

Environmental Institute

September 2018

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Report Card

The Environmental Institute houses our Tribal College Extension programs.

Mission Statement:

To promote the education and cultural growth of the community in natural resources and the environment. The Environmental Institute supports and coordinates education, research, and outreach that serve our greater community.

Future Directions

The Environmental Institute is a leader and catalyst for a sustainable and culturally relevant use of natural resources. We connect our students and greater community with empowering opportunities and partnerships through culturally relevant research and programming.

Thirteen Moons

A turtle's shell has a unique pattern of thirteen large scales in the center representing the thirteen moons of the lunar calendar. The circle of twenty-eight scales, circling the edge of the shell, corresponds to the number of days comprising the lunar cycle.

GICHI-MANIDOO GIIZIS
January
Great Spirit Moon

NAMEBINI GIIZIS
February
Sucker Fish Moon

ONAABANI GIIZIS
March
Hard Crust on Snow Moon

ISKIGAMIZIGE GIIZIS
April
Maple Sap Boiling Moon

WAABIGWANII GIIZIS
May
Flowering Moon

ODE'IMINI GIIZIS
June
Strawberry Moon



MANIDOO GIIZISOONS
December
Little Spirit Moon

GASHKADINO GIIZIS
November
Freezing Moon

BINAAKWII GIIZIS
October
Falling Leaves Moon

WAATEBAGAA GIIZIS
September
Leaves Changing Colors Moon

MANOOMINIKE GIIZIS
August
Ricing Moon

AABITA-NIIBINO GIIZIS
July
Mid Summer Moons (2)

Ashi-Niswi Giizisoog

Thirteen Moons is a Tribal Extension Program with a mission and goal to

- *increase awareness of natural resources,*
- *provide new opportunities for social interaction, and*
- *increase knowledge of the Ojibwe culture*

In order to fulfill these goals the Thirteen Moons program publishes monthly features in the Fond du Lac Newspaper on traditional resource ecology, management, and culture.

Future Focus

Over the next four years the Thirteen Moons program will focus on programming that supports USDA NIFA strategic action of supporting informal education to increase food and agricultural literacy of youth and adults and develop programs that increase public knowledge and citizen engagement leading to actions that protect or enhance the nations' food supply, agricultural productivity, environmental quality, community vitality, and/or public health and well-being.

The Thirteen Moons program is designed to use the progression of the seasons to highlight the traditional uses, current issues, and economic opportunities of natural resources. The next four years will expand that scope to include programming that views harvest in both the traditional ways practiced by the Ojibwe people and local more conventional agricultural harvest. This programming will continue to build upon the outreach and partnerships built during our previous Extension activities and support the Food Sovereignty Initiatives (FSI) strategic plan goals to promote community resiliency through economic, health, and healing programming around fresh foods. Out of this Food Sovereignty Initiatives strategic plan the Fond du Lac Bimaaji'idiwin Local Foods Commission was formed and it has created a vision statement of sovereign, holistic, food systems rooted in Anishinaabe values that are environmentally responsible and empowers a thriving, resilient community. Our programming will feature agricultural workshops, events, and activities to help realize the Fond du Lac vision.

Workshops

- Seasonal Decorations using Natural Resources
- Herbal Products
- Snowsnakes & Snowshoes
- Sugar Bush
- Manoomin (wild rice) Camp
- 13 Moons Pow Wow—*Gichi Manidoo Giizis*
- Wild Foods Sampling
- Balsam Bough Harvesting
- Wetlands Through the Seasons – Master Naturalist Course which culminated in Manoomin Camp

Partners

- FDL Ojibwe School
- FDL Resources Management
- Bimaaji'idiwin Garden Program
- University of Minnesota
- Great Lakes Indian Fish and Wildlife Commission (GLIFWC)
- USDA/NRCS
- NASA Science Camp

Participants and Outreach

- Nearly 2,000 community members served by 13 Moons programming
- Monthly pages in FDL newspaper *Nagahchiwonong*
- FDL Radio



Thirteen Moons webpage <http://www.fdlrez.com/RM/13moons.htm>

Facebook <https://www.facebook.com/13-Moons-Ashiniwi-giizisoog-118178048248982/>

Sustainable Agriculture



Workshops

- Food Preservation-Canning
- Business Ag Training
- Growing Season Extension
- Garden to Table Feast
- Food Initiative Strategic Planning

Projects

- Seed saving
- Farm Tours
- Demonstration Garden
- Garden Intern Support
- Farmers Markets
- 2501 Agricultural Outreach for Small Producers
- Restoring Fruit Trees and Bushes to Fond du Lac Community

