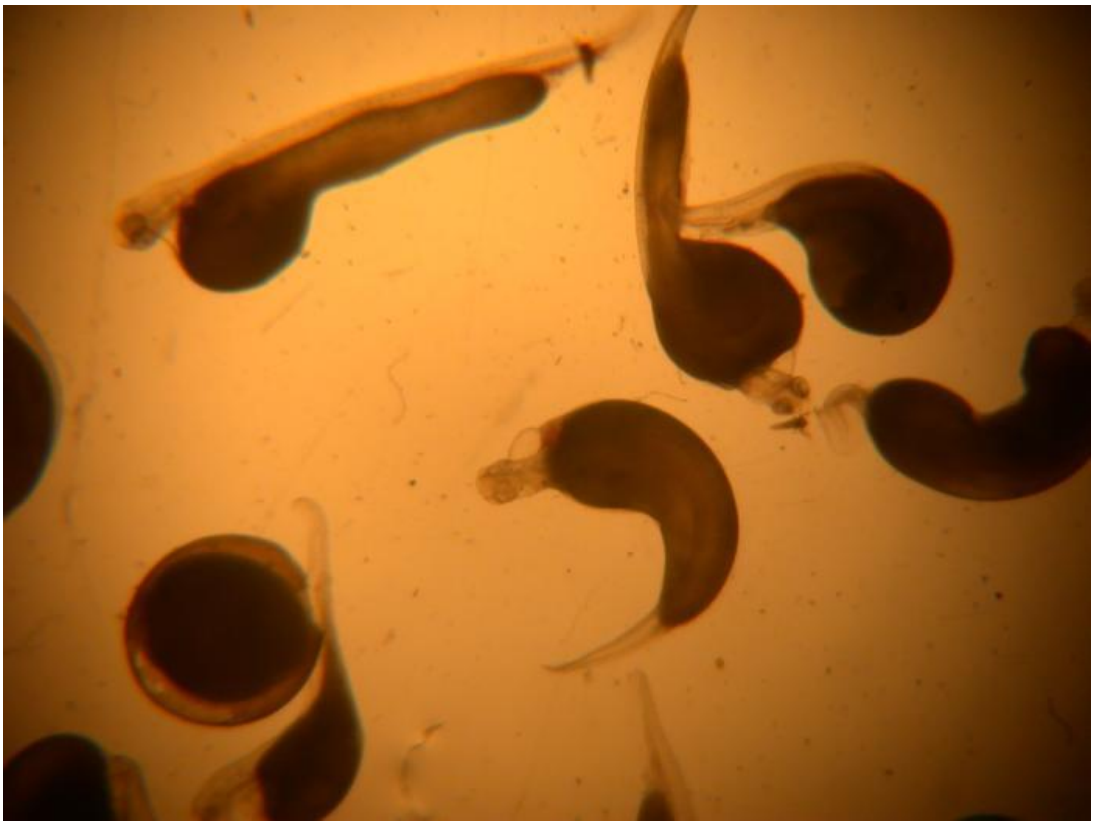
REPORT OF THE

ROBUST REDHORSE CONSERVATION COMMITTEE ANNUAL MEETING

Hickory Knob State Park
McCormick, South Carolina
September 24 – 25, 2007



Robust Redhorse larvae spawned from captive-reared adults at Warm Springs NFH, a first for this species. *USFWS Photo*

Report compiled by
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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
C	Celcius
cfs	Cubic feet per second
cm	Centimeter
g	Gram
kg	Kilogram
km	Kilometer
m	Meter
mg/l	Milligrams per liter
mm	Millimeter
MWe	Megawatts of electrical output
m3/s	Cubic meter per second
N*e*	Effective population size
ppt	Parts per thousand
rkm	River kilometer
RM	River mile
TL	Total length
YC	Year class
YOY	Young of year

EXECUTIVE SUMMARY

The robust redhorse recovery effort, in its 13th 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.

The 13th annual meeting of the RRCC was held September 24 – 25, 2007 at Hickory Knob State Park in McCormick, South Carolina. Approximately 35 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 Energy, South Carolina Electric and Gas Company, U.S. Fish and Wildlife Service, U.S. Geological Survey, 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 Aquarium, Georgia River Network, 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.

This report summarizes updates on management activities, research findings, and conservation efforts and decisions made at the 2007 RRCC Annual Meeting. The RRCC Annual Meeting Reports have become important documents of research, science, management, and recovery that are often referred to and cited. 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.

I N T R O D U C T I O N

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. In the Altamaha River drainage, the species is presently known to exist in a relatively short reach of the Oconee River between Sinclair Dam and Dublin, Georgia and in a short upper Coastal Plain section of the Ocmulgee River. Individuals also have been found in the Savannah River (the boundary river between Georgia and South Carolina) in the Augusta Shoals area as well as below the New Savannah River Bluff Lock and Dam. In addition, robust redhorse have been captured in the Pee Dee River below Blewett Falls Dam in North Carolina. Robust redhorse populations have also been reintroduced within their historic range into the Broad and Ocmulgee Rivers, Georgia, as well as the Broad and Wateree Rivers, 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.

River impoundments, predation by introduced nonnative species, and significant 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.

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

Welcome – Dave Coughlan

Dave Coughlan welcomed participants to the 13th annual meeting of the RRCC.

Memorandum of Understanding Status – Ross Self

Ross Self updated the group on the status of the MOU Renewal. At this time all signatory pages have been signed. The current MOU will expire in 2009.

