

The Fishes of Hot Springs National Park, Arkansas, 2003

Prepared in cooperation with the
National Park Service

Scientific Investigations Report 2005-5126

U.S. Department of the Interior
U.S. Geological Survey

The Fishes of Hot Springs National Park, Arkansas, 2003

By James C. Petersen and B.G. Justus

Prepared in cooperation with the
National Park Service

Scientific Investigations Report 2005-5126

**U.S. Department of the Interior
U.S. Geological Survey**

U.S. Department of the Interior
Gale A. Norton, Secretary

U.S. Geological Survey
P. Patrick Leahy, Acting Director

U.S. Geological Survey, Reston, Virginia: 2005

For sale by U.S. Geological Survey, Information Services
Box 25286, Denver Federal Center
Denver, CO 80225

For more information about the USGS and its products:
Telephone: 1-888-ASK-USGS
World Wide Web: <http://www.usgs.gov/>

Any use of trade, product, or firm names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Although this report is in the public domain, permission must be secured from the individual copyright owners to reproduce any copyrighted materials contained within this report.

Contents

Abstract.....	1
Introduction	1
Description of Study Area.....	1
Methods.....	3
Fishes of Hot Springs National Park	4
Relation of Fishes to Habitat and Distributional Ranges	4
Comparison to Past Inventories	13
Species of Interest.....	13
Summary.....	13
References	13

Figures

1. Map showing location of sampling sites at Hot Springs National Park	2
--	---

Tables

1. Site-specific information for eight fish sampling sites within Hot Springs National Park, 2003	3
2. Number of fish collected at eight sampling sites within Hot Springs National Park, 2003.....	5
3. Percent relative abundance of fish collected at eight sampling sites within Hot Springs National Park, 2003	6
4. Abundance classification of fish collected at eight sampling sites within Hot Springs National Park, 2003	7
5. List of fish species expected to occur at Hot Springs National Park.....	8
6. List of fish collected in two inventories at Hot Springs National Park.....	12

The Fishes of Hot Springs National Park, 2003

By James C. Petersen and B.G. Justus

Abstract

Fish communities were sampled from eight sites within Hot Springs National Park. Fish were collected by seining and electrofishing during base-flow periods in July and October 2003. All individuals were identified to species. More than 1,020 individuals were collected, representing 24 species. The number of species collected at the sites ranged from 5 to 19. Central stoneroller, orangebelly darter, and longear sunfish were among the more abundant fish species at most sites. These species are typical of small streams in this area.

An expected species list incorrectly listed 35 species because of incorrect species range or habitat requirements. Upon revising this list, the inventory yielded 24 of the 51 expected species (47 percent).

No species collected in 2003 were federally-listed threatened or endangered species. However, two species collected at Hot Springs National Park may be of special interest to National Park Service managers and others. The Ouachita madtom is endemic to the Ouachita Mountains and is listed as a species of special concern by the Arkansas Natural Heritage Commission. The grass carp, which is a native of eastern Asia, is present in Ricks Pond; one individual was collected and no other grass carp were observed. The introduction of grass carp into the United States is a controversial issue because of possible (but undocumented) harmful effects on native species and habitats.

Introduction

The National Parks Omnibus Management Act (1998) facilitated a monitoring program that would allow National Park Service (NPS) employees to effectively monitor important selected natural resources located on parks managed by the NPS. The Heartland Network, a part of the NPS Inventory and Monitoring Program, is coordinating inventories of vascular plants and vertebrates in 15 parks in 8 midwestern States (including Arkansas) (Boetsch and others, 2000). Data collected over extended periods eventually will be evaluated to determine how biological communities are changing and to ensure that resources are being managed properly. One of the 15 parks being inventoried is Hot Springs National Park. The U.S.

Geological Survey, in cooperation with the NPS, Heartland Network, inventoried fishes of the park.

The park lies within and adjacent to the city of Hot Springs (population about 36,000; U.S. Census Bureau, 2005) in central Arkansas. The park is managed by the NPS and was established to protect the hot springs and the remaining historic bathhouses in the area (National Park Service, 2004). The 47 hot springs and surrounding area continue to provide visitors with leisure activities such as hiking, picnicking, and scenic drives.

The purpose of this report is to provide the NPS with information related to fish species of the park. This information includes a list of fish collected during an inventory of the fish species of the park conducted during July and October 2003, relative abundance of each species at each collection site, and a revised list of expected species at the park. Methods used to conduct the inventory also are described.

Stephen Rudd of Hot Springs National Park provided information used for site selection. He also assisted with sampling logistics.

Description of Study Area

Hot Springs National Park is located in the Ouachita Mountains physiographic area (Fenneman, 1938) of central Arkansas (fig. 1) and includes about 3.3 square kilometers (8.5 square miles). Much of this area is forested; basins of most streams are more than 90 percent forested. Water resources of the park are described in a National Park Service water resources scoping report (Petersen and Mott, 2002).

Streams and lakes within the park include Bull Bayou, Gulpha Creek, Whittington Creek, unnamed tributaries of Gulpha Creek, Ricks Pond, and an unnamed pond south and east of Gulpha Creek. The streams have drainage areas of less than 47 square kilometers (18 square miles) and only Bull Bayou has a drainage area that exceeds 13 square kilometers (5 square miles) (Petersen and Mott, 2002). Ricks Pond has a surface area of approximately 1.0 hectare (2.5 acres) (Buchanan and others, 1978) and the unnamed pond has a surface area of approximately 0.8 hectare (2 acres). The streams and lakes lie within the Ouachita River Basin and Bull Bayou flows into Lake Hamilton about 0.6 kilometer (1 mile) downstream from the boundary of the park.

