Mazina'igan

A Chronicle of the Lake Superior Ojibwe

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Freshwater rivers & lakes provide for Ojibweg across Territory

By Charlie Otto Rasmussen
Editor

It's around midnight in mid-April. Just past the roiling froth below Upper Michigan's Escanaba River dam, Bay Mills members spear ogaa from a maze of rocks and broken concrete cobble. Between freight trains sounding off to the northwest and intermittent traffic overhead, clunking across the US Highway 2/41 bridge, it's a unique setting, unlike the typical Northwoods walleye lake—silent save the calls of new loon arrivals.

Here on the river, walleye harvesters swap out motor boats for rubber chest waders, stepping carefully across slippery rocks as the current pulls downriver to Lake Michigan. Headlights powered by AA batteries replace the heavier miner-style helmets often used on inland Ceded Territory lakes. But the reflective eyes shine all the same, marking ogaawag in pools that include white suckers and other fish.

Lynn Carrick emerges from the Escanaba River in Upper Michigan with a pair of walleyes last April. (CO Rasmussen photo)

"I've been coming here for about seven years now. It's a really nice spot to get some fish," says Lynn Carrick of Bay Mills Indian Community. Carrick fished with Adrian Hatfield, a Bay Mills member living near Sault Ste. Marie.

Up on the steep riverbank, GLIFWC Officer Gale Smith monitors the treaty harvest. Other fishermen are also drawn **(See Freshwater, page 17)**

Chronicles of Mille Lacs:

The walleye, the zebra mussel, & the waterflea

By GLIFWC Inland Fisheries Section

Not long ago in a large 1837 Ceded Territory lake, abundant walleye roamed freely. These walleye provided excellent harvest opportunities for tribes and state-licensed anglers and repopulated through abundant naturally produced year-classes (i.e., lots of baby walleye) approximately every 4 years.

But something happened around 2010, and abundant walleye year-classes started to die at higher rates, resulting in abundant year-classes surviving to adulthood less often (approximately every seven years).

Spiny waterflea. (Gary Montz, 144, **Bugwood.org***)*

Very quickly, the adult walleye population declined (see "A closer look at Mille Lacs management" on page 7 for more info).

Tribal and state biologists reduced harvest levels to preserve what was left, but death rates of young unharvestable walleye remained high. Around the same time, two food chain rearranging invasive species, the zebra mussel and the spiny waterflea crashed into the lake ecosystem. Were these the culprits in the walleye decline?

The zebra mussel is a filter-feeding animal about the size of a quarter with alternating stripes on its shell. This little strainer is native to eastern Europe and western Russia. It was first found in the Midwest in the Great Lakes in 1988 after hitchhiking in the ballast water of large vessels.

Since its discovery in the Great Lakes, it has caught a ride with unsuspecting boaters to several inland waters, including the 132,500 acre Mille Lacs Lake, where it was first discovered in 2005. Zebra mussels are extremely prolific, females can produce up to 500,000 eggs, and eventually, the young will attach to any hard surface available.

Zebra mussel densities on the Mille Lacs Lake floor skyrocketed from 0.00016 per square foot in 2005 to a high of 1,269 per square foot in 2012 (Figure 1). Zebra mussels consume the tiny microscopic plant-like organisms called phytoplankton that form the base of the Mille Lacs food chain. What this might mean is less zooplankton (microscopic animal-like organisms which feed on phytoplankton) for baby fish.

The zooplankton community in Mille Lacs was dealt another blow in 2009 when spiny waterfleas were discovered. Also initially brought over from Europe and Asia in ballast **(See Chronicles of Mille Lacs, page 22)**

Be roadwise this niibin

Keep your boats clean.

Slow down for migrating turtles.

High honor for GLIFWC environmental biologist

The Environmental Protection Agency (EPA) presented the Taimi Lynne Hoag Award for Environmental Stewardship to GLIFWC's John Coleman at a ceremony April 6th in Chicago. The EPA Region 5 Tribal Operations Committee selected Coleman for the prestigious award for his work on a wide range of environmental protection projects throughout the Ceded Territories.

Each year the award recognizes significant contributions in environmental management and/or environmental stewardship in Indian country. Nominations are solicited from all tribes in Region 5 annually. Nominees are considered and selected by the R5TOC Tribal Caucus.

The EPA established the award in March 2003 to recognize the environmental protection accomplishments and contributions of Taimi Hoag, the former Environmental Director for the Little Traverse Bay Band of Odawa Indians. Hoag was a community, regional, and national leader for environmental protection in Indian country. **—COR**

Pictured from left: Cheryl Newton, EPA R5 Acting Deputy Regional Administrator and RTOC Co-Chair; Tina L. Van Zile, Environmental Director, Sokaogon Chippewa Community; Mark Parrish, Pokagon Band of Potawatomi, Tribal Council Secretary and RTOC Co-Chair; and Coleman with GLIFWC Executive Administrator James Zorn. (Toby Wall photo)

Counting every fish

Harvest monitoring on Mille Lacs Lake

The 2017 spring tribal harvest season in the Mille Lacs Lake area is all wrapped up. Through long nights and cold weather, GLIFWC and tribal creel clerks, wardens, and biologists worked together to ensure that the process ran smoothly.

But what went into tracking all of this harvest? It turns out that a lot of work is involved with recording catch information and managing the fishery within the quota.

Every day, tribal officials provided GLIFWC personnel with a list of Mille Lacs Lake boat landings where band members wished to spear or gill-net.

Creel teams, wardens from some individual tribes, plus GLIFWC wardens and biologists, were then notified and sent to those "named landings" to issue spearing or netting permits, which hold information such as the name of the harvester, walleye bag limit, and type of fishing gear being used. The creel team, biologist, and/or warden remained at the landing while spearing or netting activity was occurring.

After band members were finished with spearing or netting, they brought their catch back to the landing where the creel team counted and weighed each and every fish for all species; additional information such as length, sex, and age data was collected from a sub-sample of the total harvest and recorded on a catch report form.

After all the fish were creeled at a landing, a warden or biologist entered the catch data into an online database that automatically updated quota balances.

Based off this information, tribal officials, wardens, and biologists could determine bag limits and the number of netting or spearing permits that could be issued to band members the following night.

This entire system of recording and tracking tribal harvest has enabled GLIFWC and tribal staff to closely monitor quota balances, successfully keeping the walleye harvest well within quotas on Mille Lacs Lake every year.

Chi-miigwech to all GLIFWC and tribal staff, including creel clerks, wardens, and biologists who were involved in this process!

—Ben Michaels

As Fond du Lac fisherman Mike Ziebarth picks fish at a Mille Lacs boat landing, GLIFWC Biologist Ben Michaels examines the net for invasive plants. GLIFWC Warden Holly Berkstresser monitors the activity. (J. Ballinger photo)

Bazhiba'owe-inaajimowinan

Spearfishing stories in Waaswaagoning

By: Dylan Jennings, Staff Writer & Melonee Montano, GLIFWC TEK Outreach Specialist

The warm and cleansing smell of sage filled the room as community members flooded into the Waaswaagoning (Lac du Flambeau) multipurpose building. It was that time of the year again and tribal members were excited to share about it.

Spearing has been a traditional subsistence practice for many Ojibwe Bands for centuries. Spearing is both a selective and effective means of harvesting the much needed giigoonh (fish). Tribal members can spearfish year round, which even includes spearing through the ice. The Waaswaagoning community has a deeply rooted relationship with the giigoonh as its name clearly indicates. Lac du Flambeau or Lake of the Torches refers back to European contact. The French fur traders would see Anishinaabeg fishing out of canoes guided by torchlight. Today, this tradition continues.

A ceremonial pipe traveled around the room and a prayer was spoken on behalf of the people and for the food. Shortly after, food was served and the stories began. Tom Maulson, former Lac du Flambeau Chair and walleye warrior started the gathering by recalling the struggle that Anishinaabeg had to endure. Children listened intently as the elder spoke the truth. "We had rocks thrown at us. Some of us wondered if we would even make it home on some of those nights."

Vice Chairman John "Goober" Johnson recalls both the resiliency and generosity shown by Anishinaabeg: "When I harvest, sometimes we get a hundred fish. But everyone knows those fish don't go to my freezer—they always end up feeding our elders, our single mothers, and at ceremonies. We are a giving people and I see this tradition carried forward even today." Many of the harvesters nod in agreement. Harvesting not only translates into feeding your immediate family, but it extends to the community.

Shortly after the *LCO (Voigt) Decision* in 1983, all hell broke loose in Northern Wisconsin. Boat landings were filled in the evenings with hostile protestors, angered by the reaffirmation of treaty reserved rights. It was the memories and stories of these times that inspired Tom Maulson's idea of this event. When approaching some Waaswaagoning elders about the event, a few felt they wouldn't have much to share. Yet it was those ones who had some of the strongest voices that evening that were heard by the younger generation.

"I think about what I need to do as a person living the days that I have on this here earth. The best ideas that came, to share it with our young people because they're the generation that's going to be around for a while," said Tom Maulson.

On the cover

Wildlife Biologist Peter David photographed this ayaabe near Sandy Lake, Minnesota in late July last niibin.

Ziigwan addendum: Melonee Montano and Hannah Panci co-authored the article "Resources like waaboozoog, snow sheds light on climate trends" with Kim Stone on page 11.

Ceded Territory news briefs

Moose survey incomplete after snow melt

Marquette, Mich.—Mild winter weather with limited snowfall prevented the Michigan Department of Natural Resources (DNR) from completing a moose populations analysis in the Upper Peninsula. A dramatic thaw in January melted much of the snow cover that researchers rely on to spot moose from the air.

Using three airplanes that fly over a sprawling grid of study plots, the DNR conducts moose population surveys every odd-numbered year. Following the January 2015 assessment, biologists estimated moose numbers at 323 animals, a 28% drop from 2013. Despite the abbreviated survey this past winter, the DNR announced it would issue an abundance estimate sometime this summer for the core portion of moose range where survey flights occurred.

The vast majority of mainland moose occupy a 1,400-square mile area on the eastern edge of the 1842 Treaty Ceded Territory. **—CO Rasmussen**

Language conference draws students, speakers from across Ojibwe Country

The 23rd annual Anishinaabemowin-teg conference took place March 30 through April 2 in Sault Ste Marie, Michigan The theme of the conference this year was "Aabziitoodaa gdi-nweninaa nje-shkiniijig," or reviving our language for our youth.

The conference consisted of a series of workshops relating to different aspects of language preservation and revitalization. The workshops are put on by language enthusiasts of various fluency levels.

A few of the workshop titles this year were: Decolonizing Our Worldview and Philosophy, Ojibwe Language Play Group for Families, Decolonizing Madeline Island, and Strategies for K-6 programs.

The conference is always a great place for language teachers and learners to gather and speak the language, network, and pass ideas for language revitalization back and forth. There was a good turn out this year with people from across Canada and the United States meeting up and conversing with multiple dialects of Anishnaabemowin. For more information see *http://anishinaabemowin-teg.org* or *www.facebook.com/anishinaabemowinteg*.

—Levi Tadgerson

Critical Issues for Michigan Natives

Marquette, Mich.—Drum songs and good words led off Michigan Indian Education Council's (MIEC) Native American Critical Issues Conference March 24 at Northern Michigan University. During opening remarks, Chris Swartz, Keweenaw Bay Indian Community Chairman, encouraged attendees to stand up for natural resources across the region.

"Clean air, clean water, are both really important to us at Keweenaw Bay Indian Community and to everyone around the Great Lakes," Swartz said.

The MIEC advocates for improvements in Native American education across the state. The conference draws a broad range of participants including students, teachers, policy makers, and Title VI Indian education program administrators. For more see *www.miec.org*. **—CO Rasmussen**

Birch Grove Campground closure on Chequamegon-Nicolet NF

Over the last couple of years the Chequamegon-Nicolet National Forest (CNNF) recreation program has been facing significant challenges related to increased operational costs and a decrease in the amount of funding available to cover those costs. This led to closures and reduced services at various recreational locations including campgrounds, day-use sites, and trails.

According to the CNNF: "Once again, the Forest will be focusing its efforts on the recreation areas open to the public in 2017. As a continuation from the last two years, a small portion of the Forest's recreation areas will have reduced service and/or be closed again this season. Many of these areas are a carryover from the last two years with a few minor adjustments passed on the feedback we received. These changes are once again necessary given our current recreation budget."

Upon review of the campground listings, the only significant change campers can expect from last year is the closure of the Birch Grove Campground on the Washburn Ranger District. This campground is closed due to the storm damage that was sustained in 2016.

All updates and closures can be found at: *https://data.glifwc.org/camping/* or *www.fs.usda.gov/recmain/cnnf/recreation*.

Be sure to visit your registration clerk to receive your camping permit and directions on how to submit the fee envelope at the campgrounds. **—Alex Wrobel**

Campers learn wild ricing safety techniques at Onji-Akiing (From the Earth) summer cultural camp, where youth focus on traditional ecological knowledge deepening their relations with Mother Earth. (Photo by Heather Bliss)

Onji-Akiing (From the Earth)

Natural Resource Cultural Summer Camp

July 17-21, 2017

Lake Nesbit Environmental Center
Sidnaw, Michigan

GLIFWC is excited to announce our 2017 cultural summer camp program: Onji-Akiing (From the Earth) for grades 5-8!

A collaborative effort between GLIFWC and the USFS, Onji-Akiing is a cultural outdoor adventure-based camp that focuses on natural resource career exploration and treaty rights. This camp is held at beautiful Camp Nesbit, nestled in the heart of the Ottawa National Forest in Sidnaw, Michigan, also home to the calling loons of Lake Nesbit.

Leadership and service learning activities are important aspects of this program. Activities also focus on group cooperation and communication, problem solving, self-confidence, leadership, physical exercise, spiritual growth, social skills, as well as respect and responsibility to self and community. Hands-on experiential activities include a group obstacle course, high ropes course, birch bark basket making, smokehouse construction, fishing, archery, swimming, Canoomin safety, animal and plant wisdom, cultural exploration, and cooperative games.

Centered on the Medicine Wheel, this camp explores Native American traditional ways and traditional ecological knowledge, but also learning in the areas of forestry, biology, fisheries and botany. Youth will work with staff from GLIFWC and the USFS. This camp is free of cost. Deadline for accepting applications is June 12, 2017 and fills up fast so early applications are welcomed.

Deadline for accepting applications is June 12, 2017

Onji-Akiing Registration Form

Participant Name _____

Address _____

City _____ State _____ Zip _____

Email _____ Phone #( )_____

Grade _____ Age _____

Tribe Affiliation _____(if none, leave blank)

Please attach another sheet of paper with a short essay (at least 100 words) on why you want to attend Camp Onji-Akiing. Please include any special achievements, and how this camp might help you in school, your community, and with any life goals.

Please attach one letter of recommendation from an adult, not related to you, about why they think you should attend the camp and how you will benefit from it.

Students are accepted on the basis of their essays, recommendations, and space availability. In the event you are accepted, you will be expected to sign a statement saying that you will participate fully in all activities. Parents/guardians will have to complete and sign health forms and permissions for all camp activities.

For questions or concerns, please contact:

Heather Bliss
906-458-3778
hnaigus@glifwc.org

Fred Maulson
715-682-6619 ext. 113
fmaulson@glifwc.org

Mail application, essay and letter of recommendation to:
GLIFWC, Attn: Camp Registrations, PO Box 9, Odanah, WI 54861 or Heather Bliss at 253 Silver Creek Road, Marquette, MI 49855. You can also email application to *hnaigus@glifwc.org* or fax application to 715-682-4221.

A closer look at Lake Mille Lacs management

By GLIFWC Inland Fisheries Section

Mille Lacs (a shallow, well-mixed lake, with moderate amounts of dissolved nutrients "mesotrophic") is a famous walleye (ogaa) fishery in Minnesota harvested by both tribes and state anglers. Walleye are harvested by the Mille Lacs, Fond du Lac, Bad River, Mole Lake, St. Croix, Red Cliff, Lac du Flambeau, and Lac Courte Oreilles tribes located in the 1837 Ceded Territory.

Tribal members traditionally harvest walleye during the spring spawning period with gill nets and spears, with minimal harvest occurring with rod and reel throughout the year. Mille Lacs Lake is also a prominent walleye fishery among recreational anglers, who target walleyes with hook and line year-round, except during early spring. As a result, tourism associated with the walleye fishery supports the local economy. Overall, walleye have been the centerpiece for both subsistence and recreational fishing in Mille Lacs Lake.

Cooperative walleye research

The Minnesota Department of Natural Resources (MNDNR) with support from the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) and Mille Lacs Band of Ojibwe conduct gill net surveys throughout the lake each fall. These surveys allow biologists to estimate the number of mature adult walleye in the lake. These yearly estimates of adult walleye abundance are supported by a more laborious mark-recapture population estimate, approximately every five years. In 1999, Mille Lacs Lake had over 2 million pounds of adult walleye but declined to approximately 1.5 million pounds in 2005, a low adult walleye biomass for this lake but within the range of natural variation. Unfortunately, adult walleye stocks continued to decline, reaching an all-time low of approximately 0.7 million pounds in 2013. Luckily, a relatively large year-class (i.e., lots of young walleye) was produced in 2013, and most survived to become adults, resulting in a moderate increase to 0.89 million pounds of adult fish in 2017. Even with this moderate increase, the pounds of adult walleye are still well below historical levels (Figure 1; Figure 2). The production of more large year-classes (i.e., lots of babies) and subsequent survival to adulthood is required to recover walleye stocks to near historical levels.

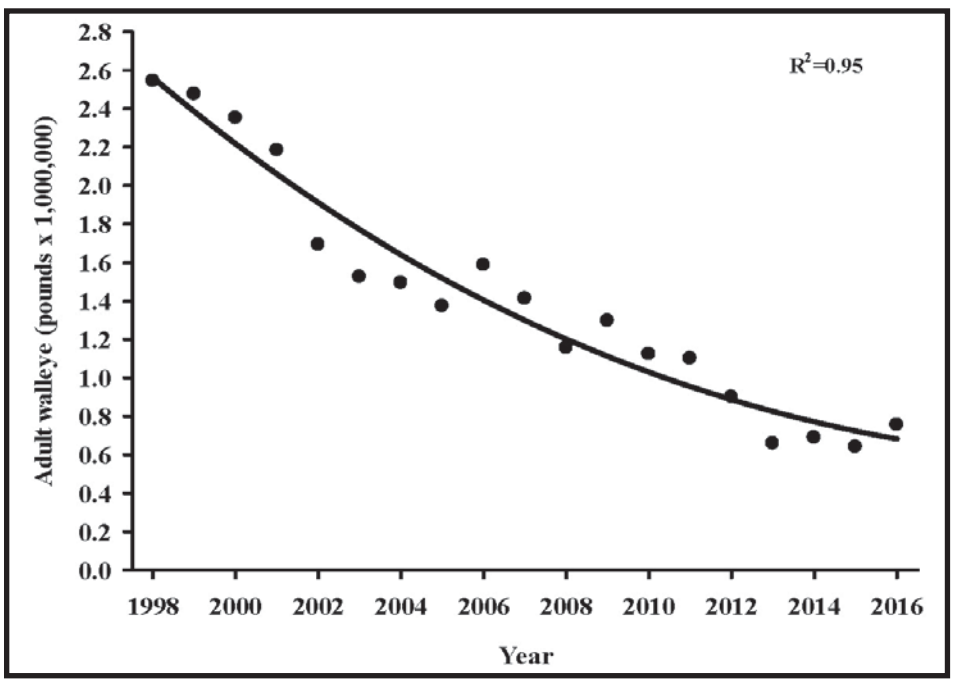


Figure 2. Adult walleye biomass (pounds of adult fish) in Mille Lacs Lake from 1998 to 2016. Solid line represents a best fit curve.

