Meeting Summary
Second Annual Meeting of the Robust Redhorse Conservation Committee
Georgia Wildlife Resources Division Headquarters Office
Social Circle, Georgia
October 16 - 17, 1996

October 16, 1996
(Presentation Session)

The meeting began at approximately 1:00 p.m.. Jimmy Evans made a few introductory comments and introduced Margaret Holt, the meeting facilitator. Margaret discussed the organization and format of the meeting and introduced the speakers.

A. <u>Present status of the Oconee River population. Jimmy Evans</u>

- The most recent length-frequency data indicate that 80 - 90% of the population is between 24 - 27 in. The largest specimen is 29 in., the smallest is 17 in.

- Based on aging of opercles done primarily by Bob Jenkins at Roanoke College, Virginia, it is estimated that most of the adults presently found in the Oconee River were spawned in 1972 - 1979. The youngest currently found in the Oconee River are about 5 years old, the oldest about 26 years of age. The majority appear to be between 17 and 24 years old.

- The mean, median, and modal lengths have increased since 1992 and the catch rates have declined. Based on these data, there is some indication that older age classes may be declining in abundance.

- Three hundred and twenty-four adult robust redhorse were tagged during the period 1993 - 1996. There were 104 recaptures during the same period; approx. 15 - 30% of the fish collected during a typical sampling day are tagged. The number of recaptures varies with sampling location, but it appears, roughly, that 15 - 30% of the population has been tagged. Based on simple proportion, this gives a population estimate of 1000 - 2,500, probably closer to 2,500. Since neither the tagging effort nor the recap effort is randomly conducted, the assumptions of a valid mark/recapture study are violated and the population estimate is only an approximation.

- Why the decline in abundance that appears to have occurred after 1980?
  - Flathead catfish appeared in about 1980 and have probably caused an increase in predation pressures.
  - The construction of Wallace Dam in 1980 has changed the limnology of Lake Sinclair and may have altered the characteristics of tailrace releases. It is unclear at present, however, how these changes may have affected robust redhorse reproductive success.
  - Asiatic clams were introduced into the Oconee River in the recent past, probably in the 1970s, but more precise dates not known. Large numbers of these clams can cause

localized degradation of water quality.
- At present, it is impossible to determine which, if any, of these changes are correlated with reductions in recruitment success.

- The new flow regime negotiated for the FERC relicensing of Sinclair Dam was implemented in June 1996. The initial change was an increase in the minimum flow (700 cfs); more pronounced operational changes will occur in the spring of 1997, including run-of-the-river (ROR) flows during the May spawning season for robust redhorse. It is hoped that this will enhance reproduction and recruitment; the new flows were recommended and implemented with these enhancements as the primary objective.

B. <u>Update on the status surveys within the historical range. Bud Freeman.</u>
Bud was not able to attend the first day of the meeting; Jimmy Evans reviewed a poster prepared by Bob Jenkins and Bud Freeman for a manuscript on the molar-toothed redhorses (1993, in preparation).

- No other robust redhorse populations have been located since the discovery of the Oconee River population in 1991. Occasional anecdotal reports of large suckers from various drainages still arise and these are investigated where possible, but none have been verified at present.

- Drainages with robust redhorse records considered valid at present are:
  - Pee Dee R., NC (1 adult)
  - Savannah R., GA/SC (1 juvenile, 1 partial skeleton of an adult found in collections at University of Georgia)
  - Oconee R. between Milledgeville and Dublin, GA (numerous specimens, viable population)

  Archeological remains:
  -Yadkin and S. Yadkin R., upper Pee Dee Drainage, NC
  - Briar Creek, Savannah Drainage, GA

  Reliable *anecdotal reports*, specimens nonextant and/or localities inaccurately known:
  - Yadkin (1 report) and Rocky R. (1 report), Dee Pee drainage, NC
  - Catawba R., NC (1 report)
  - Savannah R., GA/SC (1 report)

- A question was asked about a reported 12 lb. sucker from the Savannah River. Jimmy Evans indicated that this fish had been examined by Dennis Schmitt at Richmond Hill and was identified as a common carp. A short discussion was held at this point on the reliability of anecdotal reports of possible robust redhorse occurrences in other drainages.

C. <u>Results from 1996 spawning season. Greg Looney</u>

- Broodfish were collected and transferred to holding tanks located at the Beaverdam Wildlife Management Area (WMA). Females were injected with hormones, induced to ovulate, and eggs were stripped at the Beaverdam site. Eggs were then fertilized and

shipped to incubation facilities at the Warm Springs Regional Fisheries Center, the McDuffie state fish hatchery, and the Whitehall Lab located at the University of Georgia (UGA). Broodfish were returned to the river immediately after spawning. This was essentially the same protocol which was utilized successfully in 1995.

