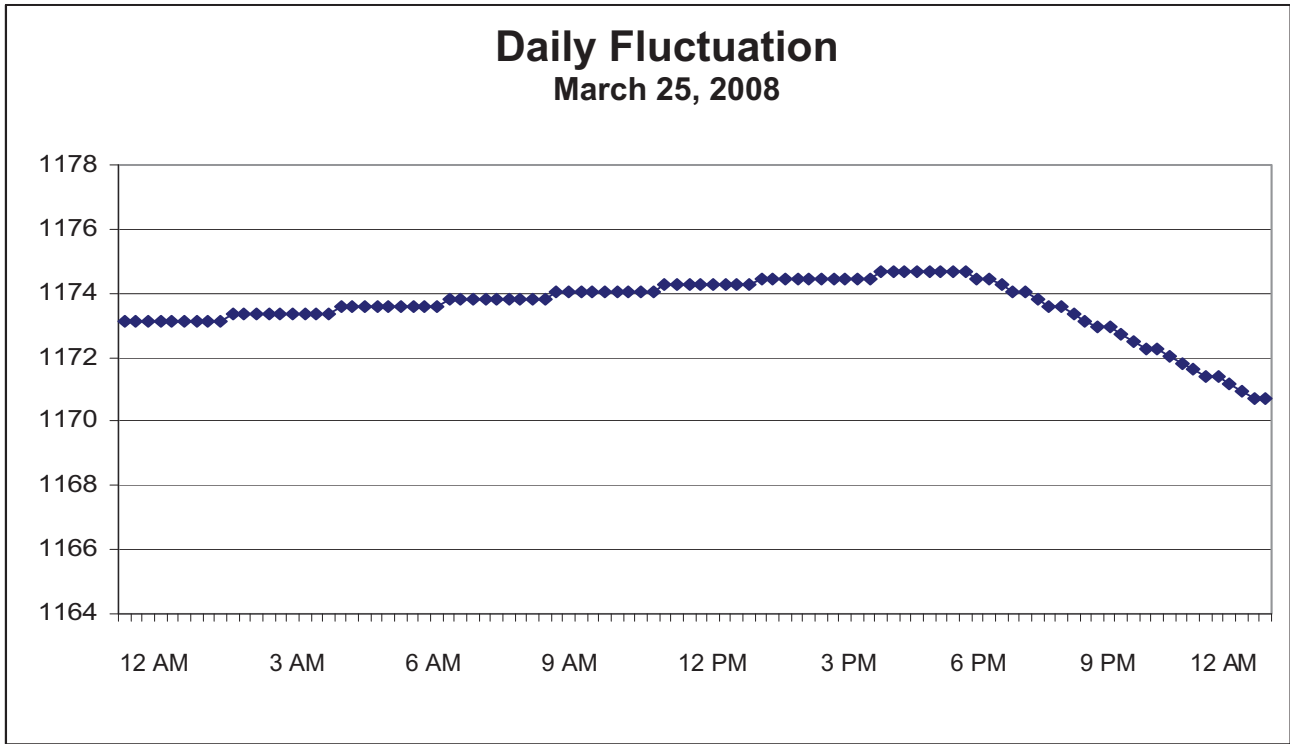


Figure K-3. Water Surface Elevations at Ralston Afterbay – Summer.

