

TECHNICAL MEMORANDUM

TO: Daryl Peterson, Director of Restoration Programs | Minnesota Land Trust

FROM: John Thayer, Natural Resources Scientist

DATE: February 11th, 2026

RE: Native Plant Community Mapping in the Cedar Lake Restoration Area
SEH No. MNLAN 186096 3-37

INTRODUCTION

This technical memorandum documents the methods and results of native plant community mapping in the Cedar Lake Restoration project area, located in the Fond Du Lac Reservation. The survey was completed by Natalie White, who is a Minnesota Department of Natural Resources (DNR) Certified Listed-species Surveyor for Plants – Prairie Parkland Province (PPP), Plants – Eastern Broadleaf Forest (EBF), Plants – Laurentian Mixed Forest (LMF), and John Thayer, who is a DNR Certified Listed-species Surveyor for Plants – PPP, Plants – EBF, Plants – LMF, *Botrychium* spp., and lichens. This technical memorandum was completed by John Thayer.

SURVEY AREA DESCRIPTION

Figure 1 shows the survey area (i.e., the Area of Interest [AOI]). It is in the North Shore Highlands (212Lb) ecological subsection of the Northern Superior Uplands (212L) ecological section within the Laurentian Mixed Forest (212) ecological province.

METHODOLOGY

NPCs were mapped using relevant offsite (i.e., "desktop") resources before the survey, and are shown in the figures as follows:

- 2024 Carlton County aerial imagery in **Figure 1**.
- 1939 aerial imagery in **Figure 2**.
- 2023 color infrared (CIR) imagery in **Figure 3**.
- DNR's Native Plant Community (NPC) data layer. No DNR-mapped NPCs were present in or near the project area.

Natalie White and John Thayer conducted a site visit on July 28th, 2025, and September 3rd, 2025, respectively. Vegetation data were collected using a qualitative field inventory in which vascular plant species observed at a given point were recorded by stratum. NPC classes/types were assigned using vascular plant species composition, dominance patterns, hydrologic setting, and comparison to DNR-mapped NPCs elsewhere. NPC classification followed the guidance in the DNR's 2003 *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* field guide and the DNR's *NPC Silviculture Strategies for Forest Stand Prescriptions* webpage¹.

¹ https://www.dnr.state.mn.us/forestry/ecs_silv/npc/index.html

RESULTS

NPC mapping is provided in **Figure 4**. The following NPCs were observed within the study area:

- Fire-Dependent Forest
- Forested Peatland Complex
- Northern Cedar Swamp
- Northern Poor Conifer Swamp
- Wet Meadow/Carr System – Dogwood Shrub Swamp
- Wet Meadow/Carr System – Dogwood Shrub Swamp / Northern Mixed Cattail Marsh

Vascular plant species observed and other observational remarks for each data collection point, shown in **Figure 4**, are provided for each data collection point in **Table 1** below. Photographs showing vegetation and onsite conditions were taken at each data point, and are included in **Attachment A**.

