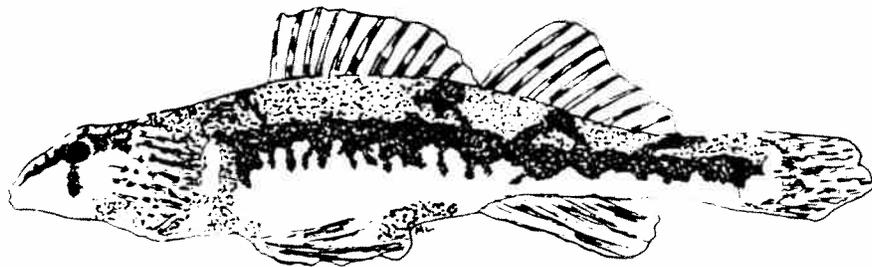
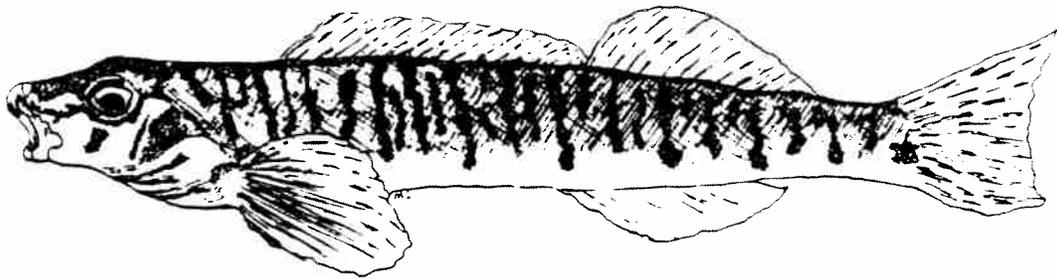


Conasauga Logperch  
and  
Amber Darter



Recovery Plan



RECOVERY PLAN

for

Conasauga Logperch (Percina jenkinsi) Thompson  
and  
Amber Darter (Percina antesella) Williams and Etnier

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Approved:

  
Regional Director, U.S. Fish and Wildlife Service

Date:

June 20, 1986

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THIS IS THE COMPLETED CONASAUGA LOGPERCH AND AMBER DARTER RECOVERY PLAN. IT HAS BEEN APPROVED BY THE U.S. FISH AND WILDLIFE SERVICE. IT DOES NOT NECESSARILY REPRESENT OFFICIAL POSITIONS OR APPROVALS OF COOPERATING AGENCIES, AND IT DOES NOT NECESSARILY REPRESENT THE VIEWS OF ALL INDIVIDUALS WHO PLAYED A ROLE IN PREPARING THIS PLAN. THIS PLAN IS SUBJECT TO MODIFICATION AS DICTATED BY NEW FINDINGS, CHANGES IN THE SPECIES' STATUS, AND COMPLETION OF TASKS DESCRIBED IN THE PLAN. GOALS AND OBJECTIVES WILL BE ATTAINED AND FUNDS EXPENDED CONTINGENT UPON APPROPRIATIONS, PRIORITIES, AND OTHER CONSTRAINTS.

ACKNOWLEDGEMENTS SHOULD READ AS FOLLOWS:

U.S. Fish and Wildlife Service. 1986. Conasauga Logperch and Amber Darter Recovery Plan. U.S. Fish and Wildlife Service, Atlanta, Georgia. 34 pp.

ADDITIONAL COPIES MAY BE PURCHASED FROM:

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Informatics General Corporation  
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Rockville, Maryland 20852