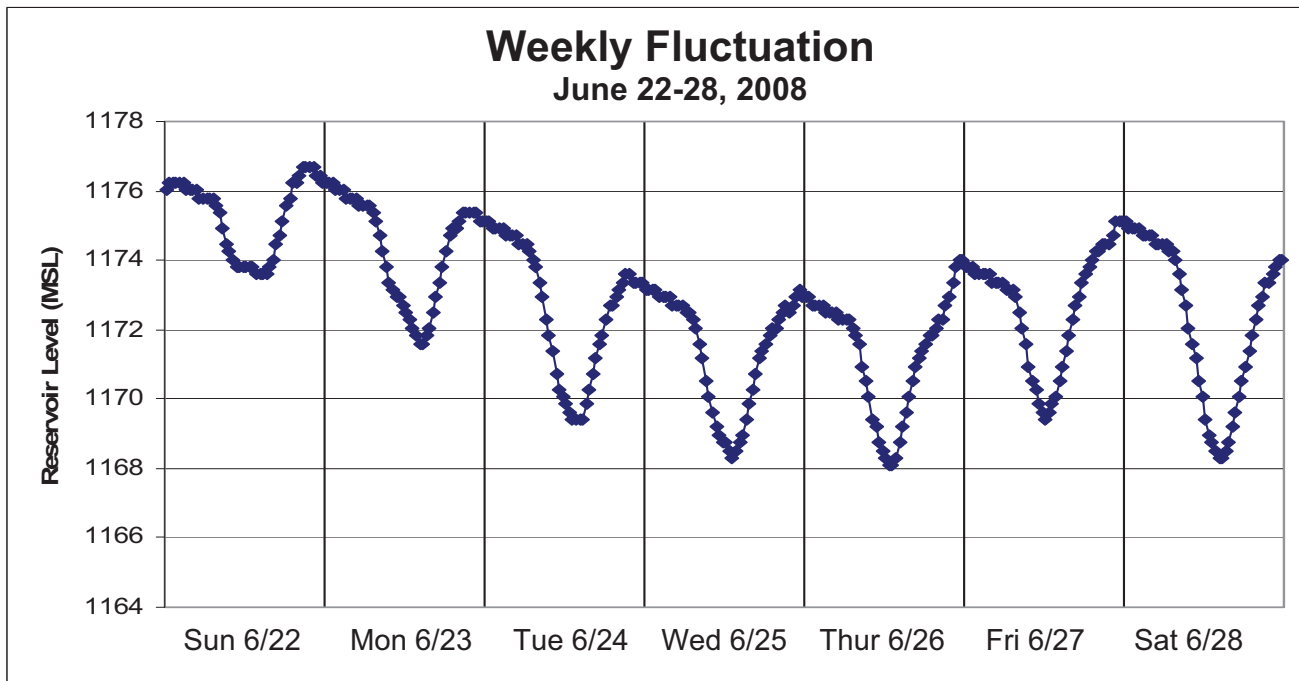
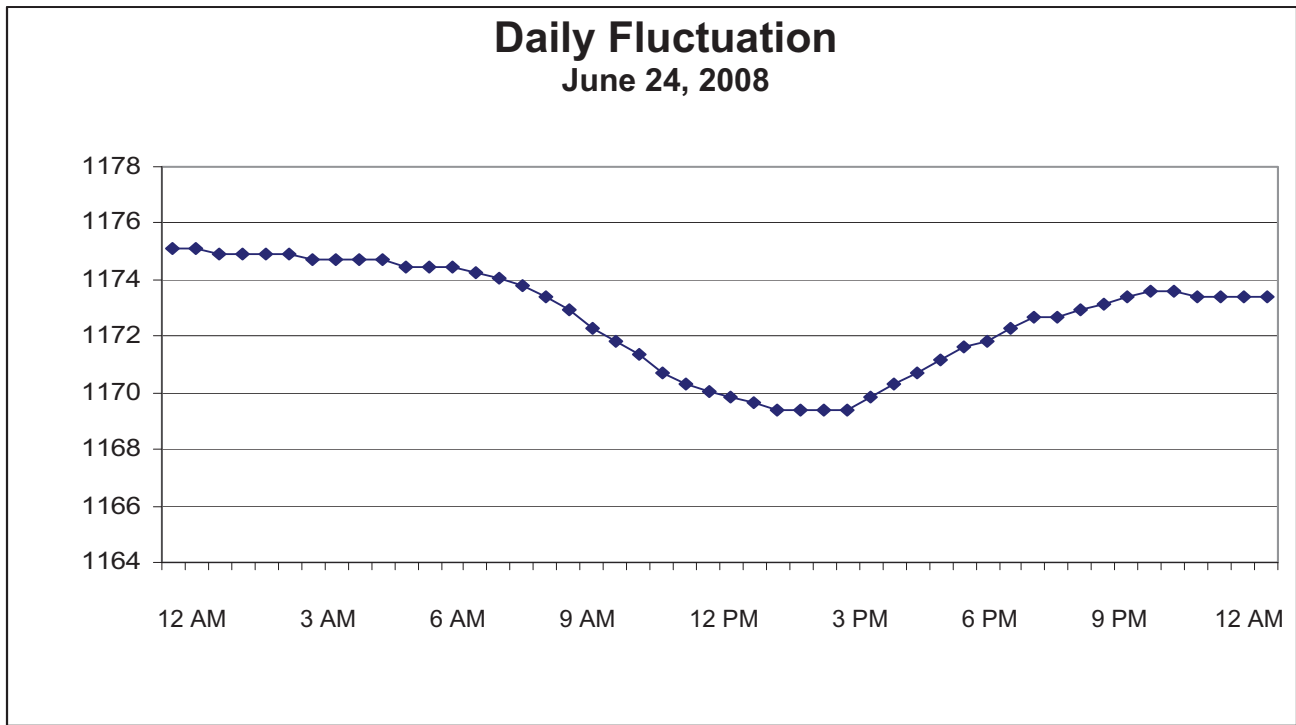