Table 1: Data Points and Observational Remarks

Data Collection Point	Observational Remarks
1	This area was characterized by a moderately dense shrub layer, primarily composed of <i>Alnus incana</i> , <i>Salix petiolaris</i> , <i>Ilex verticillata</i> , etc. The ground layer was dominated by a diverse assemblage of graminoids and forbs, including <i>Calamagrostis canadensis</i> , <i>Calla palustris</i> , <i>Persicaria sagittata</i> , <i>Bidens connata</i> , <i>Epilobium leptophyllum</i> , <i>Glyceria canadensis</i> , <i>Utricularia minor</i> , and <i>Scirpus cyperinus</i> , among others.
2	The canopy is absent. The shrub layer is sparse and composed primarily of <i>Alnus incana</i> , with scattered <i>Larix laricina</i> , <i>Salix petiolaris</i> , <i>Salix pyrifolia</i> , and <i>Betula pumila</i> . The ground layer was dominated by sedges and forbs such as <i>Carex lacustris</i> , <i>Carex utriculata</i> , <i>Comarum palustre</i> , <i>Lysimachia thyrsiflora</i> , and <i>Iris versicolor</i> . <i>Sphagnum</i> mats/hummocks were present.
3	The canopy is very sparse, with only scattered <i>Larix laricina</i> present. The shrub layer is moderately dense and composed of <i>Larix laricina</i> , <i>Betula pumila</i> , <i>Alnus incana</i> , and various willows. The ground layer is dominated by sedges and forbs, including <i>Carex utriculata</i> , <i>Comarum palustre</i> , <i>Carex lacustris</i> , and <i>Chamaedaphne calyculata</i> , among others. <i>Sphagnum</i> mats/hummocks were present.
4	The canopy is sparse, with scattered <i>Larix laricina</i> , many of which are dead or declining. The shrub layer is moderately dense and dominated by <i>Alnus incana</i> and <i>Betula pumila</i> . The herbaceous layer is dominated by <i>Typha X glauca</i> along with <i>Chamaedaphne calyculata</i> , <i>Rhododendron groenlandicum</i> , <i>Lysimachia thyrsiflora</i> , <i>Calla palustris</i> , <i>Carex utriculata</i> , <i>Comarum palustre</i> , <i>Carex</i> spp., <i>Calamagrostis canadensis</i> , and <i>Menyanthes trifoliata</i> . Well-developed <i>Sphagnum</i> hummocks and mats throughout.
5	The canopy is absent. The shrub layer is moderately dense and composed of <i>Alnus incana</i> , <i>Larix laricina</i> , <i>Cornus sericea</i> , and <i>Salix</i> spp. The ground layer includes <i>Equisetum fluviatile</i> , <i>Comarum palustre</i> , <i>Symphotrichum puniceum</i> , <i>Bidens connata</i> , <i>Carex comosa</i> , <i>Osmunda regalis</i> , and <i>Utricularia minor</i> . Hydrologic conditions seem to be changing. More standing water present and a noticeable reduction in <i>Sphagnum</i> hummocks.
6	The canopy is absent, with only a few dead <i>Larix laricina</i> remaining. The shrub layer is moderately dense and composed primarily of <i>Alnus incana</i> and <i>Salix</i> spp. The herbaceous ground layer is dominated by a mix of peatland and wet meadow/carr species, including <i>Chamaedaphne calyculata</i> , <i>Typha X glauca</i> , <i>Comarum palustre</i> , <i>Equisetum fluviatile</i> , <i>Osmunda regalis</i> , <i>Rumex</i> sp., and <i>Symphotrichum puniceum</i> . Flooding is potentially contributing to the decline of peatland vegetation and facilitating a transition toward a wet meadow/carr with hybrid cattail infestation.

