Monocacy National Battlefield

National Park Service
U.S. Department of the Interior

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.



Photo courtesy of: http://cnre.vt.edu/efish, Bob Jenkins & Noel Burkhead

Central stoneroller (*Campostoma anomalum*)

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.

The NCRN began long-term fish monitoring in 2008. Each summer 5-8 sites are visited, and following a set rotation, the NCRN will visit thirty-seven sites throughout the region every six years. At Monocacy monitoring is done on Gambrill Creek and Bush Creek. 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 game-fish (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) score for each stream. Scoring takes into account: the number of fish per stream area, the total biomass of fish captured, which species are most abundant, if most fish are disturbance tolerant or generalist feeders, the number of benthic fish (occupying the stream bottom), and the number of fish who need silt-free rocky stream beds to spawn. Scoring also takes into account a Monocacy's location in the Eastern Piedmont physiographic province. 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

Monocacy's streams were sampled in 2010 and also in 2004 while monitoring protocols were under development. No rare, threatened, or endangered fish species were found during monitoring.

Bush Creek (MONO-316-N)

2010 FIBI = 4.67 (good)

Species found:

317	blacknose dace (*Rhinichthys atratulus*)
1	bluegill (*Lepomis macrochirus*)
376	Blue Ridge sculpin (*Cottus caeruleomentum*)
100	bluntnose minnow (*Pimephales notatus*)
371	central stoneroller (*Campostoma anomalum*)
5	creek chub (*Semotilus atromaculatus*)
1	cutlips minnow (*Exoglossum maxillingua*)
19	fallfish (*Semotilus corporalis*)
24	fantail darter (*Etheostoma flabellare*)
82	greenside darter (*Etheostoma blennioides*)

6 green sunfish (*Lepomis cyanellus*)
3 longear sunfish (*Lepomis megalotis*)
211 longnose dace (*Rhinichthys cataractae*)
2 margined madtom (*Noturus insignis*)
5 northern hogsucker (*Hypentelium nigricans*)
45 Potomac sculpin (*Cottus girardi*)
92 rainbow darter (*Etheostoma caeruleum*)
26 redbreast sunfish (*Lepomis auritus*)
3 rock bass (*Ambloplites rupestris*)
20 rosyface shiner (*Notropis rubellus*)
6 rosyside dace (*Clinostomus funduloides*)
6 satinfin shiner (*Cyprinella analostana*)
9 smallmouth bass (*Micropterus dolomieu*)
50 swallowtail shiner (*Notropis procne*)
26 tessellated darter (*Etheostoma olmstedi*)
126 white sucker (*Catostomus commersonnii*)
16 yellow bullhead (*Ameiurus natalis*)

Game fish: 9 smallmouth bass, ranging from 83 to 268 mm. Average length = 153 mm.

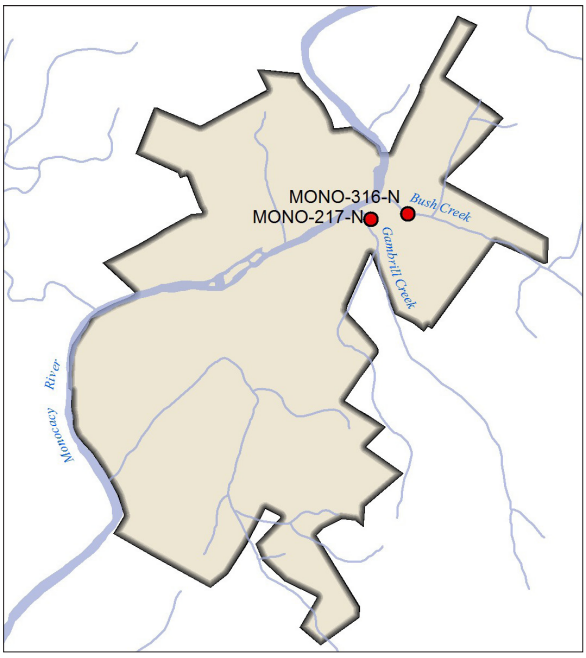
Invasives: Virile crayfish (*Orconectes virilis*) and Asiatic clam (*Corbicula fluminea*)

Bush Creek (MONO-316-N)

2004 FIBI = 3.67 (fair)

Species found:

107 blacknose dace (*Rhinichthys atratulus*)
6 bluegill (*Lepomis macrochirus*)
107 Blue Ridge sculpin (*Cottus caeruleomentum*)
14 bluntnose minnow (*Pimephales notatus*)
120 central stoneroller (*Campostoma anomalum*)
1 creek chub (*Semotilus atromaculatus*)
6 fantail darter (*Etheostoma flabellare*)
13 greenside darter (*Etheostoma blennioides*)
11 green sunfish (*Lepomis cyanellus*)
1 largemouth bass (*Micropterus salmoides*)
1 longear sunfish (*Lepomis megalotis*)
91 longnose dace (*Rhinichthys cataractae*)
96 Potomac sculpin (*Cottus girardi*)
2 rainbow darter (*Etheostoma caeruleum*)
29 redbreast sunfish (*Lepomis auritus*)
33 spotfin shiner (*Cyprinella spiloptera*)
8 tessellated darter (*Etheostoma olmstedi*)
30 white sucker (*Catostomus commersonnii*)



Monocacy sites monitored for fish, macroinvertebrates, and stream physical habitat.

