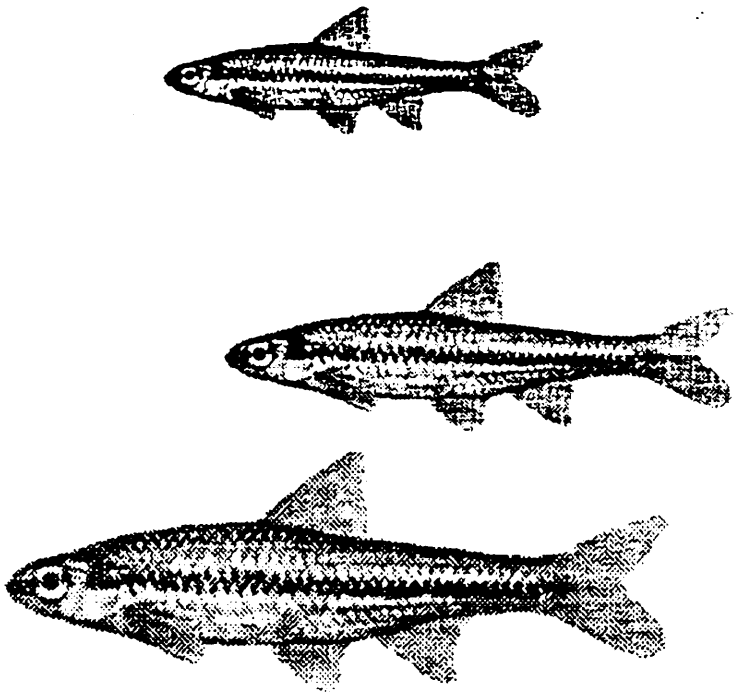
CAPE FEAR SHINER
RECOVERY PLAN



U.S. Fish and Wildlife Service
Atlanta Georgia

RECOVERY PLAN

for

Cape Fear Shiner (*Notropis mekistocholas*)

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Date: 10/7/88

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ACKNOWLEDGEMENTS SHOULD READ AS FOLLOWS:

U.S. Fish and Wildlife Service. 1988. Cape Fear Shiner Recovery Plan. U.S. Fish and Wildlife Service, Atlanta, Georgia. 18 pp.

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PART I

INTRODUCTION

The Cape Fear shiner (Notropis mekistocholas) was known from three populations when it was listed as an endangered species with three critical habitat areas (see map, page 2) on September 25, 1987 (FR 52 36034). Currently the Cape Fear shiner is known from only four small populations in the Cape Fear River drainage in Randolph, Moore, Lee, Chatham, and Harnett Counties, North Carolina (Harnett County population reported after listing). Due to the species' limited distribution, any factor that degrades habitat or water quality in the short river reaches it inhabits could threaten the species' survival.

