

Ultraviolet (UV) Radiation in Midwest Lakes

Its impact on fish and fisheries

Photo by Paul Vecsei

The Problems: Increased Water Clarity and Climate Change

The spread of invasive mussels (*Dreissena spp.*) has increased water clarity in many Midwest lakes, as the mussels filter algae out of the water. Fish are at greater risk of damage from UV radiation in clearer water, and will move deeper, hide under structure, and take refuge under ice to avoid harm. However, warming temperatures from climate change are reducing ice cover on many lakes, threatening early life stages of species like Cisco with increased exposure to UV radiation.

Midwest and Great Lakes Restoration

State, Tribal, First Nation, U.S., and Canadian partners have improved habitat, water quality, and fisheries in the Midwest and Great Lakes region in recent decades. In the Great Lakes, these partners are now beginning to restore native fish species such as Cisco (Ojibwa, *Coregonus artedii*), which is an important forage fish that supports recreational and commercial fisheries as well as the lake ecosystem.

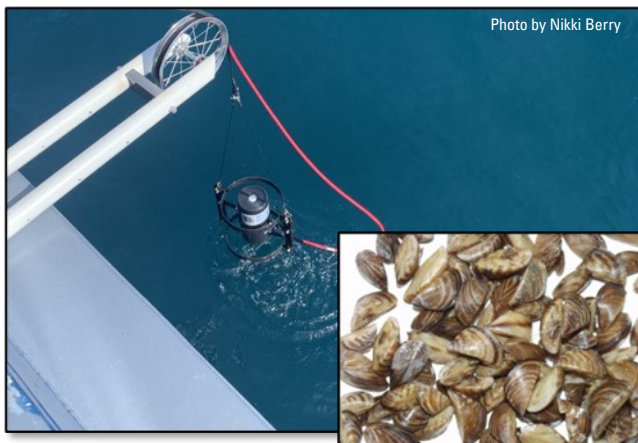


Photo by Nikki Berry

Photo by Amy Benson

Top: A UV radiation profiling instrument that records readings of UV radiation underwater. Bottom: Invasive Zebra Mussels, which filter water and have spread across the Great Lakes region.

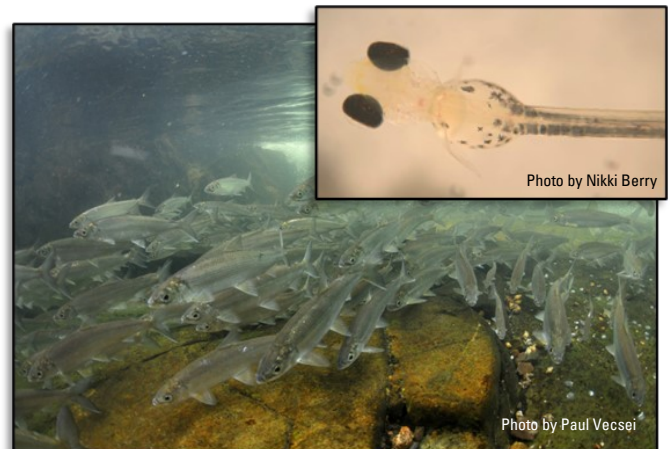


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Top: Larval Cisco under a microscope showing spots of pigment that protect against UV radiation. Bottom: Cisco schooling in the shallows. Cisco lay eggs in shallow water, where they overwinter under ice.

