Warm Stream

A Brief Ecological Description of this Michigan River Type

Warm Stream segments are defined (by the Michigan Department of Natural Resources, Fisheries Division) as typically having drainage areas < 80 mi^2 and warm July mean water temperatures greater than 69.8ºF. These warm temperatures occur in landscapes of fine textured, silt/clay geologies and flat topographic relief, where groundwater deliveries to stream channels are minimal. **Warm Streams** are generally found in former glacial lake beds and are most common in southeastern Michigan.

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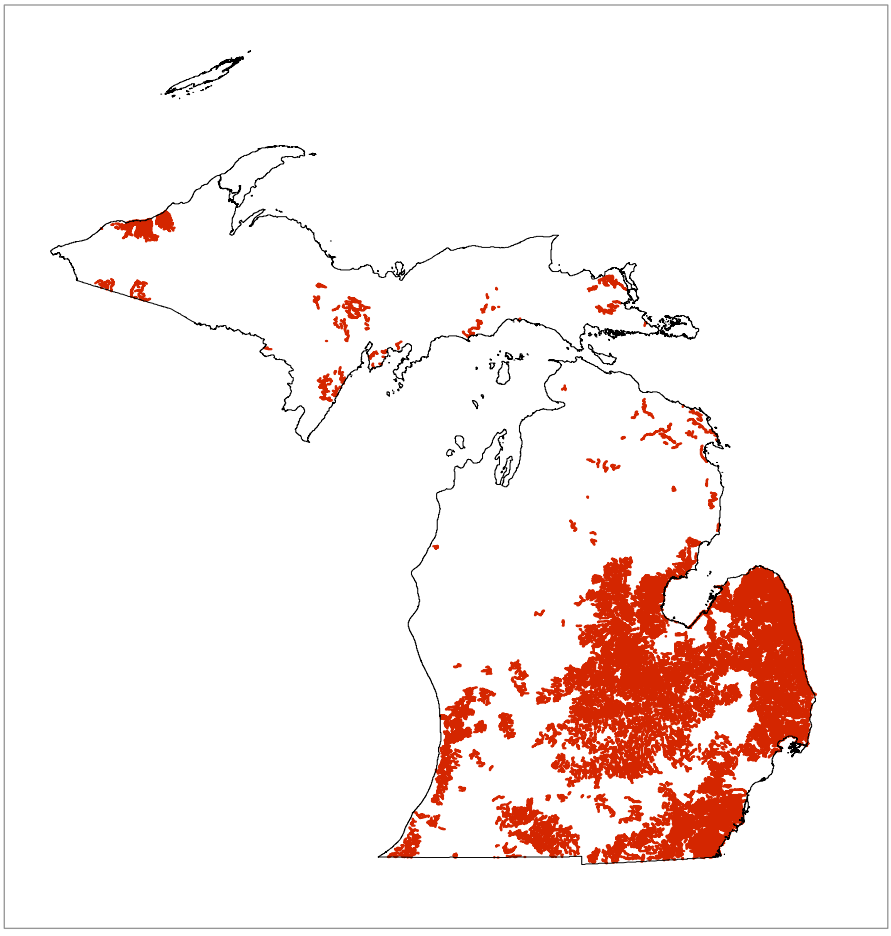
*Figure 1. Geographic distribution of **Warm Stream** segments in Michigan.*



Fish Species of **Warm Streams**

Warm Streams are home to a limited number of fish species that tolerate extreme diurnal temperature fluctuations (often 50ºF), associated swings in dissolved oxygen concentrations, and smaller waters. The typical summer fish assemblage of a Michigan **Warm Stream** includes 15-18 tolerant fish species, including several adapted to transitional temperatures (chubs, minnows, daces, bullheads, mudminnows, and darters), and a few warm-adapted species (shiners, pikes, pirate perch, and sunfishes).