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## PART I

### INTRODUCTION

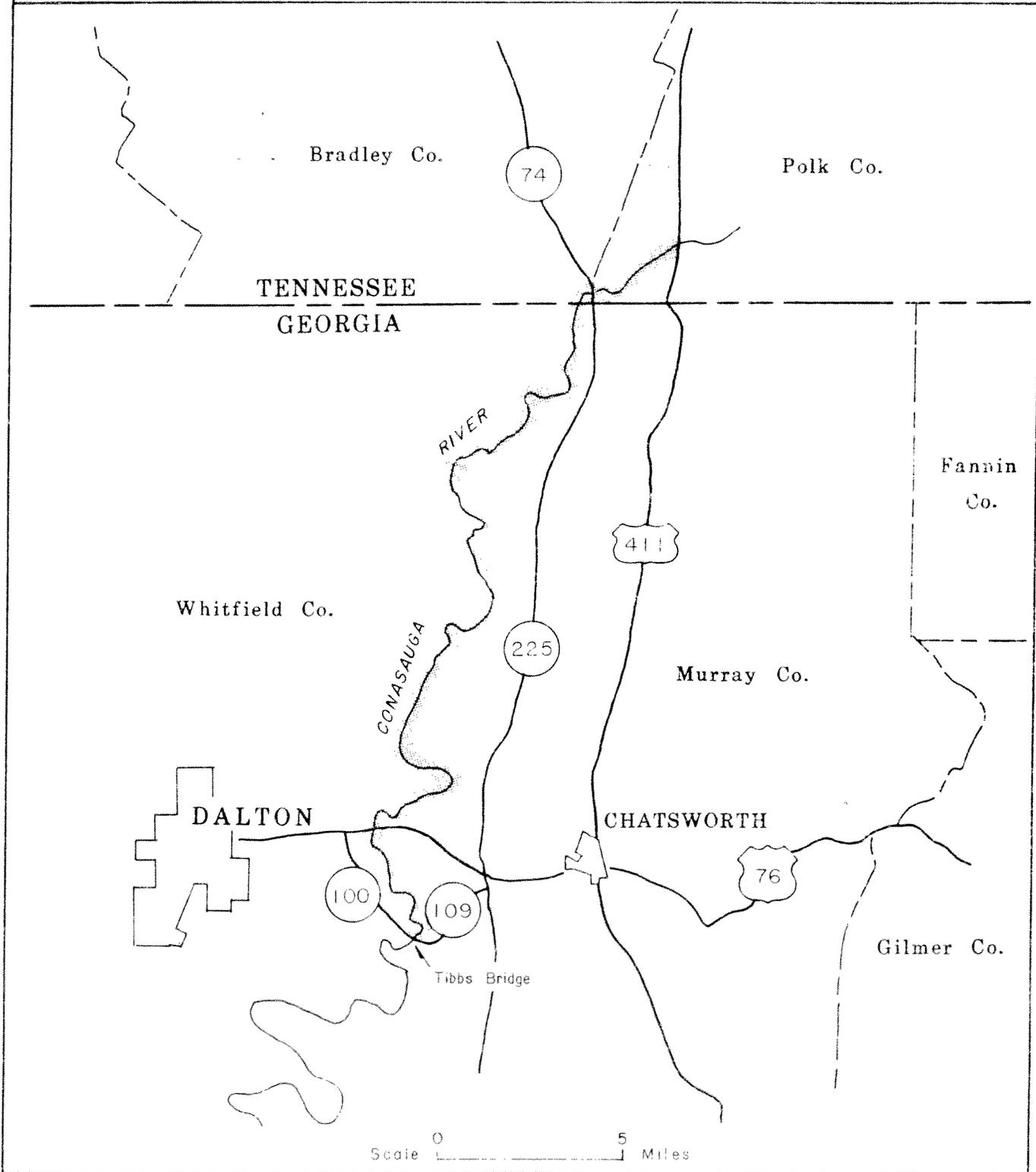
The amber darter (Percina antesella) and the Conasauga logperch (Percina jenkinsi) are currently known only from a short reach of the Conasauga River (amber darter - 33.5 miles, Conasauga logperch - 11 miles), a Coosa River tributary in northern Georgia and southcentral Tennessee. Due to these species' limited distributions, any factor that degrades habitat or water quality in these short river reaches could threaten the fishes' survival.

The amber darter and Conasauga logperch were listed as endangered species in the August 5, 1985, Federal Register (50 FR 31597). Concurrently with the listing, critical habitat was designated to include the following.

#### Amber Darter

The Conasauga River from U.S. Route 411 Bridge in Polk County, Tennessee, downstream approximately 33.5 miles through Bradley County, Tennessee, and Murray and Whitfield Counties, Georgia, to Tibbs Bridge Road Bridge (Murray County Road 109/Whitfield County Road 100) (see map).

