

RECREATION USE ASSESSMENT

Yadkin Hydroelectric Project

Final Study Plan July 23, 2003

Background

Alcoa Power Generating Inc. (APGI) is the licensee for the Yadkin Hydroelectric Project. The Yadkin Project is currently licensed by the Federal Energy Regulatory Commission (FERC) as Project No. 2197. This license expires in 2008 and APGI must file a new license application with FERC on or before April 30, 2006 to continue operation of the Project.

The Yadkin Project consists of four reservoirs, dams, and powerhouses (High Rock, Tuckertown, Narrows, and Falls) located on a 38-mile stretch of the Yadkin River in central North Carolina. The Project generates electricity to support the power needs of Alcoa's Badin Works, to support its other aluminum operations, or is sold on the open market.

As part of the relicensing process, APGI prepared and distributed, in September 2002, an Initial Consultation Document (ICD), which provides a general overview of the Project. Agencies, municipalities, non-governmental organizations and members of the public were given an opportunity to review the ICD and identify information and studies that are needed to address relicensing issues. To further assist in the identification of issues and data/study needs, APGI has formed several Issue Advisory Groups (IAGs) to advise APGI on resource issues throughout the relicensing process. IAGs will also have the opportunity to review and comment on Draft Study Plans. This Draft Study Plan has been developed in response to comments on the ICD and through discussions with the Recreation, Aesthetics, and Shoreline Management IAG, to provide additional necessary information for consideration in the relicensing process.

1.0 Study Objectives

On March 13, 2003 the Recreation, Aesthetics and Shoreline Management IAG met and discussed objectives for the Recreation Use Assessment. Based on written comments and the discussions at the IAG meeting, the following objectives have been identified for this study. The study plan has been revised as a result of comments from the April 10, 2003 IAG meeting.

1. Collect sufficient information to be able to make statistically sound estimates of the following aspects of recreational use of the Yadkin Project.
 - Total annual recreation use under varying water levels (residents and visitors) at the Yadkin Project, at each of the four Project reservoirs, including 40 public access recreation areas, 4 canoe portages, private waterfront residents, 27 private community boat launches, 8 private organizations/clubs, and 12 campgrounds (in recreation days)
 - Total annual daytime and nighttime use (residents and visitors) at each of the four Project reservoirs (in recreation days)

- Peak use weekend average recreation use (in recreation days); “Peak Use Weekend Average” is generally a summary of Saturday and Sunday recreational use during the peak use season (generally considered Memorial Day to Labor Day), and includes both daytime and nighttime use at each of the four Project reservoirs
- Total annual recreation use at the Yadkin Project by recreational activity type (e.g. boating, fishing, camping, hiking, swimming, picnicking, etc.)
- Effects of varying water levels on amount and type of recreational use and recreational safety (e.g., boating hazards)
- Percent utilization of each individual public access recreation area expressed as percent capacity (based on the completed recreation use assessment, identify any recreation areas that are meeting or exceeding use capacity)
- Recreational user (resident and visitor) profile information (e.g. length of stay, types of recreational activities, party size, adequacy of the recreation facilities etc.)

2. Assess the effects of the Yadkin Project on recreation in the tailwaters of the four dams that comprise the Project. Stakeholder comments on the Yadkin Project ICD raised the following information needs/issues:

- Characterize existing recreational use within the Project tailwaters;
- Evaluate vehicular, pedestrian, and disabled access to the tailwater areas;
- Evaluate canoe/kayak portage conditions and opportunities;
- Evaluate effects of flow rates, timing, and water quality on boating/angling/other tailwater recreational uses;
- Evaluate recreational safety issues such as physical hazards, effects of Project operations on water currents and depths, and access to tailwater areas.

3. Evaluate the recreational carrying capacity of the Yadkin Project.

- Estimate the physical (safety) and social carrying capacities of each of the four reservoirs, while also noting any environmental effects related to recreational use.
- Identify traditional recreational uses of the Project area
- Estimate future recreational use of the Project area

This Final Study Plan describes the technical approach for collecting and evaluating information to respond to these information needs/issues, the study’s final products, and a proposed study schedule.

