

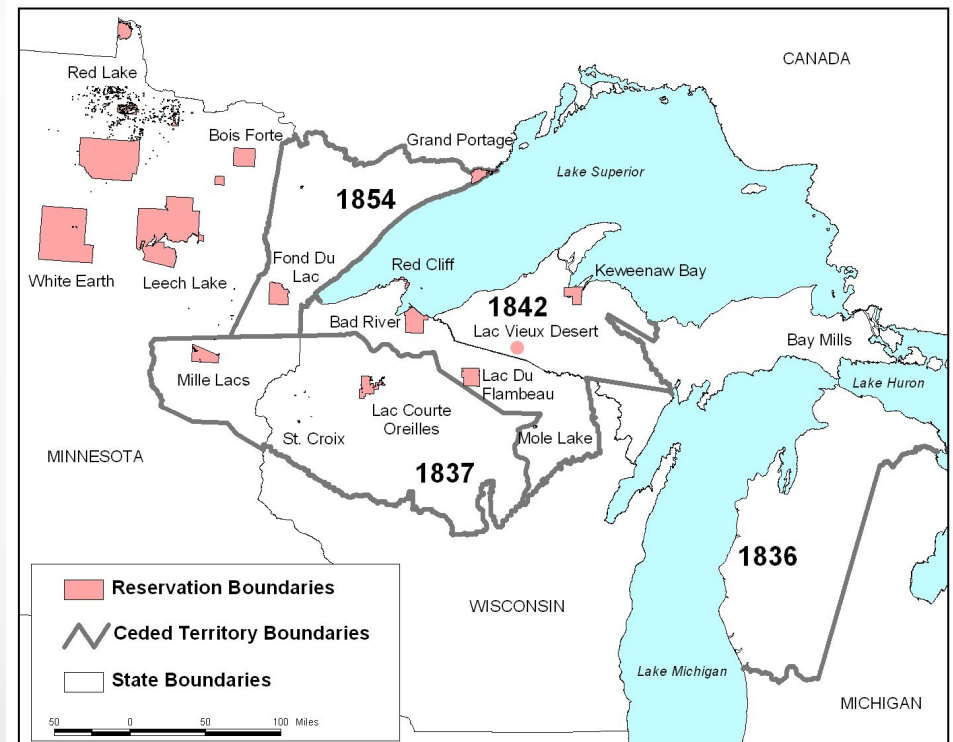
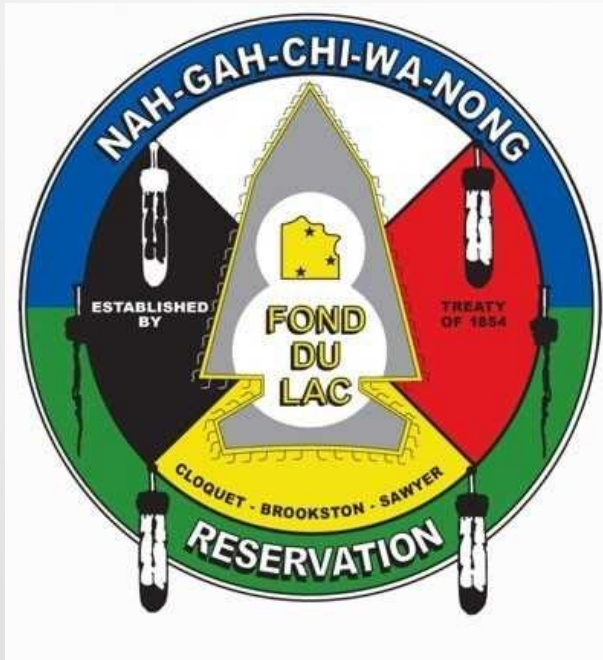
One Tribe's response to combat the threats of emerald ash borer and climate change to forested swamps around wild rice lakes

-Presented by Alex Mehne-

- Forest Manager at Fond du Lac Reservation

Background: Fond du Lac Reservation

- Ojibwe Name: Nagaajiwanaang
 - English Translation: ‘Where the Water Stops’
- Located just west of Duluth
- Established via 1854 treaty of LaPointe as sovereign Ojibwe Nation
- Currently has >4,200 members



Background: Climate Change

- Forecasted increase of 2 to 2.5°C in latest IPCC report assumes large reductions in carbon emissions
- High emissions are upwards of 5-7°C
- 2-2.5°C Puts Reservation at climate similar to what has historically been in Dubuque, IA, 5-7°C corresponds to east-central Missouri
- Driven by Carbon Emissions, leading to Carbon Credit Market
- Is predicted to affect several culturally important tree species at Fond du Lac, particularly Birch and Boreal Swamp Conifers

Background: Emerald Ash Borer

- Native to Eastern Asia, introduced to Europe and North America, ash species vary in their susceptibility
- Tribe has concerns about environmental effects of Ash species not native to North America
- Many Ash species are not cold hardy to USDA zone 3, but even if they are, can they grow in forested swamps?

