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7.9 RECREATION RESOURCES AFFECTED ENVIRONMENT

This section describes the recreation resources and opportunities in the vicinity of the Middle Fork American River Project (MFP or Project). The information presented in this section addresses the Federal Energy Regulatory Commission's (FERC or Commission) informational requirements and is organized in the following subsections:

- Information Sources;
- Overview of the Recreation Resources in the Middle Fork American River Watershed (Watershed);
- Specially Designated areas in the Watershed;
- MFP Recreation Facilities;
- Reservoir Recreation Opportunities;
- Shoreline Management;
- Stream-based Recreation Opportunities; and
- Potential Future Recreation Use and Demand.

Placer County Water Agency (PCWA) evaluated the various comprehensive plans identified on the FERC's July 2010 List of Comprehensive Plans and found a number of plans that summarize current and future recreation needs. These plans are discussed in Section 12.5 – Consistency with Comprehensive Plans and are, therefore, not discussed in this section.

7.9.1 Information Sources

The information contained in this section is based on a review of relevant information, extensive agency and stakeholder consultation, and on the results of land and recreation studies conducted by PCWA as part of the MFP relicensing process. PCWA's land and recreation studies were conducted in accordance with Technical Study Plans (TSP) that were developed in consultation with the Land Technical Working Group (TWG) and the Recreation TWG. These TSPs were included in PCWA's Pre-Application Document (PAD) (PCWA 2007), and approved by FERC in a letter dated July 18, 2008. Detailed descriptions of the MFP land and recreation study methods and results are available in the following Technical Study Reports (TSR), which are included in Supporting Document (SD) B:

- LAND 1 – Transportation System TSR (LAND 1 – TSR) (PCWA 2011a; SD B) describes the Project roads and trails based on survey information collected by PCWA in 2008. This report includes information about the location and condition of signage located along Project roads, including recreation-related directional and safety signage.

- LAND 3 – Emergency Action and Public Safety TSR (LAND 3 – TSR) (PCWA 2011b; SD B) describes PCWA's: (1) Emergency Action Plan (EAP); (2) procedures for Project emergencies not covered under the EAP; and (3) inter-agency notification and coordination procedures. In addition, this report includes a description of the public safety features associated with the MFP, including those that pertain to recreation.

- REC 1 – Recreation Use and Facilities Assessment TSR (REC 1 – TSR) (PCWA 2011c; SD B) includes a detailed description of the developed recreation facilities associated with the MFP, including an inventory of the facility features, condition assessments, and representative photographs. In addition, this report provides estimates of recreation use at: (1) the MFP recreation facilities; (2) dispersed concentrated use areas (DCUA) in the vicinity of the MFP; and (3) select locations along the peaking reach. The use estimates are based on vehicle counts conducted by PCWA from May 2007 through May 2008, and on use and occupancy data provided by the Tahoe National Forest (TNF) and the Eldorado National Forest (ENF).

- REC 2 – Recreation Visitor Surveys TSR (REC 2 – TSR) (PCWA 2011d; SD B) describes the results of recreation visitor surveys and reservoir angler surveys conducted by PCWA in 2008. A total of 968 people participated in the recreation visitor survey, which was administered at all of MFP recreation facilities, at select DCUAs and at five sites located along the peaking reach. A total of 213 people participated in the reservoir angler surveys, which were conducted at French Meadows and Hell Hole reservoirs and at Ralston Afterbay. Detailed survey results are included in the REC 2 – TSR appendices (PCWA 2011d; SD B).

- REC 3 – Reservoir Recreation Opportunities TSR (REC 3 – TSR) (PCWA 2011e; SD B) describes reservoir-based recreation opportunities associated with the MFP. Specifically, it addresses: (1) reservoir based recreation opportunities relative to water surface elevation (WSE); (2) boat ramp functionality as it relates to WSE; (3) reservoir access; (4) safety conditions; (5) use conflicts; (6) existing and future operational constraints; and (7) future recreation demand.

- REC 4 – Stream-based Recreation Opportunities TSR (REC 4 – TSR) (PCWA 2011f; SD B) describes: (1) general stream-based recreation opportunities in the bypass and peaking reaches associated with the MFP; (2) flows (hydrology) in the bypass and peaking reaches under impaired and unimpaired conditions, as they relate to specific stream-based recreation opportunities; and (3) provides detailed activity-specific information regarding trail use at stream crossings, angling, whitewater boating, and mining in the bypass and peaking reaches. In addition, this report provides information about how flow information is disseminated to the public and identifies potential public safety issues related to stream-based recreation.

- REC 4 – Contingency Whitewater Boating TSR (REC 4 – Contingency TSR) (PCWA 2011g; SD B) describes the results of controlled flow studies conducted by PCWA on select bypass reaches in 2010.

The following subsections summarize the key findings developed during the relicensing process.

7.9.2 Overview of Recreation Resources in the Middle Fork American River Watershed

The MFP recreation facilities are situated in the foothills and mountainous uplands of the western slope of the central Sierra Nevada, in the Watershed. The MFP includes seven campgrounds, three group campgrounds, three picnic areas, four boat ramps, a vista, and a recreational vehicle (RV) dump station. The MFP recreation facilities are identified in Table 7.9-1 by area and are shown on Maps 7.9-1a–d, with respect to the primary MFP facilities, land jurisdictions, and FERC Project boundary. The MFP recreation facilities are discussed further in Section 7.9.4. In addition, detailed information about the Project recreation facilities and associated use is available in the REC 1 – TSR (PCWA 2011c; SD B).

The MFP recreation facilities are primarily concentrated around French Meadows Reservoir and, to a lesser extent, Hell Hole Reservoir. Individual MFP recreation facilities are also located near the South Fork Long Canyon Diversion Pool and Ralston Afterbay. There are no MFP recreation facilities in the Middle Fork Interbay area. French Meadows Reservoir, Hell Hole Reservoir, and Ralston Afterbay are the primary reservoirs associated with the MFP. The Middle Fork Interbay and the small diversion pools are too small to provide reservoir-based recreation opportunities; however, a limited amount of dispersed use occurs in the Duncan Creek Diversion area. Recreation opportunities associated with the MFP reservoirs is discussed in Section 7.9.5. Detailed information about recreation opportunities at MFP reservoirs is available in the REC 3 – TSR (PCWA 2011e; SD B).

All of the MFP recreation facilities, and most of the land within the FERC Project boundary, are located primarily within the ENF and the TNF or on land owned by PCWA. Private parcels are present in the vicinity of the MFP and intersect the FERC Project boundary at various locations. These private parcels are primarily owned by timber companies. Land use within the FERC Project boundary is focused on hydropower generation and recreation. Land outside the FERC Project boundary is managed for recreation, timber harvest, grazing, natural resource protection, and to a lesser extent mining. Land uses in the Watershed are discussed in Section 7.10 – Land Use Affected Environment. The FERC Project boundary is described in detail in Exhibits A and G (Volume 1) of this License Application.

The Watershed is rural in nature and sparsely populated. The MFP area is characterized by steep canyons and rugged terrain, with dense forests and woodlands; and there are no residential or commercial developments in the immediate vicinity. Several paved roads provide the primary access to the MFP recreation facilities and

other recreation areas. These include Mosquito Ridge Road, Ralston Ridge Road, Blacksmith Flat Road, and Soda Springs – Riverton Road. Access to more remote locations is possible using ancillary roads and trails associated with the United States Department of Agriculture-Forest Service (USDA-FS or Forest Service) Transportation System.

The MFP does not include any developed hiking trails, but hiking occurs throughout the area on a variety of USDA-FS system trails and other non-system trails. Popular trails in the vicinity of the MFP are shown Maps 7.9-2a–b. Most of the trails within the National Forest are considered multi-purpose and are used for hiking, mountain biking, and equestrian use. Off-highway vehicle (OHV) use is restricted to designated areas and is limited due to steep terrain. The Auburn State Recreation Area (ASRA), located downstream of Ralston Afterbay, includes an extensive trail system used by bikers, hikers, and equestrians.

Operation of the MFP affects flows on the following river reaches, referred to as bypass reaches:

- Middle Fork American River from French Meadows Dam to the Middle Fork Interbay;
- Middle Fork American River from Middle Fork Interbay to Ralston Afterbay;
- Duncan Creek from the Duncan Creek Diversion to the confluence with the Middle Fork American River;
- Rubicon River from Hell Hole Dam to Ralston Afterbay;
- North Fork Long Canyon Creek from the North Fork Long Canyon Creek Diversion to the confluence with South Fork Long Canyon Creek;
- South Fork Long Canyon Creek from the South Fork Long Canyon Creek Diversion to the confluence with North Fork Long Canyon Creek; and
- Long Canyon Creek to the confluence with the Rubicon River.

These river reaches bisect rugged terrain with limited vehicle access. Therefore, recreation use is generally limited to areas in the immediate vicinity of the MFP facilities or to areas where USDA-FS roads and trails provide access. Except for the Rubicon River, the remainder of the bypass reaches have limited to no documented whitewater boating use. Recreation opportunities and use along the bypass reaches are discussed in Section 7.9.6.1. In addition, detailed information about the recreation opportunities and use along the bypass reaches is available in the REC 4 – TSR (PCWA 2011f; SD B) and the REC 4 – Contingency TSR (PCWA 2011g; SD B).

Operation of the MFP also affects flows in the Middle Fork American River and the North Fork American River downstream of Oxbow Powerhouse, the lowest elevation

powerhouse in the MFP system. Combined, these reaches are referred to as the peaking reach, as follows:

- Middle Fork American River from Ralston Afterbay to the confluence of the North Fork American River; and

- North Fork American River from the confluence of the Middle Fork American River to the Folsom Reservoir high-water mark.

The peaking reach bisects Auburn Project Lands, which are primarily owned by the United States Bureau of Reclamation (USBR or Reclamation) and operated by California State Parks under contract with USBR. Operation of the MFP affects stream-based activities such as angling, whitewater boating, and stream-crossing along trails. Accordingly, the MFP relicensing studies have focused on these activities. Recreation opportunities and use along the peaking reach is discussed in Section 7.9.6.2. In addition, detailed information about stream-based recreation opportunities and use on the peaking reach is available in the REC 4 – TSR (PCWA 2011f; SD B).

The following subsections describe the Middle Fork American River Watershed in more detail, beginning with specially designated areas.

7.9.3 Specially Designated Areas

Several specially designated areas are present in the Middle Fork American River Watershed. These areas are shown on Map 7.9-3 and briefly described in the following subsections.

7.9.3.1 National Wild and Scenic Rivers

Portions of the North Fork American River, the Middle Fork American River, and the Rubicon River have been identified as eligible or suitable for inclusion in the National Wild and Scenic River (W&SR) system. The current status of these rivers is described below.

North Fork and Middle Fork American River

In 1978, 38.3 miles of the North Fork American River from near Heath Springs to the Colfax Iowa-Hill- Bridge crossing was designated as “Wild” under the National Wild and Scenic Rivers Act (WSRA) based on a study conducted by the USDA-FS. Portions of this river segment are also protected under the California W&SR system. This segment is shown on Map 7.9-3. As indicated, this segment is located upstream of Lake Clementine. This segment does not intersect the FERC Project boundary and is not affected by operation of the MFP.

In January 1993, the USBR published a report entitled, “American River Water Resources Investigation, Wild and Scenic Rivers Eligibility and Preliminary Classification” (USBR 1993). In this study report, the USBR identified two segments on the North Fork American River and one segment on the Middle Fork American River as

eligible for inclusion in the National W&SR system. These segments are all located downstream from the segment identified above and are delineated in the USBR report as follows:

- **North Fork American River:** From Colfax-Iowa Hill Bridge to the upper end of Lake Clementine (approximately 16 miles).

- **North Fork American River:** From the North Fork Debris Dam to the intake of the Auburn Dam diversion tunnel (approximately 5 miles).

- **Middle Fork American River:** From Oxbow Dam to the confluence with the North Fork American River (approximately 23 miles).

These river segments are not located within the existing FERC Project boundary of the MFP, with the exception of a small segment of the Middle Fork American River below the Ralston Afterbay Dam (0.5 mile). MFP operations affect streamflow in the Middle Fork American River and a portion of the North Fork American River.

According to the USBR, a suitability study has not been conducted on any of these segments and there are no plans to conduct a suitability study at this time (R. Schroeder, pers. comm. 2010). Regardless, federal agencies, including the USBR, manage the river and the area within 0.25 mile either side of the river to preserve the values for which the river is considered eligible under the W&SR.

Rubicon River

Three segments of the Rubicon River, from Hell Hole Dam to Ralston Afterbay, were found to be eligible and suitable for inclusion in the National W&SR system by the ENF. The background behind the eligibility and suitability studies for the Rubicon River is complex and is explained in detail in Appendix A of PCWA's PAD Errata (PCWA 2008). In 2007, the ENF adjusted their original classification information to reflect on-the-ground conditions, based on new information developed as part of their motor vehicle route designation process. The following are the most current segment descriptions provided by the USDA-FS.

- **Segment 1:** Hell Hole Dam to 1.5 miles below Ellicott Bridge (approximately 10.5 miles) meets the "Scenic" classification criteria.

- **Segment 2:** 1.5 miles below Ellicott Bridge to a point upstream of Ralston Afterbay (approximately 18 miles) meets the "Wild" classification criteria.

- **Segment 3:** A point immediately upstream of the Ralston Ridge Road to Ralston Afterbay and Ralston Powerhouse (0.5 mile) meets the "Scenic" classification criteria.

None of these segments have been formally included in the National W&SR system. Regardless, the ENF manages the Rubicon River, and a 0.25-mile corridor on each side of the river, to protect the outstandingly remarkable values (ORV) identified in their

W&SR eligibility and suitability studies. The ORV for which the Rubicon River is eligible is “fisheries”.

None of these river segments are located within the existing FERC Project boundary of the MFP, with the exception of a small segment of the Rubicon River below Hell Hole Dam (0.48 mile) and a small section (0.12 mile) of the Rubicon River above Ralston Afterbay. Operation of the MFP affects streamflow in the Rubicon River.

7.9.3.2 State Protected River Segments

The Rubicon River, from Hell Hole Reservoir to Ralston Afterbay, is designated by the State of California as a Wild Trout Stream. In 1971, the California Department of Fish and Game (CDFG) established the California Wild Trout Program to protect and enhance wild trout fisheries. The primary purpose of the program is to preserve attractive stream trout fisheries, which are naturally sustained by wild strains of trout.

Pursuant to its designation as a Wild Trout stream, CDFG developed the “Rubicon River Wild Trout Management Plan (Plan)” (CDFG 1979). This plan summarized the trout resource status and proposed management goals, direction, activities, and recommendations for the Rubicon River. The stated goals of the Plan are to:

- Protect the aquatic environment of the Rubicon River and its tributaries;
- Perpetuate a naturally sustained, balanced population of rainbow trout; and
- Provide a quality backcountry angling experience characterized by a naturally scenic streamside environment.

7.9.3.3 National Trails System

One National Recreation Trail, the Western States Trail, traverses the Middle Fork American River Watershed in the vicinity of the MFP. Two other nationally recognized trails traverse the uppermost portions of the Watershed, upstream of the MFP facilities. These are the Pacific Crest Trail, which is designated as a National Scenic Trail and the Rubicon Trail, a nationally recognized OHV trail. The locations of these trails are shown on Maps 7.9-2a–b along with some of the more popular local trails. The Western States Trail, the Pacific Crest Trail, and the Rubicon Trail are briefly described in the following.

Western States Trail

The Western States Trail (WST) traverses the Watershed in the vicinity of the MFP. A detailed description of the WST is available in PCWA’s PAD Errata (PCWA 2008) and in the REC 4 – TSR (PCWA 2011f; SD B). The WST, including its route variations, is shown on Maps 7.9-2a–b), and briefly described in the following.

Within the Watershed, the WST generally begins near Squaw Valley near Tahoe City northwest of Lake Tahoe, California. From there the WST trends westward, through the Granite Chief Wilderness, where it bifurcates, with one route (southern route) paralleling

the Middle Fork American River and the north shore of French Meadows Reservoir and the other route (northern route) traversing Red Star Ridge to Robison Flat. The southern route turns northward near French Meadows Dam, crosses Duncan Creek upstream of the Duncan Creek Diversion Dam, and then converges with the northern route near Robinson Flat. From Robinson Flat, the WST continues southwestward to the Foresthill area, where it descends into the Middle Fork American River canyon and eventually converges with the Middle Fork American River approximately 9.6 miles downstream of Ralston Afterbay. From there, the WST parallels the north side of the Middle Fork American River, eventually crossing the river at the Ruck-a-Chucky Recreation area, which is located approximately 15 miles downstream of Oxbow Powerhouse. An alternative route crosses the Middle Fork American River at Poverty Bar, which is located approximately 18 miles downstream of Oxbow Powerhouse. After crossing the river, the WST continues along the south side of the Middle Fork American River until it crosses the river again at "No Hands Bridge". This bridge is located near the confluence of the Middle and North forks of the American River. From the bridge, the WST ascends out of the canyon towards Auburn. Various trails associated with the ASRA trail system tie into the WST.

The WST is referred to by several names with various designations, depending upon location. The section of trail extending from Highway 89 near Squaw Valley to the TNF boundary near Foresthill is generally referred to as the WST and is currently proposed as a National Recreation Trail. The section of the WST extending from the western boundary of the TNF near Foresthill to the western boundary of Folsom Lake (Beal's Point) is referred to as the Pioneer Express Western States Trail (or Pioneer Express Trail) and was designated a National Recreation Trail by the Secretary of the Interior in 1975.

In addition to the National Recreation Trail designations, two segments of the WST are included on the National Register of Historic Places (NRHP). Specifically, a section of trail between Last Chance and Michigan Bluff was added to the NRHP in 1992. In addition, the "No Hands Bridge" (also known as the Mountain Quarries Bridge) was added to the NRHP in 2004.

In 2008 and 2009, Senator Barbara Boxer introduced a bill to amend the National Trails System Act to provide for the study of the WST, from Squaw Valley to Auburn, for designation as a National Historic and Scenic Trail. In a resolution dated June 12, 2007, and forwarded to Senators Boxer and Feinstein, the Placer County Board of Supervisors expressed its support for Congressional designation of the WST (with Tevis Cup Loop) as a National Historic and Scenic Trail. Similarly, on August 16, 2007, the PCWA Board of Directors adopted a resolution supporting the study and designation of the 100-mile WST from Squaw Valley to Auburn as a National Historic and Scenic Trail. The resolution was developed at the request of the Western States Trail Foundation (Placer County 2007).

The WST is used for two world-class endurance races: the Tevis Cup Equestrian Ride and the Western States 100-Endurance Run. As shown on Map 7.9-2b, both races cross the Middle Fork American River downstream of Oxbow Powerhouse at Ruck-a-

Chucky Recreation Area (also known as Drivers Flat or Greenwood) or Poverty Bar. After crossing, both race routes traverse the south side of the Middle Fork American River to the confluence of the North Fork American River where racers cross the river again. During the races, MFP operations are modified as much as practicable to reduce flow releases into the Middle Fork American River downstream of Oxbow Powerhouse to facilitate river crossings. A detailed description of these crossings and PCWA's operations during these trail events is available in the REC 4 – TSR (PCWA 2011f; SD B).

Pacific Crest Trail

The Pacific Crest Trail (PCT) traverses the crest of the Sierra and the northeastern portion of the Middle Fork American River Watershed. With a few exceptions, the PCT is one continuous trail that extends more than 2,650 miles from Mexico to Canada. At its nearest point to the MFP, the PCT is located about 5 miles east of Hell Hole Reservoir. The PCT was designated as a National Scenic Trail in 1968 and connects to the WST described above.

The Rubicon Trail

The Rubicon Trail is a world-renowned four-wheel drive route. The entire route extends from Georgetown to Lake Tahoe. Some of the route is paved and some is not. As shown on Map 7.9-2a, the OHV segment begins near the north shore of Loon Lake, located in the Crystal Range in El Dorado county, and heads generally eastward, terminating near Tahoma on the west shore of Lake Tahoe. MFP operations do not affect the Rubicon Trail. Additionally, the Rubicon Trail is not accessible by motor vehicle from any of the MFP facilities or roads.

7.9.3.4 Wilderness Areas

None of the MFP facilities are located within a designated Wilderness Area. However, as shown on Map 7.9-3, the Granite Chief Wilderness Area is located in the upper portion of the Watershed, immediately east of the MFP and can be accessed by the same road system used to travel to the MFP recreation facilities. At its closest points, the Granite Chief Wilderness boundary is located approximately 0.25 mile east of Hell Hole Reservoir and approximately 4.5 miles east of French Meadows Reservoir. A portion of the Desolation Wilderness is also situated in the Watershed. At its closest point, the Desolation Wilderness boundary is about 8 miles south east of Hell Hole Reservoir. As shown on Map 7.9-3, the upper Rubicon River bisects the Desolation Wilderness and the southern boundary of Granite Chief Wilderness before entering Hell Hole Reservoir.