2.0 Technical Approach

This section describes ERM's proposed methodology for preparing a sound, accurate, and highly defensible estimate of recreation use at the Yadkin Project.

2.1 Recreation Use Assessment

Six subtasks will be undertaken in order to assess recreational use at the Yadkin Project:

- Spot Counts
- Canoe Registry
- Visitor Use Survey
- Resident Use Survey
- Private Boat Launch Survey
- Other Recreational Use Data Collection

Each of these subtasks is described below.

2.1.1 Spot Counts

Spot counts will be conducted at 40 public access recreation areas (see Table 1 for a list of these areas) throughout the study year (May 2003 to April 2004).

- *Sampling Dates* –sampling days will be selected using a stratified random sampling methodology. All calendar days will be stratified by peak holidays, weekends, and weekdays for each month to ensure adequate sampling for the entire year.
- *Sampling Frequency* –Each public access recreation area will be sampled 62 days over the year with the following frequency:
 - 3 weekend days and 3 weekdays a month during April, May, June, July, August, September, and October (including Memorial Day, 4th of July, and Labor Day peak weekends) – we will treat 4th of July as a weekend day
 - 2 weekend days and 2 weekdays a month during the rest of the year.

During each sampling day, staff will visit each site 3 times (early in the morning, mid-day, and late afternoon/evening) to determine total daily recreational use and better estimate the turnover rate. The Highway 601 and the Rowan County Pump Station Boat access areas may be surveyed less frequently (but at least one weekday and one weekend day per month) during the off-season because of low use and their remoteness.

Table 1. Sample Sites and Number of Observations Made

Site	Site Description	Reservoir
1	Highway 601 Access Area	High Rock
2	Rowan County Pump Station	High Rock
3	York Hill Boat Access	High Rock
4	Crane Creek Fishing Access Pull-off	High Rock
5	Little Crane Creek Fishing Access	High Rock
7	Southmont Boat Access Area	High Rock
8	High Rock Marina and Campground	High Rock
9	Highway 47 Fishing Pull-off	High Rock
10	Buddle Creek Boat Access Area	High Rock
12	Abbotts Creek/NC 8 Bridge Pull-off	High Rock
13	Tamarac Marina	High Rock
14	Dutch Second Creek Boat Access	High Rock
15	Flat Swamp Boat Access	High Rock
17	High Rock Dam Tailrace Access	Tuckertown
18	High Rock Dam Tailrace Access	Tuckertown
19	Bringle Ferry Boat Access	Tuckertown
20	Cedar Creek Fishing Pull-off	Tuckertown
21	Lick Creek Fishing Pull-off	Tuckertown
22	Flat Creek Boat Access Area	Tuckertown
23	Flat Creek Fishing Access Area	Tuckertown
24	Newsome Road Access	Tuckertown
25	Riles Creek Recreation Area	Tuckertown
26	Highway 49 Boat Access Area	Tuckertown
27	Tuckertown Pull-off Fishing Access	Tuckertown
29	Tuckertown Dam Tailrace Access	Narrows
30	Garr Creek Access Area	Narrows
32	Old Whitney NCWRC Fishing Pier	Narrows
33	Old Whitney Boat Access Area	Narrows
34/35	Lake Forest CG/Fish Tales Marina	Narrows
37	Circle Drive Boat Access Area	Narrows
38	Lakemont Access Area	Narrows
39	UNF Holt's Cabin Picnic Area	Narrows
40	UNF Walk-in Fishing Pier	Narrows
41	UNF Badin Lake Campground	Narrows
42	UNF Cove Boat Landing	Narrows
43	Palmerville Access Area	Narrows
44	Badin Lake Swim/Picnic Area	Narrows
45	Badin Boat Access	Narrows
47	Badin Lake Group Camp	Narrows
48	UNF Deep Water Trail Access	Falls
49	Falls Boat Access	Falls

Survey Administration – At each public access recreation area, ERM staff will count and record the number of vehicles, boat trailers, jet ski trailers, mounted roof-top carriers for canoes (not including roof-top carriers that come with vehicles), campers, anglers, swimmers, picnickers, and other recreation users. Any capacity problems will be noted and recorded.

