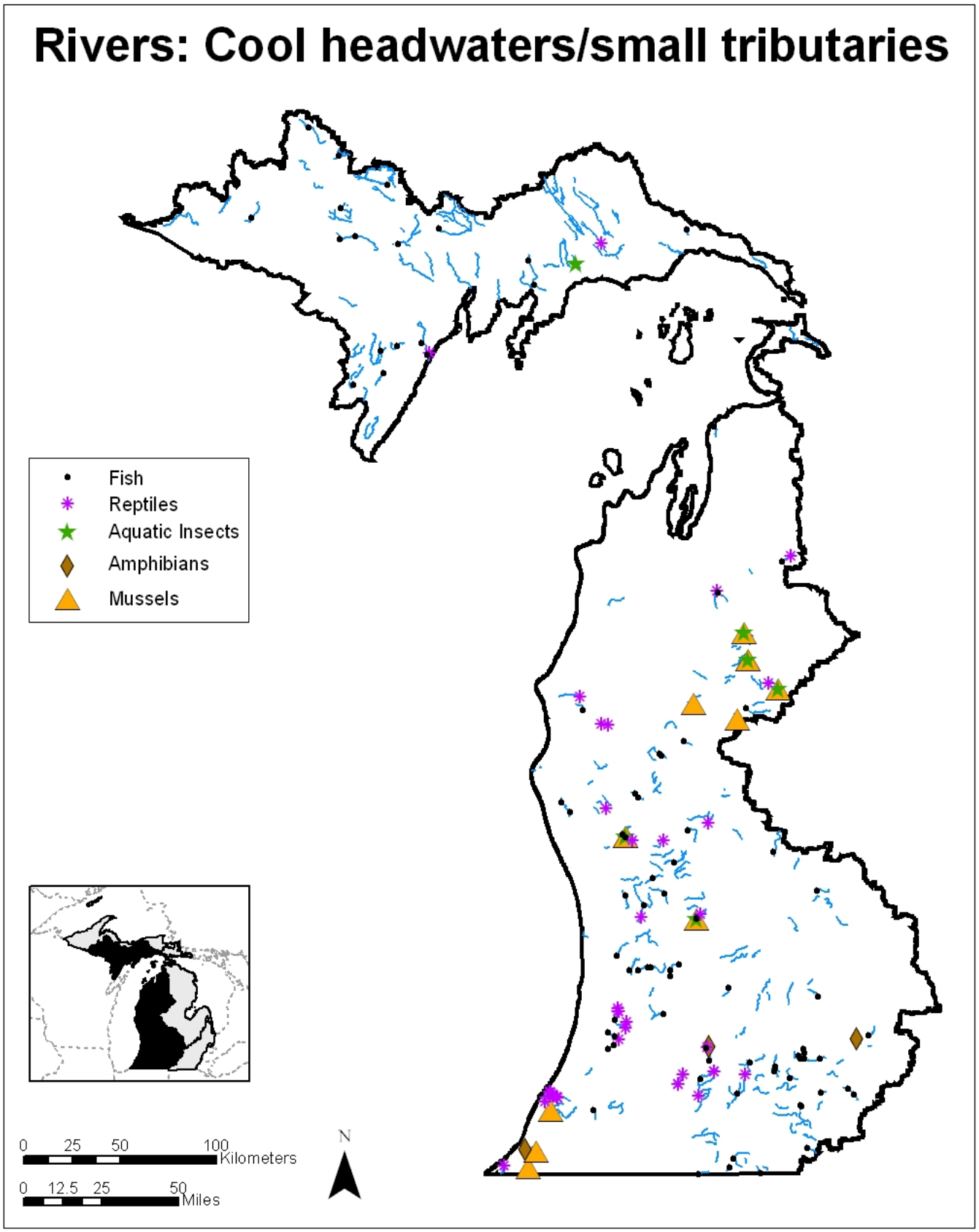
Rivers: Cool headwaters/small tributaries
Fish
Reptiles
Aquatic Insects
Amphibians
Mussels
0 25 50 100 Kilometers
0 12.5 25 50 Miles
N

Rivers: Cool Headwaters & Small Tributaries

Description

Headwater streams and small trMichiganibutaries are wadeable systems that have a midpoint catchment area (the land area above the midpoint of the stream from which water drains towards the stream) less than 40 square miles. These low stream order systems join together to form larger streams and rivers, or run directly into other streams, rivers, and lakes. They have great influence on the collective health and functioning of the primary stream network to which they belong. Headwater streams and small tributaries tend to be strongly affected by riparian vegetation.

Cool headwater streams and small tributaries are usually low-gradient, runoff-driven systems with fair to moderate baseflows and moderate to high peak flows. Many of these systems pass through unconfined alluvial valleys. July weekly mean temperature in cool headwater streams range from 19-22^{o}C.

