

REC 15 RESERVOIR RECREATION WATER SURFACE ELEVATION STUDY

1.0 EXECUTIVE SUMMARY

Interviews with representatives from resource agencies, reservoir recreation concessionaires, and local stakeholders and active and passive recreation surveys of visitors to the reservoirs within the study area were completed during the summer, 2002. Reservoirs within the Big Creek ALP study area include Shaver Lake, Huntington Lake, Florence Lake, and Mammoth Pool Reservoir. The designed use and functional use of the recreation facilities at each reservoir were determined and relationships between water surface elevations (WSEs) and the operation of each reservoir were examined over time. The influence of WSEs on the functionality of the recreation facilities and the primary recreation uses at each reservoir were evaluated. Recreation use/water elevation curves were developed for the primary activities at each reservoir. Potential conflicts among user groups and reservoir operations that may influence WSEs were identified.

The operations of the boat docks and launches at the four reservoirs are the primary recreation facilities affected by changes in WSEs. Boat angling is one of the primary recreation activities at all the reservoirs during the summer recreation season (Memorial Day to Labor Day). Various boating recreation activities, including water skiing and sailing, were also popular at Shaver Lake and Huntington Lake.

Recreation use/water stage curves indicate that boating use is high as long as the WSEs are within the functional use range of the recreation facilities. Water skiing and other personal watercraft tended to have steeper declines in recreation use in response to decreases in WSEs than angling (by boat or from the shore). The majority of the surveyed anglers during the 2002 summer recreation season at the four reservoirs did not think that WSEs affected their enjoyment of fishing.

Water surface elevations during 1983-2002 were within the functional use ranges of all the boat launches and docks at the four reservoirs greater than 85% of the time during the summer recreation season, except at Mammoth Pool Reservoir during Critically Dry Water-years (WY).

The majority of conflicts identified from the interviews and surveys were not dependent on WSEs. Rather, potential conflicts tended to be between different user groups. Few recreationists indicated that existing WSEs negatively impacted their picnicking or camping experience.

2.0 STUDY OBJECTIVES

Determine optimal range of reservoir elevations for recreational and aesthetic uses and determine feasibility of providing advanced information on reservoir water levels.

3.0 STUDY IMPLEMENTATION

3.1 STUDY ELEMENTS COMPLETED

- Identified and quantitatively ranked the relative use of the current recreational activities at each reservoir by season;
- Identified all associated support facilities for each recreational activity;
- Identified the designed and functional reservoir elevation range for each support facility;
- Identified the factors influencing recreational activities at each reservoir by season;
- Developed a quality of recreational use/stage relationship curve (USC) for each recreational activity that depicts the relationship between recreational use and reservoir WSE;
- Identified the potential conflicts between recreation user groups;
- Compiled historical operations data for each reservoir; and
- Identified reservoir operational constraints that may influence WSE and recreational activities.

3.2 OUTSTANDING STUDY ELEMENTS

Evaluate the potential for increasing recreational opportunities based on modifying reservoir operations or support facilities.

4.0 STUDY METHODOLOGY

4.1 RESERVOIR USE AND WATER SURFACE ELEVATION

The range of reservoir WSEs for recreational uses was evaluated at four reservoirs within the Big Creek ALP study area, including Shaver Lake, Huntington Lake, Florence Lake, and Mammoth Pool Reservoir. Water levels were photo-documented, elevations of reservoir support facilities were surveyed, and interviews were conducted with recreational users or knowledgeable persons at each reservoir. Information from the photographs, surveys, and interviews was compiled and summarized to determine the range of WSEs required to support or enhance the primary recreation activities at each reservoir.

Photo-Documentation

At each of the reservoirs, photographs were taken from primary use areas at different WSEs to document the physical and aesthetic lake characteristics at each water level. The photographs were also used during the interviews to more clearly portray the relationships among WSEs, recreation activities, and support facility operations.

Interviews

Data on recreation uses associated with each reservoir was obtained from interviewing various people that have a working knowledge of each reservoir and the primary recreation activities associated with the reservoirs.

Members of the Recreation Working Group provided a list of individuals thought to have a working knowledge of the operational and recreational constraints relative to each reservoir. Each of these individuals was contacted and informed of the study process and the specific data needs. Following this initial contact, fifteen individuals participated in the study. The number of interviews for each reservoir differed depending on the availability of willing and qualified individuals associated with each reservoir. For Huntington Lake, eight interviews were conducted, while one was conducted at Mammoth Pool Reservoir (the interviews are provided in Appendix A). The interviewee only answered the survey questions of which they were knowledgeable.

The interviewees at each reservoir are:

- Shaver Lake: Steve Byrd, technical specialist/scientist of Southern California Edison's (SCE) Camp Edison; John Mount, manager of SCE's Camp Edison; Greg Powell, manager of Sierra Marina; Sheldon Sandstrom, manager of Shaver Lake Marina; and Jack Yandell, retired Shaver Lake fishing guide.
- Huntington Lake: Maureen Barile, representative from the Huntington Lake Historical Society and Huntington Lake Association (HLA); Frank Hoke, representative from the HLA; Toby Horst, representative from the Sierra Nevada Access, Multiple-Use and Stewardship Coalition (SAMS Coalition) and the Sierra Resource Conservation District; Fred Ilcher, representative from the Fresno Yacht Club; Steve Monke, Gold Arrow Camp manager; Mark Richards, manager of Rancheria Marina; Sandra Richey, manager of Huntington Lake Resort; and Steve Sherri, manager of Lakeshore Resort.
- Florence Lake and Lake Edison: Retha Gomez, recreation specialist with the United States Forest Service (USDA-FS) and Toby Horst, representative from the SAMS/Resource Conservation District and former operator of Vermilion Valley Resort.
- Mammoth Pool Reservoir: Mike LeFevre, USDA-FS ranger, manager of Mammoth Pool Reservoir.

A survey instrument, Water Surface Elevation Study Consultation Questions (WSESCQ), was developed and approved by the Recreation Working Group to gather the data needed for the study (refer to Appendix A for the WSESCQ Form). The WSESCQ consists of five Water Surface Elevation Threshold (WSETs) definitions and ten questions. The WSESCQ was used for each interview.

Five WSETs were defined in the WSESCQ. They are:

Maximum Acceptable Water Surface Elevation:

The **highest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Minimum Acceptable Water Surface Elevation:

The **lowest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Maximum Optimal Water Surface Elevation:

The **highest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Optimal Water Surface Elevation:

The **lowest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Useable Water Surface Elevation:

The **lowest stage** at which you predict that **10%** of the users would be willing to recreate on the reservoir.

Data gathered in the interviews included:

- Identification of recreation activities during the main recreation season (Memorial Day through Labor Day);
- Identification of recreation activities during the spring (April 1 through Memorial Day) and fall (Labor Day through October 31) seasons;
- Identification of recreation activities during the winter season (November 1 through March 31);
- Ranking the relative use of each recreation activity by season;
- Identification of the associated support facilities for primary recreation activities by season;
- Identification of the primary determinants affecting the function of support facilities for establishing WSETs for each primary recreation activity;

- Identification of the primary determinants affecting recreation use for establishing WSETs for each primary recreation activity;
- Identification of factors other than WSE and support facility function that affects recreation use;
- Identification of reservoir operational constraints that influence WSE and/or recreation; and
- Identification of recreation activity conflicts associated with WSE.

Upon completion of the WSESCQ, interviewees were asked to identify specific WSETs. In some cases interviewees had very specific elevational or reservoir storage data from which WSETs could be established. In other cases, photographs and descriptions of support facilities and/or reservoir conditions were used to establish WSETs. Water Surface Elevation Threshold data and the supporting WSESCQ data were recorded for each interview. The completed interview surveys are provided in Appendix A.

Recreation Surveys

Data on recreation uses was also obtained from active and passive angling and summer recreation use surveys completed by summer recreation users at each reservoir between April and early September 2002. Refer to 2002 REC 10, Recreation Opportunities and Needs Assessment (SCE 2003), and to 2002 REC 8, Angling Opportunities and Experience Assessment (SCE 2003), for approaches and additional information.

A survey of visitors to the Big Creek study area was completed during summer, 2002, to evaluate the current uses at recreational facilities in the study area. About 2,000 responses were obtained from a combination of active and self-census surveys. Visitor surveys were administered at 51 recreation sites and 12 businesses. They were administered on 32 weekdays (which included Memorial Day, Independence Day, and Labor Day) and 30 weekend days. Visitors were asked to complete surveys on a variety of topics including: general background characteristics (e.g., group size, length of stay, approximate trip expenditures), areas visited, activities engaged in, and satisfaction with activities and their related facilities and conditions. The survey was designed to capture detailed responses from five major activity/location groups, including camping, picnicking, trail use, boating, and recreation activities in stream/river corridors. Respondents were given the opportunity to offer specific comments about items they may have found unacceptable and any general comments about their trip to the Big Creek study area. Refer to REC 10, Recreation Opportunities and Needs Assessment (SCE 2003), for approach, methodology, and results of the surveys.

In addition to the summer recreation use surveys, a survey specific to angling use was conducted in 2002 from April to November. In order to evaluate angling opportunities and experiences on reservoirs in the study area, 1,800 surveys were obtained from a combination of active and self-census surveys. Visitor surveys were administered at 51 recreation sites and 12 businesses. They were administered through active surveys on

40 weekdays and 38 weekend days. From September 2, 2002 to November 15, 2002 surveys were administered by self-census through kiosks and business locations. Anglers were asked to provide information on user demographics, fishing experience, fishing, location, methods and success, and preferences and satisfaction. Refer to REC 8, Angling Opportunities and Experience Assessment (SCE 2003) for approach, methodology, and results of the surveys.

Surveying of Reservoir Recreation Support Facilities

The boat ramps and docks at Huntington Lake, Florence Lake, and Mammoth Pool Reservoirs were surveyed at low levels to identify the range of WSEs at which the facilities were functionally useable. Facilities at Shaver Lake were not surveyed because the WSE did not fall below the lower limits of the boat ramps during the duration of the study.

Data Evaluation

The recreational support facilities and features that are supported by reservoirs were identified. Those facilities that are dependent on WSEs were identified for further evaluation. Two critical elevations were determined for each support facility, the designed use and functional use ranges. The designed use range is the maximum to minimum WSEs at which the facility was designed to operate. For a boat ramp, this is based on the length and slope of the ramp pavement. The functional use range is the maximum and minimum elevations at which the facility still functions for at least a fraction of potential recreation users.

Interviews

The interview responses on recreation use and recreation support facilities at each reservoir were compiled and summarized.

The primary recreation activities, by season (activities in which the majority of the recreationists participates and are the principal purposes for their recreation trip to the area) were identified. Secondary activities that may be available at the different reservoirs were also identified.

Recreation use/stage relationship curves (USCs) were developed from the WSETS identified in the interviews for each reservoir. The USCs depict the projected relationship between primary recreation activity use and WSE for each reservoir. The slope of the curves between the identified WSETs were estimated from data gathered in the WSESCQs, designed use and functional use field surveys of the support facilities, and anecdotal information provided by the interviewees.

For Mammoth Pool Reservoir, Florence Lake, and Huntington Lake, a single USC was generated for each primary activity. For Shaver Lake, differing opinions of the relationship between recreation use and WSEs by the interviewees required multiple USCs.

Recreation Surveys

The survey questions on the angling and recreation use surveys (refer to REC 8, Angling Opportunities and Experience Assessment (SCE 2003) and REC 10, Recreation Opportunities and Needs Assessment (SCE 2003) for the survey forms and approach) that considered recreation activities at the reservoirs and WSEs were compiled and summarized.

The WSE on the date of the survey was related to the survey respondents' enjoyment/satisfaction rating of the various recreation activities and any conflicts or surface water level issues.

4.2 RESERVOIR OPERATIONAL CONSTRAINTS

Information available from the project license conditions and other agreements were compiled to determine and identify any constraints that may affect the reservoir operations.

5.0 STUDY RESULTS

5.1 RESERVOIR USE AND WATER SURFACE ELEVATION

For all of the study reservoirs, the most popular recreation season is summer, which typically extends from Memorial Day weekend through Labor Day. Consequently, the results will focus on recreation uses during this time. In general, this period corresponds to traditional work and school vacation schedules and warmer ambient temperatures preferred by most recreationists. In addition, accessibility by recreationists is reduced in the winter and early spring, primarily due to road closures associated with heavy snow conditions at Kaiser Pass to Florence Lake and Lake Thomas A. Edison, portions of Huntington Lake Road to Huntington Lake, and Minarets Road to Mammoth Pool Reservoir. There are also temporary or vehicle restrictions on access to areas of reservoirs, such as Mammoth Pool and the north shore of Shaver Lake, based on reducing human disturbance to deer during migration or fawning seasons.

Numerous recreation support facilities are associated with Shaver Lake, Huntington Lake, Florence Lake, and Mammoth Pool (Table REC 15-1). The operations of the boat ramps are directly related to WSE. Other shoreline activities, such as shoreline fishing, picnicking, and camping, are also affected by WSE as they are dependent on the access to, size and utility of the beaches. The focus of these results will be on the relationships of WSE and the operations of these facilities and the results of the recreation surveys. Photographs that show these facilities at different WSEs are provided in Appendix B.

The results of the study elements are organized by reservoir and include:

- Summary of the most popular recreation uses by season;

- Description of the activities and facilities which are dependent on WSEs for enjoyment or operation;
- Summary of interviews and active and passive recreation surveys and discussion of the quality of recreational USC for each recreational activity that depicts the relationship between recreational use and reservoir WSE;
- Discussion of potential conflicts among recreation uses and impacts of changes to water levels;
- Discussion of the influence of water year type on reservoir WSEs and the optimal WSE range for popular recreation uses; and
- Identification of potential reservoir operation procedures that may affect WSEs.

Shaver Lake

The primary summer recreation activities at Shaver Lake are camping and picnicking around its shores and angling and boating on its surface (Table REC 15-2). Angling is common both by boat and from the shore, and occurs throughout the year. Boating recreation activities on the lake include water skiing, pontoon boating, and personal watercraft use. Other summer lake activities include non-motorized boat use (canoe, kayak, and rowboat) and campsite and beach use (swimming, wading, and water play).

The functionality of the boat ramps at Sierra Marina and Shaver Lake Marina are dependent on WSE. Table REC 15-3 lists the maximum and minimum WSE and reservoir storage for the designed use and functional use of each boat ramp. Some day-use areas are not accessible by automobile on the north shore of Shaver Lake, because the roads are gated. Therefore, picnicking and water play at these areas can be affected by WSE, as some users access these areas by boat.

The Sierra Marina is a private concession located at the northern end of Shaver Lake. The boat ramps are dependent on WSEs. The boat docks and other marina services are floating and are not dependent on WSEs. The boat ramp is designed to operate from full pool levels (5,370 ft elevation or 135,568 acre-feet (ac-ft) storage) to 5,333 feet elevation (66,000 ac-ft storage). Beyond this point, potential recreation users wishing to launch boats are required to leave the pavement and to drive onto the reservoir bed to reach the water. The minimum reservoir elevation at which boats still have water accessibility is 5,296 feet (20,000 ac-ft storage).

The Shaver Lake Marina is a private concession located on the western side of Shaver Lake within SCE's Camp Edison Campground. Use of the boat ramp located at the marina is limited by WSE. The docks and other marina services are floating structures and move in response to WSE changes. The boat ramp is designed to operate from full pool (5,370 ft elevation or 135,568 ac-ft storage) to a WSE of 5,348 feet (90,000 ac-ft storage). The functional use of the ramp extends to 5,300 feet (24,000 ac-ft storage), as it is possible to launch boats from the reservoir bed.

The relationship between the primary recreation uses at Shaver Lake and the reservoir WSE is described by the recreational use/stage curves, and is illustrated in Figure 15 C-1, Appendix C. For Shaver Lake, the perception of the relationship between WSE and recreation use varied by interviewees; consequently five USCs were developed to illustrate changes in use of different recreational activities (angling and water skiing/personal watercraft use), in relation to WSE. Maximum recreation use occurs when the reservoir is between 80% and 90% capacity (WSE of 5,360 to 5,365 ft or approximately 112,657 to 125,807 ac-ft storage), when WSEs are high for the boaters and anglers, and good beach locations are exposed around the reservoir. At higher WSEs, the boating and angling uses remain high, but the beach area is minimal. Camp Edison personnel stated that all recreation uses on Shaver Lake would remain high (80% of potential use) down to an elevation of 5,315 feet, or 30% of storage capacity (40,670 ac-ft storage).

Differences in the USCs among the interviewees occur when WSE reach 5,345 ft (86,000 ac-ft). According to John Mount and Steve Byrd at Camp Edison, a 10% loss of use for angling, skiing, and personal watercraft (PWC) occurs. In contrast, the managers of Sierra Marina indicated that about a 45% decrease of angling, skiing, and PWC use would occur. According to Jack Yandell, a retired Shaver Lake fishing guide, half of the angling use would be lost at a WSE of 5,335 feet (approximately 66,000 ac-ft storage). Approximately 50% of the anglers will be lost at the point when the paved portions of the boat ramps are out of the water (approximately 5,333 ft, or 66,000 ac-ft storage). Shore anglers will continue to utilize the shoreline fishing opportunities even at low WSEs.

From active and passive recreation surveys of recreationists at Shaver Lake conducted during 2002 (Dry WY), 83% did not think that WSE affected their recreation activities (107 completed surveys). WSEs were always within the designed use or functional use range at the Sierra Marina and Shaver Lake Marina Boat Ramps during the sampled summer recreation season (minimum storage level was 109,100 ac-ft during the 2002 summer season). Specifically, 75% of recreationists who participated in boating activities (82 completed surveys) between late-May and mid-September, including motor boats, water skiing, sailing, fishing, non-motor boats, and water play, did not have an issue with the WSEs. Eighty-six general recreation users, participating in fishing, motor boating, and jet skiing, did not identify WSE issues as adversely affecting their enjoyment (37 completed surveys). WSE did not adversely affect the picnickers at Shaver Lake. Eighty-two percent of anglers that fished by boat, PWC, or from the shore did not think that the WSE affected their enjoyment of fishing (277 completed surveys) (Table REC 15-4). Forty-three percent of anglers during July 2002 indicated that WSE affected their fishing experience on the reservoir, although storage levels were within the facilities' designed use ranges (118,011 to 125,780 ac-ft during July 2002). Few anglers indicated that WSE affected the enjoyment of their fishing experiences during the other months of the summer recreation season.

The managers of the Sierra Marina and Shaver Lake Marina and Mr. Yandell, retired fishing guide, indicated that the main conflict at Shaver Lake is the incompatibility of anglers and PWC users. The nature of the conflicts between these two groups is

related to the interactions of the recreationists, rather than to WSE. Thirty-four anglers indicated that conflicts or issues affected their angling experience at Shaver Lake. Thirteen anglers had issues with the camping and/or fishing facility conditions. Two anglers had issues with motorized boating (facility conditions, resource, and social conflicts). Sixteen anglers experienced social conflicts that affected their fishing experience, and three anglers indicated that resource issues affected the enjoyment of their fishing experience.

During the period of record (1983-2002), WSEs varied during the year and between years. In general, WSEs are greater during Wet WYs and lowest during Critically Dry WYs. However, considerable variations occur among years within the same WY type category. Figure REC 15-D-1 (Appendix D) presents the Shaver Lake daily reservoir storage levels in relation to the designed use and functional use range of the boat ramps.

During the period of record (1983-2002), the WSEs were within the designed use and functional use range of the Sierra Marina Boat Ramp during the entire summer recreational season (Memorial Day to Labor Day) of Wet and Above Normal WYs (Table REC 15-5). The WSEs were also within the functional use range during the entire summer season during the Dry and Critically Dry WYs. The paved portion of the ramp was within the water 93% of the time during the Dry WY summers and 36% of the time in Critically Dry WY summers. The relationship between WSEs and the designed use and functional use of each recreation facility is provided by year in Appendix E.

The WSEs between 1983 and 2002 were within the functional use range of the Shaver Lake Boat Ramp during the entire summer recreational season (Memorial Day to Labor Day) of Wet, Above Normal, and Dry WYs. The ramp was functional greater than 98% of the time during the Critically Dry WYs. WSEs were within the designed use range greater than 96% of the time during Wet and Above Normal WYs, but fell to 67% and 9% of the time during Dry and Critically Dry WYs, respectively. The relationship between WSEs and the designed use and functional use of each recreation facility is provided by year in Appendix E.

Huntington Lake

Angling (boat and shore), and boating activities, including sailing, and water skiing, are the most popular summer recreation activities at Huntington Lake (Table REC 15-2). Other summer activities include pleasure boating (pontoon boating and personal watercraft), non-motorized boat use (canoe, kayak, and rowboat), and beach use (swimming, wading, and water play). During spring and fall seasons, angling is the primary recreational use. The Rancheria Boat Docks, the USDA-FS Boat Ramp, and the Huntington Lake Resort Boat Ramp and Boat Docks are influenced by WSE (Table REC 15-1). Table REC 15-3 lists the maximum and minimum WSE and reservoir storage for the designed use and functional use of each boat ramp or boat launch. Each support facility is described below.

The Rancheria Marina is a private concession located at the eastern end of Huntington Lake. Recreation support features include boat docks and marina services, such as boat rentals. The marina operates floating boat docks with 125 mooring slips. The designed and functional use ranges of the docks are from full pool (6,950 ft or 89,166 ac-ft storage) to 6,942 feet elevation (78,025 ac-ft storage) (Table REC 15-3).

