Knife River Indian Villages North Forest Restoration Project

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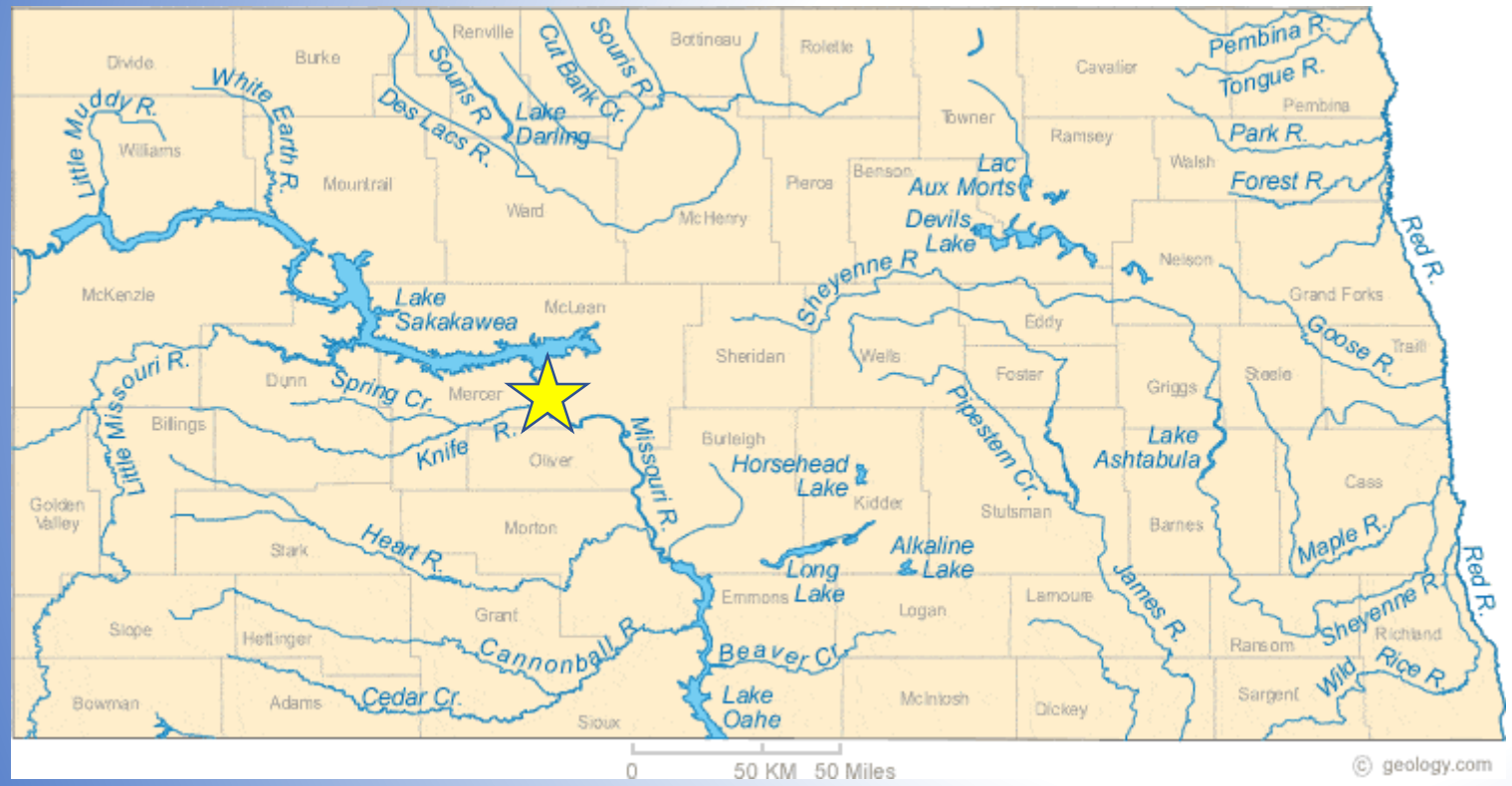
Great Plains Cooperative Ecosystem Studies Unit – Annual Meeting

https://en.wikipedia.org/wiki/Knife_River_Indian_Villages_National_Historic_Site#/media/File:Knife_River_Earthlodge.JPG

