

Ogaa (Walleye)

Sander vitreus

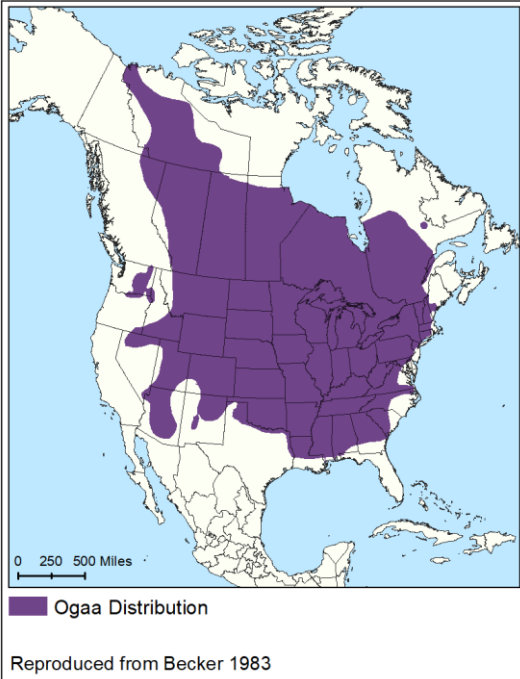
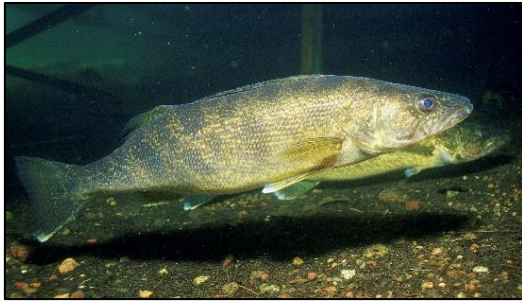


Figure 7. Range map of ogaa.

Moderately - Extremely Vulnerable
(Confidence level: High)

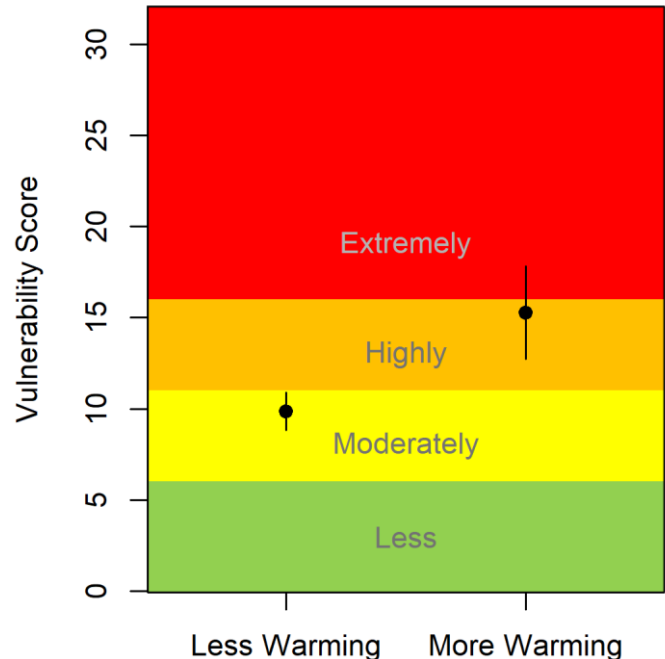


Figure 8. Climate change vulnerability scores for ogaa on a scale of 0 (lowest vulnerability) to 32 (highest vulnerability). Dots indicate average score; lines indicate possible range of scores for each warming scenario.

General Description:

Like many of the swimmers, ogaa is highly respected in Ojibwe culture. Ogaa features prominently in many traditional stories and personal memories illustrating how Ojibwe people have depended on fishing as a means of survival. In a historical interview from 1992, Mille Lacs tribal member Doug Sam emphasized how his people have relied on ogaa and other swimmers for their subsistence needs:

"We used to go out here [Mille Lacs] ... used to have big barrels full of salted fish to last all winter... and early spring there you go put a little tepee out there and get a golden northern or a walleye. That was your meal. You didn't get a whole bunch. You just got what you needed for... it was a good life."

Traditional stories of ogaa depict its interconnectedness with other beings/species. A tribal member from Red Cliff remembered her mother from the Bad River Tribe describing how the frogs would make noise to indicate the start of the ogaa season.

Ogaa was a main focus of protests by non-Indians during the "Walleye Wars" of the late 1980s. Sports fishermen and others opposed to tribal members spearing ogaa led protests at boat landings on Ceded Territory lakes. These protests, which sometimes turned violent, came after the landmark court case of Lac Courte Oreilles v. Wisconsin, which recognized the Ojibwe people's treaty-reserved rights to hunt, fish, and gather off-reservation in Wisconsin's Ceded Territories.

Ogaa is found in many lakes and rivers throughout the Ceded Territories and is commonly harvested by tribal members and recreational anglers (Figure 7). Ogaa gains a competitive advantage over other species in turbid or stained, low-light waterbodies with limited plant growth. It typically spawns at night in early spring, shortly after ice-out over shallow (<6 feet) gravel and/or cobble bars. Young ogaawag commonly move offshore into

the pelagic zone after gaining the ability to swim. Juvenile and adult ogaawag tend to use deeper, darker water during the day and move into the nearshore environment (littoral zone) at night to feed.

