REPORT OF THE

ROBUST REDHORSE CONSERVATION COMMITTEE ANNUAL MEETING

Hickory Knob State Park
McCormick, South Carolina
October 19-20, 2005

Report compiled by Jaci Zelko
Warm Springs National Fish Hatchery
U.S. Fish & Wildlife Service

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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 11th 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 and documents decisions made at the 2005 RRCC Annual Meeting. Below are highlights of the meeting held October 19 – 20, 2005 at Hickory Knob State Resort Park in McCormick, South Carolina.

RRCC chairman Ross Self indicated that the Nominating Committee (Jaci Zelko, Mike Abney, Jimmy Evans) have selected a nominee. The nominee selected is Dave Coughlin, Duke Energy. He indicated that he accepts the nomination but will need to consult with his supervisors before fully accepting the nomination. The members were asked to vote on this selection and all said yea. Dave would serve as RRCC Chair from 2007 to 2008.

The Oconee TWG is working on the Oconee River Management Plan (Figure 52), which will be a comprehensive document covering data collected from 1991 to the present. The plan recognizes that alternative interpretations may exist and that some interpretations or conclusions may need to be modified in the future.

Research priorities for 2006 in each river basin were discussed by all members. Research will be dependent on funding and personnel but each signatory will make efforts to conduct research in each of their designated basins.

INTRODUCTION

The tenth annual meeting of the Robust Redhorse Conservation Committee was held October 19-20, 2005 at Hickory Knob State Park near McCormick, South Carolina. The RRCC was formed by a MOU signed in 1995 to develop and manage a recovery program for the robust redhorse (*Moxostoma robustum*), previously a Category 2 candidate for federal listing under the Endangered Species Act. The RRCC is committed to the recovery of the imperiled robust redhorse throughout its former range. This report is a summary of the management activities and decisions, research results, conservation efforts, and panel discussion presented at the 2005 RRCC Annual Meeting.

The robust redhorse was re-discovered in the Oconee River of Georgia in 1991, the first scientifically verified sighting since the species was described by the naturalist Edward Drinker Cope in 1869. Since 1991, robust redhorse individuals have been found in the Oconee River between Sinclair Dam and Dublin, GA; in a short upper coastal plain section of the Ocmulgee River, GA; in the Savannah River (the boundary between GA and SC) in the Augusta Shoals area and below New Savannah River Bluff Lock and Dam; and in the Pee Dee River, NC below Blewett's Falls Dam. Robust redhorse living today appear to inhabit specialized areas of large rivers which are difficult to sample. However, small numbers of individuals are occasionally found when targeted surveys are conducted. The historic range of the robust redhorse includes Atlantic slope drainages from the Pee Dee River system in North Carolina to the Altamaha River system in Georgia.

It is believed that river impoundments, predation by nonnative species, and habitat deterioration due to sedimentation and water pollution have contributed to the decline of the robust redhorse. Because of the diversity and complexity of these threats, an interdisciplinary recovery approach is needed which includes the experience, expertise, and authority of many agencies and individuals. Additionally, recovery efforts will be enhanced by a close partnership with private industries and government agencies which potentially impacted by and concerned in robust redhorse conservation.

The eleventh annual RRCC annual meeting was attended by approximately 30 representatives (see Attachment) of signatory agencies to the MOU, university research affiliates, and other organizations with interest in the robust redhorse and its recovery. The following signatories include: Georgia Department of Natural Resources, South Carolina Department of Natural Resources, North Carolina Wildlife Resources Commission, Georgia Power 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 Georgia Rivers Network. 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, State University of New York Medical Center, and Roanoke College Department of Biology. In addition, representatives of other concerns with interests in the recovery of the robust redhorse include: South Carolina Electric and Gas Company, Santee Cooper Power Company, South Carolina Aquarium, and Natural

Resource Conservation Service. The success of the recovery effort depend greatly on the willingness of RRCC members and others to participate in the annual meeting and in activities throughout the year.

The RRCC annual meeting satisfies one requirement for the conservation of the species as designated in the MOU. It is also the only scheduled time for all interests to assess progress and to establish management decisions to guide recovery efforts in the coming year and beyond. The annual meeting is also a forum in which to explore and debate the scientific and management implications of new research data and results, to debate philosophical viewpoints, and to bring together the collective expertise of fisheries and environmental management professionals. This dialogue includes the best available scientific data on the robust redhorse, which forms the basis for the RRCC's recovery and policy decisions.

This report includes a summary of the research progress, management activities, and conservation effort decisions and presentations made at the 2005 RRCC annual meeting. The presentations made at this year's meeting were organized into five sections: Outreach and Education; Basin Management Updates; Research Updates; reports from each Technical Working Group; and a discussion of robust redhorse research needs for the coming year and beyond.

Committee Business Notes

Ross Self, RRCC chair, opened the 2005 annual meeting by welcoming everyone and inviting all participants to introduce themselves to the other attendees. Ross thanked all the sponsors of the meeting. He also introduced the facilitator for this year's meeting, Bill Marshall, Coordinator of Planning and Research in the Scenic Rivers Program for South Carolina DNR.