7.9.3.5 Regionally or Nationally Important Recreation Areas

The peaking reach (defined in Section 7.9.2) bisects Auburn Project Lands, which consist of federal lands and private lands reserved for the Auburn Dam and Reservoir Project (totaling 41,000 acres) that was Congressionally–authorized in 1965. Construction of the Auburn Dam and Reservoir Project, initiated by the USBR in 1967,

was halted in the 1980's. In 2008, the State Water Resources Control Board revoked the USBR's water rights permits for the Auburn Dam, however, the Auburn Dam and Reservoir Project remains a Congressionally-authorized project.

The Auburn Project Lands include USBR fee title lands (26,000 acres), and other lands (15,000 acres) owned by Bureau of Land Management (BLM), USDA-FS, United States Army Corps of Engineers (USACE), and private land owners (USBR 1992). Land use planning and resource management on all federal lands within Auburn Project Lands has been granted to the USBR in accordance with interagency agreements (Section 7.1 – Description of the River Basin, Attachment A). The Auburn Project Lands boundary is shown on Map 7.1-4 (Section 7.1 – Description of the River Basin).

In 1977, the USBR entered into an interim agreement with California State Parks to assume responsibility for management of public use on Auburn Project Lands. California State Parks continues management of public use on these lands at the discretion of USBR. Funding to manage public use and provide recreational opportunities and service within the Auburn Project Lands is provided in part from USBR, State of California, and user fees.

In 1978, the USBR developed a General Plan for the Auburn Project Lands, which designated that the area be managed as a reservoir-based recreation area, following construction of the Auburn Dam and reservoir. In 1979, the State of California incorporated Auburn Project Lands into the state park system as the ASRA (USBR 1992). Lands reserved for the Auburn Dam and Reservoir Project (Auburn Project Lands), as managed by California State Parks, are referred to in this License Application as ASRA.

In 1992, due to the delays in constructing Auburn Dam and Reservoir Project, the USBR developed an Interim Management Plan (IRMP), which was designed to guide use of ASRA, consistent with its "interim status" as a river-based recreation area. In 2006, USBR and California State Parks began collaborating on a joint Updated General Plan and Resource Management Plan for ASRA. However, in a letter dated May 11, 2010, California State Parks notified the stakeholders involved in the planning process that the "planning process to develop a new General Plan and Interim Resource Management Plan (GP/IRMP) for ASRA and the Auburn Dam Project Lands has been suspended indefinitely at the request of the U.S. Bureau of Reclamation (Reclamation)". California State Parks also stated in the letter that "Reclamation had indicated that it would not be prudent to proceed with the preparation of the GP/IRMP until the future management is resolved, therefore the GP/IRMP process is suspended" (DPR 2010). Therefore, public use in ASRA is currently managed in accordance with the Interim Resource Management Plan (USBR 1992).

As shown on Map 7.9-2b, ASRA encompasses land along 40 miles of the North and Middle Fork American rivers. The main access is from Auburn, either on Highway 49 or the Auburn-Foresthill Road. The area offers a wide variety of recreation opportunities to approximately 900,000 visitors a year.

The ASRA includes over 100 miles of hiking, biking, and equestrian trails that traverse the steep American River canyon. Primary recreational activities include hiking, swimming, boating, hunting, fishing, camping, mountain biking, gold panning, off-highway motorcycle riding, and horseback riding. Whitewater recreation is also very popular along both forks of the river. Until recently, management of ASRA was primarily funded by the USBR, and to a lesser extent, the State of California and through user fees. Recent reductions in state and federal funding have forced California State Parks to reduce staff and increase user fees.

None of the MFP recreation facilities are located in ASRA. The Indian Bar Rafter Access is located immediately adjacent to the Oxbow Powerhouse, on Forest Service land, and is primarily used as a put-in by whitewater boaters. In general, operation of the MFP has no affect on land-based recreation activities in the ASRA. However, operation of the MFP affects flows in the peaking reach, which may affect stream-based recreation opportunities along the peaking reach, primarily whitewater boating, angling, and stream crossing where ASRA system trails intersect the Middle Fork and North Fork of the American River. Therefore, PCWA conducted studies to identify how the MFP affects angling, whitewater boating, and trail crossing. The results of these studies are summarized in Section 7.9.6.2 and documented in detail in the REC 4 – TSR (PCWA 2011f; SD B).

7.9.3.6 Other Protected Areas

A portion of the Watershed has been designated as a State Game Refuge. As shown on Map 7.9-3, the refuge boundaries encompass French Meadows Reservoir and extend roughly from the west end of French Meadows Reservoir to the northwest portion of the Granite Chief Wilderness Area. While the designation is intended primarily to protect habitat used by the Blue Canyon mule deer herd, California state law prohibits hunting of any species within a State Game Refuge. State law also prohibits possession or discharge of firearms, pellet guns, and bows and arrows within the refuge.

7.9.4 Middle Fork Project Recreation Facilities

The following subsections describe the MFP recreation facilities, organized by area. In addition to a general overview, each subsection covers the following topics: operation and maintenance; recreation activities; recreation use; facility capacity and utilization; and public safety. Reservoir opportunities are discussed in Section 7.9.5 and stream-based recreation opportunities are discussed in Section 7.9.6.

7.9.4.1 French Meadows Reservoir Area

French Meadows Reservoir is located on the Middle Fork American River 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. Thousands of forested acres west of the dam were consumed in the Star Fire in 2001.

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 MFP recreation facilities, which are identified and described in Table 7.9-1. A detailed description of the MFP recreation facilities, including an inventory of the facility amenities, representative photographs, and a condition assessment, is available in the REC 1 – TSR (PCWA 2011c; SD B).

The locations of the recreation facilities in the French Meadows Reservoir area are shown on Map 7.9-1a, which also shows the locations of the primary MFP facilities and land ownership. As indicated on Map 7.9-1a, Ahart Campground, Gates Group Campground, Coyote Group Campground, and Lewis Campground are not contiguous to the reservoir. French Meadows Campground is located on the south shore of the reservoir, near the shoreline. The French Meadows RV Dump Station is located along Forest Route (FR) 96, across from the French Meadows Administration buildings. The French Meadows Administration buildings are not MFP facilities. Poppy Campground is located on the north shore of the reservoir and can only be reached by boat or by hiking along a short (0.7-mile) segment of the WST. 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, respectively, which provide day use opportunities near the reservoir.

Camping in the French Meadows Reservoir area is permitted only in the developed camping areas (TNF website, USDA-FS 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.

The French Meadows Reservoir area is typically accessible from about Memorial Day to November 1. However, during some years, snow may limit access to the area until the end of May.

Operation and Maintenance

French Meadows Reservoir and the associated MFP recreation facilities are located within the boundaries of the TNF. Routine recreation facility operation and maintenance activities are currently carried out by the TNF, paid for in part with funding provided by PCWA in accordance with an ongoing Collection Agreement with the TNF (No. 08-CO-11051700-009).

All of the campgrounds in the French Meadows Reservoir area are currently operated and maintained by a concessionaire, under contract with the TNF. Use fees are set by the concessionaire, but must be approved by the Forest Service. According to the TNF, aside from collecting fees, the concessionaire is responsible for: cleaning; maintenance;

vegetation removal; repair or replacement of missing, damaged, or vandalized features (e.g., picnic tables); removal of hazard trees; litter pick-up; and garbage removal.

Recreation Activities

A total of 316 people intercepted in the French Meadows Reservoir area participated in the REC 2 – General Visitor Surveys. The survey respondents indicated they participated in the following activities during their visit (note: multiple responses were accepted):

- Camping at a developed site – 82.9% (262 people);
- Reservoir recreation – 48.4% (153 people);
- Fishing – 36.7% (116 people);
- Day use along a stream/river – 7.9% (25 people);
- Day use at a developed site – 5.1% (16 people); and
- Day use or camping in undeveloped areas – 3.8% (12 people).

These survey participants were also asked to identify the main (one) activity they participated in during their trip. A total of 168 people provided valid responses to this question. The most frequent response was "camping in a developed site" (51.2%) followed by "reservoir fishing" (19.0%). Additional survey results are available in the REC 2 – TSR (PCWA 2011d; SD B).

Recreation Use

PCWA developed use estimates for the MFP recreation facilities in the French Meadows Reservoir area using data provided by the USDA-FS and vehicle count data collected by PCWA from May 2007 through May 2008. Detailed use information for each Project recreation facility is available in the REC 1 – TSR (PCWA 2011c; SD B), and summarized by facility in Table 7.9-2. The information on Table 7.9-2 is reported in Recreation Visitor Days (RVD). An RVD equals one person recreating for 12 hours or any combination of people and hours equaling 12 hours.

As indicated on Table 7.9-2, recreation-use estimates for the French Meadows Reservoir area totaled 29,251 RVDs, with most of that use occurring during the summer period (May 26–September 3, 2007). In general, recreation use in the area increased through the late spring, peaked during the summer, and declined during the fall. Use during the winter months was very low because the area was inaccessible due to snow.

Facility Capacity and Utilization

Table 7.9-3 summarizes the capacity of each of the developed MFP recreation facilities, and the percent of that capacity that was utilized based on the use data collected in 2007 and 2008. The percent of facility capacity was calculated as follows:

- % of Campground Facility Capacity = Average number of occupied campsites ÷ total number of available campsites

- % of Day Use Area Facility Capacity = Average number of vehicles counted ÷ total number of parking spaces available

According to the USDA-FS, campsite and picnic site capacity is limited to six people at one time (PAOT). Therefore, the PAOT capacity of each facility equals the number of sites multiplied by six. The percent PAOT capacity was calculated as follows:

- % of Campground PAOT Capacity = Average number of people on site based on either vehicle count data or campground occupancy data ÷ total PAOT capacity

- % of Picnic Area PAOT Capacity = Average number of people on site based on vehicle count data ÷ total PAOT capacity

With the exception of group campgrounds, the use and capacity data indicate that the developed MFP recreation facilities in the French Meadows Reservoir area were substantially under-utilized during weekdays, weekends, and holidays. The group campgrounds were utilized at a higher rate than the other campgrounds and day use areas. During the summer of 2008, facility capacity utilization at Coyote Group Campground ranged from a low of 13% on weekdays to a high of 58% on weekends. Facility capacity utilization at Gates Group Campground ranged from a low of 23% on weekdays to a high of 67% on weekends.

Public Safety

PCWA maintains a variety of programs and measures to ensure public health and safety in the French Meadows Reservoir area, 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 – TSR (PCWA 2011b; SD B) and the REC 3 – TSR (PCWA 2011e; SD B), which also include inventories of all safety and recreation-related signage, respectively. The safety features that PCWA maintains in the French Meadows Reservoir area are summarized in the following.

- **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.

- **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.

- **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.

- **Gates:** PCWA has installed gates in certain locations to limit vehicular access onto MFP roads. A locked gate prohibits vehicle access by the public to the French Meadows – Hell Hole Tunnel Gatehouse area from FR 96. In addition, a gate prohibits vehicle access by the public to the Duncan Creek – Middle Fork Tunnel Portal area.

- **Guardrails:** 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 guardrails along both sides of the top of the dam for safety purposes.

- **Signage:** PCWA and the USDA-FS maintain signs of various types to provide MFP-related information to the public and to warn the public about potentially hazardous conditions or areas.

7.9.4.2 Hell Hole Reservoir Area

Hell Hole Reservoir is located on the Rubicon River at an elevation of approximately 4,630 feet 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.

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 MFP recreation facilities, which are identified and described in Table 7.9-1. A detailed description of the MFP recreation facilities, including an inventory of the facility amenities, representative photographs, and a condition assessment, is available in the REC 1 – TSR (PCWA 2011c; SD B).

The locations of the MFP recreation facilities in the Hell Hole Reservoir area are shown on Map 7.9-1b, 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 immediately adjacent to Hell Hole 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. Camping in undeveloped areas is allowed by the ENF. A limited amount of dispersed use occurs in the Hell Hole Reservoir area, but the steep terrain and sparse road access generally limits dispersed use.

The Hell Hole Reservoir area is typically accessible from about May 15 to November 1. However, in some years, snow may limit access to the area until the end of May.

Operation and Maintenance

Hell Hole Reservoir and the associated MFP recreation facilities are located within the boundaries of the ENF. Routine recreation facility operation and maintenance activities are currently carried out by the ENF, paid for in part with funding provided by PCWA in accordance with an ongoing Collection Agreement with the TNF (No. 08-CO-11050300-009). The ENF does not utilize concessionaires to run any of the MFP recreation facilities located in the Hell Hole area.

Recreation Activities

A total of 255 people intercepted in the Hell Hole Reservoir area participated in the REC 2 – General Visitor Surveys. The survey participants indicated they participated in the following activities during their visit (note: multiple responses were accepted):

- Camping at a developed site – 65.1% (166 people);
- Fishing – 49.4% (126 people);
- Reservoir recreation – 32.9% (84 people);
- Day use or camping in undeveloped areas – 11.4% (29 people);
- Day use along a stream/river – 5.1% (13 people); and
- Day use at a developed site – 4.7% (12 people).

The survey participants were also asked to identify the main (one) activity they participated in during their trip. A total of 152 people provided valid responses to this question. The most frequent response was “reservoir fishing” (39.5%), followed by “camping in developed site” (28.3%). Additional survey results are available in the REC 2 – TSR (PCWA 2011d; SD B).

Recreation Use

PCWA developed use estimates for the MFP recreation facilities in the Hell Hole Reservoir area using vehicle count data collected by PCWA from May 2007 through May 2008. Detailed use information for each Project recreation facility in the Hell Hole Reservoir area is available in the REC 1 – TSR (PCWA 2011c; SD B), and summarized by facility in Table 7.9-2. The information on Table 7.9-2 is reported in RVDs.

As indicated on Table 7.9-2, during the 2007–2008 study period, recreation-use estimates for the Hell Hole Reservoir area totaled 8,391 RVDs, which is substantially lower than the French Meadows Reservoir area. Like French Meadows, recreation use in the Hell Hole Reservoir area increased through the late spring, peaked during the

summer, and declined during the fall. Use during the winter months was very low, because the area was inaccessible due to snow. Most of the use in the Hell Hole Reservoir area occurred during the summer period (roughly Memorial Day through Labor Day).

Facility Capacity and Utilization

Table 7.9-3 summarizes the capacity of each of the developed MFP recreation facilities and the percent of that capacity that was utilized based on the use data collected in 2007 and 2008. The use and capacity data indicate that the developed MFP recreation facilities in the Hell Hole Reservoir area were under-utilized during weekdays, weekends, and holidays. During the study period, Upper Hell Hole Campground was substantially under-utilized, with less than 5% of the sites being utilized even on weekends and holidays. Hell Hole Boat Ramp was utilized more frequently, with facility utilization ranging from a low of 12% on weekdays to a high of 29% on weekends and holidays.

Public Safety

PCWA maintains a variety of programs and measures to ensure public health and safety in the Hell Hole Reservoir area. These programs and measures are described in detail in the LAND 3 –TSR (PCWA 2011b; SD B) and the REC 3 – TSR (PCWA 2011e; SD B), which also include inventories of all safety and recreation-related signage. The safety features that PCWA maintains in the Hell Hole Reservoir area are summarized in the following.

- **Audible Warning Devices:** PCWA maintains security alarms at all powerhouses, including French Meadows Powerhouse located on Hell Hole Reservoir; and at Hell Hole Powerhouse, located immediately downstream of Hell Hole Dam. The security alarms sound in the event of an unauthorized entry into the powerhouse.

- **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.

- **Public Safety 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. These fences restrict public access to PCWA's facilities and/or potentially hazardous areas.

- **Slope Fences:** PCWA has installed a slope fence adjacent to the French Meadows Powerhouse and Switchyard to protect the public from falling rocks.

- **Gates:** PCWA has installed gates in certain locations to limit vehicle access to select MFP facilities. Gates are present in the following locations in the Hell Hole Reservoir area: French Meadows Powerhouse Road, Hell Hole Dam Spillway

Northern Access Point Road, Operators Cottages and Shop Road, Hell Hole Dormitory Road, and Hell Hole Dam and Powerhouse Road. The latter prevents public access to Hell Hole Dam, Hell Hole Spillway, Hell Hole Powerhouse, and ancillary features such as a streamflow gage and weir, and communication and power lines.

- **Guardrails:** 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 guardrails along both sides of the top of the dam for public and worker safety purposes.

- **Signage:** PCWA and the ENF maintain signs of various types to provide MFP-related information to the public and to warn the public about potentially hazardous conditions or areas.

7.9.4.3 Duncan Creek Diversion Area

Duncan Creek Diversion Dam and Duncan Creek Diversion Pool are located on Duncan Creek, a tributary to the Middle Fork American River. The facilities are located at an elevation of 5,275 feet msl, about 1.5 miles northwest of French Meadows Reservoir (Map 7.9-1a). The pool is relatively small, with a gross storage capacity of approximately 20 acre-feet (ac-ft) and a maximum surface area of approximately 3 acres. There are no developed MFP recreation facilities in the Duncan Creek Diversion area. However, dispersed use occurs in the vicinity of the Duncan Creek Diversion.

Operation and Maintenance

The Duncan Creek Diversion area is located in the TNF. According to the TNF, dispersed use results in resource damage and sanitation issues in the Duncan Creek Diversion area. The TNF addresses these issues, in part, through regular patrols and litter pick-up.

Recreation Activities

A total of five people intercepted in the Duncan Creek Diversion area participated in the REC 2 – General Visitor Surveys. The survey participants indicated they participated in the following activities during their visit (note: multiple responses were accepted):

- Day use or camping in undeveloped areas – 100% (5 people);

- Day use along a stream/river – 20.0% (1 person); and

- Fishing – 20.0% (1 person).

Additional survey results are available in the REC 2 – TSR (PCWA 2011d; SD B).

Recreation Use

PCWA developed use estimates for the Duncan Creek Diversion area using vehicle count data collected by PCWA from May 2007 through May 2008. Detailed use information is available in the REC 1 – TSR (PCWA 2011c; SD B) and summarized in Table 7.9-2. The information on Table 7.9-2 is reported in RVDs.

As indicated on Table 7.9-2, recreation use in the Duncan Creek area totaled 384 RVDs, ranging from a low of 20 RVDs during the winter/spring period to 333 RVDs during the summer period. Use in the Duncan Creek area was highest during the summer. The fall data may be unusually low because the Duncan Creek Diversion Dam area was inaccessible to the general public from September 1 through October 15, 2007 while PCWA constructed a new bridge over Duncan Creek. Winter/spring use was low because the area was inaccessible due to snow from about December 10, 2007 through May 1, 2008.

Facility Capacity and Utilization

There are no developed MFP recreation facilities in the Duncan Creek area. Therefore, facility capacity and utilization does not apply.

Public Safety

PCWA maintains several programs and measures to ensure public health and safety in the Duncan Creek Diversion area. These programs and measures are described in detail in the LAND 3 – TSR (PCWA 2011b; SD B), and summarized below.

- **Log Boom and Intake Grate:** PCWA maintains a log boom and intake grate in the Duncan Creek Diversion Pool. The purpose of the log boom and intake grate is to prohibit access to the Duncan Creek – French Meadows Reservoir Tunnel.

- **Signage:** PCWA and the TNF maintain signs of various types to provide MFP-related information to the public and to warn the public about potentially hazardous conditions or areas.

7.9.4.4 Long Canyon Creek Area

Long Canyon is a tributary to the Rubicon River. Long Canyon is fed by two forks, the North Fork and the South Fork (Map 7.9-1c). One MFP recreation facility is located along South Fork Long Canyon Creek, just upstream of the South Fork Long Canyon Diversion Dam. This facility is referred to as Middle Meadows Campground. The location of this facility is shown on Map 7.9-1c, which also shows the locations of the primary MFP facilities and land ownership. A detailed description of this facility, including an inventory of the facility amenities, representative photographs, and a condition assessment is available in the REC 1 – TSR (PCWA 2011c; SD B).

Middle Meadows Campground is a group campground consisting of two group campsites: one that can accommodate 25 PAOT and one that can accommodate

50 PAOT. Both units are fully accessible. The campground is generally open between May 15 and November 1, depending upon weather. The units may be used by reservation only.

Operation and Maintenance

Middle Meadows Campground is located within the boundaries of the ENF. Routine operation and maintenance activities at the campground are currently carried out by the ENF, paid for in part with funding provided by PCWA in accordance with an ongoing Collection Agreement with the TNF (No. 08-CO-11050300-009). The ENF does not utilize a concessionaire to run this campground.

Recreation Activities

A total of 51 people intercepted at Middle Meadows Campground participated in the REC 2 – General Visitor Surveys. The survey participants indicated they participated in the following activities during their visit (note: multiple responses were accepted):

- Camping at a developed site – 98.0% (50 people);
- Reservoir recreation – 13.7% (7 people);
- Fishing – 9.8% (5 people);
- Day use at a developed site – 5.9% (3 people);
- Day use or camping in undeveloped areas – 3.9% (2 people); and
- Day use along a stream/river – 3.9% (2 people).

