



REPORT OF THE

ROBUST REDHORSE CONSERVATION COMMITTEE ANNUAL MEETING

Webb Wildlife Management Area
Garnett, South Carolina
September 14-16, 2009



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ACRONYMS & ABBREVIATIONS

CPLC	Carolina Power and Light Company		
CVIOG	Carl Vinson Institute of Government		
DPC	Duke Power Company		
FERC	Federal Energy Regulatory Commission		
GA Coop	University of Georgia Cooperative Fish & Wildlife Resource Unit		
GA DNR	Georgia Department of Natural Resources		
GPC	Georgia Power Company		
GRN	Georgia River Network		
GWF	Georgia Wildlife Federation		
NC WRC	North Carolina Wildlife Resources Commission		
NCS MNS	North Carolina State Museum of Natural Sciences		
NYU	New York University		
SC Coop	South Carolina Cooperative Fish & Wildlife Research Unit		
SC DNR	South Carolina Department of Natural Resources		
SCEG	South Carolina Electric and Gas		
SCA	South Carolina Aquarium		
UGA	University of Georgia		
USACOE	U.S. Army Corps of Engineers		
USFS	U.S. Forest Service		
USFWS	U.S. Fish and Wildlife Service		
USGS	U.S. Geological Survey (Biological Resources Division)		
FTC	Fish Technology Center		
NFH	National Fish Hatchery		
SFH	State Fish Hatchery		
WMA	Wildlife Management Area		
CCAA	Consolidated Conservation Agreement with Assurances for the Ocmulgee River		
Excom	Former Technical Advisory Group to the RRCC+		
GIS	Geographic Information System		
IT TWG	Information Technology Technical Working Group		
MOU	Memorandum of Understanding		
PIT	Passive Integrated Transponder Tags		
RRCC	Robust Redhorse Conservation Committee		
TAG	Technical Advisory Group		
TWG	Technical Working Group		
AGR	Artificial genetic refuge	MW	Megawatts of electrical output
C	Celsius	m ³ /s	Cubic meter per second
cfs	Cubic feet per second	N _e	Effective population size
cm	Centimeter	ppt	Parts per thousand
g	Gram	rkm	River kilometer
kg	Kilogram	RM	River mile
km	Kilometer	TL	Total length
m	Meter	YC	Year class
mg/l	Milligrams per liter	YOY	Young of year
mm	Millimeter		



EXECUTIVE SUMMARY

The robust redhorse recovery effort, in its 15th year, encompasses management activities and research and conservation efforts undertaken by members of the Robust Redhorse Conservation Committee (RRCC), university scientists, and other affiliates. The RRCC, established by a Memorandum of Understanding (MOU) signed in 1995, is responsible for developing and managing a recovery approach for the imperiled robust redhorse (*Moxostoma robustum*). The effort and expertise applied to the questions of recovery are brought together at the annual meeting of the RRCC. This report summarizes updates on management activities, research findings, and conservation efforts, as well as documents decisions made at the 2009 RRCC Annual Meeting.



INTRODUCTION

Historically, the robust redhorse (*Moxostoma robustum*) inhabited Atlantic slope drainages from the Pee Dee River system in North Carolina to the Altamaha River system in Georgia. The first scientifically confirmed sighting of robust redhorse since naturalist Edward Cope described the species in 1869 occurred when the fish was re-discovered in the Oconee River in Georgia in 1991. The species is presently known to exist as natural populations in the Ocmulgee, Oconee, Savannah, and Pee Dee (NC, SC) rivers. Fingerlings from the Oconee River population have been introduced in the Oconee, Ocmulgee, Broad, and Ogeechee Rivers in Georgia. Fingerlings produced from Savannah River broodstock have been introduced into the Broad and Wateree Rivers in South Carolina. The robust redhorse appears to inhabit specialized areas of large rivers, which are difficult to sample but regardless of the absence of sightings, small numbers are usually found when species-targeted surveys are conducted.

Impoundments, predation by introduced nonnative species, and deterioration of habitat due to sedimentation and water pollution are believed to have contributed to the decline of the species. The complex and diverse problems facing the robust redhorse require an interdisciplinary approach, using a broad spectrum of experience, expertise, and management authority to maintain and restore this imperiled species. In addition, it is essential that recovery efforts include a process that works closely with the private sector as well as government agencies potentially impacted by and interested in robust redhorse conservation.

The Robust Redhorse Conservation Committee (RRCC) was established by a Memorandum of Understanding (MOU) signed in 1995 to develop and manage a recovery approach for the robust redhorse (*Moxostoma robustum*), previously a Category 2 candidate for Federal listing under the Endangered Species Act. The RRCC is actively committed to the recovery of the imperiled robust redhorse throughout its former range. It identifies priority conservation needs for the robust redhorse and its habitat and coordinates implementation of research and management programs for addressing those needs.

The ninth annual meeting of the RRCC was held September 14 – 16, 2009 at Webb Wildlife Management Area, South Carolina. Approximately 30 representatives of the signatory agencies to the MOU, university research affiliates and other interests attended the meeting. The 13 signatory agencies include: Georgia Department of Natural Resources, South Carolina Department of Natural Resources, North Carolina Wildlife Resources Commission, Georgia Power Company, Progress Energy (formerly Carolina Power and Light Company), Duke Power Company, South Carolina Electric and Gas Company, U.S. Fish and Wildlife Service, U.S. Geological Survey (Biological Resources Division), U.S. Forest Service, U.S. Army Corps of Engineers, Georgia Wildlife Federation, and South Carolina Aquarium. University research affiliates include: University of Georgia Warnell School of Forest Resources, University of Georgia Institute of Ecology, University of Georgia Cooperative Fish and Wildlife Research Unit, Roanoke College Department of Biology, University of Georgia Carl Vinson Institute of



Government, University of Georgia Department of Genetics, Cornell University Department of Molecular Biology and Genetics, Clemson University Cooperative Fish and Wildlife Research Unit, New York University School of Medicine Institute of Environmental Medicine, and State University of West Georgia. In addition, representatives of other concerns with interest in recovery of the robust redhorse include: Santee Cooper Power Company, Georgia River Network, PBS & J, Fort Stewart Environmental and Natural Resources Division, and the North Carolina State Museum of Natural Sciences. The success of the recovery effort, to a large extent, depends on the willingness of RRCC members and others to participate in the annual meeting and to continue to support recovery throughout the year.

