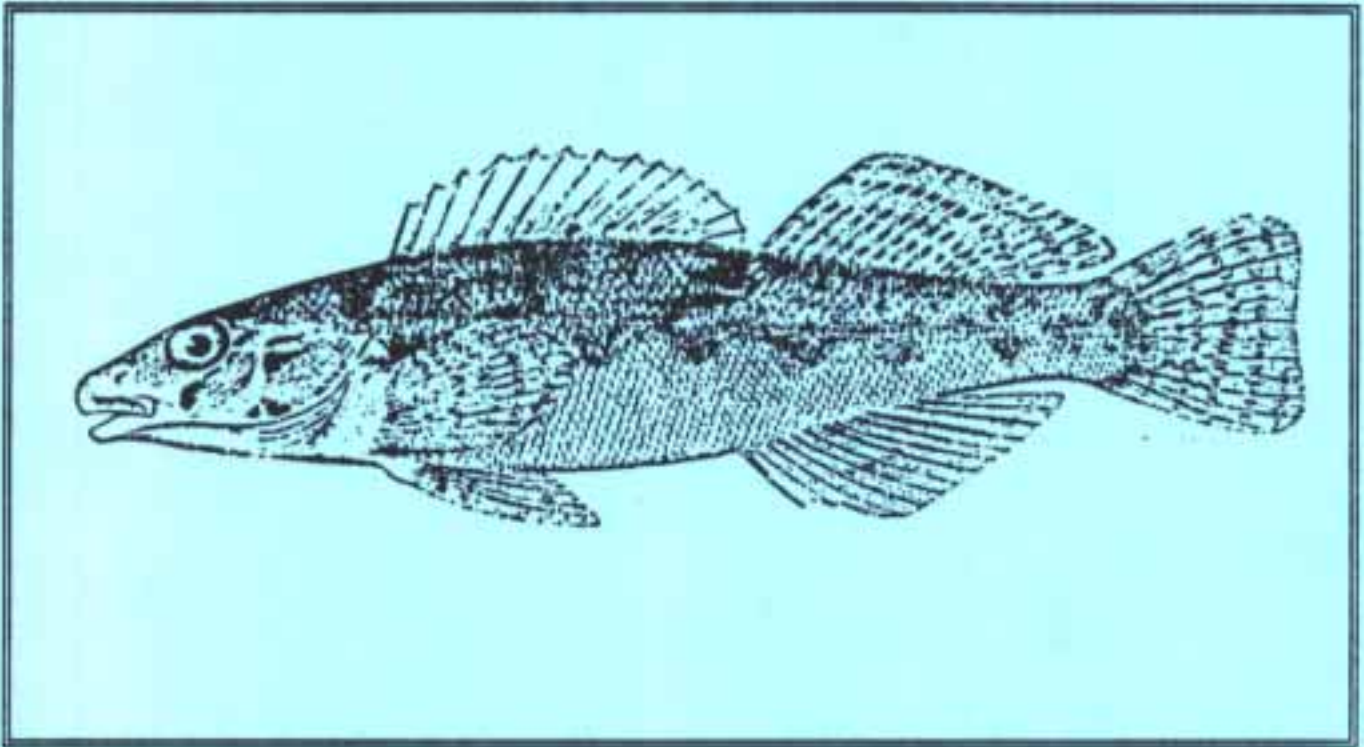


Roanoke Logperch

(Percina rex)

Recovery Plan



Region Five, U.S. Fish and Wildlife Service



Roanoke Logperch (*Percina rex*)

RECOVERY PLAN

Prepared by


G. Andrew Moser
Annapolis Field Office
U.S. Fish and Wildlife Service
Annapolis, Maryland

for

Region Five
U.S. Fish and Wildlife Service
Newton Corner, Massachusetts

Approved:

ACTING


Regional Director, Region Five
U.S. Fish and Wildlife Service

Date:

MAR 20 1992

EXECUTIVE SUMMARY OF THE ROANOKE LOGPERCH RECOVERY PLAN

Current Status: Endemic to Virginia, this endangered fish now occurs in four populations located in widely separated segments of the upper Roanoke River, Pigg River, Nottoway River, and Smith River. Each population is vulnerable because of its relatively low density and limited range. No genetic exchange occurs between these populations.

Habitat Requirements and Limiting Factors: The Roanoke logperch occupies medium to large warm-water streams and rivers of moderate gradient and relatively unsilted substrates. During different phases of life history and season, every major riverine habitat is exploited by the logperch. Except in winter, all age classes are intolerant of moderately to heavily silted substrates. Major causes of decline include excessive stream sedimentation, construction of impoundments, and associated cold-water discharges.

Recovery Objectives: Objective 1: Downlist to Threatened. With a concerted effort, a minimum of 15 years will be required to achieve this objective. Objective 2: Delist. Complete recovery will be difficult at best. The probability of complete recovery cannot be realistically gauged until Objective 1 is achieved.

Criteria for Downlisting:

1. All four populations of the Roanoke logperch are stable or expanding and are protected from foreseeable threats.
2. The logperch population and/or range has been increased in the upper Roanoke drainage and in at least two of the other three drainages supporting the species.

Actions Needed:

1. Use existing legislation to protect the species.
2. Develop educational programs and inform the public about the Roanoke logperch.
3. Search for additional populations as well as habitats for reintroduction.
4. Determine feasibility of re-establishing logperch and reintroduce the species where feasible.
5. Characterize the species' habitat requirements and population viability; monitor threats.
6. Implement measures to reduce stream sedimentation and other threats.
7. Monitor population levels and habitat conditions.

