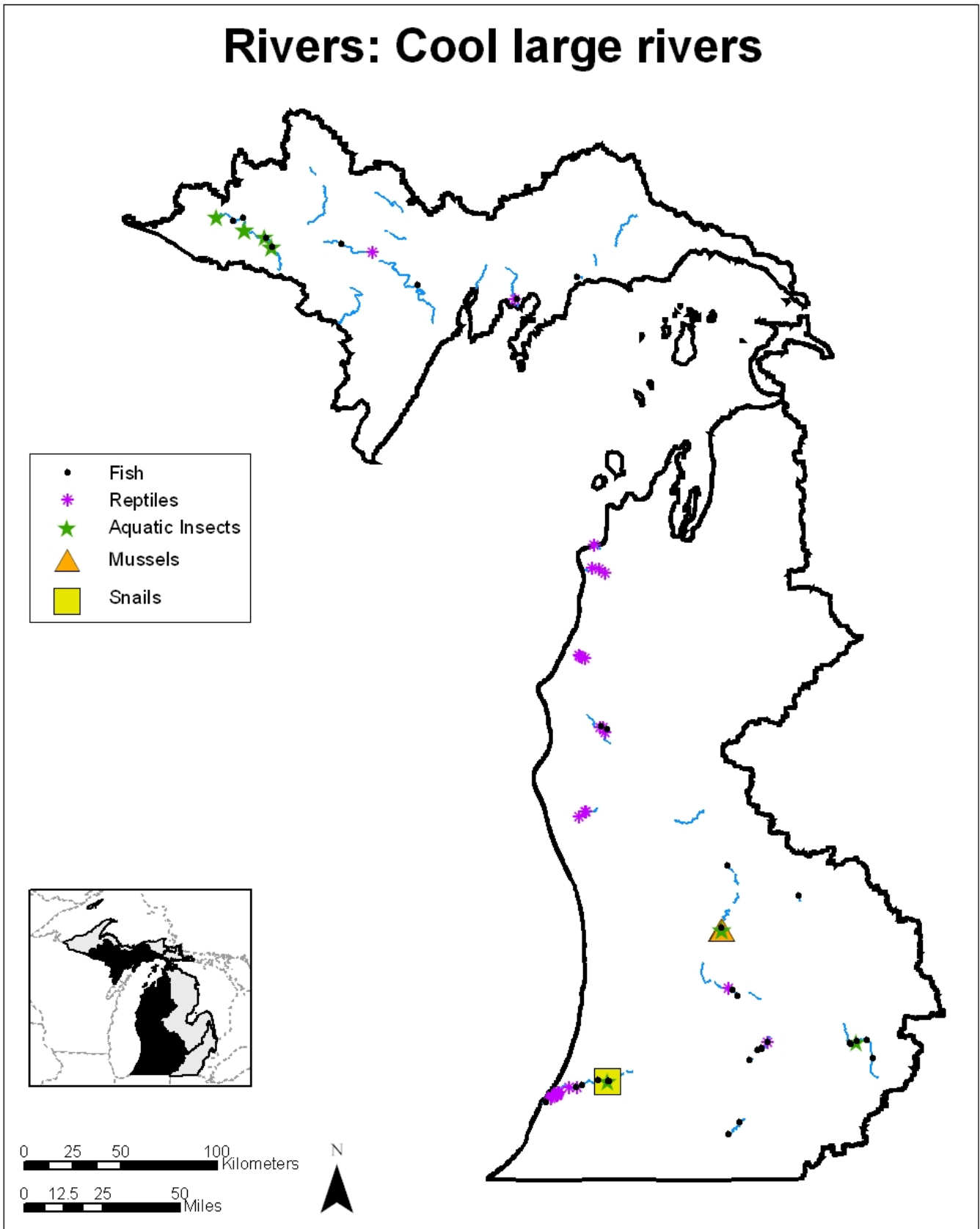


## Rivers: Cool large rivers



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### Description

Large rivers are wadeable and non-wadeable systems that have a midpoint catchment area from 180 to 620 square miles. Large rivers are intermediate stream order systems with diverse substrate and habitat. Cool large rivers in Michigan are usually runoff-driven systems with fair to moderate baseflow and peak flow. The gradient varies from low to high and most flow through confined or unconfined glacial or alluvial valleys. July weekly mean temperatures in these systems range from 19-22°C (66-72°F).

### General Condition of Feature

This habitat is considered 35% in good to excellent condition, 20% in fair condition, and 45% in degraded to very degraded condition.

### Associated Species of Greatest Conservation Need

#### MUSSELS

Specific associations with this landscape feature were not found in the literature

#### SNAILS

Specific associations with this landscape feature were not found in the literature

#### INSECTS

Specific associations with this landscape feature were not found in the literature

#### FISH

lake sturgeon (*Acipenser fulvescens*)  
spotted gar (*Lepisosteus oculatus*)  
mooneye (*Hiodon tergisus*)  
river chub (*Nocomis micropogon*)

#### FISH cont.

bigmouth shiner (*Notropis dorsalis*)  
river redhorse (*Moxostoma carinatum*)  
black redhorse (*Moxostoma duquesnei*)  
golden redhorse (*Moxostoma erythrurum*)  
brown bullhead (*Ameiurus nebulosus*)  
stonecat (*Noturus flavus*)  
cisco or lake herring (*Coregonus artedii*)  
slimy sculpin (*Cottus cognatus*)  
sauger (*Sander canadensis*)

#### REPTILES

Specific associations with this landscape feature were not found in the literature

