

**Yadkin Hydroelectric Project (FERC No. 2197)
Fish and Aquatics (RTE aquatic) IAG Meeting
March 12, 2003**

**Alcoa Conference Center
Badin, North Carolina**

Final Meeting Summary

Agenda

See Attachment 1.

Meeting Attendees

See Attachment 2.

Welcome and Introductions

Gene Ellis, Yadkin, opened the meeting with introductions and a review of the agenda. Jane Peeples, Meeting Director, distributed copies of "Issue Advisory Groups Outline of Purpose and Suggested Process", a document distributed originally at the February 28, 2003 Issue Advisory Group (IAG) Organizational Meeting to those who did not have a copy (see Attachment 3). Jane reviewed the three-stage relicensing process schedule. She noted that at the February 28 meeting the following IAG meeting dates were set: April 8-10, 2003; May 20-22, 2003; June 3-5, 2003; July 8-10; August 5-7, 2003; September 2-4, 2003; October 7-9, 2003; November 4-6, 2003; and December 2-4, 2003. Continuing, Jane also reviewed the meeting procedures (i.e. meeting agendas and meeting summaries) and various meeting norms.

IAG Dispute Resolution Process

Jane mentioned that the issue of resolving study disputes was discussed briefly at the February 28 meeting, but was not resolved. Based on the discussions at the February 28 meeting, Jane said that she had prepared a single "IAG Dispute Resolution Process" document that could be used by all of the IAGs (for consistency of process). Jane distributed copies of this document (see Attachment 4). She admitted that, at times, there may not be agreement between Yadkin and the relicensing participants and that rather than allowing the disagreement to hinder the progress of the IAG, the disagreement or issue would be discussed and resolved on a separate, but parallel track by a dispute resolution workgroup. As part of this effort, the various members of the dispute resolution workgroup will develop position statements for consideration by Yadkin and for inclusion in the final consultation record. Yadkin's decision will then be reported to the full IAG.

Larry Jones, High Rock Lake Association, asked that the phrase "vested interest" under No. 1 in the document be revised to read, "expressed interest". Jane agreed to make the revision (see Attachment 5).

Steve Reed, NC Division of Water Resources, asked that a No. 5 be added to the document to describe the option of elevating the dispute to the Federal Energy Regulatory Commission (FERC). Jane noted that the “Issue Advisory Groups Outline of Purpose and Suggested Process” document states, “If through its dispute resolution process an IAG is not able to resolve a dispute regarding whether or how a particular study should be conducted, then Yadkin may opt to send the dispute to FERC for formal dispute resolution”. Steve clarified that it is not only Yadkin, but also the agencies or other participants that can request formal FERC dispute resolution. Jane agreed to revise the document accordingly (see Attachment 5). There were no additional comments.

Introduction of Technical Consultants

Wendy Bley, Long View Associates, stated that the purpose of the meeting was to scope fish and aquatic technical studies based on comments/issues/and study requests submitted to Yadkin in January 2003. She noted that Yadkin has retained Normandeau Associates (NAI) to plan and conduct the fish and aquatics, water quality, terrestrial and botanical, and rare, threatened and endangered species (RTE) studies at the Yadkin Project. Normandeau has been working with Alcoa Power Generating Inc. (APGI) on their Tapoco Project. Wendy introduced Rick Simmons, NAI, who said that NAI (130 employees in 10 offices) has been working for over 30 years at over 100 hydro sites conducting fish and aquatics, water quality, terrestrial, and RTE species related studies. Rick also introduced Don Kretchmer, NAI, and Sarah Allen, NAI who will be managing the water quality and terrestrial studies respectively.

Discussion of Study Requests and Study Scopes

Wendy Bley said that field studies would be conducted over the next two years (2003 and 2004). She noted that to be able to take advantage of the upcoming 2003 field season, it would be imperative to use the March and April IAG meetings to quickly develop study plans. She asked the participants to consider which, if any, studies could be conducted in year two rather than year one. She said that the goal for the meeting was “to leave with enough understanding of the study requested to develop draft study plans”.

Wendy listed several study scoping objectives that should be considered by all when scoping technical studies:

1. What is the issue?
2. What is the relationship to the Project or its operation?
3. What are the study objectives or what questions does the study need to answer?
4. What is the appropriate geographic scope?
5. Are there any timing/scheduling issues?
6. Are there any methodological issues?

Andy Abramson, The Land Trust for Central NC, asked that a No. 7 “coordination” be added to the list (i.e. can the proposed study be coordinated with other ongoing or proposed studies or projects).

Laura Fogo, Pee Dee National Wildlife Refuge, asked if the Project boundary would define No. 4 “the appropriate geographic scope” of the studies. If so, she asked Wendy to define the Project boundary. Wendy said that the Yadkin Project boundary, as defined in the Yadkin Initial Consultation Document (ICD, September 2002) is typically the normal full pool elevation of the Project reservoirs. She noted that there are areas where the Project boundary is greater than the full pool elevation. The Project boundary also includes lands around the Project’s dams and powerhouses. Wendy said that Yadkin had submitted a request to FERC that all transmission lines with the exception of two lines from the Narrows and Falls powerhouses be removed (not physically) from the Project boundary. The lines being proposed for removal are a part of the regional transmission grid and are regulated under a different part of the Federal Power Act.

Mark Cantrell, US Fish and Wildlife, asked if it was reasonable to presume that FERC will grant Yadkin’s request. Wendy said that the request is a standard request that she thought FERC would approve.

Larry Jones asked that the IAGs not confine their focus to within the existing Project boundary because, for example, there are some shoreline management issues beyond the Project boundary that should be addressed in relicensing. Wendy said that it is not a Project boundary question per se, but a Project nexus question. If the issue/resource is affected by the Project’s existence or operation, then it is a legitimate issue to be studied.

Randy Benn, Yadkin counsel, asked that No. 2 be revised to read, “What is the relationship between the resource and the Project or its operation?”

Danny Johnson, SC Department of Natural Resources, noted that South Carolina is quite a distance from Yadkin’s FERC Project boundary but that the state has real concerns about the amount and timing of flow coming from the Yadkin Project into the Pee Dee River. Wendy said that Yadkin had been asked to evaluate the potential impacts on aquatic and recreational resources downstream of the Project in cooperation with Progress Energy. She noted that at the February 28 meeting a suggestion was made that there be a separate IAG or Resource Workgroup (RWG) that includes participants in both the Yadkin and Progress Energy relicensings to address this issue. Wendy suggested that the formation of such a workgroup would have to wait until Progress Energy receives comments/study requests and is prepared to discuss those comments/study requests.