Estimated Costs (\$1000's) for the First Ten Years of Recovery:

<u>Year</u>	<u>Need 1</u>	<u>Need 2</u>	<u>Need 3</u>	<u>Need 4</u>	<u>Need 5</u>	<u>Need 6</u>	<u>Need 7</u>	<u>Total</u>
FY1	1.0	1.0	10.0	0	20.0	25.0	0	57.0
FY2	1.0	11.0	10.0	0	70.0	25.0	30.0	147.0
FY3	1.0	2.0	0	5.0	70.0	25.0	0	103.0
FY4	1.0	1.0	0	5.0	26.0	20.0*	0	53.0
FY5	1.0	1.0	0	5.0	1.0	20.0*	30.0	58.0
FY6	1.0	1.0	0	*	1.0	20.0*	0	23.0
FY7	1.0	1.0	0	*	1.0	20.0*	0	23.0
FY8	1.0	1.0	0	*	1.0	20.0*	30.0	53.0
FY9	1.0	1.0	0	*	1.0	20.0*	0	23.0
FY10	1.0	1.0	0	*	1.0	20.0*	0	23.0
Total	10.0	21.0	20.0	15.0*	192.0	215.0*	90.0	563.0*

* Total costs for reintroduction of the logperch (Need 4) and to implement habitat improvement measures (Need 6) will be known only after 3-4 years of research.

Date of Recovery: Downlisting will be considered in the year 2007 if habitat improvement measures have been implemented and recovery criteria have been met. Until Objective 1 is met, the probability of and a time frame for complete recovery cannot be projected.

* * *

Recovery plans delineate reasonable actions needed to recover and/or protect listed species. Attainment of recovery objectives and availability of funds are subject to budgetary and other constraints affecting the parties involved, as well as the need to address other priorities.

Recovery plans do not necessarily represent the views or official position of any individuals or agencies involved in plan formulation, other than the U.S. Fish and Wildlife Service. Approved recovery plans may be modified as dictated by new findings, changes in species status, and the completion of recovery tasks.

Literature citations should read as follows:

U.S. Fish and Wildlife Service. 1992. Roanoke Logperch (*Percina rex*) Recovery Plan. Newton Corner, Massachusetts. 34 pp.

Copies of this plan can be purchased from:

Fish and Wildlife Reference Service
5430 Grosvenor Lane, Suite 110
Bethesda, Maryland 20814
301-492-6403
or
1-800-582-3421

Fees vary according to number of pages.

ACKNOWLEDGEMENTS

Much of the material contained in Part I has been taken from the work of Noel Burkhead, Robert Jenkins, Richard Neves, and Timothy Simonson. Other persons who contributed data or provided valuable comments during review of the plan include: Paul Angermeier and William Ensign of Virginia Polytechnic Institute and State University; Bill Kittrell of The Nature Conservancy; and Sue Bruenderman, Mike Duval, A.L. LaRoche, III, and Scott Smith of the Virginia Department of Game and Inland Fisheries.

TABLE OF CONTENTS

PART I: INTRODUCTION	1
Description, Ecology, and Life History	1
Distribution	3
Decline and Threats	7
PART II: RECOVERY	12
Recovery Goal	12
Recovery Objectives	12
Recovery Tasks	13
Literature Cited	20
PART III: IMPLEMENTATION	22
Appendix: List of Reviewers	

FIGURES AND TABLES

Figure 1. Map of current distribution of the Roanoke logperch	4
Table 1. Distribution of the Roanoke logperch in Virginia	6
Table 2. A partial list of toxic chemical spills and fish kills occurring on the Roanoke River and its tributaries since October 1970	9

PART I: INTRODUCTION

The Roanoke logperch (*Percina rex*) was listed as an endangered species on August 18, 1989 (54 FR 34464). Endemic to Virginia, this fish now occurs in four populations located in widely separated segments of the upper Roanoke River, the Pigg River, the Nottoway River, and the Smith River. Each population is vulnerable because of its relatively low density and limited range. The largest and most vigorous population, in the upper Roanoke River, is subject to the most serious threats: urbanization, industrial development, water supply and flood control projects, and agricultural runoff in the upper basin. The other three populations are subject to siltation from agricultural activities and to potential chemical spills. The Smith River population is particularly vulnerable because of its small size.

DESCRIPTION, ECOLOGY, AND LIFE HISTORY

The Roanoke logperch was first collected in the Roanoke River near Roanoke, Virginia, in 1888 and described by Jordan (1889) as *Etheostoma rex*.

It is now placed in the genus *Percina* (subgenus *Percina*), which contains all logperches, and is most closely related to the blotchside logperch, *P. burtoni*, and the Ohio logperch, *P. caprodes* (Simonson and Neves 1986).

Percina rex attains a length of 14 centimeters (5.5 inches), and is characterized by an elongate, cylindrical to slab-sided body, a conical snout, and complete lateral line. The back is dark green, sides are greenish to yellowish, and belly is white to yellowish. The upper sides and back have dark scrawlings and numerous small saddles. Bar markings on the side are prominent, usually separated from the

dorsal markings, and typically ovoid in shape. The subocular bar and caudal spot are also well developed. The first dorsal fin has a narrow black margin, a broad yellowish to red-orange band, and a broad black base. Second dorsal, caudal, and pectoral fins have black spots (tesselated) with a yellowish wash. Pelvic and anal fins are typically pale. A more complete description of this species is provided by Jordan (1889) and Burkhead and Jenkins (1991).

