Inland Cisco Lakes

Michigan's Wildlife Action Plan 2015-2025

Today's Priorities, Tomorrow's Wildlife

Contents

What are Inland Cisco Lakes?

Inland Cisco Lakes are unique, high quality, and relatively fragile resources. Of the 11,000 inland lakes in Michigan, fewer than 200 support populations of our rare, native Cisco species. While these waters are distributed throughout the state, nearly half are located in the glacial interlobate regions of southern Michigan. Another group of Cisco Lakes occurs in counties adjacent to the Great Lakes. Cisco Lakes vary in size between 20 and 18,800 acres with most being larger than 100 acres. Most Cisco Lakes are characterized as cold and deep with narrow nearshore areas, steep drop-offs, and exceptional water quality. Cisco are members of the whitefish family and require clean, cold, well-oxygenated waters. These narrow habitat requirements make Cisco sentinels of lake quality and indicators of habitat degradation.

Plan Contributors

Central Michigan University
Little Traverse Bay Bands of Odawa Indians
Michigan Department of Natural Resources
National Park Service
The Nature Conservancy

What Uses Inland Cisco Lakes?

Focal species in bold

Cisco

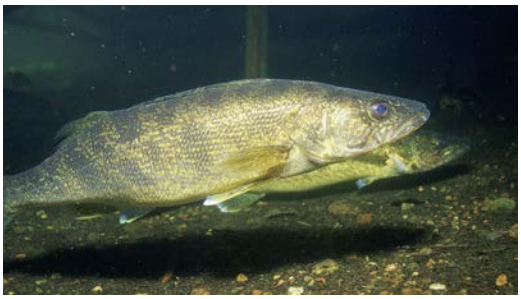
Siskiwit Lake Cisco

Ives Lake Cisco

Yellow Perch

Bluegill

Northern Pike



Walleye

Osprey

Why are Inland Cisco Lakes Important?

Deep, clear, cool water, and a surface that shines like polished glass, our inland Cisco Lakes are unique in their value to Michiganders as well as the habitats and animals they support. With fewer than 200 of these lakes statewide, the fish in these systems depend on high quality, intact watersheds for their continued survival. Yet, these uncommon lakes can be found near many of our largest cities where they are enjoyed by lakeshore residents and visitors alike coming for a day trip of fishing, picnicking, birdwatching, sunning, or kayaking. Leaking septic tanks and fertilizer runoff can dramatically alter the food web in these lakes. Degraded water quality can lead to the loss not just of Cisco, but also the trophy Muskellunge, Walleye, and Northern Pike that grow large on a diet of Cisco, in addition to the loss of clean water for swimming, paddling, fishing, and drinking. As with the canary in the coal mine, the health of Cisco in our inland lakes acts as an early warning system for the fish, wildlife, and people dependent on Michigan's waters.

What is the Health of Inland Cisco Lakes?

Although the current status of Michigan's Cisco Lakes is largely unknown, a review of fish populations reported that Ciscoes were in decline or had been extirpated in 22 lakes (Latta 1995). Habitat deterioration and introduced competitive species were the primary causes of extirpation. As lakes become more developed, there is an increase in runoff carrying sediments and nutrients, which reduces water quality, oxygen levels, and the quality of shoreline and nearshore littoral zone habitats (Wehrly et al. 2015). Climate predictions suggest these inland lakes are also vulnerable to warming, further reducing available habitat (Jacobson et al. 2010).

Callout box: Cisco Stamp

Michigan once had a short, noncommercial gillnet fishery for Cisco on select inland lakes that lasted less than a month. Anglers were required to purchase a license similar to the stamp shown here. At the end of each season anglers were required to deliver their nets to local Conservation Officers for keeping until the following season. Because gillnets are non-selective and their use was not consistent with modern sport fishing ethics, the season was ended in 1983.

What Are the Inland Cisco Lakes Focal Species?

Where we are now and what we think we can realistically achieve over the next 10 years.

Cisco (Coregonus artedi) –

State Threatened

Formerly known as the Lake Herring, Cisco are a slender, silvery fish that range in size from eight to 18 inches in length. Cisco exhibit highly variable body morphology among populations and were previously described as several subspecies (Koelz 1931). Ciscoes require cold, deep lakes with well-oxygenated waters below the thermocline. Cisco are a state threatened species that has been extirpated from several inland lakes as a result of habitat degradation, nutrient inputs, and introduction of nonnative egg predators such as rainbow smelt and alewife.

Goals

- Protect known populations of inland Cisco.
- Improve Cisco status from threatened to special concern.

Siskiwit Lake Cisco (Coregonus zenithicus bartletti) –

State Threatened

The Siskiwit Lake Cisco is similar in body form to C. *artedi.* Koelz (1931) describes them as small, with long fins, a rather deep body, and a protruding lower jaw. Unlike other cisco species that spawn in late fall, the Siskiwit Lake Cisco spawns in May. This fish is known only from the deep, cold waters of Siskiwit Lake in Isle Royale National Park and its management is the sole responsibility of the National Park Service. Latest records indicate this species has not been reported since the 1990s (Kallemeyn 2000). The taxonomic status of Siskiwit Lake cisco is not fully accepted and genetic research is needed to determine if this species is distinct from Shortjaw Cisco (*C. zenithicus*; Hubbs et al. 2004).