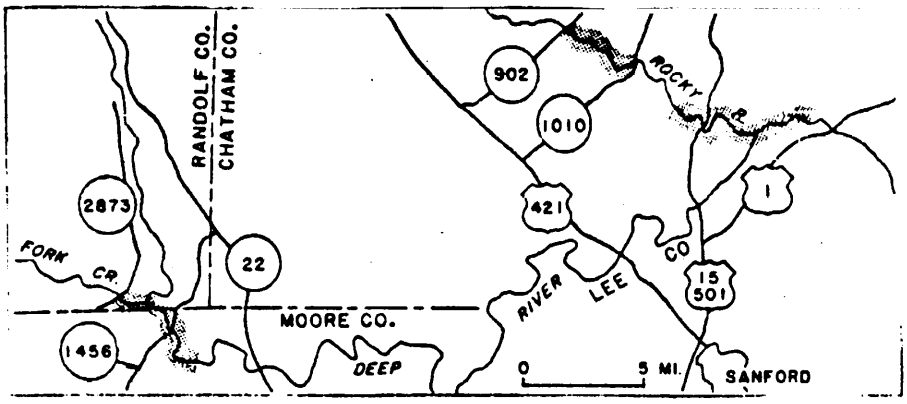
Description, Ecology, and Life History

The Cape Fear shiner (Notropis mekistocholas), described by Snelson (1971), is a small (rarely exceeding 2 inches in length), moderately stocky minnow. The fish's body is flushed with a pale silvery yellow, and a black band runs along its side. The fins are yellowish and somewhat pointed. The upper lip is black, and the lower lip bears a thin black bar along its margin. The lateral line is complete but dips slightly from its head to below the dorsal fin. The round eye is moderate in size and is located on the side of the head. It is distinguished from all other Notropis by having an elongated alimentary tract with two convolutions crossing the intestinal bulb. The lateral line scales range from 34 to 37 (mean = 35.5), the pharyngeal teeth number 0,4-4,0, and dorsal ray count is 8. Type specimens are at the U.S. National Museum, Cornell University, Tulane University, the University of Florida, and the University of Michigan Museum of Zoology. Other specimens are located at the North Carolina State Museum. Published photographs are in Snelson (1971).

The species is generally associated with gravel, cobble, and boulder substrate, and it has been observed inhabiting slow pools, riffles, and slow runs often associated with water willow (Justicia) beds (Palmer and Braswell, North Carolina State Museum of Natural History, personal communication, 1986; Pottern and Huish 1985, 1986; Snelson 1971). In these habitats the species is typically associated with schools of related species, but it is not the numerically dominant species. Juveniles are often found in slackwater, among large rock outcrops in mid-stream, and in flooded side channels and pools (Pottern and Huish 1985, 1986). Little is known about its food habits, but it is believed that the species' black peritoneum and elongated intestine are adaptations to a herbivorous feeding habit, probably including bottom detritus, diatoms, and other periphytes (Snelson 1971). Captive specimens feed readily on both plant and animal matter (Pottern and Huish 1985). No information is presently available on breeding behavior, fecundity, longevity, or other aspects of the species' life history.

CAPE FEAR SHINER CRITICAL HABITAT

NORTH CAROLINA



THIS MAP PREPARED FROM THE RALEIGH 1:250,000 TOPO
J.L.L. 3/86

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CRITICAL HABITAT - LEGAL DESCRIPTION

(1) North Carolina. Chatham County. Approximately 4.1 miles of the Rocky River from North Carolina State Highway 902 Bridge downstream to Chatham County Road 1010 Bridge;

(2) North Carolina. Chatham and Lee Counties. Approximately 0.5 mile of Bear Creek, from Chatham County Road 2156 Bridge downstream to the Rocky River, then downstream in the Rocky River (approximately 4.2 miles) to the Deep River, then downstream in the Deep River (approximately 2.6 miles) in Chatham and Lee Counties, to a point 0.3 river mile below the Moncure, North Carolina, U.S. Geological Survey Gauging Station; and

(3) North Carolina. Randolph and Moore Counties. Approximately 1.5 miles of Fork Creek, from a point 0.1 creek mile upstream of Randolph County Road 2873 Bridge downstream to the Deep River, then downstream approximately 4.1 miles of the Deep River in Randolph and Moore Counties, North Carolina, to a point 2.5 river miles below Moore County Road 1456 Bridge.

Distribution, Reasons for Decline, and Threats to Its Continued Existence

The Cape Fear shiner may always have existed in low numbers. However, its recent reduction in range and its small population size (Pottern and Huish 1985, 1986, 1987) increase the species' vulnerability to a catastrophic event, such as a toxic chemical spill. Dam construction in the Cape Fear River system has probably had the most serious impact on the species by inundating the species' rocky riverine habitat and altering stream flows. A review of historic collection records (Palmer and Braswell, personal communication, 1986; Snelson 1971), along with recent survey results (Pottern and Huish 1985, 1986), indicates that the Cape Fear shiner is presently restricted to only four populations. Two historic populations have apparently been extirpated (Pottern and Huish 1985, 1986). Robeson Creek, Chatham County, was believed lost when Jordan Lake flooded part of the creek. The reasons for the loss of the population from Parkers Creek in Harnett County are not known. The shiner has also not been recollected (Pottern and Huish 1985) from the Cape Fear River in Harnett County. However, review of historical and current collection records reveals that only one specimen has ever been collected from this river, and the fish may have been a stray individual from an upstream or tributary population. As much of the Deep, Haw, and Cape Fear Rivers and their major tributaries has been impounded for hydroelectric power and much of the rocky shoal habitat inundated, other populations and population segments that were never discovered have likely been lost to these reservoirs.