The Roanoke logperch occupies medium to large warm-water streams and rivers of moderate gradient with relatively unsilted substrata. Habitat use by the species varies with age, spawning condition, and seasonal temperature (Burkhead 1983). During different phases of life history and season, every major riverine habitat is exploited by the logperch. Males are associated with shallow riffles during the reproductive period, whereas females are common in deep runs over gravel and small cobble, which are the observed spawning areas. Young and juveniles usually occupy slow runs and pools with clean sand bottoms. Winter habitat (water temperature $< 8^{\circ} \text{C}$) of all individuals is assumed to be under boulders in deep pools. Except in winter, all age classes are intolerant of moderately to heavily silted substrata (Burkhead 1983). Some quantitative measures of the Roanoke logperch's habitat preferences are provided by Angermeier and Ensign (1991).

The species commonly lives 5-6 years with a maximum known age of about 6.5 years (Burkhead and Jenkins 1991). Males mature in two years; most females mature in three years (Burkhead and Jenkins 1991). Spawning occurs in April or May at $12-14^{\circ} \text{C}$ (based on ovarian development). The spawning behavior of *P. rex*, noted by Burkhead (1983), is similar to that of *P. caprodes* (Winn 1958). All *Percina* species typically bury their eggs, with no subsequent parental care (Page and Swofford 1984).

Feeding habits of *P. rex* were examined by Burkhead (1983) for 56 specimens from the upper Roanoke River. Young Roanoke logperch fed primarily on chironomid

larvae (62% of total diet), while adults consumed mainly caddisfly larvae of the *Hydropsychidae* (37.1%) and chironomids (25.5%). The Roanoke logperch is considered a diurnal, visual predator. The feeding behavior of *P. rex*, noted by Burkhead (1983), consisted of flipping over stones with its snout and ingesting the exposed prey. This strategy, along with stomach content analysis, suggests that *P. rex* does not actively select certain taxa but consumes most food items encountered.

DISTRIBUTION

The Roanoke logperch is endemic to two river systems in Virginia -- the Roanoke River drainage (including the Pigg and Smith rivers) and the Nottoway River drainage (Figure 1). Its range extends from the Ridge and Valley province through the Blue Ridge to the lower Piedmont. The four disjunct populations now known probably represent remnants of much larger populations that once occupied much of the Roanoke River and Nottoway River drainages upstream of the fall line.

Information on the presently known distribution, taken largely from Simonson and Neves (1986), is described below by river system.

Upper Roanoke River System, Roanoke and Montgomery Counties, VA: The distribution in the upper Roanoke system extends roughly from Niagara dam (on the Roanoke River proper, in Roanoke, VA) upstream into the North Fork Roanoke River (to stream kilometer [SK] 25.1) and into the South Fork Roanoke River (to SK 24.1).

Recently, the known distribution of the Roanoke logperch was extended approximately 3 km by the collection of three specimens approximately 1/2 km below Niagara Dam on the mainstem Roanoke River (A.L. LaRoche *in litt.*).

