

Maryland Biological Stream Survey Chesapeake and Atlantic Coastal Bays Trust Fund Wheel Creek Results

2013



Overview

The project area is a small watershed south of Bel Air, MD. The stream has no officially accepted name, but is called Wheel Creek by Harford County DPW. Wheel Creek flows into Atkisson Reservoir, an Army Corps of Engineers impoundment on Winters Run. The Wheel Creek watershed is dominated by urban/suburban land use with some forest and a smaller amount of agriculture. Wheel Creek originates in the Festival at Bel Air commercial development and flows through several residential neighborhoods. After crossing under Wheel Rd, Wheel Creek enters Harford Glen, an environmental education facility of Harford County Schools. The Harford Glen property contains the only large block of protected land within the Wheel Creek watershed. The majority of the forested area in the watershed is in the riparian area adjacent to the stream or in several large undeveloped parcels.

Seven sites are located throughout Wheel Creek. One site (ATKI-101-X) is on the downstream most reach of Wheel Creek. Site ATKI-107-X is located near the headwaters of the west branch of Wheel Creek and is downstream of one proposed stream stabilization project reach (400 ft in length). ATKI-105-X is on the west branch downstream of ATKI-107-X and downstream of a proposed stormwater management retrofit. ATKI-102-X is on the furthest reach downstream on the west branch and is located near the downstream end of a small (250 ft) proposed stream stabilization project reach. ATKI-006-X is near the headwaters of the east branch of Wheel Creek and is downstream of two proposed stormwater management retrofits. Site ATKI-004-X is further downstream on the east branch and is located downstream of a proposed stormwater management retrofit. ATKI-003-X is the furthest downstream site on the east branch and is located downstream of another proposed stormwater management retrofit and near the downstream end of a short (300 ft) proposed stream stabilization project reach. All of the proposed restoration activities will take place upstream of ATKI-101-X. ATKI-101-X is located just downstream of a long proposed stream stabilization project reach (2825 ft) on Wheel Creek.

The eighth site (LWIN-101-X) is located in a small unnamed watershed to the south-southeast of Wheel Creek. This site was selected because the watershed is a similar size to Wheel Creek (Table 1), has similar land use and is not known to have any additional development or restoration activities in the foreseeable future. This site will serve as a control for the analysis of the Wheel Creek sites, especially after the restoration is completed.

Wheel Creek



Methods

A detailed description of monitoring methods can be seen in Stranko et al, 2007. A brief summary of the methods follows below.

