Marshall County Natural Features Inventory:

The Trails at Mill Pond

Marshall Co. Memorial Forest

PRESENTER:
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March 2, 2023

Marshall Co. Parks & Recreation Department

- **The Trails at Mill Pond** (Mill Pond) and the **Marshall County Memorial Forest** (Memorial Forest)

- 3 Survey periods to **assess and map natural features**
  - Spring 2022, Summer 2022, Fall 2022
  - Invasive Species Assessment
  - Plant Community Assessment

- **The GOAL: Inform stewardship of the properties and potential future plans**
  - "…preserve, protect, and steward the County's natural, cultural, and recreational resources."

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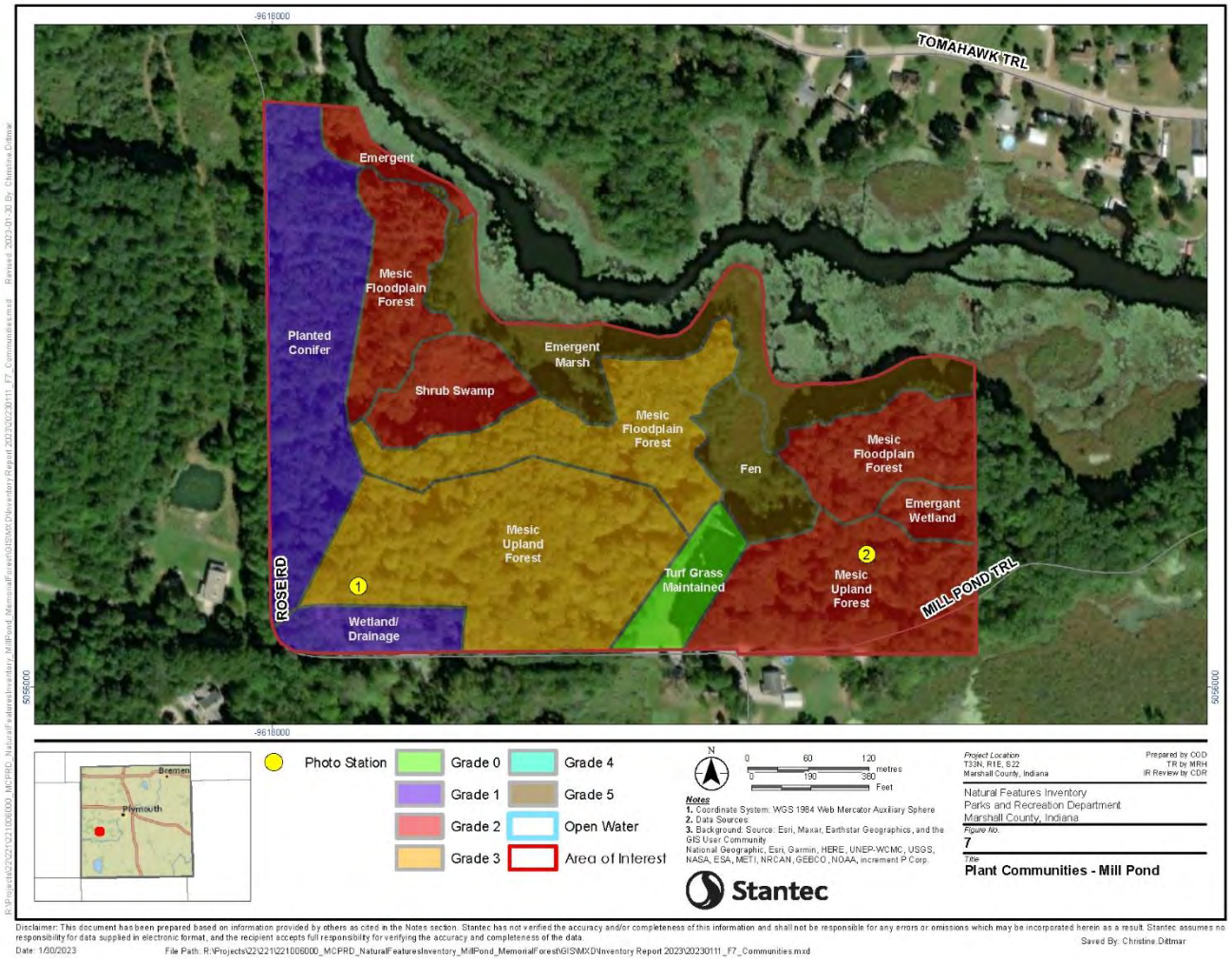
The Trails at Mill Pond

Site Assessment and Inventory

Site Overview – Mill Pond 35 Acres

- Mixed plant communities consisting primarily of **mesic upland forest**, **emergent marsh/wetland**, and **mesic floodplain forest**.
- Bottomland forests featuring **amphibian-rich seasonal wetlands**
- Adjacent to Zehner Mill pond

- Features a **fen** (peat accumulating, freshwater-fed wetland)
  - Floating peat and moss flats **featuring native orchids and sedges**



