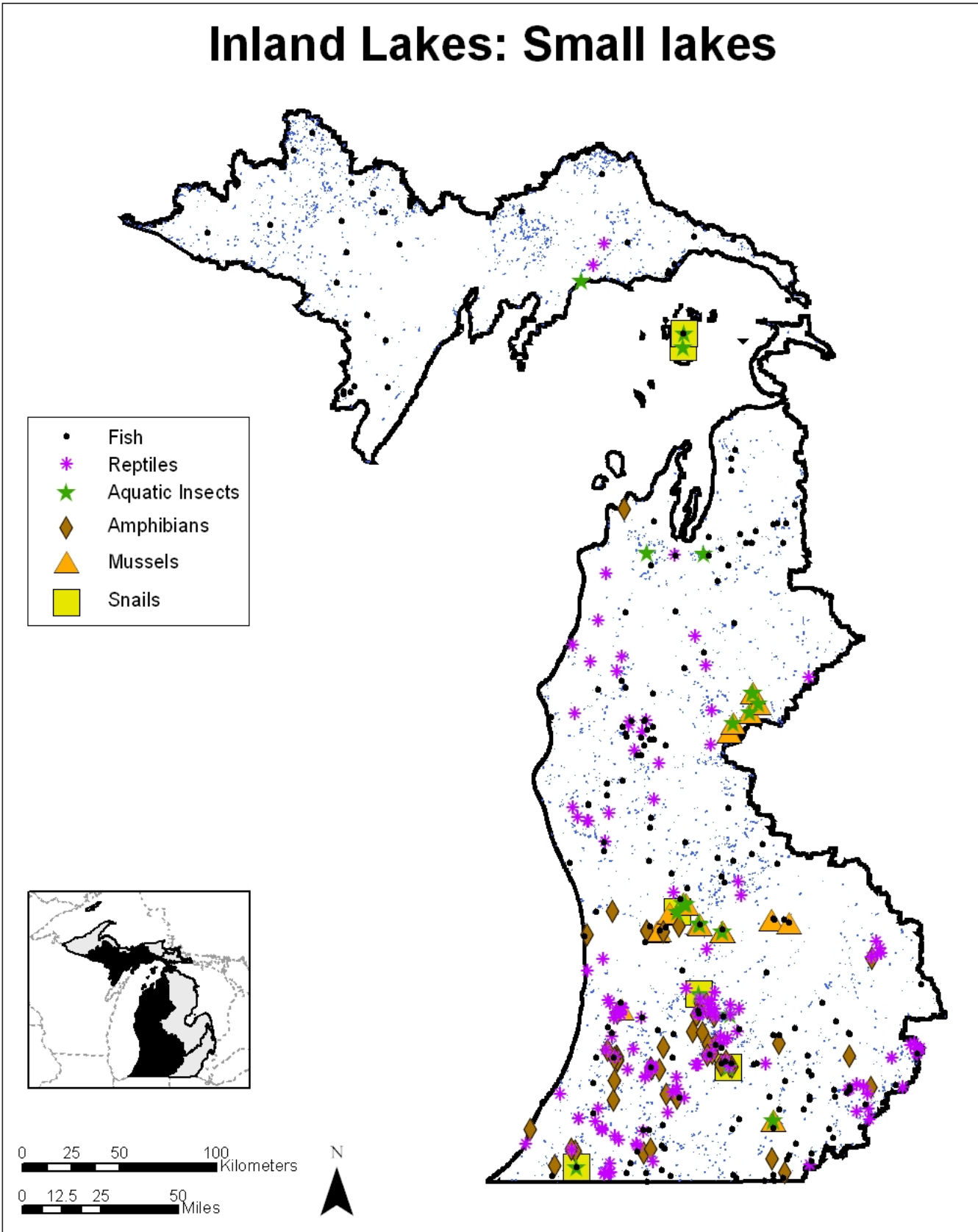


Inland Lakes: Small lakes



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Description

Small lakes are permanent standing water bodies that are greater than 5 acres and less than 99 acres in area. Water bodies in this group are highly diverse in terms of chemical and biological variables. Stratification status can range from fully stratified throughout the summer season, to no stratification. In lakes with stratification, there is development of true open-water (pelagic) zones that are distinct from shallow nearshore zones. Small lakes can range from cold to warm water depending on amounts of groundwater inflows, lake depth, and climate. Winter oxygen levels are also variable and depend on lake depth. If lakes are shallow (< 2 m average depth), there are two states in which they are generally found. The first is characterized by high nutrients, high wind resuspension, no rooted plants, and turbid water, and the second is characterized by low to medium nutrients, low wind resuspension, rooted plants dominant, and clear water.

General Condition of Feature

This habitat is considered 35% in good to excellent condition, 30% in fair condition, and 35% in degraded to very degraded condition.

Associated Species of Greatest Conservation Need

MUSSELS

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

SNAILS

- spindle lymnaea (*Acella haldemani*)
- watercress snail (*Fontigens nickliniana*)

INSECTS

- sedge darner (*Aeshna juncea*)
- spatterdock darner (*Aeshna mutata*)
- ocellated darner (*Boyeria grafiana*)
- a stonefly (*Arcynopteryx compacta*)
- a belostoman bug (*Belostoma lutarium*)

FISH

- spotted gar (*Lepisosteus oculatus*)
- brassy minnow (*Hybognathus hankinsoni*)
- pugnose shiner (*Notropis anogenus*)
- bigmouth shiner (*Notropis dorsalis*)
- finescale dace (*Phoxinus neogaeus*)
- lake chubsucker (*Erimyzon sucetta*)

FISH cont.