- Delays were encountered in setting up the equipment and initiating spawning efforts because of bad weather and atypical temperatures. A major flood event caused near inundation of the river bank spawning facility in early April.

- An initial attempt was made to induce females at an early stage of maturity to spawn. This was attempted to determine if broodfish could be collected and spawned early in the spawning season, thereby limiting disturbance during the peak of the spawning activity.
  - Fish were first captured and injected on 4/29 and held until 5/7. Temperatures during this period varied between 17.5 and 23.3°C.
  - Females were difficult to collect at locations where they had been abundant in previous years. Eight females were collected in two days and only two spawned.
  - 50,190 fertilized eggs produced during this early spawning effort were shipped to Warm Springs, McDuffie, and the Whitehall Lab (UGA).

- A second spawning effort was made during the period 5/12 - 5/19.
  - Broodfish were collected on 5/13 - 5/15; water temperatures were 21.0 - 24.9°C.
  - Broodfish were more abundant than during the initial spawning attempt; twenty acceptable females were collected and five were successfully spawned.
  - 242,072 fertilized eggs were produced and shipped to incubation facilities.

- A third spawning attempt was made during the period 5/20 - 5/23.
  - Broodfish were collected on 5/20 and water temperatures ranged from 24.1 - 26.6°C.
  - Seven females were captured; three were overripe or spent and released.
  - Four females were injected with the hormone Ovaprim, which previous experiments had shown to be most effective. All 4 females spawned; 184,857 eggs were produced and shipped to the incubation facilities.

- Total egg and fry production during 1996:
  - A total of 477,119 eggs were produced from 12 females; 21 males were used.
  - 24 crosses were made but production was low and/or mortality high for a number of these crosses. It is unclear how many of these crosses contributed significantly to the gene pool of fry production but it appears that eggs from the third spawning attempt produced the fewest fry.
  - A total of 94,713 fry were shipped to 4 ponds at the McDuffie and Walton state fish hatcheries. A significant percentage of these fry were in poor condition at the time of shipment and substantial mortalities may be anticipated. In addition, 2,000 fry were retained at the Whitehall Lab at UGA for use in ongoing studies.

Pond/Hatchery	Acreage	Fry Source	No. Fry Stocked	Date Stocked
3B (McDuffie)	1.26	McDuffie	12,600	5/29/96
		UGA	9,400	6/5/96
		Warm Springs	18,852	6/7/96
			40,852	
15W (McDuffie)	0.76	McDuffie	9,500	5/29/96
		UGA	5,500	6/5/96
		Warm Springs	14,197	6/7/96
			29,197	
9A (McDuffie)	0.42	McDuffie	3,150	5/29/96
		UGA	2,900	6/5/96
		Warm Springs	6,421	6/7/96
			12,471	
Walton	0.45	McDuffie	3,375	6/4/96
		UGA	4,818	6/7/96
		Warm Springs	4,000	6/13/96
			12,193	
Total	2.89		94,713	

- Based on the experience gained in 1995 and 1996, it appears that relatively constant river temperatures of 20 -21°C are needed for a minimum of 2 - 3 days to successfully induce ovulation with hormones. In addition, based on both field observations and lab studies, temperatures approaching 25 - 26°C may cause reductions in the quality of eggs and overall fry production.

D. Overview of proposed juvenile stockings in the Broad River and Piedmont National Wildlife Refuge. Jimmy Evans.

- Fingerlings from the 1995 year class currently being reared at the Walton, McDuffie, Bo Ginn, and McKinney Lake hatcheries will be reintroduced into the Broad River at several locations in November 1996. This represents the first major attempt to reintroduce the robust redhorse into another river system. A smaller number on fingerlings will be stocked into several refugial ponds located on the Piedmont National Wildlife Refuge.

- A total of 72,000 fry were stocked into rearing ponds at the four hatcheries in June 1995 and approximately 40,000 three to five inch fingerlings were inventoried, thinned and restocked in December 1995. These fingerlings will be harvested in November 1996 at an average length of 8 - 10 inches for stocking into the Broad River and Piedmont Refuge ponds.

- Rationale for choosing the Broad River for the first attempt to reestablish the species outside of the Oconee River:
  1. Suitable habitat
  2. Relatively undeveloped watershed with good water quality
  3. No hydropower development

4. Although flathead catfish are present in the system, predator densities are relatively low in the upper portions of the drainage. There are no flathead catfish above low head dams on the N. and S. Forks of the Broad.
5. The river is relatively accessible for monitoring.
6. Local environmental organizations are supportive of the reintroduction effort.
7. There are historical records of robust redhorse in the drainage.