**AMBER DARTER  
CRITICAL HABITAT  
GEORGIA AND TENNESSEE**



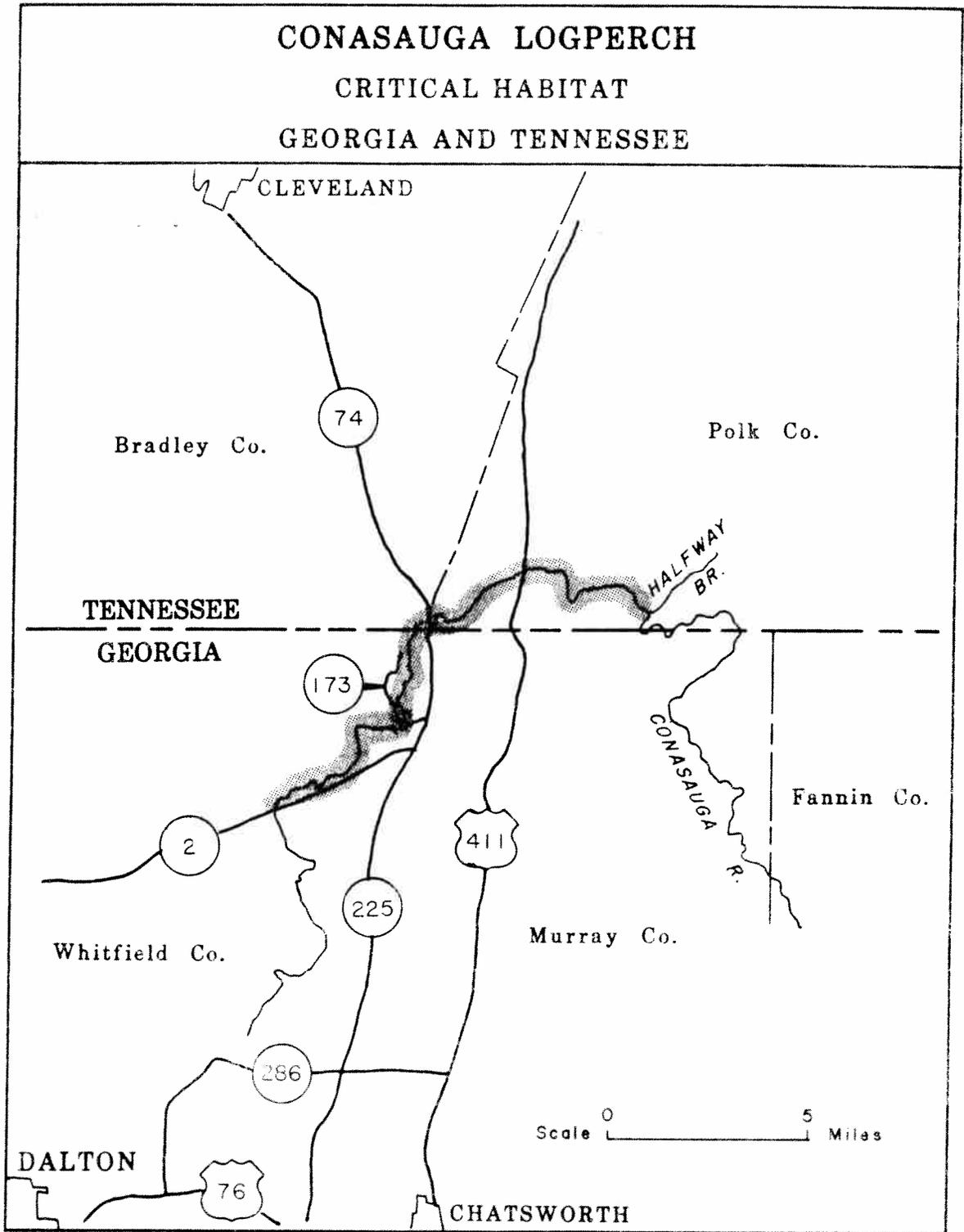
### Conasauga Logperch

The Conasauga River from the confluence of Half-way Branch with the Conasauga River in Polk County, Tennessee, downstream approximately 11 miles through Bradley County, Tennessee, to the Georgia State Highway 2 Bridge, Murray County, Georgia (see map).