The RRCC identifies priority conservation needs for the robust redhorse and its habitat as well as coordinates implementation of research and management programs for addressing those needs. The annual RRCC meeting is a partial requirement for conservation of the species as designated in the MOU. It also represents the only scheduled time for all interests to assess progress and to establish management directions that guide recovery efforts in the upcoming year and beyond. The annual meeting is the occasion to explore the scientific and management implication of research results and new data, to debate philosophical viewpoints, and to gather the collective expertise of fisheries and environmental management professionals. This dialogue includes the best available science on the robust redhorse, which forms the basis of the RRCC's recovery and policy decisions. Although a consensus decision-making approach is sought at the annual meeting, consensus is not always possible due to divergent points of view on the interpretation of preliminary findings, differing comfort levels with acceptable risk or to enduring responsibility related to the consequences of certain decisions. Therefore, some decisions may need to be made by representatives of the administrative agencies that have legal purview for the management decision.

This report summarizes updates on management activities, research findings, and conservation efforts, as well as decisions made at the 2009 RRCC Annual Meeting. The RRCC Annual Meeting Reports have become important documents of research, science, management, and recovery that are often referenced. The format of this year's report closely follows the format of previous reports and it provides a more accurate record of activities. The report notes discussion points, questions, main ideas, and/or notes recorded by the participants.



A D M I N I S T R A T I O N

Opening Remarks – Forrest Sessions

Forrest Sessions opened the 2009 Annual Meeting by welcoming the participants to the Webb Center. Forrest gave a brief history of the Webb Center.

Memorandum of Understanding Renewal – Ross Self

The MOU establishes the RRCC and allows the RRCC to establish operating guidelines. The current MOU expires at the end of December, 2009. The new version would operate from January 1, 2010 to December 31, 2014. Because of the organizational structure of the signatories, it was important that revisions and/or updates to the MOU be discussed at the 2009 meeting. Ross has received some comments from signatory representatives. Any changes discussed will be revised shortly and be re-sent to the representatives.

Another topic of discussion among participants was the completing and publishing of annual reports. Section D under Committee Responsibilities in the MOU states, “evaluate program implementation and prepare an annual progress report.” The last final annual report for the Committee posted to the website was the 2001 annual report. Jaci Zelko has taken over responsibility of completing reports and she has final versions of the 2003 report and draft reports for 2004 and 2005. To streamline this process and finalize all back logged reports, it was decided that a standardized form will be created. Forrest Sessions will create this form and send to any participant that presented during the annual meeting. Each presenter will be responsible for filling out this form (an abstract and details from each presentation) and sending it to Jaci Zelko. Once annual reports are completed, they will be posted to the robust redhorse website. The abstracts for the 2009 meeting will be due by Oct 15, 2009.

Plant Washington Environmental Review (Oconee River intake and discharge) – Jimmy Evans

Plant Washington is a proposed 850 MW coal-fueled power plant to be located in Washington County, GA. A consortium of Electric Membership Corporations (EMCs) under the name Power4Georgians is funding the project and although several EMCs have withdrawn from the project the company has applied for all of the required permits. The Georgia Wildlife Resources Division is primarily responsible for assisting the Georgia Environmental Protection Division (GAEPD) in the development of permit conditions for the three required water permits. These permits are NPDES discharge permit no. GA0039055, groundwater use permit no. 150-0026, and water withdrawal permit no. 150-0391-04.

The primary issue in the environmental review process is the proposed location of the water intake and discharge structures on the Oconee River near the Avant Kaolin Mine,



site of the only known suitable robust redhorse spawning habitat in the Oconee River. Water will be withdrawn from the Oconee River, pumped 30 miles to the plant site, then used as process water mainly to condense steam produced by the plant. The water will then be pumped 30 miles back to the Oconee and discharged as heated effluent. Water will be withdrawn from the Oconee at flows above the monthly 7Q10 and at flows below the monthly 7Q10 the supply will be switched entirely to ground water.

Initial discussions with MACTEC (primary consultants for Power4Georgians) on the proposed locations of the intake and discharge structures were initiated in March 2008. Since the proposed locations of the structures were adjacent to the only known robust redhorse spawning site on the Oconee River, discussions focused on potential impacts to this species. Subsequent dialog expanded the scope of potential project impacts to include American shad, striped bass, and Atlantic sturgeon as well as the general fish and invertebrate communities.

The GAEPD has issued draft permits that incorporated as conditions some of our concerns, but several outstanding issues remain. These issues include:

- Permitted concentrations of contaminants (corrosion inhibitors, etc.) that are found in the cooling tower blowdown water discharged back into the Oconee River
- Discharge of storm water from the plant site (Ogeechee Basin) into the Oconee River
- Thermal discharge not addressed in permit
- Effects of long-term exposure to chlorine that will be permitted for the discharge
- Agency notification of non-compliance, emergencies, etc.
- Monitoring contaminate levels in the discharge (duration, frequency, timing, and methods)
- Monitoring robust redhorse population at the Avant site
 1. Effects of electrofishing on spawning robust redhorse
 2. Search for other possible spawning sites in the Avant Mine area
 3. Need for standardized, visual observations of spawning activity at the Avant spawning location
 4. Young-of-the-year and juvenile monitoring downstream of Avants
- Numerous issues related to intake structure
 1. Have agreed on general design of intake structure and associated approach and through-screen velocities
 2. Some disagreement on screen mesh size related to anadromous species; mesh size protective of robust redhorse
 3. Need for fish handling device
 4. Timing and duration of impingement and entrainment monitoring
 5. Inspections and maintenance of intake structure
 6. Implementation of adaptive management practices
 7. Research needs
 8. Reporting requirements
 9. Participation in Robust Redhorse Conservation Committee



Final water permits will probably be issued by the end of the year and our final comments will be submitted in early December. The permits can be modified if needed after they are issued but future modifications may be difficult and initial permit conditions should be as protective as possible.

Georgia Aquarium Update – Jimmy Evans

The robust redhorse in the display at the Georgia Aquarium are doing well, no mortalities have occurred, and there are no problems to report since the last RRCC meeting. The aquarium staff seems to be doing an excellent job of husbandry.

Tubercle development in the males has recently been noted. The fish were thinned last year when signs of aggressive behavior were observed, probably caused by crowding. Several were sent to the Tennessee Aquarium where they are being displayed in the river delta exhibit with representative delta species.

When asked if RRCC assistance was needed, Jeff Krenner requested some smaller fish (10 – 12 fish in the 3 – 6 inch range). Jeff was informed that Forrest Sessions at the Dennis Wildlife Center should have fish this size available after pond harvest in fall 2009. These could possibly be the last fingerling robust redhorse that are produced. Jeff was also informed that Jaci Zelko at the Warm Springs National Fish Hatchery had plans to remove all robust redhorse remaining at the hatchery and that several slightly larger fish (8 – 10 inches) might be available from that source later in the fall – winter of 2009. In combination, this would provide three size classes and a more visually interesting display.

