ICHTHYOLOGICAL INVESTIGATIONS
IN
SHILOH NATIONAL MILITARY PARK



BY

Lowell K. Higgins

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HARDIN COUNTY, TENNESSEE

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National Park Service

Shiloh National Military Park

Shiloh, Tennessee 38376

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Dedicated to the memory of my father, the late Leo A. Higgins, who instilled in me the love and respect of nature and insisted that I attend the University of Missouri to learn more about our world of natural wonders.

PREFACE

This study and report* was initiated to meet, in part, the administrative requirement set forth in the National Park Service "Natural Resource Management Guideline (NPS-77)" to inventory and monitor all natural resources on lands administered by the National Park Service. It was **designed to be a working document of baseline data** for comparison with future monitoring within the park, **and for park administrators to consider before making any land use decisions that may affect water quality and aquatic ecosystems.**

In addition, this research provides baseline information for West Tennessee ichthyologists research. Perhaps it will also inspire other small historic parks to begin natural resources inventories. Who knows what natural secrets await discovery in other parks such as this Civil War battlefield where administration of the land has been for its historic significance, while the natural environment was largely ignored?

This report will also serve to justify the partial support received from National Park Service "Small Park" and "Natural Resource" funding.

The research was initiated, sponsored, and published locally by the United States Department of the Interior, National Park Service, Shiloh National Military Park, under the direction of Park Superintendent Haywood S. Harrell and Chief Park Ranger Paul H. Hawke.

***Portions of this report will be published in a scientific journal** with Dr. Jack Grubaugh, University of Memphis, graduate student Laurie Hart, University of Memphis, and the author of this document as co-authors.

A WORD OF CAUTION TO FUTURE RESEARCH PERSONNEL

Poisonous cottonmouth watermoccasins were frequently encountered during this study. This semi-aquatic snake was especially abundant in the Owl Creek Beaver Ponds area of the park, but it was also encountered even in the upper sections of small branches. Their color tends to blend with the ground, and they have an annoying habit of remaining motionless until persons have entered the "danger zone," so they are difficult to see in time to avoid them.

Because of this lurking hazard, all personnel working outside, especially in the Owl Creek Beaver Ponds area, and around lower Tilghman and lower Shiloh Branch areas, should use caution by watching their step and reach. Researchers should be particularly cautious about reaching under undercut banks as that is where cottonmouths tend to stay along streams when they are not sunning on a rotten log across a stream. They also like to lie hidden in grass near the waters edge.

Poisonous copperheads are also present in the park and should be watched for, however, none were encountered during this research.

Persons must be reminded that **all native wildlife within the park is protected by Federal law and must not be molested (this includes poisonous snakes).**



Photo K-28. Cottonmouth from Shiloh Branch below Rea Spring. Their color varies widely, from olive, brown, or dull black unpatterned, to conspicuously patterned.

ACKNOWLEDGEMENTS

I would like to thank Shiloh National Military Park Superintendent **Haywood Harrell** and Chief Ranger **Paul Hawke** for supporting this research. Without their support I would not have been able to take the time away from other duties to accomplish this task.

I am deeply indebted to my fellow park rangers **(Stacy Allen, Dennis Turnbo, Joe Davis, and Brian McCutchen)** for taking over some of my park protection duties so that I could devote more time to the project.

The seeds for this project were planted by **the late George A. Reaves III**, former Chief Ranger of Shiloh. He recognized the need and encouraged me to investigate the park streams water quality. **Brendhan Zubricki**, from the Southeast Regional Office, helped me start water quality monitoring by supplying me with a Hydrolab, and by making a trip to Shiloh to show me how to use it. It was as a result of water quality monitoring that I realized the park streams were teeming with life (both macroinvertebrate and fish) and more research was needed.

I am also deeply indebted to **Dr. Jack Grubaugh, PhD,** Assistant Professor of Biology at the University of Memphis for helping me to understand just how unique and important the park was for stream research, because most of West Tennessee's waterways have been polluted to at least some extent or altered by human habitation. His enthusiasm was contagious, and his guidance with scientific matters was extremely valuable. His graduate student, **Laurie Hart,** began aquatic macroinvertebrate research within the park which so far has turned up at least 7 new Tennessee state caddisfly records and a half dozen or more significant caddisfly range extensions. More discoveries are expected. She will be publishing a masters degree thesis on her research, and the three of us will be publishing our combined findings in a scientific journal soon.

Dr. Grubaugh also brought my attention to the book **"THE FISHES OF TENNESSEE" by David A. Etnier and Wayne C. Starnes**. It had been 39 years since I had taken a college course in Ichthyology, so the book was essential. It was the best and most complete publication on the subject that I had seen. After a brief meeting and later correspondence with **Professor David Etnier, PhD,** from the University of Tennessee (the ichthyologist who discovered the snail darter which was "the center of world renowned controversy"-see page 588 of Etnier and Starnes, 1993), I was enlightened on some specific things to look for. He identified the largescale stoneroller for me (it was not the central stoneroller mentioned in his book as the only stoneroller in Tennessee) and helped me to discover an additional species (the lake chubsucker). (The lake chubsucker was very similar to the creek chubsucker. I had

mistakenly identified it, but Dr. Etnier's suggestions made me take another look at the fish under the microscope).

I am very grateful to the individuals who actually helped me with sampling the streams: **David Scott**, a University of Memphis pre-med student, park volunteer. **Bruce Beck**, a Hardin County school teacher and seasonal park resource management employee, was on the other end of the seine when we first discovered the dusky darter and creek chubsucker in the park. **Kristina Edwards**, a park volunteer, assisted me in seining. **Fran Bening**, a seasonal park interpreter, was on the other end of the seine when we first discovered the bluntface shiner and steelcolor shiner in Owl Creek. **Dr. Bill Gutske, PhD**, Associate Professor of Herpetology at the University of Memphis, was on the other end of the seine when we first discovered the yellow bullhead. His young **son Bill "Bert"** dipnetted the first pirate perch found in the park. **Dr. Bill Simco, PhD**, and his **Ichthyology class from the University of Memphis**, helped seine and electroshock the Owl Creek Beaver Ponds; and **Dr. Kurt Maier, PhD**, Assistant Professor of Aquatic Ecotoxiclogy at the University of Memphis, supplied, and gave instructions on, the electroshocker. **Dr Jack Grubaugh**, took time out from his busy schedule to help me seine the streams. He was on the other end of the seine when we discovered for the first time in the park the mimic shiner, bullhead minnow, freshwater drum, redear sunfish, gizzard shad, yellow perch, and ribbon shiner. **Gary Pritts**, a park volunteer with a Masters Degree in Herpetology, not only assisted me with the final portions of the fish research, but also began research for a reptile and amphibian park baseline inventory (It is our intentions for him to publish his findings in a scientific journal). He was on the other end of the seine when we first discovered in the park the sauger, longnose gar, lake chubsucker, flier, northern hogsucker, and bluntface shiner. And, **Dennis Turnbo** helped me to seine during cold weather when it was hard to find interested persons.

Stacy Allen, Park Historian for Shiloh, helped me reduce a whole library of park history into four paragraphs. **Lisa Roberson**, a seasonal cultural resource intern and park volunteer, was of great help in getting my "Ichthyological Baseline Inventory And Species Distribution" chart on the computer, and assisted me with other computer challenges. **Brian McCutchen** helped me with recurrent computer problems. The final draft was proof read by **Dr. Jack Grubaugh**, **my wife Ellen**, and **Bruce Beck**.

I would also like to thank park neighbors **Jamie Fullwood**, owner of Owl Creek Sod Farms, and **Jimmy Cooksey**, private land owner, for allowing us access across their property to Owl Creek and the lower section of Shiloh Branch.

Others, such as **Shelia Colwell**, **Teresa Leibfreid**, **Kelly Watson**, and **Megan Greiner**, all National Park Service support staff at the

Atlanta Federal Center, voiced their support and helped me obtain partial funding for the research.

I am indeed grateful to the above mentioned persons for not only helping with this project, but also for helping me to conclude the last three years of my 39 year National Park Service career with an interesting and exciting adventure into the unknown. It was fun and very rewarding. And, I believe the research will be of lasting significant value to the scientific community, as well as to the National Park Service and Shiloh National Military Park. Discovery of the very rich aquatic biodiversity within Shiloh National Military Park may have made scientific history!

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ABOUT THE AUTHOR

The primary researcher and author of this document obtained a Bachelor of Science Degree in Wildlife Conservation and Management at the University of Missouri in 1959. He began a 39 year career with the National Park Service the same year. He has served as a park ranger naturalist, tour leader, park ranger, chief ranger, and resource management specialist. His career has taken him to Yellowstone National Park, Joshua Tree National Monument, Carlsbad Caverns National Park, Petrified Forest National Park, Natchez Trace Parkway, Chickamauga-Chattanooga National Military Park, Great Smoky Mountains National Park, and Shiloh National Military Park.



PHOTO P-02. The author with an exotic "grass carp" or white amur, Ctenopharyngodon idella (Valenciennes), taken from Shiloh's historic Bloody Pond. Several were introduced as fingerlings into the small shallow spring fed historic pond for aquatic vegetation control which had been a problem. The experiment was very successful.

The historic pond is isolated from park streams, so there is no chance for an accidental introduction into natural habitat. All fish in Bloody Pond were introduced for cultural resource management purposes, were not a part of the natural environment, and were not considered in this study.

Author x

PHOTOGRAPHY

EXPLANATION

The following 97 photographs are dispersed where appropriate throughout this document. All but those where the author is in the photograph were taken by the author and are the property of the National Park Service.

Most of the photographs were taken with a Pentax ME single lens reflex camera equipped with a SMC Pentax-M macro 1:4 50 mm lens, using Kodak Royal Gold ISO 1000 or Kodak Gold Max ISO 800 color print film under natural light conditions. All but three of the fish portraits were taken of live specimens in a 3.8 liter (1 gal) aquarium using no lens filters. The three exceptions were too large for the aquarium. Most of the smaller fish are shown larger than life size.

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ABSTRACT

From January 1995 through December 1997, the small spring fed streams that originate within Shiloh National Military Park in West Tennessee were surveyed to develop a baseline inventory for fish species in the park. This was the first aquatic research to be done in this unique and protected area. Results from seining the 13 streams (3 of the 13 were included as 1 in the "Owl Creek Beaver Ponds") totaling approximately 13.7 km (8.5 mi) within the 1604.8 ha (3,962.5 acres) park were astounding. Fifty species of small fish, representing 10 orders, 14 families, and 35 genera, were identified. All were native species except for a single specimen of 1 introduced species (Yellow Perch, Perca flavescens).

For comparison, a 1990 study done in the 205,740 ha (508,000 acres) Great Smoky Mountains National Park in East Tennessee revealed a park ichthyofauna of 74 native and 5 introduced fish species (Simbeck, 1990). The park contains 333 streams which total 1,181 fishable km (734 mi) and is said to have a greater variety of freshwater species of fish than any other National Park (Lennon, 1962). [Unfortunately, 32 species appear to have been extirpated from one park stream from intentional poisoning of waters to "improve" habitat for rainbow trout, which is a non-native gamefish and from the impoundment of the lowest 4.2 km (2.6 mi) of the same stream by a dam outside the park. Ten species appear to have been extirpated from the park (Simbeck, 1990)].

In Shiloh, none of the 13.7 km (8.5 mi) of streams could be considered "fishable" because they are quite small, and the few "sport" fish in these small streams are generally tiny. Most of the fish sampled ranged from 35 mm (1.4 in) to 90 mm (3.5 in) total length. The largest specimen collected was a 295 mm (11.6 in) gizzard shad behind a beaver dam in Riverbottoms Branch. The largest gamefish collected was a 270 mm (10.6 in) sauger at the same location. The largest stream fish collected was a 190 mm (7.5 in) northern hogsucker in lower Shiloh Branch.

No endemic, rare, or endangered species was found. However, information gathered in this research indicates 21 of the 50 species are new distribution records for the state as recorded in Etnier and Starnes 1993 authoritative book "THE FISHES OF TENNESSEE." Three species, the lake chubsucker, Erimyzon sucetta; the flier, Centrarcus macropterus; and the dollar sunfish, Lepomis marginatus; were significant location discoveries. No dollar sunfish was known to exist (until now) on the Tennessee River drainage south (upstream) of about mid-state, except for a reported isolated population in the area of Pickwick Lake near the Alabama State Line. Until the discovery of the lake chubsucker and the flier in the park, none were known to exist in the entire Tennessee River Drainage, except along the Big Sandy River System which empties into the Tennessee River at Paris Landing State Park near

the Kentucky State Line. The lake chubsucker was known in only 8 locations in the State of Tennessee. "It would appear to be very uncommon and perhaps extirpated from many habitats altered by agricultural practices" (Etnier and Starnes, 1993).

Also collected within the park was a record size brown madtom, Noturus phaeus. Its total length measured 155 mm (6.1 in). The largest specimen known until now was 150 mm (5.9 in) (Etnier and Starnes, 1993, page 326).

Although no endemic, rare, or endangered fish species was discovered, analysis of this and other related research concludes the streams originating within Shiloh National Military Park are abundantly biologically diverse and have intact ecosystems which are themselves rare and endangered. They are worthy of continued preservation and considerably more scientific study.

INTRODUCTION

ABOUT THE PARK AND THE NEED FOR STUDY

Shiloh National Military Park was established on December 27, 1894 to preserve and commemorate a great American Civil War battlefield. Therefore, one would not normally think of it as a wildlife sanctuary. The park had been managed for the past 100 years for its historical significance. The park Resource Management Plan recognized a need and called for aquatic research, and in 1991 the National Park Service Natural Resources Management Guideline (NPS-77) mandated (among other things) natural resources baseline inventory and monitoring, but it was not until the spring of 1994 that special NRPP small park funding from the National Park Service, Southeast Regional Office made it possible to begin "water quality monitoring." No aquatic study had ever been made in the park, so there was no knowledge of what might exist. Excitement and astonishment began to grow as the research progressed and the secrets of Shiloh's unexpected abundant biodiversity began to be revealed.

A BRIEF ON THE PARK'S HISTORICAL SIGNIFICANCE

The Tennessee River in this area was the main route for commercial transportation of goods during the mid-1800's. Pittsburg Landing, now the location of Shiloh National Military Park headquarters and National Cemetery, was a port for steamboats to unload and load goods to and from Corinth, Mississippi which was about 35.4 km (22 mi) by dirt road to the south. It was "high ground," well above river flood stage. During extreme low water, steamboats could not navigate much farther upstream (south), so Pittsburg Landing was the most reliable year around river port in the vicinity.

In March 1862, Union General Ulysses S. Grant brought his Army of the Tennessee, about 40,000 strong, up the Tennessee River by steamboat. The size of the fleet that ascended the Tennessee River to Pittsburg Landing was unparalleled in American history. There were 167 vessels in the fleet; 153 steamers and 14 gunboats (Alldredge, Spottswood, Anderson, Goff, and LaForge, 1937). Since it was the rainy season and the countryside was flooded, Grants purpose was to camp on the "high ground" on farmland in the vicinity of Pittsburg Landing and await the arrival of General Don Carlos Buell's Army of the Ohio. The combined forces would then march to Corinth and seize the strategic intersection of the Memphis and Charleston, and the Mobile and Ohio Railroads.

Confederate General Albert Sidney Johnston realized what was about to happen and moved his Army of the Mississippi from his defensive position at Corinth to Pittsburg Landing in an offensive attempt to defeat Grant's army before Buell arrived.

Johnston attacked Grant's unfortified camps on April 6. In a savage day of fighting, which resulted in the death of the Condederate leader, the southerners forced Grant's army to retreat 3.2 km (2 mi) before darkness ended the day of bloodshed. The Confederates were finally repulsed on April 7, after Buell's army reached the field to assist Grant. Fought on the banks of the Tennessee River, the battle which became known as Shiloh, was one of the most momentous battles of the North American continent. It stands today as one of the bloodiest and most desperately fought battles in history (Alldredge, Spottswood, Anderson, Goff, and LaForge, 1937).



Above: Photo C-20. The "Hornets Nest," scene of some of the bloodiest fighting during the battle of Shiloh. The field drains into the headwaters of Tilghman Branch.
Below: Photo C-23. Ruggles Battery opposing the Hornets Nest. It took this Confederate line of 62 cannons to blast the Union out of the Hornets Nest.





Above: Photo C-21. Bloody Pond, where wounded soldiers from both sides came to quench their thirst and bathe their wounds.
Below: Photo C-22. Welker's Battery at Cloud Field. Dill Branch ravine headwaters begin within the forest in the background.



THE STUDY AREA*

TOPOGRAPHY:

The Shiloh upland is a gently rolling to nearly level plain developed on river terrace materials. Dissection is steepest in the eastern part of the park where tributary streams (including Dill Branch, Mounds Branch, Rogers Branch, and Johnston Branch) cut through the terrace deposits and descend about 24 m (80 ft) over a 1.2 km (.75 mi) distance on their way eastward to the Tennessee River. Shiloh is on the outside of a meander bend of the Tennessee River and the eastern park boundary thus consists of steep and eroding river bluffs about 30 m (100 ft) high. Elevation ranges 67 m (220 ft) from 110 m (362 ft) on the Tennessee River (now the upper end of Kentucky Lake because of a 1944 TVA impoundment) to 177 m (580 ft) along the southern park boundary. The park is mapped on the Pittsburg Landing and Counce USGS 7.5 minute quadrangles.

DRAINAGE:

The majority of the park drains northward into Tilghman Branch and Westward into Shiloh Branch approximately for 2.4 km (1.5 mi) each to Owl Creek. Parts of Owl Creek have been channelized outside the park, but significant natural meandering still occurs along the northwest boundary of the park. Important bottomland habitat occurs at Owl Creek, including old-aged forest. Many beaver dams impound several hectares of water in the bottomland just north of Picnic Branch near Owl Creek. Beaver dams are also found in Owl Creek, however the Tennessee Valley Authority removes them periodically. Bottomlands and a few beaver dams also exist along the lower parts of drainages into the Tennessee River. Floodplain forests occur along the Tennessee River and Owl Creek.

The streams usually very clear water flows gently over a gravel and sand substrate, except in the lower part of the floodplains where the substrate changes to silt and/or sand. Owl Creek water is slightly stained and flows gently over sand. Tennessee River flood waters occasionally back up 6 m (20 ft) deep or more over Owl Creek along the park boundary. Owl Creek's water is significantly lower in quality because of agricultural and rural residential drainage.

Natural clearwater springs of low pH are abundant. The largest and most noted are Shiloh Spring and Rea Spring.

PHYSIOGRAPHY AND GEOLOGY:

Shiloh is located in the Western Valley physiographic unit of Tennessee (Luther 1977) in the Upper Plain area of the Coastal Plain near the Highland Rim to the east. The substrate consists of Quartenary and Tertiary river deposits and includes both channel

and floodplain deposits. This material is about 30 m (100 ft) thick and consists of sand, gravel, and silt. Some chert materials were eroded from nearby Paleozoic rocks and deposited here. Some Cretaceous sand and clay deposits occur in the dissected ravines. Recent alluvium covers areas along major floodplains.

Rock outcrops are infrequent except along the Tennessee River. Here, compacted river deposits have the texture and appearance of sandstone. A coarse, conglomerate-like, flat-lying material occurs under the upper part of the river bluffs and at a similar absolute elevation along the sides of stream ravines and in stream beds. It is resistant to erosion and seems to have slowed further dissection of the upland itself. No limestone occurs within Shiloh (Russell 1964,1968), so the water is very soft.

SOILS:

Paden silt loam is the predominate soil on uplands. It is acidic and low in fertility. A fragipan often occurs at a depth of about 0.6 m (2 ft). Waynesboro very gravelly sandy loam occurs on ravine slopes. It is acidic and also low in fertility. Waverly and Wolftever silt loams are important bottomland soils. These are acidic, medium to low in fertility, and poorly drained.

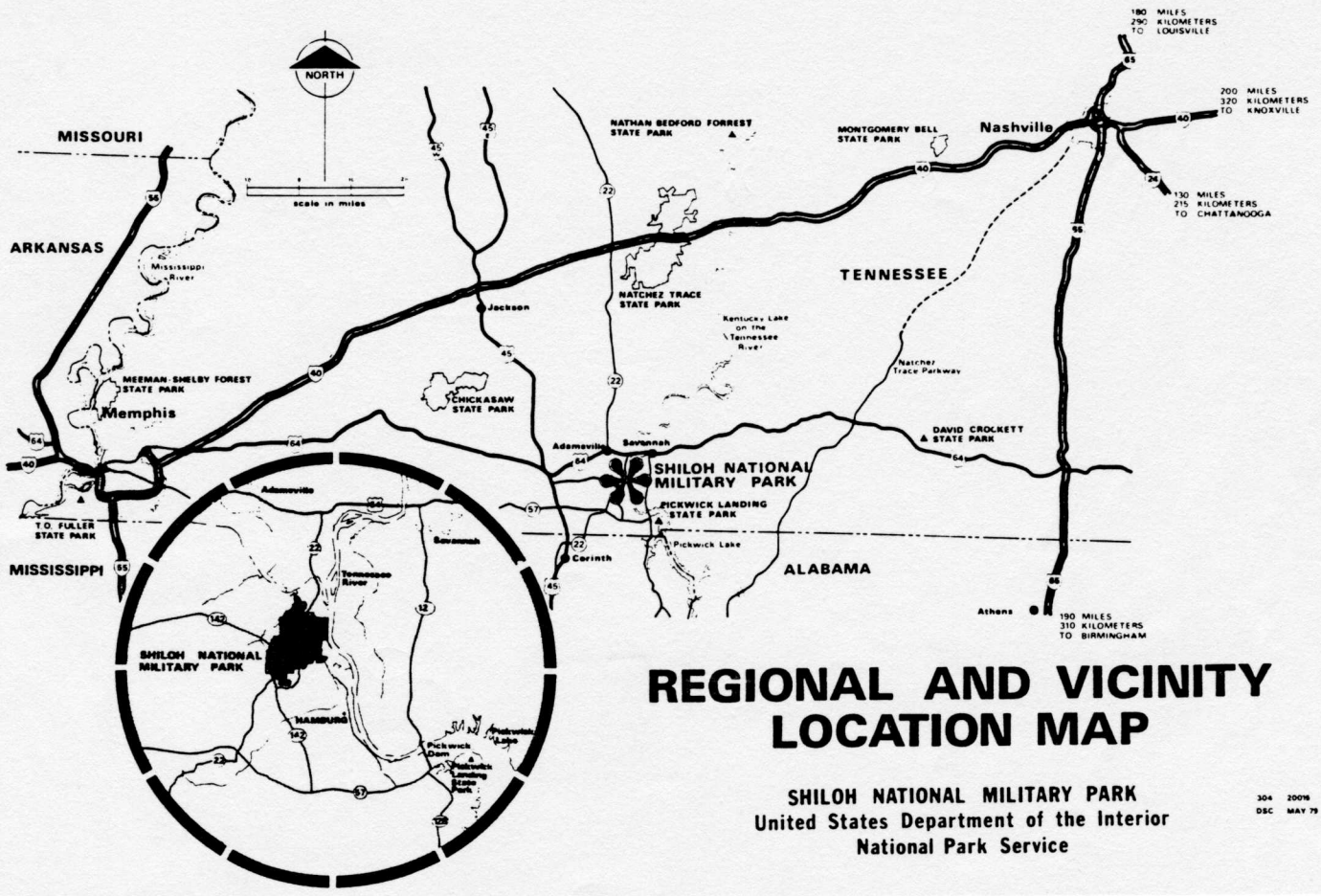
VEGETATION:

Shiloh's vegetation consists of about 1296 ha (3200 acres) of forest. The remaining 324 ha (800 acres) are historic fields which are presently hay crops and open grassy areas, such as roadsides and lawns. Mixed oak forest predominates on the uplands, except on old abandoned fields (dominated by pine and red cedar) or where historic fields are currently maintained. Mesic hardwoods dominate the ravines and river bluff slopes. These sites are moist but well drained. Floodplains and the terraces immediately above them are dominated by alluvial and mixed bottomland forests, respectively.

CLIMATE:

Summers are hot and humid, and winters are mild. Mean July temperature is about 29 degrees C (82 degrees F) (Ruffner and Bair, 1977). Mean January temperature is about 14 degrees C (40 degrees F). The average frostless period is 220 days. The average annual precipitation is 135 cm (53 inches). Violent thunderstorms occur (annual average: 53 thunderstorm days). Tornados have occasionally occurred, with catastrophic effects on vegetation. The most devastating tornado was in 1909. The last tornado was reported in 1971.

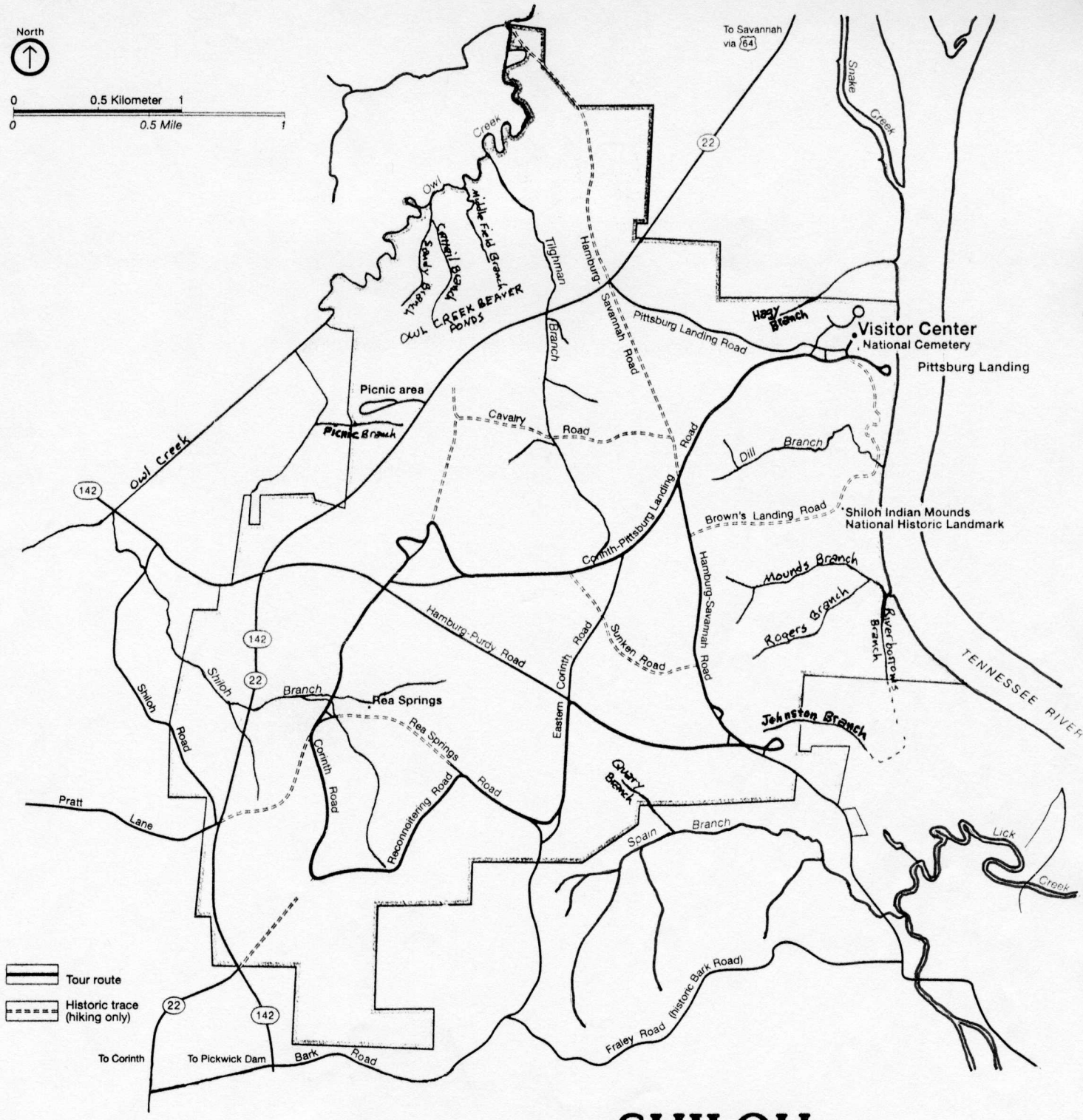
*Narrative of STUDY AREA adapted and corrected from Research/Resources Management Report No. 50 "The vascular Flora of Shiloh National Military Park, Hardin County, Tennessee."



REGIONAL AND VICINITY LOCATION MAP

SHILOH NATIONAL MILITARY PARK
United States Department of the Interior
National Park Service

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SHILOH NATIONAL MILITARY PARK

Study Area 8

METHODS

SAMPLING:

Simple observation of great numbers of small fish in the clear water streams was the first indication that a study was needed. Later in the project, after studying fish in aquariums, tentative identification by simple observation with the naked eye or with the aid of binoculars could sometimes be made of certain species such as lamprey, longnose gar, gizzard shad, threadfin shad, stoneroller, rosyside dace, striped shiner, southern redbelly dace, creek chub, creek chubsucker, black bullhead, brown madtom, grass pickerel, topminnow, mosquitofish, brook silverside, green sunfish, bluegill, longear sunfish, largemouth bass, and bandfin darter. But to be certain of proper identification, a specimen had to be collected.

At first, a dip net was tried for collection, but it was found to be largely unsuccessful, except for observed individual fish in shallow water and for fish in tiny stream sections or isolated potholes. Two minnow seines were used the most. One was 1.5 X 1.2 m (5 X 4 ft) for use by one person. It was successful if the area being seined wasn't very large. It was only marginally successful on larger waters. The other was 4.6 X 1.2 m (15 X 4 ft) and required two persons. Their mesh size was 5 mm, which was adequate for most, but too large for certain of the smaller or more slender species such as ribbon shiners, cypress darters, and dusky darters. Occasionally, a 3 X 1.2 m (10 X 4 ft) seine with 4 mm mesh (courtesy of Dr. Jack Grubaugh), and a 6 X 1.2 m (20 X 4 ft) seine with a 3 mm mesh (courtesy of Gary Pritts) was made available. The 3 mm mesh provided the most success with small species and is recommended for future sampling.

Hundreds of ribbon shiners slipped through the nets with 5 mm diameter mesh. They were at first dismissed as immature spotfin shiners before a larger one was inadvertently collected and deposited in an aquarium for observation along with two spotfin shiners. The following day it was realized there was an unidentified species in the aquarium. Finding a new species in the aquarium was an unexpected discovery and a lesson to look more carefully at all seined fish.

Several cypress darters were seen but slipped through the net before they could be identified for the first time. Cypress darters were thought to be only occasional residents within the park until the 3 mm mesh seine was used. Then it was realized they were more prevalent than expected. Dusky darters were also probably more numerous than this study indicated, as it is suspected that a few very slender specimens also slipped through the net.

A method used by the author for sampling any species that tended to hide under the gravel, was "gravel scuff trapping." It was discovered that by setting up a one meter square macroinvertebrate screen, or a net, at the tail end of riffles, and scuffing the gravel deeply with hands or feet as if collecting invertebrates, more darters, madtoms, and lampreys could be collected than by seining.

Although minnow traps were considered, they were not used. They should be tried sometime in the future.

No collecting was done at night, so the relative abundance of pirate perch, brown madtom, black bullhead, yellow bullhead, and other nocturnal species was not reliably determined. The great abundance of poisonous cottonmouth watermoccasins discouraged night sampling activity.

All sampling was done during low water levels for two reasons: It was easier, and the purpose was to determine what lived within the park under "normal" conditions. When the Tennessee River floods, the lower sections of park streams and the bottomlands containing beaver ponds may be covered with 6 m (20 ft) or more of water. During floodstage, many river fish likely enter the park temporarily, but it is likely that most return to the river as the water recedes.

Hip boots or chest high waders were always worn when doing stream research even in hot weather when tennis shoes might have been more comfortable. Frequent encounters with large cottonmouth watermoccasins during the warmer months (even during winter on mild sunny days) required researchers to be cautious. It was hoped that rubber boots would provide at least some protection from a serious snake bite, although boot protection effectiveness was never tested (no one was bitten during the study).

Electroshock was tried, but it was only marginally successful because tiny fish do not float to the surface well.

IDENTIFICATION:

After new specimens were collected, it was useful for identification to observe them in four ways if they were not readily identifiable:

1. Out of water, held in the hand.
2. In a jar full of clear water.
3. In an aquarium for an extended period of time.
4. Preserved and under a 10x or 20x dissecting microscope.

Most of the time it was possible to identify a specimen simply by observing it in an aquarium. After several days in captivity, many species colors or markings became more distinct. However, some

species colors tended to fade. A few species changed their colors or spots while they were being observed, which gave one an indication of possible variations that might be encountered in the field. Other species, such as small spotfin shiners, bluntface shiners, and steelcolor shiners, as well as chubsuckers, required close observation under a dissecting microscope to tell them apart. A 76 liter (20 gal) aquarium was probably the most valuable tool to identify, observe, and become familiar with individual species, unless a fin ray or scale count was necessary.

AQUARIUM USE:

A 76 liter (20 gal) and a 38 liter (10 gal) aquarium with aerators, charcoal filters, and lighted covers were set up in the park resource management office for observation purposes (two aquariums were needed to separate incompatible species). A neutral gray cardboard was taped to the outside back of the aquariums. Native stream gravel was deposited on the bottom to a depth of about 25 mm (1 in). It was found that 9.8 ml (2 tsp) of rock salt per 3.8 liter (1 gal) of water and an additional 4.9 ml (1 tsp) per 3.8 liter (1 gal) the following day helped prevent disease (Walker). Tap water was used rather than stream water because stream water was not as clear. The tap water was drawn and let set for several days to let the chlorine dissipate, or "Fin Care Aquarium Conditioner*" or "Stress Coat Aquarium Water Conditioner*" was added according to directions before any fish were placed in the tank.

AQUARIUM PROBLEMS:

"Ick" disease became a problem with certain species, especially southern redbelly dace, rosyside dace, and creek chubs, when the aquariums became overpopulated as they frequently were. "Jungle Ick Care*," added according to instructions, always cleared up the problem. Once ick was cured, the problem did not reoccur unless another infected fish was added to the population.

Aquarium food was not a problem for most species. A commercial food most readily accepted by most fish was "Tetra Bits*." Next was "Avant Tropical Fish Food Flakes*." The flakes needed to be crumbled into much smaller pieces before the fish would eat them.

Feeding darters was a special problem at first. After a few days in an aquarium, most darters seemed to learn from the feeding activities of other fish and would even go to the surface to get floating food. However, they much preferred small live aquatic invertebrates. They apparently are stimulated to feed by seeing live prey move. Finally, it was discovered that "Wardley Freeze Dried Tubifex Worms*," held on the bottom with locking forceps or a paper clip, was the answer. As the compressed cube began to dissolve, the tiny worms began to wave in the water current from the aquarium aerator. The darters (as well as other fish) would

gather around and begin pecking at the cube until it was consumed. The stripetail darter was the only fish that tended to starve in an aquarium. It appeared very sedentary and seemed to be waiting for food to be swept past it. It was never observed to eat anything except tiny live macroinvertebrates.

The flier also was never observed to feed on anything except live earthworms, although it apparently ate tiny live minnows (1 to 3 minnows were usually missing from the aquarium each morning).

"Wardley Tiny Shrimps*" (sun dried Gammarus) were also tried, but only the larger fish above about 102 mm (4 in) appeared to care much for them. The Gammarus tended to float on the surface, so most fish didn't pay much attention to them. Most sunfish required fairy shrimp, small insects, earthworms, or tiny minnows for food. Although some sunfish took dried Gammarus from the surface, the flier did not.

VOUCHER SPECIMENS:

Voucher specimens were collected, preserved, and cataloged for all species except sauger and drum which were too large for any available collection jars. The sauger and drum were photographed (as were all other species) and were easily identifiable without a preserved specimen. Voucher specimens were placed alive into denatured alcohol, so they would draw the preserving chemical into their bloodstream. For fish over 76 mm (3 in), it was helpful to also inject alcohol into their abdominal cavity with a small hypodermic syringe. This not only helped preserve the fish but also prevented the belly of the fish from shriveling.

According to Dr. Etnier, a better way to preserve fish is to first put them in a 10% formaldehyde solution for a week or two (until the silver color is gone from the shiners), then soak them in water for a few days to get rid of the formalin. After that, they can be permanently stored in 50% isopropanol or 70% ethanol. This alcohol should be changed every year or two to maintain preservation.

*NOTICE: Mention of any commercial product by name does not in any way constitute endorsement of that product by the author or the United States Government. It simply was the most readily available product at the time.