The survey participants were also asked to identify the main activity they participated in during their trip. A total of 17 people intercepted at Middle Meadows Campground identified one main activity. The most frequent response was “camping in developed site” (58.8%), followed by “picnicking in developed sites” (17.6%). Additional survey results are available in the REC 2 – TSR (PCWA 2011d; SD B).

Recreation Use

The USDA-FS does not collect recreation use data at this site, and data available from National Recreation Reservation System was insufficient to estimate use. Therefore, PCWA conducted vehicle counts at this site. The vehicle count data was used in combination with the group size information derived from the REC 2 – TSR (PCWA 2011d; SD B) to estimate recreation use at Middle Meadows Campground. Detailed results are available in the REC 1 – TSR (PCWA 2011c; SD B).

As indicated on Table 7.9-2, recreation use at Middle Meadows Campground totaled 2,025 RVDs. The data indicate that this campground is primarily used during the

summer. Fall use was substantially lower and no use was recorded during the winter/spring period.

Facility Capacity and Utilization

Facility capacity and utilization rates for Middle Meadows Campground are summarized on Table 7.9-3. As indicated, Middle Meadows Campground is relatively well utilized compared to the other developed MFP recreation facilities. During the summer of 2008, facility occupancy ranged from a low of 10% on weekdays to a high of 75% on weekends. PAOT capacity utilization ranged from a low of 8% on weekdays to 67% on weekends.

Public Safety

PCWA does not maintain any public safety features at Middle Meadow Campground. Public safety features at the nearby South Fork Long Canyon Diversion Dam include guardrails and safety signage.

7.9.4.5 Middle Fork Interbay Area

Middle Fork Interbay is located on the Middle Fork American River, between French Meadows Reservoir and Ralston Afterbay, at an elevation of 2,536 feet msl. Middle Fork Interbay has a maximum operating surface area of about 7 acres and a gross storage capacity of 175 ac-ft. The landscape in the vicinity of Middle Fork Interbay is moderately steep, entrenched, and confined by narrow V-shaped valleys. The vegetation is comprised of communities dominated by mixed conifer and pine species, including Douglas-fir and ponderosa pine.

There are no developed MFP recreation facilities in the Middle Fork Interbay area. The Middle Fork Interbay Dam Road (Forest Road 96-17) provides access to the Middle Fork Interbay area from Mosquito Ridge Road (FR 96). This road is used by anglers and boaters to access the Middle Fork American River. It is possible to park in small, unpaved turn-outs along the road, in the vicinity of Middle Fork Interbay. However, it is not possible to continue upstream from the Middle Fork Powerhouse due to the presence of fencing around the powerhouse.

Operation and Maintenance

The Middle Fork Interbay is located in the TNF, who periodically conducts patrols along Middle Fork Interbay Road and in the vicinity of Middle Fork Interbay Dam.

Recreation Activities

With the concurrence of the Recreation TWG, the REC 2 – General Visitor Surveys were not conducted in this location due to low-use levels and logistical considerations. Based on information provided by the relicensing participants, this area is primarily used by anglers who access the river just downstream of Middle Fork Interbay Dam. Whitewater boaters may also put-in just below Middle Fork Interbay Dam to boat the

Middle Fork American River, taking out at Ralston Afterbay. PCWA plows Mosquito Ridge Road to the Middle Fork Interbay Road turn-off, and the Middle Fork Interbay Road to Middle Fork Powerhouse during the winter, as needed. Therefore, this area is accessible during the winter and spring, when other nearby areas at similar elevations may not be accessible.

Recreation Use

With the concurrence of the Recreation TWG, vehicle counts were not conducted in this location. Therefore, recreation-use levels are unknown. Based on anecdotal observations made by PCWA operators, and on information developed through consultation with the relicensing participants, recreation use in the Middle Fork Interbay area appears to be low, and consists primarily of angling.

Facility Capacity and Utilization

There are no developed MFP recreation facilities in the Middle Fork Interbay area. Therefore, facility capacity and utilization does not apply. Parking is available in a small turn-out near the Middle Fork Interbay Dam (1-2 vehicles) and adjacent to the Ralston Tunnel Intake and Gatehouse (2-3 vehicles). In addition, limited parking is available along the road between the dam and powerhouse and at several turn-outs between the Middle Fork Interbay Road turn-off and the dam.

Public Safety

PCWA maintains several programs and measures to ensure public health and safety in the Middle Fork Interbay area. These programs and measures are described in detail in the LAND 3 –TSR (PCWA 2011b; SD B), which also includes an inventory of all safety signage. The safety features that PCWA maintains in the Middle Fork Interbay area are summarized in the following.

- **Audible Warning Devices:** PCWA maintains security alarms at Middle Fork Powerhouse, which sound in the event of an unauthorized entry into the powerhouse. In addition, an audible warning device is located at Middle Fork Interbay, which warns the public of spill gate operation.

- **Log Booms:** PCWA maintains a log boom at Middle Fork Interbay. The purpose of the log boom is to prohibit access to the dam area from the impoundment.

- **Public Safety Fences:** PCWA has erected fencing to prohibit public access to the Middle Fork Powerhouse and Upper and Lower Switchyards.

- **Slope Fences:** PCWA uses slope fences in the following locations to prevent damage and to protect the public from falling rocks: Middle Fork Powerhouse and Switchyard, Middle Fork – Ralston Tunnel Butterfly Valve House, Middle Fork – Ralston Tunnel Surge Shaft and Tank, and Middle Fork Interbay Dam.

- **Signage:** PCWA maintains signs of various types to provide MFP-related information to the public and to warn the public about potentially hazardous conditions or areas.

7.9.4.6 Ralston Afterbay Area

Ralston Afterbay is located in the TNF at an elevation of approximately 1,179 feet msl (Map 7.9-1d). 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 (FR 23). The landscape in the Ralston Afterbay area is characterized by moderate to steep slopes and the vegetation consists of mixed conifer stands interspersed with large black oaks, and predominant black oak stands. The Ralston Afterbay area does not experience heavy snow and is typically accessible year-round.

Ralston Afterbay provides day-use opportunities and is primarily used for fishing and water-enhanced activities such as picnicking. These activities are supported by one MFP recreation facility named the Ralston Picnic Area. Indian Bar Rafter Access is located downstream of Ralston Afterbay, adjacent to the Oxbow Powerhouse. This facility is primarily used by whitewater boaters as a put-in for the Tunnel Chute Run, which extends from the Indian Bar Rafter Put-in to the Ruck-a-Chucky Recreation Area located approximately 15 miles downstream.

The locations of these recreation facilities are shown on Map 7.9-1d, which also shows the locations of the primary MFP facilities and land ownership. A detailed description of these facilities, including an inventory of the facility amenities, representative photographs, and a condition assessment, is available in the REC 1 – TSR (PCWA 2011c; SD B).

Public use of these two recreation facilities is very different. As such, they are discussed separately in the following.

Ralston Afterbay Picnic Area

Ralston Afterbay Picnic Area is a day-use facility located on the Middle Fork American River arm of Ralston Afterbay. The picnic area consists of a parking area, five picnic sites, and a small, unimproved boat ramp referred to as the Ralston Afterbay Car Top Boat Ramp. A single-unit vault toilet is available at this facility, but potable water is not available. Camping is prohibited by the TNF.

OPERATION AND MAINTENANCE

The Ralston Picnic Area and Car Top Boat Ramp is located within the boundaries of the TNF. The area is operated and maintained by the TNF, paid for in part with funding provided by PCWA in accordance with Collection Agreement #03-CO-11051700-009. Routine operation and maintenance of this facility typically includes bathroom cleaning, litter pick-up, garbage removal, and patrols.

RECREATION ACTIVITIES

A total of 41 people encountered at the Ralston Picnic Area and Car Top Boat Ramp (or along the Ralston Afterbay shoreline) participated in the REC 2 – General Visitor Surveys. The survey participants indicated they participated in the following activities during their visit (note: multiple responses were accepted).

- Day use along a stream/river – 58.5% (24 people);
- Fishing – 43.9% (18 people);
- Reservoir recreation – 34.1% (14 people); and
- All other responses were less than 9%.

These survey participants were also asked to identify the main (one) activity they participated in during their trip. The most frequent responses were "stream fishing" and "reservoir fishing" (both 25%). Additional survey information is available in the REC 2 – TSR (PCWA 2011d; SD B).

RECREATION USE

PCWA developed use estimates for the MFP recreation facilities in the Ralston Afterbay area using vehicle count data collected by PCWA. Detailed use information for the Ralston Afterbay Picnic Area is available in the REC 1 – TSR (PCWA 2011c; SD B), and summarized in Table 7.9-2. The information on Table 7.9-2 is reported in RVDs.

As indicated on Table 7.9-2, recreation use at Ralston Afterbay Picnic Area totaled 604 RVDs, with use ranging from a low of 90 RVDs during the fall period to a high of 279 RVDs during the summer period. Recreation use during the summer period was similar to recreation use during the winter/spring period. However, it is important to note the winter/spring period covers a substantially longer period than the summer and fall periods, which make the winter/spring data appear high compared to the other data.

FACILITY CAPACITY AND UTILIZATION

Facility capacity and utilization rates for the Ralston Afterbay Picnic Area are summarized on Table 7.9-3. As indicated, during the summer of 2007, facility utilization at the Ralston Afterbay Picnic Area ranged from a low of 10% on weekdays to a high of 33% on holidays. PAOT capacity utilization ranged from a low of 7% on weekdays to a high of 21% on weekends.

PUBLIC SAFETY

PCWA maintains a variety of programs and measures to ensure public health and safety in the Ralston Afterbay area. These programs and measures are described in detail in the LAND 3 – TSR (PCWA 2011b; SD B) and the REC 3 – TSR (PCWA 2011e; SD B), which also include inventories of all safety and recreation-related signage. The

safety features that PCWA maintains in the Ralston Afterbay area are summarized in the following.

- **Audible Warning Devices:** PCWA maintains security alarms at all powerhouses, including Ralston Powerhouse located on Ralston Afterbay. The security alarms sound in the event of an unauthorized entry into the powerhouse.

- **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.

- **Public Safety Fences:** PCWA has erected fences around potentially hazardous areas, as follows: A fence with a locked gate prohibits access to the Ralston Afterbay Dam; a perimeter fence prohibits access to the adjacent Ralston Afterbay Dam Generator Building; and the Ralston Powerhouse is surrounded by a perimeter fence.

- **Slope Fences:** PCWA has installed a slope fence adjacent to the Ralston Powerhouse Switchyard to protect the public from falling rocks.

- **Gates:** PCWA has installed gates in certain locations to limit access onto MFP roads. Locked gates prohibit public access to the PCWA's Ralston Afterbay Private Boat Ramp, the Ralston – Oxbow Tunnel Intake, and Ralston Afterbay Access Point.

- **Guardrails:** The public is not allowed on Ralston Afterbay Dam. However, PCWA has installed guardrails along both sides of the top of the dam for worker safety purposes.

- **Signage:** PCWA and the TNF maintain signs of various types to provide MFP-related information to the public and to warn the public about potentially hazardous area or conditions, including fluctuating water levels.

Indian Bar Rafter Access

The Indian Bar Rafter Access is located on the Middle Fork American River, adjacent to the Oxbow Powerhouse. It is primarily used by whitewater boaters but also supports other stream-based recreation users. The site includes a large unloading area, approximately nine to ten unmarked parking spaces, a boat ramp, and vault toilets. The boat ramp is graded, but otherwise unimproved. Potable water is not available.

OPERATION AND MAINTENANCE

Indian Bar Rafter Access is located on TNF land, but is currently operated and maintained by California State Parks, in part, using funds generated through commercial boating concession permits. Routine maintenance generally includes

bathroom maintenance and cleaning, litter pick-up, and garbage removal. Both the TNF and California State Parks conduct regular patrols.

RECREATION ACTIVITIES

A total of 17 people encountered at the Indian Bar Rafter Access participated in the REC 2 – General Visitor Surveys (commercial whitewater rafting patrons were specifically excluded from the visitor surveys pursuant to the study plan). The survey respondents indicated they participated in the following activities during their visit (note: multiple responses were accepted):

- Day use along a stream/river – 100% (17 people);
- Day use or camping in undeveloped areas – 29.4% (5 people); and
- Fishing – 5.9% (1 person).

These survey participants were also asked to identify the main (one) activity they participated in during their trip. A total of seven people identified one main activity. The most frequent response was "whitewater boating" (42.9%). Additional survey information is available in the REC 2 – TSR (PCWA 2011d; SD B) and the REC 4 – TSR (PCWA 2011f; SD B).

RECREATION USE

California State Parks does not collect detailed data on non-commercial stream-based recreation use at this site. Therefore, non-commercial recreation use was estimated using vehicle count data collected by PCWA. Detailed use information for the Indian Bar Rafter Access is available in the REC 1 – TSR (PCWA 2011c; SD B), and summarized in Table 7.9-2. The information on Table 7.9-2 is reported in RVDs.

As indicated on Table 7.9-2, recreation use at Indian Bar Rafter Access totaled 1,195 RVDs, ranging from a 304 RVDs during the winter/spring period to a high of 460 RVDs during the fall period. These estimates do not include commercial boating use, which accounts for most of the use at the Indian Bar Rafter Access. Whitewater boating is a stream-based recreation use and is, therefore, discussed in Section 7.9.6.

FACILITY CAPACITY AND UTILIZATION

Facility capacity and utilization rates for the Indian Bar Rafter Access are summarized on Table 7.9-3. As indicated, during the summer of 2007, facility utilization at Indian Bar Rafting Access ranged from a low of 2% on weekdays to a high of 26% on holidays. Note that these utilization rates are based on the number of parking spaces (12) and use by private stream-based users. The Indian Bar Rafter Access includes a large unloading area that can become congested in the morning while commercial boating outfitters unload passengers and gear.

PUBLIC SAFETY

PCWA maintains a variety of programs and measures to ensure public health and safety at the Indian Bar Rafter Access and vicinity. These programs and measures are described in detail in the LAND 3 – TSR (PCWA 2011b; SD B) and the REC 4 – TSR (PCWA 2011f; SD B), which also include inventories of all safety and recreation-related signage. The safety features that PCWA maintains in the vicinity of the Indian Bar Rafter Access are summarized in the following.

- **Audible Warning Devices:** PCWA maintains security alarms at all powerhouses, including Oxbow Powerhouse, which is located immediately adjacent to the Indian Bar Rafter Access. The security alarms sound in the event of an unauthorized entry into the powerhouse.

- **Public Safety Fences:** Oxbow Powerhouse is surrounded by a perimeter fence with a locked gate.

- **Slope Fences:** PCWA has installed a slope fence behind Oxbow Powerhouse to protect the public and workers from falling rocks.

- **Signage:** PCWA, California State Parks, and the TNF maintain signs of various types to provide Project-related information to the public and to warn the public about potentially hazardous area or conditions, including fluctuating water levels.

7.9.5 Reservoir Recreation Opportunities

The following subsections describe the MFP reservoirs and associated recreation opportunities. The small stream diversion pools and Middle Fork Interbay are not large enough to support reservoir-based recreation opportunities. Therefore, the discussion focuses on French Meadows Reservoir, Hell Hole Reservoir, and Ralston Afterbay. In addition to a brief overview, each subsection covers the following topics: reservoir access, reservoir activities, reservoir capacity, and boat ramps. Shoreline management is addressed at the end of this section. Additional information about the MFP reservoirs and associated recreation opportunities is available in the REC 3 – TSR (PCWA 2011e; SD B).

7.9.5.1 French Meadows Reservoir

At maximum operating WSE, French Meadows Reservoir has a gross storage capacity of 134,993 ac-ft and a 10.5-mile-long shoreline. French Meadows Reservoir is encompassed by public land managed by the TNF – American River Ranger District (90%) and land owned by PCWA (10%). Land ownership in the French Meadows Reservoir area is shown on Map 7.9-1a.

Reservoir Access

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 MFP facilities to protect public safety, as briefly described in the following.

- **French Meadows Dam and Spillway:** 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 MFP 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. PCWA accesses this area via a short MFP 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.

Reservoir Activities

The reservoir supports water based recreation activities, primarily fishing and boating. These activities are discussed further in the following.

RESERVOIR ANGLING

Fishing is allowed on the reservoir year-round but primarily occurs between May and October, when the area is accessible. The CDFG plants rainbow trout in French Meadows Reservoir throughout the season to enhance recreation fishing (USDA-FS 2006). During the period of 2001 through 2009, CDFG stocked an average of 10,500 catchable rainbow trout per year.

PCWA conducted a reservoir angler survey in 2007. A total of 63 people who participated in the survey indicated they fished at French Meadows Reservoir. Highlights from these 63 surveys are summarized below.

- Survey respondents were asked to identify the number of fish they caught, kept, and released by species (multiple answers were accepted). A total of 52 people provided a valid response to this question. These anglers reported catching a total of 192 fish at French Meadows Reservoir. Of these, most of the fish that were caught were rainbow trout (84.4%), followed by brown trout (5.7%), and lake trout (4.2%). (It should be noted that lake trout are not believed to be present in French Meadows Reservoir). Five anglers (5.7%) indicated they were "not sure" what type of fish they caught.

- Catch per unit effort was determined to be 0.5 fish/hour with a standard deviation of 0.5.

- Survey participants were asked to rate their overall fishing experience using a satisfaction scale. A total of 60 people answered this question. Of these, 45 people (75.0%) indicated that they were either very satisfied (43.3%) or satisfied (31.7%) with their overall fishing experience.

Additional angler survey results are available in the REC 2 – TSR (PCWA 2011d; SD B).

RESERVOIR BOATING

According to the USDA-FS, popular watercraft used on the reservoir include 10- to 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 – TSR (PCWA 2011d; SD B), 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; and

- 8.8% (5 people) used personal watercraft.

Reservoir Capacity

At maximum operating WSE, 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

one 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).

Based on use data collected by PCWA in 2007, there was a total of 13 boats on the reservoir at one time on the heaviest use day of the year (May 27, 2007). Given this information, reservoir capacity far exceeds boating use on the reservoir. Additional information about reservoir carrying capacity is available in the REC 3 – TSR (PCWA 2011e; SD B).

Boat Ramps

There are two public boat ramps at French Meadows Reservoir, French Meadows Boat Ramp, and McGuire Boat Ramp. These two boat ramps are described below.

French Meadows Boat Ramp

As shown on Map 7.9-1a, French Meadows Ramp is located on the southeast shore of the reservoir and is accessible via Mosquito Ridge Road (FR 96). The 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 existing ramp is constructed of concrete and includes three turn-around areas that may be used as water levels recede.

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 existing concrete ramp terminates at an elevation of 5,200 feet. Additional information about the physical configuration of the boat ramp and associated support facilities is available in the REC 3 – TSR (PCWA 2011e; SD B).

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 the percent of years that the boat ramp was functional (e.g., average daily WSE at French Meadows Boat Ramp is above the elevation of the bottom of the boat ramp) under impaired conditions. This evaluation was conducted for two time periods: (1) the peak recreation season (Memorial Day through Labor Day); and (2) an extended season (Memorial Day through November 1). The results of this evaluation are summarized below.

Water Year Type	Percent of Years that Boat Ramp was Functional for Entire Recreation Season (Memorial Day–Labor Day)	Percent of Years that Boat Ramp was Functional for Entire Extended Season (Memorial Day–November 1)
Wet (n = 12)	100%	92%
Above Normal (n = 4)	100%	100%
Below Normal (n = 6)	100%	83%
Dry (n = 6)	33%	17%
Critical (n = 4)	25%	0%
Extreme Critical (n = 1)	0%	0%

McGUIRE BOAT RAMP

As shown on Map 7.9-1a, McGuire Boat Ramp is situated on the northeast shore of the reservoir, and is accessible via the French Meadows North Shore Access Road (Forest Road 42.02). 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 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. Additional information about the physical configuration of the boat ramp and associated support facilities is available in the REC 3 – TSR (PCWA 2011e; SD B).

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 as the French Meadows Boat Ramp, the results are the same as those discussed above under French Meadows Boat Ramp.

7.9.5.2 Hell Hole Reservoir

Hell Hole Reservoir is the largest MFP reservoir. At maximum operating WSE, Hell Hole Reservoir has a gross storage capacity of 207,590 ac-ft and a 13-mile-long shoreline. Hell Hole Reservoir is encompassed by public land managed by the ENF – Georgetown Ranger District (70%) and land owned by PCWA (30%). Land ownership in the Hell Hole Reservoir area is shown on Map 7.9-1b.

Reservoir Access

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 MFP 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 Trail (14E02.3), 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 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.

Reservoir Activities

The reservoir supports water-based recreation activities, primarily fishing and boating. These activities are discussed further in the following.

RESERVOIR ANGLING

Fishing is allowed on the reservoir 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 (including the Eagle Lake strain), brown trout, brook trout, cutthroat trout (and cutthroat-rainbow hybrids), lake trout, kokanee, and coho salmon (PCWA 2007). During the 2001–2009 period, an average of approximately 5,500 catchable brown trout were stocked (PCWA 2007). During the same period, an average of approximately 24,600 fingerling Kokanee salmon were stocked.