Formation of Genetics Technical Working Group

There was much discussion concerning the emphasis on using genetics for assisting with management decisions for spawning, mating, and stocking of robust redhorse. A Genetics TWG would help address those issues. All participants voted 'yea' for the formation of this group. Greg Moyer, Regional Geneticist for FWS Southeast Region will chair the group. Several people volunteered to join the TWG including Scott Lamprecht and Wayne Starnes. Greg will contact Joe Nairn to see if he will join and NCWRC will also participate but a specific individual has not been named.

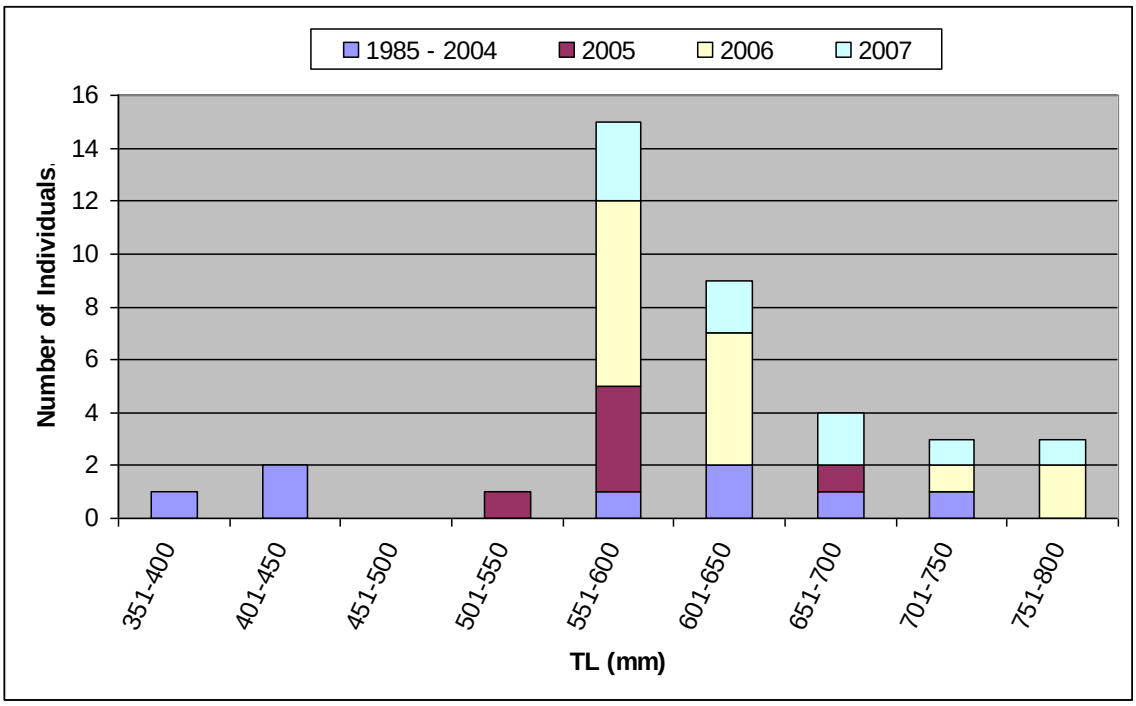
MANAGEMENT ACTIVITIES

North Carolina 2007 Update – Ryan Heise

The short-term goals of the Yadkin-Pee Dee Technical Working Group are to consistently collect robust redhorse in the Yadkin-Pee Dee River, locate the extent of the population, and determine habitat requirements. The long-term goals of the TWG are to determine population size, genetic variability, recruitment and mortality rates, and ensure a viable, self-sustaining population in the Yadkin-Pee Dee River basin.

In 2007, fish were tracked monthly during the winter then weekly in April. Biologists also monitored the water temperatures at Blewett Falls Dam. Electrofishing began when tagged fish moved near or onto shoals or when temperatures reach 18 °C. These areas were sampled 2-3 days each week during the 3-week spawning season. Captured fish were implanted with a 4-year life span ATS radio-tag and a PIT tag. In addition, scales were removed for ageing, and a fin clip was taken for genetic studies.

A total of 52 robust redhorse have been captured in the Pee Dee River (1985, 2000-2007). Fifty of these fish were adults (15 males and 35 females) and 2 were juveniles. Most of the captures occurred in the springtime near or on the shoals. The mean total length was 622 mm (375 - 793) and mean weight was 3994g (728 - 8450).



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

Spawning on the Pee Dee River occurs at a water temperatures between 16 and 25 °C (mean =19.3 °C) from late-April to early May. Telemetry and capture data suggest that robust redhorse exhibit high site fidelity. There are 3 known spawning areas with

spawning fish located at Big Island (near Blewett Falls Dam), the shoal and island complex downstream from Hwy 74, and Jones Creek Shoal.

Radio tags have been implanted in fish over the past three years (5 fish in 2005, 10 fish 2006, 10 fish 2007). There have been 137 total relocations during tracking so far.

An adult robust redhorse that has been implanted with a radio tag and is ready to be released back into the Pee Dee River. *NCWRC Photo*

Sampling over the past few years indicates that a small population of robust redhorse persists in the Pee Dee River downstream from Blewett Falls Dam. Spawning robust redhorse have been captured in shoals and side channels. Telemetry has shown that some of these fish migrate long distances to overwintering areas in while others remain near spawning sites and there is evidence of spawning site fidelity.

South Carolina 2007 Update – Forrest Sessions and Scott Lamprecht

Six females were crossed with 15 males for the 2007 spawning season on the Savannah River. The eggs from each female were divided into lots and fertilized with several males. Approximately 30,000 eggs were incubated and had a hatch rate of 66%. About 20,000 larvae were stocked into ponds.

