Cold-transitional Stream

A Brief Ecological Description of this Michigan River Type

Cold-transitional Stream segments are defined (by the Michigan Department of Natural Resources, Fisheries Division) as typically having drainage areas < 80 mi^2 and fairly cold July mean water temperatures between 63.5ºF and 67.1ºF. These fairly cold temperatures occur where groundwater deliveries to stream channels are substantial but not as strong as for **Cold Streams**. **Cold-transitional Streams** often drain landscapes with highly permeable geologies that develop large aquifers, but where topographic relief is moderate; in a sense in "the foothills" of the landscapes that produce **Cold Streams**. **Cold-transitional Streams** are quite common across the Upper Peninsula where summer air temperatures remain quite cool, and can also occur where streams drain steep valley walls of larger, incised river valleys and receive groundwater inputs from upslope aquifers. **Cold-transitional Streams** contribute to Michigan's unusually abundant coldwater resources.

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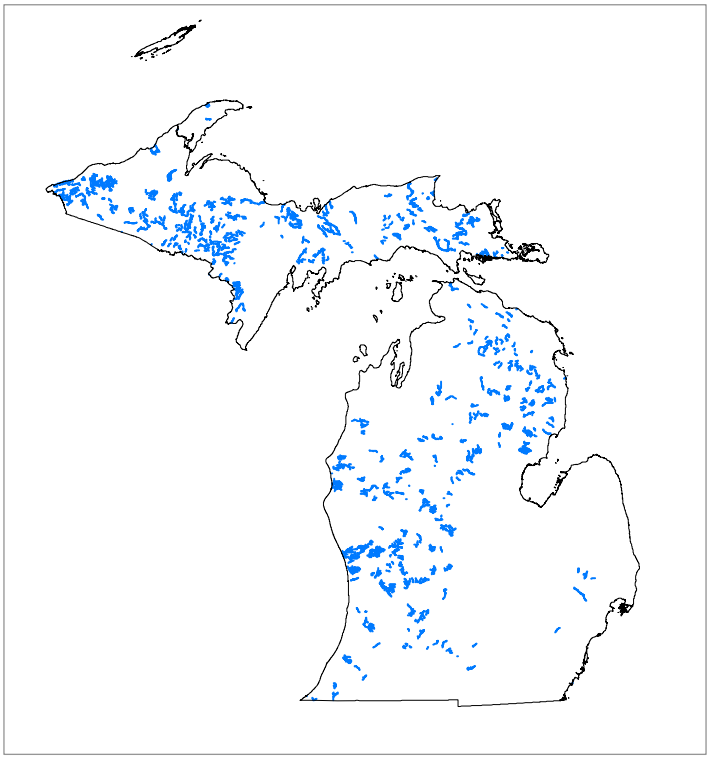
*Figure 1. Geographic distribution of **Cold-transitional Stream** segments in Michigan.*



Fish Species of **Cold-transitional Streams**

July temperatures in **Cold-transitional Streams** fall at the warmer edge of the acceptable range for trouts and juvenile salmons, and the slightly warmer (than in **Cold Streams**) temperatures often promote rapid growth in trout and salmon. The typical summer fish assemblage of a Michigan **Cold-transitional Stream** includes 10-18 fish species: some cold-adapted (juvenile salmons, trouts, and sculpins), and several that are well-adapted to grow and reproduce at cool temperatures (daces, chubs, suckers, mudminnows, and sculpins). It is also not unusual for limited numbers of warm-adapted species to be present. **Cold-transitional Stream** fish populations are sensitive to small changes in July water temperature.

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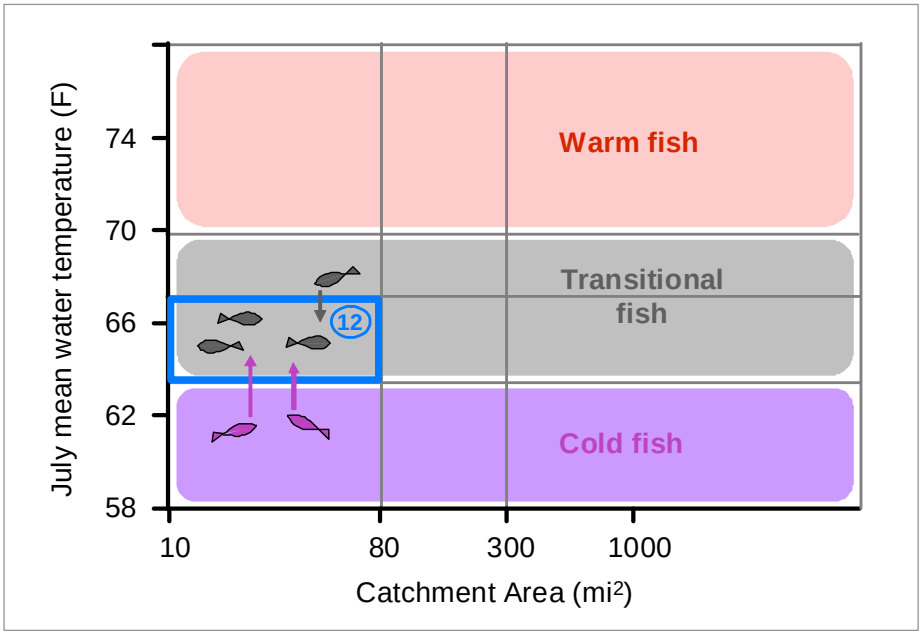
*Figure 2. Michigan's **Cold-transitional Streams** type highlighted (**blue box**) on the environmental gradients of river segment catchment area and July mean water temperature.* The typical number of characteristic fish species for this river type is shown circled in blue. And the proportional makeup 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-transitional Streams**. Thermally transitional fishes are **gray font**; cold fishes are **purple font**.

white sucker (www.gwsphotos.com)

w. blacknose dace (www.wiscfish.org)

n. redbelly dace (K. Schmidt MN DNR)

mottled sculpin (www.nativefish.org)

rainbow trout juvenile (www.calfish.org)

brown trout (K. Schmidt MN DNR)

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

White sucker
Johnny darter
Central mudminnow
Creek chub
Western blacknose dace
Northern redbelly dace
Mottled sculpin
Brook stickleback
Chinook salmon
Rainbow trout
Brown trout
Coho salmon

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.