UNITED STATES GEOLOGICAL SURVEY

Fact Sheet

National Water-Quality Assessment Program

What fish live in the streams of Metropolitan Atlanta?

Why should I care about the fish living in my local stream?

Most residents of the Chattahoochee River basin in Metropolitan Atlanta live in one of 35 tributary basins to this river. Many of these tributaries are too small to support good fishing, are not generally accessible for recreation, and are not directly used for drinking water supply. However, as the Chattahoochee River flows through Metropolitan Atlanta, its water quality is affected by the water it receives from these tributaries.

As the population of the Chattahoochee River basin continues to grow, an increasing part of land is becoming urbanized. Streams that drain urban areas often have poor water quality resulting from contaminants in storm water and ground water, and have physical habitats degraded by sedimentation and stream bank erosion. Periodic sampling of water chemistry may not detect water-quality problems that occur infrequently, such as during storm runoff. Human induced changes in water quality or habitat can alter the number of individuals and species of fish present in streams. Because fish respond directly to the quality of water they inhabit, they are useful as indicators of the cumulative effects of water-quality problems that may not otherwise be detected. Although the small tributaries of the Chattahoochee River may not be important to people for fishing or recreation, the types of fish living in these streams provide an indication of the quality of water that flows into the Chattahoochee River.

In November 1993, personnel from the U.S. Geological Survey (USGS) surveyed fish in sections of nine tributaries of the Chattahoochee River Basin in Metropolitan Atlanta. The location of survey sites, basin boundaries, and the extent of urban area are shown in figure 1. Eight tributaries, Nickajack Creek, Rottenwood Creek, Sope Creek, Willeo Creek, Nancy Creek, Peachtree Creek, Proctor Creek, and Utoy Creek, receive runoff from urban areas such as subdivisions, office and industrial parks, shopping malls, airports, roads, and golf courses. In addition to these urban basins, Snake Creek was surveyed to provide a comparison of fish populations in a mostly forested basin.

This report summarizes information from historic fish surveys, and describes the results of the November 1993 fish survey. The results indicate the changes in fish populations that may occur as forested and rural basins become urbanized. Gray shaded parts of figure 1 show the extent of urban area in Metropolitan Atlanta in 1990. In contrast to the Snake Creek basin which is 83 percent forested, the other 8 basins range from 70 to more than 90 percent urban area (table 1). Although residences cover a large percentage of area in all urban basins, industrial, commercial, and transportation areas cover approximately one-fourth to one-third of the Rottenwood, Nancy, Peachtree, and Proctor Creek basins. These basins are among the older urban areas of Metropolitan Atlanta.

