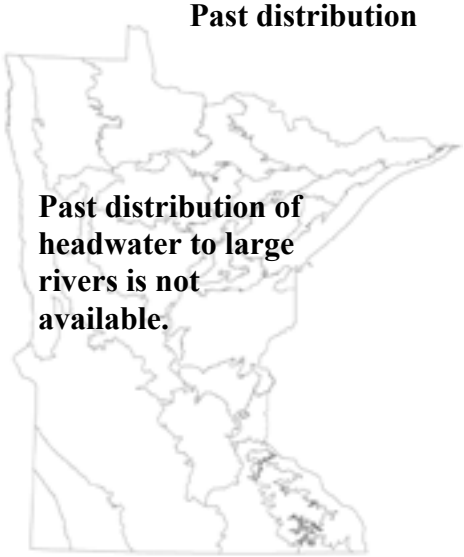
River-Headwater to Large

Ecological Systems	Native Plant Community Types (NPC)	NPC Codes
Not defined	Aquatic systems are not classified in the native plant communities system.	None

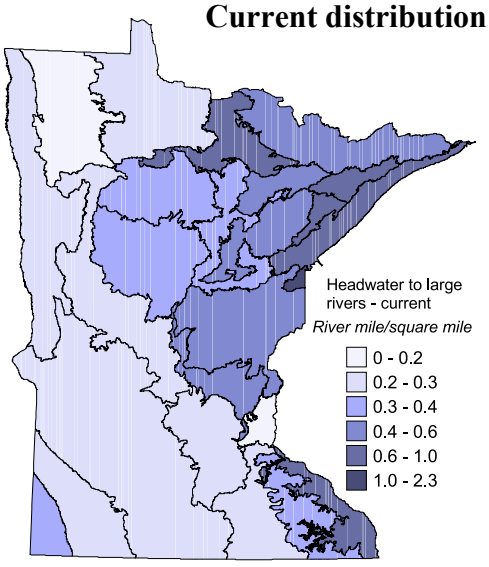
F. Harris MN DNR

Cottonwood River, Brown County

Past distribution



Current distribution



Source: MN DNR 24k Rivers and streams 1980

General Description

As the title of this category implies, headwater to large rivers encompass a large category of river habitats. The generality of this stream classification reflects our current lack of understanding and development in aquatic habitat classifications. The CWCS process initiated a simple classification of streams to provide more detail for this broad category of headwater to large rivers, but much work remains to be done.

Rivers in the headwater to large category range in size from just a few feet to more than 100 feet (30 m) wide. They can also be either warm or cold water, the latter often being designated trout streams. The CWCS process used information on species habitat needs and stream survey data from the Minnesota Pollution Control Agency (MPCA) to identify six different categories of river systems within this broader category:

1. Headwater, warm
2. Headwater, cold
3. Moderate, warm
4. Moderate, cold
5. Large, warm
6. Large, cold

Delineating the sizes of these rivers depended on the size of the watershed they drain which ranged from just a few square miles to over 200 square miles (520 km^2). The actual sizes of the streams in these categories were summarized using data from the MPCA (Table 6.1).

Table 6.1 River Size Descriptions

Stream Size	Watershed Area	Maximum Width
Headwater	< 25 mi^2 (65 km^2)	averages ~ 13 ft (4 m) across, varies from ~ 3–23 ft (1–7 m)
Moderate	25–200 mi^2 (65–520 $km^{2)}$	averages ~ 33 ft (10 m) across, varies from ~ 16–50 ft (5–15 m)
Large	> 200 mi^2 (520 km^2)	averages ~ 100 ft (30 m) across, varies from ~ 50–150 ft (15–45 m)

The relationship between watershed area and river size varies by watershed province in which the stream is located; in particular, rivers in the Minnesota River basin do not increase in size with watershed basin area as sharply as streams in the other watershed provinces (See Chapter 7, Figure 7.1). This variability should be considered during implementation of this strategy. The importance of watershed province extends beyond stream morphological characteristics. Aquatic species distributions are highly influenced by geographic barriers, and historical influences of glaciation and stream channel connections shaped the animal communities found in these different watershed provinces today.

Although there are important differences between the rivers in this broad category, they do share the five major components of hydrology, geomorphology, water quality, connectivity, and biology described in the Rivers Overview section.

The use of stream size and water temperature in the CWCS aquatic classification is an attempt to capture some of these components of river systems. Headwater streams tend to have cooler water, fast velocities, and shallower pools. As streams increase in size, the likelihood of cold water decreases, velocities are typically slower, and pools can be deeper. Larger streams tend to have a more complicated geomorphology, and are more likely to have dams that limit their connectivity. Water quality of headwater streams is often affected by human activities, particularly by chemical pollutants, but as streams increase in size, a greater number and variety of pollutant inputs further reduce water quality. However, larger streams tend naturally to have a higher sediment load, and species have adapted to such features; many headwater species require high water quality.

Examples of Important Features for Species in Greatest Conservation Need

The **redside dace,** a fish species in greatest conservation need, is most abundant in clear, spring-fed, coldwater streams. It typically occurs in pools with moderate current and overhanging vegetation and spawns in riffles or shallow flowing pools. Another fish SGCN, the **plains topminnow,** is also most common in headwater streams of high water quality but does not require cold water. In addition, it requires sandy to rocky substrates and moderate to rapid currents. The **creek heelsplitter** mussel is found in headwater to moderate sized, warmwater streams. It is usually found in swift currents with a substrate of sand, fine gravel, and mud, often downstream of riffles in small pools.

The **largescale stoneroller, black redhorse,** and **greater redhorse** are all found in moderate-sized warmwater streams. Largescale stonerollers require clear water with moderate to swift current, often in deep, fast riffles. They require gravel bottoms and are intolerant of siltation, as they feed by overturning small stones; hence the name stoneroller. Black redhorses prefer pools with gravelly to rocky, occasionally sandy and silty, bottoms. They spawn in gravel and fine rubble runs and riffles in water about 8 - 24 inches (20- 60 centimeters) deep. The greater redhorse also requires clear water with moderate to fast-flowing currents, and clean sand or gravel substrates.

The **least darter** occurs in moderate to large warmwater streams, as well as large, deep lakes. It prefers heavily vegetated areas with sluggish flow, immediately downstream of pools in the spawning and growing season, and overwinters in the deep water of pools.

The **crystal darter** occurs in large to very large, warmwater rivers. It is usually in water more than 24 inches (60 centimeters) deep with strong current, and along expanses of clean sand and gravel, where it buries itself in sand with only its eyes protruding.

Management Options to Support Species in Greatest Conservation Need

- Support the removal of dams where appropriate to restore movement corridors.
- Advocate for maintenance of natural flow regimes.
- Provide technical assistance and incentives to support best management practices and the maintenance of native vegetation in riparian areas.

M. Lee MN DNR

Seepage fed stream, Stearns County

D. Rose MN DNR

Root Rover, Fillmore County