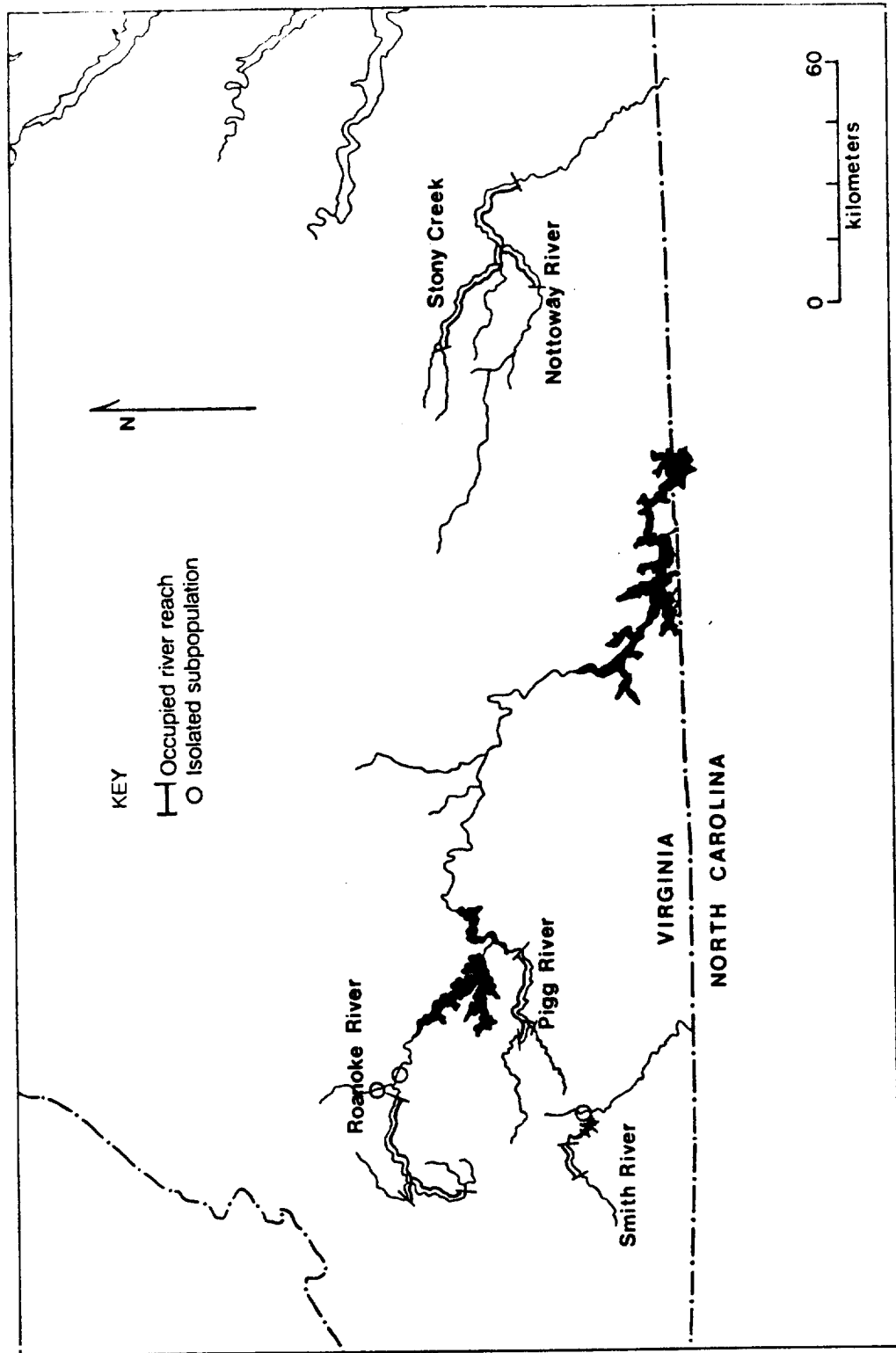


Figure 1. Current distribution of the Roanoke logperch
 Modified from Simonson and Neves (1986)

One adult *P. rex* was captured farther downstream in Beaverdam Creek Cove, Smith Mountain Reservoir, in 1981, but this unusual record is thought to have been an upstream expatriate (Burkhead 1983). The Roanoke logperch was also taken in Tinker Creek, 3.2 SK above its confluence with the Roanoke River, in August 1986. Total range of the species in the Roanoke River system is approximately 87 SK.

Pigg River System (Roanoke River drainage), Franklin and Pittsylvania Counties, VA: The geographic extremes reported by Simonson and Neves (1986) for the Pigg River are from the vicinity of Glade Hill downstream nearly to the backwaters of Leesville Reservoir. Their report indicates that no specimens of *P. rex* were found near the previously reported upstream limit (State Route 220 bridge in Rocky Mount). The logperch has also been captured in Big Chestnut Creek, 3.2 SK above its confluence with the Pigg River. Two Roanoke logperch were collected from Leesville Reservoir (mainstem impoundment of the Roanoke River) during sampling on August 24, 1989 (A. L. LaRoche *in litt.*). These specimens appear to be upstream expatriates from the Pigg River, since no other specimens have been collected from the reservoir, despite rather intensive sampling there. Total range of the logperch in the Pigg River system encompasses approximately 52.2 SK.

Smith River System (Roanoke River drainage), Patrick and Henry Counties, VA: In Patrick County, the Roanoke logperch is known from a short reach of the Smith River (and its tributary, Rock Castle Creek) upstream of Philpott Reservoir. The upstream limit of this reach is located approximately 2.5 air kilometers southeast of Woolwine (A.L. LaRoche, VDGIF, pers. comm.). A single specimen was taken from Town Creek in Henry County in 1986.

Nottoway River System (Chowan River drainage), Dinwiddie, Sussex, and Greenville Counties, VA: The Roanoke logperch occurs in a 52-kilometer reach of the mainstem Nottoway in Sussex and Greenville counties; in Stony Creek, a tributary of the Nottoway in Dinwiddie and Sussex counties; and in Butterwood

Creek, a tributary to Stony Creek. It was historically reported from another Stony Creek tributary, Sappony Creek (Jenkins 1977), but was not found there during more recent surveys (Simonson and Neves 1986).

The known geographic extremes of present distribution in the mainstem Nottoway River are from State Route 619 bridge, Sussex County, downstream to just above the State Route 40 bridge east of Sussex, VA (a distance of 52 SK). The known geographic extremes in Stony Creek are from its headwaters (i.e., Butterwood Creek) downstream roughly to its confluence with the Nottoway River. The upstream record was reported by Simonson and Neves (1986); the downstream record was a specimen taken in 1988 above the Route 301 bridge in the Town of Stony Creek (R. Southwick, VDGIF, pers. comm. 1990).

Table 1 summarizes the stream lengths occupied by the Roanoke logperch in each of the four river systems; however, because of variations in population size and densities, these stream lengths may not be indicative of the relative importance of each of the systems to the logperch.

Table 1. Distribution of the Roanoke logperch in Virginia, as reported by Simonson and Neves (1986).

Stream System	Stream Kilometers Occupied
Roanoke River	84.1
Pigg River	52.2
Nottoway River	94.9
Smith River	<u>4.0</u>
Total	235.2

* The logperch is now known from an additional 6.6 km of the Smith River and an additional 3.0 km of the Roanoke River.

Data collected by Simonson and Neves (1986) indicate that the largest population of *P. rex* inhabits the upper Roanoke River. The Pigg River system is rather sparsely inhabited by the logperch, while the Nottoway River has an even lower population density of the species. The Smith River logperch population appears to be very small.

DECLINE AND THREATS

Factors that have adversely affected the Roanoke logperch in various locations include: turbidity and siltation, chemical spills and organic pollution, channelization, impoundments, and cold-water releases. Known causes of decline as well as actual and potential threats are discussed below by river system.

Upper Roanoke River: The best known and largest population, which inhabits the upper Roanoke from the City of Roanoke upstream into the North and South Forks, has been subjected to considerable stress from human uses in the basin -- progressively more so in the downstream direction. The human population of the Greater Roanoke area (Roanoke, Salem, Vinton, and adjacent areas) is continuing to expand, stimulating additional development of the Roanoke Valley. The rest of the upper Roanoke basin is largely rural, with considerable crop and livestock farming. The valley is also a major thoroughfare, traversed by Interstate 81 and Routes 11, 220, and 460, and by the Norfolk and Western Railroad (Jenkins 1977).