Laura Fogo asked if such a downstream instream flow study would be discussed in the Operations Model IAG meeting scheduled for Friday, March 14. Wendy replied that a component of the operations model would be likely to interact with the downstream instream flow study, but that the two were not the same thing (i.e. one is necessary to evaluate the other). For clarification, Wendy said that Friday’s Operations Model IAG meeting would focus on the development and status of the operations model itself.

Ben West, US Environmental Protection Agency, asked if it would be possible to conduct the downstream instream flow study during the 2003 field season, given where Progress Energy is today. Wendy said that Yadkin is ready and willing to participate in a downstream instream flow study, but is uncertain of Progress Energy’s position.

Steve Reed said that it should not be necessary to wait until June for Progress Energy to receive comments/study requests. He proposed that Yadkin and the resource agencies contact Progress Energy about initiating the study during the 2003 field season. Gene Ellis said that Yadkin is ready to talk and would be happy to meet with Progress Energy and the resource agencies.

Wondering if the SC Department of Natural Resources should continue to participate on the Fish and Aquatics IAG given that downstream instream flows would be addressed by a separate working group, Danny Johnson asked Wendy if she thought South Carolina should participate on the Water Quality IAG or the Operations Model IAG. Wendy suggested that South Carolina participate on the Operations Model IAG.

After reviewing the issues/comments/study requests received by Yadkin during Stage 1 regarding fish and aquatics (see Attachment 6), Wendy distributed outlines for four fish and aquatic studies (see Attachment 7).

Reservoir Fish and Aquatic Habitat Assessment

Working from the outline of the Reservoir Fish and Aquatic Habitat Assessment (see Attachment 7), Wendy proposed a field assessment of aquatic habitat at High Rock Reservoir and a reconnaissance level assessment of aquatic habitat at Tuckertown, Narrows, and Falls reservoirs. A reservoir macroinvertebrate analysis, reservoir fishery assessment, and fish entrainment evaluation was also proposed as a part of the study. Wendy noted that the Reservoir Fishery Assessment would not include the collection of any new data, but would be a compilation of existing North Carolina Wildlife Resources Commission (NCWRC) and other available data. Wendy solicited input on the proposed study.

Larry Jones said that it is important not to presume that High Rock Reservoir will be operated in the future (under a new license) as it is presently. He noted that there would be beneficial effects of operating High Rock similar to Narrows Reservoir. Wendy replied that she did not presume that the operation of High Rock Reservoir will not change in the future. She explained that because of the water level fluctuations and seasonal drawdown at High Rock, she thought a field assessment of the aquatic habitat appropriate (the distinction between High Rock and the other reservoirs being the level of assessment provided). Wendy noted that a similar habitat assessment was completed at APGI's Tapoco Project on Santeetlah Reservoir, a seasonal storage reservoir. Wendy said the objective of the study would be to understand how the current operation of High Rock affects aquatic habitat and that one of the questions answered by the study could be if the operation of High Rock was altered would there be a benefit (or detriment) to aquatic habitat. Wendy concluded by saying that Yadkin is not trying to make any judgments about how the reservoirs will be operated in the future. Yadkin is trying to ensure that FERC has the information it needs to make decisions about Project operations in the future.

Chris Goudreau, NCWRC, stated that he wants to be able to compare the aquatic habitat data collected on the four reservoirs and therefore wants a similar level of effort (field study) on all four reservoirs. He acknowledged that the reservoir level fluctuations were most dramatic at High Rock and noted the possibility that the rule curves for the operation of Tuckertown and Narrows Reservoirs could change under the new license. Wendy stated that because of the way

the reservoirs are currently operated (High Rock as a storage reservoir and Tuckertown, Narrows, and Falls as essentially run-of-river) the assessment methodologies would have to be different (i.e. there is an opportunity to survey High Rock during the winter drawdown, but no similar opportunity at the other reservoirs). Mark Bowers, U.S. Fish and Wildlife Service (USFWS) said that it was possible to draw down the other reservoirs to some level that would allow for some comparative measures on all four reservoirs. Wendy questioned drawing Tuckertown, Narrows, and Falls reservoirs down for the sole purpose of conducting the Aquatic Habitat Assessment. She said that because there is no established drawdown of these reservoirs currently, she would be uncertain about how to decide how much of a drawdown to assess. Gene Ellis noted that drawdowns of Tuckertown, Narrows, and Falls would likely require license variances.

Gerrit Jobsis, South Carolina Coastal Conservation League (SCCCL) and American Rivers, said he did not anticipate more of a draw at High Rock and was therefore satisfied with assessing the current drawdown area. Gerrit agreed that a potential 5-, 10-, 15, and/or 20-foot drawdown at the other reservoirs should be assessed in the event that these reservoirs are operated differently under a new license. He suggested that the study plan and methodology could be “fine-tuned” for each individual reservoir. Gerrit said that habitat characterization data could be collected with water in the reservoir.

Larry Jones commented that the assessment could not occur on High Rock during the summer, when the reservoir must be kept within five feet of full pool. Wendy said she understood that the assessment would have to occur outside of the summer recreation season.

Mark Cantrell suggested two potential methodologies for conducting the Aquatic Habitat Assessment at all four reservoirs: 1) divers or 2) a reservoir drawdown. He said that sonar/ponar could also be used to evaluate aquatic habitat parameters.

Wendy agreed to consider assessing the aquatic habitats at the reservoirs on an equal basis, especially Narrows Reservoir, which has the potential to operate differently and contribute to the system’s storage. She thought it possible to save time and money by limiting the assessment of aquatic habitat at Falls Reservoir, a reservoir with no large drawdown and negligible storage and Tuckertown Reservoir. Acknowledging that the study plan and methodology might have to be different for the four reservoirs, Chris Goudreau asked that the type of data (parameters) collected be the same (e.g. substrate and vegetation) to allow for comparison (i.e. the data collected at Tuckertown, Narrows, and Falls reservoirs should be the same as collected at High Rock Reservoir).

Donley Hill, U.S. Forest Service (USFS), commented that historic fishery data might not be adequate enough to characterize the existing fishery in High Rock Reservoir. Wendy acknowledged that there may have been some changes in the High Rock Reservoir fishery as a result of the 2002 drought, but she said the impacts are likely short-term. She said that the 2002 drought was an extreme condition, but not the existing condition.

