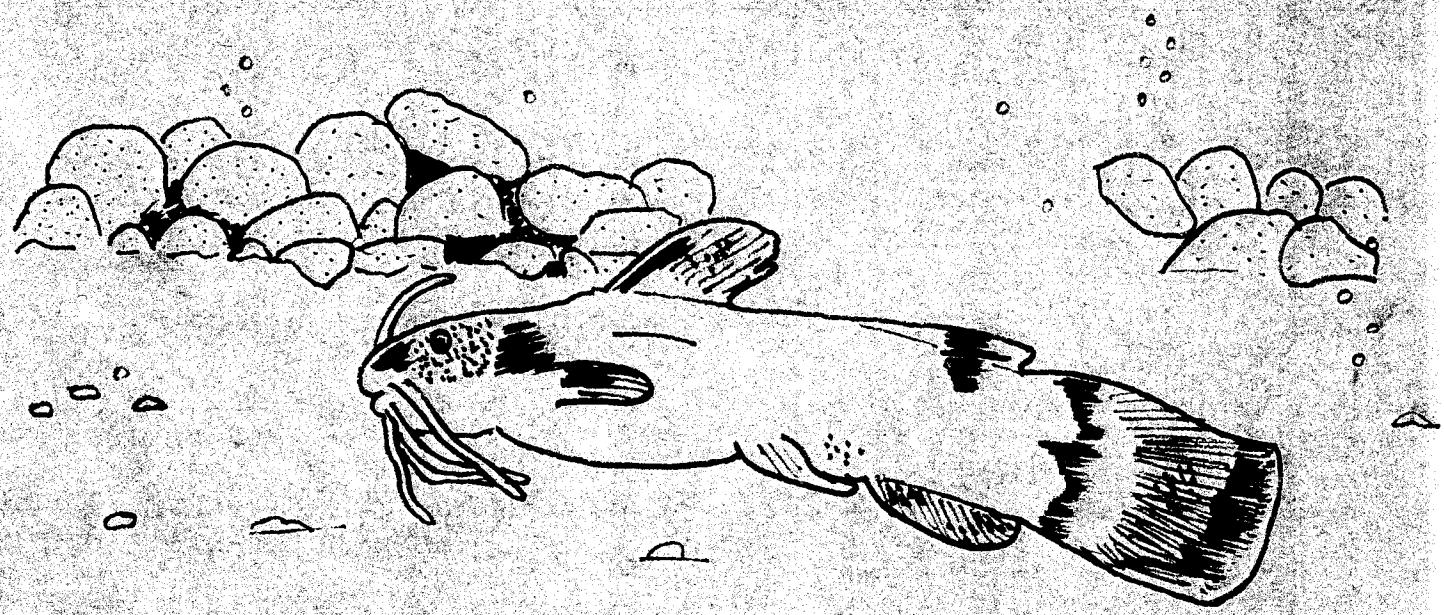
Recovery Plan

Yellowfin Madtom (*Noturus flavipinnis*)



RECOVERY PLAN

YELLOWFIN MADTOM (*Noturus flavipinnis*) Taylor

Prepared by

Asheville Endangered Species Field Station

U.S. Fish and Wildlife Service

Southeast Region, Atlanta, GA

June 1983

Approved: _____
Regional Director, Southeast Region

Date: June 23, 1983

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Crayfish Springs), Catoosa County, Georgia. The creek was extensively sampled in 1979-1980 (Etnier, et al., 1981) but this madtom was not collected. This river system has been seriously impacted by industrial pollution. However, some habitat is still available which may be able to support reintroduction of the species (Bruce Bauer, 1982, personal communication).

Hines Creek - The yellowfin was taken from Hines Creek, a Clinch River tributary, Anderson County, Tennessee, in 1884. The lowermost section of this stream is now flooded by Melton Hill Reservoir on the Clinch River.

North Fork Holston River - The fish was collected from this river just above Saltville, Smyth County, Virginia, in 1888. Taylor (1969) reported that the river above Saltville, Virginia, apparently was relatively undisturbed in 1959, but he did not observe the yellowfin madtom. He did find that another madtom, Noturus insignis, a possible competing species, had become established. Robert Jenkins (personal communication, 1982) reported that he believes the area has been vigorously sampled and that the yellowfin madtom is likely extirpated from the entire North Fork Holston River.

Copper Creek - The yellowfin was first collected at Copper Creek in 1969 by Robert Jenkins and Noel Burkhead, Roanoke College, Salem, Virginia. Subsequent sampling, primarily by Jenkins and Burkhead, indicated the fish inhabited the creek (possibly not continuous over the entire river reach) in Scott and Russell Counties, Virginia, from its mouth upstream to rkm 72 (Jenkins, 1975). The largest collections were obtained in 1969 when 17 were taken at rkm 10.3 and 11 at rkm 15.8 (in part, Taylor, et al., 1971).

With coal in such high demand and with anticipated increases in coal utilization (Freedman et al., 1974), coal related impacts on the Powell River can be expected to increase unless steps are taken to minimize its effects on the river. However, even if coal fines and silt from present coal operations and abandoned mine lands could be kept from the river, coal fines and silt already in the upper river may move downstream and further impact the lower Powell River fish fauna.

The Copper Creek yellowfin madtom population may be in decline. Although collection efforts since the early 1970's have dropped, collection trips to Copper Creek are generally directed towards the yellowfin madtom. Burkhead and Jenkins (1982) reported a decline in successful collections. They sampled the stream in 1981 and reported taking a total of eight specimens in four of eight collections at three localities. These individuals were taken in the lower portion of the creek. No specimens were taken (two sampling efforts) in the upstream portions where the species had been taken in the past.