The water quality in the upper Roanoke River, from Salem downstream, has improved since 1970 as a result of installation of the Roanoke sewage treatment plant and reduction of wastes from other point sources. Non-point sources of pollution remain a problem. Large quantities of stormwater drain from streets and lawns, carrying nutrients, oil, metals, and other pollutants into the river.

Relatively frequent spills of toxic chemicals have occurred in the Roanoke river in Salem and Roanoke. Additional information on the location, nature, and impact of some of these spills is contained in Table 2. One of the most destructive spills resulted from the accidental discharge of more than 100,000 gallons of liquid manure (from a dairy farm storage tank) into a tributary of the South Fork of the Roanoke River. It is estimated that this spill killed 190,000 fish, including 300 Roanoke logperch. The numerous liquid manure storage facilities in the upper Roanoke drainage and other drainages supporting the Roanoke logperch represent a potential threat to the species.

The morphology and hydraulics of the upper Roanoke River have been modified in numerous locations as a result of channelization or levee construction. In Roanoke and Salem, significant portions of the Roanoke River floodplain have been filled to support industrial parks and residential areas. Local farmers have also channelized small portions of the South Fork Roanoke River (Jenkins 1977).

The upper Roanoke River population of the logperch will also be affected by a pending Roanoke County water supply project and a U.S. Army Corps of Engineers flood control project. The latter project, which has been the subject of a formal consultation between the Corps and the Service, will affect the logperch population within the boundaries of Roanoke City. A study has been initiated by the Corps to monitor impacts on the logperch resulting from project construction.

The water quality of the North Fork of the Roanoke River is significantly degraded by silt washed from agricultural lands in the watershed. It is probable that the absence of the logperch from the upper and middle portions of the North Fork Roanoke is the result of historical habitat degradation (W.E. Ensign pers. comm.), and the results of the most recent comprehensive survey indicate that the species is continuing to decline in the North Fork Roanoke (Simonson and Neves 1986).

Table 2. A partial list of toxic chemical spills and fish kills occurring on the Roanoke River and its tributaries since October 1970. Principal Source: Burkhead (1983).

Locality	Date	Pollutant	Reported affected stream length, km (estimated)	Fish Kill	Source
Roanoke River, Salem	October 1970	ethyl benzene-creosote	11.3	yes	Cairns et al. 1971
Carvin and Tinker Creeks, Roanoke County	April 1973	unidentified	?	yes	RTWN 4/73
Tinker Creek, Roanoke	September 1973	gasoline	?	no	RTWN 9/6/73
Roanoke River, Salem	June 1975	unidentified	12.1	yes	Ayers 1975
Roanoke River, Roanoke	July 1975	toluene	?	yes	RTWN 7/30/75
Roanoke River, Salem and Roanoke	June 1976	sodium cyanide	12.1	yes	RTWN 6/3/76
Roanoke River, Roanoke County	October 1980	diesel fuel	?	no	RTWN 12/29/80
Roanoke River, Roanoke	February 1981	fuel oil	?	no	RTWN 2/6/81
Roanoke River, Roanoke	October 1982	fuel oil	8.0	no	RTWN 10/30/82
Roanoke River, Roanoke	November 1982	fuel oil	?	no	RTWN 11/16/82
Elliott Creek and South Fork Roanoke River, Montgomery County	September 1991	liquid manure	24	yes	VWCB 10/10/91

RTWN = Roanoke Times and World-News
 VWCB = Virginia Water Control Board

Pigg River: A 1975 discharge of copper sulfate and silver nitrate into a tributary (Furnace Creek) of the Pigg River caused a severe fish kill for about 37 kilometers (23 miles) downstream (James 1979), likely reducing or eliminating the logperch population in the Pigg River near Rocky Mount, Virginia. In addition, much of the Pigg River contains moderate to heavy silt deposits.

Middle Roanoke River: Prior to pollution from the greater Roanoke area, the mid-reach of the Roanoke probably had a logperch population that was contiguous with the upper Roanoke population (Jenkins 1977). Any population supported by this reach of the Roanoke would have been further reduced by the Smith Mountain/Leesville Reservoirs, a 92-kilometer (57-mile) long pumped storage project completed in 1966 on Roanoke River. Although the reservoirs hold back much of the fine sediment from the upper Roanoke, the river below is fluctuating and often carries considerable silt from Piedmont tributaries below Leesville Dam. Taken together, these modifications appear to have eliminated any habitat suitable for the logperch.

Smith River System: The historical status of the Town Creek population is unknown. It probably extended into the Smith River prior to completion in 1953 of Philpott Dam on the Smith River, three miles above the mouth of Town Creek (Jenkins 1977). Smith River now contains an excellent trout fishery, but is too cold for a population of *P. rex*. Town Creek is a warm, slightly to moderately silted stream in an agricultural valley, with one industry located in its middle section, in the town of Henry, above the *P. rex* population. The industry is not known to have caused a stream pollution problem (Jenkins 1977). Upper Smith River, above the 15-mile long Philpott Reservoir, contains a small, isolated population of *P. rex*. Burkhead and Jenkins (1991) indicate that the upper Smith River population may be held at a low level by heavy metal and chlorinated effluents from an upstream fabric plant. This population was probably contiguous with the Town Creek

population prior to construction of Philpott Dam. The ecological and geographical isolation of these two small populations may threaten their long-term viability.

