

**YADKIN-PEE DEE RIVER HYDROELECTRIC PROJECT**

**FERC NO. 2206**

**ISSUE EVALUATION – FINAL STUDY PLAN**

**WATER RESOURCES WORKING GROUP**

**ISSUE NO. 1**

**RESIDENT RIVER AQUATIC RESOURCES OF PROJECT AREA**

**January 2004**

**PROGRESS ENERGY**

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

**Issue No. 1: Describe current resident river aquatic resources of Project area**

**1. Description of Issue**

There needs to be an adequate description of the current aquatic resources of the Pee Dee River of the tailwater reaches below the Tillery and the Blewett Falls Hydroelectric developments. Aquatic resources include resident fish species and benthic macroinvertebrates, including mussel fauna. Terrestrial wildlife that use the river for habitat and/or feeding and wetland habitats will be addressed under the Terrestrial Resources Work Group (see Terrestrial RWG Issues No. 4, 6, and 9). Key attributes of the aquatic resources include relative abundance, distribution, community trophic function and inter-relationships with other trophic levels. The status of rare, threatened, or endangered aquatic species within the Project area (e.g., shortnose sturgeon, robust redhorse, Carolina redhorse, highfin carpsucker, and mussel taxa) also needs to be addressed relative to species' life history/habitat needs and Project effects. Finally, there needs to be an adequate description of the existing recreational fishery resources and a review of state and federal fishery management plans and goals for the two river reaches. Incorporation of fishery management goals into relicensing studies will ensure that any recommended protection, mitigation, or enhancement (PME) measures are consistent with these plans.

**2. Project Effects**

Power plant operations result in fluctuations in river flows in tailwater reaches depending upon the need for power generation. Flow fluctuations can vary in both duration and magnitude depending upon the amount of power generation, inflows from the intervening watershed and season. The duration, magnitude and timing of power plant discharges will need to be evaluated to determine the effects of current and proposed flow regimes on the existing aquatic resources, including community composition, habitat, and overall ecosystem functioning.

Additionally, the fish community in each river reach is heavily influenced by the presence of non-native species, such as common carp, smallmouth buffalo, blue catfish, channel catfish, and flathead catfish. These non-native species have altered the native fish community through competition and/or predation effects. However, the immediate tailwaters support reasonable warmwater fisheries as evidenced by species composition and abundance of species. The river also supports a fairly diverse mussel community as evidenced by the number of species collected during contemporary surveys conducted by various entities. Several state-threatened and endangered mussel species have been documented in both river reaches, although detailed survey data on these species is lacking.

### **3. Applicable Existing Information**

Several sources of existing information are available to describe the current aquatic resources in the two river reaches below the Project dams. Most significantly, Progress Energy has conducted contemporary surveys of the aquatic resources of the Pee Dee River below each hydroelectric development during the period of 1998-2002. These studies included intensive biweekly surveys during the spring fish spawning period of March through June and quarterly or seasonal surveys. Furthermore, Progress Energy has helped lead cooperative, intensive surveys for rare sucker species (robust redhorse, Carolina redhorse, and highfin sucker) in and near the Project area during the spring and/or fall months since 2000.

Additional fishery resource data, including recreational fishery creel data, have been collected in the South Carolina portion of the Pee Dee River by the South Carolina Department of Natural Resources (Crochet and Sample 1996; Crochet and Black 1997). The North Carolina Wildlife Resources Commission, in coordination with the N.C. Department of Transportation and North Carolina Division of Water Quality, has collected mussel data in the North Carolina portion of the Pee Dee River.

Progress Energy has summarized and described aquatic resource data in its Initial Consultation Document<sup>3</sup> published in February 2003 (see Section 4 and Appendices D through G). The 2002 aquatic resources survey data collected in the river reach below the Tillery Development and the 2003 spring survey data for rare redhorses were not included in the ICD due to the publication deadline. These data will be summarized and compared to previously collected data. Community structure and trophic relationships of each river reach can be assessed with previously collected data.