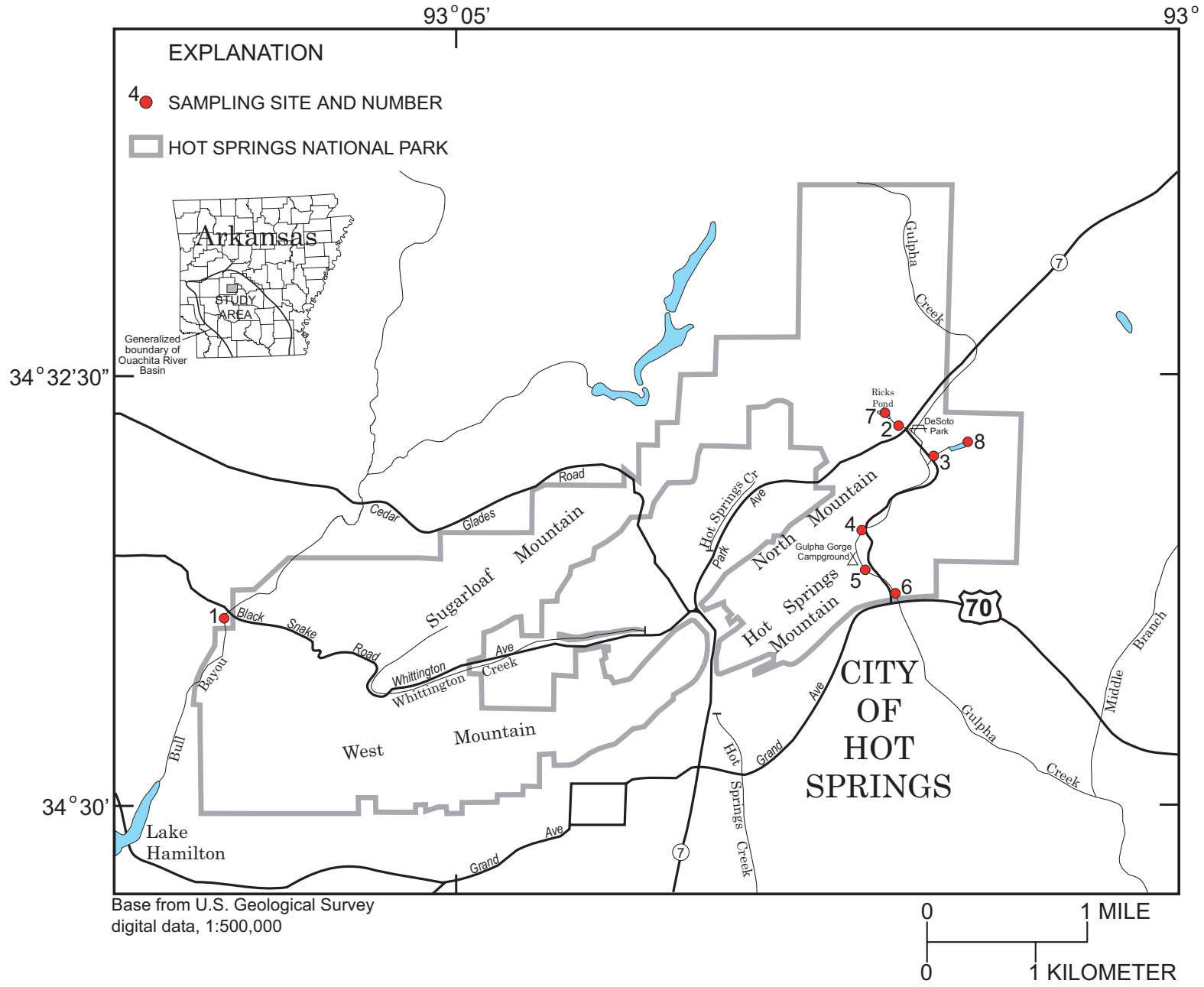


Figure 1. Location of sampling sites at Hot Springs National Park.

Methods

Prior to fish sampling in the streams, a sampling reach was designated. A military-issue global positioning system (GPS) unit utilizing the Precise Positioning Service (PPS, authorized to U.S. Federal Civilian Agencies by the Department of Defense) was used to obtain Universe Transverse Mercator (UTM) measurements according to North American Datum of 1983 (NAD83). UTM measurements were made at the upstream and downstream ends of the reach. Because the measurements were made with PPS, no correction to the position was necessary.

Fish were sampled using conventional electrofishing (direct current) equipment. Fish were sampled at eight sites (fig. 1, table 1) in July and October of 2003. Six sites were sampled on Bull Bayou, Gulpha Creek, and tributaries of Gulpha Creek. Two ponds also were sampled. Because the streams were small and wadeable, a battery powered backpack-electrofishing unit was used to collect fish at all stream sites. An electrofishing boat was used to sample fish in Ricks Pond and the unnamed

pond. All sites, except a site located on Gulpha Creek downstream from the campground and just upstream from the southern boundary of the park, were sampled one time. This site was sampled twice because of its proximity to the location of a previous collection of a relatively rare species (*Ouachita madtom*, *Noturus lachneri*).

Small-mesh dipnets were used to collect fish incapacitated by the sampling equipment. Once fish had been netted, they were temporarily placed in a plastic bucket containing ambient stream water. After a brief sampling period (and partial sampling of the reach), fish in the bucket were identified and counted. Photographs were taken of each species collected, and specimens were released outside of the area being sampled. Fish that were not readily identifiable in the field were preserved for laboratory identification. This process was repeated until the entire stream reach was sampled. The amount of time spent sampling and identifying fish at each site was recorded on the field sheets. Site-specific location and collecting information for all sampling efforts is provided in table 1.

Table 1. Site specific information for eight fish sampling sites within Hot Springs National Park, 2003.

