BAY MILLS INDIAN COMMUNITY

BIOLOGICAL SERVICES NEWSLETTER

SUMMER 2023 ISSUE 17

INSIDE THIS ISSUE

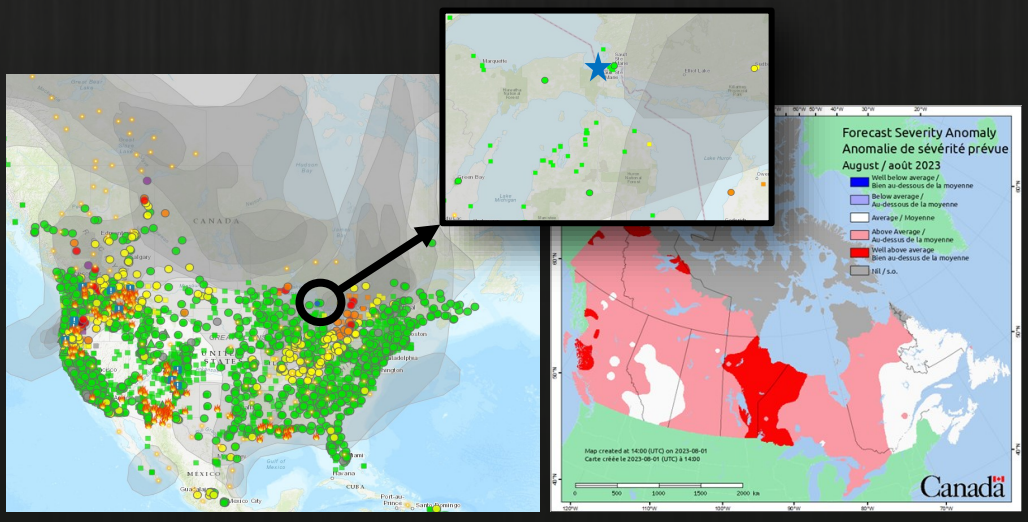
For questions about fishing/hunting licenses, current regulations, or to report poaching, please contact Conservation Officers at 906-248-8640.

In The News: EUP Blanketed in Smoke this Summer

On June 4, 2023 Michigan Department of Environment, Great Lakes and Energy issued its very first air quality warning for particulate matter 2.5 (PM2.5) in response to the Canadian wildfires. The wildfires have produced a significant amount of smoke which has produced a haze reducing visibility, an odor and has many associated health concerns. Breathing in these fine particulates can irritate the respiratory system, especially for people with already existing respiratory health issues. Since June 4th, there have been more than ten (10) air action days due to high levels of PM2.5. To-date in 2023 there have been more than 13,000,000-ha burned in Canada, which is far above the 2,000,000-ha average. BMIC has been averaging PM2.5 levels in the unhealthy range for both sensitive and healthy individuals due to the Canadian wildfires..

Sign up for air quality action alerts at https://www.enviroflash.info/signup.cfm

Check out the fire and smoke map at https://fire.airnow.gov/



Above: Maps showing fires and air sensor ratings as of 8/15/23.

AIR QUALITY PROGRAM: Be Bay Mills Air Aware

NEW SENSORS INSTALLED AT BAY MILLS

On average a person breathes over 3,000 gallons of air every day, so being aware of your local air quality is important for your health. The recent 2023 summer fires have had a negative impact on our local ambient air quality, especially for particulate matter.

Particulate matter or PM is a mixture of solid particles and liquid water droplets found in the air. PM pollution includes very small fine particles (PM2.5) and larger particles (PM10). To be more aware of PM in the air Bay Mills has installed two real-time PurpleAir PM2.5 Sensors. The PurpleAir sensors use lasers to count the particles in the air. These counts are then processed and communicated based on the Air Quality Index chart.

Check out the sensor readings here on the PurpleAir map by scanning the QR code or visiting the website!