Partners

- First Nations Development Institute
- Gitigaan
- Thirteen Moons
- Nahgahchiwanong Dibahjimowinnan
- North American Water Office
- MN SARE
- USDA OAO
- Fond du Lac Planning Department
- Fond du Lac Agricultural Learning Center Partnership

Bimaaji'idiwin Ojibwe Garden Program

Translated from Ojibwe, Bimaaji'idiwin means “saving each others’ lives.” This is a heavy name to live up to and the Ojibwe Garden Program attempts to do so through education, outreach, and preservation. An important objective for the research and demonstration garden is to develop, expand, and maintain a collection of Anishinaabe and Native American heirloom crop seeds through a miinikaanag agindaasoowigamig (seed library), which is a point of connection between a growing network of dedicated seed savers and our local gardeners.

The Ojibwe Garden also provides over 300 pounds of produce to the community:

- Elderly Nutrition Program
- Ojibwe School Lunch Program
- FDL Summer Lunch Program
- Age to Age camp
- Gitigaan Feast

Food Sovereignty Initiative: *Vision for a sovereign holistic food system rooted in Anishinaabe values that is environmentally responsible and empowers a thriving, resilient community.*

The initiative aims to balance social and ecological needs and desires of the band while providing food in a sustainable manner, strengthening community resilience to natural resource vulnerabilities and risks. The Food Sovereignty Initiative will reduce the area’s dependency on external food systems and enhance Tribal members’ abilities to adapt to anticipated changes in food resources.



Bimaajii'idiwin

New Sustainable Food Systems (SFS) Certificate Program – established by the SEEDS project

Development of a new certificate program links faculty and regional community professionals such as Elders, experienced farmers, and natural resource harvester. Semi-annual workshops will focus on sustainably grown foods, harvested foods and medicines important to the region, as well as local food systems. Workshops will help build skills, knowledge and resources for classroom teaching with a specific focus on methodologies for the northeastern Minnesota region such as cold weather crop farming, season extension, and soil amendments.

SFS Certificate Outcomes

- Development of a certificate in sustainable food systems that complements FDLTCC's current Environmental Science degree
- Support regional and Fond du Lac community members in their pursuit to become sustainable agricultural producers
- Provide internships to Fond du Lac Tribal and Community College students to pursue sustainability and agricultural based programs at Fond du Lac Reservation and other locations
- Provide professional development opportunities to educate Fond du Lac Tribal and Community College faculty on latest research and issues with sustainable agriculture and resource harvest



3rd Annual Bee Symposium – February 2018



This one day, annual event featured a beginning beekeeping morning course and presentations by the renowned University of Minnesota Bee Squad, the national organization Xerces Society, as well as added value product demonstrations by regional beekeepers. Over 190 participants attended from Minnesota and Wisconsin. In February of 2019 the 4th Annual Bee Symposium will continue the tradition of pollinator education.

Check out a video of the 2018 Symposium at <https://vimeo.com/267325284>



Serving Our Youth

USDA APHIS: Agricultural and Natural Resources Knowledge Immersion Camp

The APHIS summer camp program connects youth ages 14-17 years with agriculture and natural resource career pathways in an experiential setting. The series of three camps focuses on how these subjects connect to Ojibwe culture and natural heritage. The fundamentals of the camp incorporate scientific training in understanding the relationship of plants to the soil, air, water and other organisms, with immersion into the fields of biology and environmental science. The Camp series exposes youth to the field of agribusiness while they help to manage a local garden and experience running a profitable agricultural operation.

The establishment of this camp enhances Fond du Lac's 10-year-old Journey Garden Program which offers youth summer employment working in a garden, gaining professional skills while learning about agriculture. The camp series expands this program to include natural resource careers.

Miinigoowiziwinan
Ezhi-ganawendamang Manitoo Ogitigaanan

"Our Gifts: As we take care of the Creator's garden"

Harvest Overnight Camp
Cloquet Forestry Center
July 29 - August 3, 2018

- Overnight camp
- Career and college exploration
- Rope course, archery, canoeing and more
- Meals and lodging included

Harvest Day Camp
Fond du Lac Tribal and Community College
August 6 - 10, 2018

- Day camp, 8am - 6pm
- Career and college exploration
- Natural resources job shadowing
- Meals included

For youth ages 12 - 17



Gidakiimanaaniwigamig

NASA College Internships and Gidaa Camps

NASA has a proven record of providing internships and research opportunities to undergraduate students. Building on the relationships built during the collaboration on the NASA NSSTC/MSFC in Huntsville, Alabama and other NASA research centers, “gidaa” students work with NASA researchers on climate change data sets that will be used to understand the impact of climate change on culturally significant natural resources within the Ceded Territories. Research Experiences for Undergraduates (REUs) give students a chance to work in a NASA facility and connect with NASA scientists. Past student accomplishments include Wayne Greensky’s research paper *Spatial and Temporal Analyses of Environmental Effects on Zizania palustris and Its Natural Cycles*.