OUTREACH & EDUCATION

The U.S. Fish & Wildlife Service Washington Office has developed two brochures for private landowners on the CCAA and Safe Harbor Agreements. Alice Lawrence has copies of "Conservation Profiles: Landowners Help Imperiled Wildlife" available for distribution. The copies of "Working Together Tools for Helping Imperiled Wildlife on Private Lands" are available online at the following address: http://www.fws.gov/endangered/pubs/Tools.Brochure/Tools%20Brochure%20PDFs.pdf. The brochures were also presented at a Georgia Waters meeting along with Georgia DNR's spawning triad display

A Department of Defence Conference was held in Savannah for all environmental programs. The organizers requested a display on robust redhorse and the recovery efforts made by the committee.

Wayne Starnes gave an update on the Peterson Guide. Robust redhorse will be included in the new issue. The Guide should be ready sometime in 2006. The authors will be using Tomelleri's illustration. The Guide will also include other imperiled and un-described species.

The new Georgia Aquarium, located in downtown Atlanta, has been in contact with Jimmy Evans to coordinate the new robust redhorse exhibit. Jeff Grinner, freshwater fish curator had indicated that a specialized exhibit with a 12' tank has been built to hold smaller robust with moderate flow and gravel substrate. The exhibit mimics a raceway construction with appropriate substrate. At this time, hasn't received any Robust yet, but will get a few smaller fish from Carlos Echevarria, Warm Springs NFH next week. The aquarium may also get a small number of fish after harvesting the Walton pond. A large river exhibit will also hold 3-5 larger robust along with many other species (may need to get bigger fish from Ogeechee). A 1 ½ minute video is also available by the exhibit that shows the background story of the robust (was filmed in 2004 at Richmond Hill SFH during harvesting and CWT tagging).

David Wilkins gave a South Carolina aquarium update. The two robust on display are doing well. One robust is held in holding/quarantine to rotate into the exhibit if needed. David indicated that the robust are very spooky fish, and slow growing but the coloring of the fins is fairly red. Their fish are fed freshwater shrimp, bloodworms, sinking trout chow, millworms, mealworms, and a Vitamin C supplement.

Ross Self told the participants that the South Carolina Wildlife Magazine TV was doing a segment of robust redhorse stocking into the Broad River, SC. This was filmed and placed on public TV, and copies are available. The meeting participants were shown this wonderful TV segment.

Bill Bailey updated the members on the priority list of research needs generated at the 2004 annual meeting was presented to the Georgia Water Resources Commission.

ADMINISTRATION

Ross Self gave a report on the Robust Redhorse Conservation Committee Budget. No new contributions were added in 2005. Funds received in 2004 included $1,000 from PBS&J, $1,500 from Duke Energy, and $250 by South Carolina Electric and Gas. These funds covered the 2004 and 2005 annual meetings. Ross indicated that the Committee will need to secure additional funds in 2006. South Carolina AFS continues to manage the RRCC funds.

RRCC chairman Ross Self indicated that the Nominating Committee (Jaci Zelko, Mike Abney, Jimmy Evans) have selected a nominee. The nominee selected is Dave Coughlin, Duke Energy. He indicated that he accepts the nomination but will need to consult with his supervisors before fully accepting the nomination. The members were asked to vote on this selection and all voted yea. Dave would serve as RRCC Chair from 2007 to 2008.

Ross Self gave an update on the status of the Memorandum of Understanding. The final copy with signed pages of all signatories will be forwarded as soon as North Carolina WRC signs their form and submits it back to Ross.

As per RRCC Policies, a written record of meeting notes is to be compiled for each Annual Meeting. The Committee is lagging behind in compiling and completing some years' reports. The 2004 report by Beth Dakin is in draft form, and is waiting for review by the Excom. The 2003 report by Jaci Zelko is in draft form, and is also waiting for review by Excom. The 2003 and 2004 reports should be reviewed and finalized by the end of 2005. Once the reports are finalized, a pdf version will be posted on the RRCC website for access by all members. The 2002 draft report is being written by Jaci Zelko and should be finalized by mid-2006.

BASIN MANAGEMENT UPDATES 2005

Yadkin – Pee Dee Basin Update – Ryan Heise, North Carolina WRC

The short-term goals of the Yadkin-Pee Dee TWG is consistent collections, location of extant populations, and determining the habitat and life history requirements or robust redhorse. The 2005 work plan included 2 separate tracking scenarios. The first scenario consists of tracking tagged fish (tagged in 2004) until the river reaches 18 ºC. The area would be sampled for a 3-week period. This scenario is of course dependent on finding the tagged fish. In the second scenario, if no tagged fish are located; sampling would take place in previously successful areas. Flights over the Pee Dee were used to find tagged fish in 2004. This year, the fly-over focus will be on shorter segments of the river. Any new captures will be tagged with 3-year ATS tags.