SCAN ME

View local PM2.5 levels at https://map.purpleair.com/1/mAQI/a10/p2592000/cC0#11.74/46.4113/-84.6018

What is PM2.5?

- PM2.5 are fine inhalable particles with diameters generally around 2.5 micrometers
- The average piece of human hair is about 70 micrometers which is about 30 times ***larger*** than a PM2.5 particulate.

AIR QUALITY INDEX CHART

Daily AQI Color	Level of Concern	Values of Index	Description of Air Quality
Green	**Good**	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	**Moderate**	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	**Unhealthy for Sensitive Groups**	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	**Unhealthy**	151 to 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	**Very Unhealthy**	201 to 300	Health alert: The risk of health effects is increased for everyone.
Maroon	**Hazardous**	300 and higher	Health warning of emergency conditions: everyone is more likely to be affected.

GOING WITH THE FLOW; *GNAW*-LEDGE ABOUT BEAVERS

BEAVER FACTS TO GAWN ON

- Beavers are primarily nocturnal and build dams at night.
- Maximum of 30 years in captivity, but usually 10 -12 years.
- Beavers secrete an oil from their rears that smells like vanilla, and it is used in artificial vanilla flavoring.
- Beavers have iron teeth! Where calcium strengthens human tooth enamel, iron strengthens beaver teeth. The iron causes the orange coloring in beavers' teeth, makes the teeth stronger against mechanical stress, and makes them more resistant to acid.
- Beaver tails are dense in fat and probably were an important winter food for humans.

BMIC's BUSY BEAVERS

Everyone knows what a beaver is, the furry animal with a big flat tail and big front teeth. Beavers, or amik, are plentiful around the eastern Upper Peninsula and can become infamous for their work. Beavers build lodges for shelter, but also build networks of dams to manipulate water levels in their favor.

Beavers can do a lot of good by shaping the environment in beneficial ways, such as creating a wetland when damming a stream. Wetlands create a habitable environment for many different species of frogs, salamanders, birds, and fish. In fact, almost half of the endangered and threatened species in the world need wetlands to survive. Dams also slow water flow, preventing soil erosion and retaining sediment, which allows toxins such as heavy metals to settle-out of the water. Dams may last well-beyond a beaver's lifespan; many near Ishpeming, MI were mapped in the 1860s and are still intact today, over 150 years later. Some studies suggest beaver colonies may last over 1,000 years.

Beavers can negatively impact their surrounding area as well. Beavers cut down 200 trees/yr, usually 2-6 inches in diameter, but sometimes 30-40 inches. Depending on the location of their efforts, beavers may clear out riparian trees, destabilizing stream banks. Their constructions can flood nearby roads, residential areas and cause damage to the structure of human buildings. Migrating fish can also be blocked by beaver dams.

Sources:

- https://championsforwildlife.org/beaver-facts/?gclid=CjwKCAjwtuOlBhBREiwA7agf1pggGWYm-wsiVUipHMElRd7eUC0d61o2-fAAjaCRaL2cSkadoRgLORoC0aAQAvD_BwE
- https://portal.ct.gov/DEEP/Wildlife/Nuisance-Wildlife/Problems-with-Beavers
- https://www.mlive.com/news/2016/04/michigan_beaver_dam_ishpeming.html
- https://oaec.org/wp-content/uploads/2014/12/novel-physical-evidence-beaver-sierra-nevada-James-Lanman-2012.pdf
- https://factanimal.com/beaver/

BROWNFIELDS PROGRAM UPDATE

TACKLING DUMP SITES AT BAY MILLS INDIAN COMMUNITY

Bay Mills Indian Community is tackling two large dump sites this summer. These sites are being cleaned up and revegetated to make the areas safer for public health and remove contamination sources from the environment. In 2023, BMIC was provided funding through Indian Health Service's Sanitation Deficiency System to clean up the debris and rehabilitate the sites.

