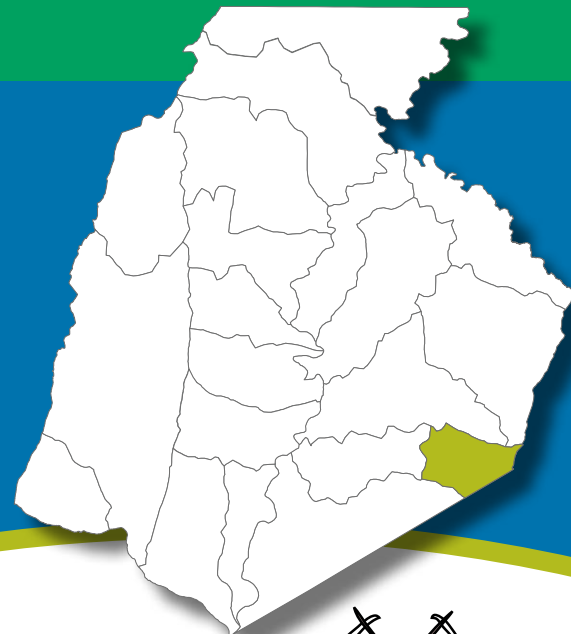


# HOW HEALTHY IS YOUR STREAM?

## A Summary Report for the Upper Bush Creek Watershed

The Frederick County Stream Survey (FCSS) was developed to help County staff determine the health of our streams. Between 2008 and 2011, scientists visited 200 sites throughout Frederick County to collect important information including the amount of forest along stream banks, the amount of stream bank erosion, levels of particular pollutants in the water, stream bug samples, and more. This fact sheet summarizes the results of the information collected from Upper Bush Creek and its surrounding land and waters – also known as the Upper Bush Creek watershed.



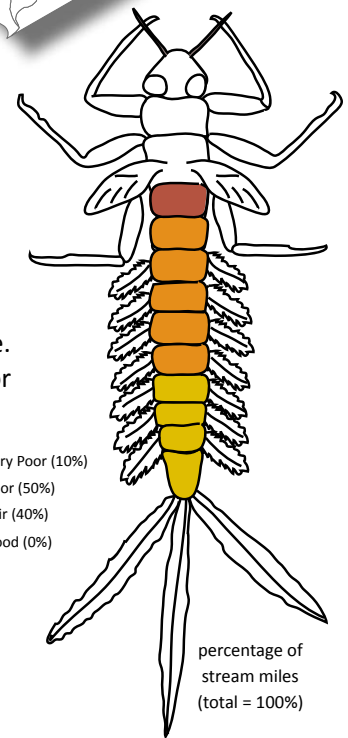
## Stream Bugs & Stream Health

### Benthic Index of Biotic Integrity (BIBI)

**BIBI SCORE**  
**2.68**  
**POOR**

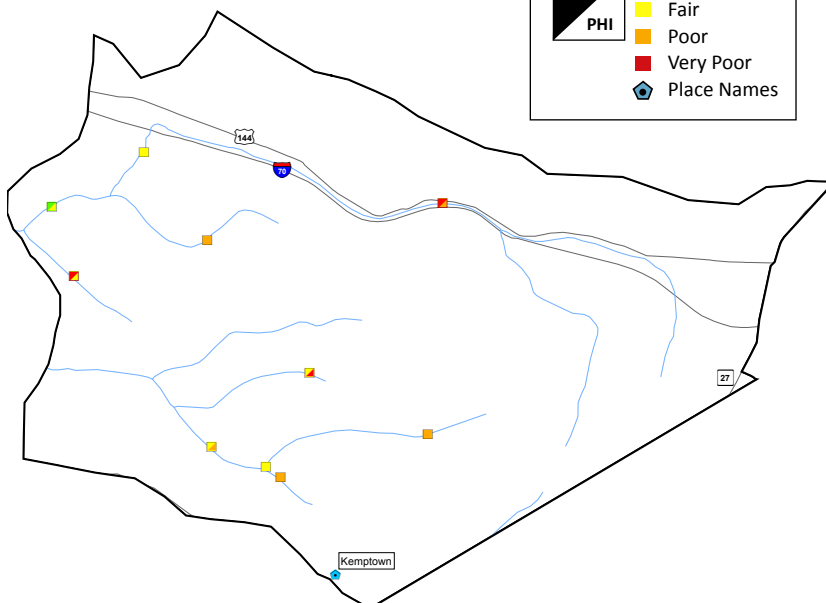
Bugs found in streams are good indicators of pollution because they live in the water and cannot travel far or quickly to escape pollutants. Some stream bugs are considered “pollution-tolerant” and can live in somewhat polluted streams, while other bugs are considered “pollution-sensitive” and are only found in cleaner streams. When our scientists collect bugs from each stream site, they count and separate the bugs by type. They use this information to determine a Benthic Index of Biotic Integrity (BIBI) score for each stream. These scores range from 1.00 (very poor) to 5.00 (good). In a stream where