Nottoway River: Excessive siltation, generated by poor agricultural and logging practices, is a problem in this watershed. Because soils in this drainage are extremely erodible, excessive stream sedimentation has been a chronic problem (A.L. LaRoche *in litt.*). As indicated by discussions throughout this section, siltation may be the most widespread threat to the logperch. Excessive silt deposition reduces habitat heterogeneity and primary productivity; increases egg and larval mortality; abrades organisms; and alters, degrades, and entombs macrobenthic communities (Burkhead and Jenkins 1991).

PART II: RECOVERY

RECOVERY GOAL

The goal of this recovery plan is to maintain or restore viable populations of *Percina rex* in a significant portion of its historical range, thereby allowing removal of the species from the Federal List of Endangered and Threatened Wildlife and Plants. This can be accomplished by (1) protecting and enhancing habitat containing *Percina rex* populations, and (2) expanding populations within river corridors that either now support this species or supported it historically.

RECOVERY OBJECTIVES

Objective 1. Reclassify the Roanoke logperch from endangered to threatened status when the likelihood of extinction in the foreseeable future has been eliminated by meeting the following criteria:

- A. Populations of *Percina rex* are shown to be stable or expanding and reproducing (as evidenced by sustained recruitment) in each of the following river systems: upper Roanoke River, Pigg River, Smith River, and Nottoway River. Achievement of this criterion will be determined by population monitoring over at least a ten-year period.
- B. Each of the known populations is protected from present and foreseeable threats that may interfere with the species' survival.

Objective 2. Remove *Percina rex* from the Federal list of endangered and threatened species when the following criterion has been met in addition to A and B above:

- C. Habitat improvement measures have been developed and successfully implemented, as evidenced by a sustained increase in logperch population size and/or length of river reach inhabited within the upper Roanoke River drainage and a similar increase in at least two of the other three *P. rex* populations (Pigg River, Smith River, or Nottoway River).

RECOVERY TASKS

- 1. Preserve present populations and presently used habitats.
 - 1.1 Continue to utilize existing legislation and regulations to protect the fish and its habitat. Protection of the Roanoke logperch and its habitat will require the full enforcement of existing laws and regulations (Federal and State Endangered Species Acts, Federal and State water quality regulations, stream alteration regulations, sediment and erosion control regulations, Federal Energy Regulatory Commission licensing, etc.). The U.S. Fish and Wildlife Service, the Virginia Department of Game and Inland Fisheries, and the Virginia Division of Natural Heritage have recommended that the Virginia Water Control Board use its regulations to designate specific river reaches for the protection of the logperch. NPDES permits for discharges within or upstream of river reaches occupied by Roanoke logperch should be conditioned to maintain or improve water quality for this species. Because non-point sources of pollution and siltation are among the most significant threats to the logperch, more stringent

enforcement of regulations controlling these sources (such as Section 208 of the Clean Water Act) is vital to the recovery of the logperch.

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

Section 7 consultation under the Endangered Species Act as well as Fish and Wildlife Coordination Act activities can assist in protection of the species, but these programs alone cannot recover the Roanoke logperch. It is essential to obtain further assistance from Federal and State agencies, conservation groups, and local governments. The assistance of the Soil Conservation Service, Virginia Department of Soil and Water Conservation, Virginia Department of Forestry, The Nature Conservancy, and local sediment and erosion control inspectors is especially important. In addition, the support of the local industrial and business community as well as from private citizens will be solicited to meet the goal of recovering the species.

1.21 Meet with local representatives to inform them about recovery efforts and request their support. The assistance of local government officials, regional planners, local business interests, and landowners may play a critical role in areas such as land-use planning and maintenance of water quality. Efforts should be made to work with County governments to establish strict erosion control ordinances in watersheds supporting the Roanoke logperch.

1.22 Develop educational materials and programs. Items such as slide/tape shows and brochures will be developed and presented to schools, business groups, civic groups, youth groups, church organizations, etc., located within watersheds supporting the Roanoke logperch. Educational materials

outlining the recovery goals, with emphasis on the various benefits of maintaining and upgrading habitat quality, will be extremely useful in eliciting public support.

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

Distributional studies of this species have been completed (Simonson and Neves 1986). Most of the likely habitats have been surveyed; however, it is possible that some small populations were missed. For instance, two sections of the Roanoke River where additional sampling should be conducted are the mainstem below Niagara Dam (just downstream of Roanoke) and the mainstem below Leesville Dam. Sampling should also be conducted in some of the larger tributaries of the Roanoke, Pigg, Smith and Nottoway Rivers, which have been inadequately sampled in the past. Further study may reveal additional populations or identify habitats suitable for enhancement or reintroduction.

3. Determine the feasibility of reestablishing the logperch in historical habitat and reintroduce where feasible.

Based on results of Task 2, it will be determined if any habitats exist within the species' probable historical range that are potentially suitable for reintroduction of the Roanoke logperch. The upper North Fork of the Roanoke River is one area that should be carefully examined with this in mind. If stream reaches are available which can again be made suitable for the logperch, populations should be reintroduced.

3.1 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 logperches to be taken from these rivers to meet the needs for successful introductions. It may be necessary to artificially rear the Roanoke logperch in a hatchery situation and use these individuals for stocking new rivers.

3.2 Reintroduce the species within its historical range where establishment is feasible and where needed to meet the recovery objectives.

If habitat is available, introductions are likely to succeed, and, where needed to meet recovery objectives, introduction of the species into rivers or river segments within its historical range should proceed.