Jeff also requested a small amount of gravel to improve the visual appeal of the display and provide more authentic habitat. I indicated that I could deliver the gravel while attending the SEAFWA conference in Atlanta in early November. The aquarium staff also indicated an interest in participating in robust redhorse sampling on the Oconee or Ogeechee rivers.

The aquarium staff was also interested in the Oconee River gravel augmentation project and suggested that the project could be filmed and included in the video associated with the display. There is a need to update the video periodically with more recent recovery activities. Aquarium staff will be notified when additional fieldwork is scheduled.

Jeff Krenner would like to improve the graphics at the display, but did not give further details. He was informed that the RRCC could assist with this project. There may be a need to schedule a meeting at the aquarium to review future plans and reestablish contacts between the RRCC and the Georgia Aquarium.



MANAGEMENT ACTIVITIES

Georgia Update 2009 – Jimmy Evans

The recovery activity level in Georgia remains high, although the emphasis has shifted from broodfish collection, spawning, and stocking to status surveys and habitat enhancements. Following is a complete list of current recovery activities in Georgia. This list provides a general overview; various meeting attendees will cover individual topics.

Recovery activities in Georgia

- Monitoring status of Oconee River population
- Assessment of reproduction and recruitment success on Ogeechee River
- Assessment of reproduction and recruitment success on Ocmulgee River
- Population status and assessment of reproduction and recruitment in the Broad River system of Georgia
- Oconee and Ogeechee river gravel augmentation projects
- Oconee River telemetry study
- Environmental review of proposed Plant Washington water intake and discharge at Avant site on Oconee River
- Work on Oconee River Robust Redhorse Management Plan
- Activities associated with Georgia Aquarium display
- Robust redhorse activities at Warm Springs Federal Fish Hatchery
- Removal of remaining robust redhorse (Savannah R. ESU) from refugial ponds at Fort Gordon

Status Survey of Oconee River Robust Redhorse Population 2009 – Jimmy Evans

Annual standardized surveys of the Oconee River robust redhorse population were initiated in 2008, the year following termination of annual broodfish collections that had been conducted since 1993. The annual standardized surveys are conducted in generally the same areas, time period, and normally at similar flows to sampling conducted in previous years to collect broodfish (see Figure 1 showing the four primary areas sampled to collect broodfish in the past and that are presently sampled for the standardized surveys). In addition to these standardizations, crews and equipment have been nearly identical in both the broodfish collection (1993 - 2007) and standardized sampling periods (2008 - present).

Sampling in 2009 was conducted on May 6 – 7 during the traditional peak of the robust redhorse spawning season on the Oconee River (first two weeks in May). The four standardized sampling stations located from the Central of Georgia Railroad Trestle downstream to about nine miles above Dublin (Figure 1) were sampled for a total of 6.0 hrs. No robust redhorse were collected or observed during the two-day period.



In the past, flow reductions have been requested at Sinclair Dam, if needed, to improve robust redhorse broodfish sampling efficiency and the target typically has been 500 – 700 cfs at Sinclair Dam or about 1000 – 1,200 cfs at Dublin. However, in 2009 due to the presence of radio-tagged robust redhorse in the area the decision was made to maintain higher flows in this reach to reduce the possibility that flow reductions would disrupt normal migratory behavior. Therefore, flow reductions only down to 1,000 cfs were requested at Sinclair Dam, resulting in flows near 1,500 cfs at Dublin. The higher flows probably reduced sampling efficiency and contributed somewhat to poor sampling results. Numerous robust redhorse have been collected in the past at similar flows, however, suggesting that abundance was low in this reach and similar to levels found in the last several years. Absence of robust redhorse in 2009 samples should not be interpreted as evidence that they were entirely absent from the area, however.

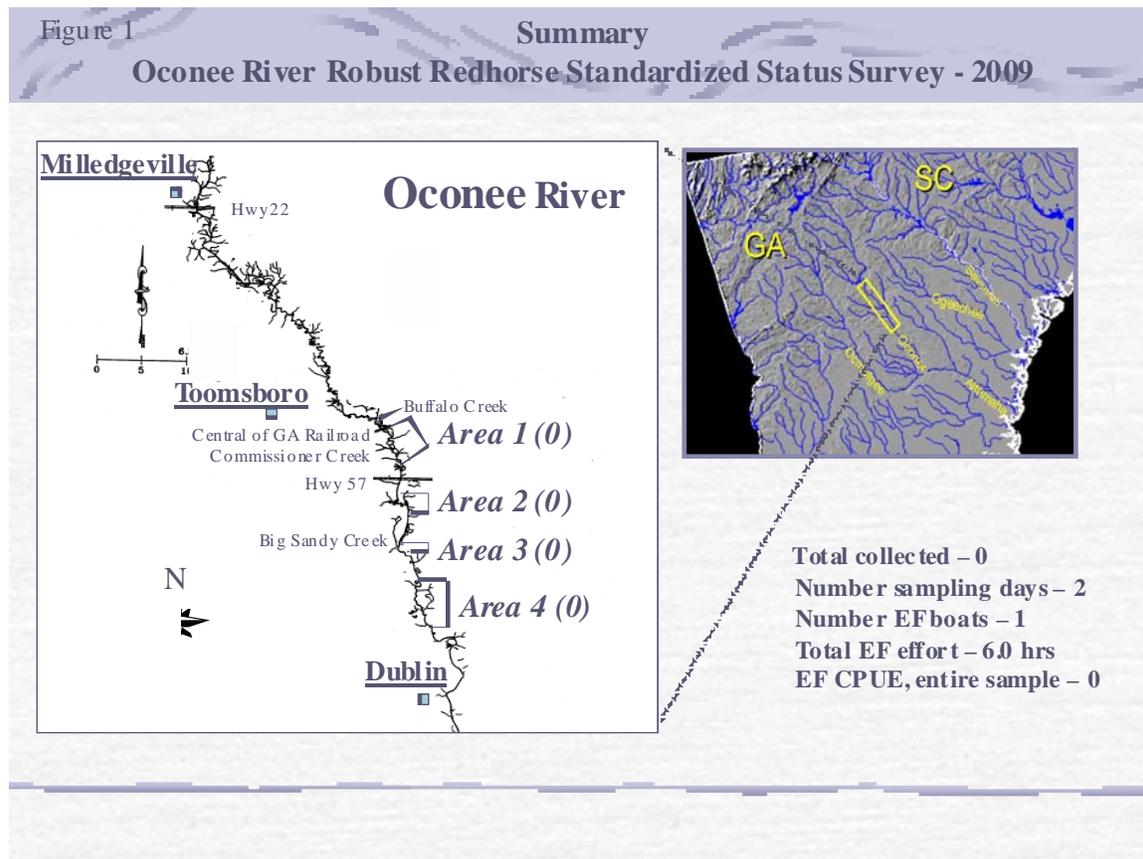


Figure 1. Oconee River Robust Redhorse Standardized Status Survey 2009.