- *Sampling Forms* – A standardized data collection form will be utilized to ensure completeness of the spot counts and to facilitate data entry into the electronic database (see Attachment A).

2.1.2 *Canoe Registry*

In lieu of conducting spot counts at the canoe portage trails at each of the four dams, a sign and weather-protected registry form for canoeists portaging around the dams will be installed at a prominent location near the take-out. The signs will request canoeists to register the date, time, and number in their party (see Attachment B). Staff will check these registries approximately every 2 weeks to tally the number of users. The survey technicians will ask any canoeist observed at any of the 40 public recreation access areas whether they used the portages and whether they signed the registry.

2.1.3 *Visitor Use Surveys*

ERM will also conduct an on-site contact Visitor Use Survey, which will provide information on user characteristics, activities, concerns, and overall recreational experience. This survey will also be available in Spanish.

- *Sampling Locations* –the contact use survey will be administered at 40 public access recreation areas during the spot counts.
- *Sampling Dates* –sampling will occur on the stratified random sampling days selected for the spot counts.
- *Sampling Frequency* – ERM will try to collect at least 100 surveys at each of the major public access recreation areas (see list below) and at least 50 surveys at the other minor public access recreation areas. These surveys will be collected such that we have representative survey for each season.

Major Recreation Areas

Southmont Boat Access Area
Buddle Creek Boat Access Area
Tamarac Marina
Dutch Second Creek Boat Access
Flat Swamp Boat Access
Flat Creek Boat Access Area
Highway 49 Boat Access Area
Tuckertown Dam Tailrace Area
Old Whitney Fishing Pier/Boat Access Area
Circle Drive Boat Access Area
Lakemont Access Area
UNF Cove Boat Landing
Badin Lake Swim/Picnic Area
UNF Badin Lake Campground
Badin Boat Access

Sampling at this level is expected to result in at least 2,500 surveys. This intensity of survey would allow for statistically valid conclusions to be drawn at the individual public access recreation area level regarding recreational use and opinions and a very high degree of confidence at the individual reservoir level.

- *Survey Administration* –the surveys will be administered on-site by trained survey technicians. Sample days would be 10 hours long. The survey technicians will approach recreation users at each site, explain that we are collecting information on recreational use for Yadkin to provide to FERC, and request that they complete a short survey. The survey form would be given to the user to fill out. The questionnaire will be relatively short (no more than 2 pages) and able to be completed in about five minutes. Surveys would be collected immediately on-site following their completion. At recreation areas with only a few users, the survey technician will ask all groups to complete the survey. At sites with many users, the survey technician will try to get surveys from recreation users in each recreation activity.
- *Sampling Forms* – a standardized survey form will be developed and used (see Attachment C). This survey form would ask user profile and expenditure information, such as:
 - length of stay
 - types of recreational activities
 - party size
 - adequacy of recreation facilities
 - degree of crowding
 - conflicts with other recreational users
 - changes in their visitation frequency to the Yadkin Project over time
 - recreation-related expenditures made on this trip (e.g., food, lodging, supplies, equipment, entertainment, fuel) for inclusion into IMPLAN

ERM will include some additional questions for the surveys distributed at the Uwharrie National Forest (see Attachment I). These questions are intended to evaluate whether the U.S. Forest Services' Recreation Opportunity Spectrum (ROS) goals for the Uwharrie National Forest are being attained. These data will be analyzed in the same way as described above for the other data collected.

ERM will also keep track of the number of refusals to ensure the statistical validity of the results.