### Former and Present Distribution

Amber Darter:

The amber darter, described by Williams and Etnier (1977), is presently known from approximately 33.5 miles of the Conasauga River (between the Tennessee Highway 74 crossing and the U.S. 411 Bridge in Polk County, Tennessee, downstream to the Tibbs Bridge Road crossing, Murray County Road 109 [Tibbs Bridge Road], Murray County, Georgia) in Polk and Bradley Counties, Tennessee, and Murray and Whitfield Counties, Georgia (Freeman, 1983). The amber darter was taken in 1980 from a site on the Etowah River in Cherokee County, Georgia (Etnier et al., 1981). Freeman (1983) surveyed that site and other sites on the Etowah River in 1982 and 1983, but he was unable to recollect the species. If a population of the amber darter does exist in the Etowah River, it is believed to be very small. The only other collection record for this species was from Shoal Creek, a tributary of the Etowah River in Cherokee County, Georgia. Shoal Creek was surveyed by Freeman (1983) on



several occasions, but no amber darters were found. It is believed this population was lost in the 1950s when Allatoona Reservoir inundated the lower portion of Shoal Creek.

#### Conasauga Logperch:

The Conasauga logperch, formerly referred to by the Service as the reticulate logperch (Percina sp.), has recently been described by Dr. Bruce Thompson under contract to the Service (Thompson, 1985). This species is apparently restricted to about 11 miles of the upper Conasauga River in Tennessee and Georgia. Specifically, it has been observed in the Conasauga River reach from approximately 1/4 mile above the junction of Minnewauga Creek, Polk County, Tennessee, downstream through Bradley County, Tennessee, to the Georgia State Highway 2 Bridge, Murray County, Georgia. Thompson (1985) examined hundreds of fish collections from the Coosa River system but did not find any logperch identifiable as Percina jenkinsi outside the main channel of the Conasauga River. Thompson (1985) hypothesized that the "...species appears to have been derived from Percina c. caprodes, theoretically from ancestral stock captured from the Tennessee River system." He further stated, "The presence of the Mobile logperch, already occupying the entire upper Coosa system may have prevented this form from expanding its range resulting in the surviving species residing in a very small section of the Conasauga River."

### Description, Ecology, and Life History

#### Amber Darter:

The amber darter is a small (rarely exceeding 60 mm [2.5 inches] SL), slender-bodied fish (Williams and Etnier, 1977). The fish's upper body is golden brown with four dark saddles, and its belly is yellow-to-cream color. The saddles are located (1) across the nape just anterior to the first dorsal fin, (2) under the posterior end of the first dorsal fin, (3) between the sixth and eleventh ray of the soft dorsal fin, and (4) the posterior portion of the caudal peduncle. The spinous dorsal fin is clear, with a vague gray-black basal and marginal band. The soft dorsal, caudal, and pectoral fin rays have clusters of dark chromatophores, while their membranes are unpigmented. The anal and pelvic fins are unpigmented except for a few clusters of dark chromatophores.

Very little is known of the amber darter's biology. All studies to date on the species have been primarily distributional investigations. Those studies, however, have reported on some life history information. Freeman (1983) observed the fish inhabiting gentle riffle areas over sand, gravel, and cobble substrates. He also noted, as the summer season progressed and aquatic vegetation (Podostemon) developed in the riffles, the amber darter used this vegetated habitat for feeding and cover. The species has not been observed in slackwater areas over silty substrate with detritus or mud

bottoms. The fish's habitat preference for gentle riffles may explain why the species has not been found above the U.S. Highway 411 Bridge, Polk County, Tennessee, where the Conasauga River's gradient increases. The extent of the species' downstream range is likely limited by the increase in silt.

Gastropods (snails and limpets) and insects (Trichoptera and Ephemeroptera primarily, and occasionally Coleoptera, Diptera, and Plecoptera) were found in amber darter stomachs (Freeman, 1983). The occurrence of snails and limpets in the amber darter's diet is somewhat expected, as other members of the subgenus Imostoma consume these organisms.

Freeman (1983) reported that spawning may occur from late fall to early spring, as gravid specimens have been collected in October, March, April, and May. However, the ripest females were collected during late April and early May, and courting males and females have been observed in May. Starnes (1977) collected ripe males in early November.

#### Conasauga Logperch:

The Conasauga logperch is a slender fish that attains a maximum length of about 116 mm (4.6 inches) SL (Thompson, 1985). The sides of the fish's body have numerous dark brown vertical bars set against a yellow-tan background on the upper half of the body and a light cream-white color on the lower half.

The upper portion of the head is tan, and the rest of the head is a light cream color. The cheeks and opercles have a series of irregular markings, and the subocular bar is well developed.