A total of 101 people who participated in the reservoir angler survey indicated they fished at Hell Hole Reservoir. Highlights from these 101 surveys are summarized below.

- Survey respondents were asked to identify the number of fish they caught, kept, and released by species (multiple answers were accepted). A total of 78 people intercepted in the Hell Hole Reservoir area responded to this question. These anglers reported catching a total of 451 fish in Hell Hole Reservoir. Of these,

over half (51.9%) were kokanee, followed by brown trout (22.4%), rainbow trout (16%), and lake trout (9%).

- Catch per unit effort was determined to be 0.6 fish/hour, with a standard deviation of 0.7.

- Survey participants were asked to rate their overall fishing experience using a satisfaction scale. A total of 98 people answered this question. Of these, 77 people (78.5%) said that were either very satisfied (41.8%) or satisfied (36.7%) with their overall fishing experience.

Additional angler survey results are available in the REC 2 – TSR (PCWA 2011d; SD B).

RESERVOIR BOATING

According to the USDA-FS, popular watercraft used on Hell Hole 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 type of boats used on Hell Hole Reservoir was collected through the REC 2 – TSR (PCWA 2011d; SD B), 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; and

- 4.3% (2 people) used ski boats.

Reservoir 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, assuming a carrying capacity coefficient of one boat per 10 acres.

Based on use data collected by PCWA in 2007, there were a total of 21 boats on the reservoir at one time on the heaviest use day of the year (May 27, 2007). Given this information, reservoir capacity far exceeds boating use on the reservoir. Additional information about reservoir carrying capacity is available in the REC 3 – TSR (PCWA 2011e; SD B).

Boat Ramps

Hell Hole Boat Ramp is the only boat ramp at Hell Hole Reservoir. This ramp is described in the following.

HELL HOLE BOAT RAMP

As shown on Map 7.9-1b, Hell Hole Boat Ramp is located on the southwest end of the reservoir, northwest of Hell Hole Dam. The ramp is accessible via FR 2, which is also referred to as Eleven Pines Road and/or Forest Road 17N02.

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.

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 feet msl, 8 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. Additional information about the physical configuration of the boat ramp and associated support facilities is available in the REC 3 – TSR (PCWA 2011e; SD B).

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 the percent of years that the boat ramp was functional (e.g., average daily WSE at Hell Hole Boat Ramp is above the elevation of the bottom of the boat ramp) under impaired conditions. This evaluation was conducted for two time periods: (1) the peak recreation season (Memorial Day through Labor Day); and (2) an extended season (Memorial Day through November 1). The results of this evaluation are summarized below.

Water Year Type	Percent of Years that Boat Ramp was Functional for Entire Recreation Season (Memorial Day–Labor Day)	Percent of Years that Boat Ramp was Functional for Entire Extended Season (Memorial Day–November 1)
Wet (n = 12)	100%	92%
Above Normal (n = 4)	100%	100%
Below Normal (n = 6)	100%	67%
Dry (n = 6)	50%	17%
Critical (n = 4)	75%	25%
Extreme Critical (n = 1)	0%	0%

7.9.5.3 Ralston Afterbay

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. Relative to Hell Hole and French Meadows Reservoirs, Ralston Afterbay is very small and has a gross storage capacity of 2,782 ac-ft and approximately 4.4 miles of shoreline. Approximately 70% of the reservoir shoreline bisects land managed by the USDA-FS. The remaining 30% is owned by PCWA. Land ownership in the Ralston Afterbay area is shown on Map 7.9-1d.

Ralston Afterbay is used primarily as a regulating facility. Therefore, fluctuations at Ralston Afterbay occur daily throughout the year, but the daily pattern varies depending upon season. Daily fluctuations typically are 6 feet or less, except during PCWA's maintenance outage when Ralston Afterbay WSE is lowered considerably for facility maintenance and inspection. PCWA's annual maintenance outage typically occurs over a three–six week period during the fall. Operation of Ralston Afterbay is described in detail in the REC 3 – TSR (PCWA 2011e; SD B).

Reservoir Access

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 MFP 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 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 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 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 to 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 turn-outs 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. Otherwise, there are no other facilities on the afterbay that are designed to facilitate recreation access to the afterbay. The afterbay is easily accessible from FR 23 and parking is available in unpaved turn-outs along the road. Relatively large turn-outs 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 informal access to the afterbay. This access point is open to the public but is not considered a developed recreation facility.

Reservoir Activities

The reservoir supports water based recreation activities, primarily fishing and boating. These activities are discussed further in the following.

RESERVOIR ANGLING

Fishing is allowed on Ralston Afterbay year-round. Based on information collected as part of the reservoir angler survey, anglers primarily caught rainbow trout. Survey participants were asked to rate their overall fishing experience. A total of 83% (five of six people) said that were either very satisfied (50%) or satisfied (33%) with their overall fishing experience (PCWA 2011d; SD B).

RESERVOIR BOATING

PCWA and the USDA-FS do not restrict boating on Ralston Afterbay, nor do they 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 by the small size and unimproved nature of the existing boat ramps as discussed below, and the absence of parking and turn-around areas.

Reservoir Capacity

Ralston Afterbay has a surface area of approximately 71 acres at the normal operating WSE range of 1,169 to 1175 feet msl. Accordingly, during the summer recreation period the afterbay can accommodate about seven boats at one time, assuming a carrying capacity coefficient of one boat per 10 acres.

Based on use data collected by PCWA in 2007, no more than one boat was observed on the reservoir at any given time. Accordingly, reservoir capacity far exceeds boating use.

Boat Ramps

There is one public boat ramp at Ralston Afterbay referred to as the Ralston Afterbay Car Top Boat Ramp. Visitors also utilize PCWA's Ralston Afterbay Sediment Removal Access Point, which is not a MFP recreation facility. These two ramps are described in the following.

RALSTON AFTERBAY CAR TOP BOAT RAMP

The ramp is located immediately adjacent to the Ralston Picnic Area. 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. Because 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.

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 boats on trailers 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.

RALSTON AFTERBAY SEDIMENT REMOVAL ACCESS POINT

Recreation visitors sometimes utilize PCWA's Sediment Removal Access Point to access Ralston Afterbay (Map 7.9-1d). This ramp is not a MFP recreation facility, but PCWA does not prohibit its use by the public. The Ralston Afterbay 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 limited parking is available in the adjacent turn-out.

7.9.5.4 Shoreline Management

The existing FERC Project boundaries represent buffer zones around the reservoirs and smaller impoundments. These buffer zones serve two purposes: to ensure public

access to the MFP lands and waters and to help protect the recreation and aesthetic values of the MFP reservoirs and their shorelines. All of the land surrounding the MFP reservoirs, within the FERC Project boundary, is either owned by PCWA or is public land managed by the USDA-FS. Neither PCWA nor the USDA-FS restrict access to any of the MFP reservoirs or shorelines, except where perimeter fences surround certain MFP facilities (e.g., powerhouses and switchyards) are present for security purposes. Access to portions of the reservoirs and to smaller impoundments is limited due to steep terrain.

As required in the Federal Power Act (FPA), PCWA operates the MFP shorelines consistent with license requirements and project purposes, while addressing the needs of the public. Other than the MFP recreation facilities, there are no permitted piers, boat docks, landings, bulkheads, or other shoreline facilities associated with any of the MFP reservoirs or diversion pools. Furthermore, PCWA has not authorized, and the FERC has not approved, any specific uses or occupancies along the MFP reservoir shorelines that are not related to hydroelectric power production or other project purposes. Therefore, PCWA does not maintain a shoreline management plan.

7.9.6 Stream-Based Recreation Opportunities

Operation of the MFP affects flows in the bypass and peaking reaches, which are identified above in Section 7.9.2. Accordingly, PCWA identified the recreation opportunities along the bypass and peaking reaches and conducted studies to determine whether MFP operations affect these resources. Stream-based recreation along the bypass and peaking reaches is described in detail in the REC 4 – TSR (PCWA 2011f; SD B), and summarized in the following subsections. The bypass reaches are discussed first, followed by the peaking reach.

7.9.6.1 Bypass Reaches

The bypass reaches bisect steep and rugged terrain, which limits access and recreation opportunities. The bypass reaches are primarily used for angling and whitewater boating. A variety of trails traverse the MFP area and some intersect the bypass reaches, where flows may affect crossing opportunities. Therefore, angling, whitewater boating, and trail use are discussed in following. This summary is based mainly on information developed through focus group sessions conducted by PCWA in 2008 and 2010, and on whitewater boating flow studies conducted by PCWA in 2010 (REC 4 – Contingency TSR) (PCWA 2011g; SD B).

Angling

PCWA conducted two focus group sessions with local anglers: one on May 20, 2008 and another on March 4, 2010. A complete set of the notes that were captured during the Angler Focus Group sessions, and follow up letters provided by the Angler Focus Group participants, are included in the REC 4 – TSR (PCWA 2011f; SD B).

Popular fishing areas and access points identified by the Angler Focus Group participants are shown on Map 7.9-4. As indicated, fishing along the bypass reaches is

concentrated near areas where Forest Service roads and trails provide access to the river. According to the May 20, 2008, focus group participants, angling use decreases the further one travels from the access point. Families with children tend to stay near the access points. More experienced anglers hike and wade upstream and downstream from the access points.

The May 20, 2008 Angler Focus Group did not identify specific flow-related concerns or issues on the bypass reaches. The May 20, 2008 Angler Focus Group participants reported that flows on the bypass reaches are typically conducive to wading and fording in the summertime when the area is accessible (e.g., the roads are no longer closed due to snow and spring run-off has receded). Comments provided by the anglers present at the May 20, 2008 Angler Focus Group session indicate that lower flows allow easier wading and fording in the river channel and movement upstream and downstream through the channel.

Information later provided in a letter dated January 18, 2010 and during the March 4, 2010 Angler Focus Group, indicated that some of the best fishing occurs in situations where the flows are higher than normal summer flows, where there is some color to the water and larger fish are most inclined feed (REC 4 – TSR) (PCWA 2011f; SD B).

Whitewater Boating

To develop information about whitewater boating opportunities on the bypass reaches, PCWA initially conducted a Whitewater Boating Focus Group session on April 23, 2008. In addition, PCWA conducted follow-up consultation with local, experienced, whitewater boaters. A complete set of notes developed during the Whitewater Boating Focus Group session, and a summary of the information developed through follow-up consultation, are available in the REC 4 – TSR (PCWA 2011f; SD B).

The focus group participants and the boaters contacted after the focus group session indicated that whitewater boating occurs on the following bypass reaches:

- Rubicon River – RM25 to Ellicott Bridge;
- Rubicon River – Ellicott Bridge to Ralston Afterbay;
- Long Canyon Creek – Confluence of North and South forks of Long Canyon Creek to the Rubicon River;
- Duncan Creek – Gold Dollar Trail to the Middle Fork American River (one boater);
- Middle Fork American River – French Meadows Reservoir to Middle Fork Interbay; and
- Middle Fork American River – Middle Fork Interbay to Ralston Afterbay.

These reaches and the primary access points identified by the focus group participants and through follow up consultation are shown on Map 7.9-5.

At the request of the relicensing participants, PCWA subsequently conducted controlled flow studies on the following two bypass reaches:

- Middle Fork American River – French Meadows Reservoir to Middle Fork Interbay; and

- Middle Fork American River – Middle Fork Interbay to Ralston Afterbay.

The results of these studies are documented in the REC 4 – Contingency TSR (PCWA 2011g; SD B). A controlled flow study on the Rubicon River was not possible because the release from the Hell Hole Dam outlet works is limited to about 70 cubic feet per second (cfs) and the target Rubicon River contingency study flows (500–800 cfs) were not met via reservoir spill or natural run-off in 2010.

Based on the information developed to date, the following bypass reaches were identified as boatable. The flow ranges are based on information developed through the focus group session, through follow-up consultation, or through PCWA's flow studies.

Acceptable flow ranges identified through the focus group session, follow up consultation, and/or through PCWA's whitewater flow studies are summarized below by reach.

Reach	Minimum Acceptable Flow (cfs)	Optimum Flow (cfs)	Maximum Acceptable Flow (cfs)	Information Source
Rubicon River – RM25 to Ellicott Bridge	400–500	500–1,000	1,200–1,500	Focus Group/ Follow-up consultation
Rubicon River – Ellicott Bridge to Ralston Afterbay	400	500 – 1,500	1,200–3,000	Focus Group/ Follow-up consultation
Long Canyon Creek – Confluence of North and South forks of Long Canyon Creek to the Rubicon River	200–250	300 - 500	500–600	Focus Group/ Follow-up consultation
Duncan Creek – Gold Dollar Trail to the Middle Fork American River	unknown	unknown	unknown	Focus Group/ Follow-up consultation
Middle Fork American River – French Meadow Dam to Middle Fork Interbay	215 (at take-out)	300-350 (at take-out)	450 (at take-out)	Controlled flow study/ follow-up consultation
Middle Fork American River – Middle Fork Interbay Dam to Ralston Afterbay	400–425 (at put-in) or 450–465 (at take-out)	450 (at put-in) or 500–550 (at take-out)	600 (at take-out)	Controlled flow study

Additional information about each of these reaches, including put-in, take-outs, and gradients is presented on Table 7.9-4. In addition, these reaches are described in detail in the in the REC 4 – TSR (PCWA 2011f; SD B) and the REC 4 – Contingency TSR (PCWA 2011g; SD B).

Very little whitewater boating has historically occurred on the bypass reaches. Occasional use (e.g., one or two runs) by advanced or expert boaters was documented on the bypass reaches identified above. Only one reach, the Rubicon River between Ellicott Bridge and Ralston Afterbay, is boated with any regularity. The bypass reaches are not boated commercially.

In general, boating on the bypass reaches appears to be limited by a combination of the following factors:

- The bypass reaches traverse remote and rugged terrain with limited road or trail access;
- Due to snow, the roads to some of the access points along the bypass reaches are not accessible during the early spring, when boating flows are available;

- Bypass reach gradients are extremely steep. The steep gradients result in difficult rapids and drops that can only be boated by advanced and expert boaters or portaged;

- The overall character of the small bypass reaches, for example Duncan Creek, and North and South Long Canyon creeks, is not conducive to boating. These streams are relatively narrow, boulder choked, and densely vegetated; and

- There are no real-time flow gages on any of the bypass reaches. Accordingly, boaters have to determine whether boatable flows are present by sight, word of mouth, and/or estimate flows.

WHITEWATER BOATING OPPORTUNITIES

The boatable flow ranges identified above were utilized in conjunction with the hydrologic data to evaluate boating opportunities under impaired conditions. The results of the boating opportunities analysis were tabulated by five water year types (extreme critical/critical, dry, below normal, above normal, and wet) and by month (April–September), and are provided in Tables 7.9-5a–e.

Trail Use/Stream Crossing

PCWA conducted a Trail User/Stream Crossing focus group session with local trail users on May 12, 2008. A complete set of the notes that were captured during the Trail User/Stream Crossing Focus Group is available in the REC 4 – TSR (PCWA 2011f; SD B).

The primary trails that provide access to or cross the bypass reaches are shown on Map 7.9-2a. All of the trails in the vicinity of the bypass reaches are considered multi-purpose and are used to access the bypass streams for general recreation purposes (picnicking and swimming), as well as hiking, mountain biking, and equestrian use. Most of the trails in the vicinity of the bypass reaches are managed and maintained by the USDA-FS; however, some of the trails that provide access are not USDA-FS system trails. In general, operation of the MFP reduces flow in the bypass reaches thereby improving stream crossing conditions.

In general, the Rubicon River is more accessible than the other bypass streams. The following trails provide access to the Rubicon River between Hell Hole Dam and Ralston Afterbay:

- Hunters Trail (14E09);

- Parsley Bar Trail (14E10);

- Deer Creek Trail (14E11);

- South Fork Trail (14E14);

- Hales Crossing Trail (connecting Forest Road 14N11 to Hunters Trail near RM25);
- Slide Point Trail;
- Lawyer Trail;
- Unnamed trail on south side of Rubicon near RM10; and
- Nevada Point Trail (12E07).

According to focus group participants, these trails are used to access specific segments of the Rubicon River for fishing, and to a lesser extent whitewater boating. As indicated on Map 7.9-2a, trail access to the other bypass streams is very limited. The following trails provide access to the other bypass reaches:

- The Mosquito Ridge Trail provides access to the Middle Fork American River;
- The Gold Dollar Trail provides access to Duncan Creek;
- Blacksmith Flat Trail (12E06) provides access to Long Canyon Creek and connects Forest Roads 14N25B and 13NY01; and
- Donaldson Creek Trail provides access to Long Canyon Creek.

7.9.6.2 Peaking Reach

The peaking reach extends from Oxbow Powerhouse downstream to the high-water mark of Folsom Reservoir and includes two river segments: (1) the Middle Fork American River from Oxbow Powerhouse to the confluence of the North Fork American River; and (2) the North Fork American River from the confluence of the Middle Fork American River to the high-water mark of Folsom Reservoir.

The peaking reach bisects ASRA, which is managed by the California State Parks under contract to the USBR. Like the bypass reaches, the terrain surrounding the peaking reach is steep and rugged, which limits stream-based recreation activities primarily to areas where developed recreation facilities are available or where roads and/or trails provide access to the river. The developed recreation facilities and primary roads and trails that provide access to the peaking reach are shown on Map 7.9-6.

The peaking reach supports a variety of general stream-based recreation opportunities such as picnicking, swimming, wading, and recreational mining (e.g., gold panning). In addition, angling and whitewater boating are popular in the peaking reach. Numerous hiking, biking, and equestrian trails traverse ASRA; and some of these trails intersect the peaking reach. These topics are discussed in the following subsections.

General Stream-based Recreation Activities

The REC 2 – General Visitor Surveys were administered at five locations in the peaking reach: Indian Bar Rafter Access, Ruck-a-Chucky Recreation Area, Mammoth Bar, Confluence/Quarry Trailhead, and Birdsall Access/Oregon Bar Access. These locations are shown on Map 7.9-6. The survey participants intercepted in these locations were asked to identify their primary activities. The two most frequent responses were swimming/waterplay/wading (33.7%) and whitewater rafting/kayaking (20.5%) followed by relaxing (8.7%), walking/hiking (7.3%), fishing (4.6%), and gold panning (4.1%). All other responses were less than 4%. The majority of people who indicated whitewater boating as their primary activity were encountered at Ruck-a-Chucky Recreation Area. Survey administration did not focus on intercepting any particular user type. The results of these surveys are discussed in detail on a site-by-site basis in the REC 4 – TSR (PCWA 2011f; SD B).

These survey participants intercepted on the peaking reach were also asked to rate their overall river/stream experience. Excluding boaters intercepted at Ruck-a-Chucky Recreation Area, the majority of survey respondents (97%) stated that they were either very satisfied (67.4%) or satisfied (29.8%) with their overall river/stream experience. All of the boaters intercepted at Ruck-a-Chucky Recreation Area indicated they were either very satisfied (87.1%) or satisfied (12.9%) with their overall experience.

Nine survey participants indicated they were gold panning and ten survey participants indicated they were fishing. These activities are discussed in the following subsections.

Recreational Mining

Recreational gold panning and rock hounding is allowed only in permanent running streambeds in ASRA, subject to specific restrictions (California State Parks 2007). Gold panning is a popular recreation activity in the peaking reach and has been observed in the vicinity of the following developed recreation areas: Ruck-a-Chucky Recreation Area, Mammoth Bar, the Confluence of the Middle Fork American River and North Fork American River, Birdsall Access, and various locations in the China Bar recreation area. Suction and vacuum dredging is not currently allowed along the peaking reach in accordance with California Senate Bill (SB) 370. Commercial mining is not allowed on public land within the ASRA boundaries.

Angling

Fishing occurs throughout the peaking reach. To develop information about angling opportunities and issues in the peaking reach, PCWA conducted two focus group sessions with local anglers: one on May 20, 2008 and another on March 4, 2010. A complete set of the notes that were captured during the Angler Focus Group sessions, and follow up letters provided by the Angler Focus Group participants, are included in the REC 4 – TSR (PCWA 2011f; SD B).

Popular fishing areas and access points identified by the Angler Focus Group participants are shown on Map 7.9-7. As indicated, fishing along the peaking reach is

concentrated near areas where roads and trails provide access to the river. Relative to the bypass reaches, the peaking reach is more accessible, except where private property precludes use by the general public.

The May 20, 2008 focus group participants reported that fishing quality is generally good at all flow levels in the peaking reach. However, information developed at the March 4, 2010 focus group, and provided by local anglers in subsequent letters, indicate fishing quality and experience varies, depending upon flow. Additional comments provided by the March 4, 2010 focus group participants include:

- At lower flows people can spread out. Higher flows offer less variety and access and anglers are compacted into smaller areas.
- Access to multiple fishing areas can be hindered during high flows and anglers can be stranded until flows recede.
- Fishing methods in the peaking reach (Oxbow Powerhouse to Ruck-a-Chucky Recreation Area) include bank fishing, float tubing, wading, and fishing from a boat.
- The number of fish caught in the peaking reach is “good or better than average”.