Spot count and survey data on recreation use will be supplemented with recreational use counts made from aerial photos. ERM will obtain approximately 6 aerial photographs of High Rock and Narrows reservoirs and count the total number of boats on the reservoirs. The 6 over flights will be scheduled as follows:

- 2 holiday weekends (4th of July and Labor Day)
- 2 summer weekends
- 2 summer weekdays

2.1.4 Resident Use Survey

There are approximately 3,700 residences with piers or other permitted private recreation facilities along the shoreline of High Rock and Narrows reservoirs. These residents have direct access to Project waters from their property without needing to use any of the 40 public access recreation areas. There are very

few residences along the shoreline of Tuckertown Reservoir and private recreation facilities are not permitted on Tuckertown Reservoir. There are no private residences on Falls Reservoir.

A non-contact mail-back Resident Use Survey of Narrows and High Rock residents will be conducted that would provide information on user characteristics, activities, concerns, and overall recreational experience of these residents.

- *Sampling Dates* –surveys will be distributed 9 times (once a month for the period of March through October and once for the collective period of November through February) and request that they be returned within two weeks. These property owners will receive one of the 9 mailings requesting information on their recreational use of the reservoirs over the prior month. These surveys will have an addressed stamped return envelope provided to encourage a high return rate.
- *Sampling Size and Frequency* – Although a random survey of a portion of these residences would be acceptable statistically, ERM will mail the survey to all 3,700 residences that have private recreation facility permits from Yadkin (this does not guarantee their participation, only their opportunity to participate). Each residence will be randomly selected to receive one of the surveys. The surveys will be distributed as follows:
 - March – 11% of High Rock and Narrows/Tuckertown residents will receive a survey
 - April – 11% of High Rock and Narrows/Tuckertown residents will receive a survey
 - May – 11% of High Rock and Narrows/Tuckertown residents will receive a survey
 - June – 11% of High Rock and Narrows/Tuckertown residents will receive a survey
 - July – 11% of High Rock and Narrows/Tuckertown residents will receive a survey
 - August – 11% of High Rock and Narrows/Tuckertown residents will receive a survey
 - September – 11% of High Rock and Narrows/Tuckertown residents will receive a survey
 - October – 11% of High Rock and Narrows/Tuckertown residents will receive a survey
 - November through February – 12% of High Rock and Narrows/Tuckertown residents will receive a survey
- *Survey Administration* –information from all returned surveys will immediately be entered into a database.
- *Sampling Forms* –a standardized survey form will be used (see Attachment D). This survey form would ask user profile and expenditure information, such as:
 - household size
 - types of recreational activities
 - approximately how many days a year do they reside at their waterfront residence
 - frequency of recreational use for each recreational activity by season
 - average amount of time spent recreating per outing
 - adequacy of recreation facilities
 - degree of crowding
 - conflicts with other recreational users
 - changes in their visitation frequency to the Yadkin Project over time
 - recreation-related expenditures (e.g., food, lodging, supplies, equipment, entertainment, fuel) for a typical day of recreation, for inclusion into IMPLAN.
 - questions regarding aesthetics

The data collected about recreation-related expenditures and aesthetics will be used in separate studies that evaluate the effects of recreation on regional economics and the effects of the Project on aesthetics.

2.1.5 Private Boat Launch Survey

There are approximately 47 private boat launches at the Yadkin Project, including 12 commercial facilities, 27 private communities, and 8 organizations/private clubs. These are distributed as follows: 37 on High Rock Reservoir, 2 on Tuckertown Reservoir, 8 on Narrows Reservoir, and 0 on Falls Reservoir. ERM proposes a three-pronged approach to obtaining recreational use information based on type of ownership.