Ogeechee River Recruitment Monitoring 2009 – Jimmy Evans

The Ogeechee River, Georgia was stocked with a total of 43,048 robust redhorse fingerlings during the period 1997 – 2004 and an attempt has been made to conduct some level of monitoring annually to evaluate survival, growth, and reproductive success. After 5 – 6 years of intermittent monitoring it was apparent that survival and growth were excellent and the primary sampling objective then shifted to an assessment of



reproductive success. Status surveys of the Ogeechee River robust redhorse population are an objective of the Fisheries Region VII annual river standardized sportfish sampling program. In addition, both Region IV and Region VII personnel conduct targeted robust redhorse sampling intermittently during the spring, summer, and fall.

In 2009 robust redhorse sampling was conducted on the Ogeechee River during June 9 – 11 and again on September 11 at four stations from Midville to just above Louisville. The stations were located at Hwy. 88 above Louisville, Hwy. 1 at Louisville, Hwy. 78 east of Wadley, and Hwy. 56 at Midville. Two boats sampled a total of 5.2 hrs and 21 robust redhorse were collected, resulting in an overall catch rate of 3.9 fish per hour. Catch rates were extremely variable and ranged from 0 to 12 fish per hour. These catch rates are similar to those observed in the past.

Based on locations of coded-wire tags, the 2001 and 2002 year classes (7 – 8 year old fish) predominated in samples, and sizes ranged from 450 to 560 mm (18 to 22 in). All fish collected were mature. In the June samples all males were still flowing, although tubercles were fading in most and the majority had a partial mucus coating. Most of the females seemed to have completed spawning and evidence suggested that spawning activity for the year was in the final stages.

Most fish had definite indications of spawning injuries, especially in fish collected during June but also in those collected in September. The evidence consisted of a reddish, bloody coloration laterally on both sides and some missing scales. Old regenerated scales suggested spawning activity during one or more previous years.

Since stocking was terminated in 2004, the process for documenting recruitment in the Ogeechee River is greatly simplified. Based on known growth rates, any fish smaller than about 400 mm must be wild spawned and not stocked. A coded-wire tag reader is desirable but not absolutely essential to document successful reproduction and recruitment. The only requirement for documentation is the collection of smaller fish that clearly could only have been spawned after 2004. Since all fish collected in 2009 ranged from 450 to 560 mm, no evidence of recruitment is indicated. All fish collected in 2009 were probably stocked. Observed spawning injuries did provide strong evidence that spawning is occurring, even though there appears to be very little gravel in the system.

Based on evidence of spawning activity in 2009, an obvious need exists for a telemetry study to locate possible spawning areas and any gravel deposits that are presently undocumented. Alternatively, a telemetry study may help determine if robust redhorse actively spawn in the absence of suitable gravel spawning substrate. The results will help evaluate the potential for the stocked population in the Ogeechee River to become sustainable and therefore contribute to long-term improvements in the species status. Efforts should be made to locate a funding source for a telemetry investigation at a minimum, with possible additional objectives being a study of population demographics, including a population estimate.



In addition to any funded studies, annual recruitment monitoring on the Ogeechee River should be continued by Fisheries Regions IV and VII, although sampling frequency will depend on seasonal flows and agency staffing. An attempt should be made to sample during the spawning season in late April through May, but evidence suggests that monitoring can be successfully conducted during the summer and fall as well.

Broad River Research Update 2009 – Jimmy Evans

The objective of this project is to assess the population status, distribution, and habitat use patterns of stocked robust redhorse in the Broad River system, GA. This project is funded by a Georgia State Wildlife Grant. Initial surveys for spawning robust redhorse were conducted in the Broad River system of Georgia and five locations were identified where there was evidence of spawning activity. Three of these locations held robust redhorse in at least one of the two years that surveys were being conducted. In 2008, approximately 20 eggs were collected from a spawning site within the Hudson River and hatched in an aquarium. Young were successfully reared to a size where most were identified as robust redhorse. High water prevented surveys in spring of 2009.

In the late summer of 2008 surveys were conducted for young-of-the-year robust redhorse. Although no robust redhorse were identified, four other catostomid species were collected: *Minytrema melanops*, *Moxostoma rupiscartes*, *M. sp. cf. M. lachneri*, and *M. collapsum*. Equipment for sonic tracking was purchased, including six stationary receivers, one manual receiver, and 30 transmitters. This equipment was not received until 2009. Additionally, PIT tags and a data-logging antenna were purchased for individually marking all robust redhorse. Based on advice from consulting veterinarians, sonic transmitters and PIT tags were not implanted in 2009 due to interference with developing reproductive organs and onset of warm temperatures.

An initial survey at Anthony Shoals on the lower Broad River on June 9, 2009 yielded four post-reproductive robust redhorse, two males and two females. These fish were tagged with floy tags and checked for condition. Due to warm temperatures sonic transmitters were not implanted. Current plans are to implant the sonic transmitters in fall 2009, but plans are critically dependant on flow levels and the ability to sample effectively.

Ocmulgee River Recruitment Monitoring – Joey Slaughter

Robust redhorse conservation activities continued in the Ocmulgee River in 2009 pursuant to the Candidate Conservation Agreement with Assurances (CCAA) between Georgia Power Company (GPC) and the US Fish and Wildlife Service (FWS). Activities associated with Phase I of the CCAA were suspended in 2008 as a result of low broodfish collection in the Oconee River leading to no available fingerlings of the Oconee genetic stock and resulting in a lower-than-projected stocking rate of approximately 14,500 individuals released into the river compared to the target of 20,000. In 2008, GPC and



FWS agreed to move forward with Phase II of the CCAA in light of the suspension of Phase I.

In 2009, GPC conducted juvenile and adult fish monitoring surveys in the Ocmulgee River between Lloyd Shoals Dam and the Juliette low-head dam near Juliette, GA. Access is limited to much of that reach due to large shoal complexes and few boat ramps, and a total of 4 days were expended for sampling efforts within that section of river. A total of five robust redhorse were collected in 320 minutes of electro-fishing pedal time, resulting in a catch rate of only 0.9 fish per hour. Specimens collected ranged in size from 347-542 mm TL, two were coded wire tag recaps, none were PIT tag recaps, and only one specimen was ripe (a flowing male). The site with the highest catch rate was a newly identified gravel/riffle/shoal area, stretching approximately 0.5 miles, located downstream of the Wise Creek confluence and at the upstream most passable portion of the river above the GA Highway 83 access ramp.