The USDA-FS Boat Ramp is located near the eastern end of the lake across Huntington Lake Road from the Lakeshore Resort. Recreation support features include a paved boat ramp with docks on each side for loading and unloading boats. The USDA-FS Boat Ramp designed and functional uses extend to 6,936 feet elevation (70,105 ac-ft storage), at the end of the paved ramp. The reservoir bed is too uneven and flat to extend the use of this facility beyond its designed use.

The Huntington Lake Resort Marina is located near the western end of the lake. Reservoir recreation support facilities include a paved boat ramp, boat docks with slips, and marina services including boat rentals. The designed use of the boat ramp extends to a WSE of 6,945 feet (82,124 ac-ft storage) (92% of reservoir storage capacity). The slope and surface of the reservoir bed beyond the paved ramp extend the functional use of this facility to 6,928 feet elevation (60,633 ac-ft storage) (70% reservoir capacity).

At Huntington Lake, the managers of the Gold Arrow Camp, Huntington Lake Resort, Lakeshore Resort, and Rancheria Marina and representatives from the Fresno Yacht Club, the Huntington Lake Historical Society, and the SAMS/Resource Conservation District, indicated that angling use is at a maximum when WSEs are between full pool and 6,936 feet (70,105 ac-ft storage), and when WSEs are within the functional use range of the USDA-FS Boat Ramp (Figure REC 15-C-2, Appendix C). Angling use declines with decreases in WSEs below 6,936 feet (70,105 ac-ft storage), as increasingly fewer boats are able to launch and the attraction for bank fishing decreases. Angling use is estimated at 10% at minimal WSEs (5,225 ft elevation or 8,916 ac-ft storage).

The interviewees indicated that sailors and water skiers respond similarly to changes in WSE. Maximum recreation use levels occur when the reservoir is at full pool (6,950 ft elevation or 89,166 ac-ft storage). When the lake level drops three to five feet, water depths are too shallow for approximately 80% of the sailboats. Reservoir hazards present when drawdowns reach 5 feet deter about 10% of potential water skiers. At a drawdown of 10 feet (6,936 ft elevation or 70,105 ac-ft storage), the water levels are too low to launch boats from the existing boat ramps.

Data from active and passive recreation surveys conducted during 2002 (Dry WY) that were completed by various recreation users at Huntington Lake, indicate that 88% of the respondents did not think that WSE affected their recreation activities (186 completed surveys). Specifically, 82% of recreationists who participated in boating activities did not identify WSEs adversely affecting their enjoyment. Twenty-five percent of sailors identified WSEs affecting their recreation enjoyment. No recreationists identified WSE negatively impacting their picnicking enjoyment. Eighty-seven percent of anglers fishing at the reservoir did not think that the WSE affected their enjoyment of

fishing (214 completed surveys) (Table REC 15-4). Twenty-five percent of anglers during July 2002 indicated that WSE affected their fishing experience on the reservoir. Few anglers indicated that WSE affected the enjoyment of their fishing experiences during the other months of the summer recreation season.

The managers at the various resort facilities and marinas and local stakeholders indicated that the main conflicts at Huntington Lake occur between sailors and boat anglers, as there is some confusion among these recreationists over who has the right-of-way on the water. Anglers complain that sailboats cut behind them and cut their trolling lines. This conflict is greatest during regattas, which are scheduled about ten weekends per summer season. This conflict is unrelated to reservoir WSE. Six anglers indicated that conflicts or issues affected their fishing enjoyment at Huntington Lake. Two anglers identified issues with the camping facilities. Three anglers indicated that social conflicts affected their fishing enjoyment, and one indicated that resource issues affected his/her enjoyment.

During the period of record (1983-2000), WSEs varied during the year and between years. Considerable variations occurred among years within the same WY type category. Figure REC 15-D-2 (Appendix D) presents the Huntington Lake daily reservoir storage levels in relation to the designed use and functional use range of the boat ramps.

During the period of record (1983-2000), the WSEs at Rancheria Marina Boat Docks and the USDA-FS Boat Ramp were within the designed use and functional use during the entire summer season (Memorial Day to Labor Day) during the Above Normal and Dry WYs (Table REC 15-5). At Rancheria Marina, WSEs were within the designed use and functional use 87% of the summer recreation season during Wet WYs and 95% of the summer season during Critically Dry WYs. At the USDA-FS Boat Ramp, WSEs during Wet and Critically Dry WYs were within the desired use and functional use ranges 90% and 99% of the summer recreation season, respectively.

The boat ramp located at Huntington Lake Resort (HLR) functioned 100% of the time during the only Dry WY for which data is available (2000). WSEs were within the functional range of the HLR Boat Ramp during the entire summer season of the Above Normal and Critically Dry WY types, and 93% of this time period during the Wet WYs. The relationship between WSEs and the designed use and functional use of each recreation facility is provided by year in Appendix E.

Florence Lake

The two primary summer recreation activities at Florence Lake are boat angling and hiking (Table REC 15-2). Unlike other locations within the study area, WSEs can influence hiking at Florence Lake because some recreationists use the Florence Lake Ferry Service to cross the reservoir to access the wilderness areas. Approximately 80% of recreational users of Florence Lake are hikers venturing into the wilderness areas surrounding the lake. The USDA-FS Boat Ramp and the Florence Lake Ferry Service are dependent on WSEs (Table REC 15-1). Table REC 15-3 lists the maximum and

minimum WSE and reservoir storage for the designed use and functional use of the USDA-FS Boat Ramp and the Florence Lake Ferry Service. Each support facility is described below.

The USDA-FS Boat Launch is located between the Florence Lake Day Use Area and the store at the north end of the lake. The USDA-FS Boat Ramp, approximately 25 feet in length, is designed to function from full pool (7,330 ft elevation or 64,406 ac-ft storage) to the end of the paved ramp at 7,326 feet elevation (62,967 ac-ft storage). There is no lower limit to the functional use of the ramp, as it is possible to drive down the reservoir bed until water is reached.

The Florence Lake Ferry Services operate from the Florence Lake Store located at the north end of the lake near the USDA-FS Boat Ramp. A floating dock, which adjusts to varying WSEs, is used so that the ferry can function at varying water levels. The functional uses of the dock and the ferry extend from 7,327 feet elevation (64,406 ac-ft storage) to 7,261 feet (12,237 ac-ft storage) (about 19% of reservoir storage capacity) when large areas of the reservoir bed are exposed and rock hazards are high.

At Florence Lake, the interviewees (representatives from the SAMS Coalition/Resource Conservation District and the USDA-FS) indicated that hiking use is slightly affected by WSEs because of the reliance of some on the ferry to access the backcountry (Figure REC 15-C-3, Appendix C). Hiker use of the ferry is at its maximum when the lake is full (7,330 ft elevation or 64,406 ac-ft storage) and approximately 20% of the hikers are potentially lost when the lake is at about 19% capacity (7,260 ft elevation or 12,302 ac-ft storage). At that point, the lake separates into two pools and the ferry can no longer carry passengers; however, ferry operations are not necessary to gain access into the wilderness area.

Angling use is also maximized with a full pool (7,330 ft or 64,406 ac-ft storage) and approximately 10% fewer anglers fish at the WSE at which the lake separates into two pools (7,260 ft or 12,302 ac-ft storage). Angler use continues to linearly decrease as WSEs fall below 7,260 feet (12,302 ac-ft storage), as it is possible to drive down the reservoir bed to reach water to launch a boat or to fish from the shore. From active and passive recreation surveys conducted during 2002 (Dry WY) completed by recreation users at Florence Lake, 59% did not think that WSE affected their recreation activities (29 completed surveys). Specifically, 40% of boaters, predominantly participating in fishing activities, and four of 17 Florence Lake recreationists, identified that WSEs affected their enjoyment. Forty-one percent of recreationists identified issues associated with the condition of the facilities. In addition to WSE and facility conditions, recreationists identified social conflicts and jet skiers as adversely affecting their recreation enjoyment. WSEs did not affect the enjoyment of any picnickers at Florence Lake. WSEs during the 2002 sampling season were within the designed use and functional use range of the ferry service and within the functional use range of the USDA-FS boat ramp. Seventy-nine percent of anglers who fished by boat or from the lakeshore did not think that WSE affected their angling experience (98 respondents). Sixty-seven percent of anglers thought that WSEs were a resource issue during August 2002.

The interviewees indicated that relatively few conflicts occur at Florence Lake. Fifteen anglers identified various conflicts or issues that affected their fishing experience. Camping facility conditions, social hiking conflicts, and the motor boating facilities were each identified by one visitor. The conditions of the fishing facilities were noted by nine anglers as affecting their fishing experience. One visitor commented that the resource conditions affected his/her fishing experience.

During the period of record (1983-2002), WSEs varied during the year and between years. In general, WSE were greater during Wet WYs and lowest during Critically Dry WYs. However, considerable variations occurred among years within the same WY type category. Figure REC 15 D-3 (Appendix D) presents the Florence Lake daily reservoir storage levels in relation to the designed use and functional use range of the boat ramps.

During the period of record (1983-2002), the WSEs at the USDA-FS boat launch were within the functional use range during the entire summer recreation season (Memorial Day to Labor Day) (Table REC 15-5). The ferry service was operational during the entire summer season during Above Normal and Dry WYs, and 98% of the time during Wet WYs. The ferry was operational 90% of the summer recreation season during the Critically Dry WYs. The relationship between WSEs and the designed use and functional use of each recreation facility is provided by year in Appendix E.

Mammoth Pool Reservoir

Water skiing and boat angling are the most popular recreation activities at Mammoth Pool Reservoir during the summer (Table REC 15-2). Dispersed camping, where locations are accessible only by boat, is also popular during the summer months. Secondary summer activities include shoreline uses and water play. The summer recreation season at Mammoth Pool Reservoir is different from the other reservoirs within the study area. The main summer recreation season is from June 16 (July 1 for water skiing) to Labor Day. Recreational activities, including vehicular access and fishing, are restricted from May 1 to June 15 to protect deer migrating through the area. A 20-mph speed limit on the reservoir during the spring, winter, and fall restricts water skiing, without posted speed limits between July 1 and September 10. As a result, in addition to weather, vacation schedules, and accessibility issues during the winter, recreation use patterns are controlled by the deer closure period and posted speed limits.

The functionality of the USDA-FS boat launch and the Windy Point Alternative Boat Ramp is dependent on WSEs. Table REC 15-3 lists the maximum and minimum WSE and reservoir storage for the designed use and functional use of each boat ramp. Each support facility is described below.

The USDA-FS Boat Ramp, which includes a paved boat ramp with two turnouts, is located on the north bank of the reservoir across from the dam. The USDA-FS boat ramp is designed to function from full pool (3,330 ft elevation) to the end of the paved ramp at 3,262 feet elevation. The ramp does not function well beyond the end of the

paved section, due to large rock hazards at the end of the paved ramp and a steep reservoir bed.

When the USDA-FS ramp is above the water, boaters generally use the Windy Point Boat Ramp. The ramp was originally designed as an access road during reservoir construction to the intake structure located near the bottom of the reservoir. However, due to the uniform slope at the ramp, it is utilized as a boat launch when reservoir levels are low. There is no lower limit to the functional use of the ramp at Windy Point, as it is possible to drive down the reservoir bed until water is reached.

The relationship between WSE and recreational use was evaluated from an interview with an USDA-FS ranger, Mr. LeFevre. His responses to the interview questions were used to develop the recreation use/stage curve relationships.

For Mammoth Pool Reservoir, Mr. LeFevre indicated that angling use would be expected to change little until levels drop below 50% of storage capacity (3,265 ft elevation or 59,970 ac-ft storage) (Figure REC 15-C-4, Appendix C). At this level, where the USDA-FS paved ramp is not useable, about 10% of the anglers do not recreate at Mammoth Pool Reservoir. Most anglers, however, continue to use the alternate boat launch at Windy Point. Below the 50% storage level, angling use declines linearly with declining water levels.

Water skiing use is maximized at full pool (3,337 ft elevation or 119,940 ac-ft storage) (Figure REC 15-C-4, Appendix C). As water levels drop to 60% of capacity (3,280 ft elevation or 71,964 ac-ft storage), Mr. LeFevre indicated that hazards within the reservoir deter about 75% of the potential water skiers from recreating at Mammoth Pool Reservoir. As water levels fall below 3,265 feet (59,970 ac-ft storage) (about 50% storage capacity), skiers are no longer able to launch their boats from the paved ramp and use drops to zero.

Dispersed camping is maximized when the reservoir is at 55-90% storage capacity (3,265 to 3,319 ft elevation or 59,970 to 107,946 ac-ft storage), when numerous beaches are exposed for camping options (Figure REC 15-C-4, Appendix C). When water elevations are at full pool (3,337 ft elevation or 119,940 ac-ft storage), almost all the bank areas suitable for camping are inundated and at levels below 55% storage capacity (approximately 3,265 ft or 59,970 ac-ft storage), the length of the hike required to reach the good camping spots deters many potential campers.

From active and passive recreation surveys conducted during 2002 (Dry WY) of various recreation users at Mammoth Pool Reservoir, 93% did not think that WSE affected their recreation activities (14 completed surveys). Specifically, 10 of 12 boaters did not identify WSE issues. Two respondents identified WSE as adversely affecting fishing and water skiing in July. Between June and mid-August 2002, storage ranged between 82,473 ac-ft and 111,401 ac-ft, which is within the designed range of the USDA-FS and Windy Point Boat Launches. One of eight general recreationists identified WSE as negatively impacting their boating and camping enjoyment at Mammoth Pool Reservoir in late July. WSE was not identified as a concern by picnickers at Mammoth Pool

Reservoir (37 respondents). Eighty-nine percent of anglers surveyed (18 respondents) did not think that WSE issues affected their fishing experience. No one expressed any WSE issues between May and July.

Mr. LeFevre indicated that a few conflicts arise among users at Mammoth Pool Reservoir, particularly between water skiers and anglers due to boat speeds. This conflict is not related to reservoir levels. The surveyed anglers indicated few conflicts (2 respondents), and both identified fishing conflicts were attributed to social issues or facility conditions, rather than to resource issues.

During the period of record (1983-2002), WSEs varied during the year and between years. In general, WSE were greater during Wet WYs and lowest during Critically Dry WYs. However, considerable variations occurred among years within the same WY type category. Figure REC 15-D-4 (Appendix D) presents the Mammoth Pool Reservoir daily reservoir storage levels in relation to the designed use and functional use range of the boat ramps.

During the period of record (1983-2002), the WSEs at the Windy Point Boat Ramp were within the functional use range during the entire summer recreation season (Memorial Day to Labor Day) (Table REC 15-5). The USDA-FS Boat Ramp was operational during 99% of the summer season during Wet Water Years. WSEs were within the designed and functional use range (which are the same) 90% and 93% of the summer season during Above Normal and Dry WYs. The ramp was operational 66% of the summer season during Critically Dry WYs. The relationship between WSEs and the designed use and functional use of each recreation facility is provided by year in Appendix E.

5.2 RESERVOIR OPERATIONAL CONSTRAINTS

The management and operation of the study area reservoirs are constrained by the physical capacity of system components, SCE's water rights, and current FERC License conditions. Except for a minor amount of water used at SCE's Big Creek No. 1 facilities, all water from the Big Creek Hydroelectric System eventually ends up in Millerton Lake.

The United States Bureau of Reclamation (USBR) is responsible for delivering water from Millerton Lake (Friant Dam) to the downstream water right holders. When Mammoth Pool Reservoir was constructed in 1957, SCE entered into a contract with the USBR that SCE refers to as "The Mammoth Pool Operating Contract" (MPC). The MPC affects the ability of SCE to store waters of the SJR. Specifically, the MPC includes minimum and maximum storage constraints. The MPC supersedes prior water rights agreements among SCE and the downstream water rights users relating to SCE's storage of water. The MPC places certain seasonal constraints on the net aggregate storage of water in SCE's Big Creek reservoirs. Furthermore, an agreement between SCE and Pacific Gas and Electric Company (PG&E) requires that SCE maintain a flow in the SJR below the Big Creek No. 4 Powerhouse sufficient to meet PG&E's right to divert water at Kerckhoff Dam.

Each year, snow pack and precipitation data is collected and is used to produce a water runoff forecast, which assumes median precipitation and temperature conditions through the remainder of the water year (September 30). The forecast includes an estimate of both the timing and quantity of water that will enter the reservoirs. The snow pack and precipitation data is shared with the Department of Water Resources (DWR) and the USBR, who also use the data to forecast runoff volumes and to determine types of water years (critically dry, dry, below normal, above normal, or wet). The majority of the constraints imposed on SCE operations by the MPC are based on actual runoff volumes. The runoff forecast is a valuable tool for use by SCE in operational planning. The forecast is also used for determining: 1) certain FERC license instream flow release requirements; 2) recreation reservoir elevation requirements; 3) how to plan to meet probable MPC reservoir storage and water delivery requirements; and 4) hydroelectric generation.

The Big Creek System has three interlinked water chains that transport water and produce power (Figure REC 15-1). The three water chains are:

1. Huntington Chain: This chain, in order, consists of Portal, Big Creek Powerhouse Nos. 1, 2, 8, 3, and 4.
2. Shaver Chain: This chain, in sequence, consists of Portal, Eastwood Power Station, Big Creek Powerhouse Nos. 2A, 8, 3, and 4.
3. Mammoth Chain: This chain, in order, consists of Mammoth Pool Powerhouse and Big Creek Powerhouse Nos. 3 and 4.

(Note: Powerhouses in the above chains are listed in the order of highest to lowest in elevation).

After passing through Big Creek Powerhouse Nos. 1 and 2, water on the Huntington Chain joins water from the Shaver Chain. Water from the Shaver Chain goes from Huntington Lake to Shaver Lake via the Huntington-Pitman Siphon and through the Eastwood Power Station and then through Big Creek Powerhouse No 2A. Water from these two chains is then diverted through Big Creek Powerhouse No. 8 and joins the water coming from the Mammoth Chain. The Mammoth Chain begins producing energy at the Mammoth Pool Powerhouse. Water from all three chains then continues through Big Creek Powerhouse Nos. 3 and 4. Energy load changes on these chains will not have an effect on the WSEs at Huntington, Shaver or Redinger Lakes as long as adjustments are made to match inflows to the outflows at those reservoirs. However, load changes may slightly affect the daily WSEs at Mammoth Pool, Lake Thomas A. Edison (Lake Edison), and Florence Lake. Normally, changes to the WSEs are only noticed over time as daily changes are small enough to go unrecognized. Management and operational constraints for each reservoir are discussed below.

Lake Edison and Florence Lake are the highest elevation reservoirs on the Big Creek Hydroelectric System. Lake Edison stores water from Mono Creek along with various other tributaries. Water released from Lake Edison is diverted approximately one mile

downstream at Mono Creek Diversion. After joining the water diverted from Bear Creek Diversion and flowing through the Mono-Bear Siphon, it reaches Ward Tunnel.

Florence Lake stores water from the South Fork of the San Joaquin River (SFSJR) and other small tributaries (e.g., Crater, Tombstone, North and South Slide creeks, and Hooper Creek). Water stored at Florence Lake is diverted directly into Ward Tunnel. Water from Bolsillo, Chinquapin, Camp 62 and Camp 61 creeks (Camp Creek Diversions) is also diverted into Ward Tunnel. These diversions do not have storage and are relatively small in size. In general, water entering Ward Tunnel from the facilities without storage capabilities is given priority over the water being diverted from Lake Edison and Florence Lake. However, first priority is given to water being diverted from Florence Lake if spill is imminent at that location. Water being diverted from Lake Edison is given last priority because it is the least likely to spill. All water diverted into the Ward Tunnel passes by Portal Forebay, exits the Ward Tunnel at Portal Powerhouse, and goes into Huntington Lake. Water spilling from facilities that would otherwise be diverted into Ward Tunnel, join the SJR and flow into Mammoth Pool Reservoir and then into Redinger Lake.

Florence Lake storage is kept low during the winter months to avoid water freezing on the dam face. Storage usually begins to increase in late April. From July 1–August 31 of each year, the minimum storage requirement at Florence Lake is 21,000 acre-feet. However, the storage level during this period is normally considerably higher. After the peak storage level is reached, the reservoir elevation gradually declines until it again reaches the minimum storage level in the late fall, after the recreation season ends with the closure of Kaiser Pass Road.

During the spring runoff period in most years, all inflows into Lake Edison are stored and are not released until the threat of spill at Florence Lake, Bear Creek, and the Camp Creeks has passed. Peak storage at Lake Edison normally occurs sometime during the month of July. Once water begins to be diverted from Lake Edison, the storage level decreases gradually through the end of the water year. Minimum storage at Lake Edison is dependent on the water year classification.

For the most part, Portal Powerhouse is operated independently of the other Powerhouses. Portal Powerhouse operations are dependent on the flow through Ward Tunnel, and due to the relatively small amount of generation available at Portal, water management through the major Big Creek generation chains dictates flows through Ward Tunnel rather than the ability of the Portal project to generate power. Portal Powerhouse has a hydraulic capacity of 724 cfs at full load. If there is a need for more flow than 724 cfs through the Ward Tunnel, a Howell-Bunger (HB) valve is opened to enable by-pass flows around the Portal Powerhouse and into Huntington Reservoir. Due to the construction of the bifurcation device that splits the penstock to supply the turbine and the by-pass release, the by-pass flow immediately begins to negatively affect the pressure at the turbine due to a venturi affect. The reduced pressure causes the turbine/generator load to diminish even though the turbine gate position is not altered (and the actual amount of flow through the Ward Tunnel has increased). This inadvertent condition continues until the turbine experiences cavitation with

accompanying pounding and vibration. When the Ward Tunnel flow approaches about 1,500 cfs, the Project generator load is approximately 3 MW, and the unit must be shut down to avoid damage to the generating unit.