Lawrence Dorsey, NCWRC, agreed that any drought-related impacts to High Rock's fishery are likely short-term and suggested that the fishery would likely rebound well. He said that the NCWRC had pre-drought fishery data and would continue to collect fishery data (using the same methodology) to allow for a comparison and determination of the drought's impacts on the fishery. Lawrence offered to share the NCWRC data with the IAG.

Mark Cantrell cautioned against relying on data from third or fourth parties. He thought it necessary to know when any existing data would be made available so that the IAG could appropriately determine if there is any additional data that needs to be collected during 2003 and 2004. Wendy said that all of the existing fishery resource data was summarized in Yadkin's ICD. She suggested that Mark and others review the data summarized in the ICD to determine if the methodologies and/or data collected is sufficient. Mark said that if the agencies thought the data in the ICD was adequate, they probably would have not requested the study.

Gerrit Jobsis, recommended that NAI use the study plan developed for the Tapoco Project relicensing (Santeetlah Reservoir Aquatic Habitat Assessment) as a starting point for the Aquatic Habitat Assessment study plan at Yadkin (to include Objectives 1, 2, and 3 on the study outline). Wendy asked if Objective 5 (Reservoir Fishery Assessment) could be grouped into the Aquatic Habitat Assessment study plan. Again, she said that the Reservoir Fishery Assessment would be a detailed accounting of all existing data (no new data collection). Gerrit asked that the Reservoir Fishery Assessment not be grouped with the Aquatic Habitat Assessment, but he agreed with Wendy that maybe a study plan for the Reservoir Fishery Assessment was not necessary.

Donley Hill asked if the Aquatic Habitat Assessment would evaluate the potential effects of the drawdown at High Rock Reservoir on spring spawners (March 15 – May 15). He stated that eggs that could be beneficial to High Rock are being lost. Chris Goudreau said that Objective 3 of the Reservoir Fish and Aquatic Habitat Assessment – evaluate the impacts to habitats associated with Project operations/water levels – would evaluate the affect of daily and seasonal reservoir fluctuations on habitat. Chris asked that this type of evaluation give consideration to fish spawning seasons and tolerance of water level fluctuations.

Gerrit suggested that Yadkin voluntarily agree to a reservoir stabilization plan during the peak spawning season and forego the need for a study. Gene Ellis noted that over the past several years Yadkin had, at the request of the NCWRC, minimized reservoir fluctuations (to no more than one foot) during the spawning season.

Summarizing, Wendy said that the Aquatic Habitat Assessment would examine the relationship between reservoir operations and aquatic habitat and evaluate how changes in operations impact habitat. Wendy agreed that the assessment would evaluate daily and seasonal fluctuations. She also agreed that the study plan would include a list of the species to be evaluated.

Laura Fogo asked if any RTE species studies were being proposed above Blewett Reservoir. Wendy said that there are no known RTE species within the Yadkin Project reservoirs and therefore Yadkin had no plans to survey for any particular species.

Continuing, Wendy asked if there were any other study objectives for the Reservoir Fish and Aquatic Habitat Assessment. Working through the study scoping objectives identified earlier, Wendy said that the geographic scope of the study would be all four Project reservoirs (although different methodologies might be used at the various reservoirs with the goal of collecting comparable data at each reservoir). With regard to timing and schedule, the Aquatic Habitat Assessment would most likely be conducted at High Rock during the winter to take advantage of the drawdown. Chris Goudreau asked that the aquatic vegetation in the reservoirs be evaluated during the growing season. Rick Simmons said that he would be relying on the wetlands study (to also be conducted by NAI) to map the aquatic vegetation (water willow).

Rick proposed a slightly different methodology for the Aquatic Habitat Assessment at High Rock Reservoir than that used at the Tapoco Project's Santeetlah Reservoir. He noted that High Rock has approximately 360 miles of shoreline, compared to Santeetlah's 80 miles. He said that NAI planned to look at aerial photographs and then go into the field with laser goggles, capable of mapping habitat polygons in the field, which can then be easily input into the computer. Larry Jones said that the residual vegetation that grew in the reservoir during the drought would not show up on the aerial photos.

Larry asked that the soils in High Rock Reservoir be studied to determine the potential for aquatic vegetation to grow in High Rock if water levels are stabilized. Wendy suggested that the soil study should be discussed in the Wetlands, Wildlife, and Botanical IAG meeting.

Donley Hill said that the USFS had identified soil erosion as an issue/study request. He asked if the Aquatic Habitat Assessment would be the logical place for this type of data collection. Wendy said that she understood the USFS request to be to evaluate the effects of shoreline erosion on the existing plant communities along the national forest and therefore had included the study request under the proposed terrestrial studies. Donley said that the same tools and expertise needed to complete the Aquatic Habitat Assessment could be used to map vertical soil erosion, not just along the national forest but also along other Project shorelines. He asked that soil erosion be included as part of the Aquatic Habitat Assessment. He also asked that the aquatic habitat data and soil erosion data all be included in one mapped product. Sarah Allen said that the aquatic habitat data and soil erosion data would be input into a common database.

Gerrit asked that draft study plans be distributed to the IAG in advance of the April meetings. Wendy said that she would work with NAI to try and distribute study plans in advance of the next meeting.

Reservoir Macroinvertebrate Surveys

Wendy said that the reservoir macroinvertebrate surveys are proposed to be included under the Reservoir Fish and Aquatic Habitat Assessment. She said that the objective of such surveys would be to understand the existing macroinvertebrate communities at each of the four reservoirs and to evaluate how the macroinvertebrate communities are impacted positively or negatively by reservoir operations. She said the surveys would likely entail standardized sampling of different substrate types, with the number of samples being commensurate with the size of the reservoir.

Rick Simmons added that the surveys would focus on habitats less than 20 feet deep. He said that NAI would collect deep-water ponar samples to survey for oligochaetes.

Gerrit Jobsis said that it is well documented that the water being discharged from Yadkin's dams and powerhouses does not meet state water quality standards. He said however, that the effect of water quality on the aquatic communities has not been documented. He asked that the Aquatic Habitat Assessment be dovetailed with any tailwater water quality studies.

Chris Goudreau asked if there was a specific request to sample for benthos in the Project reservoirs. He said that it might not be necessary to collect benthos data in the reservoirs. He said that the NCWRC is most interested in collecting benthos data in the Project tailwaters, where low levels of dissolved oxygen may be impacting habitat and the aquatic communities. Wendy said that she would review the comment letters received by Yadkin to see who, if anyone, requested reservoir benthos surveys. She said that Yadkin would not collect the data if it was not requested or necessary. Donley said that he had little use for oligochaete and/or chironomid data collected from deep in the reservoirs, but he thought that a survey of adult dragonflies around the reservoir margins would be useful. He suggested seasonal macroinvertebrate sampling in the Project tailwaters.