Based on our limited 2009 sampling results, wholesale conclusions about the Ocmulgee River population cannot be made. However, the recurrence of smaller, untagged robust redhorse in samples could indicate that a relict population may exist within the upper Ocmulgee. Additionally, the collection of robust redhorse on the previously un-sampled gravel/riffle/shoal complex downstream of Wise Creek suggests that adequate spawning habitat may be available with the reach and that a spawning aggregate might be found in the area during the reproductive season in future years and with greater and targeted sampling efforts at that location.

South Carolina Update 2009 – Scott Lamprecht

South Carolina Santee Basin restoration efforts continued with our 6th year of spawning Savannah River strain robust redhorse for restocking in the Santee Drainage. Collections were made again at the gravel bar located below Augusta at RK 173.3. This year's efforts brought the number of paired crossings to one short of our target of 100. As of last November, 44,537 phase I fingerlings have been stocked in the Broad River; half above and half below Parr Shoals Dam. To date in the Wateree River, 9600 Phase I, 2400 Phase II, and 400 Phase III have been released below Wateree Dam.

Five mature robust redhorse, collected immediately below Wateree Dam, were equipped with sonic transmitters that are to be monitored with stationary Vemco receivers. Documented movements show repeated excursions to an areas above and below the Wateree Dam tailwater shoals. One individual traveled down the Wateree River and ascended the Congaree River.

In addition to observations of adults by Duke Power personnel below Wateree Dam, one mature male was photographed traveling upstream through the Columbia Dam fish ladder on the Broad River. Telemetry based study of the Broad and Wateree river population will continue in order to identify spawning and seasonal habitat.



North Carolina 2009 Update – Ryan Heise

In spring 2009, a total of 20 robust redhorse (including recaptures) were collected, of which 8 individuals were new captures. Targeted sampling for robust redhorse was initiated in 2000, and annual boat electrofishing effort has ranged from 18.6 to 124 hours of pedal time. Including the 1985 capture, a total of 96 robust redhorse have been collected in the Pee Dee River. Of these, 27 were among year recaptures and 8 were within year recaptures for a total of 61 individual fish collected.

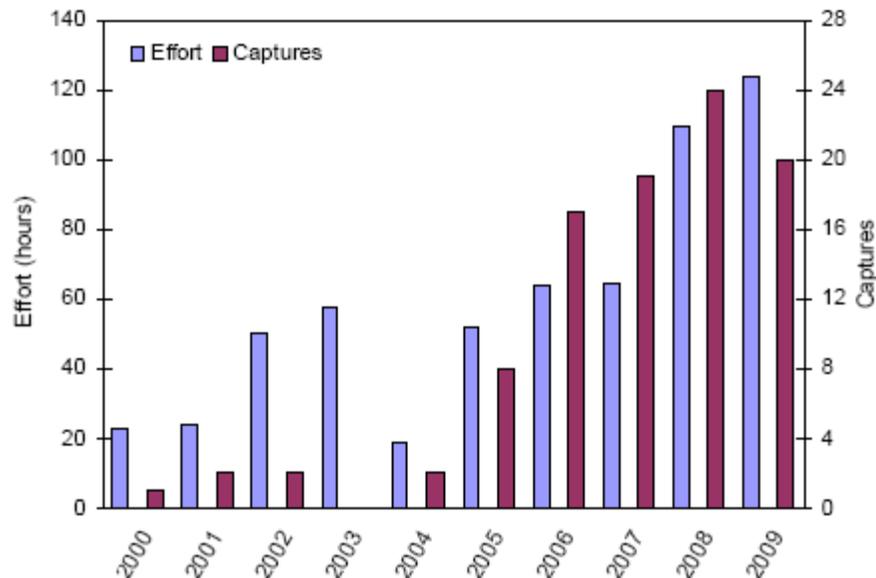


Figure 2. Robust redhorse captures and electrofishing effort on the Pee Dee River 2000-2009.

The areas that have been sampled extend from Blewett Falls Dam downstream to Hwy 43 (Cashua Ferry, South Carolina). Three juveniles have been captured in South Carolina (one near Cheraw in 2001 and two near Tom Blue Landing in 2002). We captured adult robust redhorse in North Carolina, mostly during the spring (mid-April through early May), on and near shoals. We also captured an adult in South Carolina during fall 2008. This fish migrated upstream to a known spawning area at Jones Creek shoal the following spring.

The mean water temperature during spring captures was 18.9° C and ranged from 16 - 22° C. Spawning individuals have been captured in three areas of the Pee Dee River: (1) side channel at Big Island (near Blewett Falls Dam), (2) Hitchcock Creek Shoal, and (3) Jones Creek Shoal. However, 2004 and 2005 were the only years where robust redhorse were captured upstream of Hwy 74. Robust redhorse were captured over shallow gravel and boulder habitats, especially near and within side channels.

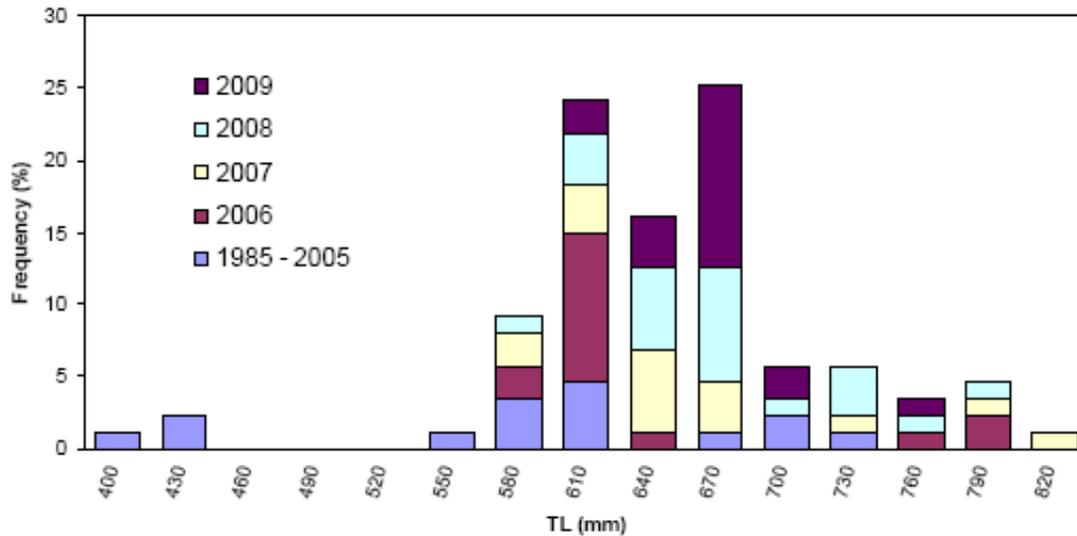


Figure 3. Length-frequency distribution (30mm size classes) of robust redhorse captured in the Pee Dee River. Histogram includes among year recaptures.