Burkhead and Jenkins (1982) stated that except for apparent declines in yellowfins and another madtom (Noturus eleutherus), a common species in the lower creek in 1969-1972 (only two taken in 1981), species richness is comparable to earlier surveys. They offered no speculation as to whether these results were significant and if so, what might have caused the decline. The habitat quality in Copper Creek in 1981 did not appear degraded from that of the early 1970's.

1.1 Continue to utilize existing legislation and regulations (Federal and state endangered species laws, water quality requirements, stream alteration regulations, etc.) to protect the species and its habitat.

1.2 Conduct population and habitat surveys.

1.2.1 Determine species present distribution and status.

1.2.2 Characterize the habitat and ecological association and determine essential elements (biotic and abiotic factors) of the species' habitat for all life history stages on a need to know basis.

1.2.3 Determine the extent of the species' preferred habitat.

1.2.4 Present the above information in a manner which identifies specific areas in need of special attention.

1.3 Determine present and foreseeable threats to the yellowfin madtom and strive to minimize and/or eliminate the threats where necessary to meet the recovery objective.

1.3.1 Determine impacts of coal industry related pollution on the species in the Powell River.

C. Narrative Outline

1. Preserve populations and currently occupied habitat of the yellowfin madtom. Introduction of the species back into its former range may be feasible; however, the protection of established populations and their essential habitat is the key to the survival of the species.

1.1 Continue to utilize existing legislation and regulations (Federal and state endangered species laws, water quality requirements, stream alteration regulations, etc.) to protect the species and its habitat. This species, although listed as Threatened, could easily become Endangered if the presently known populations are not maintained.

1.2 Conduct population and habitat surveys.

1.2.1 Determine species' present distribution and status. The entire present distribution of the species must be determined. The species may be present in other streams within the Tennessee River drainage--such as the Little River in Russell and Tazewell Counties, Virginia, Big Moccasin Creek in Scott County, Virginia, the Tennessee River tributaries in northwest Alabama, and the Duck River tributaries in Tennessee. Once distribution and status are known, the future emphasis of the

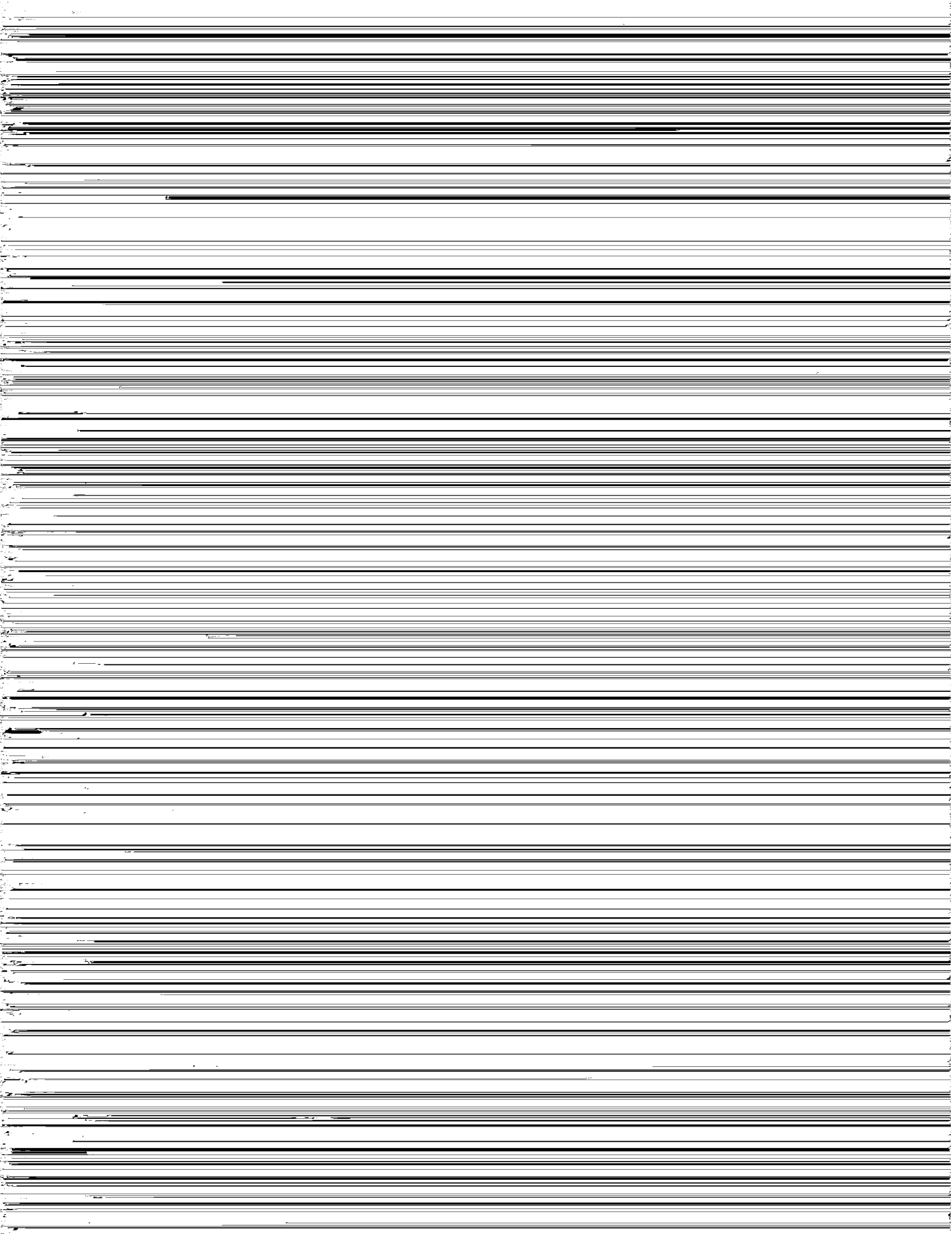
Act and Fish and Wildlife Coordination activities can assist in protecting the species, but these programs alone cannot recover the species. The assistance of Federal and state agencies and local governments will be essential. Also, support of the local industrial and business community, as well as local people, will be needed to meet the goal of recovering the species. Without a commitment from the people in these river valleys who have an influence on habitat quality, the recovery effort will be doomed.

