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More than the Sum of its Parts: Understory Plants as Indicators of Forest Health

By Chelsey Baranczyk,
Natural Resources Biologist - Botany /Wetlands



Braun's holly fern (*Polystichum braunii*), a Wisconsin-threatened plant with a c-value of 10, requires a very specific habitat of cool, rocky drainages in order to survive.

When you walk into a healthy forest, you can often distinguish between multiple forest layers that include the tree canopy, mid-story consisting of younger trees, a shrub layer, an herbaceous layer of non-woody vegetation, and lastly the leaf litter. These forest layers perform a variety of ecological functions, including providing food

and habitat for wildlife along with resources for human use, regulating light and water movement within the forest, and enriching the soil through natural decomposition processes. However, most monitoring is only conducted on the canopy level, leaving knowledge about the herbaceous understory plants relatively unknown.

Plants, just like people, have a preference for where they like to live. However, unlike humans, they aren't able to quickly pick up and move when the habitat becomes degraded or undesirable. That's why when forests are struggling from disturbances such as encroachment due to human development, wildfires, timber management, heavy

wildlife browsing, or invasion of non-native plants, insects, or earthworms, the understory plant species are often the first indication that something is wrong. When you step into a forest, the understory should be lush with multiple fern species, shrubs, sedges and grasses, and depending on the time of year, flowering plants. When forests start experiencing stress or degradation, their ability to support diverse and valuable plant species, and subsequently wildlife species, begins to decline. This, in turn, could have a domino effect on the critical ecosystem processes of the forest.

Exactly how can we use plant species as a measure of forest quality? Well, every single plant species is given a specific numeric ranking, a Coefficient of Conservatism (C-value), which is determined by

the ability of the plant to survive in specific habitats or respond to disturbance. A C-value of 1 indicates that the plant is a habitat generalist and can grow just about anywhere. Many of these species are classified by homeowners as weeds and are very resilient to disturbance. Whereas plants with C-values of 9 or 10 require more specialized habitats and may have higher quality habitat requirements in order to survive and reproduce, such as many orchid species. If a species is given a value of 0, that implies that it is not native to this area and may be considered a threat to the integrity of the forest.

A botanist can use these values along with other variables to assign a Floristic Quality Index (FQI) value to a site. The higher the FQI value of a site, the higher vegetative quality the site is considered, indicating the site is capable of maintaining well-balanced ecosystem processes. Measuring an FQI of a forest over multiple years can serve as a reference for determining how well the forest is responding to natural and human disturbances.

While the Forestry Department has been collecting tree data on FCPC's land for multiple years, the forest understory species are just beginning to be monitored by the Natural Resources Department. Permanent vegetation

monitoring plots are being established in various forest community types to allow thorough inventory and assessment of the herbaceous plant communities on Tribal land. If you come across orange pipes in the ground while in the woods that have labeling and ribbon on them, please do not disturb them. These are the permanent monitoring plots that will be used to collect several years of understory plant data.

What information can we glean from long-term studying of understory plant species?

- The relative diversity, spatial arrangement, and abundance of native and introduced plant species;
- Vulnerability of a forested ecosystem to disturbance, along with the ability of an ecosystem to recover following disturbance;
- Forest vegetation trends over time; and
- Likelihood of supporting habitat and food for vulnerable wildlife species.

Many factors influence the health of a forest, and both the canopy and understory plant species are highly correlated with ecosystem properties such as productivity, response to disturbance, and use by wildlife. Our long-term objective is to manage forests

so they are able to regenerate and sustain optimum ecosystem processes. The more we know about the forests on Tribal lands, the better equipped we are to manage them for subsistence and enjoyment by wildlife and people for many years to come.

Celeste Schuppler, the NRD Education and Monitoring Technician, assessing vegetation at one of the permanent vegetation monitoring plots.



BODWÉWADMI KTĚGAN

Quieting Down

After a very busy season at the farm, things are a little quieter now. The plants have gone to sleep under a blanket of snow. The staff, however, are still

busy taking care of animals and preparing for next spring. They did take a moment to share some of their favorite photos from the farm's first year.