The mean size of robust redhorse was 633.8 mm TL (range = 375-793) and the mean mass was 4095.7g (range = 728-8450). The most abundant size classes for all years combined were 581-610 and 641-670 mm TL. The majority of the robust redhorse captured from the Pee Dee River have been adult which is likely due to our study design. Much of our recent electrofishing has been located in spawning habitats during the spring. Despite the low capture rates, the range of sizes of adult fish that were captured throughout the study suggests that multiple year classes are present and that some limited recruitment is occurring.

Wateree River Collections – Dave Coughlin

Duke Energy electro-fished the tailrace of the Wateree Hydroelectric Facility weekly in 2009 from April 9 through June 4. A minimum of one hour of pedal time was expended on each of the nine electro-fishing trips. While this sampling was mainly directed at collection of diadromous fish species, it has also provided collections from a newly introduced (starting in December 2005) SCDNR-propagated robust redhorse population that originated from Savannah River broodstock. A total of ten robust redhorse were collected from April 9 through May 21 at water temperatures ranging from 17.5 – 22.6°C (see table). The ten fish collected in 9.04 hours of pedal time produced a CPUE of 1.1 fish/hr in 2009. Fish lengths ranged from 450 – 521 mm and some males were observed with tubercles.



Figure 4. Adult robust redhorse collected out of the tailrace at Wateree Hydroelectric Facility.



Two fish were provided to SCDNR for implantation of VEMCO ultrasonic tags. During similar sampling in 2008, a total of four robust redhorse were collected.

Table 1. Data from robust redhorse collected out of Wateree in 2009.

Date	Temp. (°C)	Sex	Length (mm)	Weight (g)	Tag
9-Apr	17.5	M	496	nm	L cheek CWT, no PIT
16-Apr	17.3	F	497	1936	L cheek CWT, PIT (470E7E4F4F)
24-Apr	19.1	M	490	1878	L cheek CWT, no PIT
24-Apr	19.1	M	521	2142	L cheek CWT, no PIT
24-Apr	19.1	M	481	1596	No CWT, PIT (472B3A0F10)
30-Apr	18.8	F	491	nm	R cheek CWT, no PIT
7-May	20.5	F	469	nm	R cheek CWT, PIT (486A1A1576)
13-May	21.3	M	481	1760	L cheek CWT, no PIT
21-May	22.6	F	514	2176	No CWT, not checked for PIT
21-May	22.6	M	450	1292	R cheek CWT, not checked for PIT

Captive Refugia at Warm Springs NFH Update – Jaci Zelko

Warm Springs NFH personnel have focused on providing assistance with broodfish spawning, providing facilities for egg incubation and rearing fry for distribution since the beginning of the program in 1995. Limited numbers of captive reared fish have been maintained at Warm Springs for advancement of culture information on the species. Holding captive refugia at Warm Springs has allowed for the development of suitable techniques for rearing and propagation of broodfish to meet research needs. Warm Springs has limited personnel and their focus has shifted to propagating other imperiled species. It was necessary to remove the captive refugia from the hatchery and transfer the broodfish to other facilities. At that time, the hatchery held 31 adults, 2 – 2005YC, and 9 – 2007YC robust redhorse. All of the 2007YC fish were transferred to UGA for freshwater mussel host-fish trials. The two 2005YC fish were held back at Warm Springs NFH and placed in their public aquarium. Three fish were placed in the Bass Pro Shop in Macon. Two fish were used for preservation and will be stored at the Georgia Museum of Natural History. The remaining 26 fish were stocked into the Ocmulgee River at Highway 83 on Dec 3, 2009. Warm Springs no longer holds any broodfish but maintain the resources and technology to hold captive refugia in the future if warranted.



RESEARCH UPDATES

Preliminary results of gravel augmentation projects on the Oconee River, Georgia – Jimmy Evans

The first phase of the project is gravel augmentation at the Avant Mine site. This project was completed in October 2007 with the deposition of 75 tons of gravel in the Oconee River channel near the shore and about 200 ft. above an existing but degraded robust redhorse spawning site adjacent to the Avant Kaolin Mine in Washington County (about 25 RM below Milledgeville). This is presently the only known robust redhorse spawning site in the Oconee River and spawning activity has diminished during the past 5 – 10 years as habitat quality has slowly degraded. Reduction in habitat quality is believed to be caused by natural processes of channel evolution immediately upstream. Spawning habitat at the site is augmented utilizing natural fluvial processes to erode the deposited gravel into the channel, sort the particles, and distribute them to the leading edge of the gravel bar where most spawning activity occurs. Colored tracer gravel was mixed with gravel deposited in the channel to assist in monitoring gravel movement along the channel.

Monitoring at the site continued intermittently from 2007 through 2009 to determine the degree of erosion and movement of gravel toward the target site at the leading edge of the degraded spawning bar. Approximately 50 – 75% of the gravel has eroded into channel to date (September 2009). Success in meeting the objective of augmenting and improving spawning habitat at the Avant Mine site remains inconclusive. However, monitoring at low flows in September 2009 suggests that the gravel is moving to the east side of the existing mid-channel spawning bar and at least a portion of the particles are contributing to spawning habitat associated with a large snag immediately east of the leading edge of the gravel bar. Spawning habitat quality in this area has noticeably improved. Significant augmentation does not appear to be occurring immediately above the leading edge or to the west of the existing spawning bar, but results of monitoring are preliminary. The ability to detect the colored tracer gravel is greatly reduced by algae that cover the gravel particles soon after movement into the channel.

In Phase II of the Oconee River gravel augmentation project an existing gravel and debris deposit is being augmented to improve habitat quality and provide a suitable spawning site for robust redhorse. Although the site possesses some attributes of suitable spawning habitat, robust redhorse spawning activity is not known to occur at this location.

On February 5, 2009 approximately 70 tons of gravel (mixture of three sizes) was placed in the Oconee River channel at a location about 200 ft. below the Central of Georgia Railroad Trestle, 2 miles west of the community of Oconee in Washington County. Gravel was trucked from a stockpile site located 1.5 miles north of Oconee, GA and 3.5 miles from the Oconee River augmentation site. A pontoon barge was launched at a primitive boat ramp located immediately below the railroad trestle and loaded with gravel using a 40 ft. portable conveyor. The barge then traveled about 200 – 250 ft. downriver



where the gravel was washed from the barge and onto the deposition site using a high-pressure water pump.

The gravel was placed over about 7,000 sq. ft. in areas with depths and velocities documented from previous observations to provide optimal robust redhorse spawning habitat. Post-project monitoring on Feb 11, 2009 at low flows indicated suitable spawning riffles had been created at 2 - 3 locations and gravel was deposited to depths of 4 – 8 inches over most of the area. A second inspection on June 16, 2009 following a major flood event indicated that most of the gravel remained on the site and although sedimentation was noted it appeared to be insignificant and less than anticipated.