- *Private Community Boat Launches* – ERM will conduct a stratified random sample of residents within private communities with boat launches. This approach requires that APGI (or some other entity) provide the total number of improved lots (lots with houses) within the 27 private communities with boat launches. ERM will provide APGI with guidelines for randomly selecting approximately 500 lots and will provide ERM with the owner’s name and address. ERM will develop a mail survey (a modification of the Resident Use Survey) (see Attachment E) to collect information on the frequency and type of recreational use by residents of private communities. These property owners will receive one of four mailings requesting information on their recreational use of the reservoirs over the prior 3 months. Data from the returned surveys will be entered into a database and analyzed to estimate total annual recreational use at these private community boat launches and to describe recreational patterns.
- *Private Organizations/Clubs* –ERM will conduct a telephone survey of each club/organization to collect information on the organization/club’s membership, extent of annual use (e.g., all year, summer, hunting season), frequency of use, and type of recreational activities at each site (see Attachment F). This approach assumes that APGI (or some other entity) can provide the names, addresses and phone numbers of contact persons at each organization/club.
- *Campgrounds and Commercial Operations* –ERM will conduct a telephone survey with each campground or commercial facility operator and collect information on the number of campsites, relative number of permanent, seasonal, and occasional residents, and recreational opportunities at the campgrounds. This approach assumes that APGI (or other entity) can provide the names and phone numbers of contacts at each campground. ERM will develop a survey (modification of the private community survey above) (see Attachment G) for the contact person to distribute to a statistically-determined number of campers regarding the frequency and type of recreational use at the reservoirs. Data from the returned surveys will be entered into a database and analyzed to estimate total annual recreational use at these private campgrounds/commercial operations and to describe recreational patterns.

2.1.6 Additional Recreational Use Data Collection

Spot counts and the Resident and Visitor Use Surveys will be supplemented by collecting available use data from the following entities that own and/or operate recreational facilities within the Yadkin Project boundary:

- commercial marina/campground operators,
- the U.S. Forest Service for the Uwharrie National Forest,
- North Carolina Wildlife Resources Commission

Some of the commercial marinas charge a launch fee (e.g., Tamarac Marina), the data from which we would convert into known launch use statistics. Obtaining information on the number of launches would allow us to compare that information with our spot counts to help confirm the turnover rate for boating-related recreational activities. Yadkin will coordinate with the marina operators (Boat Dock Marina, Badin Shores Marina, Badin Lake Marina, and Uwharrie Point Marina) to try to get their agreement to participate. ERM will collect information from the operators approximately every 2 weeks.

APGI will be conducting a Recreation Facility Inventory Study of the Project during the relicense effort and will provide a detailed assessment of each site with the inventory. The inventory will record the condition of the site, type of site, conditions of materials and facilities available to the public. This will be a separate study from the Recreation Use study or Aesthetic studies.

2.2 Reservoir Carrying Capacity

ERM will estimate the carrying capacity of each reservoir in terms of physical and social factors.

2.2.1 Physical Carrying Capacity

Estimates of physical carrying capacity are primarily driven by safety considerations (i.e., maintaining safe distances between boats). ERM will apply national boating safety criteria (e.g., Bureau of Outdoor Recreation) for area requirements for various types of reservoir recreational uses (e.g., power boating, waterskiing, jet skis, canoes) at various water levels. ERM will also obtain boating accident data from NC Wildlife Resources Commission and evaluate responses on the Visitor Use Survey regarding safety hazards in relation to water levels.

2.2.2 Social Carrying Capacity

Estimates of social carrying capacity are a more direct measure of recreational experience and address crowding issues. There are several ways of measuring social carrying capacity that can lead to different carrying capacity estimates:

- Preferred boating density from an experience standpoint
- Acceptable boating density from an experience standpoint
- Boating density at which the user would accept limitations on the number of boats

ERM will evaluate social carrying capacity in several ways:

- Estimate the maximum number of boats at one time (BAOT) from the aerial photographs on peak holiday and summer weekend days (see Task 2.1 above)
- The Visitor Contact Survey asks recreational users how crowded the reservoir was on that day and to what extent has crowding been an issue for them at the reservoirs.

Based on these data, ERM will estimate both the physical and social carrying capacities of each of the four reservoirs.