Data Collection Point	Observational Remarks
7	Point adjacent to stream channel, with patches of floating and emergent vegetation. The shrub layer is sparse, with <i>Alnus incana</i> and <i>Salix</i> spp. The herbaceous layer is well developed and includes <i>Typha X glauca</i> , <i>Bidens connata</i> , <i>Sagittaria latifolia</i> , <i>Calla palustris</i> , <i>Lycopus uniflorus</i> , <i>Eleocharis</i> sp., <i>Galium labradoricum</i> , <i>Calamagrostis canadensis</i> , and <i>Symphyotrichum lanceolatum</i> , among others.
8	Point in a transition zone between the stream channel and a cedar-dominated area. Most of the <i>Thuja occidentalis</i> present are dead or stressed from flooded conditions. The shrub layer is dominated by <i>Alnus incana</i> , with scattered individuals of other wetland shrubs. The ground layer is dense and dominated by <i>Typha X glauca</i> , <i>Chamaedaphne calyculata</i> , <i>Comarum palustre</i> , <i>Carex comosa</i> , <i>Sagittaria</i> sp., <i>Lysimachia thyrsiflora</i> , <i>Osmunda regalis</i> , <i>Osmunda cinnamomea</i> , <i>Epilobium leptophyllum</i> , <i>Equisetum fluviatile</i> , and <i>Calla palustris</i> . <i>Sphagnum</i> hummocks are also present. Hummock-hollow microtopography. Hollows with 1-3'+ surface water.
9	The canopy is composed mostly of dead or stressed <i>Thuja occidentalis</i> , with a few scattered <i>Acer rubrum</i> and <i>Betula papyrifera</i> persisting. The shrub layer is moderately dense and dominated by <i>Alnus incana</i> . The ground layer supports a diverse mix of wet meadow/carr and peatland species, including <i>Osmunda regalis</i> , <i>Osmunda cinnamomea</i> , <i>Calla palustris</i> , <i>Sagittaria</i> sp., <i>Carex disperma</i> , <i>Comarum palustre</i> , <i>Rubus</i> cf. <i>pubescens</i> , <i>Cornus sericea</i> , <i>Iris versicolor</i> , <i>Glyceria canadensis</i> , <i>Chamaedaphne calyculata</i> , <i>Rhododendron groenlandicum</i> , <i>Utricularia vulgaris</i> , <i>Dryopteris cristata</i> , and <i>Typha X glauca</i> . <i>Sphagnum</i> hummocks present. Flooding appears to be facilitating succession toward a wet meadow/carr community and cattail infestation.
10	The canopy is sparse, with stressed or dead <i>Thuja occidentalis</i> . The shrub layer is moderately dense and composed primarily of <i>Betula pumila</i> and <i>Alnus incana</i> . The ground layer includes <i>Carex lacustris</i> , <i>Typha X glauca</i> , <i>Comarum palustre</i> , <i>Calla palustris</i> , <i>Thelypteris palustris</i> , <i>Rhododendron groenlandicum</i> , <i>Calamagrostis canadensis</i> , <i>Chamaedaphne calyculata</i> , <i>Cicuta bulbifera</i> , etc. <i>Sphagnum</i> hummocks are still present.
11	The canopy is absent, though the area retains scattered <i>Larix laricina</i> nearby. The shrub layer is dominated by <i>Alnus incana</i> , particularly to the north and west. The ground layer is diverse and includes <i>Chamaedaphne calyculata</i> , <i>Typha X glauca</i> , <i>Calla palustris</i> , <i>Iris versicolor</i> , <i>Comarum palustre</i> , <i>Lysimachia thyrsiflora</i> , <i>Carex lacustris</i> , <i>Eriophorum virginicum</i> , <i>Thelypteris palustris</i> , <i>Osmunda regalis</i> , and <i>Carex comosa</i> . <i>Typha</i> becomes increasingly dense toward the east. <i>Sphagnum</i> hummocks/mats still present.
12	No canopy. The shrub layer is moderately dense and dominated by <i>Alnus incana</i> , with <i>Ilex verticillata</i> , <i>Cornus sericea</i> , and <i>Viburnum opulus</i> var. <i>americana</i> . The ground layer includes <i>Carex lacustris</i> , <i>Calamagrostis canadensis</i> , <i>Lysimachia thyrsiflora</i> , <i>Dryopteris cristata</i> , <i>Symphyotrichum puniceum</i> , <i>Eutrochium maculatum</i> , <i>Onoclea sensibilis</i> , <i>Chelone glabra</i> , <i>Typha X glauca</i> , <i>Epilobium leptophyllum</i> , and <i>Thalictrum dasycarpum</i> . To the south, this community transitions into a tamarack-dominated peatland.
13	The canopy is absent. The shrub layer is moderately dense and composed primarily of <i>Alnus incana</i> . The ground layer is dominated by <i>Typha X glauca</i> with <i>Comarum palustre</i> , <i>Thelypteris palustris</i> , <i>Rhododendron groenlandicum</i> , <i>Chamaedaphne calyculata</i> , <i>Campanula aparinoides</i> , <i>Cicuta bulbifera</i> , <i>Lysimachia thyrsiflora</i> , <i>Eutrochium maculatum</i> , <i>Onoclea sensibilis</i> , <i>Dryopteris cristata</i> , <i>Calla palustris</i> , <i>Carex lacustris</i> , <i>Symphyotrichum puniceum</i> , <i>Chelone glabra</i> , and <i>Glyceria canadensis</i> . A wet meadow/carr transitioning toward a cattail-dominated condition. No obvious <i>Sphagnum</i> hummocks are present.