WATER QUALITY BASELINE AND MONITORING

SAMPLING:

After only a few water samples, it became evident the streams that originated within the park were in a relatively pristine condition, though acidic. Water flowing from the small springs had a pH of 4.6 to 4.8 and downstream pH ranged from 5.6 to 5.9. By comparison, Owl Creek pH ranged from 6.3 to 8.4, Bloody Pond pH ranged from 6.3 to 7.5, the Tennessee River pH ranged from 7.2 to 8.1, and local rainfall pH ranged from 5.9 to 7.8. The water was very low in potassium and nitrogen. Details of the water quality samples can be obtained from the park's Water Resources Monitoring Semi-Annual Interpretive Reports, and the University of Memphis research publication by graduate student Laurie Hart on the park's water quality.



Photo A-04. University of Memphis graduate student, Laurie Hart, taking water quality samples on Shiloh Branch.

MACROINVERTEBRATE INDICATORS OF WATER QUALITY:

Macroinvertebrates provide food for most small fish. They are a critical link in the aquatic food chain. They are also good indicators of the general condition of a stream.

As part of our water quality studies, an Izaak Walton League of America SOS (Save Our Streams) stream quality survey was begun. After a period of learning the procedure and identification techniques by trial and error, it was found the stream quality in the three selected study streams (Dill, Tilghman, and Shiloh Branches) was EXCELLENT according to the biological diversity of macroinvertebrate indicator species present.

GROUP ONE TAXA, which are pollution sensitive organisms found only in good quality water, were found in moderate to large numbers. These organisms, listed in descending order of quantity present were: caddisfly larva, water penny larva, mayfly nymph, stonefly nymph, riffle beetle adult, and dobsonfly larva (hellgrammite).

GROUP TWO TAXA, which are somewhat pollution tolerant organisms and can be found in good or fair quality water, were found in moderate to low numbers. These organisms, listed in descending order of quantity present were: dragonfly nymph, crayfish, cranefly larvae, damselfly nymph, alderfly larvae, and scud.

GROUP THREE TAXA, which are pollution tolerant organisms and can be found in any quality water, were practically non-existent. The only organism found in this group (which includes snail, leech, and blackfly larva) was the gordian worm. However, bloodworms could also be found if one dug deep enough in the streambed.

During the process of taking the one meter square stream riffle samples for the macroinvertebrate count, tiny brown madtoms, least brook lamprey ammocetes, bandfin darters, and many tiny spotted dusky salamanders were discovered in the sample net. In addition, thousands of small native "minnows" and many frogs were observed in the streams. It became obvious this simple and limited aquatic research needed to be expanded.

Several professors at the University of Memphis, biology department were contacted and briefed on what the preliminary aquatic investigations had revealed. All were interested in the environmental possibilities for study. During the spring of 1966, assistant professor Jack Grubaugh, PhD (stream invertebrate ecology) began to oversee graduate student Laurie Hart's macroinvertebrate ecological study of Dill, Tilghman, and Shiloh Branches as a first major step in the aquatic investigations. Their initial findings will be published soon.



Above: Photo A-13. The author on the trail to water quality sample site #4 on Shiloh Branch.
Below: Photo A-14. The author unloading aquatic research equipment at water quality sample site #4 on Shiloh Branch.





Above: Photo P-06. Dr. Jack Grubaugh collecting macroinvertebrate samples from Shiloh Branch.
Below: Photo A-02. Dr. Jack Grubaugh and son Daniel setting "black light" traps for flying aquatic insects on Shiloh Branch.



ENVIRONMENTAL DETRIMENTS

PREDATION:

Shiloh National Military Park contains only small streams and small beaver ponds, therefore the fish therein were generally tiny [most were under 77 mm (3 in)]. What few gamefish there were within the park were also generally of insignificant size [the largest collected was 270 mm (10.6 in)], and since most of the streams are not easily accessible, there has been little or no fishing pressure. Occasional illegal seining for bait minnows may have occurred, but more easily accessible seining locations are available nearby in Owl Creek or Snake Creek. So, the human element of predation has been minimal.

Most predation has probably occurred from cottonmouth and other large water snakes, ducks, osprey, kingfisher, frogs, snapping turtle and mink. None of the above would likely have had a detrimental impact. Among fish, largemouth bass, sunfish, pirate perch, madtom and other small catfish, grass pickerel, longnose gar, yellow perch, and sauger are obviously predators, but most were not large enough, or did not occur in great enough numbers to have had more impact than was needed for natural ecological balance.

Therefore, at this time there was no indication of excessive predation of fish that had any potential to significantly reduce the numbers of fish or extirpate a species within the park.

DISEASE, PARASITES, AND ABNORMALITIES:

No disease or parasite was noticeable on any specimens collected in free flowing streams anywhere in the park. However, ick was present in fish inhabiting tiny headwater streams, but was not manifest until specimens were added to a crowded aquarium. Ick apparently was not present in fish farther downstream.

A few specimens from the beaver ponds in Riverbottoms Branch (especially golden shiners) were found to have tiny black spots on their fins and body. The condition did not appear to be detrimental to the fish.

A single 56 mm (2.2 in) striped shiner collected in middle Shiloh Branch was found to have no dorsal fin, but was otherwise healthy (SHIL FISH 0123). All observed fish appeared healthy. Only an occasional fish was found dead in the streams, except in certain headwater areas where streams were reduced to small puddles during summer dry spells.

The Owl Creek Beaver Ponds were an exception. In Sandy Branch, a collected male bandfin darter was found to have a tiny brownish colored unidentified leech attached to a fin. In Cattail Branch, a similar looking white colored leech was found on a collected 77 mm (3 in) warmouth.

Occasional other warmouth, dollar sunfish, and bluegill in the Owl Creek Beaver Ponds were observed with bulging eyes. Closer observation revealed an unidentified red colored worm wrapped around the base of the eye within the eye socket. The worm could be removed with forceps without apparent damage to the fish's eye.

A third problem found only in the Owl Creek Beaver Ponds was an unidentified white colored crusty growth on a small spotfin shiner's fins. The fish was collected in Cattail Branch and was placed in the 76 liter (20 gal) aquarium before the growth was discovered. Within a few days, <u>all</u> the aquarium fish acquired the growth. Within 3 weeks, all the aquarium fish died. Even the two brown madtoms in the tank got large open wounds on their bodies and died. The only blackspotted topminnow in the aquarium died after all its scales became erect (SHIL FISH 0118).

ABUNDANT BIODIVERSITY

DISCOVERY:

While working on water quality sampling and finding the water unpolluted, the author noticed thousands of small, apparently native, "minnows" inhabiting the small clear streams. It was realized that over the years, as the countryside was developed, the park had become a relatively unaltered natural environmental "island" apparently unaffected by disruptive human activities surrounding this "high ground." It became evident the fish must be inventoried as soon as possible, because there was a strong possibility an endemic or endangered species could be present. Since no one from the University of Memphis came forward with a research proposal for fish (as was done for aquatic invertebrates), the author decided it was urgent to immediately start a fish inventory.

When the baseline inventory research was started in January 1995, it was expected to be completed, in between other duties, within a few months. After all, in a small park containing only 13 small spring fed streams totalling about 13.7 km (8.5 mi) in length, how many fish species could there be? Maybe a dozen or so? The biggest concern was trying to identify the few species that were being found, because it had been 39 years since the author had a college ichthyology course.

By July, 10 species had been discovered and identified. Then in October, 1 more species was found. That pretty much met expectations. However, it was realized there were several more streams that needed to be checked.

Since an endemic or endangered species was at that time the focus of the search, sampling was continued in June 1996. By August 31 of that second year of sampling, another 15 species were discovered bringing the total to 26. A hand written rough draft report on what had been found was started. It was titled "Preliminary Ichthyological Investigations in Shiloh National Military Park," because by then it was realized these findings were just a beginning. The purpose of the report was to gain support for more research. It was much too soon to conclude there were no endemic or endangered species of fish in the park, but by then it could be concluded the streams originating within the park were very biologically diverse with intact ecosystems which were rare and endangered in West Tennessee. The streams were certainly worthy of considerably more scientific study.

Before the "preliminary" report could be finished, it was grossly outdated. By October 19, 1996 another 7 fish species were discovered, bringing the total to 33, and by January 4, 1997 even another 7 species were found, bringing the total to 40.

As of this writing, three years after the study began, another 10 species have been discovered and identified, bringing the total to 50 species of fish living in the small streams and small beaver ponds within the boundaries of the park. There is a very good chance that several additional species could be found.

It would appear there are FOUR CONDITIONS THAT CONTRIBUTE TO THE UNUSUAL NUMBER OF FISH SPECIES found in such a small area:

1. **VARIABLE HABITAT.** Springs and spring branches flowing to clear gravel streams and on to bottomland floodplain streams with sand substrates, or beaver ponds with silt, mud, and/or clay substrates with aquatic vegetation provide variable habitat.

2. **PHYSIOGRAPHIC LOCATION.** The park is situated near the intersection of two major physiographic provinces (divisions based on prevailing geology) in Tennessee. They are the Coastal Plain (Mississippi Embayment) which is dominated by Cretaceous to Quaternary geological formations consisting of mainly sands, hard clays, and silt, and the Highland Rim which is composed primarily of limestones and chert, and some shales (Etnier and Starnes, 1993). Shiloh adjoins the west bank of the Tennessee River which more or less divides the two provinces.

3. **HIGH GROUND.** Most of the park is located on the highest ground in the vicinity, well above the Tennessee River flood plain. The small clear spring fed streams originate from within and flow out of the park, so except for the bottomlands along the park boundary, contamination from outside sources does not happen.

4. **FEDERAL PROTECTION.** The streams have been protected within a National Park for over 100 years.

These four conditions have led to a greater biological diversity than one might expect in the modern human inhabited landscape of rural West Tennessee. The last two conditions have contributed to keep the original ecosystems intact, not significantly altered by human activity or settlement.

BEAVER ENHANCED HABITAT:

Naturally occurring beaver in park bottomlands enhance some of the otherwise minor aquatic habitats by building and maintaining stick and mud dams. Some smaller stream branches would not be suitable habitat for fish without beaver influence. Other streams that could sustain fish life, now contain even more numbers and species of fish in the larger waters created by the dams. Beaver have not dammed the larger streams such as Tilghman and Shiloh Branches, although beaver sign has been noticed in the lower section of Tilghman Branch. Beaver only recently dammed the extreme lower end of Dill Branch in November 1997.

The three areas studied in the park that were enhanced by beaver ponds were: Riverbottoms and Lower Mounds Branch near the Tennessee River; the lower portion of Dill Branch; and Sandy, Cattail, and Middle Field Branches combined as the "Owl Creek Beaver Ponds near Owl Creek. Since beaver moved into the lower portion of Dill Branch only near the completion of this study, it was possible to begin comparing before and after fish populations. In January, the 1.2 m (4 ft) high dam washed out due to the Tennessee River flooding, and the beaver have not rebuilt. So, continued study of species succession into the beaver pond was interrupted.

Fish that most likely would not have been found within the park, and thus far have been found only in beaver ponds within the park, include the following 18 species which amounts to 36% of the park inventory:

1. Longnose Gar
2. Gizzard Shad
3. Threadfin Shad
4. Golden Shiner
5. Mimic Shiner
6. Pugnose Minnow
7. Lake Chubsucker
8. Spotted Sucker
9. Yellow Bullhead
10. Brook Silverside
11. Flier
12. Dollar Sunfish
13. Redear Sunfish
14. White Crappie
15. Cypress Darter
16. Yellow Perch
17. Sauger
18. Freshwater Drum

Although the Tennessee Valley Authority and local landowners consider native beaver a pest, and they have an active beaver and beaver dam removal program along Owl Creek and other streams in

West Tennessee, beaver within Shiloh National Military Park are protected by Federal law (as is all other native wildlife including the abundant cottonmouth watermoccasins).

Beaver ponds also enhance habitat for other native wildlife within the park, especially reptiles, amphibians, and aquatic invertebrates, as well as certain species of birds and mammals.



Photo A-10. A beaver dam on a west side tributary of Owl Creek near the remains of the Hamburg-Savannah Road iron bridge.

ICHTHYOLOGICAL BASELINE INVENTORY
OF SHILOH NATIONAL MILITARY PARK STREAMS
HARDIN COUNTY, TENNESSEE
as of December 19, 1997

CHECKLIST:

ORDER PETROMYZONTIFORMES

Family Petromyzontidae (the lampreys)

1	Least Brook Lamprey	Lampetra aepyptera

ORDER LEPISOSTEIFORMES

Family Lepisosteidae (the gars)

2	Longnose Gar	Lepisosteus osseus

ORDER CULPEIFORMES

Family Culpeidae (the herrings)

3	Gizzard Shad	Dorosoma cepedianum
4	Threadfin Shad	Dorosoma petenense

ORDER CYPRINIFORMES

Family Cyprinidae (the minnows)

5	Largescale Stoneroller	Campostoma oligolepis
6	Rosyside Dace	Clinostomus funduloides
7	Bluntface Shiner	Cyprinella camura
8	Spotfin Shiner	Cyprinella spiloptera
9	Striped Shiner	Luxilus chrysocephalus
10	Rosefin Shiner	Lythrurus ardens
11	Ribbon Shiner	Lythrurus fumeus
12	Golden Shiner	Notemigonus crysoleucas
13	Emerald Shiner	Notropis atherinoides
14	Mimic Shiner	Notropis volucellus
15	Pugnose Minnow	Opsopoeodus emiliae
16	Southern Redbelly Dace	Phoxinus erythrogaster
17	Bluntnose Minnow	Pimephales notatus
18	Bullhead Minnow	Pimephales vigilax
19	Blacknose Dace	Rhinichthys atratulus
20	Creek Chub	Semotilus atromaculatus

Family Catastomidae (the suckers)

21	Creek Chubsucker	Erimyzon oblongus
22	Lake Chubsucker	Erimyzon sucetta
23	Northern Hogsucker	Hypentelium nigricans
24	Spotted Sucker	Minytrema melanops
25	Golden Redhorse	Moxostoma erythrurum

ORDER SILURIFORMES

Family Ictaluridae (the North American freshwater catfishes)

26	Black Bullhead	Ameiurus melas
27	Yellow Bullhead	Ameiurus natalis
28	Brown Madtom	Noturus phaeus

ORDER SALMONIFORMES

Family Esocidae (the pikes)

29	Grass Pickerel	Esox americanus

ORDER APHREDODERIFORMES

Family Aphredoderidae (the pirate perch)

30	Pirate Perch	Aphredoderus sayanus

ORDER CYPRINDONTIFORMES

Family Fundulidae (the topminnows)

31	Blackspotted Topminnow	Fundulus olivaceus

Family Poeciliidae (the livebearers)

32	Western Mosquitofish	Gambusia affinis

ORDER ATHERINIFORMES

Family Atherinidae (the silversides)

33	Brook Silverside	Labidesthes sicculus

ORDER PERCIFORMES

Family Centrarchidae (the sunfishes)

34	Flier	Centrarchus macropterus
35	Green Sunfish	Lepomis cyanellus
36	Warmouth	Lepomis gulosus
37	Bluegill	Lepomis macrochirus
38	Dollar Sunfish	Lepomis marginatus
39	Longear Sunfish	Lepomis megalotis
40	Redear Sunfish	Lepomis microlophus
41	Largemouth Bass	Micropterus salmoides
42	White Crappie	Pomoxis annularis

Family Percidae (the perches)

43	Stripetail Darter	Etheostoma kennicotti
44	Goldstripe Darter	Etheostoma parvipinne
45	Cypress Darter	Etheostoma proeliare
46	Bandfin Darter	Etheostoma zonistium
47	Yellow Perch	Perca flavescens
48	Dusky Darter	Percina sciera
49	Sauger	Stizostedion canadense

Family Sciaenidae (the drums)

50	Freshwater Drum	Aplodinotus grunniens

VOUCHER SPECIMENS AND VOUCHER PHOTOGRAPHS:

1. Least Brook Lamprey, Lampetra aepyptera
   0040 0110 0111 0112
   Photo F1
2. Longnose Gar, Lepisosteus osseus
   0134
   Photo H14
3. Gizzard Shad, Dorosoma cepedianum
   0094 0121
   Photo G19
4. Threadfin Shad, Dorosoma petenense
   0085 0122
   Photo D21
5. Largescale Stoneroller, Campostoma oligolepis
   0019 0025 0026 0047 0116 0129 0141 0142
   Photo B05
6. Rosyside Dace, Clinostomus funduloides
   0020 0051
   Photo A23
7. Bluntface Shiner, Cyprinella camura
   0127
   Photo H06
8. Spotfin Shiner, Cyprinella spiloptera
   0056 0065 0066 0067 0068 0081 0115 0119 0124
   Photos B24 F07
9. Striped Shiner, Luxilus chrysocephalus
   0010 0011 0012 0013 0028 0035 0036 0037 0041 0048 0050
   0123 Photo B01
10. Rosefin Shiner, Lythrurus ardens
    0079 0082 0098 0128
    Photos B08 D04
11. Ribbon Shiner, Lythrurus fumeus
    0106 0125
    Photo I12
12. Golden Shiner, Notemigonus crysoleucas
    0089 0092 0093
    Photos D23 I10
13. Emerald Shiner, Notropis atherinoides
    0055 0074 0075 0076 0087
    Photo D15
14. Mimic Shiner, Notropis volucellus
    0097
    Photo E11
15. Pugnose Minnow, Opsopoeodus emiliae
    0105 0107
    Photo E19
16. Southern Redbelly Dace, Phoxinus erythrogaster
    0007 0008 0038 0039
    Photos G14 D10

17. Bluntnose Minnow, Pimephales notatus
    0060 0069 0070 0080 0101 0140 0147
    Photos D13 I25
18. Bullhead Minnow, Pimephales vigilax
    0096
    Photo E05
19. Blacknose Dace, Rhinichthys atratulus
    0091 0149
    Photo E08
20. Creek Chub, Semotilus atromaculatus
    0009 0017 0018 0024 0045 0046 0049
    Photo B02
21. Creek Chubsucker, Erimyzon oblongus
    0027 0063 0143
    Photo B04
22. Lake Chubsucker, Erimyzon sucetta
    0133 0135 0136 0148
    Photos I04 I23
23. Northern Hogsucker, Hypentelium nigricans
    0146
    Photo I20
24. Spotted Sucker, Minytrema melanops
    0088 0090 0126
    Photo I07
25. Golden Redhorse, Moxostoma erythrurum
    0059 0061 0064 0073 0077
    Photo I06
26. Black Bullhead, Ameiurus melas
    0062
    Photo D09
27. Yellow Bullhead, Ameiurus natalis
    0144 0150
    Photo F11
28. Brown Madtom, Noturus phaeus
    0001
    Photo E24
29. Grass Pickerel, Esox americanus
    0005 0108 0109 0117 0139
    Photos G24 E21
30. Pirate Perch, Aphredoderus sayanus
    0029 0054
    Photo A22
31. Blackspotted Topminnow, Fundulus olivaceus
    0003 0118
    Photo A25
32. Western Mosquitofish, Gambusia affinis
    0004
    Photo I13
33. Brook Silverside, Labidesthes sicculus
    0072
    Photo D11

34. Flier, Centrarchus macropterus
    0138
    Photo H18
35. Green Sunfish, Lepomis cyanellus
    0083
    Photo D06
36. Warmouth, Lepomis gulosus
    0058 0086 0114
    Photo I18
37. Bluegill, Lepomis macrochirus
    0006
    Photo B16
38. Dollar Sunfish, Lepomis marginatus
    0104 0132 0137
    Photos E12 H21 H23
39. Longear Sunfish, Lepomis megalotis
    0014 0145
    Photo B18
40. Redear Sunfish, Lepomis microlophus
    0102
    Photo E17
41. Largemouth Bass, Micropterus salmoides
    0103 0120
    Photo E15
42. White Crappie, Pomoxis annularis
    0084
    Photo D24
43. Stripetail Darter, Etheostoma kennicotti
    0015 0043 0057 0131
    Photo B22
44. Goldstripe Darter, Etheostoma parvipinne
    0021 0030 0031 0032 0033 0034 0042 0113
    Photo B21
45. Cypress Darter, Etheostoma proeliare
    0099 0100
    Photo E07
46. Bandfin Darter, Etheostoma zonistium
    0002 0016 0022 0044 0052 0053 0071 0078 0130
    Photos B20 B23
47. Yellow Perch, Perca flavescens
    0095
    Photo E01
48. Dusky Darter, Percina sciera
    0023
    Photo H11
49. Sauger, Stizostedion canadense
    (no voucher specimen kept)
    Photo G23
50. Freshwater Drum, Aplodinotus grunniens
    (no voucher specimen kept)
    Photo G21

CONSIDERING OWL CREEK AND THE TENNESSEE RIVER:

Since the actual Shiloh National Military Park boundary extends to the middle of Owl Creek and to the lowest stream level of the Tennessee River before impoundment by the Kentucky Dam, the following additional 32 species of fish theoretically could be considered at least part-time residents of the park (according to the distribution maps by Etnier and Starnes in their 1993 book "THE FISHES OF TENNESSEE," and the author's own personal observations and collections). That would total 82 species, which exceeds the Great Smoky Mountains National Park's 79 species that is said to be a greater variety of freshwater fishes than any other National Park.

The additional species are:

	SPECIES	DISTRIBUTION MAP PAGE	COLLECTED BY AUTHOR
1.	Chestnut Lamprey	91	
2.	Paddlefish	105	
3.	Skipjack Herring	124	Tenn River
4.	Steelcolor Shiner	160	Owl Creek
5.	Common Carp	162	Tenn River
6.	Silver Chub	196	
7.	River Carpsucker	262	
8.	Quillback	265	
9.	Smallmouth Buffalo	278	
10.	Bigmouth Buffalo	279	
11.	Black Buffalo	280	
12.	Silver Redhorse	286	
13.	River Redhorse	289	
14.	Black Redhorse	291	
15.	Shorthead Redhorse	293	
16.	White Catfish	no map	Tenn River
17.	Blue Catfish	306	
18.	Channel Catfish	308	Tenn River
19.	Brindled Madtom	323	
20.	Freckled Madtom	326	
21.	Flathead Catfish	331	
22.	Chain Pickerel	340	
23.	Banded Sculpin	388	
24.	White Bass	392	Tenn River
25.	Yellow Bass	394	Tenn River
26.	Striped Bass	no map	Tenn River
27.	Smallmouth Bass	431	Tenn River
28.	Spotted Bass	433	Tenn River
29.	Blackfin Darter	509	
30.	Logperch	571	
31.	River Darter	585	
32.	Saddleback Darter	591	

However, since the park has no control over the headwaters of the Tennessee River or Owl Creek, fish species located in those waters were not considered "within the park" for the purposes of this study.

DISCUSSION OF INDIVIDUAL SPECIES:

Please refer to THE FISHES OF TENNESSEE by David A. Etnier and Wayne C. Starnes (1993) for a more complete discussion on characters, biology, nationwide and statewide distribution and status, similar sympatric species, and systematics.

This section will discuss the following subjects:

IDENTIFYING CHARACTERS

LARGEST SPECIMENS [Total Length (TL)]

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK

SPECIES BEHAVIOR IN AN AQUARIUM*

DISTRIBUTION AND RELATIVE ABUNDANCE WITHIN THE PARK

COMMENTS

RELATIVE ABUNDANCE of each species in each section of stream is indicated as follows:

ABUNDANT (found in large numbers)

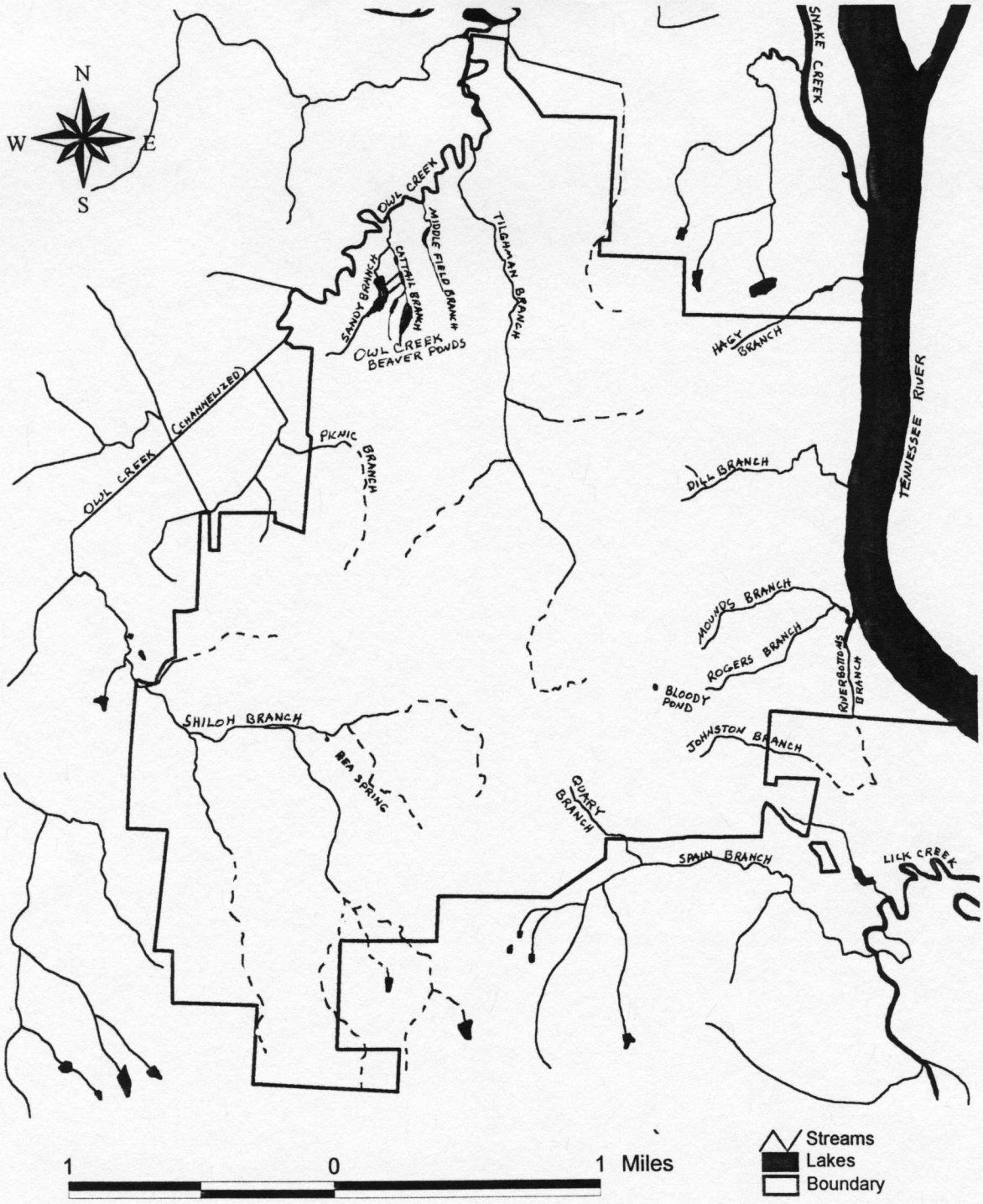
COMMON (frequently found in samples)

UNCOMMON (only 4 to 15 specimens collected)

OCCASIONAL (only 1 to 3 specimens collected)

*Although "species behavior in an aquarium" was not even a remote purpose of this study, it was knowledge that was inadvertently obtained. It was included in this report because it could be useful to future researchers, and it might be useful information for hobbyists who are turning from tropical fish aquariums to native fish aquariums. Native fish aquariums could help amateur biologists understand and appreciate a part of the otherwise unseen natural world around us, and they would perhaps better understand the need to keep our streams clean and unaltered from their natural courses.

Shiloh National Military Park
Ponds, Streams, and Boundary



This park map, showing only the water courses and park boundary, is reduced in size and presented on the following pages to show species distribution. Black dots on the maps indicate collection sites.

1. **LEAST BROOK LAMPREY**, Lampetra aepyptera (Abbott)

(See page 95 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Dorsal fin divided by deep notch
Expanded mouth narrower than head
Poorly developed or absent disc teeth from posterior field
Adults grayish, usually mottled on sides
Venter and fins yellowish
(Ammocoetes have no eyes and otherwise look somewhat different than adults)

LARGEST SPECIMENS:

Maximum total length 180 mm (7 in)
Largest collected in the park 140 mm (5.5 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

largescale stoneroller
rosyside dace
striped shiner
southern redbelly dace
creek chub
creek chubsucker
brown madtom
blackspotted topminnow
longear sunfish
stripetail darter
bandfin darter
dusky darter

AQUARIUM BEHAVIOR:

No adult least brook lamprey lived more than 5 days in an aquarium. They would attach themselves to a rock or the aquarium glass with their mouth and lie motionless, or they would bury themselves in the graveled aquarium bottom.

DISTRIBUTION AND RELATIVE ABUNDANCE:

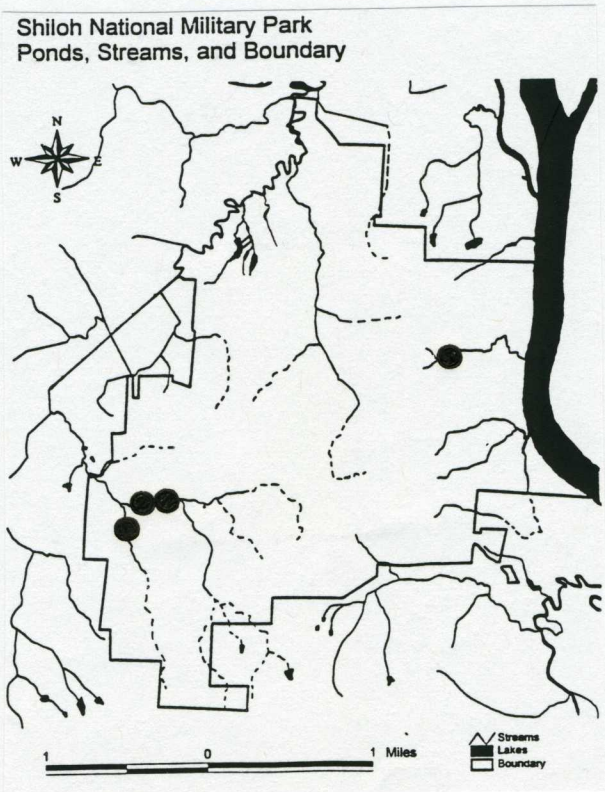
Shiloh Branch	
Middle Section	COMMON
Dill Branch	
Upper Section	COMMON

COMMENTS:

Although the least brook lamprey was commonly found spawning in the above streams during March and April, they were not seen at other times of the year except as ammocoetes buried in the sand and gravel substrate.



Photo F-01. Least Brook Lamprey, Lampetra aepyptera, 130 mm TL, from Shiloh Branch.



2. **LONGNOSE GAR**, Lepisosteus osseus (Linnaeus)

(See page 112 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Extremely long slender snout
Fins spotted, body may have a few spots, but **top of head and snout without spots**
Juveniles have middorsal cinnamon colored stripe that is scalloped on its dorsal margin

LARGEST SPECIMENS:

Maximum total length 1.834 m (6 ft), 22.8 kg (50 lbs 5 oz)
Largest collected in the park 202 mm (7.9 in) juvenile

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

spotfin shiner	western mosquitofish
striped shiner	flier
golden shiner	warmouth
pugnose minnow	bluegill
lake chubsucker	dollar sunfish
yellow bullhead	longear sunfish
grass pickerel	redear sunfish
pirate perch	largemouth bass
blackspotted topminnow	white crappie

AQUARIUM BEHAVIOR:

A 202 mm (7.9 in)juvenile specimen was kept for several days. It remained suspended in position most of the time. It consumed 1 to 3 minnows daily. Small longnose gar could be kept in a native fish aquarium only if all other species in the tank were expendable.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Owl Creek Beaver Ponds (bottomlands)	
Cattail Branch Section	OCCASIONAL (only 2)
Owl Creek (bottomlands)	UNCOMMON

COMMENTS:

Several 610 mm (2 ft) or larger longnose gar were observed in channelized ditches that are tributaries to Owl Creek, just upstream from the park boundary and Owl Creek Beaver Ponds. One 610 mm (2 ft) specimen was observed in Owl Creek. They could best be seen suspended just under the water surface in early spring. Binoculars helped with positive identification. The largest beaver pond on Sandy Branch in the Owl Creek Beaver Ponds should contain adult specimens, but none have been seen there.

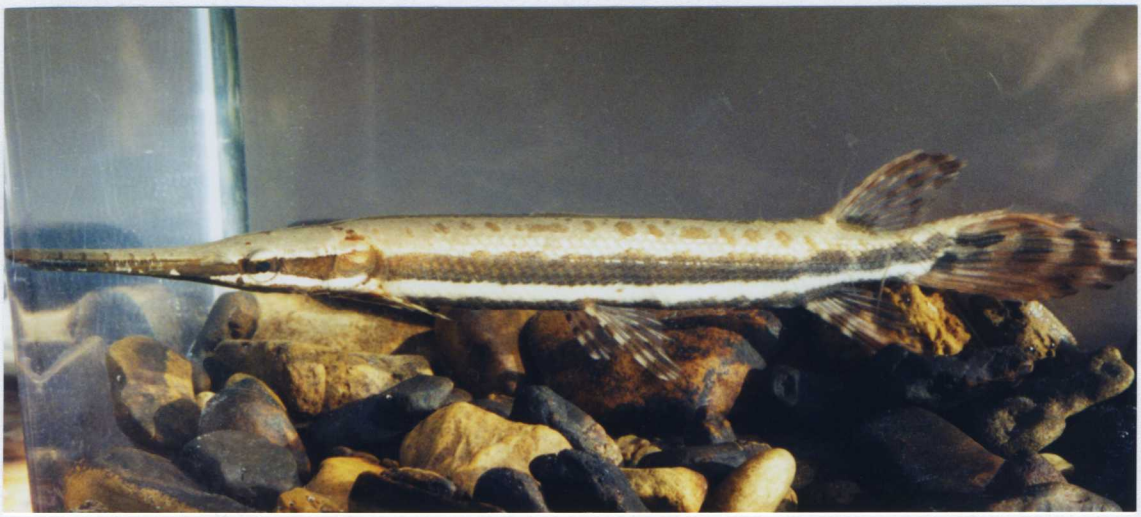
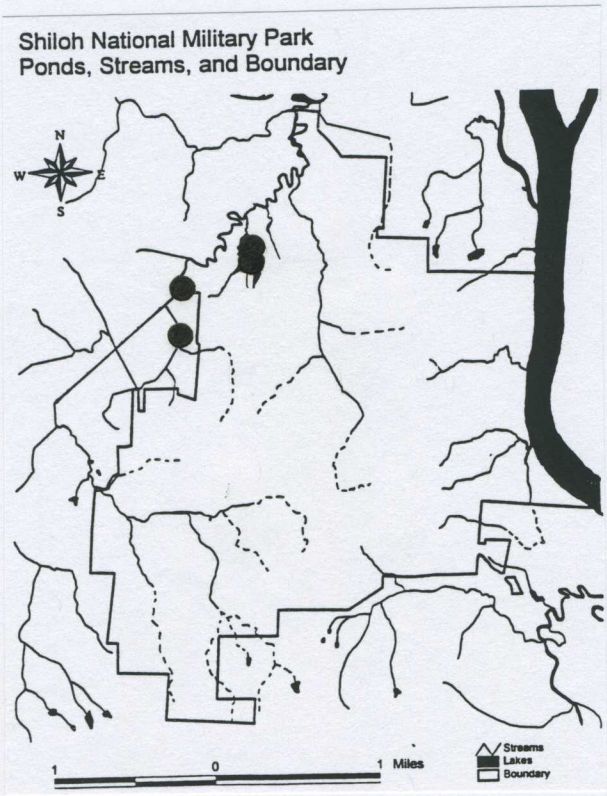


Photo H-14. Longnose Gar, Lepisosteus osseus, 202 mm TL, from Cattail Branch of the Owl Creek Beaver Ponds.



3. **GIZZARD SHAD**, Dorosoma cepedianum (Lesueur)

(See page 126 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Color gray or greenish dorsally, silvery below
Thin deep bodied
Large black spot behind gill cover
Rather blunt snout
Gray fins
Very oily skin surface

LARGEST SPECIMENS:

Maximum total length 520 mm (20.5 in), 1.59 kg (3.5 lbs)
Largest collected in the park 295 mm (11.6 in)

This was the largest specimen of any fish species collected within the park.