2.3 *Tailwater Use Assessment*

Each of the four Project tailwaters has different physical and hydrologic characteristics, which requires that each be evaluated individually. This study plan reflects this requirement. The study plan is organized around each of the specific information needs/issues identified in Section 1.0, and is described below.

2.3.1 *Tailwater Physical Description*

ERM will prepare a description of the physical characteristics of each of the four Project tailwaters with respect to recreational conditions, under a range of flow releases. Physical characteristics that may be considered include channel width, water depth, substrate, and flow velocities. Data used to describe tailwater physical conditions will be gathered from a variety of sources including:

- Field observation and inspection at a range of discharges – including photo-documentation over a range of flow releases
- Results from the APGI's fisheries consultant's (NAI) tailwater habitat assessments, which are anticipated to include width, depth, velocity and substrate information
- Hydraulic modeling from APGI's engineering consultant

The spatial extent of the tailwater area below each dam to be evaluated in this study will be the same as the tailwater area defined and used in the aquatic resources studies. ERM will discuss with the IAG the proposed definition of tailwater for each reservoir based on input from the Fish and Aquatics IAG.

2.3.2 *Specific Information Needs/Issues*

Characterize Existing Recreational Use of the Project Tailwaters

Task 2.1 will include spot counts and contact surveys in the following locations relevant to this Tailwater Recreation Study:

- High Rock Dam tailrace - High Rock Dam Picnic and Fishing Access (Rowan County) and High Rock Dam Tailrace Access (Davidson County)
- Tuckertown Dam tailrace - Tuckertown Dam Tailrace Access Area
- Narrows Dam tailrace – there is no direct access to the Narrows Dam tailrace other than the canoe portage. The RUA study is conducting spot counts and contact surveys at the Deep Water Trail Access and Falls Boat Access points.
- Falls Dam tailrace – there is no direct access to the Falls Dam tailrace other than the canoe portage.

In addition, a canoe registry will be established at each of the canoe portages at the four dams as part of the RUA study. This information will be supplemented with any information available from Progress Energy regarding recreational use of the Falls Dam tailrace.

During the field visits conducted in Task 2.1, spot counts of users will be recorded and a short oral survey will be conducted regarding user preferences and concerns regarding recreational facilities, opportunities, access, and safety. ERM will develop a short survey instrument tailored to tailwater recreation areas (see

Attachment H). This survey may also be distributed to boaters in the tailwater by APCI's fisheries consultant (NAI) during their field work so as to survey boaters as well as recreational users on shore. ERM will also survey boaters who used the tailwaters at nearby public access sites.

This information will be used to characterize existing recreational use of the Project tailwaters in terms of:

- The estimated total amount of recreational use (e.g., in terms of annual recreation-days)
- Recreational use by month and time of day
- Types and amounts of various recreational activities
- User assessment of the adequacy of recreational facilities

Recreation Safety Condition Assessment

The recreational safety condition assessment will evaluate safety conditions for recreational users in the Project tailwaters, including safety issues associated with Project operations (e.g., sudden changes in water depths and velocities, adequacy of safety signage) and associated with recreational use (e.g., proximity of recreational use to dam, presence of appropriate safety measures, safety policies and procedures).

ERM will review the Yadkin Project's safety history, FERC safety inspection reports, and the Project Emergency Action Plan (EAP). The Project will be evaluated in terms of consistency with FERC safety guidelines (*Guidelines for Public Safety at Hydropower Projects*) and the industry general standard of care regarding:

- Presence of safety devices such as fences, signs, boat barriers, buoys, log booms, audible devices, night illuminations, and beacon lights
- Presence of safety barriers to keep people and boats away from danger areas,
- Fencing to discourage public entry to hazardous areas,
- Warning signs, signals, and audible alarms to denote sudden changes in water releases,
- Signage to warn swimmers and other recreational users of danger areas

Effects of Project Operations on Project Tailwater Recreation

ERM will evaluate the effects of Project operations on tailwater recreation. This will involve evaluating the effects of a range of flow releases from the upstream dam and downstream reservoir headwater elevations on recreational facilities, access, use, and safety. The methodology for this evaluation will include:

- Effects on recreational facilities – determine based on water elevations whether any tailwater recreation facilities are unusable above or below certain flows/levels.
- Effects on recreational access – determine, based on water elevations, depths, or velocities, whether access (i.e., vehicular, boat, pedestrian, or handicapped) to any tailwater recreation areas is impeded, and if so, to what extent and where.
- Effects on recreational use – determine whether Project operations limit recreational use or opportunities, and if so, to what extent and under what conditions. This would include project effects on water quality.