Data Collection Point	Observational Remarks
14	The canopy includes a few scattered <i>Larix laricina</i> . The shrub layer is moderately dense and dominated by <i>Betula pumila</i> and <i>Alnus incana</i> . The ground layer includes <i>Typha X glauca</i> , <i>Sagittaria</i> sp., <i>Comarum palustre</i> , <i>Calla palustris</i> , <i>Thelypteris palustris</i> , <i>Chamaedaphne calyculata</i> , <i>Galium labradoricum</i> , <i>Calamagrostis canadensis</i> , and <i>Epilobium leptophyllum</i> present, among others. The overall structure and species composition are more characteristic of a wet meadow/carr community. No obvious <i>Sphagnum</i> hummocks are present.
15	The canopy is absent. The shrub layer is moderately dense and dominated by <i>Betula pumila</i> and <i>Alnus incana</i> . The ground layer is dominated by abundant <i>Typha</i> spp., along with <i>Sagittaria</i> sp., <i>Comarum palustre</i> , <i>Campanula aparinoides</i> , <i>Carex lacustris</i> , <i>Epilobium leptophyllum</i> , <i>Calla palustris</i> , and scattered patches of <i>Chamaedaphne calyculata</i> . No obvious <i>Sphagnum</i> hummocks are present.
16	Dead <i>Fraxinus nigra</i> , likely from stress from prolonged flooding. The shrub layer is moderately dense with <i>Alnus incana</i> , <i>Betula pumila</i> , <i>Salix</i> spp., etc. The ground layer is dominated by abundant <i>Typha X glauca</i> along with a characteristic mix of wet meadow/carr species. No obvious <i>Sphagnum</i> hummocks are present.
17	The canopy is absent. The shrub layer is sparse with <i>Spiraea alba</i> . The ground layer is dominated by <i>Typha X glauca</i> and <i>Phalaris arundinacea</i> , with <i>Glyceria canadensis</i> , <i>Carex lacustris</i> , <i>Sagittaria latifolia</i> , <i>Equisetum fluviatile</i> , <i>Onoclea sensibilis</i> , <i>Iris versicolor</i> , <i>Asclepias incarnata</i> , <i>Poa palustris</i> , and <i>Cicuta maculata</i> also present.
18	The canopy is absent. The shrub layer is absent. The ground layer is dominated by <i>Typha X glauca</i> and <i>Eriophorum</i> cf. <i>vaginatum</i> , with <i>Calla palustris</i> , <i>Carex</i> cf. <i>lasiocarpa</i> , <i>Carex hystericina</i> , <i>Triadenum fraseri</i> , <i>Lycopus americanus</i> , <i>Cicuta maculata</i> , and <i>Utricularia vulgaris</i> also present. Standing water approximately 1.5–3 feet deep is present throughout the area.
19	The canopy is absent. The shrub layer is moderately dense east of the beaver dam and sparse to absent just west of the beaver dam. It is dominated by <i>Alnus incana</i> . The ground layer is dominated by <i>Typha X glauca</i> , with <i>Phalaris arundinacea</i> and <i>Glyceria canadensis</i> also abundant. Additional species present include <i>Sagittaria latifolia</i> , <i>Carex hystericina</i> , <i>Scirpus cyperinus</i> , <i>Carex stipata</i> , <i>Onoclea sensibilis</i> , <i>Campanula aparinoides</i> , <i>Asclepias incarnata</i> , <i>Rumex orbiculata</i> , and scattered <i>Salix discolor</i> . Standing water up to approximately 1 foot deep is present.
20	The canopy is absent. The shrub layer is moderately dense and composed primarily of <i>Alnus incana</i> , with scattered <i>Ilex verticillata</i> and <i>Fraxinus nigra</i> . The ground layer is dominated by <i>Scirpus cyperinus</i> , <i>Typha X glauca</i> , and <i>Calamagrostis canadensis</i> , with <i>Glyceria canadensis</i> , <i>Carex tenera</i> , and <i>Sagittaria latifolia</i> also present. Standing water up to approximately 1 foot deep occurs across the site.
21	The canopy is sparse and dominated by <i>Acer rubrum</i> . The shrub layer is moderately developed and includes <i>Corylus cornuta</i> , <i>Fraxinus nigra</i> , and <i>Ilex verticillata</i> . The ground layer is dominated by <i>Glyceria canadensis</i> , with <i>Doellingeria umbellata</i> , <i>Athyrium filix-femina</i> , and <i>Solidago gigantea</i> also present. This narrow wetland fringe represents a hardwood swamp community northwest of the beaver dam, transitional between upland forest and adjacent emergent wetland.