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Plant Dominance – Mill Pond

- Primarily **bottomland floodplain forests** and **upland woodlands** with **emergent wetlands** along Northern edge.
- **Bottomland Floodplain Forests**
  - Deciduous tree communities: **maples** (*Acer* spp.) and **oaks** (*Quercus* spp.).
  - Spring ephemerals include **jack-in-the-pulpit** (*Arisaema triphyllum*), **may apple** (*Podophyllum peltatum*), **red trillium** (*Trillium recurvatum*), and **skunk cabbage** (*Symplocarpus foetidus*).
- **Upland Woodlands**
  - **Spicebush** (*Lindera benzoin*) and invasive **bush honeysuckle** (*Lonicera* spp.) dominate shrub layer.
  - **Woodland sedges** (*Carex* spp.) found throughout.
- **Emergent Wetlands**
  - Along Zehner Mill Pond lake edge, **sedges** (*Carex* spp.) and **spike rushes** (*Eleocharis* spp.) dominate
  - P**urple loosestrife** (*Lythrum salicaria*)


Jack-in-the-pulpit (*Arisaema triphyllum*)

The Wonders of Wetlands

- **Cornerstone Ecosystems**
  - Plant/Animal Diversity
  - Pollutant absorption
  - Carbon sequestration
    - Holding carbon in living vegetation, peat, leaf litter, sediments

- Seasonal (ephemeral) wetlands serve as **amphibian breeding grounds and nurseries.**

- Vegetation within floodplains **slows water movement** across the surface, allowing the floodwaters to distribute more evenly and with more predictability.


American Toad
(*Anaxyrus americanus*)

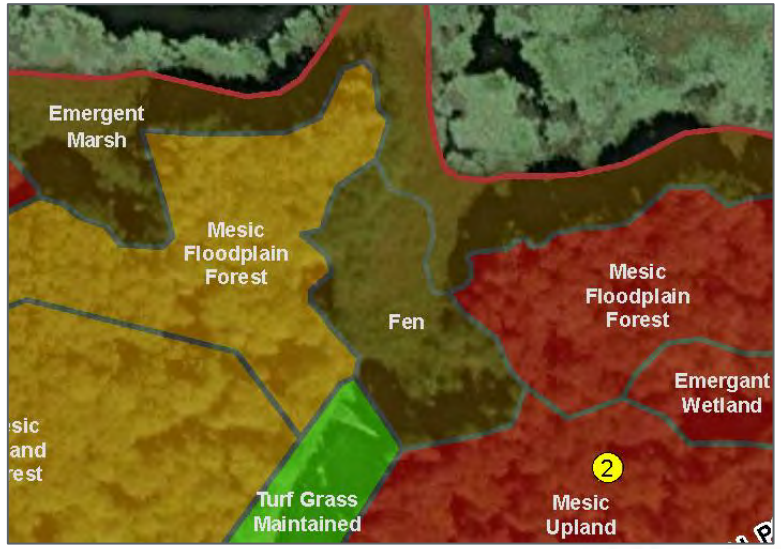

Skunk cabbage
(*Symplocarpus foetidus*)

Plant Dominance Continued – Mill Pond

> Fen

- Located at the **base of the hill** within the “Right-of-Way” (ROW)
- **Floating peat and moss flats**
  - Native orchids like the **green twayblade orchid** (*Liparis loeselii*), **sedges** (*Carex* spp.), **poison sumac** (*Toxicodendron radicans*), and **buttonbush** (*Cephalanthus occidentalis*).
- The canopy **remains clear and open** due to the maintenance of the ROW

Sometime shortly before the fall visit in mid-September, the poison sumac was heavily sprayed with an herbicide application, killing back much of the woody vegetation (poison sumac and buttonbush) within that area of the ROW.




Green twayblade orchid (*Liparis loeselii*)

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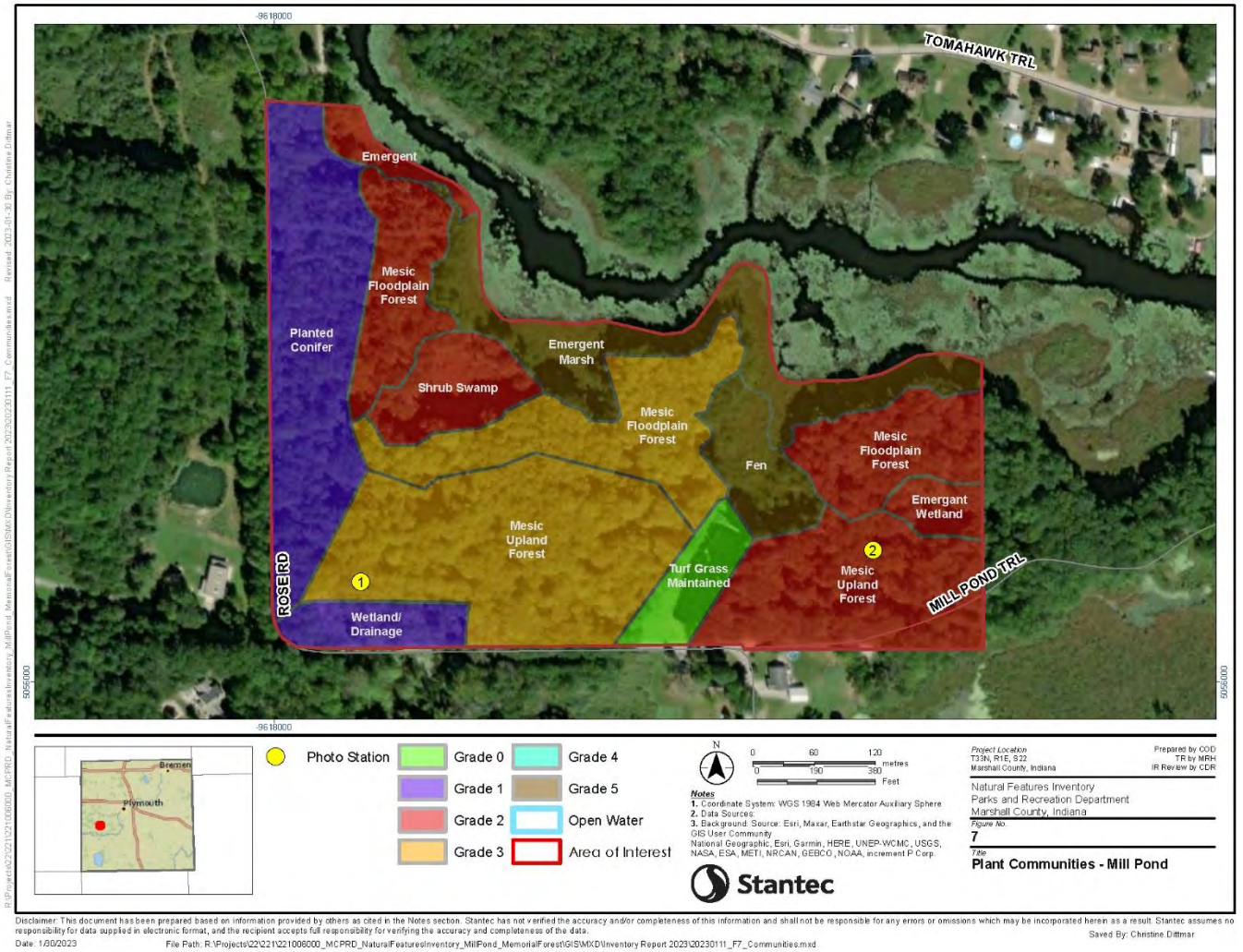
Log Sedge (*Carex decomposita*) – **State Threatened**