Of the four remaining populations, only the one located around the confluence of the Deep and Rocky Rivers in Chatham and Lee Counties (inhabiting a total of about 7.3 river miles) appears strong (Pottern and Huish 1985). Specifically, this population inhabits the Deep River from just above the Locksville Dam pool upstream to the Rocky River, then upstream in the Rocky River to Bear Creek, and upstream in Bear Creek to the Chatham County Road 2156 Bridge (see map for description of critical habitat area). A few individuals were collected just downstream of the Locksville Dam in the Deep River, but because of the limited extent of Cape Fear shiner habitat at this site, it is thought these fish represent either a small reproducing population or result from fish that are periodically dispersed from the population above the Locksville Dam pool.

The second population in the Rocky River, above the Rocky River hydroelectric facility, was the source of the type specimens used to describe the species (Snelson 1971). Historic records reveal that collections of 15 to 30 specimens were made in this stretch of the Rocky River (State Route 902 to Chatham County Road 1010 Bridge) during sampling visits in the late 1960s and early 1970s. Recent samples (1985 and 1986) were made from the Rocky River throughout this reach, with only one specimen being collected near State Highway Bridge 902 (see map for description of critical habitat area). The reason for the apparent decline in this population is unknown.

The third population (see map for description of critical habitat area), located in the Deep River system in Moore and Randolph Counties, is represented by the collection of six individuals (Pottern and Huish 1986).

Three individuals were taken above the Highfalls Hydroelectric Reservoir--one in Fork Creek, a tributary of the Deep River in Randolph County, and two in the Deep River proper in Moore County. The other Cape Fear shiners were taken from below the dam. As the available habitat below the dam is limited, it is believed these fish are migrants from the upstream population (Pottern and Huish 1986), where Cape Fear shiner habitat is more extensive. However, a small reproducing population that sometimes receives individuals from upstream could also explain this aggregation of fish.

The fourth population represents a rediscovery of a population in Neals Creek, Harnett County. This watershed had been a historic site and was surveyed in 1985 (Pottern and Huish 1985) on four occasions without success. However, Pottern and Huish (1987) reported (after the species was listed) collecting 15 individuals from Neals Creek in 1987 at the U.S. Route 401 crossing about 0.5 mile upstream of the Cape Fear River. No critical habitat was designated for this population. The population was unknown when the fish was listed. Although this is an important population, there are no plans to designate its critical habitat. The designation of critical habitat is a lengthy and time-consuming process. With the extensive backlog of listing actions needed for other unprotected species and their habitat and the minimal added protection critical habitat provides, it is not prudent to list critical habitat for Neals Creek at this time.

Potential threats to the species and its habitat could come from such activities as land use changes, chemical spills, road construction, stream channel modification, changes in stream flows from hydroelectric power, impoundments, wastewater discharges, increases in agricultural runoff, and other projects in the watershed, if such activities are not planned and implemented with the species' survival and habitat protection in mind (Pottern and Huish 1986). The species could also be impacted by two reservoir projects presently under review for the Deep River. The Randleman Dam project, proposed for construction by the Piedmont Triad Regional Water Authority, would consist of a reservoir on the Deep River in Randolph County above known Cape Fear shiner habitat. The Howards Mill Reservoir (a U.S. Army Corps of Engineers project) would be on the Deep River in Moore and Randolph Counties and would flood presently occupied Cape Fear shiner habitat.