many pollution-sensitive bugs are found, the stream is likely to be cleaner and have a good BIBI score. In a stream where most of the bugs found are pollution-tolerant, the stream is likely to be more polluted and have a poor to very poor BIBI score. The average BIBI score for the Upper Bush Creek watershed is 2.68, telling us that the average health of the Upper Bush Creek watershed is poor. 0% of the sites sampled scored as good, 40% of the sites sampled scored as fair, and 60% of the sites sampled scored as poor or very poor.



**BIBI and PHI Scores**

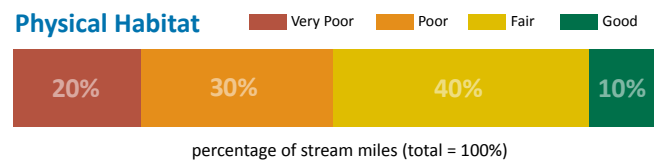
|             |             |
|-------------|-------------|
| <b>BIBI</b> | Good        |
|             | Fair        |
| <b>PHI</b>  | Poor        |
|             | Very Poor   |
|             | Place Names |



### Physical Habitat Indicator (PHI)

Our scientists also measure the physical habitat of the stream using the Physical Habitat Indicator (PHI). The Physical Habitat Indicator helps us to understand the amount of food and shelter available for bugs and animals in the stream. In the Upper Bush Creek watershed, 10% of the streams are good, 40% are fair, 30% are poor, and 20% are very poor.

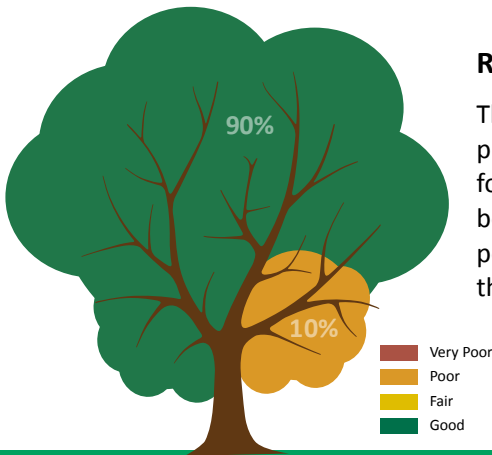
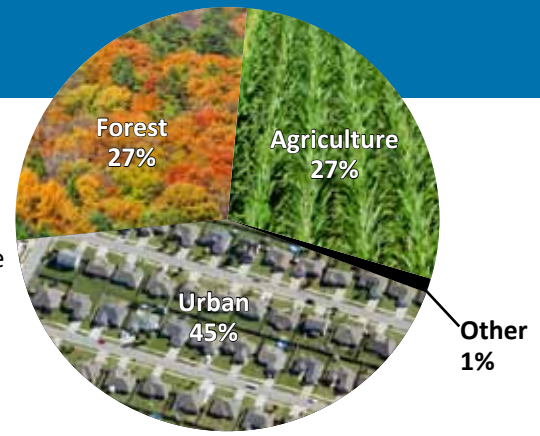
The map to the left shows the BIBI and PHI scores for each site where information was collected within the Upper Bush Creek watershed.