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

1.4.2 Work with local, state, and Federal agencies to encourage them to utilize their authorities to protect the species and its river habitat.

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

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



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THIS IS THE COMPLETED YELLOWFIN MADTOM 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 KEY ROLE IN PREPARING THIS PLAN. THIS PLAN IS SUBJECT TO MODIFICATION AS DICTATED BY NEW FINDINGS AND CHANGES IN 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 BUDGETARY CONSTRAINTS.

ACKNOWLEDGMENTS SHOULD READ AS FOLLOWS:

U.S. Fish and Wildlife Service. 1983. Yellowfin Madtom Recovery Plan. U.S. Fish and Wildlife Service, Atlanta, Georgia. 33 p.

ADDITIONAL COPIES MAY BE OBTAINED FROM:

U.S. Fish and Wildlife Reference Service
Unit j
3840 York Street
Denver, Colorado 80205
Telephone: 303/294-0917
1-800/525-3426 (USA except CO)

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PART I

INTRODUCTION

The yellowfin madtom (Noturus flavipinnis) was probably once widely distributed in many of the lower gradient streams of the Tennessee River drainage upstream of the Chattanooga, Tennessee, area (Jenkins, 1975). The species' present distribution (Burkhead and Jenkins, 1982) is represented by only three known populations (Citico Creek, Monroe County, Tennessee; Powell River, Hancock County, Tennessee; and Copper Creek, Scott and Russell Counties, Virginia). Three other populations are believed to have been extirpated; one from pollution, one as the result of an impoundment, and the third may have been lost due to competition from an introduced related species Noturus insignis. Specimens from these extirpated populations, collected in the late nineteenth century, were used by W. Ralph Taylor to describe the species in 1969 (Taylor, 1969)

The yellowfin madtom was listed as a Threatened species under the Federal Endangered Species Act in the September 9, 1977, Federal Register, Volume 42, No. 175, pages 45527 to 45529. Concurrently with that listing, Critical Habitat was also designated to include the following:

Tennessee - Claiborne and Hancock Counties. Powell River, main channel from backwaters of Norris Lake upstream to the Tennessee-Virginia state line.

Virginia - Lee, Scott, and Russell Counties. Powell River, main channel from Virginia-Tennessee state line upstream through Lee County. Copper

Creek, main channel from its junction with Clinch River upstream through Scott County and upstream in Russell County to Dickensonville.

Citico Creek, although essential to the species, is not presently listed as Critical Habitat. The yellowfin madtom was discovered in Citico Creek after Critical Habitat was listed.

Historical and Present Distribution

The yellowfin madtom has been collected from six streams in the Tennessee River basin: Chickamauga Creek, Hines Creek, North Fork Holston River, Copper Creek, Powell River, and Citico Creek (Figure 1). Jenkins (1975) described the fish's probable former distribution as follows, "Formerly it probably was widely distributed in the Tennessee drainage, from the Chickamauga system upstream. However, it probably did not ascend to higher gradient streams of the Blue Ridge physiographic province. The known records are in the Ridge and Valley province, and the other two members of the *miurus* group - *N. miurus* and *N. flavator* - prefer moderate to low gradient streams. *N. flavipinnis* may not have extended significantly into the lower Tennessee which is occupied by its close relative, and presumed major competitor, *N. miurus*."

Chickamauga Creek - Evermann and Hildebrand (1916) reported on an 1893 collection from Chickamauga Creek which contained the yellowfin madtom. This collection was taken at Lee and Gordon's Mill (three miles from

Crayfish Springs), Catoosa County, Georgia. The creek was extensively sampled in 1979-1980 (Etnier, et al., 1981) but this madtom was not collected. This river system has been seriously impacted by industrial pollution. However, some habitat is still available which may be able to support reintroduction of the species (Bruce Bauer, 1982, personal communication).

Hines Creek - The yellowfin was taken from Hines Creek, a Clinch River tributary, Anderson County, Tennessee, in 1884. The lowermost section of this stream is now flooded by Melton Hill Reservoir on the Clinch River.

North Fork Holston River - The fish was collected from this river just above Saltville, Smyth County, Virginia, in 1888. Taylor (1969) reported that the river above Saltville, Virginia, apparently was relatively undisturbed in 1959, but he did not observe the yellowfin madtom. He did find that another madtom, Noturus insignis, a possible competing species, had become established. Robert Jenkins (personal communication, 1982) reported that he believes the area has been vigorously sampled and that the yellowfin madtom is likely extirpated from the entire North Fork Holston River.

Copper Creek - The yellowfin was first collected at Copper Creek in 1969 by Robert Jenkins and Noel Burkhead, Roanoke College, Salem, Virginia. Subsequent sampling, primarily by Jenkins and Burkhead, indicated the fish inhabited the creek (possibly not continuous over the entire river reach) in Scott and Russell Counties, Virginia, from its mouth upstream to rkm 78 (Jenkins, 1975). The largest collections were obtained in 1969 when 17 were taken at rkm 10.3 and 11 at rkm 15.8 (in part, Taylor, et al., 1971).

Powell River - This river has been surveyed since 1877 (intensively since 1968), but only two yellowfin madtoms have been taken--both by Tennessee Valley Authority crews. One individual was taken in 1979 at Buchanan Ford (rkm 159.6) and one in 1968 at McDowell Ford (rkm 171.8), both of which are in Hancock County, Tennessee. Although the Powell River is more difficult to collect than Copper Creek because of its size and the relative turbid condition of its water, Burkhead and Jenkins (1982) reported that current data suggest that the Powell population is the lowest of the three known yellowfin madtom populations.

