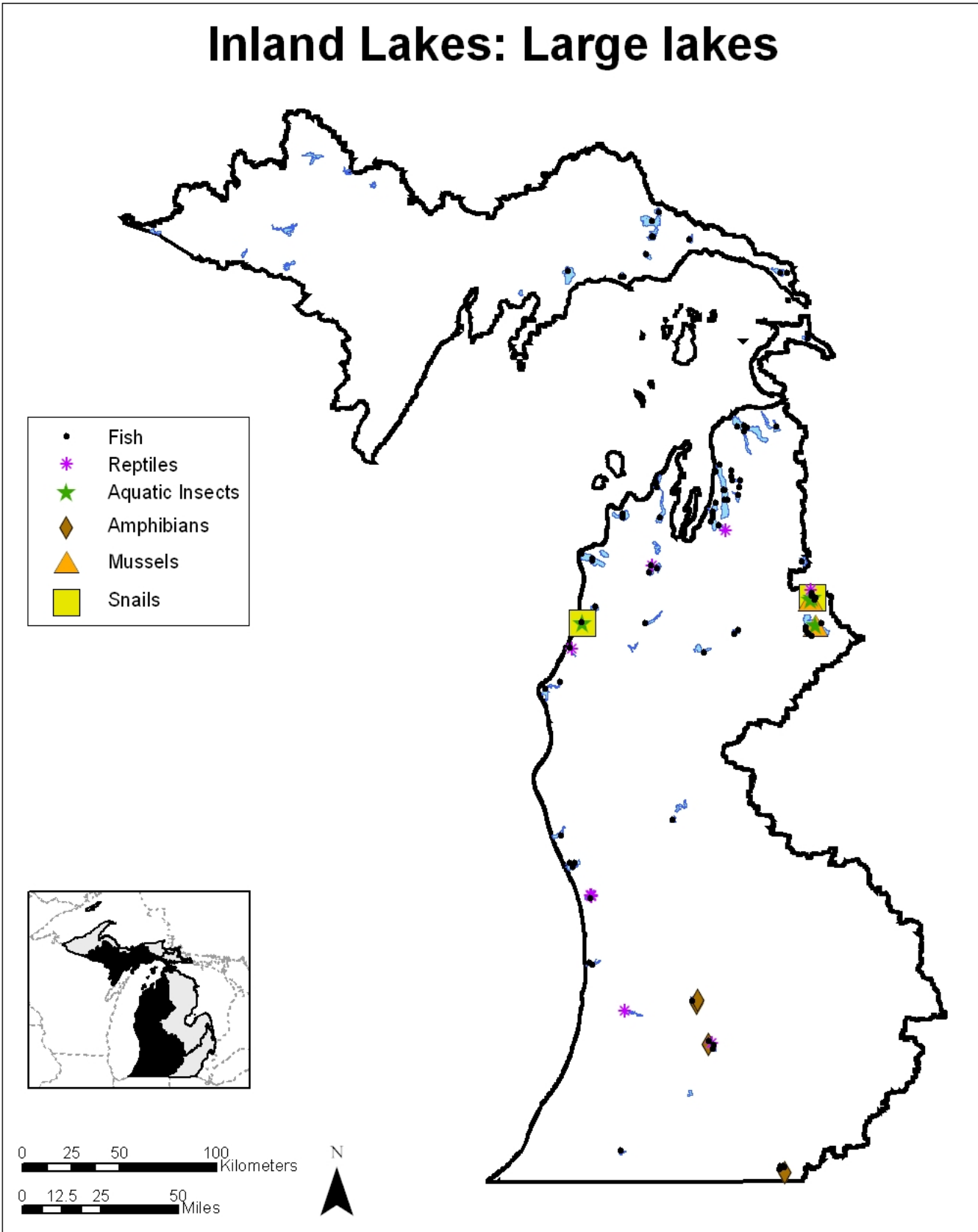


Inland Lakes: Large lakes



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Description

Large lakes are permanent standing water bodies greater than 1000 acres in area. These lakes are more homogeneous in terms of chemical and biological variables than smaller lakes, although there is still some diversity. They are typically oligotrophic to mesotrophic and most are dominated by open-water zones (pelagic) and are stratified. Large lakes are more likely to have wave-washed shores compared to smaller lakes and are unlikely to have low winter oxygen levels. There is more diversity of within-lake habitats in these lakes than smaller lakes. These lakes are the most likely to have public access points.

General Condition of Feature

This habitat is considered 45% in good to excellent condition, 40% in fair condition, and 15% in degraded to very degraded condition. Relative condition is typically excellent in large lakes under public ownership.

Associated Species of Greatest Conservation Need

MUSSELS

- round lake floater (*Pyganodon subgibbosa*)
- eastern pondmussel (*Ligumia nasuta*)

SNAILS

- deepwater pondsnail (*Stagnicola contracta*)

INSECTS

- ocellated damer (*Boyeria grafiiana*)
- Douglas Stenelmis riffle beetle (*Stenelmis douglasensis*)

FISH

- lake sturgeon (*Acipenser fulvescens*)
- spotted gar (*Lepisosteus oculatus*)

FISH cont.