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

threadfin shad	warmouth
spotfin shiner	bluegill
striped shiner	redear sunfish
golden shiner	largemouth bass
emerald shiner	white crappie
spotted sucker	yellow perch
pirate perch	sauger
blackspotted topminnow	freshwater drum
western mosquitofish	

AQUARIUM BEHAVIOR:

Unable to keep alive in an aquarium

DISTRIBUTION AND RELATIVE ABUNDANCE:

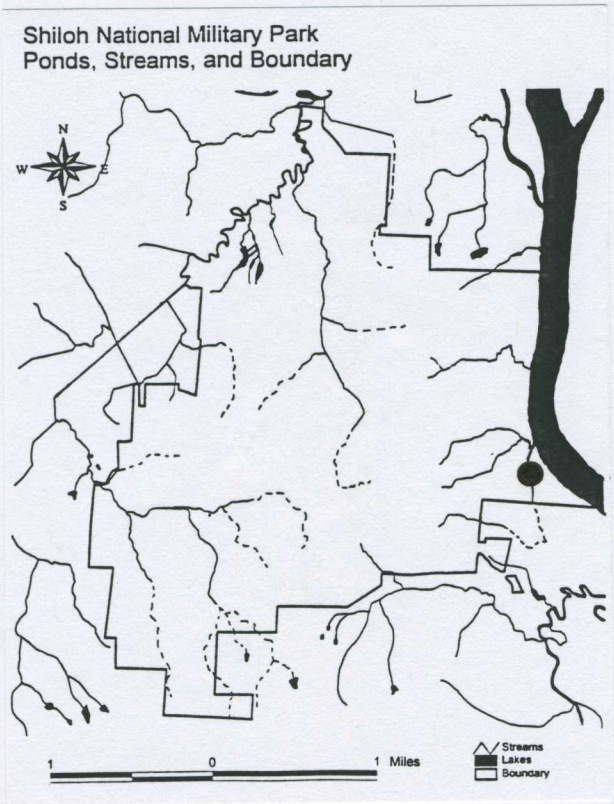
Riverbottoms Branch (bottomlands) UNCOMMON

COMMENTS:

The species likely wandered into the park from the Tennessee River during flood stage and remained behind the beaver dams when the water level receded.



Photo G-19. Gizzard Shad, Dorosoma cepedianum, 95 mm TL, from Riverbottoms Branch.



4. **THREADFIN SHAD**, Dorosoma petenense (Guenther)

(See page 127 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:
Thin deep bodied
Color gray or green dorsally, silver below
Large black spot behind gill cover
Very oily skin surface
All fins except dorsal yellowish

LARGEST SPECIMENS:
Maximum total length 216 mm (8.5)
Largest collected in park 83 mm (3.3 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

gizzard shad	warmouth
spotfin shiner	bluegill
striped shiner	redear sunfish
golden shiner	largemouth bass
emerald shiner	white crappie
spotted sucker	yellow perch
pirate perch	sauger
blackspotted topminnow	freshwater drum
western mosquitofish	

AQUARIUM BEHAVIOR:
Unable to keep alive in an aquarium

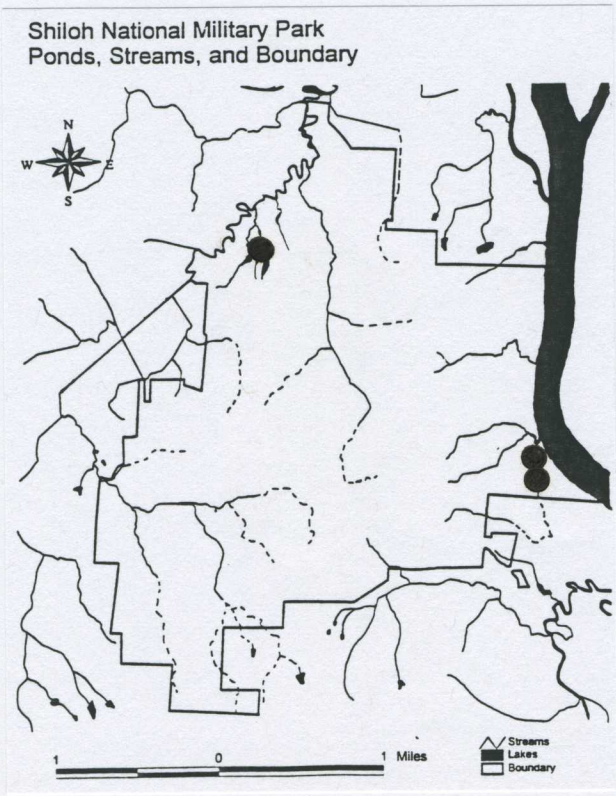
DISTRIBUTION AND RELATIVE ABUNDANCE:

Owl Creek Beaver Ponds (bottomlands)	
Cattail Branch Section	OCCASIONAL (only 1)
Mounds Branch	
Lower Section (bottomlands)	ABUNDANT
Riverbottoms Branch (bottomlands)	ABUNDANT

COMMENTS:
The species likely wandered into the park from the Tennessee River during flood stage and remained behind the beaver dams when the water level receded.



Photo D-21. Threadfin Shad, Dorosoma petenense, 83 mm TL, from Riverbottoms Branch.



5. **LARGESCALE STONEROLLER**, Campostoma oligolepis (Hubbs and Greene)

(See page 139 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Large adults heavy bodied with blunt head and rounded snout
Smaller specimens more slender
Silvery or golden color with **sides randomly marked with dark colored scales (peppered appearance)**
Inferior U shaped horizontal mouth with cartilaginous lower lip

LARGEST SPECIMENS:

Maximum total length 203 mm (8 in)
Largest collected in the park 103 mm (4 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

least brook lamprey	brown madtom
rosyside dace	blackspotted topminnow
striped shiner	bluegill
rosefin shiner	longear sunfish
southern redbelly dace	stripetail darter
creek chub	bandfin darter
creek chubsucker	

AQUARIUM BEHAVIOR:

The species was an active aquarium fish, but it tended to nip and damage the dorsal fin of the very docile creek chubsucker and caudal fin of small minnows. Only very small specimens are compatible with other minnows in a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Tilghman Branch	
Lower Section	UNCOMMON
Shiloh Branch	
Middle Section	UNCOMMON
Lower Section	UNCOMMON
Owl Creek Beaver Ponds (bottomlands)	
Cattail Branch Section	OCCASIONAL (only 1)

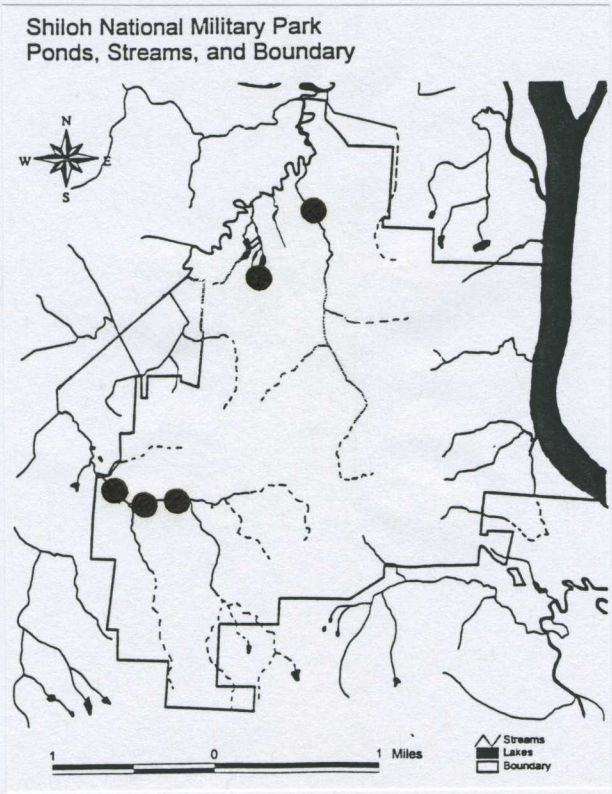
COMMENTS:

Campostoma anomalum or C. pullum may also inhabit Shiloh streams. Their identification and separation from C. oligolepis is very difficult without observing the tubercles of a breeding male. During this study, no tuberculate male was collected. Any tuberculate male stonerollers encountered should be saved for positive identification.

According to Etnier and Starnes (1993, page 139), C. anomalum, the central stoneroller, was the only species of stoneroller found in the State of Tennessee. At the time their book was published, they questioned the identification of C. oligolepis, the largescale stoneroller, by other ichthyologists as an inhabitant of the lower Tennessee River Drainage. After the book's publication, Dr. Etnier confirmed that C. oligolepis does indeed occur in the lower Tennessee drainage, and C. anomalum apparently does not. He positively identified several specimens sent to him from Shiloh as C. oligolepis.



Photo B-05. Largescale Stoneroller, Campostoma oligolepis, 81 mm TL, from Shiloh Branch.



6. **ROSYSIDE DACE**, Clinostomus funduloides (Girard)

(See page 142 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Extremely large mouth for a minnow
Both sexes of adults typically have a **broad red stripe along sides**
(stripe along sides may appear purplish)
(small specimens may appear silvery with no red stripe)

LARGEST SPECIMENS:

Maximum total length 115 mm (4.5 in)
Largest collected in the park 96 mm (3.8 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

least brook lamprey
largescale stoneroller
striped shiner
rosefin shiner
southern redbelly dace
creek chub
creek chubsucker
brown madtom
blackspotted topminnow
bluegill
longear sunfish
stripetail darter
bandfin darter

AQUARIUM BEHAVIOR:

The species was very active, graceful, and beautiful. It ate almost any top water or slow sinking aquarium fish food. It was not aggressive and was compatible with most other species that did not prey on it, or that was large enough for it to not prey upon. The rosyside dace would be a very desirable addition to a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

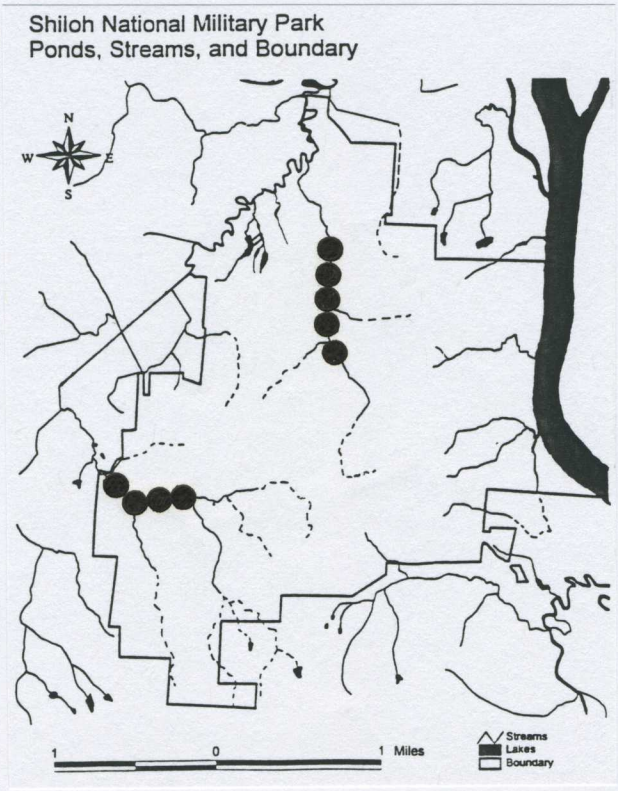
Tilghman Branch	
Upper Section	COMMON
Middle Section	COMMON
Shiloh Branch	
Middle Section	ABUNDANT
Lower Section	COMMON

COMMENTS:

The rosyside dace was found only in Tilghman and Shiloh Branches, although Dill Branch would also seem to be suitable habitat.



Photo A-23. Rosyside Dace, Clinostomus funduloides, 85 mm TL, from Middle Shiloh Branch.



7. **BLUNTFACE SHINER**, Cyprinella camura (Jordan and Meek)

(See page 149 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Silvery with no distinctive markings
Pale vertical bar at caudal fin base may be seen after specimen is held in aquarium for several days
Nuptial males have red dorsal and caudal fins
Anal fin rays 9-10
(The similar spotfin shiner has 8 anal fin rays, is more slender, and has black spot at the caudal fin base).
(The similar steelcolor shiner has 9 anal fin rays. It was found in Owl Creek, but it is not likely to be found within the park because of a lack of suitable habitat).

LARGEST SPECIMENS:

Maximum total length 150 mm (6 in)
Largest collected in the park 70 mm (2.7 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

spotfin shiner
striped shiner
ribbon shiner
bluntnose minnow
blackspotted topminnow
cypress darter
bandfin darter

AQUARIUM BEHAVIOR:

Although the bluntface shiner did well in an aquarium, it tended to chase and nip fins of other species, so it was determined to be incompatible in a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

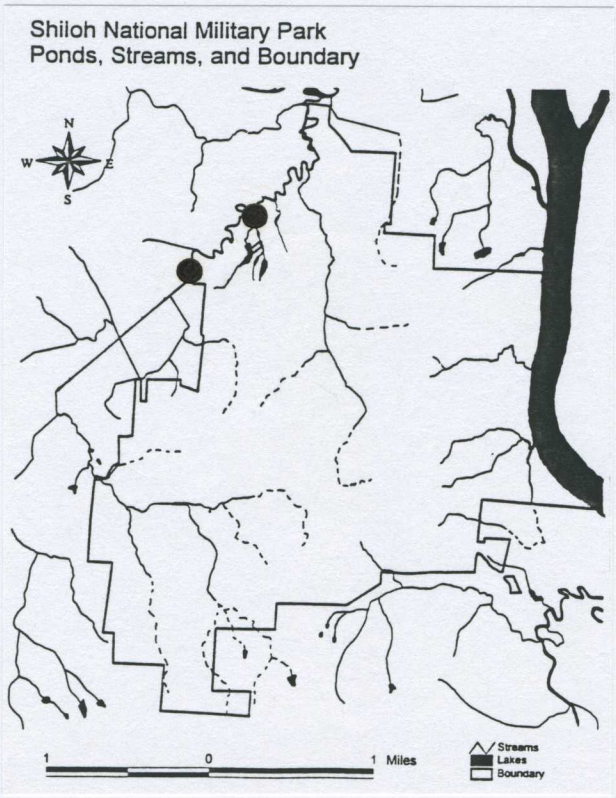
Owl Creek Beaver Ponds (bottomlands)	
Sandy Branch Section	OCCASIONAL (only 2)
Owl Creek (bottomlands)	UNCOMMON

COMMENTS:

Small bluntface shiners are difficult to separate from spotfin shiners, ribbon shiners, and steelcolor shiners when looking at them out of water in a net. They likely are more common in Owl Creek than this research indicates. Although only 2 specimens were identified in lower Sandy Branch near Owl Creek, it is likely others were overlooked. Although they have not yet been identified there, they should be looked for in lower Tilghman and lower Shiloh Branches.



Photo H-06. Bluntface Shiner, Cyprinella camura, 70 mm TL, from Owl Creek.



8. **SPOTFIN SHINER**, Cyprinella spiloptera (Cope)

(See page 155 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Silvery on sides, to gray on back
Caudal fin faintly pale yellow
All but smallest specimens have **faint dark spot on trailing edge of dorsal fin**
Small black spot at base of caudal fin
Adult males have pastel blue tint to body
Anal fin rays 8

LARGEST SPECIMENS:

Maximum total length 122 mm (4.8 in)
Largest collected in the park 81 mm (3.2 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

longnose gar	blackspotted topminnow
threadfin shad	western mosquitofish
bluntface shiner	brook silverside
striped shiner	flier
ribbon shiner	warmouth
golden shiner	bluegill
emerald shiner	dollar sunfish
pugnose minnow	longear sunfish
bluntnose minnow	redear sunfish
lake chubsucker	largemouth bass
yellow bullhead	white crappie
grass pickerel	cypress darter
pirate perch	bandfin darter

AQUARIUM BEHAVIOR:

Nuptial males are a beautiful pastel blue fish, but because all sizes tend to be aggressive toward other confined species, the spotfin shiner was determined to be incompatible in a native fish aquarium. When it was the only species in the tank, spotfin shiners seemed to get along alright with each other and made an attractive aquarium fish.

DISTRIBUTION AND RELATIVE ABUNDANCE:

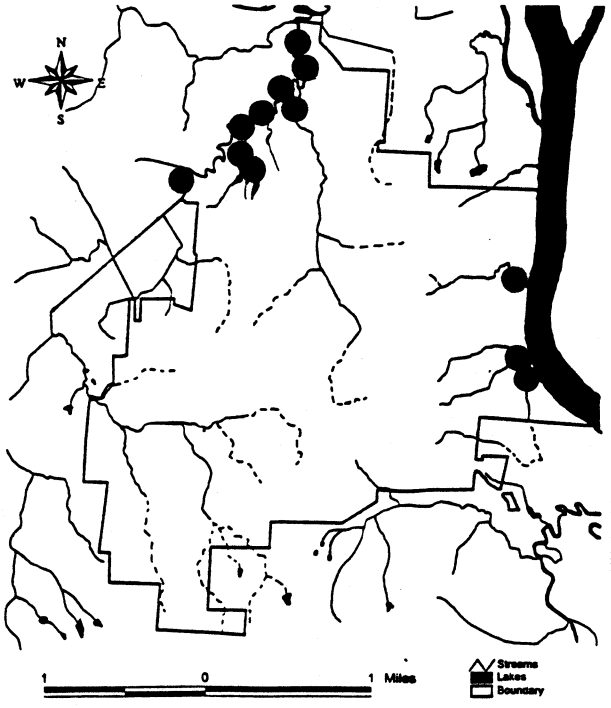
Tilghman Branch		
Lower Section (bottomlands)	COMMON	(in isolated population)
Owl Creek Beaver Ponds (bottomlands)		
Sandy Branch Section	ABUNDANT	(in isolated populations)
Cattail Branch Section	ABUNDANT	(in isolated populations)
Dill Branch		
Lower Section (bottomlands)	*UNCOMMON	
Mounds Branch		
Middle Section (bottomlands)	ABUNDANT	
Lower Section (bottomlands)	ABUNDANT	
Extreme Lower Section (bottomlands)	UNCOMMON	
Riverbottoms Branch (bottomlands)	ABUNDANT	
Owl Creek (bottomlands)	ABUNDANT	

*(Found only after a new beaver dam was built at the Dill Branch Ravine Causeway tunnel).

COMMENTS:

The spotfin shiner was found to be both abundant and widespread in the lower park environments, even behind beaver dams. The species was found in Dill Branch only after beaver built a 1.2 m (4 ft) high dam at the Dill Branch Ravine Causeway.

Shiloh National Military Park
Ponds, Streams, and Boundary





Above: Photo F-07. Spotfin Shiner, Cyprinella spiloptera, 62 mm TL, from Tilghman Branch.

Below: Photo B-24. Spotfin Shiner, Cyprinella spiloptera, 81 mm TL, nuptial male from Owl Creek.



9. **STRIPED SHINER**, Luxilus chrysocephalus (Rafinesque)

(See page 182 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Pattern of straight dark longitudinal dorsolateral lines
Silvery with faint yellowish caudal fin
May have fragmented wide lateral stripe
Rounded snout
Small dorsally placed eye (very small specimens may appear to have large eye)

LARGEST SPECIMENS:

Maximum total length 240 mm (9.3 in)
Largest collected in the park 153 mm (6 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

largescale stoneroller
rosyside dace
spotfin shiner
rosefin shiner
ribbon shiner
golden shiner
pugnose minnow
bluntnose minnow
creek chub
creek chubsucker
lake chubsucker
yellow bullhead
brown madtom
grass pickerel
pirate perch
blackspotted topminnow
western mosquitofish
green sunfish
flier
warmouth
bluegill
dollar sunfish
longear sunfish
redear sunfish
largemouth bass
white crappie
cypress darter
stripetail darter
bandfin darter

AQUARIUM BEHAVIOR:

The species was active but not aggressive toward other species. Although not colorful, it would be a welcome addition to a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

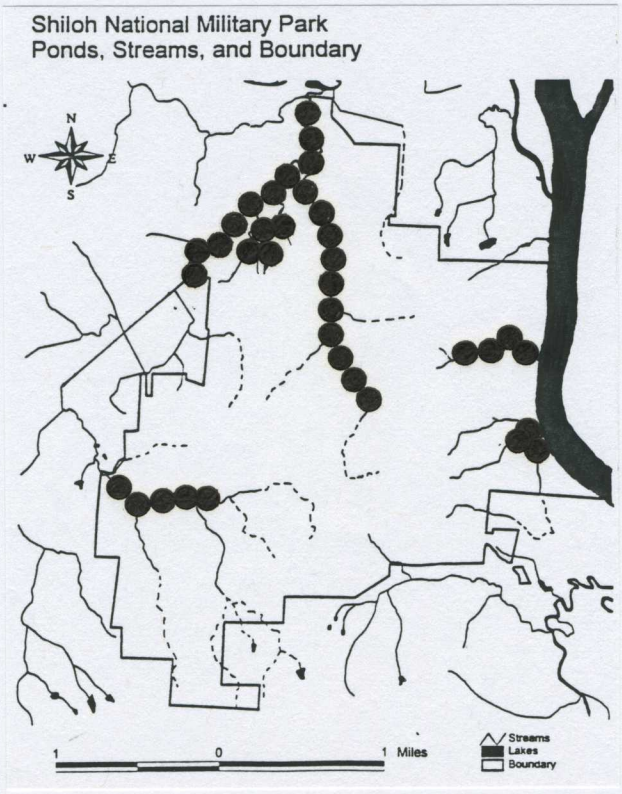
Tilghman Branch	
Upper Section	ABUNDANT
Middle Section	ABUNDANT
Lower Section	ABUNDANT
Shiloh Branch	
Middle Section	ABUNDANT
Lower Section	ABUNDANT
Owl Creek Beaver Ponds (bottomlands)	
Sandy Branch Section	ABUNDANT
Cattail Branch Section	ABUNDANT
Middlefield Branch Section	ABUNDANT
Dill Branch	
Upper Section	ABUNDANT
Middle Section	ABUNDANT
Lower Section (bottomlands)	ABUNDANT
Mounds Branch	
Middle Section (bottomlands)	ABUNDANT
Lower Section (bottomlands)	ABUNDANT
Riverbottoms Branch (bottomlands)	ABUNDANT
Rogers Branch	
Lower Section (bottomlands)	ABUNDANT
Owl Creek (bottomlands)	ABUNDANT

COMMENTS:

The striped shiner was one of the more abundant and widely distributed fish within the park. Many of the larger, deeper stream pools had some surprisingly large specimens with few, if any, other species.



Photo B-01. Striped Shiner, Luxilus chrysocephalus, 84 mm TL, from Shiloh Branch.



10. **ROSEFIN SHINER** (or blueside shiner), Lythrurus ardens (Cope)

(See page 187 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Relatively small slender minnow
Bluish cast to sides interrupted by series of darker blue vertical bars
Nuptial males have brilliant red on fins
Dark spot at anterior base of dorsal fin
Dorsal fin origin well behind pelvic fin insertion

LARGEST SPECIMENS:

Maximum total length 90 mm (3.5 in)
Largest collected in the park 71 mm (2.8 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

largescale stoneroller
rosyside dace
striped shiner
creek chub
creek chubsucker
blackspotted topminnow
bluegill
longear sunfish
bandfin darter

AQUARIUM BEHAVIOR:

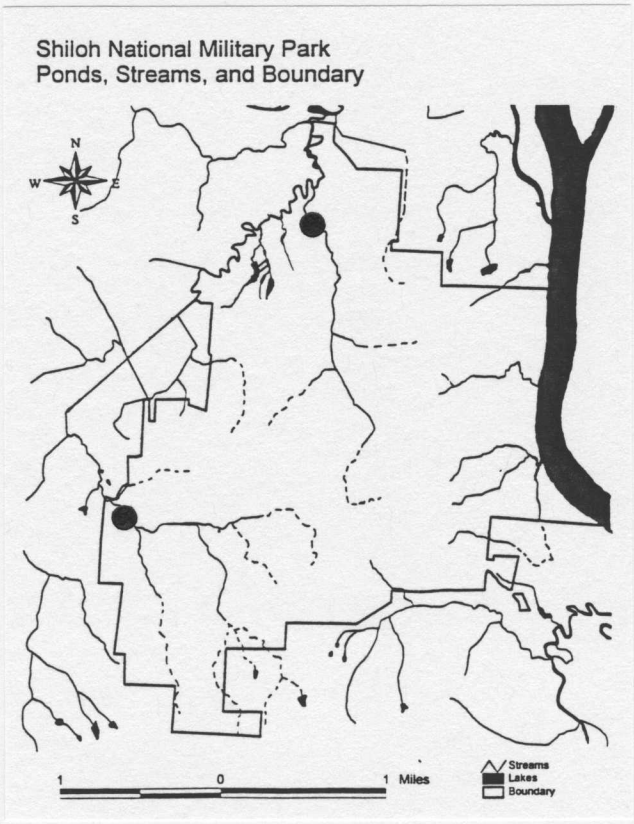
The males were beautifully colored and active but were aggressive toward other species. They nipped other fishes fins enough to cause damage. They would be incompatible in a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Tilghman Branch		
Lower Section	UNCOMMON	(in isolated populations)
Shiloh Branch		
Lower Section	UNCOMMON	(in isolated populations)

COMMENTS:

The species was found in some of the deeper pools only in the lower sections of Tilghman and Shiloh Branches. Their habitat needs seemed to be more restrictive than other minnows.


Shiloh National Military Park
Ponds, Streams, and Boundary
N
W
E
S
1
0
1 Miles
Streams
Lakes
Boundary



Above: Photo D-08. Rosefin Shiner, Lythrurus ardens, 67 mm TL male, from lower Shiloh Branch.

Below: Photo D-04. Rosefin Shiner, Lythrurus ardens 65 mm TL, from lower Shiloh Branch



11. **RIBBON SHINER**, Lythrurus fumeus (Evermann)

(See page 188 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Small silvery to pale yellow minnow
Dorsal fin origin well behind pelvic fin insertion
Dark edging of tiny dorsolateral scales
Tiny crowded predorsal scales
Oblique preorbital bar, dark rimmed lips
Centrally located large eye
Black stripe on sides shows up only in aquarium after capture
Area below stripe and above anal fin is translucent

LARGEST SPECIMENS:

Maximum total length 66 mm (2.6 in)
Largest collected in the park 53 mm (2.1 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

spotfin shiner	bluegill
striped shiner	dollar sunfish
golden shiner	cypress darter
blackspotted topminnow	bandfin darter
western mosquitofish	

AQUARIUM BEHAVIOR:

The species was not aggressive and got along well with other species, but it was so small that larger fish tended to consume it. It would be a welcome addition to a native fish aquarium as a specimen or to provide food for larger fish.

DISTRIBUTION AND ABUNDANCE:

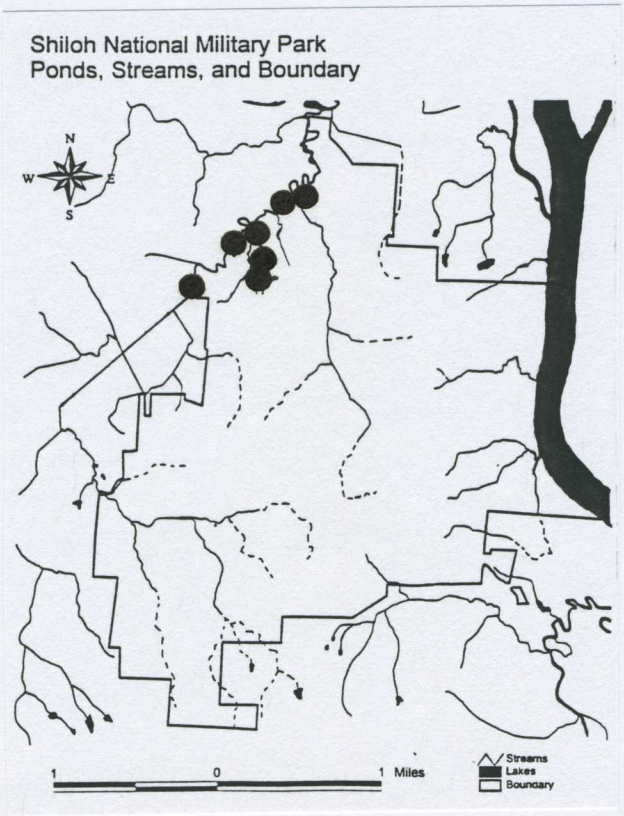
Tilghman Branch		
Lower Section	OCCASIONAL	(only 1)
Owl Creek Beaver Ponds (bottomlands)		
Sandy Branch Section	ABUNDANT	
Cattail Branch Section	ABUNDANT	(in isolated populations)
Owl Creek (bottomlands)	ABUNDANT	

COMMENTS:

The ribbon shiner and pugnose minnow were the 2nd smallest species found within the park. The cypress darter was the smallest species.



Photo I-12. Ribbon Shiner, Lythrurus fumeus, 53 mm TL, from Sandy Branch of the Owl Creek Beaver Ponds.



12. **GOLDEN SHINER**, Notemigonus crysoleucas (Mitchill)

(See page 199 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Deep-bodied, flat sided, silver or golden minnow
Belly with sharp naked keel between pelvic fin base and anus
Juveniles with broad, dark, lateral stripe

LARGEST SPECIMENS:

Maximum total length 367 mm (14.5 in)
Largest collected in park 126 mm (5 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

threadfin shad	flier
spotfin shiner	warmouth
striped shiner	bluegill
emerald shiner	dollar sunfish
lake chubsucker	redear sunfish
spotted sucker	largemouth bass
grass pickerel	white crappie
pirate perch	cypress darter
blackspotted topminnow	yellow perch
western mosquitofish	sauger
brook silverside	freshwater drum

AQUARIUM BEHAVIOR:

The golden shiner was an active, non-aggressive fish, well suited for an aquarium. It would be a welcome addition to a native fish aquarium.

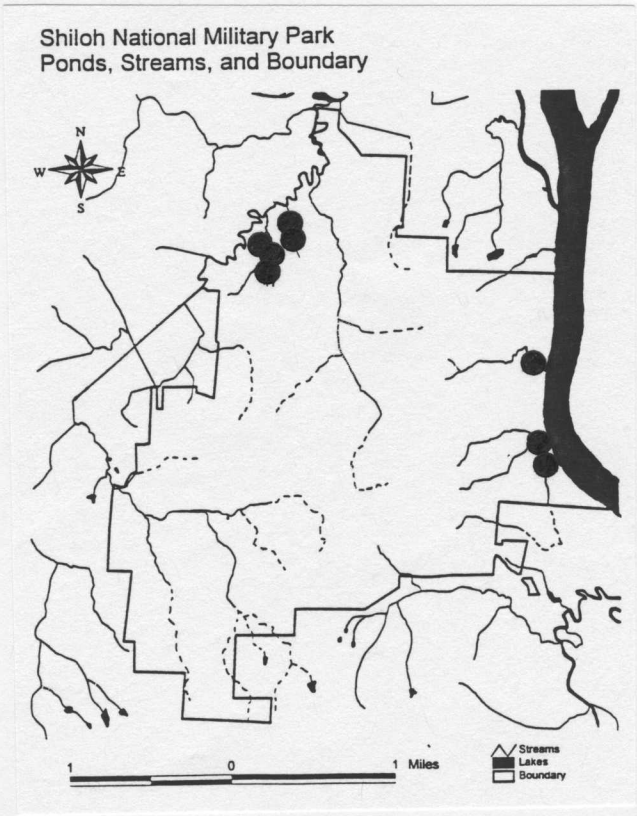
DISTRIBUTION AND RELATIVE ABUNDANCE:

Owl Creek Beaver Ponds (bottomlands)	
Sandy Branch Section	COMMON
Cattail Branch Section	COMMON
Middlefield Branch Section	COMMON
Dill Branch	
Lower Section (bottomlands)	*UNCOMMON
Mounds Branch	
Lower Section (bottomlands)	UNCOMMON
Riverbottoms Branch (bottomlands)	COMMON

*(Found only after a new beaver dam was built at the Dill Branch Ravine Causeway tunnel).

COMMENTS:

Larger specimens looked much different than smaller fish. They inhabited only bottomlands habitats.


Shiloh National Military Park
Ponds, Streams, and Boundary
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Lakes
Boundary



Above: Photo D-23. Golden Shiner, Notemigonus crysoleucas, 97 mm TL immature specimen, from Riverbottoms Branch.

Below: Photo I-10. Golden Shiner, Notemigonus crysoleucas, 100 mm TL adult, from Cattail Branch of the Owl Creek Beaver Ponds.



13. **EMERALD SHINER**, Notropis atherinoides (Rafinesque)

(See page 210 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Very long, slender, flat sided, bright silvery minnow
Dorsal fin well behind pelvic fin base
pigment present on chin and extends back between mandibles on gular area

LARGEST SPECIMENS:

Maximum total length 124 mm (4.9 in)
Largest collected in the park 106 mm (4.1 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

threadfin shad	western mosquitofish
spotfin shiner	brook silverside
striped shiner	bluegill
golden shiner	longear sunfish
blackspotted topminnow	largemouth bass

AQUARIUM BEHAVIOR:

A beautifully graceful, active, non-aggressive fish. A very thin emerald stripe was visible on the upper sides when the light was right. Larger specimens appearance was striking because of their unusually long slender shape (smaller specimens do not appear as long and slender). The species would make a welcome addition to a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

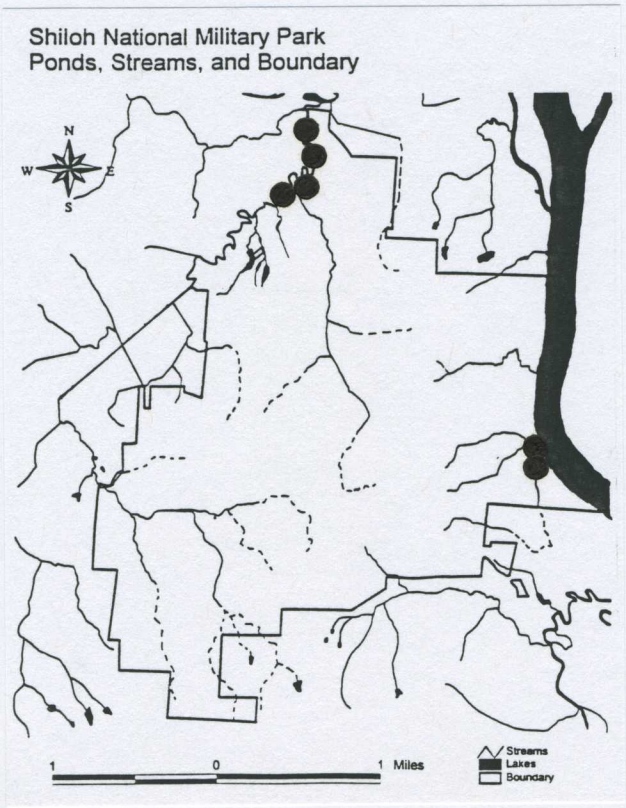
Tilghman Branch	
Lower Section (bottomlands)	OCCASIONAL (only 2)
Mounds Branch	
Lower Section (bottomlands)	COMMON
Riverbottoms Branch (bottomlands)	COMMON
Owl Creek (bottomlands)	ABUNDANT

COMMENTS:

Freshly captured specimens were difficult to keep alive in warm weather. Emerald shiners were found only in bottomland habitats.



Photo D-15. Emerald Shiner, Notropis atherinoides, 89 mm TL, from Riverbottoms Branch.



14. **MIMIC SHINER**, Notropis volucellus (Cope)

(See page 232 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Translucent silver on sides, gray or faintly amber on back
Dark edgings conspicuous on dorsolateral scales
Tiny, triangular basicaudal spot often evident
Pre-orbital bar present, rather large eye
Infraorbital canal complete

This species is similar to several other minnows. See key on page 204 and 205 of Etnier and Starnes (1993) for help with identification.