Summer Campers Recycle Plastic Bottles into Greenhouse

*By Jenni Mabrier,
Environmental Education Coordinator*

During the six weeks of camp this summer our campers worked hard, using nearly 3,000 bottles to build a greenhouse. Natural Resources will be using this new greenhouse this spring to start vegetable and herb seeds for the garden at Gte Ga Nēs Preschool and Rising Sun Daycare. A huge migwétth to our campers for all

their hard work and to Nitty, Tony, and Philip over at Solid Waste and our SYE – Brevin, Israel, Daniel and Isaiah. Solid Waste saved all these bottles for the kids, making the whole project possible, and our SYE took on the daunting task of removing the label and bottom on all the bottles!

Campers strung rows of bottles onto 2x4-foot frames to make the greenhouse walls.



Home-Energy Audit

By Michelle Berdan, Capital & Community Project Coordinator

Recently, the tribe was awarded funding from the Department of Energy in order to conduct the First Steps project. This project will allow the tribe to gather energy usage data and conduct home-energy audits for tribal homes located on reservation land.

Two informational community meetings were held on Oct. 23, 2017, in Stone Lake and Oct. 26, 2017, in Carter. The meetings were an opportunity for Tribal members to learn more information

about home-energy audits, view a demonstration of the blower door test, sign-up to participate and ask questions.

Receive up to
\$375

toward implementation
of the audit findings



ATTENTION

FCPC TRIBAL HOMEOWNERS WHO LIVE ON THE RESERVATION

Are you interested in lowering your utility bills and using less energy?

An energy audit shows where energy is wasted and identifies ways to make your home more efficient, lower your energy usage and reduce your utility bills.

Contact us to find out more information about how to sign-up for a FREE home-energy audit!

Contact: Krushna Patil @ (715) 478-4155 or Michelle Berdan @ (715) 478-4944.

This project is funded through an awarded grant from the Department of Energy (DOE). The grant limits this opportunity to FCPC tribal homeowners residing on the reservation.

Solar Panels Expected to Save FCPC up to \$1.9 Million



FCPC SOLAR PANEL LOCATIONS

- Milwaukee Casino
- Recreation Building
- Solid Waste Building
- Utilities Building
- Emergency Management
- Land & Natural Resources Building
- Caring Place
- Rising Sun Daycare
- Gte Ga Nēs Preschool
- Property Management
- Air Monitoring Site
- AODA Building
- Museum
- Ordinance Building
- Stone Lake C-Store

Beginning in 2015, with the assistance of the Department of Energy grant funding, the tribe was able to focus on one of its long-term goals of becoming energy independent using renewable energy. This led to the installation of ground- and roof-mounted solar panels at 14 FCPC government facilities and the Milwaukee Casino.

Recently, the tribe received notification of a \$1 million grant award from the Department of

Energy for the deployment of community-scale solar energy systems in the Forest County Potawatomi Community. With this award, the tribe is investigating sites that will result in maximum-power

generation advancing the tribe's long-term goal of energy independence.

If you would like more information on any of the FCPC energy projects, please contact Krushna Patil, FCPC Energy

Specialist, at (715) 478-4155, or stop in at the Land & Natural Resources Building located at 5320 Wensaut Lane, Crandon.

From 2015 to September 2017

- ✓ The solar panels have produced 2,473,597 kWh of electricity.
- ✓ Provided savings of over \$225,000 in utility costs.
- ✓ At this rate, the Tribe's investment in the project will be paid back within the next 3 years.
- ✓ 1522 metric tons of carbon dioxide emissions have been avoided.
- ✓ Over their 25-year life span, the Tribe should save approximately \$1.9 million in utility costs based on current utility rates and efficiency.