The Big Creek System is managed to avoid spill at Huntington Lake, due to dam integrity and downstream safety issues. SCE attempts to keep Huntington Lake at its maximum capacity to support recreational uses from the Memorial Day through Labor Day weekends. However, during wet years, it is necessary to keep storage within Huntington Lake lower until late spring to accommodate local runoff. A spill might otherwise occur if local uncontrolled inflows exceed the facilities' capabilities to divert water out of Huntington Lake during a time when it is at full storage capacity. Minimum storage at Huntington Lake usually occurs just prior to the start of the spring runoff (approximately mid-March).

At Shaver Lake, WSEs may be slightly impacted on a daily basis by the pump-back operations at Eastwood Powerhouse, which usually occurs during the late-night early-morning hours when energy prices are low. Eastwood pump-back takes water from Shaver Lake and pumps it back up to Balsam Meadows reservoir, which is the forebay for Eastwood Powerhouse. During the day when energy prices are higher, this water is again used for generation through Eastwood Powerhouse and is subsequently returned to Shaver Lake. Shaver Lake has to be above a minimum elevation of 5,342 feet, or 78,426 acre-feet of storage for pump-back operations to occur. The seasonal WSEs of Shaver Lake are probably more stable and higher since pump-back went into service to take advantage of this capability and to stay within operational constraints. Because Shaver is not designed to spill, during wet water years, Shaver Lake storage will be drawn down below the pump-back minimum elevation in order to create storage space for the upcoming runoff and minimize the possibility of spill.

Mammoth Pool Reservoir spills more often than the other project reservoirs because the storage capacity is small relative compared to the drainage area. In most cases, spill at Mammoth Pool Reservoir will also result in spill at Redinger Lake. Ideally, minimum storage at Mammoth Pool Reservoir will occur just prior to the beginning of spring runoff in order to maximize storage space availability. After the threat of spill has passed, storage at Mammoth Pool Reservoir declines at a rate necessary to ensure compliance with the September 30 storage requirement in the MPC.

During most of the year, Redinger Lake inflows and outflows are balanced to maintain a relatively constant WSE. During fall, however, outflows often exceed inflows, and reservoir levels may drop 49.2 feet or more. Yearly variations in annual and seasonal flows in Redinger Lake can be substantial. In addition, the Division of Dam Safety requires annual maintenance of the spillway gates at Redinger Lake. Consequently, storage within Redinger Lake must be reduced below 13,000 ac-ft, which affects the WSE for approximately 3 weeks out of the year. This maintenance is usually performed in late October.

TABLES

Table REC 15-1. Recreation Support Facilities and Features Associated with Reservoirs in the Study Area.

Florence Lake

USDA-FS Boat Ramp - Florence Lake¹
 Florence Lake Day Use Picnic Area
 Florence Lake Ferry Service¹
 Jackass Meadow Campground
 Trailhead - Dutch/Crater Trail

Huntington Lake

Boat Ramp - Huntington Lake, East (USDA-FS)¹
 Boat Ramp - Huntington Lake, West (Huntington Lake Resort)¹
 Bear Cove Day Use Picnic Area
 Billy Creek Cabin/Huntington Lake Big Creek Museum
 Billy Creek Day Use Picnic Area
 Catavee Campground
 College Campground
 Dam 3 parking area
 Deer Creek Campground
 Deer Creek Day Use Picnic Area
 Dowville Day Use Picnic Area
 Eastwood Snow Park
 Eastwood Visitor Center
 Huntington Lake Boat Launch/Snow Park
 Inspiration Point Trailhead
 Kinnikinnick Campground
 Lower Billy Creek Campground
 Rancheria Campground
 Rancheria Marina and Boat Docks¹
 Trailhead - Billy Creek
 Upper Billy Creek Campground

Shaver Lake

Camp Edison Boat Ramp/Launch (Shaver Lake Marina)¹
 Camp Edison Campground
 Camp Edison Cross Country Ski Trails
 County Boat Ramp and Parking Area (Sierra Marina)¹
 Day Use Area off Hwy 168 (The Point)
 Day Use Areas on North Shore Roads 1 & 2
 Dorabelle Campground
 Dorabelle Day Use Picnic Area
 Eagle Point Boat Only Day Use Area
 Rest Area off Dinkey Creek Road
 Shaver Lake Marina Concessionaire Facility at Camp Edison
 Shaver Lake Water Sports Concessionaire Facility at Shaver Lake Point
 Sierra Marina Concessionaire Facility

Mammoth Pool Reservoir

Boat Ramp - Mammoth Boat Launch (USDA-FS)¹
 China Bar Boat Camp
 Mammoth Pool Campground
 Trailhead - Logan Meadow
 Windy Point Boat Launch and Ramp¹
 Windy Point Picnic Area

Permittees at Shaver Lake

Camp Chawanakee (Boy Scouts)
 Gold Arrow Camp (Boy Scouts)
 Private Boat Docks (44)
 Shaver Lake Fishing Club

¹ Operations of these reservoir recreation support facilities are influenced by water surface elevations.

Table REC 15-2. Reservoir Recreation Uses by Season.

Reservoir	Primary Uses	Season	Secondary Uses	Season
Shaver Lake	Angling	All year	Non-motorized boating	Summer
	Boating recreation (water skiing) Pleasure boating (pontoon boating, and watercraft)	Summer	Beach use	Summer
Huntington Lake	Angling	Spring, summer, and fall	Pleasure boating	Summer
	Boating recreation (water skiing and sailing)	Summer	Non-motorized boating	Summer
	Snowmobiling	Winter	Beach use	Summer
Florence Lake	Boat angling	Spring, summer and fall		
	Hiking	Spring, summer and fall		
	Snowmobiling	Winter		
Mammoth Pool Reservoir	Waterskiing	Summer	Swimming and water play	Summer
	Boat angling	All year		
	Disperse camping	Summer		

Table REC 15-3. Recreation Support Facility Designed and Functional Water Elevation Ranges.

Support Facility	Designed Use Range ²		Functional Use Range ³	
	Elevation (ft.)	Storage (ac-ft.)	Elevation (ft.)	Storage (ac-ft.)
Shaver Lake				
Sierra Marina Boat Ramp	5,370 - 5,333	135,568 - 66,000	5,370 - 5,296	135,568 - 20,000
Shaver Lake Marina Boat Ramp	5,370 - 5,348	135,568 - 90,000	5,370 - 5,300	135,568 - 24,000
Huntington Lake				
USDA-FS Boat Ramp	6,950 - 6,936	89,166 - 70,105	6,950 - 6,936	89,166 - 70,105
Rancheria Marina Boat Docks	6,950 - 6,942	89,166 - 78,025	6,950 - 6,942	89,166 - 78,025
Huntington Lake Resort Boat Ramp	6,954 - 6,945	89,166 - 82,124	6,950 - 6,928	89,166 - 60,633
Huntington Lake Resort Boat Docks	6,950 - 6,947	89,166 - 84,909	6,950 - 6,945	89,166 - 82,124
Florence Lake				
USDA-FS Boat Ramp	7,330 - 7,326	64,406 - 62,967	7,327.5 - -- ¹	64,406 - -- ¹
Florence Lake Ferry Service	N/A	N/A	7,327.5 - 7,261	64,406 - 12,237
Mammoth Pool Reservoir				
USDA-FS Boat Ramp	3,337 - 3,262	119,940 - 57,861	3,330 - 3,262	119,940 - 57,861
Windy Point Alternative Boat Ramp	3,333 - -- ¹	119,940 - -- ¹	3,330 - -- ¹	119,940 - -- ¹

¹No lower limit as it is possible to drive on the reservoir bed to reach water.

²Maximum and minimum water surface elevations at which the facility was designed to operate.

³Maximum and minimum water surface elevations at which the facility still functions for a least a fraction of the potential recreation users.

Table REC 15-4. The Percentage of On-site Angling Survey Respondents Who Did Not Indicate that WSE Affected their Angling Enjoyment in 2002 by Month and Location.¹

% of Surveyed Without WSE Issues					
	Month	Boat (%)	Lakeshore (%)	Personal Watercraft (%)	ALL (%)
Shaver Lake					
(277 respondents)	April	60	60	N/A	82
	May	81	80	1	
	June	88	91	N/A	
	July	57	86	N/A	
	August	92	100	N/A	
	Sept	83	50	N/A	
	Oct-Nov	67	100	N/A	
Florence Lake					
(98 respondents)	April	N/A	N/A	N/A	79
	May	75	55	N/A	
	June	90	92	N/A	
	July	79	90	N/A	
	August	33	75	N/A	
	Sept	100	100	N/A	
	Oct-Nov	N/A	60	N/A	
Huntington Lake					
(214 respondents)	April	100	100	N/A	86
	May	90	85	N/A	
	June	100	89	1	
	July	75	94	N/A	
	August	100	91	N/A	
	Sept	50	40	N/A	
	Oct-Nov	100	71	N/A	
Mammoth Pool Reservoir					
(18 respondents)	April	N/A	N/A	N/A	86
	May	100	100	N/A	
	June	100	100	N/A	
	July	100	N/A	N/A	
	August	50	100	N/A	
	Sept	N/A	N/A	N/A	
	Oct-Nov	0	N/A	N/A	

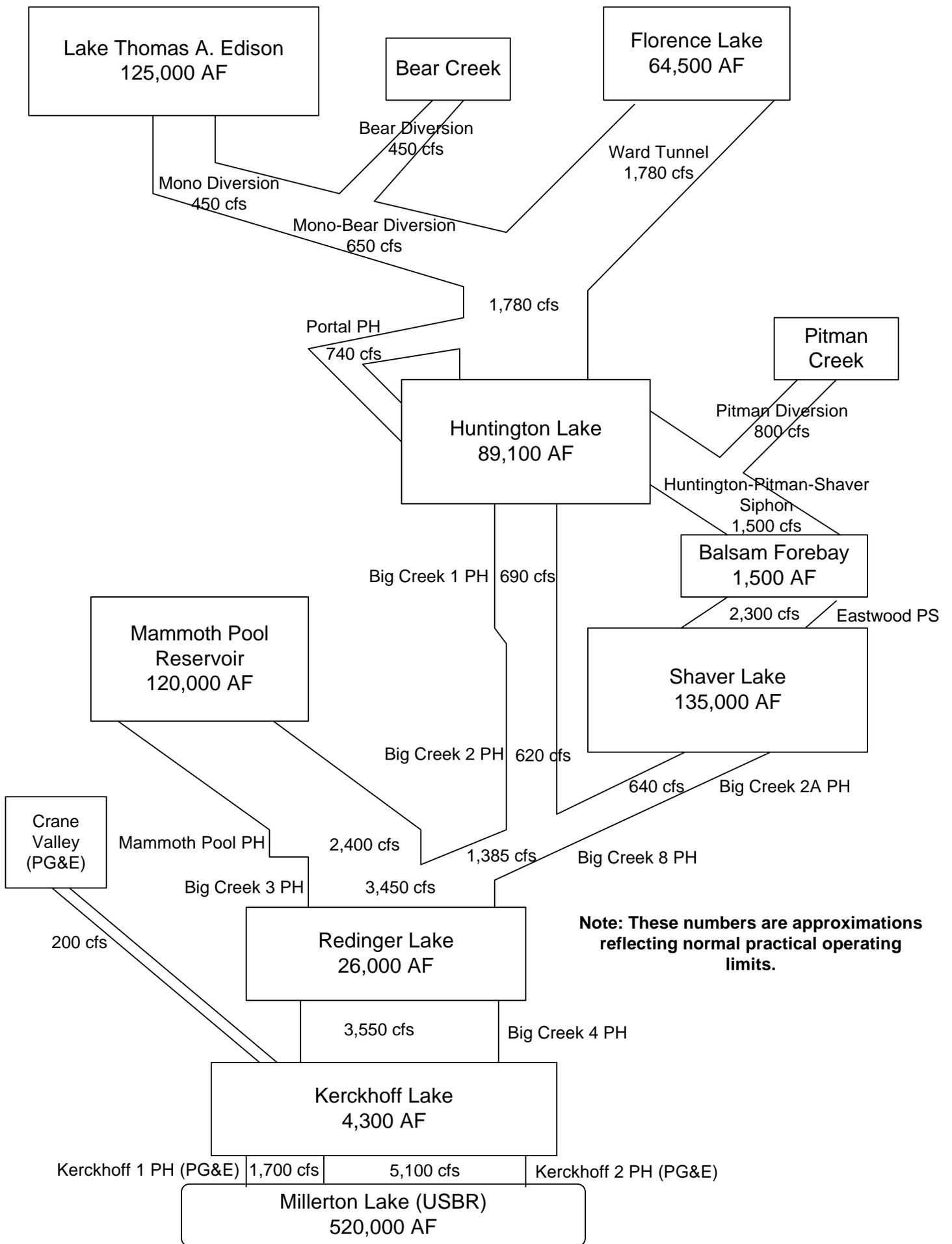
¹ Water surface elevations during this time period are provided for each reservoir in Appendix C.

Table REC 15-5. Percent of Time Reservoir Water Surface Levels were within the Designed Use and Functional Use of the Boat Ramps During the Primary Recreation Season Between Memorial Day and Labor Day (1983-2002).

Reservoir	Support Facility	Water-year Type	% of Time WSE within Designed Use Range	% of Time WSE within Functional Use Range
Shaver Lake	Sierra Marina Boat Ramp	Wet (7 years)	100	100
		Above Normal (3 years)	100	100
		Dry (3 years)	92.6	100
		Critically Dry (7 years)	36.1	100
	Shaver Lake Marina Boat Ramp	Wet (7 years)	96.5	100
		Above Normal (3 years)	100	100
		Dry (3 years)	67.7	100
		Critically Dry (7 years)	9.3	98.6
Huntington Lake	Rancheria Marina Boat Docks	Wet (7 years)	87	87
		Above Normal (3 years)	100	100
		Dry (1 years)	100	100
		Critically Dry (7 years)	95.3	95.3
	USDA-FS Boat Ramp	Wet (7 years)	89.9	89.9
		Above Normal (3 years)	100	100
		Dry (1 years)	100	100
		Critically Dry (7 years)	98.5	98.5
	Huntington Lake Resort Boat Ramp	Wet (7 years)	84.5	92.6
		Above Normal (3 years)	99	100
		Dry (1 years)	100	100
		Critically Dry (7 years)	88.8	100
	Huntington Lake Resort Boat Docks	Wet (7 years)	80.4	84.5
		Above Normal (3 years)	94	99
		Dry (1 years)	100	100
		Critically Dry (7 years)	73.6	88.8
Florence Lake	USDA-FS Boat Ramp	Wet (7 years)	37	100
		Above Normal (3 years)	28	100
		Dry (3 years)	30	100
		Critically Dry (7 years)	0	100
	Florence Lake Ferry Service	Wet (7 years)	N/A	98
		Above Normal (3 years)	N/A	100
		Dry (3 years)	N/A	100
		Critically Dry (7 years)	N/A	90
Mammoth Pool Reservoir	USDA-FS Boat Ramp	Wet (7 years)	99	99
		Above Normal (3 years)	90	90
		Dry (3 years)	93	93
		Critically Dry (7 years)	66	66
	Windy Point Boat Ramp	Wet (7 years)	100	100
		Above Normal (3 years)	100	100
		Dry (3 years)	100	100
		Critically Dry (7 years)	100	100

FIGURE

Figure REC 15-1. Big Creek System Hydraulic Diagram



APPENDIX A
Interview Consultation

Southern California Edison
Big Creek Alternative Licensing Process

Final Water Surface Elevation Study Consultation Questions

Southern California Edison and the Big Creek Collaborative are conducting consultation interviews with resource agencies, reservoir recreational concessionaires, and user groups to evaluate the effect of water surface elevation on recreational activities and support facilities at each reservoir. Your responses to the interview questions will assist in the development of use-stage-curve graphs to represent recreational use, by activity type, at various water surface elevations. The results of the REC-15 Reservoir Recreation Water-Surface Elevation Study will help determine future recreation conditions for the Big Creek Hydroelectric System.

Date: _____ Interviewer(s): _____

Person(s) interviewed: _____

Affiliation: _____

Phone number: _____

Reservoir discussed: _____ (complete separate interview for each reservoir)

1) What recreation activities take place at the reservoir during the summer season (Memorial Day through Labor Day)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- House boat/ Pontoon boat
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

a) Rank the relative use of each summer recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

2) What recreation activities take place at the reservoir during the spring and fall seasons?

Spring (April 1-Memorial Day):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

Fall (Labor Day – October 31):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

Southern California Edison
Big Creek Alternative Licensing Process

Final Water Surface Elevation Study Consultation Questions

- a) Rank the relative use of each spring and fall recreation activity at the reservoir, by season. (1=highest use, 2=second highest use, etc.)
- 3) What recreation activities take place at the reservoir during the winter season (November 1 – March 31)?
- Shore Fishing
 - Boat Fishing (Car-top launch Ramp launch)
 - Water Skiing
 - Jet ski/wave runners
 - Sailing
 - Non-motorized boat (canoe, kayak, rowboat)
 - Beach use (picnicking, swimming, water play)
- a) Rank the relative use of each winter recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)
- 4) What are the associated support facilities for each of the activities by season?
- Boat launch ramps
 - Parking lots
 - Marinas
 - Docks
 - Restrooms
 - Others: _____
- 5) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting the designed and functional use of the support facilities for each activity at the reservoir? Factors to be considered include: support facility condition, length of boat launch ramp, distance to parking, water depth, etc.
- a) List other influential factors and estimate their relative importance in affecting facility use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)
- 6) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting recreational use for each of the activities discussed, by season? Factors to be considered include: condition of shoreline, aesthetics, navigational hazards, reservoir size (surface area).
- a) List other influential factors and estimate their relative importance in affecting recreation use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)
- 7) What factors, other than water surface elevation and support facility function, influence the use of the reservoir for the recreation activities listed above (i.e., draw down, season, etc.)?

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Big Creek Alternative Licensing Process
Final Water Surface Elevation Study Consultation Questions

- 8) Are you aware of any reservoir operation constraints (ex. minimum/maximum pool elevations, etc.) that influence water surface elevation and, therefore, recreation activities?

- 9) Are you aware of any conflicts related to water surface elevation influences between participants of different recreation activities on the reservoir?

- 10) Would you like to recommend any other individuals or organizations to be contacted to contribute to this study?

Southern California Edison
Big Creek Alternative Licensing Process
Final Water Surface Elevation Study Consultation Questions

Glossary

Maximum Acceptable Water Surface Elevation:

The **highest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Minimum Acceptable Water Surface Elevation:

The **lowest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Maximum Optimal Water Surface Elevation:

The **highest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Optimal Water Surface Elevation:

The **lowest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Useable Water Surface Elevation:

The **lowest stage** at which you predict that **10% or less** of the users would be willing to recreate on the reservoir.

Southern California Edison
Big Creek Alternative Licensing Process
Final Water Surface Elevation Study Consultation Questions

Southern California Edison and the Big Creek Collaborative are conducting consultation interviews with resource agencies, reservoir recreational concessionaires, and user groups to evaluate the effect of water surface elevation on recreational activities and support facilities at each reservoir. Your responses to the interview questions will assist in the development of use-stage-curve graphs to represent recreational use, by activity type, at various water surface elevations. The results of the REC-15 Reservoir Recreation Water-Surface Elevation Study will help determine future recreation conditions for the Big Creek Hydroelectric System.

Date: 8/19/03 Interviewer(s): Tim Blewett, Dave Martinez, Mark Newquist

Person(s) interviewed: John Mount, Steve Byrd

Affiliation: SCE, Camp Edison

Phone number: 559-841-3194

Reservoir discussed: Shaver Lake (complete separate interview for each reservoir)

1) What recreation activities take place at the reservoir during the summer season (Memorial Day through Labor Day)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- House boat/ Pontoon boat – increasing use – waiting lists for slips – need another marina
- Non-motorized boat (canoe, kayak, rowboat) – increasing use
- Beach use (picnicking, swimming, water play)

a) Rank the relative use of each summer recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

- 1 Boat and Shore Fishing (mostly boat fishing, shore fishing in spring)
- 1 Boat Fishing
- 2 Water Skiing
- 2 Jet ski/wave runners
- 3 House boat/ Pontoon boat
- 4 Beach use (picnicking, swimming, water play)
- 5 Non-motorized boat (canoe, kayak, rowboat)

Kokanee is the primary fishery at Shaver Lake. It is the #1 factor in the recent boom at Shaver. Most of the 750,000 visitors to the area in 2003 were anglers. The campground (Camp Edison) is frequently full. There were 250,000 visitors in 1997, and over 600,000 visitors in 2002 (Camp Edison).

The anglers like to fish when the water is down. There is a perceived smaller barrel affect.

There are 50,000 Kokanee planted in Shaver every May.

Most pontoon boaters are lumped in with fishing.

2) What recreation activities take place at the reservoir during the spring and fall seasons?