[EBP, electrofishing backpack; EB, electrofishing boat; BPS, electrofishing backpack/seine combination; n/a, not applicable; E, easting; N, northing]

Site number and name	Date	Reach length (meters)	Easting/Northing (upstream) ¹	Easting/Northing (downstream) ¹	Gear	Estimated sampling time (minutes)
1-Bull Bayou downstream from Black Snake Road	07/01/03	300	0489897 E/ 03819616 N	0489873 E/ 03819348N	BPS	250
2-Unnamed tributary to Gulpha Creek downstream from Ricks Pond	10/10/03	300	0496959 E/ 03821488 N	0497134 E/ 03821377N	EBP	115
3-Unnamed tributary to Gulpha Creek in Sleepy Hollow	10/10/03	75	0497502 E/ 03821103 N	0497460 E/ 03821023N	EBP	30
4-Gulpha Creek upstream from campground	10/21/03	175	0496845 E/ 03820443 N	0496658 E/ 03820308N	EBP	75
5-Gulpha Creek downstream from campground	07/02/03	300	0496877 E/ 03819995 N	0497029 E/ 03819775N	EBP	145
5-Gulpha Creek downstream from campground	10/21/03	300	0496877 E/ 03819995 N	0497029 E/ 03819775N	EBP	120
6-Gulpha Creek at downstream end of campground	07/02/03	100	0496664 E/ 03820130 N	0496782 E/ 03820046N	EBP	30
7-Ricks Pond	07/02/03	n/a	n/a	0496941E/03821508N	EB	75
8-Unnamed pond in Sleepy Hollow	10/22/03	n/a	n/a	0497839 E/ 03821288N	EB	30

¹The horizontal datum used for obtaining Universe Transverse Mercator (UTM) measurements was North American Datum of 1983 (NAD83).

4 The Fishes of Hot Springs National Park, Arkansas, 2003

At the stream sites, all fish that could be collected were identified (Robison and Buchanan, 1988; Nelson and others, 2004) and counted. However, the sole purpose of sampling the ponds was to determine qualitative relative abundance of species in the ponds. Consequently, only one or two representative individuals of each species encountered at the ponds were collected.

Fish species collected also are classified according to how common they occurred in this study. Criteria for this classification were based on percent relative abundance and were as follows: most common—greater than 20.0 percent, common—10.0 to 20.0 percent, least common—2.0 to 10.0 percent, and rare—less than 2.0 percent, and not collected. Fish occurrences for this study were compared to fish occurrence in a previous study at Hot Springs National Park (Buchanan and others, 1978).

At the onset of the study, the NPS provided the USGS with a preliminary list of fish (Boetsch and others, 2000) based on county records from maps in Robison and Buchanan (1988) that were suspected of occurring at Hot Springs National Park. This list was provided with the intent that the USGS would make revisions that would result in a more accurate list of fish species that could reasonably be expected to occur at the park and was to be used as a guide to determine if 90 percent of those species reasonably expected to occur at the park had been documented. The preliminary list included some fish that probably do not occur at Hot Springs National Park because the park is outside of the species' range, or the aquatic habitats in the park are not representative of the typical habitat for the species. After reviewing the literature and environmental settings at Hot Springs National Park, the list was revised to better reflect species that have been collected or could occur in the park.

Fishes of Hot Springs National Park

More than 1,020 fish were collected and identified at the eight sampling sites (table 2). These individuals represented 24 species and 17 genera (table 2). The number of species per sampling site ranged from 5 (at one of the ponds) to 19 at the site on Bull Bayou (table 2).

Based on relative abundance, eight species were classified as "most common" at one or more sites (tables 3-4). Central stoneroller (*Campostoma anomalum*), orangebelly darter (*Etheostoma radiosum*), and longear sunfish (*Lepomis megalotis*) were among the more abundant fish species at several sites. Nine species were found only at the site on Bull Bayou and many of these nine species were represented by only one or two individuals.

The preliminary expected species list incorrectly listed 35 species because of incorrect species range or habitat requirements. Upon revising this list, the inventory yielded 24 of the 51 species (47 percent) (table 5). Twenty-seven additional species not collected in 2003 may occur at Hot Springs National Park for two primary reasons—because the species had been col-

lected previously at the park, or because the park occurs within the known species range and habitats found at the park are suitable for these species.

Twelve species not previously collected at the park (Buchanan and others, 1978) from the Gulpha Creek Basin upstream from the southern boundary of the park were collected during the 2003 sampling (table 6). A total of 27 species have been collected from the park.

Relation of Fishes to Habitats and Distributional Ranges

The three most common species (central stoneroller, orangebelly darter, and longear sunfish) are typical of habitats found in streams of Hot Springs National Park. The central stoneroller is often the most abundant species in small upland streams (Robison and Buchanan, 1988). The orangebelly darter is the most abundant darter in the southern Ouachita Mountains of Arkansas and is found in small high-gradient creeks (Robison and Buchanan, 1988). The longear sunfish is common in many Arkansas streams; it is most abundant in small, clear upland streams with rocky bottoms (Robison and Buchanan, 1988).

Several species were collected at two or less stations and were not common at these stations. Most of these were species collected only at the site on Bull Bayou, which is the stream with the largest drainage area in Hot Springs National Park and which flows into Lake Hamilton (Petersen and Mott, 2002). Five or less bluntnose minnows (*Pimephales notatus*), golden redbreast (*Moxostoma erythrurum*), greenside darters (*Etheostoma blenniodes*), logperch (*Percina caprodes*), northern studfish (*Fundulus catenatus*), Ouachita madtoms, pirate perch (*Aphredoderus sayanus*), spotted bass (*Micropterus punctulatus*), and warmouth (*Lepomis gulosus*) were collected from the Bull Bayou site. Less than five creek chubsuckers (*Erimyzon oblongus*), grass carp (*Ctenopharyngodon idella*), and redear sunfish (*Lepomis microlophus*) were collected from other single sites. Most of these species typically occur in larger streams and rivers (bluntnose minnows, golden redbreast, and spotted bass) or in lower gradient, lowland streams (pirate perch, warmouth, and redear sunfish) (Robison and Buchanan, 1988).