The major disadvantage of the Broad River is the presence of flathead catfish. The only way to evaluate the impacts of flathead catfish predation is to stock and monitor survival.

- Seven stocking sites, or stocking reaches, are being considered for the Broad River. The stocking reaches are distinguished by broadly defined habitat characteristics. The stocking reaches vary in length from 12 to 27 river miles.

Site	Length (RM)	Carrying Capacity (per RM)	Target Number	No. Fingerlings Required/year
1	18	40	720	1,500
2	12	20	240	500
3	13	20	260	500
4	13	60	780	1,500
5	27	60	1,020	2,000
6	25	80	2,000	4,000
7	13	20	260	500
Totals	121		5,280	10,503

- The carrying capacity for adult robust redhorse per stocking reach was determined based on the abundance of adults observed in the Oconee River. The ultimate goal of the Broad River reintroduction effort is to replicate the abundance observed in the Oconee River. The carrying capacity for the seven Broad River stocking reaches varies from 20 to 80 per RM (240 to 2,000 per stocking reach).

- A mathematical model has been constructed to determine the number of Phase II (8 - 10 in.) robust redhorse fingerlings which must be stocked into the Broad River each year to replicate and maintain the approximate number of adults observed in the Oconee River, under the assumption of no natural reproduction.
  - Other model assumptions are: 50% mortality the first year, 20% mortality in subsequent years, and maturity reached between ages six and eight.
  - Under these assumptions, the number of Phase II fingerlings required per year for each of the several stocking reaches varies from 500 to 4,000.

- The total number of Phase II fingerlings required each year for the basin-wide Broad River recovery effort is estimated at 10,000 - 11,000.
- This number would be required for three to five years, followed by maintenance stockings at lower levels if natural reproduction does not occur.

- In addition to the Broad River reintroductions, 5 ponds totaling about 20 acres will be stocked at the Piedmont National Wildlife Refuge. These ponds are considered primarily as refugia - to preserve genetic material from each hatchery year class in the event that riverine stockings fail and/or the Oconee River population experiences a rapid decline.

- A model similar to the one constructed for the Broad River was utilized to determine the number of Phase II fingerlings required each year to reach and maintain a reasonable biomass in the ponds. Each pond should contain fingerlings from three to five year classes.

- Model assumptions for the ponds were 30% mortality the 1st year and 15% in subsequent years, maturity between ages six and eight, and maximum pond carrying capacity of 1000 lb. per acre. Bases on these assumptions, Phase II fingerling requirements for the Piedmont Refuge ponds are approximately 150 per acre each year for 3 - 5 years, followed by maintenance stockings at lower levels.

- Finally, as many as 1,000 Phase II fingerlings may be required each year for several years to supplement the accidental stocking of Little River drainage, which resulted from the failure of a hatchery pond dam located adjacent to the Walton Hatchery.

- In summary, Phase II robust redhorse fingerling requirements for 1996 are as follows:
  - Broad River - 11,000
  - Ponds at Piedmont National Wildlife Refuge -2,500
  - Little River - 1,000

  Total number required - 14,500

- Based in the inventory of a single pond at the Walton Hatchery in September, which indicated a survival rate of more than 90%, total survival from the 40,000 Phase I fingerlings stocked into rearing ponds in December 1995 could be as high as 30,000. This number would exceed the Phase II fingerling requirements for 1996. The number actually available for stocking in 1996 will not be known until all rearing ponds are harvested in November, and could be significantly less than estimated.

- After the presentation was made, there was some discussion on hatchery related issues.
  - The suggestion was made that it might be possible to use channel catfish ponds to rear robust redhorse fingerlings.
  - The point was raised there is still not enough known about the best feeds for rearing fingerlings in ponds. More work needs to ne done on fingerling food habits in ponds.

- The question was asked whether or not the receiving stream (Dennis Creek) was sampled for the escaped fingerlings after the dam failure at the Walton Hatchery. Jimmy Evans indicated that the stream had been sampled by backpack electrofishing on two occasions, but no robust redhorse were captured. They have probably migrated into the Little River drainage, which is difficult to sample.

E. <u>Preliminary results of recent research.</u>

1. Use of hormones to induce ovulation of broodfish. Tim Barrett.

- Tim could not attend the meeting, but supplied a poster detailing results of experiments.

- The following table summarizes the hormone treatment regimes used in the induced ovulation study of female robust redhorse during the spring of 1995 and 1996.