Spring (April 1-Memorial Day):

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- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

Fall (Labor Day – October 31):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- House boat/ Pontoon boat
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each spring and fall recreation activity at the reservoir, by season. (1=highest use, 2=second highest use, etc.)

The pontoon boats are still big in the fall season. Activity at Shaver Lake is primarily fishing in the shoulder seasons.

- 3) What recreation activities take place at the reservoir during the winter season (November 1 – March 31)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each winter recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

There are anglers year round, but very few. There is a fishing boat on the lake every day of the year.

- 4) What are the associated support facilities for each of the activities by season?

- Boat launch ramps
- Parking lots
- Marinas
- Docks
- Restrooms
- Others: Fuel stations – have 2 on lake

- 5) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting the designed and functional use of the support facilities for each activity at the reservoir? Factors to be considered include: support facility condition, length of boat launch ramp, distance to parking, water depth, etc.

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- a) List other influential factors and estimate their relative importance in affecting facility use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)
- 6) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting recreational use for each of the activities discussed, by season? Factors to be considered include: condition of shoreline, aesthetics, navigational hazards, reservoir size (surface area).

Minimum usable/acceptable/optimal would be below 5315'. At 5315' elevation, all activities still have use of the lake. About 80% of the typical users will remain when the water is at this level.

There is no way to know when you would lose 50% of the users, there are too many factors. These factors would include other reservoir elevations, the fact that it doesn't ever get that low at Shaver, etc.

Minimum optimal would be at 90,000af for all activities, because the Camp Edison boat ramp (Shaver Lake Marina) is still in the water. Below that, there is more beach use, but the ability to get boats in and out of the water is minimized.

Elevation of the lake does not matter as long as there is a ramp in the water.

Maximum optimal would be at about 5' below full pool. This elevation has the maximum surface area with sufficient beach space.

There is no maximum acceptable for any use, including beach use.

The aesthetics of draw-down (white line of beach around lake) does not seem to affect recreational use.

- a) List other influential factors and estimate their relative importance in affecting recreation use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)
- 7) What factors, other than water surface elevation and support facility function, influence the use of the reservoir for the recreation activities listed above (i.e., draw down, season, etc.)?

Critical factors are related to what is going on at other surrounding reservoirs. Shaver Lake is affected more by other areas (Yosemite included) than Water Surface Elevation fluctuations. One cannot isolate Shaver Lake – you need to consider the bigger world. The sphere of influence for Shaver is a 2 to 3 hour travel time from the lake.

At Camp Edison, the campground is considered 100% full at 90% capacity. A 10% fluctuation in use is expected due to uncontrollable factors.

- 8) Are you aware of any reservoir operation constraints (ex. minimum/maximum pool elevations, etc.) that influence water surface elevation and, therefore, recreation activities?

The lake is managed with a minimum elevation necessary to allow pumpback into Eastwood Powerhouse. The last significant draw-down was 1989-1993.

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- 9) Are you aware of any conflicts related to water surface elevation influences between participants of different recreation activities on the reservoir?

Conflicts and incidents will occur if there is too much water in the reservoir, because there is not enough beach, and the high water level causes conflicts surrounding private piers.

Decreased lake level means decreased water surface area and conflicts between users on water increase (same amount of people in less area). Shore conflicts, in contrast, will go down because of increased beach area (same amount of people in more area).

Number of fires goes down with a little bit of beach – keeps barbecues and camp fires out of the woods and on the sand. Conflicts between users decrease with more beach – less people fighting over beach space.

Around Shaver Lake Point, high pool causes conflicts with people walking near private piers.

- 10) Would you like to recommend any other individuals or organizations to be contacted to contribute to this study?

Other Comments:

There are hazards in the lake at all levels. The common perception is that there are more hazards when the water is low because you can see more rocks. Actually, there are a lot of rocks just below the surface when the lake is full.

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Glossary

Maximum Acceptable Water Surface Elevation:

The **highest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Minimum Acceptable Water Surface Elevation:

The **lowest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Maximum Optimal Water Surface Elevation:

The **highest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Optimal Water Surface Elevation:

The **lowest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Useable Water Surface Elevation:

The **lowest stage** at which you predict that **10% or less** of the users would be willing to recreate on the reservoir.

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Date: 8/19/03 Interviewer(s): Tim Blewett, Dave Martinez, Mark Newquist

Person(s) interviewed: Greg Powell

Affiliation: Shaver Lake Marina

Phone number: 559-841-5331

Reservoir discussed: Shaver Lake (complete separate interview for each reservoir)

1) What recreation activities take place at the reservoir during the summer season (Memorial Day through Labor Day)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- House boat/ Pontoon boat
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

a) Rank the relative use of each summer recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

House/pontoon boating in the summer is the biggest use. About 5-10% of pontoon boaters will fish.

The primary recreation season is defined by the school year. Most of the use is family based activity from mid June to mid August.

In April, marina operators start to get calls to check if the ramps are in the water.

Jet skiers start using the lake in mid June, after school is out.

2) What recreation activities take place at the reservoir during the spring and fall seasons?

Spring (April 1-Memorial Day):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

Fall (Labor Day – October 31):

- Shore Fishing

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- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each spring and fall recreation activity at the reservoir, by season. (1=highest use, 2=second highest use, etc.)

Spring and fall dominant use is angling.

- 3) What recreation activities take place at the reservoir during the winter season (November 1 – March 31)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each winter recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

- 4) What are the associated support facilities for each of the activities by season?

- Boat launch ramps
- Parking lots
- Marinas
- Docks
- Restrooms
- Others: _____

There are no other support facilities. Most other lakes have pump out facilities and floating restrooms. This is not a dyer need at shaver, but it would get used.

- 5) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting the designed and functional use of the support facilities for each activity at the reservoir? Factors to be considered include: support facility condition, length of boat launch ramp, distance to parking, water depth, etc.

- a) List other influential factors and estimate their relative importance in affecting facility use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

The minimum acceptable elevation for Shaver Lake Marina is a little above 90,000 acre-feet. The Shaver Lake Marina ramp is not as deep as the Sierra Marina ramp.

- 6) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting recreational use for each of the activities discussed, by season? Factors to be considered include: condition of shoreline, aesthetics, navigational hazards, reservoir size (surface area).

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The maximum optimal level is full pool, though some people complain about the lack of beaches.
There is no maximum acceptable – will not lose 50% of visitors at any high elevation level.

- a) List other influential factors and estimate their relative importance in affecting recreation use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)
- 7) What factors, other than water surface elevation and support facility function, influence the use of the reservoir for the recreation activities listed above (i.e., draw down, season, etc.)?
- 8) Are you aware of any reservoir operation constraints (ex. minimum/maximum pool elevations, etc.) that influence water surface elevation and, therefore, recreation activities?

Minimum pump back elevation of 86,000 acre-feet.

- 9) Are you aware of any conflicts related to water surface elevation influences between participants of different recreation activities on the reservoir?

There are more user conflicts at the lake at high water levels. On the shore, there are more conflicts because there is less beach space available. On the water, there are more users when the lake is full, so there are more conflicts between groups (fishermen and wave runners).

- 10) Would you like to recommend any other individuals or organizations to be contacted to contribute to this study?

Other comments:

The lake has hazards at all levels, but the perception is that it is less dangerous when the lake is full. Sierra Marina has more problems with boat damage when the lake is full, but Shaver Lake Marina has more damage occur when the lake level is down. This may be a function of the location of the 2 marinas and the specific hazards in those areas.

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Glossary

Maximum Acceptable Water Surface Elevation:

The **highest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Minimum Acceptable Water Surface Elevation:

The **lowest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Maximum Optimal Water Surface Elevation:

The **highest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Optimal Water Surface Elevation:

The **lowest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Useable Water Surface Elevation:

The **lowest stage** at which you predict that **10% or less** of the users would be willing to recreate on the reservoir.

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Date: 8/19/03 Interviewer(s): Tim Blewett, Dave Martinez, Mark Newquist

Person(s) interviewed: Sheldon Sandstrom

Affiliation: Sierra Marina

Phone number: 559-841-3324

Reservoir discussed: Shaver Lake (complete separate interview for each reservoir)

1) What recreation activities take place at the reservoir during the summer season (Memorial Day through Labor Day)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- House boat/ Pontoon boat
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

a) Rank the relative use of each summer recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

House/pontoon boating in the summer is the biggest use, angling is secondary (as far as the rental fleet at Sierra Marina). It is hard for the Sierra Marina operators to judge the number of anglers because many of them are self-sufficient. They launch their boats and pull them out without ever stopping at the marina for gas or supplies.

Jet ski season starts July first – because of water and air temperature, not water surface elevation.

The primary recreation season is defined by the school year. Most of the use is family based activity from mid June to mid August.

In April, marina operators start to get calls to check if the ramps are in the water.

2) What recreation activities take place at the reservoir during the spring and fall seasons?

Spring (April 1-Memorial Day):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

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Fall (Labor Day – October 31):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each spring and fall recreation activity at the reservoir, by season. (1=highest use, 2=second highest use, etc.)

Spring and fall dominant use is angling.

From the day after Labor Day to October 1st is the best ski season. The lake is not crowded and all the locals come out to use it.

- 3) What recreation activities take place at the reservoir during the winter season (November 1 – March 31)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each winter recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

- 4) What are the associated support facilities for each of the activities by season?

- Boat launch ramps
- Parking lots
- Marinas
- Docks
- Restrooms
- Others: _____

There are no other support facilities. Most other lakes have pump out facilities and floating restrooms. This is not a dyer need at shaver, but it would get used.

- 5) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting the designed and functional use of the support facilities for each activity at the reservoir? Factors to be considered include: support facility condition, length of boat launch ramp, distance to parking, water depth, etc.

- a) List other influential factors and estimate their relative importance in affecting facility use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

The minimum useable lake level is 20,000 acre-feet. This shut down Sierra Marina in 1989, couldn't get boats out of the lake.

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The minimum acceptable (for boat based recreation) is at pump back – 86,000 a-f (lake down 28').

The secondary ramp at Sierra Marina is useable to 66,000 acre-feet.

- 6) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting recreational use for each of the activities discussed, by season? Factors to be considered include: condition of shoreline, aesthetics, navigational hazards, reservoir size (surface area).

The maximum optimal level is full pool, though some people complain about the lack of beaches.

There is no maximum acceptable – will not lose 50% of visitors at any high elevation level.

- a) List other influential factors and estimate their relative importance in affecting recreation use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)
- 7) What factors, other than water surface elevation and support facility function, influence the use of the reservoir for the recreation activities listed above (i.e., draw down, season, etc.)?
- 8) Are you aware of any reservoir operation constraints (ex. minimum/maximum pool elevations, etc.) that influence water surface elevation and, therefore, recreation activities?

Minimum pump back elevation of 86,000 acre-feet.

- 9) Are you aware of any conflicts related to water surface elevation influences between participants of different recreation activities on the reservoir?

There are more user conflicts at the lake at high water levels. On the shore, there are more conflicts because there is less beach space available. On the water, there are more users when the lake is full, so there are more conflicts between groups (fishermen and wave runners).

- 10) Would you like to recommend any other individuals or organizations to be contacted to contribute to this study?

Other comments:

The lake has hazards at all levels, but the perception is that it is less dangerous when the lake is full. Sierra Marina has more problems with boat damage when the lake is full, but Shaver Lake Marina has more damage occur when the lake level is down. This may be a function of the location of the 2 marinas and the specific hazards in those areas.

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Maximum Acceptable Water Surface Elevation:

The **highest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Minimum Acceptable Water Surface Elevation:

The **lowest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Maximum Optimal Water Surface Elevation:

The **highest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Optimal Water Surface Elevation:

The **lowest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Useable Water Surface Elevation:

The **lowest stage** at which you predict that **10% or less** of the users would be willing to recreate on the reservoir.

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Date: 8/19/03

Interviewer(s): Tim Blewett, Dave Martinez, Mark Newquist

Person(s) interviewed: Jack Yandell

Affiliation: Fishing Guide

Phone number: 559-841-2522

Reservoir discussed: Shaver Lake (complete separate interview for each reservoir)

1) What recreation activities take place at the reservoir during the summer season (Memorial Day through Labor Day)? Main season usually starts mid-June.

- Shore Fishing
- Tube Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing - rare
- House boat/ Pontoon boat – Very popular, 2 marinas offering slips
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play) – Lower use because there are only 2 areas you can get to. Most people have some sort of watercraft.

a) Rank the relative use of each summer recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

1-jet ski/water ski; 2-boat angling; 3-beach/shore use, fishing; 4-pontoon

2) What recreation activities take place at the reservoir during the spring and fall seasons?

Spring (April 1-Memorial Day):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing – water too cold
- Jet ski/wave runners – water too cold
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

Fall (Labor Day – October 31): Use shifts to fishing. A lot of seniors. September and October are Jacks favorite months.

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

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- a) Rank the relative use of each spring and fall recreation activity at the reservoir, by season. (1=highest use, 2=second highest use, etc.)
- 3) What recreation activities take place at the reservoir during the winter season (November 1 – March 31)?
- Shore Fishing
 - Boat Fishing (Car-top launch Ramp launch)
 - Water Skiing
 - Jet ski/wave runners
 - Sailing
 - Non-motorized boat (canoe, kayak, rowboat)
 - Beach use (picnicking, swimming, water play)
- a) Rank the relative use of each winter recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)
- 4) What are the associated support facilities for each of the activities by season?
- Boat launch ramps
 - Parking lots
 - Marinas
 - Docks
 - Restrooms – [Need more. There is only one at the other end of the lake \(Eagle Point\). Road 1, Road 2, and Eagle Point. There is nothing at the south side of the lake.](#)
 - Others:
- 5) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting the designed and functional use of the support facilities for each activity at the reservoir? Factors to be considered include: support facility condition, length of boat launch ramp, distance to parking, water depth, etc.
- [The average fisherman would not come up if the boat ramps were out of the water. 50% of the anglers would not use the lake if the ramps were out. There would be more bank angling, and better bank fishing during lower water though, because the fish are more concentrated.](#)
- a) List other influential factors and estimate their relative importance in affecting facility use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)
- 6) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting recreational use for each of the activities discussed, by season? Factors to be considered include: condition of shoreline, aesthetics, navigational hazards, reservoir size (surface area).

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Boat ramps in the water is the critical factor in determining use.

Minimum Acceptable and Minimum Optimal are the same – If the ramps are in the water, then people will use the lake.

Maximum optimum – Anglers don't care if there is a bank or not. At spill, 90% of the anglers will still use the lake. From the point the ramps are in the water to full pool, anglers will use the lake.

Minimum usable – Never seen it that low. Anglers will still fish even if they have to follow the retreating water level into the historic river channel. The minimum useable condition is a dry lake (no water).

Maximum Levels – There is no maximum for angling. Anglers will fish when the reservoir is spilling.

- a) List other influential factors and estimate their relative importance in affecting recreation use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

- 7) What factors, other than water surface elevation and support facility function, influence the use of the reservoir for the recreation activities listed above (i.e., draw down, season, etc.)?

Most of the use is in the summer months. Recreation use is very much controlled by the calendar and this peak season.

- 8) Are you aware of any reservoir operation constraints (ex. minimum/maximum pool elevations, etc.) that influence water surface elevation and, therefore, recreation activities?

No ramp on point, just private docks. Historically, people have launched down the bank right at the corner of 168, but there is no developed ramp.

Need a dock at the Shaver Marina ramp. Ramp needs to be steeper and longer. The Shaver ramp comes out of the water long before Sierra Marina. Sierra Marina hasn't been out of the water for years. Sierra Marina is also free. But people would pay for Shaver if there was a dock because people like to picnic there.

- 9) Are you aware of any conflicts related to water surface elevation influences between participants of different recreation activities on the reservoir?

No. There are conflicts between anglers and jet skiers/water skiers, but they seem to be independent of elevation. There is no relation between the rate of conflicts and the water surface elevation.

- 10) Would you like to recommend any other individuals or organizations to be contacted to contribute to this study?

Dave Powell at Shaver Lake Sports

Additional notes/comments:

Jack fishes Shaver Lake approximately 250 days per year. The fishing is ideal at current conditions. 98% capacity is too much water, there is no bank, nowhere to tie up. About 90% capacity would be ideal. There needs to be a minimum of about 5 feet of bank to tie up a boat.

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In the last couple of years, water surface elevation has not affected fishing success. If you can get a boat on the water, you can catch fish. With the pumpback system for Eastwood Powerhouse, the maximum lake level drop is 28 feet. At this point, you can still launch boats on the lake. There is not a lot of water surface elevation change during the main season.

Jack gives 3 fishing reports – 2 weekly, and 1 every 2 weeks. Anglers will know from the reports if the ramps are in or out of the water. Bank fishers respond to those reports, too.

Every water level has hazards because the rocks are not marked. Even at full pool, there are rocks near the surface. There is no more risk at any level than any other. Jack avoids some places (Boy Scout Point, Road 2 cove) entirely because of the hazards.

Glossary

Maximum Acceptable Water Surface Elevation:

The **highest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Minimum Acceptable Water Surface Elevation:

The **lowest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Maximum Optimal Water Surface Elevation:

The **highest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Optimal Water Surface Elevation:

The **lowest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Useable Water Surface Elevation:

The **lowest stage** at which you predict that **10% or less** of the users would be willing to recreate on the reservoir.

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Southern California Edison and the Big Creek Collaborative are conducting consultation interviews with resource agencies, reservoir recreational concessionaires, and user groups to evaluate the effect of water surface elevation on recreational activities and support facilities at each reservoir. Your responses to the interview questions will assist in the development of use-stage-curve graphs to represent recreational use, by activity type, at various water surface elevations. The results of the REC-15 Reservoir Recreation Water-Surface Elevation Study will help determine future recreation conditions for the Big Creek Hydroelectric System.

Date: 9/16/03 Interviewer(s): Tim Blewett

Person(s) interviewed: Steve Monke

Affiliation: Gold Arrow Camp, Huntington Lake

Phone number: 800-554-2267

Reservoir discussed: Huntington and Shaver

1) What recreation activities take place at the reservoir during the summer season (Memorial Day through Labor Day)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- House boat/ Pontoon boat
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

All these activities, except sailing, take place at Shaver. All take place at Huntington, though pontoon boating is not very popular there.

a) Rank the relative use of each summer recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

At Shaver, the most popular activities are probably beach use, water/jet ski, and fishing, but unsure about the relative ranking. At Huntington, sailing is probably number 1. There is a regatta almost every weekend. The one beach people use a lot is Lakeshore Beach by the boat ramp. There is not a lot of water skiing at Huntington.

2) What recreation activities take place at the reservoir during the spring and fall seasons?

Spring (April 1-Memorial Day):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

Fall (Labor Day – October 31):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)

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- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each spring and fall recreation activity at the reservoir, by season. (1=highest use, 2=second highest use, etc.)

Steve is not very aware of the shoulder season (spring or fall) use. The Gold Arrow camp operates from late June to late August. The camp administration sets up in early June at the camp and is gone in early September. Steve does not regularly observe the shoulder season use.

- 3) What recreation activities take place at the reservoir during the winter season (November 1 – March 31)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each winter recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

See response to question 2. Steve does not live in the area during the camp's off season. He is aware that snowmobiling is popular around Huntington Lake.

- 4) What are the associated support facilities for each of the activities by season?

- Boat launch ramps
- Parking lots
- Marinas
- Docks
- Restrooms
- Others: _____

The primary support facilities are the boat ramps and marinas.

- 5) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting the designed and functional use of the support facilities for each activity at the reservoir? Factors to be considered include: support facility condition, length of boat launch ramp, distance to parking, water depth, etc.

- a) List other influential factors and estimate their relative importance in affecting facility use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

- 6) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting recreational use for each of the activities discussed, by season? Factors to be considered include: condition of shoreline, aesthetics, navigational hazards, reservoir size (surface area).

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- a) List other influential factors and estimate their relative importance in affecting recreation use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

Response to 5 & 6:

There is no maximum acceptable water surface elevation at Huntington or Shaver. If the water was spilling over the dam, the lake would still be useable. You would not lose 50% of the visitors at any high water level. A limiting factor of high water could be if the boat ramps were not accessible. If you could not launch boats, that would limit some use.

For minimum acceptable, the level would have to be really low to lose 50% of the visitors. The limiting factor would be lake surface area, because there would not be sufficient lake surface for all the visitors. At some point, you could lose half of the visitors because of crowding on the lake. Huntington is less crowded than Shaver, so it would take longer to get to this point.

Minimum and maximum optimal elevations are too hard to define. If the lakes were spilling, 90% would still use them, so maybe no maximum optimal. Minimum optimal would depend on lake surface area. If you lost 75% of the lake surface area, maybe you would lose 90% of the visitors.

- 7) What factors, other than water surface elevation and support facility function, influence the use of the reservoir for the recreation activities listed above (i.e., draw down, season, etc.)?

The season has a major effect. Most use is during the summer months. Another factor is that people are busier with jobs, summer school, and stuff to do and they don't have as much time to get away. Gas prices may also inhibit some people from coming up to the lakes.

- 8) Are you aware of any reservoir operation constraints (ex. minimum/maximum pool elevations, etc.) that influence water surface elevation and, therefore, recreation activities?

Not aware of any constraints. The typical management of the reservoir keeps the water level high throughout the summer and drops the level in the fall. SCE provides a letter each year to the camp to inform them of what the lake levels will be. This forecast is usually very accurate. In 1998, the El Nino year, Huntington Lake didn't fill until mid July – had to reserve space to accommodate potential flooding from late snow melt. This was a problem for the camp because they couldn't float their docks until mid July.