During the 2005 surveys, both fish tagged in 2004 were located, so the biologists continued with the first tracking scenario, as described above. The river was sampled from April 28th to May 10th (total of 51.86 hours of electro-fishing). Four males and 4 females were collected during this time. Five of these fish were implanted with the new 3-year ATS tags. All adults were running ripe and measured from 535 to 685 cm. The captures were concentrated below Blues Landing and some of the fish were captured in side channels. Two of the 8 fish were recaptures. Fin clips and scales are taken from each fish collected. Pit tags are also injected and if fish have been previously radio-tagged, those tags are not extracted to prevent internal tissue damage if removed.

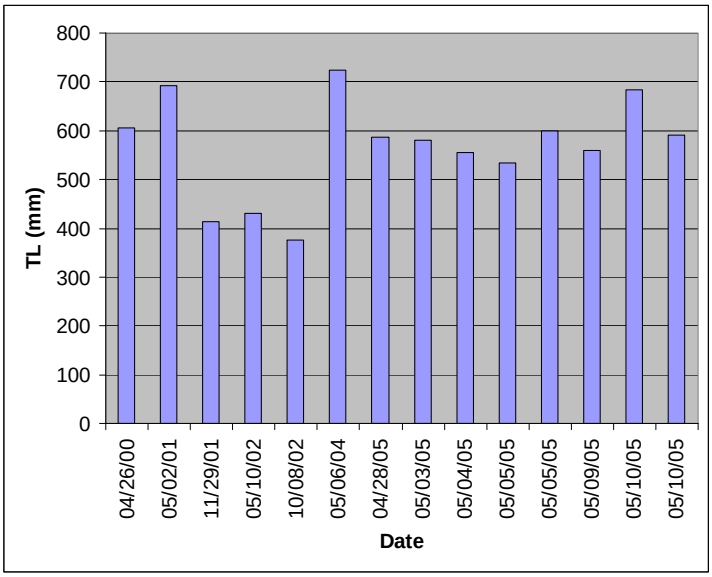


Figure 1. Total lengths of robust redhorse captured in the Pee Dee River from 2000 – 2005.

In conclusion, the 2005 data suggests that the population persists in Pee Dee below Blewett Falls, spawning individuals are captured in side channels, and some individuals will migrate long distances. Bob Jenkins has done some work on ageing some of the younger fish that have been observed spawning. He indicated the scales show the fish are pretty young (either 98 or 99 year-class). The water fluctuates between 400 and 7000 cfs daily. Because of this, the biologists need regulated flows to get on the river. The habitat

in the side channels is a rapid flow during generations but is consistent at all times and has a boulder/gravel mix with sand substrate.

Savannah and Santee River Basin Task Force Update– Ross Self, Forrest Sessions, Scott Lamprecht, South Carolina DNR

In November 2004, a total of 28,000 Phase I fish were harvested. Of that total, 18,920 fish were stocked below and above Par Shoals reservoir on the Broad River, SC. The remaining number of fish was stocked in ponds at Ft. Gordon for Phase II production. All stocked fish received coded-wire tags.

During the 2005 spawning efforts, six females were crossed with 16 males. All females were ripe and running at time of capture. The fish used for spawning have never been spawned before. The goal for the South Carolina population is to make 100 crosses. A total of 36 crosses have been made in 2004 and 2005.

Approximately 40,000 eggs were incubated at Bayless STB Hatchery, and hatched fry were fed *artemia* for 5 days prior to stocking. About 33,000 larvae were hatched. Over 8,000 larvae were stocked in ponds at Lake Burton Hatchery in Georgia.

South Carolina DNR and Duke Power are in development to assist with stockings to cover the Santee Basin with a Conservation Candidate Agreement with Assurances.

Altamaha River Basin Update – Jimmy Evans, Georgia DNR

Twelve broodfish were collected during the spring of 2005 in the Oconee River. Of these12 fish caught, 4 were females, 6 were males, and 2 of the fish were recaptures. These fish were captured Area 2 (7) and Area 3 (5). None of these fish caught were stocked fish. 50% of fish caught were recaptures. The 10 day sampling effort concluded with 34 hrs electro-fishing with 3 boats and 0.36 CPU. The length distribution (N=10) was 52-68 cm.

It was presented that the Length-Frequency Distribution from 1992 to 2005 has trended to older, larger fish. It has also been shown that most of the new recruits have come from stocked fish. There has been a general decline in electro-fishing catch rates since 1993. Population estimates have been produced for 1995 to 2004. The latest estimate is 100 to 150 fish in the Oconee River. The Jolly-Sever sustainability of population for 200 runs over 100 years is about 150 fish.