Life history aspects of the Conasauga logperch are poorly understood. Thompson (1985) reported that adults have been collected in deep shutes and flowing pools with clear, clean gravel and mixed rubble substrates. Freeman (1983) observed adult Conasauga logperch in a moderate to swift current, over a bottom composed of cobble, gravel, sand, and Podostemon. He also observed two juveniles at the head of a riffle in a large pool area over gravel and sand substrate. The species likely spawns during April, as highly tuberculate males have been collected in this month (Thompson, 1985). Feeding is accomplished by flipping over rocks with its pig-like snout and catching disturbed invertebrates (Starnes and Etnier, 1980).

#### Reasons for Decline and Threats to Their Continued Existence

The Tennessee Wildlife Resources Agency and the Tennessee Heritage Program of the Tennessee Department of Conservation list both darters as threatened (Starnes and Etnier, 1980). They stated that, relative to the amber darter's habitat, "The combination of gently flowing runs and silt-free substrate is rare in these times of widespread siltation due to poor watershed management or impoundments. The Conasauga River in Tennessee remains clear in all but the heaviest floods, indicating its uniqueness and importance in preserving

the amber darter...." J. S. Ramsey (1976), in a report on extinct and rare freshwater species in Georgia, classified the amber darter as a "rare--1 species," which he defined, in part, as species not known to survive in reservoirs or channelized streams. Ramsey further categorized the darter as "vulnerable," which he defined as "...species whose range is limited and a species that could be rendered extinct by a single land use change."

The amber darter and Conasauga logperch apparently require unpolluted, clean water streams. The amber darter utilizes areas with moderate current over gravel and silt-free sand substrate (Williams and Etnier, 1977). The Conasauga logperch occurs in flowing pool areas and riffle areas over clean substrate of rubble, sand, and gravel (Starnes and Etnier, 1980). Siltation, which often results when lands are cleared for agriculture or other land uses, is a major threat to the quality of stream habitats. Siltation changes the character of streams so that gravel riffle areas become infiltrated with silt.

The upper Conasauga River flows through U.S. Forest Service lands. This provides some protection for the downstream habitat sections where the fish are found. However, both species are presently known from restricted ranges. The amber darter is known from only about 33.5 miles of the Conasauga River, and it may also exist at very low numbers in a short reach of the Etowah River. The Conasauga logperch is known only from about 11 miles of the upper Conasauga River. With such limited ranges, both species could be jeopardized

by a single catastrophic event, either natural or human related. Potential threats to these species and their habitat could also come from increased silvicultural activity, road and bridge construction, stream channel modification, impoundments, land use changes, and other projects in the watershed if such activities are not planned and implemented with the survival of the species and the protection of their habitat in mind.

Both species are also potentially threatened by two U.S. Army Corps of Engineers projects--the Dalton Lake and Jacks River projects. The Jacks River project was authorized for study by Congress in the Rivers and Harbors Act of 1945, but it has not been funded for further planning. This project, if constructed, would be located on the Jacks River, which enters the Conasauga River upstream of the area inhabited by these fish. The degree of the project's impact on the fish would depend on the type and extent of the project and the resultant modification to stream flows, water temperatures, and silt loads, especially during the construction stage.

Multi-purpose Dalton Lake, on the Conasauga River, is no longer being considered by the Corps as a viable option because of a low benefit/cost ratio. However, the Corps is studying alternatives for meeting the lake's prime objective, which is water supply augmentation for the local community. One of the options under review is a fixed crest dam. This reservoir would still inundate a significant portion of the amber darter's habitat. As a reservoir would be expected to alter downstream water and habitat quality,

the amber darter, which inhabits at least seven miles of the river below this reservoir site, would also be adversely impacted.

A reservoir on the Conasauga River could also affect both fish upstream of the proposed reservoir. Some game fish and non-game species common to reservoirs, such as carp (Cyprinus carpio), generally respond to reservoir construction by dramatically increasing their population levels. These reservoir fish at times could migrate upstream into the habitat of the two darter species. An influx of reservoir fish can be expected, through competition, predation, and changes in the habitat caused by some of the fishes' feeding behavior (carp stirring up the substrate during feeding), to reduce the chances of these two darters surviving.

