Review of Standards and Methodology in FERC Relicensing Studies

Prepared for:
Catawba-Wateree Relicensing Coalition

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August, 2005

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Introduction

The purpose of this document is to respond to the following item at the request of the Catawba-Wateree Relicensing Coalition:

> 7. Review recreation standards and study methodology used in other FERC relicensings around the country.

In the pages that follow, I will review three recreation carrying capacity studies conducted as a component of a FERC relicensing project. Note that the accompanying document, *Techniques for Estimating Boating Carrying Capacity: A Literature Review*, summarizes additional recreational boating carrying capacity studies unaffiliated with the FERC relicensing process.

Sacramento Municipal Utility District Upper American River Project (FERC No. 2101): Recreation Carrying Capacity Technical Report
Study Area: Sacramento, CA
Authors: Devine Tarbell & Associates, Inc., The Louis Berger Group (2005)

Carrying capacity studies that were reviewed for this study included: Water Recreation Opportunity Spectrum Guidebook (draft, 2002), the Bureau of Outdoor Recreation's (1977) Guidelines for Understanding and Determining Optimum Recreation Carrying Capacity, Statewide Comprehensive Outdoor Recreation Plan (New York, 2003), Final Environmental Impact Statement for the Lake Mead National Recreation Area (National Park Service [NPS], 2002), and the Eldorado National Forest Land and Resource Management Plan, as amended in 2002.

Field Observations

Field observations were conducted at parking areas and reservoir surfaces. In addition, since this study had a broader recreation scope, observations were made at campgrounds, day use areas, and dispersed sites (i.e., reservoirs and river access points).

At parking areas, observations were made regarding the number of vehicles only, vehicles with trailers, and trailers only. Also, if parking areas were full, notes were made about overflow parking.

On reservoir surfaces, researchers systematically traversed the lake, noting the number and types of active watercraft. Boats were also counted from vantage points on land, using binoculars, although the researchers commented that there were certain areas of the reservoir that were hidden from view. Consequently, boat counts from land-based observation points were less than actual usage.

At campgrounds and day use areas, sites were visited and the number of occupied camp sites was recorded. Average party size data from a previous study were used to determine annual visitation to campgrounds.

Vehicle counts at dispersed sites were more difficult to conduct. Researchers counted the number of vehicles parked along the routes to these dispersed sites, differentiating between administrative vehicles (e.g., park maintenance vehicles) and non-administrative vehicles (e.g., recreation area users' vehicles).

Social Carrying Capacity

In terms of social carrying capacity, perceived crowding at recreation sites was measured using the following statement options: not at all crowded, slightly crowded, moderately crowded, extremely crowded, and don't know. For all facilities in the study area, the majority of responses were not at all or moderately crowded. Conflict at recreation facilities was measured via the following two questions:

- Were there any recreation activities that conflicted with your recreation activities?
- Were there any non-recreation activities that conflicted with your recreation activities?

Respondents selected from response options of yes, no, and no opinion. For those who indicated that there were recreation conflicts, they were asked to list two recreation or non-recreation activities that conflicted with their recreation activities.

Ecological Capacity

Perceptions of environmental damage were also measured using two questions:

- Were there any recreation activities causing harm to the environment?
- Were there any non-recreation activities causing harm to the environment?

For affirmative responses, respondents were asked to specify the type of harm perceived.

Boating Density

Boating density was calculated in order to assess boating safety on the reservoirs. Observers counted the total number of watercraft, then used the highest observed value to calculate an average number of acres per vessel. Safe boat density standards from BOR (1977) and New York SCORP were included, along with the density guidelines for the WROS classification settings: Urban, Rural Developed, Rural Natural, Semi-primitive, and Primitive. The sixth WROS classification, Suburban, was not included in the setting options, perhaps because the researchers had employed a draft version of the WROS Users' Guidebook. (See Table 1.)