Threats could come from continued deterioration of water quality through increases in siltation. The North Carolina Department of Natural Resources and Community Development (1983) stated that, "Within the Cape Fear Basin, estimated average annual soil losses from cropland ranged from 3 tons per acre in the lower basin to 12 tons in the headwaters." The North Carolina Division of Soil and Water Conservation considers over 5 tons of soil loss per acre to be excessive.

The North Carolina Wildlife Resources Commission has in the past stocked Roanoke bass (Ambloplites cavifrons) and other predatory fish into the Cape Fear system. Because of the present precarious status of the Cape Fear shiner, impacts to the species must be considered before any more introductions are undertaken.

PART II

RECOVERY

A. Recovery Objectives

The ultimate goal of this recovery plan is to restore viable populations* of the Cape Fear shiner (Notropis mekistocholas) to a significant portion of its historic range and, as a result, remove the species from the Federal List of Endangered and Threatened Wildlife and Plants.

The species will be considered for reclassification to threatened status when the likelihood of the species' becoming extinct in the foreseeable future has been eliminated by achievement of the following criteria:

1. Through protection of existing populations and successful establishment of reintroduced populations or discovery of additional populations, a total of four distinct viable populations* exist in the Cape Fear River basin.

2. Studies of the fish's biological and ecological requirements have been completed and the implementation of management strategies developed from these studies have been or are likely to be successful.

The species will be considered for removal from Endangered Species Act protection when the likelihood of the species' becoming threatened in the foreseeable future has been eliminated by the achievement of the following criteria:

1. Through protection of existing populations and successful establishment of reintroduced populations or discovery of additional populations, a total of six distinct viable populations* exist in the Cape Fear River basin.

2. Studies of the fish's biological and ecological requirements have been completed and the implementation of management strategies developed from these studies have been or are likely to be successful.

3. No foreseeable threats exist that would likely threaten survival of any of these six populations.

*Viable populations: A reproducing population that is large enough to maintain sufficient genetic variation to enable it to evolve and respond to natural habitat changes. The number of individuals needed and the amount and quality of habitat required to meet this criterion will be determined for the species as one of the recovery tasks.

4. Noticeable improvements in water and substrate quality have occurred to the species' habitat and the species has responded through natural means or with human assistance to successfully recolonize other streams and stream reaches within the Cape Fear River basin.

B. Step-down Outline

1. Preserve present populations and presently used habitat.

1.1 Continue to utilize existing legislation and regulations (Federal Endangered Species Act, Federal and State surface mining laws, water quality regulations, stream alteration regulations, Federal Energy Regulatory Commission licensing, etc.) to protect the fish and its habitats.

1.2 Solicit help in protecting the species and its essential habitats.

1.2.1 Meet with local government officials and regional and local planners to inform them of our plans to attempt recovery and request their support.

1.2.2 Meet with local business and/or industry interests and try to elicit their support in implementing protective actions.

1.2.3 Develop an educational program using such items as slide/tape shows, brochures, etc. Present this material to business groups, civic groups, youth groups, church organizations, etc.

1.3 Determine threats to the species, conduct research necessary for the species' management and recovery, and implement management where needed.

1.3.1 Conduct life history research on the species to include reproduction, food habits, age and growth, mortality factors, etc.

1.3.2 Characterize the species' habitat (relevant physical, biological, and chemical components) for all life history stages.

1.3.3 Determine present and foreseeable threats to the species.

1.3.4 Based on the biological data and threat analysis, investigate the need for management, including habitat improvement. Implement management, if needed, to secure viable populations.

1.3.5 Determine the number of individuals required to maintain a viable population.

2. Search for additional populations and/or habitat suitable for reintroduction efforts.

3. Determine the feasibility of reestablishing the Cape Fear shiner back into historic habitat and reintroduce where feasible.