- **Uncommon wetland sedge** that appears to be better documented further South in Indiana, however, this population appears to be the **northern-most population** on record at this time.
  - Believed to be **extirpated** from previous documented populations further North in Michigan.
- **Mill Pond Populations**
  - Growing within established sections of **Mill Pond's shallow lake edge**. The established areas consist of larger hummocks where this species grows. Found growing in areas with more **open canopy, 20-50% cover**. In addition to being located in these areas, this species seems to grow only on certain hummocks **limiting its extent within the area even further**.
- **Direct Threats**
  - Fluctuating lake levels due potentially due to failed outflow structures or beaver activity within the water bodies.
  - Purple Loosestrife encroachment and poorly applied herbicide
  - Beaver run expansion


Log sedge
(*Carex decomposita*)

Mill Pond **Qualitative Assessment**. Figure 7

- **Upland Forest Areas**
  - Planted Conifer areas **Low Quality**
  - Mesic Upland areas **Mid to Low Quality**
- **Emergent Communities**
  - Lake Edge **High Quality**
- **Mesic Floodplain Communities**
  - Low-lying seasonally wet areas **Mid to Low Quality**
- **Fen**
  - Fen area **High Quality**
- **Turf area**
  - Mowed/parking areas **Grade 0**



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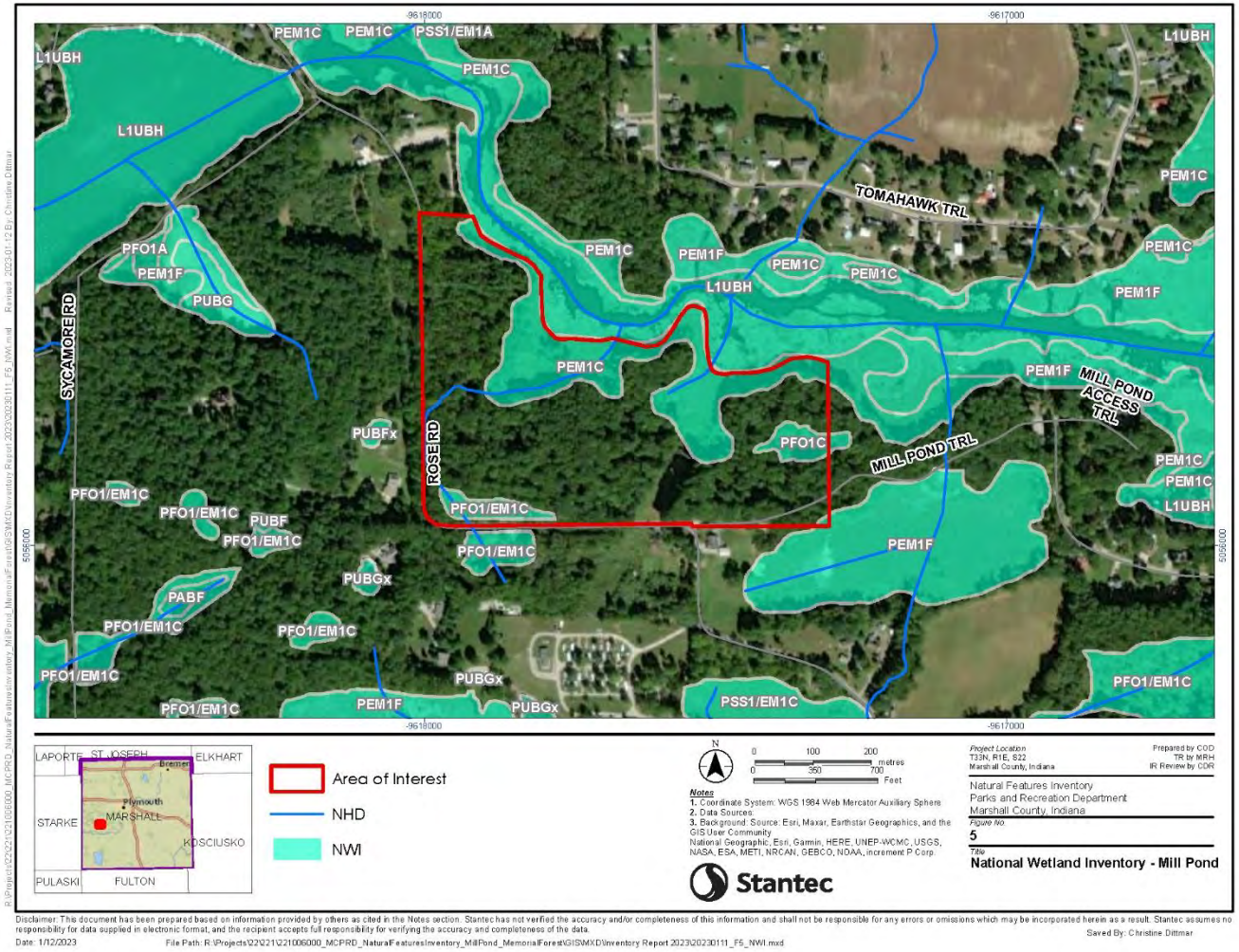
Mill Pond **Qualitative Assessment**. Figure 5