One of the goals for South Carolina's Savannah River robust redhorse population was to stock progeny from 100 paired matings. Since the program began in 2004, the total unique crosses stocked are 72 (24 females and 3 males per female). South Carolina will continue until they reach their goal of 100 pairs.

South Carolina robust redhorse stocking from 2004 to the present includes 37,652 Phase I stocked in the Broad River, SC; and 5,303 Phase I, 2,410 Phase II, and 400 Phase III stocked in the Wateree River. SCDNR started assessing their stockings in October 2007 in the Broad and Wateree rivers using electrofishing.


(L) Phase II fingerlings are harvested. (R) Fingerlings travel down a "slip and slide". *SCDNR Photos*

Wateree River Collections 2007 – Dave Coughlan

Duke Energy did not conduct any diadromous fish sampling on the Wateree River in 2007.

Georgia 2007 Update – Jimmy Evans

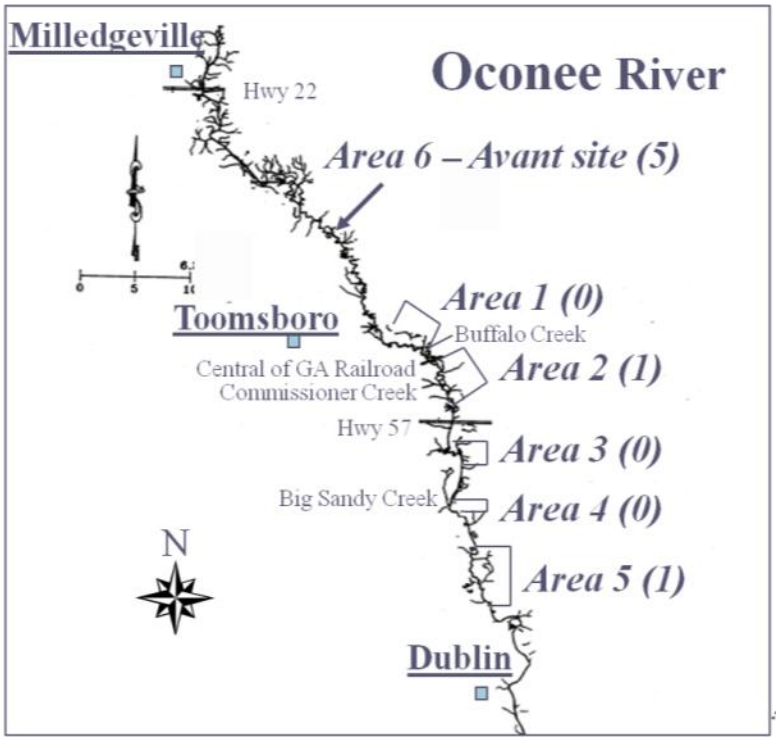
A total of seven robust redhorse were collected during sampling conducted on the Oconee River using a combination of pre-positioned electric grids at the Avants spawning site and boat electrofishing from the Central of Georgia railroad trestle to Dublin. One robust redhorse was collected by electrofishing on May 8 between the railroad trestle and Hwy 57 and a second on May 14 between Beaverdam WMA and Dublin. Total effort was 7.2 hours during the three days of sampling and the catch rate was 0.28 fish per hour. Boat electrofishing was conducted primarily to monitor the status of the Oconee River population and both of the fish collected were released at the site of capture.

The results suggest that the robust redhorse population in the Oconee River remains at low levels and catch rates were similar to those during the 2003 – 2006 period when population estimates varied from 100 to 150 adults.

A total of five robust redhorse were collected on May 2 using pre-positioned electric grids at the Avant spawning site. Three males and two females were collected and lengths ranged from 554 to 680 mm. The larger female was spent and about 16,000 eggs were collected from a small female (554 mm TL). The eggs were in good condition and were fertilized, divided, and shipped to the Warm Springs and Richmond Hill hatcheries.

Of the total of seven robust redhorse that were captured in 2007, four were identified as recaptures of fish collected in previous years and three appeared to be untagged. All three of the untagged fish were collected at the Avant site and two of these were very large (650 and 680 mm). One of the fish collected by boat electrofishing below the railroad trestle was a recapture from the May 2 grid sampling at Avants and the second was a fish that had been collected from the Ogeechee River and stocked into the Oconee.

Stocking activities since the 2006 annual RRCC meeting were 1.) 91 Phase I fingerlings harvested from the Richmond Hill hatchery in November 2006 and stocked into the Ocmulgee River below Lloyd Shoals Dam, and 2.) 41 large juveniles and small adults collected by electrofishing from the Ogeechee River March – April 2007 and stocked into the Oconee River at Avants, Balls Ferry, and Beaverdam WMA.



Robust Redhorse Oconee River Broodfish Summary 2007. This figure shows the areas sampled and the number of fish captured. *Courtesy of GADNR*

Oconee River 2007 Spawning Update – Jaci Zelko

The Oconee River was sampled for three weeks during the spring of 2007 to capture spawning fish to produce fingerlings for ongoing stocking programs in the Ogeechee, Ocmulgee, and Oconee Rivers in Georgia. Electric grids were used for broodfish collection on May 1st and 2nd at a known spawning aggregation located near the Avant Kaolin Mine. Water temperatures of the river were 23 – 25˚ C. The grids were placed on the leading edge of the gravel bar in water up to 1 meter in depth and water flows ran 600 – 700 cfs. All 7 specimens were collected (4 males and 3 females) using the grids. The fish were only collected after several spawning events were observed on the gravel bar. On May 1st, two fish were collected (1 male and 1 female). The female collected was the fish collected and spawned in previous years, so she was released. The female showed signs of spawning condition including a soft belly, enlarged genital dome, and mucus loss. The male was also released that day.

