

**YADKIN-PEE DEE RIVER HYDROELECTRIC PROJECT
FERC NO. 2206**

**ISSUE EVALUATION TEMPLATE –FINAL STUDY PLAN
WATER RESOURCES WORKING GROUP
ISSUE NO. 16**

DESKTOP ENTRAINMENT STUDY – RESERVOIR AND ANADROMOUS FISH

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PROGRESS ENERGY

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YADKIN-PEE DEE RIVER PROJECT
WATER RESOURCES WORKING GROUP
ISSUES EVALUATION TEMPLATE**

Issue No. 16: Desk Top Entrainment Study - Reservoir and Anadromous Fish

1. Description of Issue

Impingement, entrainment, and turbine mortality of fish was identified as a potential impact to reservoir and anadromous fish populations. A desktop analysis of the potential for fish impingement, entrainment, and turbine mortality at the Project was requested. This analysis would also include pertinent plant intake physical information, reservoir environmental dynamics, and biological data on fish population characteristics.

2. Project Effects

Project operations result in periodic withdrawal of significant volumes of water through intake structures, which may potentially cause either impingement or entrainment of fish through the turbines, possibly resulting in fish mortality.

3. Applicable Existing Information

Information on the physical dimensions of each power plant intake structure exists. Based on the physical data, through-slot intake velocities can be calculated for each powerhouse intake. Other pertinent environmental data, including contemporary data on fish populations, exist for each hydroelectric development. These data can also be used for a desktop analysis. Much of this information has been summarized in Progress Energy's Initial Consultation Document, published in February 2003.

The Electric Power Research Institute has published a turbine entrainment and survival database for hydroelectric sites across the nation (EPRI 1997). This information can be used to evaluate the potential for impingement and entrainment at the Blewett and Tillery hydroelectric plants, based on similar physical and environmental characteristics listed in the database.

4. Study Needs

A desktop analysis (i.e., technical "white" paper) will be conducted to evaluate the potential for impingement and entrainment and turbine mortality for both plants. A study plan will be prepared that will outline the desktop analysis approach. The technical report will include information on existing physical data for the intake structures, reservoir environmental data, including fish population characterizations. Information for the Project will be compared to the

EPRI or other comparable databases to evaluate impingement and entrainment. This analysis will be completed during 2004.

5. Final Study Plan

5.1 Purpose

Impingement, entrainment, and turbine mortality of fish was identified as a potential impact to reservoir and diadromous fish populations in written comments on the Initial Consultation Document (ICD) for the Yadkin-Pee Dee River Hydroelectric Project. A desktop analysis of the potential for fish impingement, entrainment, and turbine mortality at the Project was requested. This analysis would also include pertinent plant intake physical information, reservoir environmental dynamics, and biological data on fish population characteristics.

5.2 Objectives

The objectives of this study are two-fold. First, the study will evaluate potential turbine entrainment effects on the major, representative resident fish species and any species proposed for diadromous restoration upstream of Project dams. A second objective is to determine the relative health of the resident fish populations and assess whether the qualitative level of turbine entrainment poses a significant impact to the populations.

5.3 Methodology

Most of the data necessary for this study are readily available, and no field data collection is planned. This will be a “desk-top” study of the available data, resulting in a brief paper summarizing the potential effects of turbine entrainment on Project area fisheries.

Desktop evaluations of fish entrainment and entrainment mortality potential will be conducted for selected, representative resident species and diadromous fish species planned for future restoration above Project dams using methodology similar to EPRI (1997). Intake approach velocities, frequency of spillage at dam, fish community composition, fish density, fish distribution and habitat use, and intake configuration, will be used to develop a qualitative estimate of potential fish entrainment. Potential entrainment mortality will be assessed by evaluation of fish species and their size classes at risk for entrainment, and by the type of turbine runner, mechanics, hydraulics and operation at each generating unit of each Project powerhouse as in other such desktop evaluations of fish entrainment mortality (EPRI 1997).

Prerequisite data for this study includes information coming out of the Water Resources Work Group (RWG) Issues Nos. 2, 3, and 4. The status of the health and condition of fish populations in Lake Tillery and Blewett Falls Lake will be determined as part of Water Resources Work Group Issue No. 2, “Describe Current Reservoir Aquatic Resources of Project Area”. Issue 3, “Current Migratory (Diadromous) Fishery Resources of the Yadkin-Pee Dee River in the Project Area”, will provide information on the current status of diadromous fish populations in the Pee

Dee River downstream of Blewett Falls Dam. Issue 4, “Support Development of a Resource Agency Diadromous Fish Restoration Plan for the Pee Dee River”, will describe planned future restoration of diadromous fish upstream of Blewett Falls Dam.

The assessment of reservoir fish community will be based in large part on the results of RWG Issue 2. Issue 2 analyses will include a review and further analysis of the historic fisheries data published in the ICD (Progress Energy 2003). The proposed studies must be completed in order to fully evaluate the status of the fish community and identify potential Project impacts. Concurrent with these cross-referenced studies, information on historical and current fish stocking and angler harvest within each reservoir will be reviewed to assess how the fishery has been managed in the past and to evaluate management success. Relevant current fish management plans for the Project reservoirs and any relevant resource agency fishery data will also be reviewed as appropriate. Community assessments will use fish species and life stage composition, relative abundance, growth data if available, angler capture and harvest data, along with comparison of Project reservoir fishery data with any applicable fisheries data from other lakes and reservoirs in the southeast region for which sufficient information exists.

5.4 Location and Duration

This study will be conducted in late 2004 to early 2005, following completion of prerequisite studies described in RWG Issues 2, 3, and 4. No fieldwork is anticipated as part of this study.

5.5 Data Analysis and Reporting

Study results will be used to determine if Project enhancements are needed. A report will be prepared summarizing the study results.

6.0 References

Progress Energy. 2003. Initial consultation document. Yadkin-Pee Dee River Project. FERC No. 2206. February 2003. Submitted by Progress Energy, Raleigh, North Carolina.

Electric Power Research Institute. 1997. Turbine entrainment and survival database-field studies. TR-108630. Final Report, October 1997. Prepared by Alden Research Laboratories, Inc., Holden, MA, Prepared for Electric Power Research Institute, Palo Alto, CA.

Resource Working Group Overlap (check if applicable)

___ **Water Resources Issue #** ___
___ **Land Use and Recreation Issue #** ___
___ **Terrestrial Resources Issue #** ___

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