- **Overall Qualitative Summary**
  - **Provides larger functionality/benefit**
  - **Roughly 50% wetlands**
  - **Overflow/floodplain** for Zehner Mill Pond
    - **Amphibian breeding.**

- **The Mill Pond site is considered mid-to-high quality, due to the wide-ranging functionality of the site as a whole.**



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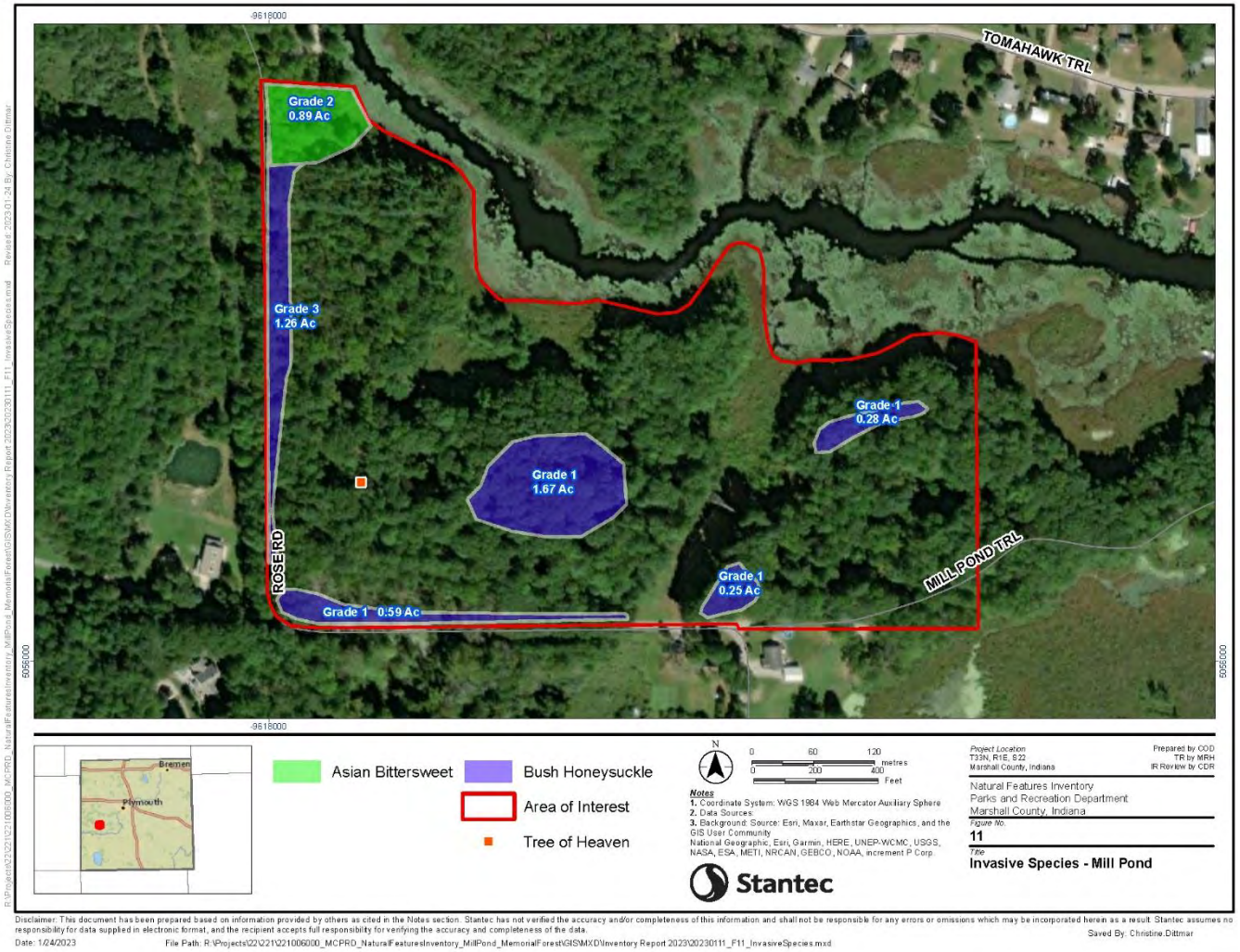
Biodiversity at Mill Pond

- **Botanical Inventory Summary**
  - Total Plant Species Recorded: 298 (Native: 252, Non-native: 46)
- **Avian Inventory Summary** (MCPRD volunteers Carol Goodall & Mark Gidley)
  - Total Avian Species Recorded: 46 (Native: 46, Non-native: 0)
- **Herptile Inventory Summary**
  - Total Herptile Species Recorded (Reptile: 1, Amphibian: 5)


Eastern red-backed salamander (*Plethodon cinereus*)

Invasive Species Assessment – Mill Pond. Figure 11.