Several species on the preliminary expected species list for Hot Springs National Park were not collected during 2003 and many of these species, while potentially present, are unlikely to be found within Hot Springs National Park (for reasons described in Robison and Buchanan, 1988). Twenty species typically occur in larger streams (table 5). Fifteen additional species were removed from the list because they are absent from or rare in the Ouachita River drainage or the part of the Ouachita River Basin near Hot Springs National Park (table 5).

Table 2. Number of fish collected at eight sampling sites within Hot Springs National Park, 2003.

[E, estimated; --, not collected; all fish were not counted at the two pond sites and presence (P) and absence (A) are used to denote occurrence; n/a, not applicable]

Common name	Scientific name	1	2	3	4	5	5	6	7	8
		Bull Bayou	Gulpha Creek tributary	Gulpha Creek tributary	Gulpha Creek	Gulpha Creek July	Gulpha Creek October	Gulpha Creek	Ricks Pond	Unnamed Pond
Bigeye shiner	<i>Notropis boops</i>	--	--	--	--	41	13	4	A	A
Blackspotted topminnow	<i>Fundulus olivaceus</i>	9	97	3	1	2	4	1	P	P
Bluegill	<i>Lepomis macrochirus</i>	4	6	--	9	1	1	--	P	P
Bluntnose minnow	<i>Pimephales notatus</i>	1	--	--	--	--	--	--	A	A
Central stoneroller	<i>Campostoma anomalum</i>	E70	45	59	33	34	35	5	A	A
Creek chub	<i>Semotilus atromaculatus</i>	--	3	8	1	8	4	18	A	A
Creek chubsucker	<i>Erimyzon oblongus</i>	--	3	--	--	--	--	--	A	A
Golden redbhorse	<i>Moxostoma erythrurum</i>	1	--	--	--	--	--	--	A	A
Grass carp	<i>Ctenopharyngodon idella</i>	--	--	--	--	--	--	--	P	A
Green sunfish	<i>Lepomis cyanellus</i>	4	34	3	2	1	--	--	P	P
Greenside darter	<i>Etheostoma blennioides</i>	5	--	--	--	--	--	--	A	A
Largemouth bass	<i>Micropterus salmoides</i>	2	2	--	6	--	1	--	P	P
Logperch	<i>Percina caprodes</i>	5	--	--	--	--	--	--	A	A
Longear sunfish	<i>Lepomis megalotis</i>	E70	--	--	34	13	27	5	A	A
Northern hog sucker	<i>Hypentelium nigricans</i>	4	--	--	10	8	16	8	A	A
Northern studfish	<i>Fundulus catenatus</i>	2	--	--	--	--	--	--	A	A
Orangebelly darter	<i>Etheostoma radiosum</i>	68	8	10	6	16	14	18	A	A
Ouachita madtom	<i>Noturus lachneri</i>	1	--	--	--	--	--	--	A	A
Pirate perch	<i>Aphredoderus sayanus</i>	1	--	--	--	--	--	--	A	A
Redear sunfish	<i>Lepomis microlophus</i>	--	--	--	2	--	--	--	A	P
Spotted bass	<i>Micropterus punctulatus</i>	3	--	--	--	--	--	--	A	A
Striped shiner	<i>Luxilus chrysocephalus</i>	5	--	--	24	--	37	3	A	A
Warmouth	<i>Lepomis gulosus</i>	1	--	--	--	--	--	--	A	A
Yellow bullhead	<i>Ameiurus natalis</i>	5	5	--	--	--	6	1	P	A
Number of species collected		19	9	5	11	9	11	9	6	5
Number of individuals collected		E261	203	83	128	124	158	63	n/a	n/a

Table 3. Percent relative abundance of fish collected at eight sampling sites within Hot Springs National Park, 2003.

[--, not collected; >, greater than; <, less than; fish sampling at Ricks Pond and the unnamed pond in Sleepy Hollow was qualitative and relative abundance was estimated for species collected there using these criteria—greater than 20.0 percent = most common (MC), 10.0 to 20.0 = common (C), 2.0 to 10.0 percent = least common (LC), less than 2.0 percent = rare (R)]

Common name	Scientific name	1	2	3	4	5	5	6	7	8
		Bull Bayou	Gulpha Creek tributary	Gulpha Creek tributary	Gulpha Creek	Gulpha Creek July	Gulpha Creek October	Gulpha Creek	Ricks Pond	Unnamed Pond
Bigeye shiner	<i>Notropis boops</i>	--	--	--	--	33.1	8.2	6.3	--	--
Blackspotted topminnow	<i>Fundulus olivaceus</i>	3.4	47.8	3.6	0.8	1.6	2.5	1.6	>20	<10
Bluegill	<i>Lepomis macrochirus</i>	1.5	3.0	--	7.0	0.8	0.6	--	>20	>20
Bluntnose minnow	<i>Pimephales notatus</i>	0.4	--	--	--	--	--	--	--	--
Central stoneroller	<i>Campostoma anomalum</i>	26.8	22.2	71.1	25.8	27.4	22.2	7.9	--	--
Creek chub	<i>Semotilus atromaculatus</i>	--	1.5	9.6	0.8	6.5	2.5	28.6	--	--
Creek chubsucker	<i>Erimyzon oblongus</i>	--	1.5	--	--	--	--	--	--	--
Golden redhorse	<i>Moxostoma erythrurum</i>	0.4	--	--	--	--	--	--	--	--
Grass carp	<i>Ctenopharyngodon idella</i>	--	--	--	--	--	--	--	<2	--
Green sunfish	<i>Lepomis cyanellus</i>	1.5	16.7	3.6	1.6	0.8	--	--	<10	<2
Greenside darter	<i>Etheostoma blennioides</i>	1.9	--	--	--	--	--	--	--	--
Largemouth bass	<i>Micropterus salmoides</i>	0.8	1.0	--	4.7	--	0.6	--	10-20	<10
Logperch	<i>Percina caprodes</i>	1.9	--	--	--	--	--	--	--	--
Longear sunfish	<i>Lepomis megalotis</i>	26.8	--	--	26.6	10.5	17.1	7.9	--	--
Northern hog sucker	<i>Hypentelium nigricans</i>	1.5	--	--	7.8	6.5	10.1	12.7	--	--
Northern studfish	<i>Fundulus catenatus</i>	0.8	--	--	--	--	--	--	--	--
Orangebelly darter	<i>Etheostoma radiosum</i>	26.1	3.9	12.0	4.7	12.9	8.9	28.6	--	--
Ouachita madtom	<i>Noturus lachneri</i>	0.4	--	--	--	--	--	--	--	--
Pirate perch	<i>Aphredoderus sayanus</i>	0.4	--	--	--	--	--	--	--	--
Redear sunfish	<i>Lepomis microlophus</i>	--	--	--	1.6	--	--	--	--	<10
Spotted bass	<i>Micropterus punctulatus</i>	1.1	--	--	--	--	--	--	--	--
Striped shiner	<i>Luxilus chrysocephalus</i>	1.9	--	--	18.8	--	23.4	4.8	--	--
Warmouth	<i>Lepomis gulosus</i>	0.4	--	--	--	--	--	--	--	--
Yellow bullhead	<i>Ameiurus natalis</i>	1.9	2.5	--	--	--	3.8	1.6	<10	--