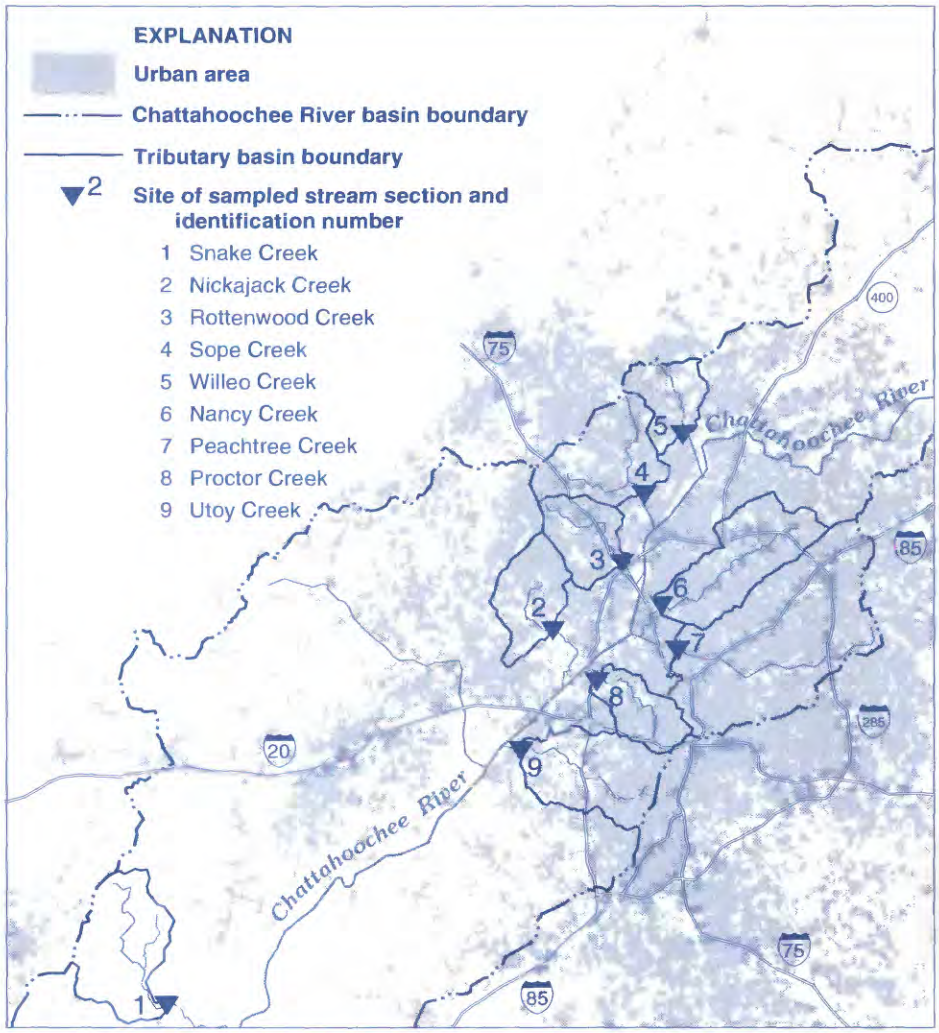

Figure 1. Location of stream sections surveyed and tributary boundaries in the Metropolitan Atlanta area. (Urban area from Atlanta Regional Commission, 1990.)

Table 1. Drainage areas and basin characteristics for tributaries upstream of locations surveyed for fish populations

Tributary	Drainage area (square miles)	Percentage of land area by classification for basins upstream of surveyed locations[1]					
		Urban			Forest	Agriculture	Other
		Residential	Industrial, commercial, transportation	Other urban			
Snake Creek	36	1	0	0	83	15	1
Sope Creek	31	68	13	1	12	4	2
Nickajack Creek	21	63	11	1	20	3	2
Willeo Creek	15	68	1	1	20	6	4
Peachtree Creek	85	59	32	2	7	0	0
Nancy Creek	35	63	24	4	7	<1	<2
Proctor Creek	16	53	26	7	11	0	3
Rottenwood	18	39	33	15	12	<1	<1
Utoy Creek	34	52	12	6	26	<1	<4

[1]from Atlanta Regional Commission (1990)

What fish were identified in historic surveys?

Fish species identified in historic surveys of the study area were compiled from museum records (table 2). Because many of these surveys were conducted before basins became urbanized, the records indicate fish species that were present when these basins were mostly rural. Forty-two native fish species have been found in tributaries of the Chattahoochee River in the study area. Native species are those that naturally occur in the basin. Although many of these species prefer small shallow tributaries, most also have been found in the Chattahoochee River. There are fish species in the Chattahoochee River that do not occur in tributaries. For example, trout inhabit the Chattahoochee River where they find the cool water necessary for their survival. This cool water originates as deep-water releases from Buford Dam at Lake Lanier north of Atlanta. The water temperatures of tributaries in Metropolitan Atlanta are too warm to support trout.

The group with the largest number of species is the minnow family. Minnows are small fish that can be seen darting around in streams that are only a few feet wide. Other families with large numbers of species are the sunfish and bass family, the catfish family, and the sucker family. Species that have the largest numbers of individuals living in streams typically are minnows and suckers. These species are often not well known because unlike sunfish, bass, and catfish, people do not fish for them, although certain minnows may be used as bait. Minnows have an important role in the aquatic food chain as prey for larger fish, aquatic snakes, turtles, and wading birds such as herons. Suckers can grow to more than one foot long and are named for their down-turned mouth that they use to "vacuum" food from stream bottoms. Although suckers are not popular game fish, they are ecologically important because they often account for the largest fish biomass in streams.