- Upland woody invasives, including **Asian Bittersweet** and **Bush Honeysuckle**
  - Not as dense as seen at Memorial Forest site.
  - ***Road edges at most risk within this site.***
- Potential for population expansion of **Purple Loosestrife**
  - Early and precise control critical to control population spread.
- Small numbers of **Tree-of-Heaven** seen within the site.



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Management Recommendations – Mill Pond

- **Lake edges and emergent wetlands harbor much of the diversity within the Mill Pond site, including the state threatened Log Sedge.**
  - Direct threats
    - **Encroachment of invasive plants**, **sustained periods of high water levels, and beaver activity.**
    - Monitoring beaver activity

- **Limiting human activity** along lake edge and within the floodplain areas of the site is recommended.

- **Invasive plant control**
  - **Controlling** the new spread of **Purple Loosestrife** along lake edges.
  - **Controlling woody invasive plants** within upland areas and along roadsides.
  - Regular upkeep of walking/biking trails

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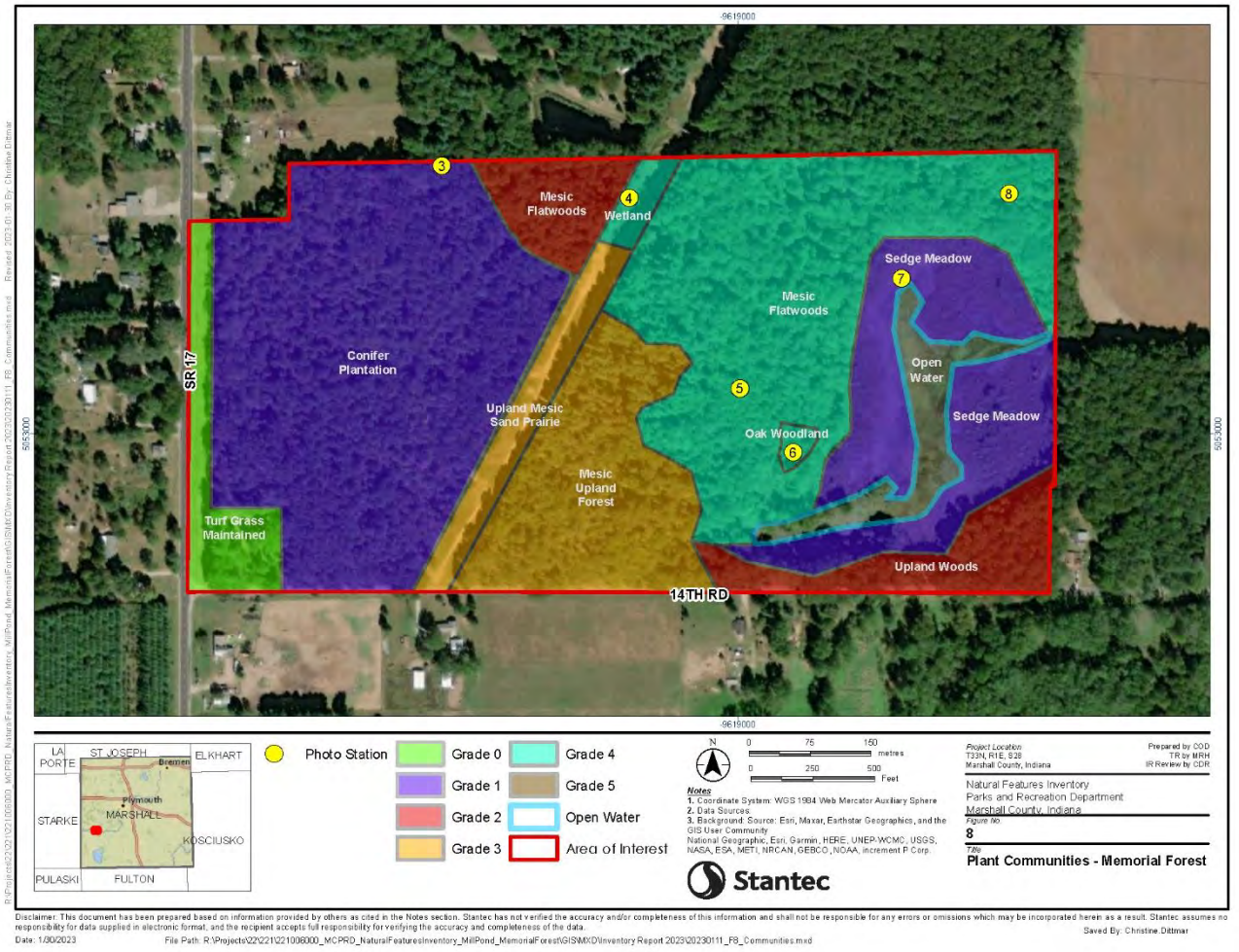
Marshall County Memorial Forest