On May 2nd, three males and two females were collected via the grids. One female was completely spent but the other female was in great spawning condition. She naturally released over 16,000 eggs (hormone injection was not used). All three males collected on Tuesday were in excellent spawning condition including almost total mucus loss,

moderate to severe bruising, scale loss, and a dark stripe and extensive sharp tubercles. The males were running ripe at time of collection. Sperm was only collected for fertilization purposes.

One running ripe female was crossed with sperm collected from three males (16,803 eggs total). The eggs were split into three lots, fertilized, and then divided into two batches. The fertilized eggs were shipped to Warm Springs (9,630) and Richmond Hill State Fish Hatchery, GA (7,173) to be incubated as per the Robust Redhorse Spawning Protocols. A total of 9,630 fertilized eggs were received from the Oconee River field collecting station on May 2nd, 2007. Due to the shortage of eggs, no studies were undertaken that involved the use of eggs.

From the eggs incubated at our facility, >1,500 fry hatched (50%). Water quality parameters during egg incubation and fry culture included water temperatures that averaged 23 ˚C, (range 22 - 24˚), pH at 6.9 and hardness ranging between 120 to 140 ppm. Two of the three lots of fertilized eggs had high mortalities after hatch and also had a high percentage of deformed fry. This could be attributed to spawning conditions at the river. Fish were spawned after river temperatures reached 25˚C. Live brine shrimp were fed to the fry four times daily between May 14th and May 31st. A small amount of starter feed was also presented along with the brine shrimp as an aid in future feed transitioning. Samples of fry were examined microscopically for external parasites by Warm Springs Fish Health Center prior to distribution, and none were found.

On May 31st, 650 fry 23-days post-hatch were distributed to Georgia's Walton State Fish Hatchery. Those fry were stocked into 1 pond. 1,020 fry from the 2007 year-class robust redhorse were held back to be intensively reared (on a diet of brine shrimp, bloodworms, and razorback feed) using culture techniques developed specifically for this species by hatchery staff. At the end of FY2007, there were 575 fingerlings remaining (56.4% survival). Once the fingerlings reach 3-5" in size, they will be coded-wire tagged and stocked according to GADNR recommendations.

Robust redhorse fingerlings intensively reared at Warm Springs National Fish Hatchery. *USFWS Photos*

Even though cryopreservation was not undertaken in 2007, the Oconee River robust redhorse repository holds 2,122 straws of cryopreserved sperm collected from 51 males between 1997 and 2006. The Savannah River robust redhorse repository contains 570

straws of cryopreserved sperm collected from 25 males between 1999 and 2004. The samples in the repository from both the Oconee and Savannah Rivers will possibly be used for increasing genetic diversity in future spawning efforts if needed, and research purposes.

Robust Redhorse Conservation Strategy and CCAA Update – Mike Abney
Georgia Power Company provided information on the work effort and progress regarding the Candidate Conservation Agreement with Assurances (CCAA) and the Conservation Strategy.

An overview of the status of the robust redhorse and the catalyst for creating the two documents was presented. The historic range for the robust redhorse was rivers from the Pee Dee River in NC to the Altamaha River system in GA. Population estimates for the Oconee River ranged from 335 to 607 ± 144 individuals from 1994-1999. To this end, the RRCC was created and established a long-term goal of at least six self-sustaining populations distributed throughout the historic range. Short-term goals were also determined and they include: establish refugial populations to reduce the impact of potential catastrophic events on known populations and core ESUs, locate wild populations within the historic range, determine characteristics of populations, including population size, age structure, genetic variability, recruitment rate, and mortality rate, implement necessary actions to maintain populations, and identify and implement habitat restoration and/or protection measures to benefit the species. The Conservation Strategy was adopted in October of 2002 and had established short-term goals for 2003-2008. The goals were establishing 3 native and 5 stocked populations of robust redhorse.

Stockings of fingerlings from Oconee River stock were implemented to reach the long-term goal. A total of 111,507 hatchery-reared robust redhorse from nine year classes have been produced since 1993 in Georgia, with 88,923 released to rivers. From this source, 32000 juveniles were reintroduced into the Broad River between 1996 and 1999. These fish disappeared and could not be found by electrofishing. In 1998, these fish began appearing 60 miles downstream in Clarks Hill Reservoir. All were above 40 cm in length and were tagged. These fish are beginning to reach maturity and have been observed making a spawning run. In 1998, two Georgia Power Biologist collected the first recent specimen from the Savannah River, below Augusta. Subsequent renewed sampling has found fish from a 100 mile reach of the Savannah. This find complicates our Broad River reintroduction in that these fish have been geographically isolated from the Oconee population and show some differences in genetic markers. As a result, reintroduction into the Broad has been on hold.

In 1997, we considered a proposal to reintroduce the fish into the Ocmulgee River, which is a subject of the rest of this presentation. In preparation for this, we proposed revisting the Ocmulgee, and in 1999 found four. The CCAA for the Ocmulgee River would address stocking the project site (GADNR will stock approximately 4,000 fingerlings annually for five years; 13,187 fingerlings introduced through 2006), study the movement

of introduced juveniles through telemetry (2 studies completed), monitor abundance and distribution of introduced robust redhorse, and estimate population size.

In addition to this, a Sinclair Dam Flow Agreement was established. The provisions include flows for December – February at 500 cfs, normal peak, flows in March-April at 1500 cfs, modified peaking, May flows at run-of-river, and in June – November flows of 700 cfs, normal peak.