LARGEST SPECIMENS:

Maximum total length 65 mm (2.6 in)
Largest collected in the park 60 mm (2.3 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

threadfin shad
spotfin shiner
striped shiner
emerald shiner
blackspotted topminnow
brook silverside
bluegill
largemouth bass

AQUARIUM BEHAVIOR:

The species was an active, non-aggressive fish. It would make a welcome addition to a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

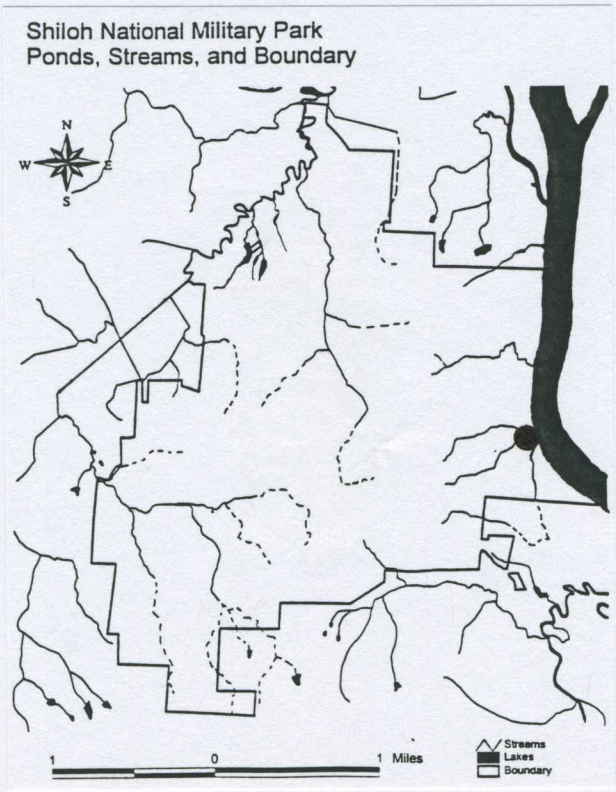
Mounds Branch
Lower Section (bottomlands) OCCASIONAL (only 3)

COMMENTS:

Only 3 specimens were collected in one seine haul in lower Mounds Branch not far above Riverbottoms Branch. Since they reportedly tend to avoid small creeks and marshy or swampy areas, they are not likely to be found elsewhere within the park. These specimens likely came from the Tennessee River during high water and remained behind beaver dam #1 after the water receded. They will likely continue to be occasional park visitors.



Photo E-11. Mimic Shiner, Notropis volucellus, 60 mm TL, from lower Mounds Branch.



15. **PUGNOSE MINNOW**, Opsopoeodus emiliae (Hay)

(See page 237 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Small, slender, silvery minnow with large fins
Dark edgings of dorsolateral scales
Dark, very narrow lateral stripe
Separate diffuse basicaudal spot usually evident
First 4 and last 3 dorsal fin rays outlined with melanophores, but rays 5 and 6 lack dark pigment (total of 9 dorsal fin rays)
Nearly vertical mouth

LARGEST SPECIMENS:

Maximum total length 66 mm (2.6 in)
Largest collected in the park 58 mm (2.3 in)

The ribbon shiner and pugnose minnow were the 2nd smallest species found within the park.

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

longnose gar	western mosquitofish
spotfin shiner	warmouth
striped shiner	bluegill
golden shiner	dollar sunfish
lake chubsucker	longear sunfish
yellow bullhead	redear sunfish
pirate perch	largemouth bass
blackspotted topminnow	white crappie

AQUARIUM BEHAVIOR:

The pugnose minnow was active and non-aggressive, but it was so small that it was eaten by other fish. The species would be a welcome addition to a native fish aquarium, as long as there are no fish large enough to consume it.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Owl Creek Beaver Ponds (bottomlands)
Cattail Branch Section COMMON (in isolated populations)

COMMENTS:

The pugnose minnow was found only in small isolated populations of heavily vegetated middle and upper portions of Cattail Branch in the Owl Creek Beaver Ponds. Its habitat seemed to be very restrictive.

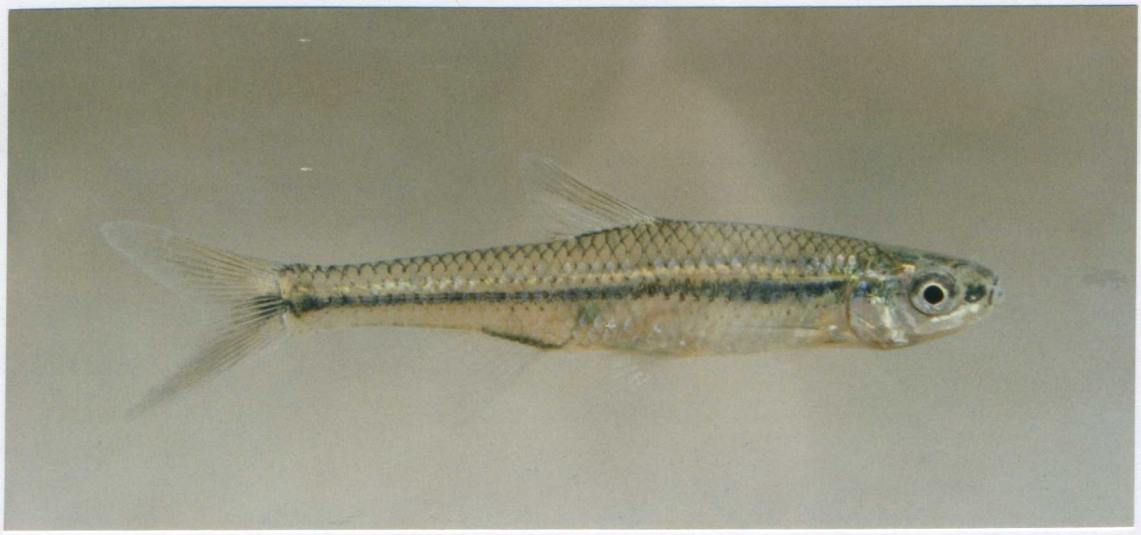
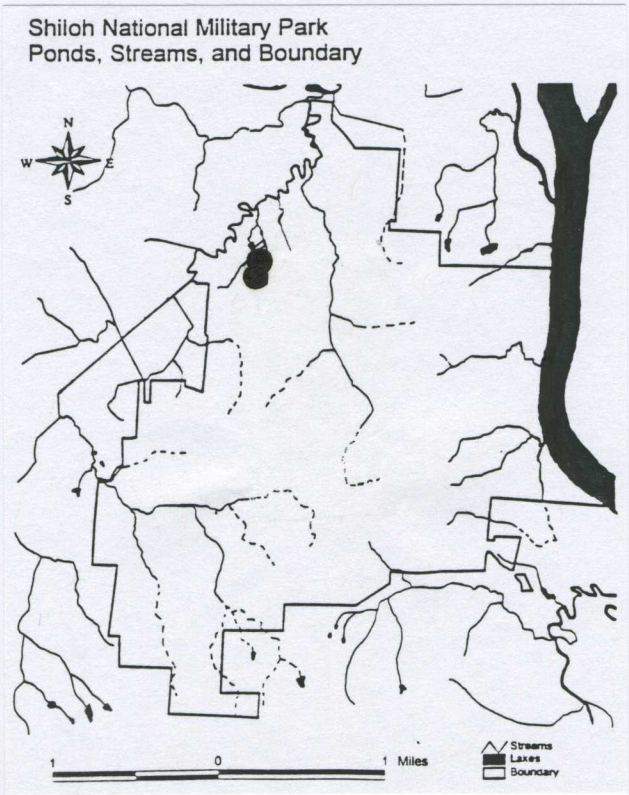


Photo E-19. Pugnose Minnow, Opsopoeodus emiliae, 58 mm TL, from Cattail Branch of the Owl Creek Beaver Ponds.



16. **SOUTHERN REDBELLY DACE**, Phoxinus erythrogaster (Rafinesque)

(See page 245 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Small minnow with **two parallel lateral stripes**, upper often interrupted posteriorly
Red spot on dorsal fin base
Pectoral, pelvic, and anal fins bright yellow
Males may have some red on belly throughout the year

LARGEST SPECIMENS:

Maximum total length 90 mm (3.5 in)
Largest collected in the park 69 mm (2.7 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

least brook lamprey
largescale stoneroller
rosyside dace
striped shiner
blacknose dace
creek chub
creek chubsucker
brown madtom
blackspotted topminnow
green sunfish
stripetail darter
goldstripe darter
bandfin darter

(typically found associated only with blacknose dace, creek chub, and goldstripe darter in tiny headwaters streams)

AQUARIUM BEHAVIOR:

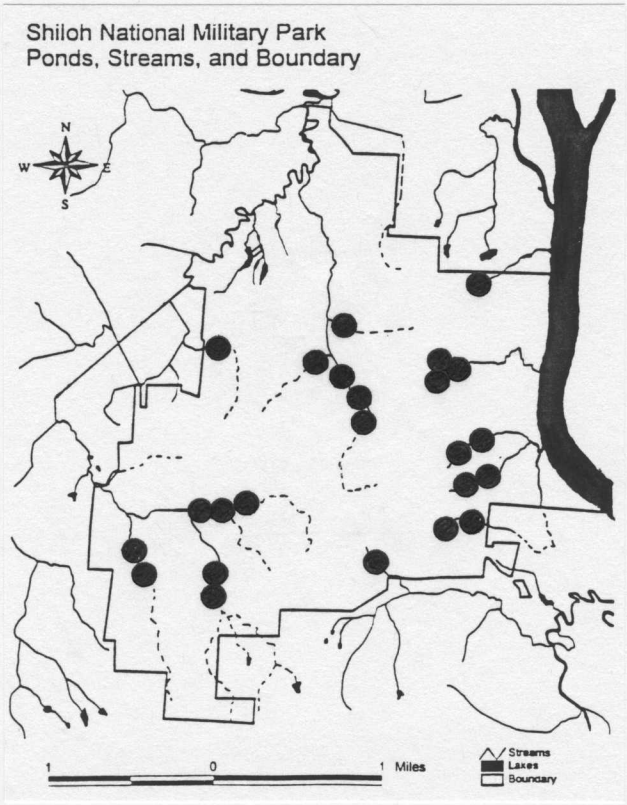
The species was active and non-aggressive. Beautifully colored in the wild, it tended to lose its red belly and dark lateral stripes in the aquarium (although the red belly would reappear from time to time, generally under low light conditions). It was especially susceptible to ick in an overcrowded aquarium. It would be a welcome addition to a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Tilghman Branch	
Upper Section	ABUNDANT
Middle Section	COMMON
Shiloh Branch	
Upper Section (headwaters)	ABUNDANT
Middle Section	COMMON
South Prong	COMMON
Picnic Branch (headwaters)	ABUNDANT
Dill Branch	
Headwaters Section	ABUNDANT
Upper Section	COMMON
Mounds Branch	
Upper Section (headwaters)	ABUNDANT
Hagy Branch (headwaters)	ABUNDANT
Rogers Branch	
Upper Section (headwaters)	ABUNDANT
Johnston Branch (headwaters)	ABUNDANT
Quarry Branch (headwaters)	ABUNDANT

COMMENTS:

This small species was found in very large numbers in all headwaters portions of park streams. The southern redbelly dace was the most colorful and one of the most widespread and abundant species within the park.





Above: Photo G-14. Southern Redbelly Dace, Phoxinus erythrogaster, 55 mm TL adult male, from Picnic Branch.

Below: Photo D-10. Southern Redbelly Dace, Phoxinus erythrogaster, 58 mm TL, from upper Dill Branch.



17. **BLUNTNOSE MINNOW**, Pimephales notatus (Rafinesque)

(See page 249 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Silvery with dark scale edgings
Crowded predorsal scales
Black midlateral stripe terminating in a caudal spot
Cylindrical shaped body (similar to creek chub)
Preorbital bar
Very orange caudal fin
(large specimens may not be silvery and may not have black midlateral stripe, therefore may look quite different)
(some specimens may have dark spot on anterior margin of dorsal fin same as P. vigilax)

LARGEST SPECIMENS:

Maximum total length 110 mm (4.3 in)
Largest collected in the park 102 mm (4 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

spotfin shiner
striped shiner
creek chub
blackspotted topminnow
bluegill

AQUARIUM BEHAVIOR:

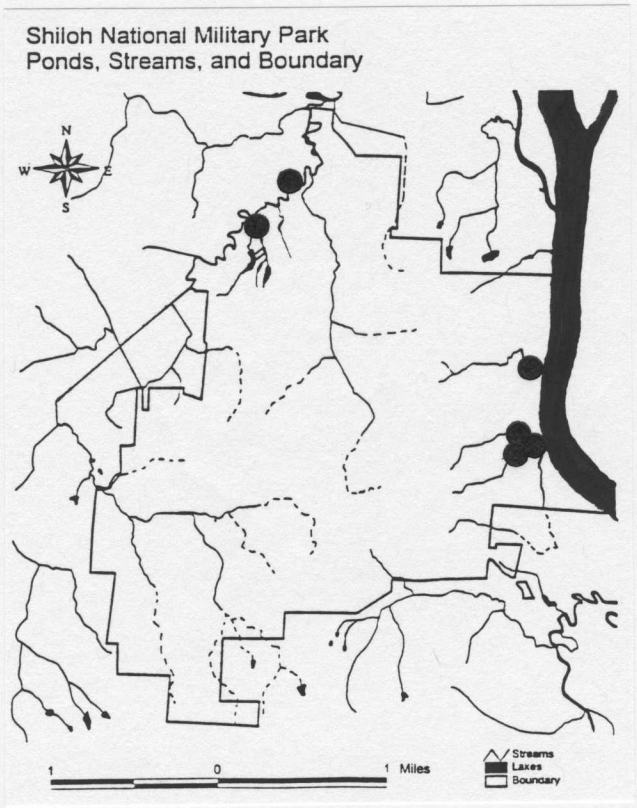
The bluntnose minnow was as easily spooked as members of the sucker family. The species was active, but some specimens were aggressive toward other confined species. Even though they chased other species, they usually did no visible harm. Their orange caudal fin showed up well on larger specimens in the aquarium. The species fed aggressively. Selected non-aggressive specimens would be a welcome addition to a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Owl Creek Beaver Ponds (bottomlands)	
Sandy Branch Section	UNCOMMON
Dill Branch	
Lower Section	UNCOMMON
Mounds Branch	
Middle Section (bottomlands)	ABUNDANT
Lower Section (bottomlands)	COMMON
Rogers Branch	
Lower Section (bottomlands)	COMMON
Owl Creek (bottomlands)	UNCOMMON

COMMENTS:

The species was found in bottomland streams. At Sandy Branch in the Owl Creek Beaver Ponds, it was found only in the extreme lower section below all beaver ponds near Owl Creek.


Shiloh National Military Park
Ponds, Streams, and Boundary
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Above: Photo I-25. Bluntnose Minnow, Pimephales notatus, 64 mm TL, from lower Sandy Branch of the Owl Creek Beaver ponds.

Below: Photo D-13. Bluntnose Minnow, Pimephales notatus, 100 mm TL, from middle Mounds Branch.



18. **BULLHEAD MINNOW**, Pimephales vigilax (Baird and Girard)

(See page 252 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Silvery on sides to gray or straw colored on back
Cylindrical shaped body
Dark basicaudal spot prominent
Dark spot on anterior margin of dorsal fin

LARGEST SPECIMENS:

Maximum total length 92 mm (3.6 in)
Largest collected in the park 63 mm (2.5 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

spotfin shiner
bluegill

AQUARIUM BEHAVIOR:

The species was active but not aggressive. The dark spot on the anterior margin of its dorsal fin made it distinctive and easy to identify in the aquarium. It would be a welcome addition to a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

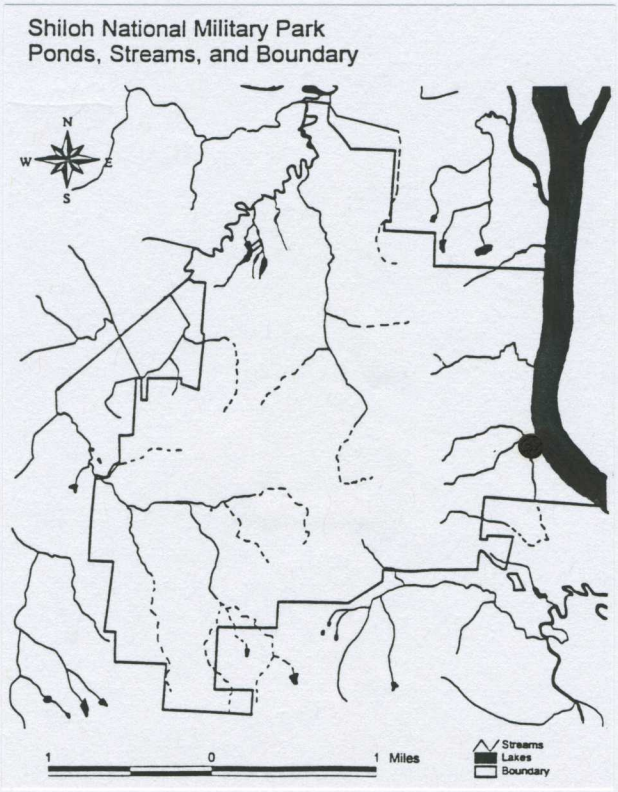
Mounds Branch
Extreme Lower Section OCCASIONAL (only 1)

COMMENTS:

The bullhead minnow is reported to be an inhabitant of sluggish medium to large rivers. Only a single specimen was collected within the park in Mounds Branch below the beaver dam several meters above the Tennessee River during low water. The moderately fast flowing water was channeled about 0.9 m (3 ft) wide and 152 mm (6 in) deep with sandy clay substrate. This species is likely to occur nowhere else within the park and to occur at this location only occasionally.



Photo E-05. Bullhead Minnow, Pimephales vigilax, 63 mm TL, from lower Mounds Branch below beaver dam #1 near the Tennessee River.



19. **BLACKNOSE DACE**, Rhinichthys atratulus (Hermann)

(See page 254 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Dark brown to gray on back grading to silvery on lower sides and belly
Scattered dark colored scales on sides make it speckled
Males may develop orange to rust colored streak on sides

LARGEST SPECIMENS:

Maximum total length 124 mm (4.9 in)
Largest collected in the park 56 mm (2.2 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

southern redbelly dace
creek chub

AQUARIUM BEHAVIOR:

The species stayed close to the bottom. It was active and sometimes aggressive toward other aquarium fish, although there was little indication of injury. When spooked, it would bury itself in the bottom gravel or under a rock. Its distinctive markings tended to fade in the aquarium. It would be all right to add to a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

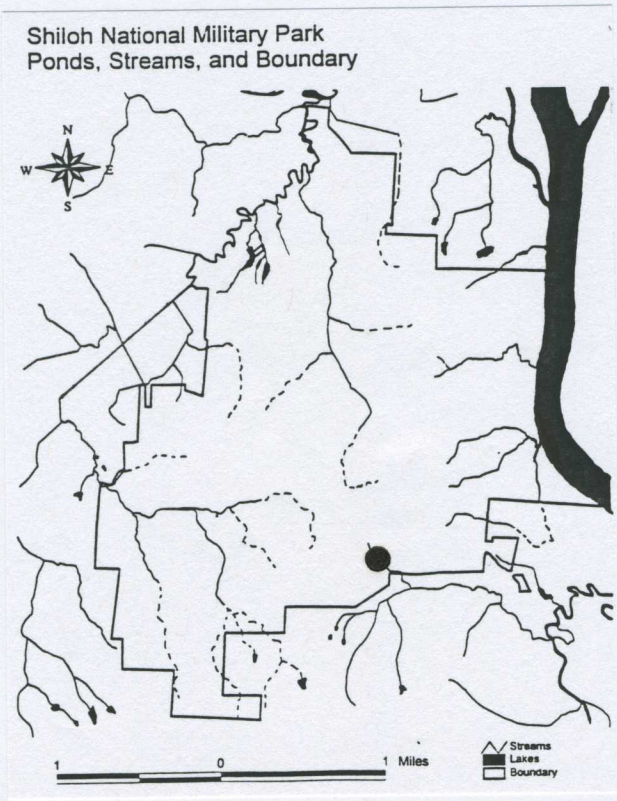
Quarry Branch	UNCOMMON	(in isolated population)

COMMENTS:

The blacknose dace was found in only one tiny headwaters stream. Although there were several specimens in the short section of stream, the population was not large. It would seem likely the species should be in most (if not all) park headwaters streams, but they have not been found.



Photo J-07. Blacknose Dace, Rhinichthys atratulus, 56 mm TL, from Quarry Branch.



20. **CREEK CHUB**, Semotilus atromaculatus (Mitchill)

(See page 257 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Dark gray to brown on back
Creme colored sides with conspicuous dark lateral stripe
Dark brown spot on anterior base of dorsal fin
Cylindrical body shape (chubby looking)

LARGEST SPECIMENS:

Maximum total length 303 mm (11.9 in)
Largest collected in the park 165 mm (6.5 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

largescale stoneroller
rosyside dace
striped shiner
rosefin shiner
southern redbelly dace
blacknose dace
creek chubsucker
brown madtom
blackspotted topminnow
green sunfish
bluegill

AQUARIUM BEHAVIOR:

The species was active, but not aggressive. It was easy to identify because of its body shape and dark brown spot on the anterior base of its dorsal fin. It and the southern redbelly dace seemed to be more susceptible to ick than other species in an overcrowded aquarium. It would be a welcome addition to a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

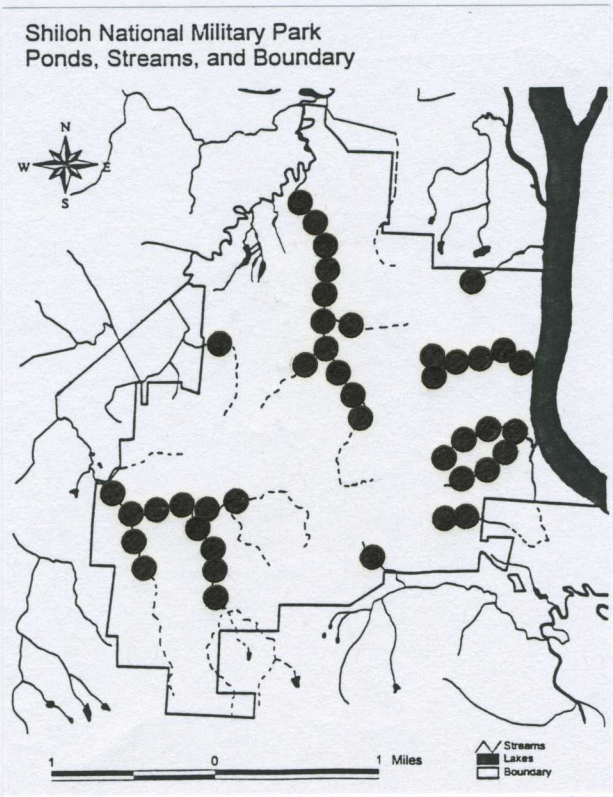
Tilghman Branch	
Upper Section	ABUNDANT
Middle Section	ABUNDANT
Lower Section	COMMON
Shiloh Branch	
Upper Section (headwaters)	ABUNDANT
Middle Section	ABUNDANT
Lower Section	ABUNDANT
South Prong Section	ABUNDANT
Picnic Branch (headwaters)	COMMON
Dill Branch	
Headwaters Section	ABUNDANT
Upper Section	ABUNDANT
Middle Section	ABUNDANT
Lower Section (bottomlands)	ABUNDANT
Mounds Branch	
Upper Section (headwaters)	ABUNDANT
Middle Section	ABUNDANT
Lower Section (bottomlands)	COMMON
Hagy Branch (headwaters)	ABUNDANT
Rogers Branch	
Upper Section (headwaters)	ABUNDANT
Lower Section (bottomlands)	ABUNDANT
Johnston Branch (headwaters)	ABUNDANT
Quarry Branch (headwaters)	ABUNDANT

COMMENTS:

This easily identified species was probably the most widespread over a variety of habitats, and it was the most abundant of any fish within the park. It was found from the smallest headwaters to the bottomlands (but not behind beaver dams). In deeper clear pools, even in some small headwaters habitat, it sometimes achieved surprisingly large sizes [up to 165 mm (6.4 in)].



Photo B-02. Creek Chub, Semotilus atromaculatus, 86 mm TL, from Shiloh Branch.



21. **CREEK CHUBSUCKER**, Erimyzon oblongus (Mitchill)

(See page 271 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Brownish to olivaceus above, paler below
Diffuse lateral stripe of nearly confluent blotches often present
Posterior anal fin placement (typical of all suckers)
Sucker-like mouth, except nearly terminal
Dorsal fin rays 9-10
Lateral scales 39-41
Young less than 30 mm (1.2 in) total length have uniform dark lateral stripe
Adults body elongate, body depth into standard length 3.2 to 4.2 times

LARGEST SPECIMENS:

Maximum total length typically less than 250 mm (10 in), but largest recorded was 376 mm (14.8 in)
Largest collected in the park 130 mm (5.1 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

least brook lamprey
rosyside dace
striped shiner
southern redbelly dace
creek chub
brown madtom
blackspotted topminnow
bluegill
longear sunfish
stripetail darter
bandfin darter

AQUARIUM BEHAVIOR:

The species was fairly active when other active species were present. It fit in well with other non-aggressive fish. However, because it was shy and easily spooked, it was a prime target for aggressive fish. The largescale stoneroller was especially aggressive toward this species and nipped off chunks of its dorsal fin during periods of inactivity. It cleaned up uneaten food that dropped to the bottom of the aquarium. It would be a welcome addition to a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Tilghman Branch	
Upper Section	UNCOMMON
Middle Section	UNCOMMON
Lower Section	UNCOMMON
Shiloh Branch	
Middle Section	COMMON
Lower Section	COMMON
Dill Branch	
Upper Section	COMMON
Middle Section	COMMON
Lower Section (bottomlands)	COMMON

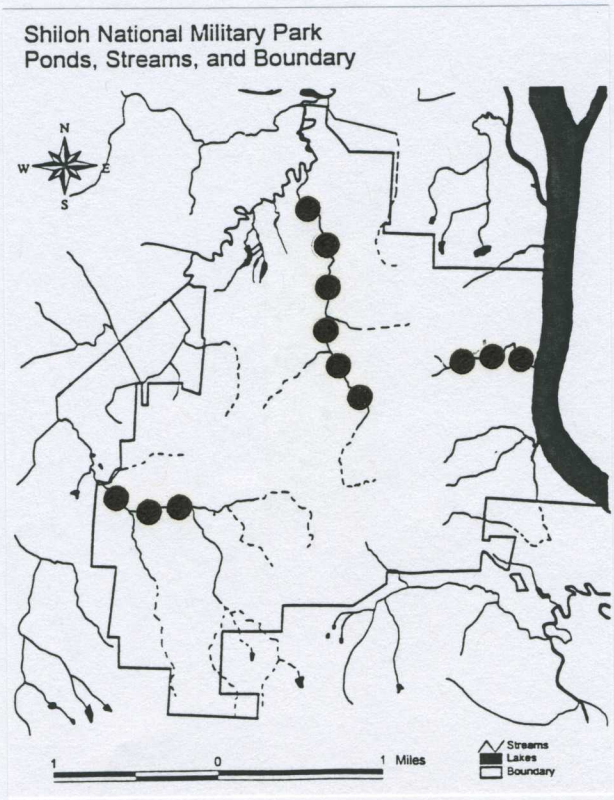
COMMENTS:

Creek chubsuckers occurred only in the three largest streams within the park. They were not found in any great numbers or concentrations, but they were the most plentiful of the sucker family.

The lake chubsucker is very similar and must be closely examined to identify properly. Generally, the creek chubsucker is a stream fish, while the lake chubsucker was found only in the Owl Creek Beaver Ponds. However, their populations <u>may</u> overlap.



Photo J-04. Creek Chubsucker, Erimyzon oblongus, 108 mm TL, from middle Shiloh Branch.



22. **LAKE CHUBSUCKER**, Erimyzon sucetta (Lacepede)

(See page 272 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Adults may be olive green to gray dorsally with a series of midlateral blotches, or dark golden brown dorsally to light golden on the sides
Juveniles have a faint red caudal fin and jet black lateral stripe and dusky anterior margin on dorsal fin
Posterior anal fin placement (typical of all suckers)
Sucker-like mouth, except nearly terminal
Dorsal fin rays 11 to 12 (sometimes 13)
Lateral scales 35 to 38
Adults moderately deep bodied, body depth into standard length 2.9 to 3.1 times
The species is very similar to the creek chubsucker and must be examined closely to differentiate

LARGEST SPECIMENS:

Maximum total length 394 mm (15.5 in), 998 gm (2.2 lb)
Largest collected in the park 180 mm (7.1 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

longnose gar
spotfin shiner
striped shiner
golden shiner
pugnose minnow
spotted sucker
yellow bullhead
grass pickerel
pirate perch
blackspotted topminnow
western mosquitofish
flier
warmouth
bluegill
dollar sunfish
longear sunfish
redear sunfish
largemouth bass
white crappie

AQUARIUM BEHAVIOR:

The species was fairly active, non-aggressive, and shy. It spent a lot of time hiding behind rocks and was easily spooked. Juvenile specimens would make a welcome addition to a native fish aquarium. Because their population seems to be so uncommon in Tennessee, it is hoped that collectors would set the fish free.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Owl Creek Beaver Ponds (bottomlands)
Cattail Branch, Middle section — UNCOMMON (in isolated populations)

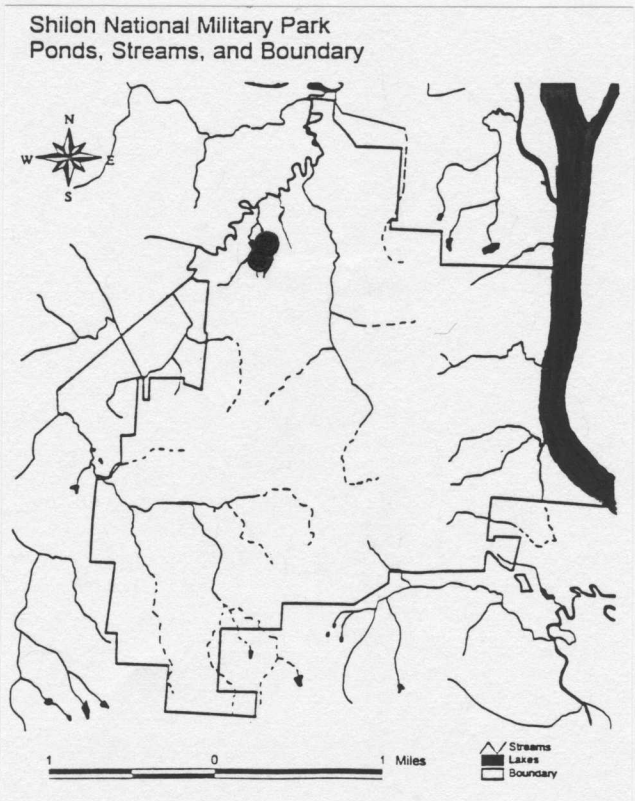
COMMENTS:

The lake chubsucker was found only in two isolated areas in Cattail Branch of the Owl Creek Beaver Ponds in thick aquatic vegetation. It reportedly avoids all but the lowest gradient streams and is typically found in vegetated backwaters.

One 67 mm (2.6 in) juvenile specimen was a curiosity. When it was first captured, its caudal fin had no hint of red, and its lateral stripe was dark but not jet black. Its dorsal fin ray count was 12, indicating it was a lake chubsucker and not a creek chubsucker. After being in an aquarium for a few weeks, its caudal fin appeared to have a very slight red tint. After several months in captivity, its lateral stripe suddenly disappeared, and its body turned silvery with no markings. It remained that way for about 2 weeks when suddenly its dark stripe returned, and its dorsum color returned to olive with a slightly golden tinge on its sides.

According to Etnier and Starnes (1993), "It would appear to be very uncommon and perhaps extirpated from many habitats by agricultural practices." It was known to occur in only 8 locations in the state. Previously, it was unknown on the Tennessee River drainage, except for 2 sites in the upper reaches of the Big Sandy River System which is a tributary to the Tennessee River downstream from the park near the Kentucky State Line.

This species was undoubtedly the most significant discovery within the park.





Above: Photo I-23. Lake Chubsucker, Erimyzon sucetta, 61 mm TL immature specimen, from Cattail Branch of the Owl Creek Beaver Ponds.

Below: Photo I-04. Lake Chubsucker, Erimyzon sucetta, 94 mm TL, from Cattail Branch of the Owl Creek Beaver Ponds.



23. **NORTHERN HOGSUCKER**, Hypentelium nigricans (Lesueur)

(See page 275 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Slender, dark brown and tan mottled, sucker with large head
Posterior anal fin placement (typical of all suckers)
Small eyes located far back and high on the head
Snout long and decurved, sucker-like mouth
Head squarish in cross section
Dorsal fin rays 11

LARGEST SPECIMENS:

Maximum total length 570 mm (22.5 in), 1.9 kg (4.25 lb)
Largest collected in the park 190 mm (7.5 in)

(This was the largest stream fish collected within the park)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

largescale stoneroller
rosyside dace
striped shiner
rosefin shiner
creek chub
creek chubsucker
blackspotted topminnow
bluegill
longear sunfish
bandfin darter

AQUARIUM BEHAVIOR:

The species spent hours lying motionless on the bottom of the tank blending in very well with the native rocks. It would occasionally root among the rocks for food (one could actually hear the rocks being moved around in the aquarium when it fed). The fish was extremely spooky and moved very fast when it was spooked. Small specimens would be a welcome addition to a native fish aquarium, although they may stir up bottom sediment and make it difficult to keep the water clear.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Shiloh Branch
Lower Section — OCCASIONAL (only 1)

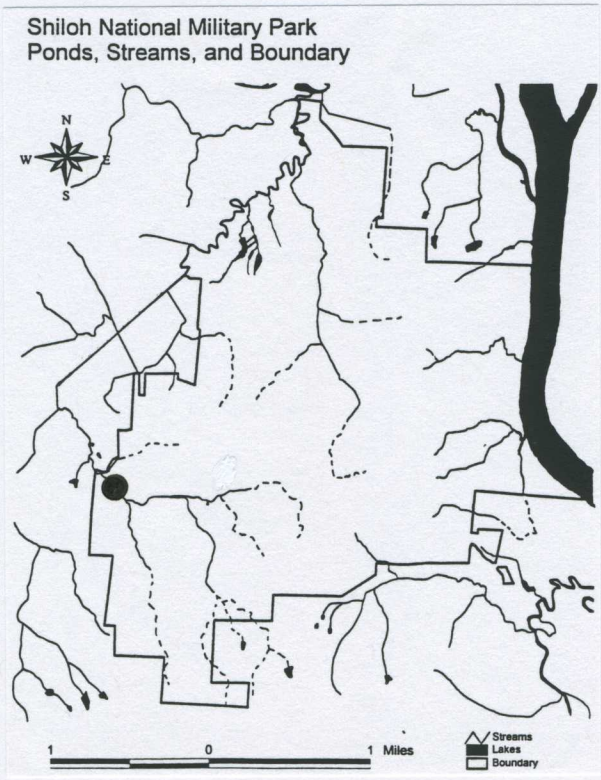
COMMENTS:

This species most likely occurs in low numbers, but in larger numbers than indicated by this study. The fish blended well with the bottom, so it was difficult to see, and it spooked at the least provocation. It tended to hide under any available cover. Since it is known to occur in tiny creeks as well as

large rivers, it should be looked for in Tilghman, Dill, and Mounds Branches, as well as farther upstream on Shiloh Branch.



Photo I-20. Northern Hogsucker, Hypentelium nigricans, 190 mm TL, from lower Shiloh Branch.



24. **SPOTTED SUCKER**, Minytrema melanops (Rafinesque)

(See page 282 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Sucker-like mouth
Posterior anal fin placement (typical of all suckers)
Olivaceus above, paler below, may also appear gold or silver
Tiny dark spots at scale bases form very narrow horizontal lines on sides
Juveniles have dark posterior margin on dorsal fin
May have several large but faint dark spots on body

LARGEST SPECIMENS:

Maximum total length 450 mm (18 in), 1.4 kg (3 lbs)
Largest collected in the park 103 mm (4 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

threadfin shad	brook silverside
spotfin shiner	flier
striped shiner	warmouth
golden shiner	bluegill
lake chubsucker	dollar sunfish
yellow bullhead	redear sunfish
pirate perch	largemouth bass
blackspotted topminnow	white crappie
western mosquitofish	freshwater drum

AQUARIUM BEHAVIOR:

The species was semi-active, non-aggressive, and a bottom feeder. It was easily spooked. Large faint dark spots on its body appeared or disappeared before ones eyes while the fish was motionless on the rocky aquarium bottom. Small specimens would be a welcome addition to any native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

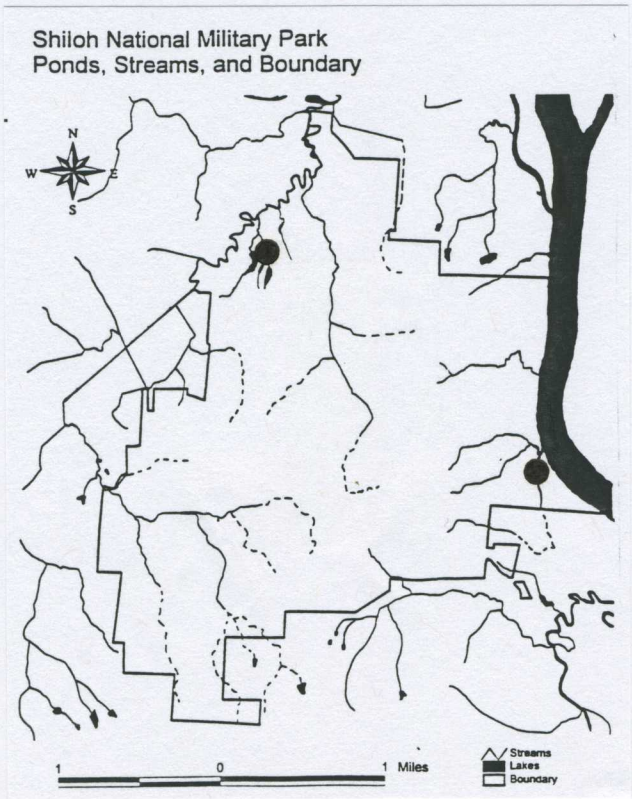
Owl Creek Beaver Ponds (bottomlands)	
Cattail Branch, Middle Section	OCCASIONAL (only 1)
Riverbottoms Branch (bottomlands)	UNCOMMON

COMMENTS:

The species was found in small numbers only in bottomlands habitat within the park.