The oгаа population has declined in many waterbodies throughout the Ceded Territories in recent years. For example, oгаа in Lac Vieux Desert Lake has declined from a high of ~3 adult fish/acre in 1998 to approximately 0.5 fish/acre in 2016, an amount quite low relative to other Ceded Territory lakes (average 2.5 fish/acre). Similarly, oгаа in Mille Lacs Lake declined by approximately 90,000 pounds per year between 1998 (biomass ~2.5 million pounds) and 2016 (biomass ~0.89 million pounds). Oгаа stocks are predicted to decline in many other lakes throughout the Ceded Territories.

In interviews with tribal members, oгаа was frequently mentioned. Tribal members are seeing a decrease in the population in a majority of the lakes where oгаа are present. Current contamination and the potential for future contamination have been consistently mentioned as a concern. One tribal member from Mille Lacs voiced concern about the change in color of some oгаа, noting that some are darker grey and, during processing, the meat won't separate from the skin and tends to shrink to one-third of the size. Another consistent observation and concern noted during interviews is that cooler oгаа-dominated lakes are getting warmer.

Summary of climate threats:

Oгаа was in the 78th percentile relative to other fish in the assessment. Relative to other beings/species, oгаа was in the 90th percentile. Factors that increased oгаа's vulnerability to climate change include: natural and anthropogenic barriers (e.g., connectivity of inland lakes, dams), thermal niche (loss of coolwater habitat), hydrological niche (e.g., droughts), disturbance regime (more intense floods), dietary versatility (availability of specific prey items), sensitivity to competition (ogaa competes with bass species), sensitivity to pathogens (i.e., more susceptible to infections and parasites) and documented (e.g., decline in abundance) and predicted response (e.g., range contraction) to climate change (Figure 8).

Factors that increase oгаа's vulnerability to climate change:

- SI** Natural barriers: Limited connectivity of inland lakes will reduce the ability of oгаа to move to suitable habitat as the climate changes. Moreover, migration routes such as shallow waterways have the potential to warm faster than lakes, creating a barrier for this coolwater species. Conversely, an increase in frequency and intensity of extreme weather and precipitation events has the potential to create new migration routes between waterbodies. Natural barriers are likely to impede oгаа dispersal as the climate changes, but some dispersal will still occur through river systems.
- N/SI** Anthropogenic barriers: Barriers such as dams and road crossings can impede movements of oгаа in rivers and are likely to impede oгаа dispersal to a limited extent as the climate changes. Oгаа in lakes are less affected by this factor as few anthropogenic barriers exist in lakes.
- SI** Physiological thermal niche: Thermal niche for oгаа, a coolwater species, depends on the life stage. For eggs, the optimum temperature is 48-59°F, with high mortality occurring when temperatures remain below 42°F or above 66°F for extended periods. Optimal temperature for growth of fry (young fish capable of feeding themselves) is 59°F, and no growth occurs at temperatures below 50°F or above 68°F (upper lethal temperature is 70°F; lower lethal temperature is 42°F). Optimal temperature for growth of juvenile oгаа (young fish that have developed scales and working fins) is approximately 70-77°F, with no growth occurring at temperatures below 54°F or above 84°F. For adult fish (capable of reproducing), optimum temperature is approximately 64-72°F with performance decreasing at 79°F and lethal temperatures at 84-93°F (lower lethal limit is not defined). Water temperature is predicted to increase as the climate changes, potentially reducing thermal habitat for oгаа by 10-40% and resulting in negative consequences for growth and survival of this species.
- SI** Historical hydrological niche: The area oгаа occupies has experienced slightly lower than average variation in precipitation in the past 50 years.

- N/SI **Disturbance regime:** An increase in the intensity and frequency of extreme precipitation events might decrease ogaa recruitment in some lakes and rivers.
- N/SI **Dietary versatility:** Ogaa diet is flexible across life stages, but due to its small mouth (i.e., gape limitation), newly hatched ogaa typically consume zooplankton. It is possible that this prey item might not be available as the climate changes, thereby limiting food for this life stage.
- SI **Sensitivity to competition:** Ogaa's sensitivity to competition depends on the fish community in the individual waterbody. Ogaa is likely to experience more competition in lakes and rivers containing largemouth bass and smallmouth bass, a situation likely to be exacerbated as the climate changes because these species perform better at elevated temperatures.
- SI **Documented response to climate change:** Distribution and abundance of ogaa has been declining in recent decades and has been correlated with environmental conditions associated with climate change (e.g., growing degree days, water clarity).
- I **Modeled change in range or population size (2050):** The number of lakes that support naturally reproducing stocks of ogaa is predicted to decrease by 65% in Wisconsin. A similar decline will likely occur in lakes throughout the Ceded Territories.
- SI **Overlap of modeled future (2050) range with current range:** It is predicted that only 35% of the lakes that currently support naturally reproducing stocks of ogaa will do so by 2050.
- I **Occurrence of protected areas in modeled future (2050) distribution:** Less than 5% of ogaa habitat in the Ceded Territories is predicted to be in a protected area by 2050.

Legend	GI Greatly Increase This factor greatly increases vulnerability	I/GI Increase/Greatly Increase This factor may increase or greatly increase vulnerability	I Increase This factor increases vulnerability
	SI/I Somewhat Increase/Increase This factor may somewhat increase or increase vulnerability	SI Somewhat Increase This factor somewhat increases vulnerability	N/SI Neutral/Somewhat Increase This factor may not increase or may somewhat increase vulnerability