Freeman (1983) reported on the impact of a channel modification on these two darters. An island in the Conasauga River, just upstream of Murray County Road 173 Bridge, Murray County, Georgia, was removed (the reason for removal is not known) in 1982. This site was sampled prior to the island's removal, and both darters were observed to inhabit the area. Six to nine months after the area was modified, the amber darter and Conasauga logperch were not seen at the site. Similar modifications in other sections of the Conasauga River could be expected to result in elimination, at least temporarily, of the amber darter and Conasauga logperch from a river section.

## PART II

## RECOVERY

A. RECOVERY OBJECTIVE:

The Service's goal in developing and implementing recovery plans is to improve a species' status to the point that the protection of the Endangered Species Act is no longer required. This is usually accomplished through the establishment and protection of some specified number of viable populations.\* However, based on available information, realistic recovery goals for either species and reclassification objectives for the Conasauga logperch cannot be developed at this time. The amber darter is known only to exist in about 33.5 miles of the Conasauga River and possibly a short reach in the Etowah River. The Conasauga logperch is found only in about 11 miles of the Conasauga River. No other historic habitat is known for either species. With such restricted ranges, one catastrophic event, such as a chemical tanker truck accident, could render the logperch and possibly the amber darter extinct. Therefore, unless other populations can be found

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\*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 to meet this criterion will be determined for each species as one of the recovery tasks.

or some extirpated populations, which we are presently unaware of, can be reestablished, it is unlikely the present populations can be sufficiently protected to allow for removing the species from the Act's protection.

Although reclassification to threatened status is unlikely for the Conasauga logperch, this status change is possible for the amber darter. The following are criteria that must be met before reclassification can be considered. The potential for developing recovery goals for both species and reclassification objectives for the Conasauga logperch will be reevaluated as data on the species are gathered.

#### RECLASSIFICATION TO THREATENED

Amber Darter:

1. Through protection of the existing Conasauga River population and by introductions or expansion of the species in the Etowah River, or discovery of an additional population, there exist viable populations in two rivers. (Sufficient habitat is not available to have two separate populations in the Conasauga River.)
2. Studies of the fish's biological and ecological requirements have been completed, and the implementation of management strategies developed

from the study findings have ensured that the species is no longer likely to become extinct in the foreseeable future.

B. STEP-DOWN OUTLINE

(Although neither species may ever be delisted or reclassified to threatened status, they must be managed to perpetuate and enhance present populations. Most of the following tasks are aimed toward these objectives.)

1. Preserve Conasauga River populations and presently used habitat of the amber darter and Conasauga logperch.
  - 1.1 Continue to utilize existing legislation and regulations (Federal Endangered Species Act, State Endangered Species Laws, water quality regulations, stream alteration regulations, etc.) to protect the two fish and their habitats.
  - 1.2 Conduct research necessary for the management and recovery of the Conasauga River populations.
    - 1.2.1 Conduct life history research on the species to include reproduction, food habits, age and growth, mortality factors, etc.

- 1.2.2 Characterize these species' habitats (relevant physical, chemical, and biological components) for all life history stages.
- 1.2.3 Determine the extent of the species' preferred habitats and present this information in a manner that identifies specific areas in need of special attention.
- 1.2.4 Determine present and foreseeable threats to the species and implement protective measures.
- 1.2.5 Investigate the need and value of habitat improvement. Implement improvements if needed to secure viable populations.
- 1.2.6 Determine the number of individuals required to maintain a viable population.
- 1.3 Solicit help in protecting the species and their essential habitats.
  - 1.3.1 Meet with local government officials and regional and local planners to inform them of our plans to attempt recovery and request their support.

- 1.3.2 Work with local, state, and Federal agencies to encourage them to utilize their authorities to protect the species and their river habitat.
- 1.3.3 Meet with local business and/or industry interests and try to elicit their support in implementing protective actions.
- 1.3.4 Meet with landowners adjacent to the species population centers, inform them of the project, and try to get their support in habitat protection measures.
- 1.4 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.
2. Search for additional populations and/or habitats suitable for reintroduction efforts.
3. Determine the feasibility of reestablishing the amber darter back into its historic habitat in the Etowah River and the amber darter and Conasauga logperch into other suitable stream reaches that are determined to have been historic habitats.