Citico Creek - This population in Monroe County, Tennessee, was discovered in 1981. It appears to be a relatively dense but highly localized population. Bauer, et al. (in press), reported that 15 fish were captured along approximately 200 meters of stream on one occasion and on another occasion, seven specimens were taken. A study funded by the U.S. Forest Service is presently investigating the status of this population and conducting searches for other populations in the general area. Results of this study are not complete, but it appears the population is small and very localized (Peggy Shute, 1982, personal communication).

Description, Ecology, and Life History

Noturus flavipinnis (see photo) is a moderately elongated madtom (maximum known length 92 millimeters SL, ca 120 millimeters TL). It has a depressed head, large eyes, and a truncate to slightly rounded caudal fin. The pectoral spines are long with highly developed serrae. The fish's dorsal area is marked with four prominent dorsal saddles, a dark bar is present on

the caudal fin base and near the caudal margin, while the dorsal fin has a medial stripe. Live specimens exhibit a yellowish tinge on the paler areas of the body, particularly the fins.

Jenkins (1975) reported that the yellowfin occupies small-to-medium size (8 to 40 meters wide) warmwater streams with moderate current and that they apparently prefer clean water with little siltation. Jenkins further stated that nearly all specimens were taken from quiet sections of pools or backwaters. The species is generally associated with cover (undersides of flat rocks, detritus, and stream banks) during daylight hours. Jenkins (1975) reported that at night it was associated with cover and stayed on the stream bed away from the banks. Bauer et al. (in press) described observing the fish in two pool areas in Citico Creek. These pools were about 15 meters wide and 1-2 meters deep. The substrate was organic, sand, gravel, and rock rubble. He noted that no specimens were observed in the riffle areas between the pools.

Jenkins (1975) reported on the stomach contents of 21 yellowfin madtoms taken from Copper Creek. He found that they consumed a variety of aquatic insects from tiny midges to large burrowing mayfly larvae. He stated that the species apparently feeds at night moving out from its hiding places in search of food, but that if the opportunity arose, it would likely feed during daylight hours. Both tactile and chemical stimuli are used by the yellowfin in locating food.

There is scant knowledge on the species' reproductive behavior as few specimens have been collected in spawning condition. However, examination

of yellowfin madtom gonads indicates that they may spawn in late spring or early summer and, as known for other Noturus species, they may deposit their eggs on the underside of stones in higher gradient stream sections than they normally occupy.

Reasons For Decline And Threat To The Continued Existence

Three of the six known populations of the yellowfin madtom are gone primarily because of human related factors (impoundments, pollution, habitat modification, etc.) and the known existing populations are threatened.

The presence of the yellowfin madtom in the Powell River is based on the collection of only two individuals in Hancock County, Tenneessee. This population may therefore be extremely small and we could easily lose it to coal related siltation. This river has serious coal related water and substrate quality problems. The upper valley is rich in coal reserves and past and present mining activities have adversely impacted the upper reaches of the river. Ahlstedt and Brown (1980) reported coal mining activities in the upper Powell River apparently impact the river through the deposition of silt and coal fines on mussel beds. Neves et al. (1980) reported that no live mussels were observed at a Big Stone Gap, Virginia, sampling site and that no endangered mussels were found in the Powell River above rkm 217.8. Burkhead and Jenkins (1982) found coal fines deposited as deep as one meter in pools and back water areas at McDowell Ford (rkm 171.8). Pools and back water areas are apparently preferred habitat for the yellowfin.

With coal in such high demand and with anticipated increases in coal utilization (Freedman et al., 1974), coal related impacts on the Powell River can be expected to increase unless steps are taken to minimize its effects on the river. However, even if coal fines and silt from present coal operations and abandoned mine lands could be kept from the river, coal fines and silt already in the upper river may move downstream and further impact the lower Powell River fish fauna.

The Copper Creek yellowfin madtom population may be in decline. Although collection efforts since the early 1970's have dropped, collection trips to Copper Creek are generally directed towards the yellowfin madtom. Burkhead and Jenkins (1982) reported a decline in successful collections. They sampled the stream in 1981 and reported taking a total of eight specimens in four of eight collections at three localities. These individuals were taken in the lower portion of the creek. No specimens were taken (two sampling efforts) in the upstream portions where the species had been taken in the past.

Burkhead and Jenkins (1982) stated that except for apparent declines in yellowfins and another madtom (Noturus eleutherus), a common species in the lower creek in 1969-1972 (only two taken in 1981), species richness is comparable to earlier surveys. They offered no speculation as to whether these results were significant and if so, what might have caused the decline. The habitat quality in Copper Creek in 1981 did not appear degraded from that of the early 1970's.

The Citico Creek yellowfin population appears to be the most secure. Its presence in the Cherokee National Forest offers it substantial protection. However, the creek is paralleled by a well traveled dirt road and could be subject to toxic chemical spills, road construction activities, and general maintenance. Also, forest management practices will need to be conducted with great care to maintain the high water and substrate quality now present in the stream.

Burkhead and Jenkins (1982) reviewed the status of the yellowfin madtom and stated as follows: "Noturus flavipinnis still merits threatened status and continued monitoring of its populations. All three populations are widely separated and completely isolated by impoundments (Norris Reservoir in the Clinch system and Tellico Reservoir in the Little Tennessee system). The Powell River population appears extremely low and the Copper Creek population appears to have declined".

PART II

RECOVERY

A. Recovery Objectives:

The ultimate goal of the recovery plan is to restore viable populations* of the yellowfin madtom (Noturus flavipinnis) to a significant portion of its historic range and remove it from the Federal endangered species list. The yellowfin madtom shall be considered recovered when the following criteria are met.

