

3.2a Stream Ecology

The Environmental Protection Agency notes that headwaters are “the smallest parts of river and stream networks but make up the majority of river miles in the United States. They are the part of rivers furthest from the river's endpoint or confluence with another stream.” These headwaters act as small tributaries, many of which are in Meriden.

In Meriden, Spoon Shop Brook and the North Branch of Spoon Shop Brook are tributaries that drain into Baldwins Pond. Cathole Brook is a tributary that flows into Sodom Brook. Willow Brook is a tributary of Harbor Brook. Crow Brook is a tributary to Harbor Brook.

In the headwaters of Meriden, trout and other migratory fishes are vital to the ecosystem's health. These creatures rely on and contribute to stable tributary health. According to [CT DEEP](#), when fish swim upstream for spawning, they feed off microorganisms and vegetation in the tributaries. When these fish produce waste, this waste feeds many invertebrates in the tributary and further downstream. The eggs and larvae of these fish are sensitive to the temperature changes of headwaters. Temperatures of headwaters remain stable when water quality is healthy and stable. Migratory fish species in the Meriden area include Alewife and American Shad.

Tributaries rely on riparian buffers to regulate the water temperature, prevent stream erosion, and filter runoff that tries to enter the stream (USGS). According to the American Water Resources Association, headwater streams contain species that fit into five categories:

1. Species unique to these headwaters
2. Species that are found in these and larger streams, with abundance varying on stream size
3. Seasonal species that move into headwaters when downstream conditions are no longer desirable
4. Species that require headwaters for different life stages like spawning
5. Species that live around the headwater streams.

Headwaters/Tributaries are crucial for ecosystem diversity. Tributaries need to have hydrologic connectivity to the floodplain for species dispersal. The [American Fisheries Society](#) notes that tributaries provide habitat for many aquatic and semiaquatic organisms, such as invertebrates, amphibians, and birds. In Connecticut, headwater streams are home to creatures ranging from herring and turtles to salamanders. Since headwaters are the smallest origins of a stream, they act as a safe place away from larger predators.

As the USGS notes, invertebrates are an essential indicator of the headwaters' health. When invertebrates are healthy, they can shred plant and waste material, allowing fungi and bacteria to break down particles further. Harvesting these particles for food, other invertebrates, and fish use the headwaters for less competition over resources since headwater streams tend to have fewer species than downstream.

Headwaters are also responsible for the significant nutrient cycling in a river system. These tributaries deliver up to 45% of the nitrogen that flows downstream. The loss of a headwater or tributary could lead to major biogeochemical changes in river systems, leading to large areas of algal blooms, unsuitable conditions for spawning, and higher levels of pollutants.

Algal blooms are one of the largest threats to any stream or water body. When substances that contain excess nutrients like fertilizers enter a water body, it causes an overgrowth of algae. This overgrowth decreases water health by blocking out sunlight for aquatic plants and reducing the oxygen in the water. These effects create challenging conditions for any life to survive, preventing juvenile fish from reaching adulthood and clogging fish gills.

Resources

CT DEEP, Migratory Fish Runs

https://portal.ct.gov/-/media/DEEP/fishing/fisheries_management/Migratory-Fish-Runs.pdf

American Water Resources Association, "THE CONTRIBUTION OF HEADWATER STREAMS TO BIODIVERSITY IN RIVER NETWORKS"

https://www.srs.fs.usda.gov/pubs/ja/ja_meyer002.pdf

USGS, "The Quality of Our Nation's Water"

<https://pubs.usgs.gov/circ/1373/pdf/Circular1373.pdf>

American Fisheries Society, "Headwater Streams and Wetlands are Critical for Sustaining Fish, Fisheries, and Ecosystem Services"

<https://fisheries.org/wp-content/uploads/2019/02/Headwaters-Paper-final.pdf>

NOAA, What is Harmful Algal Bloom?

<https://www.noaa.gov/what-is-harmful-algal-bloom>

EPA, Nutrient Pollution

<https://www.epa.gov/nutrientpollution/effects-environment>

QRWA, Streamside Woods

<https://www.qrwa.org/images/customer-files//StreamsideWoods.pdf>

QRWA, Muddy Waters

<https://www.qrwa.org/images/customer-files//MuddyWaters.pdf>

QRWA, Habitats

<https://www.qrwa.org/images/customer-files//Habitats.pdf>