Transit Bus Service Revised Routes

By Mary Jo Bocek,
Fleet Administrative Assistant

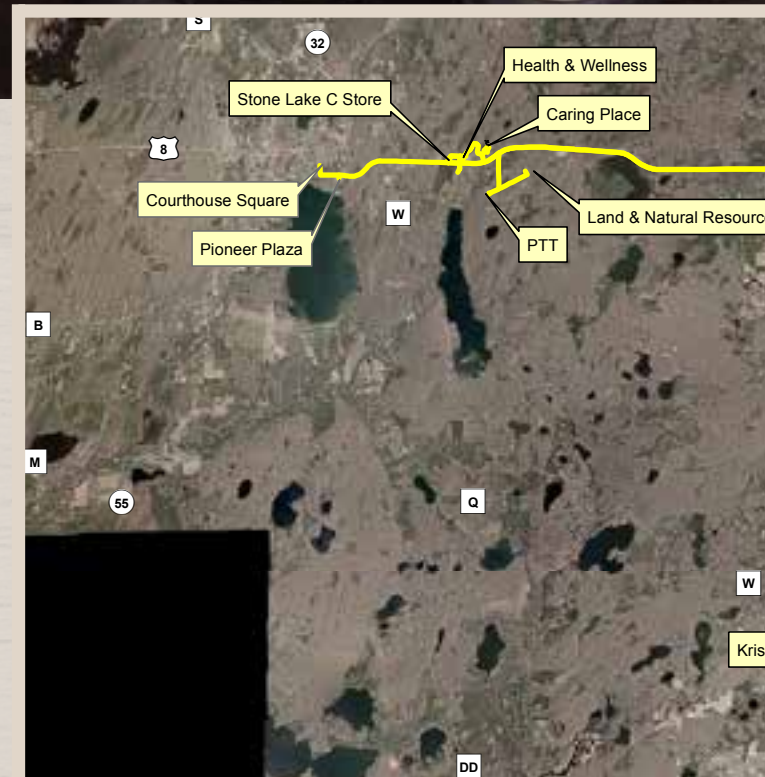
The FCP Transit Bus Service 120-day pilot program has come to an end. With the data that was collected, surveys that we received back and community member feedback, we have revised the routes and schedules to try to accommodate more individuals with their transportation needs.

The new route/schedule contains a work route and loops through the FCP communities and surrounding areas Monday-Thursday.

The new routes/schedule began on Nov. 6, 2017, and will run for a 90-day trial ending Jan. 31, 2018. At that time, the data that is collected will be reviewed and changes will be made if necessary.

If you or someone you know needs help with their transportation needs, please check out the Transit Bus Service as an option.

Visit transit.fcpotawatomi.com for routes and schedules, fare information, and a real-time bus tracker.





WORK ROUTE

CARTER TO STONE LAKE

6:30-6:55am Arrival
5-5:25pm Drop Off

MONDAY-THURSDAY

Carter C-Store

6am 5:50pm

Carter Casino

6:05am 5:45pm

Wabeno Krist Oil

6:10am 5:40pm

Laona Double Bucks Café

6:25am 5:25pm

Stone Lake LNR/Gte Ga Nes Area

6:40am 5:15pm

Stone Lake Caring Place/Housing

6:45am 5:10pm

Stone Lake Executive Building

6:50am 5:05pm

Stone Lake Health & Wellness

6:55am 5pm

CRANDON TO STONE LAKE

6:30-6:55am Arrival
5-5:25pm Drop Off

MONDAY-THURSDAY

Crandon Courthouse Square (E. Polk St.)