Specific flows identified by the March 4, 2010 Angler Focus Group meeting participants are summarized in the following bullets. These comments pertain to the reach between Oxbow Powerhouse and Ruck-a-Chucky Recreation Area.

- 300 cfs is about the minimum flow for fishing this reach;
- 400 cfs is about the maximum for stream crossing;
- 600 cfs is about the maximum flow for fishing this reach. More experienced anglers may be able to fish at higher flows, with 1,000 cfs being the about the maximum for skilled, athletic anglers; and
- Between 800–1,000 cfs, access, wadeabilitly, and fishability decreases, leading to lower fishing success.

Two primary flow-related concerns were expressed by the focus group participants: (1) ramping affects fishing quality and success; and (2) high flows make it difficult to cross the river and to move up and down the river (e.g. wade). These two topics are addressed further in the following subsections.

RAMPING

The primary flow-related effect on fishing quality in the peaking reach reported by the focus group participants is associated with ramping. Anglers present at both focus group meetings indicated that fishing quality and success decline as ramping begins, and remains depressed through the ramping period (about two hours), and for about

one to two hours after ramping is completed. Based on this information, PCWA analyzed ramping conditions in the peaking reach. The study methods and results are described in detail in the REC 4 – TSR (PCWA 2011f; SD B), and summarized in the following.

RAMPING ANALYSIS

PCWA characterized the frequency, timing, and duration of ramping in the peaking reach under current MFP operations, focusing on the area immediately downstream of Oxbow Powerhouse. The objective of the analysis was to determine the average number of hours per day ramping occurs under current MFP operations. For the purposes of this analysis, ramping was defined as a change of flow of 40 cfs/15 minutes as measured at the Middle Fork American River Gage near Foresthill (USGS Gage No. 11433300). In addition, a day was defined at the 12-hour period between 7:00 AM and 7:00 PM.

The ramping analysis results were tabulated by water year type and by month, and summarize: (1) the number of days each month that ramping occurred while flows were less than 2,000 cfs; and (2) the number of hours that ramping occurred during those days. The results of this analysis, including summary tables and hydrographs, are available in the REC 4 – TSR (PCWA 2011f; SD B) and summarized on Table 7.9-6.

The following general patterns are evident in the summary tables and hydrographs.

- The average number of ramping days is lowest in October. Ramping occurs less frequently in October because the MFP is typically shut down for maintenance. During the maintenance outage, flows in the peaking reach are reduced to 75–150 cfs and are relatively stable.

- Using the ramping rate identified above, the total number of hours between 7:00 AM and 7:00 PM that ramping occurred did not exceed an average of four hours and generally ranged from an average of about 1.5 to 2 hours.

The number of hours that ramping occurs is generally highest during critically dry and dry water years and decreases as water years become wetter. This primarily occurs for two reasons. First, the base flow is lower during drier water years and increases as water years become wetter. For example, during dry water years, base flows are relatively low so a longer period of time is needed to ramp from base flow to peak flow. Conversely, during wetter water years, base flow is relatively high so the amount of time needed to ramp from base flow to peak flow is shorter. Second, ramping is more likely to occur between the hours of 7:00 AM and 7:00 PM during drier water years and typically does not occur during this time period during wet years.

WADING

According to the anglers present at the March 4, 2010 Angler Focus Group meeting, high flows can make it difficult to wade and cross the river while fishing, which limits angling opportunities. PCWA evaluated wading and crossing opportunities at various

flows using data developed as part of the 2-D modeling studies conducted for the AQ 1 – Instream Flow TSR (PCWA 2011h; SD B) combined with stream crossing criteria developed for the REC 4 – TSR (PCWA 2011f; SD B). Specifically:

- The data were utilized to identify wading and crossing suitability over a range of flows at two 2-D modeling sites, Fords Bar and Buckeye Bar (near Mammoth Bar). These two sites were selected in consultation with the relicensing participants as representative of conditions throughout the peaking reach.

- The data were utilized to determine the weighted usable area (WUA) for wading over a range of flows at Fords Bar and Buckeye Bar.

These two efforts are discussed further in the following subsections.

WADING SUITABILITY

As part of the AQ 1 – Instream Flow TSP, PCWA modeled velocity and depth over a range of flows at two sites in the peaking reach (Fords Bar and Buckeye Bar), each of which is approximately 0.75 miles long. The methods and results of this effort (referred to as 2-D modeling) are discussed in detail in the AQ 1 – TSR (PCWA 2011h; SD B).

The 2-D modeling results for Fords Bar and Buckeye Bar (near Mammoth Bar) were used in combination with wading/crossing suitability criteria developed for the trail crossing studies to evaluate wading and crossing opportunities for angling at these two locations at flows ranging from 80 to 1,018 cfs. The wading/crossing suitability curves used for the trail crossing studies are shown on Figure 7.9-1. The wading suitability analysis for angling relies on the easy/moderate crossing threshold.

The results of this analysis are visually depicted on Figure 7.9-2 (Fords Bar) and Figure 7.9-3 (Buckeye Bar). Each figure shows wading suitability at eight specific flows ranging from 80 to 1,018 cfs. Each study reach is approximately 0.75 mile long. Areas where the combination of depth and velocity are suitable for wading (i.e. below the easy/moderate crossing criteria) are shown in blue. Areas that exceed the easy/moderate crossing criteria are shown in red. At both study sites, wading suitability and crossing opportunities decrease as flows increase. At Fords Bar, wading and crossing opportunities are available throughout the study reach up to about 300 cfs, at which point wading suitability noticeably decreases. At 407 cfs easy/moderate wading and crossing is limited to two specific locations. At 600 cfs easy/moderate wading and crossing is no longer available. These results are consistent with the trail crossing study results, which identified 275 cfs as the easy/moderate crossing threshold and 550 cfs as the moderate/difficult crossing threshold for the Fords Bar crossing transect.

The results for Buckeye Bar are similar. At Buckeye Bar, wading and crossing opportunities are readily available up to about 225 cfs, at which point easy wading and crossing opportunities are limited to two specific locations. Again, these results are consistent with the trail crossing study results, which identified 175 cfs as the

easy/moderate crossing threshold and 375 cfs as the moderate/difficult crossing threshold for the Mammoth Bar Crossing.

Based on the information provided by the Angler Focus Group participants, anglers prefer flows between 300 and 600 cfs. These flows do not appear to be suitable for wading and crossing as it relates to angling in the peaking reach.

WADING WUA

The 2-D modeling data and wading/crossing criteria were also utilized to determine the WUA for wading over a range of flows (75–1,500 cfs) at Fords Bar and Buckeye Bar. The results of this effort are shown on Figure 7.9-4. As indicated, more wading area is available at Fords Bar than at Buckeye Bar. The graphs indicate that wading area decreases as flows increase. At Fords Bar wading area begins to decline more rapidly between 300 and 400 cfs. At Buckeye Bar this transition occurs between about 150 to 200 cfs. In both cases, the amount of wading area declines with increasing flow, until about 800 cfs, at which point WUA remains relatively constant through 1,500 cfs.

Whitewater Boating

Whitewater boating occurs along the entire peaking reach, from Oxbow Powerhouse to the Oregon Bar Access point in the China Bar Recreation Area. This area bisects ASRA, so whitewater boating resources along the peaking reach are managed by California State Parks, in accordance with the ASRA Interim Resource Management Plan (USBR 1992).

The peaking reach is typically divided into four runs, as follows:

- **Tunnel Chute Run:** Middle Fork American River – Indian Bar Rafter Access to Ruck-a-Chucky Recreation Area;
- **Mammoth Bar Run:** Middle Fork American River – Ruck-a-Chucky Recreation Area to Mammoth Bar;
- **Murderer's Bar Run:** Middle Fork American River – Mammoth Bar to the North Fork American River Confluence; and
- **Confluence Run:** North Fork American River – Middle Fork American River Confluence to Oregon Bar.

The location of these runs and the primary access points for each of these runs are shown on Map 7.9-8.

The peaking reach is boated privately and commercially; however commercial boating accounts for the vast majority of use. Based on counts of private boaters conducted by PCWA in 2007, a total of 573 individuals boated the peaking reach either from the Indian Bar Rafter Access to Ruck-a-Chucky Recreation Area or from Ruck-a-Chucky Recreation Area to Mammoth Bar. According to California State Parks a total of

17,110 individuals boated these reaches with commercial outfitters during 2007. Therefore, during 2007 private boating use represented about 3% of the total boating use on the peaking reach. PCWA's boating count data and California State Parks commercial boating data is available in the REC 4 – TSR (PCWA 2011f; SD B).

The runs on the peaking reach can be boated separately or in combination. Overnight camping associated with whitewater boating occurs at primitive camping areas found at Cache Rock, the confluence with Otter Creek (Fords Bar), and at Cherokee Bar (Map 7.9-8). Commercial outfitters are allowed to camp at these locations under their Concessions Contract with California State Parks. Non-commercial boaters who plan to camp along the river at locations other than Cache Rock must obtain a River Camping Permit from California State Parks. Boaters who plan to camp at Cherokee Bar must bring their gear in by boat. Developed camping is available at Ruck-a-Chucky Recreation Area.

PCWA currently coordinates with California State Parks and a designated commercial whitewater boating representative to schedule MFP operations during the summer and early fall to accommodate commercial whitewater boating activities. Whitewater boating releases are scheduled on a voluntary basis such that they minimize affects to power production and do not compromise maintenance activities or consumptive water deliveries. Additional information about PCWA's operations and coordination efforts in the peaking reach are available in the REC 4 – TSR (PCWA 2011f; SD B).

WHITEWATER BOATING FLOW STUDIES

To better define whitewater boating flow requirements on the peaking reach, PCWA conducted whitewater boating studies on the following three runs located in the peaking reach.

- **Tunnel Chute Run:** Middle Fork American River – Indian Bar Rafter Access to Ruck-a-Chucky Recreation Area;

- **Mammoth Bar Run:** Middle Fork American River – Ruck-a-Chucky Recreation Area to Mammoth Bar; and

- **Confluence Run:** North Fork American River – Confluence of Middle Fork American River to Oregon Bar.

A whitewater boating study was not conducted on the Murderer's Bar Run. According to the focus group participants, flow preferences for this run are the same as those on the Mammoth Bar Run, located immediately upstream.

The study methods and results are documented in detail in the REC 4 – TSR (PCWA 2011f; SD B). Acceptable flow ranges identified through PCWA's whitewater flow studies are summarized below.

Run	Minimum Acceptable Flow (cfs)	Optimum Flow (cfs)	Maximum Acceptable Flow (cfs)
Tunnel Chute Run	800–900	1,000–1,250	1,500–2,500
Mammoth Bar Run	500–600	800–1,200	1,500–2,500
Murderer's Bar Run	500–600	800–1,200	1,500–2,500
Confluence Run	350–600	800–1,500	1,700–2,500

WHITEWATER BOATING OPPORTUNITIES

The boatable flow ranges identified through PCWA's whitewater boating studies were utilized in conjunction with the hydrologic data to evaluate boating opportunities under impaired conditions. The results of the boating opportunities analysis were tabulated by five water year types (extreme critical/critical, dry, below normal, above normal, and wet) and by month (April–September), and are provided in Tables 7.9-7a–d.

Trail Use/Stream Crossing

PCWA conducted a Trail User/Stream Crossing focus group session with local trail users on May 12, 2008. A complete set of the notes that were captured during the Trail User/Stream Crossing Focus Group is available in the REC 4 – TSR (PCWA 2011f; SD B).

During the focus group meeting and the Recreation TWG meetings, five trails and one access road that is used as by trail users (Drivers Flat Road) were identified as relevant to the MFP relicensing because they provide access to a specific stream crossing location, as follows:

- WST – Ruck-a-Chucky Recreation Area and Poverty Bar Crossings;
- Roanoke Trail – Fords Bar Crossing;
- Drivers Flat Road – Ruck-a-Chucky Recreation Area Crossing;
- American Canyon Trail – Poverty Bar Crossing;
- Quarry Road Trail – Mammoth Bar Crossing; and
- Auburn to Cool Trail (ACT) – Coffer Dam Crossing.

These trails and their associated stream crossings are shown on Map 7.9-2b and are described in detail in the REC 4 – TSR (PCWA 2011f; SD B).

STREAM CROSSING STUDIES

PCWA conducted stream crossing flow studies at five stream crossing locations in the peaking reach. Specifically, PCWA developed stage/discharge relationships for each crossing location and then used hydraulic modeling results combined with the

wading/crossing criteria to determine the range of flows that were crossable by pedestrians and equestrians. The results were used to determine how often stream crossing was possible under impaired conditions at each stream crossing location. The study methods and results are described in detail in the REC 4 – TSR (PCWA 2011f; SD B), and summarized in the following.

SUITABLE STREAM CROSSING FLOWS

Two crossing flows were determined at each site, as shown below. These flows represent: (1) the flow at which crossing suitability shifts from easy/moderate to moderate/difficult; and (2) the flow at which crossing shifts from moderate/difficult to difficult. Both of the crossing thresholds were utilized for the analyses contained in the REC 4 – TSR (PCWA 2011f; SD B) and in Section 8.9 – Recreational Resources Environmental Effects of the License Application. The lower thresholds are appropriate for the average hiker, biker, and equestrian in a recreational setting. The higher thresholds are also valid, but may be more appropriate for more athletic or experienced individuals and equestrians.

Location	Easy/Moderate to Moderate/Difficult Crossing Threshold Flow (cfs)	Moderate/Difficult to Difficult Crossing Threshold Flow (cfs)
Fords Bar	275	550
Ruck-a-Chucky	125	450
Poverty Bar	225	550
Mammoth Bar	175	375
Coffer Dam	175	375

STREAM CROSSING OPPORTUNITIES

After it was determined which flows were crossable at each trail crossing, the historic hydrology was used to determine the amount of time that each crossing in the peaking reach was crossable under impaired conditions. Specifically, the flow data were used to determine the average number of hours that easy/moderate and moderate/difficult crossing conditions were available at each stream crossing location under impaired conditions. For the purposes of this analysis, a "day" was defined as the 12-hour period between 7:00 AM and 7:00 PM. The results of this analysis are provided in Tables 7.9-8a–d.

7.9.7 Potential Future Recreation Use

Future recreation demand depends on several factors, including:

- The demographics, visitation patterns, and recreation activities associated with the people who currently use the MFP area;
- Future population projections; and

- Trends in outdoor participation rates.

These three topics are discussed in the following subsections. Additional, more detailed information is available in the REC 3 – TSR (PCWA 2011e; SD B).

7.9.7.1 Current Recreation Visitor Demographics

Demographic information regarding the people who currently visit the MFP area, including area of origin, age, and ethnicity information and information regarding visitation patterns was collected as part of the REC 2 – TSR (PCWA 2011d; SD B). The results are discussed in detail in the REC 3 – TSR (PCWA 2011e; SD B), and summarized below. Note that the discussion is based on people intercepted in the Hell Hole Reservoir, French Meadows Reservoir, and Ralston Afterbay areas.

- The majority of respondents primarily reside in Placer (29.2%), Sacramento (26.0%), and El Dorado (11.4%) counties.
- The average age of the survey respondents ranged from 42 to 43.4 years.
- The ratio of adults to minors in each group was approximately 4 to 1.
- The majority of survey respondents identified themselves as Caucasian (88%).
- Survey respondents indicated that they have been recreating in the Project area an average of 16.5 years.
- Survey respondents indicated that they visit the area an average of 4.2 times per year.

Survey respondents were also asked to identify what activities in which they participated. 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”.

7.9.7.2 Population Projections

Information available from the California Department of Finance was reviewed to determine how the populations of Placer, Sacramento, and El Dorado counties are expected to change over time. Population for the three counties combined is projected to increase by 68% between 2008 and 2050. The non-Caucasian population in these three counties is expected to grow faster than the Caucasian population. Currently, Caucasians make up a larger proportion of the population in Placer, Sacramento, and El Dorado counties than non-Caucasians. However, 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.

7.9.7.3 Trends in Outdoor Recreation Participation Rates

PCWA collected and reviewed existing literature regarding current trends in outdoor recreation participation. The existing literature sources are identified and discussed in the REC 3 – TSR (PCWA 2011e; SD B). In general, recreation demand and facility utilization is not expected to substantially increase over time, primarily due to shifts in the visitor demographics, and declining participation rates in the types of recreation activities that occur associated with the MFP. The one exception may be future demand for group camping, which may increase due to shifts in regional demographic and outdoor recreation trends.

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TABLES

Table 7.9-1. Project Recreation Facilities.

Project Area	Single Camp Units[1]	Group Camp Units[2]	Picnic Units	Handicap Accessible Units	Maximum PAOT[3] Capacity	Boat Launch	Flush Toilets	Vault Toilets	Pit Toilets	Potable Water	Parking Spaces/Spurs	Land Ownership	Within Existing Project Boundary	Notes
French Meadows Reservoir Area														
Ahart Campground	12	0	0	0	72	–	–	X	–	–	12	TNF	No	
Coyote Group Campground	0	4	0	0	125	–	X	X	–	X	43[4]	TNF	Yes	
Poppy Campground	12	0	0	0	72	–	–	–	X	–	–	TNF	Yes	Hike-in or boat-in access
French Meadows Campground	75	0	0	8	450	–	X	X	–	X	75	TNF	Yes	
Gates Group Campground	0	3	0	0	125	–	–	X	–	X	43[4]	TNF	Portion	
Lewis Campground	40	0	0	3	240	–	X	X	–	X	40	TNF	Portion	
French Meadows Picnic Area and Boat Ramp and Associated Parking Areas	–	–	4	0	24	X	X	X	–	X	46[5]	TNF/ TNF, PCWA	Yes	
McGuire Picnic Area and Beach	–	–	10	0	60	–	X	–	–	X	30[5]	TNF	Portion/Yes	
McGuire Boat Ramp and Associated Parking Areas (includes Poppy Trailhead Parking Area)	–	–	0	0	–	X	X	X	–	X	75[5]	TNF	Portion/Yes	
French Meadows RV Dump Station	–	–	–	–	–	–	–	–	–	–	–	TNF	Yes	
Hell Hole Reservoir Area														
Big Meadows Campground	54	0	0	1	324	–	X	X	–	X	54	ENF, LST	No	
Hell Hole Campground	10	0	0	0	60	–	–	X	–	X	15[5]	ENF	No	Walk in tent units only
Upper Hell Hole Campground	13	0	0	0	78	–	–	–	X	–	–	ENF	Portion	Hike-in or boat-in access
Hell Hole Vista	–	–	1	0	6	–	–	X	–	–	6[5]	ENF	No	
Hell Hole Boat Ramp and Associated Parking Areas	–	–	3	0	–	X	–	X	–	–	57[4]	ENF	Yes	
Ralston Afterbay Area														
Ralston Picnic Area and Cartop Boat Ramp	–	–	5	0	30	X	–	X	–	–	13[5]	TNF	Yes	
Indian Bar Rafting Access and General Parking	–	–	0	0	–	X	–	X	–	–	12[5]	TNF	Yes	
Long Canyon Area														
Middle Meadows Group Campground	0	2	0	2	75	–	X	X	–	X	15[5]	ENF, PCWA	Portion	
Project Recreation Facility Water Supplies														
Dolly Creek Water Supply	–	–	–	–	–	–	–	–	–	X	–	TNF	Portion	Serves Lewis, Gates Group, and Coyote Group Campgrounds, McGuire Picnic Area and Boat Ramp, RV Dump Station, and the French Meadows Administrative Site
French Meadows Campground Water Supply	–	–	–	–	–	–	–	–	–	X	–	TNF, PCWA	Portion	Serves French Meadows Campground, Boat Ramp, and Picnic Area
Big Meadows Campground Water Supply	–	–	–	–	–	–	–	–	–	X	–	ENF	Portion	Serves Big Meadows and Hell Hole Campgrounds

Table 7.9-1. Project Recreation Facilities (continued).

Project Area	Single Camp Units[1]	Group Camp Units[2]	Picnic Units	Handicap Accessible Units	Maximum PAOT[3] Capacity	Boat Launch	Flush Toilets	Vault Toilets	Pit Toilets	Potable Water	Parking Spaces/Spurs	Land Ownership	Within Existing Project Boundary	Notes
Project Recreation Facility Water Supplies (continued)														
Middle Meadows Group Campground Water Supply	–	–	–	–	–	–	–	–	–	X	–	ENF, PCWA	Portion	Serves Middle Meadows Group Campground

Source:
REC 1 – TSR (PCWA 2010b; SD B)

[1]Single camp units typically include a parking spur, picnic table, campfire ring, pedestal cooking grill, and a bear-proof food storage locker.
[2]Group camp units typically include parking areas, picnic tables, serving tables, a group fire ring, benches, double pedestal cooking grills, bear-proof garbage containers, and a bear-proof food storage lockers.
[3]PAOT = Persons At One Time (assumes 6 persons at one time for single camp or picnic units) and is based on number of units.
[4]Determined based on number of striped stalls.
[5]Estimated based on parking area dimensions.
– = Not applicable.