Gumshoes Hillside Clean-Up

The hillside above Gumshoes campground and beach was once an area where trash and debris was discarded over the hill, which was a common practice several decades ago. The hillside has since grown over with trees and other vegetation, but the debris remains. Glass, plastic items, metal containers and even a couple of cars have slowly deteriorated over the years. A housing development has been built on top of the hill since the days of dumping occurred. Those exploring the forest in that area come across the remnants of past practices. Broken glass, sharp rusted metal and other harmful objects make for a less than ideal experience.

During clean-up (left) and after (right) work on Gumshoes hillside. Disturbed soil was replanted with native species.

Great Lakes Climate Corp (GLCC) was hired to remove the debris using hand tools and rehabilitate the site. Two 30-yard scrap metal dumpsters were needed to collect the metal for recycling and reduce landfill costs. Three 20-yard dumpsters were filled with other waste materials. Sites on the hillside were capped with weed-free topsoil. Annual rye and native woodland grass seed species were sown and straw mulch mats were installed to reduce erosion impacts. Native and culturally significant plant species and trees were planted throughout the area to aid in vegetation regeneration.

GUMSHOES CLEAN-UP

7,000 lbs scrap metal

10,000 lbs trash

The Gumshoes hillside area includes a trail that travels from Gumshoes Road, down the hillside to link with another trail and then back up the hillside. This trail then comes out near the Housing Authority building. That trail was re-established as part of the cleanup efforts. Residents can now explore the area with much less chance of injury thanks to GLCC's clean up efforts.

Sugar Island Clean-Up

A parcel on Sugar Island Trust land includes a dumpsite over an acre in size. Years of dumping is evident with trees growing up through cars, a boat, household trash and a myriad of other items. While this isn't a site that receives a lot of visitors, it has generated several complaints from Sugar Island residents. As with any dump site there are concerns about public safety and environmental health. BMIC Public Works department will be cleaning up the site in late summer 2023. After the debris has been cleaned up, the soil and groundwater will be tested for contamination utilizing funding from the Environmental Protection Agency's (EPA) 128(a) Brownfields program.

BMIC has a full service waste transfer station where most materials can be properly disposed or recycled. The Environmental Coordinator can provide guidance on questions regarding waste materials, recycling and proper disposal options. Please report any dump sites or other contamination concerns on Tribal Lands; contact the Environmental Coordinator at (906) 248-8655 or email jmparks@baymils.org.

CHIPPEWA LANDING CLEAN-UP & REDEVELOPMENT

Chippewa Landing holds a special spot in the memories of many people in the area. There are lots of stories about the arcade, snack shop, fishing, boating and camping told around the community. The main building and most of the structures have deteriorated and a leaking gasoline pipe contaminated soil and water near the boat launch. There is no other contamination located near other home sites or groundwater sources. In spite of these challenges, Bay Mills Indian Community (BMIC) saw the potential of Chippewa Landing and acquired the property in 2021. In 2023, BMIC was awarded a Brownfields Clean Up grant from the Environmental Protection Agency (EPA). The funding will enable BMIC to demolish the buildings which contain asbestos and lead paint, and clean up the soil and groundwater affected by the gasoline contamination near the boat launch. Redevelopment planning for the site also began. Chippewa Landing's new life will be similar to its former. Plans include an accessible waterfront and areas for launching canoes, kayaks and motorized boats. A store, small restaurant, outfitter and eventually camping cabins are also part of Chippewa Landing's future. The Clean Up project is planned to be completed within four years.

BMIC administers several EPA Brownfields grants. These grants support BMIC's Brownfields program which includes a list of sites of concern, monitoring and sampling of these sites and clean up of contaminated areas. Information about BMIC's Brownfield program can be found online: https://www.baymills.org/brownfields. The webpage includes a form to report any sites of concern to the BMIC Environmental Coordinator.

Chippewa Landing as viewed from above. Photo by unknown source.