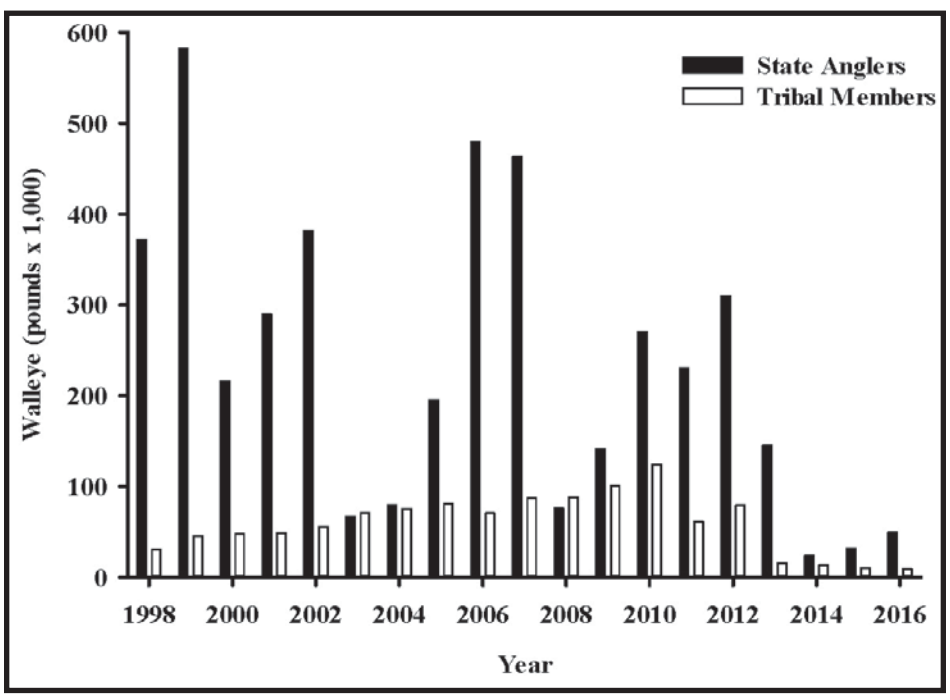


Figure 3. Walleye fishing mortality in Mille Lacs Lake from 1998 to 2016. Mortality estimates include fish that die after being released by anglers.

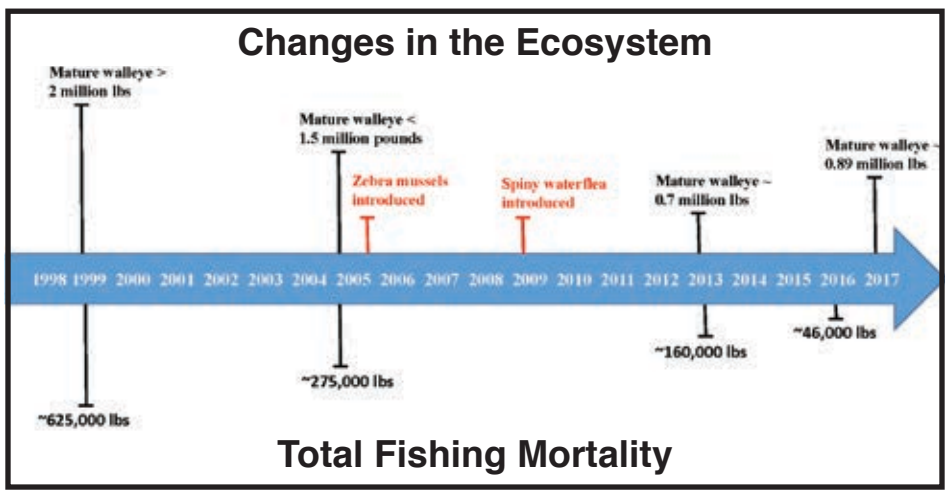


Figure 1.

Monitoring the harvest

MNDNR, GLIFWC, Mille Lacs, and Fond du Lac are responsible for monitoring harvest of walleye from Mille Lacs Lake throughout the year. Creel surveys conducted by the MNDNR collect information from individual anglers about species, fish size, bait type, number of hours fished, number of fish caught, number of boats, and number of ice shanties. From this information, MNDNR estimates the number of walleye harvested by anglers every year, including the number of fish that die after being released. GLIFWC counts and weighs every fish captured by netting or spearing, thus providing an exact number of walleye that tribal members harvest by these methods every year. Combined, these numbers equal the total walleye fishing mortality every year. In 1999, total fishing mortality was approximately 625,000 lbs but was reduced by more than half in 2005 (~275,000 lbs) because of a lower adult population size. Total fishing mortality decreased again to 160,000 lbs in 2013 when pounds of adult fish was at its lowest (~0.7 million pounds). Corrective management actions were taken by the State of Minnesota and Ojibwe Bands to limit harvest to relatively low levels so that adult walleye stocks would not continue to decline, with a low total fishing mortality of approximately 46,000 lbs in 2016 (Figure 1; Figure 3).

The invasive species wildcard

A potential complicating factor in understanding the decline of walleye in Mille Lacs Lake was the introduction of invasive species. In 2005, zebra mussels were found in Mille Lacs Lake, which were most likely introduced by hitchhiking on boats and trailers or in bilge water. Similarly, spiny waterflea was introduced in 2009 and again, these organisms were most likely transported by unknowing boaters (see invasive species article this issue for more info and this website (*http://stopaquatichitchhikers.org*). These invasive species can compete with and consume native zooplankton (microscopic organisms that age-0 fish eat), which can negatively affect their population size. In fact, by 2012, the native zooplankton population decreased from ~60/liter to less than 20/liter, directly correlating with the increasing number of spiny waterfleas and zebra mussels in the lake. The effect these exotic species have on top predators (walleye, northern pike) remains unclear, but research efforts are underway that will attempt to understand how productivity and food web connections (who is eating whom) might have changed since these invasions.

Although more research is needed to understand recent changes in the walleye fishery, it is clear that continued implementation of a conservative management strategy will help promote recovery. The good news is that the State of Minnesota and Ojibwe Bands have agreed to a small increase in the total fishing mortality to 64,000 lbs in 2017. This approach will result in a moderate increase in the mature adult population in 2017, an outcome that should assist with the recovery of this fishery. GLIFWC and MNDNR will need to monitor this fishery closely over the coming years to ensure management strategies (e.g., habitat protection, harvest limits) are achieving mutually agreed upon recovery goals.

Please contact Dr. Aaron Shultz, Mark Luering, Ben Michaels, Carl Klimah, Dr. Adam Ray, or Joe Dan Rose for more information.

Zebra Mussels. (National Oceanic and Atmospheric Administration, Great Lakes Environmental Research Laboratory photo)

Making sense of good years, bad years on manoomin waters

By Peter David, GLIFWC Wildlife Biologist

Ask a simple question; get a complicated answer. This is the way nature often works.

I have frequently been asked: "does manoomin abundance cycle?" The question certainly seems straight-forward. Rice harvesters of course are familiar with the great variability rice can depict between years, but they often wonder if there is a pattern underlying that variability. Are the year-to-year changes they witness in the field more or less random, or is there some pattern—even a rough one—governing these changes over time?

Over the years, I have certainly read references suggesting that rice "cycles." But does it really?

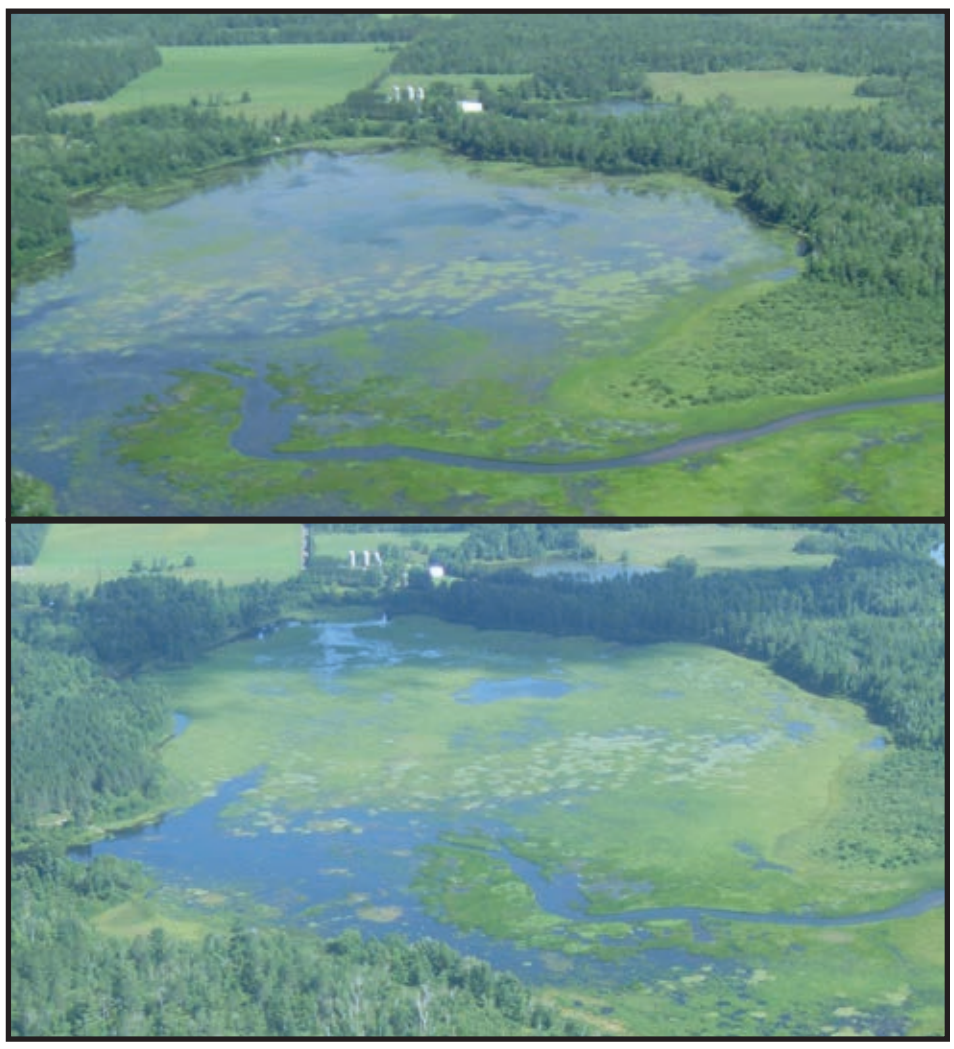
Probably the best support for cycling comes from a paper published in 1989 that looked at wild rice production in Ontario, Manitoba and Saskatchewan between 1970 and 1987. That data suggested cycling of abundance might be occurring on the province level in Ontario and Manitoba—but not Saskatchewan—on roughly a 4-year period. Pretty interesting data at first blush, but that paper also exemplifies the challenges inherent in trying to answer this question.

First of all, it turns out the question—does wild rice abundance cycle?—is really too vague to easily answer. For one thing, it's not clear at what scale the question is being asked. An individual lake? A region, state or province? The answer could be different at different scales. For example, individual lakes could be cycling, but unless they are in synchrony with each other, that cycling would be lost when measured at a regional scale.

It's also important to note that the Canadian data was tracking commercially harvested wild rice. In Canada, much of that harvest is coming from "semi-domesticated" wild rice. While this rice is generally grown on natural lakes, it is often subject to a much higher level of management than true wild-growing manoomin.

For example, water levels may be tightly regulated and bed density is often manipulated through thinning. In addition, commercial harvest levels can be influenced by market prices and other factors. In fact, it is likely that the lack of cycling in Saskatchewan may have been due to a marked increase in production during the study period. These factors and others suggest that data based on commercial harvest may not accurately reflect what is happening on more natural stands.

(See Making sense of good years, page 23)



What a difference a year makes: manoomin abundance in back-to-back years on Pacwawong Lake. (Peter David photos)

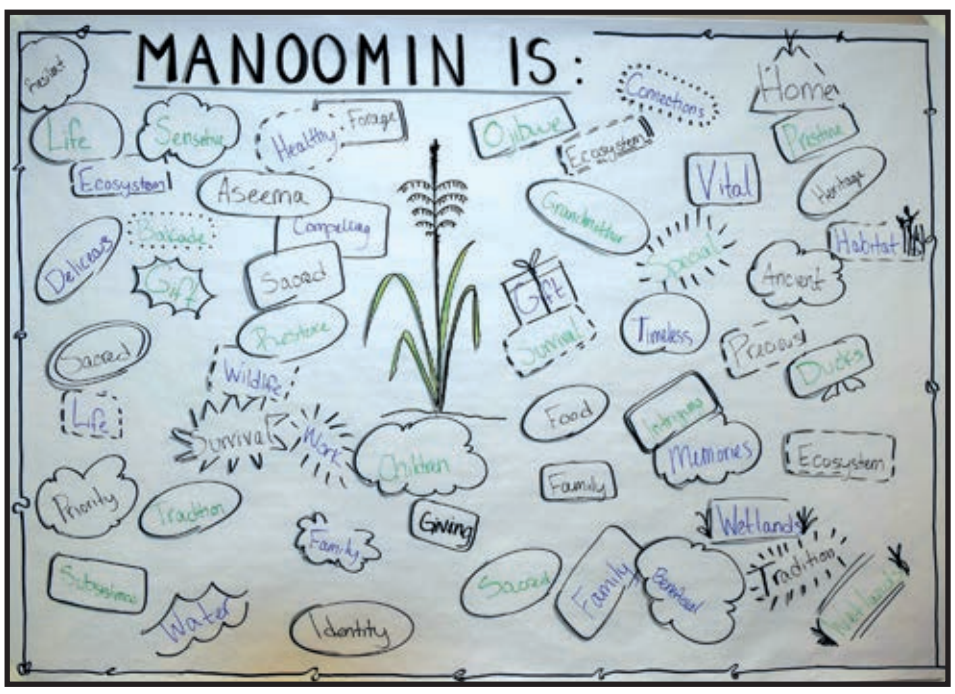
Manoomin restoration brings together tribal, federal, state stakeholders

By Paula Maday
Staff Writer

Odanah, WI—Survival. Ecosystem. Grandmother. Priority. To start the Lake Superior Manoomin Restoration Workshop on April 11-12, participants introduced themselves and shared one word to describe what manoomin means to them.

The words ranged from cultural to economic to biological in nature, accurately reflecting the complex interests on the table for the gathering between tribal, federal, and state agencies.

The purpose of the workshop—organized by the National Oceanic and Atmospheric Administration (NOAA) with a planning team of representatives from the Bureau of Indian Affairs, Fond du Lac Band, Bad River Band, Keweenaw Bay Indian Community, and GLIFWC—was to provide a meaningful opportunity for tribal communities to share knowledge and exchange perspectives on wild rice management and restoration.



What does manoomin mean to you? Participants in the Lake Superior Manoomin Restoration Workshop on April 11-12 each chose one word to describe what manoomin means to them. The collage of words shows the complexity of interests involved in manoomin restoration efforts. (PM)

Specific objectives included: identifying the best areas and approaches for wild rice restoration efforts in the Lake Superior region, understanding opportunities and challenges for the restoration of wild rice, and identifying priority needs for restoration success—including tangible outcomes for potential funding from the Great Lakes Restoration Initiative (GLRI).

Culturally relevant viewpoints punctuated opening presentations by Roger LaBine, Lac Vieux Desert Band, who talked about wild rice as an important part of his cultural identity, and Edith Leoso, Bad River Band, who shared the history of manoomin as told in Ojibwe prophecies.

"The history of wild rice grounds us to this place that we were guided to for our survival, for our livelihood," Leoso said. "We were guided to follow the path to the place where food grows on water. We are to take care of that good seed so that the good seed takes care of us," she said.

So how is the "good seed" being taken care of? Workshop participants first shared their knowledge of manoomin, developing an understanding of historical wild rice coverage, old and new monitoring techniques, and commonly used management and harvesting practices.

Darren Vogt, Environmental Director for the 1854 Treaty Authority presented to the group on the biology of wild rice, wild rice presence in Minnesota and how the Authority is monitoring wild rice abundance in the 1854 Ceded Territory.

According to Vogt, the Authority has had a wild rice monitoring program in place since 1998 and has consistently observed a suite of ten lakes since 2002. Activities include tracking water depth and temperature on each lake after ice out until late fall. Field measurements and lab analysis of water samples are also conducted to garner information on water quality. Finally, biologists estimate wild rice density on each lake when rice is standing and mature.

More information on these efforts can be found in the report "Wild Rice Monitoring and Abundance in the 1854 Ceded Territory (1998-2016)" at *www.1854treatyauthority.org*. Additional tribal and government representatives indicated they conducted similar monitoring programs within their areas.

Under Stress

Day two began with a panel discussion on the stressors affecting wild rice and the impacts on harvesting. Identified irritants include hydrology, climate change, recreation, and some plant communities. All panelists agreed however,

(See Manoomin, page 15)

Sugar Island research to expand Bay Mills harvest options

Mainland sugar bush a family affair

By Charlie Otto Rasmussen, Editor

Sault Ste Marie, Mich.—With an eye to expanding harvest opportunities for tribal members, Bay Mills Indian Community's Inland Fish & Wildlife Program is investigating the wilds of Sugar Island situated in the far-east of the Upper Peninsula. Much of the band's 606 acres of reservation holdings on the island are uninhabited and heavily wooded.

"We're determining what's available there, from wildlife to plant species," said Emily Martin, Bay Mills biologist and project leader. "The main reservation occupies a small area, and these surveys should help expand on-reservation options for members."

Just east of Sault Ste Marie, the St. Mary's River wraps around the island, which forms the international boundary with Canada. Bay Mills' primary land base is located to the west on Lake Superior at Waishkey Bay.

The study kicked off this past winter, focusing on the island's namesake resource: the sugar bush. Following a short ferry ride, Bay Mills natural resources staff strapped on snowshoes, trekking through dense woods to a mixed stand of maples in late February. They tapped both red (soft) and sugar (hard) maples, installing a five gallon bucket below each spile. The large sap receptacles allowed researchers to wait a week or two between visits to check the 24 tapped trees.

Paula Carrick's grandchildren at the family sugar bush in Bay Mills. From left: Albert Walden and Evan & Quinn Parker. (P. Carrick)

While sugar maples are the signature species for syrup production, scientists expect red maples to fair better in the future as the region continues to warm under climate change. Depending on variables like site conditions, it typically requires more red maple sap than from sugar maples to make a gallon of syrup. The reds have a slightly lower sugar content.

Trees in the Bay Mills study yielded sugar percentages between 1.8 to 4.4 with an average around 2.5%, Martin said. Since the trees were selected after the fall leaf-drop, Martin and her crew plan to return to Sugar Island this summer to pair up individual trees—red or sugar—with the corresponding sugar content results.

Martin said that while the island holds potential for a resurgence in maple production, another culturally important tree species is fading fast from an exotic invasive insect.

"There a lot of dead ash out there," she said. "Every tree we checked had EAB holes in them." EAB, or emerald ash borer, first arrived near Detroit in shipping containers from China around 15 years ago.

Since then, the ash-killing insect has made its way to isolated locations in a handful of Ceded Territory forests—from Michigan to Wisconsin and Minnesota. For black ash basket crafters from Bay Mills and other regional native communities, EAB creates a lot of uncertainty about the future of the ash resource and makes locating healthy trees increasingly difficult.

(See Sugarbush, page 22)

Remote cameras keep a close watch on the seasons

By GLIFWC Biological Services Staff

The second field season of the GLIFWC phenology project is well underway. GLIFWC climate change scientist Hannah Panci and wildlife biologist Travis Bartnick have been visiting the two study sites since March, making observations and recording the phenological status of each plant that has been tagged for monitoring.

Prior to the start of the growing season, Hannah Panci and Travis Bartnick visited the locations of the time-lapse cameras that have been placed at strategic locations to record images of the forest canopy (Figure 1). During their site visits, they cleaned the time-lapse camera lenses, checked for any new obstructions in the photo frame, and replaced the rechargeable batteries and memory cards in preparation for the 2017 growing season.

