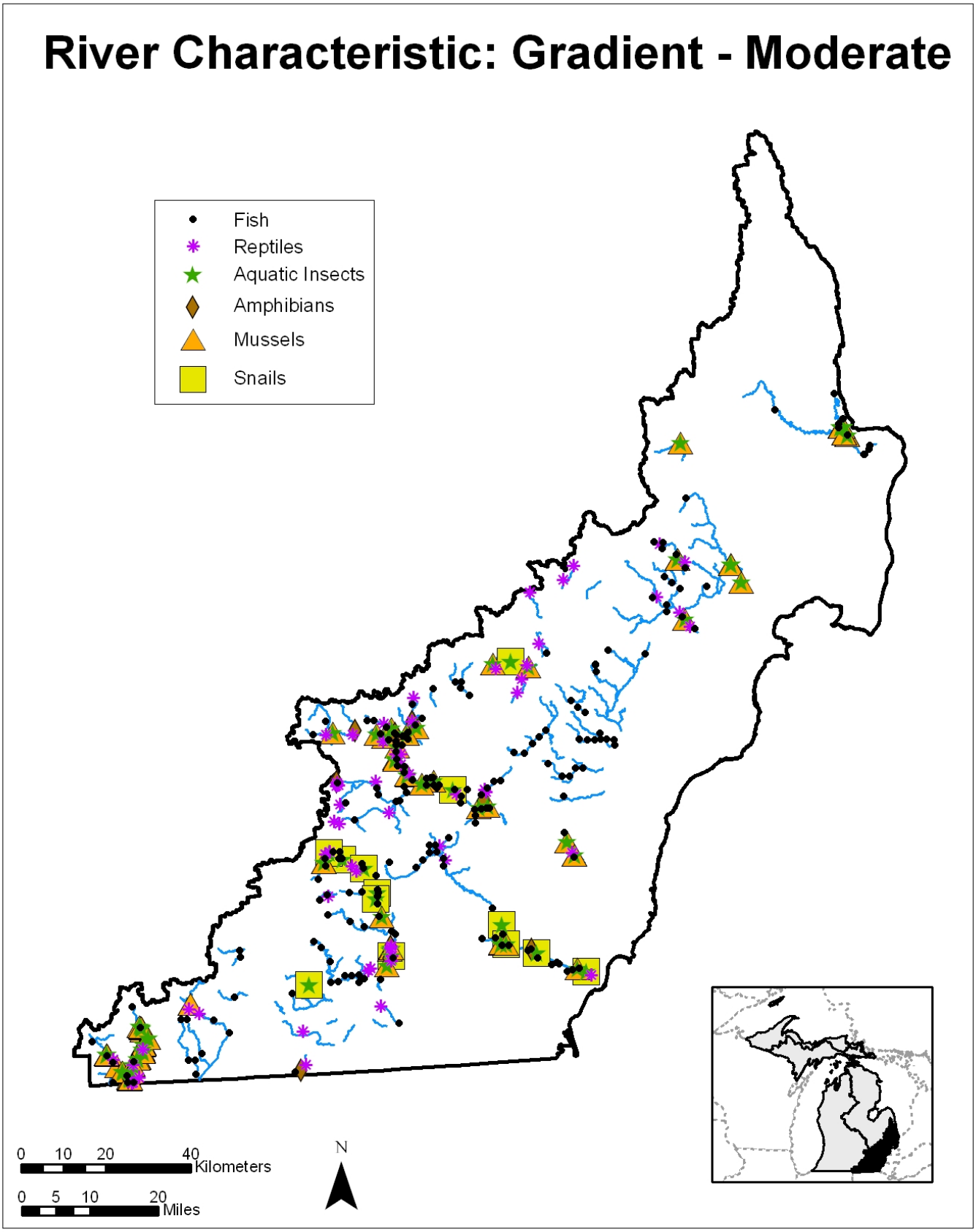
River Characteristic: Gradient - Moderate