Climate Strong! – Building Tribal Youth Leadership for Climate Resiliency

Climate Strong is an immersions camp model for middle and high school youth to gain awareness of how climate change impacts cultural and community systems, while building leadership skills to contribute to community resiliency strategies. Over the next three years, program outcomes include:

- 10,800 student hours of training
- 6,600 community members served, highlighting community resiliency issues facing our region.
- Reflecting on and sharing climate resiliency projects and outcomes through G-WOW website’s interactive blogs.
- Sharing of project results with partners
- Increasing community resiliency through adaptation of culturally relevant stewardship strategies that reduce climate change impacts on natural resources that support cultural practices.
- Demonstrating leadership by tribal youth
- Increasing community resiliency teaching skills by middle to high school teachers tribal community educators within the Ojibwe Ceded Territories
- Increasing the number of community-based climate resiliency projects that reduce extreme weather impacts

Program Impacts

- 30-45 Native American K-12 students participating yearly.
- 8 Native American College Mentors participating in all camps
- 5 Native American students were placed in REU positions in partner research facilities
- Internships at the NASA center in Huntsville Alabama over two summers.
- 30-60 teachers working in schools that serve Native American students. These teachers are trained on the online G-WOW curriculum that increases climate change literacy by looking at climate change in the context of effects on Ojibwe lifeways.

Partners

- University of Wisconsin Extension
- Great Lakes Indian Fish and Wildlife Commission
- Northstar AISES Alliance & Professional Chapter
- Marshall Space Flight Center
- Universities Space Research Association
- NOAA
- Lake Superior National Estuarine Research Reserve
- 1854 Treaty Authority
- Fond du Lac Resource Management

Fond du Lac Research

Tracking Mercury across the Watershed

The St. Louis River watershed is facing historical and future mining pressures which have affected subsistence lifeways and health of the Ojibwe people. Mining discharges, especially sulfates, are a major concern.

Sulfates in mining discharge convert mercury to methylated mercury, a form of mercury easily assimilated by biological organisms. As methylated mercury becomes available to the aquatic food web the mercury accumulates in the tissue of plants, animals, and eventually the humans that consume the fish. In light of these health issues, Fond du Lac tribal researchers are looking at ways to track mercury in the St. Louis River watershed and in this case in particular, to understand mercury loading in the region.

This research project builds upon previous research from 2014/15 which utilized dragonfly larvae as a sentinel species for measuring total mercury. The project seeks to correlate dry atmospheric deposition of mercury in leaf litter with bio-accumulated mercury in dragonfly larvae.

Research will continue in a new direction for the following two years concentrating on how landscapes and ecotypes impact mercury levels in water, leaf litter, and odonates.

Spatial Variability of Mercury in the St. Louis River Watershed Across Four Landscape Types

Heather Buttgen, Alicia Hallfrisch, Cade Kowalczak, Arianna Northbird, Sara Rybak, Courtney Kowalczak, Andrew Wold (FDLTC), Nathan Johnson (UMD)

INTRODUCTION

The purpose of our project is to determine the spatial variability of mercury in the St. Louis River Watershed through four types which are: ditched peatland, forested, wetland, and reservoir systems in Northern Minnesota. We will be using stable isotope analysis along with efforts of tribal resource managers to protect natural resources vital to tribal members. Mercury contamination hasn't always been a concern, but it has become one due to the industrial revolution and the decline in fish and fish less offshore. This is particularly important for the indigenous community because fish is a large component of their diet. We will be measuring the amount of methylmercury (MeHg) in total mercury (THg) bioaccumulation in dragonfly larvae (Odonata) in these different landscapes. This will be accomplished by measuring the amount of MeHg in the water, the amount of lead left in the water by dredging Odumite waste. This will be compared with variability with Odonata, stream water, and leaf litter.

Study Area, St. Louis River Watershed

Map 1 shows the four sample sites and if it different land coverages within the St. Louis River Watershed.

A

Map 2 shows the four sample sites and if it different land coverages within the St. Louis River Watershed.