1. Through protection of existing populations and/or by introductions and/or discoveries of new populations there exist viable populations* in the Powell River, Copper Creek, and Citico Creek of the following magnitude:

   a. Powell River - A minimum of five population centers** exist from the backwaters of Norris Reservoir upstream to approximately rkm 189.3. These populations are dispersed throughout this river reach so that it is unlikely that a single event would cause the loss of the entire population.

   b. Copper Creek - The species is widely distributed from the creek's mouth to rkm 50.

   c. Citico Creek - The species is widely distributed throughout its preferred habitat within the creek.

*Viable populations - ten years of population monitoring (biannual sampling) indicates that the species is reproducing and that the population is either stable or expanding. Due to the difficulity of sampling yellowfin madtoms in the Powell River, the collection of one individual at each of the five population centers on three occasions over ten years would constitute viability for the Powell River population.

**Population Center - a single or grouping of sites which contain yellowfin madtoms in such close proximity that the individual fish can be considered as belonging to a single breeding unit.

2. Through introductions and/or discoveries of new populations, there exists viable populations in two other rivers within the species historic range. These populations should be at least as large as the smallest population in the aforementioned rivers.

3. Noticeable improvements in coal-related problems and substrate quality have occurred in the Powell River.

4. The species and its habitat in all five rivers are protected from present and foreseeable human related and natural threats that may adversely affect essential habitat or the survival of any of the populations.

B. Recovery Outline

Prime Objective: Recover the species to the point it no longer requires Federal Endangered Species Act protection.

1. Preserve populations and currently occupied habitat of the yellowfin madtom.

1.1 Continue to utilize existing legislation and regulations (Federal and state endangered species laws, water quality requirements, stream alteration regulations, etc.) to protect the species and its habitat.

1.2 Conduct population and habitat surveys.

1.2.1 Determine species present distribution and status.

1.2.2 Characterize the habitat and ecological association and determine essential elements (biotic and abiotic factors) of the species' habitat for all life history stages on a need to know basis.

1.2.3 Determine the extent of the species' preferred habitat.

1.2.4 Present the above information in a manner which identifies specific areas in need of special attention.

1.3 Determine present and foreseeable threats to the yellowfin madtom and strive to minimize and/or eliminate the threats where necessary to meet the recovery objective.

1.3.1 Determine impacts of coal industry related pollution on the species in the Powell River.

1.3.2 Investigate and inventory other factors negatively impacting the species and its environment.

1.3.3 Solicit information on proposed and planned projects that may impact the species.

1.3.4 Evaluate the potential threat to the species of overcollecting.

1.3.5 Determine measures that are needed to minimize and/or eliminate any adverse impacts and implement where necessary to meet the criteria outlined in the recovery objectives.

1.4 Solicit help in protecting the species and its essential habitat.

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

1.4.2 Work with local, state, and Federal agencies to encourage them to utilize their authorities to protect the species and its river habitat.

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

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

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

2. Determine the feasibility of reestablishing the species in rivers within its historic range and introduce where feasible and necessary to meet recovery objectives.

2.1 Survey rivers within the species' historic range to determine the availability and location of suitable transplant sites. This can include areas for population expansion within rivers where the species presently exists.

2.2 Investigate and determine the best method of establishing new populations, i.e., introduction of adults, juveniles,

artificially raised individuals, or other means or combinations.

2.3 Reestablish species within historic range where it is likely it will become established and where needed to meet the recovery objectives.

2.4 Implement the same protective measures for these introduced populations as outlined for established populations in numbers 1.3 through 1.4 above.

3. Conduct, on a need to know basis, life history studies not covered under section 1.2.2 above, i.e., age and growth, reproductive biology, longevity, natural mortality factors, and population dynamics.

4. Investigate the necessity for habitat improvement and, if feasible and necessary to meet recovery, develop techniques and sites for habitat improvement and implement.

5. Develop and implement a program to monitor population levels and habitat conditions of presently established populations as well as introduced and expanding populations.

6. Annually assess overall success of recovery program and recommend action (changes in recovery objectives, delist, continued protection, implement new measures, other studies, etc.).

C. Narrative Outline

1. Preserve populations and currently occupied habitat of the yellowfin madtom. Introduction of the species back into its former range may be feasible; however, the protection of established populations and their essential habitat is the key to the survival of the species.

1.1 Continue to utilize existing legislation and regulations (Federal and state endangered species laws, water quality requirements, stream alteration regulations, etc.) to protect the species and its habitat. This species, although listed as Threatened, could easily become Endangered if the presently known populations are not maintained.

1.2 Conduct population and habitat surveys.

1.2.1 Determine species' present distribution and status. The entire present distribution of the species must be determined. The species may be present in other streams within the Tennessee River drainage--such as the Little River in Russell and Tazewell Counties, Virginia, Big Moccasin Creek in Scott County, Virginia, the Tennessee River tributaries in northwest Alabama, and the Duck River tributaries in Tennessee. Once distribution and status are known, the future emphasis of the

recovery plan can be charted. If other populations are found, protection of habitat may be the prime management tool. However, if no other populations are encountered, introductions will be necessary.

1.2.2 Characterize the habitat and ecological association and determine essential elements (biotic and abiotic factors) of the species' habitat for all life history stages on a need to know basis. Knowledge of the species habitat needs will enable the recovery effort to focus management and protection efforts on the habitat and ecological associations required for the survival of the species.

1.2.3 Determine the extent of the species' preferred habitat. As knowledge on the preferred habitat is gathered, this information should be utilized to delineate specific habitat areas within each stream that need special attention.