Table 4. Abundance classification of fish collected at eight sampling sites within Hot Springs National Park, 2003.

[MC, most common (greater than 20.0 percent); C, common (10.0 to 20.0 percent); LC, least common (2.0 to 10.0 percent); R, rare (less than 2.0 percent); --, not collected; based on relative abundance and semiquantitative sampling, fish sampling at Ricks Pond and the pond in Sleepy Hollow was qualitative and relative abundance was estimated for species collected there]

Common name	Scientific name	1	2	3	4	5	5	6	7	8
		Bull Bayou	Gulpha Creek tributary	Gulpha Creek tributary	Gulpha Creek	Gulpha Creek July	Gulpha Creek October	Gulpha Creek	Ricks Pond	Unnamed Pond
Bigeye shiner	<i>Notropis boops</i>	--	--	--	--	MC	LC	LC	--	--
Blackspotted topminnow	<i>Fundulus olivaceus</i>	LC	MC	LC	R	R	LC	R	MC	LC
Bluegill	<i>Lepomis macrochirus</i>	R	LC	--	LC	R	R	--	MC	MC
Bluntnose minnow	<i>Pimephales notatus</i>	R	--	--	--	--	--	--	--	--
Central stoneroller	<i>Campostoma anomalum</i>	MC	MC	MC	MC	MC	MC	LC	--	--
Creek chub	<i>Semotilus atromaculatus</i>	--	R	LC	R	LC	LC	MC	--	--
Creek chubsucker	<i>Erimyzon oblongus</i>	--	R	--	--	--	--	--	--	--
Golden redhorse	<i>Moxostoma erythrurum</i>	R	--	--	--	--	--	--	--	--
Grass carp	<i>Ctenopharyngodon idella</i>	--	--	--	--	--	--	--	R	--
Green sunfish	<i>Lepomis cyanellus</i>	R	C	LC	R	R	--	--	LC	R
Greenside darter	<i>Etheostoma blennioides</i>	R	--	--	--	--	--	--	--	--
Largemouth bass	<i>Micropterus salmoides</i>	R	R	--	LC	--	R	--	C	LC
Logperch	<i>Percina caprodes</i>	R	--	--	--	--	--	--	--	--
Longear sunfish	<i>Lepomis megalotis</i>	MC	--	--	MC	C	C	LC	--	--
Northern hog sucker	<i>Hypentelium nigricans</i>	R	--	--	LC	LC	C	C	--	--
Northern studfish	<i>Fundulus catenatus</i>	R	--	--	--	--	--	--	--	--
Orangebelly darter	<i>Etheostoma radiosum</i>	MC	LC	C	LC	C	LC	MC	--	--
Ouachita madtom	<i>Noturus lachneri</i>	R	--	--	--	--	--	--	--	--
Pirate perch	<i>Aphredoderus sayanus</i>	R	--	--	--	--	--	--	--	--
Redear sunfish	<i>Lepomis microlophus</i>	--	--	--	R	--	--	--	--	LC
Spotted bass	<i>Micropterus punctulatus</i>	R	--	--	--	--	--	--	--	--
Striped shiner	<i>Luxilus chrysocephalus</i>	R	--	--	C	--	MC	LC	--	--
Warmouth	<i>Lepomis gulosus</i>	R	--	--	--	--	--	--	--	--
Yellow bullhead	<i>Ameiurus natalis</i>	R	LC	--	--	--	LC	R	LC	--

Table 5. List of fish species expected to occur at Hot Springs National Park.

[Preliminary list, expected species list provided by National Park Service; Revised list, list compiled by USGS after review of pertinent literature; USGS, collected by USGS in 2001-2003; 0, unexpected, park is outside of species' range or lacks appropriate habitat; 1, species is expected within park; 2, collected. Comments based on information from Robison and Buchanan (1988)]