Site Assessment and Inventory

Site Overview – Memorial Forest 75 Acres

- Mixed plant communities consisting primarily of **mesic flatwoods**, **sedge meadow**, **row-planted conifers**, and **upland mesic sand prairie.**
  - Majority of site has been logged up until recent decades.
- Western half **reforested in mid-to-late 1940's**
- Eastern portion of the site
  - **Remnant mesic flatwoods**, **mesic upland forest**, and **sedge meadow**.
- A "Right-of-Way" (ROW)
  - Example of site **before reforestation occurred.**



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Plant Dominance – Memorial Forest

- Primarily **flatwoods** with large areas of **row-planted conifers,** and **sedge meadow** dominated by invasive purple loosestrife**.**
- **Mesic Flatwoods – Remnant** (Eastern portion of site)
  - Large mature **hickories** (*Carya* spp.), **swamp white oak** (*Quercus bicolor*), **silver maple** (*Acer sacchharinum*), **American beech** (*Fagus grandifolia*), and **black gum** (*Nyssa sylvatica*) that shade the forest floor.
  - **Woodland sedges** (*Carex* spp.), **blueberry shrubs** (*Vaccinium* spp.), **regal fern** (*Osmunda regalis*), **sensitive fern** (*Onoclea sensibilis*), and **cinnamon fern** (*Osmundastrum cinnamomeum*) dominate the understory.
- **Row-Planted Conifers** (Western portion of site)
  - Primarily **non-native red pine** (*Pinus resinosa*) and **eastern white pine** (*Pinus strobus*) with ferns and club mosses like **trailing ground pine** (*Diphasiastrum* digitatum) dominating much of the open ground.
  - Aging pine canopy
    - Invasive plants are likely to dominate open areas that have been more openly exposed to.
  - It was within portions of these recovering areas, however, that the **state endangered pipsissewa** (*Chimaphila umbellatta*) was located along with some **woodland sedges** (*Carex* spp.).


Cinnamon Fern
(*Osmundastrum cinnamomeum*)

Pipsissewa (*Chimaphila umbellata*) – **State Endangered**

- **Endangered woodland plant** that remains evergreen throughout all seasons.
- **Mill Pond Populations**
  - The tree canopy in this area of Memorial Forest is dense (85-90% cover) and predominantly oaks with minimal shrub understory. The herbaceous understory is fairly limited to scattered sedges and grasses with dense leaf litter.
  - The plants found on site are growing under a single highbush blueberry (*Vaccinium corymbosum*) with a barrier of fallen trees and branches, presumably limiting the herbivory of this species. **No other locations for this species have been found within the same site despite the efforts to find more.**
- **Direct Threats**
  - Herbivory may be a threat to pipsissewa at this site.
  - Decrease in canopy cover may lead to the spread of nearby bush honeysuckle.
  - Poor management practices could lead to decline, specifically, prescribed burning without creating a “fire line” around these individual populations.


Pipsissewa
(*Chimaphila umbellata*)

Plant Dominance Continued – Memorial Forest

- **Sedge Meadow**
  - Currently a dense monoculture of **purple loosestrife** with a layer of **spike rushes** (*Eleocharis* spp.) and **sedges** (*Carex* spp.) below.
  - Along the perimeter
    - **Swamp loosestrife** (*Decodon verticillatus*), **poison sumac**, and **buttonbush**, creating a dense wall of woody vegetation around the perimeter of much of the sedge meadow.