- 9) Are you aware of any conflicts related to water surface elevation influences between participants of different recreation activities on the reservoir?

Shaver Lake is crowded. Jet skis are already disliked by many other users. When the lake level is lower, this increases the potential for conflict because the jet skiers and other users are sharing less lake area.

- 10) Would you like to recommend any other individuals or organizations to be contacted to contribute to this study?

There are two Boy Scout camps on the lake – Camp Kern and Camp Oljato. The best information will probably come from the marina operators because they depend more closely on lake levels than anyone. The lake level does not really affect the Gold Arrow Camp, except for in 1998 (see #8).

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Maximum Acceptable Water Surface Elevation:

The **highest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Minimum Acceptable Water Surface Elevation:

The **lowest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Maximum Optimal Water Surface Elevation:

The **highest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Optimal Water Surface Elevation:

The **lowest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Useable Water Surface Elevation:

The **lowest stage** at which you predict that **10% or less** of the users would be willing to recreate on the reservoir.

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Date: 9/22/03 Interviewer(s): Tim Blewett and Dave Martinez

Person(s) interviewed: Mark Richards

Affiliation: Rancheria Marina

Phone number: 559-893-3234

Reservoir discussed: Huntington Lake (complete separate interview for each reservoir)

1) What recreation activities take place at the reservoir during the summer season (Memorial Day through Labor Day)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- House boat/ Pontoon boat
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

a) Rank the relative use of each summer recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

All these uses take place at Huntington. The dominant uses are fishing and sailing. There has been a 25% increase in power boats (ski, pontoon, etc. – all motor) in the 4 years that Mark has been running the business. Seven out of ten new slip owners have power boats (3 have sailboats). Kayak use is increasing a little.

There are about 120 sailboats and 80-90 other boats moored on the lake during the summer season.

The main season is Memorial Day to Labor Day. SCE has a water mandate, Huntington has to be full.

This summer was the best all-summer fishing. Fishing success usually drops off around 7/15 and comes back later in the summer. This year it was good all through the summer.

2) What recreation activities take place at the reservoir during the spring and fall seasons?

Spring (April 1-Memorial Day):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

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Fall (Labor Day – October 31):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each spring and fall recreation activity at the reservoir, by season. (1=highest use, 2=second highest use, etc.)

The shoulder season (spring and fall) activity is primarily fishing. After Labor Day, about 20 fishing boats launch per weekend. A lot of deer hunters in the fall rent fishing boats after hunting.

- 3) What recreation activities take place at the reservoir during the winter season (November 1 – March 31)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each winter recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

Snowmobiling. Drag strips set up on lake bed at east end near Rancheria.

- 4) What are the associated support facilities for each of the activities by season?

- Boat launch ramps
- Parking lots
- Marinas
- Docks
- Restrooms
- Others: _____

All

- 5) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting the designed and functional use of the support facilities for each activity at the reservoir? Factors to be considered include: support facility condition, length of boat launch ramp, distance to parking, water depth, etc.

- a) List other influential factors and estimate their relative importance in affecting facility use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

- 6) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting recreational use for each of the activities discussed, by season? Factors

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to be considered include: condition of shoreline, aesthetics, navigational hazards, reservoir size (surface area).

- a) List other influential factors and estimate their relative importance in affecting recreation use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

5 & 6 response:

All recreation activities function well at full pool. A seven foot drawdown eliminates most recreation use. Every boat is pulled out at that point. No one recreating at 10-foot draw down.

No boats can launch or get out at 10-foot draw down. The Rancheria docks are out at 10' down also. The lakebed is too flat after the end of the paved ramp to launch boats.

This year, the water level is high enough for all the businesses to operate to October 1st. That is a good year.

- 7) What factors, other than water surface elevation and support facility function, influence the use of the reservoir for the recreation activities listed above (i.e., draw down, season, etc.)?

Use drops significantly at the end of August when school starts and also after Labor Day.

Weather can affect the use, too. One year there was snow on the ground until June 25. There were no boats in the water until July 1.

- 8) Are you aware of any reservoir operation constraints (ex. minimum/maximum pool elevations, etc.) that influence water surface elevation and, therefore, recreation activities?

- 9) Are you aware of any conflicts related to water surface elevation influences between participants of different recreation activities on the reservoir?

There are few boat to boat conflicts. Those that occur are during the regattas. Anglers get upset with sailboats cutting behind them across their trolling lines. The state law says that a trolling boat has the right of way when a line is in the water. Most fishermen don't go out during the regattas.

- 10) Would you like to recommend any other individuals or organizations to be contacted to contribute to this study?

Other comments:

Rancheria Marina rents the following:

- 11 fishing boats
- 6 house (pontoon) boats (2 are geared for fishing – fishing patio, fish finder, etc.)
- 2 waverunners
- 2 canoes (one 3-man, one 2-man)
- 5 kayaks (three single, two 2-man)

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- 2 paddle boats
- 98 seasonal slips (June-Sept)
- 20 short-term (weekly) slips
- 7 additional slips not rented (for marina use)

Lakeshore boat ramp needs a sign with lake and boating rules.

The biggest comment from anglers is that they want a fish cleaning station.

The launch ramp has good disabled access, but other areas of the lake don't.

A landing mat style boat ramp surface would be good to extend the ramp.

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Glossary

Maximum Acceptable Water Surface Elevation:

The **highest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Minimum Acceptable Water Surface Elevation:

The **lowest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Maximum Optimal Water Surface Elevation:

The **highest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Optimal Water Surface Elevation:

The **lowest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Useable Water Surface Elevation:

The **lowest stage** at which you predict that **10% or less** of the users would be willing to recreate on the reservoir.

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Date: 9/22/03 Interviewer(s): Tim Blewett and Dave Martinez

Person(s) interviewed: Sandra Richey

Affiliation: Huntington Lake Resort

Phone number: 559-893-3226

Reservoir discussed: Huntington Lake (complete separate interview for each reservoir)

1) What recreation activities take place at the reservoir during the summer season (Memorial Day through Labor Day)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners – some use at Huntington
- Sailing
- House boat/ Pontoon boat
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play) – Beach use is not that important at the lake. Lakeshore beach is the popular spot for beach use. It is the only location with sand.

a) Rank the relative use of each summer recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

The top uses on the lake are fishing and sailing. There has been more kayak use this year than in the past.

2) What recreation activities take place at the reservoir during the spring and fall seasons?

Spring (April 1-Memorial Day):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

As soon as the road opens in the spring, fishing starts. As soon as the water level is high enough to get sail boats in, the sailing will start. When about 3 sections of the lakeshore pier is floating (up to about the second post), the water is deep enough to launch sail boats. At that point, HLR will launch their sail boats at lakeshore and bring them down to moor at buoys near the resort.

Fall (Labor Day – October 31):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)

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- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each spring and fall recreation activity at the reservoir, by season. (1=highest use, 2=second highest use, etc.)

Fall use is mainly fishing.

- 3) What recreation activities take place at the reservoir during the winter season (November 1 – March 31)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each winter recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

- 4) What are the associated support facilities for each of the activities by season?

- Boat launch ramps
- Parking lots
- Marinas
- Docks
- Restrooms
- Others: _____

All

- 5) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting the designed and functional use of the support facilities for each activity at the reservoir? Factors to be considered include: support facility condition, length of boat launch ramp, distance to parking, water depth, etc.

- a) List other influential factors and estimate their relative importance in affecting facility use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

- 6) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting recreational use for each of the activities discussed, by season? Factors to be considered include: condition of shoreline, aesthetics, navigational hazards, reservoir size (surface area).

- a) List other influential factors and estimate their relative importance in affecting recreation use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

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5 & 6 response data:

The HLR boat ramp is still in the water today (9/22/03). The lake is down about 4 feet.

Today's elevation is a little too low for using the HLR stationary docks to climb into the smaller aluminum fishing boats. When the lake is down about 1-2' from the docks, getting in and out of boats becomes difficult. At low levels, like today, a pontoon boat is used as a step between the docks and the fishing boats.

When the HLR ramp is out of the water, boats will still launch by backing down the bank. Small boats easily launch from the dirt at HLR. Big boats launch at the Lakeshore ramp.

The shore off HLR has 2 benches. Somewhere shortly after 68-70% elevation, the step from the first bench will be too steep to back a trailer down and launch a boat. When the lake is down, people will drive out to the first bench to fish, but will not drive to the second.

The lowest elevation for rec. at Huntington is dependent on the Lakeshore ramp. As long as boats can launch at Lakeshore, the recreation use will still go on.

There is no maximum limit on lake level. The lake is good at full pool.

- 7) What factors, other than water surface elevation and support facility function, influence the use of the reservoir for the recreation activities listed above (i.e., draw down, season, etc.)?

The past year's lake level affects return customer use. It takes 2-3 seasons to bounce back from something like what occurred last year when SCE dropped the lake 2 feet/day starting the day after Labor Day.

School starting has an affect on how many people come to the lake. But homeschooling is becoming more popular and they will vacation later in the year, tie-in their visit with their lessons.

Late snow (road closed longer than normal) or early snow (has been as early as September) affects use. One year there was 4' of snow at Memorial Day. Since then, there has been fewer visitors early in the year. The road usually closes after the 3rd snow of the year. The first 2 snows usually melt off the road because the road is still warm.

- 8) Are you aware of any reservoir operation constraints (ex. minimum/maximum pool elevations, etc.) that influence water surface elevation and, therefore, recreation activities?

SCE is supposed to keep the lake full every year during the summer.

- 9) Are you aware of any conflicts related to water surface elevation influences between participants of different recreation activities on the reservoir?

There is not much conflict between uses. The winds come up on the lake around 10 am and die down around 4 or 5 pm, these are the sailing hours. Skiers tend to go out early and later, before or after the winds. Fishermen work the shoreline and sailboats are typically in the middle of the lake.

Any conflicts that occur don't have to do with water level. Some conflicts come from a difference of opinion between sailers and anglers on who has the right of way on the water.

- 10) Would you like to recommend any other individuals or organizations to be contacted to contribute to this study?

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Other comments:

Sandra has run the resort for 34 seasons. The resort includes the restaurant, marina, and 8 rental cabins.

The resort rents fishing boats, sail boats, pontoon boats, canoes, and moorings.

Last year, SCE dropped Huntington 2 feet/day starting the day after Labor Day.

There are more hazards in the lake when the water gets a little low. There are more obstacles and rocks, especially near the shore, to look out for.

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Glossary

Maximum Acceptable Water Surface Elevation:

The **highest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Minimum Acceptable Water Surface Elevation:

The **lowest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Maximum Optimal Water Surface Elevation:

The **highest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Optimal Water Surface Elevation:

The **lowest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Useable Water Surface Elevation:

The **lowest stage** at which you predict that **10% or less** of the users would be willing to recreate on the reservoir.

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Date: 9/29/03 Interviewer(s): Tim Blewett

Person(s) interviewed: Steve Sherri

Affiliation: Lakeshore Resort

Phone number: 559-893-3193

Reservoir discussed: Huntington Lake (complete separate interview for each reservoir)

I had a conversation with Steve over the phone because I was unable to contact him to set up an interview for the days that we were at Huntington during the week of 9/22. I described the input we had received from others at Huntington Lake and Steve agreed. Additional information provided is listed below.

1) What recreation activities take place at the reservoir during the summer season (Memorial Day through Labor Day)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- House boat/ Pontoon boat
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

a) Rank the relative use of each summer recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

The main season is through Labor Day but it could easily be extended through September if the lake level was kept up. This year, there have been good numbers of people every weekend in September. The lake level has stayed higher than it did last year. As of 9/29, Steve thinks the level is only down 4 to 5 feet. If the season was extended through September, the lake would still have a lot of visitors, but it would be a different group of people. The families with kids would be gone back to school and other activities. The September users would be older people, sailors, and locals.

Steve confirmed that the primary activities are fishing and sailing. He said that there is a little more skiing and pwc use, but not significant. The numbers of users in those activities are going up compared to years when that equipment was less common (fewer people owned ski boats or pwc).

2) What recreation activities take place at the reservoir during the spring and fall seasons?

Spring (April 1-Memorial Day):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners

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- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

Fall (Labor Day – October 31):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each spring and fall recreation activity at the reservoir, by season. (1=highest use, 2=second highest use, etc.)

[See comments above regarding extending season into September.](#)

- 3) What recreation activities take place at the reservoir during the winter season (November 1 – March 31)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each winter recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

- 4) What are the associated support facilities for each of the activities by season?

- Boat launch ramps
- Parking lots
- Marinas
- Docks
- Restrooms
- Others: _____

- 5) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting the designed and functional use of the support facilities for each activity at the reservoir? Factors to be considered include: support facility condition, length of boat launch ramp, distance to parking, water depth, etc.

- a) List other influential factors and estimate their relative importance in affecting facility use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

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- 6) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting recreational use for each of the activities discussed, by season? Factors to be considered include: condition of shoreline, aesthetics, navigational hazards, reservoir size (surface area).
- a) List other influential factors and estimate their relative importance in affecting recreation use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

Q 5&6:

Steve agreed with the prior data collected on Huntington critical lake levels. His business is not as closely related to lake levels in terms of giving him confidence in identifying threshold elevations. But he is aware that the lake is the draw for visitors, and business is better when the lake is higher.

Steve also noted that while a full pool is good for all the uses, letting the water down about 1 foot is good for the regattas because it creates a little more beach to use and to pull boats up to.

- 7) What factors, other than water surface elevation and support facility function, influence the use of the reservoir for the recreation activities listed above (i.e., draw down, season, etc.)?

The season is an important factor driving recreation use. The lake level and the main season peak during the same period (June-August), so it is difficult to separate the influence of the two factors.

- 8) Are you aware of any reservoir operation constraints (ex. minimum/maximum pool elevations, etc.) that influence water surface elevation and, therefore, recreation activities?

There is an operational mandate to provide recreation opportunities during the summer season. That is why the lake stays high during the summer and begins to drop after Labor Day (in addition to water supply and power production considerations).

- 9) Are you aware of any conflicts related to water surface elevation influences between participants of different recreation activities on the reservoir?

Sailboats cut across and clip trolling lines and aggravate anglers. Steve tells the anglers to slow down or stop when a sailboat is approaching. Then their line will sink and the sailboat won't clip it. The sailboats can easily navigate around the anglers, but they think they need to speed up and get out of the way. That is why their lines are always getting cut.

When the lake is down and there is less surface area, conflicts between these users will increase. They are competing for less space and there are fewer areas for anglers to hide back out of the way.

More important than the conflicts is the danger associated with low lake levels (there really aren't a lot of conflicts on Huntington). There are a lot of hazard rocks near the water surface. A slight drop in the lake can make these very dangerous. Huntington has shallow sloped banks, not steep walls. Races would still go on at low levels, but getting near the shores is very dangerous.

- 10) Would you like to recommend any other individuals or organizations to be contacted to contribute to this study?

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Glossary

Maximum Acceptable Water Surface Elevation:

The **highest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Minimum Acceptable Water Surface Elevation:

The **lowest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Maximum Optimal Water Surface Elevation:

The **highest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Optimal Water Surface Elevation:

The **lowest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Useable Water Surface Elevation:

The **lowest stage** at which you predict that **10% or less** of the users would be willing to recreate on the reservoir.

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Final Water Surface Elevation Study Consultation Questions

Southern California Edison and the Big Creek Collaborative are conducting consultation interviews with resource agencies, reservoir recreational concessionaires, and user groups to evaluate the effect of water surface elevation on recreational activities and support facilities at each reservoir. Your responses to the interview questions will assist in the development of use-stage-curve graphs to represent recreational use, by activity type, at various water surface elevations. The results of the REC-15 Reservoir Recreation Water-Surface Elevation Study will help determine future recreation conditions for the Big Creek Hydroelectric System.

Date: 9/23/03 Interviewer(s): Tim Blewett and Dave Martinez

Person(s) interviewed: Maureen Barile (HLA, Huntington Lake Historical Society), Fred Ilchert (Fresno Yacht Club), Frank Hoke (HLA), Toby Horst (SAMS, Resource Conservation District)

Affiliation: see above

Phone number: see contact list

Reservoir discussed: Huntington Lake (complete separate interview for each reservoir)

1) What recreation activities take place at the reservoir during the summer season (Memorial Day through Labor Day)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- House boat/ Pontoon boat
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

a) Rank the relative use of each summer recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

The primary season is Memorial Day to Labor Day. The primary activities are fishing and sailing. Another important factor is just enjoying the aesthetics of the area. Non-motor boating (kayaks) is increasing.

2) What recreation activities take place at the reservoir during the spring and fall seasons?

Spring (April 1-Memorial Day):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

Fall (Labor Day – October 31):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing

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- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each spring and fall recreation activity at the reservoir, by season. (1=highest use, 2=second highest use, etc.)

Shoulder season (spring and fall) use is mainly anglers. Many anglers are out to catch big fish during the shoulder seasons. Sailing is dependent on being able to get in and launch the boat. If that is possible during the shoulder season, sailboats will be there.

- 3) What recreation activities take place at the reservoir during the winter season (November 1 – March 31)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each winter recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

Winter use is best when the water is lowest. Snowmobile, cross-country skiing, and snowshoeing are the primary uses.

- 4) What are the associated support facilities for each of the activities by season?

- Boat launch ramps
- Parking lots
- Marinas
- Docks
- Restrooms
- Others: _____

- 5) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting the designed and functional use of the support facilities for each activity at the reservoir? Factors to be considered include: support facility condition, length of boat launch ramp, distance to parking, water depth, etc.

- a) List other influential factors and estimate their relative importance in affecting facility use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

- 6) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting recreational use for each of the activities discussed, by season? Factors to be considered include: condition of shoreline, aesthetics, navigational hazards, reservoir size (surface area).

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- a) List other influential factors and estimate their relative importance in affecting recreation use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

Response to 5&6:

Full pool is good for all activities.

6-feet of draw down is very limiting for boat based recreation. Most docks are in rocky areas. With 6' draw down, some private docks get hung up on rocks.

This week (9/23/03), the lake is down about 3-4'. If you had a full keel sailboat, it would take some work to get it out (at 4' draw down). The general rule is that you pull boats out by the end of September. Any time after Labor Day, people with boats in the water need to check lake levels regularly.

More hazards appear in the lake at 6' draw down. Huntington does not have a buoy system to warn of hazards. The yacht club puts in racing buoys to identify the course for the regattas but many people mistake these as identifying safe navigation areas.

Lose 80% of the sailboat use with a 4-6' lake level drop. At 4' down, some docks start to hit sand even for motor boats.

Boat fishing is less sensitive to the lake level. Some people will still drive their boats down the shore to launch even when the ramp is out. These tend to be the smaller boats, not many big bass boats. Small boats are easier to launch at the low levels.

Tree stumps in the lake are a hazard. Some areas of the lake were logged when storage had already begun, so at certain lake levels there are 20-30' stumps that are near the water surface.

- 7) What factors, other than water surface elevation and support facility function, influence the use of the reservoir for the recreation activities listed above (i.e., draw down, season, etc.)?

There is a limit of 150 boats per weekend during the regattas. There are about 10 regatta weekends per year.

Huntington can have different weather conditions at different areas of the lake because of the wind patterns. See answer to #9.

The aesthetics of the lake and the surrounding environment are an influential factor in choosing to recreate at Huntington.

- 8) Are you aware of any reservoir operation constraints (ex. minimum/maximum pool elevations, etc.) that influence water surface elevation and, therefore, recreation activities?

- 9) Are you aware of any conflicts related to water surface elevation influences between participants of different recreation activities on the reservoir?

There are no conflicts among users when the lake level is in the full to 4' down range. The winds are better at the east side of the lake, so the sailboats naturally stay at that side and the motorboats stay toward the west side.

Conflicts may occur at boat ramps when pulling out sailboats and powerboats are waiting. Sometimes it can be difficult to properly line the sailboat up on the trailer.

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10) Would you like to recommend any other individuals or organizations to be contacted to contribute to this study?

Other comments:

The HLA/Historical Society position is to see the lake levels remain how they have been historically to provide opportunity for the historical activities (fishing and sailing).

Millerton Lake is the Fresno Yacht Club's home lake. There has been some talk of making Huntington the home lake. This would mean that the club would start sailing there earlier in the year and stay later, given adequate lake levels.

There are more powerboats now at Huntington. New carburetors can self-adjust for the altitude.

The summer water temperature at Huntington is about 60 degrees. If a racer tips his sailboat and can't right it in 5 minutes, the Forest Service rule is that they must be rescued because of risk of hypothermia.

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Glossary

Maximum Acceptable Water Surface Elevation:

The **highest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Minimum Acceptable Water Surface Elevation:

The **lowest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Maximum Optimal Water Surface Elevation:

The **highest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Optimal Water Surface Elevation:

The **lowest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Useable Water Surface Elevation:

The **lowest stage** at which you predict that **10% or less** of the users would be willing to recreate on the reservoir.

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Final Water Surface Elevation Study Consultation Questions

Southern California Edison and the Big Creek Collaborative are conducting consultation interviews with resource agencies, reservoir recreational concessionaires, and user groups to evaluate the effect of water surface elevation on recreational activities and support facilities at each reservoir. Your responses to the interview questions will assist in the development of use-stage-curve graphs to represent recreational use, by activity type, at various water surface elevations. The results of the REC-15 Reservoir Recreation Water-Surface Elevation Study will help determine future recreation conditions for the Big Creek Hydroelectric System.