3.1 Develop a successful technique for reestablishing populations.

3.2 Coordinate with North Carolina Wildlife Resources Commission, North Carolina State Museum, and North Carolina Natural Heritage Program to identify unoccupied habitat which could be utilized for reintroductions and which could be successfully protected after populations become established.

3.3 Reintroduce the species back into its historic range and evaluate success.

3.4 Implement the same protective measures for any introduced populations as outlined for established populations.

4. Develop and implement a program to biennially monitor population levels and habitat conditions of presently established populations as well as newly discovered, introduced, or expanding populations.

5. Annually assess overall success of the recovery program and recommend action (changes in recovery objectives, delist, continue to protect, implement new measures, other studies, etc.).

C. Narrative Outline

1. Preserve present populations and presently used habitat. Because so few populations exist, it is essential that all populations are protected.

1.1 Continue to utilize existing legislation and regulations (Federal Endangered Species Act, Federal and State surface mining laws, water quality regulations, stream alteration regulations, Federal Energy Regulatory Commission licensing, etc.) to protect the fish and its habitats. Prior to and during implementation of this recovery plan, the species and its habitat can be protected by the full enforcement of existing laws and regulations.

1.2 Solicit help in protecting the species and its essential habitats. Section 7 consultation under the Endangered Species Act and Fish and Wildlife Coordination Act activities can assist in protection of the species, but these programs alone cannot recover the Cape Fear shiner. The assistance of Federal and State agencies and conservation groups as well as

local governments will be essential. Also, support of the local industrial and business community as well as local sportsmen will be needed to meet the goal of recovering the species. Without a commitment from the people in the Cape Fear River basin who have an influence on habitat quality, recovery efforts will be doomed.

1.2.1 Meet with local government officials and regional and local planners to inform them of our plans to attempt recovery and request their support.

1.2.2 Meet with local business and/or industry interests and try to elicit their support in implementing protective actions.

1.2.3 Develop an educational program using such items as slide/tape shows, brochures, etc. Present this material to business groups, civic groups, youth groups, church organizations, etc. Educational material outlining the recovery goals with emphasis on the other benefits of maintaining and upgrading habitat quality will be extremely useful in informing the public of our actions.

1.3 Determine threats to the species, conduct research necessary for the species' management and recovery, and implement management where needed.

1.3.1 Conduct life history research on the species to include reproduction, food habits, age and growth, mortality factors, etc. The work of Snelson (1971) and Pottern and Huish (1985, 1986, 1987) provides some data on the species' life history, but much more information is needed to understand the species' requirements. Unless the species' life cycle and environmental requirements are defined, recovery efforts may be inconsequential or misdirected.

1.3.2 Characterize the species' habitat (relevant physical, biological, and chemical components) for all life history stages. The Cape Fear shiner has been able to withstand some degree of habitat degradation. However, some stream habitats have been so severely altered that the species has been extirpated. Knowledge of the species' habitat requirements and ecological associations is needed to focus management and recovery efforts on the specific problems within the species' habitat.

1.3.3 Determine present and foreseeable threats to the species. Hydroelectric development has been a major factor in altering the species' habitat and reducing

its range. Siltation from poor land use practices has likely also had an impact. However, other impacts are also possible. The mechanism by which the species and its habitat are impacted is not entirely understood, and the extent to which the species can withstand these impacts is unknown. The impact of the introduction of exotic fish species also needs to be considered. To minimize and eliminate these threats, where necessary to meet recovery, the information gathered under tasks 1.3.1 and 1.3.2 must be utilized to target the specific problem areas.

1.3.4 Based on the biological data and threat analysis, investigate the need for management, including habitat improvement. Implement management, if needed, to secure viable populations. Specific components of the species' habitat may be lacking, and these may be limiting the species' potential expansion. Habitat improvement programs, such as changes in stream flows, may be needed to alleviate these limiting factors.

