



## Stream Physical Habitat

## Resource Brief

### Importance

The physical habitat and water quality of a stream are the template upon which aquatic communities of fish and macroinvertebrates must live.

An aquatic macroinvertebrate is any water-dwelling animal without a backbone that is large enough to be seen by the naked eye. They need spots to cling and burrow, and organic material to consume. Fish require places to hide, feed, and lay eggs.

Together, water quality, aquatic communities, and stream physical habitat indicate a great deal about the condition of a stream and its watershed.

### Monitoring

Stream physical habitat 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 stream physical habitat monitoring at thirty-seven park sites throughout the NCRN began in 2008 and follows a set, six-year rotation. Each spring 5-8 sites are visited. At Catoctin, monitoring is done in Owens Creek, Big Hunting Creek, and Blue Blazes (Whiskey Still) Creek. 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

Observations of stream physical



Blue Blazes Creek

habitat are gathered at the same location and time as fish monitoring in late summer and macroinvertebrate monitoring in spring. Monitoring is conducted on non-tidal wade-able streams and rivers.

### PHI Scoring

To calculate a stream's Physical Habitat Index (PHI) score, streams are sorted by physiographic province and compared against high quality reference streams in the same province. Catoctin's streams are all in the Piedmont stream class. As a result, the following 8 characteristics are evaluated:

- 1) riffle quality
- 2) stream bank stability (the extent, height, and severity of bank erosion)
- 3) quantity of woody debris and root wads in the stream
- 4) instream habitat available for fish
- 5) suitability of stream bed surface materials for macroinvertebrates (epifaunal substrate)
- 6) shading
- 7) distance from nearest road (remoteness)
- 8) embeddedness of substrates

PHI scores range from 0-100 with four possible ratings:  
(81-100) minimally degraded,  
(66-80) partially degraded,  
(51-65) degraded, and  
(0-50) severely degraded.

### Results & Discussion

Owens Creek and Blue Blazes Creek were sampled in 2010. Big Hunting Creek was sampled in 2006 and 2010.

All sites had well developed riffles and pools, as well as good shading and low embeddedness.

### Glossary

**Benthic**- Referring to the bottom of a body of water.

**Embeddedness**- The amount of space around large stream bottom particles (gravel, cobble, etc). When smaller particles (sand, silt, mud) surround larger particles, embeddedness rises and habitat for small fish, macroinvertebrates, and other creatures is reduced.

**Epifaunal Substrate**- hard, stable materials that stream biota can live on (such as large woody debris, rootwads, cobble, gravel, etc).

**Riffle**- Section of stream with faster flow and more turbulence. Provides shelter, is a food source, and adds oxygen to water.

**Root wads**- A mass of plant roots (a type of woody debris).

**Shading**- Amount and duration of shade cast over a stream. Helps lower water temperatures.

**Woody Debris**- large branches, logs, and tree material. Provides shelter.



## Big Hunting Creek

(MONO 230-N)  
2010 PHI = 65 (degraded)

(MONO 201-N)  
2006 PHI = 67 (partially degraded)

In 2006 Big Hunting Creek earned a score of partially degraded which in 2010, dropped very slightly into the category of degraded condition.

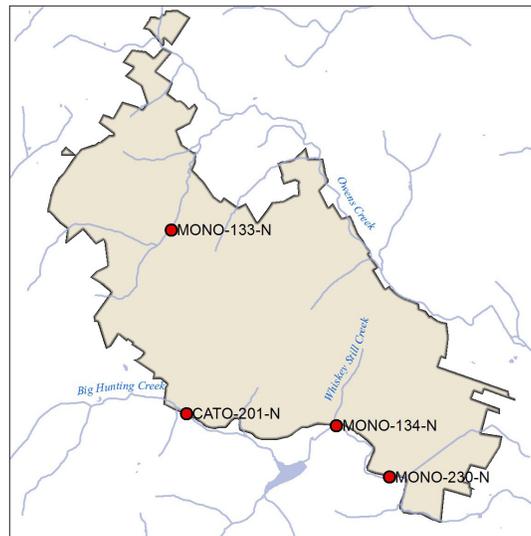
Big Hunting Creek did have a high quantity of woody debris and root wads in the stream channel and good epifaunal substrate and instream habitat, but the score suffered from the creek's very close proximity of a road. Also, while still relatively low, Big Hunting Creek had the highest level of embeddedness of all of Catoctin's sampled streams.

## Owens Creek (MONO-133-N)

2010 PHI = 72 (partially degraded)

The relatively high PHI score for Owens Creek puts it in the partially degraded category.

Positive stream characteristics for Owens Creek include large amounts of instream habitat and good epifaunal substrate. The influence of a road and paved areas located very close to the stream is one factor that kept it from earning a better score.



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

## Blue Blazes (Whiskey Still) Creek (MONO-134-N)

2010 PHI = 48 (severely degraded)

Blue Blazes Creek was rated as severely degraded, though this score is misleading. Several of the habitat components that factor into PHI calculations could not be rated in summer 2010 because of the dry site conditions.

Blue Blazes Creek did exhibit good bank stability (minimal erosion) and lots of shading. However, it did not have much woody debris in the stream, and had lower levels of instream habitat and epifaunal substrate.

At time of sampling, field crews also noted that the area above the pipe culvert (upstream of the sampling site) had started to fill in with sediment, up to a depth of 66 centimeters. The affects seemed to be localized to an area approximately 15 meters in length and deposition further above and below the culvert was normal. Crews noted that maintenance or repair may be required.

## Challenges

The presence of the invasive algae didymo (*Didymosphenia geminata*) was very documented in Big Hunting Creek in 2012. It has not been detected in any other Catoctin streams.

## References:

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