Family name	Scientific name	Common name	Pre- liminary list	Revised list	USGS	Comment
Amiidae	<i>Amia calva</i>	Bowfin	1	0	No	Primarily a lowland species
Anguillidae	<i>Anguilla rostrata</i>	American eel	1	0	No	Not reported from the Ouachita River upstream from Lake Catherine
Aphredoderidae	<i>Aphredoderus sayanus</i>	Pirate perch	1	2	Yes	
Atherinidae	<i>Labidesthes sicculus</i>	Brook silverside	1	1	No	
Catostomidae	<i>Ictiobus cyprinellus</i>	Bigmouth buffalo	1	0	No	Prefers large streams and rivers
Catostomidae	<i>Erimyzon oblongus</i>	Creek chubsucker	1	2	Yes	
Catostomidae	<i>Moxostoma erythrurum</i>	Golden redhorse	1	2	Yes	
Catostomidae	<i>Hypentelium nigricans</i>	Northern hog sucker	1	2	Yes	
Catostomidae	<i>Ictiobus bubalus</i>	Smallmouth buffalo	1	0	No	Prefers large streams and rivers
Catostomidae	<i>Minytrema melanops</i>	Spotted sucker	1	1	No	
Centrarchidae	<i>Pomoxis nigromaculatus</i>	Black crappie	1	1	No	
Centrarchidae	<i>Lepomis macrochirus</i>	Bluegill	1	2	Yes	
Centrarchidae	<i>Lepomis cyanellus</i>	Green sunfish	1	2	Yes	
Centrarchidae	<i>Micropterus salmoides</i>	Largemouth bass	1	2	Yes	
Centrarchidae	<i>Lepomis megalotis</i>	Longear sunfish	1	2	Yes	
Centrarchidae	<i>Lepomis microlophus</i>	Redear sunfish	1	2	Yes	
Centrarchidae	<i>Ambloplites ariommus</i>	Shadow bass	1	0	No	Not reported from this part of the Ouachita River Basin
Centrarchidae	<i>Micropterus dolomieu</i>	Smallmouth bass	1	1	No	
Centrarchidae	<i>Micropterus punctulatus</i>	Spotted bass	1	2	Yes	
Centrarchidae	<i>Lepomis gulosus</i>	Warmouth	1	2	Yes	
Centrarchidae	<i>Pomoxis annularis</i>	White crappie	1	1	No	

Table 5. List of fish species expected to occur at Hot Springs National Park.—Continued

[Preliminary list, expected species list provided by National Park Service; Revised list, list compiled by USGS after review of pertinent literature; USGS, collected by USGS in 2001-2003; 0, unexpected, park is outside of species' range or lacks appropriate habitat; 1, species is expected within park; 2, collected. Comments based on information from Robison and Buchanan (1988)]

Family name	Scientific name	Common name	Pre-liminary list	Revised list	USGS	Comment
Clupeidae	<i>Dorosoma cepedianum</i>	Gizzard shad	1	1	No	
Clupeidae	<i>Alosa chrysochloris</i>	Skipjack herring	1	0	No	Restricted to larger rivers and major tributaries
Clupeidae	<i>Dorosoma petenense</i>	Threadfin shad	1	0	No	Typically in moderate to large rivers and impoundments
Cyprinidae	<i>Notropis boops</i>	Bigeye shiner	1	2	Yes	
Cyprinidae	<i>Cyprinella venusta</i>	Blacktail shiner	1	0	No	Almost entirely absent from the Ouachita Mountains
Cyprinidae	<i>Pimephales notatus</i>	Bluntnose minnow	1	2	Yes	
Cyprinidae	<i>Pimephales vigilax</i>	Bullhead minnow	1	0	No	Prefers large streams and rivers
Cyprinidae	<i>Notropis percobromus</i> ¹	Carmine shiner ¹	1	0	No	Not reported from this part of the Ouachita River Basin
Cyprinidae	<i>Campostoma anomalum</i>	Central stoneroller	1	2	Yes	
Cyprinidae	<i>Cyprinus carpio</i>	Common carp	1	2	No	
Cyprinidae	<i>Semotilus atromaculatus</i>	Creek chub	1	2	Yes	
Cyprinidae	<i>Notropis atherinoides</i>	Emerald shiner	1	0	No	Prefers medium to large streams
Cyprinidae	<i>Pimephales promelas</i>	Fathead minnow	1	1	No	
Cyprinidae	<i>Notemigonus crysoleucas</i>	Golden shiner	1	1	No	
Cyprinidae	<i>Carassius auratus</i>	Goldfish	1	1	No	
Cyprinidae	<i>Ctenopharyngodon idella</i>	Grass carp	1	2	Yes	
Cyprinidae	<i>Erimystax x-punctatus</i>	Gravel chub	1	0	No	Prefers medium to large streams
Cyprinidae	<i>Hybopsis amnis</i>	Pallid shiner	1	0	No	Prefers medium to large streams
Cyprinidae	<i>Lythrurus umbratilis</i>	Redfin shiner	1	1	No	
Cyprinidae	<i>Cyprinella whipplei</i>	Steelcolor shiner	1	1	No	
Cyprinidae	<i>Luxilus chrysocephalus</i>	Striped shiner	1	2	Yes	
Cyprinidae	<i>Pimephales tenellus</i>	Western slim minnow	1	1	No	

Table 5. List of fish species expected to occur at Hot Springs National Park.—Continued

[Preliminary list, expected species list provided by National Park Service; Revised list, list compiled by USGS after review of pertinent literature; USGS, collected by USGS in 2001-2003; 0, unexpected, park is outside of species' range or lacks appropriate habitat; 1, species is expected within park; 2, collected. Comments based on information from Robison and Buchanan (1988)]