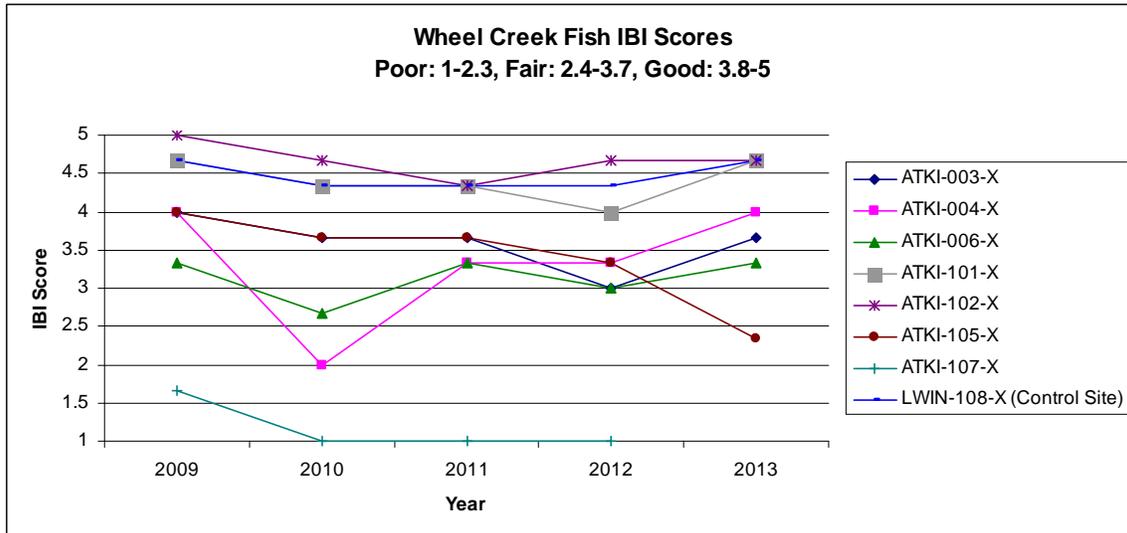
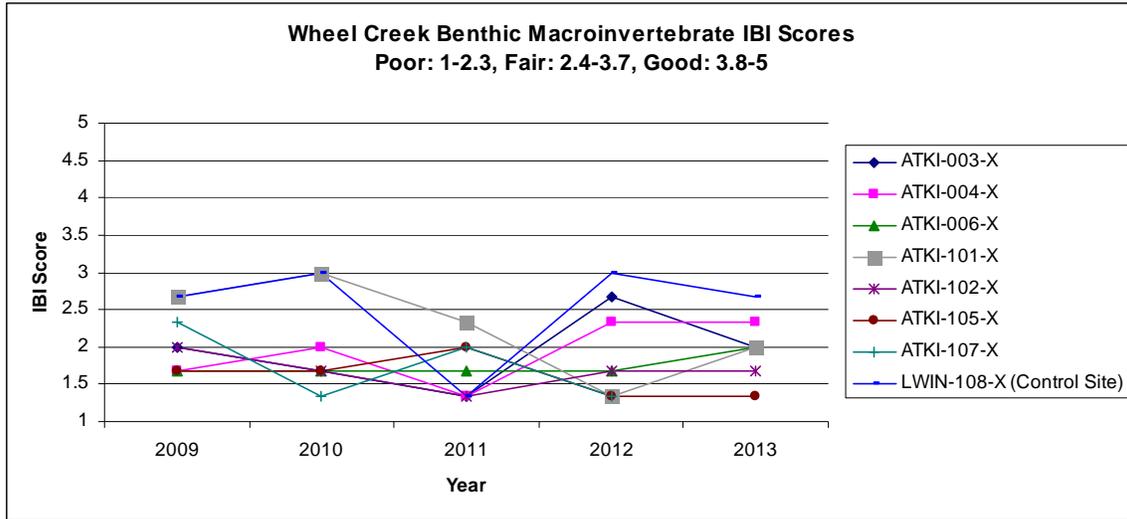
In the spring of 2009, each of the eight sites was located, GPS coordinates were recorded, and the 75m stream site was marked for future visit. Starting in 2009, each of the eight sites was sampled once in the spring for water chemistry, the presence of vernal pools and benthic macroinvertebrates. During the spring visit recording temperature loggers were deployed at each site. These loggers were set to measure stream temperature every 20 minutes starting June 1. These sites were sampled once in the summer for fish, crayfish, freshwater mussels, reptiles, amphibians, invasive riparian vegetation and instream habitat. For each site the upstream catchment was drawn by hand using a GIS and USGS 7.5' topographic maps. The upstream catchment for each site was used to calculate land use and impervious surface amounts from the 2001 National Land Cover Database.

Results and Discussion

Urban land cover dominates both Wheel Creek (46.1%) and the control watershed (50.5%). The high amounts of urban land cover contribute large amounts of impervious cover to each small watershed. Wheel Creek has 21.4% of its watershed area covered with impervious surfaces and the control watershed has 16.4% of its watershed covered with impervious surfaces. Impervious surface and its related effects on stream biota are stressors on streams and aquatic organisms. It is widely held that once impervious surfaces reach 10% of watershed area that the biological community is stressed and can be considered impaired.

The Indexes of Biotic Integrity for each site are presented below. All of the Benthic Indexes of Biotic Integrity (BIBI) are in the Poor or Very Poor category. Scores in the Poor and Very Poor categories are considered impaired and would be candidates for listing on the 303(d) list of impaired waters. Most of the Fish Indexes of Biotic Integrity (FIBI) for the eight sites were in the Good category. One site (ATKI-006-X) was in the Fair category, and only one site (ATKI-107-X) was in the Very Poor category. The high amount of urban land cover and impervious surfaces in each watershed is a likely cause of the impaired BIBI scores. Currently it is unclear why the FIBI scores have not responded the same as the BIBI scores to the large amount of development in each watershed.

Indexes of Biotic Integrity



The results of sampling have been used to define baseline conditions and ecological health in Wheel Creek and future sampling will measure post restoration conditions. These baseline conditions were used to assess the efficacy of the restoration activities implemented in the Wheel Creek watershed. By comparing post-restoration conditions to the baseline, we can quantify any potential benefits to stream biota from the restoration activities. As there is a site located downstream of each proposed restoration site, we may have the ability to assess the benefits of each individual project and assess the efficacy of individual restoration techniques. This will provide valuable data that may help guide the selection of restoration techniques in the future.