11 yellow bullhead (*Ameiurus natalis*)

Game fish: 1 largemouth bass, 51 mm.

Invasives: none

Gambrill Creek (MONO-217-N)

2010 FIBI = 2.67 (poor)

Species found:

300 blacknose dace (*Rhinichthys atratulus*)
33 Blue Ridge sculpin (*Cottus caeruleomentum*)
4 creek chub (*Semotilus atromaculatus*)
2 eastern mosquitofish (*Gambusia holbrooki*)
16 fantail darter (*Etheostoma flabellare*)
2 green sunfish (*Lepomis cyanellus*)
14 white sucker (*Catostomus commersonnii*)

Game fish: none

Invasives: Virile crayfish (*Orconectes virilis*)

Gambrill Creek (MONO-217-N)

2004 FIBI = 3.33 (fair)

Species found:

245 blacknose dace (*Rhinichthys atratulus*)
27 bluegill (*Lepomis macrochirus*)

69	Blue Ridge sculpin (*Cottus caeruleomentum*)
19	bluntnose minnow (*Pimephales notatus*)
2	central stoneroller (*Campostoma anomalum*)
7	creek chub (*Semotilus atromaculatus*)
20	fantail darter (*Etheostoma flabellare*)
17	green sunfish (*Lepomis cyanellus*)
12	largemouth bass (*Micropterus salmoides*)
14	longnose dace (*Rhinichthys cataractae*)
6	Potomac sculpin (*Cottus girardi*)
1	sunfish hybrid (*Lepomis spp.*)
34	white sucker (*Catostomus commersonnii*)
5	yellow bullhead (*Ameiurus natalis*)

Game fish: 12 largemouth bass, ranging from 33 to 49 mm. Average length = 41 mm.

Invasives: Virile crayfish (*Orconectes virilis*)

Discussion

The FIBI score for Bush Creek went from fair in 2004 to good in 2010. Many factors influencing the scores stayed the same in both years: numbers of stream bottom (benthic) dwelling fish like darters, sculpins, madtoms, and lampreys stayed high; numbers of fish that need silt-free rocky stream bottoms to spawn (including trout and sculpins) stayed moderate ; and numbers of disturbance tolerant and generalist fish stayed low. However, numbers of fish per stream area rose from 2004 to 2010, the total biomass of fish sampled rose sharply, and the number of species found went from 19 to 27, leading to an improved score for Bush Creek.

Gambrill Creek went from a fair FIBI score in 2004 to a poor score in 2010. Many factors stayed the same between the two years. Both had high numbers of fish per stream area; a high number of stream bottom (benthic) dwelling fish like darters, sculpins, madtoms, and lampreys; low numbers of fish that need silt-free rocky stream bottoms to spawn (including trout and chub); and high numbers of disturbance tolerant fish. What changed was that numbers of generalist fish rose and total biomass of fish sank. Also, the number of species present declined from 14 to 7.

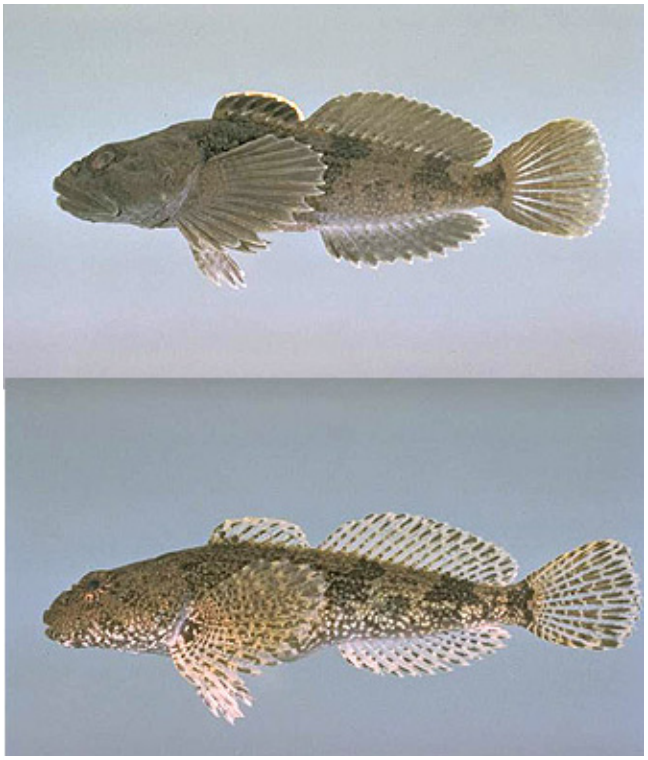


Photo courtesy of: http://cnre.vt.edu/efish, Bob Jenkins & Noel Burkhead

Potomac sculpin (*Cottus girardi*)

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/monitoring_products.cfm

Raesly, R.L, et al. 2004. Inventory and Biological Monitoring of Fishes in National Parks of the National Capital Region. TIC #: NCRO D-54. http://science.nature.nps.gov/im/units/ncrn/inventories_fish.cfm