Remote cameras have been gaining popularity for many uses, including hunting, birding, and science-based monitoring. One of the ways scientists have been using remote cameras is to monitor the phenology (the study of the timing of biological events over time) of vegetation on the landscape with digital repeat photography. The cameras used for this purpose can come in many forms, including remote trail cameras, cameras designed specifically for time-lapse photography, and even security cameras near parks and college campuses. When used to monitor phenology, these cameras are collectively known as "phenocams." Phenocams are typically programmed to capture digital photos at regular intervals from a fixed position throughout the growing season. When the photos are sorted, processed, and played back in a movie format, we can observe the transition of the seasons at a rapid rate. Since most of the phenocams have a date and time stamp associated with every photo, we can use the photos to determine the date that the tree canopy greens up in ziigwan (spring), and the date when the leaves begin to change color in dagwaagin (autumn).

Figure 1. Photo of a phenocam at one of the GLIFWC phenology study sites. The phenocams are placed in a sturdy metal security box in an attempt to keep bears and other curious animals from disturbing or altering the view of the camera throughout the growing season.

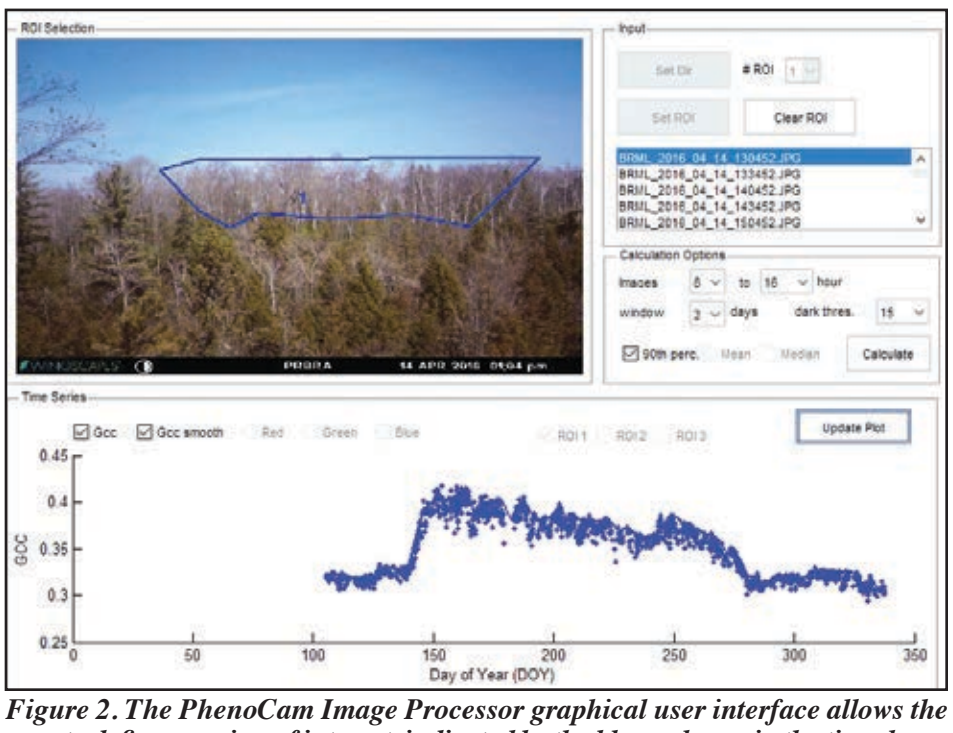


Figure 2. The PhenoCam Image Processor graphical user interface allows the user to define a region of interest, indicated by the blue polygon in the time-lapse photo. The processor also calculates the Greenness chromatic coordinate (Gcc) values and creates a time series plot on the graph at the bottom, representing the entire growing season. The sharp incline around day 140 (May 19, 2016) indicates the beginning of the spring green-up. The Gcc fluctuates throughout the growing season, but the decline starting after the peak around day 250 (September 6, 2016) indicates the date when the leaves started changing color in the canopy.

Scientists at Harvard University, the University of New Hampshire, and other partners have taken this idea a step further by developing a phenocam image processor graphical user interface (GUI). Digital photos are made up of pixels, and the color within each pixel typically contains a mix of red, green, and blue (RGB) values. The phenocam image processor allows the user to calculate the proportion of green values from the raw RGB values, resulting in a greenness chromatic coordinate (Gcc) value for each image. The GUI also allows the user to define and analyze a specific region of interest in the photo frame (Figure 2).

(See GLIFWC phenology project, page 19)

Omashkoozoog from Kentucky arrive in northern Wisconsin

Travis D. Bartnick, GLIFWC Wildlife Biologist

Winter, Wis.—On a cloudy March morning, a group of people dressed in warm winter clothing gathered at the Flambeau River State Forest Headquarters near Winter. The group shared a potluck breakfast as they waited for Wisconsin Department of Natural Resources (WDNR) staff to give them the go-ahead to be shuttled down the road to a large cleared-off portion of the forest, dominated by a 7-acre holding pen. The holding pen was designed and constructed for the arrival of 28 omashkoozoog (elk) that had been captured in Kentucky several weeks earlier, and were now on their way to northern Wisconsin as part of a long-term elk reintroduction effort.

Once the group was shuttled to the elk holding pen site, Dennis White of Lac Courte Oreilles (LCO) conducted a pipe ceremony, followed by a drum ceremony by Stony Larson, Bill Cadotte, and other members of the LCO Badger Singers. The welcoming ceremony was held to show respect and to welcome the elk in a good way as they finished their long journey from Kentucky to Wisconsin in two large livestock trailers.

After the welcoming ceremony, the group walked down one side of the holding pen, which had black fabric attached all along the tall fencing, creating a continuous visual barrier. Those in attendance peeked through slits cut into the black fabric as the elk were unloaded from the trailers and released into the pen. The elk came bounding through the open portion of the holding pen and headed directly toward the patch of dense young aspen (see photo).

The release of the elk was successful and went forward without any major issues. The elk will remain in the holding pen for an additional 10 weeks as they are closely monitored by wildlife technicians and have a chance to acclimate to their new surroundings.

The translocation of the captured elk is part of an agreement between the WDNR and the Kentucky Department of Fish and Wildlife, which allows the WDNR to relocate up to 150 elk over a 3–5 year period, and includes the trapping and transport of up to 50 elk per year.

Two of the 28 elk that were trapped in Kentucky and released into a 7-acre holding pen near Winter, Wisconsin as part of a multi-year translocation effort to boost the northern Wisconsin elk herd. (Travis Bartnick photo)

The intent of translocating the elk from Kentucky is to boost the elk herd and to provide additional genetic diversity in Wisconsin. One of the ways GLIFWC has been involved in the translocation efforts is through the purchase of feed for the elk during the quarantine period in Kentucky and during the time they are in the holding pen near Winter. Beyond assistance from GLIFWC and LCO, general tribal gaming contributions to the elk reintroduction program total $1,748,100 since the State of Wisconsin's 2001-2002 fiscal year.

Habitat central to sharp-tailed grouse success

USFS leads project with Red Cliff, WI & MN DNRs

By Charlie Otto Rasmussen, Editor

Ino, Wis.—As the habitat diminished in the Moquah Barrens, so did the aagaskoog. Unlike their relations—the ruffed grouse, which thrive in deep aspen forests—sharptails are a bird of pine barrens and prairie. It's the kind of country Great Lakes Indians historically set alight to rejuvenate the plant community, creating browse and lush habitat for all manner of species—from small birds to large four-legged mammals. But fire suppression and tree growth transformed the landscape into a dense woodland through the 20th Century.

"In the past we had nine dancing grounds, or leks, where sharp-tailed grouse congregated during the breeding season," said US Forest Service (USFS) Wildlife Biologist Brian Heeringa. "By 2014 we were down to one known lek with only two known dancing males."

Over the past eight years the USFS has implemented a plan to restore a large portion of the Moquah Barrens—high, rolling sand country near the Gichigami South Shore—back to a functioning pine savannah and pine barrens ecosystem. Loggers cut vast swaths of jack and red pine, and fire specialists conducted prescribed burns, refreshing understory plants. Through a broad inter-agency effort, wildlife managers are also infusing the ecosystem with sharp-tailed grouse, known as aagaskoog in the Ojibwe language.

A sharp-tailed grouse, or aagask, checks out its surroundings in the Moquah Barrens after emerging from transport box. (CO Rasmussen photo)

Mating season round-up

A half-dozen Red Cliff tribal natural resources staff joined Heeringa and others in northwest Minnesota this past spring to trap, tag, and box-up wild sharp-tails. The process—conducted with the blessing of private landowners and Minnesota Department of Natural Resources—included a health check with a Duluth-based veterinarian enroute to the Moquah Barrens.

"It's been a great opportunity to work with state and federal biologists to help restore a native species," said Jeremy St. Arnold, Red Cliff assistant wildlife biologist.

The project team spent several weeks in Minnesota—split between Karlstad and Baudette areas—to capture 67 grouse for the Moquah Barrens. That number is in addition to 29 birds brought over in 2016, the first year of the trap-and-transfer program. Biologists hope the Minnesota grouse help kick start population growth and provide needed genetic diversity.

"We had a harder time getting females into the trap," St. Arnold said. "The males weren't too worried about walking into traps. They were concentrated on strutting their stuff for the females."

During the April-May breeding season, male aagaskoog congregate at active leks just before dawn. There's a bit of fighting as birds establish dominance, and a whole lot of dancing. With their tails pointed up in the air, the males extend their wings and bend forward; the really cool part happens when their legs get going, pumping like pistons, making a low Tommy-gun sound. Standing along the edge of the lek, females ultimately select a mate and the two will fly off together.

Turning them loose

It took a number of trips to get all the captured birds from Minnesota to Wisconsin. The last transfer took place May 5 when Greg Kessler, Wisconsin Department of Natural Resources wildlife biologist, received 10 grouse in four wooden boxes. Kessler arranged the boxes—fitted with sliding doors—around a black rectangular blind positioned on a Moquah Barrens lek.

"This is a soft release," Kessler whispered in the late afternoon. "We want the birds to come out and take in their surroundings rather than bursting out, randomly flying off."

After tying off individual nylon cords to each door, Kessler extended the ends under the blind. He positioned a small speaker box—the kind predator hunters used to call in coyotes—out into the middle of the lek, then went into hiding. On a hand-held remote control, he hit play. Instead of pitched yowling, the box broadcast soft cooing and other soothing sounds made by sharptails.

Fifteen minutes later, he pulled the doors open one by one. A few birds took off wildly, but most of them took time to walk around and inspect the lek. Like a greeting party, local male birds began showing up, dancing and weaving around atop pounding legs. After a time, all the birds walked off in pairs and threes into the rolling hills of spare trees, low grass, and sweet fern.

Biologists hope to repeat the trap-and-transfer effort one more time in 2018.

Public engagement, education key to phragmites control

By Jennifer Ballinger, GLIFWC Outreach Specialist

Duluth, Minn.—According to the Lake Superior Lakewide Action and Management Plan (LAMP), aquatic invasive species (AIS) are a high threat to the lake and surrounding basin due to their tendency to outcompete native species and the changes they make to the local ecosystem.

Recently, a nonnative variety of phragmites has been found in the wetlands and shorelines of the Lake Superior basin. Infestations in the basin are not yet well established and removal efforts, such as the one in the St. Louis River estuary, are underway to prevent further spread.

An open house sponsored by the St. Louis River Alliance April 20 featured informational booths about in-basin AIS prevention and promoted awareness of the environmental impacts of phragmites. Landowners learned how to prevent the spread of phragmites and the removal process if the invasive plants are on their property.

The event provided an opportunity for stakeholders to interact with invasive species experts during a panel discussion followed by a question and answer session. The panel featured Wildlife Section Leader Miles Falck who shared his experiences of removing phragmites in the Ceded Territories as well as efforts by other agencies working on LAMP objectives and the Great Lakes Restoration Initiative (GLRI).

Phragmites. (Leslie J. Mehrhoff, University of Connecticut, Bugwood.org)

Phragmites experts: Brian Huberty (USFWS), Darcy Rutkowski (Upper Peninsula Resource Conservation and Development Council), Miles Falck (GLIFWC), and Brock Woods (WDNR) participated in an hour long panel discussion followed by a question and answer session moderated by the St. Louis River Alliance. (J. Ballinger photo)

"Prevention is key. Remediation is harder, less effective, and a lot more expensive than going in and taking out a few plants before they take over a whole lake's shoreline. There's a good chance that we can keep phragmites from becoming too much of an issue here in the Lake Superior basin," said Falck.

About forty people attended and learned about the story of phragmites in the Great Lakes basin, which included the differences between the native and invasive varieties, the suspected introduction vectors, and the environmental and economic impacts.

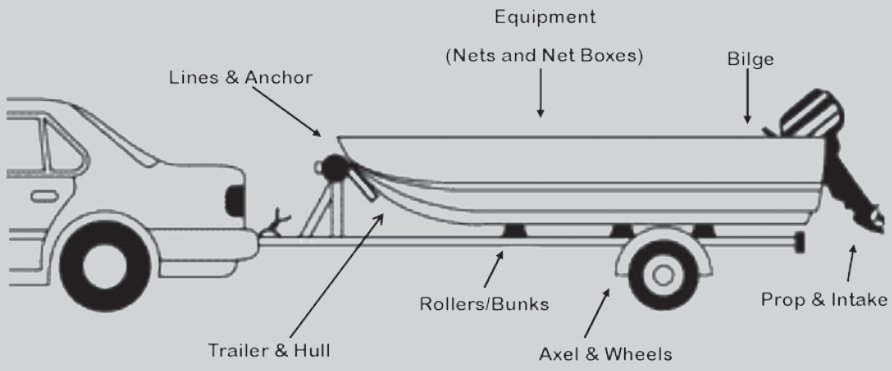
Through the question and answer session, the public learned the protocols of removal treatments for small infestations of phragmites using herbicides and **(See Phragmites control, page 16)**

Ganawendan Ginibiiminaan (Protect Our Waters)

Aquatic invasive species (AIS) can have negative impacts to treaty resources including spawning and fish habitats. Remember when out on the waters to take the precautions to prevent their spread. Watch for invasives hitching rides on plant fragments, mud or debris!

Stop Aquatic Invasives

- ✓ ***REMOVE*** any mud or debris, plants and animals from your boat, trailer and equipment
- ✓ ***DRAIN*** all water from boat, fishing boxes and equipment ensuring it does not drain back into the waterbody.
- ✓ ***CLEAN*** or ***DRY*** boat, trailer and all equipment that came into contact with water including nets, buoys, anchors, ropes and lines, etc.



Don't forget to check these spots for hitchhikers.

No news is good news

Last fall's emerald ash borer (EAB) update ("Turtle Island's forests at risk," Winter 2016-2017 *Mazina'igan*) mentioned new county quarantines for EAB in central Upper Michigan, northern Wisconsin and around Duluth, Minnesota. Since then something notable has happened: No new Ceded Territory counties have been quarantined! While no one can say for sure whether or not more northwoods infestations will be found this summer, it appears as though the EAB is spreading into the region more slowly than expected. So chi-miigwech to everyone who has taken the "don't move firewood" message to heart!

We still have a modest number of 12 x 18 inch aluminum "Don't Move Firewood" signs available. Tribal wardens, natural resource people and others are encouraged to put them up along main roads into reservations, at tribal campgrounds, at powwows, and anywhere else where they may remind people of what's at risk. We also have flyers about EAB and other forest invasives. We can send you copies, or you can download your own from *www.glifwc.org/Forest_Pests/Education.html*.

Boardman River project aims to block lamprey, support fishery

Underway in Michigan 1836 Ceded Territory

Traverse City, Mich.—A consortium of fishery management and research institutions has selected Lower Michigan's Boardman River as the site for a first-of-its-kind project to develop and evaluate the effectiveness of technologies to pass desirable fish around river barriers while simultaneously blocking harmful species, most notably the destructive sea lamprey.

The ten-year project, led by the bi-national Great Lakes Fishery Commission, will take place at the Boardman River's Union Street Dam. The initiative has gained widespread attention, as lessons learned may be applied to other rivers and optimized to create selective bi-directional fish passage at new sites. The Traverse City Commission unanimously endorsed the technology demonstration and evaluation project during a meeting last fall.

Mouth of a sea lamprey. (reprinted from Wikipedia)

The Great Lakes Basin contains hundreds of thousands of barriers, some dating to the beginning of European settlement in the region. Although the basin's dams often serve industrial, recreational, aesthetic, and ecological purposes, they also block fish access to streams. Many Great Lakes fish move up streams at some point in their life to live, feed, and reproduce. Barriers segment and disrupt natural stream ecological functions, which affect aquatic species and inhibit fish movement while undermining sound fishery management. However, barriers also play an essential role in protecting fish from harmful invasive species and fish disease. Sea lampreys, a noxious, destructive pest, for instance, are denied access to tens of thousands of miles of prime spawning habitat by effective barriers. In fact, without barriers to block sea lampreys, the $7 billion Great Lakes fishery would not exist as we know it today.

The Great Lakes are not alone in coping with the legacy of barriers, as managers globally struggle with rehabilitating fisheries in disconnected river ecosystems while managing around invasive species.

"One of the major fishery management challenges of our time is to find ways to allow desirable fish to pass barriers while denying passage to harmful species like sea lamprey," said Commission Chair David Ullrich. "This project will bring together the best minds, the best fishery managers, and the best engineers to identify promising technologies, test those technologies in a real-world setting, and evaluate whether those technologies can be applied elsewhere. If we are successful, we will demonstrate that we can simultaneously pass desirable fish and block harmful species, melding for the first time those two primary fishery management objectives."

The project itself will involve a steering committee of fishery experts and engineers who will identify potential technologies and then modify Traverse City's Union Street Dam to demonstrate whether the technologies successfully pass desirable fish while also blocking undesirable species.

The intent is to construct one or more channels in association with the existing dam site so that a suite of tools and technologies can be integrated for fish passage and invasive species control. For instance, natural alarm cues or pheromones could be used to guide fish toward passage devices or to guide sea lampreys into traps. Computer recognition of fish species could be used to automatically sort different species, passing those that should be passed and blocking those that should not. Tools already under development in the Great Lakes region could be used, though the steering committee will also scour the globe for other potential technologies.

"Traverse City's Union Street Dam, near the mouth of the Boardman River, was selected as this project's site for a variety of reasons, not the least of which is because the project aligns with existing restoration objectives," said Gary Whelan, Michigan Department of Natural Resources (MDNR)–Fisheries Division Program Manager. "Several dams have already been removed on the Boardman River, and further connectivity to Lake Michigan is a major goal." Scott Heintzelman, Central Lake Michigan Unit Manager, MDNR added: "The Boardman River is excellent habitat for many of our prized species such as brook trout, lake sturgeon, and walleye, just to name a few. It is also prime sea lamprey habitat. The Union Street Dam does block sea lampreys effectively, though its fish ladder is poor in passing desirable fish."

Frank Dituri, Ecologist for the Grand Traverse Band and Chairman of the Boardman River Dams Implementation Team, added: "The Grand Traverse Band of Ottawa and Chippewa Indians has been a proud partner in the process of restoring the Boardman River. It is exciting to think that this river, which is tremendously important to the Tribe, could usher in a new era in fishery management."

Lieutenant Colonel Dennis Sugrue, Commander, Detroit District of the Army Corps of Engineers, said: "This project is a model of how federal, state, tribal, and local leadership can combine resources and work to a shared goal of habitat and wildlife protection and restoration. This project has a regional benefit, as its outcomes may be applied across the Great Lakes on various other restoration projects."

Ullrich warned that while success is not guaranteed, the potential benefits warrant the effort: "We are blazing new ground here, and we are well aware that things might not go as planned. We might learn that sorting a variety of fish spe-

(See Sea Lamprey, page 14)

Pheromones may be used to guide fish toward passage devices, or to guide sea lampreys into traps. Funding for this project is from the Great Lakes Restoration Initiative.