B

Figure 5 shows the relationship between Odontate larva THg and water MeHg during fall 2017 sampling. The same relationship for Jameson et al. in the St. Louis River (solid line).

METHODOLOGY

We chose three sample sites within each landscape type, giving a total of 12 sample sites. We collected water samples from all 12 sample sites. Dissolved organic carbon (DOC), dissolved oxygen (DO), pH, and water temperature were measured at each site. Species and length of the Odontate larvae were recorded. All samples were focused on for the first analysis. We collected these from 7 sites as seen in Figure 5. After collection, we measured the length of the larvae.

After digestion, all the mercury in the samples was converted into total mercury that could be analyzed in the CVATs. The protocol followed from EPA Method 1631. We used EPA Method 1631 E. MeHg was analyzed in outside lab using EPA method 1631 E.

Table 1 shows the 7 times that gorgonites were measured across the four landscape types.

Sample Site

Land Coverage	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
Shrub swamp	1	1	1	1	1	1	1
Wetland	1	1	1	1	1	1	1
Forest	1	1	1	1	1	1	1
Ditch Peatland	1	1	1	1	1	1	1

Figure 6 shows the average amount (± SE) of THg in Odontate larvae.

Figure 7 shows the average amount (± SE) of DOC in different land coverages.

Figure 8 shows the average amount (± SE) of water MeHg in different land coverages.

Figure 9 shows the average amount (± SE) of water MeHg in different land coverages.

Figure 10 shows the average amount (± SE) of water MeHg in different land coverages.

Figure 11 shows the average amount (± SE) of water MeHg in different land coverages.

Figure 12 shows the average amount (± SE) of water MeHg in different land coverages.

RESULTS

All significant differences in the results had p < 0.05. There is a relationship between water MeHg and Odontate MeHg (Figure 5). Ditched peatland is significantly different than the forested; forested is significantly different than wetland, and wetland is significantly different than reservoir. When we look at the average amount of THg in the water, we see that ditched and wetland - and forested and reservoir (Figure 2). Odontate in forested land coverage have higher concentrations of THg in the water than the other two different types (Figure 3). Forested and wetland THg in leaf litter are higher than ditched and ditched peatland sites within different land coverages (Figure 4). Odontate in the ditched peatland have the highest concentrations below THg than forested and wetland land coverages (Figure 5).

DISCUSSION

The data shows the Odontate to water MeHg ratio is consistent with other studies in the region suggesting Hg found in water ends up in the benthos and Hg in benthos is in the upper midsection and support our hypothesis that there are differences in THg between landscape types common for this watershed (Figure 5). The water samples were taken from the ditched peatland land coverages compared to the ditched peatland and reservoir, but not as much as the forested. The water samples are higher in forested and wetland land coverages compared to the ditched peatland and reservoir. This is consistent with the data seen in Figure 4. More research is needed to observe the connection between the THg in leaf litter and water (Figure 4 & 5). Some difficulties we faced were getting enough leaf litter to measure. We had to go back to the stream beds in August through October. Complications were chosen to avoid stream beds in August to prevent flooding. Leaf litter was collected in the most common forest found in all of the land coverages.

FUTURE RESEARCH

- Contaminant research will be performed by testing THg and MeHg concentrations in our remaining Odontate samples. More samples will be collected in the summer and fall seasons of 2018. We will also look at
- Measuring ping pong leaf to determine Odontate larva instar
- install water level data loggers to monitor flow variability
- measure seasonal data to replicate samples for greater statistical strength

ACKNOWLEDGEMENTS

We would like to thank Nathan Johnson from University of Minnesota Duluth for his help with the field work and the Fond du Lac Tribal Environmental Management. Without their help, support, and resources this project would not have been able to reach its full potential.

CITED WORK

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Kowalczak, C., A. Hallfrisch, H. Buttgen, A. Wold, and N. Johnson. "Mercury Bioaccumulation of Odonata in the St. Louis River Watershed." In *Proceedings of the Annual Meeting of the Great Lakes Indian Fish and Game Commission on Indigenous Sustainability*, edited by G. L. Hines, M. L. Hines, and S. L. Hines, 10-12. Duluth, MN: Great Lakes Indian Fish and Game Commission, 2017.

USDA. *USDA: Data for the St. Louis River Watershed*. 2018. <http://www.fslc.usda.gov/stlouis/>.