3.3 Implement the same protective measures for these introduced populations as outlined for established populations in Tasks 1.2 and 5.

4. Conduct studies necessary for the species' management and recovery.

4.1 Characterize the species' habitat requirements for all life history stages. Knowledge of the logperch's habitat requirements (relevant physical, biological, and chemical components) and ecological associations is needed to focus management and recovery efforts on specific problems facing the species. Much relevant information was gathered by Burkhead (1983). Additional research is needed to define the winter habitat requirements of the species. Studies, using the Service's Instream Flow Incremental Methodology, are needed to characterize instream flow requirements (for all life history stages) of this species and/or surrogate species.

4.2 Determine the viability of various subpopulations. Determine the long-term viability of the major subpopulations based on studies of

demographic factors including recruitment rates, sex ratios, population structure, and relative population size.

4.3 Determine and monitor present and foreseeable threats to the species. Reservoir development has had a role in altering the species' habitat and reducing its range. Siltation from poor land use practices continues to contribute to substrate and water quality degradation. Acidic precipitation may be degrading the aquatic systems upon which the logperch depends. Other factors, such as discharges from industries, wastewater treatment plants and agricultural facilities, may be affecting the species and must be inventoried. Studies are needed to evaluate the extent to which the species is being affected by each of these factors.

5. Implement management where needed.

Based on the biological data and threat analysis, investigate the need for management of watersheds supporting the logperch. Implement management where needed to secure viable, expanding populations. Specific components of the species' habitat, such as appropriate water temperatures, flows, water quality, and silt-free substrata, may be limiting the species' potential expansion. Habitat improvement programs throughout the watersheds supporting the logperch are needed to alleviate these limiting factors. As part of the management planning process, effects on other species occupying the same river reaches will be noted.

5.1 Implement measures to reduce erosion and excessive stream sedimentation. Highest priority should be placed on reducing the quantity of silt entering the North Fork Roanoke, Nottoway, and Pigg Rivers. The U.S. Fish and Wildlife Service will work with the Soil Conservation Service, the Virginia Department of Soil and Water

Conservation, Virginia Department of Forestry, the Virginia Department of Game and Inland Fisheries, and The Nature Conservancy to assist landowners in improving riparian zone management and other land use practices. Measures should include the establishment of vegetated buffers (shrubs and trees) along the banks of the above rivers and their tributaries. Conservation easements or land trusts should be established along key riverine corridors.

5.2 Identify manure holding facilities within drainages supporting Roanoke logperch populations and require measures (such as berm construction and check valve installation) to prevent accidental manure spills.

5.3 Minimize or eliminate other threats. As necessary to achieve recovery, the information gathered under Tasks 4.1, 4.2, and 4.3 will be used to target other specific problem areas.

6. Monitor population levels and habitat conditions. Develop and implement a program, using index sites, to monitor population levels and habitat conditions of present populations as well as any newly discovered or expanding populations. This information will be used to assess any progress toward recovery. Monitoring will be conducted every three years.

7. Periodically assess the overall success of the recovery program and recommend actions (changes in recovery objectives, downlist, delist, continue to protect, implement new measures, other studies, etc.). The recovery plan will be evaluated to determine if it is on track and to recommend future actions. As more is learned about the species,

recovery objectives may need to be modified. A "recovery implementation group" composed of representatives of the U.S. Fish and Wildlife Service, state agencies, conservation groups, etc., will be established to assist in implementing this task (as well as other aspects of the recovery plan).

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PART III: IMPLEMENTATION

The following Implementation Schedule outlines actions and estimated costs for the recovery program. It is a guide for meeting the objectives discussed in Part II of this plan. This schedule indicates task priorities, task numbers, task descriptions, duration of tasks, the responsible agencies, and estimated costs. These actions, when accomplished, should bring about recovery of the species and protect its habitat.

Key to Implementation Schedule Priorities (column 1)

- 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
ROANOKE LOGPERCH

March 1992

Priority	Task Description	Task Number	Duration	Responsible Agency		Cost Estimates, \$000			Comments
				USFWS	Other	FY1	FY2	FY3	
1	Use existing legislation and regulations to protect the logperch and its habitat.	1.1	Continuous	Region 5	VDGIF,SCS, ACOE,VAWCB, TNC,VADOF, VADSWC,EPA	1	1	1	
2	Inform local representatives about recovery efforts and request their support.	1.21	3 years	Region 5	VDGIF,SCS, ACOE,VAWCB, TNC,VADOF, VADSWC	1	1	1	
2	Develop and distribute/present educational materials and programs.	1.22	Continuous	Region 5	Contract or VDGIF	---	10	1	Materials developed first year; presentation will be ongoing.
2	Search for additional populations and/or habitat suitable for enhancement or reintroduction.	2	2 years		VDGIF,VADNH or Contract	10	10	---	
3	Determine feasibility of reestablishing logperch and reintroduce where feasible.	3		Region 5	Contract or VDGIF	---	---	5	
2	Characterize habitat requirements for all life history stages.	4.1	3 years	Region 5	Contract or VDGIF	---	25	25	
2	Determine viability of various subpopulations.	4.2	2 years	Region 5	Contract or VDGIF	---	25	25	
2	Determine and monitor present and foreseeable threats to the species.	4.3	Continuous	Region 5	VDGIF	20	20	20	3-year study needed to evaluate threats; monitoring then needed.