Photo I-07. Spotted Sucker, Minytrema melanops, 103 mm TL, from Riverbottoms Branch.



25. **GOLDEN REDHORSE**, Moxostoma erythrurum (Rafinesque)

(See page 291 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Sucker-like mouth
Posterior anal fin placement (typical of all suckers)
Silvery with golden tinge (may appear only silvery)
Caudal and dorsal fins gray in adults, often tinted red in young
Lower fins yellow to orange

LARGEST SPECIMENS:

Maximum total length 660 mm (26 in), 2 kg (4.5 lb)
Largest collected in the park 89 mm (3.5 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

largescale stoneroller
spotfin shiner
striped shiner
creek chub
black bullhead
blackspotted topminnow
bluegill
longear sunfish
bandfin darter

AQUARIUM BEHAVIOR:

This species behavior in an aquarium was identical to the previously mentioned spotted sucker listed on page 89.

DISTRIBUTION AND RELATIVE ABUNDANCE:

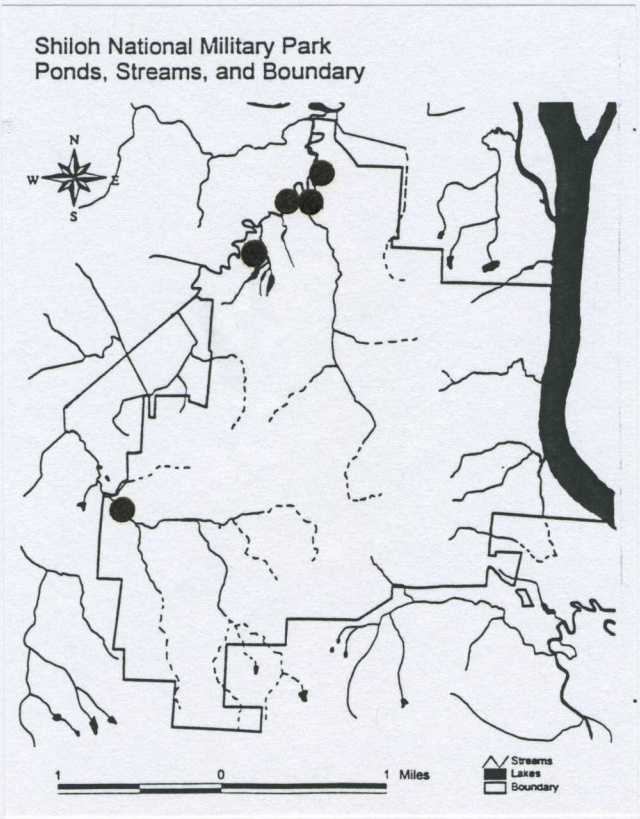
Tilghman Branch	
Lower Section	UNCOMMON
Shiloh Branch	
Lower Section	OCCASIONAL (only 1)
Owl Creek Beaver Ponds (bottomlands)	
Sandy Branch	OCCASIONAL (only 1)
Owl Creek (bottomlands)	UNCOMMON

COMMENTS:

The golden redhorse is reportedly a common species of larger creeks and small rivers. They may also be found in smaller streams. It was found in small numbers in lowland and bottomland habitats within the park.



Photo I-06. Golden Redhorse, Moxostoma erythrurum, 72 mm TL, from lower Tilghman Branch.



26. **BLACK BULLHEAD**, Ameiurus melas (Rafinesque)

(See page 300 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Dark brown to nearly black dorsally
Yellow to white ventrally
Sharply contrasting black membranes and pale rays of caudal and anal fins
Barbels black
Anal fin rays 19-25

LARGEST SPECIMENS:

Maximum total length 350 mm (13.7 in), about 1.4 kg (3 lbs)
Largest collected in the park 95 mm (3.7 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

largescale stoneroller
striped shiner
creek chub
blackspotted topminnow
bluegill
longear sunfish
bandfin darter

AQUARIUM BEHAVIOR:

The species was semi-active during the day, but spent long periods of time resting on the bottom of the tank. It was non-aggressive toward other fish too large for it to eat. It fed from the water surface as well as in mid-water and on the bottom. Small specimens would be a welcome addition to any native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

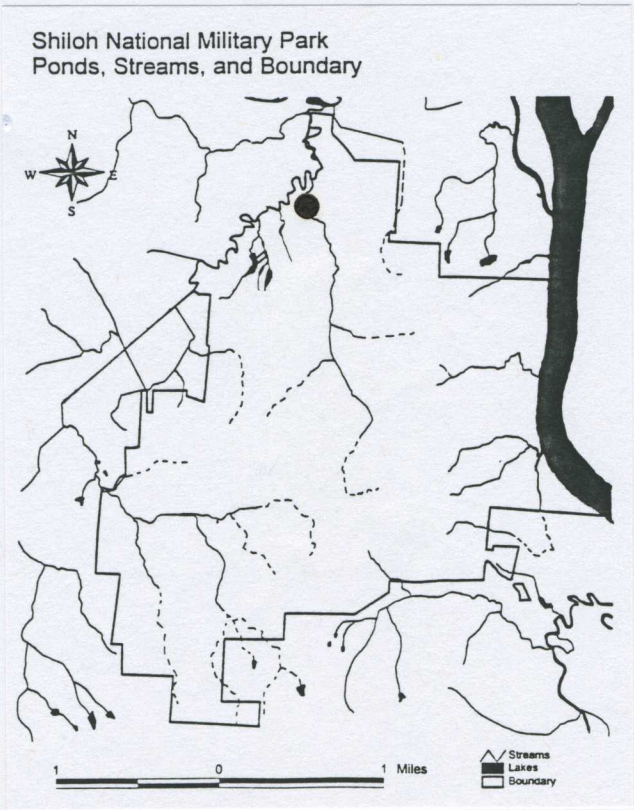
Tilghman Branch
Lower Section (bottomlands) OCCASIONAL (only 2)

COMMENTS:

Only two small specimens were collected within the park. They were observed side by side on the bottom of a clear 0.6 m (2 ft) deep pool with sand and gravel substrate in the lower part of Tilghman Branch. Other specimens would be expected to be present and may have been hidden under undercut banks, etc. during the day.



Photo D-09. Black Bullhead, Ameiurus melas, 82 mm TL, from lower Tilghman Branch.



27. **YELLOW BULLHEAD**, Ameiurus natalis (Lesueur)

(See page 301 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Yellowish brown dorsally, occasionally slightly mottled
Pale yellow to white ventrally
Fins uniformly dusky, with black margin typical on anal and caudal fins
Anal fin rays 24-28 (much wider than other catfish)
Chin barbels pale yellowish or white

LARGEST SPECIMENS:

Maximum total length 465 mm (18.3 in), 1.6 kg (3 lb 10 oz)
Largest collected in the park 156 mm (6.1 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

longnose gar	western mosquitofish
spotfin shiner	flier
striped shiner	warmouth
golden shiner	bluegill
pugnose minnow	dollar sunfish
lake chubsucker	longear sunfish
grass pickerel	redear sunfish
pirate perch	largemouth bass
blackspotted topminnow	white crappie

AQUARIUM BEHAVIOR:

The species remained hidden in a hole or under a rock during daylight hours in the tank. It was aggressive toward any fish small enough for it to eat, and it occasionally attacked some specimens apparently slightly too large for consumption. Small specimens would be an acceptable addition to a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

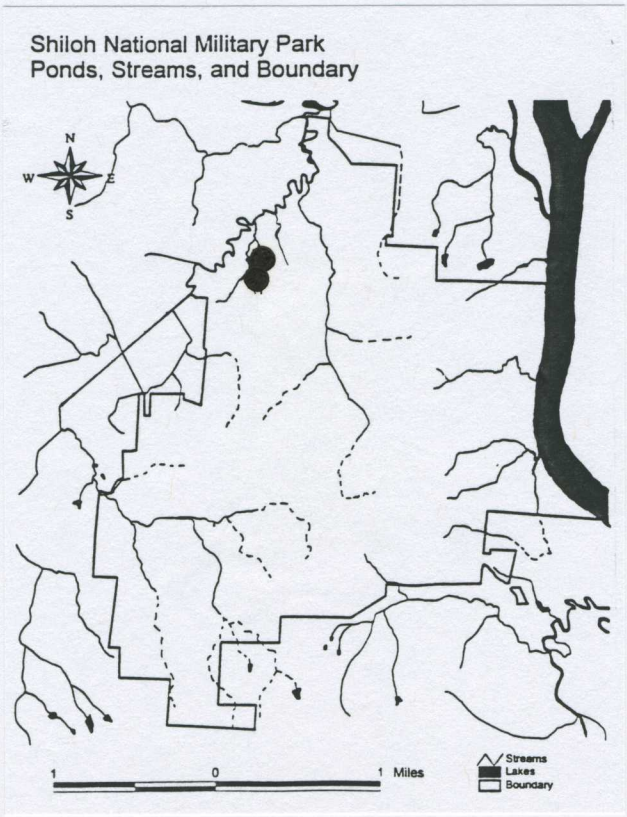
Owl Creek Beaver Ponds (bottomlands)
Cattail Branch, Middle Section — UNCOMMON (in isolated populations)

COMMENTS:

The species was found in small numbers only in the Cattail Branch Section of the Owl Creek Beaver Ponds. It most likely occurs in larger numbers in the Owl Creek Beaver Ponds than this study indicates.



Photo J-09. Yellow Bullhead, Ameiurus natalis, 156 mm TL, from Cattail Branch of the Owl Creek Beaver Ponds.



28. **BROWN MADTOM**, Noturus phaeus (Taylor)

(See page 326 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Uniformly gray to brown with pinkish tint under skin on sides (belly occasionally pinkish or even red)
Adipose fin fused to caudal fin (typical of all madtoms)
Rounded caudal fin
Whiskers pale
Fins pale
(must check the pectoral fin spine under a dissecting scope for positive separation from some other madtoms)

LARGEST SPECIMENS:

Maximum total length 150 mm (5.9 in)
Largest collected in the park 155 mm (6.1 in)*

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

least brook lamprey
largescale stoneroller
rosyside dace
striped shiner
southern redbelly dace
creek chub
creek chubsucker
blackspotted topminnow
bluegill
longear sunfish
stripetail darter
bandfin darter

AQUARIUM BEHAVIOR:

The species was semi-active. Tiny specimens spent most of their daylight time buried under the gravel. Larger specimens actively fed on the water surface as well as in mid-water and bottom. It was not aggressive toward other fish. The species would be a welcome addition to a native fish aquarium, except very small specimens may disappear under the gravel substrate for months.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Tilghman Branch	
Middle Section	UNCOMMON
Shiloh Branch	
Middle Section	COMMON
Dill Branch	
Upper Section	UNCOMMON
Middle Section	UNCOMMON
Lower Section (bottomlands)	UNCOMMON
Mounds Branch	
Lower Section (bottomlands)	OCCASIONAL (only 1)

COMMENTS:

The brown madtom is a species found in tiny to medium size creeks. Small specimens may be buried under gravel substrate during the day. Larger specimens may be under undercut banks. The park population is probably much larger than this study indicates due to the difficulty of locating their hiding places. Night collections might reveal larger numbers of the species.

The largest concentration of brown madtoms found was in the vicinity of, and just downstream from, Corinth Road (near Rea Spring). As many as 6 tiny specimens were collected from one pool in this area. Early one morning while the light was still very subdued, the stream survey crew stepped on and injured a large specimen in very shallow water below the road. During the bare-handed capture of this fish, it attempted to defend itself by biting Dr. Grubaugh's hand (the bite was painful, but did not cause injury). Most notable about the specimen was its brilliant dark red belly.

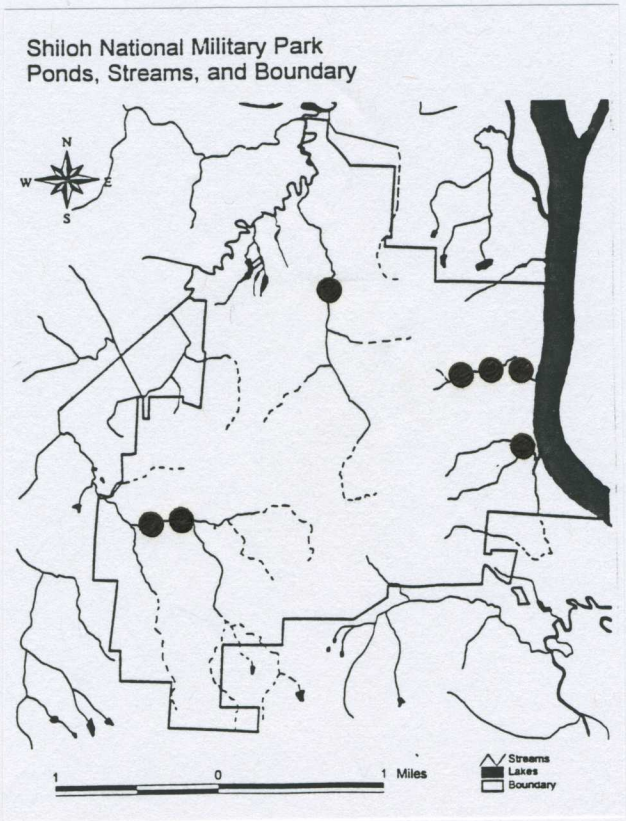
*On September 26, 1996 the author collected a large brown madtom from a 0.6 m (2 ft) deep small clear pool in Lower Dill Branch (just above the bottomland floodplain) approximately 305 m (1,000 ft) upstream from the Tennessee River. The fish was observed lying on the sand and gravel substrate in midstream during mid-day. It made no movement until it was touched by the seine, then it swam lethargically toward an undercut bank. Its feeble attempt to elude capture was too late. After capture, the specimen spent a lot of time lying on its side on the bottom of the collection bucket. The fish was a dull gray and only gained the expected pinkish tinge after being held in captivity for about 12 hours. It had a large head, slender body, and part of its caudal fin was missing.

The specimen was measured and photographed. After it died, its pectoral fin spine was skinned out and examined under a dissecting microscope for positive identification. The spine was consistent with Noturus phaeus as shown on page 326 of Etnier and Starnes (1993). Because the specimen was too large for the available specimen jars, it was discarded.

Over a year later during the writing of this document it was discovered the 155 mm (6.1 in) fish was a "world record" total length for the species. Until now, 150 mm (5.9 in) was the largest known (Etnier and Starnes, 1993).



Photo E-24. Brown Madtom, Noturus phaeus, 155 mm TL record size, from lower Dill Branch.



29. **GRASS PICKEREL**, Esox americanus (Gmelin)

(See page 334 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Long and slender with dorsal and anal fins near caudal peduncle
Large mouth with teeth
Pale mid-lateral streak may be present
Black suborbital bar extends obliquely down and back (vertical in chain pickerel)
Distance from center of eye to tip of snout less than or equal to distance from center of eye to posterior border of gill cover (shorter nose than chain pickerel)

LARGEST SPECIMENS:

Maximum total length 381 mm (15 in), 397 gm (14 oz +)
Largest collected in the park 180 mm (7.1 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

longnose gar
largescale stoneroller
rosyside dace
spotfin shiner
striped shiner
golden shiner
creek chub
creek chubsucker
lake chubsucker
yellow bullhead
pirate perch
blackspotted topminnow
western mosquitofish
flier
warmouth
bluegill
dollar sunfish
longear sunfish
redear sunfish
bandfin darter

AQUARIUM BEHAVIOR:

Most of the time the species remained motionless (except for constantly moving fins), suspended in mid-water. A 130 mm (5.1 in) specimen ate only live minnows; 1 to 3 western mosquitofish or ribbon shiners per day. It was capable of swallowing much larger minnows than one might expect. They would be acceptable as aquarium fish only if all other small fish in the aquarium were expendable, and there was an unlimited supply of easily obtainable small minnows available for food.

DISTRIBUTION AND RELATIVE ABUNDANCE:

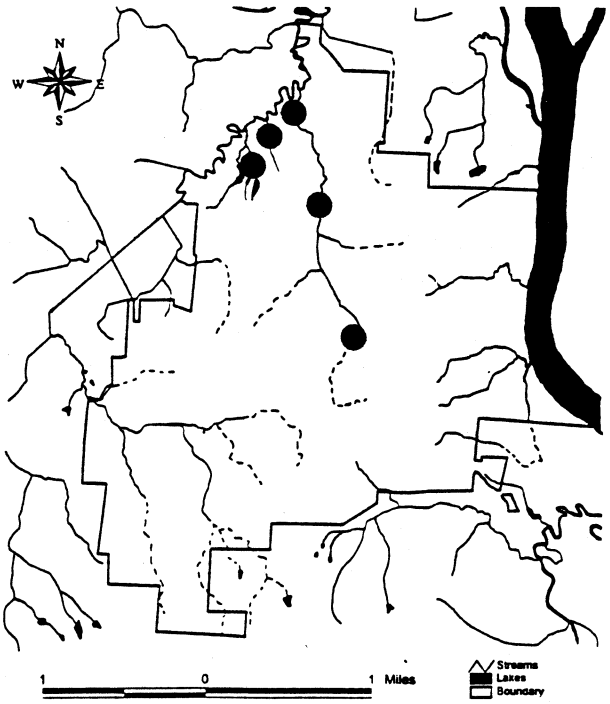
Tilghman Branch	
Upper Section	UNCOMMON (in isolated populations)
Middle Section	UNCOMMON (in isolated populations)
Lower Section (bottomlands)	UNCOMMON (in isolated populations)
Owl Creek Beaver Ponds (bottomlands)	
Cattail Branch, Middle Section)	UNCOMMON (in isolated populations)
Middlefield Branch	OCCASIONAL (only 1)

COMMENTS:

Although grass pickerel seem to prefer sluggish waters with dense vegetation such as is found in the Owl Creek Beaver Ponds, they were also found throughout Tilghman Branch. The largest observed (but not collected) specimen was in a pool without vegetation in the middle section of Tilghman Branch. It was estimated to be about 203 mm (8 in) and was suspended motionless under a 51 mm (2 in) diameter submerged horizontal tree limb.

A 15 mm (0.6 in) specimen was collected in Owl Creek Beaver Ponds, Cattail Branch, in early December indicating a fall spawn (specimen SHIL 0139).

Shiloh National Military Park
Ponds, Streams, and Boundary





Above: Photo E-21. Grass Pickerel, Esox americanus, 55 mm TL juvenile, from Cattail Branch of the Owl Creek Beaver Ponds.

Below: Photo G-24. Grass Pickerel, Esox americanus, 130 mm TL adult, from upper Tilghman Branch.



30. **PIRATE PERCH**, Aphredoderus sayanus (Gilliams)

(See page 353 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Shaped like a plump sunfish, but with a **rounded caudal fin**
Purplish to dusky color
Single dorsal fin
Relatively large mouth like a green sunfish
Anus just behind gill juncture in throat (instead of anterior to the anal fin like other fish)

LARGEST SPECIMENS:

Maximum total length 144 mm (5.6 in)
Largest collected in Shiloh Branch 73 mm (2.9 in)

Larger specimens, estimated to be about 102 mm (4 in), were collected in Owl Creek Beaver Ponds but were not measured.

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

In Owl Creek Beaver Ponds and Riverbottoms Branch

longnose gar	blackspotted topminnow
gizzard shad	western mosquitofish
threadfin shad	brook silverside
spotfin shiner	flier
striped shiner	warmouth
ribbon shiner	bluegill
golden shiner	dollar sunfish
emerald shiner	longear sunfish
pugnose minnow	redear sunfish
lake chubsucker	largemouth bass
spotted sucker	white crappie
yellow bullhead	cypress darter
grass pickerel	

In Shiloh Branch

least brook lamprey	creek chubsucker
largescale stoneroller	brown madtom
rosyside dace	blackspotted topminnow
striped shiner	longear sunfish
rosefin shiner	stripetail darter
southern redbelly dace	bandfin darter
creek chub	dusky darter

AQUARIUM BEHAVIOR:

The species is nocturnal. During the daytime, it remained motionless on the bottom in a corner of the aquarium or behind an obstacle. It ate small minnows and would not make a compatible native species aquarium fish.

DISTRIBUTION AND RELATIVE ABUNDANCE:

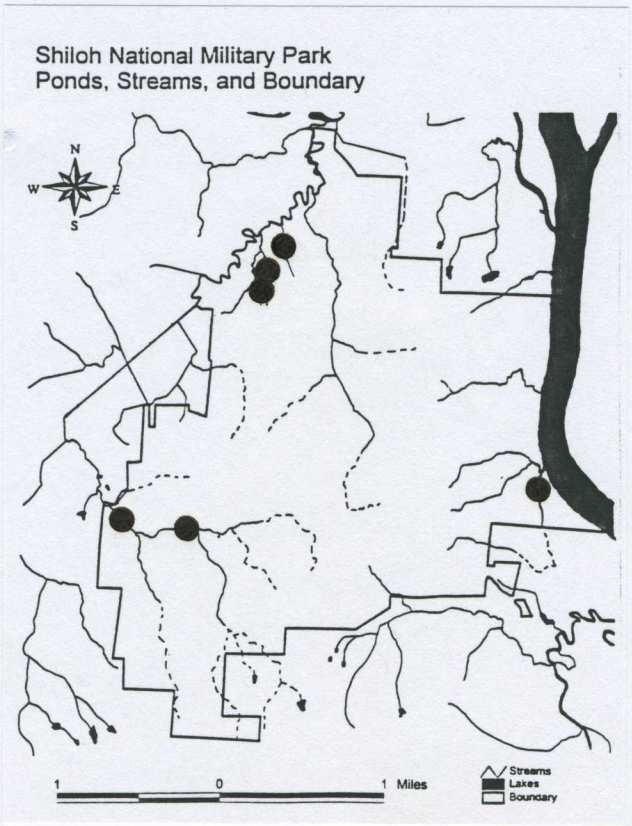
Shiloh Branch	
Middle Section	UNCOMMON (in isolated populations)
Lower Section	OCCASIONAL (ONLY 1)
Owl Creek Beaver Ponds (bottomlands)	
Cattail Branch	COMMON
Middlefield Branch	COMMON
Riverbottoms Branch (bottomlands)	COMMON

COMMENTS:

The species was common in the Owl Creek Beaver Ponds and Riverbottoms Branch where there was typical pirate perch habitat. A few small specimens were collected in Middle and Lower Shiloh Branch which has atypical habitat consisting of a clear flowing stream with sand and gravel substrate and little or no aquatic vegetation.



Photo A-22. Pirate Perch, Aphredoderus sayanus, 66 mm TL, from middle Shiloh Branch.



31. **BLACKSPOTTED TOPMINNOW**, Fundulus olivaceus (Storer)

(See page 368 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Pale brownish yellow to olive green dorsally
Prominent irregular black stripe on sides
Tiny dorsolateral spots as dark as the lateral stripe
Upturned mouth, rounded caudal fin
Typically with light colored small spot on top of head
Typically seen just under the water surface with caudal fin flexed at nearly a right angle to its body
(The blackspotted topminnow is very difficult to distinguish with certainty from the blackstripe topminnow).

LARGEST SPECIMENS:

Maximum total length 97 mm (3.8 in)
Largest collected in the park 89 mm (3.5 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

The bullhead minnow, blacknose dace, and goldstripe darter were the only fish species within the park that were not found associated with the blackspotted topminnow.

AQUARIUM BEHAVIOR:

This active and beautifully graceful species was non-aggressive and got along well with all other species that were not big enough to eat it. It spent most of its time near the water surface or in mid-water. It ate any prepared food that floated or that sank slowly. No native fish aquarium would be complete without one or more blackspotted topminnows.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Tilghman Branch	
Middle Section	COMMON
Lower Section	COMMON
Shiloh Branch	
Middle Section	COMMON
Lower Section	COMMON
Owl Creek Beaver Ponds (bottomlands)	
Sandy Branch	COMMON
Cattail Branch	COMMON
Middlefield Branch	COMMON
Dill Branch	
Middle Section	COMMON
Lower Section (bottomlands)	COMMON
Mounds Branch	
Middle Section (bottomlands)	COMMON
Lower Section (bottomlands)	COMMON
Riverbottoms Branch (bottomlands)	COMMON
Rogers Branch	
Lower Section (bottomlands)	COMMON
Owl Creek (bottomlands)	COMMON

COMMENTS:

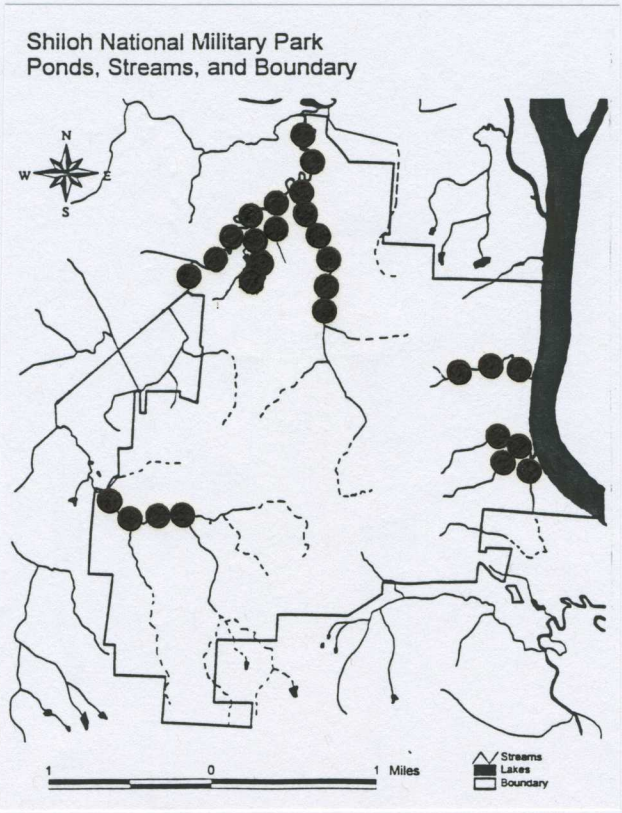
The species was widespread throughout the park (except in headwaters habitat). It did not occur in large numbers like the striped shiner, creek chub, southern redbelly dace, and western mosquitofish. Seldom would one see more than 1 to 6 specimens in a pool.

F. olivaceus was the only species of topminnow identified within the park. Any topminnow that is collected should be looked at very carefully for comparison. F. notatus, blackstripe topminnow could be found within the park, especially in the lower gradient waters found in riverbottoms branch and the Owl Creek Beaver Ponds.

Another topminnow to watch for in the Owl Creek Beaver Ponds is F. dispar, northern starhead (see page 364 of Etnier and Starnes, 1993). According to Dr. Etnier, since the lake chubsucker, flier, and dollar sunfish occur here, the northern starhead topminnow could very well be here too.



Photo A-25. Blackspotted Topminnow, Fundulus olivaceus, 84 mm TL, from Shiloh Branch.



32. **WESTERN MOSQUITOFISH**, Gambusia affinis (Baird and Girard)

(See page 372 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Tiny fish usually seen just under the water surface in schools
Large cycloid scales
Rounded caudal fin
Upturned mouth
Head and body dorsally flattened anterior to dorsal fin
Black subocular bar usually present
In females, dark lining of posterior body cavity often shows through as a large spot on each side

(G. affinis is nearly identical to G. holbrooki except for male gonopodia. All male Gambusia gonopodia should be examined closely under a dissecting scope for positive identification. G. holbrooki may very well be present within the park).

LARGEST SPECIMENS:

Maximum total length 65 mm (2.5 in), males rarely exceed 35 mm (1.4 in)
Largest collected in park 45 mm (1.8 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

Gambusia may be the only species in an isolated pool, or it may be associated with the following species in upland streams or bottomland beaver ponds or streams:

longnose gar
gizzard shad
threadfin shad
spotfin shiner
striped shiner
ribbon shiner
golden shiner
pugnose minnow
bluntnose minnow
creek chub
lake chubsucker
spotted sucker
golden redhorse
yellow bullhead
grass pickerel
pirate perch
blackspotted topminnow
brook silverside
flier
warmouth
bluegill
dollar sunfish
longear sunfish
redear sunfish
largemouth bass
white crappie
cypress darter
bandfin darter

AQUARIUM BEHAVIOR:

Gambusia is a tiny active, non-aggressive, topwater fish. It did well in an aquarium as long as no other fish was large enough to eat it. It would be a welcome addition to a native fish aquarium, however its life span is only about 1 year. Its small size and abundance makes it a good food source for larger fish.

DISTRIBUTION AND RELATIVE ABUNDANCE:

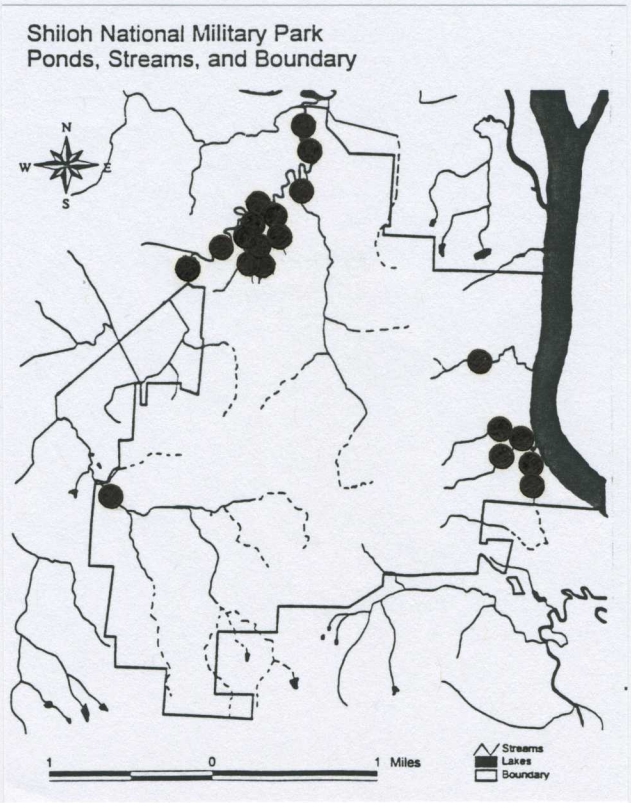
Tilghman Branch		
Lower Section (bottomlands)	COMMON	(in isolated populations)
Shiloh Branch		
Lower Section (bottomlands)	ABUNDANT	(in isolated populations)
Owl Creek Beaver Ponds (bottomlands)		
Sandy Branch	ABUNDANT	(in isolated populations)
Cattail Branch	ABUNDANT	
Middlefield Branch	ABUNDANT	
Dill Branch		
Middle Section	ABUNDANT	(in isolated populations)
Mounds Branch		
Middle Section (bottomlands)	COMMON	
Lower Section (bottomlands)	COMMON	
Riverbottoms Branch (bottomlands)	COMMON	
Rogers Branch		
Lower Section (bottomlands)	UNCOMMON	
Owl Creek (bottomlands)	COMMON	(in isolated populations)

COMMENTS:

Gambusia were widespread and abundant in isolated populations. They were most abundant in bottomland habitats, however, they were also found in isolated populations as far upstream as the middle section of Dill Branch and in small springs leading into the clear branch.



Photo I-13. Western Mosquitofish, Gambusia affinis, 45 mm TL female, from Dill Branch.



33. **BROOK SILVERSIDE**, Labidesthes sicculus (Cope)

(See page 375 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Extremely slender body with narrow silvery lateral streak
Two widely separated dorsal fins, first with 4 spines
Beak-shaped snout
Long anal fin
No lateral line

LARGEST SPECIMENS:

Maximum total length 112 mm (5.2 in)
Largest collected in the park 88 mm (3.5 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

longnose gar	ribbon shiner
gizzard shad	golden shiner
threadfin shad	emerald shiner
spotfin shiner	spotted sucker
striped shiner	golden redhorse

AQUARIUM BEHAVIOR:

This delicate species made an attractive and interesting addition to the native fish aquarium. It was non-aggressive, but was very susceptible to the aggression of other species. It was easily killed by smaller aggressive fish.

DISTRIBUTION AND RELATIVE ABUNDANCE:

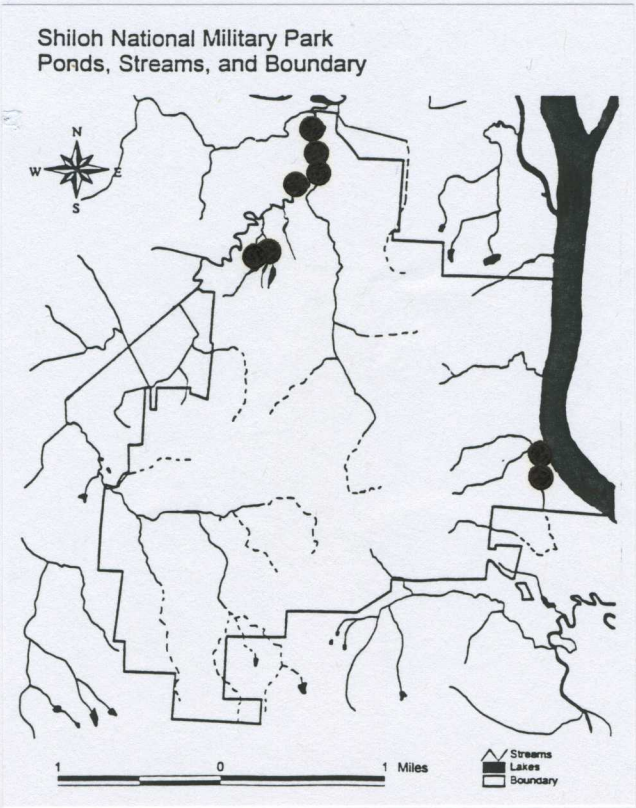
Owl Creek Beaver Ponds (bottomlands)	
Sandy Branch	UNCOMMON (in isolated populations)
Cattail Branch	UNCOMMON (in isolated populations)
Mounds Branch	
Lower Section (bottomlands)	COMMON
Riverbottoms Branch (bottomlands)	COMMON
Owl Creek (bottomlands)	COMMON

COMMENTS:

The brook silverside is an open-water fish and most often schools near the surface of lakes, reservoirs, rivers, and large creeks (Etnier and Starnes, 1993). It was somewhat surprising that this species was found within the park.



Photo D-11. Brook Silverside, Labidesthes sicculus, 69 mm TL, from Riverbottoms Branch.



34. **FLIER**, Centrarchus macropterus (Lacepede)

(See page 402 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Pale green to white with rows of dark spots along sides
Dark suborbital bar
Unusually long anal fin with 7-9 spines and 14-16 soft rays
Dorsal fin with 11-13 spines and 12-14 soft rays
Gill rakers long and slender
Juveniles are white or mottled with large "eye spot" on the posterior soft dorsal fin on specimens up to about 65 mm (2 in)
(Crappies have similar profile, but have half as many dorsal spines)

LARGEST SPECIMENS:

Maximum total length 200 mm (8 in)
Largest collected in the park 124 mm (4.9 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

longnose gar
spotfin shiner
striped shiner
golden shiner
lake chubsucker
spotted sucker
yellow bullhead
grass pickerel
pirate perch
blackspotted topminnow
western mosquitofish
warmouth
bluegill
dollar sunfish
redear sunfish
white crappie
cypress darter

AQUARIUM BEHAVIOR:

The species spent most of its time stationary in a corner of the aquarium. It was very shy and spooked at the least provocation. It ate only small minnows and earthworms. The species would make a beautiful and interesting aquarium fish. However, it could be difficult to supply food for it, and an aquarium larger than 76 liter (20 gal) capacity would be needed.