Knife River Indian Villages

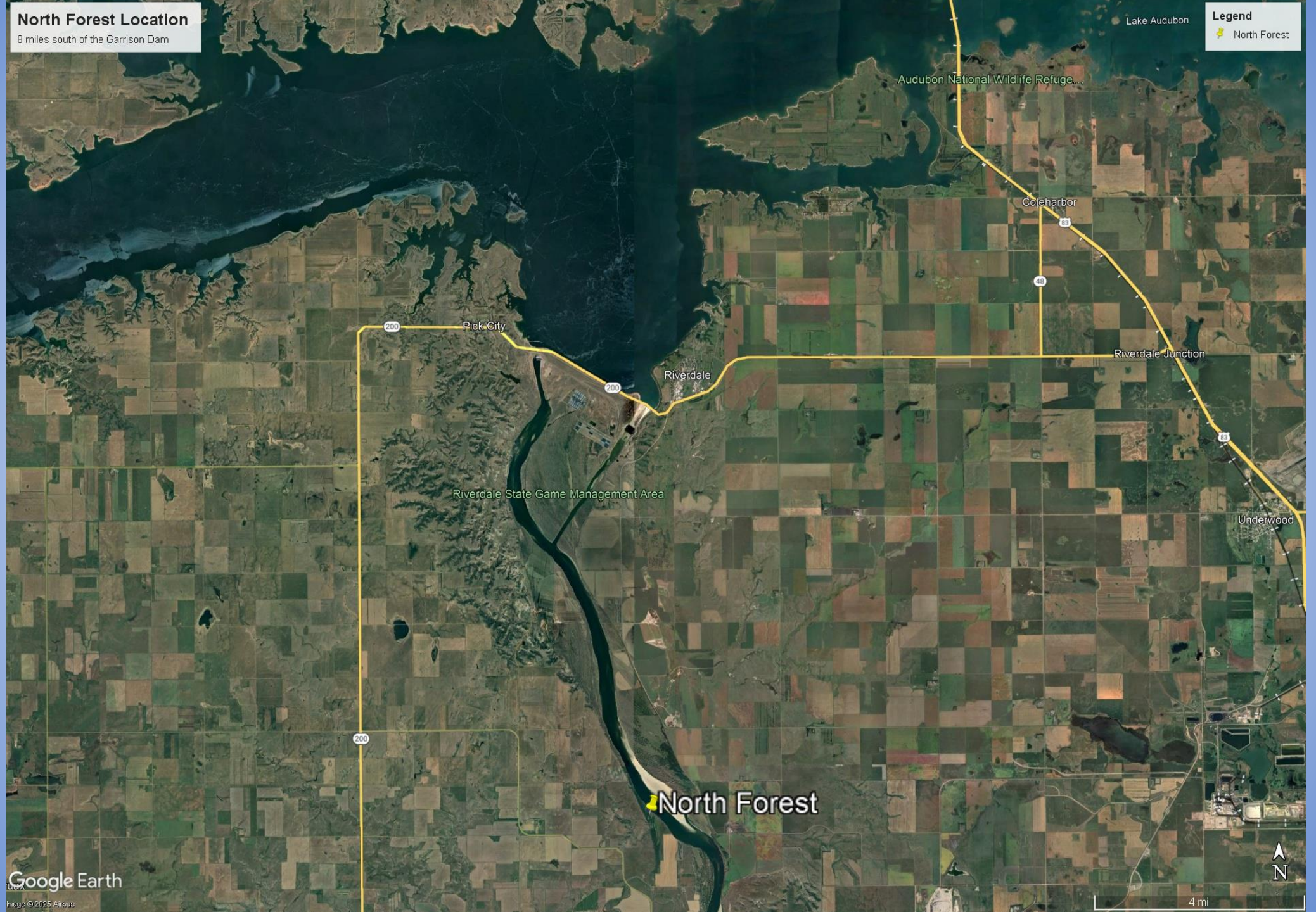


https://geology.com/lakes-rivers-water/north-dakota.shtml

https://home.nps.gov/knri/learn/historyculture/awatixa-village.htm

North Forest

- **200 Acres in Size (Over 2 miles long)**
- **Historic Floodplain of the Missouri River**
- **Mainly Green Ash and Box Elder, has Cottonwood and American Elm too**
- **Minimal Regeneration**
- **Invasive Species**
- **Eventuality of the Emerald Ash Borer**
- **Declining Health of Existing Trees**


