

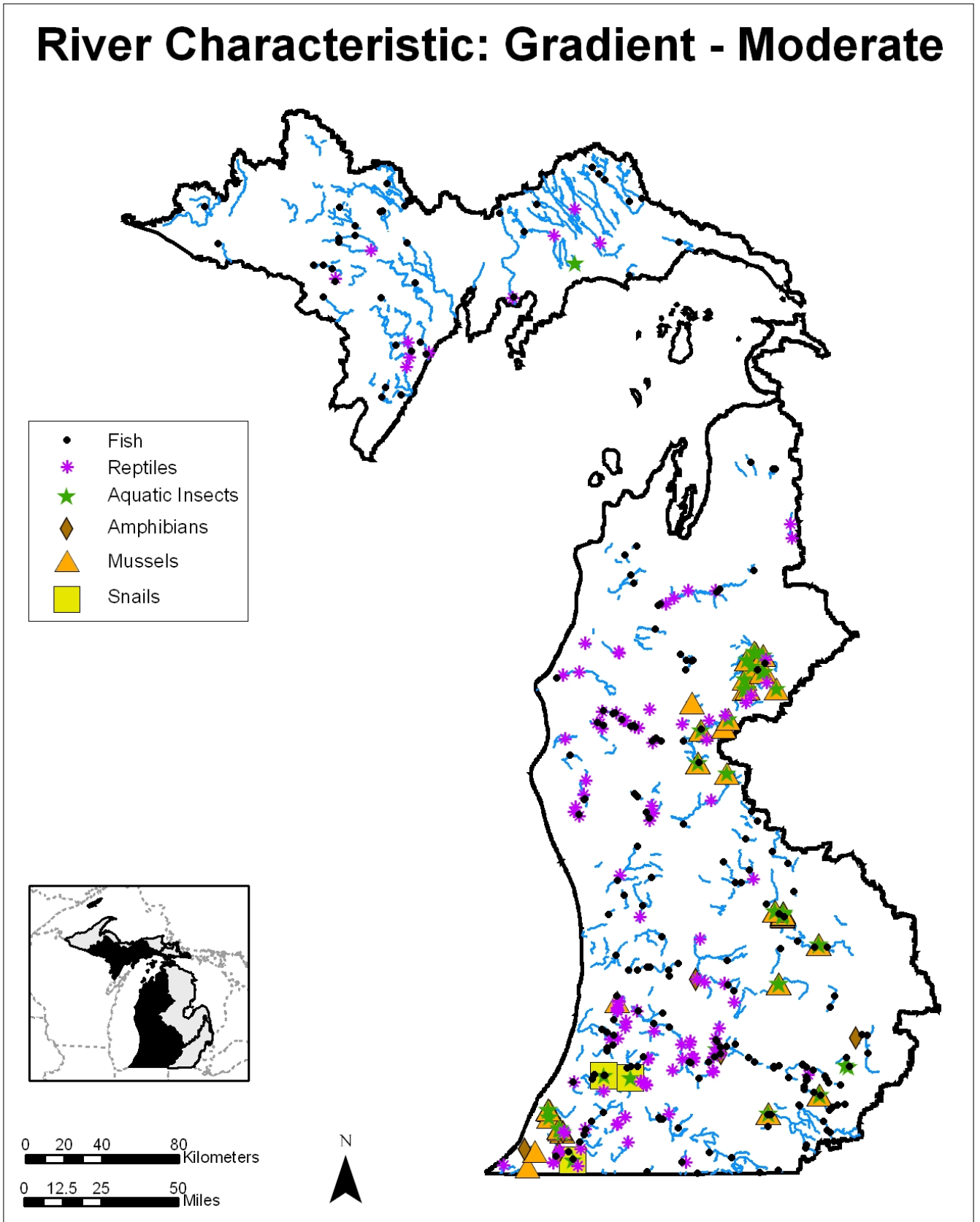
**MICHIGAN'S WILDLIFE ACTION PLAN**  
**AQUATIC SYSTEMS: LAKE MICHIGAN BASIN**

- Determine unknown life history requirements for SGCN associated with slow gradient
- Develop alternatives to current drainage practices
- Establish ways of communicating with the public and enhancing their stewardship role
- Model hydrologic flow of slow gradient areas

Monitoring

- Aquatic invasive species
- Dredging and channelization
- Erosion
- Riparian modification
- Stream crossings
- Wetland and floodplain modification

# River Characteristic: Gradient - Moderate



## River Characteristic: Gradient – Moderate

### Description

Gradient is the general slope, or the change in vertical elevation per unit of horizontal distance, of the water surface in a flowing stream. Moderate gradient is defined as having a change in the vertical elevation of the water surface of a flowing stream ranging from 4.0-9.9 feet per mile.

### General Condition of Feature

This habitat is considered 30% in good to excellent condition, 25% in fair condition, and 45% in degraded to very degraded condition.