2007 STOCKING RECOMMENDATIONS

Georgia

Walton SFH ponds will be harvested in November. All fish will be removed from the ponds and larger fish will go to: 1. Cecil Jennings for telemetry work, 2. Warm Springs NFH for the captive program, and 3. stocked into the Ogeechee River.

There was a discussion concerning transferring adult fish from the Ogeechee River back into the Oconee River. The Ogeechee population estimate is currently around 390 and the goal was about 600 adults. GADNR indicated that they will augment the Oconee population by pulling adults from the Ogeechee. The Ogeechee was sampled for 4 days in 2007. After 7.8 hours of pedal time, 41 fish were captured. Of these fish, all seven year-classes from previous stockings were represented (over 43,000 fish have been stocked into the Ogeechee from 7 year-classes from 1997-2004). The length distribution was 40-58 cm. these 41 fish were released into the Oconee River after capture.

South Carolina

Fingerlings from the 2007 year-class will be stocked into the Broad and Wateree Rivers. An estimated 10,000 fingerlings will be harvested and stocked.

2008 BROODSTOCK COLLECTION PLANNING

Georgia

It was decided that efforts to collect broodstock out of the Oconee River have been suspended. At this time, GADNR will continue their standardized sampling during the spring, but ripe adults will not be spawned. They will also monitor the gravel bar to effects of the gravel augmentation.

South Carolina

SCDNR will repeat their spawning efforts to try and reach their set goal of making 100 pairs.

North Carolina

NCWRC is currently tracking and monitoring the population and spawning efforts have not been conducted for the Pee Dee River. They will continue to monitor the population.

R E S E A R C H U P D A T E S

Robust Redhorse Captures and Demography in the Pee Dee River – Bob Jenkins
All robust redhorse were aged directly or indirectly by scales. Because annuli form in the first few weeks after spawning, reported ages of fish caught during the apparent spawning period of late April to early or mid-May in the Pee Dee River have 1 year added to the number of annuli. Indirect age assessments involved recaptured fish from which no scale was taken or all scale/s taken were too regenerated to age. These cases were resolved by availability of scales from a prior or later capture. Scale ageing are confident for fish under age 6, whereas 2 of the 8 cases involving recaptured fish of ages 6 or 7 were problematic. The 2 cases were resolved by reevaluating the best scales per fish from combination or original and next-year captures. No fish was ages as 8 or 9. The age-10 fish was confidently ages by an opercle; it was scale-aged as age 8. Reported ages of 11-16 are minimal ages; the 5 fish reported as ages 14-16 may be much older but it is impossible to reveal by scale-aging.

There were 52 records of 38 fish because 12 were recaptured either1 or 2 times.
30 of the 38 (79%) fish were first caught between 2005 and 2007, but the recapture rate is (52.6% in 2007) and maybe increasing. Of the 38 fish, only 3 juveniles were caught and those were in the South Carolina portion of the river. All of the adults have been caught in North Carolina. The female to male catch is 27:11 which is unusual for suckers in the spring. This brings up a question if females are more abundant and/or is this related to major sampling of female habitat before they join the males? Dr. Jenkins reported the best news is likely recent population increase and current demography regarding age-group and year-class distribution, wherein ages 6-7 and the 1999-2000 classes greatly dominate the original records.

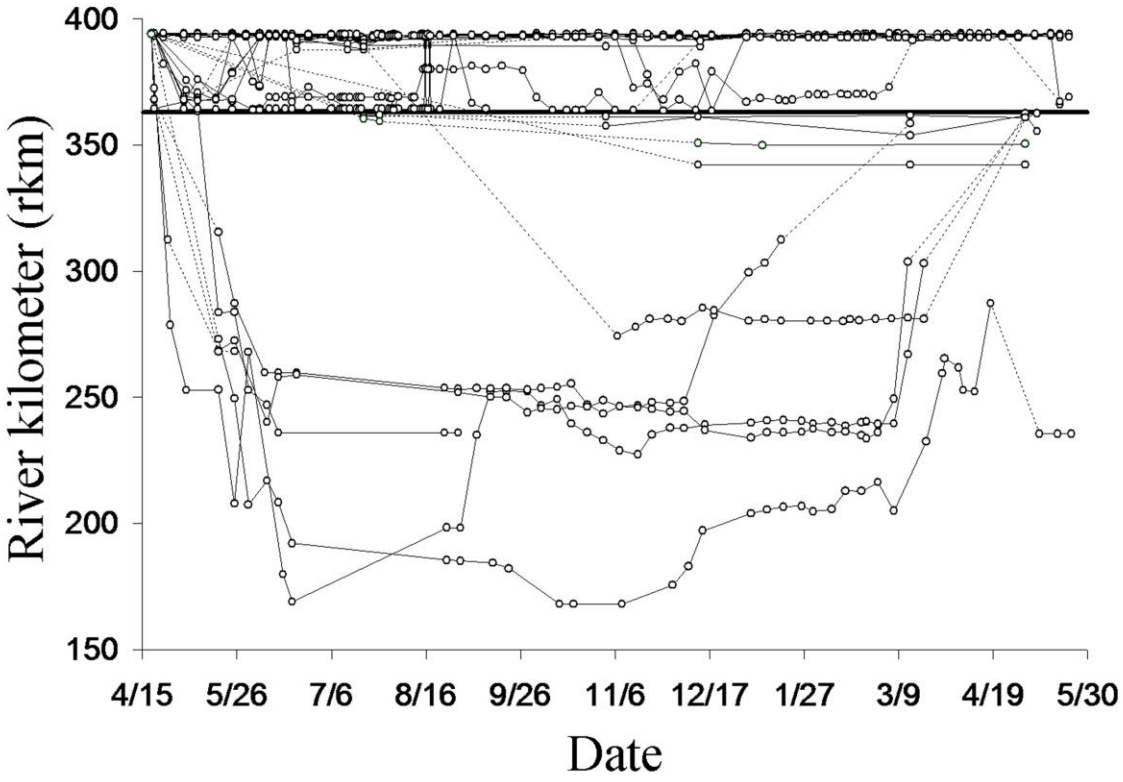
Habitat Use and Movement Patterns of Robust Redhorse Released in the Ocmulgee River, GA – Cecil Jennings and Tim Grabowski
The Ocmulgee River CCAA between USFWS and GA DNR goal is to establish a population of robust redhorse in the Ocmulgee River. A 30-km reach of river bounded by dams on both ends was selected as a suitable site for re-introduction. A previous radio telemetry study with Phase II juveniles found both a high survival rate and high retention rate within the study area (Jennings and Shepard 2003).