North Forest Location
8 miles south of the Garrison Dam
Legend
North Forest
Lake Audubon
Audubon National Wildlife Refuge...
Coleharbor
Pick City
Riverdale
Riverdale Junction
Riverdale State Game Management Area
Underwood
North Forest
Google Earth
Image © 2025 Airbus
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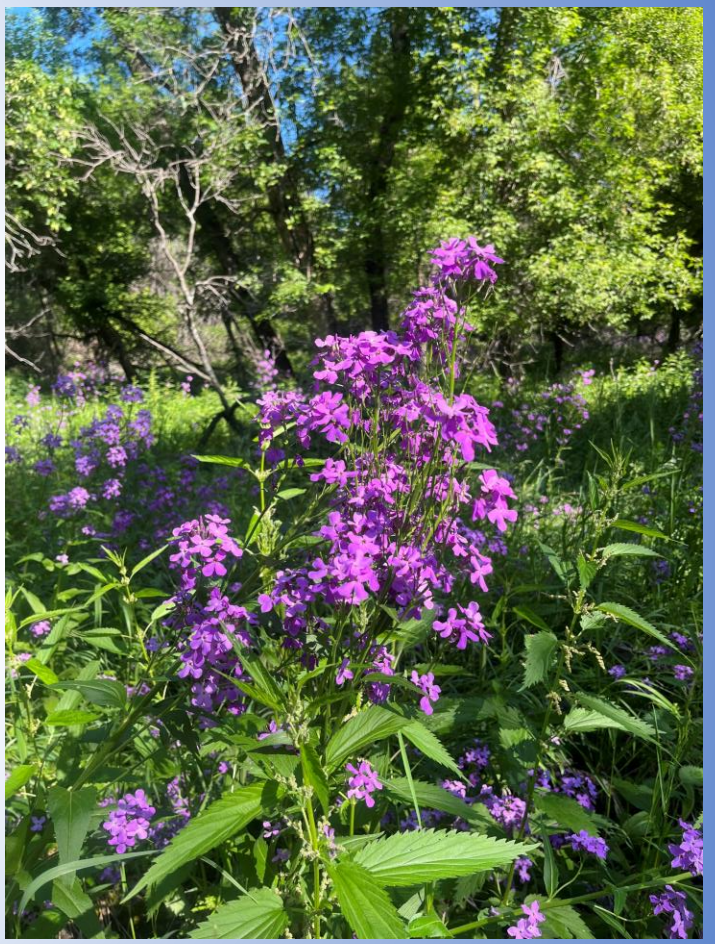
Declining Tree Health

Perenniporia fraxinophila
(Ash Fomes)
Known to cause “trunk rot”

Declining Tree Health

Invasive Species

- **Dame’s Rocket**
- **Smooth Brome**
- **Kentucky bluegrass**
- **Native “weeds”**



Invasive Species

Research Plan

- **Inventory Woodland – Summer 2024**
  - **Herbaceous Understory via Transects and Quadrats (Includes Light Readings)**
  - **Downed Woody Debris via Transects**
  - **Forest Overstory via Large Quadrats**
  - **Tree Ring Analysis via Cookies and Increment Borer**
  - **Tree Health via Transects**
  - **Seedbank Analysis via Transects**
- **Herbicide Trial for Dame's Rocket – Summer 2024**
- **Restoration Trials – Summer 2025**
  - **No Tree Removal, No Debris Removal (Deer Fence/No Deer Fence)**
    - **Control, Tree Planting Only, Glyphosate and Tree Planting**
  - **No Tree Removal, Debris Removal (Deer Fence/No Deer Fence)**
    - **Control, Tree Planting Only, Glyphosate and Tree Planting, Glyphosate and Tree Planting and Understory Seeding**
  - **Clear Cut, Debris Removal (Deer Fence/No Deer Fence)**
    - **Control, Tree Planting Only, Glyphosate and Tree Planting, Glyphosate and Tree Planting and Understory Seeding**