Three species are noteworthy because they are endemic: that is, they live exclusively in the Chattahoochee and Flint River basins. The endemic species are the bluestripe shiner, grayfin redhorse, and greater jumprock. Although many of the basin's native fish also naturally occur in other river basins, these three species are native only to the Chattahoochee and Flint River basins. In addition, the highscale shiner may also have been endemic. However, the highscale shiner has been found in one location in the Savannah River basin. The bluestripe shiner and highscale shiner are listed by the state of Georgia as threatened. In addition, the bluestripe shiner is a candidate for listing under the Federal Endangered Species Act.

In addition to the 42 native species, 8 non-native species have been introduced into the basin by man probably as game fish or released from bait buckets. The introduced, non-native species are the red shiner, white sucker, black bullhead, flat bullhead, spotted bass, smallmouth bass, green sunfish, and yellow perch.

Table 2. Fish species inhabiting tributaries to the Chattahoochee River in the study area. Compiled from museum records maintained by the University of Georgia Museum of Natural History

Scientific name	Common name
Petromyzontidae	lampreys
Ichthyomyzon gagei	southern brook lamprey
Esocidae	pike
Esox americanus	redfin pickerel
Esox niger	chain pickerel
Cyprinidae	minnow
Notemigonus crysoleucas	golden shiner
Semotilus atromaculatus	creek chub
Semotilus thoreauianus	dixie chub
Nocomis leptocephalus	bluehead chub
Campostoma pauciradii	bluefin stoneroller
Luxilus zonistius	bandfin shiner
Cyprinella venusta cercostigma	blacktail shiner
Cyprinella lutrensis[2]	red shiner
Cyprinella callitaenia[1]	bluestripe shiner
Notropis lutipinnis	yellowfin shiner
Notropis longirostris	longnose shiner
Notropis hypsilepsis	highscale shiner
Hybopsis sp. cf. *winchelli*	clear chub
Ericymba buccata	silverjaw minnow
Catostomidae	suckers
Catostomus commersoni[2]	white sucker
Minytrema melanops	spotted sucker
Hypentelium etowanum	Alabama hog sucker
Moxostoma sp. cf. *poecilurum*[1]	grayfin redhorse
Scartomyzon rupiscartes	striped jumprock
Scartomyzon lachneri[1]	greater jumprock
Ictaluridae	catfish
Ictalurus punctatus	channel catfish
Ameiurus natalis	yellow bullhead
Ameiurus melas[2]	black bullhead
Ameiurus nebulosus	brown bullhead
Ameiurus brunneus	snail bullhead
Ameiurus platycephalus[2]	flat bullhead
Noturus gyrinus	tadpole madtom
Noturus leptacanthus	speckled madtom
Noturus funebris	black madtom
Cottidae	sculpin
Cottus carolinae	banded sculpin
Cottus bairdi	mottled sculpin
Fundulidae	topminnows
Fundulus stellifer	southern studfish
Poeciliidae	livebearers
Gambusia affinis holbrooki	mosquitofish
Centrarchidae	basses and sunfish
Pomoxis nigromaculatus	black crappie
Ambloplites ariommus	shadow bass
Micropterus salmoides	largemouth bass
Micropterus punctulatus[2]	spotted bass
Micropterus coosae	redeye bass
Micropterus sp. cf. *coosae*	shoal bass
Micropterus dolomieu[2]	smallmouth bass
Lepomis gulosus	warmouth
Lepomis cyanellus[2]	green sunfish
Lepomis macrochirus	bluegill
Lepomis microlophus	redear sunfish
Lepomis auritus	redbreast sunfish
Percidae	perches and darters
Perca flavescens[2]	yellow perch
Percina nigrofasciata	blackbanded darter

[1]endemic species, [2]non-native species

Species that survive outside of their native streams often can tolerate a wide range of water-quality and habitat conditions. Consequently, such hardy, non-native fish often thrive in streams where water quality or habitat has been degraded.

What fish were identified in the USGS survey?

A combination of backpack electrofishing and seining was used to capture fish in sections of each stream at least 482 feet long (Meador and others, 1993a). Electrofishing is a technique which uses electricity to mildly stun fish that are then captured by net or seine. Standard survey methods were used in each stream section so that results among stream sections could be compared. Stream sections were chosen to represent typical conditions in each tributary.

