

Mapping the Distribution of Great Lakes Migratory Fish

What did we do?

Scientists in the Michigan Chapter of the Nature Conservancy have recently completed the first comprehensive map of priority river habitat for Great Lakes migratory fish. Drawing on 40 sources of field samples, we painstakingly lined up samples with one stream map. We then calculated the value of every reach of stream for each of the 40 species analyzed. Figure 1 shows an example of this work for one species, yellow perch. We were also interested which watersheds stood out as high value for the whole set of migratory species. That result is shown in Figure 2.

Why does this matter?

In the Great Lakes Basin, connectivity is essential not only within rivers, but also supports the phenomenon of freshwater migration, where at least forty species of fish use the Lakes' tributaries as part of their natural life cycle—usually for spawning, but sometimes to forage or find refuge from warm water or predators. These fish spend a portion of their life in nearshore, coastal wetland, or offshore systems linking Great Lakes freshwater ecosystems through transfer of energy and materials among all these habitats.

The lack of access to spawning habitat, due primarily to dams and improperly installed road-stream crossings, puts all migratory fish species at risk. Currently, dams block 68% of the stream habitat that could be connected to the Great Lakes, and we predict that over 150,000 road crossings further fragment this habitat.

How will we use this information?

The map of priority habitat for migratory fish is fundamental to identifying priority areas to restore connectivity. In the Great Lakes priorities are essential for two reasons. First, the loss of connectivity is widespread. Second, because of the presence of aquatic invasive species in the lakes that benefit from access to tributary habitat, current dams serve as a valued barrier to the spread of species like Sea Lamprey, and future invaders. We need to know what the tradeoff is between habitat gained for migratory fish and potential exacerbation of a challenging management issue.

Our data is being incorporated into a sophisticated barrier removal optimization model, Fishwerks (Greatlakesconnectivity.com) that allows decision makers to consider the benefit to habitat access and fish species, as well as consider the cost of restoration and invasive species control. With fish distribution data, we can optimize for the biggest return of fish to their spawning habitats.

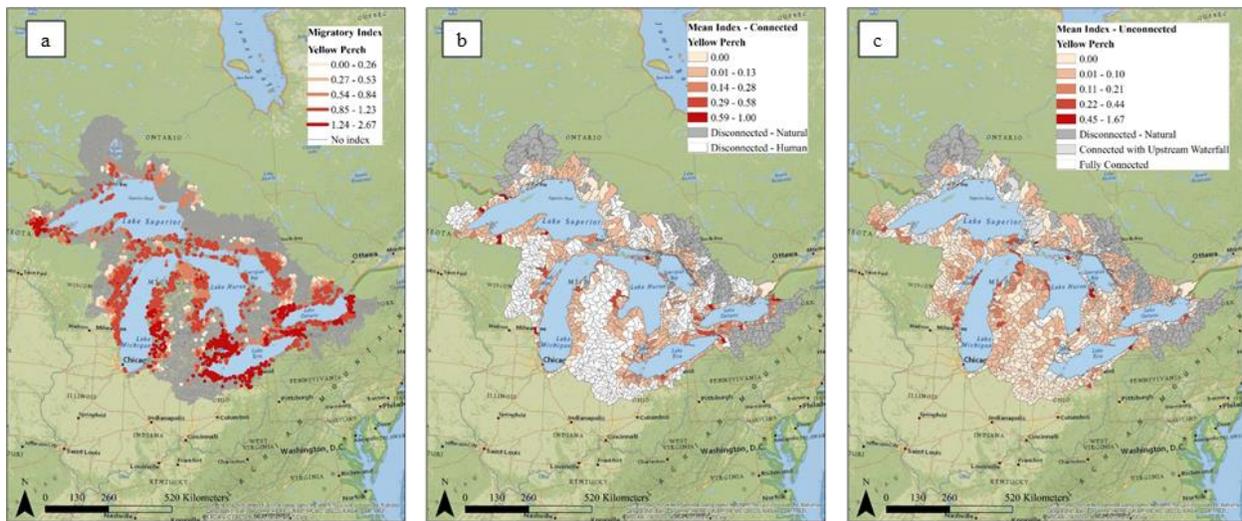


Figure 1a-c. Tributaries that analyses indicate are important to yellow perch for (a) specific stream locations, (b) watersheds using only stream reaches connected to the Great Lakes, and (c) watersheds based only stream reaches that are unconnected to the Great Lakes.

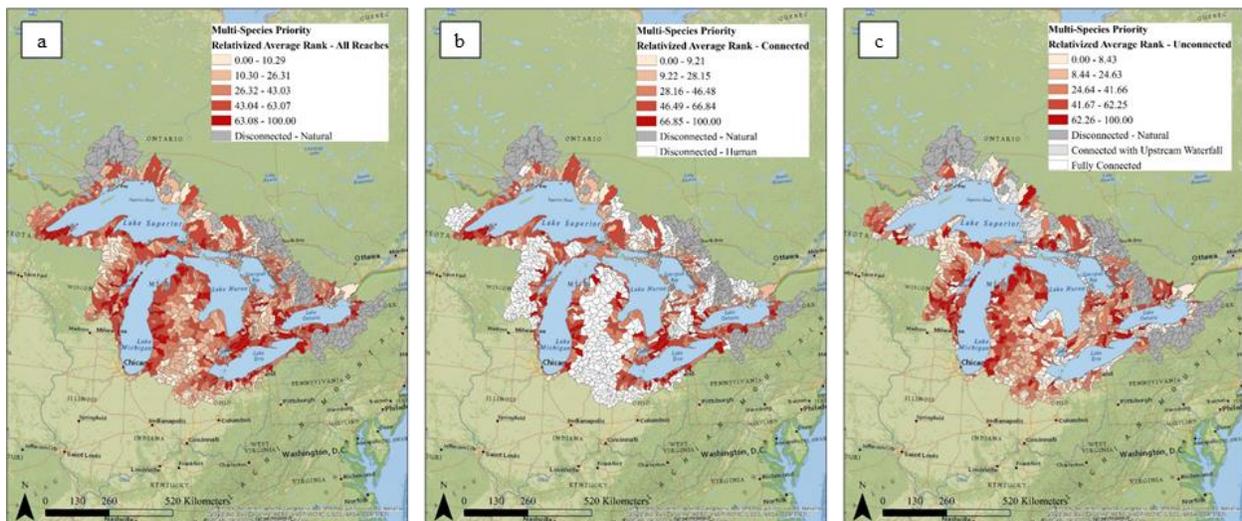


Figure 2a-c. Multi-species priorities determined by average rank of index score for watersheds using data from a) all reaches, (b) only reaches connected to the Great Lakes, and (c) only reaches unconnected to the Great Lakes.