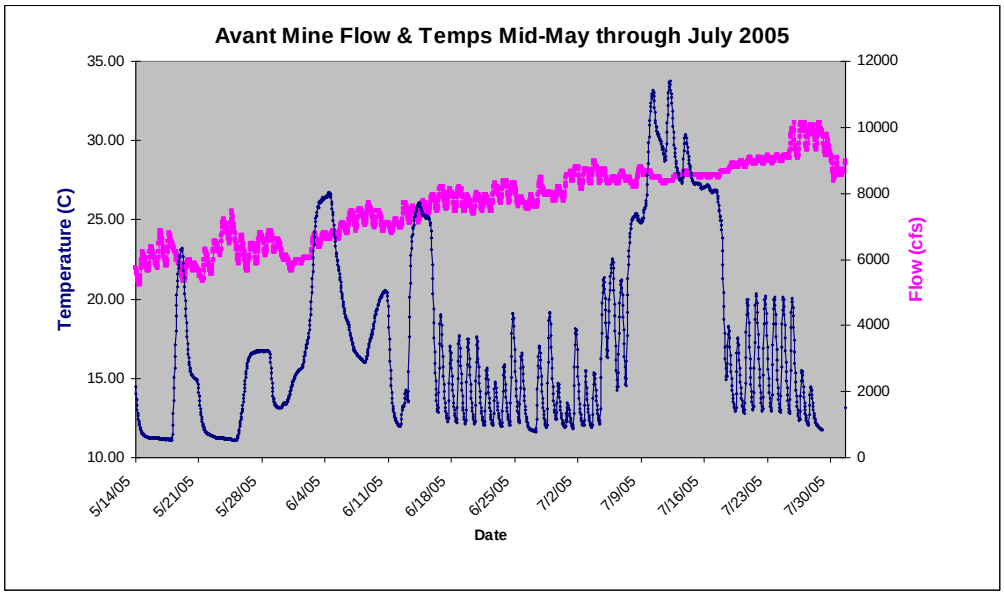
Jimmy also gave an update on the pond harvest in the fall of 2004. One Walton State Fish Hatchery pond stocked with 8000 fry and 324 fingerlings were harvested (4% survival. Richmond Hill State Fish Hatchery ponds stocked with 22,000 fry and 8,000 fingerlings were harvested (36% survival). A total of 8,300 fingerlings were produced.

The following rivers and reservoirs have been stocked in the fall of 2004 (Ocmulgee River – 3000, Oconee River – 250, Ogeechee River – 4500, Walton pond – 500, Piedmont refugial pond – remaining fingerlings). The following numbers show stocking histories for each river/reservoir: (Oconee River – 499 from 7 year-classes (mostly Phase II, only collected 10 recaps out of the 499; Ocmulgee River – 9,590 from 7 year-classes; Ogeechee River – 43,048 from 7 year-classes; Broad River, GA – 32,189 from 4 year-classes; Piedmont NWR – 22,584 from 8 year-classes).

Oconee River Flow Advisory Team Report – Mike Abney, Mike Nichols – GPC
Members of this team include Mike Nichols, Mike Abney, Cecil Jennings, Jimmy Evans and Alice Lawrence. This team has looked at various flow regimes in the Oconee River.

The team has determined that in a dry year there are only minimal flows and in a wet year, flows can't be controlled. As of this meeting, the flow modifications are run of river in May and limited peaking from June to November. The turbines can not handle flows above 7600 cfs. Georgia Power Company will not be changing the license flow agreement and this recommendation will be sent to FERC.

Figure 2. Avant Mine Flow and Temps through July 2005.



Oconee River Temperatures and Flows in 2005 – Mike Abney, Mike Nichols – GPC

The goal is to reproduce the historical run of the year conditions in the Oconee River. Georgia Power Company is trying to keep run of the year flows until June 10th.

SUPPLEMENTAL BREEDING

Spawning, Rearing, and Distribution of Oconee River Progeny 2005 – Jaci Zelko
Spawning efforts were conducted on the Oconee River from May 2nd – 25th. Six females and four males eligible for spawning were collected by electro-fishing and brought to the stream-side spawning site at Beaverdam WMA. All males collected were flowing and visible signs of sparring were present. The females showed enlarged genital domes, mucus loss and soft undersides. However, only two females had flowing eggs. The other females were either spent or gave overripe eggs. Almost 35,000 eggs were collected, fertilized and split between two rearing facilities. Eggs were sent to Warm Springs NFH and McDuffie SFH. The matings consisted of four females crossed with seven males. Due to the lack of good sperm from wild fish, sperm from fish held at Warm Springs NFH was used on small lots of eggs. Only 325 fry were produced with this sperm. An additional fertilization technique was used. Cryopreserved sperm was used to fertilize two small lots of eggs. The sperm was originally frozen in 2004. There was an extremely low fertilization rate of <1% using this technique.

Figure 3. Male robust redhorse collected from the Oconee River.

Cryopreservation efforts were attempted in 2005 for robust from the Oconee and Savannah rivers. The Oconee River sperm repository now holds 1,474 straws from 41 males. The Savannah River sperm repository now holds 570 straws from 25 males. This research will continue during future spawning efforts to preserve the genetic integrity of these populations and also give managers more options during spawning.

Oconee river progeny were reared at Warm Springs National Fish Hatchery and McDuffie SFH. Over 25,000 eggs were received at Warm Springs from May 10th to May 18th. Over 13,300 fry hatched, with an overall hatching rate of 45-50%. 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. Live brine shrimp were fed to the fry four times daily between May 23th and June 8th. A small amount of starter feed was also presented along with the brine shrimp as an aid in future feed transitioning. A sample of fry was examined microscopically for external parasites prior to distribution, none were found. Fish were moved using fry transport boxes with a mixing of the above lots into each shipping box. Each site received a uniform mixing of the crosses.