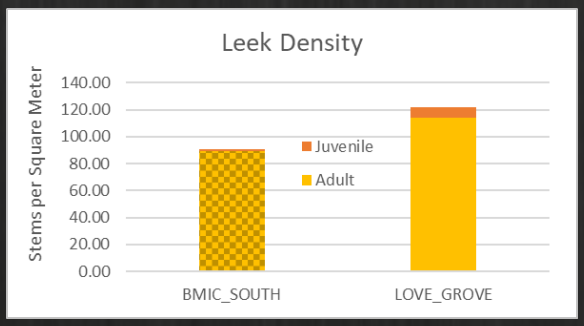
PLANT STUDY RESULTS LEEEEKED

BAGWAJI ZHIGAAGAWINZHIIG, WILD LEEK POPULATION DEMOGRAPHICS OF BAY MILLS AND TROUT LAKE

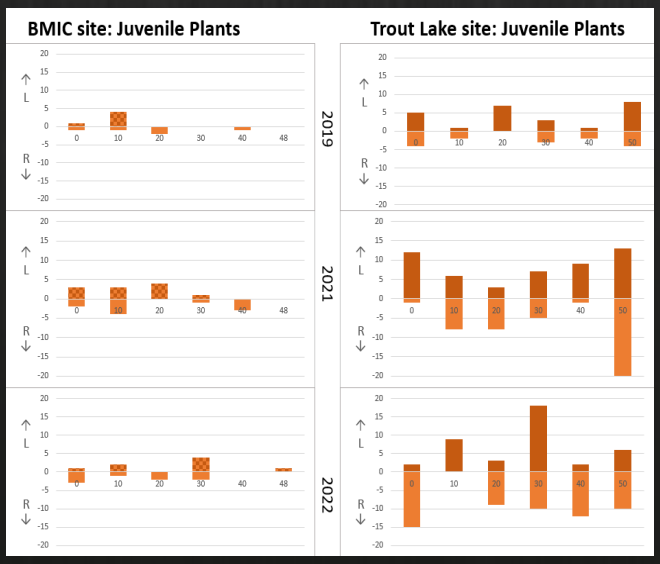
Since 2019, Biological Services staff have undertaken a special research study. Bagwaji zhigaagawinzhiig, wild leeks (*Allium tricoccum)*, are understood to be a tribally-important species for subsistence harvesting. Wild leeks are an edible plant, with leaves only visible in the spring before they die back, store energy in their bulb. They reproduce very slowly by seed and bulb division.

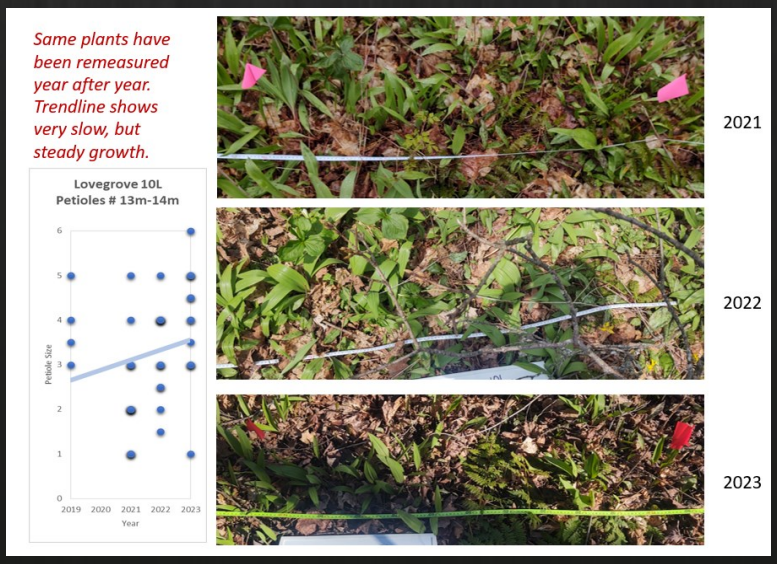
Local harvesters have expressed the hope that local wild leek populations be self-sustaining and allow for modest subsistence harvest. Before restoration and expansion efforts may be explored, the existing leek population must first be assessed. Better understanding of existing leek habitat will aid researchers in determining suitability of sites for future leek planting/introduction. The overall approach of this study has been to establish long-term studies to assess the baseline condition and the impact harvesting has on populations of leeks.