Family name	Scientific name	Common name	Pre-liminary list	Revised list	USGS	Comment
Esocidae	<i>Esox niger</i>	Chain pickerel	1	1	No	
Esocidae	<i>Esox americanus</i>	Grass pickerel	1	1	No	
Fundulidae	<i>Fundulus olivaceus</i>	Blackspotted topminnow	1	2	Yes	
Fundulidae	<i>Fundulus notatus</i>	Blackstripe topminnow	1	0	No	Not reported from this part of the Ouachita River Basin
Fundulidae	<i>Fundulus catenatus</i>	Northern studfish	1	2	Yes	
Hiodontidae	<i>Hiodon alosoides</i>	Goldeye	1	0	No	Restricted to larger rivers and major tributaries
Hiodontidae	<i>Hiodon tergisus</i>	Mooneye	1	0	No	Restricted to larger rivers and major tributaries
Ictaluridae	<i>Ameiurus melas</i>	Black bullhead	1	1	No	
Ictaluridae	<i>Ictalurus furcatus</i>	Blue catfish	1	0	No	Mainly an inhabitant of big rivers
Ictaluridae	<i>Noturus miurus</i>	Brindled madtom	1	1	No	
Ictaluridae	<i>Ameiurus nebulosus</i>	Brown bullhead	1	0	No	Uncommon and prefers quiet, vegetated waters
Ictaluridae	<i>Ictalurus punctatus</i>	Channel catfish	1	2	No	
Ictaluridae	<i>Pylodictis olivaris</i>	Flathead catfish	1	0	No	Mostly absent from headwater streams, can be placed in ponds
Ictaluridae	<i>Noturus nocturnus</i>	Freckled madtom	1	1	No	
Ictaluridae	<i>Noturus eleutherus</i>	Mountain madtom	1	0	No	Not reported from this part of the Ouachita River Basin
Ictaluridae	<i>Noturus lachneri</i>	Ouachita madtom	1	2	Yes	
Ictaluridae	<i>Noturus albater</i>	Ozark madtom	1	0	No	Absent from the Ouachita Mountains
Ictaluridae	<i>Noturus gyrinus</i>	Tadpole madtom	1	1	No	
Ictaluridae	<i>Ameiurus natalis</i>	Yellow bullhead	1	2	Yes	
Lepisosteidae	<i>Lepisosteus osseus</i>	Longnose gar	1	0	No	Generally restricted to Ouachita River in this part of the basin
Lepisosteidae	<i>Lepisosteus oculatus</i>	Spotted gar	1	0	No	Generally absent from small streams in the Ouachita Mountains
Moronidae	<i>Morone saxatilis</i>	Striped bass	1	0	No	Restricted to larger rivers and major tributaries

Table 5. List of fish species expected to occur at Hot Springs National Park.—Continued

[Preliminary list, expected species list provided by National Park Service; Revised list, list compiled by USGS after review of pertinent literature; USGS, collected by USGS in 2001-2003; 0, unexpected, park is outside of species' range or lacks appropriate habitat; 1, species is expected within park; 2, collected. Comments based on information from Robison and Buchanan (1988)]

Family name	Scientific name	Common name	Pre-liminary list	Revised list	USGS	Comment
Moronidae	<i>Morone chrysops</i>	White bass	1	0	No	Prefers moderate to large rivers
Percidae	<i>Etheostoma zonale</i>	Banded darter	1	1	No	
Percidae	<i>Percina maculata</i>	Blackside darter	1	0	No	Almost entirely absent from the Ouachita Mountains
Percidae	<i>Etheostoma chlorosomum</i>	Bluntnose darter	1	1	No	
Percidae	<i>Percina copelandi</i>	Channel darter	1	0	No	Mostly absent from small and moderate-sized creeks
Percidae	<i>Etheostoma collettei</i>	Creole darter	1	1	No	
Percidae	<i>Etheostoma proeliare</i>	Cypress darter	1	1	No	
Percidae	<i>Percina sciera</i>	Dusky darter	1	0	No	Mostly absent from the Ouachita Mountains
Percidae	<i>Etheostoma blennioides</i>	Greenside darter	1	2	Yes	
Percidae	<i>Etheostoma histrio</i>	Harlequin darter	1	0	No	In larger streams, mostly absent from the Ouachita Mountains
Percidae	<i>Etheostoma nigrum</i>	Johnny darter	1	0	No	Not reported from this part of the Ouachita River Basin
Percidae	<i>Percina caprodes</i>	Loggerhead	1	2	Yes	
Percidae	<i>Etheostoma radiosum</i>	Orangebelly darter	1	2	Yes	
Percidae	<i>Etheostoma pallidiorum</i>	Paleback darter	1	0	No	Not reported from this part of the Ouachita River Basin
Percidae	<i>Etheostoma whipplei</i>	Redfin darter	1	0	No	Not reported from this part of the Ouachita River Basin
Percidae	<i>Etheostoma stigmaeum</i>	Speckled darter	1	1	No	
Petromyzontidae	<i>Ichthyomyzon castaneus</i>	Chestnut lamprey	1	1	No	
Petromyzontidae	<i>Ichthyomyzon gagei</i>	Southern brook lamprey	1	0	No	Not reported from this part of the Ouachita River Basin
Poeciliidae	<i>Gambusia affinis</i>	Western mosquitofish	1	2	No	
Polyodontidae	<i>Polyodon spathula</i>	Paddlefish	1	0	No	Restricted to larger rivers and major tributaries
Sciaenidae	<i>Aplodinotus grunniens</i>	Freshwater drum	1	0	No	Mostly expected in large rivers and impoundments

¹Formerly referred to as rosyface shine (*Notropis rubellus*).

12 The Fishes of Hot Springs National Park, Arkansas, 2003

Table 6. A list of fish collected in two inventories at Hot Springs National Park.

[X, collected; --, not collected]

Common name	Scientific name	2003	Buchanan and others (1978)
Bigeye shiner	<i>Notropis boops</i>	X	--
Blackspotted topminnow	<i>Fundulus olivaceus</i>	X	X
Bluegill	<i>Lepomis macrochirus</i>	X	X
Bluntnose minnow	<i>Pimephales notatus</i>	X	--
Central stoneroller	<i>Campostoma anomalum</i>	X	X
Channel catfish	<i>Ictalurus punctatus</i>	--	X
Common carp	<i>Cyprinus carpio</i>	--	X
Creek chub	<i>Semotilus atromaculatus</i>	X	X
Creek chubsucker	<i>Erimyzon oblongus</i>	X	--
Golden redhorse	<i>Moxostoma erythrurum</i>	X	X
Grass carp	<i>Ctenopharyngodon idella</i>	X	--
Green sunfish	<i>Lepomis cyanellus</i>	X	X
Greenside darter	<i>Etheostoma blennioides</i>	X	--
Largemouth bass	<i>Micropterus salmoides</i>	X	X
Logperch	<i>Percina caprodes</i>	X	--
Longear sunfish	<i>Lepomis megalotis</i>	X	X
Northern hog sucker	<i>Hypentelium nigricans</i>	X	X
Northern studfish	<i>Fundulus catenatus</i>	X	X
Orangebelly darter	<i>Etheostoma radiosum</i>	X	X
Ouachita madtom	<i>Noturus lachneri</i>	X	--
Pirate perch	<i>Aphredoderus sayanus</i>	X	--
Redear sunfish	<i>Lepomis microlophus</i>	X	--
Spotted bass	<i>Micropterus punctulatus</i>	X	--
Striped shiner	<i>Luxilus chrysocephalus</i>	X	--
Warmouth	<i>Lepomis gulosus</i>	X	--
Western mosquitofish	<i>Gambusia affinis</i>	--	X
Yellow bullhead	<i>Ameiurus natalis</i>	X	X
Total number of species		24	15