DISTRIBUTION AND RELATIVE ABUNDANCE:

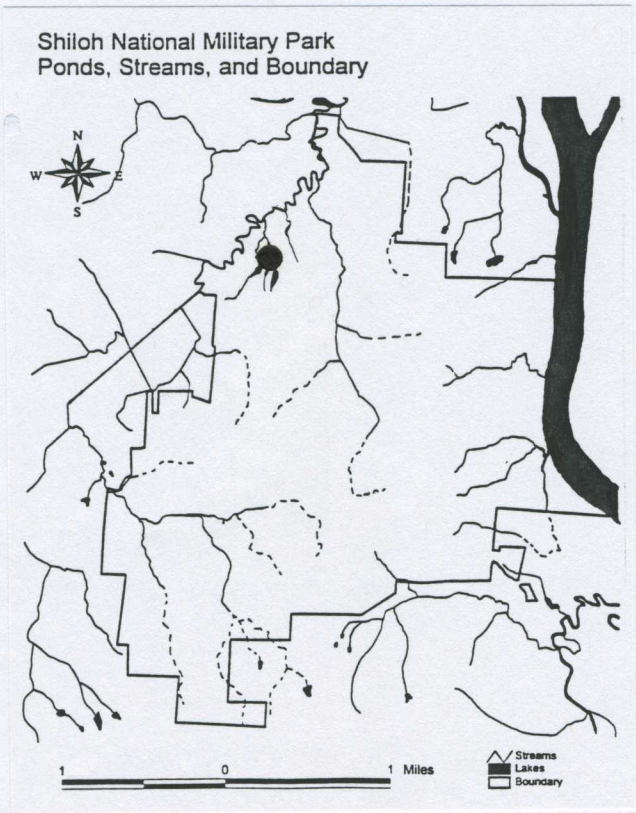
Owl Creek Beaver Ponds (bottomlands)
Cattail Branch, middle section — UNCOMMON (in isolated population)

COMMENTS:

The species is an inhabitant of lowland sluggish streams, swamps, and natural lakes. Until the discovery of the flier within the park, none were known to exist in the entire Tennessee River Drainage except along the Big Sandy River system which empties into the Tennessee River at Paris Landing State Park near the Kentucky State Line.



Photo H-18. Flier, Centrarchus macropterus, 124 mm TL, from Cattail Branch of the Owl Creek Beaver Ponds.



35. **GREEN SUNFISH**, Lepomis cyanellus (Rafinesque)

(See page 410 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Larger mouth than other similar looking sunfish
Blue vermiculations on cheeks and opercles
Dorsal fin usually has dark spot at posterior base
Dorsolateral area blue-green to dusky with scattered black flecks, belly white to yellowish
Palatine teeth present
Gill rakers 11-14, longest rakers about 6 times basal width (except for less slender rakers in very large adults)

LARGEST SPECIMENS:

Maximum total length 305 mm (12 in), 964 gm (2 lb 2 oz)
Largest collected in the park 81 mm (3.2 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

largescale stoneroller
rosyside dace
striped shiner
southern redbelly dace
creek chub
creek chubsucker
blackspotted topminnow
bluegill
longear sunfish
goldstripe darter
bandfin darter

AQUARIUM BEHAVIOR:

Not kept in an aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

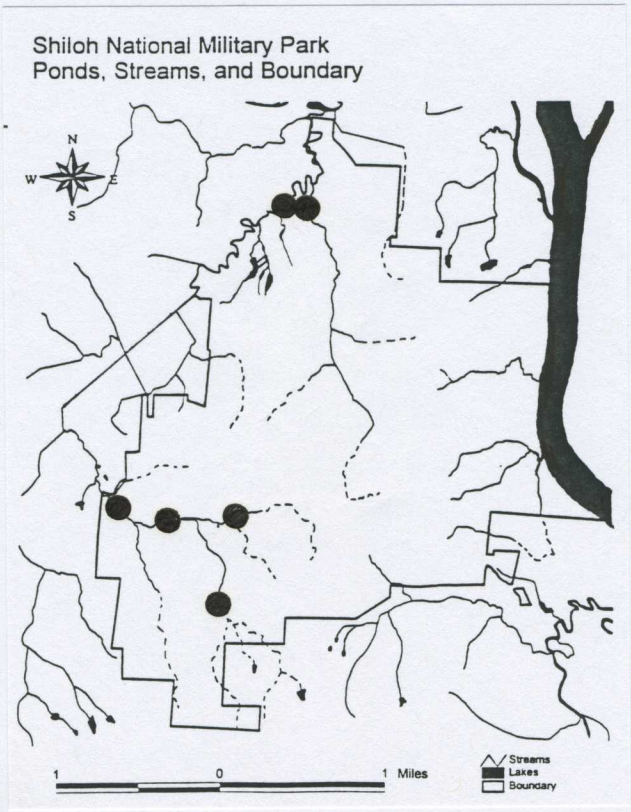
Tilghman Branch	
Lower Section	UNCOMMON
Shiloh Branch	
Upper Section	OCCASIONAL (only 1)
Middle Section	OCCASIONAL (only 1)
Lower Section	OCCASIONAL (only 1)
South Prong	OCCASIONAL (only 2)
Owl Creek	OCCASIONAL (only 1)

COMMENTS:

The green sunfish is extremely tolerant of adverse conditions, such as drought, and has a great capacity for colonization and exploitation of new habitats (Etnier and Starnes, 1993). However, the park population is very low in the streams and apparently non-existent in the beaver ponds where they might be expected to flourish. A large population of green sunfish would likely be detrimental to park biodiversity. The population should be closely monitored.



Photo D-06. Green Sunfish, Lepomis cyanellus, 95 mm TL, from Shiloh Branch.



36. **WARMOUTH**, Lepomis gulosus (Cuvier)

(See page 413 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Dark olivaceous to brassy yellow with profuse dark mottling on body and fins
Cheeks and opercles with 3 or 4 distinctive dark bars radiating posteriorly from eyes
Palatine teeth present
Eye may be reddish
Larger mouth than most other sunfish similar to green sunfish

LARGEST SPECIMENS:

Maximum total length usually less than 230 mm (9 in)
Largest collected in the park 170 mm (6.7 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

longnose gar	pirate perch
gizzard shad	blackspotted topminnow
threadfin shad	western mosquitofish
spotfin shiner	brook silverside
striped shiner	flier
golden shiner	bluegill
emerald shiner	dollar sunfish
pugnose minnow	longear sunfish
lake chubsucker	redear sunfish
spotted sucker	largemouth bass
yellow bullhead	white crappie
grass pickerel	cypress darter

AQUARIUM BEHAVIOR:

The species spent most of its time stationary, suspended just above the bottom. It ate small minnows and little else in the aquarium. It was aggressive toward other sunfish, especially toward the shy flier.

DISTRIBUTION AND RELATIVE ABUNDANCE:

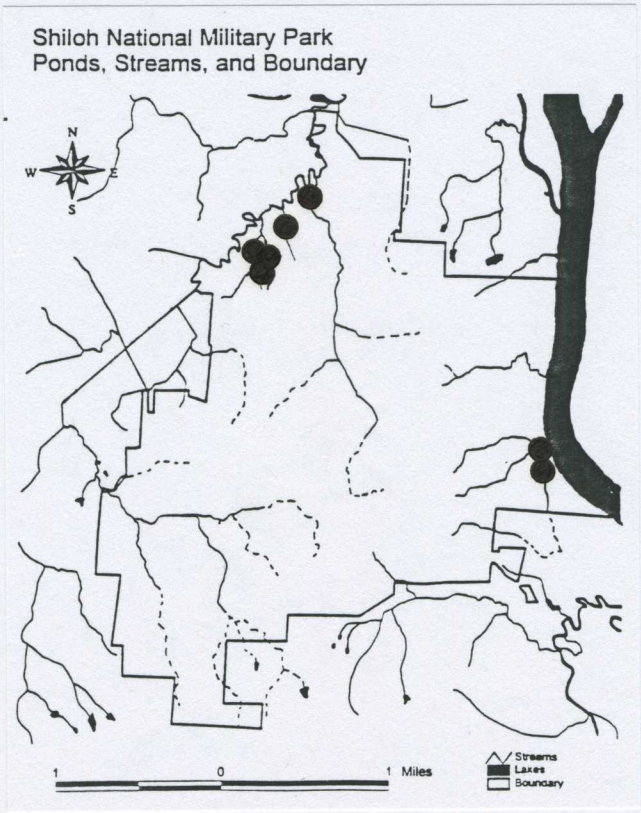
Tilghman Branch	
Lower Section (bottomlands)	UNCOMMON
Owl Creek Beaver Ponds (bottomlands)	
Sandy Branch	UNCOMMON
Cattail Branch	COMMON
Middlefield Branch	UNCOMMON
Mounds Branch	
Lower Section (bottomlands)	UNCOMMON
Riverbottoms Branch (bottomlands)	UNCOMMON

COMMENTS:

Warmouth specimens caught in clear water tended to be brassy colored, while those in vegetated beaver ponds were olive colored. All were found in bottomlands habitat.



Photo I-18. Warmouth, Lepomis gulosus, 112 mm TL, from Cattail Branch of the Owl Creek Beaver Ponds.



37. **BLUEGILL**, Lepomis macrochirus (Rafinesque)

(See page 417 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Dorsum olivaceous, breast and belly white to light orange
Juveniles have 8-10 sets of double bluish vertical bars
Dusky spot of posterior soft dorsal fin in fish over 50 mm
Black opercular lobe
No red in eye
Very long sharply pointed pectoral fins
Palantine teeth typically absent

LARGEST SPECIMENS:

World record size 2.2 kg (4 lb 12 oz), seldom exceeds 227 gm (8 oz)
Largest collected in the park 170 mm (6.7 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

The only species bluegill were not associated with were the blacknose dace and goldstripe darter.

AQUARIUM BEHAVIOR:

Juveniles kept away from other fish. Adults were aggressive toward other fish, especially other sunfish.

DISTRIBUTION AND RELATIVE ABUNDANCE:

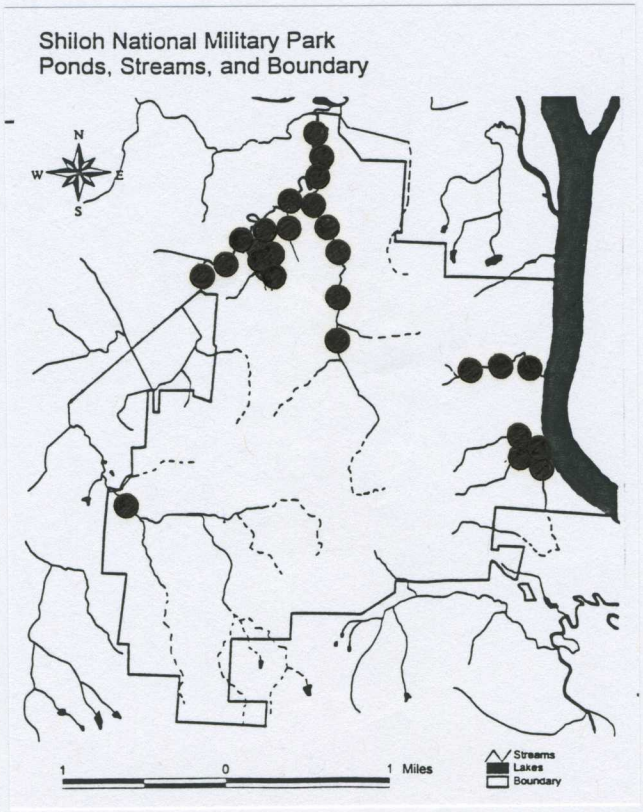
Tilghman Branch	
Middle Section	COMMON
Lower Section	COMMON
Shiloh Branch	
Lower Section	UNCOMMON
Owl Creek Beaver Ponds (bottomlands)	
Sandy Branch	ABUNDANT
Cattail Branch	ABUNDANT
Middlefield Branch	ABUNDANT
Dill Branch	
Upper Section	UNCOMMON
Middle Section	UNCOMMON
Lower Section	UNCOMMON
Mounds Branch	
Middle Section	COMMON
Lower Section (bottomlands)	COMMON
Extreme Lower Section (bottomlands)	UNCOMMON
Riverbottoms Branch (bottomlands)	COMMON
Rogers Branch	
Lower Section (bottomlands)	COMMON
Owl Creek (bottomlands)	COMMON

COMMENTS:

Small juvenile specimens could be found in low numbers most anywhere within the park's larger clear streams, except in the tiny headwaters spring branches. They were not found upstream from Lower Shiloh Branch. Larger specimens were found in bottomlands habitats, especially in beaver ponds.



Photo B-16. Bluegill, Lepomis macrochirus, 55 mm TL juvenile, from lower Tilghman Branch.



38. **DOLLAR SUNFISH**, Lepomis marginatus (Holbrook)

(See page 419 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Dorsum olivaceous, breast and belly pale yellow to scarlet
Blue vermiculations on cheeks and opercles
Opercular lobe expansive, angled upward, and conspicuously outlined by white
Opercular lobe may have silver or white blotches on dark portion
Eye often reddish
Fins occasionally red
Palantine teeth absent
Pectoral fin rays 12, cheek scale rows 3-4
(small longear sunfish are very similar, but have 14 pectoral fin rays)
Longest gill rakers equal to basal width in adults, twice basal width in juveniles

LARGEST SPECIMENS:

Maximum total length 127 mm (5 in)
Largest collected in the park 105 mm (4.1 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

longnose gar	blackspotted topminnow
spotfin shiner	western mosquitofish
striped shiner	flier
ribbon shiner	warmouth
golden shiner	bluegill
pugnose minnow	longear sunfish
lake chubsucker	redear sunfish
yellow bullhead	largemouth bass
grass pickerel	white crappie
pirate perch	cypress darter

AQUARIUM BEHAVIOR:

This beautiful and interesting species would make an acceptable aquarium fish for an aquarium considerably larger than 76 liter (20 gal). It was aggressive toward other sunfish. The only prepared aquarium fish food that it would eat was sun dried Gammarus. Any small minnows in the aquarium must be considered expendable and food for the sunfish.

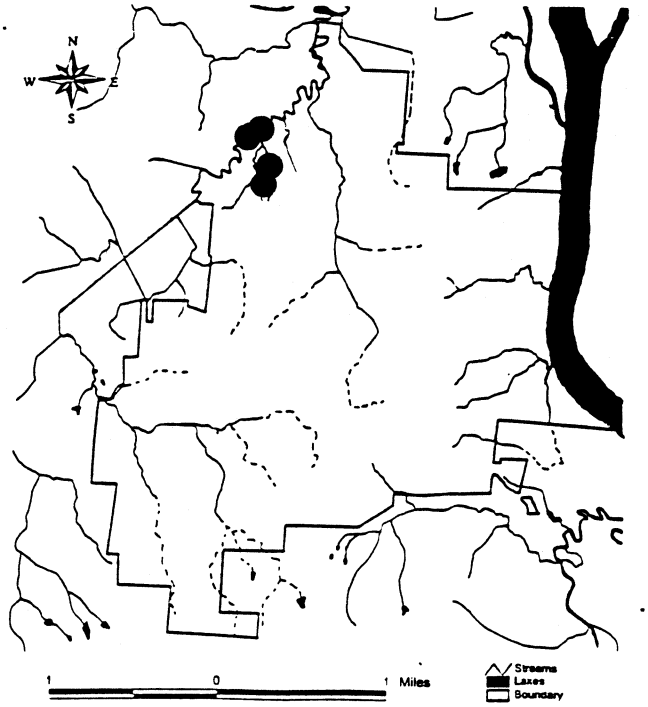
DISTRIBUTION AND RELATIVE ABUNDANCE:

Owl Creek Beaver Ponds (bottomlands)	
Sandy Branch, Lower Section	OCCASIONAL (only 2)
Cattail Branch	COMMON (in isolated populations)
Owl Creek (bottomlands)	OCCASIONAL (only 2)

COMMENTS:

The dollar sunfish is an inhabitant of good quality lowland habitats (Etnier and Starnes, 1993). Until this study, the species was known to exist on the Tennessee River Drainage only north (downstream) of about mid-state, except for a reported isolated population in the vicinity of Pickwick Lake near the Alabama State Line.

Shiloh National Military Park
Ponds, Streams, and Boundary





Above: Photo H-21. Dollar Sunfish, Lepomis marginatus, 100 mm TL, from Cattail Branch of the Owl Creek Beaver Ponds.

Below: Photo E-12. Dollar Sunfish, Lepomis marginatus, 79 mm TL, from Cattail Branch of the Owl Creek Beaver Ponds.



39. **LONGEAR SUNFISH**, Lepomis megalotis (Rafinesque)

(See page 421 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Adults attain brilliant reddish-orange coloration
Blue vermiculations on cheeks and opercles
Adults have long black opercular lobes
Palantine teeth absent
Pectoral fin rays 14
(small dollar sunfish are similar, but have 12 pectoral fin rays)

LARGEST SPECIMENS:

Maximum Tennessee State record size 361 gm (12.75 oz)
Largest collected in the park 140 mm (5.5 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

least brook lamprey
longnose gar
largescale stoneroller
rosyside dace
spotfin shiner
striped shiner
rosefin shiner
golden shiner
emerald shiner
creek chub
creek chubsucker
northern hogsucker
golden redhorse
brown madtom
grass pickerel
pirate perch
blackspotted topminnow
western mosquitofish
brook silverside
green sunfish
bluegill
dollar sunfish
largemouth bass
stripetail darter
cypress darter
bandfin darter
dusky darter

AQUARIUM BEHAVIOR:

Although the species was not kept in an aquarium, it was very colorful and would likely exhibit similar behavior as the dollar sunfish.

DISTRIBUTION AND RELATIVE ABUNDANCE:

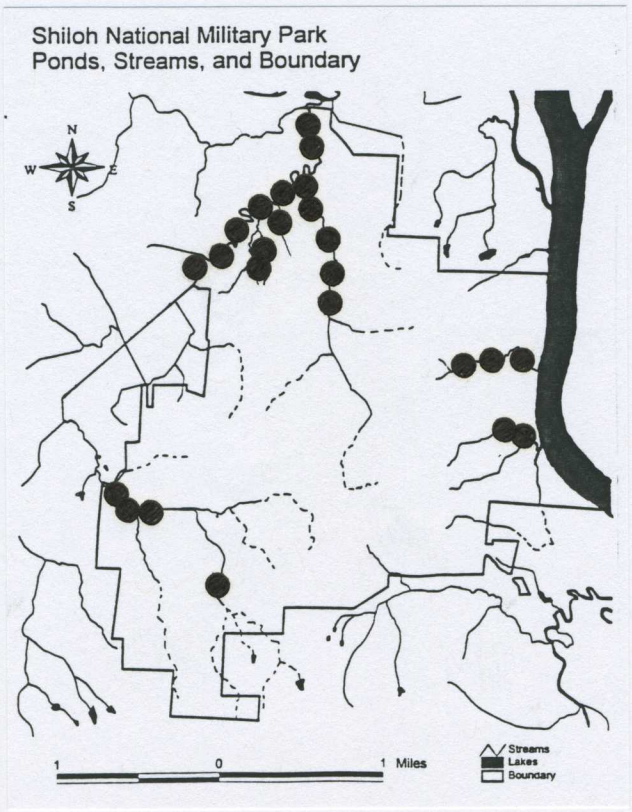
Tilghman Branch	
Middle Section	COMMON
Lower Section	COMMON
Shiloh Branch	
Middle Section	COMMON
Lower Section	COMMON
South Prong Section	COMMON
Owl Creek Beaver Ponds (bottomlands)	
Cattail Branch, Middle Section	COMMON
Middlefield Branch	UNCOMMON
Dill Branch	
Upper Section	UNCOMMON
Middle Section	COMMON
Lower Section (bottomlands)	UNCOMMON
Mounds Branch	
Middle Section	COMMON
Lower Section (bottomlands)	COMMON
Owl Creek (bottomlands)	COMMON

COMMENTS:

The longear sunfish occurs in a variety of habitats but is most common in moderately flowing streams (Etnier and Starnes, 1993). The species was found in small numbers throughout the larger park streams, Owl Creek, and the Owl Creek Beaver Ponds, but it was totally absent in smaller streams, headwaters, and Riverbottoms Branch.



Photo B-18. Longear Sunfish, Lepomis megalotis, 140 mm TL adult, from lower Tilghman Branch.



40. **REDEAR SUNFISH**, Lepomis microlophus (Guenther)

(See page 423 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Gray to straw yellow with dusky spots
Characteristic red tip on short opercular lobe
Eye often reddish
Palantine teeth absent
Dorsal fin with 10 spines

LARGEST SPECIMENS:

Maximum Tennessee State record size 1.5 kg (3 lb 5.5 oz)
Largest collected in the park 190 mm (7.5 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

longnose gar	blackspotted topminnow
gizzard shad	western mosquitofish
threadfin shad	flier
spotfin shiner	warmouth
striped shiner	bluegill
golden shiner	dollar sunfish
emerald shiner	longear sunfish
lake chubsucker	largemouth bass
spotted sucker	white crappie
yellow bullhead	cypress darter
grass pickerel	sauger
pirate perch	freshwater drum

AQUARIUM BEHAVIOR:

The species was not kept in an aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

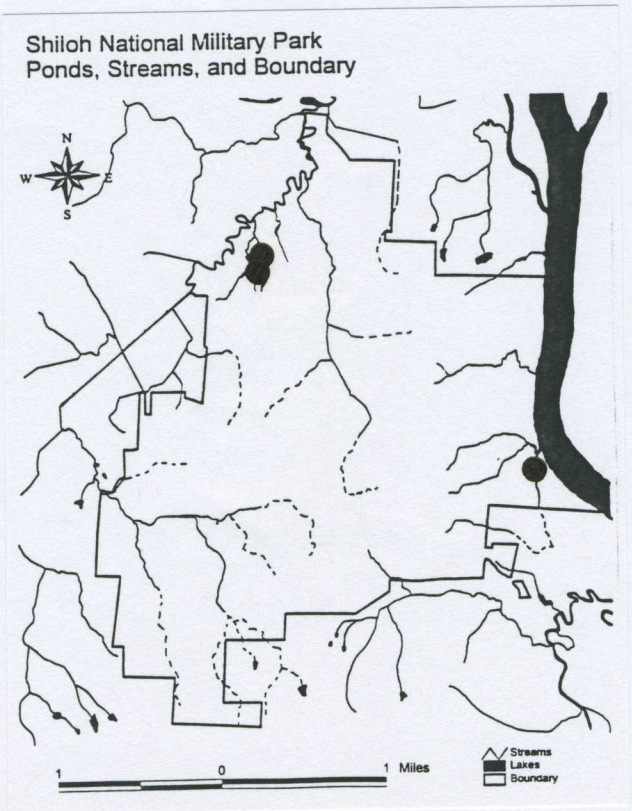
Owl Creek Beaver Ponds (bottomlands)	
Cattail Branch	COMMON
Riverbottoms Branch (bottomlands)	UNCOMMON

COMMENTS:

In Tennessee, the redear sunfish is widespread but not abundant (Etnier and Starnes, 1993). Within the park it was found only in bottomlands beaver ponds in low numbers.



Photo E-17. Redear Sunfish, Lepomis microlophus, 112 mm TL, from Cattail Branch of the Owl Creek Beaver Ponds.



41. **LARGEMOUTH BASS**, Micropterus salmoides (Lacepede)

(see page 433 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Olivaceous green dorsally, pallid below
Wide black lateral stripe or nearly confluent blotches
Large mouth, maxillary extending behind eye in specimens over 150 mm (5.9 in)
Eye color brown
Teeth absent from tongue

LARGEST SPECIMENS:

Maximum Tennessee State record size 6.6 kg (14.5 lb)
Largest observed in the park estimated 204 mm (8 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

longnose gar	pirate perch
gizzard shad	blackspotted topminnow
threadfin shad	western mosquitofish
spotfin shiner	brook silverside
striped shiner	warmouth
ribbon shiner	bluegill
golden shiner	dollar sunfish
emerald shiner	longear sunfish
mimic shiner	redear sunfish
lake chubsucker	white crappie
spotted sucker	cypress darter
golden redhorse	bandfin darter
black bullhead	yellow perch
yellow bullhead	sauger
grass pickerel	freshwater drum

AQUARIUM BEHAVIOR:

The species was not kept in an aquarium for observation.

DISTRIBUTION AND RELATIVE ABUNDANCE:

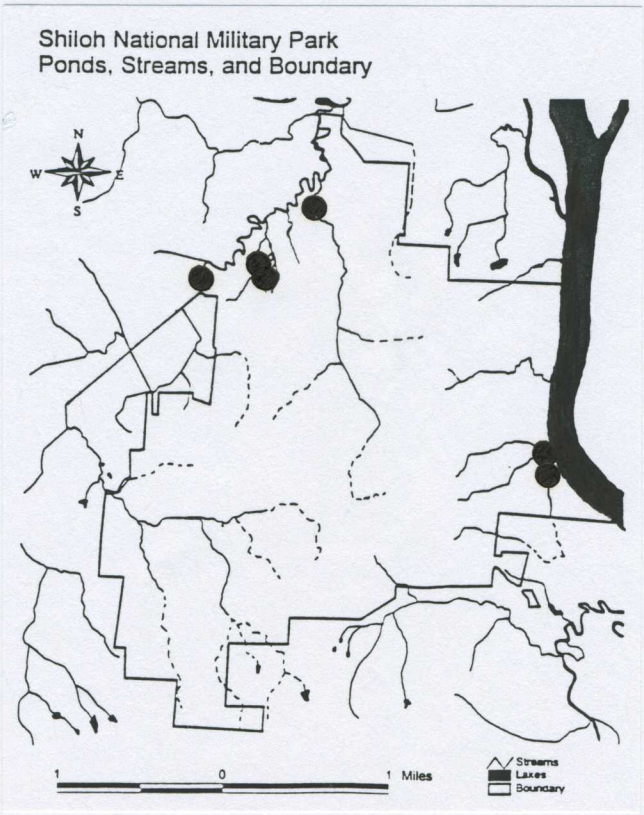
Tilghman Branch	
Lower Section (bottomlands)	OCCASIONAL (only 1)
Owl Creek Beaver Ponds (bottomlands)	
Sandy Branch	OCCASIONAL (only 1)
Cattail Branch, Middle Section	UNCOMMON
Mounds Branch	
Lower Section (bottomlands)	OCCASIONAL (only 2)
Riverbottoms Branch (bottomlands)	UNCOMMON
Owl Creek (bottomlands)	UNCOMMON

COMMENTS:

Although a few small largemouth bass were found in the extreme lower sections of two streams, most were collected in beaver ponds. All specimens were found only in bottomland habitat in very small numbers and small sizes. Larger fish may exist in the Owl Creek Beaver Ponds.



Photo E-15. Largemouth Bass, Micropterus salmoides, 61 mm TL, from Riverbottoms Branch.



42. **WHITE CRAPPIE**, Pomoxis annularis (Rafinesque)

(See page 436 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Body deep and laterally compressed
Olivaceous to bright green or bluish gray dorsally
Silvery on sides with 8-10 dark irregular vertical bars and mottling
Dorsal fin spines 5-6
Dorsal fin base length much less than distance from dorsal fin origin to center of eye

LARGEST SPECIMENS:

Maximum Tennessee State record size 2.3 kg (5 lb, 1 oz)
Largest collected in the park 178 mm (7 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

longnose gar
gizzard shad
threadfin shad
spotfin shiner
striped shiner
ribbon shiner
golden shiner
emerald shiner
pugnose minnow
lake chubsucker
spotted sucker
yellow bullhead
grass pickerel
pirate perch
blackspotted topminnow
western mosquitofish
brook silverside
flier
warmouth
bluegill
dollar sunfish
longear sunfish
redear sunfish
largemouth bass
cypress darter
yellow perch
sauger
freshwater drum

AQUARIUM BEHAVIOR:

The species was not kept in an aquarium for observation.

DISTRIBUTION AND RELATIVE ABUNDANCE:

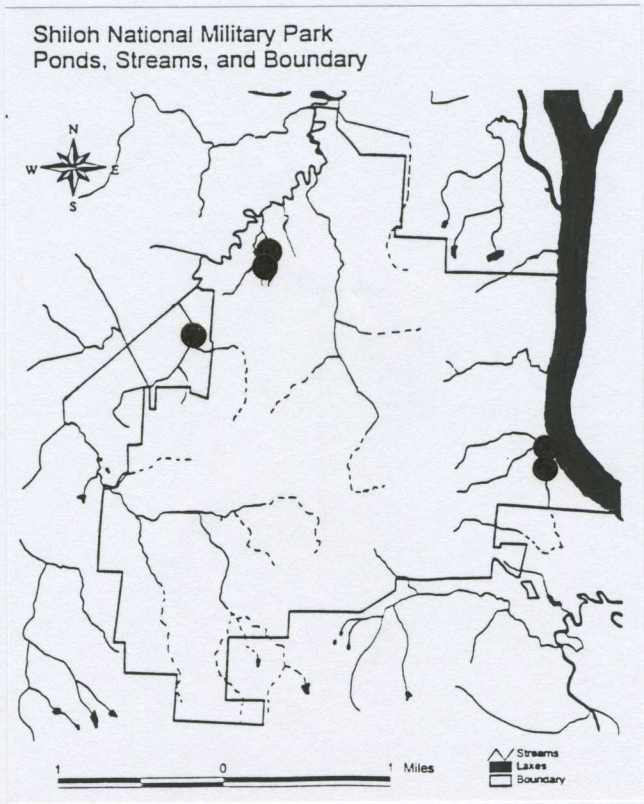
Owl Creek Beaver Ponds (bottomlands)	
Cattail Branch, Middle Section	COMMON
Mounds Branch	
Lower Section (bottomlands)	OCCASIONAL (only 1)
Riverbottoms Branch (bottomlands)	UNCOMMON

COMMENTS:

Most specimens sampled were quite small. Larger crappie were found in a 1.2 m (4 ft) deep channelized ditch dammed by beaver just outside the park west of the picnic area.



Photo D-24. White Crappie, Pomoxis annularis, 74 mm TL juvenile, from Riverbottoms Branch.



STRIPETAIL DARTER, Etheostoma kennicotti (Putnam)

(See page 498 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Females, juveniles, and non-breeding males tan with darker brown mottling
Nuptial males have swollen, darkened heads, yellow-orange knobs on dorsal spine tips, lack dorsal and lateral mottling
Soft dorsal and caudal fins conspicuously banded
Dark humeral spot consistently present
Spinous dorsal fin has clear basal band and dark brown submarginal band

LARGEST SPECIMENS:

Maximum total length 85 mm (3.3 in)
Largest collected in the park 63 mm (2.5 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

least brook lamprey	brown madtom
largescale stoneroller	grass pickerel
rosyside dace	pirate perch
striped shiner	blackspotted topminnow
rosefin shiner	bluegill
southern redbelly dace	longear sunfish
creek chub	bandfin darter
creek chubsucker	dusky darter

AQUARIUM BEHAVIOR:

This species remained motionless on the bottom most of the time. It was never observed to eat, and all specimens eventually starved to death. This was the only species sampled that never adapted to aquarium life or available aquarium food.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Tilghman Branch	
Middle Section	UNCOMMON
Lower Section	UNCOMMON
Shiloh Branch	
Middle Section	UNCOMMON
Lower Section	UNCOMMON
Owl Creek (bottomlands)	OCCASIONAL (only 1)

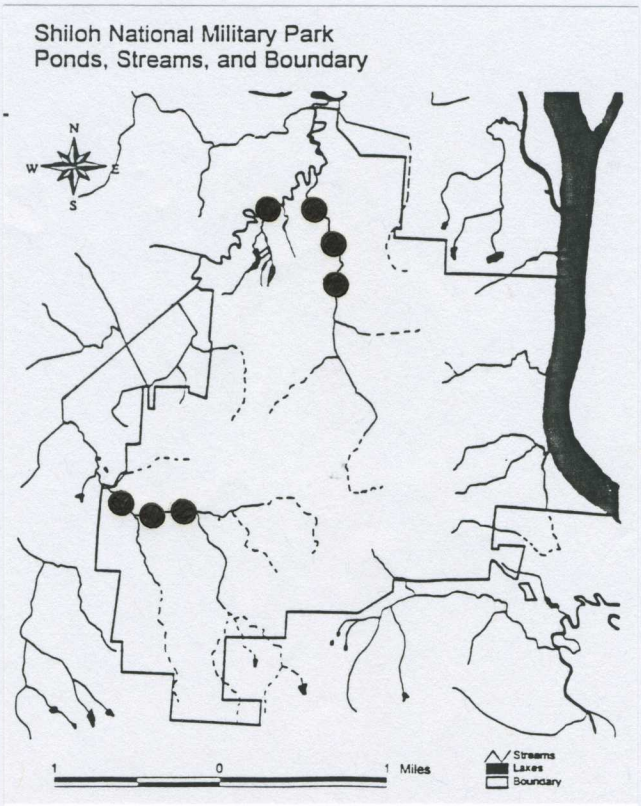
COMMENTS:

Etnier and Starnes (1993, page 499) reported the stripetail darter preferred habitat was pool areas in small headwater streams where slabrocks were abundant. However, no slabrocks exist within the park. All park branches can be considered "small headwater streams," but their substrate is a mixture of sand and gravel. No specimens were found in the upper

sections of these branches or in their tiny spring branch tributaries. One specimen was discovered in Owl Creek, which is a medium size stream with sand substrate.



Photo B-22. Stripetail Darter, Etheostoma kennicotti, 53 mm TL, from Tilghman Branch.



44. **GOLDSTRIPE DARTER**, Etheostoma parvipinne (Gilbert and Swain)

(See page 515 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Relatively drab gray to yellowish brown
Suborbital bar
Wide caudal peduncle
Anterior half of lateral line conspicuously depigmented and may be yellowish which gives the species its common name
Faint narrow brown stripes laterally on posterior half of adults
Relatively large mouth
Dorsal and caudal fins spotted
Tiny specimens in tiny clear spring branches had 8 dorsal saddles and 12 or more midlateral blotches

LARGEST SPECIMENS:

Maximum total length 75 mm (3 in)
Largest collected in the park 66 mm (2.6 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

southern redbelly dace
creek chub

AQUARIUM BEHAVIOR:

The species was semi-active, alternating between lying motionless on the bottom, darting along the bottom, and even going to the water surface looking for food. It took commercial aquarium fish food readily, even from the water surface. It would be a welcome addition to a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

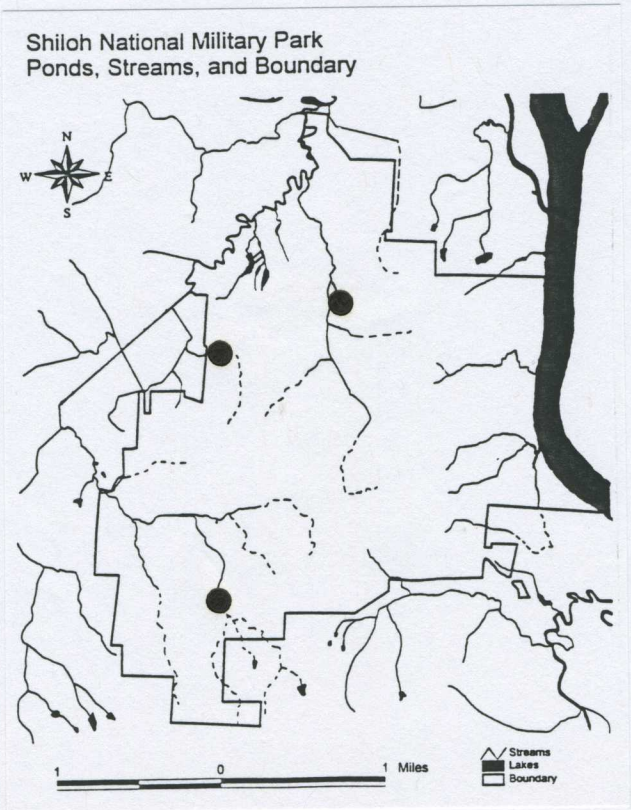
Tilghman Branch	
Middle Section tributary (headwaters habitat)	COMMON (found only in a tiny tributary to the main stream)
Shiloh Branch	
South Prong, Headwaters	OCCASIONAL (only 1)
Picnic Branch (headwaters)	OCCASIONAL (only 1)

COMMENTS:

Although Etnier and Starnes (1993) indicates the species is an inhabitant of small sandy Coastal Plain streams, goldstripe darters within the park were found only in the upper end of tiny branch headwaters or a tiny spring branch with a mixture of sand and gravel substrate. An estimated 100 or more tiny specimens exist in a tiny spring branch tributary to the lower middle section of Tilghman Branch.