Under the auspices of the Robust Redhorse Conservation Committee (RRCC), Progress Energy has co-funded studies to evaluate the genetic makeup of the robust redhorse population in the Pee Dee River. Results of these studies are described in Hendricks (2000) and DeMeo (1999, 2000, 2001). The RRCC has developed a conservation strategy for robust redhorse, which includes conservation goals, actions, and monitoring of known populations (Nichols 1999). This conservation strategy is currently being revised and should be available in 2003. The RRCC has also recently published policies regarding robust redhorse restoration goals, conservation, and committee administration (RRCC 2002). This information can be used to help manage the Pee Dee River population.

The life history, distribution, and genetic makeup of the Carolina redhorse in the Pee Dee River and associated tributaries (Little and Uwharrie Rivers) is currently being studied by the North Carolina State Museum of Natural Science (NCMNS), under a Progress Energy research grant. This information will be useful in determining the population status in the river basin of this undescribed species and in developing appropriate management strategies. Results of this research will be made available to Resource Work Group participants after publication by the NCMNS, which is anticipated to occur during early 2004.

Identified published fishery management or conservation plans that are relevant to the existing resource are listed below:

- National Marine Fisheries Service. 1998. Final recovery plan for the shortnose sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, MD. This plan is also pertinent to Issue No. 4, "Support development of resource agency diadromous fish restoration plan for the Yadkin-Pee Dee River Basin."
- Nichols, M. C. 1999. Conservation strategy for robust redhorse (*Moxostoma robustum*). Prepared by Michael C. Nichols for the Robust Redhorse Conservation Committee, October 1999. (Currently being revised).
- Robust Redhorse Conservation Committee. 2002. Robust Redhorse Conservation Committee Policies. Adopted October 18, 2002.
- Robust Redhorse Conservation Committee Yadkin-Pee Dee River Technical Work Group. 2002. September 17, 2002 meeting minutes, long-term and short-term conservation goals for robust redhorse.

The North Carolina Wildlife Resources Commission (NCWRC) is currently drafting a fishery management plan for the Yadkin-Pee Dee River, including both river reaches. The plan is expected to be available during 2003 (personal communication with Mr. Lawrence Dorsey, NCWRC).

The SCDNR has no current fishery management plan for the Pee Dee River, but the agency expects to develop a plan in the near future (personal communication with Mr. Dan Crochet, SCDNR).

The U.S. Fish and Wildlife Service, in cooperation with the NCWRC, SCDNR, and the National Marine Fisheries Service will be working on a diadromous fish restoration plan for the Yadkin-Pee Dee River Basin, which will be available during late 2004 or early 2005 (see Issue No. 4, "Support development of resource agency diadromous fish restoration plans for the Yadkin-Pee Dee River Basin"). The plan will be made available to RWG members.

#### **4. Study Needs**

Existing data collected by Progress Energy are sufficient to address the current status of aquatic resources with the exception of shallow water fish and crayfish, and mussel fauna. Progress Energy proposes to conduct two studies in 2004: (1) an intensive shallow water sampling for fish and crayfish fauna in shoal and gravel bar habitat; and (2) a habitat-based survey of mussel fauna in North Carolina waters of each river reach, including the immediate confluence areas of major Project reservoir tributaries, during 2004. The study plans will be developed with input from RWG participants. The Nature Conservancy of South Carolina (TNC) will be conducting a similar effort for mussel surveys for South Carolina waters of the Pee Dee River during 2003 (TNC 2003). Progress Energy is funding this survey and will provide in-kind field support, as requested by TNC.

Regarding research and management of the robust redhorse population in the Pee Dee River, Progress Energy has been an active member of the RRCC since its inception in 1995 and helped form the Yadkin-Pee Dee TWG in February 2003. Progress Energy will continue to actively participate in the RRCC and is committed to the TWG's short- and long-term conservation goals for the species in the Yadkin-Pee Dee River. Progress Energy will also continue to coordinate annual, cooperative surveys for the species in the Pee Dee River. These surveys also have a secondary objective of evaluating the status of Carolina redhorse and highfin carpsucker in each river reach. Standardized sampling methodology has been developed for these surveys (Nature Conservancy 2003, CP&L 2000, CP&L 2001, CP&L 2002, Yadkin Pee Dee Technical Work Group 2003), which is consistent with sampling methodology guidelines recommended by the RRCC (Robust Redhorse Conservation Committee 2002).