Herbicide Trial

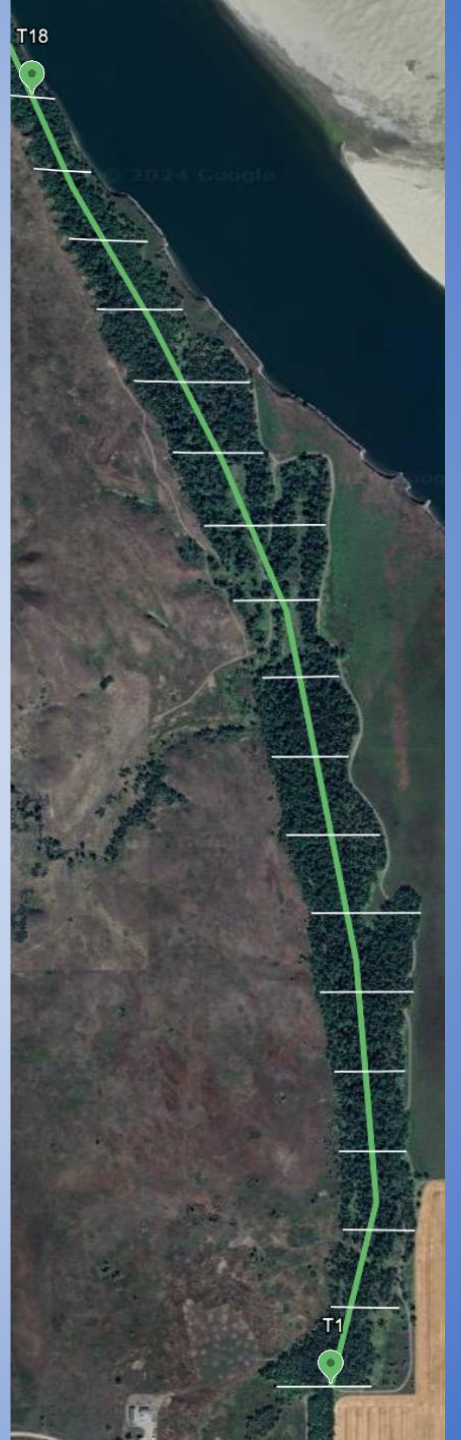
Trt No.	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit	Appl Code	Amt Product to Measure	Rep 1	2	3
A1 1, 2	UNTREATED (CONTROL)								101, 102	205, 206	317, 318
A2 3, 4	TELAR XP	75%	AW/W	DF	52.5	g ai/ha	A	0.3611 g/mx	103, 104	213, 214	305, 306
	INDUCE	70%	AW/W	XL	0.25	% v/v	A	2.413 mL/mx			
A3 5, 6	TELAR XP	75%	AW/W	DF	79	g ai/ha	A	0.5433 g/mx	105, 106	201, 202	315, 316
	INDUCE	70%	AW/W	XL	0.25	% v/v	A	2.413 mL/mx			
A4 7, 8	ESCORT XP	60%	AW/W	DF	70	g ai/ha	A	0.6018 g/mx	107, 108	215, 216	319, 320
	INDUCE	70%	AW/W	XL	0.25	% v/v	A	2.413 mL/mx			
A5 9, 10	CIMARRON PLUS	63%	AW/W	DF	66	g ai/ha	A	0.5404 g/mx	109, 110	203, 204	309, 310
	INDUCE	70%	AW/W	XL	0.25	% v/v	A	2.413 mL/mx			
A6 11, 12	2,4-D-AMINE	455	gAE/L	SL	840	g ae/ha	A	9.523 mL/mx	111, 112	209, 210	311, 312
	QUINSTAR 4L	38.8%		SC	390	g ai/ha	A	4.509 mL/mx			
	MSO CONCENTRATE	100%	AW/W	EC	1	% v/v	A	9.65 mL/mx			
A7 13, 14	QUINSTAR 4L	38.8%		SC	780	g ai/ha	A	9.017 mL/mx	113, 114	211, 212	303, 304
	MSO CONCENTRATE	100%	AW/W	EC	1	% v/v	A	9.65 mL/mx			
A8 15, 16	TELAR XP	75%	AW/W	DF	39.4	g ai/ha	A	0.271 g/mx	115, 116	217, 218	307, 308
	2,4-D-AMINE	455	gAE/L	SL	840	g ae/ha	A	9.523 mL/mx			
	INDUCE	70%	AW/W	XL	0.25	% v/v	A	2.413 mL/mx			
A9 17, 18	CIMARRON PLUS	63%	AW/W	DF	44	g ai/ha	A	0.3603 g/mx	117, 118	207, 208	313, 314
	2,4-D-AMINE	455	gAE/L	SL	1120	g ae/ha	A	12.7 mL/mx			
	INDUCE	70%	AW/W	XL	0.25	% v/v	A	2.413 mL/mx			
A10 19, 20	METHOD	240	GA/L	SL	70	g ai/ha	A	1.504 mL/mx	119, 120	219, 220	301, 302
	TELAR XP	75%	AW/W	DF	27.8	g ai/ha	A	0.1912 g/mx			
	INDUCE	70%	AW/W	XL	0.25	% v/v	A	2.413 mL/mx			

Applied Rejuvra Herbicide to half of each plot.