Table 1
WROS Boating Density Guidelines

WROS Classification	Range of Boats at One Time	
	Low Range	High Range
Urban	1 acre/vessel	10 acres/vessel
Rural Developed	10 acres/vessel	20 acres/vessel
Rural Natural	20 acres/vessel	110 acres/vessel
Semi-primitive	110 acres/vessel	480 acres/vessel
Primitive	480 acres/vessel	3,200 acres/vessel

Also cited in the section on boating density were the density standards used in the Lake Management Plan for Lake Mead (NPS, 2002). Although the classification titles are similar to the WROS classifications, the corresponding recommended boating densities are much different. (See Table 2.)

Table 2
Lake Mead Boating Density Standards

ROS Classification	Boats at One Time
Urban Park	4.5 acres/vessel
Urban Natural	6.75 acres/vessel
Rural Natural	9 acres/vessel
Semi-primitive	13.5 acres/vessel
Primitive	18 acres/vessel

Regarding the occupancy at boat launches, the study found that "parking spurs within the campgrounds are not large enough to allow visitors to park their vehicles and/or their boat trailers at their campsites…Additionally, there may be campsites where visitors have more than two vehicles, which is the maximum allowed per campsite" (p. 70). This finding is similar to the Lake Oroville study included in the literature review, where the capacity of parking lots near marinas had been exceeded due to a disproportionate number of single vehicles belonging to marina boaters and their guests, who often used boat/trailer spaces when the available single-vehicle spaces had been filled (EDAW, 2004).

Recreation Capacity and Suitability Analysis: Lewis River Hydroelectric Projects, FERC Nos. 935, 2071, 2111, and 2213
Study Area: Longview, WA
Authors: EDAW (2002)

The researchers discuss carrying capacity within the context of Shelby and Heberlein's (1986) four capacity types: ecological, physical/spatial, facility, and social. Ecological capacity was not addressed in this recreation capacity study. Physical/spatial capacity was considered in terms of surface acres per boat, and a theoretical boating capacity standard of 25 acres per boat was applied. Social capacity included a perceived crowding measure, using a 7-point scale ranging from not at all crowded to extremely crowded. Facility capacity at campgrounds used the threshold levels in Table 3.

Table 3
Campground Capacity Threshold Levels

Capacity Level	Percent Occupancy
Below Capacity	< 40%
Approaching Capacity	< 60%
At Capacity	60%
Above Capacity	> 60%

An excellent summary table on the determination of capacity levels for the four capacity types is reproduced in Table 4 below (EDAW, 2002, p. A1-15).

Table 4
Guidelines for Assessing Recreation Capacity Levels

Capacity Types/Variables	Capacity Levels			
	Below	**Approaching**	**At**	**Exceeding**
Ecological				
Bare ground evident	Minimal to no impacts observed	Some minor impacts observed	Minor to moderate impacts observed, but appears to be sustainable	Excessive impacts observed, not sustainable
Wetland impacts				
Riparian impacts				
Other vegetation loss/damage				
Erosion evident				
Sanitation and trash concerns				
Physical/Spatial				
Available land space/area for expansion if needed	Area is adequate/high to moderate expansion capacity	Area is adequate/minimal expansion capacity	Area is adequate/no expansion capability	Area is not adequate/no expansion capability/use areas may overlap
Facility				
Camping capacity utilization (percent)	< 40 percent	< 60 percent	60 percent (90 percent peak months)	> 60 percent
Day use capacity utilization (percent)	< 40 percent	< 60 percent	60 percent (75 percent peak months)	> 60 percent
Boat launch wait time acceptable	Acceptable	Acceptable	Acceptable	Unacceptable
Social				
User conflicts reported	Few or no significant conflicts reported	Some conflicts reported, but considered minor or minimal	Some conflicts reported, but considered an acceptable level	Moderate to high number of conflicts reported; considered an unacceptable level
Perceived crowding level - average crowding score	< 2.3	2.3 - 3.5	3.5 - 4.7	> 4.7

Reservoir Boating; Final; R-7; Oroville Facilities Relicensing, FERC Project No. 2100
Study Area: Lake Oroville, CA
Authors: EDAW (2004)

Study Objectives

This study was conducted by EDAW for the State of California's Department of Water Resources, as part of a FERC relicensing project. One of the study objectives was to "determine if capacity limits for boating are being exceeded on the reservoirs, and if reservoir surface water management changes are needed relative to recreational boating" (EDAW, 2004, p. RS-2). Similar to the previously cited study, EDAW based their analysis on Shelby and Heberlein's (1986) four carrying capacity types: ecological, facility, physical/spatial, and social.