Date: 9/23/03 Interviewer(s): Tim Blewett and Dave Martinez

Person(s) interviewed: Retha Gomez and Toby Horst

Affiliation: USFS (Retha) and SAMS/Resource Conservation District (Toby)

Phone number: see contact list

Reservoir discussed: Florence (complete separate interview for each reservoir)

1) What recreation activities take place at the reservoir during the summer season (Memorial Day through Labor Day)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- House boat/ Pontoon boat
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

a) Rank the relative use of each summer recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

The peak water elevation is reached around the end of June or early July. The main recreation season is from approximately July 1st to Labor Day. A few anglers will wait at the gate on Kaiser Pass Road the day the road opens to get into the back country.

The primary user group is wilderness hikers. About 80% hikers to 20% anglers. Florence is a base point for access into several hiking areas. This is a major trailhead for renowned hiking destinations.

There is dispersed boat camping at the south end of the lake.

Most of the fishing from Jackass Campground users (60-80%) is in the river, not the lake.

2) What recreation activities take place at the reservoir during the spring and fall seasons?

Spring (April 1-Memorial Day):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

Fall (Labor Day – October 31):

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- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each spring and fall recreation activity at the reservoir, by season. (1=highest use, 2=second highest use, etc.)

There is very little, if any, use in the spring because the road doesn't open until mid-May. There is some use in the fall, use type doesn't change.

- 3) What recreation activities take place at the reservoir during the winter season (November 1 – March 31)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each winter recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

- 4) What are the associated support facilities for each of the activities by season?

- Boat launch ramps
- Parking lots
- Marinas
- Docks
- Restrooms
- Others: _____

- 5) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting the designed and functional use of the support facilities for each activity at the reservoir? Factors to be considered include: support facility condition, length of boat launch ramp, distance to parking, water depth, etc.

- a) List other influential factors and estimate their relative importance in affecting facility use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

- 6) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting recreational use for each of the activities discussed, by season? Factors to be considered include: condition of shoreline, aesthetics, navigational hazards, reservoir size (surface area).

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- a) List other influential factors and estimate their relative importance in affecting recreation use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

Q 5&6:

The ferry is critical to hiking use (see #7). The ferry can't run when the water becomes so low that Florence becomes 2 lakes. This happens somewhere a little under 19% capacity. At 19%, it is still one lake, though the ferry dock at the north end is a long walk from the store. At 19% lake capacity, 80% of the users will still use the area.

Boat ramp condition does not deter any anglers from launching their boats.

The limiting factor for recreation at Florence Lake is the road in (Kaiser Pass Rd.). Some people won't drive it. The road is getting worse, but there are still a lot of people in the backcountry.

- 7) What factors, other than water surface elevation and support facility function, influence the use of the reservoir for the recreation activities listed above (i.e., draw down, season, etc.)?

The ferry is critical to the hiking use. Hikers will not walk around the lake if the ferry is running. The hike around the lake is over unshaded rock. It can be a very hot hike in the summer. This is unlike Lake Edison where most of the hike around the lake is through forest.

Kaiser Pass Road condition (see above)

Season (road closure)

- 8) Are you aware of any reservoir operation constraints (ex. minimum/maximum pool elevations, etc.) that influence water surface elevation and, therefore, recreation activities?

- 9) Are you aware of any conflicts related to water surface elevation influences between participants of different recreation activities on the reservoir?

There are very few conflicts between users at Florence, and in the backcountry in general. A different type of user ventures back to these areas. Most have a friendlier attitude. Once in a while someone brings a powerboat to the area and that can cause a conflict.

- 10) Would you like to recommend any other individuals or organizations to be contacted to contribute to this study?

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Glossary

Maximum Acceptable Water Surface Elevation:

The **highest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Minimum Acceptable Water Surface Elevation:

The **lowest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Maximum Optimal Water Surface Elevation:

The **highest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Optimal Water Surface Elevation:

The **lowest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Useable Water Surface Elevation:

The **lowest stage** at which you predict that **10% or less** of the users would be willing to recreate on the reservoir.

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Final Water Surface Elevation Study Consultation Questions

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Date: 9/23/03 Interviewer(s): Tim Blewett and Dave Martinez

Person(s) interviewed: Retha Gomez and Toby Horst

Affiliation: USFS (Retha) and SAMS/Resource Conservation District (Toby)

Phone number: see contact list

Reservoir discussed: Lake Edison (complete separate interview for each reservoir)

1) What recreation activities take place at the reservoir during the summer season (Memorial Day through Labor Day)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- House boat/ Pontoon boat
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

a) Rank the relative use of each summer recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

The peak water elevation is reached around the end of June or early July. The main recreation season is from approximately July 1st to Labor Day. A few anglers will wait at the gate on Kaiser Pass Road the day the road opens to get into the backcountry.

The main uses at Lake Edison are fishing and wilderness hiking. Most of these users are also camping at the lake, but they are there to fish or hike as the primary activity. The hiking use seems to be growing, especially with hikers stopping over at Vermilion Valley Resort. The VVR is a main supply station for the John Muir Trail and hikers are now the main income source for VVR (speculated). Hiking use in the area seems to be growing.

The season for hiking use depends on the previous winter. Hikers can't get in to the area until they can get over some of the higher passes to the south.

The VVR ferry is rarely used for fisherman, mainly hikers.

2) What recreation activities take place at the reservoir during the spring and fall seasons?

Spring (April 1-Memorial Day):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing

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- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

Fall (Labor Day – October 31):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each spring and fall recreation activity at the reservoir, by season. (1=highest use, 2=second highest use, etc.)

There is very little, if any, use in the spring because the road doesn't open until mid-May. There is some use in the fall, use type doesn't change.

- 3) What recreation activities take place at the reservoir during the winter season (November 1 – March 31)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each winter recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

- 4) What are the associated support facilities for each of the activities by season?

- Boat launch ramps
- Parking lots
- Marinas
- Docks
- Restrooms
- Others: _____

- 5) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting the designed and functional use of the support facilities for each activity at the reservoir? Factors to be considered include: support facility condition, length of boat launch ramp, distance to parking, water depth, etc.

- a) List other influential factors and estimate their relative importance in affecting facility use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

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- 6) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting recreational use for each of the activities discussed, by season? Factors to be considered include: condition of shoreline, aesthetics, navigational hazards, reservoir size (surface area).
- a) List other influential factors and estimate their relative importance in affecting recreation use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

Q 5&6:

The critical lake level is when the ferry can travel from the resort to the other end of the lake (all the way to the resort). At 38% capacity (per the photos), the lake is too low for the ferry to reach VVR. The lake needs to be about 10' higher to navigate Boggy channel. Probably needs to be about 60% capacity to navigate the channel. Any level higher than that is good.

Fishing still occurs below 38% lake capacity. Some think that the fishing actually improves because the fish are concentrated in a smaller pool. Anglers will fish in the minimum pool (about 17,000 ac-ft). There are less fishermen because it requires more effort, but you would not lose 50% of the anglers at minimum pool.

A low lake level does not seem to affect any family camping (non-fishing) users either.

At 10-12' above 38% capacity, the campground is more attractive. Water line is closer to the campground. Needs to be a little higher than 60% capacity for the best campground level.

At 80% capacity, the level is good for the campground and all uses. Part of the attraction of the vermilion campground is the beach. There is a nice beach with a good view and warm water (because of shallow depth) when the water is up.

Aesthetics of draw down does not seem to affect the Lake Edison users.

They are not affected by the water dropping below the ramp, either. Boats can still be launched from lakebed beyond ramp.

The limiting factor for recreation at Lake Edison is the road in (Kaiser Pass Rd.). Some people won't drive it. The road is getting worse, but there are still a lot of people in the backcountry.

- 7) What factors, other than water surface elevation and support facility function, influence the use of the reservoir for the recreation activities listed above (i.e., draw down, season, etc.)?

Kaiser Pass Road condition (see above)

Season (road closure)

Ferry operation

- 8) Are you aware of any reservoir operation constraints (ex. minimum/maximum pool elevations, etc.) that influence water surface elevation and, therefore, recreation activities?

- 9) Are you aware of any conflicts related to water surface elevation influences between participants of different recreation activities on the reservoir?

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There are very few conflicts between users at Lake Edison, and in the backcountry in general. A different type of user ventures back to these areas. Most have a friendlier attitude. Once in a while someone brings a powerboat to the area and that can cause a conflict.

- 10) Would you like to recommend any other individuals or organizations to be contacted to contribute to this study?

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Final Water Surface Elevation Study Consultation Questions

Glossary

Maximum Acceptable Water Surface Elevation:

The **highest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Minimum Acceptable Water Surface Elevation:

The **lowest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Maximum Optimal Water Surface Elevation:

The **highest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Optimal Water Surface Elevation:

The **lowest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Useable Water Surface Elevation:

The **lowest stage** at which you predict that **10% or less** of the users would be willing to recreate on the reservoir.

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Southern California Edison and the Big Creek Collaborative are conducting consultation interviews with resource agencies, reservoir recreational concessionaires, and user groups to evaluate the effect of water surface elevation on recreational activities and support facilities at each reservoir. Your responses to the interview questions will assist in the development of use-stage-curve graphs to represent recreational use, by activity type, at various water surface elevations. The results of the REC-15 Reservoir Recreation Water-Surface Elevation Study will help determine future recreation conditions for the Big Creek Hydroelectric System.

Date: 9/23/03 Interviewer(s): Tim Blewett and Dave Martinez

Person(s) interviewed: Mike LeFevre

Affiliation: USFS

Phone number: 559-877-2218 x3125

Reservoir discussed: Mammoth Pool (complete separate interview for each reservoir)

1) What recreation activities take place at the reservoir during the summer season (Memorial Day through Labor Day)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- House boat/ Pontoon boat
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

a) Rank the relative use of each summer recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

The dominant use at Mammoth is water skiing. The second biggest use is fishing. Shoreline use is related to the two main activities. Few people come to the lake who are not skiing or fishing during their trip. Many visitors do both.

The main season starts June 16th, after the deer closure (see #7). Water skiing stops mid-August (school starts in late August for most kids now). The lake level is starting to drop by then, too.

Personal water craft use is starting to grow. Wind sports are not too common.

Dispersed camping is allowed anywhere around the lake with a campfire permit. The China Bar boat-in campground is popular, too.

2) What recreation activities take place at the reservoir during the spring and fall seasons?

Spring (April 1-Memorial Day):

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

Fall (Labor Day – October 31):

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- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each spring and fall recreation activity at the reservoir, by season. (1=highest use, 2=second highest use, etc.)

The weekend prior to May 1st is the opening of fishing season. There is usually heavy use during that weekend, then starting May 1st the reservoir is closed to fishing (see #7).

The fall gets a fair amount of fishing use.

There is no skiing in spring and fall (see speed regulation in #7).

- 3) What recreation activities take place at the reservoir during the winter season (November 1 – March 31)?

- Shore Fishing
- Boat Fishing (Car-top launch Ramp launch)
- Water Skiing
- Jet ski/wave runners
- Sailing
- Non-motorized boat (canoe, kayak, rowboat)
- Beach use (picnicking, swimming, water play)

- a) Rank the relative use of each winter recreation activity at the reservoir. (1=highest use, 2=second highest use, etc.)

There is always someone fishing at Mammoth as long as the road is open at mile high vista.

- 4) What are the associated support facilities for each of the activities by season?

- Boat launch ramps
- Parking lots
- Marinas
- Docks
- Restrooms
- Others: _____

There are no docks or marinas. Most boats are pulled each night if camping at the campground and brought back to the campsite.

- 5) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting the designed and functional use of the support facilities for each activity at the reservoir? Factors to be considered include: support facility condition, length of boat launch ramp, distance to parking, water depth, etc.

- a) List other influential factors and estimate their relative importance in affecting facility use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

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6) What is the determining factor in establishing water surface elevation thresholds (maximum acceptable, minimum acceptable maximum optimal, minimum optimal, and minimum useable) affecting recreational use for each of the activities discussed, by season? Factors to be considered include: condition of shoreline, aesthetics, navigational hazards, reservoir size (surface area).

a) List other influential factors and estimate their relative importance in affecting recreation use relative to water surface elevation. (1=highest importance, 2=second highest, etc.)

Q 5&6:

Anglers fish the lake when the level is down. The fish are concentrated and the other uses are gone.

There is no problem with full pool for either use (skiing or fishing). Full pool may be a little less attractive for anglers who like to fish the inlets.

When the lake is about half way down the ramp, many hazards appear and the skiers leave.

50% lake capacity is needed for skiers to launch boats from the paved ramp. Hazards are probably exposed at that level and skiers wouldn't use it anyway, even if the ramp was extended. 60-70% is good for skiers, the lake is above the hazards. 75% of skier use would drop out if the lake level went below that point.

When the water is below the paved ramp, anglers will launch by car top or use the windy point ramp.

Angling use stays consistent throughout the main season. But as a preference, fishing improves when the level drops and the skiers leave.

A good level for dispersed camping around the lake is from 55-90% lake capacity. A variety of beaches open and close at changing water levels. Full pool would eliminate this use, and lower than 55% would create too much of a hike up the lakebed.

There is no minimum lake level for fishing.

7) What factors, other than water surface elevation and support facility function, influence the use of the reservoir for the recreation activities listed above (i.e., draw down, season, etc.)?

There is a closure for deer migration from May 1st to June 15th. The reservoir is closed to vehicles and closed to fishing. Technically, there is no restriction on boats if someone were to carry one in.

There is a speed regulation on the lake that influences the use. From July 1st to September 10th, there is no speed limit. Outside that season, the speed limit is 20 mph. The sheriff patrols the lake infrequently.

The road is not plowed over mile high vista. Snowfall may close access to the lake.

The daily wind patterns at Mammoth may deter users.

8) Are you aware of any reservoir operation constraints (ex. minimum/maximum pool elevations, etc.) that influence water surface elevation and, therefore, recreation activities?

Southern California Edison
Big Creek Alternative Licensing Process
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- 9) Are you aware of any conflicts related to water surface elevation influences between participants of different recreation activities on the reservoir?

Conflicts between users are infrequent. There is always some skier/angler conflict, at any lake level. It is not a big issue at Mammoth.

- 10) Would you like to recommend any other individuals or organizations to be contacted to contribute to this study?

Phil Bartholomew – Fish and Game biologist 559-683-7219

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Glossary

Maximum Acceptable Water Surface Elevation:

The **highest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Minimum Acceptable Water Surface Elevation:

The **lowest stage** at which you predict that **50%** of the users would be willing to recreate on the reservoir.

Maximum Optimal Water Surface Elevation:

The **highest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Optimal Water Surface Elevation:

The **lowest stage** at which you predict that **90%** of the users would be willing to recreate on the reservoir.

Minimum Useable Water Surface Elevation:

The **lowest stage** at which you predict that **10% or less** of the users would be willing to recreate on the reservoir.

APPENDIX B

Photo-Documentation of Reservoir Water Surface Elevations

Appendix B
Photo-Documentation of Florence Lake USDA-FS Boat Ramp
and Ferry Dock



Florence Lake, looking NE from work camp access road. Visible facilities, store, boat ramp, ferry dock and dam. July 18, 2002, Reservoir 77.1% full.



Florence Lake, looking at dam and Florence Lake Ferry Dock from work camp access road. September 4, 2002, Reservoir 31.1% full.

Appendix B
Photo-Documentation of Florence Lake USDA-FS Boat Ramp
and Ferry Dock



Florence Lake Ferry Dock
September 4, 2002, Reservoir 31.1% full.



Florence Lake, looking east at dam, ferry dock and USDA-FS Boat Launch from work camp
access road. September 23, 2002, Reservoir 19.1% full.

Appendix B
Photo-Documentation of Florence Lake USDA-FS Boat Ramp
and Ferry Dock



**End of uniformly sloped low-water USDA-FS Boat Ramp road, Florence Dam and spillway
in background. October 29, 2002, Reservoir ~2% full.**

Appendix B
Photo-Documentation of Huntington Lake Boat Ramps



Huntington Lake Resort Boat Ramp
October 1, 2001, Reservoir 89.3% full

Appendix B
Photo-Documentation of Huntington Lake Boat Ramps



Rancheria Marina Boat Docks
October 1, 2001, Reservoir 89.3% full



USDA-FS Boat Ramp
October 1, 2001, Reservoir 89.3% full

Appendix B
Photo-Documentation of Huntington Lake Boat Ramps



USDA-FS Boat Ramp
July 2, 2002 Reservoir 95% full



Huntington Lake Boat Ramp, looking south
July 2, 2002 Reservoir 95% full

Appendix B
Photo-Documentation of Huntington Lake Boat Ramps



Shoreline East of USDA-FS Boat Ramp
September 17, 2002, Reservoir 87.1% full



Huntington Lake Boat Ramp looking south
October 9, 2002, Reservoir 77.5% full

Appendix B
Photo-Documentation of Huntington Lake Boat Ramps



Boat dock at Rancheria Marina, looking east
October 9, 2002, Reservoir 77.5% full



Boat Ramp at Huntington Lake Resort looking south
October 9, 2002, Reservoir 77.5% full

**Appendix B
Photo-Documentation of Huntington Lake Boat Ramps**



**Boat Ramp and Docks at Huntington Lake Resort
October 29, 2002, Reservoir 68.5% full**



**Huntington Lake Boat Ramp looking south
October 29, 2002, Reservoir 68.5% full**



**Huntington Lake from USDA-FS Boat Ramp
March 30, 2003, Reservoir 44% full**



Huntington Lake from USDA-FS Boat Ramp
May 21, 2003, Reservoir 44% full



Huntington Lake from Rancheria Campground
May 21, 2003, Reservoir 72% full

Appendix B
Photo-Documentation of Mammoth Pool Reservoir Boat Ramps



Mammoth Pool Reservoir Boat Ramp
October 4, 2001, Reservoir 21% full



Mammoth Pool Reservoir, Dam and Windy Point Boat Ramp
October 4, 2001, Reservoir 21% full

Appendix B
Photo-Documentation of Mammoth Pool Reservoir Boat Ramps



Mammoth Pool Reservoir Boat Ramp, looking S-SW
July 15, 2002, Reservoir 90.2% full



Mammoth Pool Reservoir shoreline near Windy Point picnic area, looking SE
July 15, 2002, Reservoir 90.2% full

Appendix B
Photo-Documentation of Mammoth Pool Reservoir Boat Ramps



**Mammoth Pool Reservoir Boat Ramp, looking S-SW
August 29, 2002, Reservoir 54.7% full**



**Mammoth Pool Reservoir Windy Point area, looking SE
August 29, 2002, Reservoir 54.7% full**

Appendix B
Photo-Documentation of Mammoth Pool Reservoir Boat Ramps



**Mammoth Pool Reservoir Boat Ramp looking S-SW
September 16, 2002, Reservoir 41.4% full**



**Mammoth Pool Reservoir Windy Point area, looking SE
September 16, 2002, Reservoir 41.4% full**

Appendix B
Photo-Documentation of Mammoth Pool Reservoir Boat Ramps



**Mammoth Pool Reservoir Boat Ramp, looking south
October 28, 2002, Reservoir 18.2% full**



**Mammoth Pool Reservoir Windy Point Picnic area looking SE and Mammoth Pool Windy
Point Boat Ramp looking SE
October 28, 2002, Reservoir 18.2% full**

Appendix B
Photo-Documentation of Mammoth Pool Reservoir Boat Ramps



Mammoth Pool Reservoir, Windy Point Picnic Area
May 22, 2003, Reservoir 39% full

Appendix B
Photo Documentation of Shaver Lake Boat Ramps



Shaver Lake Marina Boat Ramp and Marina, Camp Edison
October 3, 2001, Reservoir 75.5% full



Sierra Marina Boat Ramp
October 3, 2001, Reservoir 75.5% full

Appendix B
Photo Documentation of Shaver Lake Boat Ramps



Sierra Marina Boat Ramp
September 4, 2002, Reservoir 81.3% full



Shaver Lake Marina, Camp Edison
September 4, 2002, Reservoir 81.3% full

Appendix B
Photo Documentation of Shaver Lake Boat Ramps



Shaver Lake Marina, Camp Edison, looking west
October 9, 2002, Reservoir 78.6% full



Shaver Lake Boat Ramp, Camp Edison, looking NW
October 9, 2002, Reservoir 78.6% full

Appendix B
Photo Documentation of Shaver Lake Boat Ramps



Sierra Marina Boat Ramp, looking south
October 9, 2002, Reservoir 78.6% full



Sierra Marina Boat Ramp
July 30, 2003, Reservoir 98.8% full

APPENDIX C

Reservoir Use and Water Surface Elevation Relationship Curves

Figure REC 15-C-1. Shaver Lake Recreational Use/Stage Relationship.