The number of individual fish and species captured in the 9 streams are shown in table 3. The streams are presented, from left to right, in descending order of the number of native species captured. The largest number of native species and individuals (with the exception of Peachtree Creek) was found in Snake Creek, the basin mostly covered by forest. One of the 3 endemic species, the grayfin redhorse, was found in Snake Creek. Although the 8 urban streams vary from 2 to 15 in the number of native species found, they share several characteristics in their fish populations. Generally, less than 50 percent of the number of fish found in Snake Creek were found in the urban streams, and up to 91 percent of the fish in urban streams were from non-native species. Native minnow and sucker species were almost completely absent in Nancy, Peachtree, Rottenwood, Proctor, and Utoy Creeks. These 5 creeks differ from Sope, Nickajack, and Willeo Creeks in the amount or proximity of industrial, commercial, and transportation areas (table 1). Although Utoy Creek has a lower percentage of area in this category, an industrial park is located immediately upstream of the sampling location.

The large number of mosquitofish found in Peachtree Creek may indicate poor water quality. Similar to the non-native red shiner, white sucker and green sunfish species, mosquitofish are tolerant of a wide range of water-quality conditions. After mishaps, such as chemical or sewerage spills which decrease fish populations, mosquitofish can repopulate a stream rapidly. They have short life cycles, and unlike other fish species listed in table 2, they bear their young live rather than lay eggs.

Table 3. Number of fish collected in each stream section by the USGS in November, 1993

Common name of fish species	Number of fish (—, none found)								
	Snake Creek	Sope Creek	Nickajack Creek	Willeo Creek	Nancy Creek	Peachtree Creek	Rottenwood Creek	Proctor Creek	Utoy Creek
golden shiner	—	—	—	—	—	2	—	—	—
creek chub	4	9	4	—	7	—	—	—	—
bluehead chub	21	9	20	12	—	1	—	—	—
bluefin stoneroller	89	16	59	—	—	1	—	—	—
bandfin shiner	169	47	10	2	—	—	—	—	—
red shiner	—	—	39	—	58	479	3	191	—
yellowfin shiner	—	48	—	21	—	—	—	—	—
longnose shiner	26	9	—	4	—	—	—	—	—
silverjaw shiner	—	—	14	—	6	1	—	—	—
white sucker	—	2	—	—	1	1	8	11	—
spotted sucker	6	—	—	—	—	—	—	—	—
Alabama hog sucker	71	28	28	71	3	—	1	—	—
grayfin redhorse	53	—	—	—	—	—	—	—	—
channel catfish	—	—	—	—	—	1	—	—	—
yellow bullhead	1	1	2	—	—	—	—	—	1
black bullhead	—	—	—	—	—	1	—	—	—
brown bullhead	—	—	4	—	—	7	—	—	—
snail bullhead	17	1	1	—	3	—	—	—	—
flat bullhead	2	3	—	—	22	—	—	—	—
banded sculpin	—	—	—	—	—	—	—	—	—
southern studfish	—	1	—	6	—	—	—	—	—
mosquitofish	—	—	—	—	4	1143	3	—	—
shadow bass	—	—	—	—	1	—	—	—	—
largemouth bass	2	3	—	2	2	—	—	1	—
redeye bass	7	—	—	—	—	—	—	—	—
smallmouth bass	—	—	2	—	—	—	—	—	—
warmouth	2	5	1	1	1	2	1	—	—
green sunfish	—	1	7	1	2	26	27	3	2
bluegill	27	80	37	117	30	7	24	—	2
redear sunfish	—	—	—	17	—	—	—	—	—
redbreast sunfish	48	20	21	20	78	31	13	18	—
bluegill x redbreast hybrid	—	—	—	—	—	37	—	—	—
blackbanded darter	96	24	33	11	2	—	—	—	—
Total native species	16	15	13	12	11	11	5	2	2
Total species	17	18	16	13	15	15	8	5	3
Total individuals	641	307	282	285	220	1740	80	224	5
Percent non-native individuals	<1	2	17	<1	38	29	47	91	40

Why is physical habitat important?