- mooneye (*Hiodon tergisus*)
- black buffalo (*Ictiobus niger*)
- river redhorse (*Moxostoma carinatum*)
- brown bullhead (*Ameiurus nebulosus*)
- stonecat (*Noturus flavus*)
- tadpole madtom (*Noturus gyrinus*)
- cisco or lake herring (*Coregonus artedii*)
- sauger (*Sander canadensis*)

AMPHIBIANS

- mudpuppy (*Necturus maculosus maculosus*)
- Fowler's toad (*Bufo fowleri*)

Associated Threats

MODIFICATION OF NATURAL PROCESSES

- Altered hydrologic regimes: (low threat)
- Climate change: (low threat)
- Fragmentation: (low threat)

POLLUTION

- Altered nutrient inflows: Nutrient inputs from lawn fertilizer and septic tanks
- Altered sediment loads
- Pesticides and herbicides
- Thermal changes
- Urban, municipal, and industrial pollution: Municipal pollution

HABITAT CONVERSION

- Dams: (low threat)
- Dredging and channelization: Dredging; Filling
- Riparian modification: Seawalls; Shoreline armoring; Marinas and other shoreline development
- Wetland modification: Loss of wetlands adjacent to large lakes (low threat)

BIOLOGICAL INTERACTIONS

- Invasive plants and animals: Greater potential of invasive species issues due to boat ramps; Zebra mussels

CONSUMPTIVE BIOLOGICAL RESOURCE USE

- Removal of wildlife: (low threat)

NON-CONSUMPTIVE BIOLOGICAL RESOURCE USE

- Macrophyte removal: Beach grooming and sanding; "Weed" treatment using herbicides (low threat)

EDUCATION

- Lack of scientific knowledge: (low threat)
- Social attitudes: (low threat)

Conservation Actions Needed (Threats addressed)

LAND, WATER & SPECIES MANAGEMENT

- Avoid important fish nursery areas during macrophyte treatments
- Control and prevent aquatic invasive species introductions and establishments (invasive plants and animals)
- Develop management plans for large lakes (variety of threats)

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

- Ensure roads near lakes are not contributing sediment to the system (altered sediment loads)
- 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 sediment loads, riparian modification)
- Protect and rehabilitate wetland functions (variety of threats)
- Reduce pesticide and herbicide use (macrophyte removal, pesticides and herbicides)
- When removing invasive vegetation, at least 60-80% of native vegetation should be preserved (invasive plants and animals, macrophyte removal)
- Require vegetation management to occur in conjunction with a watershed management plan (macrophyte removal)

LAW & POLICY

- Encourage agricultural conservation practices (variety of threats)
- Encourage implementation of USDA soil conservation practices to reduce erosion (altered sediment loads)
- Encourage use of natural materials or soft engineering techniques for any shoreline modification (riparian modification)
- Include wetland protections in zoning and planning ordinances (wetland modification)
- Manage lake-level control structures to mimic natural water levels and fluctuations (altered hydrologic regimes, dams)
- Manage or modify lake-level controls to allow for run-of-river flows (altered hydrologic regimes, dams)
- Reduce effluent flows (urban, municipal, and industrial pollution)
- Restrict beach grooming (riparian modifications)
- Restrict dredging and channelization, especially during spawning and migration seasons and around mussel beds (dredging and channelization)
- Strengthen water quality laws and enforcement of permits controlling effluent discharge (thermal changes, Urban, municipal, and industrial pollution)
- Upgrade septic systems (altered nutrient inflows)
- Use best management practices (variety of threats)
- Work with and educate lake associations (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

- Continue educating landowners and boaters on preventing the spread of invasive aquatic species (invasive plants and animals, social attitudes)
- Educate legislators, other policy makers, and landowners on the value of riparian areas, macrophytes, woody structure, and stewardship issues (social attitudes)
- Educate the public on the use of and reasons for maintaining septic systems (altered nutrient inflows, social attitudes)

Research and Survey Needs

- Determine effective prevention, control, and survey techniques for aquatic invasive species
- Determine important aquatic nursery areas
- Determine socially-acceptable ways to coordinate macrophyte treatments with aquatic species needs
- Determine the amount of shoreline development in large lakes
- Determine the number of natural lake outlets and socially acceptable ways of maintaining them
- Determine the number and method of operation of lake-level control structures
- Determine unknown life history requirements for SGCN associated with large lakes
- Establish effective methods of communicating with the public and their role in stewardship, especially shoreline modification (beach grooming, seawalls, dredging)
- Investigate the effects of over zealous macrophyte removal on native vegetation and species communities
- Develop socially acceptable ways of maintaining natural lake inflows and outlets
- Work with watershed council and other local groups on identification skills and habitat restoration techniques

Monitoring

- Aquatic invasive species
- Dredging and channelization
- Effluent discharges: waste water treatment plants, septic systems
- Indicator species
- Lake-level control structures
- Land use changes
- Macrophyte removal
- Public attitudes and perceptions
- Riparian modification
- Water levels downstream of water-level controlled lakes to ensure that streams continue to have sufficient water
- Water levels in water-level controlled lakes to ensure they mimic natural hydrologic regimes with lakes

- Water temperatures