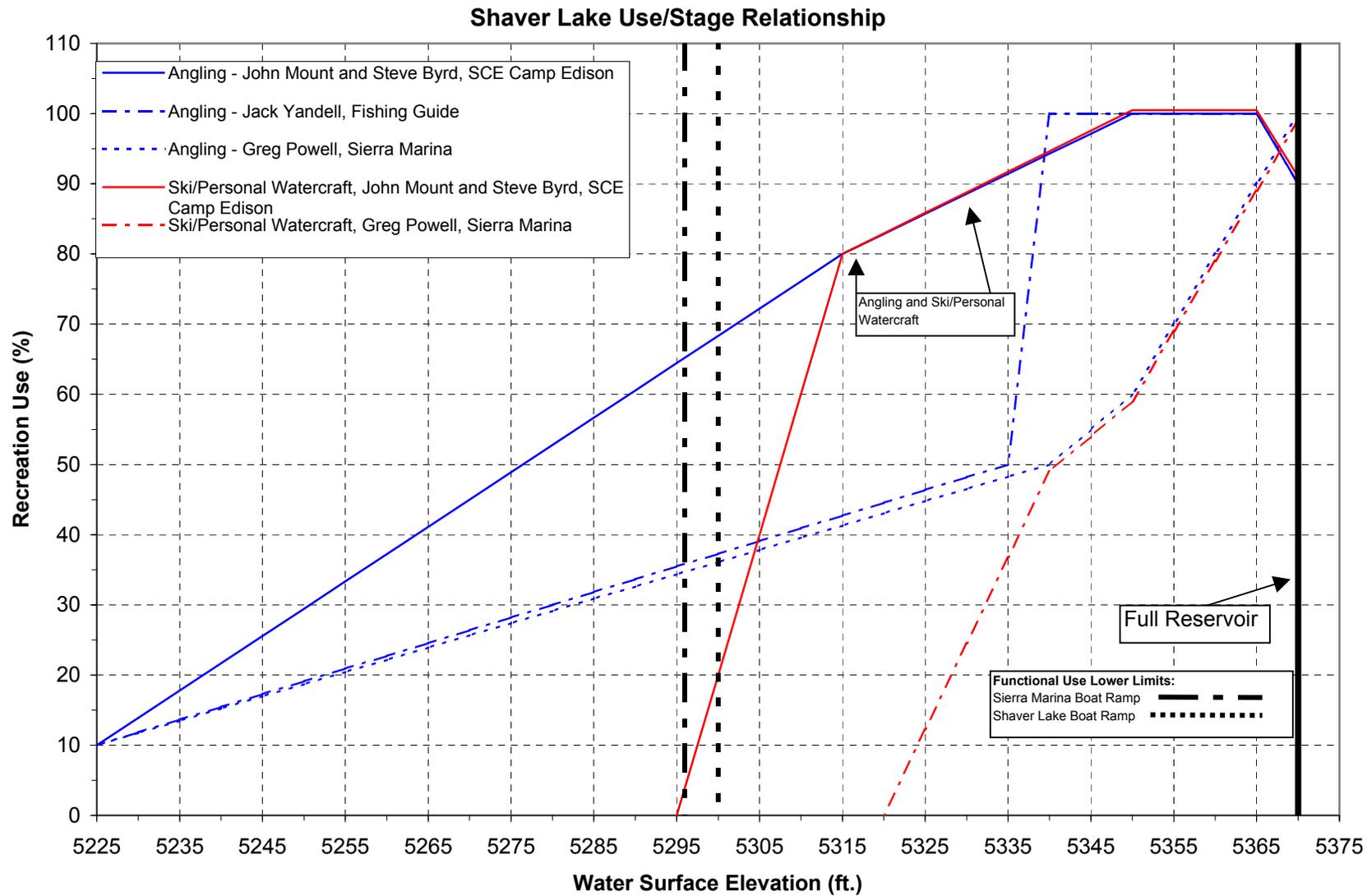


Figure REC 15-C-1. Shaver Lake Recreational Use/Stage Relationship.

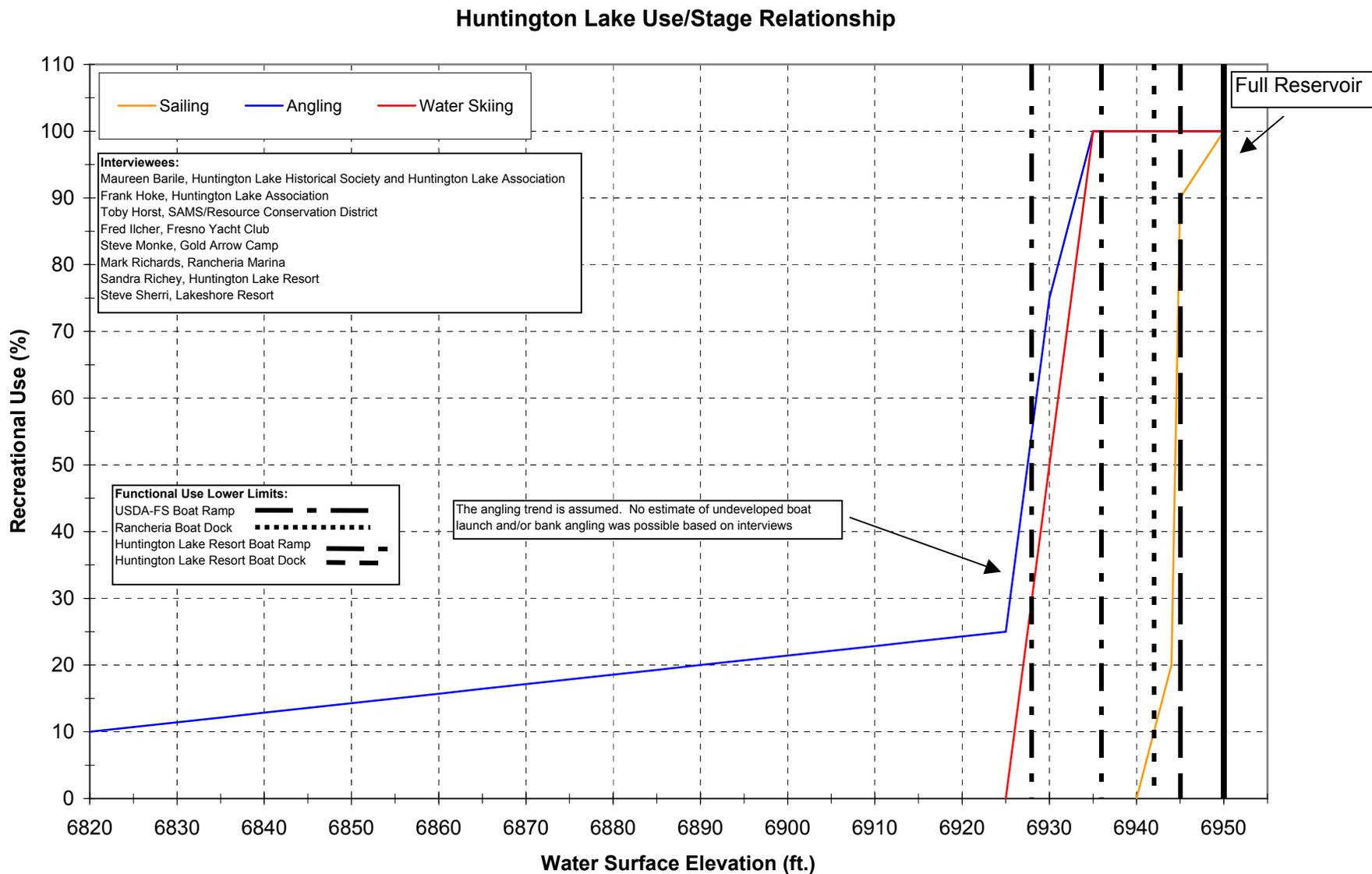


Figure REC 15-C-3. Florence Lake Recreational Use/Stage Relationship.

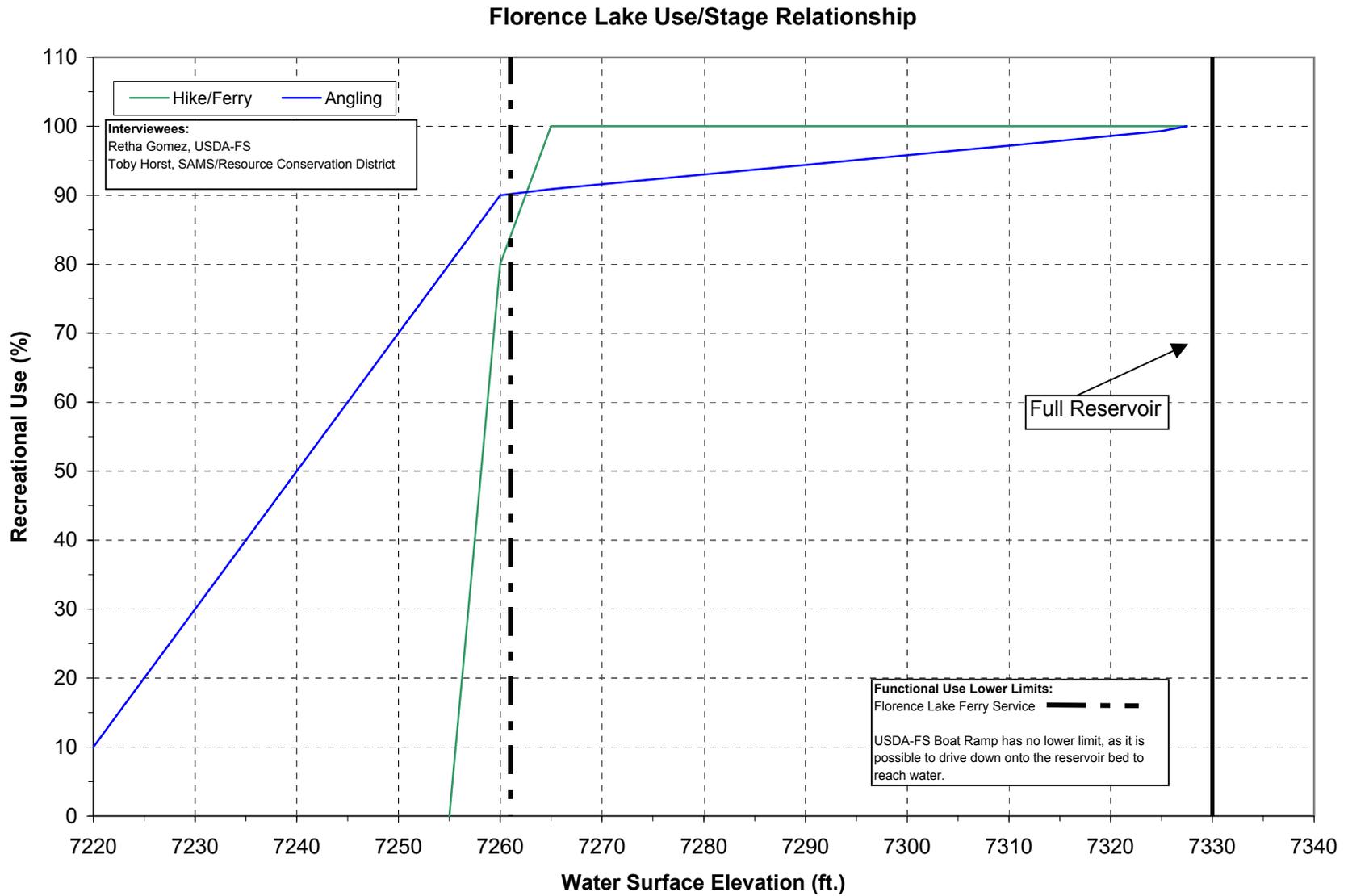
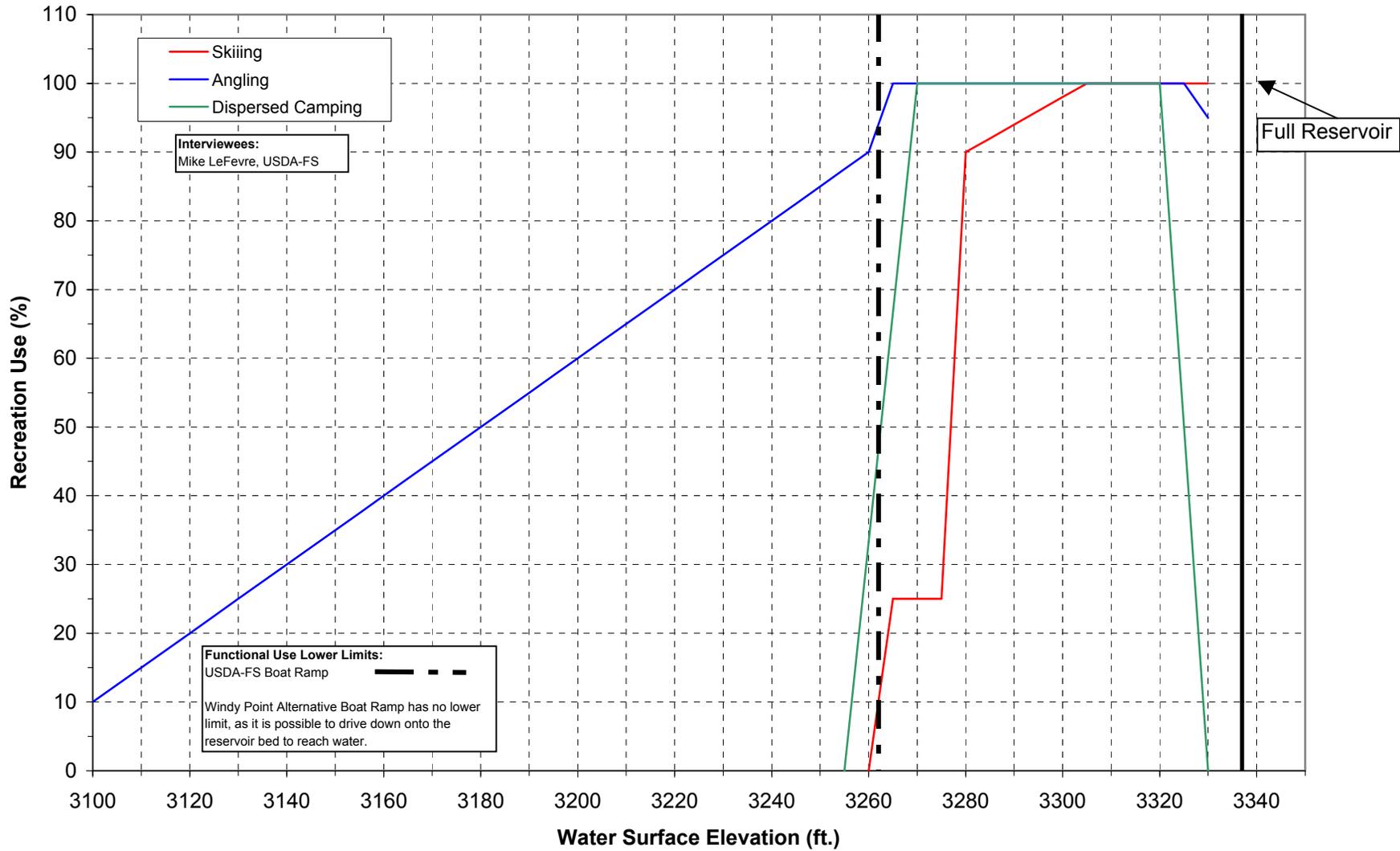


Figure REC 15-C-4. Florence Lake Recreational Use/Stage Relationship.

Mammoth Pool Use/Stage Relationship



APPENDIX D

Daily Reservoir Storage Levels in Relation to Designed Use and Functional Use Ranges of Recreation Facilities

Figure REC 15-D-1. Designed and Functional Uses of the Boat Ramps at Sierra Marina and Shaver Lake Marina at Shaver Lake in Relation to Reservoir Storage (1983-2002).

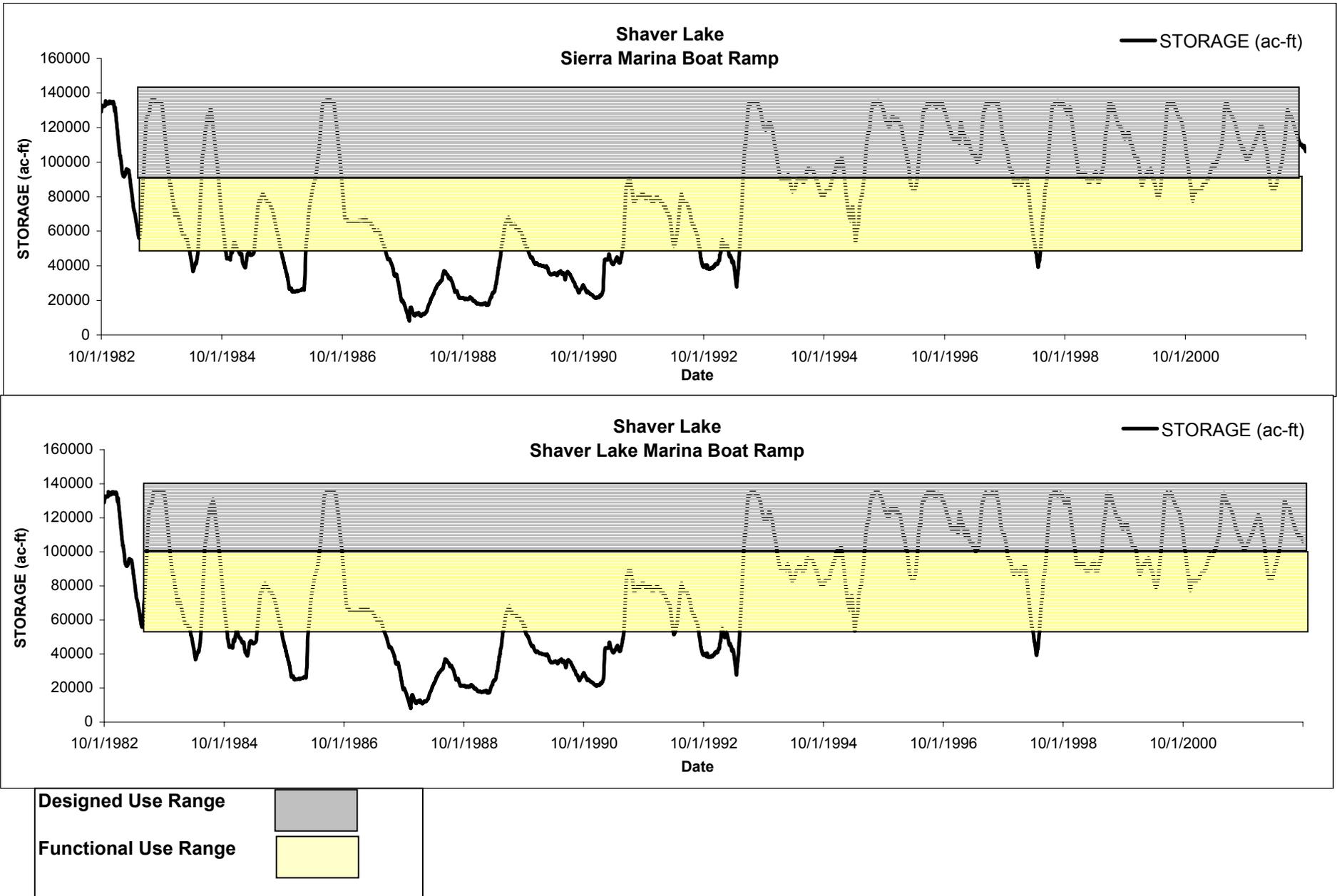


Figure REC 15-D-2. Designed and Functional Uses of the Boat Ramps and Marinas at Huntington Lake in Relation to Reservoir Storage (1983-2002).

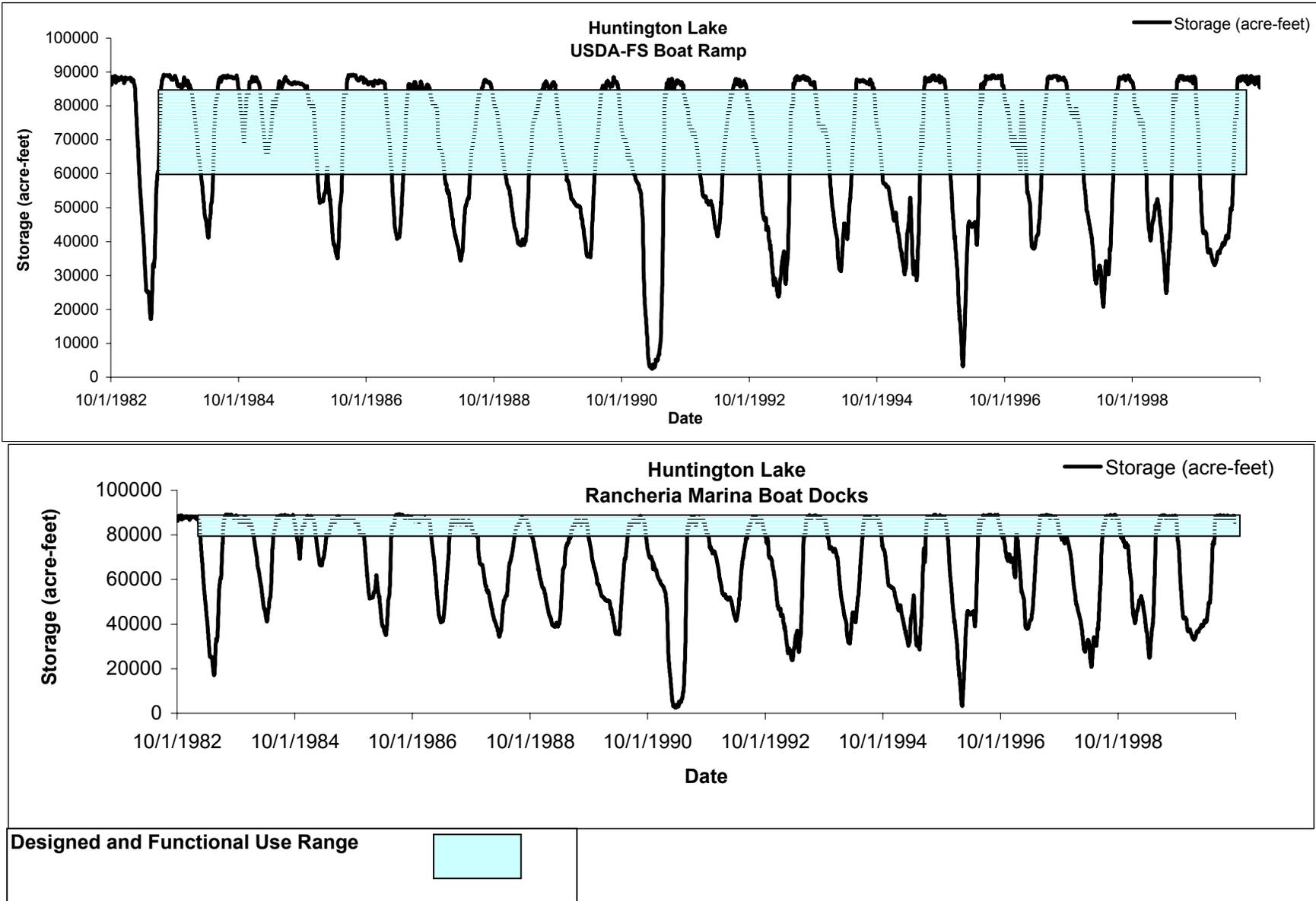


Figure REC 15-D-2. Designed and Functional Uses of the Boat Ramps and Marinas at Huntington Lake in Relation to Reservoir Storage (1983-2002).