Flow issues will be addressed in Water Resources Issue No. 5, "Evaluate the relationships between Project operations/hydraulics and aquatic habitat, water quality, and fish migrations". It is expected that an instream flow study will assist in evaluating alternative scenarios and their adequacy in protecting and enhancing the existing aquatic resources. The instream flow study will also delineate the river reaches to be examined.

Water quality effects on aquatic resources attributed to power plant operations, specifically dissolved oxygen fluctuations in summer months, will be evaluated under Issues No. 6 ("Evaluate water quality of Lake Tillery and tailwaters") and 7 ("Water Quality - Blewett Falls Lake and Downstream"). Other water quality effects, such as sedimentation and nutrient enrichment, are not directly caused by Project operations. These effects result from either point or non-point discharge sources located within the basin watershed, operation of upstream reservoirs and other watershed-related factors indicating they are more properly considered as cumulative effects.

## **5. Final Study Plan**

### **5.1 Purpose**

The purpose of this study is to conduct two surveys consisting of: (1) shallow water surveys for fish and crayfish in the Pee Dee River below the Blewett and Tillery Hydroelectric Plants; and (2) surveys for mussels in the Pee Dee River below the Blewett and Tillery Hydroelectric Plants, including major tributaries of the river and Project reservoirs. These surveys are being conducted to augment the aquatic resources data collected by Progress Energy as summarized in the Water Resources Work Group Issue No. 1, "Describe current resident river aquatic resources of Project area".

### **5.2 Objectives**

#### **5.2.1 Shallow Water Fish and Crayfish Survey**

The objective of this survey is to intensively sample shallow water habitats in the Pee Dee River below each plant to characterize the fish and crayfish communities that inhabit these areas. An intensive, one-time sampling effort will be conducted in the two river reaches during the spring

or early summer months on shoal/island and shallow run complexes in the Piedmont and Fall Line Zone and on gravel/cobble bars, sand bars, and backwaters/sloughs in the Sandhills and Coastal Plain Zones.

### **5.2.2 Mussel Survey**

The objective of this survey is to intensively survey the Pee Dee River below each plant to characterize the mussel communities that inhabit these areas. Additionally, the major tributaries of each river reach and in the Project reservoirs will also be surveyed. An intensive, one-time sampling effort will be conducted in the two river reaches during the summer months through a habitat-based survey in the Piedmont and Fall Line Zones located in North Carolina and South Carolina. The Nature Conservancy of South Carolina is conducting a mussel survey in South Carolina waters of the Pee Dee River during 2003-2004, and results from that study will be used to describe mussel fauna in that reach of the river (The Nature Conservancy 2003; see Appendix 1). Progress Energy is supporting that survey with funds and any requested in-kind support.

### **5.2.3 Describe Current Riverine Aquatic Resources**

This objective will utilize the new shallow water fish and crayfish data, mussel data, and the riverine historical fishery and benthic macroinvertebrate data together to allow a comprehensive overview of the health and status of the resident riverine aquatic community. Data summaries presented in the ICD will be augmented with new data then compared with available data from other nearby drainages. Also, the results will be compared with relevant aquatic resource management plans to assess the level of consistency with current management expectations.

## **5.3 Methodology**

### **5.3.1 Shallow Water Fish and Crayfish Survey**

The survey will be conducted during the spring or early summer months (April through June), depending upon flow conditions conducive for sampling the identified areas. Samples will be collected either at or just above low-flow conditions (no plant generation or reduced power plant generation). A reach length of 366 m (1,200 feet) will be established in each identified sampling area, and representative habitat areas will be identified and sampled to ensure that all habitat types in an area are represented. Habitats that are expected to occur, depending upon the sampled area, include riffle areas, undercut banks with woody debris, gravel or cobble bars, boulder outcrops, island/side channel complexes, sand bars, and backwater sloughs. An attempt will be made to standardize the number of samples collected in each identified area. However, the total number of collected samples will depend upon the number of identified habitat areas present in each area and whether safe, wadeable sampling conditions are present at the site. Fish and crayfish will be sampled in each habitat area, and sampling passes will continue in each habitat area until no new taxa are collected. The total electrofishing time will be recorded for each habitat area. Each habitat area sampled will be delineated with the GPS and qualitatively described in field notes. Visual substrate classification will follow the modified Wentworth scale

(McMahon et. 1996). The GPS data will be overlaid on a scaled map to depict the sampled habitat types within each area.