- 3.1 Develop a successful technique for reestablishing populations.
- 3.2 Reintroduce the species back into their historic range.
- 3.3 Implement the same protective measures for any introduced populations as outlined for established populations.
4. Develop and implement a program to monitor population levels and habitat conditions of presently established populations as well as any 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 Conasauga River populations and presently used habitat of the amber darter and Conasauga logperch. As the Conasauga River populations are the only ones known to exist, it is essential that these populations be protected.

- 1.1 Continue to utilize existing legislation and regulations (Federal Endangered Species Act, State Endangered Species Laws, water quality regulations, stream alteration regulations, etc.) to protect the two fish and their habitats. Prior to and during implementation of this recovery plan, the species and their habitats can be protected by the full enforcement of existing laws and regulations.
  
- 1.2 Conduct research necessary for the management and recovery of the Conasauga River populations.
  - 1.2.1 Conduct life history research on the species to include reproduction, food habits, age and growth, mortality factors, etc. The work of Freeman (1983) and Thompson (1985) indicates that much needs to be learned concerning these species' life histories. Unless the species' life cycles and environmental requirements are defined, recovery efforts may be inconsequential or misdirected. As the Conasauga River populations are very vulnerable, extreme care must be taken to ensure research does not further threaten these species, especially the Conasauga logperch.
  
  - 1.2.2 Characterize these species' habitats (relevant physical, chemical, and biological components) for all life history

stages. Before these species' habitats can be adequately protected, they must be completely characterized. The summer habitats are somewhat characterized for adults, but winter habitats, the requirements of juveniles, and spawning habitats are unknown. Knowledge of the species' habitats will enable the recovery effort to focus management and protection efforts on the habitats and ecological associations required for the survival of the species.

1.2.3 Determine the extent of the species' preferred habitats and present this information in a manner that identifies specific areas in need of special attention. Not only is it necessary to know the types of habitats needed, the extent and location of these required habitats must be delineated. By knowing the location of the habitats, protection procedures can be implemented. The use of maps delineating areas of special concern will allow planners to avoid sensitive areas.

1.2.4 Determine present and foreseeable threats to the species and implement protective measures. The Conasauga river system is subjected to certain environmental influences, i.e., land use practices, pesticide use, gravel dredging,

etc., that threaten the species and their habitats. To minimize and/or eliminate these threats, where needed to meet recovery, the threats must be identified and correlated with the species' specific life history and habitat requirements gathered under 1.2.1 and 1.2.2, and measures must be taken to alleviate the problem areas.

- 1.2.5 Investigate the need and value of habitat improvement. Implement improvements if needed to secure viable populations. Specific components of the species' habitats may be missing and these may be limiting the species' potential expansion. Habitat improvement programs and activities may be helpful in alleviating these limiting factors.
- 1.2.6 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 actual

population size include sex ratio, length of species' reproductive life, fecundity, extent of exchange of genetic material within the population, plus other life history aspects of these species. Some of these factors can be addressed under Task 1.2.1, while others will need to be addressed as part of this task on a need-to-know basis.

- 1.3 Solicit help in protecting the species and its essential habitats. Section 7 consultation under the Endangered Species Act and Fish and Wildlife coordination activities can assist in protection of the species, but these programs alone cannot recover the amber darter and Conasauga logperch. The assistance of Federal and state agencies as well as local governments will be essential. Also, support of the local industrial and business community as well as local people will be needed to meet the goal of recovering the species. Without a commitment from the people in the Conasauga and Etowah River valleys who have an influence on habitat quality, recovery efforts will be doomed.

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

1.3.2 Work with local, state, and Federal agencies to encourage them to utilize their authorities to protect the species and their river habitats.

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

1.3.4 Meet with landowners adjacent to the species population centers, inform them of the project, and try to get their support in habitat protection measures.

1.4 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.

2. Search for additional populations and/or habitats suitable for reintroduction efforts. A study of these species, funded by the Service, was completed in 1983 (Freeman, 1983). That survey involved extensive sampling of the upper Coosa River drainage in Georgia and Tennessee. Although some habitat looked favorable and a record existed

for the amber darter in the Etowah River, these fish were not found outside of the Conasauga River.

Although it now appears unlikely that other populations will be found, further survey may be warranted after the studies under Task 1.2.1 and 1.2.2 better define the species' habitat requirements. This information should aid in delineating specific habitat types that could be more thoroughly searched. Bruce Thompson (personal communication, 1986) recommends an intensive search of the upper Conasauga River watershed in Alaculsy Valley, especially for the logperch. If new populations are found, they should be protected using measures outlined above.