Roanoke Logperch Implementation Schedule (continued) March 1992

Priority	Task Description	Number	Duration	Responsible Agency		Cost Estimates, \$000			Comments
				USFWS	Other	FY1	FY2	FY3	
1	Implement measures to reduce erosion and stream sedimentation.	5.1	10 years	Region 5	SCS,VDGIF, VADSWC, VAWCB, VADOF,TNC, VADNH,EPA	20	20	20	
1	Implement measures to prevent accidental manure spills.	5.2	3 years	Region 5	VAWCB, VDGIF	5	5	5	
*	Minimize or eliminate other threats.	5.3		Region 5					* Priority and other items will be determined based on results of 4.1 and 4.3.
2	Monitor population levels and habitat conditions.	6	Continuous	Region 5	VDGIF or Contract	---	30	---	Complete survey conducted once every 3 years.
3	Periodically assess recovery and recommend actions.	7	Continuous	Region 5	Recovery Implementation Group	---	0.5	0.5	

ACOE = Army Corps of Engineers
 EPA = Environmental Protection Agency
 SCS = Soil Conservation Service
 TNC = The Nature Conservancy
 USFWS = U. S. Fish and Wildlife Service
 VADNH = Virginia Division of Natural Heritage
 VADSWC = Virginia Division of Soil and Water Conservation
 VAWCB = Virginia Water Control Board
 VDGIF = Virginia Department of Game and Inland Fisheries
 VADOF = Virginia Department of Forestry

Appendix: List of Reviewers

[* indicates those reviewers who submitted comments on the Technical or Agency Draft Recovery Plans]

- * Mr. William Adams
Planning Division
Wilmington District, Corps of Engineers
P.O. Box 1890
Wilmington, NC 28402

- * Dr. Paul Angermeier
Virginia Coop Fisheries Unit
Department of Fisheries and Wildlife
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061

- Mr. Richard Biggins
U.S. Fish and Wildlife Service
Asheville Field Office
100 Otis Street
Asheville, NC 28801

- Mr. Bud Bristow
Executive Director
Department of Game and Inland Fisheries
P.O. Box 11104
Richmond, VA 23230

- * Ms. Sue Bruenderman
Virginia Department of Game and Inland Fisheries
Route 2, Box 54706
Ashland, VA 23005

- Mr. Noel Burkhead
U.S. Fish and Wildlife Service
Fisheries Research Center
7920 NW 71st Street
Gainesville, FL 32606

Mr. Richard Burton
Executive Director
State Water Control Board
P.O. Box 22243
Richmond, VA 23230

Department of Conservation and Recreation
Virginia Division of Natural Heritage
Main Street Station
1500 East Main Street, Suite 312
Richmond, VA 23219

Director
Office of Hydropower Licensing
Federal Energy Regulatory Commission
825 North Capitol Street, NE
Washington, D.C. 20426

Director
Division of Soil and Water Conservation
203 North Governor Street
Richmond, VA 23219

Director
Division of Water Programs
Office of Health Protection
James Madison Building
109 Governor Street
Richmond, VA 23219

Ecological Effects Branch
Environmental Fate and Effects Division
U.S. Environmental Protection Agency
Washington, D.C. 20460

- * Mr. Bill Ensign
Department of Fisheries and Wildlife
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061

Executive Director
American Fisheries Society
5410 Grosvenor Lane
Bethesda, MD 20814

- * American Fisheries Society
Virginia Tech Chapter
Cheatham Hall
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061

Mr. R.L. Hundley
Virginia Department of Transportation
1401 East Broad Street
Richmond, VA 23219

Dr. Robert Jenkins
Department of Biology
Roanoke College
Salem, VA 24153

- * Colonel Richard Johns
District Engineer
Norfolk District, Corps of Engineers
Fort Norfolk
803 Front Street
Norfolk, VA 23510

Mr. George W. Kelley
Forest Supervisor
George Washington National Forest
Harrison Plaza
P.O. Box 233
Harrisonburg, VA 22801

Ms. Helen Kitchel
Virginia Department of Game and Inland Fisheries
4010 West Broad Street
Richmond, VA 23230

* Mr. A.L. La Roche, III
Regional Fisheries Manager
209 East Cleveland Avenue
Vinton, VA 24179

Mr. Michael Lipford
The Nature Conservancy
Virginia Field Office
1110 Rose Hill Drive
Charlottesville, VA 22901

Ms. Karen Mayne
U.S. Fish and Wildlife Service
Virginia Field Office
Mid-County Center
U.S. Route 17, P.O. Box 480
White Marsh, VA 23183

Mr. William Neal
Virginia Department of Game and Inland Fisheries
4010 West Broad Street
P.O. Box 11104
Richmond, VA 23230

* Dr. R.J. Neves
Virginia Coop Fisheries Unit
Department of Fisheries and Wildlife
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061

Mr. Mitchell D. Norman
Regional Fisheries Manager
Burnt Mills Estate, Box 1
Windsor, VA 23487

Mr. George C. Norris
State Conservationist
Soil Conservation Service
Federal Building, 400 North Eighth Street
Richmond, VA

* Lieutenant Colonel Thomas C. Suermann
Wilmington District, Corps of Engineers
P.O. Box 1890
Wilmington, NC 28402

* Mr. William H. Tanger
Friends of the Roanoke River
P.O. Box 1750
Roanoke, VA 24008

U.S. Forest Service
Wildlife and Fisheries
Manager, Endangered Species Program
P.O. Box 96090
Washington, D.C. 20013

Mr. David K. Whitehurst
Chief, Fisheries Division
Department of Game and Inland Fisheries
P.O. Box 11104
Richmond, VA 23230

Dr. James Williams
U.S. Fish and Wildlife Service
Fisheries Research Center
7920 NW 71st Street
Gainesville, FL 32606