A Smith-Root 2.5 GPP or 5.0 GPP pram electrofisher and/or a Smith-Root Model 15 backpack electrofisher and seines will be used to sample the fish community. Pulsed DC electrofishing will be utilized for sampling with voltage adjusted to produce 3-4 amps in the sampling field, depending upon the water conductivity. Electrofishing will be conducted in an upstream fashion at each wadeable sampling location. The pram or backpack electrofisher will also be used in tandem with a 0.32-cm kick seine (3.1-m in length and 1.8-m in depth) to adequately sample any riffle areas for species (e.g., darters) that might inhabit these areas. A 6.1-m x 1.8-m flat seine (0.32 cm mesh) will be used to sample sites at each sample area that are suitable for efficient seining. The number of seine hauls will depend upon the number of suitable sampling areas identified at each sampling area.

Crayfish will be qualitatively sampled with kick-nets and/or dip nets by disturbing the substrate. Additionally, crayfish will also be collected during the electrofishing sampling for fish.

The following areas will be sampled in the Pee Dee River downstream of the Tillery and Blewett Plants. A description of the transect locations for each plant is given below:

#### **Pee Dee River below the Tillery Hydroelectric Plant**

<b>Area</b>	<b>Location Description (approximate river miles from plant)</b>
1	Shoal below N.C. Highway 731 Bridge (0.5 mile)
2	Shoal just above Rocky River confluence (5.0 miles)
3	Buzzard Island shoal and side channel complex (8.1 miles)
4	Shoal with boulder outcrop below N.C. Highway 109 Bridge (12.2 miles)
5	Shoals just above Blewett Falls Lake (17.0 miles)

#### **Pee Dee River below the Blewett Hydroelectric Plant**

<b>Area</b>	<b>Location Description (approximate river miles from plant)</b>
1	Big Island shoal and side channel complex (NC waters - 1.0 mile)
2	Shoal and island complex just below Highway 74 Bridge (NC waters - 5.0 miles)
3	Mill Creek shoal and island complex (NC waters - 11.7 miles)
4	Great Island shoal and side channel complex (SC waters - 20.2 miles)
5	Shoal just above U.S. Highway 1 at Cheraw (SC waters - 23.0 miles)
6	Thompson Creek shoal complex below Cheraw (SC waters - 26.2 miles)
7	Gravel and sand bar complex below Blue's Landing (SC waters - 55.0 miles)
8	Gravel and cobble shoal just above Cashua Ferry Landing (SC waters - 72.0 miles)

All fish and crayfish, regardless of sampling methodology, will be identified to the lowest practicable taxa level. Fish will be measured for total length to the nearest millimeter and weighed to the nearest gram. Fish that can not be accurately identified in the field or large numbers of small individuals will be preserved with 10% buffered formalin solution and transported to the laboratory for identification and body measurements. If large numbers of a particular minnow or other taxon are collected, the taxon will be subsampled for lengths, group weights, and identification. Crayfish that cannot be accurately identified in the field will be

preserved in 70% ethanol. All other collected fish and crayfish that are alive and healthy will be released at the sampling site. Some specimens will be retained for voucher purposes. Any retained voucher specimens will be kept in Progress Energy's fish and invertebrate collections or transferred to the North Carolina State Museum of Natural Science's collections.

At each sampling location, water temperature, dissolved oxygen, conductivity, pH, and turbidity will be measured with a laboratory- and field-calibrated YSI multi-parameter instrument (Model 650) or similar equipment. Sample locations will be located with a GPS unit with sub-meter accuracy. Digital photographs will also be taken of each sampling site.