### Associated Species of Greatest Conservation Need

#### MUSSELS

scaleshell (*Leptodea leptodon*)  
round pigtoe (*Pleurobema coccineum*)  
ellipse (*Venustaconcha ellipsiformis*)  
rainbow (*Villosa iris*)  
purple wartback (*Cyclonaias tuberculata*)  
creek heelsplitter (*Lasmigona compressa*)  
snuffbox (*Epioblasma triquetra*)  
black sandshell (*Ligumia recta*)

#### SNAILS

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

#### INSECTS

rapids clubtail (*Gomphus quadricolor*)  
pygmy snaketail (*Ophiogomphus howei*)  
riverine snaketail (*Stylurus amnicola*)  
Hungerford's crawling water beetles (*Brychius hungerfordi*)

#### FISH

spotted gar (*Lepisosteus oculatus*)  
mooneye (*Hiodon tergisus*)  
brassy minnow (*Hybognathus hankinsoni*)

#### FISH cont.

striped shiner (*Luxilus chrysocephalus*)  
river chub (*Nocomis micropogon*)  
bigmouth shiner (*Notropis dorsalis*)  
finescale dace (*Phoxinus neogaeus*)  
black buffalo (*Ictiobus niger*)  
spotted sucker (*Minytrema melanops*)  
river redhorse (*Moxostoma carinatum*)  
black redhorse (*Moxostoma duquesnei*)  
golden redhorse (*Moxostoma erythrurum*)  
stonecat (*Noturus flavus*)  
slimy sculpin (*Cottus cognatus*)  
fantail darter (*Etheostoma flabellare*)  
banded darter (*Etheostoma zonale*)

#### AMPHIBIANS

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

#### REPTILES

queen snake (*Regina septemvittata*)  
wood turtle (*Glyptemys insculpta*)

#### MAMMALS

water shrew (*Sorex palustris*)

### Associated Threats

#### MODIFICATION OF NATURAL PROCESSES

- Altered hydrologic regimes: Altered flow and stream channel due to dams; Road crossings and culverts can change flows and gradient
- Climate change: (low threat)
- Fragmentation: Road crossings and culverts can be barriers to fish

#### POLLUTION

- Altered nutrient inflows: (low threat)
- Altered sediment loads: Bank erosion
- Pesticides and herbicides: (low threat)
- Thermal changes: (low threat)
- Urban, municipal, and industrial pollution: (low threat)

#### HABITAT CONVERSION

- Dams: Altered flow and stream channels due to dams; Both beaver and human-made
- Dredging and channelization: Dredging
- Incompatible natural resources management
- Riparian modification: Natural resource mgmt practices such as stream improvement and bank stabilization may change gradient
- Wetland modification

#### BIOLOGICAL INTERACTIONS

- Disease, pathogens, and parasites: (low threat)
- Invasive plants and animals

#### CONSUMPTIVE BIOLOGICAL RESOURCE USE

- Forestry practices: (low threat)
- Mining practices: Gold mining; Gravel mining (low threat)

- Removal of wildlife: (low threat)

#### **EDUCATION**

- Lack of scientific knowledge: (low threat)
- 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)
- Decrease amount of impervious surfaces (altered hydrologic regimes)
- Engineered drainage channels should mimic natural stream channel stability, i.e., channel dimension, pattern, and profile (dredging and channelization)
- If culverts are necessary, use single large capacity culverts that match bankfull channel width (altered hydrologic regimes, fragmentation)
- If enclosures are necessary, minimize the length and ensure capacity can handle bankfull flows (altered hydrologic regimes, fragmentation)
- Maintain or establish riparian buffers of at least 50 ft., but 500 ft. or wider maximizes conservation benefits (altered hydrologic regimes, altered sediment loads, riparian modification)
- Maintain or rehabilitate original flow paths and hydrologic functions, i.e., seasonal flooding, connect meanders, throughflow, wetlands (altered hydrologic regimes)
- Manage or modify existing dams to release water to mimic natural river conditions (altered hydrologic regimes, dams)
- Preserve woody riparian vegetation to reduce sedimentation (altered sediment loads, dredging and channelization)
- Protect existing natural wetlands and rehabilitate degraded wetlands (wetland modification)
- Soften or remove hard river structures (riparian modification)
- Work with road commissioners to fix perched culverts (altered hydrologic regimes, fragmentation)
- Work with road commissions on siting new and maintaining river crossings (altered hydrologic regimes, altered sediment loads, fragmentation)

##### ***LAW & POLICY***

- Continued vigilance and cooperation on preventing more aquatic invasive species establishments (invasive plants and animals)
- Encourage use of bridges over culverts for new stream crossings (altered hydrologic regimes, fragmentation)
- Enforce the use of sediment barriers and best management practices during road siting, construction and maintenance (altered sediment loads)
- Include wetland protections in zoning and planning ordinances (wetland modification)
- Limit water withdrawals in flow-limited or groundwater-fed systems (altered hydrologic regimes)
- Protect and rehabilitate groundwater recharge by requiring all development-related runoff be captured by infiltration basins (altered hydrologic regimes)
- Protect the natural seasonal flow patterns of the river by incorporating best management practices (altered hydrologic regimes)
- Rehabilitate channel diversity where possible (dredging and channelization)
- Remove dams to rehabilitate natural hydrology (altered hydrologic regimes, dams)
- Remove unnecessary or abandoned bridges, culverts, and stream enclosures (altered hydrologic regimes, fragmentation)
- Restrict dredging and channelization activities (dredging and channelization)
- Strengthen wetland regulations, mitigation requirements, and enforcement (wetland modification)
- Work with Drain Commissioners to use natural channel processes to allow a river to manage sediment and flow and decrease the amount of channelization needed (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***

- Educate canoeists and snowmobile users on the importance of woody structure to water bodies and aquatic species (incompatible natural resource management)
- Educate legislators, other policy makers, and the public on the importance of natural processes (social attitudes)

#### **Research and Survey Needs**

- Determine effective prevention, control, and survey techniques for aquatic invasive species
- Determine unknown life history requirements for SGCN associated with moderate gradient
- Develop alternatives to current drainage practices
- Inventory eroding stream sites
- Inventory dams and determine those that are no longer necessary
- Model hydrologic flow of moderate gradient areas