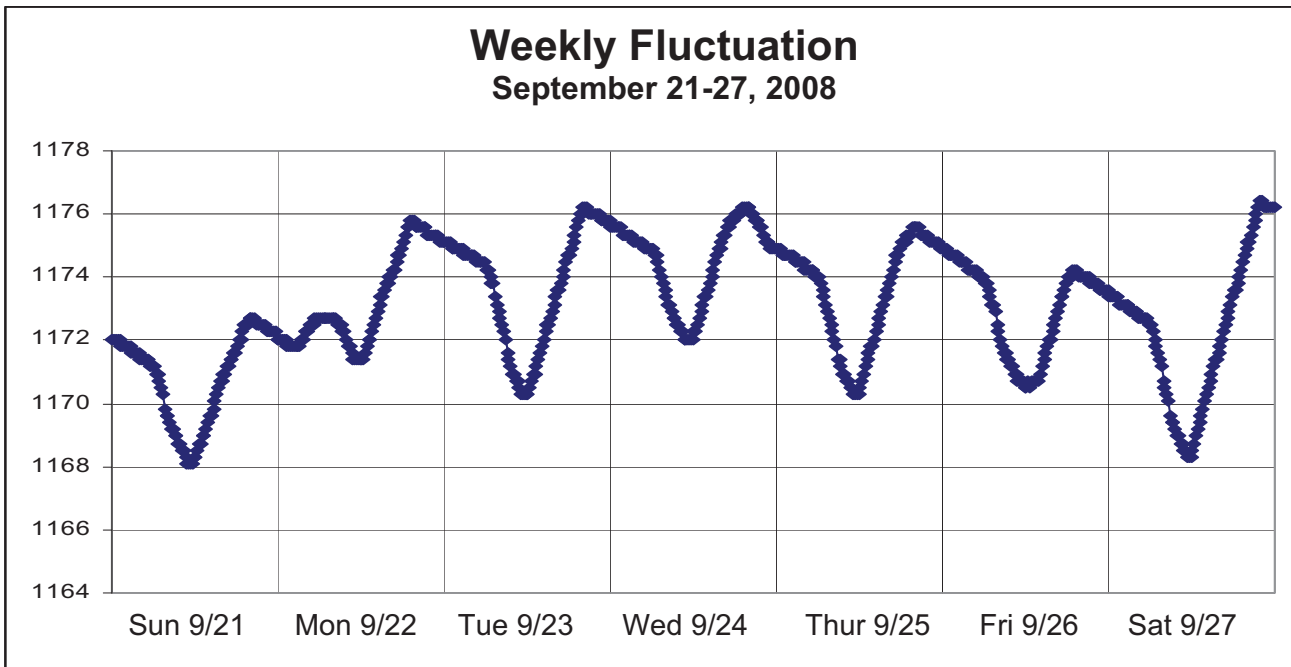
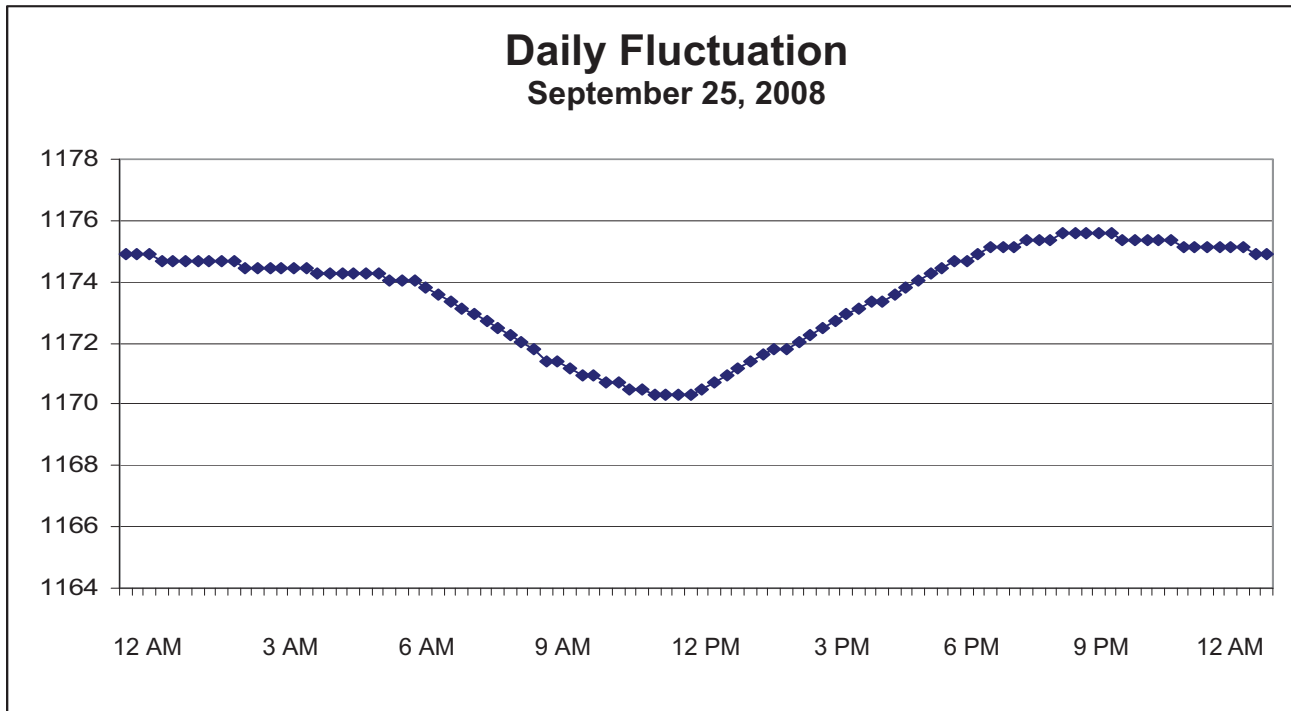