1.2.4 Present the above information in a manner which identifies specific areas in need of special attention. The use of maps delineating areas of special concern will allow planners to avoid sensitive areas.

1.3 Determine present and foreseeable threats to the yellowfin madtom and strive to minimize and/or eliminate the threats where necessary to meet the recovery objective. Each river system inhabited by the species will be subject to certain environmental influences which threaten the species and its habitat. To minimize and/or eliminate these threats where needed to meet recovery, the threats must be identified; they must be correlated with species specific habitat requirements gathered under 1.2.2; and measures must be taken to alleviate the problem areas.

1.3.1 Determine impacts of coal industry related pollution on the species in the Powell River. Coal related siltation is a major water and substrate quality problem in the Powell River. The extent of its impact on the species must be determined. It is likely that recovery of the species in the Powell is not possible without control of this problem.

1.3.2 Investigate and inventory other factors negatively impacting the species and its environment. Threats to the species in each river must be assessed. Some threats such as gravel dredging and point source pollutants will be fairly obvious to determine. However, other subtle factors such as

the impact of pesticides may need to be evaluated in some streams.

1.3.3 Solicit information on proposed and planned projects that may impact the species. If the species is to be delisted, the Service must be assured that there are no proposed and/or planned projects that could likely jeopardize the continued existence of the species. Once all negative factors are assessed, those that are seriously affecting the species will need to be minimized in order to effect recovery of the species.

1.3.4 Evaluate the potential threat to the species of overcollecting. If overcollecting is a threat, methods to control it should be implemented. However, such restrictions should not unduly interfere with legitimate and beneficial research by professional ichthyologists.

1.3.5 Determine measures that are needed to minimize and/or eliminate any adverse impacts and implement where necessary to meet the criteria outlined in the recovery objectives.

1.4 Solicit help in protecting the species and its essential habitat. Section 7 Consultation under the Endangered Species

Act and Fish and Wildlife Coordination activities can assist in protecting the species, but these programs alone cannot recover the species. The assistance of Federal and state agencies and 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 these river valleys who have an influence on habitat quality, the recovery effort will be doomed.

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

1.4.2 Work with local, state, and Federal agencies to encourage them to utilize their authorities to protect the species and its river habitat.

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

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

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

2. Determine the feasibility of reestablishing the species back into rivers within its historic range and introduce where feasible and necessary to meet recovery objectives. Introductions may be necessary in order to increase the number of these populations of madtoms and thus increase the security of the species. In some cases, introductions will involve other streams outside its present range. However, introductions may also be useful to accelerate the expansion of a species within a stream such as the Powell River.

2.1 Survey rivers within the species' historic range to determine the availability and location of suitable transplant sites. This can include areas for population expansion within rivers where the species presently exists. The first step in the reintroduction of the species will be to locate suitable

habitat for transplants. The information collected under Section 1.2 will be essential in locating these sites.

2.2 Investigate and determine the best method of establishing new populations, i.e., introduction of adults, juveniles, artificially raised individuals, or other means or combinations. Sufficient stock may not be available in the streams presently inhabited by the species to allow for enough madtoms to be taken from these rivers to meet the needs for successful introductions. It may be necessary to artificially rear the yellowfin madtoms in a hatchery situation and use these individuals for stocking new rivers.

2.3 Reintroduce species within historic range where it is likely it will become established and where needed to meet the recovery objectives. If habitat is available, introductions are likely to succeed, and introductions are needed to meet the recovery objectives, the introduction of the species into other rivers within its historic range should proceed.

2.4 Implement the same protective measures for these introduced populations as outlined for established populations in numbers 1.3 through 1.4 above.

3. Conduct life history studies not covered under section 1.2.2 above, i.e., age and growth, reproductive biology, longevity, natural mortality factors, and population dynamics. Much of the

information needed to manage the species will be available after completion of the tasks outlined in 1.2.2. However studies involving the fish's life history will likely be required to fully understand the response of the species to protective measures.

4. Investigate the necessity for habitat improvement and, if feasible and necessary to meet recovery, develop techniques and sites for habitat improvement and implement. Specific components of the madtom's habitat such as spawning substrate may be missing and these may be limiting the potential expansion of the species. Habitat improvement programs and activities may be helpful in alleviating these limiting factors.

5. Develop and implement a program to monitor population levels and habitat conditions of presently established populations as well as introduced and expanding populations. Once recovery actions are implemented, the response of the species and its habitat must be monitored to assess any progress towards recovery. This will likely require an annual census schedule.

6. Annually assess overall success of recovery program and recommend action (Changes in recovery objectives delist, continued protection, 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.