Research Objectives

1. Provide research data to Fond du Lac Reservation's Resources Management division that will help monitor mercury in the St. Louis River Watershed.
 2. Give college students a hands-on opportunity to increase their skills, knowledge, and confidence in environmental science by conducting, analyzing, and reporting back on research that is critically important to the tribe.
 3. Create connections between students and Fond du Lac Resource Management researchers

Partners

- Fond du Lac Resources Management Air Quality and Water Divisions
 - UMD Civil Engineering Department
 - USDA Tribal Research



Campus Sustainability

The Sustainability project transforms FDLTCC into a space that supports our educational efforts on sustainability. By managing our campus to support sustainability we impact our students and greater community by providing hands-on opportunities to learn about agricultural, natural resources, and alternative energy issues, opportunities, and skills.

As a Tribal College, our mission encompasses the vision of sustainability as we seek to become more conscientious stewards of resources while promoting the language, culture, and history of the Anishinaabeg.

Sustainable development is a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present but also in the future. Fond du Lac Tribal & Community College faculty, staff, and students implement changes on our campus that increase the ability of our college to be a leader in sustainability.



Sustainability Starts with You

Fond du Lac Tribal & Community College Earth Week Daily Theme's included:

- Taking care of yourself
- Reconnecting with traditional values
- Water appreciation, which included the “run for Water” 2K run on campus in collaboration with nursing students for fitness and health
- Fitness and health
- Student research presentations
- Art mural and birch bark expressions
- Spreading awareness on climate change

Indigenous Visionaries: Native Women Leadership Fellowship

The goal of the Fellowship is to support Native women leaders who have a foundation in Indigenous knowledge, culture, and history, and who will bring visionary leadership to Native communities in the future. Kayla Jackson (left) and Arianna Northbird (right) implemented the goals of the fellowship with two projects on sustainability.



Twin Ports Collegiate
Sustainability Network
(TP-CSN)

As a result of the Native Women Leadership Fellowship, the Twin Ports-Collegiate Sustainability Network was expanded from 5 to 9 colleges and met quarterly to share insight and network with one another on projects such as STEM and sustainability in a student led environment.

VISTA Partnership

The **AmeriCorps VISTA (Volunteer in Service to America)** at Fond du Lac Tribal College Extension funded by the American Indian Higher Education Consortium (AIHEC) supports the Fond du Lac Band Food Sovereignty Initiative.

The role of the VISTA member is to focus on food sovereignty for encouraging a community that is resilient to natural resource vulnerabilities and risks.

Goals of the VISTA program at Fond du Lac include:

- Researching and writing an agricultural resource management plan.
- Demonstrating a long-term commitment to food initiatives.
- Providing outreach to the Fond du Lac and larger community.
- And in general building capacity for programming for a project with at least a 3-year vision.

Past VISTA members have supported the work of the Coordinator and Farm Manager at the Bimaaji'idiwin Garden and future home of the Agricultural Learning Center.



**Thomas
Zurek
(left)
2018-19
VISTA
member**



Past Environmental Institute Programs

- Climate Change Resiliency – *MN Sea Grant*
- Fond du Lac Outdoor Environmental Club – *Boulder Lake- Northland Foundation*
- BioChar-*USDA AFRI*
- Farm to School – *USDA 2501*
- Dragonfly Research Project – *EPA EcoAmbassadors*

Outreach Programs & Partnerships

- Jay Cooke State Park
- Taking Care of Things Gathering
- College for Seniors
- Adopt a Beach – Conservation Days
- Fond du Lac Diabetes Prevention Program
- Twin Ports College Sustainability Network
- Robert Wood Johnson Foundation
- MN Food Charter
- Superior Citizen Science





The Environmental Institute is dedicated to providing the education, skills, and research that will help our communities connect with Ojibwe culture, our natural resources, and knowledge on living a sustainable lifestyle.

Environmental Institute Catalyst for Change

The Environmental Institute is determined to be a catalyst for positive change in our community. Our programming concentrates on:

- Sustainable Food
- Sustainable Natural Resources
- Encourage students interest in Science Technology Engineering & Math (STEM)
- Connection with Ojibwe culture
- Community outreach

Upcoming Workshops

- Manoomin (wild rice) Camp
- Seasonal Decorations using Natural Resources
- Seed Saving and Food Preservation
- 13 Moons Pow Wow
- 4th Annual Bee Symposium
- Sugar Bush
- Ag Business Planning
- FDLTCC Earth Week



Contact us!

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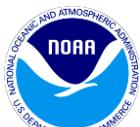
Website: <http://fdltcc.edu/academics/outreach-programs/environmental-institute/>

Facebook: <https://www.facebook.com/Environmental-Institute-at-Fond-du-Lac-Tribal-and-Community-College-278478008887826/>

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Fond du Lac  Tribal & Community College