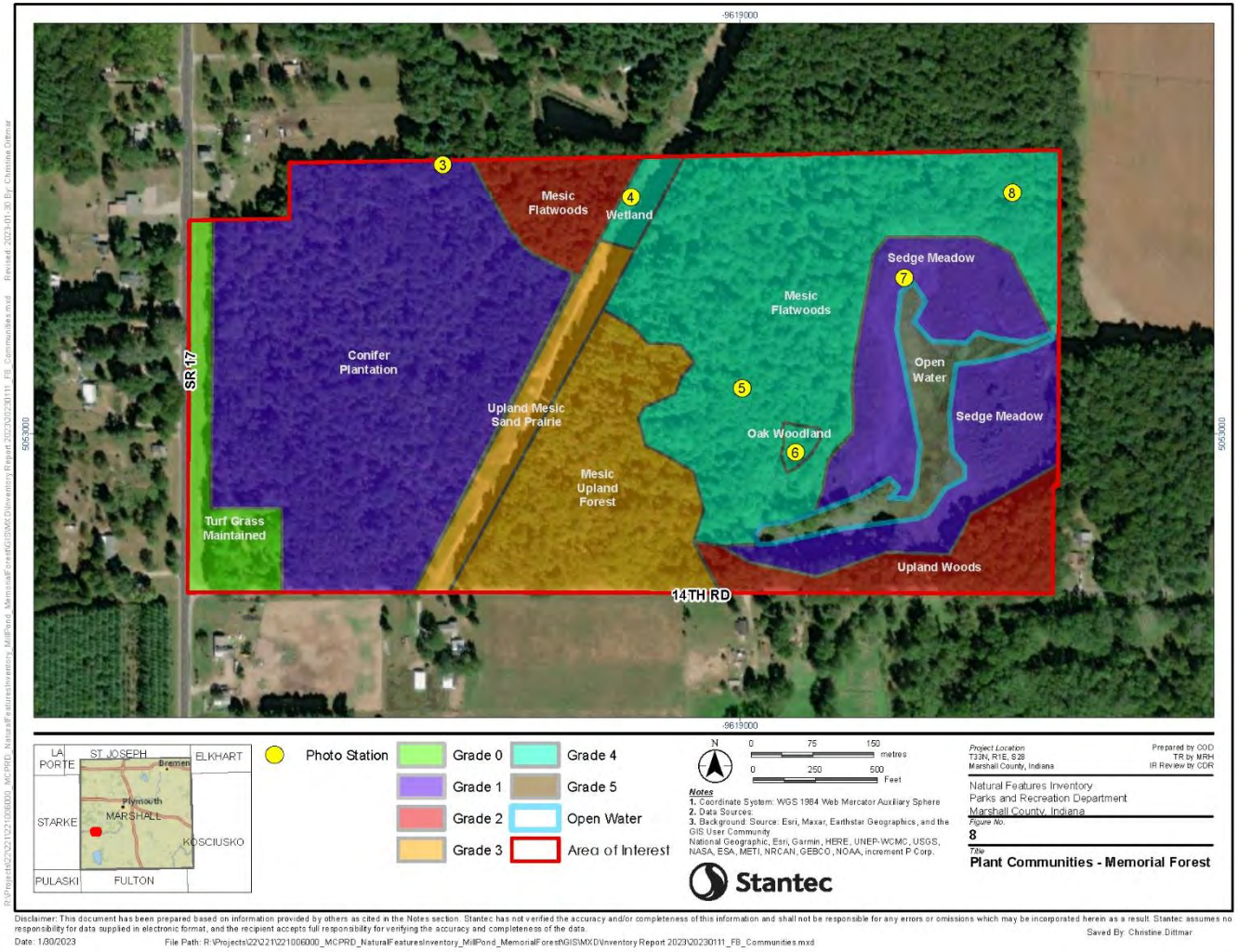

buttonbush
(*Cephalanthus occidentalis*)


Photo Station 7
Facing South


swamp loosestrife
(*Decodon verticillatus*)

Memorial Forest **Qualitative Assessment**. Figure 8

- **Conifer Plantation**
  - Mix Native/Non-Native pine plantings **Low Quality**
- **Mesic Flatwoods**
  - Mix of remnant hardwoods and native herbaceous community **High Quality**
- **Mesic Upland Forest**
  - Upland woodlands with history of logging **Moderately High Quality**
- **Sedge Meadow**
  - Imperiled plant community dominated by invasive plants **Low Quality**
- **Upland Mesic Sand Prairie**
  - ROW with primarily sandy soil dominated by mid-quality plants **Moderately High Quality**



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Memorial Forest **Qualitative Assessment** circa 1946

- **Conifer Plantation**
  - Mix Native/Non-Native pine plantings **Low Quality**
- **Mesic Flatwoods**
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- **Mesic Upland Forest**
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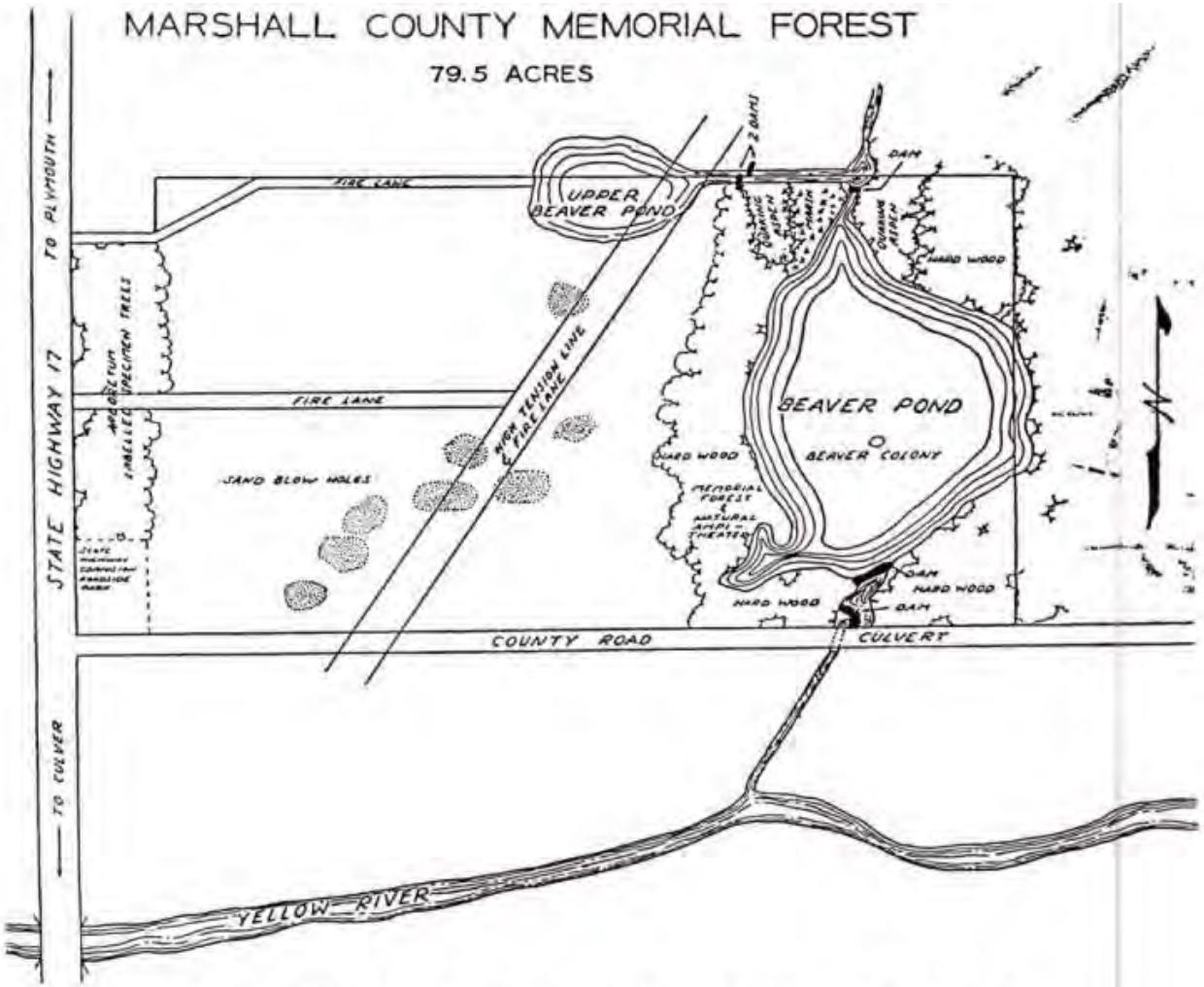