After interviewing local harvesters, Biology staff set up study plots at two locations, one on Bay Mills trust lands, the other at a popular harvest location near Trout Lake, MI. The Bay Mills study site has loamy soil, with some clay. It borders an upland and floodplain. Full canopy cover is dominated by Sugar Maple/ birch/ fir. The Trout Lake study site has loamy/ limestone soil, upland. The full canopy cover is dominated by Sugar maple. Researchers set up transects across the leek patches surveying 1m x 10cm plots. This allowed the researchers to carefully photograph, count and measure individual plants over the years. This image below shows the same 1m plot on different years; the graph of individual plant diameter shows slow but steady growth, about 1 mm/ yr.



Study results show other differences between the two study sites. Trout Lake plots have higher numbers of juvenile (seedling) plants than Bay Mills. Leeks grow slowly and only begin reproducing at 7-10 years old, suggesting that the Trout Lake population of leeks is older and more established. The graph below shows that more juvenile plants consistently sprout

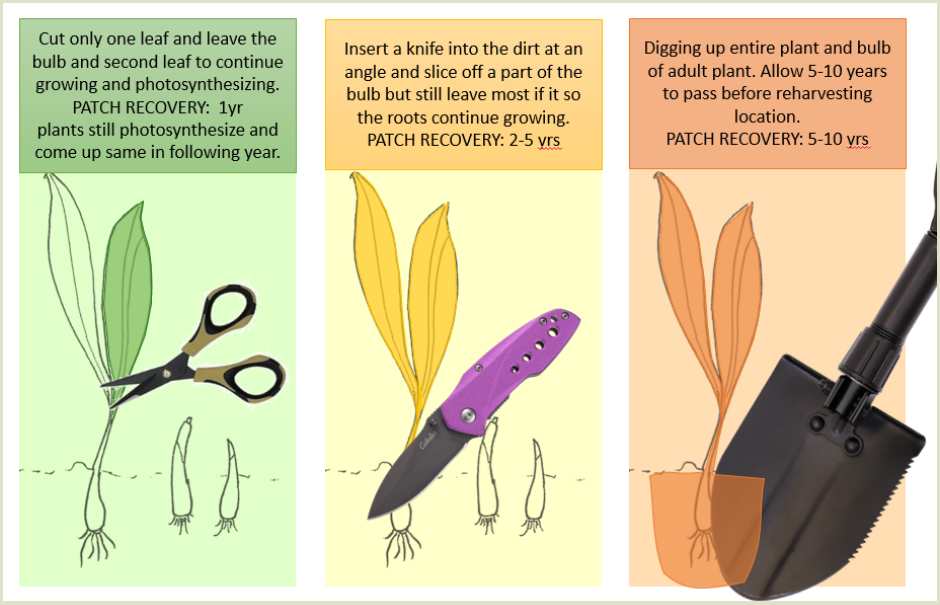




Above: Leek juvenile vs adult density. Left: Comparison of juvenile leeks over time. Right: The same leek plot photographed and measured over years. Individual plant diameters are growing at very slow, but steady pace.

NOTES FOR HARVESTORS

There are many methods to harvest these edible plants. Your choice of method and harvest intensity impacts plant recovery time.



Above: Study in North Carolina. Six years after 100 % Bulb Harvest. This regrowth is typical for 100% bulb harvest. Pre-harvest, this plot had 126 leeks in it. As of 2022, there were only eight leeks, five of them juveniles.

