



## Fish

## Resource Brief

### Importance

Fish and aquatic communities are excellent indicators of watershed health and water quality. They are sensitive to many factors including pollution, stream physical habitat, and diseases and invasive organisms.

Fish are also a vital part of ecosystems, consuming plankton, crustaceans, insects, and other organisms and in turn providing food for birds of prey, river otters, raccoons, and other creatures.

### Monitoring

Fish monitoring is part of a broader effort by the National Capital Region Network (NCRN) Inventory & Monitoring (I&M) program to assess the condition of streams and watersheds.

Long-term fish monitoring at thirty-seven park sites throughout the NCRN began in 2008 and followed a six-year rotation. Each summer 5-8 sites were visited. At Harpers Ferry National Historical Park (HAFE) monitoring is done in Flowing Springs Run. Fish monitoring is co-located with macroinvertebrate monitoring and stream physical habitat analysis.

The objectives of this combined monitoring are to:

- determine current conditions and track long-term trends in stream condition,
- determine trends in species composition and functional groups of fish and benthic invertebrates,
- detect invasions of non-native fish

Streams monitored are small (first- to third-order) and non-tidal. At each site, monitoring teams electrofish two passes along a designated 75-meter stream segment. Electrofishing uses a mild electric current to stun fish to the water surface where they are netted. Captured fish are counted, identified to species, weighed in aggregate, and released. Any gamefish (trout, bass, walleye, northern pike, chain pickerel, and striped bass) are measured for total length. Symptoms of illness or anomalies in fish are noted and described.

### FIBI Scores

The species and number of fish present in a stream segment is used to calculate a Fish Index of Biotic Integrity (FIBI)



The greenside darter (*Etheostoma blennioides*), a benthic species, was found during monitoring in Flowing Springs Run in 2013 and 2004.

Photo: <http://cnre.vt.edu/efish>, Bob Jenkins & Noel Burkhead

score for each stream. Scoring takes into account factors such as the abundance of fish that are disturbance tolerant, dominant, insectivorous, omnivorous, or benthic (occupying the lowest level of a body of water). Scoring also takes into account a HAFE's location in the Warmwater highlands region. FIBI scores range from 1 to 5, with four possible ratings: very poor (1-1.99), poor (2-2.99), fair (3-3.99) and good (4-4.99).

### Results

Flowing Springs Run was monitored in 2013. It was also sampled in two spots during 2004 while monitoring protocols were under development. All resulting FIBI scores indicate relatively poor stream conditions for fish.

No rare, threatened, or endangered fish species were found. While the invasive rusty crayfish (*Orconectes rusticus*) and red swamp crayfish (*Procambarus clarkii*) were not detected, the virile crayfish (*Orconectes virilis*) was found in 2013.

### Flowing Springs Run (SHEN-110-N-2013)

2013 FIBI = 2.67 (poor)

Species found:

- 4 bluntnose minnow (*Pimephales notatus*)
- 2 greenside darter (*Etheostoma blennioides*)
- 49 longnose dace (*Rhinichthys cataractae*)
- 4 river chub (*Nocomis micropogon*)
- 1 yellow bullhead (*Ameiurus natalis*)

Game fish: none

Invasive crayfish: virile crayfish (*Orconectes virilis*)



## Flowing Springs Run (SHEN-110-N-2004)

(Same site monitored in 2013)

2004 FIBI = 1.33 (very poor)

### Species found:

- 93 bluntnose minnow (*Pimephales notatus*)
- 2 mosquitofish (*Gambusia affinis*)
- 1 pumpkinseed (*Lepomis gibbosus*)
- 1 river chub (*Nocomis micropogon*)
- 27 spotfin shiner (*Cyprinella spiloptera*)

Game fish: none

Invasive crayfish: none

## Flowing Springs Run (HARP-103-N-2004)

(Site monitored only in 2004, located upstream from SHEN-110-N-2004.)

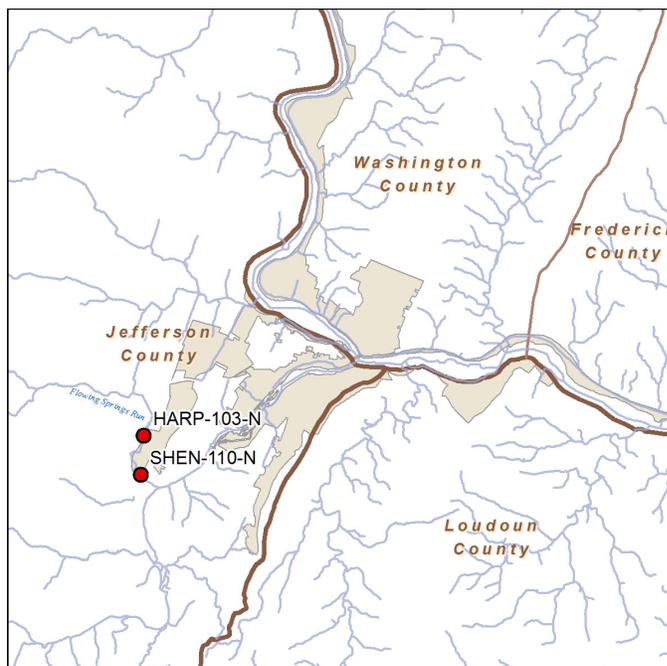
2004 FIBI = 3 (fair)