The objectives of this study include: assess success of reintroduction efforts in Ocmulgee River and monitor the dispersal rates, habitat use, and movement patterns.
The study used 37 robust redhorse from refugial populations in late March and early April 2006. 13 were fish captured from the Broad River, GA. These fish ranged from 513-573 mm TL and appeared to be either sexually mature or getting very close to it. The remaining 24 fish were caught from the Ogeechee River and ranged 316-502 mm TL. Fish were transported back to holding facilities at UGA.

ATS frequency coded radio transmitters were implanted into 30 individuals (10 Broad River; 20 Ogeechee River) on 11 April 2006. These transmitters have a guaranteed

battery life of approximately 1 year. Radio transmitters were surgically implanted into the abdominal cavity and used the shielded needle method to create a small secondary opening for the antennae. The incision site was closed using 2-3 interrupted sutures. Fish were held for an additional 8 days to monitor their condition and recovery. During this time, we lost 3 Ogeechee fish. We re-implanted transmitters from these fish into the spare Ogeechee fish.

All radio-tagged fish were released at the boat ramp immediately downstream of Lloyd Shoals Dam on the morning of 19 April 2006. Broad River and Ogeechee River fish were kept separate up to the point of release. Fish initially were relocated several times a week and are currently relocated once a week. Tracking is conducted primarily by boat; however, a canoe is used some stretches 1-2 times a month. Upon relocation, GPS waypoint and temperature, DO, depth, current velocity, and turbidity measurements are taken. A qualitative habitat assessment by categorizing available cover and substrate is also conducted.



Movements of individual radio-tagged robust redhorse released into the Ocmulgee River, Georgia, April 2006 to June 2007. *Courtesy of UGA-Georgia Coop*

This study shows that robust redhorse have different habitat use and movement patterns upstream and downstream of Juliette Dam, likely because of differences in habitat above and below the dam. Also, stocked robust redhorse behavior similar to wild individuals in the Savannah River (Grabowski and Isely 2006) and the Pee Dee River (R. Heise, personal communication) in regards to seasonal migrations and high levels of site fidelity. Stocking the Ocmulgee River seems to be a viable strategy because all fish remained in Ocmulgee with about half remaining above Juliette Dam. Individuals

integrated with resident population with individuals joining spawning aggregations below the dam. Above Juliette Dam, individuals made spawning migration but did not seem to aggregate for spawning. Better assessment of spawning habitat availability and reproductive success is necessary to assess long-term success.

Detection Probability and Response of a Cryptic Riverine Fish to Electrofishing – Cecil Jennings, Tim Grabowski, James Peterson, and Tyler Ferguson

This study aims to answer the question "Why are robust redhorse so rarely encountered?" and how should this be taken into account when estimating populations. Possible answers could include low population densities, cryptic behavior, inaccessible habitat, or a combination of these factors. The objectives are to evaluate the immediate and longer-term response of robust redhorse to electrofishing, evaluate the behavior of robust redhorse after repeated exposure to electrofishing sampling efforts, and determine the detection probability of robust redhorse.

Radio-tagged robust redhorse (n=1-8) were located with radio telemetry prior to electrofishing. Sampling was conducted in transect delineated by tracker using a boat-mounted electrofisher (700-800 v, 4-6 A), which followed RRCC sampling recommendations of 0.3 hrs of effort per river mile (0.19 hrs per rkm) as minimum guideline. Fish behaviors were monitored during sampling and were relocated immediately after sampling, after 24 hrs, and after 3-5 days.

The following formulas were used:

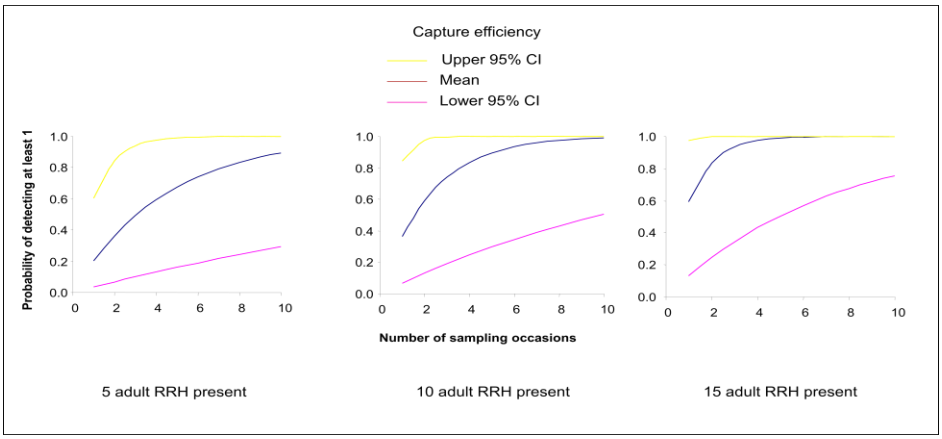
$$\text{RRH capture efficiency} = \frac{\text{Number tagged RRH captured}}{\text{Number tagged RRH in reach}}$$

$$P(C) = P(C|F)P(F)$$

RRH caught (can include zero)

RRH capture efficiency

RRH present



Courtesy of UGA-Georgia Coop

The researchers concluded that detection probability is low and could be operator or situation dependent. The recommend estimating detection probability for various sampling efforts and using estimates of detection probability to update estimates of robust redhorse abundance.