The survey data will be collected in accordance with Progress Energy's Quality Assurance/Quality Control Program (Progress Energy 2003a, 2003b). Progress Energy is certified by the North Carolina Division of Water Quality and the South Carolina Department of Health and Environmental Control to collect water quality and biological samples through Standard Operating Procedures (SOP). Specific procedures for sample collection and data custody are detailed in Progress Energy's QA/QC Program.

### 5.3.2 Mussel Survey

The survey will be conducted during the summer months, depending upon flow conditions conducive for sampling the identified areas. Samples will be collected at low-flow conditions (no plant generation or reduced plant generation).

The following areas will be sampled in the Pee Dee River mainstem downstream of the Tillery and Blewett Plants. In addition, major tributaries of the Project reservoir and mainstem river will be sampled at the first suitable mussel habitat encountered upstream from the confluence with the associated water body. These latter habitats will be sampled for mussels outside the zone of power plant hydraulic influence. A description of the transect locations below each plant is given below:

#### Pee Dee River below the Tillery Hydroelectric Plant

Area	Location Description (approximate river miles from plant)
1	Shoal below N.C. Highway 731 Bridge (0.5 mile)
2	Shoal just above Rocky River confluence (5.0 miles)
3	Buzzard Island shoal and side channel complex (8.1 miles)
4	Shoal with boulder outcrop below N.C. Highway 109 Bridge (12.2 miles)
5	Shoal just above Blewett Falls Lake (17.0 miles)
6	Clarks Creek
7	Rocky River
8	Brown Creek
9	Little River
10	Savannah Creek

**Pee Dee River below the Blewett Hydroelectric Plant**

<b>Area</b>	<b>Location Description (approximate river miles from plant)</b>
1	Big Island shoal and side channel complex (NC waters - 1.0 mile)
2	Shallow run with boulder outcrops above Highway 74 Bridge (NC waters - 2.7 miles)
3	Shoal and island complex just below Highway 74 Bridge (NC waters - 5.0 miles)
4	Jones Creek shoal and island complex (NC waters - 11.7 miles)
5	Great Island shoal and side channel complex (SC waters - 20.2 miles)
6	Shoal just above U.S. Highway 1 at Cheraw (SC waters - 23.0 miles)
7	Cartledge Creek (located just below Big Island shoal and side channel complex)
8	Island Creek (at shoal complex located below U.S. Highway 74 Bridge)
9	Hitchcock Creek (confluence located below Seaboard railroad trestle)
10	Jones Creek (at shoal complex)
11	Westfield Creek (at Great Island in South Carolina)

**Lake Tillery**

<b>Area</b>	<b>Location Description (approximate river miles from plant)</b>
1	Uwharrie River (first shoal complex upstream at normal lake elevation)
2	Mountain Creek
3	Jacobs Creek
4	Cedar Creek

**Blewett Falls Lake**

<b>Area</b>	<b>Location Description (approximate river miles from plant)</b>
1	Mountain Creek
2	Buffalo Creek
3	Smith Creek

In the mainstem areas, any suitable habitat that is found when traveling between the sampling areas will be visually and tactile surveyed for mussels. These areas will be documented with GPS equipment.

Mussel data from the Pee Dee River, Brown Creek, and Little River that was collected during a 2003 cooperative study will be utilized to augment data collected under this study plan. This survey was conducted under a cooperative agreement among the U.S. Fish and Wildlife Service, North Carolina Wildlife Resources Commission, and Progress Energy.

Samples will be collected in areas suitable for mussel habitation. Generally, shoal and shallow run complexes with gravel, cobble, and sand substrates will be surveyed with using the transect line method. A 100 (328 feet) meter longitudinal transect on each river bank will be established in each sample area that adequately represents suitable mussel habitats. Habitats within the established transect area (from river bank to river bank) will be searched longitudinally for mussel taxa. Timed visual surveys, aided with glass-bottomed buckets and snorkeling in shallow water areas, will be conducted at each transect. Tactile surveys of the substrate will also be conducted to determine the presence of mussel. Additionally, the riverbank and the sampled area will be visually surveyed for any relict mussel shell middens to detect potential presence or

absence of taxa. Any crayfish that are observed during the mussel surveys will also be collected to complement data collected during the shallow water fish and crayfish surveys. Each surveyed habitat area and mussel collection will be mapped with GPS equipment with sub-meter accuracy. Visual substrate classification will follow the modified Wentworth scale (McMahon et. 1996). The GPS data will be overlaid on a scaled map to depict the sampled habitat types within each area.