# How Land Affects Streams

## Land Use

Often the health of a stream is closely related to land use - the type of land or land activities – near the stream. For example, a stream that runs through a city with few trees but many highways and parking lots (also called impervious surfaces) may receive large amounts of hot, polluted stormwater runoff. Trees can slow and absorb large amounts of stormwater runoff and also shade streams to keep water temperatures cool during summer months. The leaves and branches that drop into the stream can also provide food and shelter for bugs and fish. For all of these reasons, forests are considered to be very good for stream health. Because of the important relationship between land use and stream health, the Frederick County Stream Survey evaluates the type of land use and amounts of forest near each stream. Within the Upper Bush Creek watershed, 45% of the land is developed towns and cities (urban), 27% of the land is forested, 27% is farms or agricultural land, and 1% is other types of land uses.



## Riparian Buffers

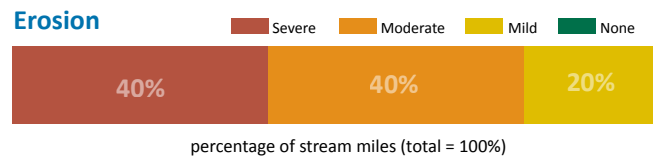
The width of forest along stream banks often determines the level of stream pollution protection that the forest can provide the stream. It can also make it easier or more difficult for wildlife to survive. In general, a combined forest width of 60 meters (about 200 ft) on both sides of a stream is wide enough to provide the stream with good protection from polluted stormwater runoff, and also provide animals with enough habitat to survive. In the Frederick County Stream Survey, the width of the forested stream bank (also called the riparian buffer) is rated as good (>60m), fair (30m to ≤60m), poor (15m to ≤30m), or very poor (≤15m). 90% of Upper Bush Creek and the streams that drain into it have a forested stream bank width greater than 60 meters.

# Pollution In Our Streams

There are many types of pollution commonly known to affect stream health. The Frederick County Stream Survey measures harmful pollutants such as excess dirt and sediment, nitrogen, and phosphorus.

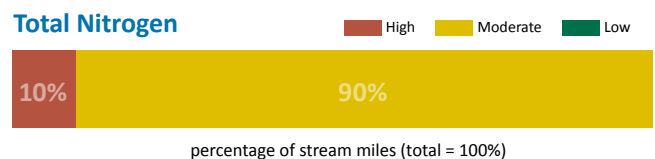
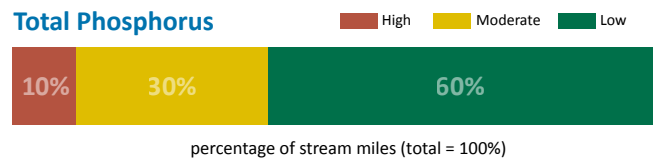
## Erosion

Excess dirt and sediment in streams is often caused by stream bank erosion. Stream bank erosion occurs when the stream banks are damaged by fast-moving stormwater runoff and dirt begins to wash away into the stream itself. This excess dirt in the streams can kill the stream bugs and clog fish gills. In the Upper Bush Creek watershed, 0% of stream banks showed no signs of erosion, 20% were mildly eroded, 40% were moderately eroded, and 40% were severely eroded.



## Nitrogen and Phosphorus

Nitrogen and phosphorus can be found in lawn fertilizer and manure. They are important nutrients for life, but when the levels become too high, stream health suffers. High levels of nitrogen and phosphorus can lead to rapid growth of algae which can completely cover the surface of the stream and block sunlight from reaching the plants and animals within the stream. As algae die and decompose it also uses the oxygen in the stream and suffocates other living creatures. In the Upper Bush Creek watershed, 90% of streams have moderate total phosphorus and 90% of streams have low or moderate total nitrogen.



Questions??? Feel free to contact the Office of Sustainability and Environmental Resources, Frederick County Community Development Division at 301-600-1350  
*All monitoring and data analysis was performed by Versar, Inc.*

Mayfly graphic courtesy of Dieter Tracey, IAN Image Library (ian.umces.edu/imagelibrary)