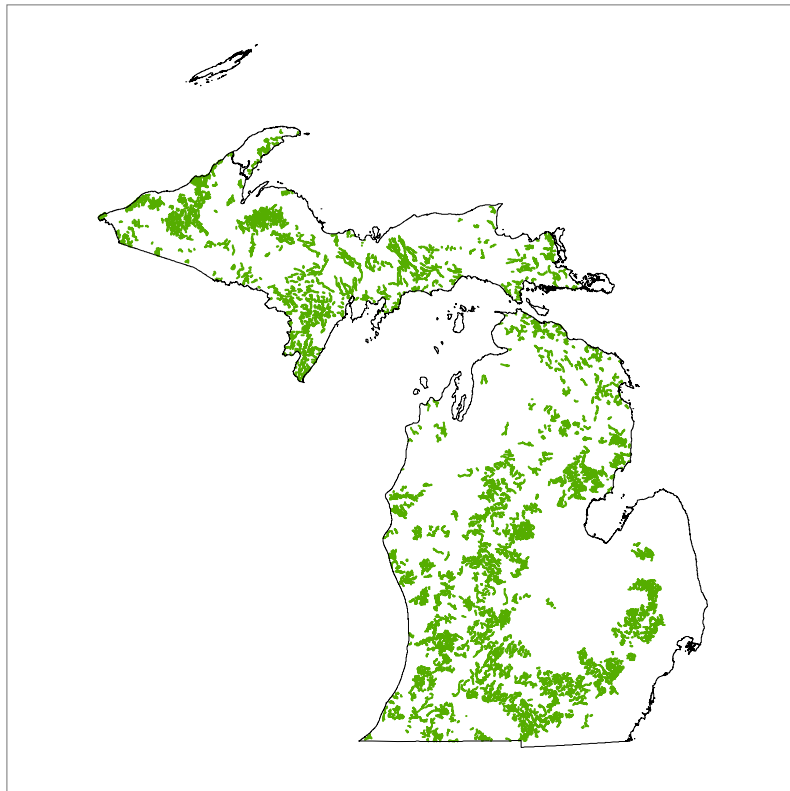


Cool (or Warm-transitional) Stream

A Brief Ecological Description of this Michigan River Type

Cool Stream segments are defined (by the Michigan Department of Natural Resources, Fisheries Division) as typically having drainage areas $< 80 \text{ mi}^2$ and cool July mean water temperatures between 67.1°F and 69.8°F . These cool temperatures occur in landscapes of fine and medium textured geologies and gentle topographic relief, where groundwater deliveries to stream channels are moderate. **Cool Streams** are generally found in the transitional regions between colder and warmer stream regions and are also widespread across the Upper Peninsula where summer air temperatures remain cool.

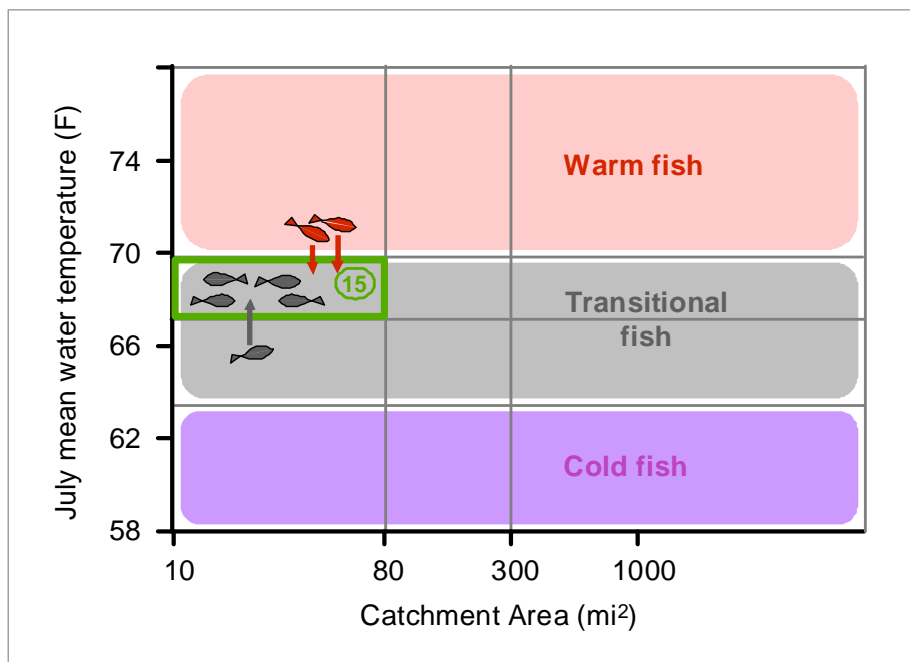
*Figure 1. Geographic distribution of **Cool Stream** segments in Michigan.*



Fish Species of **Cool Streams**

Cool Streams are home to a variety of fish species that tolerate cool and diurnally variable temperatures, and smaller waters. The typical summer fish assemblage of a Michigan **Cool Stream** includes 15-20 fish species: most adapted to transitional and somewhat variable temperatures (minnows, daces, chubs, suckers, bullheads, mudminnows, and darters), and a few warm-adapted (shiners, chubs, pikes, and sunfishes).

Figure 2. Michigan's **Cool Streams** type highlighted (**green box**) on the environmental gradients of river segment catchment area and July mean water temperature. The typical number of characteristic fish species for this river type is shown **circled in green**. And the proportional makeup of the expected fish assemblage for this river type is shown by the number of colored fish icons representing each of three thermal preference zones.



Photos of some fish species characteristic of Michigan's **Cool Streams**. Warm fishes are **red font**; thermally transitional fishes are **gray font**.



green sunfish (www.wiscfish.org)



John Lyons

grass pickerel (www.wiscfish.org)



white sucker (www.gwsphotos.com)



central stoneroller (www.gwsphotos.com)



johnny darter (www.nativefish.org)



central mudminnow (K. Schmidt MN DNR)



creek chub (www.gws.photos.com)

Fish species characteristic of Michigan's **Cool Streams**. This is a generalized, potential species list for an "average" river site; samples from any specific site are expected to be a variable subset of this list. Fish species are listed in descending order of their preferred mean July temperature, based on Michigan river surveys (Zorn et al. In press). Warm fishes are **red font**; thermally transitional fishes are gray font.

Rainbow darter

Blackside darter

Common shiner

Hornyhead chub

Green sunfish

Grass pickerel

White sucker

Central stoneroller

Black bullhead

Johnny darter

Central mudminnow

Creek chub

Western blacknose dace

Northern redbelly dace

Mottled sculpin

Literature on Michigan River and Stream Fish Assemblages and their Relationship to Summer Water Temperatures

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