Hormone (s)	Treatment Regime
Ovaprim (LH-RHa + dopamine blocker)	1 dose of 0.5 ml/kg
Carp pituitary extract (CPE)	15 mg/kg (10% warm up dosage and a 90% resolving dose 12 hours later)
Human chorionic gonadotropin (HCG)	1000 IU/kg daily for 4 days
CPE + resolving dose of HCG	15 mg/kg CPE with 1000 IU/kg HCG 24 hr later
Luteinizing hormone-releasing hormone	25 *ug*/kg
Analog (LH-RHa)	
Control	Placebo

- Ovaprim was the most effective hormone treatment evaluated in 1995. Ineffective treatments were eliminated from the experimental design in 1996 and the experiment was repeated using Ovaprim, HCG, and CPE. Ovaprim continued to produce the best results in 1996, despite climatological differences between the two years tested.

- Only females are injected. With ovaprim, fish are checked once a day and generally spawn in 2 - 3 days. One hundred percent of the females injected with ovaprim successfully spawned.

2. Assessment of reproductive and recruitment success in the Oconee River. Cecil Jennings.

- A 50-RM section of the Oconee River from the Avant Kaoline Mine to Beaverdam Wildlife Management Area was sampled in 1996 using a variety of gear types to document reproduction and recruitment success. Sampling conducted in 1996 was a continuation of

an ongoing recruitment monitoring investigation initiated in 1995.

- Push-nets, D-Ring nets, light traps, seines, and a benthic pump were used during May - August 1996. Three hundred and seventy-eight samples were collected. A total of six larval robust redhorse were identified from the samples, four collected with the benthic pump and two with push nets. All larvae were collected from a known spawning aggregation in the vicinity of the Avant Kaoline Mine. No older young-of-the-year (YOY) robust redhorse were collected.

- Since the YOY of related species (i.e., *Moxostoma anisurum*) are captured with some frequency in the Oconee River, the tentative conclusion is that older robust redhorse YOY probably do not exist in significant numbers. Since successful spawning has been demonstrated, one possible hypothesis for the lack of recruitment is the prevalence of unsuitable rearing conditions within the gravel spawning substrate. These unsuitable rearing conditions may be the result of siltation, scouring, temperature fluctuations, or other as yet unknown factors. Future studies should focus on larval rearing conditions within the gravel spawning substrate.

- A question was asked about the effectiveness of the benthic pump. Cecil indicated that in a test of effectiveness 33% of eggs placed in gravel were recovered using the pump. It was also asked if fertilized robust redhorse eggs recovered from the gravel were aged. It was indicated that they had not been aged but that ageing could be attempted in the future.

3. Swimming abilities of robust redhorse larvae and fry. Carl Ruetz

- One hypothesis for lack of robust redhorse recruitment in the Oconee River relates to the negative impacts of peaking flows on early life stages. Swimming abilities of robust redhorse larvae and fry were therefore evaluated to determine if water velocities associated with hydropeaking operations have the capacity to physically injure or dislodge early life stages from low velocity refugia.

- The major findings are presented in the following table,

Length (mm)	Sustainable Swimming Speed (cm/s)	Test Temperature (°C)
13.1	6.9	22.5
16.2	10.6	24.2
20.4	11.7	25.5

- A literature review was conducted to compare sustainable swimming speeds of robust redhorse with those for other species. Based on this review, robust redhorse larvae appear to be relatively powerful swimmers immediately after swimup and, tentatively, it appears that water velocities associated with hyrdopeaking would not likely result in physical injury or permanent dislodgement from low velocity refugia.

4. Impacts of temperature and flow on egg incubation, hatching success, and rearing of early life stages. Jay Shelton.

- These studies were conducted to determine the effects of temperature and flow on the survival of robust redhorse eggs and larvae during hatchery incubation. The data may also provide valuable information on optimum conditions for natural spawning in the Oconee River.

Major results are presented in the following table:

Treatment (°C)	Survival (%)	Deformities (%)
15	7.8	7.9
19	44.5	2.9
23	62.6	3.7
27	37.9	6.6
30	0	NA

- The highest survival was found at 23°C and deformities were most prevalent at the temperature extremes.

- Effects of various flow rates on survival of eggs and fry could not be evaluated due to an unexpected slight positive buoyancy of the eggs. The results indicate that the apparatus used to evaluate flows will have to be modified.

- Plans are to continue the temperature/flow studies for one additional year. Modifications to the study design in 1997 include narrowing the range of tested temperatures to further refine optimal incubation temperatures. In addition, the experimental apparatus will be redesigned to more effectively evaluate optimal flow rates for incubation.

- A question was asked about possible causes for the relatively high percentage of deformed larvae which were observed, even at temperatures where survival was highest. Causes are unknown but could be related to diet fed to the larvae. It was suggested that deformities could be related to high contaminant levels in adults. It was suggested that adults from

the Oconee River should be analyzed for contaminants and this should be done as soon as possible.

- A question was asked about the overall survival rate from egg to stockable fry. About 30% is an average figure but it varies considerably from year to year.