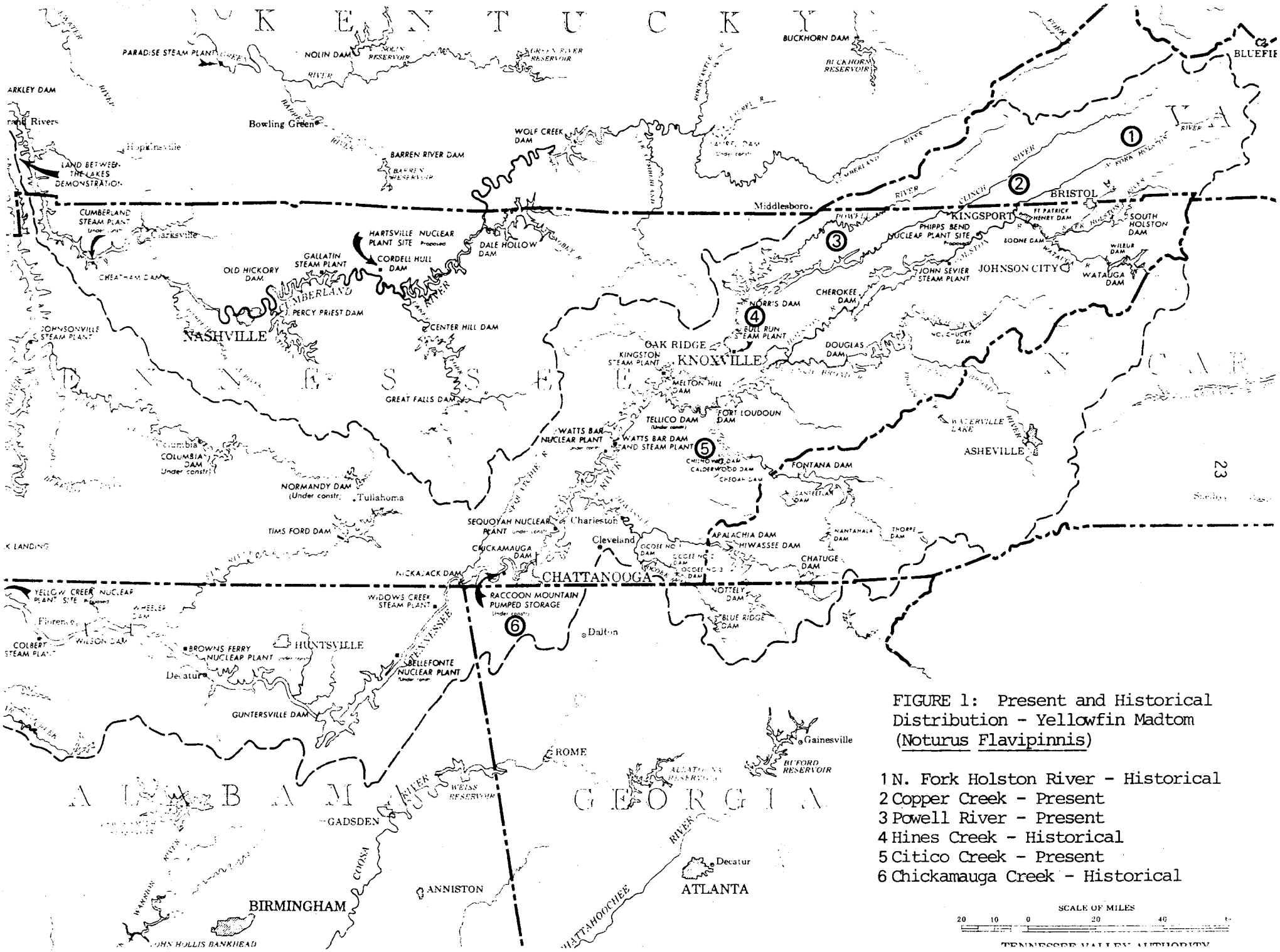
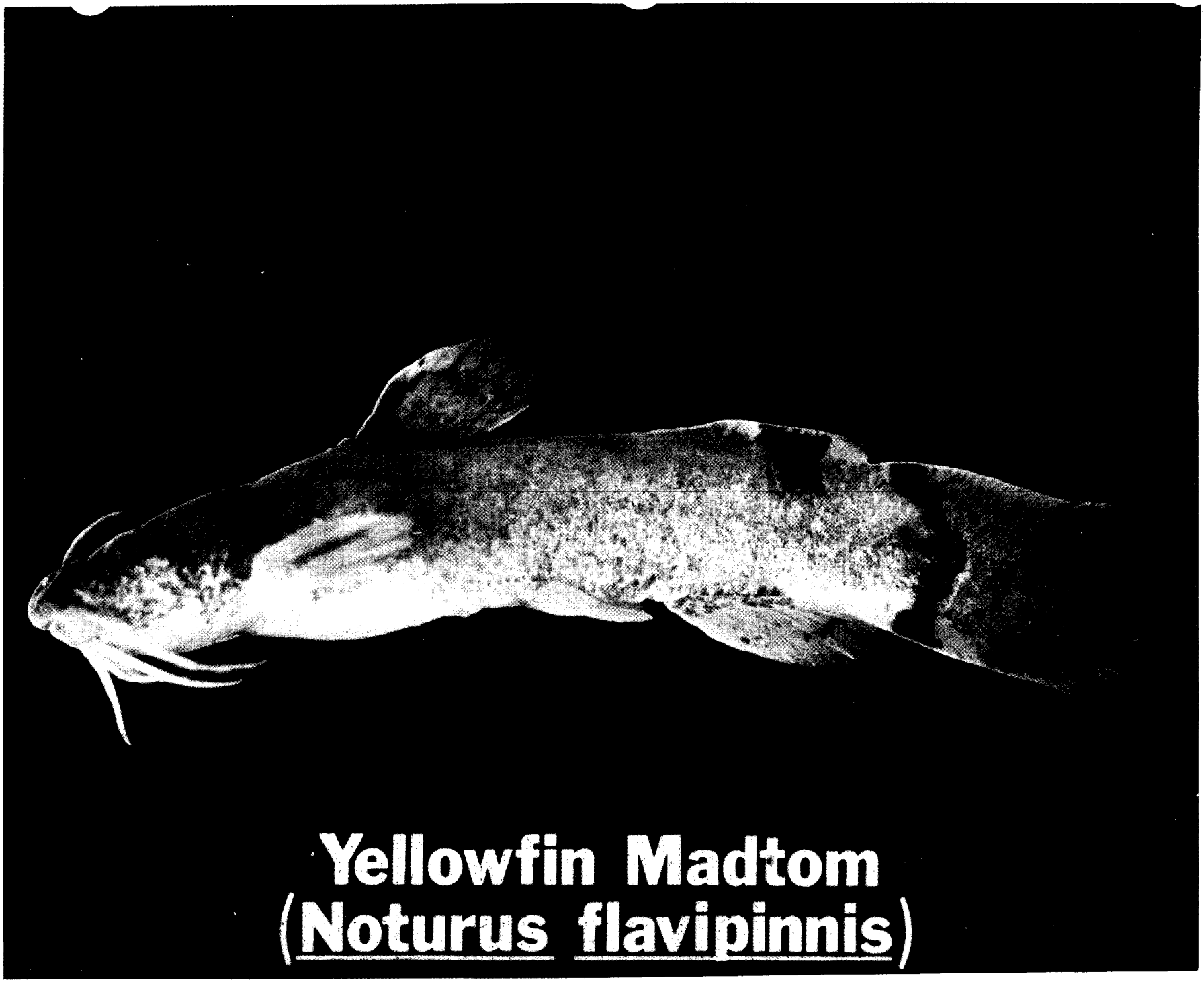