- Effects on recreational safety – determine whether Project operations create any safety issues in terms of sudden changes in water depths and velocities, access to desired recreation spots. This will be evaluated in terms of how quickly the changes in flow characteristics occur, whether there are any warnings of changes in flow, appropriateness of existing signage, and compatibility with normal safety requirements at hydropower projects.

2.4 Historic and Future Use Assessment

2.4.1 Historic Recreational Use

This subtask involves research on traditional recreational uses of the project since the Project was constructed. In terms of traditional uses, ERM will coordinate with APGI and other contractors and review any historical photos regarding historic uses of the Project reservoirs for recreation. ERM will also collect all available information on recreational use since the Project was constructed, including prior FERC Form 80 reports, other APGI studies, any counts or other information from NCWRC and other state and local agencies. ERM will conduct a trend analysis to estimate changes in recreational use over time.

2.4.2 Future Recreational Use

ERM will collect and evaluate information on:

- Recreation use trends at the Yadkin Project using information collected in task 2.4.1 above;
- Projected demographic changes (e.g., population, age distribution, income, minority populations) as well as additional waterfront development at the Yadkin Project
- Recreational activity trends (i.e., which activities are becoming more or less popular) based on national and regional sources.

ERM will combine this information to develop estimates of future recreational use and facility demand at the Yadkin Project through the year 2020. ERM will also compare future use levels with existing facility capacity to determine the adequacy of existing facilities and the potential future need for additional facilities.

3.0 Analysis and Reporting

Once a full year of survey data has been collected, ERM will analyze the data and prepare the Draft Study Report. Below is a description of how recreational use will be estimated. Based on the number of surveys expected to be obtained (at least 400 Visitor Use Surveys for each reservoir and at least 500 Resident Use Surveys each for High Rock and Narrows reservoirs), we would expect that our results would have a 95 percent confidence level and +/- 5 percent confidence interval. The actual confidence interval is also affected by the variability of the actual responses, which could yield a slightly higher or lower confidence interval.

Total Annual Visitor Recreation Use

Based on the spot counts, ERM will average daily recreational counts at each of the 40 public access recreation areas for peak weekend, weekend, and weekday by month. These daily counts will be modified to estimate daily use based on a turnover factor. The turnover factor will be determined from the analysis of spot count results from the three visits to each site per sample day and the Visitor Use Survey responses regarding length of visit. As mentioned above, if available, spot counts will be compared to actual entire day information from the commercial operators. If the preliminary analysis indicates seasonal differences (e.g., length of visit may be less in the off-season than in the summer), turnover factors specific to each recreational use (visitors may turnover less while boating, for example, than picnicking) and for each recreation season will be developed. Based on the spot counts, the turnover factor, and average party size by recreational activity, ERM will estimate daily visitor recreation use for peak weekend, weekend, and weekdays for each month and then simply multiply these estimates by the number of days for each type of day for each month for all 12 months for each public access recreation area. ERM will then sum up the monthly totals for each public access recreation area by reservoir to estimate total annual visitor recreation use at each reservoir. Total annual visitor recreation use for the Project will be estimated by simply summing the totals for each reservoir.

ERM will distinguish daytime versus nighttime visitor recreation use using the traditional definition of nighttime as sunset to sunrise. ERM will estimate “nighttime” use by tallying campground receipts and observations during the early morning and late evening spot counts.