General Observations

The Forested Peatland Complex appears to be transitioning from a forested peatland to a wet meadow/carr system. Most of the tamarack and black spruce are dead or in decline. This could be due to prolonged hydrologic alteration because of the beaver dam. The portion of this community that is adjacent to the stream has deep surface water, which is facilitating the invasion of hybrid cattail. Overall, this area was mapped as Forested Peatland Complex because of the presence of a continuous to interrupted Sphagnum cover and ground layer species that were characteristic of a Forested Peatland NPC.

This Northern Cedar Swamp is unusually wet for this NPC, with 1-3' of standing water in pools and hollows. Most of the northern white cedar in the canopy are stressed or declining. Review of the 1939 aerial imagery indicates that this area was formerly more densely forested, suggesting a substantial shift in hydrologic conditions and canopy composition over time, possibly due to the beaver dam. The deep surface water is also facilitating the invasion of the hybrid cattail in this NPC.

Hybrid cattail is a prominent component of the Wet Meadow/Carr System – Dogwood Shrub Swamp; however, it appeared to be more interspersed with shrubs. Over time, this area may convert to a Northern Mixed Cattail Marsh. The density and diversity of shrub species indicated that it was best classified as a Wet Meadow/Carr System – Dogwood Shrub Swamp.

The Wet Meadow/Carr System – Dogwood Shrub Swamp / Northern Mixed Cattail Marsh had variable densities of hybrid cattail and shrubs, reflecting a transitional condition. Portions could be mapped as Northern Mixed Cattail Marsh due to a predominance of hybrid cattail, and portions could be mapped as Wet Meadow/Carr System – Dogwood Shrub Swamp due to the presence of a well-developed shrub layer. Over time, this area may convert to a Northern Mixed Cattail Marsh.

CONTACT

Thank you for your review. Please contact me at **612-860-5087** or **jthayer@sehinc.com** if you have any questions, comments, or require additional information.