1.3.5 Determine the number of individuals required to maintain a viable population. Theoretical considerations by Franklin (1980) and Soulé (1980) indicate that 500 individuals represent a minimum population level (effective population size) which would contain sufficient genetic variation to enable that population to evolve and respond to natural habitat changes. The actual population size in a natural ecosystem can be expected to be larger, possibly by as much as ten times. The factors which will influence effective population size include sex ratio, length of species' reproductive life, fecundity, and extent of exchange of genetic material within the population, plus other life history aspects. Some of these factors can be addressed under Task 1.3.1, while others will need to be addressed as part of this task on a need-to-know basis.

2. Search for additional populations and/or habitat suitable for reintroduction efforts. Distributional studies of this species have been completed (Pottern and Huish 1985, 1986, 1987). Nearly all available habitat in the Cape Fear River basin has been surveyed; however, it is possible that some small populations were missed. Further study may yield additional populations; suitable habitat could also be identified for transplants.

3. Determine the feasibility of reestablishing the Cape Fear shiner back into historic habitat and reintroduce where feasible. The extent of the Cape Fear shiner's historic distribution is unknown, but available records indicate that the species once inhabited much of the rocky riverine habitat in the middle Cape Fear River basin.

Presently, it is known from only four populations. As many of these populations are isolated by dams, it is unlikely the species can naturally reinvade its historic habitat. If suitable habitat is available or can be made suitable, populations should be reintroduced.

3.1 Develop a successful technique for reestablishing populations. Sufficient stock of the Cape Fear shiner may not be available to allow for the removal of enough adults to establish populations. Techniques for rearing the species and introduction techniques should be developed to help ensure success.

3.2 Coordinate with North Carolina Wildlife Resources Commission, North Carolina State Museum, and North Carolina Natural Heritage Program to identify unoccupied habitat which could be utilized for reintroductions and which could be successfully protected after populations become established.

3.3 Reintroduce the species back into its historic range and evaluate success. Using techniques developed in Task 3.1, reintroduce the Cape Fear shiner into a likely historic habitat and monitor success.

3.4 Implement the same protective measures for any introduced populations as outlined for established populations.

4. Develop and implement a program to biennially monitor population levels and habitat conditions of presently established populations as well as newly discovered, introduced, or expanding populations. During and after recovery actions are implemented, the status of the species and its habitat must be monitored to assess any progress toward recovery. This should be conducted on a biennial schedule.

5. Annually assess overall success of the recovery program and recommend action (changes in recovery objectives, delist, continue to protect, implement new measures, other studies, etc.). The recovery plan must be evaluated periodically to determine if it is on track and to recommend future actions. As more is learned about the species, the recovery objectives may need to be modified.

Literature Cited and References

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KEY TO IMPLEMENTATION SCHEDULE COLUMNS 1 & 4

General Category (Column 1):

Information Gathering - I or R (Research)

1. Population status
2. Habitat status
3. Habitat requirements
4. Management techniques
5. Taxonomic studies
6. Demographic studies
7. Propagation
8. Migration
9. Predation
10. Competition
11. Disease
12. Environmental contaminant
13. Reintroduction
14. Other information

Acquisition - A

1. Lease
2. Easement
3. Management agreement
4. Exchange
5. Withdrawal
6. Fee title
7. Other

Other - O

1. Information and education
2. Law enforcement
3. Regulations
4. Administration

Management - M

1. Propagation
2. Reintroduction
3. Habitat maintenance and manipulation
4. Predator and competitor control
5. Depredation control
6. Disease control
7. Other management

Priorities within this section (Column 4) have been assigned according to the following:

Priority 1 - An action that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.

Priority 2 - An action that must be taken to prevent a significant decline in species population/habitat quality or some other significant negative impact short of extinction.

Priority 3 - All other actions necessary to provide for full recovery of the species.