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 25% in good to excellent condition, 35% in fair condition, and 40% 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 wartyback (*Cyclonaias tuberculata*)
- creek heelsplitter (*Lasmigona compressa*)
- snuffbox (*Epioblasma triquetra*)
- black sandshell (*Ligumia recta*)
- threehorn wartyback (*Obliquaria reflexa*)
- round hickorynut (*Obovaria subrotunda*)
- kidneyshell (*Ptychobranchus fasciolaris*)
- purple lilliput (*Toxolasma lividus*)

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

INSECTS
- rapids clubtail (*Gomphus quadricolor*)
- elusive snaketail (*Stylurus notatus*)
- smoky rubyspot (*Hetaerina titia*)

FISH
- lake sturgeon (*Acipenser fulvescens*)
- mooneye (*Hiodon tergisus*)
- redside dace (*Clinostomus elongatus*)
- striped shiner (*Luxilus chrysocephalus*)
- silver chub (*Macrhybopsis storeriana*)
- silver shiner (*Notropis photogenis*)
- black buffalo (*Ictiobus niger*)
- spotted sucker (*Minytrema melanops*)
- river redhorse (*Moxostoma carinatum*)
- black redhorse (*Moxostoma duquesnei*)
- golden redhorse (*Moxostoma erythrurum*)
- stonecat (*Noturus flavus*)
- eastern sand darter (*Ammocrypta pellucida*)
- fantail darter (*Etheostoma flabellare*)

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

REPTILES
- queen snake (*Regina septemvittata*)

Associated Threats

MODIFICATION OF NATURAL PROCESSES
- Altered hydrologic regimes: Increased runoff due to urbanization; Hydraulic regime changes - storm flow periodicity and channel adjustment; Due to dams
- Fragmentation

POLLUTION
- Altered sediment loads: Erosion; Sedimentation; Bank stability; Woody debris dams
- Pesticides and herbicides
- Urban, municipal, and industrial pollution

HABITAT CONVERSION
- Dams: Dam operations - lake level management impacts on river flows; Loss of riffle habitat due to dams
- Dredging and channelization: Channelization; Loss of riffle habitat due to channelization
- Riparian modification: Altered riparian land cover; Altered banks; Flood plain alteration; Some stream armoring; Loss of riparian vegetation; Loss of floodplains
- Wetland modification: Loss of wetlands (low threat)

BIOLOGICAL INTERACTIONS
- Invasive plants and animals

EDUCATION
- Social attitudes: Lack of education on how lake level management affects rivers

Conservation Actions Needed (Threats addressed)

LAND, WATER & SPECIES MANAGEMENT
- Allow seasonal flooding (altered hydrologic regimes)
- Control aquatic invasive species (invasive plants and animals)
- Prevent establishment of new aquatic invasive species (invasive plants and animals)
- Protect and rehabilitate groundwater recharge (altered hydrologic regimes)

- Rehabilitate original hydrologic functions (i.e., connect meanders, throughflow, wetlands) (altered hydrologic regimes)
- Rehabilitate, maintain, and protect wetlands and riparian buffers (riparian modification, wetland modification)
- Use sediment barriers and Best management practices during road and stream crossing constructions (altered sediment loads)
- Work with road commissions to site and maintain stream crossings (altered hydrologic regimes, altered sediment loads)

LAW & POLICY

- Avoid stream relocations (dredging and channelization)
- Encourage clustered development and green-space planning (riparian modification)
- Remove unnecessary dams and stream enclosures to rehabilitate natural hydrologic flow (altered hydrologic regimes)
- Restrict dredging and channelization during fish spawning and migration periods and around mussel beds (dredging and channelization)
- 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 (altered hydrologic regimes, altered sediment loads, dredging and channelization, riparian modification, wetland modification)
- Work with planning and zoning boards to establish zoning and setback regulations (altered hydrologic regimes, altered sediment loads, riparian modification, wetland modification)

Research and Survey Needs

- Determine effective prevention, control, and survey techniques for aquatic invasive species
- Determine life history requirements for SGCN associated with moderate gradient rivers
- Develop alternatives to current drainage practices
- Inventory eroding stream sites
- Model hydrologic flow of the entire watershed
- Survey sediment loading to the watershed

Monitoring

- Aquatic invasive species
- Dredging activities
- Erosion sites
- Riparian modification
- Road crossings
- Sediment loading