Table 7.9-2. Summary of Estimated Recreation Use at Project Recreation Facilities in RVDs.

Site	Use Estimate (May 2007–May 2008)			
	Summer (5/26/07–9/3/07)	Fall (9/4/07–11/30/07)	Winter/ Spring (12/1/07–5/23/08)	Total
Hell Hole Reservoir Area				
Big Meadows Campground	3,002	1,396	0	4,398
Hell Hole Campground	544	306	26	877
Upper Hell Hole Campground	224	32	22	279
Hell Hole Vista	48	0	0	48
Hell Hole Boat Ramp and Associated Parking Areas	2,241	323	225	2,789
French Meadows Reservoir Area				
Ahart Campground	1,804	8	68	1,880
Coyote Group Campground	5,508	-	648	6,156
Poppy Campground	302	34	0	335
French Meadows Campground	7,346	110	298	7,754
Gates Group Campground	6,204	-	660	6,864
Lewis Campground	2,894	0	76	2,970
French Meadows Boat Ramp and Picnic Area	961	555	263	1,780
McGuire Picnic Area and Beach	146	11	0	157
McGuire Boat Ramp and Associated Parking Areas	484	124	55	664
Long Canyon Area				
Middle Meadows Group Campground	2,009	16	0	2,025
Ralston Afterbay Area				
Ralston Picnic Area and Cartop Boat Ramp	279	89	235	604
Indian Bar Rafter Access and General Parking	432	459	304	1,195

Table 7.9-3. Project Recreation Facility Capacity Estimates.

Facility	Facility Capacity Utilization					PAOT[1] Capacity Utilization			
	No. of Parking Spaces	No. of Sites	Holidays	Weekends	Weekdays	PAOT Capacity	Holidays	Weekends	Weekdays
Hell Hole Reservoir Area									
Big Meadows Campground	-	54	9%	17%	8%	324	4%	7%	3%
Hell Hole Campground	-	10	7%	16%	8%	60	3%	7%	4%
Upper Hell Hole Campground	-	13	5%	5%	2%	78	2%	2%	1%
Hell Hole Vista	6	-	3%	4%	2%	Not applicable			
Hell Hole General Parking Area	57	-	29%	29%	12%				
Hell Hole Boat Ramp									
Hell Hole Boat Ramp Parking Area									
French Meadows Reservoir Area									
Ahart Campground	-	12	28%	43%	13%	72	21%	25%	7%
Coyote Group Campground	-	4	50%	58%	13%	125	34%	48%	11%
Poppy Campground	-	12	1%	5%	4%	72	1%	2%	2%
French Meadows Campground	--	75	16%	28%	11%	450	10%	15%	5%
Gates Group Campground	-	3	57%	67%	23%	125	37%	57%	20%
Lewis Campground	-	40	17%	23%	8%	240	9%	13%	3%
French Meadows Picnic Area	46	-	17%	15%	5%	Not calculated[3]			
French Meadows Boat Ramp									
McGuire Picnic Area	-	10	13%	10%	2%	60	6%	5%	1%
McGuire Boat Ramp	75	-	2%	3%	2%	Not applicable			
Long Canyon Area									
Middle Meadows Group Campground	-	2	50%	75%	10%	75	44%	67%	8%

Table 7.9-3. Project Recreation Facility Capacity Estimates (continued).

Facility	Facility Capacity Utilization					PAOT[1] Capacity Utilization			
	No. of Parking Spaces	No. of Sites	Holidays	Weekends	Weekdays	PAOT Capacity	Holidays	Weekends	Weekdays
Ralston Afterbay Area									
Ralston Picnic Area and Cartop Boat Ramp[2]	-	5	33%	21%	10%	30	21%	14%	7%
Indian Bar Rafting Access and General Parking	12	-	26%	23%	2%	Not applicable			

[1]PAOT capacity is based on 6 persons at one time at each site.

[2]PAOT capacity estimate is for Ralston Picnic Area.

[3]PAOT capacity for French Meadows Picnic Area could not be calculated because the vehicle counts did not differentiate between the French Meadows Picnic Area and French Meadows Boat Ramp Parking areas.

Note:

All data is from summer 2007 with the exception of Middle Meadows, Coyote, and Gates group campgrounds where 2008 data was used because estimating weekday, weekend, and holiday capacity was possible. Data provided for 2007 was on an annual basis for Coyote and Gates group campgrounds.

Table 7.9-4. Summary of Whitewater Boating Reaches on the Bypass Reaches.

Bypass Reaches	Put-in	Take-out	Distance (miles)	Gradient (ft/mile)	Class	Boatable Flow Ranges (cfs)
Rubicon River						
RM 25 to Ellicott Bridge	River Mile 25, on river right	Ellicott Bridge	3.9	139	Class V	400–1500
Ellicott Bridge to Ralston Afterbay	Ellicott Bridge	Ralston Afterbay near the Ralston Powerhouse	20.5	106	Class V	400–1500 1501–3000
Long Canyon Creek						
Confluence of North and South Fork Long Canyon Creeks to Confluence with Rubicon River	Confluence of North and South Fork Long Canyon Creeks	Confluence of Long Canyon Creek and Rubicon River	11.4	237	Class IV+ / Class V	200–600
Middle Fork American River						
French Meadows Dam to Middle Fork Interbay	Just below French Meadows Dam	Just below Middle Fork Interbay Dam	11.1	225	Class V	215–450
Middle Fork Interbay Dam to Ralston Afterbay	Just below Middle Fork Interbay Dam	Ralston Afterbay Car Top Boat Launch	9.6	135	Class IV / Class V	450–600

Table 7.9-5a. Whitewater Boating Opportunities by Year and Water Year Type - Bypass Reaches

Rubicon River: RM25 - Ellicott Bridge

Water Year and Year Type	Flow Range	Days Flows Meet Criteria IMPAIRED						
		Apr	May	Jun	Jul	Aug	Sep	Total
Extreme Critical								
1977	400 - 1500 cfs	0	0	0	0	0	0	**0**
Critical								
1976	400 - 1500 cfs	0	0	0	0	0	0	**0**
1987	400 - 1500 cfs	0	0	0	0	0	0	**0**
1988	400 - 1500 cfs	0	0	0	0	0	0	**0**
1992	400 - 1500 cfs	0	0	0	0	0	0	**0**
1994	400 - 1500 cfs	0	0	0	0	0	0	**0**
Average		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Dry								
1981	400 - 1500 cfs	0	0	0	0	0	0	**0**
1990	400 - 1500 cfs	0	0	0	0	0	0	**0**
1991	400 - 1500 cfs	0	0	0	0	0	0	**0**
2001	400 - 1500 cfs	0	0	0	0	0	0	**0**
2007	400 - 1500 cfs	0	0	0	0	0	0	**0**
Average		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Below Normal								
1979	400 - 1500 cfs	0	0	0	0	0	0	**0**
1985	400 - 1500 cfs	0	0	0	0	0	0	**0**
1989	400 - 1500 cfs	0	0	0	0	0	0	**0**
2002	400 - 1500 cfs	0	0	0	0	0	0	**0**
2003	400 - 1500 cfs	0	0	4	0	0	0	**4**
2004	400 - 1500 cfs	0	0	0	0	0	0	**0**
Average		0.0	0.0	0.7	0.0	0.0	0.0	**0.7**
Above Normal								
1975	400 - 1500 cfs	0	0	0	0	0	0	**0**
1978	400 - 1500 cfs	0	0	0	0	0	0	**0**
1993	400 - 1500 cfs	0	0	0	0	0	0	**0**
1999	400 - 1500 cfs	0	0	0	0	0	0	**0**
2000	400 - 1500 cfs	0	0	0	0	0	0	**0**
2005	400 - 1500 cfs	0	3	9	0	0	0	**12**
Average		0.0	0.5	1.5	0.0	0.0	0.0	**2.0**
Wet								
1980	400 - 1500 cfs	0	0	0	0	0	0	**0**
1982	400 - 1500 cfs	5	20	0	0	0	0	**25**
1983	400 - 1500 cfs	0	0	12	8	0	0	**20**
1984	400 - 1500 cfs	0	0	0	0	0	0	**0**
1986	400 - 1500 cfs	0	0	0	0	0	0	**0**
1995	400 - 1500 cfs	0	0	15	10	0	0	**25**
1996	400 - 1500 cfs	0	8	0	0	0	0	**8**
1997	400 - 1500 cfs	0	0	0	0	0	0	**0**
1998	400 - 1500 cfs	0	0	9	8	0	0	**17**
2006	400 - 1500 cfs	0	23	9	0	0	0	**32**
Average		0.5	5.1	4.5	2.6	0.0	0.0	**12.7**

Table 7.9-5b. Whitewater Boating Opportunities by Year and Water Year Type - Bypass Reaches

Rubicon River: Ellicott Bridge - Ralston Afterbay

Water Year and Year Type	Flow Range	Days Flows Meet Criteria IMPAIRED						
		Apr	May	Jun	Jul	Aug	Sep	Total
Extreme Critical								
1977	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
Critical								
1976	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1987	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1988	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1992	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1994	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
Average (400 - 1500 cfs)		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Average (1501 - 3000 cfs)		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Dry								
1981	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1990	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1991	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
2001	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
2007	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
Average (400 - 1500 cfs)		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Average (1501 - 3000 cfs)		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Below Normal								
1979	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1985	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1989	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
2002	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
2003	400 - 1500 cfs	0	0	4	0	0	0	**4**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
2004	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
Average (400 - 1500 cfs)		0.0	0.0	0.7	0.0	0.0	0.0	**0.7**
Average (1501 - 3000 cfs)		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**

Table 7.9-5b. Whitewater Boating Opportunities by Year and Water Year Type - Bypass Reaches (continued)

Rubicon River: Ellicott Bridge - Ralston Afterbay

Water Year and Year Type	Flow Range	Days Flows Meet Criteria IMPAIRED						
		Apr	May	Jun	Jul	Aug	Sep	Total
Above Normal								
1975	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1978	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1993	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1999	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
2000	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
2005	400 - 1500 cfs	0	3	13	0	0	0	**16**
	1501 - 3000 cfs	0	3	0	0	0	0	**3**
Average (400 - 1500 cfs)		0.0	0.5	2.2	0.0	0.0	0.0	**2.7**
Average (1501 - 3000 cfs)		0.0	0.5	0.0	0.0	0.0	0.0	**0.5**
Wet								
1980	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1982	400 - 1500 cfs	11	29	0	0	0	0	**40**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1983	400 - 1500 cfs	0	11	8	7	0	0	**26**
	1501 - 3000 cfs	0	0	4	0	0	0	**4**
1984	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1986	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1995	400 - 1500 cfs	3	3	17	10	0	0	**33**
	1501 - 3000 cfs	0	0	4	0	0	0	**4**
1996	400 - 1500 cfs	0	12	3	0	0	0	**15**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1997	400 - 1500 cfs	0	0	0	0	0	0	**0**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
1998	400 - 1500 cfs	0	0	7	8	0	0	**15**
	1501 - 3000 cfs	0	0	0	0	0	0	**0**
2006	400 - 1500 cfs	28	19	10	0	0	0	**57**
	1501 - 3000 cfs	0	8	0	0	0	0	**8**
Average (400 - 1500 cfs)		4.2	7.4	4.5	2.5	0.0	0.0	**18.6**
Average (1501 - 3000 cfs)		0.0	0.8	0.8	0.0	0.0	0.0	**1.6**

Table 7.9-5c. Whitewater Boating Opportunities by Year and Water Year Type - Bypass Reaches

Long Canyon Creek

Water Year and Year Type	Flow Range	Days Flows Meet Criteria IMPAIRED						
		Apr	May	Jun	Jul	Aug	Sep	Total
Extreme Critical								
1977	200 - 600 cfs	0	0	0	0	0	0	**0**
Critical								
1976	200 - 600 cfs	0	0	0	0	0	0	**0**
1987	200 - 600 cfs	0	0	0	0	0	0	**0**
1988	200 - 600 cfs	0	0	0	0	0	0	**0**
1992	200 - 600 cfs	0	0	0	0	0	0	**0**
1994	200 - 600 cfs	0	0	0	0	0	0	**0**
Average		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Dry								
1981	200 - 600 cfs	0	0	0	0	0	0	**0**
1990	200 - 600 cfs	0	0	0	0	0	0	**0**
1991	200 - 600 cfs	0	0	0	0	0	0	**0**
2001	200 - 600 cfs	0	0	0	0	0	0	**0**
2007	200 - 600 cfs	0	0	0	0	0	0	**0**
Average		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Below Normal								
1979	200 - 600 cfs	0	0	0	0	0	0	**0**
1985	200 - 600 cfs	0	0	0	0	0	0	**0**
1989	200 - 600 cfs	0	0	0	0	0	0	**0**
2002	200 - 600 cfs	0	0	0	0	0	0	**0**
2003	200 - 600 cfs	0	0	0	0	0	0	**0**
2004	200 - 600 cfs	0	0	0	0	0	0	**0**
Average		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Above Normal								
1975	200 - 600 cfs	0	0	0	0	0	0	**0**
1978	200 - 600 cfs	0	0	0	0	0	0	**0**
1993	200 - 600 cfs	0	0	0	0	0	0	**0**
1999	200 - 600 cfs	0	0	0	0	0	0	**0**
2000	200 - 600 cfs	0	0	0	0	0	0	**0**
2005	200 - 600 cfs	0	0	0	0	0	0	**0**
Average		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Wet								
1980	200 - 600 cfs	0	0	0	0	0	0	**0**
1982	200 - 600 cfs	18	9	0	0	0	0	**27**
1983	200 - 600 cfs	3	1	0	0	0	0	**4**
1984	200 - 600 cfs	0	0	0	0	0	0	**0**
1986	200 - 600 cfs	0	0	0	0	0	0	**0**
1995	200 - 600 cfs	3	7	0	0	0	0	**10**
1996	200 - 600 cfs	0	8	0	0	0	0	**8**
1997	200 - 600 cfs	0	0	0	0	0	0	**0**
1998	200 - 600 cfs	0	0	0	0	0	0	**0**
2006	200 - 600 cfs	26	10	0	0	0	0	**36**
Average		5.0	3.5	0.0	0.0	0.0	0.0	**8.5**

Table 7.9-5d. Whitewater Boating Opportunities by Year and Water Year Type - Bypass Reaches.

Middle Fork American River - French Meadows Dam - Middle Fork Interbay

Water Year and Year Type	Flow Range	Days Flows Meet Criteria IMPAIRED						
		Apr	May	Jun	Jul	Aug	Sep	Total
Extreme Critical								
1977	215 - 450 cfs	0	0	0	0	0	0	**0**
Critical								
1976	215 - 450 cfs	0	0	0	0	0	0	**0**
1987	215 - 450 cfs	0	0	0	0	0	0	**0**
1988	215 - 450 cfs	0	0	0	0	0	0	**0**
1992	215 - 450 cfs	0	0	0	0	0	0	**0**
1994	215 - 450 cfs	0	0	0	0	0	0	**0**
Average		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Dry								
1981	215 - 450 cfs	0	0	0	0	0	0	**0**
1990	215 - 450 cfs	0	0	0	0	0	0	**0**
1991	215 - 450 cfs	0	0	0	0	0	0	**0**
2001	215 - 450 cfs	0	0	0	0	0	0	**0**
2007	215 - 450 cfs	0	0	0	0	0	0	**0**
Average		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Below Normal								
1979	215 - 450 cfs	0	4	0	0	0	0	**4**
1985	215 - 450 cfs	8	0	0	0	0	0	**8**
1989	215 - 450 cfs	10	0	0	0	0	0	**10**
2002	215 - 450 cfs	9	0	0	0	0	0	**9**
2003	215 - 450 cfs	7	16	0	0	0	0	**23**
2004	215 - 450 cfs	0	0	0	0	0	0	**0**
Average		5.7	3.3	0.0	0.0	0.0	0.0	**9.0**

Table 7.9-5d. Whitewater Boating Opportunities by Year and Water Year Type - Bypass Reaches (continued).

Middle Fork American River - French Meadows Dam - Middle Fork Interbay

Water Year and Year Type	Flow Range	Days Flows Meet Criteria IMPAIRED						
		Apr	May	Jun	Jul	Aug	Sep	Total
Above Normal								
1975	215 - 450 cfs	7	24	5	0	0	0	**36**
1978	215 - 450 cfs	14	8	0	0	0	0	**22**
1993	215 - 450 cfs	26	5	0	0	0	0	**31**
1999	215 - 450 cfs	11	11	1	0	0	0	**23**
2000	215 - 450 cfs	0	0	0	0	0	0	**0**
2005	215 - 450 cfs	30	17	11	0	0	0	**58**
Average		14.7	10.8	2.8	0.0	0.0	0.0	**28.3**
Wet								
1980	215 - 450 cfs	5	0	0	0	0	0	**5**
1982	215 - 450 cfs	6	15	13	0	0	0	**34**
1983	215 - 450 cfs	26	20	10	0	0	0	**56**
1984	215 - 450 cfs	0	0	0	0	0	0	**0**
1986	215 - 450 cfs	6	2	2	0	0	0	**10**
1995	215 - 450 cfs	26	14	5	4	0	0	**49**
1996	215 - 450 cfs	16	8	0	0	0	0	**24**
1997	215 - 450 cfs	0	0	0	0	0	0	**0**
1998	215 - 450 cfs	14	15	6	3	0	0	**38**
2006	215 - 450 cfs	0	7	4	0	0	0	**11**
Average		9.9	8.1	4.0	0.7	0.0	0.0	**22.7**

Table 7.9-5e. Whitewater Boating Opportunities by Year and Water Year Type - Bypass Reaches.

Middle Fork American River: Middle Fork Interbay - Ralston Afterbay

Water Year and Year Type	Flow Range	Days Flows Meet Criteria IMPAIRED						
		Apr	May	Jun	Jul	Aug	Sep	Total
Extreme Critical								
1977	450 - 600 cfs	0	0	0	0	0	0	**0**
Critical								
1976	450 - 600 cfs	0	0	0	0	0	0	**0**
1987	450 - 600 cfs	0	0	0	0	0	0	**0**
1988	450 - 600 cfs	0	0	0	0	0	0	**0**
1992	450 - 600 cfs	0	0	0	0	0	0	**0**
1994	450 - 600 cfs	0	0	0	0	0	0	**0**
Average		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Dry								
1981	450 - 600 cfs	0	0	0	0	0	0	**0**
1990	450 - 600 cfs	0	0	0	0	0	0	**0**
1991	450 - 600 cfs	0	0	0	0	0	0	**0**
2001	450 - 600 cfs	0	0	0	0	0	0	**0**
2007	450 - 600 cfs	0	0	0	0	0	0	**0**
Average		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Below Normal								
1979	450 - 600 cfs	0	0	0	0	0	0	**0**
1985	450 - 600 cfs	0	0	0	0	0	0	**0**
1989	450 - 600 cfs	0	0	0	0	0	0	**0**
2002	450 - 600 cfs	0	0	0	0	0	0	**0**
2003	450 - 600 cfs	0	0	0	0	0	0	**0**
2004	450 - 600 cfs	0	0	0	0	0	0	**0**
Average		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**

Table 7.9-5e. Whitewater Boating Opportunities by Year and Water Year Type - Bypass Reaches (continued).

Middle Fork American River: Middle Fork Interbay - Ralston Afterbay

Water Year and Year Type	Flow Range	Days Flows Meet Criteria IMPAIRED						
		Apr	May	Jun	Jul	Aug	Sep	Total
Above Normal								
1975	450 - 600 cfs	0	0	0	0	0	0	**0**
1978	450 - 600 cfs	0	0	0	0	0	0	**0**
1993	450 - 600 cfs	0	0	0	0	0	0	**0**
1999	450 - 600 cfs	0	0	0	0	0	0	**0**
2000	450 - 600 cfs	0	0	1	2	0	0	**3**
2005	450 - 600 cfs	0	10	14	0	0	0	**24**
Average		0.0	1.7	2.5	0.3	0.0	0.0	**4.5**
Wet								
1980	450 - 600 cfs	0	0	0	0	0	0	**0**
1982	450 - 600 cfs	0	14	8	0	0	0	**22**
1983	450 - 600 cfs	16	15	7	1	0	0	**39**
1984	450 - 600 cfs	0	0	0	0	0	0	**0**
1986	450 - 600 cfs	4	0	0	0	0	0	**4**
1995	450 - 600 cfs	6	7	3	0	0	0	**16**
1996	450 - 600 cfs	0	0	0	0	0	0	**0**
1997	450 - 600 cfs	0	0	0	0	0	0	**0**
1998	450 - 600 cfs	0	0	0	0	0	0	**0**
2006	450 - 600 cfs	0	0	3	0	0	0	**3**
Average		2.6	3.6	2.1	0.1	0.0	0.0	**8.4**

Table 7.9-6. Average Hours per Day (7:00 AM–7:00 PM) that Ramping Occurred in the Peaking Reach when Flows were Less than 2,000 cfs.