F. <u>Publicity efforts and accomplishments. Greg Looney.</u>

- Greg summarized primarily newspaper and newsletter coverage of the recovery effort, focusing on the period since the last meeting of the Robust Redhorse Conservation Committee in October 1996.

- Following is a list of known articles on the robust redhorse which appeared in 1996. News releases issued by the Wildlife Resources Division have been carried by newspapers in other sections of the country, and many of these articles have not been brought to our attention.

  1. "Monumental effort gives robust redhorse a chance" - Macon Telegraph (Aug. 19, 1996).
  2. "Agencies out to save states robust redhorse" - Atlanta Journal Constitution (Jul. 14, 1996).
  3. "Robust Redhorse Conservation Committee Organized" - Bulletin of the Edison Electric Institute (Oct. 1996).
  4. "Cooperative effort aimed at rare fish" - Royston News Leader (Jul. 17, 1996).
  5. "Robust redhorse may be coming back" - The Clayton Tribune (Jul. 11, 1996).
  6. "Back from the brink" - Atlanta Journal Constitution
  7. "Georgia Power Company making progress protecting fish species" - The Citizen Weekly (Apr. 19, 1996).
  8. "Redhorse fingerlings" - Southern Company Environmental Review (Apr. 1996).
  9. "A rosier future for the robust redhorse" - Athens Daily News (Oct. 13, 1996).
  10. "The mystery fish" - Southern Wildlife (Apr. 1996).
  11. "Cooperative recovery effort aimed at rare fish" - Highlights, a publication for associates of the Georgia Wildlife Resources Division (Jul. 1996).

- There remains a great deal of media interest on the recovery effort and publicity has been positive, although variable in quality. The "prelisting" recovery approach utilizing a Memorandum of Understanding (MOU) is viewed as innovative and generally effective in promoting recovery of the species. The potential of this approach to reduce the confrontation between agencies, the private sector, and conservation groups is viewed by most media as a particularly positive development.

- It was indicated that Jim Couch had completed 90% of the filming for the documentary on the robust redhorse recovery effort. It may be completed by February 1997.

- After the presentation, it was suggested that the film could be used to promote recovery efforts in North and South Carolina and that it should be distributed as soon as possible.

G. <u>Overview of recovery activities planned for 1997. Jay Shelton.</u>

1. Research

- The following projects have been proposed, or are under consideration by funding sources for 1997 (Georgia power Company, Fish and Wildlife Foundation, Fish and Wildlife Service (FWS), Fisheries Stewardship Program):
    - **a.** Reproductive and recruitment success in the Oconee River (third year of ongoing monitoring of reproductive success in the Oconee River).
    - **b.** Spawning behavior in the Oconee River (third year of surveying/monitoring spawning locations and behavior).
    - **c.** Effects of temperature and water flow on the incubation and survival of robust redhorse eggs and larvae (second year, refinement of optimal incubation temperatures and flows).
    - **d.** Spawning microhabitat characterization in the Oconee River (new studying to focus on specific causes for recruitment failure).
    - **e.** Cryopreservation of robust redhorse gametes (new study to develop techniques).
    - **f.** Evaluation of hatchery product, habitat selection, food preference, and species interaction in the Broad River (new study to evaluate reintroductions in the Broad River).
    - **g.** Monitoring juvenile robust redhorse abundance and movement in the Broad River (new study - electrofishing and seining to monitor abundance, telemetry investigation of post-stocking movements).
    - **h.** Genetic characterization of robust redhorse in the Oconee River (new study - evaluate genetic homogeneity, develop genetic-based methods to ID robust redhorse larvae, evaluate degree of genetic variability within discrete spawning aggregations).

- Although specific funding arrangements have not been finalized, it is anticipated that funds will be obtained to conduct the majority of the research proposed for 1997.

2. Spawning: activities related to artificial propagation.

- Methods of broodfish collection, hormone induced spawning, and incubation of eggs and larvae in 1997 will be similar to those used in 1996.

- Refinements in 1997 will include: 1) use of the hormone regime discovered to be most effective in studies conducted in 1995 and 1996, 2) providing more optimal temperatures and flows for incubation, and, 3) collecting broodfish from at least one additional spawning aggregation.

3. Rearing

- Fingerlings from the 1995 year class (currently at the Walton, McDuffie, Bo Ginn and McKinney Lake hatcheries) will be reared until November 1996, then stocked into 1) the Broad River, 2) ponds at Piedmont National Wildlife Refuge and the Whitehall Lab (UGA), and, 3) possibly the Little River drainage.

- It is anticipated that the ponds containing the 1996 year class at Walton and McDuffie will be harvested, thinned, and restocked for growout to Phase II in February - March 1997. The space required to thin these fingerlings is not available at present and should be a focus of the open discussion session to be held tomorrow.