Mussel taxa will be kept alive in pursed, small meshed bags suspended in the water column until identified and processed for measurements. All mussels will be identified to the lowest practicable taxa level. Mussels will be photographed with a digital camera, measured for total shell length diameter to the nearest mm, and weighed to the nearest gram. Selected individuals may be retained for curation by the North Carolina State Museum of Natural Science (NCMNS). Tissue samples from selected taxa may also be collected for genetic analysis by the NCMNS. After processing, mussels will be returned alive to the sampled habitat area.

At each sampling location, water temperature, dissolved oxygen, conductivity, pH, and turbidity will be measured with a laboratory- and field-calibrated YSI multi-parameter instrument (Model 650) or similar equipment.

The survey data will be collected in accordance with Progress Energy's Quality Assurance/Quality Control Program (Progress Energy 2003a, 2003b). Progress Energy is certified by the North Carolina Division of Water Quality and the South Carolina Department of Health and Environmental Control to collect water quality and biological samples through Standard Operating Procedures (SOP). Specific procedures for sample collection and data custody are detailed in Progress Energy's QA/QC Program.

## **5.4 Location and Duration**

### **5.4.1 Shallow Water Fish and Crayfish Survey**

The study is expected to be conducted over several weeks at the identified areas in the Pee Dee River reaches below the Blewett and Tillery Hydroelectric Plants. Sampling will be dependent upon favorable flow conditions for wading with the sampling equipment. Five areas will be sampled below the Tillery Plant, and eight areas will be sampled below the Blewett Plant (see Section 3.0, Nature of Study).

### **5.4.2 Mussel Survey**

The study is expected to be conducted over several weeks during the June through August period at the identified areas in the Pee Dee River reaches below the Blewett and Tillery Hydroelectric Plants. Sampling will be dependent upon favorable flow conditions for wading and visual surveys. Four mainstem river areas will be sampled below the Tillery Plant, and six mainstem river areas will be sampled below the Blewett Plant. In addition, major tributaries in the Project reservoirs and mainstem reaches will also be sampled or data presented from previous contemporary sampling efforts. All sampling areas listed under Section 5.3, methodology.

## 5.5 Data Analysis and Reporting

### 5.5.1 Shallow Water Fish and Crayfish Survey

The fish data will be adjusted and reported on a catch-per-unit effort basis (number/hour and weight (grams)/hour) to evaluate taxa relative abundance and distributional patterns. For crayfish, the total collected number of each identified taxa will be reported. The fish and crayfish data will be summarized by habitat types within each sampled area, the total catch for the entire sample area (habitat types combined), and the total catch for the entire river reach below each power plant (habitat types and areas combined). Data collected from this study will augment the existing aquatic resource survey data collected from the Pee Dee River by Progress Energy from 1998 to 2002. A report, summarizing the study results, will be prepared during 2005.

### 5.5.2 Mussel Survey

Species composition, catch-per-unit effort, and relative abundance of collected taxa will be estimated. The mussel data will be summarized by habitat types within each sampled area, the total number for the entire sample area (habitat types combined), and the total number for the entire river reach below each power plant (habitat types and areas combined) or major tributary. Any rare, threatened, or endangered species that are found in the study will also be listed in a separate table and located on a GIS map. Data collected from this study will augment the existing aquatic resource survey data collected from the Pee Dee River by Progress Energy from 1998 to 2002. A report, summarizing the study results, will be prepared during 2005.