Water Year and Type	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
	Hours	Days	Hours	Days	Hours	Days	Hours	Days	Hours	Days	Hours	Days	Hours	Days	Hours	Days	Hours	Days	Hours	Days	Hours	Days	Hours	Days
Critical																								
1988	4	30	3.6	24	1.6	24	1.6	26	1.8	30	2.6	28	2.3	28	2.4	27	2.7	26	0	0	2.1	17	3.3	29
1992	2	20	0.6	6	0.3	2	1.1	3	1.9	18	2.6	26	2.5	28	2.6	25	2.5	21	2	9	3.4	17	2.4	20
1994	1	5	0.9	18	1.6	7	0.9	5	2.9	25	2.4	29	2.8	30	3.1	31	3.1	11	3.1	13	2.9	26	2.5	26
Average	2.1	18.3	1.7	16.0	1.2	11.0	1.2	11.3	2.2	24.3	2.5	27.7	2.5	28.7	2.7	27.7	2.8	19.3	1.7	7.3	2.8	20.0	2.7	25.0
Dry																								
1990	0	0	1.7	3	1.4	14	1.5	16	2	17	2.5	27	1.6	16	1.8	12	2.3	20	2	17	4	21	1.7	11
1991	2.4	16	1.5	12	1.8	17	0.8	10	1.9	14	1.1	23	1.7	22	1.3	24	1.8	22	2.2	13	3	25	2.1	13
2001	1.1	29	1.2	21	1.5	28	1.6	25	2	30	2.2	26	2.4	24	1.6	24	2	30	1	1	2.1	8	2.4	27
2007	0	0	0	0	1.5	28	1.5	19	2	29	2.9	30	1.6	31	2.8	31	2.2	28	0	0	0	0	0	0
Average	0.9	11.3	1.1	9.0	1.6	21.8	1.4	17.5	2.0	22.5	2.2	26.5	1.8	23.3	1.9	22.8	2.1	25.0	1.3	7.8	2.3	13.5	1.6	12.8
Below Normal																								
1989	2.2	28	2.7	21	1.1	4	0.8	7	0.8	11	1.4	22	1.8	22	1.6	30	1.6	16	1.4	10	2.7	21	3.2	27
2002	1.1	16	1.3	16	1	20	1.2	20	2.1	31	2.5	30	2.5	31	2.8	31	1.5	11	1.5	9	1.4	19	1.6	24
2003	1.1	26	1.3	23	0.9	15	1.1	16	1.6	20	1.6	19	1.6	25	1.4	27	1.2	13	0.8	6	0.7	17	1	22
2004	1.4	28	1.7	21	1.4	25	1.7	28	2.1	31	2.6	30	2.3	31	2.1	31	1.9	29	2	22	1.9	20	1.9	17
Average	1.5	24.5	1.8	20.3	1.1	16.0	1.2	17.8	1.7	23.3	2.0	25.3	2.1	27.3	2.0	29.8	1.6	17.3	1.4	11.8	1.7	19.3	1.9	22.5
Above Normal																								
1993	2.8	22	1.8	8	0.3	2	0.8	12	2.3	18	0.6	14	1.3	12	0.6	7	1.9	6	1.8	26	2.7	22	3.3	27
1999	1.5	25	0.7	13	2.2	18	2.6	24	2.3	26	1.7	20	2.3	27	2.4	29	1.8	18	2	15	2.2	30	1.9	31
2000	1.8	31	2.1	27	1.5	18	1.9	25	1.6	17	1.6	24	2.1	28	1.9	29	1.7	28	1.4	8	1.3	23	1.9	30
2005	0.9	9	1.1	2	0.9	17	0.6	10	1.1	6	0.8	7	1.1	19	1.5	16	1.8	24	1.3	10	1.3	27	1.1	13
Average	1.8	21.8	1.4	12.5	1.2	13.8	1.5	17.8	1.8	16.8	1.2	16.3	1.7	21.5	1.6	20.3	1.8	19.0	1.6	14.8	1.9	25.5	2.1	25.3
Wet																								
1995	1.1	13	1.1	4	1	4	0.5	2	0	0	1	1	1.4	12	1	7	1.6	12	0.3	1	0	0	1.5	26
1997	2.2	18	0.6	7	2	19	1.7	19	1.2	19	2.3	26	2.1	20	1.2	7	3	10	1.6	4	2.1	24	1	19
1998	1.4	30	1.5	24	2	20	0.8	4	1.5	7	1.3	15	2.1	18	1.3	3	2.5	16	2	1	1.3	2	0.7	22
2006	0	0	0	0	0.3	3	0	0	0.5	3	1.2	10	1.1	25	1.1	22	1.7	18	1.1	4	1.4	21	0	0
Average	1.2	15.3	0.8	8.8	1.3	11.5	0.8	6.3	0.8	7.3	1.5	13.0	1.7	18.8	1.2	9.8	2.2	14.0	1.3	2.5	1.2	11.8	0.8	16.8

Table 7.9-7a. Whitewater Boating Opportunities by Year and Water Year Type – Peaking Reach

Tunnel Chute Run (Indian Bar Rafting Access to Ruck-a-Chucky)

Water Year and Year Type	Flow Range	Days Flows Meet Criteria IMPAIRED						
		Apr	May	Jun	Jul	Aug	Sep	Total
Critical								
1988	800 - 2500 cfs	0	0	21	25	21	17	**84**
1992	800 - 2500 cfs	0	9	15	25	23	10	**82**
1994	800 - 2500 cfs	0	4	27	27	23	3	**84**
Average		0	4	21	26	22	10	**83**
Dry								
1990	800 - 2500 cfs	0	2	18	28	28	16	**92**
1991	800 - 2500 cfs	14	14	24	26	27	12	**117**
2001	800 - 2500 cfs	12	22	22	28	29	28	**141**
2007	800 - 2500 cfs	5	16	20	29	31	26	**127**
Average		8	14	21	28	29	21	**119**
Below Normal								
1989	800 - 2500 cfs	25	31	27	16	31	15	**145**
2002	800 - 2500 cfs	24	28	28	28	26	7	**141**
2003	800 - 2500 cfs	28	25	28	30	31	30	**172**
2004	800 - 2500 cfs	22	29	29	30	30	30	**170**
Average		25	28	28	26	30	21	**157**
Above Normal								
1993	800 - 2500 cfs	22	30	29	30	31	11	**153**
1999	800 - 2500 cfs	25	31	29	29	30	19	**163**
2000	800 - 2500 cfs	27	31	29	31	31	20	**169**
2005	800 - 2500 cfs	30	14	26	22	17	26	**135**
Average		26	27	28	28	27	19	**155**
Wet								
1995	800 - 2500 cfs	0	0	5	30	30	15	**80**
1997	800 - 2500 cfs	30	31	29	29	31	18	**168**
1998	800 - 2500 cfs	9	15	18	31	30	26	**129**
2006	800 - 2500 cfs	0	5	30	31	29	17	**112**
Average		10	13	21	30	30	19	**122**

Table 7.9-7b. Whitewater Boating Opportunities by Year and Water Year Type – Peaking Reach

Mammoth Bar Run (Ruck-a-Chucky to Mammoth Bar)

Water Year and Year Type	Flow Range	Days Flows Meet Criteria IMPAIRED						
		Apr	May	Jun	Jul	Aug	Sep	Total
Critical								
1988	500 - 2500 cfs	3	0	24	25	18	13	**83**
1992	500 - 2500 cfs	6	8	22	24	17	9	**86**
1994	500 - 2500 cfs	0	9	29	25	30	9	**102**
Average		3	6	25	25	22	10	**90**
Dry								
1990	500 - 2500 cfs	12	3	23	28	29	19	**114**
1991	500 - 2500 cfs	29	31	26	28	27	18	**159**
2001	500 - 2500 cfs	19	23	24	28	29	29	**152**
Total		12	2	22	28	29	19	**112**
Average		18	15	24	28	29	21	**134**
Below Normal								
1989	500 - 2500 cfs	23	31	28	18	30	16	**146**
2002	500 - 2500 cfs	30	29	30	31	30	8	**158**
2003	500 - 2500 cfs	28	23	30	31	29	30	**171**
2004	500 - 2500 cfs	23	31	28	18	30	16	**146**
Average		26	29	29	25	30	18	**155**
Above Normal								
1993	500 - 2500 cfs	19	30	30	30	31	20	**160**
1999	500 - 2500 cfs	25	31	30	31	31	19	**167**
2000	500 - 2500 cfs	30	31	30	31	31	21	**174**
2005	500 - 2500 cfs	19	31	30	30	31	20	**161**
Average		23	31	30	31	31	20	**166**
Wet								
1995	500 - 2500 cfs	0	0	4	28	31	17	**80**
1997	500 - 2500 cfs	30	31	29	31	31	21	**173**
1998	500 - 2500 cfs	8	13	18	30	31	28	**128**
2006	500 - 2500 cfs	0	0	5	29	31	17	**82**
Average		10	11	14	30	31	21	**116**

Table 7.9-7c. Whitewater Boating Opportunities by Year and Water Year Type – Peaking Reach

Murderer's Bar Run (Mammoth Bar to Confluence)

Water Year and Year Type	Flow Range	Days Flows Meet Criteria IMPAIRED						
		Apr	May	Jun	Jul	Aug	Sep	Total
Critical								
1988	500 - 2500 cfs	3	0	24	25	18	13	**83**
1992	500 - 2500 cfs	6	8	22	24	17	9	**86**
1994	500 - 2500 cfs	0	9	29	25	30	9	**102**
Average		3	6	25	25	22	10	**90**
Dry								
1990	500 - 2500 cfs	12	7	24	29	30	20	**122**
1991	500 - 2500 cfs	29	31	27	28	27	20	**162**
2001	500 - 2500 cfs	21	20	21	22	28	21	**133**
Total		12	5	24	29	30	20	**120**
Average		19	16	24	27	29	20	**134**
Below Normal								
1989	500 - 2500 cfs	23	31	28	18	30	16	**146**
2002	500 - 2500 cfs	30	29	30	31	30	8	**158**
2003	500 - 2500 cfs	28	23	30	31	29	30	**171**
2004	500 - 2500 cfs	23	31	28	18	30	16	**146**
Average		26	29	29	25	30	18	**155**
Above Normal								
1993	500 - 2500 cfs	22	31	30	31	31	21	**166**
1999	500 - 2500 cfs	26	31	30	30	31	17	**165**
2000	500 - 2500 cfs	30	31	29	29	31	21	**171**
2005	500 - 2500 cfs	23	31	30	31	31	21	**167**
Average		25	31	30	30	31	20	**167**
Wet								
1995	500 - 2500 cfs	0	0	9	31	31	17	**88**
1997	500 - 2500 cfs	30	31	29	31	31	21	**173**
1998	500 - 2500 cfs	16	19	23	31	31	26	**146**
2006	500 - 2500 cfs	0	0	10	31	31	17	**89**
Average		12	13	18	31	31	20	**124**

Table 7.9-7d. Whitewater Boating Opportunities by Year and Water Year Type – Peaking Reach

Confluence Run (Confluence to Oregon Bar)

Water Year and Year Type	Flow Range	Days Flows Meet Criteria IMPAIRED						
		Apr	May	Jun	Jul	Aug	Sep	Total
Critical								
1988	350 - 2500 cfs	30	1	23	18	8	2	**82**
1992	350 - 2500 cfs	30	22	7	2	3	3	**67**
1994	350 - 2500 cfs	30	31	21	12	4	3	**101**
Average		30	18	17	11	5	3	**83**
Dry								
1990	350 - 2500 cfs	30	1	29	29	30	21	**140**
1991	350 - 2500 cfs	26	30	30	28	26	17	**157**
2001	350 - 2500 cfs	28	31	16	5	15	1	**96**
2007	350 - 2500 cfs	30	31	28	29	30	21	**169**
Average		29	23	26	23	25	15	**141**
Below Normal								
1989	350 - 2500 cfs	4	1	29	22	31	18	**105**
2002	350 - 2500 cfs	14	31	28	0	6	4	**83**
2003	350 - 2500 cfs	12	0	21	21	12	27	**93**
2004	350 - 2500 cfs	5	24	29	22	31	17	**128**
Average		9	14	27	16	20	17	**102**
Above Normal								
1993	350 - 2500 cfs	0	0	14	31	31	21	**97**
1999	350 - 2500 cfs	6	0	22	31	31	19	**109**
2000	350 - 2500 cfs	16	17	30	18	13	5	**99**
2005	350 - 2500 cfs	0	0	12	31	31	21	**95**
Average		6	4	20	28	27	17	**100**
Wet								
1995	350 - 2500 cfs	0	0	0	20	31	18	**69**
1997	350 - 2500 cfs	24	27	30	31	31	18	**161**
1998	350 - 2500 cfs	0	0	0	22	31	28	**81**
2006	350 - 2500 cfs	0	0	0	28	31	18	**77**
Average		6	7	8	25	31	21	**97**

Table 7.9-8. Average Number of Hours per Day (7:00 AM–7:00 PM) that River Crossing was Possible at Trail Crossings in the Peaking Reach – Impaired Conditions.

Wet Water Years (1995, 1997, 1998, 2006)

Trail Crossing Location	Summer (460 days)		Fall (408 days)		Winter (346 days)		Spring (510 days)		Total	Average
	Easy/Mod	Mod/Dif	Easy/Mod	Mod/Dif	Easy/Mod	Mod/Dif	Easy/Mod	Mod/Dif		
Fords Bar	0.3	0.7	5.3	7.0	0.8	2.7	0.0	0.2	**10.5**	**2.6**
Ruck-a-Chucky	0.0	0.7	1.2	6.5	0.0	2.6	0.0	0.0	**9.9**	**2.5**
Poverty Bar	0.2	0.9	4.0	7.5	0.4	3.0	0.0	0.2	**11.6**	**2.9**
Mammoth Bar	0.1	0.7	3.1	6.6	0.2	1.9	0.0	0.0	**9.3**	**2.3**
Coffer Dam	0.0	0.2	0.9	5.8	0.0	0.2	0.0	0.0	**6.2**	**1.5**

Above Normal Water Years (1993, 1999, 2000, 2005)

Trail Crossing Location	Summer (276 days)		Fall (320 days)		Winter (360 days)		Spring (212 days)		Total	Average
	Easy/Mod	Mod/Dif	Easy/Mod	Mod/Dif	Easy/Mod	Mod/Dif	Easy/Mod	Mod/Dif		
Fords Bar	2.3	4.0	6.4	7.8	4.2	5.7	0.0	0.1	**17.6**	**4.4**
Ruck-a-Chucky	1.2	4.1	1.6	8.5	0.1	5.7	0.0	0.0	**18.2**	**4.6**
Poverty Bar	1.8	4.9	4.2	9.3	3.1	6.0	0.0	0.1	**20.3**	**5.1**
Mammoth Bar	1.8	4.1	3.5	8.7	1.8	5.4	0.0	0.0	**18.1**	**4.5**
Coffer Dam	1.0	2.9	0.4	7.6	0.0	2.8	0.0	0.0	**13.4**	**3.3**

Below Normal Water Years (1989, 2002, 2003, 2004)

Trail Crossing Location	Summer (368 days)		Fall (364 days)		Winter (391 days)		Spring (396 days)		Total	Average
	Easy/Mod	Mod/Dif	Easy/Mod	Mod/Dif	Easy/Mod	Mod/Dif	Easy/Mod	Mod/Dif		
Fords Bar	4.3	5.6	6.6	8.2	2.2	4.6	0.3	2.7	**21.0**	**5.3**
Ruck-a-Chucky	1.3	6.5	2.6	8.2	0.7	3.8	0.0	1.8	**20.2**	**5.1**
Poverty Bar	4.7	7.6	5.8	9.3	1.7	4.9	0.1	2.9	**24.7**	**6.2**
Mammoth Bar	4.2	7.4	5.0	8.5	1.4	3.1	0.0	1.3	**20.2**	**5.1**
Coffer Dam	0.4	5.5	2.2	7.2	0.0	1.2	0.0	0.0	**13.9**	**3.5**

Table 7.9-8. Average Number of Hours per Day (7:00 AM–7:00 PM) that River Crossing was Possible at Trail Crossings in the Peaking Reach – Impaired Conditions.

Dry Water Years (1990, 1991, 2001, 2007)

Trail Crossing Location	Summer (460 days)		Fall (318 days)		Winter (299 days)		Spring (538 days)		Total	Average
	Easy/Mod	Mod/Dif	Easy/Mod	Mod/Dif	Easy/Mod	Mod/Dif	Easy/Mod	Mod/Dif		
Fords Bar	4.3	5.4	7.8	9.0	7.0	9.1	3.0	7.8	**31.3**	**7.8**
Ruck-a-Chucky	2.7	6.1	7.0	9.0	5.2	8.6	0.2	6.0	**29.7**	**7.4**
Poverty Bar	4.1	7.0	8.2	9.8	6.5	9.4	2.1	7.5	**33.8**	**8.4**
Mammoth Bar	4.0	7.1	8.0	9.3	5.9	8.0	1.3	4.8	**29.2**	**7.3**
Coffer Dam	2.2	6.0	6.4	8.7	3.0	5.9	0.0	0.3	**20.9**	**5.2**

Critical Water Years (1988, 1992, 1994)

Trail Crossing Location	Summer (184 days)		Fall (289 days)		Winter (318 days)		Spring (92 days)		Total	Average
	Easy/Mod	Mod/Dif	Easy/Mod	Mod/Dif	Easy/Mod	Mod/Dif	Easy/Mod	Mod/Dif		
Fords Bar	5.9	6.7	10.4	11.1	4.1	6.6	0.2	3.0	**27.4**	**6.8**
Ruck-a-Chucky	4.6	7.9	7.8	11.4	0.9	6.0	0.0	1.7	**26.9**	**6.7**
Poverty Bar	7.2	8.9	10.8	11.8	3.7	6.9	0.1	2.4	**30.0**	**7.5**
Mammoth Bar	7.1	9.1	10.7	11.7	2.7	5.4	0.1	1.0	**27.3**	**6.8**
Coffer Dam	4.7	8.3	8.4	11.0	0.8	2.0	0.0	0.0	**21.4**	**5.3**

Notes:

Easy/Mod = Average number of hours trail crossing was available below the easy to moderate/moderate to difficult threshold.
Mod/Dif = Average number of hours trail crossing was available below the moderate to difficult/difficult threshold.
Summer = June, July, August
Fall = September, October, November
Winter = December, January, February
Spring = March, April, May

Total and Average are based on Mod/Dif values.

FIGURES

Figure 7.9-1. Wading/Crossing Suitability Relationship.

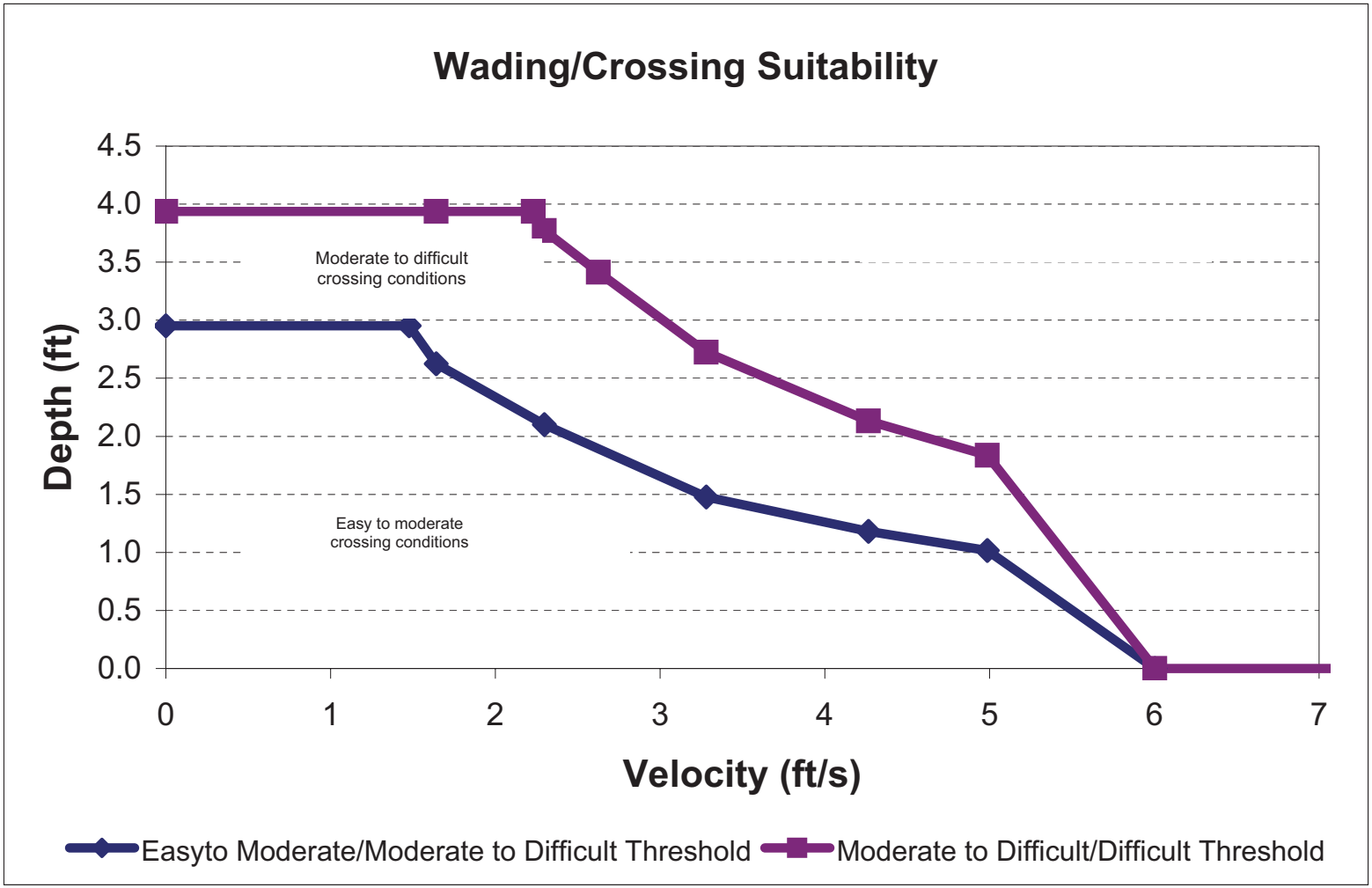


Figure 7.9-2. Fords Bar Wading Suitability (80–1018 cfs).