The types of fish that may be found in the stream flowing through your neighborhood depends not only on the quality of the water, but also on the types of physical habitat present. Every successful fisherman knows to cast in areas where fish prefer to live, and that fish species differ in their preferred habitats. For example, the redeye bass prefers to live in swift water in steep-gradient streams with exposed bedrock. In contrast, the tadpole madtom prefers quieter water flowing over mud, leaves, and other plant material. Even in streams with good water quality, certain species may be absent in sections that do not contain their preferred habitat. Not all 50 species of fish occurring in the study area will be found in every section of stream.

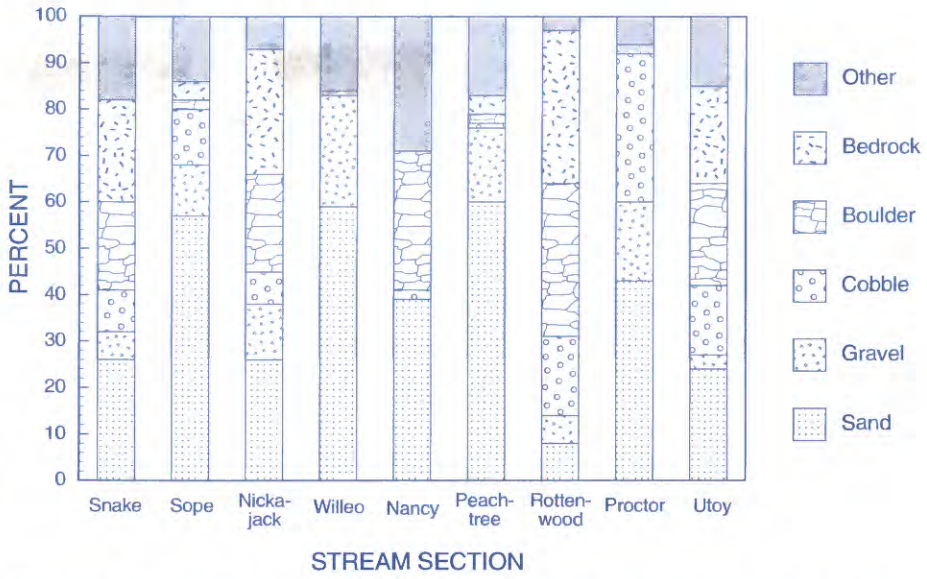

Figure 2. The percentage of stream bottom covered by different materials in each stream section. The percentage of materials such as logs, roots, mud, silt, or old tires are included in the "other" category. (See fig. 1 for stream-section location.)

Stream habitats can be compared by estimating the amount of stream bottom that is covered by different materials (Meador and others, 1993b). The percentage of each stream section covered by the major types of bottom materials is shown in figure 2. These materials differ in their importance to fish as habitat. Most fish live near larger bottom materials such as gravel, cobble, and boulders. These larger materials provide spaces where food organisms such as aquatic insects live. Many fish spawn their eggs in nests constructed from gravel, or in holes and cracks in boulders and bedrock. Other important habitats that provide food and hiding places are aquatic plants, fallen logs, and accumulations of sticks and leaves.

Sand is a natural part of the stream bottom; however, in basins without effective erosion control, sand often covers a large part of the stream bottom burying or filling the spaces between gravel and cobble. As a consequence, the abundance of food organisms and spawning areas required by fish are decreased. The bluestripe and highscale shiner are threatened because their spawning sites among clean boulders and bedrock are increasingly buried by sand and silt.

Differences in fish populations among streams may be caused by factors other than habitat. For example, Rottenwood and Utoy Creeks, which have poor fish populations, both have a large percentage of their stream bottoms covered by gravel, cobbles, and boulders that provide good habitat (fig. 2). In comparison, although poor sand habitat covers greater than 50 percent of the stream bottoms in Sope and Willeo Creeks, they support a larger number of species than Rottenwood or Utoy Creeks. All urban streams, regardless of the quality of their physical habitat, were determined to have fish populations with fewer native species, and generally less than one-half the number of fish found in the forested stream.

The USGS National Water-Quality Assessment Program is measuring water chemistry and contaminants in stream water, bottom material, and organisms to better understand water quality in these urban basins. Such information will help us to understand factors that contribute to the differences in fish populations among these streams, and ultimately to protect the water quality of the Chattahoochee River.

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