6:30am 5:25pm

Stone Lake Health & Wellness

6:40am 5:15pm

Stone Lake Executive Building

6:50am 5:05pm

Stone Lake Caring Place/Housing

6:55am 5pm

DAILY ROUTES CARTER TO CRANDON

MONDAY-THURSDAY

Carter C-Store	9:45am	11:45am	1:45pm
Carter Casino	9:50am	11:50am	1:50pm
Carter - Shiner Lake Rd/Old 32	9:55am	11:55am	1:55pm
Carter-Industrial/ Good Heart Ln.	10am	12pm	2pm
Carter-Sugarbush/ Eagle Ln.	10am	12pm	2pm
Wabeno Krist Oil	10:05am	12:05pm	2:05pm
Laona - Double Buck Café	10:20am	12:20pm	2:20pm
Stone Lake Caring Place/ Housing	10:35am	12:35pm	2:35pm
Stone Lake Everybody's Rd.	10:35am	12:35pm	2:35pm
Stone Lake Health & Wellness	10:40am	12:40pm	2:40pm
Stone Lake C-Store	10:45am	12:45pm	2:45pm
Stone Lake Young's Lane	10:50am	12:50pm	2:50pm
Stone Lake Traveling Times	10:55am	12:55pm	2:55pm
Stone Lake LNR/Gte Ga Nē's	11am	1pm	3pm
Crandon Pioneer Plaza	11:05am	1:05pm	3:05pm
Crandon Courthouse Square (E. Polk St.)	11:10am	1:10pm	3:10pm

DAILY ROUTES CRANDON TO CARTER

MONDAY-THURSDAY

Courthouse Square (E. Polk St.)	9am	11am	1pm
Stone Lake Health & Wellness	9:15am	11:15am	1:15pm
Laona Double Buck Café	9:25am	11:25am	1:25pm
Wabeno Krist Oil	9:40am	11:40am	1:40pm
Carter C-Store	9:45am	11:45am	1:45pm
Carter Casino	9:50am	11:50am	1:50pm

Emerald Ash Borer

*By Adam Bontje, Forester, and
Jenni Mabrier, Environmental Education Coordinator*

It's hard to believe a tiny green beetle could cause so much trouble. Emerald Ash Borer (EAB) is a wood-eating insect native to eastern Asia. About 15-20 years ago it hitched a ride to North America, probably in a wooden shipping container. Once here, it started munching on its favorite food – ash trees. The trees were caught completely off-guard and were defenseless against this beetle. In areas with EAB, the beetles are wiping out our ash trees.

Adult beetles lay their eggs on an ash tree. After hatching, the larvae tunnel into the inner layers of the bark. This area (the cambial region) is where the tree's food, water, and waste are carried around the tree. The larvae eat tunnels all along the cambial region until they are ready to become an adult. This interrupts the tree's nutrient transportation, and the tree essentially starves.

Once in an area, emerald ash borer usually kills all the ash trees in the surrounding area in eight to 12 years if left untreated. After that, the beetles will

either die off because there are no more ash trees to eat, or they will move to a new area that has ash trees. In preparation, FCPC Forestry and Natural Resources staff have been collecting and saving ash seeds.

FCPC has also been checking for emerald ash borer on tribal lands, but so far none have been found. EAB was found and quarantined in Oneida County near Rhineland in late 2014. This makes it highly likely that they will come to Forest County. It is hard to predict when EAB will arrive here – it usually takes several years before the trees start to show symptoms of EAB



Larvae of the emerald ash borer eat away at an ash tree's living tissue under the bark, killing the tree.



An adult emerald ash borer found in firewood.
Photo courtesy of California Department of Fish and Game

infestation. EAB could arrive in our area as soon as two to five years but could take as long as 10 years. Or they could already be here. Either way, we'll keep monitoring the forest and working to maintain the health and integrity of this resource for the community.

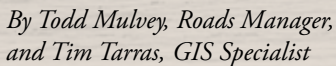


Photo courtesy of Howard Russell, Michigan State University, Bugwood.org



FCPC staff checking an emerald ash borer trap. So far no EAB have been found on FCPC lands.

New Lots Available in Blackwell



1



skid steer, dump trucks, end loader, log truck, and grader. A rented compactor was also used.

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Fish Survives Trip to Mercury

*By Ben Koski, Natural Resources Biologist -
Aquatic Sciences*



FCPC Natural Resources staff collect tissue samples from fish using non-lethal methods to test for methylmercury.