Photo B-21. Goldstripe Darter, Etheostoma parvipinne, 66 mm TL, from Picnic Branch.



45. **CYPRESS DARTER**, Etheostoma proeliare (Hay)

(See page 516 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Straw to tan color with 6-9 dorsal saddles
Suborbital and preorbital bar
Pelvic fins very long, reaching to or past anal fin origin in males
Spinous dorsal fin of males with dark blotch on leading edge
Spinous dorsal fin of nuptial males have tiny red to orange blotch on leading edge
Three rows of dark brown spots, mostly on spines of dorsal fin of females

LARGEST SPECIMENS:

Maximum total length 50 mm (2 in)
Largest collected in the park 42 mm (1.6 in)

This was the smallest fish species found within the park.

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

longnose gar
bluntface shiner
spotfin shiner
striped shiner
ribbon shiner
golden shiner
pugnose minnow
bluntnose minnow
lake chubsucker
yellow bullhead
grass pickerel
pirate perch
blackspotted topminnow
western mosquitofish
brook silverside
flier
warmouth
bluegill
dollar sunfish
longear sunfish
redear sunfish
largemouth bass
white crappie

AQUARIUM BEHAVIOR:

The species was semi-active. It spent much of its time lying motionless on the bottom. The species is so small, it could take only the smallest particles of food, and larger fish preyed upon it. It would be suitable to keep only in a native fish aquarium containing small fish.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Owl Creek Beaver Ponds (bottomlands)

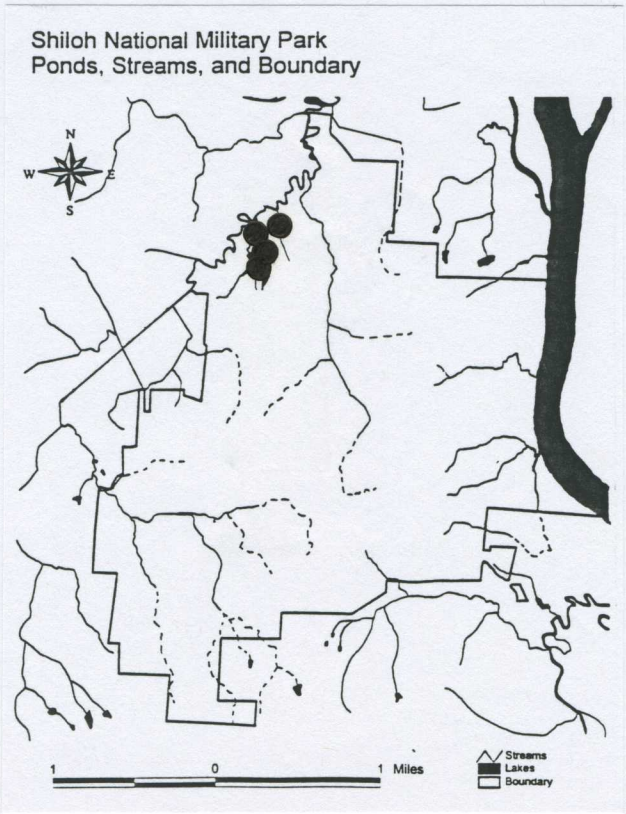
Sandy Branch	UNCOMMON (in isolated populations)
Cattail Branch	UNCOMMON (in isolated populations)
Middlefield Branch	UNCOMMON (in isolated populations)

COMMENTS:

Cypress darters inhabit sluggish, low gradient streams, floodplain swamps, and oxbow lakes (Etnier and Starnes, 1993). Within the park, they were found only in the Owl Creek Beaver Ponds and Sandy Branch (below the Owl Creek Beaver Ponds) near its intersection with Owl Creek. Until a seine with smaller than 5 mm (0.2 in) mesh was utilized, it was thought the cypress darter population was very sparse. It is now thought to be more plentiful than this research indicates.



Photo E-07. Cypress Darter, Etheostoma proeliare, 42 mm TL, from Middle Field Branch of the Owl Creek Beaver Ponds.



46. **BANDFIN DARTER**, Etheostoma zonistium (Bailey and Etnier)

(See page 552 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Tan with scattered dark mottling, 9 lateral blotches, 8 dorsal saddles
Caudal base has pair of median (often fused) and pair of marginal dark spots
Narrow suborbital bar
Dorsal, caudal, and pectoral fins with brown and pale bands
Breeding male posterior half is red, blue anal fin, conspicuously banded spinous dorsal fin

LARGEST SPECIMENS:

Maximum total length 75 mm (3.0 in)
Largest collected in the park 70 mm (2.7 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

least brook lamprey
largescale stoneroller
rosyside dace
spotfin shiner
striped shiner
rosefin shiner
ribbon shiner
emerald shiner
southern redbelly dace
creek chub
creek chubsucker
northern hogsucker
golden redhorse
black bullhead
brown madtom
grass pickerel
pirate perch
blackspotted topminnow
brook silverside (Owl Creek only)
bluegill
longear sunfish
stripetail darter
dusky darter

AQUARIUM BEHAVIOR:

The species was semi-active. It was interesting to watch a specimen slowly work its way across the bottom in short spurts, sometimes almost looking like it was crawling on legs. One could actually see it turn its head and move its eyes to look for food movement on the bottom. When it saw something that attracted its attention, it would peck at it 2 or 3 times, then move on. It would occasionally suddenly swim upward to take food off the water surface, then sink like a rock back to the bottom. Much effort was expended to swim above the bottom. When introduced into an aquarium, at first it did not feed. But, it apparently learned from other fish in the tank. Soon it started feeding when all the other aquarium fish begin to feed.

The bandfin darter (especially the colorful males) would make a welcome addition to a native fish aquarium. Unfortunately, the male specimens red color tended to fade somewhat in captivity. Experimentation with food and water temperature

might maintain their color. Subdued light could also be a factor in the retention of their color.

DISTRIBUTION AND RELATIVE ABUNDANCE:

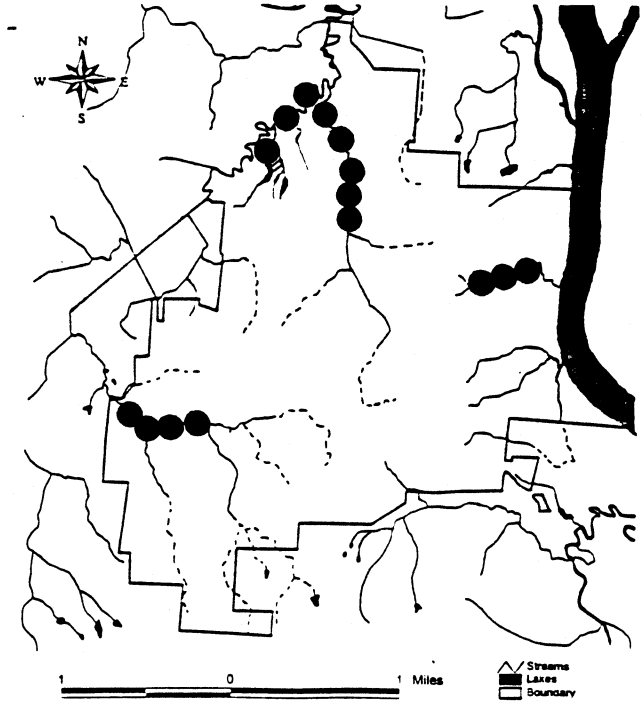
Tilghman Branch	
Middle Section	COMMON
Lower Section	COMMON
Shiloh Branch	
Middle Section	COMMON
Lower Section	COMMON
Owl Creek Beaver Ponds	
Sandy Branch (below ponds)	UNCOMMON
Dill Branch	
Upper Section	UNCOMMON
Middle Section	UNCOMMON
Owl Creek (bottomlands)	UNCOMMON

COMMENTS:

This is a common species in western tributaries of the lower Tennessee River from Pickwick Reservoir north to Southern Kentucky. In the Tennessee River drainage, the species distribution accurately reflects the boundary between Coastal Plain and Western Highland Rim (Etnier and Starnes, 1993).

The bandfin darter was the most common darter within the park. It also occurred in lower numbers in Owl Creek.

Shiloh National Military Park
Ponds, Streams, and Boundary





Above: Photo B-20. Bandfin Darter, Etheostoma zonistium, 70 mm TL male, from middle Tilghman Branch.

Below: Photo B-23. Bandfin Darter, Etheostoma zonistium, 54 mm TL, from middle Tilghman Branch.



47. **YELLOW PERCH**, Perca flavescens (Mitchill)

(See page 558 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Brownish, bronze, or olivaceous dorsum
6-9 dorsal saddles that extend well down the yellow sides and narrow to a point ventrally
Prominent blotch usually present in posterior membranes of spinous dorsal fin
Pectoral, pelvic, and anal fins pale yellow to orange

LARGEST SPECIMENS:

Maximum Tennessee State record size 801 gm (1 lb, 12.25 oz)
Largest collected in the park 112 mm (4.4 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

gizzard shad
threadfin shad
spotfin shiner
striped shiner
golden shiner
emerald shiner
spotted sucker
pirate perch
blackspotted topminnow
western mosquitofish
warmouth
bluegill
redear sunfish
largemouth bass
white crappie
sauger
freshwater drum

AQUARIUM BEHAVIOR:

The only specimen collected jumped out of the holding bucket and died before it could be observed in an aquarium. The photograph shows a live, but very ill fish. Its green color was considerably faded from when it was first caught.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Riverbottoms Branch — OCCASIONAL (only 1)

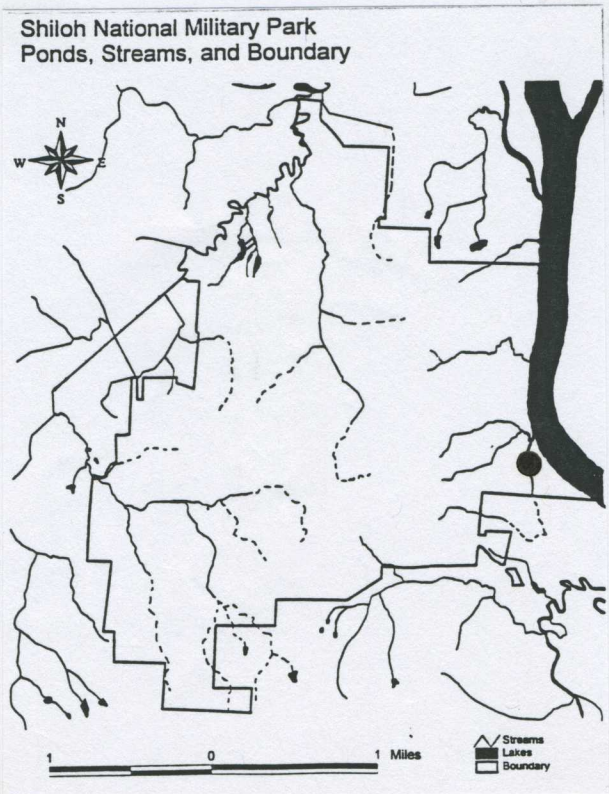
COMMENTS:

The species was native in Tennessee during the Pleistocene 12,000 to 16,000 years ago. Recently, it was reintroduced, but it is not common. There is an increasing abundance in the Tennessee River main-channel reservoirs (Etnier and Starnes, 1993).

A single specimen was collected behind a beaver dam near the Tennessee River. It likely wandered into the park from the Tennessee River during flood stage and remained behind the beaver dams when the water level receded. It is not likely to be found anywhere else within the park.



Photo E-01. Yellow Perch, Perca flavescens, 112 mm TL, from Riverbottoms Branch.



48. **DUSKY DARTER**, Percina sciera (Swain)

(See page 583 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Very slender darter
Dorsum grayish with 7-9 dark dorsal saddles
8 or so oval lateral blotches
3 vertically arranged basicaudal spots, lower 2 usually partially coalesced
Suborbital bar rarely present

LARGEST SPECIMENS:

Maximum total length 130 mm (5.1 in)
Largest collected in the park 65 mm (2.6 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

least brook lamprey
largescale stoneroller
rosyside dace
spotfin shiner
striped shiner
southern redbelly dace
bluntnose minnow
creek chub
creek chubsucker
brown madtom
pirate perch
blackspotted topminnow
bluegill
longear sunfish
stripetail darter
Bandfin darter

AQUARIUM BEHAVIOR:

Unlike other darter species that have no swim bladder and rapidly drop to the bottom when they stop swimming, the dusky darter swam like other fish. The species was considerably more active than other darters, and it sometimes swam with the other aquarium fish. It occasionally rested quietly on the bottom, but usually not for long. When spooked, it would bury itself under the gravel substrate. The species was non-aggressive and would make an interesting addition to a native fish aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Tilghman Branch	
Lower Section (bottomlands)	OCCASIONAL (only 1)
Shiloh Branch	
Middle Section (uplands)	OCCASIONAL (only 1)
Lower Section (bottomlands)	OCCASIONAL (only 1)
Mounds Branch	
Middle Section (bottomlands)	OCCASIONAL (only 1)

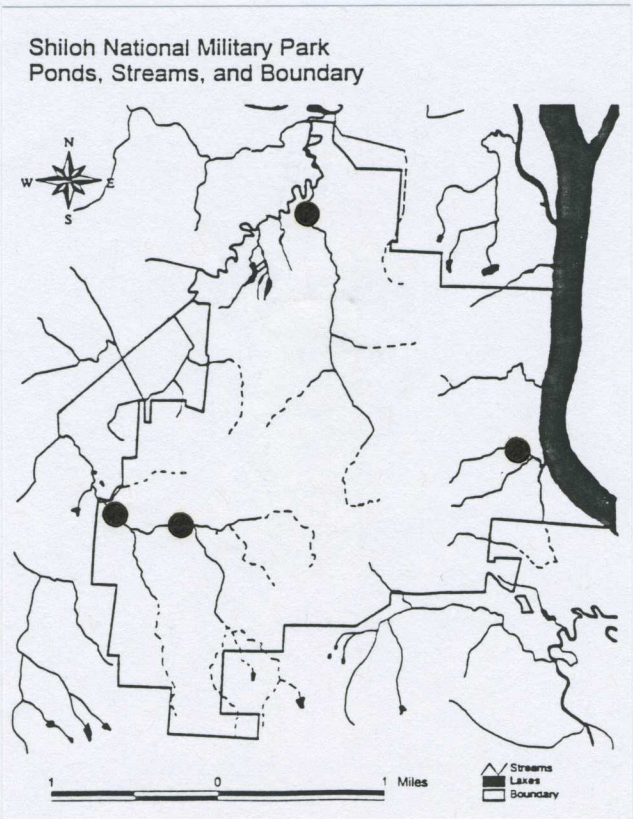
COMMENTS:

A total of only 4 specimens were collected, but it is suspected that several slipped through the 5 mm (0.2 in) mesh in the seine.

The dusky darter is most common in larger creeks and rivers over substrates of sand and silt. Some specimens migrate into smaller tributaries during spring and summer (Etnier and Starnes, 1993). It is likely to be found in Owl Creek.



Photo H-11. Dusky Darter, Percina sciera, 52 mm TL, from lower Tilghman Branch.



49. **SAUGER**, Stizostedion canadense (Smith)

(See page 596 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Strikingly patterned, with dark brown saddles and blotches on tan (dorsal) to white (ventral) background
Spinous dorsal fin with 3 horizontal rows of discrete black spots on anterior half of each membrane
Often a large black spot at dorsal fin posterior base
(juvenile specimens lack the above characteristic pigmentation)
Obvious mouth full of teeth

LARGEST SPECIMENS:

Tennessee State record 3.3 kg (7 lb, 6 oz) in Pickwick tailwater
Largest collected in the park 270 mm (10.6 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

gizzard shad
threadfin shad
spotfin shiner
striped shiner
golden shiner
emerald shiner
spotted sucker
pirate perch
blackspotted topminnow
western mosquitofish
warmouth
bluegill
redear sunfish
largemouth bass
white crappie
yellow perch
freshwater drum

AQUARIUM BEHAVIOR:

The species was not kept in an aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

Riverbottoms Branch (bottomlands) OCCASIONAL (only 1)

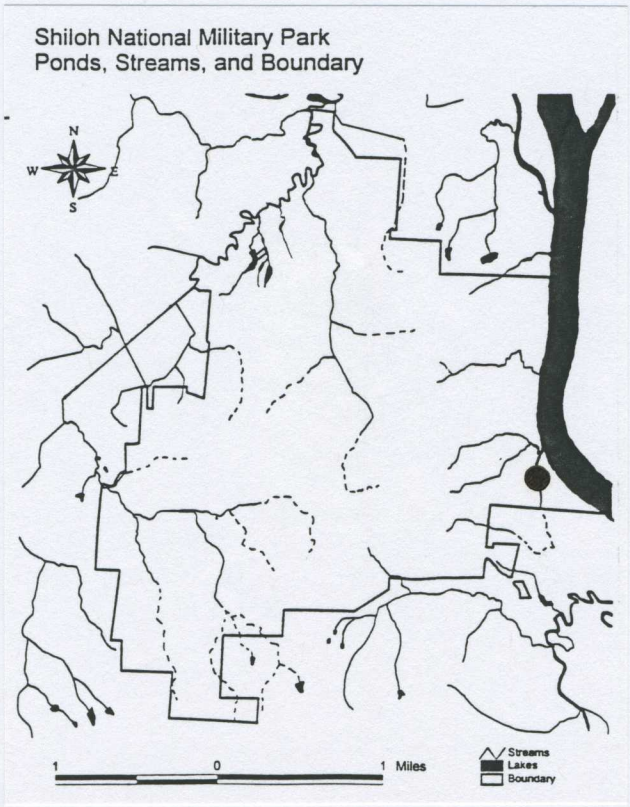
COMMENTS:

Sauger typically inhabit large, often turbid rivers (Etnier and Starnes, 1993).

A single specimen was collected behind a beaver dam near the Tennessee River. The species likely wandered into the park from the Tennessee River during flood stage and remained behind the beaver dams when the water level receded. It is not likely to be found anywhere else within the park.



Photo G-23. Sauger, Stizostedion canadense, 270 mm TL, from Riverbottoms Branch.



50. **FRESHWATER DRUM**, Aplodinotus grunniens (Rafinesque)

(See page 602 of Etnier and Starnes, 1993)

IDENTIFYING CHARACTERS:

Dusky gray dorsally, sides with purplish silver sheen, or may be more drab silvery white
Notched dorsal fin extends from pectoral fin insertion to caudal peduncle
Rounded caudal fin

LARGEST SPECIMENS:

Tennessee and World angling record 24.7 kg (54.5 lb)
Largest collected in the park 250 mm (9.8 in)

OTHER FISH SPECIES ASSOCIATES WITHIN THE PARK:

gizzard shad
threadfin shad
spotfin shiner
striped shiner
golden shiner
emerald shiner
spotted sucker
pirate perch
blackspotted topminnow
western mosquitofish
warmouth
bluegill
redear sunfish
largemouth bass
white crappie
yellow perch
sauger

AQUARIUM BEHAVIOR:

The 2 specimens collected were too large for the aquarium.

DISTRIBUTION AND RELATIVE ABUNDANCE:

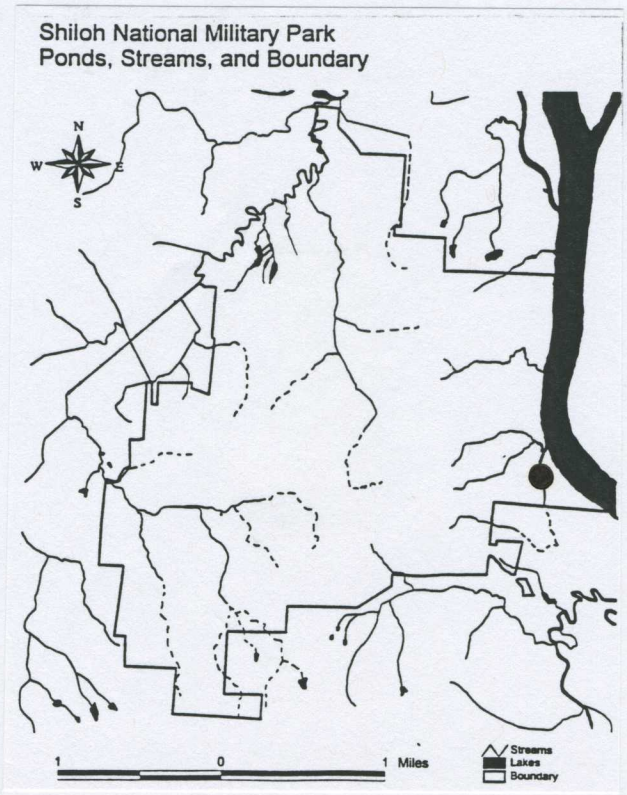
Riverbottoms Branch (bottomlands) OCCASIONAL (only 2)

COMMENTS:

The species is a common inhabitant of large rivers and reservoirs. The 2 specimens collected within the park were behind a beaver dam near the Tennessee River. They likely wandered into the park from the Tennessee River during flood stage and remained behind the beaver dams when the water level receded. They are not likely to be found anywhere else within the park.



Photo G-21. Freshwater Drum, Aplodinotus grunniens, 250 mm TL, from Riverbottoms Branch.



SPECIES DISTRIBUTION AND RELATIVE ABUNDANCE

The following chart is a summary of the findings of this survey. The chart will be discussed in detail in the following DISCUSSION OF INDIVIDUAL STREAMS.

RELATIVE ABUNDANCE of a species in each stream on the chart is indicated by the following:

A = ABUNDANT (found in large numbers)

C = COMMON (frequently found in samples)

U = UNCOMMON (only 4 to 15 specimens collected)

O = OCCASIONAL (only 1 to 3 specimens collected)

ip = isolated populations

ICHTHYOLOGICAL BASELINE INVENTORY AND SPECIES DISTRIBUTION WITHIN SHILOH NATIONAL MILITARY PARK HARDIN COUNTY, TENNESSEE

AS OF DECEMBER 19, 1997

			OWL CREEK DRAINAGE				TENNESSEE RIVER DRAINAGE								
			TILGHMAN BRANCH	SHILOH BRANCH	PICNIC BRANCH	OWL CREEK BEAVER PONDS	DILL BRANCH	MOURNS BRANCH	RIVERBOTTOMS BRANCH	HAGY BRANCH	ROGERS BRANCH	JOHNSTON BRANCH	QUARRY BRANCH	OWL CREEK	TOTALS
1	Least Brook Lamprey	Lampetra aepyptera		C			C								2
2	Longnose Gar	Lepisosteus osseus				O[2]								U	2
3	Gizzard Shad	Dorosoma cepedianum							U						1
4	Threadfin Shad	Dorosoma petenense				O[1]		A	A						3
5	Largescale Stoneroller	Campostoma oligolepis	U	U		O[1]									3
6	Rosyside Dace	Clinostomus funduloides	C	A											2
7	Bluntface Shiner	Cyprinella camura				O[2]								U	2
8	Spotfin Shiner	Cyprinella spiloptera	C ip			A ip	U*	A	A					A	6
9	Striped Shiner	Luxilus chrysocephalus	A	A		A	A	A	A		A			A	8
10	Rosefin Shiner	Lythrurus ardens	U ip	U ip											2
11	Ribbon Shiner	Lythrurus fumeus	O[1]			A								A	3
12	Golden Shiner	Notemigonus crysoleucas				C	U*	U	C						4
13	Emerald Shiner	Notropis atherinoides	O[2]					C	C					A	4
14	Mimic Shiner	Notropis volucellus						O[3]							1
15	Pugnose Minnow	Opsopoeodus emiliae				C ip									1
16	Southern Redbelly Dace	Phoxinus erythrogaster	A	A	A		A	A		A	A	A	A		9
17	Bluntnose Minnow	Pimephales notatus				U	U	A			C			U	5
18	Bullhead Minnow	Pimephales vigilax						O[1]							1
19	Blacknose Dace	Rhinichthys atratulus											U ip		1
20	Creek Chub	Semotilus atromaculatus	A	A	C		A	A		A	A	A	A		9
21	Creek Chubsucker	Erimyzon oblongus	U	C			C								3
22	Lake Chubsucker	Erimyzon sucetta				U ip									1
23	Northern Hogsucker	Hypentelium nigricans		O[1]											1
24	Spotted Sucker	Minytrema melanops				O[1]			U						2
25	Golden Redhorse	Moxostoma erythrurum	U	O[1]		O[1]								U	4
26	Black Bullhead	Ameiurus melas	O[2]												1
27	Yellow Bullhead	Ameiurus natalis				U ip									1
28	Brown Madtom	Noturus phaeus	U	C			U	O[1]							4
29	Grass Pickerel	Esox americanus	U ip			U ip									2
30	Pirate Perch	Aphredoderus sayanus		U ip		C			C						3
31	Blackspotted Topminnow	Fundulus olivaceus	C	C		C	C	C	C		C			C	8
32	Western Mosquitofish	Gambusia affinis	C ip	A ip		A	A ip	C	C		U			C ip	8
33	Brook Silverside	Labidesthes sicculus				U ip		C	C					C	4
34	Flier	Centrarchus macropterus				U ip									1
35	Green Sunfish	Lepomis cyanellus	U	U										O[1]	3
36	Warmouth	Lepomis gulosus	U			C		U	U						4
37	Bluegill	Lepomis macrochirus	C	U		A	U	C	C		C			C	8
38	Dollar Sunfish	Lepomis marginatus				C ip								O[2]	2
39	Longear Sunfish	Lepomis megalotis	C	C		C	C	C						C	6
40	Redear Sunfish	Lepomis microlophus				C			U						2
41	Largemouth Bass	Micropterus salmoides	O[1]			U		O[2]	U					U	5
42	White Crappie	Pomoxis annularis				C		O[1]	U						3
43	Stripetail Darter	Etheostoma kennicotti	U	U										O[1]	3
44	Goldstripe Darter	Etheostoma parvipinne	C ip	O[1]	O[1]										3
45	Cypress Darter	Etheostoma proeliare				U ip									1
46	Bandfin Darter	Etheostoma zonistium	C	C		U	U							U	5
47	Yellow Perch	Perca flavescens							O[1]						1
48	Dusky Darter	Percina sciera	O[1]	O[2]				O[1]							3
49	Sauger	Stizostedion canadense							O[1]						1
50	Freshwater Drum	Aplodinotus grunniens							O[2]						1
		TOTALS	25	21	3	29	14	20	19	2	7	2	3	18	

* DIRECT RESULT OF NEW BEAVER POND

A = ABUNDANT
C = COMMON
U = UNCOMMON

O = OCCASIONAL
ip = isolated populations

1 = ONLY ONE SPECIMAN COLLECTED
2 = ONLY TWO SPECIMANS COLLECTED
3 = ONLY THREE SPECIMANS COLLECTED

SPECIES ABUNDANCE PARKWIDE

(Listed in apparent order of decreasing population numbers)

Creek Chub	ABUNDANT and widespread in upland streams only
Western Mosquitofish	ABUNDANT in isolated populations mostly in bottomlands
Southern Redbelly Dace	ABUNDANT and widespread in headwater streams only
Striped Shiner	ABUNDANT and widespread in upland streams and bottomlands
Spotfin Shiner	ABUNDANT in isolated populations in bottomlands only
Ribbon Shiner	ABUNDANT in isolated populations in bottomlands only
Threadfin Shad	ABUNDANT in isolated populations in bottomland beaver ponds only
Rosyside Dace	COMMON in 2 upland streams only
Blackspotted Topminnow	COMMON and widespread in upland streams and bottomlands
Golden Shiner	COMMON in bottomland beaver ponds only
Bluegill	COMMON and widespread in upland streams and bottomlands
Bandfin Darter	COMMON and widespread mostly in upland streams
Creek Chubsucker	COMMON and widespread in 3 upland streams only
Least Brook Lamprey	COMMON in 2 upland streams only
Longear Sunfish	COMMON and widespread in upland streams and bottomlands
Brown Madtom	COMMON in 1 of 4 upland streams only OCCASIONAL in other 3 upland streams
Bluntnose Minnow	COMMON in bottomlands only
Pirate Perch	COMMON mostly in bottomlands UNCOMMON in 1 upland stream
Pugnose Minnow	COMMON in isolated populations in bottomland beaver ponds only
Dollar Sunfish	COMMON in isolated populations mostly in bottomland beaver ponds
Redear Sunfish	COMMON in bottomland beaver ponds only
Brook Silverside	COMMON in bottomland beaver ponds only
Emerald Shiner	COMMON in bottomlands only
Rosefin Shiner	UNCOMMON in lower sections of 2 upland streams only

Warmouth	UNCOMMON mostly in bottomlands
Cypress Darter	UNCOMMON in bottomlands only
Goldstripe Darter	COMMON in 1 tiny spring branch ONLY 3 in upland streams
Largescale Stoneroller	UNCOMMON mostly in 2 upland streams
Stripetail Darter	UNCOMMON mostly in 2 upland streams ONLY 1 in bottomlands stream
Flier	UNCOMMON in isolated population in bottomland beaver pond only
Lake Chubsucker	UNCOMMON in isolated population in bottomland beaver pond only
Grass Pickerel	UNCOMMON in isolated populations in 1 upland stream and bottomlands
White Crappie	UNCOMMON in bottomland beaver ponds only
Largemouth Bass	UNCOMMON in bottomlands only
Yellow Bullhead	UNCOMMON in bottomland beaver ponds only
Golden Redhorse	UNCOMMON in bottomland streams only
Spotted Sucker	UNCOMMON in bottomland beaver ponds only
Blacknose Dace	UNCOMMON in 1 tiny headwaters stream only
Green Sunfish	UNCOMMON in 3 upland streams only
Gizzard Shad	UNCOMMON in 1 bottomland beaver pond only
Bluntface Shiner	UNCOMMON in 2 bottomlands streams only
Dusky Darter	UNCOMMON in 3 upland streams only
Longnose Gar	ONLY 3 specimens collected in bottomland beaver ponds
Mimic Shiner	ONLY 3 specimens collected in bottomland beaver pond
Freshwater Drum	ONLY 2 specimens collected in bottomland beaver pond
Black Bullhead	ONLY 2 specimens collected in lower section of 1 stream
Northern Hogsucker	ONLY 1 specimen collected in lower section of 1 stream
Bullhead Minnow	ONLY 1 specimen collected in lower section of 1 stream
Sauger	ONLY 1 specimen collected in bottomlands beaver pond
Yellow Perch	ONLY 1 specimen collected in bottomlands beaver pond

SPECIES ABUNDANCE ACCORDING TO NUMBER OF STREAMS INHABITED

SPECIES	NUMBER STREAMS INHABITED
Southern Redbelly Dace	9 (abundant)
Creek Chub	9 (abundant)
Striped Shiner	8 (abundant)
Blackspotted Topminnow	8 (common)
Western Mosquitofish	8 (common to abundant)
Bluegill	8 (common)
Spotfin Shiner	6 (abundant)
Longear Sunfish	6 (common)
Bluntnose Minnow	5 (common)
Largemouth Bass	5 (uncommon)
Bandfin Darter	5 (uncommon to common)
Golden Shiner	4 (uncommon to common)
Emerald Shiner	4 (common)
Golden Redhorse	4 (uncommon)
Brown Madtom	4 (uncommon to common)
Brook Silverside	4 (common)
Warmouth	4 (uncommon)
Threadfin Shad	3 (abundant)
Largescale Stoneroller	3 (uncommon)
Ribbon Shiner	3 (abundant)
Creek Chubsucker	3 (common)
Pirate Perch	3 (common)
Green Sunfish	3 (uncommon)
White Crappie	3 (uncommon)
Stripetail Darter	3 (uncommon)
Goldstripe Darter	3 (uncommon)
Dusky Darter	3 (uncommon)
Least Brook Lamprey	2 (common)
Longnose Gar	2 (only 3 specimens)
Rosyside Dace	2 (common)
Bluntface Shiner	2 (uncommon)
Rosefin Shiner	2 (uncommon)
Spotted Sucker	2 (uncommon)
Grass Pickerel	2 (uncommon)
Dollar Sunfish	2 (common)
Redear Sunfish	2 (uncommon to common)
Gizzard Shad	1 (uncommon)
Mimic Shiner	1 (only 3 specimens)
Pugnose Minnow	1 (common)
Bullhead Minnow	1 (only 1 specimen)
Blacknose Dace	1 (uncommon)
Lake Chubsucker	1 (uncommon)
Northern Hogsucker	1 (only 1 specimen)
Black Bullhead	1 (only 2 specimens)
Yellow Bullhead	1 (uncommon)
Flier	1 (uncommon)
Cypress Darter	1 (uncommon)
Yellow Perch	1 (only 1 specimen)
Sauger	1 (only 1 specimen)
Freshwater Drum	1 (only 2 specimens)

SPECIES DISTRIBUTION ACCORDING TO DRAINAGE

EIGHTEEN SPECIES FOUND ONLY IN OWL CREEK DRAINAGE

1. Largescale Stoneroller
2. Rosyside Dace
3. Rosefin Shiner
4. Bluntface Shiner
5. Ribbon Shiner
6. Pugnose Minnow
7. Lake Chubsucker
8. Northern Hogsucker
9. Golden Redhorse
10. Black Bullhead
11. Yellow Bullhead
12. Grass Pickerel
13. Flier
14. Green Sunfish
15. Dollar Sunfish
16. Stripetail Darter
17. Goldstripe Darter
18. Cypress Darter

SEVEN SPECIES FOUND ONLY IN TENNESSEE RIVER DRAINAGE

1. Gizzard Shad
2. Mimic Shiner
3. Bullhead Minnow
4. Blacknose Dace
5. Yellow Perch
6. Sauger
7. Freshwater Drum

The other 25 species were found in both drainages.

(Also see BEAVER ENHANCED HABITAT on page 21 for the 18 species that were found only in beaver pond habitat).

SPECIES DISTRIBUTION ACCORDING TO PHYSIOGRAPHIC PROVINCES

SPECIES KNOWN TO OCCUR ONLY IN COASTAL PLAIN HABITAT

1. Bluntface Shiner
2. Ribbon Shiner
3. Pugnose Minnow
4. Lake Chubsucker
5. Brown Madtom
6. Flier
7. Goldstripe Darter
8. Cypress Darter
9. Bandfin Darter
10. Yellow Perch

SPECIES KNOWN TO OCCUR ONLY IN HIGHLAND RIM HABITAT

1. Rosyside Dace
2. Spotfin Shiner
3. Rosefin Shiner
4. Southern Redbelly Dace
5. Blacknose Dace
6. Northern Hogsucker
7. Golden Redhorse
8. Stripetail Darter

The other 32 species are known to occur both in COASTAL PLAIN AND HIGHLAND RIM HABITAT (Etnier and Starnes, 1993).