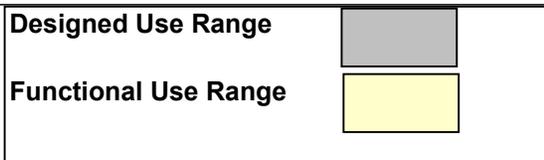
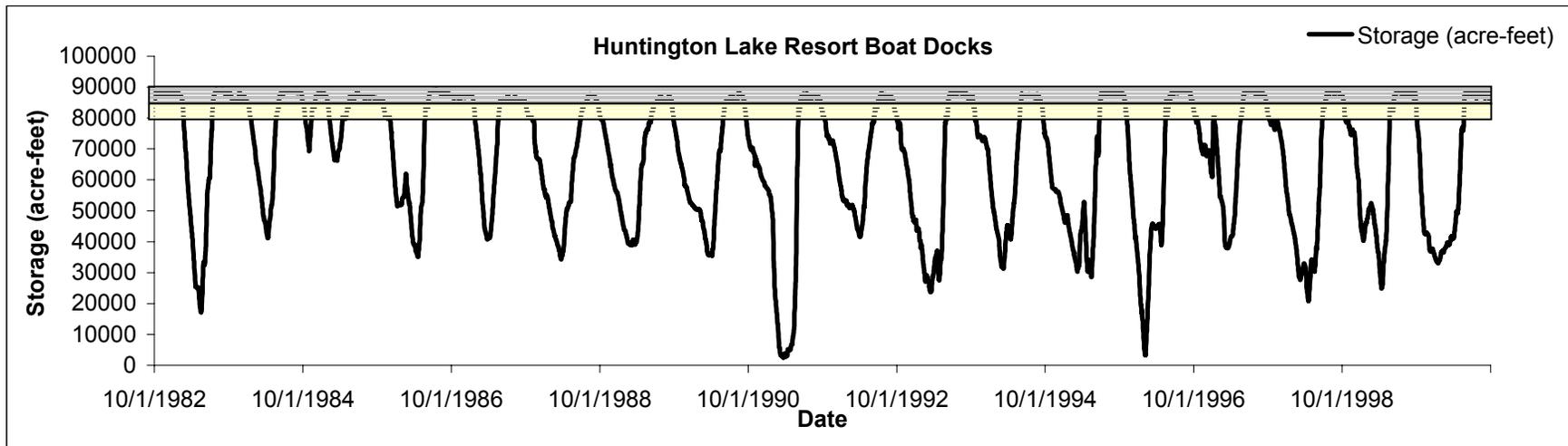
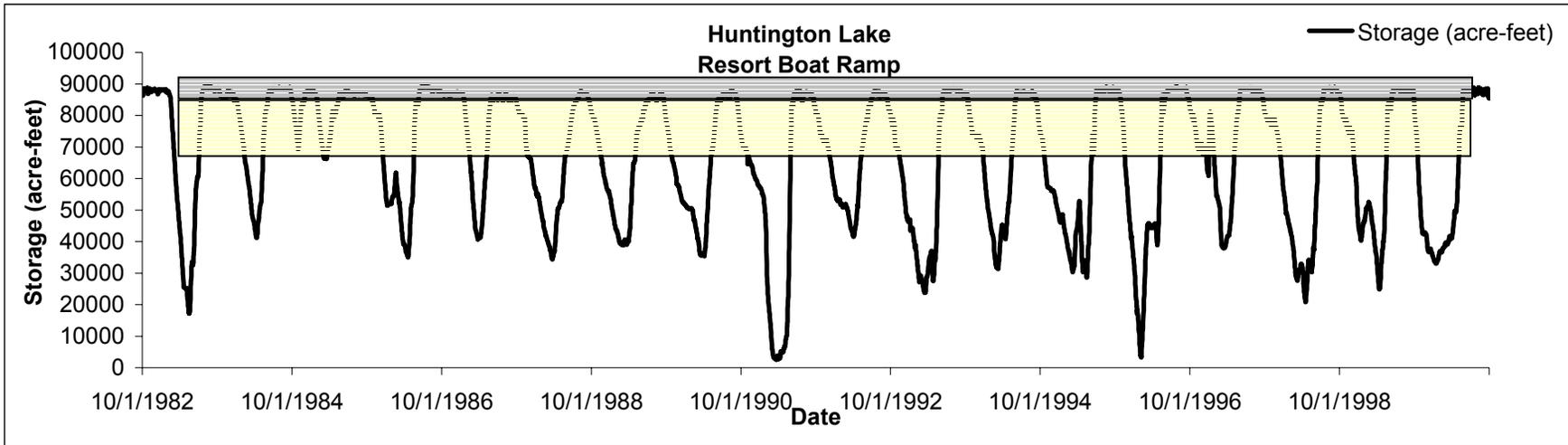


Figure REC 15-D-3. Designed and Functional Uses of the Boat Ramps and Ferry Service at Florence Lake in Relation to Reservoir Storage (1983-2002).

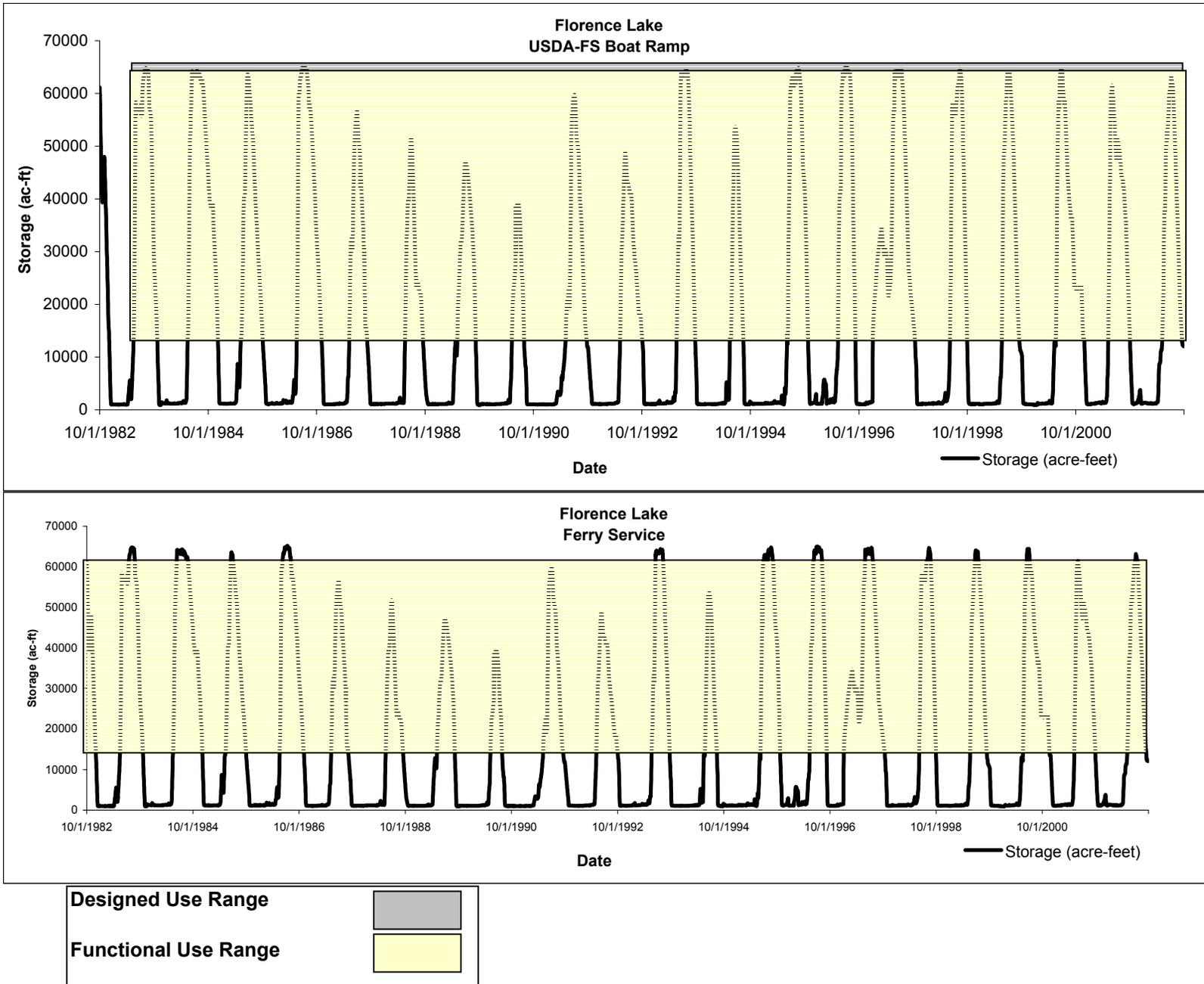
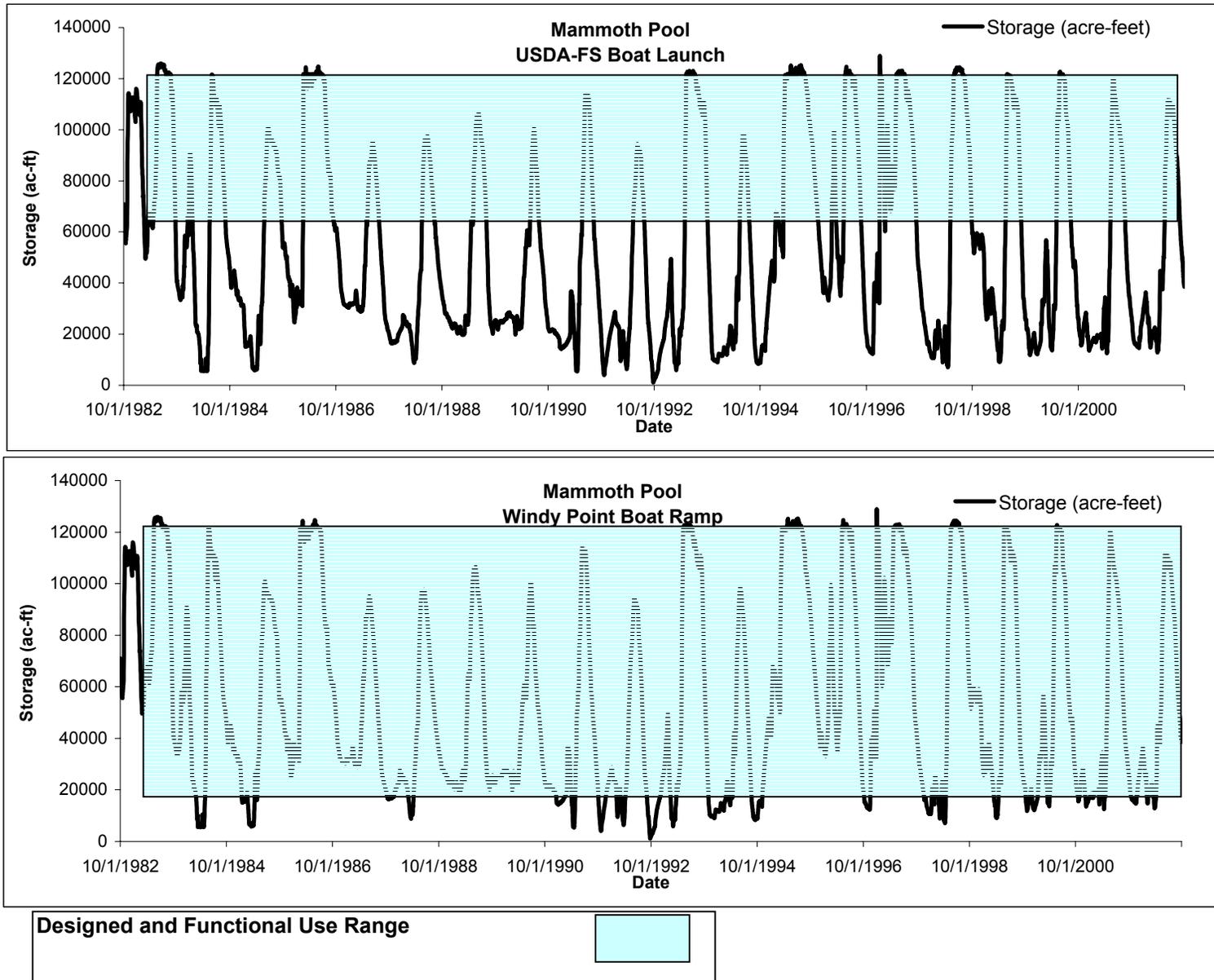


Figure REC 15-D-4. Designed and Functional Uses of the Boat Ramps at Mammoth Pool in Relation to Reservoir Storage (1983-2002).



APPENDIX E

Reservoir Water Surface Levels in Relation to the Designed Use and Functional Use Ranges of Recreation Facilities at Each Reservoir by Year

Appendix E. Percent of Time Reservoir Water Surface Levels are Within the Design Use and Functional Use Ranges of the Boat Ramps During the Primary Recreation Season from Memorial Day through Labor Day by Reservoir and Water-year Type for each Year between 1983 and 2002.

Reservoir	Water-year Type	Support Facility	% of Time WSE within Design Use	% of Time WSE within Functional Use		
Shaver Lake	Wet	Sierra Marina Boat Ramp	1983	100	100	
			1986	100	100	
			1993	100	100	
			1995	100	100	
			1996	100	100	
			1997	100	100	
			1998	100	100	
			1998	100	100	
		Shaver Lake Marina Boat Ramp	1983	89	100	
			1986	100	100	
	Above Normal	Sierra Marina Boat Ramp	1984	100	100	
			1999	100	100	
			2000	100	100	
			Shaver Lake Marina Boat Ramp	1984	100	100
				1999	100	100
				2000	100	100
		Dry	Sierra Marina Boat Ramp	1985	88	100
				2001	100	100
				2002	100	100
			Shaver Lake Marina Boat Ramp	1985	0	100
2001	100	100				
2002	100	100				
Critically Dry	Sierra Marina Boat Ramp	1987	0	100		
		1988	0	100		
		1989	12.6	100		
		1990	0	100		
		1991	91.3	100		
		1992	49	100		
		1994	1	100		

Appendix E. Percent of Time Reservoir Water Surface Levels are Within the Design Use and Functional Use Ranges of the Boat Ramps During the Primary Recreation Season from Memorial Day through Labor Day by Reservoir and Water-year Type for each Year between 1983 and 2002.

Reservoir	Water-year Type	Support Facility	% of Time WSE within Design Use	% of Time WSE within Functional Use
		Shaver Lake Marina Boat Ramp		
		1987	0	100
		1988	0	90.3
		1989	0	100
		1990	0	100
		1991	2	100
		1992	0	100
		1994	63.1	100
Huntington Lake	Wet	Rancheria Marina Boat Docks		
		1983	58	58
		1986	100	100
		1993	100	100
		1995	76	76
		1996	100	100
		1997	100	100
		1998	75	75
		USDA-FS Boat Ramp		
		1983	64	64
		1986	100	100
		1993	100	100
		1995	84	84
		1996	100	100
		1997	100	100
		1998	81	81
		Huntington Lake Resort Boat Ramp		
		1983	56	71
		1986	100	100
		1993	89	100
		1995	74	94
		1996	100	100
		1997	100	100
		1998	72	83
		Huntington Lake Boat Docks		
		1983	54	58
		1986	88	100
		1993	89	89
		1995	71	74
		1996	99	100
		1997	100	100
		1998	61	72

Appendix E. Percent of Time Reservoir Water Surface Levels are Within the Design Use and Functional Use Ranges of the Boat Ramps During the Primary Recreation Season from Memorial Day through Labor Day by Reservoir and Water-year Type for each Year between 1983 and 2002.

Reservoir	Water-year Type	Support Facility	% of Time WSE within Design Use	% of Time WSE within Functional Use
	Above Normal	Rancheria Marina Boat Docks		
		1984	100	100
		1999	100	100
		2000	100	100
		USDA-FS Boat Ramp		
		1984	100	100
		1999	100	100
		2000	100	100
		Huntington Lake Resort Boat Ramp		
		1984	100	100
		1999	96	100
		2000	100	100
		Huntington Lake Boat Docks		
		1984	94	100
		1999	88	96
		2000	100	100
	Dry	Rancheria Marina Boat Docks		
		1985	100	100
		USDA-FS Boat Ramp		
		1985	100	100
		Huntington Lake Resort Boat Ramp		
		1985	100	100
		Huntington Lake Boat Docks		
		1985	100	100
	Critically Dry	Rancheria Marina Boat Docks		
		1987	100	100
		1988	76	76
		1989	99	99
		1990	100	100
		1991	95	95
		1992	97	97
		1994	100	100
		USDA-FS Boat Ramp		
		1987	100	100
		1988	92	92
		1989	100	100
		1990	100	100
		1991	97	97
		1992	100	100
		1994	100	100

Appendix E. Percent of Time Reservoir Water Surface Levels are Within the Design Use and Functional Use Ranges of the Boat Ramps During the Primary Recreation Season from Memorial Day through Labor Day by Reservoir and Water-year Type for each Year between 1983 and 2002.

Reservoir	Water-year Type	Support Facility	% of Time WSE within Design Use	% of Time WSE within Functional Use
		Huntington Lake Resort Boat Ramp		
		1987	100	100
		1988	66	100
		1989	82	100
		1990	95	100
		1991	94	100
		1992	85	100
		1994	99	100
		Huntington Lake Resort Boat Docks		
		1987	82.5	100
		1988	48	66
		1989	59	82
		1990	83	95
		1991	81	94
		1992	70	85
		1994	93	99
Florence Lake	Wet	USDA-FS Boat Ramp		
		1983	32	100
		1986	47	100
		1993	47	100
		1995	27	100
		1996	36	100
		1997	47	100
		1998	15	100
		Florence Lake Ferry Service		
		1983	N/A	100
		1986	N/A	100
		1993	N/A	100
		1995	N/A	94
		1996	N/A	99
		1997	N/A	100
		1998	N/A	95
	Above Normal	USDA-FS Boat Ramp		
		1984	55	100
		1999	13	100
		2000	16	100
		Florence Lake Ferry Service		
		1984	N/A	100
		1999	N/A	100
		2000	N/A	100

Appendix E. Percent of Time Reservoir Water Surface Levels are Within the Design Use and Functional Use Ranges of the Boat Ramps During the Primary Recreation Season from Memorial Day through Labor Day by Reservoir and Water-year Type for each Year between 1983 and 2002.

Reservoir	Water-year Type	Support Facility	% of Time WSE within Design Use	% of Time WSE within Functional Use
	Dry	USDA-FS Boat Ramp		
		1985	7	100
		2001	0	100
		2002	2	100
		Florence Lake Ferry Service		
		1985	N/A	100
		2001	N/A	100
		2002	N/A	100
	Critically Dry	USDA-FS Boat Ramp		
		1987	0	100
		1988	0	100
		1989	0	100
		1990	0	100
		1991	0	100
		1992	0	100
		1994	0	100
		Florence Lake Ferry Service		
		1987	N/A	99
		1988	N/A	100
		1989	N/A	98
		1990	N/A	60
		1991	N/A	100
		1992	N/A	100
		1994	N/A	75
Mammoth Pool	Wet	USDA-FS Boat Ramp		
		1983	100	100
		1986	100	100
		1993	100	100
		1995	100	100
		1996	90	90
		1997	100	100
		1998	100	100
	Above Normal	USDA-FS Boat Ramp		
		1984	97	97
		1999	96	96
		2000	75	75
	Dry	USDA-FS Boat Ramp		
		1985	100	100
		2001	83	83
		2002	75	75
	Critically Dry	USDA-FS Boat Ramp		
		1987	61	61
		1988	79	79
		1989	66	66
		1990	68	68
		1991	76	76
		1992	59	59
		1994	53	53