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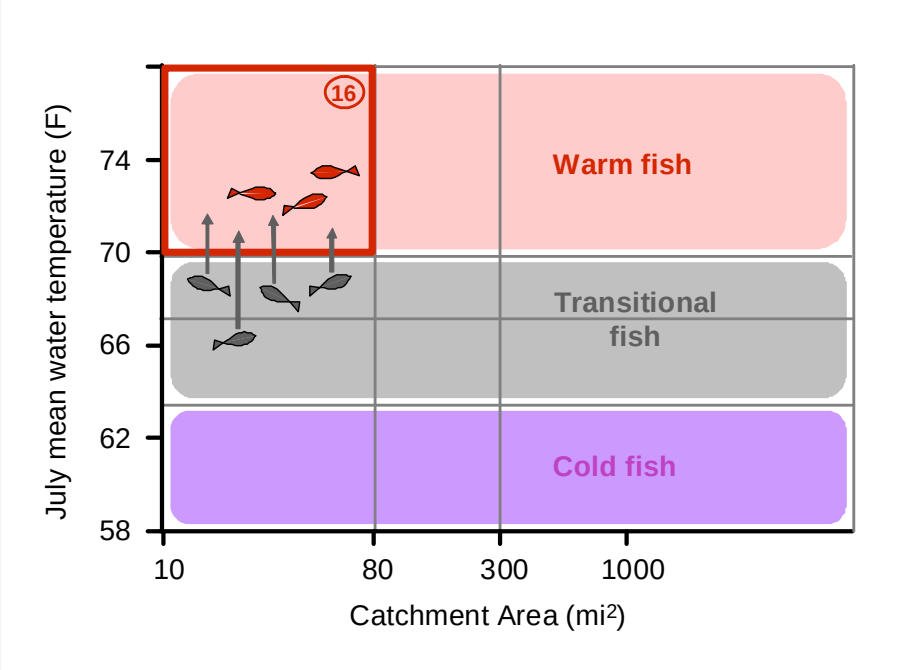
*Figure 2. Michigan's **Warm Stream** type highlighted (**red box**) on the environmental gradients of river segment catchment area and July mean water temperature.* The typical number of characteristic fish species for this river type is shown circled in red. And the proportional makeup of the expected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



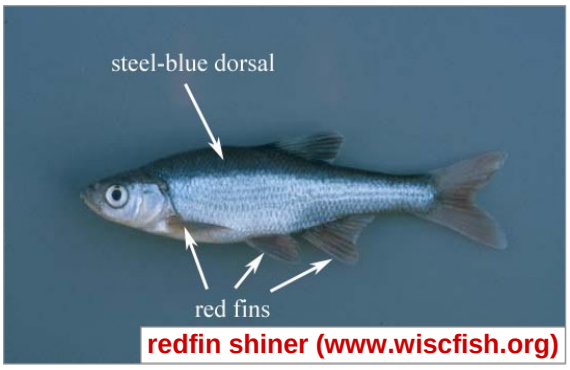
Photos of some fish species characteristic of Michigan's **Warm Streams**. Warm fishes are **red font**; thermally transitional fishes are **gray font**.

pirate perch (K. Schmidt MN DNR)

central stoneroller (www.gwsphoto.com)

green sunfish (www.wiscfish.org)

black bullhead (www.wiscfish.org)



redfin shiner (www.wiscfish.org)

johnny darter (www.nativefish.org)

fathead minnow (www.wiscfish.org)

Fish species characteristic of Michigan's **Warm 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.

Longear sunfish
Tadpole madtom
Pirate perch
Hornyhead chub
Common shiner
Green sunfish
Blackside darter
Grass pickerel
Redfin shiner
Fathead minnow
White sucker
Central stoneroller
Black bullhead
Johnny darter
Central mudminnow
Creek chub

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

Bailey, R. M., and G. R. Smith. 2002. Names of Michigan fishes. Michigan Department of Natural Resources, Fisheries Division, Ann Arbor.

Brenden, T. O., L. Wang, and P. W. Seelbach. 2008. A landscape-based river valley segment classification of Michigan rivers and streams for fisheries and environmental management. Transactions of American Fisheries Society 137:1621-1636.

Lyons, J., T. G. Zorn, J. Stewart, P. W. Seelbach, K. E. Wehrly, and L. Wang. In Press. Defining, characterizing, and quantifying coolwater streams and their fish assemblages in Michigan and Wisconsin, USA. North American Journal of Fisheries Management.

Wehrly, K. E., M. J. Wiley, and P. W. Seelbach. 2003. Classifying regional variation in thermal regime based on stream fish community patterns. Transactions of the American Fisheries Society 132:18–38.

Zorn, T. G., P. W. Seelbach, and M. J. Wiley. 2002. Distributions of stream fishes and their relationship to stream size and hydrology in Michigan's Lower Peninsula. Transactions of the American Fisheries Society 131:70–85.

Zorn, T. G., P. W. Seelbach, and M. J. Wiley. In press. Relationships between habitat and fish density in Michigan streams. Michigan Department of Natural Resources, Fisheries Research Report, Ann Arbor.

Zorn, T. G., P. W. Seelbach, E. S. Rutherford, T. C. Wills, S. Cheng, and M. J. Wiley. 2008. A regional-scale habitat suitability model to assess the effects of flow reduction on fish assemblages in Michigan streams. Michigan Department of Natural Resources, Fisheries Research Report 2089, Ann Arbor.