Reservoir Fishery Assessment (reabeled as Reservoir Fishery Report)

Wendy said that the Reservoir Fishery Assessment (reabeled by participants as the Reservoir Fishery Report) would merely be a repackaging of existing information (Yadkin, NCWRC, etc.) into a more detailed report. Wendy suggested that the assessment/report did not require a study plan.

Andy Abramson said that the Reservoir Fishery Assessment presented an opportunity to collect data on RTE species in the reservoirs. Wendy explained that it would not be reasonable to spend a lot of time and effort searching for RTE species generally without some focus on certain species. Wendy said that if there is a historical record or some Natural Heritage Program information that suggests there are RTE species in the reservoirs, then Yadkin would consider conducting such RTE surveys.

Mark Bowers said that the USFWS is interested in mussel surveys in the Project tailwaters. He offered to help NAI narrow down the habitat types to be surveyed.

Laura Fogo said that the USFWS has a list of RTE species that will need to be addressed. Wendy said that based on a similar experience during the Tapoco Project relicensing, Yadkin wanted to avoid lists and lists of RTE species being evaluated. Wendy said that Tapoco had evaluated a long list of RTE species and in the end the participants focused on just a few species. She asked that any lists be focused on those species that have the potential to be affected by the Project. Mark Bowers said that there will be RTE surveys and that it is not the job of the USFWS to narrow down the RTE species list for Yadkin. He said that the company, Yadkin, as the non-federal representative of FERC would be responsible for narrowing down the RTE species list.

Wendy said that Yadkin is only aware of the following aquatic RTE species: the Carolina and robust redhorse and RTE mussels. She said that terrestrial RTE species would be addressed in the Wetlands, Wildlife, and Botanical IAG meeting.

Resident Fish Entrainment Evaluation

Wendy said that the Resident Fish Entrainment Evaluation was the final study component included in the Reservoir Fish and Aquatic Habitat Assessment. She said that a similar desktop evaluation of entrainment based on the species of fish in the reservoirs and the Project developments and operations was conducted at the Tapoco Project. She said that she thought the NCWRC and the USFWS were comfortable with a similar approach at Yadkin, so long as there is some ground-truthing of intake velocities (at the Tapoco Project, the intake velocities were calculated, not measured). Prescott Brownell, National Marine Fisheries Service (NMFS), asked that the evaluation also consider downstream movement or out-migration (i.e. what is actually moving downstream through the Yadkin Project).

Gerrit Jobsis asked that the evaluation also study fish passage, specifically mortality rates of shad. Wendy thought it useful for the initial entrainment evaluation to focus on resident fish species, but acknowledged that the entrainment evaluation was the logical place for study of potential entrainment of migratory fish species (i.e. future fish species). Gerrit commented that the same study framework should be used for the resident and migratory fish entrainment evaluation (he suggested one study with two components).

Mark Bowers asked if Yadkin/NAI would be measuring actual intake velocities. Wendy said that Yadkin would rather not measure actual intake velocities, but because Yadkin was asked to, Yadkin would try to collect actual data to help confirm calculated velocities.

Chris Goudreau suggested that NAI prepare a study plan based on the Tapoco work.

Prescott Brownell asked for a basic limnological study of the reservoirs on a monthly basis to determine dissolved oxygen, conductivity, temperature conditions, reservoir overturn etc. Wendy said that the study request would be more appropriately addressed by the Water Quality IAG.

Tailwater Fish and Aquatic Assessment

Wendy reviewed the components of the proposed Tailwater Fish and Aquatic Assessment: 1) tailwater fishery assessment, 2) RTE fish species survey, 3) tailwater macroinvertebrate surveys, and 4) tailwater mussel surveys (see Attachment 7).

Gerrit Jobsis asked that the impact of the quality of water being discharged from the Project's dams and powerhouses on habitat suitability be evaluated. Wendy said that such an evaluation would be more appropriately addressed by the Water Quality IAG.

Rick Simmons said that NAI planned to put permanent transects in the Project tailwaters that could be used by resource agencies over the long-term for monitoring. He said that typically transects would be laid 1) close to the powerhouse, 2) mid-tailwater, and 3) further downstream.

Mark Bowers said that the USFWS would be focusing on the tailwater areas; the only areas left with any riverine habitat. He said that the USFWS would be interested in restoring fish species to the tailwater areas.

Wendy asked if there were any timing/scheduling issues associated with the tailwater sampling. Laura Fogo said that the sampling should be conducted during the last week in April and the first week of May. Lawrence Dorsey, NCWRC, suggested that sampling occur in the spring, summer, and fall. He mentioned that John Crutchfield, Progress Energy, might have some relevant temperature data.

Ben West asked if all planned unit upgrades were complete and if so, how would the upgrades be considered when conducting tailwater sampling. Wendy explained that under the current approved upgrade program, only the upgrade at Narrows Unit 4 has been completed. She said that the schedule of the remainder of the approved upgrades is uncertain. She said that it is likely that Yadkin will finish the upgrades at Narrows under the existing license but not High Rock. Wendy said that Yadkin fully understands and acknowledges that there are dissolved oxygen issues in the Project tailwaters. She said Yadkin intends to keep exploring ways to improve dissolved oxygen conditions (e.g. aeration technology). She noted that the technology installed at Narrows Unit 4 is not feasible at the High Rock units. Wendy said that Yadkin is required by FERC to continue monitoring dissolved oxygen conditions in the tailwaters and to continue consulting with the resource agencies. She concluded that it is very likely that some of the approved upgrades would be included as part of the new license.

Mark Bowers asked if FERC had bound Yadkin to a set of alternatives for increasing dissolved oxygen levels in the tailwaters. Wendy answered no. Mark recommended the installation of a complex weir to raise the tailwater several feet to re-aerate the water and improve dissolved oxygen levels, which he said is inexpensive and effective. Wendy said that there are many options for improving dissolved oxygen.

Chris Goudreau asked that the sampling for fish, macroinvertebrates, and mussels be conducted seasonally (because certain species are more easily found at certain times of the year). Rick suggested that sampling would not have to be conducted during the winter, only the spring, summer, and fall. Chris said that some mussel species are more active in the winter.

Before concluding the meeting, the group decided to briefly discuss the proposed Habitat Fragmentation Study and the Diadromous Fish Evaluation.