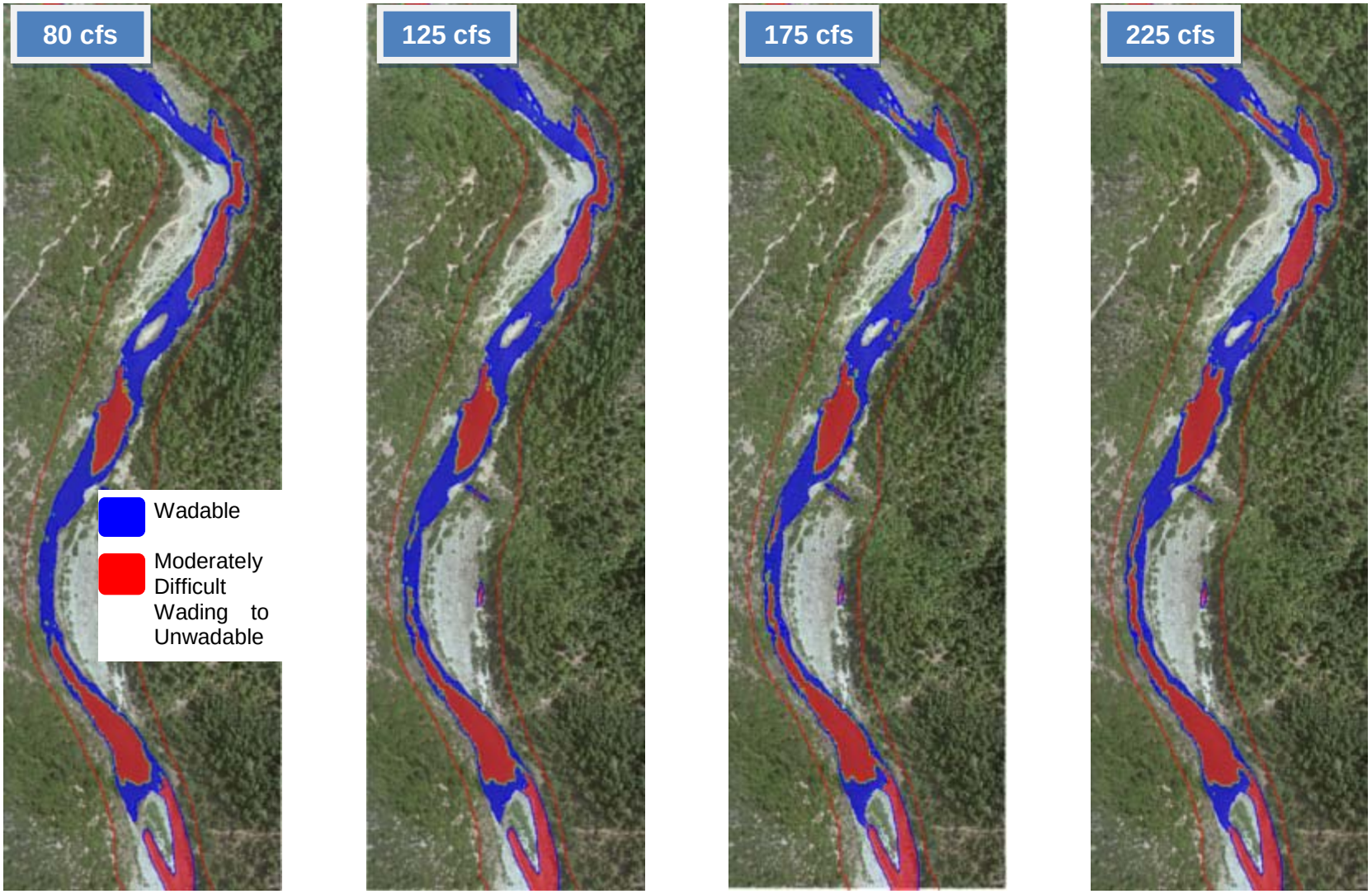


Figure 7.9-2. Fords Bar Wading Suitability (80–1018 cfs) (continued).

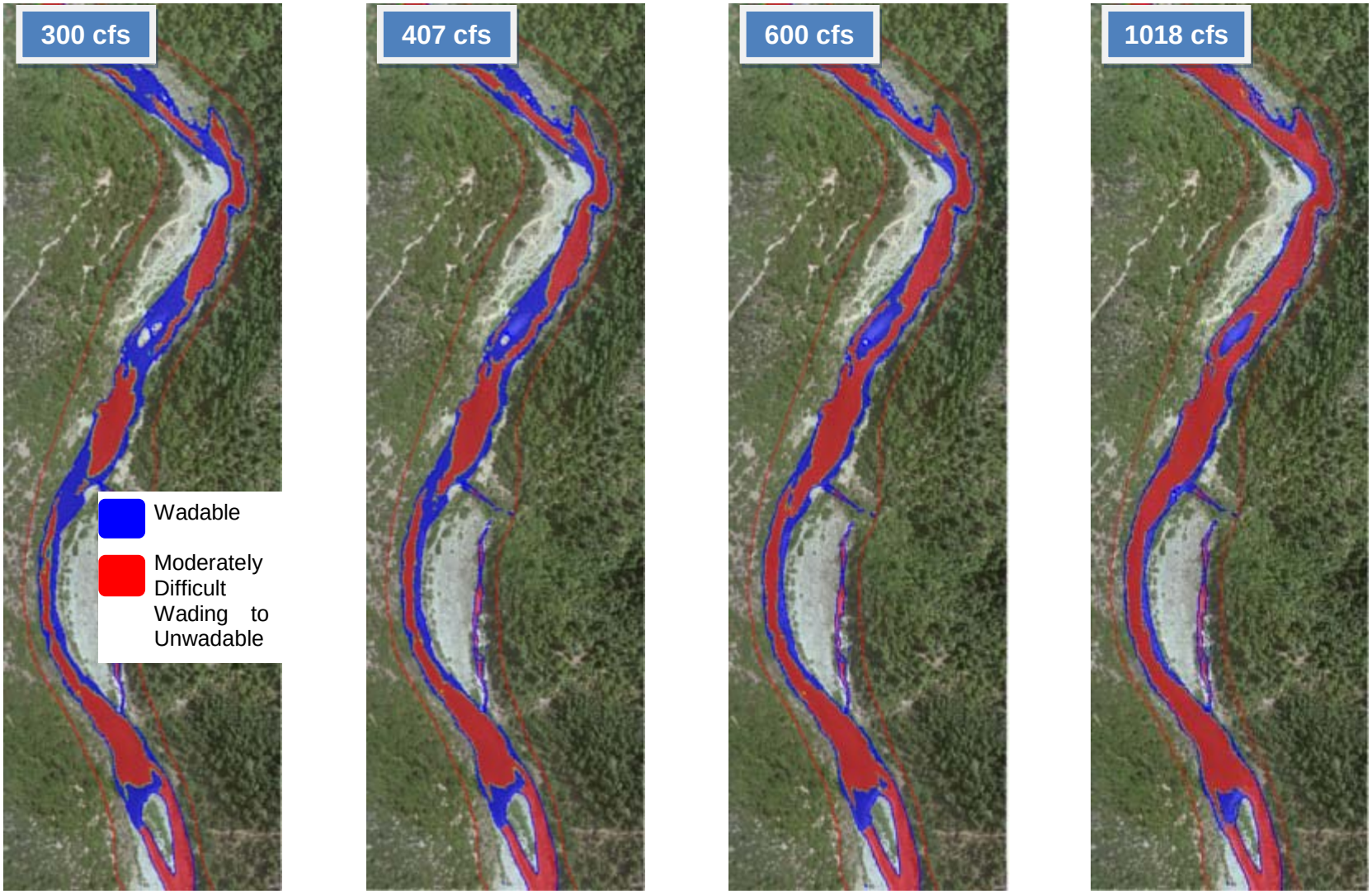


Figure 7.9-3. Buckeye Bar Wading Suitability (80–1018 cfs).

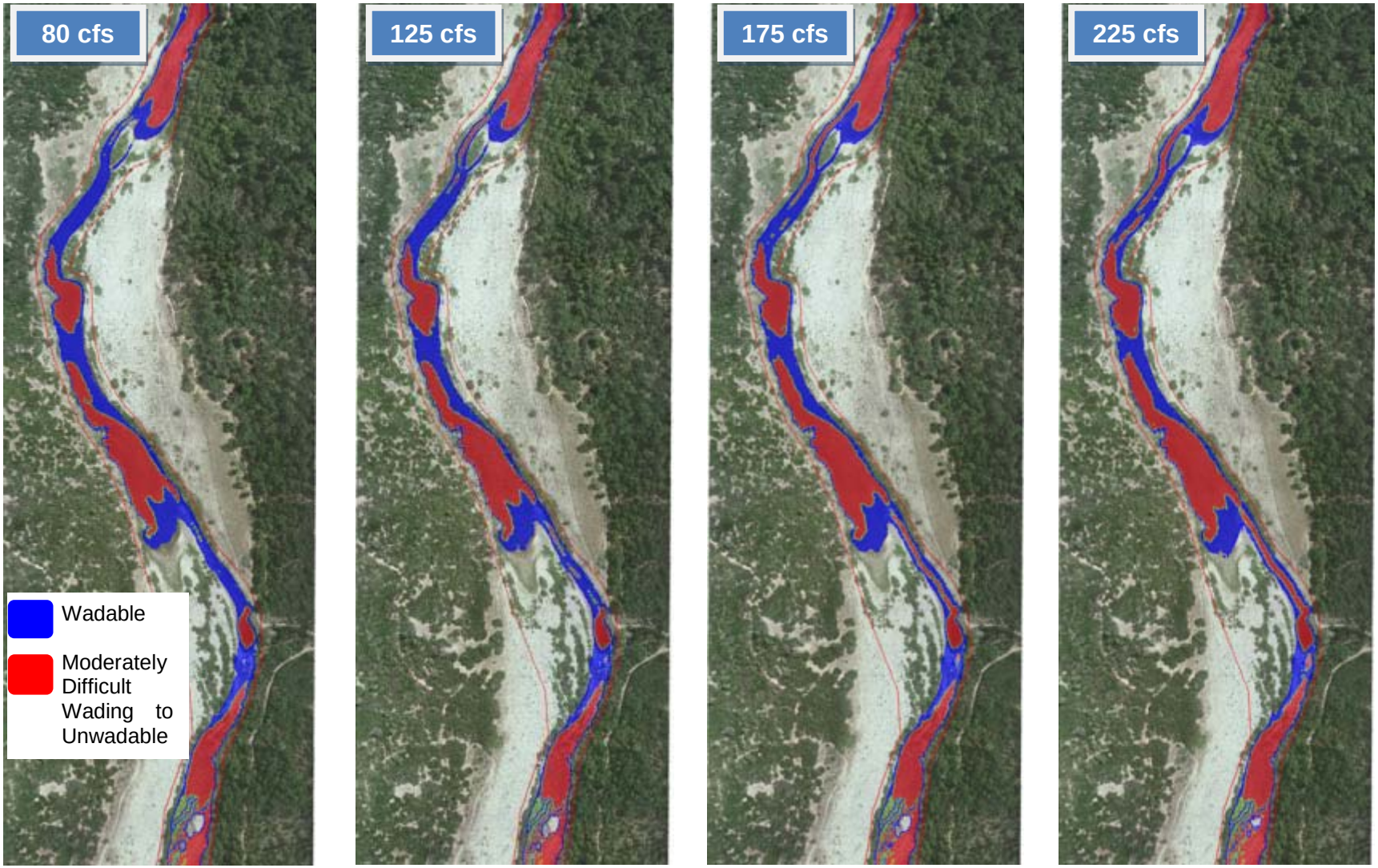


Figure 7.9-3. Buckeye Bar Wading Suitability (80–1018 cfs) (continued).

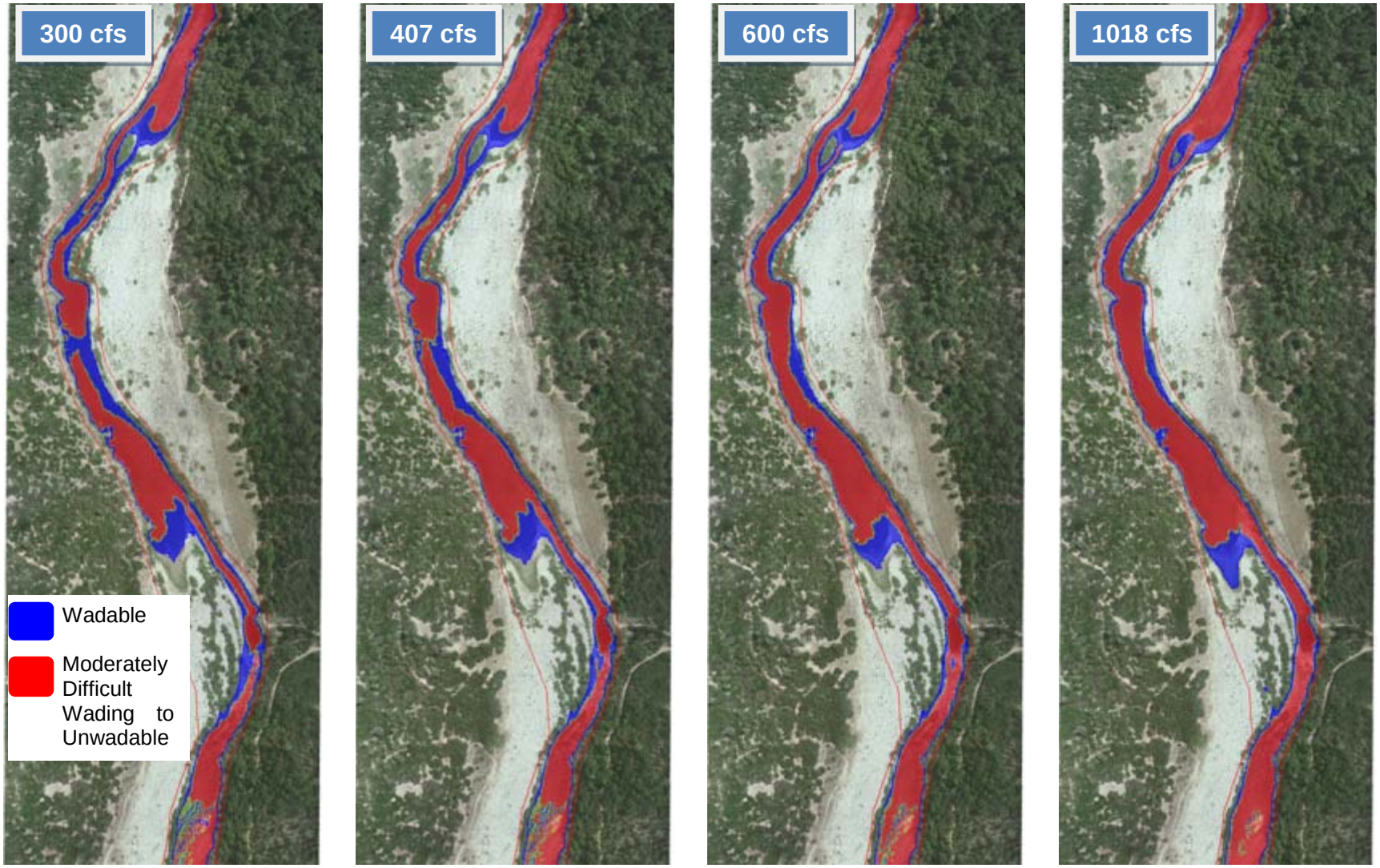
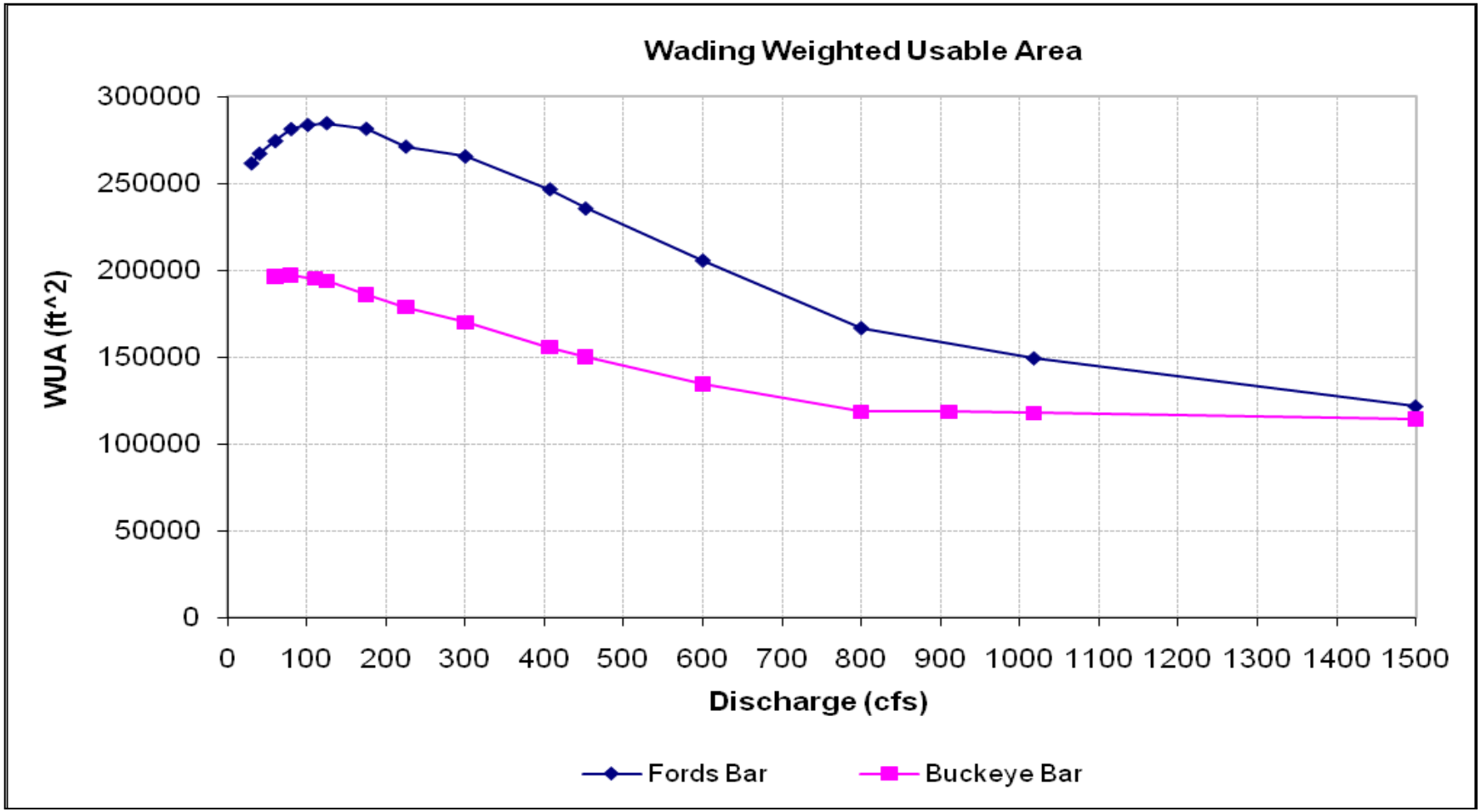


Figure 7.9-4. Wading WUA at Fords Bar and Buckeye Bar.



MAPS