Stream Team Academy Fact Sheet #6

Headwater Streams

An Educational Series For Stream Teams To Learn and Collect

Headwater Stream: The source and upper part of a stream, point of stream origin. (Webster's Dictionary)

Despite their importance, headwater streams are some of the most understudied and ignored water resources. These areas, which are often dry through much of the year, have far-reaching implications to their downstream counterparts and the entire stream system. The protection and restoration of headwater streams is crucial for water quality, aquatic diversity, and stream habitat.

Because Missouri has a vast array of natural landscapes, its headwater stream characteristics can vary. In the prairie regions, headwater streams may appear as low-lying grassy fields with no clearly defined channel. During storm events, these areas fill with water which passes through them to get to the larger downstream channels. In woodland areas, headwater streams usually have a more defined channel with organic debris lining them. This debris can help to retain isolated small pools in times without rain. Other headwater streams are not entirely dependent on rain for water because they are influenced by groundwater.

Land use changes in Missouri have altered the appearance and function of many headwater streams. The implications of these alterations affect humans and other organisms. Impaired headwaters degrade the entire stream system because they are the beginning of the downstream continuum. Healthy headwaters equal sustainable rivers.

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Above is an example of an intact headwater stream. Many headwater streams are even smaller than this one, and people refer to them as ditches or depressions.

Functions of Healthy Headwater Streams:

Headwater streams benefit the stream system by:

- reducing flooding by providing a large surface area to water interface, slowing water and allowing it to percolate into the ground.
- Filtering excess nutrients and sediment.
- Receiving organic debris from adjacent areas which becomes vital in forming habitats throughout the system.
- Supporting unique species which can tolerate variability in habitat, flow, temperature, and oxygen.
- Providing a rough surface for water to move against which expends energy and can help to decrease downstream erosion.

Missouri Stream Team

Stream Team Academy Fact Sheet Series

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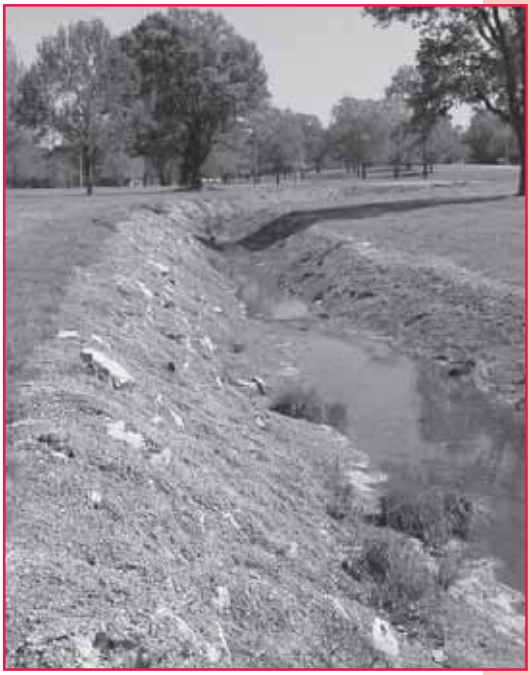
Threats to Headwater Streams:

Headwater streams make up 75% – 95% of streams within a watershed. They act as the ecological anchor for these systems, providing high levels of water quality and quantity, sediment control, and nutrient and woody debris for downstream reaches. All of these functions make them the most vulnerable to human disturbance and land use changes. These changes can encompass urbanization, agricultural conversions, impoundments, or anything that alters the natural landscape. Altering the landscape within a watershed has the potential to change flow patterns to streams that can change velocity, volume, and/or water quality. Clearing native vegetation from the riparian corridor of headwater areas alters the base of the food web for the entire river system. Instead of having organic detritus as the energy source, streams that have been cleared usually get nutrient loading from the surrounding landscapes in the form of manure, detergents, or fertilizers. These sources can be dangerous to the stream, alter the natural food chain, and impair local drinking water supplies.

In urban areas we commonly see headwater streams straightened or diverted through underground culverts or concrete ditches. This speeds the runoff and increases water velocities which in turn does not allow for filtration of nutrients and sediments, or water into the ground. Streams often become "flashy" with rapid rises and falls seen after rain events. All these factors increase the erosive energy that is sent downstream.

Headwater impoundments are another common alteration within watersheds. Impoundments can alter natural flow regimes of streams by storing water that would otherwise reach the stream channel. This change can cause a lack of scouring flows allowing sediment to build up in stream channels, which can cover habitat and invertebrates. Since impoundments prevent water from percolating down to the water table, they loose water from evaporation that would normally enter the system through the stream or groundwater. Water that enters the stream through impoundment overflows can have increased velocities causing excessive erosion, and have higher water temperatures, which can affect the stream biota. Most impoundments are stocked with predacious fish for sport fishing; during overflow events these predators can be introduced into headwater stream systems where they are not usually found. This can reduce native fish populations that normally occur there.



At left is an example of an urban headwater stream that has lost most of its functions because of the alterations to the stream and its corridor.

Summary: Headwater streams are a vital part of natural stream systems. They are often overlooked or abused and many of the changes we see downstream in the watershed can be traced back to these vital drainage areas. It cannot be overstated that healthy headwaters lead to healthy stream systems.

Sources:

Gomi, T., and R.C. Sidle. 2002. Understanding processes and downstream linkages of headwater systems. Bioscience. 52(10). 12p.

Zale, A.V., and D.M. Leslie Jr.. 1989. The physicochemistry, flora, and fauna of intermittent prairie streams: A review of the literature. Biological Report 89(5). 39p.

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Sierra Club