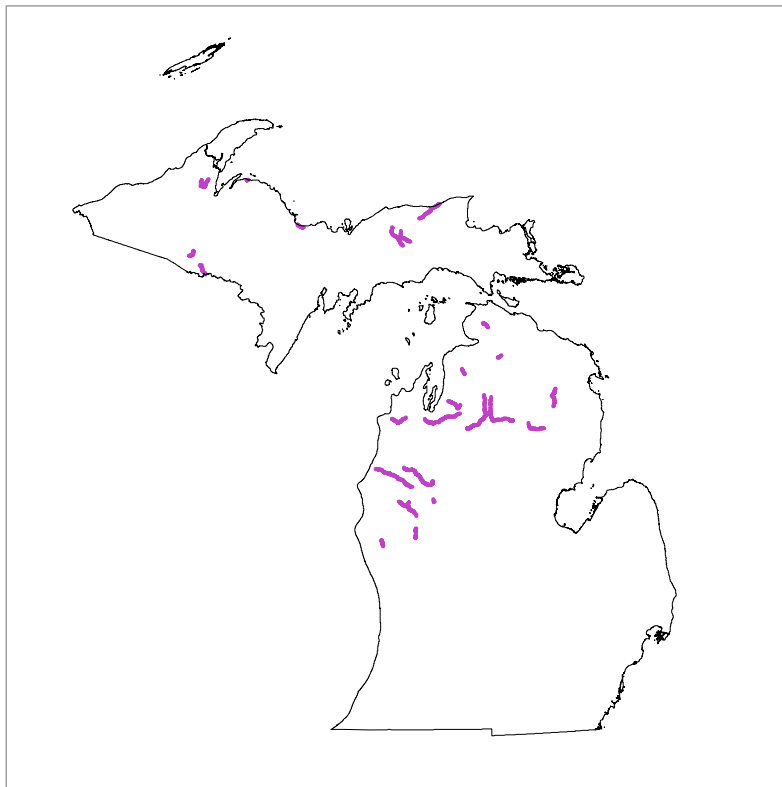


Cold Small River

A Brief Ecological Description of this Michigan River Type

Cold Small River segments are defined (by the Michigan Department of Natural Resources, Fisheries Division) as typically having drainage areas between 80 mi² and 300 mi², and cold July mean water temperatures < 63.5°F. Only a handful of Michigan's small rivers maintain such cold (and stable day-night) July water temperatures. Such rivers typically begin as **Cold Stream** headwaters, and then continue to receive very strong groundwater inputs all along the river channel; enough to offset the upriver warming tendencies of a river's water mass. Such cold temperatures are maintained in regions where hills made of coarse-textured materials develop large aquifers that deliver very strong groundwater inputs down slope to the stream channel (much of the northwest and northeast Lower Peninsula); or in regions where groundwater inputs are more modest but summer air temperatures remain quite cool (such as along the Lake Superior shoreline). Michigan's **Cold Small Rivers** represent an extremely rare resource within the Midwestern U.S.

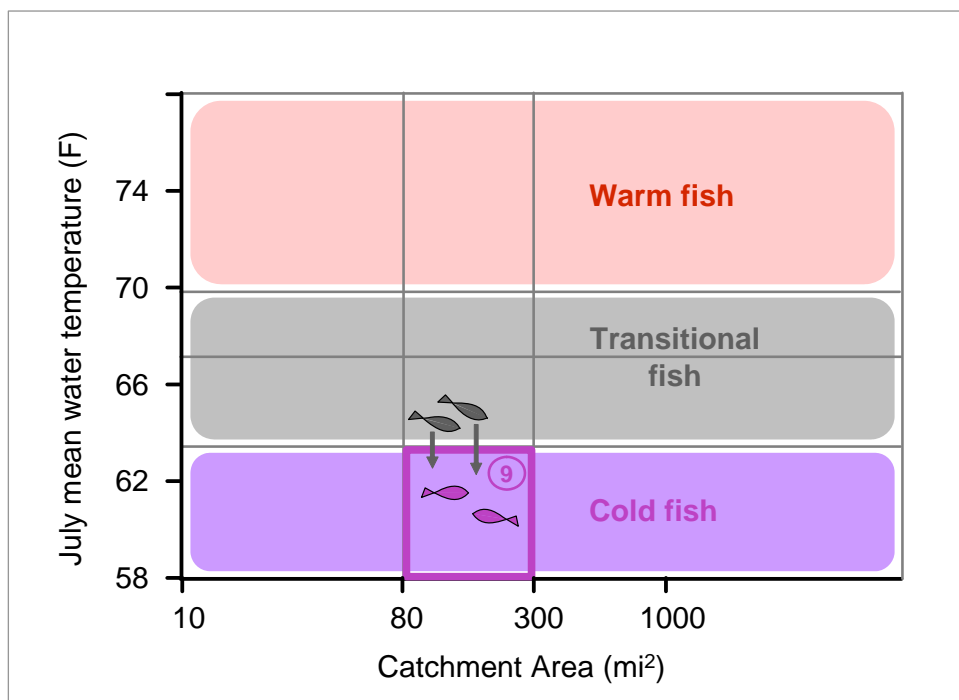
Figure 1. Geographic distribution of **Cold Small River** segments in Michigan.



Fish Species of **Cold Small Rivers**

July water temperatures in a **Cold Small River** are diurnally (day-night) stable (constantly cold, even on a hot summer day) because of the continuous input of groundwater. Flow discharge and velocities are strong, even during the lowest-flow months. The typical summer fish assemblage of a Michigan **Cold Small River** includes only 7-12 species adapted to cold or thermally transitional conditions: daces, juvenile salmons, trouts, and sculpins. No warmwater fishes are found. **Cold Small Rivers** anchor the cold end of the summer water temperature range for Michigan river systems and support excellent populations of coldwater fishes; small changes in July water temperature will not result in a significant change to fish populations.

Figure 2. Michigan's **Cold Small Rivers** type highlighted (**purple 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 purple**. 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 **Cold Small Rivers**. Thermally transitional fishes are **gray font**; cold fishes are **purple font**.



N. redbelly dace (K. Schmidt MN DNR)



rainbow trout juvenile (www.calfish.org)



mottled sculpin (www.nativefish.org)



brown trout (K. Schmidt MN DNR)

Fish species characteristic of Michigan's **Cold Small Rivers**. 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). Thermally transitional fishes are gray font; cold fishes are purple font.

Western blacknose dace

Northern redbelly dace

Mottled sculpin

Chinook salmon

Rainbow trout

Brown trout

Coho salmon

Brook trout

Slimy sculpin

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

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