Figure K-4. Water Surface Elevations at Ralston Afterbay – Fall.



APPENDIX L
**Photographs of Ralston Car Top Boat Ramp and
Ralston Afterbay Sediment Removal Access Point**



Photo L-1. Entrance to Ralston Picnic Area and Car Top Boat Ramp. Car top boat ramp is located immediately left of people (7/23/08).



Photo L-2. Car Top Boat Ramp as viewed from parking area (7/23/08).



Photo L-3. Car Top Boat Ramp as viewed from lower part of ramp (7/23/08).



Photo L-4. Ralston Car Top Boat Ramp on November 12, 2008. This photograph was taken during PCWA's annual maintenance outage when the reservoir WSE was about 1,155 feet. Note the large rock in center of ramp.



Photo L-5. Sediment removal access point on Ralston Afterbay. This site is not a Project recreation facility but is sometimes used to access the reservoir. (11/12/08).

APPENDIX M

Photographs of Select Safety Features in the Ralston Afterbay Area

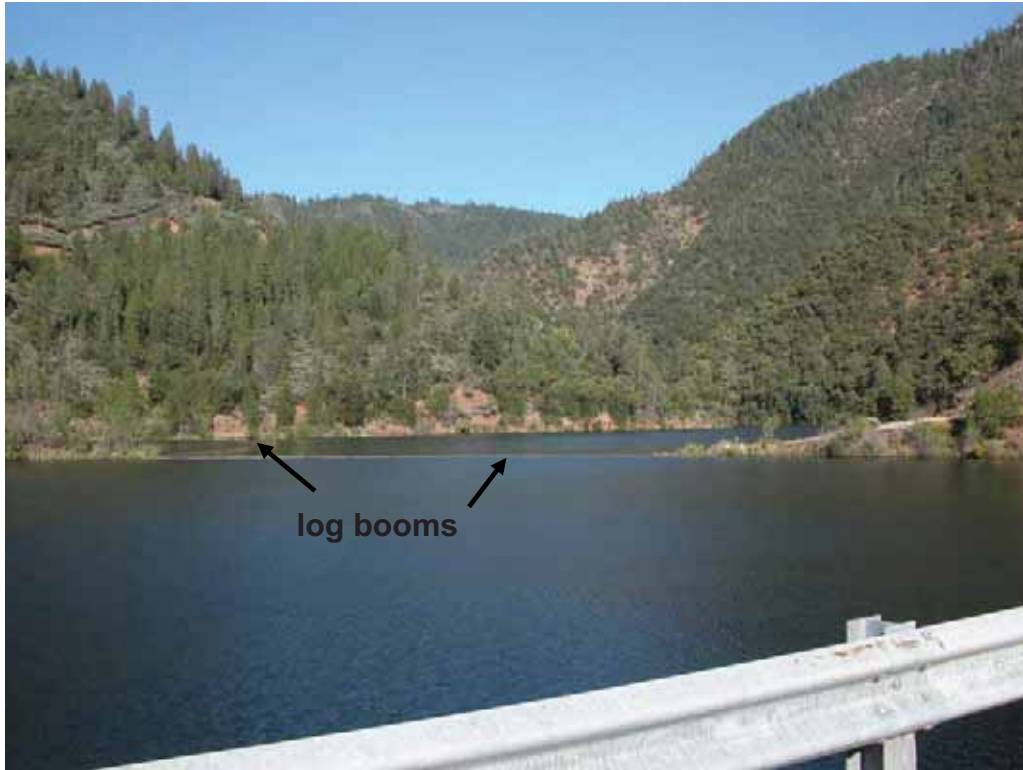


Photo M-1. View of log booms as viewed from Ralston Afterbay Dam



Photo M-2. View of public safety fence (perimeter fence) surrounding Ralston Powerhouse. Also note slope fence along road way. The slope fence is prevents rocks from falling on to the roadway.



Photo M-3. View of safety railing across Ralston Afterbay Dam and perimeter fencing around the Ralston Afterbay Dam Generator Building. Also note locked fence and gate to prohibit access to dam.