Radio-tagged "Guide Fish": A Novel Approach for Uncovering Information About Rare or Cryptic Fishes – Cecil Jennings and Tim Grabowski

Robust redhorse are difficult to observe, capture, or study possibly because of cryptic behavior, habitat selection, and small and/or dispersed populations. This leads to uncertainty as to population status or even whether a population is present. This study will attempt to use radio-tagged "guide fish" of hatchery origins in directing sampling efforts and to identifying the timing and location of spawning. The methods will be to locate radio-tagged individuals (from the detection probability study) and electrofish in areas containing radio-tagged individuals.

Six untagged robust redhorse were captured while trying to collect tagged fish during the five sampling occasions from Feb. 23 – June 19, 2007. These fish were captured where tagged individuals should have been encountered. Untagged fish were captured during 60% of the sampling events. The mean (± SE) CPUE during all 5 sampling events was 1.32 ± 0.59 fish per hour. Previous surveys in 1999 and 2001 yielded much lower CPUE of 0.15 and 0.00 fish per hour respectively.

They concluded that transplanted, hatchery-reared, radio-tagged fish were effective guides to locations to sample and observe spawning. This dramatically reduced the effort necessary to detect fish. It also allowed the discovery of unknown spawning aggregations in locations that would not have been searched. There are several considerations before employing this method in other situations such as genetic concerns and mortality associated with the introduction of naïve hatchery fish.

An untagged robust redhorse collected during this study. *UGA-Georgia Coop Photo*

Larval and Juvenile Robust Redhorse Abundance and Distribution in the Oconee River 1995-2006 – Rebecca Cull

Preliminary data for the robust redhorse reproductive success in the Altamaha system is determined by a larval survey on Oconee River. Since 2002 all larval redhorse have been

genetically identified. The numbers of robust and notchlip redhorses have varied greatly over the years.

Year	No. of Robust Redhorse	No. of Notchlip Redhorse
2002	13	157
2003	0	0
2004	4	1976
2005	0	54
2006	1	175

Courtesy of UGA-Georgia Coop

Larval robust redhorse were only collected on a few days in a few gear types. Sizes of genetically identified robust redhorse range from 13.2 to 22.2 mm TL. Robust were only collected in part of the study area. Notchlip redhorse have been collected in the same samples as the robust redhorse. During 2002, notchlip were collected in two samples containing robust redhorse ranging in size from 20.8 to 30.7 mm TL. In 2004, notchlip measured 14.0 to 32.7 mm TL. In 2006, robust redhorse was the only sucker collected.

Year	Gear	Sizes (mm TL)	No. of Samples
2002	Light trap and Seines	14.7 – 22.2	3
2004	Seines	13.3 – 15.1	3
2006	Push net	13.2	1

Courtesy of UGA-Georgia Coop

The total number of redhorse collected has varied (0 in 2003 to 1,980 in 2004). The hypothesis has been that low-stable flows during the spawning season may promote strong year-classes of redhorses (Jennings *et al.* 2004).

Oconee River Telemetry Project – Cecil Jennings

This project has been funded by the USFWS (2/3) and Georgia Power Company (1/3). UGA student Patrick Ely will be heading this project for 1 year.

Captive Robust Redhorse Spawning at Warm Springs NFH – Jaci Zelko and Carlos Echevarria

The hatchery continues to develop suitable techniques for rearing and propagation of sub-adult and adult captive broodfish in order to meet research needs. To that end, limited numbers of captive reared fish from several year classes are being maintained in tank culture systems. Overall, these fish are growing and some of the males are now sexually mature developing tubercles on their head and fins and producing sperm in early spring. The fish range between 14 to 19 inches in length (avg 16 inches) and range from 1.2 to 4.3 pounds (avg 2.32 pounds). Females are just beginning to reach sexual maturity.

The hatchery attempted the spawning of 20 captive robust redhorse in 2007, the first known trials for this species. These adults had been held at Warm Springs for several

years, and were previously held in captivity in various facilities in Georgia. Five captive adult robust redhorse were moved into a conditioning system in early March. The sex of the fish was unknown, but they looked like possible females. Several fish in a separate tank developed tubercles, indicating that they were males. Four fish were injected with the hormone Ovaprim, which is also used during the spawning efforts of wild robust redhorse in the Oconee River. All four females released eggs between June 19th and 25th, about 28,700 in total. The eggs looked very different from wild eggs, so the viability of the fertilized eggs was unknown. Only about 100 fry hatched out. The fry are currently being reared to determine longtime survival of captive-reared spawned robust redhorse. At the end of 2007, there were 16 fingerlings left (16% survival). Captive spawning of robust redhorse will be attempted in subsequent years at the hatchery.