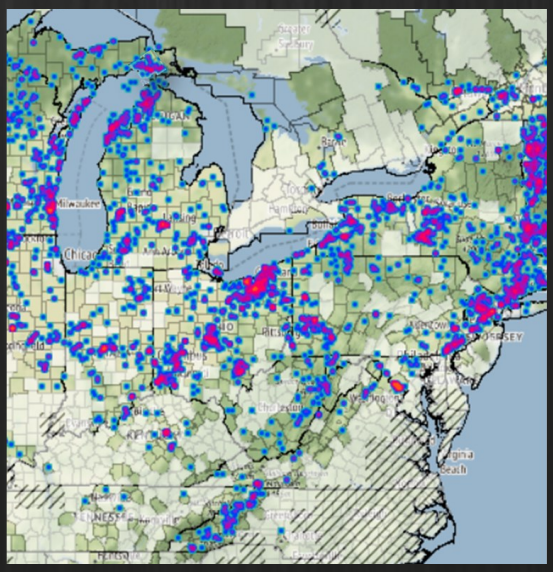
Non-native Species Monitoring

EARTHWORMS

Present at both sites
Impact: UNCLEAR
Worms may loosen soils allowing easier bulb growth of leeks. However, in hot months, the duff is an insulator, keeping soil cooler. When worms eat the leaf layer, soils warm. When combined with the already warming climate, this challenges leeks.
No earthworms are native to Michigan. The glaciers that covered this area until about ten thousand years ago wiped them out and the system that evolved as the glaciers receded did not include them. The nightcrawlers, red worms and any other worms you find are all European or Asian.

GARLIC MUSTARD

Not present in either study plot, but present within 2mi of both.
Impact: NEGATIVE
Research shows that garlic mustard is allelopathic, releasing chemicals which can inhibit the growth of other plant species. Some researchers believe that these compounds can also hinder beneficial soil fungi (mycorrhizal fungi) which help tree roots take up water and nutrients.
It poses a threat to native wildflowers like spring beauty, toothworts, hepatica, bloodroot and wild ginger. Leek biomass is lower in sites invaded by garlic mustard.



Wild Leek home range map. Courtesy of Wildflowersearch.org

in Trout Lake than at Bay Mills. Adult leeks are also slightly bigger in Trout Lake (likely older). Overall there are slightly more individual plants growing there as well. Phenology monitoring also shows that leaf-out begins seven days sooner at Trout Lake, as does leaf senescence (die-back).

The map below shows current range of leeks. Similar studies in WV, NC, and lower MI have shown populations are patchier and harvesting is heavier near roadways. Populations in NC are showing 2% decline -- possibly from the shortening season but also from increase of harvesters.

GET TO KNOW A WETLAND: BAY MILLS WETLAND PRESERVE

THE BIOLOGY CREW INVENTORIES BAY MILLS WETLANDS

Throughout the summers of 2019 - 2023 Bay Mills Indian Community Biological Services has been taking inventory of the natural community present in local wetlands on reservation land. Thirty-seven (37) sites have been surveyed to gather baseline information on the natural condition of the wetlands and to monitor them for changes due to climate change and/or pollution. Well-known wetlands at Bay Mills include Spectacle Lake bog, South (Hank's) Pond, the Wetland Preserve, Long Marsh, North Pond, and Fudd's Marsh.

The Bay Mills Wetland Preserve is surveyed for water quality, plants, and aquatic macroinvertebrates each summer. Our sample site can be found down the snowmobile trail on Lakeshore Drive. The wetland is surrounded by a large forested area, including species such as balsam fir, black spruce, and eastern white cedar. Nearby beaver dams have caused standing water and flooding in the area, providing a home for many unique wetland plants, such as spiny hornwort, water arum, and wool grasses. Many waterfowl, frogs, and dragonflies have also made their home here in this ideal habitat. The table below includes many, though not all, of the species found in the Bay Mills Wetland Preserve.