Setting the Trap

On the low shoulder of the Bad River Falls, a GLIFWC Great Lakes Fishery crew lowers a sea lamprey trap into the water. The traps are set strategically along the falls where migrating sea lamprey attempt to move upriver to spawn. (Lee Cloud photo)

On the cusp of the spring spawning season, US Fish & Wildlife Service (USFWS) and GLIFWC specialists discussed plans for invasive sea lamprey population monitoring in Lake Superior tributary rivers. GLIFWC technicians plan to transport lampreys captured from the Bad River in aerated coolers (pictured center frame) to a downriver location for release. The ratio between recaptured lampreys—marked with a fin clip—and unmarked lamprey helps biologists determine population trends and how well control efforts are working. Pictured from left GLIFWC Technician Ronnie Parisien; Sean Lewandoski & Nicholas Scripps (USFWS); Mike Plucinski, GLIFWC fisheries technician. (COR photo)

An uncertain future for Lac Vieux Desert's walleye fishery

By GLIFWC Inland Fisheries Section

Watersmeet, Mich.—Straddling the borders of Michigan and Wisconsin in the 1842 Ceded Territory, Lake Lac Vieux Desert (LVD) has been a productive walleye fishery for both tribes and state anglers. Tribal members from Mole Lake and Lac Vieux Desert Bands have harvested walleye in this lake, and state anglers from both Michigan and Wisconsin have long-enjoyed catching walleye with hook and line. Unfortunately, both catch and harvest has declined considerably in recent years, with many anglers and tribal members suggesting that the walleye population has crashed in the lake. This notion prompted the Lac Vieux Desert Tribe to eliminate harvest of walleye by its members in 2010-2011 and every year since 2013.

To understand the walleye downward population trend in LVD, biologists from GLIFWC worked in spring 2016 to estimate the lake's walleye numbers, referred to as "abundance." The effort involved capturing adult walleye by electrofishing along the spawning grounds. The captured fish were marked by fin-clipping and then released into the lake. Shortly after that, fish were recaptured by electrofishing around the entire shoreline. The proportion of recaptured fish relative to the number that were fin-clipped was used by biologists to estimate the abundance of walleye. The estimates revealed that in 2016, the abundance of adult walleye hit a 26-year low of just over 2,000 fish. By comparison, walleye abundance was at a high of 13,000 fish in 1990 (See Figure 1).

Continuing the search for clues in the LVD walleye decline, biologists from GLIFWC and Wisconsin Department of Natural Resources teamed up last fall, this time focusing on the abundance of LVD's age-0 walleye (i.e., fish that have not reached their first birthday). Crews sought to collect age-0 walleye by electrofishing the entire shoreline of LVD. Biologists were interested in comparing the abundance of walleye captured in 2016 to previous years by counting the number of walleye captured per mile of shoreline.

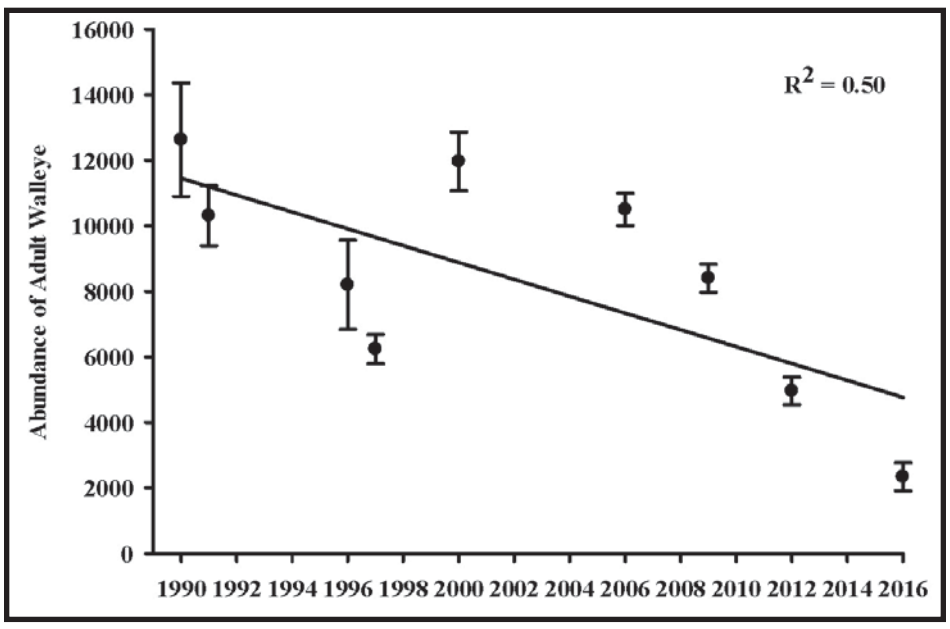


Figure 1. Estimate of adult walleye abundance in Lac Vieux Desert Flowage, Vilas County, Wisconsin from 1990-2016. Estimates are generated from mark-recapture data collected during spring electrofishing surveys.

On Long Lake in Vilas County, Seasonal Fisheries Technician Caine Heffner holds a large female walleye that showed up in a mark-recapture survey this past spring. GLIFWC electrofishing crews survey crews conducted studies on 18 Wisconsin Ceded Territory lakes to help determine adult walleye abundance. Miigwech to all the crews for their hard work. (Butch Mieloszyk)

Capture-and-release electrofishing is a key survey method to estimate walleye abundance. (CO Rasmussen Photo)

The results of the fall 2016 assessment were not encouraging. The survey indicated that no age-0 walleye had survived to September. Not any. To put these results in context, consider that in the late 1980s and early 1990s, the relative abundance of age-0 walleye was approximately 30 per mile of shoreline and this number had more than doubled to over 80 walleye per mile of shoreline by the mid-to-late 1990s (See Figure 2). The declining number of young fish—culminating in a finding of zero age-0 walleye in the fall 2016 assessment—is limiting the number of adult walleye in the population, yet the cause of this decline remains unclear.

Climate change has the potential to influence the abundance of cool and warmwater fishes. Recent research has quantified the probability that largemouth bass and walleye will be abundant in lake ecosystems under future climate scenarios. The research first depicts largemouth bass and walleye abundance under present-day environmental conditions and then projects how abundance might change in the next 40 to 60 years. For LVD, largemouth bass currently comprise a small portion of the fish community. By 2085, however, largemouth bass likely become abundant in the lake. On the other hand, walleye abundance will likely remain at present-day levels over the next 60 years. This means that as the climate changes, largemouth bass (and possibly other sunfishes, e.g., smallmouth bass, crappie) might become a major component of the fish community.

Clearly, management actions need to be taken to conserve dwindling walleye stocks and restore walleye natural reproduction in LVD. A rehabilitation plan has been developed by management agencies with input from the public. Of the 3,319 votes cast during DNR's Spring Hearings, a majority (2,302) voted in favor of changing harvest regulations for anglers from 15" length limit, bag of 3 fish to 18" length limit, bag of 3 fish. Similarly, Mole Lake and Lac Vieux Desert tribal members supported a no spearing or netting policy. In the short-term (3-5 years), these actions should protect the vast majority of adult walleye, giving them the opportunity to re-establish natural reproduction in Lac Vieux Desert Lake. Over the long-term, managers should also consider actions that will mitigate the impacts of climate change on the fish community.

Contact the authors for more information: Dr. Aaron Shultz, Mark Luehring, Dr. Adam Ray, Kim Stone, or Joe Dan Rose at 715.682.6619.

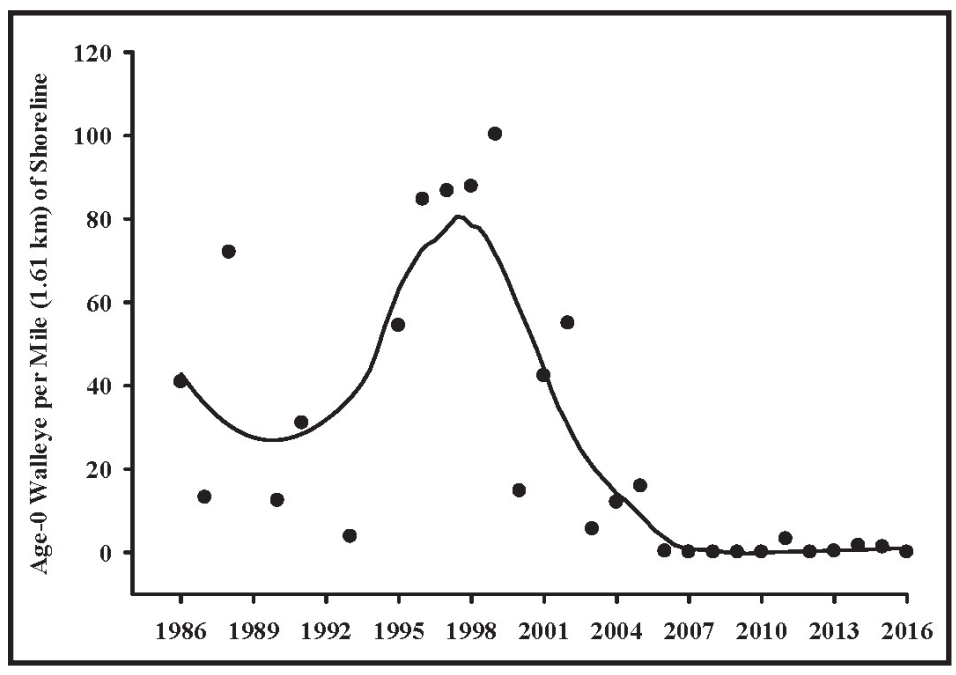


Figure 2. Relative abundance of age-0 walleye per mile (1.61 km) of shoreline in Lac Vieux Desert Flowage, Vilas County, Wisconsin, from 1979–2016. Age-0 walleye were collected during fall electrofishing surveys. Solid line represents a LOESS, 2nd-degree polynomial curve. Approximately 25,000 small fingerlings were stocked in early summer from 1986–1989 and 1993–1999. Note large fingerlings (~25,000) were stocked before the fall survey in 1991. Similarly, extended growth fingerlings in 1995 (~3,000 fish) and 1999 (~6,000 fish) were stocked before the fall survey.

GLIFWC officers explore trapping & culture with students

2017 Lake Superior Youth Symposium

By Dylan Jennings, Staff Writer

GLIFWC law enforcement officers introduced young people to fur trapping at the 2017 Lake Superior Youth Symposium held at Northland College. Officer Christina Dzwonkowski (left) is pictured with a bobcat pelt. Students (right) examine a finished beaver hide. (DJ photos)

Ashland, Wis.—Northland College hosted the 2017 Lake Superior Youth Symposium the weekend of April 28th on the NC campus. Students from all around the region gathered for a weekend of environmental experiences and ecological knowledge.

GLIFWC conservation wardens Holly Berkstresser and Christina Dzwonkowski led two morning sessions on trapping and the harvesting of furbearers.

"What does ethics mean to you?" Berkstresser asked the crowd. "Ethics is about doing the right thing, even when nobody is watching." Much like biologists, hunters and trappers also have a strict commitment to the resources they work with. Caring for the resource and protecting them is a huge part of being an ethical steward of the land.

Next, the officers highlighted the driving factors in fur prices and the fur trade industry. Anishinaabe history and perspective were incorporated throughout the presentation. The fur trade was a big part of Anishinaabe history and economy prior to currency. Furs were also a very reliable way to clothe a family and keep a lodge warm throughout the year. Officer Dzwonkowski gave an Ojibwemowin lesson for the audience to better understand that each animal has an Ojibwe name and relevant translation.

Participants also jumped out of their seats to test some of the foot-hold traps and even the more intimidating conibear traps. Some of the youth came from families with rich trapping history and were able to contribute great questions and answers. Some youth traveled from Michigan, and others from Minnesota. Every State has different equipment requirements and season regulations. For instance, in Wisconsin an individual that wants to trap on state lands is required to take a trapper education course.

"These courses are great so that we teach trappers to remain ethical and understand the rules and regulations that protect the resource," said Officer Berkstresser, stressing the importance of these classes for first time trappers.

Anishinaabe teachings always relay the significance of the seventh generation. Thinking to the future and carefully examining our metaphorical footprints on aki (earth) are lessons that need to be ingrained into the minds of our future generations. Examining the crowd of intent young listeners was enough to reassure even the most doubtful minds. The 2017 Lake Superior Youth Symposium sent students on an unforgettable adventure. These young people will return to their communities and share what they have learned in hopes of protecting the very places that are dear to them.

Peter David, GLIFWC wildlife biologist also presented at the conference.

All in the same boat

GLIFWC officers and a host of law enforcement agency representatives that serve the Great Lakes convened March 21-22 in Ypsilanti, Mich. At the twice-yearly meetings, wardens participate in training courses and share new enforcement techniques. GLIFWC's Dan North, Fred Maulson, Steven Amsler, and Matt Kniskern offered a session on using drones for search and rescue operations.

Participants included natural resources officers from Wisconsin, Michigan, Minnesota, Ohio, Illinois, Indiana, Ontario (Can), plus a number of tribes. A great example of interagency cooperation, these meetings help authorities in both the United States and Canada better understand issues important to tribes.

For the Earth, Water: Water Walk 2017

Water Walkers were greeted by the sound of the drum as they carried nibi from Mooningwanekaaning-minis (Madeline Island) to Mashkiiziibing (Bad River) on April 25. This leg of the journey was only part of a walk that extended from Duluth, Minnesota to Matane, Qeubec. Water walks are regarded as an Anishinaabe ceremony to honor all nibi and to speak to water spirits so that there will be healthy rivers, lakes, and oceans for generations to come. Melvina Flamand took the first stretch on Bad River soil, carrying the water in a copper vessel while Mike Clark walked next to her with the Eagle Feather Staff. Special thanks to GLIFWC Officer Dan North for transporting the Water Walkers across Gichigami. For more information on the walk, please visit **motherearthwaterwalk.com**. *(Paula Maday photo)*

Spring spearing with Bad River, Red Cliff youth

Next gen Ojibwe harvesters exercise treaty rights at Lake Namekagon

By Paula Maday, Staff Writer

Red Cliff elders Marvin Defoe and Richard Lafernier start youth spearing night in a good way with prayers, asemaa, and manoomin. (Paula Maday photo)

Learning to use asemaa

"What are they doing?" my son asked me, intently watching three boys who stood at the edge of the water, holding their hands out and speaking. He had been running around since we arrived at the lake, weaving in between trees and splashing at the edge of the water like energetic 5-year olds do. But now suddenly he stood still and focused, completely fascinated by what these older kids were doing.

"They're talking to the spirits," I replied, "saying thank you and asking for safety before they go out on the water. In their hands, that's tobacco, or asemaa."

"And when they have that in their hand, the spirits can hear them?" he asked.

"Yes."

"I want to do it!" he exclaimed.

He skipped to the pavilion, where we scooped some asemaa into his little hand, and then walked back down to the water. Standing at the edge, I guided him in saying his name, saying thank you to the water and thank you to the fish, and asking to keep everyone safe on the boats. Then he gently brushed the tobacco into the water as he had seen the other boys do, understanding the care with which to handle the sacred medicine.

In that moment, I felt so much gratitude for the opportunity that this youth spearing night offered. Because even if my little one was too little to spear, he still learned the first and most important part of any harvest: using asemaa and giving thanks.

Two bands, one gathering

Attending Waaswaang Maawanj'iding (Gathering on the Practice of Spearing) on April 14 were 19 youth from Red Cliff and 13 youth from Bad River. The event was a cooperative effort between GLIFWC and other tribal programs, and people from both bands who wanted to usher the time-honored Ojibwe tradition of spearfishing to the next generation.

Around 6:30 pm, the caravans arrived and people started gathering inside the pavilion. I noticed that elders, volunteers, parents, youth workers and community members filled in the spaces between youth, forging connections where there had been none before, and creating one cohesive group. Two bands were present, but this was one nation, gathering together to exercise their inherent rights.

In front of a roaring fire, Red Cliff elders Marvin Defoe and Richard Lafernier smudged, performed a pipe ceremony, and shared manoomin to get the evening started in a good way. Lac Courte Oreilles Ogichidaa Mike Tribble spoke next, sharing his and brother Fred Tribble's story about spearing off-reservation back in 1974 and being arrested for it. That story was the impetus for the *LCO v. Wisconsin* case that affirmed treaty rights for treaty tribes doing inland fishing, and an important part of these kids' story too, as they prepared to exercise their harvesting rights without fear of being arrested or harassed.

Marvin Defoe said of the youth, "They were very good listeners, respectful, and participated in today what our ancestors did a thousand years ago no different. Elders, parents, and our communities are still teaching as they did back then. If you teach our youth to love the earth, they will defend it."

As daylight faded away and asemaa made its way to the spirits, youth presented their tribal IDs to creel team workers and received their fishing permits. It was twilight, and everyone headed to the water.

What we practiced, yes, is treaty rights, but it is also something more profound. Bad River and Red Cliff, together, we practiced our future. —Marvin Defoe, Red Cliff elder

The creel team at Lake Namekagon checks tribal IDs and issues permits to spearers. (Paula Maday photo)

Stars below nibi

Lake Namekagon is an exceptionally clean lake, known for its dark root beer colored water. Many will say that if you can learn to spear in dark water, you can learn to spear anywhere. And on the evening of April 14, this seemed especially true. Clouds had moved in to cover the sky after sunset, and complete darkness surrounded those out on the boats.

Bad River youth Sean Bressette lifts a freshly speared ogaa out of the water. (PM)

Scott Babineau assists Jada Buckholtz with a spear at the front of the boat while Layla Boyd, Emily Pierre, and Red Cliff Conservation Warden Mark Duffy keep an eye on the water. (Amanda Plucinski photo)

An exciting yet anxious feeling loomed over many of the first timers. Talking about spear fishing is one thing, and actually spearing is another. As the boats approached the shallow waters where ogaa (walleye) swim, youth were instructed to stand up at the front of the boat and arm themselves with a 12-foot spear-equipped pole. Instructors were on standby, closely attending to each kid and helping to spot the notorious set of eyes that glow through pure darkness, like stars shining beneath the water.

On Lake Namekagon, the walleyes' eyes glow a few yards ahead of the boat. Judging by the speed of those eyes, one can get a better handle on how to prepare. Many spearers will start with their spears in the water and establish their footing for optimal harvesting capacity.

Once the eyes are spotted, it's up to the spearer and the boat driver to effectively communicate direction and speed. Much like harvesting wild rice, your partner and this relationship are crucial. The spearer will also watch for rocks and other hazards that the driver cannot see. With the spear in the water to help counter refraction, the harvester will aim for the eyes or just behind the eyes. In one quick jab, a fish is on the other end and is brought up and placed in a harvest tub. The process continues until the fishermen have filled their permits, or until conditions permit.

After a couple missed fish and a few spears collided with rocks, one Bad River youth pulled up his first ogaa in a boat manned by Bad River tribal members and experienced fishermen Russ Denomie and Dylan Jennings.

After bringing in their catch, youth spearers learn how to properly clean ogaa. (Amanda Plucinski photo)

In a nearby boat, a Red Cliff youth pulled up another beautiful ogaa at nearly the same time. A shimmer of headlamps shone all around the lake, signifying that Anishinaabe were being blessed in many ways. Our Ojibwe young people were becoming providers for themselves, for their families, and for their communities.

Ogaa stories

Over the course of the night, Bad River and Red Cliff youth speared 96 walleye between them. Red Cliff spearers brought in 59 ogaa and Bad River spearers brought in 37. Red Cliff Youth Services Director Misty Nordin remarked, "I had three boys who went out for their first time and absolutely loved it! They wanted to go back out for more!"

Ethan Gordon, 12, was one of those boys. Gordon went out twice, but only got to spear one of those times because it started raining and the boat had to return to shore for safety. Even so, Gordon caught two ogaa in his freshman endeavor, which he chalked up to the strategy he used. "I decided not to go first when trying it," he said. "I went second so I could watch how it was done and listen to the directions."

