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, 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 following a six-year rotation. Each summer 5-8 sites were visited. At George Washington Memorial Parkway (GWMP) monitoring was done on Mine Run, Minehaha Creek, Pimmit Run, and Turkey 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) score for each stream. Scoring takes into account factors such as the abundance of fish that are pollution-tolerant, insectivorous, omnivorous, or benthic (occupying the lowest level of a body of water). Scoring also takes into account GWMP's location in the Eastern Piedmont FIBI 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 (4-5).

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

Rosyside dace (*Clinostomus funduloides*) were found in Pimmit Run in 2006 and Turkey Run in 2012.

Results

Fish monitoring at GWMP looked at four streams where NCRN water monitoring also takes place. Minehaha Creek was sampled in 2009 while Mine Run, and Turkey Run were sampled in 2012. Pimmit Run was sampled in 2012 and 2006.

Mine Run (POTO-211-N-2012)

2012 FIBI = 3.67 (fair)

This FIBI score is based on a moderate abundance of fish, a high number of benthic species, and high overall biomass of fish. Monitoring also recorded a moderate number of pollution-tolerant species, generalist species, and species who need silt-free, rocky stream bottoms for spawning. A total of 19 taxa were detected.

Species found:

3	American eel (*Anguilla rostrata*)
41	blacknose dace (*Rhinichthys atratulus*)
12	bluegill (*Lepomis macrochirus*)

More Information

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http://science.nature.nps.gov/im/units/ncrn/index.cfm
http://science.nature.nps.gov/im/units/ncrn/monitor/stream_survey/index.cfm

13 bluntnose minnow (*Pimephales notatus*)
28 central stoneroller (*Campostoma anomalum*)
4 common shiner (*Luxilus cornutus*)
30 creek chub (*Semotilus atromaculatus*)
25 fallfish (*Semotilus corporalis*)
6 fantail darter (*Etheostoma flabellare*)
1 green sunfish (*Lepomis cyanellus*)
3 greenside darter (*Etheostoma blennioides*)
14 longnose dace (*Rhinichthys cataractae*)
1 northern hogsucker (*Hypentelium nigricans*)
2 redbreast sunfish (*Lepomis auritus*)
1 river chub (*Nocomis micropogon*)
12 spotfin shiner (*Cyprinella spiloptera*)
20 white sucker (*Catostomus commersonnii*)
1 yellow bullhead (*Ameiurus natalis*)

Game fish: 1 largemouth bass (*Micropterus salmoides*), 170 mm. 2 smallmouth bass (*Micropterus dolomieu*) 77-96 mm.

Invasive crayfish: virile crayfish (*Orconectes virilis*)

Minehaha Creek (COCA-117-N-2009)

2009 FIBI = 1.67 (poor)

This FIBI score is poor because only one species, the pollution-tolerant blacknose dace, was detected.

2009 Species found:

280 blacknose dace (*Rhinichthys atratulus*)

Game fish: none

Invasive crayfish: none

Pimmit Run (POTO-309-N-2012)

2012 FIBI =1.67 (very poor)

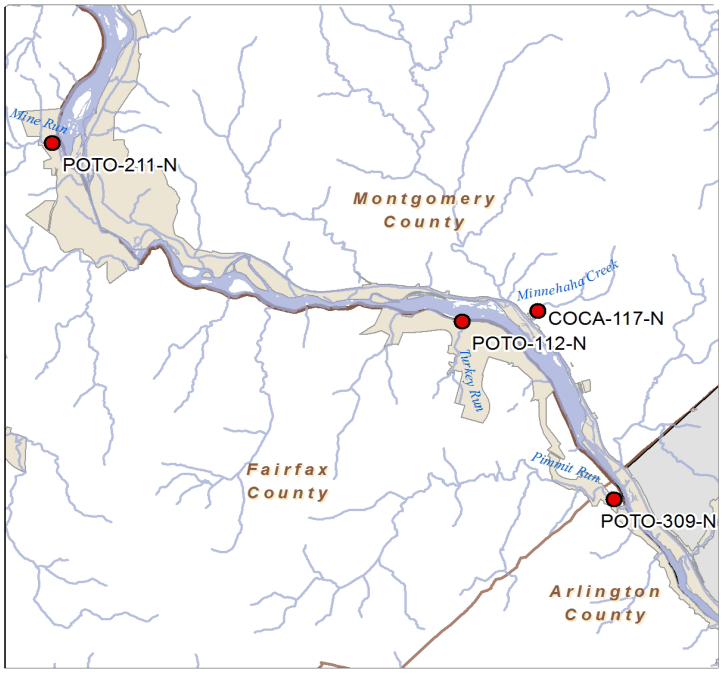
This FIBI score is based on moderate species abundance ratings, a low number of benthic species, moderate numbers of pollution-tolerant fish, high numbers of generalist species, a low fish biomass, and a low number of fish who need silt-free rocky stream bottoms for spawning. Six total taxa were detected.

2012 Species found:

26 American eel (*Anguilla rostrata*)
78 blacknose dace (*Rhinichthys atratulus*)
20 creek chub (*Semotilus atromaculatus*)
38 longnose dace (*Rhinichthys cataractae*)
13 redbreast sunfish (*Lepomis auritus*)
7 white sucker (*Catostomus commersonnii*)

Game fish: none

Invasive crayfish: none



Red dots indicate sites along the GW Parkway where fish, macro-invertebrates, and stream physical habitat condition were sampled during NCRN monitoring and inventory activities.