For more information about this project, contact Brian Wesolek at bwesolek@baymills.org.

Plant Species	Animal Species	Macroinvertebrates
Balsam fir	Bear	Backswimmer
Blue-flag iris	Beaver	Damselfly
Broad-leaved cattail	Coyote	Diving beetle
Bur-reed	Deer	Dragonfly
Eastern white cedar	Fisher	Fingernail clams
Marsh cinquefoil	Frog	Giant water bug
Spiny hornwort	Hare	Leech
Water arum	Raccoon	Mayfly
Watershield	Snake	Snail
Wool grass	Waterfowl	Water measurer

Photos by Biological Services

STAFF CHANGES in BIOLOGICAL SERVICES

Justin R. Carrick of Bay Mills rejoined the Biological Services Department. Justin began as an Inland fisheries summer assistant in 2021, and is now working full-time as a Great Lakes Fisheries Tech. He assists the Great Lakes Fisheries crew with different fish population assessments and surveys. Justin will be starting his third year at BMCC pursuing a Bachelor's degree in Business Administration. He hopes to pursue a career as a game warden for the DNR. In his free time, Justin enjoys fishing, hunting, and being in the outdoors.

Justin R Carrick, Great Lake Fisheries

Mallory Verch, Inland Wildlife

Mallory Verch of Waterford, MI joined Biological Services in August as the Inland Wildlife Biologist. She coordinates the study and management of wildlife for the Bay Mills Indian Community. Mallory earned her bachelor's of science in Wildlife Biology and Management from Michigan State University and a Master's in Biology from Indiana University of Pennsylvania. She has experience conducting research on a variety of animals including large carnivores, elk, and birds. Previously, Mallory has worked with the Pennsylvania Game Commission, the U.S. Fish and Wildlife Service, and Michigan State Bird Observatory. She enjoys hiking, camping, and spending time with friends and family.

STAFF CHANGES in BIOLOGICAL SERVICES (continued)

Charlotte is from Clinton township in the lower peninsula. Charlotte graduated from LSSU with a Bachelor's degree in Conservation Biology in 2022 from LSSU. She's been with our department since 2021! This summer she continues inventorying aquatic life in the wetlands and monitoring water quality in local streams and lakes.

Cyle is from Sault Ste Marie, MI. He working towards a career in law enforcement. Cyle began with our department in 2022 and has stayed on for his second summer! This summer he is providing outreach at the BMIC boat washing station. Cyle also is surveying aquatic life and monitoring water quality in local streams and lakes.

Patrick of Cincinnati, OH, then Sault Ste Marie, MI, graduated from LSSU with a bachelors in Biology. He is assisting with outreach at the BMIC boat washing station. He also is surveying aquatic life and monitoring water quality in local streams. Some day, Patrick hopes to work in wetlands habitat management and waterfowl conservation in the Great Lakes Region.

Kylie is from Mason, MI. She is currently pursuing a degree in Fisheries and Wildlife Management at LSSU. This summer Kylie is assisting the inland fish and wildlife program.

Lucas S is originally from Coldwater, MI, then Sault Ste Marie, MI. He graduated from LSSU with a bachelors Fisheries and Wildlife Management. This summer Lucas is assisting the inland program with wild rice and wildlife monitoring in the area.

Zach is from Flushing, MI and currently pursuing a degree in Conservation Biology at LSSU. This summer he is assisting the inland fish and wildlife program.

Lucas G is from Rhodes, MI; he moved to Sault Ste Marie, MI graduated with a Conservation Biology degree from LSSU. His plan after is to pursue a career working with threatened and endangered species. Lucas returns to us for his second season and is working with the Invasive Species program as to educate Boys and Girls Club youth on natural resources.

Photos by Biological Services

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This newsletter funded by the Great Lakes Restoration Initiative.

Great Lakes RESTORATION

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