Goals

- Determine if Siskiwit Lake Cisco is genetically distinct from the Shortjaw Cisco *(C. zenithicus).*
- If species status is confirmed, determine status and viability of population.

Ives Lake Cisco (Coregonus hubbsi) –

State Threatened

The Ives Lake Cisco also is similar in body form and coloration to *C. artedi* but with smaller overall length, longer pectoral fins, deeper body, fewer lateral line scales, and more gill rakers (Koelz 1931). This coldwater species is known only from Ives Lake in Marquette County and was last reported in 1983. As with the Siskiwit Lake Cisco, the taxonomic status of Ives Lake Cisco is not fully accepted and genetic research is needed to determine if this species is distinct from *C. artedi*.

Goals

- Determine if Ives Lake Cisco is genetically distinct from Cisco *(C. artedi).*
- If species status is confirmed, determine status and viability of population.

Call Out Box: How Vulnerable are Focal Species to Climate Change?

Cooper et al. (in preparation) and Jacobson et al. (2010) determined climate vulnerabilities for focal species. See threats section for more specifics about how climate change may affect species and habitats.

Climate vulnerability rankings are based on the likelihood and amount of change in species abundance or range by 2050 – extreme = extremely likely to substantially decrease or disappear; moderate = a modest decrease is likely.

	Climate Vulnerability
Cisco	Extreme
Ives Lake Cisco	Moderate
Siskiwit Lake Cisco	Moderate

What are the Conservation Threats and Actions?

Major threats that need to be addressed and key actions that need to be implemented over the next 10 years

Threats to Habitats

Invasive & Problematic Species, Pathogens & Genes

- Invasive species (e.g., starry stonewort) degrade and alter spawning habitats (O'Neal and Soulliere 2006).
- Unknown genetic and phenotypic variability make reintroductions and intentional movement of individuals among waterbodies problematic.

Residential & Commercial Development

- Intensive shoreline development and habitat modifications below the ordinary high water mark can degrade nearshore spawning habitats (O'Neal and Soulliere 2006).

Pollution

- Nutrient enrichment and lake eutrophication can cause loss of well-oxygenated deep-water habitat (O'Neal and Soulliere 2006; Derosier 2007; Jacobson et al. 2010).
- Sedimentation of nearshore spawning habitats can create unfavorable conditions for egg deposition.
- Aquatic plant herbicide treatments can alter food web dynamics during critical periods, such as when larval ciscoes are feeding in nearshore areas.

Climate Change

- Climate warming will result in a loss of coldwater habitat (Jacobson et al. 2010).

Conservation Actions for Habitat

Land & Water Management

H1. Implement Michigan's Aquatic Invasive Species State Management Plan. [AIS]

Raising Awareness

H2. Educate lake associations and watershed councils about ciscoes, what their presence means for water quality, and how to conserve important habitats. [MILP]

H3. Promote voluntary best management practices for stopping the introduction and spread of invasive species for recreational users, researchers, and industry. [TIS]

Law & Policy

H4. Continue to administer an effective Michigan Department of Environmental Quality protection program for wetlands, lakes, and streams, and provide incentives for conservation practices.

H5. Take appropriate enforcement actions for violations of the Invasive Species Order, and maintain the Prohibited and Restricted Species list pursuant to the Natural Resources and Environmental Protection Act, 451 of 1994, as amended. [AIS]

Research & Monitoring

H6. Refine species maps, habitat suitability models, and priority maps based on field data, updated GIS layers, and updated downscaled climate projections (Cooper et al. in preparation; Wehrly et al. in preparation Yeh et al. in preparation).

H7. Develop and implement targeted habitat surveys.

Threats to Ciscoes

Lack of Knowledge

- Lack of information on genotypic and phenotypic variability among populations, status of individual populations and their long-term viability.

Conservation Actions for Ciscoes

Conservation Designation & Planning

S1. Prioritize targeted surveys for Ciscoes using predicted occurrences of habitat suitability models (Yeh et al. in preparation) and historical sampling. [GRA; KRA]

S2. Develop and implement a Cisco management plan for Michigan. [FD]

S3. Identify important Cisco Lakes to focus conservation and management. [MILP]

Law & Policy

S4. Protect known Cisco Inland Lake habitats through the environmental permit review process.

Research & Monitoring

S5. Determine genetic and phenotypic variability of inland and Great Lakes Cisco populations.

S6. Determine the feasibility of developing a habitat suitability model based on relative abundance.

S7. Develop a sampling strategy to understand population structure beyond just presence-absence.

S8. Explore the potential for collaborative research with other partners in the Great Lake region. [MILP]

S9. Evaluate whether connectivity is an issue for inland Cisco persistence, and at what scale.

How Will We Monitor?

Assessing status and measuring progress towards goals.