### Species found:

- 1 American eel (*Anguilla rostrata*)
- 11 bluntnose minnow (*Pimephales notatus*)
- 8 green sunfish (*Lepomis cyanellus*)
- 1 greenside darter (*Etheostoma blennioides*)
- 1 mosquitofish (*Gambusia affinis*)
- 2 pumpkinseed (*Lepomis gibbosus*)
- 4 river chub (*Nocomis micropogon*)
- 3 spotfin shiner (*Cyprinella spiloptera*)
- 3 white sucker (*Catostomus commersonnii*)

Game fish: none

Invasive crayfish: none



Sites along Flowing Springs Run in Harpers Ferry monitored for fish, macroinvertebrates, and stream physical habitat condition.

## Discussion

Harpers Ferry occupies a region known for karst, a geology marked by groundwater that dissolves buried limestone layers. Karst processes not only create springs, sinkholes, and caves, but stream waters with lower levels of acidity and more dissolved material. These stream water characteristics influence the type of biota that are found in Flowing Springs Run and other Harpers Ferry streams.

In 2013, the monitoring site on Flowing Springs Run near its confluence with the Shennandoah, earned a poor FIBI score, an improvement from 2004's score of very poor. An

## References:

- National Capital Region Network Biological Stream Survey Fish Data (2008-2010). Versar, Inc. National Capital Region Inventory and Monitoring Program, Washington, DC. Generic Dataset-2175666. <https://irma.nps.gov/App/Reference/Profile/2175666>.
- NCRN Biological Stream Survey – Data Analysis Standard Operation Procedure #20, Version 1.1 (June 2009) [includes instructions for calculating FIBI scores]
- NCRN Monitoring Information for Water Quality, Physical Habitat, and Aquatic Macroinvertebrates. [http://science.nature.nps.gov/im/units/ncrn/monitor/stream\\_survey/index.cfm](http://science.nature.nps.gov/im/units/ncrn/monitor/stream_survey/index.cfm)
- Raesly, R.L, et al. 2004. Inventory and Biological Monitoring of Fishes in National Parks of the National Capital Region. <https://irma.nps.gov/App/Reference/Profile/580767>.



upstream site, monitored in 2004, scored as fair. At the upstream site, 9 total taxa were detected while downstream in 5 were detected on both visits.

The downstream site had poor abundance and generalist consumer levels in both visits. Levels of benthic and pollution-tolerant fish improved from poor to good between 2004 and 2013. The degree to which the most frequently found fish dominated sampling improved from poor to moderate. Slightly more insectivorous fish were detected during 2004 than in 2013 however, muting the improvement at the site.

The upstream site had good levels of benthic species and a more diverse population of fish. It also had moderate levels of pollution-tolerant species and insectivores.

While NCRN monitoring detected only 8 species, NCRN's earlier inventory of fish (2002-2004) yielded 29 species. The inventory had a larger group of sample sites on Elks Run, Piney Run, and Flowing Springs Run (but not the Potomac or Shenandoah Rivers).

The FIBI scores calculated during the inventory were all poor. However, the pearl dace (*Margariscus margarita*) was collected. It is the only known species with special conservation status detected in the park.

## Species List

This list includes all fish found at Harpers Ferry during both recent monitoring and earlier inventory efforts by NCRN I&M.

**M=found during monitoring; I=found during inventory.**

- MI American eel (*Anguilla rostrata*)
- I black crappie (*Pomoxis nigromaculatus*)
- I blacknose dace (*Rhinichthys atratulus*)
- I bluegill (*Lepomis macrochirus*)
- MI bluntnose minnow (*Pimephales notatus*)
- I brown bullhead (*Ameiurus nebulosus*)
- I central stoneroller (*Campostoma anomalum*)
- I common carp (*Cyprinus carpio*)
- I common shiner (*Luxilus cornutus*)
- I fallfish (*Semotilus corporalis*)
- I golden redhorse (*Moxostoma erythrurum*)
- I golden shiner (*Notemigonus crysoleucas*)
- MI greenside darter (*Etheostoma blennioides*)
- MI green sunfish (*Lepomis cyanellus*)
- I largemouth bass (*Micropterus salmoides*)
- I longear sunfish (*Lepomis megalotis*)
- MI longnose dace (*Rhinichthys cataractae*)
- I margined madtom (*Noturus insignis*)
- M mosquitofish (*Gambusia affinis*)
- I northern hogsucker (*Hypentelium nigricans*)
- MI pumpkinseed (*Lepomis gibbosus*)
- I rainbow darter (*Etheostoma caeruleum*)
- I redbreast sunfish (*Lepomis auritus*)
- MI river chub (*Nocomis micropogon*)
- I rock bass (*Ambloplites rupestris*)
- I rosyside dace (*Clinostomus funduloides*)
- I silverjaw minnow (*Notropis buccatus*)
- I smallmouth bass (*Micropterus dolomieu*)
- MI spotfin shiner (*Cyprinella spiloptera*)
- I tessellated darter (*Etheostoma olmstedii*)
- I white crappie (*Pomoxis annularis*)
- MI white sucker (*Catostomus commersonii*)
- MI yellow bullhead (*Ameiurus natalis*)