### 5.5.3 Description of Current Resident Aquatic Resources

Existing aquatic resource data presented in the ICD, combined with the new data described above, will be reviewed and evaluated with reference to any available and comparable data from other river basins in the region. Also, current management plans for the Yadkin-Pee Dee River basin will be reviewed and compared with the current data to evaluate the consistency with those plans. A report summarizing the results of this effort will be prepared to provide an overall assessment and description of the resident aquatic resources of riverine portions of the Yadkin-Pee Dee River. This summary report will be prepared in 2005.

## 6.0 References

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- Progress Energy. 2003. Initial consultation document. Yadkin-Pee Dee River Project. FERC No. 2206. February 2003. Submitted by Progress Energy, Raleigh, North Carolina.
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The Nature Conservancy. 2003. Contract proposal: Survey of Unionidae within the Pee Dee River system, March 24, 2003.

Yadkin-Pee Dee River Technical Work Group. 2003. Intensive surveys for robust redhorse (*Moxostoma robustum*) on the Pee Dee River below the Blewett Hydroelectric Plant. 2003 work plan. Conducted under the auspices of the Robust Redhorse Conservation Committee, Yadkin-Pee Dee River Technical Work Group. April 16, 2003.

**Resource Working Group Overlap (check if applicable)**

**Water Resources Issues # 4 and 5**

**Land Use and Recreation Issue # \_\_\_\_\_**

**Terrestrial Resources Issues # 4, 6, and 9**

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**APPENDIX 1**

**THE NATURE CONSERVANCY OF SOUTH CAROLINA**

**STUDY PLAN FOR THE  
MUSSEL SURVEY OF PEE DEE RIVER, SOUTH CAROLINA**



**Contract Proposal: Survey of *Unionidae* within the Pee Dee River System  
March 24, 2003**

### **Introduction**

The Pee Dee River system within South Carolina is second-largest river basin within the state. While some portion of the mainstem is apparently impacted by dams in North Carolina, a major portion of the mainstem downstream of Florence, SC, and the major tributaries (Black, Lynches, and Little Pee Dee Rivers) are free flowing, relatively free of urban development, and buffered by extensive tracts of bottomland forests.

The ecological qualities of the system are suspected to be very significant, but very little field data exists to support this assumption. Due to its rural location, the system has been little studied. A notable exception exists for fisheries, including fisheries surveys in small streams near the Fall Line for the sandhills chub (*Semotilus lumbee*) and pinewoods darter (*Etheostoma mariae*), general fishery surveys for the Sandhills National Wildlife Refuge, and intensive surveys for the rare robust redbhorse (*Moxostoma robustum*). Together, these efforts represent some relatively concentrated fisheries data for the Fall Line area, but leave much of the system in an unknown status for fisheries and other ecological targets.

The status of molluscan fauna is even lesser known. Several scattered records were reported by zoologist Richard Johnson in 1970; these sites have not been re-examined since. Nonetheless, the geographic spread of sites and variety of species Johnson reported give reason to believe the system could support a diverse and geographically significant molluscan fauna. The molluscan status of the upper Lynches River and Flat Creek (Lancaster Co, SC) were updated in the late 1990's by John Alderman (then NC Wildlife Resources Commission) during a search for the critically endangered Carolina heelsplitter (*Lasmigona decorata*). In addition to finding several locations of the heelsplitter, Alderman reported additional Unionidae including yellow lance (*Elliptio lanceolata*), Carolina slabshell (*E. congarea*), eastern creekshell (*Villosa delumbis*), notched rainbow (*V. constricta*), eastern floater (*Pyganodon cataracta*), creeper (*Strophitus undulatus*), and brook floater (*Alasmidonta varicosa*). Again, the variety of species reported by Alderman for a relatively small search area gives reason to believe that there remains significant untapped territory for molluscan fauna in the Pee Dee drainage.

### **Proposed Survey**

The work proposed herein seeks to fill molluscan data gaps across the Pee Dee system. The search will include the Pee Dee mainstem, Waccamaw River mainstem, Black River, Lynches River, and Little Pee Dee river. The effort will include a combination of searches via road crossing, canoe runs, and SCUBA diving. The latter is necessary to search the deep waters of major river mainstems.