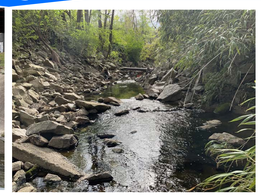
Story of a Stream

Pigeon House Branch Watershed Study

Examples of Hardened Stream Segments in Pigeon House Branch






Pigeon House Branch Watershed

- Pigeon House Branch watershed encompasses 4.5 square miles.

- The watershed contains 80 miles of stormwater pipes, streams and open channels.

- Impervious surfaces cover 51% of the watershed.

-The Pigeon House Branch watershed is primarily urban in nature and includes some of the oldest developed areas in Raleigh. Its waterways have been significantly altered by human impacts.

- Pigeon House Branch is on the North Carolina 303d list of impaired waters for fecal coliform, copper, and benthos. Both copper and fecal coliform have an approved Total Maximum Daily Load (TMDL) which establishes the maximum amount of a pollutant allowed in the waterbody to maintain water quality (2003 Plan).

The Impacts of Impervious Cover

Impervious cover is a key indicator of urbanization and has significant impacts on stream health. **Impervious cover refers to the surfaces that prevent water from infiltrating into the soil, such as roads, buildings, parking lots, and sidewalks.** Impervious cover alters the natural hydrologic cycle by reducing infiltration, increasing runoff, and changing the timing and magnitude of stream flows, which **can cause more frequent and severe flooding, erosion, and channel instability.** Impervious cover affects the water quality of streams by **increasing the delivery of pollutants and sediments.**

These changes in stream hydrology, water quality, habitat, and biodiversity can reduce the ecological integrity and resilience of streams.

As a result, quantifying the amount of impervious cover in a watershed is an important metric in understanding stream health. The figure shows the cumulative impervious cover in the Pigeon House Branch watershed. The segments are color coded to show how much of the total area upstream of the segment is impervious.

A Changing Stream

In the past, building and filling in the floodplain and channelizing streams were common practices. These practices often resulted in limited space for flood waters during large storm events which in turn spawned the need for projects to address flooding and erosion. This is true for Pigeon House Branch where the flooding and erosion issues are compounded by the fact that historical development and encroachment into the floodplain and riparian areas was prevalent. **This type of development coupled with lack of stormwater controls, which was not historically required, has lead to extensive changes to address flooding and erosion problems.** These changes include channelization, realignment, and confinement in underground concrete box culverts or walled channels.

More recently, the City has initiated several projects and programs to revitalize the watershed and improve stream health. Projects include stream restoration which directly improves the condition of the stream by reducing streambank erosion and enhancing habitat. The City also has a Drainage Assistance program that assists homeowners in addressing stream bank erosion and flooding issues on private property. In addition, the Raleigh Rainwater Rewards program works with homeowners and businesses to implement a range of green infrastructure projects such as cisterns, bioretention and permeable pavement that infiltrate or hold stormwater runoff thus reducing pollution but also addressing the altered hydrology which impacts watersheds like the Pigeon House Branch which contain a high amount of impervious surface.

Project Example

Bioretention at Gateway Center

Legend

Human Induced Alterations

Upstream Point of:
- Rip-rap channel
- Bioengineered/restoration
- Channelized reach
- Concrete channel
- Rip-rap/Concrete/Other Hardened

Existing Projects
- Stream Restoration
- Raleigh Rainwater Rewards
- Active and Completed Drainage Assistance

Cumulative Impervious Cover
- 10%
- 10 - 20%
- 20 - 30%
- 30 - 40%
- 40 - 50%
- 50 - 60%
- > 60%

1 Inch = 400 Feet

0 500 1,000 2,000 Feet

Stream Riparian Buffer

Pigeon House Branch Watershed Study

Examples of Impacted Stream Buffers

Impervious Surfaces

Landscaping

Lawn

How You Can Join the City in Improving the Stream Buffer

The Buffer Builder Bag (B3) Program is a voluntary program and provides City of Raleigh property owners with free native shrub and tree seedlings to help improve or create a streamside buffer on their property. Applicants will be eligible for one bag of 20-25 seedlings and recipients are chosen on a first-come, first-served basis. The Buffer Builder Bags will come with support materials: riparian buffer guidelines, planting techniques, and proper maintenance on the different species of trees and shrubs. Search 'Buffer Builder Bag' on the City's website to find out more.

Stream Riparian Buffers

Healthy stream riparian buffers are areas of vegetation, ideally trees and shrubs, that border streams and other water bodies. Riparian buffers provide multiple benefits to streams including:

- Buffers act as natural filters by intercepting sediment and nutrients contained in overland runoff before they reach the stream.
- Buffer vegetation stabilizes streambanks which prevents erosion.
- Riparian buffers also absorb or store excess water during rain events thus providing flood mitigation benefits.
- Trees and shrubs in the buffer provide shade and lower the water temperature, which is vital for many cold-water fish species, such as trout. Warmer water can also increase the growth of algae and bacteria and reduce dissolved oxygen levels.
- Buffers also provide shade, habitat, and food for aquatic and terrestrial animals.

Stream Shading Examples

Limited to No Shading (PHB Mainstem)

Partially Shaded Reach

Shaded Stream Reach (PHB Headwaters)

Pigeon House Branch Stream Assessment

- In March – May 2023, approximately 8 miles of stream reaches were inventoried along the main stem and major tributaries in the Pigeon House Branch watershed.
- The assessments were performed on City property as well as private property.
- Stream reaches were assessed for streambank erosion, canopy cover, channel bottom material, stream riparian buffer encroachment and human induced steam impacts.

Key findings of the streams assessment in regard to stream buffers include:

- 67 percent of the streams have essentially no intact buffer. Lawns and impervious cover are the most prevalent land cover in encroached buffers.
- 23 percent of the riparian areas have a significant amount of invasive species.
- While much of the riparian buffer has been altered resulting in limited areas with fully shaded streams, an estimated 60 percent of the assessed stream length has partial shading from riparian canopy cover.

Examples of Invasive Vegetation within the Riparian Buffer

Bamboo

English Ivy

Wisteria

Legend

- Stormwater Pipes in Study Extent
- Stream Assessment Extent
- Left Bank
- Right Bank

Riparian Buffer

(Upstream Point of Assessed Reach)

- None
- Partial
- Intact Buffer

1 Inch = 400 Feet

0 500 1,000 2,000