Pimmit Run (POTO-309-N-2006)

2006 FIBI = 1.67 (very poor)

This FIBI score is based on poor abundance ratings, a low number of benthic species, and moderate ratings for the number of pollution-tolerant fish and overall biomass of fish sampled. Again, six total taxa were detected.

2006 Species found:

23 American eel (*Anguilla rostrata*)
45 blacknose dace (*Rhinichthys atratulus*)
5 creek chub (*Semotilus atromaculatus*)
14 longnose dace (*Rhinichthys cataractae*)
4 redbreast sunfish (*Lepomis auritus*)
47 rosyside dace (*Clinostomus funduloides*)
143 white sucker (*Catostomus commersonnii*)

Game fish: none

Invasive crayfish: none

Turkey Run (POTO-112-N-2012)

2012 FIBI = 2.33 (poor)

This FIBI score comes from Turkey Run's moderate abundance of fish, high number of benthic species, high number of pollution-tolerant species, moderate number of generalist species, low fish biomass, and low number of fish who need silt-free, rocky stream bottoms for spawning. Overall, 10 taxa

were detected.

2012 Species found:

- 5 American eel (*Anguilla rostrata*)
- 279 blacknose dace (*Rhinichthys atratulus*)
- 18 creek chub (*Semotilus atromaculatus*)
- 1 fallfish (*Semotilus corporalis*)
- 2 fantail darter (*Etheostoma flabellare*)
- 10 green sunfish (*Lepomis cyanellus*)
- 10 longnose dace (*Rhinichthys cataractae*)
- 1 pumpkinseed (*Lepomis gibbosus*)
- 2 rosyside dace (*Clinostomus funduloides*)
- 1 white sucker (*Catostomus commersonnii*)

Game fish: none

Invasive crayfish: virile crayfish (*Orconectes virilis*)

Discussion

Overall, FIBI scores generated by NCRN fish monitoring at GWMP indicate poor to very poor condition. One exception is Mine Run which showed fair condition.

No species of conservation concern were found during monitoring. The invasive virile crayfish (*Orconectes virilis*) was found at Mine Run and Turkey Run. The invasive rusty crayfish (*Orconectes rusticus*) and red swamp crawfish (*Procambarus clarkii*) were not detected. A total of 20 species were observed during monitoring.

These monitoring results mirror data gathered during NCRN's earlier fish inventory at GMWP from 2002-2004. The inventory looked at nine randomly-selected stream sites, eight of which earned IBI scores of "poor" or "very poor" with only Mine Run ranking as "fair."

During this NCRN inventory, 32 species were observed. Most of those species comprised three major groups: habitat generalists (e.g., American eel), pollution-tolerant species (e.g., blacknose dace, creek chub, white sucker), and introduced species (e.g., green sunfish and largemouth bass). No species with special conservation status were collected.

Species List

This list includes all fish found at GWMP 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*)
MI	blacknose dace (*Rhinichthys atratulus*)
MI	bluegill (*Lepomis macrochirus*)
I	bluntnose minnow (*Pimephales notatus*)
MI	central stoneroller (*Campostoma anomalum*)
I	channel catfish (*Ictalurus punctatus*)
I	common carp (*Cyprinus carpio*)
MI	common shiner (*Luxilus cornutus*)
MI	creek chub (*Semotilus atromaculatus*)
I	cutlip minnow (*Exoglossum maxillingua*)
M	fallfish (*Semotilus corporalis*)
MI	fantail darter (*Etheostoma flabellare*)
I	golden redhorse (*Moxostoma erythrurum*)
I	golden shiner (*Notemigonus crysoleucas*)
I	goldfish (*Carassius auratus*)
MI	green sunfish (*Lepomis cyanellus*)
M	greenside darter (*Etheostoma blennioides*)
MI	largemouth bass (*Micropterus salmoides*)
I	longear sunfish (*Lepomis megalotis*)
MI	longnose dace (*Rhinichthys cataractae*)
I	margined madtom (*Noturus insignis*)
MI	northern hogsucker (*Hypentelium nigricans*)
I	pumpkinseed (*Lepomis gibbosus*)
MI	redbreast sunfish (*Lepomis auritus*)
M	river chub (*Nocomis micropogon*)
MI	rosyside dace (*Clinostomus funduloides*)
I	satinfin shiner (*Cyprinella analostana*)
I	sea lamprey (*Petromyzon marinus*)
MI	smallmouth bass (*Micropterus dolomieu*)
MI	spotfin shiner (*Cyprinella spiloptera*)
I	sunfish hybrids (*Lepomis hybrids*)
I	swallowtail shiner (*Notropis procne*)
I	tessellated darter (*Etheostoma olmstedi*)
MI	white sucker (*Catostomus commersonnii*)
MI	yellow bullhead (*Ameiurus natalis*)

References

Mangold, M. et al. 2004. Inventory of Fish Species Within Dyke Marsh, Potomac River (2001-2004). https://irma.nps.gov/App/Reference/Profile/581226

National Capital Region Network Biological Stream Survey Fish Data (2008-2012). Versar, Inc. National Capital Region Inventory & Monitoring Program, Washington, DC. https://irma.nps.gov/App/Reference/Profile/2195810.

NCRN Biological Stream Survey – Data Analysis Standard Operation Procedure #20, Version 1.1 (June 2009) [includes instructions for calculating FIBI scores]

Raesly, R.L, et al. 2004. Inventory and Biological Monitoring of Fishes in National Parks of the National Capital Region [NCRN Fish Inventory]. https://irma.nps.gov/App/Reference/Profile/580767