COLLECTION EXTREMES

Largest Specimen Collected:
295 mm (11.6 in) gizzard shad
Collected behind a beaver dam in Riverbottoms Branch

Largest Gamefish Collected:
270 mm (10.6 in) sauger
Collected behind a beaver dam in Riverbottoms Branch

Largest Streamfish Collected:
190 mm (7.5 in) northern hogsucker
Collected in lower Shiloh Branch

Smallest Specimen Collected:
15 mm (0.6 in) grass pickerel
Collected in early December in Owl Creek Beaver Ponds, Cattail Branch, indicating a fall spawn

Most Species Collected In One Seine Haul:
10 species
Using a 4.5 m (15 ft) 2 man seine from a medium sized pool in lower Tilghman Branch
They were as follows:
Spotfin Shiner
Striped Shiner
Rosefin Shiner
Creek Chub
Blackspotted Topminnow
Western Mosquitofish
Bluegill
Longear Sunfish
Bandfin Darter
Dusky Darter

Most Specimens Collected In One Seine Haul:
170 specimens
Using a 4.5 m (15 ft) 2 man seine, from "baptismal pool" in Shiloh Branch at Rhea Spring
The five species represented were as follows:
Largescale Stoneroller
Rosyside Dace
Southern Redbelly Dace
Creek Chub
Creek Chubsucker

NEW TENNESSEE STATE DISTRIBUTION RECORDS

This study has discovered new state distribution records for the following 21 species listed on the following pages of Etnier and Starnes THE FISHES OF TENNESSEE, 1993:

PAGE	SPECIES
112	Longnose Gar
128	Threadfin Shad
140	Largescale Stoneroller
143	Rosyside Dace
200	Golden Shiner
211	Emerald Shiner
238	Pugnose Minnow
247	Southern Redbelly Dace
273	Lake Chubsucker
301	Black Bullhead
302	Yellow Bullhead
335	Grass Pickerel
354	Pirate Perch
376	Brook Silverside
403	Flier
415	Warmouth
420	Dollar Sunfish
424	Redear Sunfish
438	White Crappie
559	Yellow Perch
584	Dusky Darter

DISCUSSION OF INDIVIDUAL STREAMS

The inventoried streams are discussed in detail on the following pages. The streams are discussed in the following order:

OWL CREEK DRAINAGE
- TILGHMAN BRANCH
- SHILOH BRANCH
- PICNIC BRANCH
- OWL CREEK BEAVER PONDS

TENNESSEE RIVER DRAINAGE
- DILL BRANCH
- MOUNDS BRANCH
- RIVERBOTTOMS BRANCH
- HAGY BRANCH
- ROGERS BRANCH
- JOHNSTON BRANCH
- QUARRY BRANCH

OWL CREEK (park boundary waters only - not considered to be within the park)

THE TENNESSEE RIVER (park boundary waters only - not considered to be within the park)

The relative abundance of each species listed is indicated as follows:

A = ABUNDANT (found in large numbers)
C = COMMON (frequently found in samples)
U = UNCOMMON (only 4 to 15 specimens collected)
O = OCCASIONAL (only 1 to 3 specimens collected)
- O1 = only 1 specimen collected
- O2 = only 2 specimens collected
- O3 = only 3 specimens collected

ip = isolated populations
\+ = found in a tiny tributary to the main stream
* = was not found until a new beaver pond was established on the stream

TILGHMAN BRANCH

Tilghman Branch is a small stream generally less than 2.1 m (7 ft) wide and 0.9 m (3 ft) deep in the widest and deepest places. Riffles between pools are usually no more than 1.2 m (4 ft) wide and 8 cm (3 in) deep. It flows through a forest for its entire length. Its waters are generally devoid of living aquatic vegetation, but it is littered with occasional brush and logs fallen from the forest canopy above. In the fall and early winter, its bottom is littered with tree leaves which are generally devoured by stream invertebrates by spring. It originates from springs along and below the 131 m (430 ft) contour and flows north approximately 2.4 km (1.5 mi) to Owl Creek at about the 111 m (365 ft) contour level. Its clear water flows gently through pools and riffles over sandy gravel until it reaches the Owl Creek Bottoms floodplain where the substrate becomes sand and gravel before it empties into Owl Creek. Owl Creek usually floods at least once annually during winter or early spring to between the 116 m (380 ft) or 119 m (390 ft) contour from Tennessee River backwaters.

Tilghman Branch was sectioned as follows:

Upper Section
From its origin to the Cavalry Road bridge.

Middle Section
From the Cavalry Road bridge to the Hwy 22 bridge.

Lower Section
From the Hwy 22 bridge to Owl Creek.

To this date the following fish species have been identified in TILGHMAN BRANCH:

		Branch Section/Relative Abundance		
	SPECIES	UPPER	MIDDLE	LOWER
1.	Largescale Stoneroller			U
2.	Rosyside Dace	C	C	
3.	Spotfin Shiner			Cip
4.	Striped Shiner	A	A	A
5.	Rosefin Shiner			Uip
6.	Ribbon Shiner			O1
7.	Emerald Shiner			O2
8.	Southern Redbelly Dace	A	C	
9.	Creek Chub	A	A	C
10.	Creek Chubsucker	U	U	U
11.	Golden Redhorse			U
12.	Black Bullhead			O2
13.	Brown Madtom		U	
14.	Grass Pickerel	Uip	Uip	Uip
15.	Blackspotted Topminnow		C	C
16.	Western Mosquitofish			Cip
17.	Green Sunfish			U
18.	Warmouth			U
19.	Bluegill		C	C
20.	Longear Sunfish		C	C
21.	Largemouth Bass			O1
22.	Stripetail Darter		U	U
23.	Goldstripe Darter		+Cip	
24.	Bandfin Darter		C	C
25.	Dusky Darter			O1



Above: Photo B-09. Middle Tilghman Branch, upstream from water quality sample station #3.
Below: Photo B-10. Mulberry Spring Branch, tiny tributory to Tilghman Branch.





Above: Photo B-11. Lower Tilghman Branch near Owl Creek.

Below: Photo B-12. Lower Tilghman Branch entering Owl Creek.



SHILOH BRANCH

Shiloh Branch is a small stream generally less than 2.1 m (7 ft) wide and 0.9 m (3 ft) deep in the widest and deepest places. Riffles between pools are usually no more than 1.2 m (4 ft) wide and 8 cm (3 in) deep. It flows through a forest for its entire length inside the park. It flows through a pasture about 0.4 km (0.25 mi) outside the park before entering Owl Creek. Its waters are generally devoid of living aquatic vegetation, but it is littered with occasional brush and logs fallen from the forest canopy above. In the fall and early winter, its bottom is littered with tree leaves which are generally devoured by stream invertebrates by spring. It originates from springs along and below the 131 m (430 ft) to 139 m (455 ft) contours and flows northwest approximately 2.4 km (1.5 mi) to Owl Creek [the last 0.8 km (0.5 mi) of the branch is on private property outside the park boundary and has not been sampled]. Two major well known springs (Rea Spring and Shiloh Spring) flow into Shiloh Branch at the 110 m (360 ft) contour. Its clear water flows gently through pools and riffles over sandy gravel substrate. Although Shiloh Branch usually floods annually, the backwaters from the Tennessee River and Owl Creek do not overflow Shiloh Branch within the park. Shiloh Branch leaves the park at the 122 m (400 ft) contour and flows another 0.8 km (0.5 mi) before entering Owl Creek.

Shiloh Branch was sectioned as follows:

Upper Section
From its origin to Rea Spring.

Middle Section
From Rea Spring to the Hwy 22 bridge.

Lower Section
From the Hwy 22 bridge to the west park boundary 0.8 km (0.5 mi) from Owl Creek.

Shiloh Branch also has a 1.2 km (0.75 mi) long South Prong and a 0.6 km (0.4 mi) long West Prong. The West Branch has not been sampled.

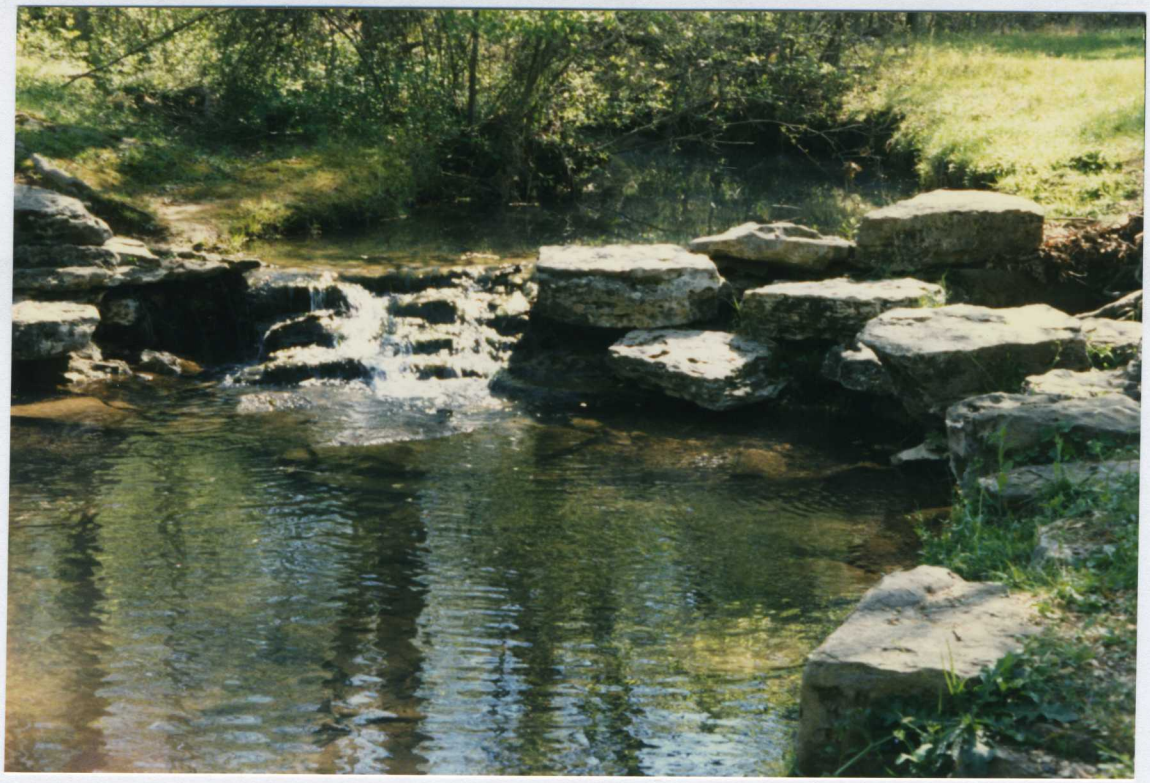
To this date the following fish species have been identified in SHILOH BRANCH:

		Branch Section/Relative Abundance			
	SPECIES	UPPER	MIDDLE	LOWER	SOUTH PRONG
1.	Least Brook Lamprey		C		
2.	Largescale Stoneroller		U	U	
3.	Rosyside Dace		A	C	
4.	Striped Shiner		A	A	
5.	Rosefin Shiner			Uip	
6.	Southern Redbelly Dace	A	C		C
7.	Creek Chub	A	A	A	A
8.	Creek Chubsucker		C	C	
9.	Northern Hogsucker			O1	
10.	Golden Redhorse			O1	
11.	Brown Madtom		C		
12.	Pirate Perch		Uip	O1	
13.	Blackspotted Topminnow		C	C	
14.	Western Mosquitofish			Aip	
15.	Green Sunfish	O1	O1	O1	O2
16	Bluegill			U	
17.	Longear Sunfish		C	C	C
18.	Stripetail Darter		U	U	
19.	Goldstripe Darter				O1
20.	Bandfin Darter		C	C	
21.	Dusky Darter		O1	O1	



Above: Photo A-05. Shiloh Branch, upstream from water quality sample station #4.
Below: Photo F-22. Rea Spring. The limestone around the spring was hauled. It is not an outcropping.





Above: Photo F-23. The upstream end of "baptismal pool" on Shiloh Branch. The limestone for the dam was hauled.
Below: Photo G-12. Shiloh Branch at "pirate perch pool" during floodstage.



PICNIC BRANCH

Picnic Branch is a very small stream generally less than 1.5 m (5 ft) wide and 0.6 m (2 ft) deep in the widest and deepest places. Riffles between pools are generally no wider than 0.9 m (3 ft) and no deeper than 5 cm (2 in). It flows through a forest for its entire length to the park boundary. Its waters are generally devoid of living aquatic vegetation, but it is littered with occasional brush and logs fallen from the forest canopy above. In the fall and early winter, its bottom is littered with tree leaves which are generally devoured by stream invertebrates by spring. It originates from seeps along the 128 m (420 ft) contour and flows west (at the edge of the park picnic area) only about 305 m (1,000 ft) before dropping over a 1.7 m (5.5 ft) waterfall at the west park boundary. It continues another 0.8 km (0.5 mi) through channelized ditches across a pasture on private property to Owl Creek. The waterfall is not reached by backwater flooding since it is just below the 122 m (400 ft) contour. Its clear water flows gently through pools and riffles over sandy gravel substrate until it drops over the barrier waterfalls. The stream below the falls outside the park has only been casually sampled.

Picnic Branch is so short it has not been sectioned. The entire 305 m (1,000 ft) long stream within the park is headwaters habitat.

To this date the following fish species have been identified in PICNIC BRANCH:

	SPECIES	RELATIVE ABUNDANCE
1.	Southern Redbelly Dace	A
2.	Creek Chub	C
3	Goldstripe Darter	O1



Above: Photo F-25. Picnic Branch between the park picnic area and the waterfall.
Below: Photo F-24. Picnic Branch Falls, a 1.7 m (5.5 ft) waterfall at the west park boundary.



OWL CREEK BEAVER PONDS

Owl Creek Beaver Ponds are found near the northwestern park boundary in the Owl Creek Bottoms. The largest stream feeding the ponds is **Sandy Branch** which originates in the bottoms below the 116 m (380 ft) contour and flows north about 1.2 km (0.75 mi) through a partially dead hardwood forest to Owl Creek at about the 111 m (365 ft) contour. The largest beaver dam in the park is on Sandy Branch. It creates the largest beaver pond in the park. The pond is about 30 m (100 ft) wide, 91 m (300 ft) long, and up to 1.5 m (5 ft) or 1.8 m (6 ft) deep. It contains two beaver houses (Beaver houses are unusual in the park; generally, beaver simply den in a mud bank). The mud bank stream cut is up to about 1.8 m (6 ft) deep. The flowing stream below the pond generally does not exceed 2.4 m (8 ft) wide and 0.9 m (3 ft) deep with most riffles no more than 1.5 m (5 ft) wide and 10 cm (4 in) deep. Pond substrate is silt or mud over sand, while stream substrate is sand. Water clarity ranges from muddy to stained. Although some aquatic vegetation exists around the edge of the beaver pond, none exists in the stream above or below the pond.

The next largest and distinctly different stream is **Cattail Branch** which originates from numerous clear springs and seeps at the base of higher ground along the 116 m (380 ft) contour and flows north about 0.8 (0.5 mi) to Sandy Branch near Owl Creek. It would be only a tiny spring branch tributary to Sandy Branch except for a series of small beaver dams that back the water up to flood several shallow hectares of dead hardwood forest and water tupelo in the upper section, and totally fill a 0.9 m (3 ft) to 1.2 m (4 ft) deep channelized ditch along the west edge of an abandoned bottomland field (abandoned because of beaver problems before the park obtained the property in 1991). The actual channelized ditch generally is 1.2 m (4 ft) to 1.5 m (5 ft) wide, but water covers a shallow area much wider. The clear to stained water is choked with aquatic vegetation. The only current that can be detected is immediately below beaver dams.

The smallest and somewhat different stream is **Middle Field Branch** which originates from a clear spring at the base of higher ground along the 116 m (380 ft) contour. It too would be only a tiny spring branch except for a channelized ditch similar to the one previously described which drains the spring through the middle of the abandoned field to the woods along the edge of Owl Creek where the ditch begins to meander through the forest before entering Owl Creek. Although the water begins clear, it quickly becomes stained to muddy most of its 0.8 km (0.5 mi) sluggish flow. The only current that can be detected is immediately below beaver dams. The branch substrate is sandy clay covered with silt. Aquatic vegetation is present in certain locations along this branch.

The Owl Creek Beaver Ponds are totally different habitats from main park streams. They are somewhat similar to Riverbottoms Branch and the lower section of Mounds Branch (although they have backwater from beaver dams, the Riverbottoms ponds are devoid of vegetation). Both Cattail Branch and Middle Field Branch have incredible masses of invertebrates living in the aquatic vegetation. They are as follows: Isopods, fairy shrimp, water beetles and bugs, mayfly nymphs, stonefly nymphs, caddisfly larvae, scuds, damselfly nymphs, dragonfly nymphs, snails, small clams, and crayfish. During the summer, mosquitos and deerflies swarm anyone venturing into this area, and cottonmouth watermoccasins lurk everywhere.

Eight species of fish were identified in this area that are not likely to be found anywhere else in the park:

1. Longnose Gar
2. Ribbon Shiner
3. Pugnose Minnow
4. Lake Chubsucker
5. Yellow Bullhead
6. Flier
7. Dollar Sunfish
8. Cypress Darter

The Owl Creek Beaver Ponds are usually inundated by Owl Creek flood waters backed up by the flooding Tennessee River at least once annually during the winter or early spring to between the 116 m (380 ft) and 119 m (390 ft) contour.

To this date the following fish species have been identified in or between the OWL CREEK BEAVER PONDS:

		Branch/Relative Abundance		
	SPECIES	SANDY	CATTAIL	MIDDLEFIELD
1.	Longnose Gar		O2	
2.	Threadfin Shad		O1	
3.	Largescale Stoneroller		O1	
4.	Bluntface Shiner	O2		
5.	Spotfin Shiner	Aip	Aip	
6.	Striped Shiner	A	A	A
7.	Ribbon Shiner	A	Aip	
8.	Golden Shiner	C	C	C
9.	Pugnose Minnow		Cip	
10.	Bluntnose Minnow	U		
11	Lake Chubsucker		Uip	
12.	Spotted Sucker		O1	
13.	Golden Redhorse	O1		
14.	Yellow Bullhead		Uip	
15.	Grass Pickerel		Uip	O1
16.	Pirate Perch		C	C
17.	Blackspotted Topminnow	C	C	C
18.	Western Mosquitofish	Aip	A	A
19.	Brook Silverside	Uip	Uip	
20.	Flier		Uip	
21.	Warmouth	U	C	U
22.	Bluegill	A	A	A
23.	Dollar Sunfish	O2	Cip	
24.	Longear Sunfish		C	U
25.	Redear Sunfish		C	
26.	Largemouth Bass	O1	U	
27.	White Crappie		C	
28.	Cypress Darter	Uip	Uip	Uip
29.	Bandfin Darter	U		



Above: Photo G-01. Owl Creek Beaver Ponds (Middle Field Branch).
Below: Photo G-10. Owl Creek Beaver Ponds (Sandy Branch, below the largest beaver pond within the park).





Above: Photo G-03. Owl Creek Beaver Ponds (Cattail Branch).
Below: Photo G-02. Owl Creek Beaver Ponds (Cattail Branch, the only location within the park where the lake chubsucker and flier were found. Dollar sunfish were also found here).





Above: Photo G-09. Owl Creek Beaver Ponds (Sandy Branch). The largest beaver dam and pond within the park.
Below: Photo G-06. Owl Creek Beaver Ponds (Sandy Branch). The largest beaver pond within the park.



DILL BRANCH

Dill Branch is a small stream generally less than 1.8 m (6 ft) wide and 0.9 m (3 ft) deep in the widest and deepest places. Riffles are usually no more than 0.9 m (3 ft) wide and 5 cm (2 in) deep. It flows through a forest for its entire length. Its waters are generally devoid of living aquatic vegetation, but it is littered with occasional brush and logs fallen from the forest canopy above. In the fall and early winter, its bottom is littered with tree leaves which are generally devoured by stream invertebrates by spring. It originates from springs along and below the 131 m (430 ft) contour and flows east about 1.2 km (0.75 mi) to the Tennessee River at about the 110 m (362 ft) level (normal pool). Its clear water flows gently through pools and riffles over sandy gravel until it reaches the river floodplain where the substrate becomes more sand than gravel with some silt before it exits through a walk-through concrete tunnel under the Brown's Landing Road Causeway. It then falls and cascades over rocks several feet to the river. The Tennessee River usually floods at least once annually during the winter or early spring to between the 116 m (380 ft) and 119 m (390 ft) contour.

Dill Branch was sectioned as follows:

Headwaters Section
North Prong
West Prong

Upper Section
From the headwaters junction to about 91 m (300 ft) downstream.

Middle Section
From the above 91 m (300 ft) downstream to the floodplain at the 119 m (390 ft) contour.

Lower Section
From the 119 m (390 ft) contour to the Tennessee River.

To this date the following fish species have been identified in DILL BRANCH:

		Branch Section/Relative Abundance			
	SPECIES	HEADWATERS	UPPER	MIDDLE	LOWER
1.	Least Brook Lamprey		C		
2.	Spotfin Shiner				U*
3.	Striped Shiner		A	A	A
4.	Golden Shiner				U*
5.	Southern Redbelly Dace	A	C		
6.	Bluntnose Minnow				U
7.	Creek Chub	A	A	A	A
8.	Creek Chubsucker		C	C	C
9.	Brown Madtom		U	U	U
10.	Blackspotted Topminnow			C	C
11.	Western Mosquitofish			Aip	
12.	Bluegill		U	U	U
13.	Longear Sunfish		U	C	U
14.	Bandfin Darter		U	U	



Above: Photo A-08. Dill Branch headwaters, right fork. Southern redbelly dace and creek chub habitat.
Below: Photo P-07. Upper Dill Branch (Cottonmouth Pool), near water quality sample site #2.





Photo J-05. Lower Dill Branch causeway tunnel, where Dill Branch empties into the Tennessee River.

MOUNDS BRANCH

Mounds Branch is a small stream generally less than 1.8 m (6 ft) wide and 0.8 m (2.5 ft) deep in the widest and deepest places, except in the lower section where a small beaver dam has it backed up to 3 m (10 ft) wide and 1.2 m (4 ft) deep. The extreme lower section runs only 46 m (150.ft) from the beaver dam to the river at low pool. The stream flows through a forest for its entire length. Its waters are generally devoid of living aquatic vegetation, but it is littered with occasional brush and logs fallen from the forest canopy above. In the fall and early winter, its bottom is littered with tree leaves which are generally devoured by stream invertebrates by spring. The branch originates from springs along and below the 131 m (430 ft) contour and flows east a little less than 1.2 km (0.75 mi) to the Tennessee River at about the 110 m (362 ft) level (normal pool). Its clear water flows gently through pools and riffles over sandy gravel until it reaches the river floodplain where the substrate becomes sand and gravel, and the water becomes stained instead of clear. The lower section substrate is sand and gravel, and/or mud and silt. The extreme lower section below the beaver dam has a hard clay substrate with faster running stained water about 0.9 m (3 ft) wide and perhaps 20 cm (8 in) deep. The Tennessee River usually floods at least once annually during the winter or early spring to between the 116 m (380 ft) and 119 m (390 ft) contour completely covering the beaver dam by 6 m (20 ft) or more of water.

Mounds Branch was sectioned as follows:

Upper Section (headwaters)
: From its origin to the floodplain at the 119 m (390 ft) contour.

Middle Section
: From the 119 m (390 ft) contour to the junction of Rogers Branch where its size increases by 0.5.

Lower Section
: From the junction of Rogers Branch to the beaver dam and junction of River Bottoms Branch.

Extreme Lower Section
: From the beaver dam (beaver dam #1) to the Tennessee River.

To this date the following fish species have been identified in MOUNDS BRANCH:

		Branch Section/Relative Abundance			
	SPECIES	UPPER	MIDDLE	LOWER	EXTREME LOWER
1.	Threadfin Shad			A	
2.	Spotfin Shiner		A	A	U
3.	Striped Shiner		A	A	
4.	Golden Shiner			U	
5.	Emerald Shiner			C	
6.	Mimic Shiner			O3	
7.	Southern Redbelly Dace	A			
8.	Bluntnose Minnow		A	C	
9.	Bullhead Minnow				O1
10.	Creek Chub	A	A	C	
11.	Brown Madtom			O1	
12.	Blackspotted Topminnow		C	C	
13.	Western Mosquitofish		C	C	
14.	Brook Silverside			C	
15.	Warmouth			U	
16.	Bluegill		C	C	U
17.	Longear Sunfish		C	C	
18.	Largemouth Bass			O2	
19.	White Crappie			O1	
20.	Dusky Darter		O1		



Above: Photo D-19. Beaver dam #1 across lower Mounds Branch at the jct. of Riverbottoms Branch near the Tennessee River.
Below: Photo H-03. Extreme lower Mounds Branch (foreground) where it empties into the Tennessee River at low pool.



RIVERBOTTOMS BRANCH

Riverbottoms Branch is a small stream backed up by two small beaver dams (Beaver dam #1 is at the junction of Mounds Branch and Riverbottoms Branch and backs up both streams. Beaver dam #2 is on Riverbottoms Branch). Because of the beaver dams, the branch is up to 4.6 m (15 ft) wide and 1.2 m (4 ft) deep in the widest and deepest places. It is a tributary to Mounds Branch, but its habitat is significantly different, except for the lower half of the lower section of Mounds Branch. Its substrate is clay mud and silt. Riverbottoms Branch muddy water flows through a bottomlands forest from springs at or below the 113 m (370 ft) contour north from the trickle of a tiny spring branch. Inhabitable water extends only about 152 m (500 ft) upstream from beaver dam #1 at the junction of Mounds Branch. The Tennessee River only has to rise about 2.1 m (7 ft) above its lowest level to "normal pool" to totally inundate the beaver dams and provide river fish access to the branch. This happens nearly daily during the summer. The river floods to as much as 6 m (20 ft) to 9 m (30 ft) deep over the branch usually at least once per year.

Riverbottoms Branch is actually the lower portion of Johnston Branch. However, Johnston Branch flows for only 0.8 km (0.5 mi) before it disappears into the dry creek channel. It reappears about 0.4 km (0.25 mi) to 0.8 km (0.5 mi) farther downstream. Their habitats are totally different with predictable results.

Riverbottoms Branch has not been sectioned because its habitat is homogenous. The entire 152 m (500 ft) long branch is beaver pond habitat greatly influenced by the Tennessee River.

To this date the following fish species have been identified in RIVERBOTTOMS BRANCH:

	SPECIES	RELATIVE ABUNDANCE
1.	Gizzard Shad	U
2.	Threadfin Shad	A
3.	Spotfin Shiner	A
4.	Striped Shiner	A
5.	Golden Shiner	C
6.	Emerald Shiner	C
7.	Spotted Sucker	U
8.	Pirate Perch	C
9.	Blackspotted Topminnow	C
10.	Western Mosquitofish	C
11.	Brook Silverside	C
12.	Warmouth	U
13.	Bluegill	C
14.	Redear Sunfish	U
15.	Largemouth Bass	U
16.	White Crappie	U
17.	Yellow Perch	O1
18.	Sauger	O1
19.	Freshwater Drum	O2



Above: Photo H-01. Beaver dam #2 across Riverbottoms Branch.
Below: Photo H-02. Closeup of beaver dam #2 showing beaver cuttings over den entrance at center of photo.



HAGY BRANCH

Hagy Branch is a very small stream generally less than 1.5 m (5 ft) wide and 0.3 m (1 ft) deep in the widest and deepest places. It flows through a forest for its entire length to the park boundary. Its waters are generally devoid of living aquatic vegetation, but it is littered with occasional brush and logs fallen from the forest canopy above. In the fall and early winter, its bottom is littered with tree leaves which are generally devoured by stream invertebrates by spring. It originates from seeps along the 128 m (420 ft) contour and flows east only 122 m (400 ft) to the park boundary. It continues another 0.5 km (0.3 mi) through a channelized ditch to the Tennessee River at the 110 m (362 ft) level (normal pool). Its clear water flows gently through shallow pools and trickles over very shallow riffles with sandy gravel substrate within the park. The stream outside the park was not sampled. It appears to be polluted.

Hagy Branch has not been sectioned. The entire 122 m (400 ft) long stream inside the park is homogenous headwaters habitat.

To this date the following fish species have been identified in HAGY BRANCH:

	SPECIES	RELATIVE ABUNDANCE
1.	Southern Redbelly Dace	A
2.	Creek Chub	A



Photo B-08. Hagy Branch. A tiny headwaters stream on the north park boundary that supports only southern redbelly dace and creek chubs.

ROGERS BRANCH

Rogers Branch is a very small stream generally less than 1.5 m (5 ft) wide and 0.6 m (2 ft) deep in the widest and deepest places. It is a tributary to Mounds Branch, but because of its smaller size is listed separately. It flows through a forest for its entire length. Its waters are generally devoid of living aquatic vegetation, but it is littered with occasional brush and logs fallen from the forest canopy above. In the fall and early winter, its bottom is littered with tree leaves which are generally devoured by stream invertebrates by spring. It originates from springs along and below the 131 m (430 ft) contour and flows east about 0.8 km (0.5 mi) to Mounds Branch at the 113 m (370 ft) level. Its clear water flows gently through shallow pools and trickles over very shallow riffles. The substrate is sandy gravel in the upper section, changing to sand and gravel in the river floodplain. The Tennessee River usually floods it at least once annually during the winter or early spring to the 116 m (380 ft) or 119 m (390 ft) contour.

Rogers Branch was sectioned as follows:

Upper Section
: From its origin to the floodplain at the 119 m (390 ft) contour.

Lower Section
: From the 119 m (390 ft) contour to the junction of Mounds Branch at the 113 m (370 ft) contour.

To this date the following fish species have been identified in ROGERS BRANCH:

		Branch Section/Relative Abundance	
	SPECIES	UPPER	LOWER
1.	Striped Shiner		A
2.	Southern Redbelly Dace	A	
3.	Bluntnose Minnow		C
4.	Creek Chub	A	A
5.	Blackspotted Topminnow		C
6.	Western Mosquitofish		U
7.	Bluegill		C

JOHNSTON BRANCH

Johnston Branch is a very small stream generally less than 1.5 m (5 ft) wide and 0.5 m (1.5 ft) deep in the widest and deepest places. It flows through a forest for its entire length. Its waters are generally devoid of living aquatic vegetation, but it is littered with occasional brush and logs fallen from the forest canopy above. In the fall and early winter, its bottom is littered with tree leaves which are generally devoured by stream invertebrates by spring. It originates from springs and seeps along and below the 134 m (440 ft) contour and flows east about 305 m (1,000 ft) to the park boundary. It continues another 457 m (1,500 ft) outside the park then disappears into a dry creek channel at the 116 m (380 ft) level. The dry creek channel continues another 0.4 km (0.25 mi) to 0.8 km (0.5 mi) to Riverbottoms Branch where the water reappears. Johnston Branch's clear water flows gently through pools and riffles over a sandy gravel substrate until it disappears outside the park.

Johnston Branch has not been sectioned. Its entire length is homogenous headwaters habitat.

To this date the following fish species have been identified in JOHNSTON BRANCH:

	SPECIES	RELATIVE ABUNDANCE
1.	Southern Redbelly Dace	A
2.	Creek Chub	A

QUARRY BRANCH

Quarry Branch is a very small stream generally less than 1.5 m (5 ft) wide and 0.5 m (1.5 ft) deep in the widest and deepest places. It flows through a forest for its entire length. Its waters are generally devoid of living aquatic vegetation, but it is littered with occasional brush and logs fallen from the forest canopy above. In the fall and early winter, its bottom is littered with tree leaves which are generally devoured by stream invertebrates by spring. It originates from seeps along the 137 m (450 ft) contour and flows southeast only about 305 m (1,000 ft) to the park boundary. It continues another 305 m (1,000 ft) to Spain Branch which is a tributary to Lick Creek which empties into the Tennessee River. Its clear water flows gently through shallow pools and trickles over very shallow riffles with a sandy gravel substrate within the park. The streams outside the park were not sampled, but they would have a variety of habitats.

Quarry Branch was not sectioned. The entire 305 m (1,000 ft) of stream within the park is headwaters habitat.

This was the only branch within the park where the blacknose dace was found.

To this date the following fish species have been identified in QUARRY BRANCH:

	SPECIES	RELATIVE ABUNDANCE
1.	Southern Redbelly Dace	A
2.	Blacknose Dace	Uip
3.	Creek Chub	A

OWL CREEK

Owl Creek is a medium size creek 6 m (20 ft) to 9 m (30 ft) wide and up to 1.5 m (5 ft) deep in pools. It flows through a forest or forest edge for its entire length along the park boundary. Its waters are generally devoid of living aquatic vegetation, but it is littered with occasional brush and logs fallen from the forest canopy above. Its origin is outside the park and the creek is channelized for several kilometers before it enters the park. It forms a meandering northwest boundary of the park for about 3.2 km (2 mi) at about the 111 m (365 ft) contour. It flows into Snake Creek which empties into the Tennessee River at the 110 m (362 ft) level (normal pool). Its stained water flows over a sand substrate. Owl Creek is flooded at least once annually to between the 116 m (380 ft) and 119 m (390 ft) contour from Tennessee River backwater. It is somewhat polluted from agricultural and rural development runoff.

Beaver dam the main stream, but the Tennessee Valley Authority and local farmers attempt to keep it clear.

Owl Creek has not been sectioned, and it has not been adequately sampled.

To this date the following fish species have been identified in OWL CREEK:

	SPECIES	RELATIVE ABUNDANCE
1.	Longnose Gar	U
2.	Bluntface Shiner	U
3.	Spotfin Shiner	A
4.	Striped Shiner	A
5.	Ribbon Shiner	A
6.	Emerald Shiner	A
7.	Bluntnose Minnow	U
8.	Golden Redhorse	U
9.	Blackspotted Topminnow	C
10.	Western Mosquitofish	Cip
11.	Brook Silverside	C
12.	Green Sunfish	O1
13.	Bluegill	C
14.	Dollar Sunfish	O2ip
15.	Longear Sunfish	C
16.	Largemouth Bass	U
17.	Stripetail Darter	O1
18.	Bandfin Darter	U

(The steelcolor shiner was believed to have been collected, but positive identification from the small specimens was only tentative).



Above: Photo A-11. Owl Creek, upstream from the Hamburg-Savannah Road iron bridge.
Below: Photo B-13. Owl Creek, near the junction of lower Tilghman Branch about midway along the park boundary.



THE TENNESSEE RIVER

The Tennessee River was not a part of this study, but it is included here because its quality and character directly affects the parks bottomland resources.

The Tennessee River begins at the junction of the French Broad and the Pigeon Rivers at Knoxville in East Tennessee over 644 km (400 mi) by river upstream from Shiloh. It flows southwest through Chattanooga and on to Guntersville in North Alabama. There it changes direction and flows west northwest through northern Alabama's Decatur and Florence. At about the Tennessee state line, the river changes direction again and flows almost straight north past Shiloh in West Tennessee to the Kentucky state line. There, it turns northwest through western Kentucky to Paducah where it empties into the Ohio River. The Ohio River then flows west to the Mississippi River at Cairo, Illinois. Pittsburg Landing at Shiloh National Military Park is 319 km (198 mi) by river upstream from the Ohio River.

The natural character of the Tennessee River has been completely altered by a series of 9 "flow-through" dams constructed by the Tennessee Valley Authority from the late 1930's to the 1960's (Etnier and Starnes, 1993). Dams that directly affect the Tennessee River at Shiloh are Pickwick Dam which was completed in 1938 [about 14 km (9 mi) upstream] and Kentucky Dam which was completed in 1944 [about 283 km (176 mi) downstream]. Although Kentucky Dam backs up the Tennessee River at Shiloh to a depth of 11 m (35 ft) to 15 m (50 ft) at normal pool [110 m (362 ft) above sea level], the "flow-through" character dams allow the upper end of Kentucky Lake to still have river-like qualities as it flows past the park.

Although there are no longer any of the expansive rocky or gravel shoal areas which once abounded in the Tennessee River, there are also no longer the great spring floods along the river's course for which it once was notorious (Etnier and Starnes, 1993). Even with dams controlling the flow, during the late winter and spring, backwater may cover the bottomlands within the park to a depth of about 11 m (36 ft). With dam control, the Tennessee River at Shiloh may still fluctuate as much as 13 m (44 ft).

The following recorded river levels are only approximate. They are based on information obtained from Pickwick Dam (telephone number 925-4342) and the author's personal observations and estimations. The river levels cited below are at the dam. At Shiloh [14.5 km (9 mi) below the dam] the water level is approximately 0.76m (2.5 ft) lower.

ABOVE SEA LEVEL	EFFECTS
108.2 m (355 ft)	Lowest river level
109.1 m (358 ft)	River breaches beaver dam #1 on Mounds Branch
110.3 m (362 ft)	Normal pool (according to the map)
111.3 m (365 ft)	River enters tunnel at mouth of Dill Branch
112.8 m (370 ft)	Pickwick Dam generating full load (all 6 generators)
117.3 m (385 ft)	River crests over Brown's Landing Road at Dill Branch
121.6 m (399 ft)	Highest recorded flood after the river was controlled by dams (March 17, 1973)

CONCLUSIONS AND RECOMMENDATIONS

At the time of this writing, there appear to be no endemic, rare, or endangered fish species within the park. However, it can be concluded the streams originating within Shiloh National Military Park are biologically diverse and ecologically intact. Intact ecosystems themselves are rare and endangered.

The park streams are relatively unpolluted and contain abundant diverse life. Therefore, they have remained relatively unchanged from human activity. Because they have been protected for over 100 years, it would seem the park's natural aquatic environment may be truly unique in today's world. It would appear that Shiloh contains some of the last biologically diverse intact small stream ecosystems in West Tennessee. That makes these streams very important and desirable for scientific study and carefully planned continued preservation.

It is important that water quality monitoring and fish monitoring be continued on a regularly scheduled basis, so that any man-caused influences can be discovered and corrected before the intact ecosystems are degraded or damaged beyond possible recovery. It must be recognized that park streams and beaver ponds are dynamic ecosystems, so one must expect some normal population and species composition changes on a short term basis. Monitoring must consider fluctuating natural environmental conditions and long term ecological equilibrium.

Shiloh National Military Park was set aside and preserved for its nationally significant historic resources and will continue to be managed for its historic significance. However, the park's unique natural aquatic resources should not be compromised for the sake of history. After all, this preserved natural environment is a part of that history.

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