List of Figures

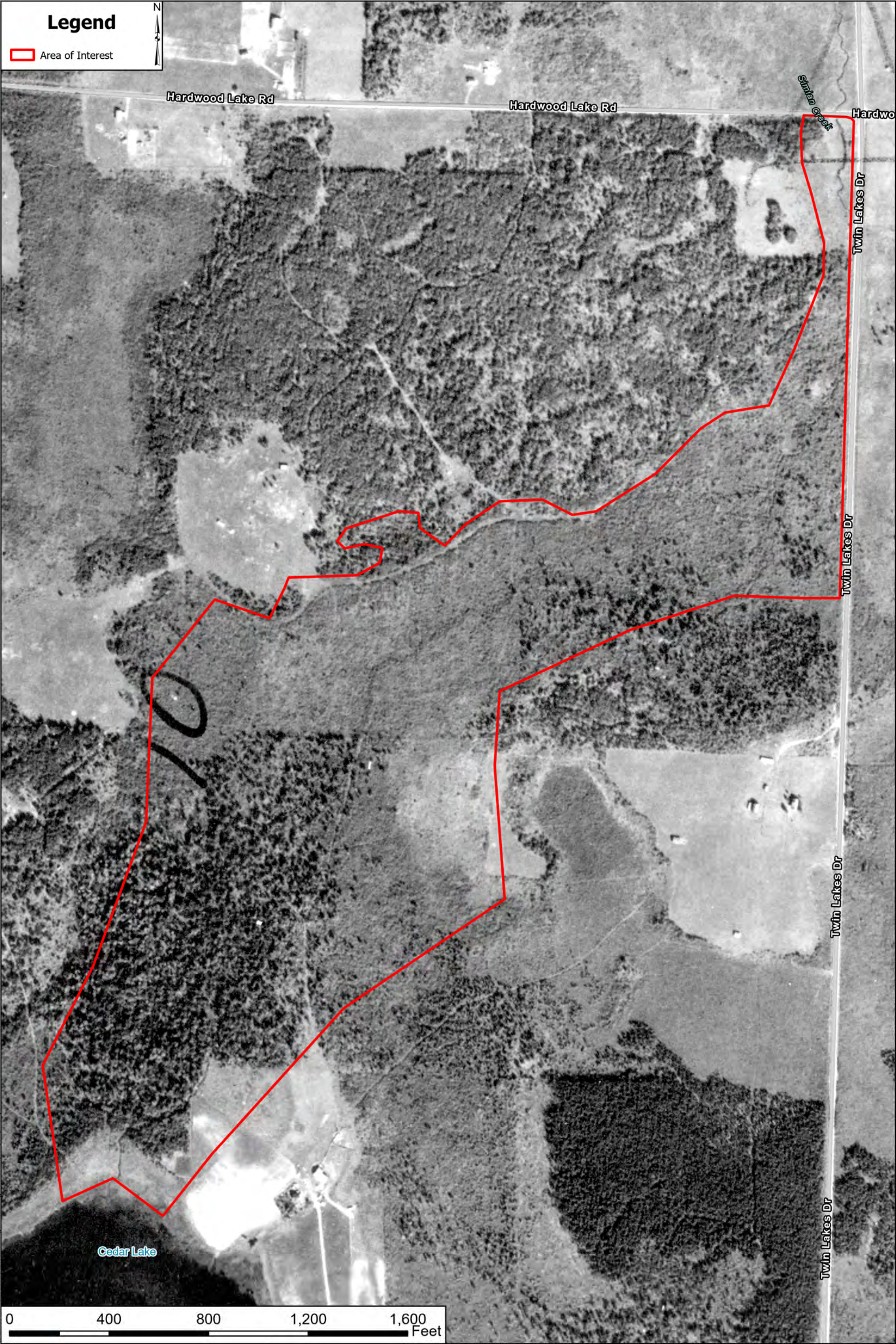
Figure 1 – 2024 Aerial Imagery

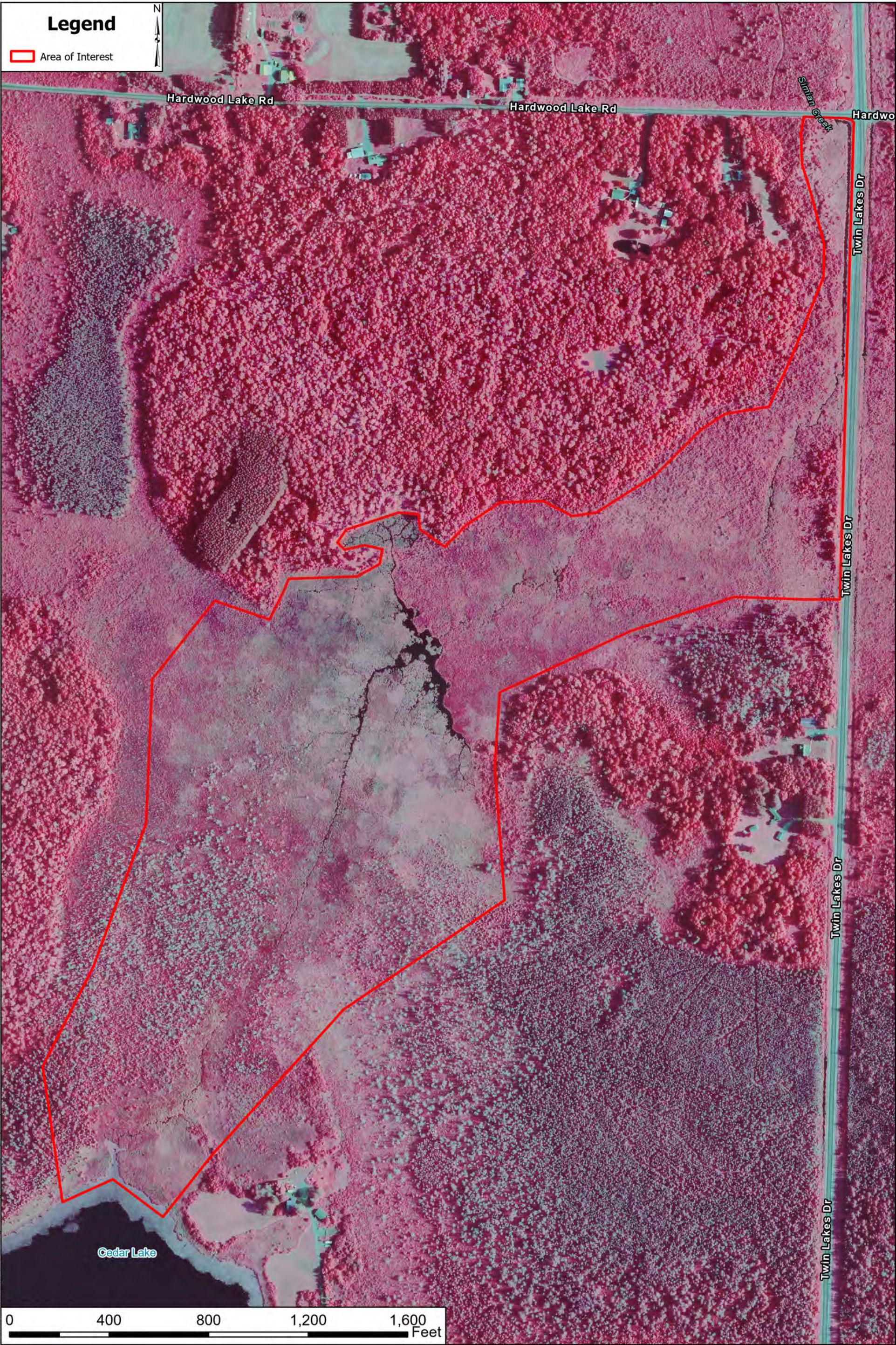
Figure 2 – 1939 Aerial Imagery

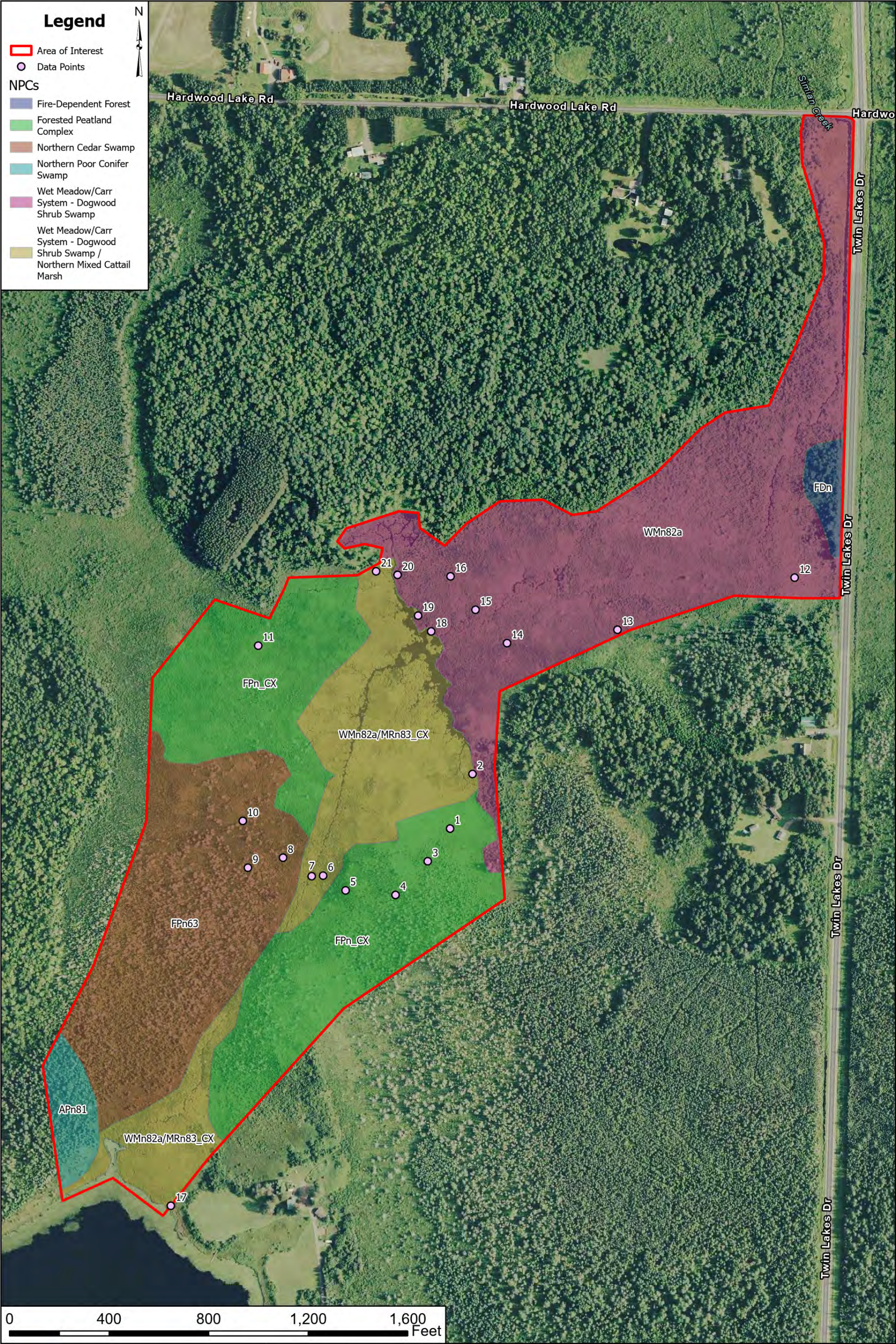
Figure 3 – 2023 Color Infrared Imagery

Figure 4 – Native Plant Communities (NPCs)









Attachment A

Representative Photos



Photo 1 Data Point 1. Showing the Forested Peatland Complex. Looking southwest.



Photo 2 Data Point 1. Showing the transition to from the Forested Peatland Complex to the Wet Meadow/Carr System – Dogwood Shrub Swamp / Northern Mixed Cattail Marsh. Looking northwest.



Photo 3 Data Point 2. Showing the Forested Peatland Complex. Looking east.



Photo 4 Data Point 2. Showing the Forested Peatland Complex. Looking northwest.



Photo 5 Data Point 3. Showing the Forested Peatland Complex. Looking northwest.



Photo 6 Data Point 3. Showing the Forested Peatland Complex. Looking southwest.



Photo 7 Data Point 4. Showing the Forested Peatland Complex. Looking southwest.



Photo 8 Data Point 4. Showing the Forested Peatland Complex. Looking northwest.



Photo 9 Data Point 5. Showing the Forested Peatland Complex. Looking northwest.



Photo 10 Data Point 5. Showing the Forested Peatland Complex. Looking southeast.



Photo 11 Data Point 6. Showing the Forested Peatland Complex. Looking northwest.



Photo 12 Data Point 6. Showing the Forested Peatland Complex. Looking southeast.