### Associated Threats

#### MODIFICATION OF NATURAL PROCESSES

- Altered hydrologic regimes: Water withdrawals; Dams result in peak and low flows outside of natural flow regimes; Hydropower development and associated flow modification; Altered timing and magnitude of run-off events (too much open area in watershed)
- Climate change: (low threat)
- Fragmentation: Dams prohibit upstream migration of fish; Road crossings and culverts can fragment habitat if species will not pass through them

#### POLLUTION

- Altered nutrient inflows
- Altered sediment loads: Erosion; Increased sediment bed load reduces spawning habitat; Sedimentation
- Pesticides and herbicides
- Thermal changes
- Urban, municipal, and industrial pollution: Industrial pollution; Municipal pollution

#### HABITAT CONVERSION

- Dams: Dams alter flows and prohibit upstream migration of fish; Altered flows due to dams result in peak and low flows outside of natural flow regimes; Hydropower development and associated flow modification
- Dredging and channelization: Commercial ship traffic; Dredging; Channelization
- Riparian modification: Seawalls; Shoreline stabilization projects alter shoreline; Development (unregulated) of all kinds; Marinas
- Wetland modification: (low threat)

#### BIOLOGICAL INTERACTIONS

- Invasive plants and animals: (low threat)

#### EDUCATION

- Social attitudes: (low threat)

### Conservation Actions Needed (Threats addressed)

#### LAND, WATER & SPECIES MANAGEMENT

- Control and prevent aquatic invasive species introductions and establishments (Invasive plants and animals)
- Develop integrated pest management plans (Invasive plants and animals)

**MICHIGAN'S WILDLIFE ACTION PLAN**  
**AQUATIC SYSTEMS: LAKE MICHIGAN BASIN**

- Engineered drainage channels should mimic natural stream channel stability, i.e., channel dimension, pattern, and profile (dredging and channelization)
- Maintain or establish riparian buffers of at least 50 ft., but 500 ft. or wider maximizes conservation benefits (altered sediment loads, riparian modification)
- Maintain or rehabilitate river to original flow path and hydrologic functions, i.e., seasonal flooding, connect meanders, throughflow, wetlands (altered hydrologic regimes)
- Soften or remove hard river structures (riparian modification)
- Work with road commissions of the siting and maintenance of stream crossings (fragmentation)

**LAW & POLICY**

- Assess dam siting to ensure minimal affects and require fish passage both upstream and downstream (dams)
- Continue Natural Rivers planning (variety of threats)
- Continue to use the most current information and innovative methods in cleaning up chemical spills (Urban, municipal, and industrial pollution)
- Continued vigilance and cooperation on preventing more aquatic invasive species establishments (Invasive plants and animals)
- Encourage sound water withdrawal practices that take into account biotic needs (altered hydrologic regimes)
- Encourage townships to separate combined sewer systems (altered nutrient inflows)
- Encourage use of natural materials or soft engineering techniques for any river modification (riparian modification)
- Enforce the use of sediment barriers and best management practices during road siting, construction, and maintenance (altered sediment loads)
- Implement and continually improve storm water and non-point source best management practices (Urban, municipal, and industrial pollution)
- Implement USDA soil conservation practices to reduce erosion (altered nutrient inflows)
- Manage or modify remaining dams to release water to mimic natural river conditions (altered hydrologic regimes, dams)
- Protect and rehabilitate groundwater recharge by requiring that all development-related runoff be captured by infiltration basins (altered hydrologic regimes)
- Protect fishery resources by screening turbine intakes at operating hydroelectric dams (dams)
- Protect the public trust by requiring dam owners to make appropriate financial provisions for future dam removal or perpetual maintenance (dams)
- Reduce effluent flow (Urban, municipal, and industrial pollution)
- Reduce use of pesticides and herbicides (pesticides and herbicides)
- Remove dams to rehabilitate natural hydrology and habitat connectivity (altered hydrologic regimes, dams, fragmentation)
- Require natural fishways, rock arch ramps and bypass channels, for both upstream and downstream fish movements at dams (dams)
- Restrict dredging and channelization, especially during spawning and migration seasons (dredging and channelization)
- Strengthen and enforce air pollution laws (Urban, municipal, and industrial pollution)
- Strengthen existing water quality laws and enforcement of permits controlling effluent discharge (thermal changes, Urban, municipal, and industrial pollution)
- Use best management practices (variety of threats)
- Work with local governments to develop and refine planning and zoning regulations and ordinances that consider natural processes (variety of threats)
- Work with local officials on setback and buffer ordinances (riparian modification)

**EDUCATION & AWARENESS**

- Expand education programs for the general public regarding natural processes, invasive species, hydrologic cycles, and stewardship issues (social attitudes)
- Increase education on preventing the spread of aquatic invasive species (Invasive plants and animals)

**CAPACITY BUILDING**

- Support watershed councils and regional conservation groups (variety of threats)

**Research and Survey Needs**

- Determine amount and condition of riparian areas
- Determine number and condition of road crossings
- Determine stream temperatures in areas lacking data
- Determine the number and condition of areas that are disconnected from the river
- Determine the number of groundwater withdrawals in the basin
- Determine use of cool large rivers by mussel, snail, aquatic insect, and reptile SGCN
- Determine ways to decrease temperature swings from retention and detention basins in urbanized watersheds
- Develop alternatives to current drainage practices

- Inventory dams and determine those which no longer serve a useful purpose
- Inventory erosion sites and conduct remediation activities
- Explore alternatives to dams
- Model hydrologic flow of each watersheds
- Survey loadings of nutrients and sediments to river and develop strategies to reduce identified problems
- Test and compare benefits of Best Management Practice's as conservation tools

Monitoring

- Dam operations
- Dredging and channelization
- Effluent discharges: waste water; septic systems
- Erosion sites
- Indicator species
- Riparian modification
- Sediment loading
- Stream modification
- Water temperature