Habitat Fragmentation Study

Wendy reviewed the study outline for the Habitat Fragmentation Study. Donley Hill suggested that the study evaluate the fragmentation effects on freshwater mussels in not only the Project tailwaters, but also the Project tributaries. Wendy said that NAI would examine existing data on mussels in the tributaries (the NCWRC provided data in their January 2003 comment letter).

Based on comments received on the Habitat Fragmentation Study conducted at Tapoco, Wendy suggested that Yadkin, Normandeau, and the Yadkin relicensing participants meet to discuss the Tapoco study and what study components were/were not useful. The resource agencies were agreeable to this idea. Laura Fogo asked that the USFWS mussel biologist (John Fridell) be involved in the meeting/discussion.

Larry Jones asked if there were mussel populations of concern (areas of concern) in the Project reservoirs. Chris Goudreau responded yes – the NCWRC included a list of areas of concern in their January 2003 comment letter.

Diadromous Fish Evaluation

Wendy reviewed the study outline for the Diadromous Fish Evaluation (see Attachment 7). She said that Yadkin is prepared to search literature and historic records to assess the historic range of fish species in the Project area and to assess the current condition of the species in the river. She assumed that the resource agencies would take the lead on the development of a diadromous fish restoration plan, but said that Yadkin expected to work cooperatively with the agencies.

Mark Bowers reported that the USFWS has taken the lead in developing a diadromous fish restoration plan and is working cooperatively with the North and South Carolina state resource agencies, NMFS, Yadkin and others. He said that the plan would be a framework, not a timetable, for the safe upstream and downstream passage of such species as American shad, striped bass, alewife, sturgeon etc. He said that he had almost completed a rough draft and had plans to meet with the resource agencies. Prescott Brownell asked that a basin habitat characterization/distribution (including a historical distribution of habitats) be included in the plan. Mark said that detailed information such as river miles, suitable acres of habitat, capacity information etc. would be included.

Gerrit asked that some sort of study plan/framework for historic range and status of diadromous fish species be provided. He said that how the information was provided to the agencies and the participants would be important. He suggested the information be provided in GIS (Geographic Information Systems) or other graphic format so that it can be easily incorporated into the plan. Wendy said that Yadkin would not attempt to develop a study plan for the Diadromous Fish Evaluation, but would wait for additional discussions.

Wrap-up

Wendy said that Yadkin would try to distribute draft study plans for the Reservoir Fishery and Aquatic Habitat Assessment (including the Resident Fish Entrainment Evaluation) and Tailwater Fish and Aquatic Assessment before the April meeting. She said that she would also attempt to schedule a separate meeting or conference call to discuss the Habitat Fragmentation Study.

The meeting adjourned at approximately 4:30 p.m.

Attachment 1 – Agenda

**Alcoa Power Generating Inc. Yadkin Division (FERC No. 2197)
Communications Enhanced Three-Stage Relicensing Process**

Issue Advisory Group Meetings

**March 12-14, 2003
Alcoa Conference Center
Badin, North Carolina**

IAG Meeting Schedule

Wednesday, March 12 1:00 to 4:00 p.m.	Fish and Aquatics (RTE aquatic)
Thursday, March 13 8:00 to 10:00 a.m.	Water Quality
Thursday, March 13 10:00 to 12:00 noon	Wetlands, Wildlife, Botanical (RTE terrestrial)
Thursday, March 13 1:00 to 4:00 p.m.	Recreation, Aesthetics, Shoreline Management
Friday, March 14 8:00 to 10:00 a.m.	Operations Model
Friday, March 14 10:00 to 12:00 noon	County Economic Impacts

Agenda

(The following agenda applies to all individual IAG meetings)

1. Review of Meeting Schedule for 2003 and Procedures
2. Discussion of IAG Dispute Resolution Process
3. Introduction of Technical Consultants
4. Review and Discuss Study Requests and Study Scopes
5. Agenda for Next Meeting

Attachment 2 – Meeting Attendees

Name	Organization	E-mail
Andy Abramson	The Land Trust for Central NC	andy@landtrustcnc.org
Ben West	US Environmental Protection Agency	west.ben@epa.gov
Bob Barwick	NC Wildlife Resources Commission	barwickrd@ctc.net
Bob Smet	APGI, Yadkin Division	robert.smet@alcoa.com
Chip Conner	Uwharrie Point Community Association	chipconner@uwharriepoint.com
Chris Goudreau	NC Wildlife Resources Commission	goudrecj@wnclink.com
Coralyn Benhart	Alcoa	coralyn.benhart@alcoa.com
Danny Johnson	SC Department of Natural Resources	johnsond@dnr.state.sc.us
Don Kretchmer	Normandeau Associates	dkretchmer@normandeau.com
Donley Hill	US Forest Service	donleyhill@fs.fed.us
Gene Ellis	APGI, Yadkin Division	gene.ellis@alcoa.com
Gerrit Jobsis	SC Coastal Conservation League	scribers@bellsouth.net
Greg Scarborough	Rowan Association of Realtors	gscarborough@cbiinternet.com
Jane Peoples	Meeting Director	jpeoples@carolinapr.com
Jim Mead	NC Division of Water Resources	jim.mead@ncmail.net
Jody Cason	Long View Associates	jjcason@worldnet.att.net
Julian Polk	APGI, Yadkin Division	julian.polk@alcoa.com
Larry Jones	High Rock Lake Association	larry@foxhollowfarm.org
Laura Fogo	USFWS Pee Dee National Wildlife Refuge	laura_fogo@fws.gov
Lawrence Dorsey	NC Wildlife Resources Commission	dorseylg@vnet.net
Mark Bowers	US Fish and Wildlife Service	mark_bowers@fws.gov
Mark Cantrell	US Fish and Wildlife Service	mark_a_cantrell@fws.gov
Paul Shiers	PB Power	shiers@pbworld.com
Prescott Brownell	National Marine Fisheries Service	prescott.brownell@noaa.gov
Randy Benn	LLGM, Yadkin counsel	rbenn@llgm.com
Ray Johns	US Forest Service	rayjohns@fs.fed.us
Richard Scharf	SC Department of Natural Resources	scharf@dnr.state.sc.us
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Attachment 3 - Issue Advisory Groups Outline of Purpose and Suggested Process Document



Alcoa Power Generating Inc. – Yadkin Division
Communications Enhanced Three-Stage Relicensing Process

Issue Advisory Groups

Outline of Purpose and Suggested Process

Purpose

Issue Advisory Groups (IAGs) are being formed to advise Yadkin on the important resource issues requiring study during the relicensing process. As a member of an IAG, your primary role will be to help identify issues that should be considered in the relicensing process, help determine information and study needs in support of those issues and to review study results.