Comparison to Past Inventories

Some differences existed between the assemblages (groups of species) collected in 1978 (Buchanan and others, 1978) and in 2003. Twelve species not previously collected from Hot Springs National Park were collected in 2003 (table 6). Three species collected in 1978 were not collected in 2003; however, each of these three species is tolerant of degradation (Robison and Buchanan, 1988) and the absence of these species does not indicate a change in environmental conditions within Hot Springs National Park. These species are the channel catfish (*Ictalurus punctatus*), common carp (*Cyprinus carpio*), and western mosquitofish (*Gambusia affinis*). A total of 27 species have been collected from the park.

Species of Interest

Although no species collected in 2003 were federally-listed threatened or endangered species (U.S. Fish and Wildlife Service, 2004), two species collected at Hot Springs National Park may be of special interest to National Park Service managers and others. One collected species (Ouachita madtom) is endemic to the Ouachita Mountains. This species previously has been collected from only a few locations in the Ouachita River Basin (Robison and Buchanan, 1988), including one location on a tributary of Gulpha Creek about 2 kilometers south of the southern boundary of Hot Springs National Park (Petersen and Mott, 2003). The Ouachita madtom is listed as a species of special concern by the Arkansas Natural Heritage Commission because it appears to be rare or uncommon (Cindy Osborne, Arkansas Natural Heritage Commission, oral commun., 2000). One individual was collected from Bull Bayou in 2003. The grass carp, which is a native of eastern Asia, is present in Ricks Pond; one individual was collected and no other grass carp were observed. The introduction of grass carp into the United States is a controversial issue because of possible (but undocumented) harmful effects on native species and habitats (Pflieger, 1997).

Summary

Fish were sampled at eight sites in July and October of 2003. Six sites were sampled on Bull Bayou, Gulpha Creek, and tributaries of Gulpha Creek. Two ponds were sampled. Fish were sampled using conventional electrofishing equipment. Because the streams were small and wadeable, a battery powered backpack-electrofishing unit was used to collect fish at all stream sites. An electrofishing boat was used to sample fish in the two ponds. More than 1,020 fish were collected and identified at the eight sampling sites. These individuals represented 24 species and 17 genera. The number of species per sampling site ranged from 5 to 19 (at the site on Bull Bayou).

The three most common species (central stoneroller, orangebelly darter, and longear sunfish) are typical of habitats found in streams of Hot Springs National Park. These three species are typical of small upland streams and high-gradient creeks.

An expected species list incorrectly listed 35 species because of incorrect species range or habitat requirements. Upon revising this list, the inventory yielded 24 of the 51 species (47 percent). Twenty-seven additional species not collected in 2003 may occur at Hot Springs National Park for two primary reasons—because the species had been collected previously at the park, or because the known species range and habitats found at the park are suitable for these species.

None of the species collected in 2003 were federally-listed threatened or endangered species. However, two species collected at Hot Springs National Park may be of special interest to National Park Service managers and others. One collected species (Ouachita madtom) is endemic to the Ouachita Mountains and previously has been collected from only a few locations in the Ouachita River Basin. A single grass carp was collected from Ricks Pond. The introduction of grass carp into the United States is a controversial issue because of possible (but undocumented) harmful effects on native species and habitats.

References

- Boetsch, J., DeBacker, M., Hughes, P., Peitz, D., Thomas, L., Wagner, G., and Witcher B., 2000, A study plan to inventory vascular plants and vertebrates: Heartland Network, National Park Service.
- Buchanan, T.M., Houston, James, Nix, J.F., Meyer, R.L., and Schmitz, E.H., 1978, A limnological study of Ricks Pond and the Gulpha Creek drainage in Garland County, Arkansas: Arkansas Water Resources Research Publication No. 62, 109 p.
- Fenneman, N.M., 1938, Physiography of eastern United States: New York, McGraw-Hill, 689 p.
- National Park Service 2004, Hot Springs National Park, Arkansas: accessed October 3, 2004 at www.nps.gov/hosp/index.htm
- Nelson, J.S., Crossman, E.J., Espinoza-Perez, Hector, Findley, L.T., Gilbert, C.R., Lea, R.N., and Williams, J.D., 2004, Common and scientific names of fishes from the United States, Canada, and Mexico: Bethesda, Maryland, American Fisheries Society, Special Publication 29, 386 p.
- Petersen, J.C. and Mott D.N., 2002, Hot Springs National Park, Arkansas, water resources scoping report: National Park Service Technical Report NPS/NRWRD/NRTR-2002/301, 26 p.
- Pflieger, W.L., 1997, The fishes of Missouri (revised edition): Jefferson City, Missouri, Missouri Department of Conservation, 372 p.
- Robison, H.W. and Buchanan, T.M., 1988, Fishes of Arkansas: Fayetteville, Arkansas. University of Arkansas Press, 536 p.
- U.S. Census Bureau, 2005, Arkansas quick facts: accessed May 12, 2005 at <http://quickfacts.census.gov/qfd/states/05/0533400.html>
- U.S. Fish and Wildlife Service, 2004, Threatened and endangered animals and plants: accessed March 24, 2004 at <http://endangered.fws.gov/wildlife.html>.