3. Determine the feasibility of reestablishing the amber darter back into its historic habitat in the Etowah River and the amber darter and Conasauga logperch into other suitable stream reaches that are determined to have been historic habitats. The amber darter is known to have occurred in the Etowah River. The species may now be extirpated from this river. If the habitat is now suitable, it would be advisable to reintroduce the species. Although no other historic populations are known, other historic habitats may still be available for introductions.

- 3.1 Develop a successful technique for reestablishing populations.

Sufficient stock of amber darters and Conasauga logperch may not

be available to allow for the removal of adults to establish new populations. Techniques for rearing amber darters and Conasauga logperch and introduction techniques must be developed before they can be reintroduced into other waters.

- 3.2 Reintroduce the species back into their historic range. Using techniques developed in Task 3.1, reintroduce the amber darter into the Etowah River, and if other historic habitats are found for the amber darter and Conasauga logperch, reintroduce where feasible.
- 3.3 Implement the same protective measures for any introduced populations as outlined for established populations.
4. Develop and implement a program to monitor population levels and habitat conditions of presently established populations as well as any newly discovered, introduced, or expanding populations. Once recovery actions are implemented, the response of the species and their habitats must be monitored to assess any progress towards recovery. This will likely require a biennial census 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.

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## KEY TO IMPLEMENTATION SCHEDULE COLUMNS 1 &amp; 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.

Part III Implementation Schedule

*1 General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency *2		Estimated Fiscal Year Costs			*3 Comments/Notes	
					FWS Region	Program	Other	FY 1	FY 2		FY 3
01-04	Continue to utilize existing legislation and regulations to protect species and their habitat.	1.1	1	Continuous	4	SEAES	Georgia Department of Natural Resources (GDNR), Georgia and Tennessee Nature Conservancy (TNC), Tennessee Wildlife Resources Agency (TWRA), Tennessee Heritage Program (THP), and U.S. Forest Service (USFS).	1,000	1,000	1,000	*1. See preceding page: general categories for Implementation Schedules. *2. 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. *3. Note: ALL ESTIMATES ARE FOR FWS FUNDS ONLY.
13-11	Conduct research into life history and habitat requirements.	1.2.1 1.2.2 and 1.2.3	1	3 years	4	SE	USFS, TWRA, THP, and TNC	30,000	25,000	25,000	
11,2, and 12	Determine present and foreseeable threats.	1.2.4	1	2 years	4	SE	USFS, TWRA, THP, and TNC	---	7,500	7,500	
14	Investigate the need for habitat improvement.	1.2.5	2	1 year	4	SE	USFS, TWRA, THP, and TNC	---	---	5,000	Cost figure is only to investigate the need for improvements.
114	Determine numbers of individuals needed to maintain viable populations.	1.2.6	3	1 year	4	SE	USFS, TWRA, THP, and TNC	---	---	5,000	
01,04	Solicit help in protecting species and critical habitats.	1.3	3	Continuous	4	SE	USFS, TWRA, THP, and TNC	1,000	1,000	1,000	

Part III Implementation Schedule

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency			Estimated Fiscal Year Costs			Comments/Notes
					FWS Region	Program	Other	FY 1	FY 2	FY 3	
01	Develop and utilize information and education programs (slide/tape shows, brochures, etc.) for local distribution.	1.4	3	1 year for 4 developing; continuous implementation	4	SE	USFS, GDNR, TMRA, THP, and TNC	10,000	2,000	2,000	
11	Search for additional populations and/or habitats.	2.	3	1 year	4	SE	USFS, GDNR, TMRA, THP, and TNC	---	---	12,000	
17,14	Determine the feasibility of reestablishing any historic populations of the species.	3.	3	1 year	4	SE	USFS, GDNR, TMRA, THP, and TNC	---	---	10,000	
11,12	Develop and implement a monitoring program.	4.	2	Continuous (every 6-8 years)	4	SE	USFS, GDNR, TMRA, THP, and TNC	1,000	---	1,500	
04	Annual assessment of recovery program and modify where needed.	5.	3	Continuous	4	SE	USFS, GDNR, TMRA, THP, and TNC	500	500	500	

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