IMPLEMENTATION SCHEDULE

Cape Fear shiner (Notropis mekistocholas)

*1 GENERAL CATEGORY	PLAN TASK	TASK NUMBER	PRIORITY	TASK DURATION	RESPONSIBLE AGENCIES *2			ESTIMATED FISCAL YEAR COSTS *4			COMMENTS/NOTES
					FWS						
					REGION	DIVISION	OTHERS *3	FY 1	FY 2	FY 3	
O2-4	Continue to utilize existing legislation and regulations to protect species and its habitat.	1.1	1	Continuous	4	FWE	FERC, COE, NCWRC, NCDNRCD, NCNHP	1	1	1	
O1	Meet with local governmental officials and business interests and elicit their support for recovery.	1.2.1, 1.2.2	2	3 years	4	FWE	NCWRC, NCDNRCD, NCNHP	1	1	1	
O1	Develop information and education program and present.	1.2.3	1	*	4	FWE	NCWRC, NCDNRCD, NCNHP, NCSM	4	1	1	*Task Duration: One year to develop program, then continuous.
R1-4, R6-8, R9-10, R12, R14	Conduct research necessary for species management and recovery; i.e., habitat requirements, biology, and threat analysis.	1.3.1, 1.3.2, 1.3.3	1	3 years	4	FWE	NCWRC, NCDNRCD, NCNHP, NCSM	20	20	20	
I4, R4, M3-5, M7	Based on biological and threat analysis, investigate need for management and implement where needed.	1.3.4	*	1 year	4	FWE	NCWRC, NCDNRCD, NCNHP, NCSM	---	---	10	*Priority 1, 2, or 3 (depending on result of 1.3.1, 1.3.2, and 1.3.3).

IMPLEMENTATION SCHEDULE

Cape Fear shiner (Notropis mekistocholas)

*1 GENERAL CATEGORY	PLAN TASK	TASK NUMBER	PRIORITY	TASK DURATION	RESPONSIBLE AGENCIES *2			ESTIMATED FISCAL YEAR COSTS *4			COMMENTS/NOTES
					FWS		OTHERS *3	FY 1	FY 2	FY 3	
					REGION	DIVISION					
R14	Determine number of individuals required to maintain viable population.	1.3.5	3	1 year	4	FWE	NCWRC, NCDNRCD, NCNHP, NCSM	---	---	*	*Unknown.
I1-2	Search for additional populations and suitable habitat.	2	2	1 year	4	FWE	NCWRC, NCDNRCD, NCNHP, NCSM	---	---	10	
R7, R13, M1-2	Develop techniques, select sites, reintroduce the species back into historic habitat, and evaluate and protect any populations established.	3	2	*	4	FWE	NCWRC, NCDNRCD, NCNHP, NCSM	20	15	20	*Task Duration: Three years (protection continuous).
I1-2	Develop and implement a monitoring program.	4	2	*	4	FWE	NCWRC, NCDNRCD, NCNHP, NCSM	3	---	3	*Continuous (biennial).

IMPLEMENTATION SCHEDULE

Cape Fear shiner (Notropis mekistocholas)

*1 GENERAL CATEGORY	PLAN TASK	TASK NUMBER	PRIORITY	TASK DURATION	RESPONSIBLE AGENCIES *2			ESTIMATED FISCAL YEAR COSTS *4			COMMENTS/NOTES
					FWS						
					REGION	DIVISION	OTHERS *3	FY 1	FY 2	FY 3	
04	Annually assess recovery program and modify program and plan where required.	5	3	Continuous	4	FWE	NCWRC, NCDNRCD, NCNHP, NCSM	.5	.5	.5	

*1 - See page 12, entitled "Key to Implementation Schedule - Columns 1 and 4."

*2 - FWE - Fish and Wildlife Enhancement
FERC - Federal Energy Regulatory Commission
COE - U.S. Army Corps of Engineers
NCWRC - North Carolina Wildlife Resources Commission
NCDNRCD - North Carolina Department of Natural Resources and Community Development
NCNHP - North Carolina Natural Heritage Program
NCSM - North Carolina State Museum

*3 - Other agencies' responsibility would be of a cooperative nature or projects funded under a contract or grant program. In some cases contracts could be let to universities or private enterprises.

*4 - All estimates are for FWS funds only (in thousands).

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