- With the closure of the federal hatcheries at Bo Ginn and McKinney Lake, pond availability for rearing the 1997 year class is uncertain. An attempt will be made to obtain funds from a variety of sources to operate the raceways and some of the ponds at Bo Ginn. The Bo Ginn hatchery was transferred to the state Division of Parks, Recreation, and Historic Sites in October but the Parks Division does not have the funds or manpower to operate either the hatchery ponds or raceways.

- An attempt will be made o obtain pond space at hatcheries operated by the South Carolina DNR and the FWS at Orangeburg. The amount of hatchery space available in Georgia for 1997 will not be known until after the warmwater hatchery meeting in February 1997. It is anticipated that at least adequate pond space will be available from a combination of these sources.

4. Reintroductions

- Fingerlings from the 1995 year class (currently at the Walton, McDuffie, Bo Ginn and McKinney Lake hatcheries) will be reared until November 1996, then stocked into the Broad River, ponds at Piedmont Wildlife Refuge and the Whitehall Lab (Athens), and possibly the Little River drainage.

- It is anticipated that the ponds containing the 1996 year class at Walton and McDuffie will be harvested, thinned, and restocked for growout to Phase II in February - March 1997. Depending on the number harvested, a portion of these fingerlings may be reintroduced into the Broad River and/or ponds at Piedmont Refuge as Phase I.

G. <u>Open discussion, final comments, review agenda for the following day, determine need for/location of evening discussions.</u>

- The decision was made to begin the discussion session on the following day and no changes to the next days agenda were suggested. An informal meeting was held in the evening to discuss recovery related issues.

- The meeting was adjourned for the day at approximately 5:00 p.m..

October 17, 1996
(Group Discussion Session)

Following some introductory comments by Jimmy Evans and Margaret Holt, the meeting was opened up for general discussion. Margaret facilitated the discussion using broad items outlined in the agenda.

A. <u>Reevaluate recovery goals established in previous meetings, refine goals for three, five, and ten year periods.</u>

- Handouts were distributed on recovery goals and proposed conservation actions. There was a broad consensus on the continued applicability of the recovery goals and actions but there were discussions on a number of points.

- The discussion began on habitat restoration and riparian zone management, two of the proposed conservation actions.
  - Mike Nichols expressed some concern about the suitability of habitat in the Broad River where the initial reintroduction effort is planned. Since the species has disappeared from the Broad River, what indications do we have that it can be recovered in that drainage.
  - Jay Shelton indicated that sedimentation is much less prevalent than it was in the past and that the Broad River Basin has been reforested following the period of row crop agriculture of the first half of this century. Conditions may now be suitable for reintroduction. He indicated that the Broad River is probably the best site we have in Georgia.
  - Cecil Jennings indicated the water quality, while not perfect, was acceptable but that habitat restoration should perhaps be a stated goal of recovery.
  - Jay Shelton stated that there is perhaps greater environmental awareness among residents along Broad River than is found on some other rivers, and this is an additional advantage of the Broad River as the initial reintroduction site. Greg Looney suggested that the robust redhorse could be a focus for increasing environmental awareness in the Broad River Basin.
  - Jay suggested that we evaluate possibilities for habitat restoration on the Broad River and develop a plan with time lines varying between three and ten years. Cecil suggested that efforts should focus on more urgent issues.
  - Les indicated that good progress had been made on many of the goals and proposed conservation action items but that we were behind in assessing the relative success of initial reintroduction efforts in the Broad River.

- The discussion shifted to the issue of contaminants and the possibility that the high percentage of deformities may be related to contaminant levels in reproductive tissue. Approximately 10% of the fingerlings inventories at Walton in September were deformed.
  - Les suggested that we look at contaminants data already available from then Oconee River before proceeding further. Cecil suggested that temperature regime at the hatchery could account for some of the deformities. Greg felt that the deformities were not caused by nutrition because deformities in larvae are seen before feeding begins.
  - Jimmy asked if the group felt that action should be taken this year to assess contaminant levels in fish tissues. The Wildlife Resources Division (WRD) would be able to collect fish. We have one robust redhorse which died in 1996 that could possibly be used for contaminant analysis. Les suggested that eggs could be used for contaminants work.
  - Les also stated that genetics (inbreeding) could be causing the deformities. Jimmy indicated that the genetic study to be conducted by Ike Wirgin is scheduled to begin next spring. Greg suggested waiting until next spring to collect samples for genetics work.
  - Mike asked what contaminants should be tested for. Jay mentioned PCB's and mercury.