Approximately 2,400 fry were retained at Warm Springs for a diet study. Fry 19 to 25 days post-hatch (0.6 to 0.85 inches) were distributed. Fry were distributed to Walton SFH (3,789 fry put into one pond) and into three ponds at Richmond Hill SFH (5,277 fry).

POPULATION DYNAMICS

Reproductive and Recruitment Success of Robust Redhorse in the Oconee River – Cecil Jennings, USGS and Georgia Coop and Rebecca Cull, Georgia Coop

The Oconee River was sampled for larval robust redhorse from May 16 to July 29, 2005. The researchers collected 264 larval samples by light trap-56, pushnet-66, and seine-142. Redhorse were collected on 4 days and size increased through the season (May 17 [22], May 24 [28], May 31 [2], and June 13 [2]). A total of 7,292 fish were collected (79 were suckers and 54 of those were robust but analysis is not complete). The samples are being processed and are waiting for genetic identification. Larvae that measure 17 mm on May 17th hatched approximately on May 10th. Larvae first swim-up at 12 to 14 mm.

The Oconee River was sampled for juveniles with experimental gillnets from Sept 20 to Nov 16. As of Oct 7, (2) 50' gillnets caught 2 gar; (20) 100' gillnets caught 4 suckers; (14) 200' gillnets caught carp suckers. Broad River, GA at Anthony shoals and Clarks Hill Reservoir was also sampled. The researchers caught 1 robust in 40 min peddle time; fish was in good condition but no evidence of any spawning activity.

Observations of the Spawning Aggregation on the Oconee River at Avant's – Bud Freeman, UGA

Bud reported that only a few fish were seen everyday at the spawning bar at Avant mine. However, there was one day that about 20 fish were observed on the gravel bar.

Observations of the Spawning Aggregation in the Ocmulgee River – Mike Abney, Mike Nichols, GPC

Georgia Power Company has tidbits in the Oconee and Ocmulgee Rivers, and Mike Abney has seen suckers when checking the tidbit at Juliette Dam. This occurred on May 18th, when the temperature was 22°C. Mike observed robust redhorse approximately 100 meters downstream of the dam. He saw two spawning events with quivering and mud streaks. The first spawning event occurred with 1 female and 3 males and the second spawning event occurred with 2 females and 7 males. Both events took place on the same gravel area, and territory and gravel holding by males was seen. Mike also observed robust redhorse the following day, but didn't see any actual spawning events.

Mike Nichols checked the gravel bar a few days later and saw that the fish had tags (stocked fish) and were large in size.

RESEARCH UPDATES

Technical and Economical Analysis of Robust Redhorse Larval Culture – Emmanuelle Rey and Carlos Echevarria, USFWS

This feed study was initiated because finding an adequate artificial diet for both intensive and extensive culture could result in substantial savings in feed cost and labor. The objectives were to develop a protocol for intensive culture of robust on a large scale, focus on improving the diet, compare two new artificial pellets, and identify artificial feeds that improve nutrient balance and health. Feeds were presented in excess four times a day. The treatments included a mixture of pellet (Rangen and razorback sucker), bloodworms, and brine shrimp. Results indicated a high survival, minimal deformities for fish fed live diets but these fish were the smallest. Fish fed either of the pellets had high survival and were the largest but also had a higher percentage of deformities. Robust can be intensively raised at higher percent survival at relatively low cost with acceptable low rates of deformities

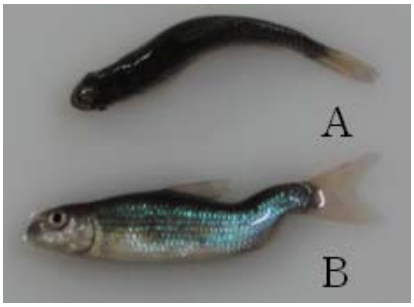


Figure 4. Lordosis and scoliosis deformities observed during the feed study.

Broodfish rearing/spawning at Warm Springs NFH – Carlos Echevarria, USFWS

Broodfish rearing at Warm Springs National Fish Hatchery has been conducted since 2000. The fish are being held as captive refugia. The fish are in good health, and are from 1999 to 2002 year-classes. The fish were received as two groups, a group originally from the Oconee River and a second group of fish came from the ponds at Piedmont NWR. The fish have been trained on Rangen semi-moist sinking pellets. Eight of the 11 males being held produced sperm in the spring of 2005 at around 17-18°C. These males also developed tubercles and produced sperm for 2 months.

Habitat Selection of Juvenile Robust Redhorse in an Experimental Mesocosm – Diarra Mosley, GA Coop and Cecil Jennings, USGS – GA Coop

The rationale of this study is based on the inability to collect juveniles from 30 – 410 mm in the Oconee River. Several theories proposed for this absence of juvenile collections is the actual abundance, sampling inefficiency, or habitat selection of robust redhorse. The results of this study will help evaluate the status of the Oconee River population. The objective of this study is to determine if the fish are selecting mesocosm areas of available habitat in proportion to its availability.