Membership

IAGs are composed of representatives from state and federal agencies, legislatures, tribes, affected municipalities and recognized non-government organizations (NGOs). Recognized NGOs are those who meet the following criteria:

- represent interests not represented in already existing NGOs
- represent an interest that is directly affected by Yadkin's relicensing
- represent the interests of a group of stakeholders rather than an individual
- demonstrate a defined organizational structure
- have a designated representative who can speak for the organization

Time Line

The first objectives of the IAG process are to help Yadkin develop a scope of technical resource studies to be conducted and to review study plans. It is anticipated that IAGs will then meet as needed throughout 2003, 2004 and the first quarter of 2005 to review study results, as available, and refine/adjust studies, as needed.

Meeting Procedures

The following are suggested procedures for managing the work of the IAGs. These suggestions are open for discussion and revision within the IAG.

Meeting Schedule

- Yadkin will schedule the initial meetings. Subsequent meetings will be held on an as needed basis as determined by the IAG or Yadkin. Yadkin will try to provide notice to IAG members of all IAG meetings about 30 days prior to the meeting, if possible. Meetings may be scheduled with less than 30 days notice, if necessary. IAG members who are unable to attend the meeting in person will be given the opportunity to participate by conference call.
- It may be helpful to select a particular week of the month to convene IAGs in order to avoid conflict with other regional licensing processes.

Agenda and Information

- IAG meeting agendas will be prepared by Yadkin with input from IAG members and distributed to members at least 14 days prior to the meeting. IAG members may submit comments about the agenda in writing, by phone, e-mail or fax up to one week prior to the meeting. In addition, the agenda may be modified at the beginning of the meeting with agreement from those attending.
- Yadkin and IAG members should endeavor to make available all documents and other information necessary to prepare for the meeting at least one week prior to the meeting. As an alternative, materials may be provided at the meeting.

Meeting Summary Preparation and Distribution

- Yadkin will provide a draft meeting summary to all meeting attendees within about 15 days of the meeting. Meeting attendees should provide their comments on the meeting summary to Yadkin in writing or by phone, fax, or e-mail within about 15 days following the meeting. Yadkin will then finalize the meeting summary within about 30 days after receiving comments and will distribute a final meeting summary to all IAG members, regardless of their

(continued)

Issue Advisory Groups (continued)

participation in the meeting. If no corrections are submitted, the meeting summary will become final 30 days after the date of the meeting.

Meeting Norms

- Meetings begin and end on time
- Agenda is followed during the meeting
- Needed information resources are available during the meeting
- Tangible progress is made toward accomplishment of the tasks
- All decisions are brought to closure in a way that is clearly understood
- Agenda for next meeting discussed at close of each meeting
- Group members demonstrate effective meeting behaviors

- One speaker at a time, one subject at a time, limit war stories
- Respect for opinions of others, look for merit in ideas
- Active participation of all
- All members present at start of meeting
- All members arrive informed about previous meeting and agenda for present meeting

Resolving Study Disputes

- As the process unfolds, disagreements may surface regarding the type and scope of studies to be conducted. It is anticipated that IAGs will consider developing an appropriate dispute resolution process with the goal of

resolving any study disputes within the IAG. Under FERC's regulations, a licensee is expected to conduct all "reasonable and necessary" studies requested by resource agencies and tribes. If through its dispute resolution process an IAG is not able to resolve a dispute regarding whether or how a particular study should be conducted, then Yadkin may opt to send the dispute to FERC for formal dispute resolution.

Yadkin's Communications Enhanced Three-Stage Relicensing Process

Stage One 2002-2003	Stage Two 2003-2006	Stage Three 2006-2008
1) Inform stakeholders and public (publish ICD) 2) Receive input from stakeholders and public 3) Form Issue Advisory Groups	4) Conduct studies 5) Review studies w/ IAGs and public 6) Draft Application 7) Receive comments on draft Application 8) File Application	9) FERC Reviews Application and Comments 10) Conducts Environmental Assessment 11) Issues License

Attachment 4 – IAG Dispute Resolution Process Document

**Alcoa Power Generating Inc.—Yadkin Division (FERC No. 2197)
Communications Enhanced Three-Stage Relicensing Process**

IAG Dispute Resolution Process

As the Issue Advisory Group process unfolds, there will be situations in which the issue being discussed cannot easily be resolved within the normal IAG setting. When such disputes first present themselves, Yadkin and the IAG members will discuss the issue and attempt to resolve the dispute through discussion commensurate with the nature and importance of the dispute. Should initial discussions over the dispute cause an inordinate delay of the work of the IAG or become an obstacle to the progress of the IAG, Yadkin will implement the following process:

- (1) The issue will be delegated by Yadkin or the meeting manager to a smaller dispute resolution work group made up of Yadkin representative(s) and IAG members who have a vested interest in the issue.
- (2) The dispute resolution work group will convene outside of the regular IAG meeting to discuss the issue. Interested parties who are part of the dispute resolution work group will have responsibility for development of their position statements.¹
- (3) Yadkin will take into consideration the position statements prepared by the interested parties while making a decision on the disputed issue. Yadkin's decision on the disputed issue and the position statements of the interested parties will be reported back to the full IAG.
- (4) Both the position statements prepared by the dispute resolution work group 's interested parties and Yadkin's report to the full IAG will become part of the IAG meeting summary and the final consultation record, which will be reviewed by FERC.

¹ For instance, in cases where the dispute is over a request to conduct a study or gather information, the position statements prepared by the dispute resolution work group should at a minimum include 1) a description of the study or information being requested, 2) the purpose of the study or need for the information being requested, and 3) the relationship between Project operations and effects on the resource to be studied.