Dayton Milligan, 13, was another first time spearer. He said that his dad goes out spearing and that he's always wanted to go but had to wait until he got a little older. "I actually felt pretty confident about myself," he said about being on the water. "And the guy I was with must have thought I was pretty good too because I got the first fish I went for! I speared two fish within the first five minutes!"

The experience also left an impression on Bad River youth. Nine-year old Betty Matus said it was "cool to see so many kids, friends, and elders gathered together." And though she didn't spear any fish ("There were so many that I almost had," she said), that won't deter her from going out again. "I hope to teach my brother how to do it someday," she declared.

The evening's significance was a little different for everyone. For some youth, it was learning how to use asemaa for the first time, for others it was looking into the eyes of their first ogaa. But for the treaty tribes, the significance of youth spearing night was much more. Marvin Defoe articulated it well when he said, "What we practiced, yes, is treaty rights, but it is also something more profound. Bad River and Red Cliff, together, we practiced our future."

Bad River and Red Cliff hope to make youth spearing night an annual intertribal tradition. **—Dylan Jennings contributed to this article.**

Many tribal fishermen practice subsistence harvesting. This means that they spear to collect food to feed their families and communities, not for sport. Sharing food is an important part of an Ojibwe harvest, and speared fish are often shared with others in the community who cannot harvest or during ceremonies. After creel team members collected fish data from boats coming into shore, youth learned how to honor the ogaa that gave their lives to feed them by learning how to prepare and cook them. (Paula Maday photo)

Chi-Miigwech

Many people and programs helped make intertribal youth spearing night a success in 2017. A heartfelt miigwech goes out to all Bad River and Red Cliff tribal programs and staff, all the harvesters that devoted their time and teaching, Mike Tribble for his willingness to continue sharing his story, and GLIFWC staff for their assistance.

Annual gathering brings together GLIFWC staff from across Ceded Territory

James Zorn, GLIFWC Executive Administrator, since 2006, marks his 30th year at GLIFWC in 2017.

At the Commission's All Staff Day March 7, employees received pin awards marking 5-year anniversaries in service to GLIFWC and its members. Pictured from left: Lee Cloud (20 years), Heather Naigus-Bliss (10), Adam McGeshick (10), Miles Falck (20), Sam Quagon (special LTE recognition), Keith Rolof (5), Holly Berkstesser (5), Mark Luehring (10), and Joe Dan Rose (20). Additional pin recipients not pictured: Jennifer Vanator (5), Zoongie Leith (5), Holly Owen Maroney (5), Mike Popovich (10), Sue Lemieux (15), Charlie Rasmussen (20), Jenny Krueger-Bear (20). (CO Rasmussen photos)

Information technology internship wrapping up

Tino Redhouse is finishing up a four-month GLIFWC internship centered on managing network systems. An Information Technology student at Wisconsin Indianhead Technical College-Ashland, Redhouse has worked alongside GLIFWC Computer Network Administrator, Lee Cloud since January.

"I've learned a lot about troubleshooting, especially with the unique needs of GLIFWC's law enforcement division," Redhouse said. "This internship has offered a little a bit of everything. I like the idea of creating networks and implementing them."

Upon completion of a network administrator associate degree, Redhouse plans to continue on at WITC to earn a network specialist degree. He said the two areas of study will provide a solid foundation to build and manage networks.

Redhouse grew up on the Bad River reservation and graduated high school in 2001 at Flandreau Indian School in eastern South Dakota. On the western end of the state, Redhouse served in the Air Force at Ellsworth Air Force Base near Rapid City. He said his duties in air traffic control and experience in writing code for flying simulators helped spark an interest in computer networks.

—CO Rasmussen

Sea lamprey

(Continued from page 9)

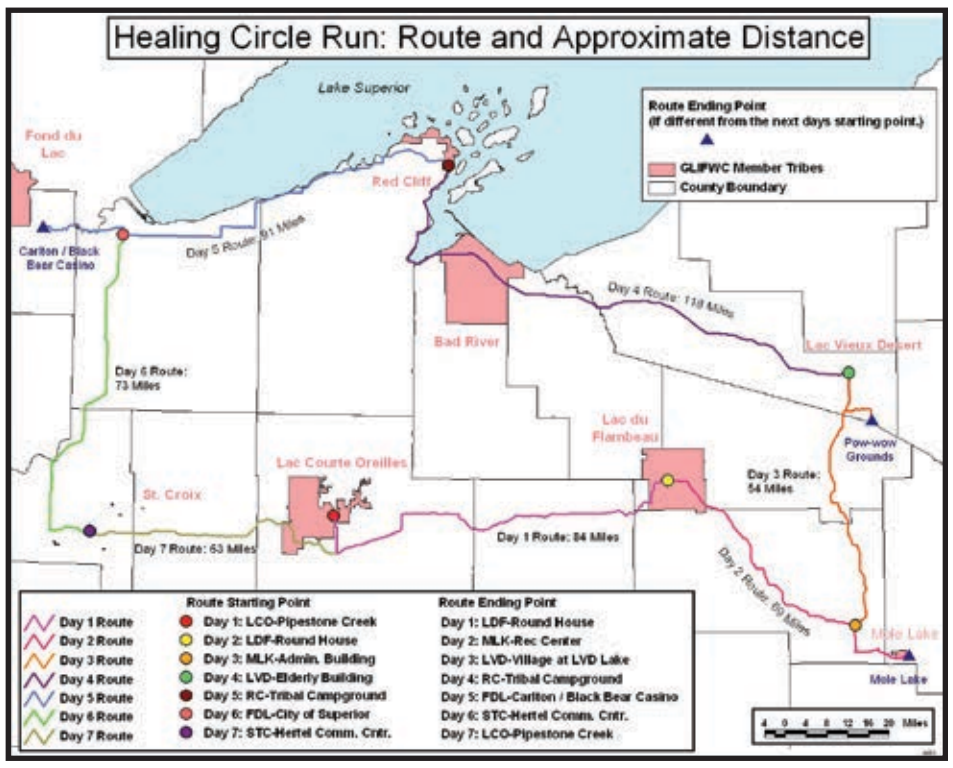
cies automatically is simply beyond our technological capabilities or that tools and methods are only applicable to certain rivers. A sea lamprey treatment might be necessary on the Boardman River if sea lampreys pass along with desirable fish. But the project's potential payoff is tremendous. If we are successful, we will generate new science and technology that we will use in the Great Lakes and export globally. We will have new tools at our disposal to manage fisheries and stop invasive species. And we will achieve real fishery restoration results that will improve the resource for generations to come. My colleagues and I cannot be more excited about the possibilities."

Ullrich concluded: "The project is a true partnership among many agencies, thus leveraging resources and aligning fishery management objectives." In addition to the Great Lakes Fishery Commission and the city of Traverse City, partners include the Michigan Department of Natural Resources, the Grand Traverse Band of Ottawa and Chippewa Indians, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the U.S. Geological Survey, Fisheries and Oceans Canada, Michigan State University, the University of Guelph, the Ontario Ministry of Natural Resources and Forestry, and the State of New York. *Editor's note: article adapted from a Great Lakes Fishery Commission press release.*

Healing Circle Run/Walk
July 8–14, 2017

The 2017 Healing Circle Run/Walk is a prayer for healing. It is an opportunity for people to come together to pray for healing for themselves, their families, their communities, their nation, akii, and all our relatives. During the 2001 Healing Journey Run, participants were told of a teaching on healing—"for a nation to heal, it must begin with the individual. As a person heals, then that person can help heal his/her family. As a family begins to heal, they can help heal their community. As communities heal, they can help heal the nation. As individuals, families, communities, and nations heal, they can help Aki (the earth) and our plant and animal relatives to heal."

The 2017 Healing Circle Run/Walk will occur from July 8–14, 2017. The run/walk will connect eight Ojibwe reservations in northern Wisconsin, Michigan, and Minnesota (see below map) starting at the Lac Courte Oreilles Reservation and ending at Lac du Flambeau on July 8 (Day 1), ending at Mole Lake on July 9 (Day 2), at Lac Vieux Desert on July 10 (Day 3), at Bad River/Red Cliff on July 11 (Day 4), at Fond du Lac/Black Bear Casino on July 12 (Day 5), at St. Croix on July 13 (Day 6), and at Lac Courte Oreilles on July 14 (Day 7).



For more information or if you are interested in participating as a core runner, or having a group of runners from your reservation participate, please contact Jenny Krueger-Bear, Sue Lemieux, or Dylan Jennings at GLIFWC at (715) 682-6619. All participants must assume personal liability, as well as responsibility for their own transportation and expenses.

Waadookodaading hosts inaugural Language Immersion Conference in Lac Courte Oreilles

By Paula Maday, Staff Writer

The Waadookodaading Ojibwe Language Institute hosted the inaugural Gaa-Onwaa'injig Language Immersion Conference in Lac Courte Oreilles on May 4-6.

The conference was designed to address four areas vital to the planning and maintenance of language revitalization efforts: K-12 indigenous immersion, community language revitalization, adult indigenous language immersion, and policy and administration.

Pre-conference classroom visits kicked off the event, with guests invited to observe 4K-5th grade classrooms at Waadookodaading. Visits gave participants an opportunity to observe activities and methods used to maintain an Ojibwe environment within the classroom. Students at Waadookodaading spend 60-100% of their day immersed in the Ojibwe language.

Down the road at Lac Courte Oreilles Ojibwa Community College, participants were treated to keynote speeches from Bawdwaywidun Eddie Benton-Banai, Waabi-bizhikiikwe Patricia Ninegwance, and Waawaakeyaash Keller Paap over the course of the weekend.

Benton-Banai is well-known as a strong advocate for culture-based education and as presiding Grand Chief of the Three Fires Midewiwin Lodge. Ninegwance is known for her 30 years of experience in language teaching, and for authoring language books *Survival Ojibwe* and *Anishinaabemodaa: Becoming a Successful Ojibwe Eavesdropper*. Paap, one of the founding members of Waadookodaading, is widely regarded as "the Godfather of Ojibwe Immersion" by many of his colleagues and contemporaries.

Tucked in between the motivating words from each of these language leaders were sixteen different breakout sessions covering topics such as using the language to heal, child language acquisition, and building language capacity.

Close to 200 people traveled from all over Ojibwe country to take part in the conference and make connections with one another. Manidoo Noodin Jason Schlender, Chairman of the Waadookodaading Board of Directors said to participants in his opening letter that he hoped the "interaction with colleagues from many different communities and personal fields leads to a creative exchange of ideas."

Close to 200 people attended Gaa-Onwaa'injig Language Immersion Conference on May 4-6 in Lac Courte Oreilles. The conference was organized on behalf of The Chippewa Federation by the Waadookodaading Ojibwe Language Institute with support from the St. Croix Band of Chippewa.

Right: Bawdwaywidun Eddie Benton-Banai gave one of three keynote addresses during the conference, emphasizing to tribal educators and speakers that "education has to be on our own terms." (Paula Maday photos)

Waadookodaading, the place where we help each other, was founded in the early 2000s by a group of elders, language activists, and community members who shared a concern about the loss of Ojibwemowin at Lac Courte Oreilles. Their language revitalization efforts have been featured in the Midwest Regional Emmy Award winning documentary First Speakers: Restoring the Ojibwe Language. Watch it now at *www.tpt.org/first-speakers-restoring-the-ojibwe-language*.

Manoomin under stress

(Continued from page 5)

that the biggest challenges currently facing manoomin are socio-political, not ecological, and there is a great need to share the importance of manoomin with legislators, youth, and others.

"We need to bring manoomin into the school systems. It should be in history. It should be in social studies. It should be in biology. Because as we've seen from up here, it has many meanings to many people," said Evelyn Ravindran, Keweenaw Bay Indian Community.

To address identified worries, the group engaged in conversations about traditional restoration practices for wild rice, as well as any challenges or gaps in knowledge that prevent these practices from being successful. To finish out the workshop, participants broke into groups to discuss priority restoration and preservation needs, resources available, and opportunities for partnerships.

GLIFWC manoomin biologist Peter David moderates a panel discussion on stressors affecting wild rice and the impacts on harvesting. Panel members included Evelyn Ravindran (Keweenaw Bay Indian Community), Barb Barton (Michigan Dept. of Transportation), Nancy Schuldt (Fond du Lac Band), and Darren Vogt (1854 Treaty Authority). (Paula Maday photo)

Among the various discussions, education and outreach was a consensus. The availability of long-term funding was another common need identified.

"I was reminded of how broad the interests are and how different the concerns are and how complex our restoration efforts will be," Peter David, GLIFWC manoomin biologist and workshop participant said.

Red Cliff Conservation Warden Mark Duffy agreed: "What I've taken away from this gathering is the biodiversity of people that are getting into ricing," he said.

Myron Burns, Sr., a Bad River tribal member who has been ricing for 60 years, reminded everyone that within new restoration and preservation efforts, there must be a place for traditional ecological knowledge.

"When we first started ricing, we used to rice in wooden canoes and make our own paddles. We knew that the best time for ricing was early in the morning and late in the evening. I don't understand the 10 o'clock rule," Burns said, referring to Wisconsin's current off-reservation harvest regulations that allow ricing from 10:00 am until sunset.

With so many diverse interests expressed at the Manoomin Restoration Workshop, NOAA Administrator Heather Stirratt acknowledged that ongoing conversations and organization would need to take place.

If you are interested in learning more about manoomin monitoring and restoration, please check out the resources listed below.

Manoomin Resources

GLIFWC Wild Rice Ecology, Harvest, Management Brochure
http://glifwc.org/publications/pdf/Wildrice_Brochure.pdf

GLIFWC Off-Reservation Harvest Regulations,
Rice Abundance Information and Map of Manoomin Waters
https://data.glifwc.org/manoomin.harvest.info

"Wild Rice Monitoring Handbook & Field Guide" by Tonya Kjerland
www.seagrant.umn.edu/coastal_communities/wildrice

"Wild Rice & the Ojibway People" by Thomas Vennum, Jr.

Sucker phenology citizen science study

By Aaron Shultz, GLIFWC Inland Fisheries Biologist

All of life has its rhythms, with certain events tied to very specific environmental conditions. Phenology is the study of the timing of biological events, like the seasonal migration of animals, and how these natural phenomena relate to climatic change.

For example, how do white and longnose suckers know when the time is right to migrate from the Great Lakes into the tributaries to spawn? Are they looking for cues from the water temperature, or is it how much water is flowing from the rivers? What happens if changes in climate shift the timing of sucker migrations? These are all questions being investigated in a new citizen science study launched last March, led by Shedd Aquarium's research biologist Dr. Karen Murchie in collaboration with researchers at the University of Wisconsin-Madison and the Lake Superior National Estuarine Research Reserve.

Citizen scientists along the western shore of Lake Michigan and southern shore of Lake Superior are spending approximately 15 minutes each day monitoring a designated tributary to document when the suckers arrive for spawning. In addition to looking for the presence of suckers and how many are there, citizen scientists write down information on weather, water clarity, and water depth as well. This will allow the researchers to analyze whether fish are responding to water temperature, stream flow, or lunar cycles as cues to initiate their spawning migrations, and to document the rolling wave of migrations along a latitudinal gradient. The project will be an ongoing commitment to collect long-term data to determine whether the timing of sucker migrations is shifting with climatic change.

> February is known as "Namebini-giizis" (the Suckerfish Moon). It was at this time (long ago) that the Anishinaabe people would set their nets under the ice in order to catch the suckers. It is said that the Anishinaabe people were starving and on the brink of death when the suckerfish (namebin) took pity on the people, and decided to bless them by swimming into the nets, thus giving themselves to the Anishinaabe.

Though they receive little attention, suckers are important to Great Lakes ecosystems. When the suckers spawn in a tributary, they contribute nutrients from the eggs and waste they deposit. These nutrients are important in kick-starting the growth of insects and plants living in the streams where spawning occurs. Shifts in sucker spawning runs can change the dynamics of nutrient inputs, affecting the stream ecosystem.

Thanks to the Bad River Natural Resources Department and GLIFWC, the Bad River is being monitored for the timing of sucker migrations. As the project continues, researchers hope to engage more citizen scientists in the Ceded Territory in subsequent years! For more information on project findings see: *www.sheddaquarium.org/Conservation--Research/*.

Namebin. (Karen Murchie/Shedd Aquarium photo)

Mercury in the environment

Common questions tribal members ask

Why do different lakes near each other have walleye with different levels of mercury?

There are many factors that affect the level of mercury in a lake's fish. Local sources of mercury can increase the amount of mercury deposited in a given lake. The physical and geochemical properties of a lake can affect the amount of mercury that settles into lake sediment.

Each lake also has its own unique biota, or makeup of organisms. A particular lake may have a higher activity of the bacteria that produce methylmercury due to the unique water chemistry of that lake. Lakes may also have different combinations of fish species present would affect how high in the food chain ogaa are in that lake.

Where does mercury come from?

Nationally, the largest source of mercury emissions is the burning of fossil fuels, especially coal-fired power plants. Within the Lake Superior basin, the mining and metals processing industry is the largest source of mercury emissions.

Installation of scrubbers in industrial smokestacks, removal of mercury from products such as thermometers and medical devices, and other pollution control measures have greatly reduced U.S. mercury emissions. Since U.S. emissions peaked in the 1970's, the mercury levels in the air, water, and fish within the Ceded Territories have been generally declining.

Phragmites control

(Continued from page 8)

prescribed burning. By educating homeowners how to identify and report invasive phragmites, agencies hope to avoid the challenges found in the southern Wisconsin area of the Lake Michigan basin where phragmites removal has not been successful.

Phragmites removal is an integral component of the remediation process for the St. Louis River estuary which is an Area of Concern, a geographic area that fails to meet general or specific Great Lakes Water Quality Agreement objectives.

A key objective of the Lake Superior LAMP is to restore the St. Louis River estuary to the condition where it meets the remediation standards to be delisted. GLIFWC will continue work on phragmites treatment this summer in the St. Louis River estuary. Removal of the phragmites will create a more favorable environment for the restoration of manoomin in the area and ensure that biodiversity of other native aquatic plants is protected.

The ups and downs of Lake Herring

By Ben Michaels
GLIFWC Fisheries Biologist

Kewis (cisco or lake herring) have long been an important fish species in Lake Superior; they serve as a food source for predators such as lake trout, and after lake herring spawn during the late fall, lake white fish won't hesitate to feast upon their developing eggs.

Aside from their ecological significance, lake herring play an important role regarding human consumption, as it has had a history of being a commercially-targeted species, especially near the Apostle Islands region within Wisconsin waters of Lake Superior.

The abundance of lake herring in the Apostle Island area has been on a rollercoaster ride of ups and downs since the late 1800's. Management agencies around Lake Superior are currently considering actions to limit harvests of lake herring to ensure both the viability of the commercial fishery and stability of the fish community.

How we got here

As fishing gear technology and boat equipment developed throughout the early 20th century, commercial yield of lake herring began to increase into the mid 1900's.

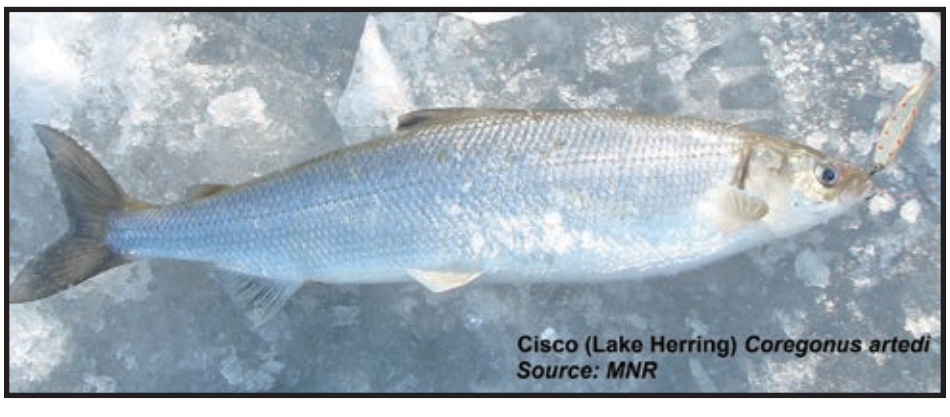
From the 1930's to the late 1950's commercial gill net effort and harvest appeared to have been fairly stable until the early 1960's when fishermen dramatically increased their fishing effort in an attempt to sustain profitable yields of lake herring. Ultimately the abundance of lake herring decreased to such low levels that commercial fisherman no longer found it economically viable to fish for them.