We've all heard of flying fish, if not fictitiously, then perhaps, maybe for real. But don't think that because some fish can fly, means that they can soar to astronomical heights. No, not the planet Mercury. And no, your fish fillet won't have a silvery mirror-like sheen from a spacesuit or even from the metal mercury. It's more elementary than that.

The element "mercury" in one of its organic forms (methylmercury) is a

compound that does not dissolve readily in water and can accumulate in surface waters like lakes. Living organisms in the lakes can build up mercury in their bodies over time. Organisms that live longer, are larger, and higher up in the food chain can accumulate greater levels of mercury in their bodies by the process of bioaccumulation.

Bioaccumulation is sort of like the following scenario: A peanut-butter cookie is

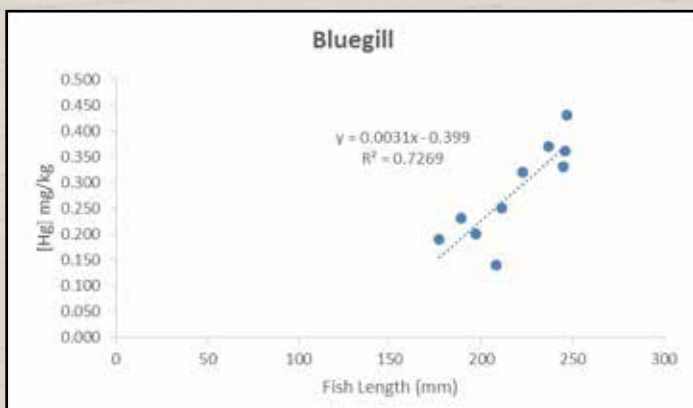
eaten by a chicken. You decide to eat the chicken, but you like to eat chicken 'n waffles covered in peanut butter. A tyrannosaurus rex decides to eat you, but she, too, likes to enjoy her meal with that sweet, slightly salty, nutty crunch of the world's #1 kid-friendly sandwich spread. OK, it's not really like that, but by the time T-rex eats you, she'll have consumed peanut butter on every level, all the way down to that delicious

peanut-butter cookie. Now that you're hungry for more science, let's agree that mercury accumulates in lakes and in higher level organisms like fish. "Well, that is terrible news if I'm hungry for fish and chips!" I would agree.

Fortunately, there is a process to test for how much mercury is in fish tissue, and if the fish from a certain lake is safe to eat. This process typically involves catching a fish, euthanizing it in the



6 mm sterile biopsy punch is carefully inserted into the muscle of the fish and removed with slight sideways pressure (see photo on page 12). The plug of tissue is then placed in a numbered vile that corresponds to the unique fish ID on the data sheet. Afterwards, a fish-specific antiseptic ointment is used to cover the small wound on the fish. The fish is then released back to the lake to swim another day (photo, this page). The vials of fish tissue are then placed on ice and sent to a qualified laboratory for mercury testing.



An example of linear regression using Fish Length (mm) against the concentration of mercury [Hg] in fish tissue (mg/kg).

mercury. Instead of using whole fish fillets, we now just use small pieces of fish muscle to test for mercury.

Back in 2014, the Tribe successfully sampled nearly 200 fish of different species and sizes to get an accurate idea of what mercury levels were like in fish from those waters. Results are available at the NRD office, simply ask for the “2014 Mercury in Fish Tissue Brochure.”

Fish are captured using trap nets or electrofishing equipment and held in a well-oxygenated tank for processing. Lengths and weights are recorded for each fish, and a few scales are saved for aging. Each fish is given a unique ID number that corresponds to the mercury testing process. The next step is to remove scales from the dorsal (top) side of the fish where the tissue will be taken. Then, a

Results are broken down by species. Linear regression is used to determine if there is a relationship between fish size and the concentration of mercury in the tissue (Figure 1). A positive relationship would mean that larger fish have more mercury in their tissue. One could expect this result from a large predatory fish that eats all other fish, but would we expect the same from a peanut-butter-loving dinosaur?