- spotted sucker (*Minytrema melanops*)
- brown bullhead (*Ameiurus nebulosus*)
- tadpole madtom (*Noturus gyrinus*)
- starhead topminnow (*Fundulus dispar*)
- least darter (*Etheostoma microperca*)

AMPHIBIANS

- mudpuppy (*Necturus maculosus maculosus*)
- western lesser siren (*Siren intermedia nettingi*)
- Fowler's toad (*Bufo fowleri*)
- Blanchard's cricket frog (*Acris crepitans blanchardi*)
- pickereel frog (*Rana palustris*)
- northern leopard frog (*Rana pipiens*)

REPTILES

- copperbelly water snake (*Nerodia erythrogaster neglecta*)
- queen snake (*Regina septemvittata*)

MAMMALS

- water shrew (*Sorex palustris*)

Associated Threats

MODIFICATION OF NATURAL PROCESSES

- Altered hydrologic regimes: Water & lake level control structures; Recreational vehicles (jet skis, boats) and associated habitat disturbance
- Climate change: (low threat)
- Fragmentation

POLLUTION

- Altered nutrient inflows: Eutrophication from failing septic tanks, lawns, and fertilizer; Increased nutrient feeding (sewage: fertilizer)
- Altered sediment loads
- Pesticides and herbicides: Surface runoff from agriculture
- Thermal changes
- Urban, municipal, and industrial pollution:

HABITAT CONVERSION

- Dams
- Dredging and channelization: Dredging; Filling
- Riparian modification: Riparian development: Seawalls; Shoreline development; Loss of shoreline habitat especially for amphibians; Biggest threat would be residential develop with increased water traffic and riparian modification
- Wetland modification:

BIOLOGICAL INTERACTIONS

- Disease, pathogens, and parasites: (low threat)
- Invasive plants and animals: Especially plants like E. milfoil

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

CONSUMPTIVE BIOLOGICAL RESOURCE USE

- Forestry practices: (low threat)
- Mining practices: (low threat)
- Removal of wildlife: (low threat)

NON-CONSUMPTIVE BIOLOGICAL RESOURCE USE

- Macrophyte removal: Vegetation control; "Weed" treatments with herbicides

EDUCATION

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

Conservation Actions Needed (Threats addressed)

LAND & WATER PROTECTION

- Create and expand conservation easements (riparian modification, wetland modification)
- Support land conservancy purchase of undeveloped lands (riparian modification, wetland modification)
- Support landowner incentive programs to foster conservation on private land (riparian modification, wetland modification)

LAND, WATER & SPECIES MANAGEMENT

- Avoid use of herbicides in small lakes (macrophyte removal, pesticides and herbicides)
- Control and prevent aquatic invasive species introductions and establishments (invasive plants and animals)
- Encourage use of natural materials or soft engineering techniques for any shoreline modification (riparian modification)
- Ensure roads near lakes are not contributing sediment to the system (altered sediment loads)
- Maintain and rehabilitate natural corridors between small lakes and significant wetland and upland habitats (fragmentation, species issue)
- Maintain and rehabilitate natural hydrology (altered hydrologic regimes)
- Maintain natural water levels and fluctuations (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 sediment loads, riparian modification)
- Protect and rehabilitate wetland functions (altered hydrologic regimes, altered sediment loads, wetland modification)
- 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)

LAW & POLICY

- Close roads during breeding seasons or install tunnels along migration pathways to allow amphibians and reptiles access to breeding areas (fragmentation, species issue)
- Develop management plans for small lakes (variety of threats)
- Encourage agricultural conservation practices (variety of threats)
- Encourage implementation of USDA soil conservation practices to reduce erosion (altered sediment loads)
- Encourage sound water withdrawal practices that take into account species needs (altered hydrologic regimes)
- 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)
- Protect and rehabilitate groundwater recharge by requiring that all development-related runoff be captured by infiltration basins (altered hydrologic regimes)
- Protect existing hydrologic conditions of lakes and remaining natural lake outlets by prohibiting construction of new lake-level control structures (altered hydrologic regimes, dams)
- Remove dams to rehabilitate connectivity (dams, fragmentation)
- Require vegetation management to occur in conjunction with a watershed management plan (macrophyte removal)
- Restrict dredging and channelization, especially during spawning and migration seasons (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 Drain Commissioners to allow or closely mimic natural hydrologic processes on legally controlled lake-level control structures (altered hydrologic regimes, dams)
- Work with Drain Commissioners to use natural processes to manage sediment and flows 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

- Continue educating landowners and boaters on preventing the spread of invasive aquatic species (invasive plants and animals, social attitudes)
- Educate landowners on the value of riparian areas, macrophytes, woody structure, and stewardship issues (social attitudes)
- Educate legislators, other policy makers, and the public on the benefits of small lakes and the species that use them (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 alternatives to current drainage practices
- Determine breeding migration pathways of amphibians and reptiles at important small lake systems
- Determine effects of over-zealous macrophyte removal on native vegetation and species communities
- Determine unknown life history requirements for SGCN associated with small lakes
- Determine the amount of shoreline development along small 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
- Investigate the effects of over zealous macrophyte removal on native vegetation and species communities
- Investigate the effects of various pollutants on small lakes and their processes
- Survey erosion sites and determine remediation

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 removals
- Pesticide and herbicide use
- Riparian modification
- Stream 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 within lake
- Water temperatures