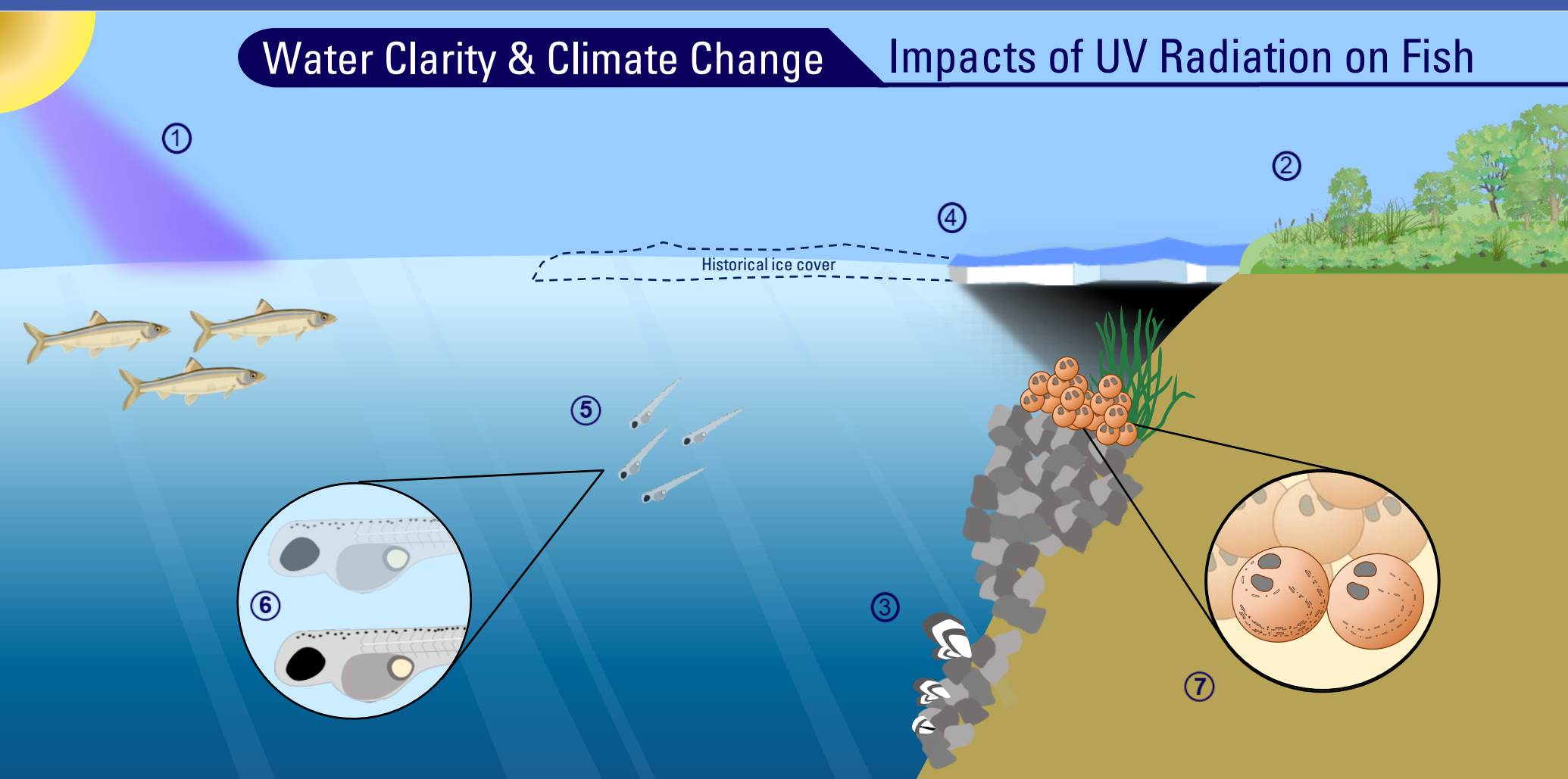
USGS Research regarding UV Impacts on Midwest Fish (and Fisheries)

The U.S. Geological Survey's Great Lakes Science Center and Miami University are supported by the Midwest Climate Adaptation Science Center to evaluate how UV radiation might be impacting fish and fisheries in Midwest lakes, including the Great Lakes. The team is investigating the likelihood of UV exposure to fish in key habitats and the potential impacts on those fish, variations in UV tolerance among fish, the ability of fish to protect against exposure at different life stages, and the relationship between UV exposure and the distribution of fish. Scan the QR code on the right to learn more!



Water Clarity & Climate Change

Impacts of UV Radiation on Fish



- 1** UV rays can harm fish and other aquatic organisms; water clarity is increasing, which may put some species at risk
- 2** Management of land use and nutrient runoff in recent decades has improved water clarity in many lakes
- 3** Invasive mussels are increasing water clarity in many Midwestern lakes
- 4** Climate change is reducing ice cover in shallow areas where it typically protects fish eggs from UV rays and winter storms
- 5** In clear lakes, larval fish may move below the surface waters to avoid UV radiation, potentially affecting their feeding and growth
- 6** Larval fish lack scales and can have varying levels of pigmentation that can protect them from UV radiation
- 7** Fish eggs have a shell that may provide them with more protection from UV radiation. UV tolerance varies with species and egg vs larval stage