- The discussion shifted to the possible impacts of temperature fluctuations in the Oconee River on mortality rates for early life stages. Temperature fluctuations have been documented associated with the peaking cycle with radiant warming occurring during minimum flow releases, followed by fairly rapid temperature reductions associated with higher generation flows.
  - Bubba suggested that temperature recorders be located at intervals along the Oconee River in the spring to document the degree of temperature fluctuation. Jay indicated that this would be done. Jimmy indicated that the temperature regime during the May spawning season could change significantly in 1997 due to the initiation of ROR flows.
  - At this point the group began discussion of item 2 on the second days' agenda.

B. <u>Discuss hatchery requirements for the next 10-year period, identify available sources of hatchery space (fry, fingerlings, adults). Define level of commitment by agencies and power companies to assist in providing hatchery space.</u>

- Jimmy indicated that the optimal hatchery protocol would involve separate ponds for Phase I and Phase II fingerling production. At present, the strategy is to stock only Phase II fingerlings (8 - 10 inches) in the wild. Three to four acres would be needed for Phase I production every year. These fingerlings would be thinned and restocked into 8 - 10 acres of ponds for growout to phase II. Based on current rearing methods, this would produce 20,000 - 30,000 Phase II fingerlings each year, enough to meet current needs for available stocking sites in Georgia.

- With the closure of the Bo Ginn and McKinney Lake hatcheries, only Walton and McDuffie are committed to rear Phase I fingerlings in 1997. No pond space is available for thinning and restocking the Phase I fingerlings from the 1996 year class currently at these two hatcheries. The Phase II pond space will be needed in 3 - 4 months and a primary goal for this session is to discuss ways for obtaining needed hatchery space.

- The ponds and raceways at Bo Ginn would be available if funds could be obtained to pay for the electricity required to pump water. Power Companies, the FWS, and the Georgia Non-game Program will be contacted about funding for Bo Ginn. The total amount required for the electricity would be less than $4,000 per year. For the short-term, manpower might be provided by graduate students at UGA. Long-term, $40,000 - $50,000 would be required to operate the hatchery for robust redhorse, with one full time position.

- Immediate needs (1997) are: 1) attempt to obtain funds to operate Bo Ginn, at least to pay electrical bills, 2) contact Val Nash, Fisheries Chief at South Carolina DNR, about space on SC state hatcheries, 3) attempt to obtain space at the remaining federal hatchery at Orangeburg, SC.) assess ability of state hatcheries in Georgia to supply additional space. Jimmy, Greg, and Jay will handle this.

- Bubba raised the question: Do we really need this much pond space? By stocking at higher rates and/or stocking Phase I fingerlings, the amount of space needed could be drastically reduced. Jay indicated that extensive studies on the Broad River would be required to determine if Phase II (18-mo.) Fingerlings are required. The decision to use Phase II fingerlings was based on a literature review of similar stocking programs elsewhere, and with the knowledge that flathead catfish may exert significant predation pressures. Jay indicated that it may in fact be difficult to rear large numbers of Phase II fingerlings. It depends on fingerling utilization of artificial feeds and the carrying capacity of the pond.

- It was decided that a hatchery subgroup should be established to arrange for hatchery space long- and short-term, and determine how it would be most effectively used. This would include an evaluation of stocking rates and further assessments of the need to use Phase II fingerlings in the reintroduction program.
  - The members of the hatchery subcommittee are: Jay, Jimmy, Bubba, Greg, and Chris. One of the first tasks of the subcommittee would be to make a list of potential funding sources for the operation of Bo Ginn, and then contact each of these sources.
  - The discussion at this point moved to Item 3 on the agenda.

C. <u>Discuss stocking site assessment throughout the historical range. Establish assessment parameters, manpower requirements, resources available. Evaluate obstacles to reintroduction efforts.</u>

- The suggestion was made that the RRCC representatives from North and South Carolina (they were not present at this meeting) should be contacted about increasing the emphasis on stocking site assessment in those states.

- The point was raised that we may have more Phase II fingerlings available in 1996 than modeling indicates would be needed for the Broad River or the ponds at Piedmont National Wildlife Refuge. Other than the Broad River, what sites would be most suitable

in Georgia to receive any excess fingerlings. The Ocmulgee River above Juliette Dam was mentioned as a potential reintroduction site because of suitable habitat and the absence of flathead catfish.

- It was then suggested that the prioritized list of stocking sites previously prepared be reevaluated. Previously developed stocking site criteria indicated that hydropower and highly developed watersheds should be avoided. The portion of the Ocmulgee River mentioned as a potential stocking site, however, is impacted by the hydropower operation at Lloyd Shoals Dam and extensive development activities in the Macon area.

- The point was raised that if the robust redhorse were reintroduced into the Ocmulgee River, and the species were later listed, future development activities in the Macon area could be curtailed, and Georgia Power Company's Plant Scherer facility could be affected as well.

