

# Headwater Streams

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The District recognizes the importance of protecting all streams, including headwater streams. It is no coincidence that many District sites buffer streams, protecting sensitive aquatic fauna, mitigating nutrient and sediment loads and reducing downstream flood impacts.

Headwater streams are the primary source of water for larger bodies of water. The physical and biological quality of larger streams is directly correlated to that of the headwater stream. Some of the important ecological functions of headwater streams includes sediment retention, organic and nutrient reduction, and habitat for unique, temperature sensitive native fauna. First or second order streams are considered headwater streams (figure 1).

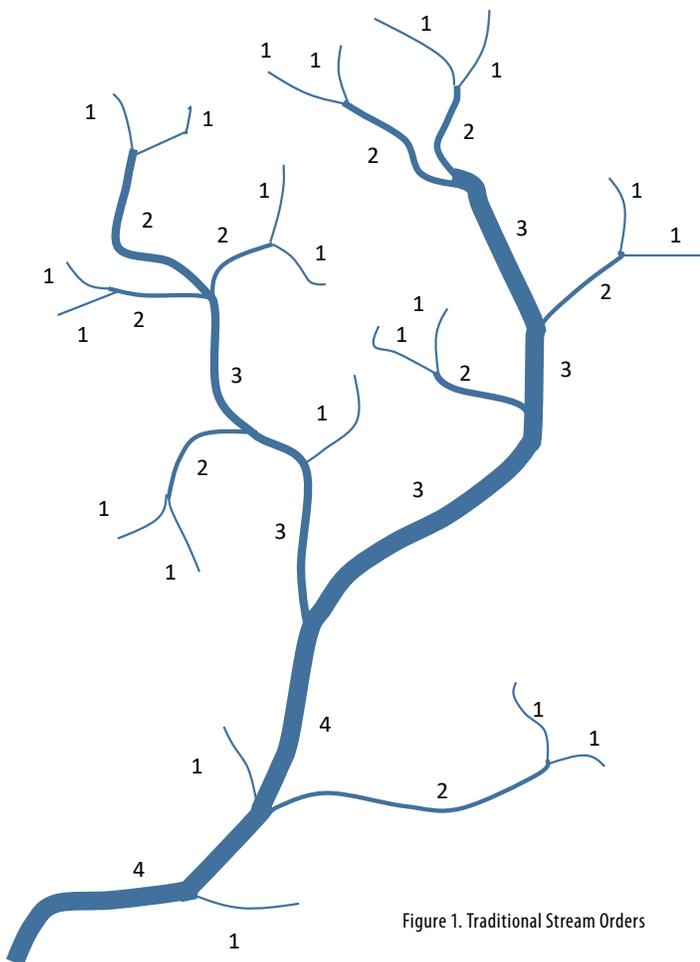


Figure 1. Traditional Stream Orders

The drainage area of most headwater streams is quite small, less than 1.0 square mile. Their water source typically emanates from a spring, seep, or a bordering wetland with discharge water from a farm tile, seep, or groundwater surcharged pond. Headwater streams can be perennial, wet year-round or intermittent with water drying up in the warmer months. They can be classified into 3 main types.

**Continuous-flow headwater streams** are characterized by cool, stable water temperatures and consistent levels of dissolved oxygen. These streams are usually spring fed with relatively swift currents and a substrate of bedrock, boulders, cobble or gravel. Due to the relatively swift currents, the embeddedness (substrate covered in silt) is often quite low. The aquatic fauna includes some very conservative species that depend on year-round high oxygen levels associated with cool water temperatures. Some quality indicator fish species for this type of stream include mottled sculpin (*Cottus bairdii*), Iowa Darter (*Etheostoma exile*), and orangethroat darter (*Etheostoma spectabile*) (Image 1).



Image 1. Male orangethroat darter (*Etheostoma spectabile*)

Some unique, conservative species of aquatic insect larvae such as stoneflies, snail-case caddisflies and saddlecase caddisflies can only be found in continuous-flow headwater streams. These species need the constant, year-round cool water temperatures with their associated high levels of dissolved oxygen and the physical presence of coarse substrate with various rock sizes for cover.

Two species of freshwater mussels, slippershell (*Alasmidonta viridis*) (Image 2) and rainbow mussel (*Villosa iris*) may also be found in continuous-flow headwater streams. Currently, both of these mussel species are listed as Endangered (rainbow) or Threatened (slippershell) in Illinois.



Image 2. Slippershell mussels (*Alasmidonta viridis*)

**Continuous-flow headwater streams** are characterized by water temperatures that vary with seasonal temperatures and levels of dissolved oxygen that are inconsistent. The substrate can be coarse or fine. The fauna are warm-water adaptive species of fish and benthic macro-invertebrates. Quality indicator fish species include brook stickleback (*Culaea inconstans*) and central mudminnow (*Umbra limi*) (Image 3).



Image 3. Central mudminnow (*Umbra limi*)

Aquatic macro-invertebrates such as damsel and dragonfly larvae, mayfly larvae, Amphipods, and riffle beetles can be found in this type of headwater stream. Some fresh water mussels that may be found in these streams are pimple back (*Quadrula pustulosa*) and lilliput (*Toxoplasma parvum*).

**Intermittent-flow headwater streams** are characterized by highly variable flow and water temperatures, this type of headwater stream is mainly inhabited by colonizer species with high productive rates such as creek chubs (*Semotilus spp.*) and some species of Amphipod invertebrates. Such streams can also be largely abiotic. During a drought these streams may completely dry up. Freshwater mussels are generally absent from this often ephemeral headwater stream.

Like so many streams in Illinois, headwater streams are sometimes modified by humans with channelization, ditching



Image 4. Staff surveying fish in a headwater stream.

and/or with dams. Due to their small size, first order streams are particularly vulnerable to “tunneling”. Tunneling is used to drain an area of water by installing drainage tiles to divert water. Entire first order streams can disappear in this way. Ghost-like images of streams that no longer exist due to tunneling can sometimes be seen in aerial photos (Image 5).



Image 5. Aerial image of a headwater stream that has been tunneled with drainage tiles.

Functioning headwater streams with vegetated buffers reduce the amount of nutrients and sediments delivered to larger streams. Because of their close connection to groundwater, subsurface water flows, and wetlands, headwater streams are important in controlling the flow of water, mitigating flood impacts downstream. Headwater streams with their unique characteristics provide habitat for conservative, temperature sensitive fauna.

Disruption of the hydrologic and biological processes of headwater streams can affect the health of an entire river system. Protecting such areas promotes clean water, abundant wildlife, and beautiful places to spend time; cherish our streams.