Approximately 300 tons of gravel (mixture of three sizes) was placed in the Oconee River channel at a location about 200 ft. below the Central of Georgia Railroad Trestle, 2 miles west of the community of Oconee, Washington County, GA. This second augmentation event occurred June 23 – 25, 2009. Gravel was deposited in the same areas using the same methods outlined above for the first augmentation event.

Post-project monitoring conducted on September 7, 2009 indicated significant enhancements with the addition of 300 tons of gravel. The gravel was still in place and a significant area of potential spawning riffle habitat had been created with suitable depths and water velocities. Gravel was deposited from 4 to 10 inches deep in most of the targeted locations. Some sedimentation was apparent, but less than expected. Most of the gravel was lightly covered with algae, however. The colonization by algae is probably a seasonal occurrence and will likely be reduced or eliminated during the winter months with associated low temperatures and high flows.

Preliminary evidence suggests that these methods have been successful in meeting the primary objective of providing potential gravel spawning habitat with apparently suitable depth and velocity attributes. The augmented habitat appears to persist for significant periods and is not degraded substantially by moderately high flows. However, it is unclear at this point if the augmented habitat will attract spawning robust redhorse.

Proposed Gravel Cleaning in Savannah River – Scott Lamprecht

Gravel cleaning in the Savannah River, similar to the project in the Oconee River, was discussed. Scott indicated that cleaning gravel in salmonid streams is beneficial and asked if the committee members are interested in the cleaning of the upper spawning bar in the Savannah. He proposed that the technology used in case studies for small, salmonid streams is a two pump system that he discovered at trade shows. This hand-operated system might have potential by working in situ. The members discussed pros and cons of this technology. It was mentioned that lifting and cleaning the gravel could be too disruptive or disrupt the chemical cues or bottom layers of the sediment. There are also other technologies such as sediment traps that might be less labor intensive. This topic requires further discussion at future meetings before this project is implemented on the Savannah River. Forrest and Scott will seek more info and disseminate to the



Committee. The gravel cleaning falls under habitat modification so it was agreed upon by members that the Habitat TWG should pursue logistics of this project. Bill Bailey will be contacted.

Seasonal movements of adult robust redhorse in the Oconee River, GA. – Patrick C. Ely and Cecil A. Jennings

Concerns about pre- and post-spawning habitat use and movement patterns of robust redhorse in the Oconee River have increased because of a continued decline in the catch-per-unit-effort during brood stock sampling over the past several years. Further, the apparent reduction in the number of individuals spawning annually at the Avant mine gravel bar has contributed to concerns about the status of this population. Radio telemetry was employed to assess seasonal habitat use and movement patterns of adult robust redhorse in the Oconee River downstream of Milledgeville; also, radio-tagged individuals were used as “guide fish” to locate unknown spawning aggregations or population centers.

Hatchery-reared robust redhorse, propagated from Oconee River broodstock, were captured from a refugial population in the Ogeechee River, GA and transferred to the Oconee River in late April 2008. The fish were anesthetized and implanted with radio transmitters at a temporary streamside surgical facility at the Balls Ferry boat ramp, allowed to recover, and released. Within two weeks of being released, 27 of 33 robust redhorse traveled upstream of the release site. Although these fish were new to the river, some moved upstream to the historical Avant spawning area.

During their initial release period (late April – June 2008), about 72% of the fish moved 24 km above the release point and 28% moved about 24 km downstream. Movement was limited during the winter period (Dec 08 – Feb 09) and during July – Aug 2008 and 2009. During the summer of 2008, 24% of the study fish congregated in an oxbow lake. In the summer of 2009, only 8% of the study fish were located in the same oxbow, and none were relocated in other oxbows. In 2008, this oxbow probably served as a refuge for robust redhorse during severe drought conditions. During fall 2008 (Sept – Nov), fish movement increased and probably was related to an increase in water level and a decrease in water temperature.

During the 2009 spring/pre-spawn period (March – April), 100% of the fish migrated upstream toward the Avant mine area. In mid-April 2009, four fish were tracked over a 24-hour period; fish were located at 2-hr intervals. Only two fish moved during that period; both moved about 10 km upstream and most of that movement was observed during daylight. During the 2009 spawning period, robust redhorse were located near the Avant mine site, but none were ever located on the historic gravel bar. However, three radio-tagged individuals were relocated consistently in a new oxbow “cut through” that contained gravel substrates. This new site is about 1.3 kilometers upstream of the historic gravel bar at the Avants Mine site. This area may be a new spawning location for robust redhorse in the Oconee River. In addition to this new spawning site, the current project



also documented a radio-tagged individual that moved between the Ocmulgee and Oconee rivers. On October 28, 2008, this individual was in the Oconee R, 40 rkm from the confluence. On March 5, 2009, the same individual relocated in the Ocmulgee R, 65 rkm from the confluence; total distance between relocations was 105 rkm. Three weeks later, the same fish was again relocated in the Oconee R, 80 rkm from the confluence; total distance between relocations was 145 rkm. This fish then continued to migrate upstream an additional 120 rkm until it reached the Avant mine area on May 1, 2009.

This movement clearly indicates robust redhorse in the system travel between the Oconee and Ocmulgee rivers and there is some site fidelity to spawning grounds. To date, one potential new spawning site has been identified, and the fish in the system move and use habitat as has been reported elsewhere.

Reproductive Ecology and Habitat Relations of the Robust Redhorse – Michael Fisk

The only known population of robust redhorse on the Pee Dee River is found downstream of Blewett Falls Dam near Rockingham, NC. Blewett Falls Dam is hydro-regulated and is in the process of implementing a new minimum flow regime that will affect available habitat for robust redhorse. Our objectives are to describe and quantify spawning and non-spawning microhabitat, quantify how these will be affected after the implementation of new minimum flows, and assess how flow augmentation may affect egg/ larvae survival. Microhabitat data was obtained from relocating radio-tagged robust redhorse from Spring 08 to Summer 09. Microhabitat consisted of depth, bottom and average velocity, substrate, cover, and distance to nearest bank. Robust redhorse were relocated every other day from April to May (spawning period), once per week from June to July (Summer) and the month of March (staging), and once per month from August to February (Fall and Winter). Seasonal upstream migration was documented as well as resident and migratory subgroups typical of robust redhorse in the Pee Dee River. Non spawning habitat typically consisted of deeper slow moving pools with bedrock and sand as substrate with boulders or coarse woody debris as cover. Spawning habitat consisted of more shallow, faster moving shoals with gravel and cobble as substrate and boulders as cover. Habitat use will be compared to availability to develop suitability indexes and look at how these change with new minimum flows.