Photo 13 Data Point 7. Showing the Forested Peatland Complex. Looking northwest.



Photo 14 Data Point 7. Showing the Forested Peatland Complex. Looking east.



Photo 15 Data Point 8. Showing the Northern Cedar Swamp. Looking west.



Photo 16 Data Point 8. Showing the Northern Cedar Swamp. Looking north.



Photo 17 Data Point 9. Showing the Northern Cedar Swamp. Looking west.



Photo 18 Data Point 9. Showing the Northern Cedar Swamp. Looking southwest.



Photo 19 Data Point 10. Showing the Northern Cedar Swamp. Looking south.



Photo 20 Data Point 10. Showing the Northern Cedar Swamp. Looking north.



Photo 21 Data Point 11. Showing the Forested Peatland Complex. Looking east.



Photo 22 Data Point 11. Showing the Forested Peatland Complex. Looking west.



Photo 23 Data Point 12. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp. Looking north



Photo 24 Data Point 12. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp. Looking south.



Photo 25 Data Point 13. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp. Looking southwest.



Photo 26 Data Point 13. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp. Looking northwest.



Photo 27 Data Point 14. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp. Looking west-northwest.



Photo 28 Data Point 14. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp. Looking west-southwest



Photo 29 Data Point 15. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp. Looking northwest.



Photo 30 Data Point 15. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp. Looking south



Photo 31 Data Point 16. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp. Looking north.



Photo 32 Data Point 16. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp. Looking southwest.



Photo 33 Data Point 17. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp / Northern Mixed Cattail Marsh. Looking north.



Photo 34 Data Point 17. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp / Northern Mixed Cattail Marsh along Cedar Lake. Looking west.



Photo 35 Data Point 18. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp / Northern Mixed Cattail Marsh west of the beaver dam.



Photo 36 Data Point 18. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp / Northern Mixed Cattail Marsh west of the beaver dam.



Photo 37 Data Point 19. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp / Northern Mixed Cattail Marsh west of the beaver dam.



Photo 38 Data Point 19. Showing the vegetation along the beaver dam. Looking south



Photo 39 Data Point 20. Showing the Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp / Northern Mixed Cattail Marsh west of the beaver dam.



Photo 40 Data Point 20. Showing the Wet Meadow/Carr System - Dogwood Shrub Swamp east of the beaver dam.