Robust redhorse with an average length of 110 mm was used in this study. The position of the fish in the mesocosm was observed and recorded during four trials at two different

temperatures (at 2-3° C and 9-10° C). Data analyis was conducted on flow data, temperature difference, and flow class (eddies, slow, moderate, and backwaters).

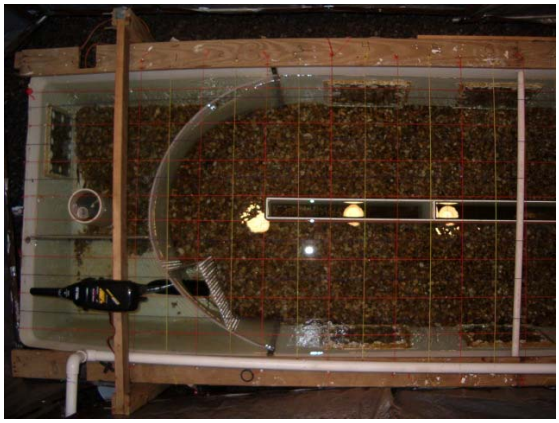


Figure 5. Overhead view of the mesocosm.

Main effects and interaction were analyzed and the data shows that fish use of mesocosm was not affected by tank or season, fish use of mesocosm was affected by flow class, and interactions with other factors was driven by flow class.

Sampling implications from this study show that during winter conditions, look for juvenile robust redhorse first in and around eddies then second in backwaters. During early spring a condition look for robust first in and around eddies then in slow current and third in backwaters.

Electrofishing study – Tom Kwak

The effects of electroshock on juvenile robust redhorse were studied. 500 fish (in the 4-5" range) were received from the Dennis Center and acclimated for 6 months. Fish were shocked and pit tagged. The fish were exposed to variant electrical treatments for 3 to 6 seconds, and at 3 – 60 Hz. There was excellent survival and good tag retention >95%. Spinal injuries did occur at extreme treatments. Electric current was tried on eggs but there was no obvious affects on hatching rates.

Seasonal and Diel Movements of Robust Redhorse in the Savannah River – Tim Grabowski, Clemson University

This research had many objectives including: seasonal migrations and site fidelity; diel movement and habitat use; spawning habitat segregation; effects of microhabitat selection on egg and larval survival; recapture histories and population estimate; and publications-realized and anticipated.

A total of 24 robust redhorse were collected from spawning aggregations in 2002 and 2004 from both the gravel bar and Savannah Shoals. Four of the fish captured in 2002 died or shed their transmitter shortly after implantation and another died or shed its transmitter 21 months later. Two of the fish captured in 2004 died or shed their transmitter within two weeks after implantation.

Spring migrations of robust redhorse in the Savannah River initiate in April when water temperatures reach 12-14°C. Adult robust redhorse show a high degree of site fidelity to overwintering habitat and most return to within 100-200 m of locations where they spent the previous winter. Adult robust redhorse appear to have a high degree of site fidelity to spawning habitat; however, there appears to be some evaluation of this habitat that occurs regardless of past use.

Figure 6. Tags used during the telemetry study.

The telemetry studies suggest the availability of suitable adult habitat is not limiting the Savannah River population. There is minimal spatial partitioning of available gravel bar habitat in the main channel of the Savannah River.

The researchers are continuing to analyze environmental data to evaluate what makes these areas so attractive. Spawning catostomids appear to partition spawning habitat through time. However, some nest site superimposition among species is likely to occur. They are continuing to analyze ichthyoplankton samples to evaluate this. Nest site superimposition almost certainly occurs within some species such as robust redhorse.

In terms of river regulation, the exact flow requirements may not be as important as maintaining a consistent flow. The limited availability of suitable spawning habitat in the Savannah River appears to leave robust redhorse eggs and larvae vulnerable to both density dependent and independent sources of mortality.

The worst case estimate is approximately 400 adult robust redhorse in lower Savannah River based on biased sex ration, incomplete data for fish captured prior to this study, and frequent recaptures of tagged fish with no records.

The best case estimate is approximately 800-1,000 adult robust redhorse in lower Savannah River assuming equal sex ratio and mixing between spawning aggregations. There is insufficient data to determine any demographic trends; however, population appears to consist of a higher proportion of younger fish than Oconee River.

This research has also provided many other accomplishments including the implantation of PIT tags into 286 individuals of 6 catostomid species (107 robust redhorse); the collection and maintenance of tissue samples from all catostomid species captured; collection of Savannah River robust redhorse broodstock for 2004 and 2005 (in

conjunction with SCDNR); collection, preservation, and deposition of 2 adult male robust redhorse from the Savannah River (in conjunction with R.E. Jenkins and W.C. Starnes/NC State Museum of Natural Sciences); and implantation of radio tags into two Pee Dee River robust redhorse and assisting subsequent tracking (as part of our participation in the RRCC Yadkin-Pee Dee TWG). The researchers are also in the process of cataloging and digitizing approximately 10-12 hours of video footage of robust redhorse spawning both above and below water.