Attachment 5 – IAG Dispute Resolution Process Document as Revised

**Alcoa Power Generating Inc.—Yadkin Division (FERC No. 2197)
Communications Enhanced Three-Stage Relicensing Process**

IAG Dispute Resolution Process

As the Issue Advisory Group process unfolds, there will be situations in which the issue being discussed cannot easily be resolved within the normal IAG setting. When such disputes first present themselves, Yadkin and the IAG members will discuss the issue and attempt to resolve the dispute through discussion commensurate with the nature and importance of the issue. Should initial discussions over the dispute threaten an inordinate delay of the work of the IAG or become an obstacle to the progress of the IAG, Yadkin will implement the following process:

- (1) The issue will be delegated by Yadkin or the meeting manager to a smaller dispute resolution work group made up of a Yadkin representative(s) and IAG members who have an expressed interest in the issue.
- (2) The dispute resolution work group will convene outside of the regular IAG meeting to discuss the issue and attempt to resolve it. As part of this effort, IAG members who are part of the dispute resolution work group will develop a written statement of their positions.¹ It is expected that these efforts will take place before the commencement of the next meeting of the IAG.
- (3) If the dispute resolution work group is unable to reach a timely resolution of the issue, Yadkin will take into consideration the position statements prepared by the interested parties when making a decision on the disputed issue. Yadkin's decision on the disputed issue and the position statements of the interested parties will be reported back to the full IAG.
- (4) Both the position statements prepared by the dispute resolution work group's interested parties and Yadkin's report to the full IAG will become part of the IAG meeting summary and the final consultation record, which will be reviewed by FERC.
- (5) If through this dispute resolution process an IAG is not able to resolve a dispute regarding whether or how a particular study should be conducted, then Yadkin or the resource agencies may opt to send the dispute to FERC for formal dispute resolution.

¹ For instance, in cases where the dispute is over a request to conduct a study or gather information, the position statements prepared by the dispute resolution work group should at a minimum include 1) a description of the study or information being requested, 2) the purpose of the study or need for the information being requested, and 3) the relationship between Project operations and effects on the resource to be studied.

Attachment 6 – Issues/Comments/Study Request Tables



WATER QUALITY

ISSUE/COMMENT	STUDY REQUEST
Current status of Yadkin Project reservoir and tailwater water quality	Continue reservoir and tailwater water quality monitoring
Effects of Yadkin Project reservoir operations/fluctuations on reservoir water quality	Evaluate effects of reservoir fluctuations on reservoir water quality
Current status of tailwater and reservoir benthic macroinvertebrate community	Evaluate benthic macroinvertebrate communities in reservoirs and tailwaters
Dissolved oxygen (DO) enhancement as a result of planned unit refurbishments	Evaluate potential DO change associated with various "aeration" technologies that could be installed during unit upgrades
Effects of sediment deposition on reservoir habitats and effects of dams/reservoirs on sediment transport to the lower river	Evaluate sedimentation and sediment transport in and through the Yadkin Project
Current status of sediment content and contamination and effects of reservoir fluctuations on contaminant availability	Evaluate sediment quality; test for pollutants and potential contaminants



FISH AND AQUATICS

ISSUE/COMMENT	STUDY REQUEST
Effects of Yadkin Project reservoir operations/fluctuations on fish and aquatic habitat	Map aquatic habitats in reservoir littoral and drawdown zones and evaluate impacts to habitats associated with Yadkin Project operations.
Effects of reservoir releases on Yadkin Project tailwater fish and aquatic habitat	Evaluate status of tailwater fisheries and habitat conditions.
Effects of Yadkin Project operations and resulting river flows free-flowing river habitat downstream of Blewett Falls	In cooperation with Progress Energy, conduct an instream flow study of free-flowing river downstream of Blewett Falls; including habitat mapping, IFIM, generalized habitat criteria analysis and IHA analysis.
Effects of Yadkin Project dams, reservoirs and operations on habitat fragmentation and population isolation	Evaluate potential for habitat fragmentation in Project watershed; including evaluation of population isolation.



FISH PASSAGE AND ENTRAINMENT

ISSUE/COMMENT	STUDY REQUEST
Diadromous fish restoration in the Yadkin/Pee Dee River basin	Evaluate the historic occurrence of diadromous fish species in the river basin.
Diadromous fish restoration planned for Yadkin/Pee Dee River	In cooperation with Progress Energy, assist agencies in the development of a diadromous fish restoration plan for the Yadkin/Pee Dee River.
Diadromous fish passage requirements at Yadkin Project dams	Develop a fish passage plan for the Project, including evaluation of possible fish passage technologies.
Entrainment of resident fish species at Yadkin Project powerhouses	Evaluate potential for fish entrainment at Yadkin Project dams; including measurement of approach velocities and other entrainment conditions.



TERRESTRIAL, WILDLIFE AND BOTANICAL

ISSUE/COMMENT	STUDY REQUEST
Effects of reservoir operations/fluctuations on wetlands and riparian habitats	Inventory wetlands and riparian habitat and evaluate potential effects of reservoir operations on these areas.
Current status of migratory bird use of Yadkin Project	Evaluate migratory bird use of Yadkin Project and identify potential habitat improvements.
Presence and impacts of terrestrial and aquatic invasive exotic plant pests (IEPPs) at the Yadkin Project	Inventory IEPPs at Yadkin Project and evaluate potential impacts to surrounding environs.
Transmission line and other facility operational impacts on vegetative cover and wildlife habitats	Inventory t-line cover-types and habitats and evaluate effects of t-line and facility operation and maintenance on these habitats.



RARE, THREATENED AND ENDANGERED (RTE) SPECIES

ISSUE/COMMENT	STUDY REQUEST
<p>Current status of RTE species at Yadkin Project that could be affected by Project operations</p>	<p>Inventory RTE species (aquatic and terrestrial; plants and animals) at the Yadkin Project and evaluate potential effects of Project operations on these species and their habitats.</p> <ul style="list-style-type: none">•Bald Eagle•Bats•Redhorses•Freshwater Mussels



RECREATION

ISSUE/COMMENT	STUDY REQUEST
Recreation use levels at Yadkin Project and at public recreation facilities	Assess recreation use at Yadkin Project.
Public recreation opportunities and facilities at Project	Inventory public recreation facilities and opportunities; and evaluate ADA accessibility. <ul style="list-style-type: none"> •Non-motorized boating •Portage trails •Primitive camping
Recreational carrying capacity of the Yadkin Project reservoirs	Evaluate the recreational carrying capacity of the Project reservoirs; including safety, experience and environmental aspects.
Effects of reservoir operations/fluctuations on recreation facilities and use	Evaluate effects of reservoir fluctuations on recreation facilities and facility use.
Effects of generation and releases on recreational use of tailwaters	Evaluate effects of powerhouse releases on recreational use of tailwaters.
Effects of recreational use of reservoirs on regional economy	Evaluate economic impacts associated with recreational use of the Project reservoirs. Evaluate effects of water level fluctuations on regional economy.