FIGURE 1: Present and Historical Distribution - Yellowfin Madtom (Noturus Flavipinnis)

1 N. Fork Holston River - Historical
2 Copper Creek - Present
3 Powell River - Present
4 Hines Creek - Historical
5 Citico Creek - Present
6 Chickamauga Creek - Historical

TENNESSEE VALLEY AUTHORITY



Yellowfin Madtom
(Noturus flavipinnis)

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PART III

IMPLEMENTATION SCHEDULE

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

Priority 1 - Those actions absolutely necessary to prevent extinction of the species.

Priority 2 - Those actions necessary to maintain the species' current status.

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

Part III Implementation Schedule

Yellowfin Madtom

1* General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency			Estimated Fiscal Year Costs			3* Comments/Notes
					FWS Region	FWS Program	Other 2*	FY 1	FY 2	FY 3	
01-04	Continue to utilize existing legislation and regulations to protect species and habitat	1.1	2	continuous	4&5	SE&ES	Tennessee Valley Authority (TVA) Tn. Wildlife Resources Agcy. (TWRA) Va. Comm. of Game & Inland Fisheries (VCGIF) Tennessee Heritage Program (THP) US Forest Service (USFS)	1,000	1,000	1,000	*1. See attachment: 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.
I1,I2	Determine species present distribution and status	1.2.1	3	1 yr.	4&5	SE	TWRA,VCGIF & TVA	6,000	---	---	*3. Note: ALL ESTIMATES ARE FOR FWS FUNDS ONLY
R3,R8, R9,R10 R11	Characterize habitat and determine essential elements	1.2.2	3	2 yr	4&5	SE	TWRA,VCGIF & TVA	---	5,000	---	
R3,02, M3	Determine the extent of preferred habitat and present information in a manner which identifies areas in need of species attention	1.2.3 & 1.2.4	3	1 yr	4&5	SE	TWRA,VCGIF & TVA	---	---	2,000	
I12,I14	Determine present and foreseeable threats to species	1.3.1 1.3.2 1.3.3 & 1.3.4	3		4&5	SE&ES	TWRA,VCGIF TVA & THP	6,000	---	---	
M3,M7	Determine measures needed to minimize threats and implement where needed to meet recovery	1.3.5	3	Unknown	4&5	SE	TWRA,VCGIF TVA,THP,USFS & Tenn.& Va Nature Conservancy (TNC)	---	Unknown	---	

Part III Implementation Schedule

Yellowfin Madtom

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency			Estimated Fiscal Year Costs			Comments/Notes
					FWS Region	FWS Program	Other	FY 1	FY 2	FY 3	
01,04	Solicit help in protecting species and essential habitat	1.4.1 1.4.2 1.4.3 1.4.4	3	continued	4&5	SE	TWRA,VCGIF TVA,THP & TNC,	2,000	2,000	2,000	
01	Develop and utilize information and education programs (slide/tape shows, brochures, etc) for local distribution	1.4.5	3	1 yr for devel. continued implementation	4&5	SE	TWRA,VCGIF TVA,THP & TNC	5,000	1,000	1,000	
I13	Survey rivers within species' historic range to determine availability of suitable transplant sites	2.1	3	1 yr.	4&5	SE	TWRA,VCGIF TVA,THP,TNC USFS, Nat'l Park Ser. (NPS)	---	5,000	---	
R13, R7	Determine best method of establishing new populations	2.2	3	2 yr.	4&5	SE	TWRA,VCGIF TVA,THP, USFS & NPS	---	---	2,000	Task 2.1 - 2.3 may not be required if other populations are found in task 1.2.1
M2	Reestablish populations within historic range as needed to meet recovery	2.3	3	Unknown	4&5	SE	TWRA,VCGIF TVA,USFS & NPS	---	---	---	
I12,I14 M3,M7	Implement same protective measures for these re-established populations as for known populations	2.4	3	Continuous	4&5	SE,ES	TWRA,VCGIF TVA,THP, USFS & NPS	---	---	---	
R8-R11	Conduct life history studies on a need-to know basis	3.	3	Unknown	4&5	SE	TWRA,VCGIF & TVA	---	Unknown	---	These studies will be developed and carried out where there is a specific need for data necessary to reach recovery

Yellowfin madtom

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	
M3	Investigate the need for habitat improvement and implementation only where needed to meet recovery objective	4.	3	Unknown	4&5	SE	TWRA,VCG & TVA	F ---	Unknown	---	
I1,I2	Develop and implement a monitoring program	5.	3	Unknown	4&5	SE	TWRA,VCG & TVA	F ---	---	5,000	
04	Annual assessment of recovery program and modify where needed	6.	3	Continued	4&5	SE	TWRA,VCG TVA,THP & TNC	F 500	500	500	

GENERAL CATEGORIES FOR IMPLEMENTATION SCHEDULES *

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

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

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

* (Column 1) - Primarily for use by the U.S. Fish and Wildlife Service.

APPENDIX

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