In 2018, the FCPC NRD will once again, be sampling fish for the presence of mercury from Tribal lakes. If you catch a fish with a small dimple on its dorsal, it may have been from a hungry heron, or just a hungry biologist, and most likely not from a small asteroid.

name of food safety, and shipping the entire fillet to a laboratory for testing, along with a note that reads, “Should’a been here yesterday, fish was amazing! Today’s dead, see.”

So by now, you’re hungry, and angry about our fish not making it to Mars, (“or was it Mercury?”) and that makes you hangry, but we’re getting there. Recent advances in analytical testing

have allowed us to get more accurate results for analytes like mercury, all the while using smaller amounts of sample (fish tissue in our case). What that means is that we can, and have, used non-lethal methods of collecting fish tissue from our finned friends to better understand what fish is safe to eat, and what fish we might need to avoid due to the bio accumulation of

Wildlife Work Changes with Seasons but Doesn't Slow Down

By Olivia Stanga,
Senior Natural Resources Technician



Martens are rarely seen, but their footprints in fresh snow let us know we share the woods with them.



Eagles are frequent winter visitors to our trail cameras.

As the seasons change, the activities of wildlife change, too. Some animals migrate to warmer climates, some animals hibernate until spring, and other animals adapt to live through harsh winter conditions.

While some creatures seem to disappear temporarily, there are a few that the Natural Resources Department likes to keep tabs on throughout the cold months.

During the cool fall days,

whitetail deer are actively moving around. This gives the Natural Resources Department good opportunities to track the health of the deer populations. One way we do this

is by setting up trail cameras at random locations throughout the land. Once every few weeks the department staff checks the pictures the cameras capture, which helps us figure out how many bucks, does, and fawns are living around us.

Another way we study whitetail deer is to perform spotlight surveys at dusk. Many animals' eyes produce an "eye

shine" at night when flashed with light. By shining our spotlights in the dark woods, we are able to get a count of how many deer are inhabiting those spaces. The number of deer that move through or live on the land depends on a handful of influences, including food supply, tree cover, and disturbances from prey animals or humans. Whitetail deer are highly adaptable species and thrive in a variety of habitats, although usually prefer quiet, undisturbed forested areas with access to wide-open grassy fields to find food.

After the whitetail deer studies start to slow down, the department starts gearing up for other surveys. We are currently preparing for some of our winter studies. There are many wildlife still active during the cold, snowy stretch besides whitetail deer. These animals include hawks, eagles,

wolves, foxes, coyotes, otters, fishers, weasels, bobcats, and even a variety of songbirds like woodpeckers and finches.

Within a few weeks, the department staff will be fully-trained to carry out winter tracking surveys. Winter tracking surveys are conducted after a fresh snowfall, typically in the early morning hours. From paw prints to hoof prints, tracks are measured and identified. This will give us the opportunity to see what kinds of animals are moving through, even if we can't actually see the animals themselves!

Trail cameras are strategically-placed by department staff throughout the lands during the winter months as well. Appetizing meat is left out for the wildlife under a camera, but little do they know they are getting their photo taken. In the past, trail cameras have taken photos of golden eagles, bobcats, fishers, and more. This year, we are hoping for good photo sets of a variety of different species. The amounts and types of wildlife that live in these areas can be a good way to determine forest health.

The Natural Resources Department is interested in finding out just what exactly we have living on Potawatomi lands. We are active all year 'round, just like some of the animals you may get to see this winter!

Welcome to THPO Staff



Bozho! My name is Allison Daniels. I have worked for FCPC's Tribal Historic Preservation Office for about a year now.

Greetings to all community members!

With the close of the last fiscal year behind us, the Tribal Historic Preservation Office (THPO) wanted to take a few moments of your time to share some of our office's achievements over the past year. For those of you that do not know our office has two main responsibilities – the identification and protection of cultural resources on tribal lands and commenting on federally-funded or licensed projects within the tribe's ancestral territories. The office also refilled the THPO Administrative Assistant position hiring Mrs. Allison Daniels in January of 2017 (see above).