Region	Common Name	Latin name	EAB long-term survival
East Asia	Manchurian Ash	<i>F. mandschurica</i>	>99%
	Chinese Ash	<i>F. chinensis</i>	>99%
Eastern North America	White Ash	<i>F. americana</i>	<10%
	Green Ash	<i>F. pennsylvanica</i>	<1%
	Black Ash	<i>F. nigra</i>	<1%
	Blue Ash	<i>F. quadrangulata</i>	About 70%
Europe	European Ash	<i>F. excelsior</i>	<10%
	Manna Ash	<i>F. ornus</i>	<10%

Background: Rice Lakes

“The construction of a judicial ditch, in 1913, known as St. Louis-Carlton County Judicial Ditch #1, reduced the water level of these lakes to such an extent that they have been of practically no use for the breeding of wild fowl since that time. The rice has decreased to such an extent that only a small fraction of the former crop is now obtained in this area.”

-Minnesota Department of Conservation, 1933



- Manoomin (Wild Rice) was historically a staple crop for the Ojibwe and is still harvested today from lakes in the midwest.

Nagaajiwanaang: Forested Wetlands

- Formerly very common around the wild rice lakes
- Currently the wetlands around many of the wild rice lakes have much less tree cover than they used to-
 - Swamp conifers were 37% of presettlement forests
 - vs about 12% of today's forests at Fond du Lac
- Usually dominated by Swamp Conifers, often with significant components of elm, red maple and black ash
- Some dominated by black ash- around 3,000 acres at Fond du Lac Reservation

Nagaajiwanaang: The solution

- EAB-resistant Black Ash are still at least a decade away from being commercially available
- Nurseries currently do not sell Blue Ash
- Fond du Lac did some underplanting of silver maple, hackberry, cedar, red maple, balsam poplar, river birch and swamp white oak
- Planting had decent initial survival, but no growth and low eventual survival- there is a need to improve success
- Foresters rarely plant wetlands due to the high chance of failure

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Nagaajiwanaang Project: How

- Site in need of rehabilitation:
 - Next to highway; excellent road access and easy to monitor success and failures, easy to showcase
 - Hydrological disturbance killed 90% of black ash, 95% of cedar, >99% of all other tree species
 - Formerly NPC WFn64b
 - Within the watershed of two wild rice lakes

Nagaajiwanaang Project: How

- Plant cedar, swamp white oak, river birch and hackberry
 - Cedar was historically more common at Fond du Lac, is utilized by the Ojibwe, long-lived, and can curb the loss of the swamp conifer cover type
 - Swamp White Oak is long lived, provides mast for wildlife and game, and is well adapted to the predicted future climate
 - River Birch could potentially be utilized in a similar fashion to how paper birch is utilized, is well-adapted to the future climate, and can cross with paper birch to potentially create a birch that is both culturally useful and heat-adapted
 - Hackberry has fruits that are utilized by wildlife, and is long-lived and well-adapted to the predicted future climate.
- Use mounding methodology to improve success over past attempts

Nagaajiwanaang Project: How

- Experimental mounding methodology from a study in Michigan involves:
 - making mounds appropriate size (1 gallon of mound mound per foot of tree height)
 - Making mounds out of well-decomposed organic material
 - Planting trees that are 1.5 feet or taller to compete with aggressive vegetation
 - As with other best practices, Deer-tasty species were coned and planting done in spring
- Marshmaster equipment used to build mounds.
- Did not do mounding methodology on south side of highway where the hydrological disturbance was less severe (only 65% ash death, 90% death of all other trees)

Nagaajiwanaang Project: How

- Methodology from
- Mehne, A.C.; Mehne, C.J. 2014. Effects of mounding on planting conifers in wetlands. St. Paul, MN: University of Minnesota, Department of Forest Resources.
<https://hdl.handle.net/11299/170432>. and
- Mehne, A.C.; Mehne, C.J. 2023. Field Observations from Reforesting a Typha-Dominated Conifer Swamp in Southwest Michigan. United States Forest Service, Tree Planters' Notes Volume 66 #1 pg 74-86
- Mortality Table from Mehne, 2014, growth mound effect from Mehne 2014:

Species	Mund	No Mund	p-value	Species/ gt	e. e.	p-value	est 5%	est 95%	N
nwc	11.5%	18.2%	0.30010	nwc/ RGR	0.1722	0.00003	0.093	0.243	125
bf	14.5%	42.9%	0.01332	nwc/ G	12.3825	0.00003	7.303	17.145	125
ws	11.3%	42.1%	0.00669	bf/ RGR	0.0691	0.14576	-0.030	0.166	55
wp	19.2%	38.2%	0.08004	bf/ G	2.5400	0.15985	-1.270	6.985	55
bs*	0.0%	9.5%	0.11750	ws/ RGR	0.0517	0.14778	-0.022	0.145	68
rc*	10.2%	16.1%	0.40680	ws/ G	5.0800	0.15744	-2.540	13.335	68
				wp/ RGR	0.0648	0.01256	0.016	0.128	53
				wp/ G	7.3025	0.00532	2.223	12.700	53