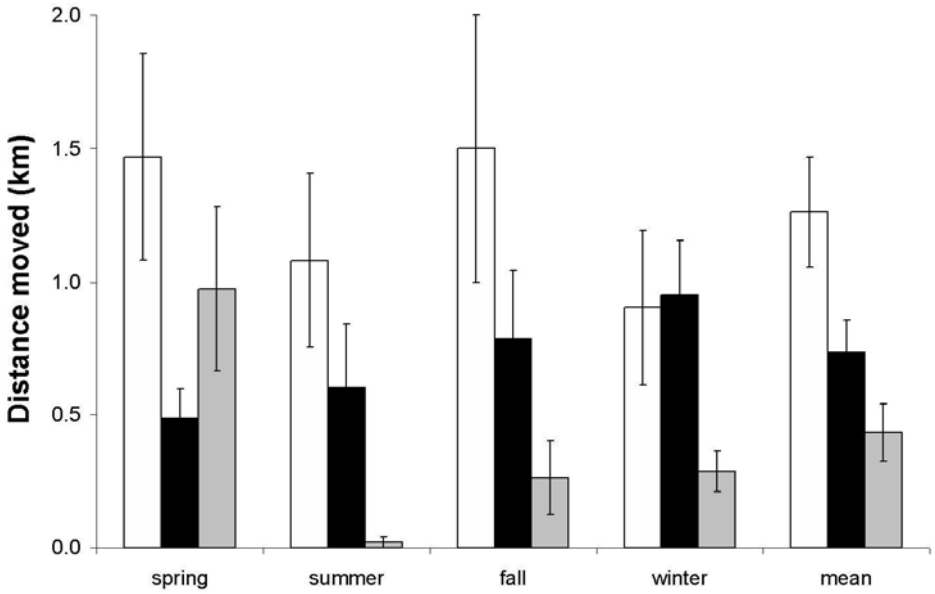


Figure 7. Diel movements of robust redhorse throughout the year in the Savannah River.

RE-INTRODUCTION MANAGEMENT

Stocking History – Jimmy Evans, GA DNR

The total number stocked in Georgia water from 1993 to 2005 is 107,910; 79% in rivers, 21% in ponds. The following list shows the stocking histories by year-class for each river basin:

Oconee River from 2000 – 2005: total 499
- 1995 yc - 46
- 1997 yc - 67
- 1998 yc - 6
- 1999 yc - 59
- 2000 yc - 41
- 2001 yc - 21
- 2004 yc – 250
- Unidentified – 9

Ocmulgee River from 2002 – 2004: total 9,590
- 1997 yc - 528
- 1998 yc - 633
- 1999 yc - 577
- 2000 yc - 415
- 2001 yc - 1,540
- 2002 yc - 2,999
- 2004 yc - 2,898

Ogeechee River from 1997 – 2004: total 43,048
- 1997 yc - 1,762
- 1998 yc - 876
- 1999 yc - 10,328
- 2000 yc - 8,025
- 2001 yc - 7,541
- 2002 yc - 10,263
- 2004 yc - 4,253

Broad River from 1993 – 1998: total 32,189
- 1993 yc - 545
- 1995 yc - 1,424
- 1997 y - 27,482
- 1998 yc - 2,738

Georgia Stocking Recommendations – Jimmy Evans, GADNR

Jimmy provided the Georgia DNR viewpoint on future stocking especially for the Oconee River. The DNR geels that the population trend is down and they would like to

see more aggressive stocking. Most effort was expended in 2005 but this is difficult to do with staff time. The DNR has expressed that changes are necessary and they do not want to ignore the genetic implications but want to try and rebuild the population. They recommend to stock 2000 – 5--- Phase I fish in the size range of 3 to 5". These fish would be divided into the Oconee and Ocmulgee rivers.

Consensus from the Committee members is to stock approximately 2000 Phase I fish into the Ocmulgee and Oconee, dependent of fingerling survival.

Another concern is the research component in making stocking recommendations. Research could determine the causes of recruitment bottleneck when stocking large number of small 3 to 5" fish. If a specific cause for the decline at this size class is discovered, corrective action can be taken. One way to approach this is to move adults from the Ogeechee River into the Oconee River. The Committee members reached a consensus to move 10 to 30 fish.

South Carolina Stocking Recommendations – Forrest Sessions, SCDNR

The 2005 stocking efforts will be dependent on fall harvest. The Broad River, SC will be stocked with 18,000 Phase I fish at two different sites. The Wateree River, SC will be stocked with 5,000 to 10,000 Phase I and another 1,000 Phase II fish (produced in 2004) below the dam.

BASIN MANAGEMENT GOALS AND ACTIVITIES 2006

Yadkin – Pee Dee Basin 2006 Activities

Future efforts in the Pee Dee include tracking to identify habitat, continue electro-fishing surveys, and implant more tags for telemetry.

Georgia Broodstock Collections 2006

Sampling will occur for a 1 -2 week period at the peak of the spawning season. They will sample by electro-shocking in the traditional areas. Grids will also be placed at the gravel Avant Bar. Georgia Power will provid lower stable flows for a longer period in 2006.

South Carolina Broodstock Collections 2006

Sampling grids are being constructed and will be used at the gravel bar in 2006. They will begin collecting spawning adults at the end of April. The biologists will try to maximize the crossings.