Herbicide Trial

Transect Surveys

- Transects were spaced 150m (18 total)
- 1m X 1m quadrats were spaced every 10m
- Percent cover recorded
- PAR reading
- Belt transect for trees and fungus noted
- Downed woody debris in center of transect
- Seedbank every 20m



Transect Surveys

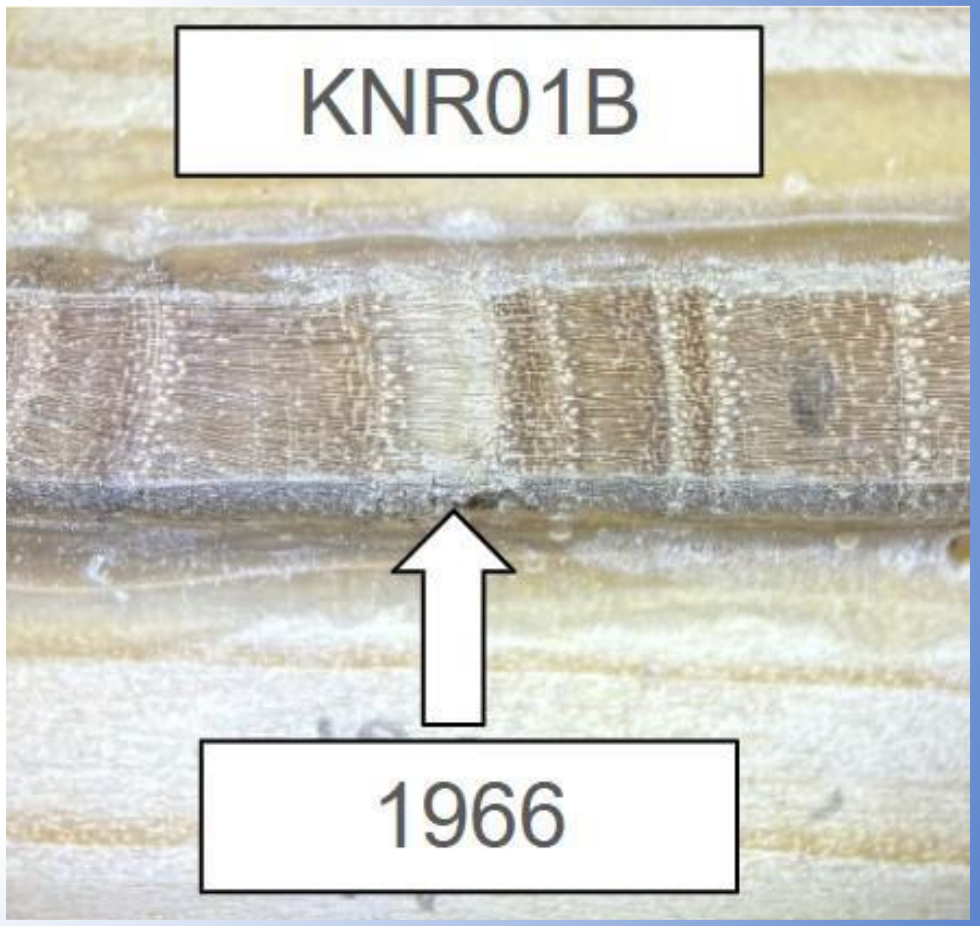
- **Data has been entered – no significant analysis yet**
  - **Definite east to west change (Smooth Brome dominating on the east, more native moving west)**
  - **Noticeable cover of Dame's Rocket, Stinging Nettle, Mother's Wort, and Catnip**
- **50% or more of the Green Ash trees had fungus**
- **A lot of downed woody debris**
- **Seedbank samples are being processed**

Overstory Survey and Tree Ring Analysis

- **Overstory consisted mainly of Green Ash (dominant), Box Elder, and some American Elm.**
- **Other species observed (infrequently) were Hawthorn, American Plum, Chokecherry, Willow Species, Cottonwood, Nannyberry, Russian Olive, and European Buckthorn.**
- **Tree ring analysis has interesting findings.**