Nagaajiwanaang Project: How to fund

- Wetland Methodology is more expensive (about 2.7x) to implement
- Had to have multiple funding mechanisms
 - NRCS CSP funds
 - Sale of Carbon Credits
 - BIA forest development funds
 - State funds to forest Ash sites
- Fortunate to have access to equipment that is designed to work in wetlands

Nagaajiwanaang Project: Results

- Mounded sight approximate results:

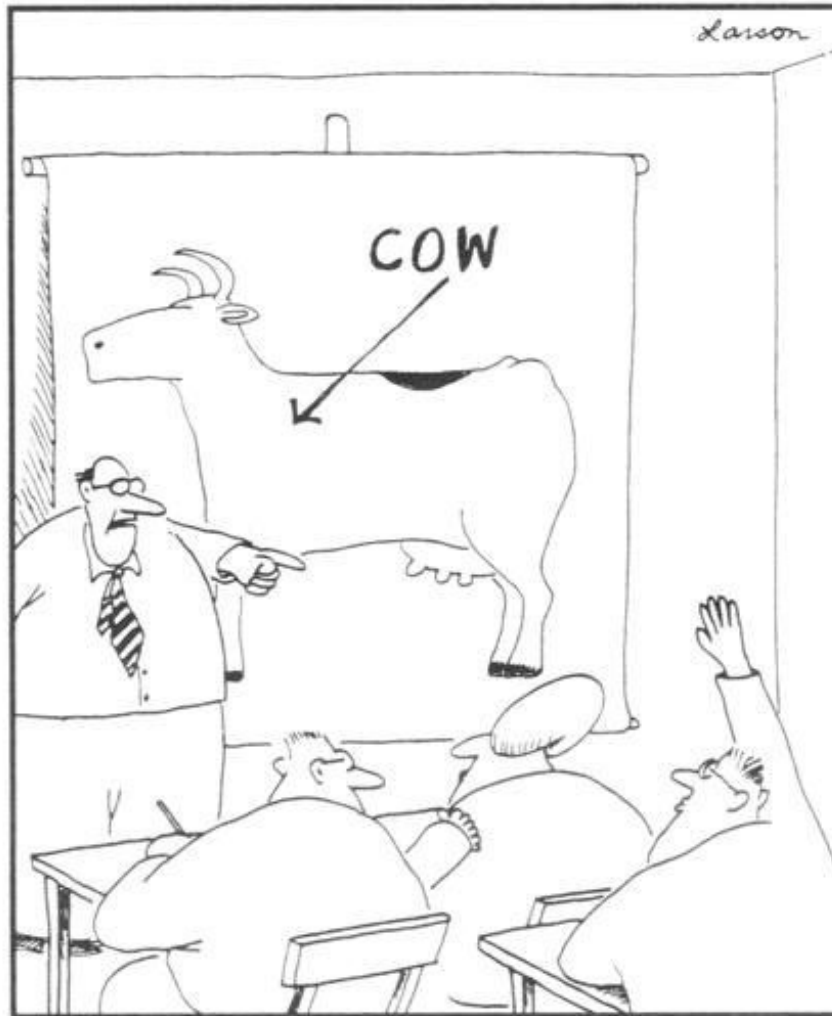
Species	Starting Stock	Approximate Survival	Growth Range (max)	Notes
Cedar	2-2 12"-18"	70%	4"-8" (12")	Faster than it usually grows in nature
River Birch	2-1 18"-30"	60%	3"-16" (24")	Wide variation. Some are already 6' or taller from only two seasons. Some cold damage observed on 20% of trees
Swamp White Oak	2-1 8"-12"	85%	1"-4" (6")	Slow-ish growth for species. Only species with more death the second year than first. Would have preferred larger stock
Hackberry	2-1 12"-18"	10%	0 (-)	The few survivors are severely damaged

- Results so far are preliminary
- Will have better gauge of success around fall of 2024
- Un-mounded site was planted with DNR nursery stock in 2023, so far appears to have a 30% survival, with all observed survivors having severe damage

Nagaajiwanaang: Going forward

- Plan trip to collect Blue ash seeds, hoping for Red Lake Nursery to grow them into trees for later plantings
- Watch for EAB-resistant black ash, both in the woods and nursery markets
- Evaluate planting: look for patterns between where there were more dead trees vs. less. Why did hackberry perform so poorly-even with the mounding?
- So far, Cedar, Swamp white oak, and River Birch may not need any modifications
- Some sites that are not as nutrient-rich may have this methodology applied to black spruce or tamarack
- Eventually, after the fall of 2024 when more results are in, share this experience with media such as the great lakes silviculture library

Questions?



"Yes ... I believe there's a question there in the back."