TECHNICAL WORKING GROUP REPORTS

Oconee TWG – Jimmy Evans, GA DNR, Bud Freeman and Cecil Jennings, USGS – GA Coop, Alice Palmer, USFWS, and Mike Nichols, GPC

The Oconee TWG is nearing completion of an Oconee River Management Plan (Figure 52), which will be a comprehensive document covering data collected from 1991 to the present. The plans objectives include: strategies to enhance status in Oconee River; guide decision making, management actions, research; comprehensive source of information; basin characteristics; initial discovery; recovery process; research and recovery activities; and population status trends since discovery. The Oconee River Management Plan is expected to be completed in the next 6 months.

Yadkin-Pee Dee TWG – Ryan Heise, NCWRC, Dave Coughlan, DPC, John Crutchfield, CPLC, Danielle Pender, NC WRC, Wayne Starnes, NCS MNS

The short-term goals of this group are to have consistent collection of robust redhorse and to determine the range of robust redhorse in the Yadkin and Pee Dee drainages. The long term goal is to have a sustainable population of robust redhorse in the region. In 2006, the members will try to find and track the radio-tagged fish, and hope that this will lead them to additional robust redhorse.

Habitat TWG – Bill Bailey, USACOE, Alice Palmer, USFWS, Liz Caldwell, USFS, Rebecca Cull, GA Coop, and Danielle Pender, NC WRC

As part of the RRCC policies, the Habitat TWG is tasked with identifying habitat requirements and establishing guidelines. The group presented a final copy of the guidelines at the 2004 Annual Meeting. The group is conducting a literature search on gravel augmentation projects. The group will continue to make small updates to the plan.

Information Technology TWG – Jaci Zelko, USFWS

The responsibilities of this TWG include data management and website management. The website www.robustredhorse.com includes several pages including: Home, Factsheet (pdf), RRCC Members, Contact Information, Reports-Publications-Plans, Range Maps, Projects & Activities, Habitat Restoration, Education, Photos, Memorandum of Understanding, and RRCC Policies. It was discussed among members that a links page and hit counter could be added to the website. The database of all data from each basin is currently contained in an excel spreadsheet. The conversion to a more user-friendly Access database is very time consuming and intricate. The IT TWG will continue to look at the viability of this database conversion. Jaci Zelko will continue to gather the yearly records in the excel spreadsheet and provide copies to all parties.

BUSINESS

Outreach/Education Opportunities

Several outreach and educational opportunities were discussed at the meeting. Bob Jenkins informed the participants that the Peterson Guide will be available soon. A South Carolina Freshwater Species Guide is also in development. One item that will need future consideration is the design and implementation of warning signs that can be placed at strategic boat ramps. The signs will let boaters and fishermen know that if a robust redhorse is captured, they should call the appropriate DNR office. The signs would be similar to ones used for paddlefish or sturgeon.

TWG Activities, Assignments, and Authorizations

The participants discussed and agreed that the TWG groups should be re-authorized every year at the annual meeting. This would allow the Excom to know the status of each TWG and decide to continue the group or disband the group if no longer warranted.

Research Topics, Needs, and Priorities for 2005

The following list of research proposals was presented to the members. Each topic was discussed but it will be ultimately up to the Excom to pursue these topics further.

- Genetics proposals (presented by Mike Nichols)
    - Existing methods use mDNA, new method could use microsatellites
    - Geneticist would need to set-up a new assay, use the old one, or use both
    - Immediate need to analyze the 2004 data with mDNA
- Telemetry on the Oconee River (presented by Cecil Jennings)
    - There is a concern of using wild fish
    - Could use fish from other rivers with a few from Oconee River
    - Implant tags in the fall to minimize stress
    - Cecil will investigate the costs
- Stress of Propagation Effort
    - Cecil's student can look at spawned versus not spawned mortalities
- Standardized information collection at Avant
    - Audio monitoring for spawning activity
    - Recording video to standardize counting
    - Cecil will investigate this with Bud Freeman

Attendees:

Wayne Starnes	NC State
David Wilkins	SC Aquarium
Bill Bailey	USCOE
Tim Grabowski	Clemson
Dave Couglan	Duke Energy
Steve Summer	SCEG
Diarra Mosely	UGA Coop
Steve Zimpfer	UGA Coop
Tavis McClean	UGA Coop
Cecil Jennings	UGA – USGS
Bill Marshall	SCDNR
Connie Keeler-Foster	USFWS
Tom Bowles	SCANA Energy
Carlos Echevarria	USFWS
Vince Mudrak	USFWS
Tom Sinclair	USFWS
Ryan Heise	NCWRC
Scott Van Horn	NCWRC
Ross Self	SCDNR
John Biagi	GADNR
Forrest Sessions	SCDNR
Scott Lamprecht	SCDNR
John Morrison	Santee Cooper
Jimmy Evans	GADNR
Lora Zimmerman	USFWS
Alice Lawrence	USFWS
Mike Abney	GPC
Mike Nichols	GPC
Jaci Zelko	USFWS
Bob Jenkins	Roanoke