- The likelihood of a future listing was discussed and although it appears to be unlikely, the possibility cannot be completely discounted. It was suggested that the first priority in avoiding a future listing is to get the species established in another river. The implications of a future listing on development activities or power plant operation were unclear.

- At this point it was decided that a legal opinion was needed from the FWS to define the potential implications of reintroductions of an imperiled fish species conducted under a "prelisting" recovery approach authorized by an MOU. This was established as an action item to be accomplished in January or February 1997, if possible. This may require an additional meeting before the spring.

- There was some discussion or the role of the RRCC in the event of a future listing and it was generally agreed that the Committee would continue to function, although in a different capacity.

- Based on these unresolved issues it was decided that any excess fingerlings from the November 1996 harvest of the 1995 year class should not be introduced into the Ocmulgee River. The discussion then shifted to the disposition of excess fingerlings, if available.
  - Options: 1) Stock the Broad River with significantly more fingerlings than the modeling indicated would be required and perhaps, therefore, more than the river could support, 2) stockpile the excess fingerlings in the ponds at Piedmont Refuge and remove for stocking or redistribution to other ponds at a later date (i.e., at Bo Ginn), 3) contact South Carolina DNR about pond space they may have available, 4) begin restocking the Oconee River, 5) stock a significant number into the Little River drainage to augment the gene pool from the 200 fingerlings which escaped in June 1995.
  - The Oconee River stocking was eliminated since it was generally agreed that stocking fingerlings into the only known population could negatively impact the gene flow, and if future stocking is to occur, it should wait until the genetics study of the Oconee River population is completed. Also, the large flathead catfish population in the Oconee River

may require the stocking of larger fingerlings that we currently have available.
- It was decided that a decision to stock large numbers of fingerlings into the Little River drainage should be delayed until a geneticist could be consulted to determine if augmentation of the gene pool is necessary. The Little River is a relatively low priority stocking site and a major stocking program for that river should be avoided, if possible.
- If larger numbers of Phase II fingerlings are available than anticipated 1996, it was decided to stock the Broad River with 20% more fingerlings than stipulated by the model and stockpile the remainder, if any, in a single pond at Piedmont Refuge.

D. Evaluate progress of research efforts to date, review prioritized list of research needs established at past meetings, re-prioritize list as needed. Identify any source of funding not discussed at last meeting.

- The list was reviewed by the group and the consensus was that the list was thorough and no revisions were recommended. There was also general agreement that substantial progress had been made in most areas of required research and that research efforts were essentially on schedule in providing the information needed to manage the species.

- It was suggested that increased emphasis is needed at present on monitoring the stocked population in the Broad River (growth, survival, predation pressures, habitat preferences, post-stocking migration, etc.).

E. Accept motions for committee discussion and consideration.

- No additional areas for discussion or consideration were suggested.

F. Identify and discuss specific work to be accomplished before the next meeting, establish dates for the next meeting.

- Tentative dates for the next annual meeting of the RRCC are October 29 - 30, 1997.

- *The list of action items to be completed prior to the next meeting are as follows:*

1. Contact the Georgia Environmental Protection Division about the possibility of analyzing contaminant levels in the Oconee River robust redhorse population.

2. In order to address hatchery pond requirements in the short-term, the following actions were recommended: 1) Attempt to obtain funds to operate the Bo Ginn Hatchery, at least to pay electrical bills to allow operation of the raceways, 2) contact Val Nash, Chief of Fisheries at South Carolina Division of Wildlife and Freshwater Fisheries, about space on SC state hatcheries, 3) attempt to obtain space at the federal hatchery at ~~Orangeburg, SC~~., 4.) Assess ability of state hatcheries in Georgia to supply additional space.

3. It was decided that a hatchery working group should be established to arrange for

hatchery space long- and short-term, and determine how the space would be most effectively used. This would include an evaluation of stocking rates and further assessments of the need to use Phase II fingerlings in the reintroduction program. The members of the hatchery subcommittee are: Jay, Jimmy, Bubba, Greg, and Chris. The hatchery working group should meet as soon as convenient and make initial recommendations to the RRCC.

4. Obtain a legal opinion from the FWS to define the potential implications of reintroductions of an imperiled fish species conducted under a "prelisting" recovery approach, as authorized by an MOU. Initial steps should be accomplished in January or February 1997, if possible.

5. Consult a geneticist to determine if the 200 fingerlings which escaped into the Little River drainage should be augmented by additional stockings, in order to increase the available gene pool. The Little River is a relatively low priority stocking site and it was decided that a major stocking program for that river should be avoided, if possible.

G. Unfinished business. None

H. Adjourn. Approximately 3:00 p.m..