The reduction in fishing effort after the 1960s, coupled with several large year classes recruiting to the fishery in the 1990's, allowed for some recovery of the lake herring population in Wisconsin waters where there has been a small but viable commercial fishery for over two decades. Since the early 1990's, yield of lake herring had remained stable but at low levels.

However, the large year classes that were supporting the fishery began to disappear, and recruitment events were becoming more sporadic and less frequent into the 1990's and 2000's. By 2008, fish buyers began purchasing lake herring in-the-round in response to an increase demand for roe in the European market. This meant that commercial fisherman did not have to spend valuable time processing their catch. Unsurprisingly, more time was devoted to increasing fishing effort and catching more fish to meet market demands.

The increased demand on the lake herring population in conjunction with results from bottom trawl surveys conducted annually by the US Geological Survey, which show that recruitment of lake herring remains low and that strong year classes do not occur very often, is especially worrisome considering that both commercial fishermen and the fish community rely on lake herring.

This lack of recruitment is not exclusive to Wisconsin waters. In fact, a downward trend of forage fish production has been observed on a lakewide scale not just for lake herring, but for a multitude of species. While the exact reason for this decline remains unclear, predator/prey ratios, changes in thermal habitat due to warmer surface water and reduced winter ice cover could be attributing to poor lake herring production.



Cisco (Lake Herring) *Coregonus artedi*
Source: MNR

The vanishing "canoe birch"

Insights into the big birch dilemma

By Steve Garske, GLIFWC Invasive Species Coordinator

Those of a certain age may remember paper birch (wiigwaasaatig or wiigwaasi-mitig) being common across the northwoods. Extensive clearcutting followed by intense fires in the early 1900s resulted in abundant regeneration of early-successional trees such as paper birch and aspen. Since then many areas of forest have matured, leaving less habitat for birch. Extensive aspen pulpwood stands have displaced birch as well. While still a fairly common tree, paper birch have become fewer and farther in between.

On poor, droughty sites, paper birch is relatively short-lived, and populations often begin to decline after 60-70 years. On richer, moister sites though, birch that reach the canopy often live significantly longer and get much larger. Surrounded by a forest of shade-tolerant trees such as hemlock, sugar maple and yellow birch, individual birch trees frequently live to be over 100 years old.

Large paper birch like these have become few and far in between in many parts of the Ceded Territory. (SCG photo)

By burning away some of the leaf litter and allowing more light to reach the forest floor, fire can create ideal site conditions for the germination, growth and survival of paper birch seedlings.

Natives across North America once made extensive use of fire for hunting, improving the growth and yield of berries and other vegetation, and regenerating browse for deer, elk, and other grazers.

In eastern North America, fires set in areas with sandy soils (supporting pine forests and oak savanna) may have promoted birch reproduction as well.

American Indians typically set fires that were relatively easy to control and designed to encourage new vegetation growth. But with European settlement, fire was pretty much taken off the table as a management tool.

In recent years Ojibwe elders and gatherers have noticed a significant decline in the abundance of paper birch across the Ceded Territories. Canoe makers are particularly concerned, as they need high-quality bark (wiigwaas) from large trees for their craft. This perception has been backed up by data gathered by researchers at GLIFWC and the US Forest Service. Their data shows that the number of birch trees across all size classes has been declining in recent decades, including large trees.

In order to get a better picture of what types of forest support large birch, I visited over 40 birch sites across northern Wisconsin and Upper Michigan last summer and fall. Many of these sites were approved for harvest by tribal elders from GLIFWC member tribes in 2001, as part of an Anishinaabe Wild Plant Traditional Environmental Knowledge project. (While these sites were considered acceptable for wiigwaas harvest, they didn't necessarily have large trees with canoe-quality bark.) Several tribal elders suggested good areas to search, leading to several sites with large-diameter birch. Several more sites were found by simply watching the woods along the way. While seeing these large, old trees is both exciting and humbling, the purpose of this project was not to locate sites with big birch trees, but to learn more about what kinds of sites are likely to support large, healthy birch.

GLIFWC intern Rashawn Bell and Sokaogon tribal member Leelyn Van Zile learn about canoe-making from expert canoe-maker Marvin DeFoe. (SCG)

Canoes from St. Croix after their maiden voyage across Big Sandy Lake in northeastern Minnesota in July 2013. (SCG photo)

While the information gathered wasn't intended to allow a direct comparison between sites with large birch and sites with smaller birch, the sites with large birch did have some things in common. All but one site was on sandy loam to loamy sand soils. Sites were moist to well-drained, but not droughty. Mean soil pH (based on a limited number of samples from each site) was strongly acid, ranging from 4.07 to 5.31 (7.0 is neutral). Large, tall, healthy birch generally grew as scattered canopy trees in mature mixed forest of aspen, maple, northern red oak, basswood, hemlock, and other tree species.

Last but certainly not least, the sites with large birch hadn't been logged (at least not heavily) for decades. Obviously wiigwaasaatigoog can't become big trees if someone comes and cuts them down when they're young (like for birch sticks and poles).

The search for big birch trees led to one site that seemed to be naturally perfect for paper birch. This site was on a hill facing Lake Superior. The open overstory was made up mostly of paper birch, with scattered aspen, sugar maple and red maple. There were lots of birch seedlings and saplings as well. Although the site hadn't been logged, the canopy was apparently kept fairly open by periodic high winds off the lake, which would occasionally blow down individuals or small groups of trees. This resulted in patches of mineral soil and increased understory light levels, allowing for good birch regeneration and large, healthy birch trees growing together on the same site.

Today paper birch faces many threats. In recent years large numbers of young trees, branches and even mature wiigwaasaatigoog have been cut to supply twigs, branches, poles and logs to the craft and decoration industry. Even more ominously, climate change threatens to pull the rug out from under paper birch (so to speak) here in the southern end of its range. It is our hope that this project will provide a basis for future work into what is needed to maintain paper birch of all ages and sizes on the landscape.

Chi-miigwech to the elders who took the time to identify and approve birch gathering sites in 2001, and to Boycee (Leon Valliere), Biskakone (Greg Johnson), Roger LaBine, Marvin DeFoe, Robert Van Zile, Larry Van Zile, Evelyn Ravindran, DeAnna Hadden, April and Jarrod Stone-Dahl, Dan Tadgerson and Sarah Bedell, who took the time to talk about this sacred tree.

Freshwater lakes provide for Ojibweg

(Continued from page 1)

to the river and Smith checks in with a pair of anglers who are casting plastic worms into the dark water for suckers—native fish that make a flavorful meal after a good brining and a half-day in the smoker.

While Carrick and Hatfield reached their permit quota that evening, spearing 10 walleyes apiece, other harvesters experienced mixed results over the season. Overall, Bay Mills spearers took a combined 116 ogaawag from the Little Bay de Noc tributaries: Escanaba and Rapid Rivers. Inland lake spearing was limited to one waterbody—Monocle Lake—where band fishers harvested just seven walleyes. Rounding out the spring season on May 7, a Bay Mills member filled the band's lone Black Lake sturgeon tag with a 47-pound spawned-out female measuring 60.5-inches.

In western Upper Michigan, Lac Vieux Desert Band fishers focused harvest efforts on Lake Gogebic—a traditional hotspot where spearers took 3,552. In total, LVD spearers brought home 4,717 walleye from the Michigan 1842 Ceded Territory. The tribe continues to withhold walleye harvest permits for its home water, Lake Lac Vieux Desert, as researchers study the declining ogaa fishery (see page 10). LVD members, however, did spear three muskies from their home lake.

The Mille Lacs Lake walleye harvest quota for Ojibwe bands edged up slightly over last year to 19,200 pounds. All eight 1837 Treaty tribes returned to the massive Minnesota lake in 2017 for a harvest dominated again by spearing. Perch, northern pike, and walleye were also taken by net. At press time with the spring season winding down, harvest totals measured in pounds stood at: 13,832.2 walleye; 2,817.7 northern pike; and 775.4 perch.

Treaty fishers visited a half-dozen smaller Minnesota 1837 lakes as well, harvesting a total of 958.4 pounds of walleye from those waters.

Once unheard of, the Wisconsin ceded territory opener kicked off again at the end of March this year. The long season yielded a record harvest of 38,942 ogaawag, surpassing another extended season from 2015 when spearers took 38,583 walleyes. The muskie harvest came in at 202 fish from a declaration of 1,577.

All harvest numbers are preliminary as of May 10.

Walking on

Teacher, speaker, drum keeper, spiritual advisor Amik O'gaabawiban

By Wesley Ballinger
ANA Language Specialist

It is a difficult thing to do—saying goodbye to someone. In native communities our greatest resources are those elders (gichi-aya`aag), and speakers (netaa-ojibwemojig) who carry with them old knowledge of tradition, medicine, stories, and ceremonies—the foundation of a people.

When one of our speakers walks-on, we all feel a tremendous loss, not only for the family and community, but also a loss of our culture, our identity, and our future as Anishinaabe people. We only have a small minority of first-speakers left, and when one leaves us, we are that much poorer as a nation.

As a language instructor, Larry Amik Smallwood passed down the teachings of Ojibwemowin to those who were willing to learn. In those language lessons, the knowledge of our elders, and the spirit of our ancestors connect with younger generations.

It is only with the use of Ojibwemowin that we are able to conduct our ceremonies such as: naming, funerals, speaking for tobacco, or speaking for the drum. Being an active participant in our culture, or Anishinaabe izhitwaawin, means being Anishinaabe. It means standing up to the histories of enculturation, genocide, and systemic racism that infect our communities. All of these endeavors were very important to Amik O'gaabawiban, this is what led him to lend his knowledge to the work GLIFWC does for our communities.

As the language and cultural director of the Mille Lacs Band of Ojibwe, he spoke at great lengths about respecting the walleye (ogaawag) and the nets (asab) we use in harvesting them. *Don't drag the nets on the ground. They should never touch the ground*, he would say. He saw the exercise of treaty rights as an extension of our sovereignty and culture; how we harvest is just as important to who we are.

Amik (Larry Smallwood) (left) and the author in 2004. (COR photo)

As a member of the G.A.A.G.I.G.E. (GLIFWC Advisory And Guidance Input Group of Elders) he lent his advice and knowledge to several language and community projects that promoted the use of culture and Ojibwemowin.

His work on "Inaadiziwin—the way of life," "Gidaadizookaaninaanan-Dibaajimowinan: Stories of Culture and Respect," and our current language project "Nenda-gikendamang Ningo-biboonagak—We Seek to Learn Throughout The Year," will be a lasting testament to his commitment to language revitalization.

As the GLIFWC Language Specialist I had the greatest of honors to work with Amik over the past nine years. I will remember our conversations about Ojibwe names, the Old Lady who raised him, life in Aazhamoog, or that one time my uncle wanted to fight him in the 1970's over the length of his hair.

Half the time we would just sit and talk about life in Ojibwe country; there was always a funny story to be shared by Amik. Humor was the medicine that allowed us to survive and Amik was always willing to prescribe that effective remedy.

He was always ready to tease me over an editing error I made with a story he told; I mistakenly said when he was young, he used to skin chipmunks (you see, the Ojibwe word for chipmunk is agongos versus the word for weasel, zhingos—when said quickly they can sound similar).

He would say: no matter how many times we look at our work, we will always find a mistake, and next thing you know, you'll have me skinning chipmunks again. And then he would laugh. I will carry the memories and teachings with me, miigwech for everything you have shared, Niijii.

Editor's note: Larry Amik Smallwood, age 69, passed away on April 11 unexpectedly at Essentia-St. Mary's Hospital in Duluth, Minnesota. *Per the author: the suffix iban is used to denote someone who has passed on.*

Treaty rights a priority under Rosen's watch

Over a 34-year career, Diane Rosen worked up through the ranks at the Bureau of Indian Affairs, promoting tribal interests in everything from real estate services to natural resources. She was ultimately promoted to director of the BIA Midwest Regional Office in 2009, a position held until last September. Rosen, 58, walked on April 4 at her home in Burnsville, Minn.

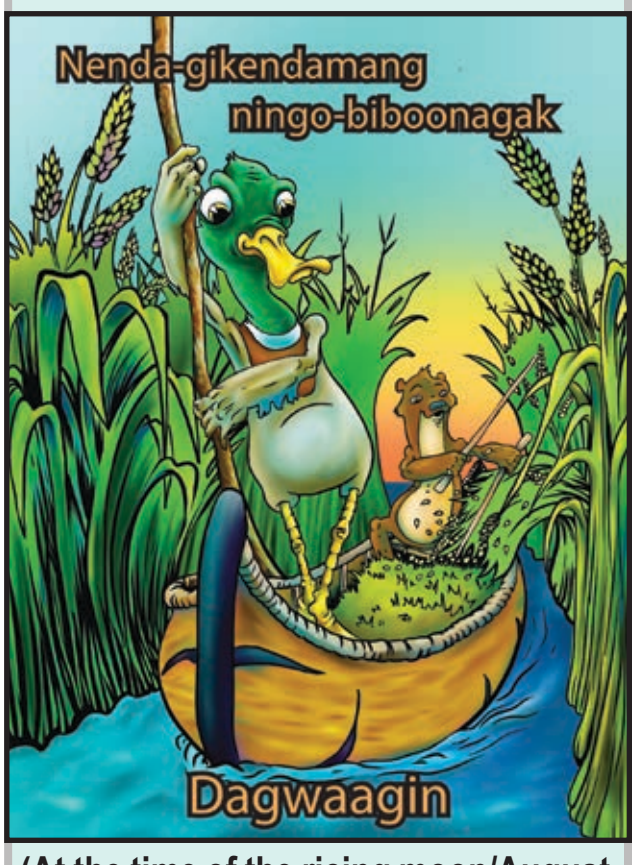
"Diane was a staunch advocate of tribal sovereignty and tribal natural resource management programs." said Michael J. Isham, GLIFWC Board of Commissioners Chairman. "Her commitment to the Commission and its member nations has helped protect ceded territory treaty rights for generations."

A Red Cliff Band member, Rosen began her career in 1979 at the BIA Great Lakes Agency in Ashland. Fifteen years later she had earned the top spot at the Great Lakes Agency, becoming superintendent.

Rosen—a frequent participant at the annual Partners in Fishing events—is also remembered for her good-humor and warm smile. She is the recipient of a number of academic and work performance honors.

—CO Rasmussen

Mii apii waa-tagoshinoomagak manoominke-giizis wayiiba onow oshki-mazina'iganan Ojibwemong, nandawaabandan onow!



(At the time of the ricing moon/August, these new Ojibwe language books will arrive, look for them!)

Mikwendaagoziwag ceremonies at Sandy Lake July 26

All are welcome to join GLIFWC for annual ceremonies, paddle and feast in commemoration of the 1850 Sandy Lake Tragedy. It is a time to remember the sacrifices made by the many tribal members who arrived at Sandy Lake, Minnesota to receive annuity payments, but found only inadequate and spoiled rations, delayed payments and, for many, death.

It is a good time to remember those people, the struggles and determination, and to say chi miigwech!

Agenda: A morning ceremony at the East Boat Landing is followed by a paddle in canoes or kayaks across Sandy Lake where ceremonies are held at the Mikwendaagoziwag Monument located at the Sandy Lake Recreation Site on Highway 65 north of McGregor, Minnesota. A noon feast follows. For more information contact GLIFWC at 715.682.6619.

Check GLIFWC's Facebook page for map, directions and other details.

Lake Superior Youth Symposium returns to its beginning

Ashland, Wis.—The 12th Biennial Lake Superior Youth Symposium attracted 94 participants, including teachers and students in grades 8-12 from around the basin April 27-30. The symposium—which began in 1995 at Northland College's Sigurd Olsen Environmental Institute—aims to enhance appreciation for the beauty and unique ecology of the largest Great Lake, inspiring youth to become environmental stewards. Breakout sessions featured GLIFWC staff to highlight key resources important to the Anishinaabe culture and how treaty rights help protect the Lake Superior basin.

Wildlife Biologist Peter David was one of the featured natural resource management professionals to showcase what a career in ecology could look like. David's talk stressed the importance that manoomin has beyond a simple food source. The Ojibwe migration story, and an overview of the traditional harvesting and processing of rice, highlights how Anishinaabe perspectives guides his work in protection and restoration. For a more hands-on education, GLIFWC wardens Christina Dzwonkowski and Holly Berkstresser hauled out trapping tools and furs of mammals from the Lake Superior basin (for more see page 7).

Attendees also participated in this year's tree planting at Whittlesey Creek National Wildlife Refuge in honor of Arbor Day in conjunction with US Fish & Wildlife Service. As the physical roots from their planted trees continue to grow, symposium goers are encouraged to cultivate and share the intangible knowledge they gained with their home communities and continue to make positive impacts around the Lake Superior basin.

Held every other year, communities in Wisconsin, Minnesota, Michigan have hosted the youth symposium. For more see *http://lakesuperioryouth.org*

–Jennifer Ballinger

GLIFWC phenology project in second year

(Continued from page 6)

This is particularly helpful in that the user can target groups of specific species of trees to look for differences in the timing between species throughout the growing season. Defining a region of interest also allows the user to avoid including portions of the sky or any other non-vegetative objects in the photo. When the Gcc is plotted over time, the result is a graphical representation of the spring green-up and fall senescence (Figure 2). When the Gcc is plotted over multiple years, we can look for variation in the timing of biological changes in the forest canopy and determine if the variation is associated with changes in localized weather or climate variables, such as precipitation, temperature, relative humidity, and so forth. Eventually, this could allow us to look for additional relationships between phenology and environmental changes, and could provide us with a better picture of what changes we might expect to occur in the future.

This year, in addition to the phenocams overlooking the forest canopy at the phenology study sites, Panci and Bartnick are also experimenting with the use of a time-lapse camera at the ground-level. They have placed one phenocam at a site near a dense patch of wild leeks on the forest floor. Keep an eye out on the GLIFWC Facebook page for updates on the status of these phenocams. Expect to see new time-lapse videos of the spring green-up sometime in late summer. To learn more about GLIFWC's climate change program, including links to past phenocam footage, please visit: *http://glifwc.org/ClimateChange*.

Spirit Pole Ceremony, Historical Trauma Event highlights native peoples at UW-Superior

By Amanda Plucinski, For Mazina'igan

Superior, Wis.—For the past 26 years Gary Johnson, director of First Nations Studies at the University of Wisconsin-Superior, has held an annual Spirit Pole Ceremony. This year was no different.

The First Nations Center, the First Nations Program, and the Native Nations Student Organization hosted this event on April 24. New Spirit Poles contain an eagle feather and ribbons representing the four directions.

"We take the old Spirit Pole down and erect a new one under the guidance of an Anishinaabe spiritual advisor. The Spirit Pole represents traditional Anishinaabe culture and signifies that we have ties to the land that the university is on," said Bret Evered, a lecturer of First Nations Studies at UW-Superior.

"The Spirit Pole connects us to past generations who looked out for our future, to the present generations, and to the future generations to follow in our path and live a good life—Bimaadiziwin," said Evered.

Gary Johnson, Troy Howes, and Connor Bouchard tighten and secure the base of the Spirit Pole. (AP photo)

This year included a traditional pipe ceremony by Dan Jones, an instructor of First Nations Studies at UW-S. A drum and song ceremony was also held by Troy Howes. After the spirit pole was erected, all that were present offered the Spirit Pole asemaa (tobacco).

The event then moved into the Yellowjacket Union for an emotional evening about the historical trauma that Native Americans have endured, such as boarding schools and the Trail of Tears.