This past field season, with assistance from other Land and Natural Resources staff, the THPO conducted archaeological surveys on 722 acres of tribal lands for various proposed tribal projects. These surveys consist of surface inspection of the project area at set intervals to identify previously unknown or undocumented cultural sites. While the Forestry Department tends to represent the largest amount of acreage of survey for the THPO, projects driven by other departments such as Housing, Construction, Natural Resources, and Utilities also play a role. Early survey and identification gives the project planner the chance to

The main objective of my job, in my eyes, is preserving and protecting Forest County Potawatomi's tribal and aboriginal lands, and its history for the future generations. Coming into my job position I was tasked with performing Section 106 duties which is consulting on projects using federal monies that impact land. Section 106 gives tribes the right to comment on any impact these projects may have on cultural resources pertaining to the Forest County Potawatomi Tribe. Currently, I work with three federal agencies; two of them being the Federal Communications Commission (FCC) and Housing and Urban Development (HUD) which is monitoring 137 counties in five different states. The last agency being Indiana DOT which includes 45 counties within Indiana.

modify their project to avoid or minimize the impact to the tribe's cultural sites. Six previously undocumented archaeological sites were identified as a result of this year's work. Any information about these sensitive sites is kept highly confidential and secured.

The responsibility of THPO is to comment on federally-funded or licensed projects stems from the THPO agreement the Tribe has with the National Park Service under Section 101 and 106 of the National Historic Preservation Act (1966 as amended). This duty resulted in comments being made on 1,419 projects within the Tribe's ancestral territories. These comment letters allow the tribe an opportunity to have a role in the planning and effect each project will have on both known and unknown cultural sites which are outside of the tribe's direct control. Last year's work resulted in the tribe signing onto two programmatic agreements (PA), two memorandum of agreements (MOA) which were project or process specific, and three memoranda of understanding (MOU) that established consultation procedures with the Department of Transportation of three states under the Federal Highway Administration.

Although the program has been around since 2010, there is still much work to be

Along with these Section 106 duties I have been assigned, I have gone forward with the re-establishment of FCPC's Cultural and Historic Preservation Review Board. Although it has a different name, this board will act in many of the same ways as a committee. Board members will be helping the Tribal Historic Preservation Office conduct our work on Tribal Lands in a culturally-appropriate fashion. I am definitely looking forward to the re-establishment of this board and the chance to directly involve FCP Tribal members in our work. If you have any questions or concerns, please feel free to contact me at (715) 478-4704 or feel free to stop in at the Land and Natural Resources Department and see me.



done in building a program that will best serve the needs of the community. I would like to personally thank those of you that have come forward and entrusted us with information regarding cultural resources that we need to be watchful of. If you have any concerns about our work or would like to share any information with our staff, please feel free to contact us at (715) 478-7354, or email us at Michael.LaRonge@FCPotawatomi-nsn.gov. Thank you and safe travels.

— Mike LaRonge, Tribal Historic Preservation Officer



FOREST COUNTY POTAWATOMI
**LAND & NATURAL
RESOURCES DIVISION**
PO Box 340 • Crandon, WI 54520

CONTACTS/EVENTS



FOREST COUNTY POTAWATOMI
**LAND & NATURAL
RESOURCES DIVISION**

LNR CONTACTS

Division Administrator	(715) 478-4192
Fleet	(715) 478-7390
Forestry	(715) 478-4975
Land Information/GIS	(715) 478-4988
Natural Resources	(715) 478-7222
Roads	(715) 478-7390
Utilities	(715) 478-7214

UPCOMING EVENTS

SATURDAY		
JANUARY	20	Bug Lake Fisheree Bug Lake 9 a.m. - 3 p.m.
FEBRUARY	24	Devil's Lake Fisheree & Snowshoeing Devil's Lake 9 a.m. - 3 p.m.
THURSDAY		
APRIL	19	Earth Day Stone Lake C-Store 9 a.m. - 3 p.m.

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