RECREATION (REGIONAL)

ISSUE/COMMENT	STUDY REQUEST
Effects of Yadkin Project operations and resulting river flows on recreational opportunities and use downstream of Blewett Falls	In cooperation with Progress Energy, conduct instream flow study for fishing and boating in lower river, below Blewett Falls.
Yadkin Project recreation facilities/opportunities may not be adequate from a regional perspective	Evaluate regional recreational opportunities.



AESTHETICS AND VISUAL QUALITY

ISSUE/COMMENT	STUDY REQUEST
Scenic quality is one of the most important aspects of the Yadkin Project	Inventory visual conditions of Project reservoirs and facilities from public access points.
Project facilities and operations may effect USFS visual quality standards and have an impact on aesthetics	Evaluate whether Project features meet visual quality objectives for UNF.



SHORELINE MANAGEMENT ISSUES

ISSUE/COMMENT	STUDY REQUEST
PIERS	
Update information on pier permits and other shoreline activities since inception of SMP	Create an updated pier permit and multi-use permit inventory for the Project.
Potential impact of piers on aquatic vegetation (water willow)	Evaluate the impact of pier development and use on water willow.
EROSION	
Reservoir shoreline erosion is adversely impacting terrestrial habitats at UNF	Inventory reservoir shorelines adjacent to UNF for areas of erosion that may be impacting terrestrial habitats.



CULTURAL RESOURCES

ISSUE/COMMENT	STUDY REQUEST
Operation of the Yadkin Project has the potential to affect historic and prehistoric cultural resources	Prepare a Cultural Resources Management Plan (CRMP) for the Yadkin Project. Conduct appropriate surveys needed to complete CRMP.



PROJECT OPERATIONS AND BASINWIDE MODELING

ISSUE/COMMENT	STUDY REQUEST
Operation of the Yadkin Project affects power generation, reservoir water levels, downstream river flows, water supplies, assimilative capacity and salinity intrusion.	Develop a basinwide hydrologic model that can evaluate alternative Project operations (flow releases and reservoir levels) and their potential impacts on power generation, river hydrology, water supply intakes, assimilative capacity, and salinity.



REGIONAL ECONOMICS

ISSUE/COMMENT	STUDY REQUEST
<p>Yadkin Project operations and resulting reservoir fluctuations have an economic impact on the 5 county region surrounding the Project.</p>	<p>Evaluate the economic impact to the five surrounding counties associated with existing and alternative reservoir operating levels.</p>

Attachment 7 – Fish and Aquatic Study Outlines

Issue Advisory Group Meetings
March 12-14, 2003
Alcoa Conference Center
Badin, North Carolina
IAG Meeting Schedule

Wednesday, March 12 1:00 to 4:00 p.m.	Fish and Aquatics (RTE aquatic)
Thursday, March 13 8:00 to 10:00 a.m.	Water Quality
Thursday, March 13 10:00 to 12:00 noon	Wetlands, Wildlife, Botanical (RTE terrestrial)
Thursday, March 13 1:00 to 4:00 p.m.	Recreation, Aesthetics, Shoreline Management
Friday, March 14 8:00 to 10:00 a.m.	Operations Model
Friday, March 14 10:00 to 12:00 noon	County Economic Impacts

IAG Meeting Agenda

1. Review of Meeting Schedule for 2003 and Procedures
2. Discussion of IAG Dispute Resolution Process
3. Introduction of Technical Consultants
4. Review and Discuss Study Requests and Study Scopes
5. Agenda for Next Meeting

FISH AND AQUATICS

ISSUE/COMMENT	STUDY REQUEST
Effects of Yadkin Project reservoir operations/fluctuations on fish and aquatic habitat	Map aquatic habitats in reservoir littoral and drawdown zones and evaluate impacts to habitats associated with Yadkin Project operations.
Effects of reservoir releases on Yadkin Project tailwater fish and aquatic habitat	Evaluate status of tailwater fisheries and habitat conditions.
Effects of Yadkin Project operations and resulting river flows free-flowing river habitat downstream of Blewett Falls	In cooperation with Progress Energy, conduct an instream flow study of free-flowing river downstream of Blewett Falls; including habitat mapping, IFIM, generalized habitat criteria analysis and IHA analysis.
Effects of Yadkin Project dams, reservoirs and operations on habitat fragmentation and population isolation	Evaluate potential for habitat fragmentation in Project watershed; including evaluation of population isolation.

Reservoir Fish and Aquatic Habitat Assessment

1. Map aquatic habitat in reservoir drawdown zones (High Rock)
2. Reconnaissance level aquatic habitat evaluation - general characterization of aquatic habitat conditions (Tuckertown, Narrows, Falls)
3. Evaluate impacts to habitats associated with Project operations/water levels
4. Reservoir macroinvertebrate surveys
5. Reservoir Fishery Assessment (current status of fishery based on existing data)
6. Resident Fish Entrainment Evaluation
 1. Desktop entrainment assessment
 2. Field measures of intake approach velocities

STUDY: Tailwater Fish and Aquatic Assessment

1. Tailwater fishery assessment
 1. Inventory and assessment of resident fish community
 2. Tailwater habitat conditions
2. Search for RTE fish species
 1. Robust redhorse
 2. Carolina redhorse
3. Tailwater macroinvertebrate surveys
4. Tailwater mussel surveys

STUDY: Habitat Fragmentation Study

1. Identification of isolated and fragmented populations
 1. Historic – literature based
 2. Present – literature and tailwater fish and mussel surveys
2. Evaluate fragmentation effects of dams and reservoirs
3. Identify opportunities for alleviating population isolation and fragmentation

FISH PASSAGE AND ENTRAINMENT

ISSUE/COMMENT	STUDY REQUEST
Diadromous fish restoration in the Yadkin/Pee Dee River basin	Evaluate the historic occurrence of diadromous fish species in the river basin.
Diadromous fish restoration planned for Yadkin/Pee Dee River	In cooperation with Progress Energy, assist agencies in the development of a diadromous fish restoration plan for the Yadkin/Pee Dee River.
Diadromous fish passage requirements at Yadkin Project dams	Develop a fish passage plan for the Project, including evaluation of possible fish passage technologies.
Entrainment of resident fish species at Yadkin Project powerhouses	Evaluate potential for fish entrainment at Yadkin Project dams; including measurement of approach velocities and other entrainment conditions.

STUDY: Diadromous Fish Evaluation

1. Historic range of diadromous fish – literature based
2. Status of diadromous fish populations in the Yadkin Pee-Dee River Basin -literature based
3. Potential for restoration of diadromous fish in the upper river basin – above Falls Dam