Habitat

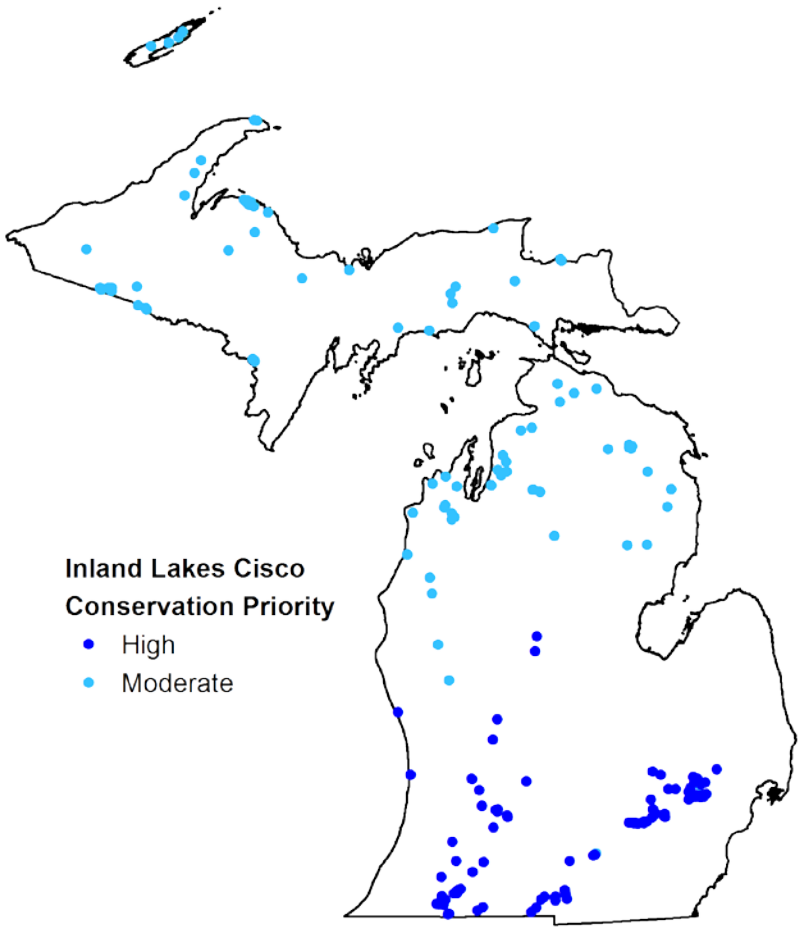
- Use Michigan Department of Natural Resources Status and Trends surveys and conduct targeted surveys in Cisco Lakes to assess status of habitat.
- Continue Michigan Department of Environmental Quality aquatic habitat and water quality monitoring.

Ciscoes

- Conduct targeted surveys of known and historical Cisco Lakes to determine presence and relative abundance; current lake fish surveys do not sufficiently sample Ciscoes.

Where Are There Places For Partnership?

This map was designed by partners to help them connect around important places for focal species. Working together on conservation actions on a voluntary basis provides great benefits to wildlife and people.



This map is based on suitability for focal species, vulnerability to climate change, and amount of landscape disturbance.

How Does This Plan Link With Other Conservation Plans?

There has been a multitude of relevant planning efforts across the state and country over the past ten years. Bracketed superscripts throughout the Wildlife Action Plan indicate where the conservation action, goal, or monitoring strategy aligns with those from another plan. For conservation plans with distinct objectives, the objective or strategy number is also included. This linking of plans is meant to assist the expansion of partnerships.

[AIS] Michigan's aquatic invasive species state management plan 2013 Update (DEQ et al. 2013).

[CC] National fish, wildlife and plants climate adaptation strategy (National Fish, Wildlife and Plants Climate Adaptation Partnership 2012).

[FD] Charting the Course: Fisheries Division's framework for managing aquatic rsources. 2013-2017 Fisheries Division Strategic Plan.(Michigan Department of Natural Resources 2013).

[MILP] Michigan inland lakes partnership strategic plan (Michigan Inland Lakes Partnership 2012).

[GRA] Draft Grand River assessment (Hanshue and Harrington 2011).

[KRA] Kalamazoo River assessment (Wesley 2005).

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Photo Credits

Ives Lake Cisco – Walter Koelz

Blugill – U.S. Fish and Wildlife Service, Eric Engbretson

Northern Pike – National Park Service

Walleye – U.S. Fish and Wildlife Service

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About The Wildlife Action Plan

Today's Priorities, Tomorrow's Wildlife

Every state has a Wildlife Action Plan, which taken together create a national conservation strategy for safeguarding wildlife and their habitats for current and future generations. Each state's action plan is uniquely designed to serve the needs of that state. These plans provide a framework for proactive conservation and management of fish and wildlife before they become endangered, which is more straightforward, cost-efficient, and effective.

Michigan's Wildlife Action Plan was developed by conservation partners across the state. It provides information about those species in greatest conservation need. The plan is organized by chapters or mini-plans. Each mini-plan outlines priorities for the next 10 years. The mini-plans detail priority habitats and focal species of greatest conservation need, status of species and habitats, critical threats, needed conservation actions, places for partnerships, monitoring needs, and goals. For more information about how the plan was built and to read other mini-plans, please visit: www.michigan.gov/dnrwildlifeactionplan.