To assess how flow augmentation may affect egg/larvae survival, fertilized robust redhorse eggs were placed in fifteen 15 quart eager jars with 5 cm of gravel and were subjected to different treatments of being dewatered to mimic hydroelectric pulsing. The treatments consisted of a 12 hour period of inundation followed by a 6 hour, 12 hour, 24 hour, or 48 hour period of being dewatered, and then the cycle repeats itself. There was also a control that was never dewatered and the four treatments and control were repeated three times. Hatch rates were observed and fry found out of the gravel were considered emerged and were removed from the system. Egg survival was limited in the 12, 24, and 48 hour treatments. Once fry hatched they did not survive the next dewatering cycle. The only fry to survive and emerge from the gravel were in the controls. This shows



some ability for eggs to tolerate some levels of dewatering but vulnerability once dependent on gills.

Since no robust redhorse were observed spawning from Spring 08 and 09 spawning habitat will be describe from habitat data recorded at each capture location of the 2009 fish (n=20) over spawning shoals. The data consists of a 20 by 20 meter grid where the capture location is the center of the grid and depth, bottom and average velocity, substrate, and cover were recorded every meter. The macrohabitat at each capture location will be described and compared with other known spawning sites.



TECHNICAL WORKING GROUP REPORTS

Oconee River Technical Working Group – Alice Lawrence

A copy of the Oconee River Management Plan was sent to signatory representatives in early 2009. Comments were received but have yet to be integrated into the plan. Once the comments are added, the plan will be resent to the representatives. One suggestion discussed during the meeting was the reporting and updating of the plan. A tentative schedule to revise the plan as needed was set. This schedule will include annual updates given at each Annual Meeting, revising the plan every 5 years, and reviewing the objective of the plan every 10 years.

Yadkin-Pee Dee Technical Work Group Activities – Ryan Heise

The short-term goals of the Yadkin-Pee Dee technical working group (TWG) are to consistently collect robust redhorse in the Pee Dee River and to determine its distribution and life history requirements so that informed conservation decisions can be made. The 2009 objectives of the TWG were to further describe the adult population structure by sampling spawning areas and to search for new spawning shoals by tracking radio-tagged individuals and electro-fishing other potential spawning shoals. Captured individuals were radio-tagged as part of a Wildlife Resources Commission and Progress Energy funded graduate research project at North Carolina State University (NCSU). Data for the collections and electro-fishing efforts can be found in the North Carolina update section in Management Activities.

An overall 96 fish have been collected on the Yadkin-Pee Dee from 1985, and 2000 – 2009. These fish include 93 adults and 3 juveniles. Most were collected during the spring and the average weight has been 4095 grams and average length of 633.8 mm. The collections indicate some limited recruitment and a high spawning site fidelity. The electro-fishing efforts will be minimized in the next few years to allow fish to adjust to new flows set the by Blewett Falls Dam FERC re-licensing.

Internet Technology Technical Working Group – Jaci Zelko

All participants will check on their latest dataset and send to Jaci Zelko to be included in the master spreadsheet. She will send out a reminder email. Jaci will have the most updated spreadsheet available for anyone that would like a copy.

The development of a user-friendly database has stalled in recent years. It has been difficult to find one person dedicated to this task and the amount of data is daunting. Joey Slaughter suggested that it would be helpful to have an outside source look at the data. Ross Self suggested that a multi-state wildlife grant could be used for the multi-agency database. Joey will pursue the idea of a trial run from an outside source using the



Ocmulgee River dataset (a much smaller dataset than the Oconee dataset). The IT Technical Working Group will facilitate this idea.

Habitat Technical Working Group

The Habitat TWG did not give a report to the Committee during the 2009 Annual Meeting.

Discussions on gravel cleaning were discussed during this meeting and the Habitat TWG was tasked to pursue information on these projects.



B U S I N E S S

Research Topics and Resource Needs

A general discussion was held concerning research needs. The following list includes these topics.

- Ogeechee telemetry
- Larval fish behavior in Oconee River
- Broad River reproduction and recruitment
- Any research needs listed in the power plant permit
- Side-scan sonar for mapping gravel deposits
- Tag retention because of variability in retention of tags based on operator
- Genetics
 - Larvae have been sent to Joe Nairn
 - Tissue is available from some Savannah stock
 - SCDNR will discuss using their samples for analysis to determine stocked population versus natural Savannah population
 - Effective population size and year-class strength analysis for Pee Dee

Fish needs for current or proposed future research was also discussed and is listed below:

- Fry and fingerlings series for Georgia Museum of Natural history (Bud Freeman)
- 10-12 Small fish (3-6 inches) for Georgia Aquarium transfer
- Fingerlings for tag retention studies



ATTACHMENTS

Attachment 1. Participants of the 2009 RRCC Annual Meeting

Abney, Michael, Fisheries Biologist, Environmental Lab, Georgia Power Company
Bowers, Mark, Raleigh Field Office, U.S. Fish & Wildlife Service
Bowles, Tom, South Carolina Electric and Gas Company
Coughlan, Dave, Environmental Center, Duke Power Company
Dodd, Tony, Georgia Power Company
Ely, Patrick, Georgia Cooperative Fish & Wildlife Research Unit, UGA
Evans, Jimmy, Fisheries Biologist, Georgia Department of Natural Resources
Fisk, Michael, North Carolina State University
Heise, Ryan, North Carolina Wildlife Resource Commission
Jenkins, Bob, Roanoke College
Jennings, Cecil, Georgia Cooperative Fish & Wildlife Research Unit, UGA, U.S. Geological Survey
Joyce, Mike, U.S. Forest Service
Kwak, Tom, North Carolina State University, U.S. Geological Survey
Lamprecht, Scott, Dennis Wildlife Center, South Carolina Department of Natural Resources
Lawrence, Alice, Ecological Services, U.S. Fish & Wildlife Service
Morrison, John, Santee Cooper
Osier, Liz, South Carolina Department of Natural Resources
Peterson, Rebecca, Georgia Cooperative Fish & Wildlife Research Unit, UGA
Quattlebaum, Milton, South Carolina Electric and Gas Company
Quertermus, Carl, Biology Department, State University of West Georgia, Georgia Wildlife Federation
Raley, Morgan, North Carolina Museum of Natural Sciences
Self, Ross, Assistant Chief of Fisheries, South Carolina Department of Natural Resources
Session, Forrest, Dennis Wildlife Center, South Carolina Department of Natural Resources
Slaughter, Joey, Georgia Power Company
Starnes, Wayne, North Carolina Museum of Natural Sciences
Wilkins, David, Freshwater Aquarist, South Carolina Aquarium
Zelko, Jaci, Warm Springs National Fish Hatchery, U.S. Fish & Wildlife Service