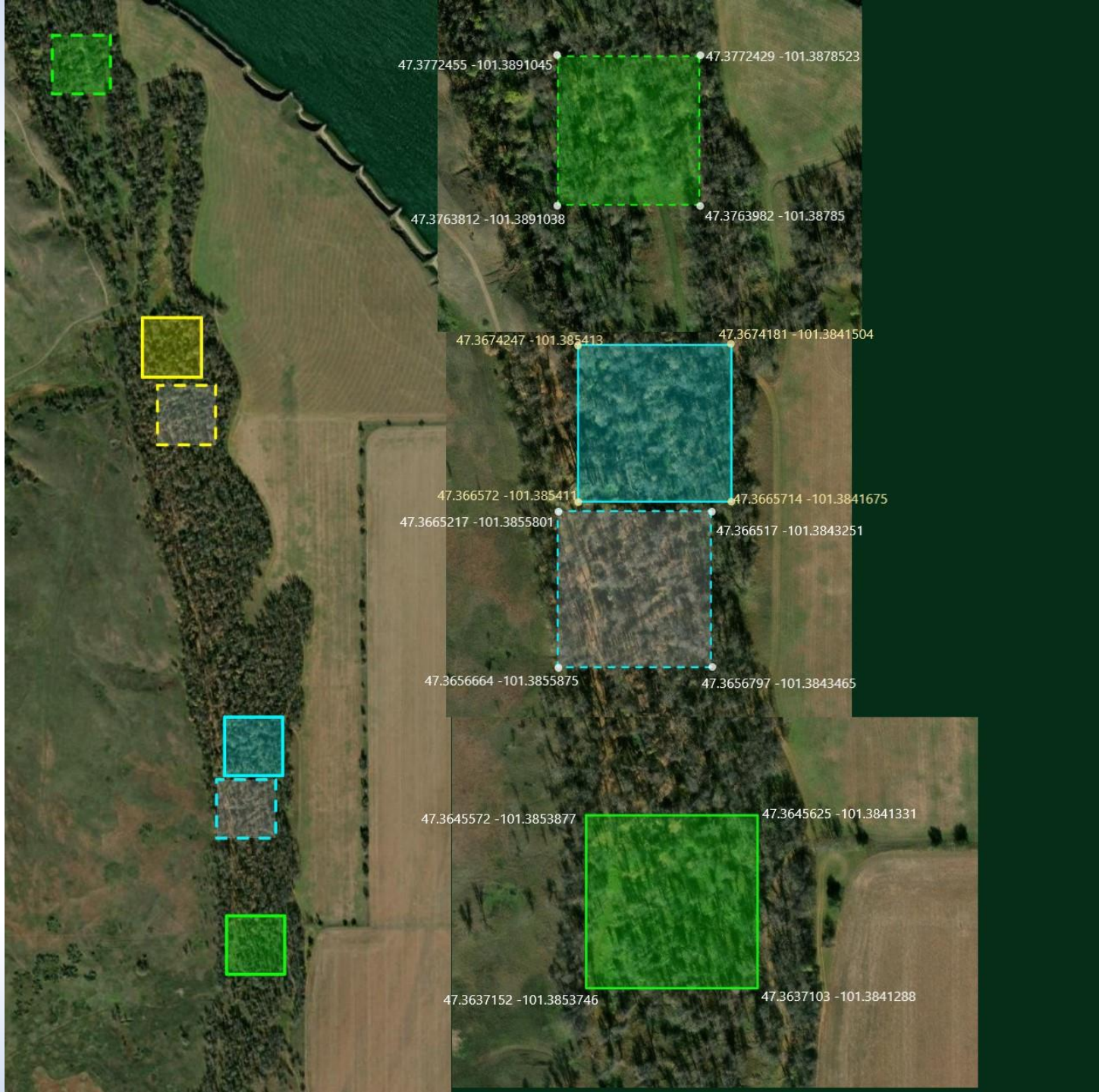
Tree Ring Analysis

- **Trees from the center of the stand dated to the 1910s, 1920s, and 1930s (i.e. pre-dam 1947-1953).**
- **The 1966 ring of many of the samples appeared white and was considered an anomaly.**
- **On June 24, 1966 a major storm was occurred and 13” of rain was recorded at Stanton, ND which caused a large flood.**
- **Trees were noted as being “stripped of their leaves”.**



Restoration Plots

- Green = Clear Cut/Debris Removed
- Blue = Debris Removed/No Clear Cut
- Yellow = No Debris Removed/No Clear Cut
- Solid Line = Deer Fence
- Dashed Line = No Deer Fence



Restoration Plots

Plan for 2025

- **Seedbank study underway and will be completed by summer.**
- **Complete all initial survey data analysis.**
- **Continue to clear cut and remove debris until April.**
- **Apply glyphosate and plant trees in May.**
- **Continue to monitor herbicide trial.**
- **Seed understory in Fall.**


Questions