Total Annual Resident Recreation Use

Based on the Resident Use Survey, an average number of recreational days per residence will be developed (by multiplying the number of recreational visits by the average number of participants) by season. If the data indicate a significant difference, separate estimates will be developed for each reservoir. This average number of recreation days per residence multiplied by the total number of waterfront residences for each reservoir will estimate the total annual resident recreation use by month for each reservoir. Total annual resident recreation use for the Project will be estimated by simply summing the totals for each reservoir.

Total Annual Recreation Use by Recreation Activity

Total annual visitor recreation use by recreation activity for each of the 40 public access recreation areas will be estimated by determining the percentage of recreation use by recreation activity by month from the Spot Count and Visitor Use Surveys and applying it to the total monthly recreation use estimates for each recreation area developed above.

Average residence recreation use by recreation activity will be estimated using the results of the Resident Use Survey where the respondents would estimate the number of recreational trips and average number of participants for each recreational activity by season. If the data indicate a significant difference, separate estimates will be developed for each reservoir. This average number of recreational days per recreational activity per season will be multiplied by the number of waterfront residences to estimate total seasonal resident recreational use by activity. The total annual resident recreation use by recreation activity will be determined by simply adding the results for each season.

Total annual recreation use by recreational activity by reservoir will be determined by simply adding the results from of the resident and visitor estimates. The total for the Yadkin Project will be determined by simply adding the totals for the four reservoirs.

Percent Utilization of Public Access Recreation Areas

ERM will estimate percent utilization for each of the 40 public access recreation areas by averaging the non-peak weekend daily use estimates and comparing them to the facility capacity. ERM will also provide additional information regarding utilization and identify any recreation areas or facilities that are meeting or exceeding use capacity using the following information:

- Estimate percent utilization of the 40 public access recreation areas by averaging the non-peak weekend daily use during the peak season only (which is a better gauge of facility capacity than all non-peak weekends) and comparing them to the facility capacity. ERM will provide the entire data set of percent use to help characterize the range of percent use and the frequency of high use by season and day type.
- Note the number of observations from Spot Counts when facility capacity was exceeded for each public access recreation area
- Gather data in several ways to help understand the magnitude of the crowding issue:
 - Include questions on the Resident and Visitor User Surveys regarding recreational user's opinions about the degree of crowding (e.g., social carrying capacity)
 - Use the proposed aerial photographs to estimate total number of boats on each reservoir at one time during peak hours on peak weekend days, and typical weekend days and weekdays.

Recreational User Profile Information

Responses from the Visitor Recreation Use and Resident Recreation Use surveys will be used to characterize recreational users. For example, this information would include:

- Basic demographics (e.g., age, sex, place of residence)
- Length of stay
- Types of recreational activities
- Party or household size
- Adequacy of recreation facilities
- Frequency of recreational use at the Yadkin Project
- Average amount of time spent recreating per outing
- Degree of crowding on reservoirs and at access sites
- Conflicts with other recreational users
- Changes in visitation to the Yadkin Project over time

Other information based on the questions in the survey instrument will also be analyzed. This information will be presented for both visitors and residents separately and combined where appropriate.

3.1 Draft Recreation Use Assessment Study Report

ERM will prepare a Draft Study Report. The Draft Study Report will be provided to APGI, the IAG, and other interested stakeholders for review and comment. The report will include standard statistical descriptors for the data (e.g., mean, median, standard deviation, confidence level). ERM will meet with the IAG up to six times to discuss study methodology, discuss results, and review the draft Study Report.

3.2 Final Recreation Use Assessment Study Report

ERM will address APGI, the Recreation, Aesthetics, and Shoreline Management IAG, and other reviewer's comments on the Draft Study Report and prepare a Final Study Report. ERM will also provide APGI with an electronic copy of the Final Study Report as well as all databases that have been created.

4.0 Proposed Project Schedule

This study should take approximately 15 months to complete the preliminary draft report (12 months of field surveys and 3 months of analysis and report preparation).