The Ashland, Wisconsin Middle School Youth Drum Group began the evening with traditional songs. Red Cliff Tribal Member and UW-Superior Student Jesse Van Wert presented his research on cultural trauma, discussing his personal experience with this topic.

The main event of the evening was a blanket exercise which was intended to represent North America before the Europeans arrived.

About 10 people started by standing on the blanket representing the Native Americans that inhabited this land. Slowly the "Europeans" moved onto the land and one by one blankets were removed to represent the land that was ceded to the United States. As more Europeans arrived the Native lands decreased and so did the people due to disease, war, and famine. At the end of the exercise only one blanket remained and two "Native Americans" who stood on the blanket. This represented how much was taken from the Native Americans.

Shalese Snowdon, UW Student , ended the evening with a presentation about Sexual Violence Against Aboriginal Women in Minnesota.

Ashland Middle School Youth Drum Group opened the evening's event. (AP)

Great Lakes Sea Lamprey

Sometimes referred to as vampire fish, sea lampreys kill other fish by sucking their blood and other body fluids. They have been around since before the dinosaurs.

Unfortunately, lampreys are invasive to the Great Lakes, and are a big problem! They entered the lakes through shipping canals built in the 1800s, allowing them to swim into Lake Ontario from the ocean. Sea lampreys were stuck in Lake Ontario because Niagara Falls blocked their path to Lake Erie. In 1919, the Welland Canal, which connects Lakes Ontario and Erie, was deepened, and sea lampreys used the route to swim into Lake Erie by 1912, then into Lakes Huron and Michigan by 1937, and finally Lake Superior by 1938.

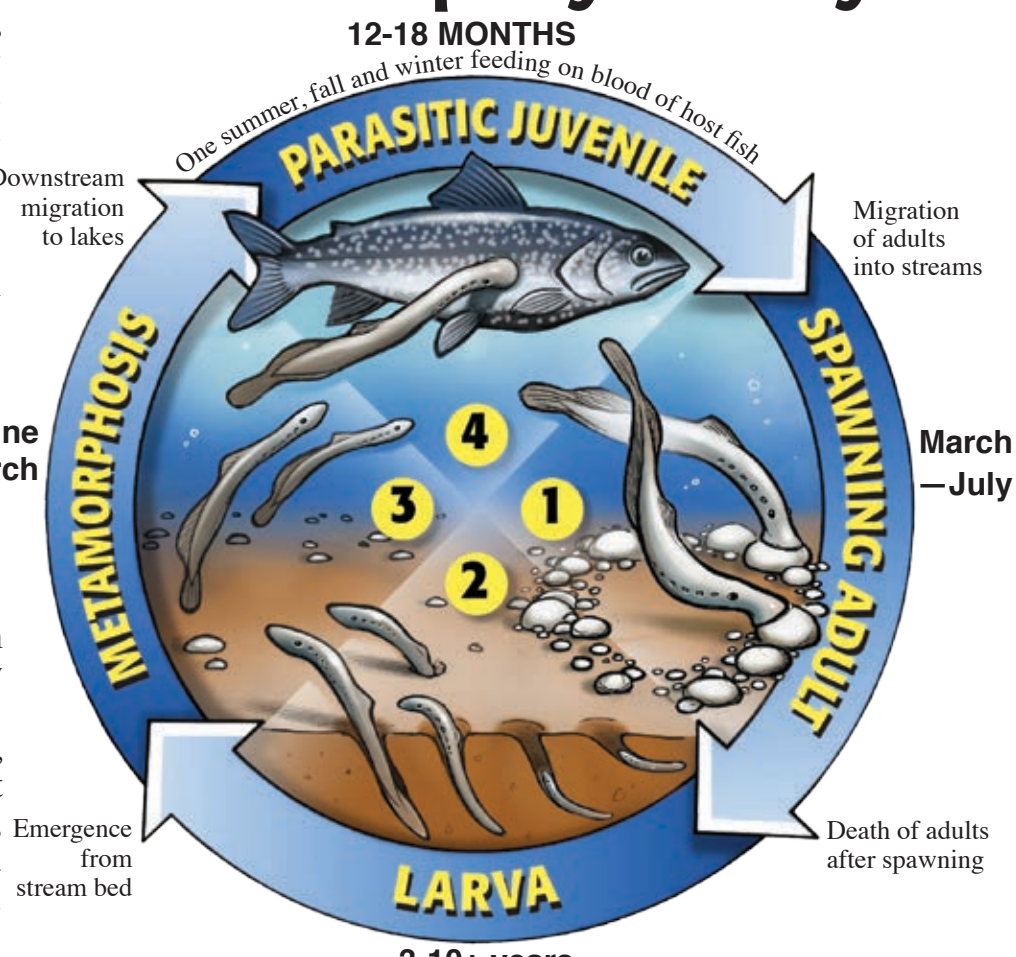
Sea lampreys attach to most species of large Great Lakes fish. Each sea lamprey can kill up to 40 pounds of fish in its lifetime!

After invading the Great Lakes, sea lamprey quickly began to devastate sport and commercial fish species, particularly lake trout.

By the time it was obvious that sea lampreys were a problem, it was too late for some lakes. Native populations of lake trout were gone from Lake Huron and Lake Michigan. However, control methods began before sea lampreys completely depleted lake trout in Lake Superior. The native lake trout population in Lake Superior survived the sea lamprey invasion!

Lake trout (upper photo) with sea lamprey wounds. Left: Lampreys have a large sucking disk for a mouth and it is filled with sharp teeth that surround a file-like tongue. Right: GLIFWC works with the other agencies to control the population of lampreys in Lake Superior.

Sea lamprey life cycle



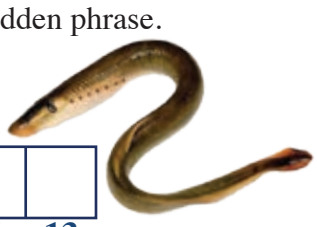
Adult lamprey build **horseshoe**-shaped nests where they lay their **eggs**. Upon hatching, baby sea lampreys—called **larvae**—burrow into the stream bottom where they will live for 3 to 10+ years. Once they reach 5-6 inches in length, a **metamorphosis** occurs where the larvae develop a suction mouth, eyes, fins, and an appetite for fish blood. Now the sea lampreys are a **parasite** ready to eat! A **migration** into the lakes then occurs where parasitic sea lampreys feed for up to a year-and-a-half, afterward returning to streams for **spawning**.

Life cycle word scramble

1. Unscramble each of the words below. *(HINT: Words used are bolded in the story above.)*
2. Copy the letters in the numbered boxes to the boxes at the bottom of the puzzle with the same number to reveal a hidden phrase.

SEGG
6

VAALER
8 7 13



PEARAIST
12 2

TORSOPMAIHEMS
10 11 1

GIMITONRA
3

GSAINNWP
4 9

SHOHREOSE
5

Hidden Phrase

1 2 3 4 5 6 7

8 9 10 11 12 13

Y !

Sea lamprey are often called "lamprey eels," but they are not eels! Sea lampreys have a skeleton of cartilage (like sharks) and are jawless, while eels (like salmon) have a jaw and bony skeleton!

Did you know?

Sea lampreys are a revered species for many nations situated on oceans, but lampreys that live in the Great Lakes are considered bad news. They kill large amounts of Great Lakes fish and are inedible because they contain a lot of contaminants like mercury.

Lampreys are a popular menu item in western Europe. And in the United States' Pacific Northwest many tribes greatly admire lampreys, valuing the ancient fish as a food source and a relative, like a brother. Tribal members catch lamprey by hand in rivers where rapids and waterfalls form. Lamprey are eaten at feasts and play an important role in some ceremonies.

But lamprey populations in the Columbia River basin have plummeted since the 1900s and only a few places like Willamette Falls, Oregon still have harvestable numbers. Regional tribes including Nez Perce, Umatilla, Yakama and Warm Springs are leading an effort to restore Pacific lamprey back to their original home range. ***—C. Rasmussen***

Reprinted with permission from the Great Lakes Fishery Commission.

Aaniin ezhiwebak agwajiing? What is happening outside?

Abaate aabawaa dash. Gichi-gigizheb, nagamowag ingiw bineshiinyag. Gigizhebaaweyaan, niminwendam. Nimiikawaadenimaag ingiw bineshiinyag. Ani-niibing, gitigaanan imaa ingitigaadaamin. Ingii-nitaa-ganawendaanan iniw gitigaanan. Gii-kimiwan gwech. Gii-aabawaate. Gaawiin gii-mikwamiikaasinoon. Ingii-amwaanaanig ingiw gichi-oginiig. Ingii-miijiminan iniw agosimaanan. Ingii-chekaakwa'aamin apane gii-mawinzoyaang, nimaamaa, nishiimeyag miinawaa niin.

(It is warming up and it is mild weather. Early in the morning, those birds are singing. When I wake up in the morning, I am happy. I think those birds are beautiful. As summer begins, we planted the gardens there. I knew how to take care of those gardens. It rained enough. It was warmed by the sunshine. It did not hail. We ate those potatoes. We ate those cucumbers/melons/squash. We always went into the woods to pick blueberries, my mother, my younger siblings and I.)

Bezhig—1

OJIBWEMOWIN (Ojibwe Language)

Double vowel system of writing Ojibwemowin.
—Long vowels: AA, E, II, OO
W<u>aa</u>booz—as in f<u>a</u>ther
Miigw<u>e</u>ch—as in j<u>ay</u>
Aan<u>ii</u>n—as in s<u>ee</u>n
M<u>oo</u>z—as in m<u>oo</u>n

—Short Vowels: A, I, O
D<u>a</u>sh—as in <u>a</u>bout
<u>I</u>ng<u>i</u>w—as in t<u>i</u>n
Niizh<u>o</u>—as in <u>o</u>nly

—A glottal stop is a voiceless nasal sound as in A'aw.

—Respectfully enlist an elder for help in pronunciation and dialect differences.

VTI Grammar-Patterns

Root verb is a command.
Used *w*/inanimate/non-living nouns.

Agindan!—Read/Count it!
Nindagind**aa**n(an).—**I** read **it**/those.
Gidagind**aa**n(an).—**You** read **it**/those.
Odagind**aa**n(an).—**S/he** reads **it**/those.
Nindagind**aamin**.—We read **it**/those.
Odagind**aanaawaa**(n).—They read **it**/those.
Ningii-agindaan i'iw mazina'igan.
I did—read that paper/book.
Bijiinaago ogii-minikwen o'ow dakib.
Yesterday s/he drank this cold water.
Ogii-kiziibiiga'aanaawaan ina i'iw jiimaan?
Did they wash that canoe?

Niizh—2

Circle the 10 underlined Ojibwe words in the letter maze. (Translations below)

A. Gitigaaning imaa <u>moozhag</u> manidoonsikaa.

B. <u>Dibikak</u> odoozhitoon <u>mitigo-makak</u>.

C. Giziibiigiiwigamigong endaso-<u>giizhik</u> gigiziiyaabide'omin.

D. Abiwigamigong ninganawaabandaan i'iw mazinaatesijigan.

E. Jiibaakwewigamigong <u>weweni</u> ninjiibaakwaadaanan miijiman.

F. Nibewigamigong imaa <u>niminoshin</u>.

G. Asaamisagong gaawiin <u>wiikaa</u> ninibaasii.

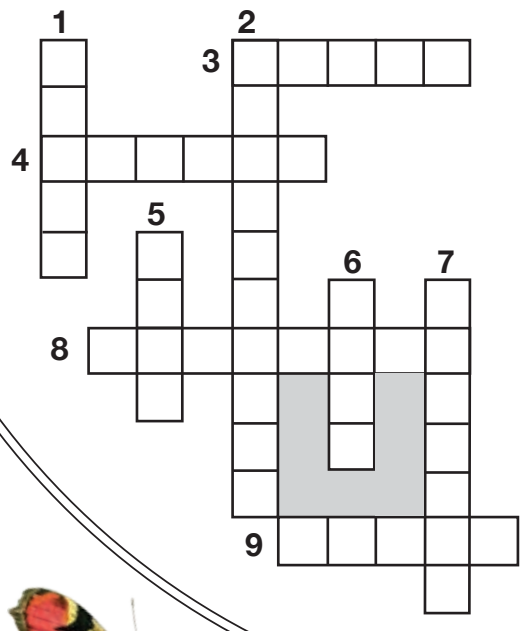
H. Zaaga'iganing <u>bangan</u>.

I. Odaabaan gizhiibide <u>imaa</u>.

O	M	J	A								
N	I	O	N	E	K						
I	T	N	O	A	'	A					
M	I	D	W	Z	O	M	A				
I	G	I	I	Z	H	I	K	I			
N	O	B	A	'	D	A	A	N	I		
O	M	I	A	O	I	O	G	N	M	K	
S	A	K	E	N	A	W	E	K	W	G	Z
H	K	A	S	A	G	W	I	I	K	A	A
I	A	K	M	W	E	A	J	I	D	O	H
N	K	I	N	W	I	Z	N	Z	'	O	N

Niswi—3

IKIDOWIN ODAMINOWIN (word play)



Down:

1. always
2. gardens
5. I, me
6. there
7. no, negative

Across:

3. enough
4. It is warming weather.
8. my mother
9. cold water

memengwaa

Online Resources
ojibwe.lib.umn.edu
umich.edu/~ojibwe
www.glifwc.org

Niiwin—4

VTI Root Commands

Class 1: end in –an. Class 2: –en,–in,–oon
Baakinan!—Open it! Gibaakwa'an!—Close it!
Mikan!—Find it! Miijin!—Eat it!
Onaabandan!–Choose, pick it!
Nanaa'itoon!—Fix it! Ozhibii'an! Write it!
Biinitoon!—Clean it! Naadin!—Go get it!
Minikwen!—Drink it! Miijin!—Eat it!
Waasakonebidoon!—Turn it on!
Aatebidoon!—Turn it out!
Goojitoon!—Try it!
All spoken with non-living things.
Gagwejitoon! Try it!
Mii'iw. That's all.

Giga– –aan

O–

nim–

Gi– –aan

O– –aanaawaan

1. Noongom ____biinitoon i'iw waakaa'igan!

2. _____baakin_____ i'iw ishkwaandem abiwigamigong.

3. _____onaaband___ gichi-onaagan ataasowining. Aaniin minik zhooniyaa?

4. Bijiinaago _____gii-nanaa'itoon i'iw waasechigan.

5. Miijin! Minikwen! Zhoomiingwenin! Giminwedam. _____-mik_____ nagweyaab

Translations:

Niizh—2 **A.** In the garden there are a lot of bugs. **B.** When it is night, s/he makes a wooden crate. **C.** In the washroom everyday we brush our teeth. **D.** In the living room I watch that television. **E.** In the kitchen carefully I cook foods. **F.** There in the bedroom, I lie comfortably. **G.** I never sleep in the basement. **H.** At the lake it is peaceful. **I.** The car drives there fast.

Niswi—3 ***Down:*** **1.** apane **2.** gitigaanan **5.** niin **6.** imaa **7.** gaawiin ***Across:*** **3.** gwech **4.** abaate **8.** nimaamaa **9.** dakib

Niiwin-4 **1.** Today **I am cleaning** the house. (nim) **2. You open** that door in the living room. (Gi...aan) **3. They choose** the big bowl in the cupboard. How much does it cost? (O-...aanaawaan) **4.** Yesterday she **fixed** that window. (O) **5.** Eat it! Drink it! Smile! You are happy. **You shall-find** a rainbow. (Giga- aan).

There are various Ojibwe dialects; check for correct usage in your area. The grammar patterns may help a beginner voice inanimate and animate nouns and verbs correctly, as well as create questions and negate statements. Note that the English translation will lose its natural flow as in any world language translation. This may be reproduced for classroom use only. All other uses by author's written permission. Some spellings and translations from The Concise Dictionary of Minnesota Ojibwe by John D. Nichols and Earl Nyholm. All inquiries can be made to **MAZINA'IGAN**, P.O. Box 9, Odanah, WI 54861 or email *lynn@glifwc.org*.

Edited by Jennifer Ballinger, Saagajiwe-Gaabawiik.

Chronicles of Mille Lacs

(Continued from page 1)

water, this large, predatory zooplankton eats smaller, native zooplankton thereby competing with young fish for food, and may be less edible for small fish due to its long abdominal spine. As these invasives have become established in Mille Lacs (Figure 2), native zooplankton abundance has declined.

So that settles it right? The Mille Lacs walleye population has declined because the invaders redirected the energy in the food web, and to get things back to the way they were, we just need to get rid of the invaders. Unfortunately, it's not that simple. First, while researchers are evaluating population control methods, there have been no effective lake-wide control programs for zebra mussels or spiny waterfleas. This means that for now, the invaders are here to stay. Secondly, while the walleye decline coincided with the increase of these two invaders, a causative link is difficult to establish. Even though the zooplankton community appears to have been affected by the invaders, walleye are surviving past the first summer of life when they depend on zooplankton for food. Survey catch rates of walleye in their first fall have not declined (2005-2008 catch rates averaged 86.2 per mile; while in 2009-2012 they averaged 103.9 per mile). Still, these fish are not surviving as well as they used to from ages 1-2. The 2005-2008 year-classes averaged 2.3 walleye per net lift at age 2 in fall assessment surveys, while the 2009-2012 year-classes averaged 0.41 walleye per net lift. A study by a blue ribbon panel of fisheries experts suggested that predation on these young walleye is higher than in the past. Has the invaders' impact reduced the abundance of prey fish, causing large predator fish (e.g. adult walleye and northern pike) to eat more young walleye? Did the invaders reduce the total amount of walleye that can live in the lake? Researchers plan to explore these questions in the near future.

For now, the zebra mussel and the spiny waterflea will continue to affect the Mille Lacs food chain. Low fishing mortality will help the walleye population increase from its lowest level, but biologists are unsure if good survival of young walleye will return. In the meantime, prevention is the best way to control the spread of aquatic invasive species. Close attention to boats, trailers, and equipment when moving between waters is critical. While the best steps to prevent movement of each specific invasive are slightly different, washing, disinfecting, freezing and sun-drying can all be helpful ways to reduce the risk of new introductions. Biologists, anglers, and tribal members need to work together to prevent the spread of invasive species and the impact these organisms have on aquatic foodwebs.

Please contact Mark Luehring, Dr. Aaron Shultz, Dara Unglaube, Ben Michaels, Dr. Adam Ray, or Joe Dan Rose at GLIFWC for more information.

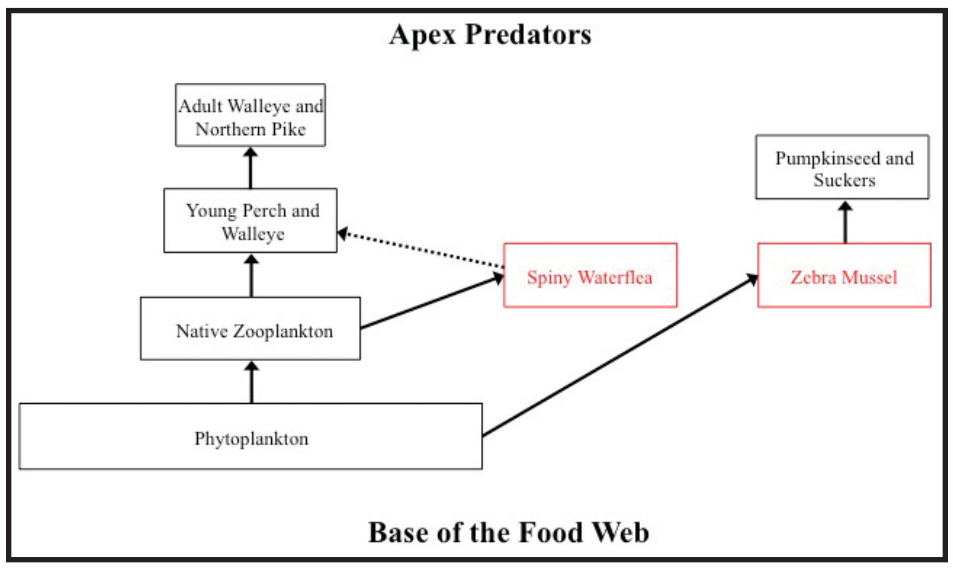


Figure 3. Simplified hypothetical food web before and after zebra mussels and spiny waterfleas were introduced to Mille Lacs Lake. Size of the box indicates changes in biomass for each trophic level (e.g., base of the food web, apex predators). Number of solid arrows indicate the relative amount of energy moving up the food web (less arrows equals less energy). Dashed arrow indicates that young fish may consume spiny waterflea, but may be more difficult due to abdominal spine, potentially resulting in consumption of fewer food items.