General Condition of Feature

This habitat is considered 45% in good to excellent condition, 15% in fair condition, and 40% 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
watercress snail (*Fontigens nickliniana*)

INSECTS
Hungerford's crawling water beetle (*Brychius hungerfordi*)

FISH
brassy minnow (*Hybognathus hankinsoni*)
striped shiner (*Luxilus chrysocephalus*)
pugnose shiner (*Notropis anogenus*)
bigmouth shiner (*Notropis dorsalis*)
finescale dace (*Phoxinus neogaeus*)

FISH cont.
black redhorse (*Moxostoma duquesnei*)
golden redhorse (*Moxostoma erythrurum*)
grass pickerel (*Esox americanus*)
slimy sculpin (*Cottus cognatus*)
fantail darter (*Etheostoma flabellare*)
least darter (*Etheostoma microperca*)
banded darter (*Etheostoma zonale*)

AMPHIBIANS
pickerel frog (*Rana palustris*)

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

Associated Threats

MODIFICATION OF NATURAL PROCESSES
- Altered hydrologic regimes
- Climate change: (low threat)
- Fragmentation: Road crossings and culverts can fragment habitats and limit species movements

POLLUTION
- Altered nutrient inflows
- Altered sediment loads: Erosion alters bottom type and reduces spawning habitat for fish; ORV crossings increase sedimentation
- Pesticides and herbicides
- Thermal changes: Water temperature fluctuations; Small dams affect water temperatures
- Urban, municipal, and industrial pollution

HABITAT CONVERSION
- Dams: Small dams affect water temperatures and many fragment habitats; Beaver dams; Human influences, including but not limited to roads and dams
- Dredging and channelization: Channelization
- Incompatible natural resources management
- Riparian modification: Any modification can change water temperature
- Wetland modification

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

CONSUMPTIVE BIOLOGICAL RESOURCE USE
- Forestry practices
- Removal of wildlife

NON-CONSUMPTIVE BIOLOGICAL RESOURCE USE

- Macrophyte removal: (low threat)

EDUCATION

- Lack of scientific knowledge : (low threat)

Conservation Actions Needed (Threats addressed)

LAND & WATER PROTECTION

- Create and/or expand conservation easements (variety of threats)
- Support land conservancy purchase of undeveloped land (variety of threats)
- Support landowner incentive programs to foster conservation on private land (variety of threats)

LAND, WATER & SPECIES MANAGEMENT

- Decrease the amount of impervious surfaces within watershed (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)
- Maintain and rehabilitate natural hydrology (altered hydrologic regimes)
- Maintain or establish riparian buffers of at least 50 ft., but 500 ft. or wider maximizes conservation benefits, but 500 ft. or wider maximizes conservation benefits (altered hydrologic regimes, altered sediment loads, forestry practices, riparian modification, thermal changes)
- Maintain or rehabilitate river to original flow path and hydrologic functions, i.e., seasonal flooding, throughflow (altered hydrologic regimes)
- Manage beaver populations for a variety of natural resource uses (altered hydrologic regimes, dams)
- Soften or remove hard stream structures (riparian modification)
- Survey erosion sites within watersheds and develop strategies to reduce identified problems (altered sediment loads)
- Work with road commissions on placement and maintenance of stream crossings (altered sediment loads)
- Work with road commissions to fix perched culverts that are barriers to aquatic species movements (altered hydrologic regimes, fragmentation)

LAW & POLICY

- Avoid stream relocations (dredging and channelization)
- Continue to work on forest certification endeavors (forestry practices)
- Encourage green space planning (riparian modification)
- Encourage townships to separate combined sewer systems (altered hydrologic regimes, altered nutrient inflows)
- Encourage use of bridges over culverts for new crossings (altered hydrologic regimes, fragmentation)
- 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 (variety of threats)
- Require mitigation practices to minimize logging effects (forestry practices)
- 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 that all development-related runoff be captured by infiltration basins (altered hydrologic regimes)
- Protect the public trust by requiring dam owners to make appropriate financial provisions for future dam removal or perpetual maintenance (dams)
- Reduce pesticide and herbicide use
- Remove dams to rehabilitate natural hydrology and connectivity of system (altered hydrologic regimes, dams, fragmentation)
- Remove lake-level control structures (altered hydrologic regimes, dams)
- Restrict dredging and channelization activities on headwater streams (dredging and channelization)
- Strengthen water quality laws (variety of threats)
- Strengthen wetland regulations, mitigation requirements, and enforcement (wetland modification)
- Use best management practices (variety of threats)
- Work with Drain Commissioners to use natural channel processes to allow a stream to manage sediment and flow and decrease the amount of channelization needed (altered hydrologic regimes, altered sediment loads, dredging and channelization, riparian modification)
- 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 legislators, other policy makers, and the public on the importance of natural headwater stream watersheds and natural processes (variety of threats)
- Educate the public on the use of and reasons for maintaining septic systems (altered nutrient inflows)
- Work with and educate ORV groups to provide environmentally friendly stream crossings (altered sediment loads)

CAPACITY BUILDING

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

Research and Survey Needs

- Determine use of cool headwaters and small tributaries by mussel and reptile SGCN
- Develop alternatives to current drainage practices
- Determine effect of different lumber harvest methods on hydrologic flow regimes of a watershed
- Inventory dams and determine those which no longer serve a useful purpose
- Inventory erosion sites and conduct remediation activities
- Model hydrologic flows in each watershed
- Develop effective methods of communicating with the public their stewardship role
- Investigate aquatic insect and snail life histories

Monitoring

- Dam operations
- Dredging and channelization
- Effluent discharges: waste water treatment plants, septic systems
- Enforcement of environmental laws
- Indicator species
- Riparian modification
- Sediment loading
- Stream modifications
- Water temperature