The goal of the reservoir boating capacity analysis was "to determine the maximum amount of use of a particular type an area can sustain without excessive detrimental effects to the natural resource, facilities, or visitors' recreation experience" (EDAW, 2004, p. 4-11). For each area (e.g., reservoir or lake zone), "conclusions were made regarding which of the four capacity types is or could be a limiting factor(s). Qualitative and quantitative data were used to make these conclusions" (EDAW, 2004, p. 4-12). As depicted in Table 4, one of the following conclusions was determined for each capacity type: below, approaching, at, or exceeding capacity.

Use Characteristics

Lake use was measured via on-water observations, counting number and type of boats, as well as whether boats were active or "'in use but inactive'" (EDAW, 2004, p. 4-3). On-water boat counts were justified as the most practical method for estimating use; however, the limitations to this method are acknowledged. The researchers state that, "[o]verall, this methodology is estimated to provide an expected error of less than 10 percent" (EDAW, 2004, p. 4-6). Aerial photographs were used "to provide data to validate boating levels obtained with the on-water observations" (EDAW, 2004, p. 4-4). Although the detail of the photographs was not refined enough to determine boat type, the researchers could derive a boat count for the entire lake.

Boating Density Standards

The researchers acknowledge that boating density standards are reservoir-specific and must take into consideration the following factors: "water depth, shoreline configuration, visitors' perceptions, number of accidents involving other boats, boat type and speed, dominant boating activities, and the types of activities that are popular on the water and on the shoreline" (EDAW, 2004, p. 4-12).

Facility Carrying Capacity

Facility capacity was assessed using information on parking levels at boater facilities, wait times at boat launches, and boaters' perceptions of the adequacy of facilities. Observations of boat launching and retrieval were conducted at a major boat ramp one holiday weekend in order to determine the typical rate of launching and retrieval.

Social Carrying Capacity

Social capacity assessment included survey data on boaters' perceptions of crowding and interactions with other boaters (i.e., user conflict). Perceived crowding was measured using a 9-point scale, as outlined by Shelby and Heberlein (1986). Social carrying capacity limits were determined to be approaching capacity when mean crowding ratings were approaching 5 and over 40% of boaters reported moderate to high crowding levels. Most respondents reported a low to moderate crowding rating.

Physical Carrying Capacity

After reviewing the WROS setting types, EDAW proposed the capacity ranges classified in Table 5 (p. 5-73).

Table 5
Proposed Boat Traffic Density Ranges for Assessing Project Area Reservoir Boat Traffic Density

Density Classification	Density Range (acres/boat)	Physical Capacity Assessment
Very High Density	≤ 10.0	Exceeding capacity
High Density	10.1-20.0	Approaching capacity
Moderate Density	20.1-50.0	Below capacity
Low Density	> 50	Below capacity

Boat Traffic Density Calculations

Boating density was calculated in two ways: for all boats observed in a reservoir/zone (including those boats that were inactive but in use), and then again for active boats only. Both density estimates were "reported in order to show the moderating effect of shoreline use on traffic density" (EDAW, 2004, p. 5-73). Density estimates, in average acres per boat, were then compared to the ranges outlined in Table 4 above to assign a physical capacity assessment to each reservoir/zone.

Deliberate Omission of a Numeric Capacity Limit

Capacity conclusions were made by identifying the limiting factor (or factors) for each zone (e.g., physical/spatial, social, facility, ecological), assessing the capacity level based on the assessment criteria in Table 5, and assigning a level of management priority (e.g., low, moderate, high) to the concern.

References

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