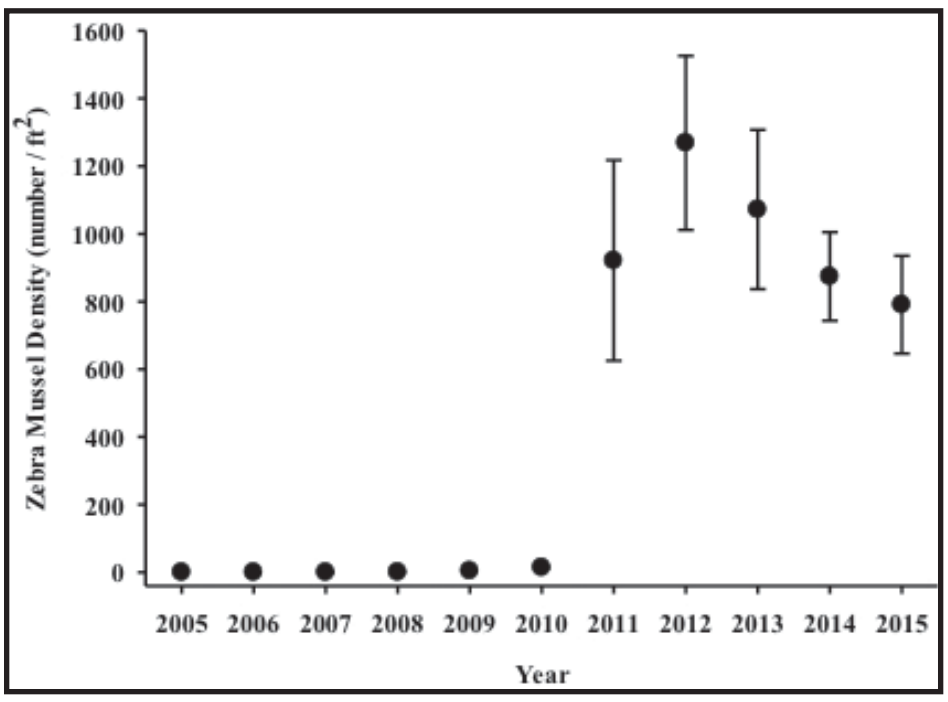


Figure 1. Mean density of zebra mussels sampled at nine sites in Mille Lacs Lake from 2005 to 2015. Zebra mussels were first observed in very low densities (<0.1 mussels / ft2) in 2005. Density was below two mussels / ft2 from 2006-2008. In 2009, density increased to over four mussels / ft2 and increased again in 2010 to almost 14 mussels / ft2. Error bars represent ± 1 standard error.

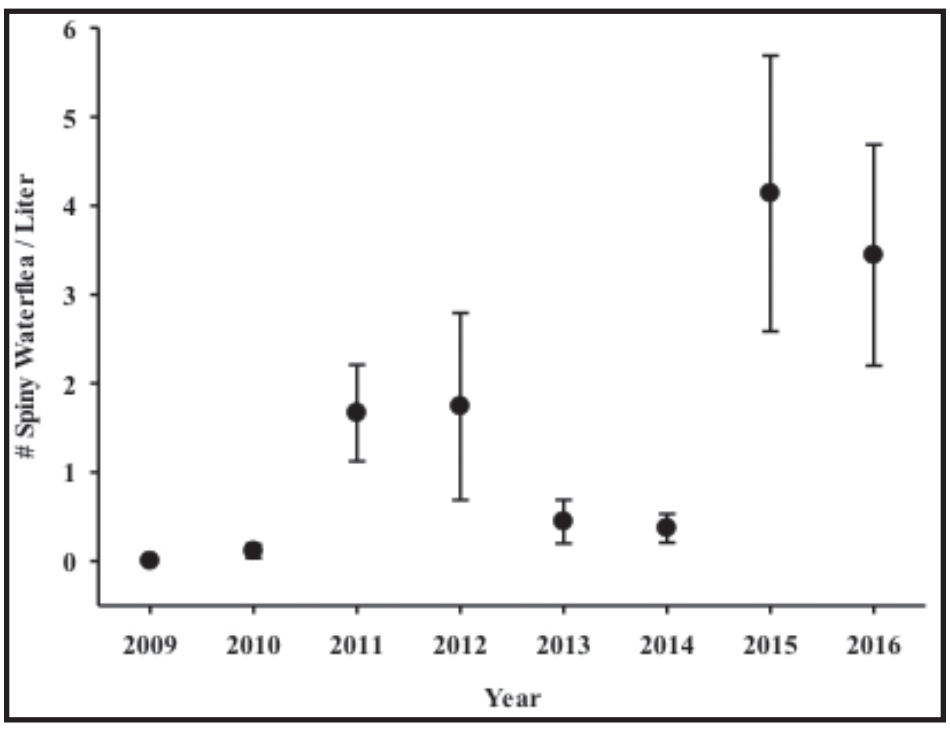


Figure 2. Average spiny waterflea per liter during MNDNR May and June sampling in Mille Lacs Lake. Spiny waterfleas were first discovered there in 2009. Error bars represent ± 1 standard error.

Sugar bush a family affair

(Continued from page 6)

"We'll be mapping the extent of EAB on Sugar Island reservation lands," Martin said. "EAB can't fly very far, so the best thing people can do is avoid moving firewood. That's how new infestations typically start." To date, Bay Mills' black ash forest preserve near Brimley has remained free of EAB.

Sharing sap & knowhow

The Bay Mills assessment crew didn't collect a lot of sap from Sugar Island—around 23 gallons—but they knew someone who would make immediate use of it: Paula Carrick and her extended family at the main reservation. In her 38th sugar bush season, Carrick said the recent run was a poor one and her family welcomed the extra sap.

Bay Mills member Kimmarie Manabat skims out small particles from a boiling vat of maple sap. (P. Carrick photo)

"We thought it was a bad season," Carrick said. "We put our taps out in March during a warm spell and there were a couple of really good days. Then it shut down for three weeks, ran a little bit more, but then that was about it."

Carrick and her sister Wanda help oversee a mainland sugar bush that draws multiple generations from three Bay Mills families. The sisters are noted for establishing the first national forest sugar bush under the 1998 Tribal/USDA Forest Service Memorandum of Understanding. From the nearby Hiawatha National Forest they produced two gallons of syrup and a handful of hard candies in 2000. Even with decades of knowledge and experience, the sisters remain intent on keeping their output at a modest level.

"There's no tubing, we're not big and don't want to get big," Carrick said. "We just do it for the family and to pass the knowhow on to the younger ones."

True to her words, the family finished 2.5 gallons this past spring with sap from their sugarbush and the trees on Sugar Island.

Sagkeeng First Nation hosts Elders Gathering on Hunting

The Assembly of Manitoba Chiefs organized an "Elders Gathering on Hunting," on March 6. The intent was to solicit advice from Manitoba elders and knowledge carriers on the values, practices, and protocols on hunting.

Another big discussion item surrounded the safety and teachings pertaining to night hunting. Many elders, hunters, and Manitoba Provincial Representatives gathered at the Turtle Lodge at Sagkeeng First Nation, everyone eager to both listen and speak for their communities.

GLIFWC accepted an invitation to speak and Mole Lake Chairman Chris McGeshick gave a presentation on night hunting within GLIFWC ceded territory.

Many of the representatives and harvesters had questions related to night hunting regulations and course work.

Overall the gathering began on a positive note and ended with the calming sense of gratitude and strengthened relationships. **–Dylan Jennings**

William Young from Bloodvein First Nation, Manitoba, Canada speaks at the Elders Gathering on Hunting. (DJ)

Ogichidaa Storytellers video release

Monday, May 22, 2017 @ 5:30 pm *Finger foods will be served!*

***Legendary Waters Convention Center*, Bayfield, WI**

Come and screen the new GLIFWC short video on the Gurnoe Decision! Learn about the rich history of Anishinaabe treaties and the warriors that stood up to defend them. Hear from some of the warriors in a community dialogue. Students and youth are highly encouraged to attend.

Can't make the event? There will be a **second Ogichidaa Storytellers video screening at the Northern Great Lakes Visitor Center, Ashland, WI on Thursday, May 25 at 5:30 pm in the theater**.

This event is sponsored by GLIFWC and the Red Cliff Band of Lake Superior Chippewa.

This project was funded in part by a grant from the Wisconsin Humanities council, with funds from the National Endowment for the Humanities. Any view, finding, conclusions or recommendations expressed in this project do not necessarily represent those of the National Endowment for the Humanities. The Wisconsin Humanities Council supports and creates programs that use history, culture, and discussion to strengthen community life for everyone in Wisconsin.

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Great Lakes Indian Fish & Wildlife Commission

Life Cycle Word Scramble

(answers from page 20)

eggs	larvae	parasite
metamorphosis	migration	spawning
parasite	horseshoe	

Hidden Phrase: **Stop Sea Lamprey**

Making sense of good years, bad years on manoomin waters

(Continued from page 5)

Perhaps harvest data from natural waters would provide more clarity? Well, it turns out that, there are challenges with using that data as well.

The best data of that kind available anywhere in manoomin's range comes right from the annual Wisconsin harvest survey GLIFWC conducts each year in cooperation with the Wisconsin DNR. Does that data suggest a cycle? I would say (drumroll, please): no—at least on a state-wide scale (Figure 1). But there are some reasons why this data might not detect a cycle even if it were there.

First off, we are using *harvest* as an index to *abundance*, and while the two are certainly related, the match is far from a perfect one. While harvest cannot be (very) high when abundance is low, harvest can be low when rice is abundant. Poor, or ideal, weather during the harvest season may affect harvest levels as much as abundance.

In addition, human harvesting pressure can vary appreciably from year to year; good crops tend to increase state license sales, for example. Pressure may even drop after a particularly good year simply because some folks still have enough left in their pantry to get them through another year.

Figure 2 depicts estimates of rice abundance and harvest from Pacwawong Lake. While the relationship between harvest and abundance is pretty strong, some years don't match up; in 2010 for example, rice plants were abundant, but an outbreak of brown-spot disease lead to a near complete failure in harvest. In contrast, the particularly high harvest seen in 2009 was likely as much a product of ideal weather during the harvest season as it was rice abundance.

And again there is the question of scale. While state-wide harvest estimates could hide cycling taking place on a local level, the Pacwawong figure is typical of our annual surveys of individual lakes in not suggesting a regular cycling in abundance either.

Of course, if manoomin were cycling, there would be the question of what is causing it. Dr. John Pastor at the University of Minnesota Duluth has explored how nutrient levels affect rice abundance. In particular, Dr. Pastor and his students have found evidence that nitrogen taken up by the plants and stored in the roots is not available to fuel growth of the next year's crop due to insufficient over-winter decay. Under carefully controlled experimental conditions, it appears this nutrient cycling can lead to a cycling in manoomin abundance at the local level. And these observations seem consistent with the observations of many ricers that river beds of manoomin seem to vary less than lake beds—presumably because of the constant influx of nutrients that occurs on rivers.

Nevertheless, on real-world rice lakes, nutrient cycling is only one of several factors that affects rice abundance in any given year. Water levels, over-winter conditions, competing vegetation, storm events and disease outbreaks are just some of the myriad of factors that can influence whether a fall harvester finds a sea of grass or just a few scattered stalks on her favorite lake. In the end, the interplay of all these factors, and the variability of each of them, leave me to conclude that while wild beds of manoomin vary greatly from year to year, they likely do not cycle in a regular way.

Finally, if there is one message hidden in all of our monitoring, it may be this: When it is a really good year on a lake you favor, you may want to put your tobacco down and get out there, because there is a good chance next year will not be as good!

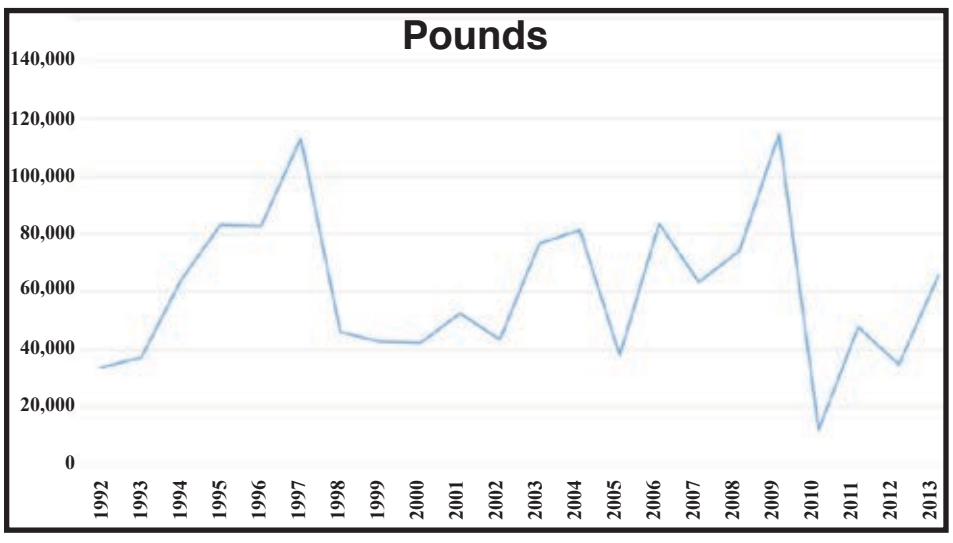

Figure 1. Estimated Wisconsin off-reservation manoomin harvest, in pounds of green rice.

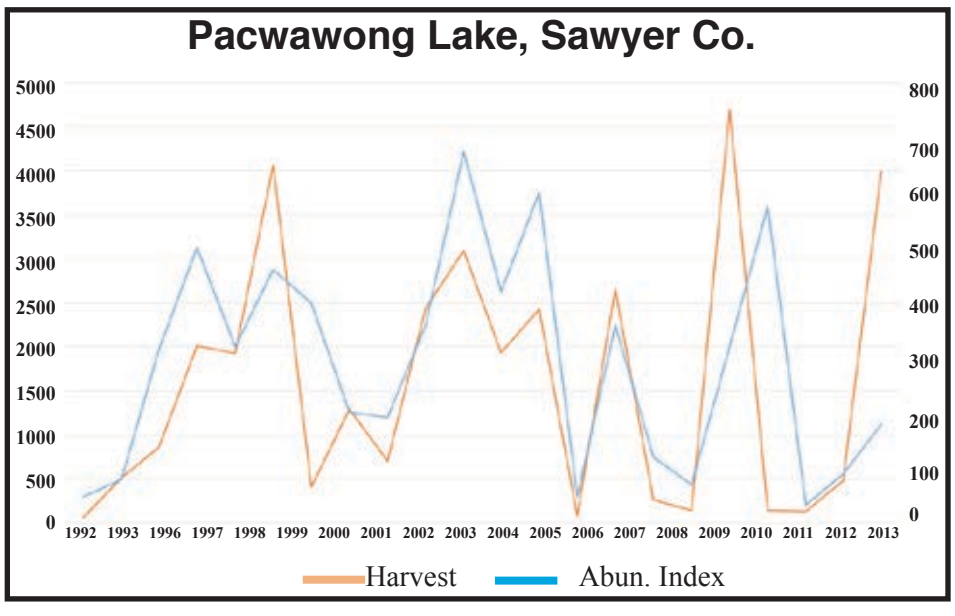

Figure 2. Estimated abundance and reported harvest from Pacwawong Lake.

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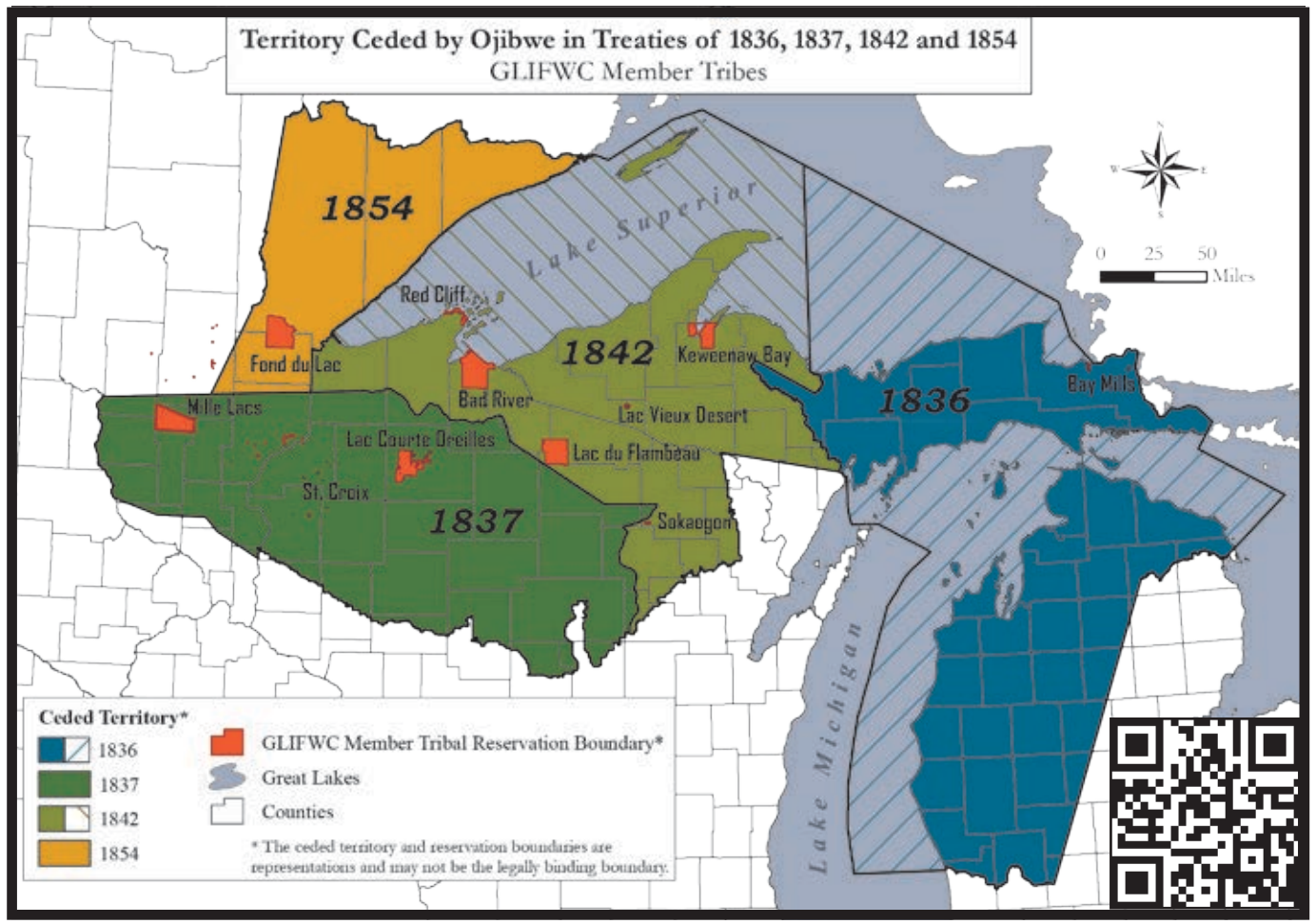

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A Chronicle of the Lake Superior Ojibwe

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Manoomin Abundance