(L) Holding tank for captive adult robust redhorse. (R) Captive adult female that was spawned in the spring of 2007 at Warm Springs National Fish Hatchery. *USFWS Photos*

TECHNICAL WORKING GROUP REPORTS

Yadkin-Pee Dee Technical Work Group Activities – Ryan Heise
Future plans for this group include tracking radio-tagged fish and continuation of electrofishing surveys.

Information Technology Technical Working Group – Jaci Zelko
This group has focused on completing Annual Meeting reports and uploading them to the website. The 2003 report is complete and ready for upload, the 2004 report draft has been written and sent to Excom members for review, and the 2005 and 2006 reports have been outlined. Also, the website has been reviewed to changes and updates. The Report-Publication-Reference page has been updated. Participants have sent many photos for upload and those will be on the website soon. Additional work on the Robust Redhorse Capture Database has been done but the data is still in excel form and not user-friendly. Jaci Zelko has discussed development of an Access database contracted out to a student with funding from Georgia Power but nothing has been finalized.

Habitat Technical Working Group – Alice Lawrence
The Habitat TWG Plan has been updated. It will be uploaded to the website (www.robustredhorse.com) soon. The group also updated participants on the status of the Stanley habitat project regarding a private landowner. The project has fallen through because the landowner is hesitant to proceed because of tax issues.

The Oconee River gravel augmentation project is making progress. GADNR received some funding from the FWS thru SARP. This project was initiated because there is only one active spawning site in the river. However, gravel augmentation could work to create additional gravel bar sites because of the dynamic river system with many oxbows. Gravel will be placed at the location above the existing gravel bar next week. The gravel has been cleaned and some has been spray-painted. 40 to 75 tons will be placed using a 40’ portable conveyor. Most of the cost of this project is for the contractor to move and clean the gravel. GADNR will monitor results by determining flows needed to move a certain weight of gravel, measuring the size of increase or decrease of the existing bar, or looking for the painted gravel. If there are good results, they could try 2 additional sites in the future and might be able to pursue additional funding.

Oconee River Technical Working Group – Alice Lawrence
Since the last annual meeting, there has not been any work done on the Oconee River Management Plan. The members are working on creating a shorter plan. Jaci Zelko has joined the TWG. The group will have a meeting by December of this year and are making the development of the plan a priority.

This picture shows the primary site selected for gravel augmentation (the existing gravel bar), a secondary site and possible future sites in the Oconee River. *GADNR Photo*

B U S I N E S S

Research Topics and Resource Needs
The following items were noted as a possible research topic:

1. Oconee River telemetry
2. Monitoring of stocked populations in Georgia and South Carolina
3. Determine genetics of wild population in Pee Dee River
4. Conduct Ocmulgee River population estimate and then use model for Oconee River
5. Determine capture/telemetry data changes after flow patterns change under new FERC license in Pee Dee River
6. Cryopreservation

It was also discussed that the group needs to send prioritized research lists to potential funding opportunities. The research lists should be accompanied by a formal letter from the Chair. The Excom was also charged to have a separate meeting to discuss detection probability in electrofishing efforts.

Outreach/Education Opportunities
Jeff Krenner, Georgia Aquarium presented information on the Robust Redhorse Sucker exhibit at the aquarium. The robust redhorse are currently housed in 550 gallon tank with an average temperature of 21 C, DO of 90-100%, salinity 2 ppt, and pH 6.6 to 6.8. The other species in this tank are bluegill, red-breasted sunfish, and creek and blue-head chub. The fish are fed a variety of artificial, live and frozen food including: large krill, small krill, pellets, gel diet, silversides, earthworms, shrimp, and clams. There was a brief discussion on the behavior of the fish since they were added to the exhibit and Jeff indicated that the fish have calmed down and have settle into the exhibit. He also noted that the males have developed tubercles but there have not been any signs of aggression or fighting amongst the fish.

North Carolina WRC will have robust redhorse highlights in their State Fair. They will have information via posters, website access, and giveaway buttons with a picture of the robust redhorse.

The Macon Museum of Natural History will have a 3-month display of the Ogeechee River and have borrowed the triad to be included in the display.

South Carolina Aquarium reported that the fish in the exhibit are doing fine. They have included a large 2x3’ display panel dedicated to the robust redhorse that is now used in all of their education and school programs.

The Southeastern meeting is coming up and Cecil Jennings was asked to contact Jim Williams to see about doing a robust redhorse presentation.

Other Business

The nominating Committee (Cecil Jennings, Ross Self, Dave Coughlan, and Jimmy evans) presented their nomination for Vice-Chair. They have selected Forrest Sessions because he is seasoned, mature and has a git-r-done attitude. A motion was made to accept Forrest as the nomination; it was seconded by David Wilkins. A vote by all participants was passed. Forrest will take over Chair of the RRCC in 2009. Congrats Forrest!

On a final note, there was discussion regarding a change of RRCC Policies to include the Nomination Committee and process for selecting Vice-Chair. The Excom was charged with delineating this matter and will report back to the RRCC at the next Annual Meeting.

Attendees:

Micheal Abney	Ryan Heise	Rebecca Perterson
William Bailey	Jeff Isely	Cindy Sanders
Tom Bowles	Cecil Jennings	Ross Self
Dave Coughlan	Brena Jones	Forrest Sessions
Tony Dodd	Jeff Krenner	Tom Sinclair
Carlos Echevarria	Scott Lamprecht	Joey Slaughter
Patrick Ely	Alice Lawrence	Wayne Starnes
Jimmy Evans	John Morrison	David Wilkins
Nathan Farnau	Greg Moyer	Beth Wrege
Michael Fisk	Mike Nichols	Jaci Zelko
Gene Hayes	Elizabeth Osier	