A map shows the forest at the time the time the article was written by Robert Kyle.

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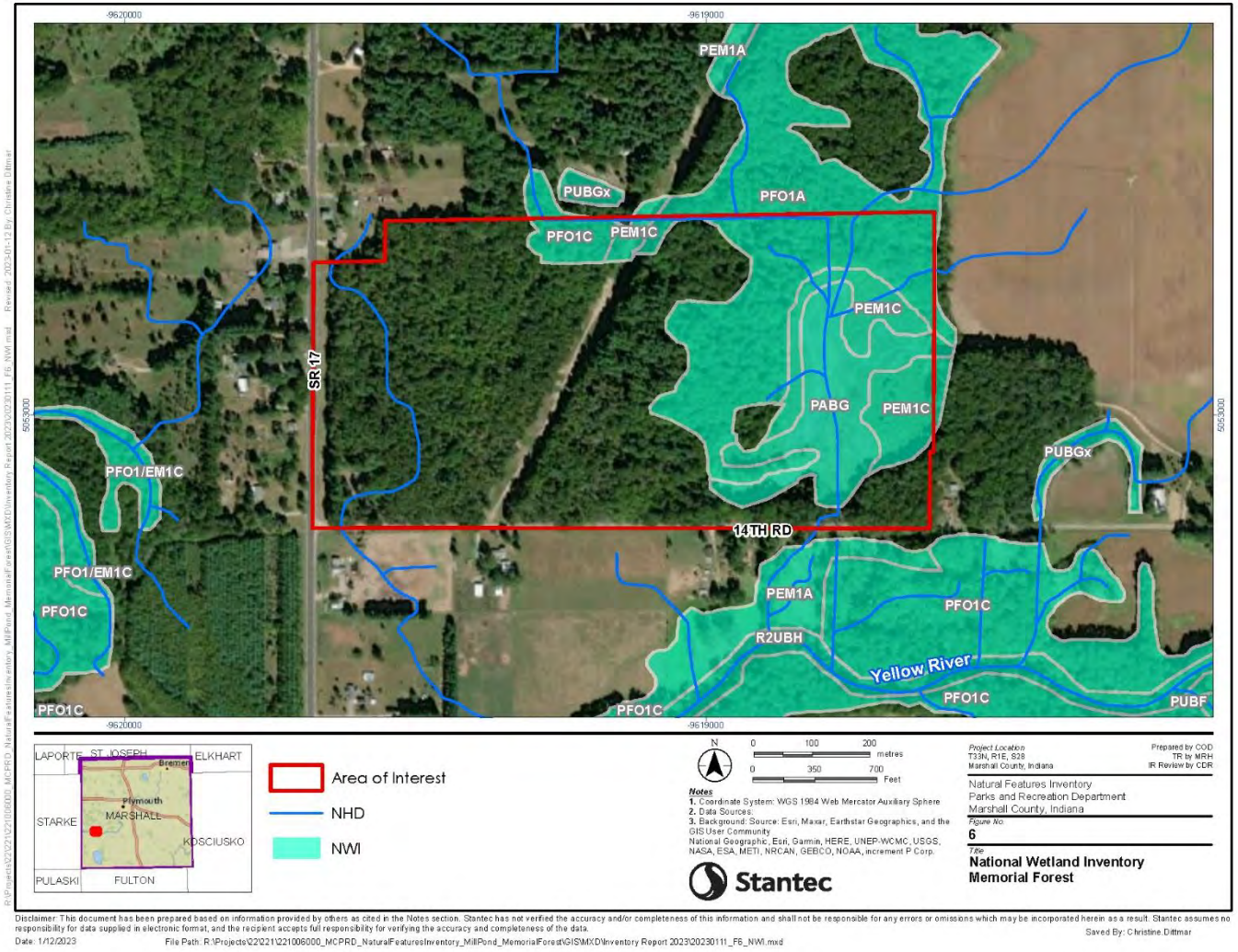
Memorial Forest **Qualitative Assessment**. Figure 6

> **Overall Qualitative Summary**

- The **mesic flatwoods** within the site are considered **remnant**
- The **conifer plantation** is low quality due to the aging and decaying conditions of the pine canopy
- The **sedge meadow** has the most potential to be the highest quality community within Memorial Forest

> **The Memorial Forest site ranges drastically from high quality to very low quality/imperiled**



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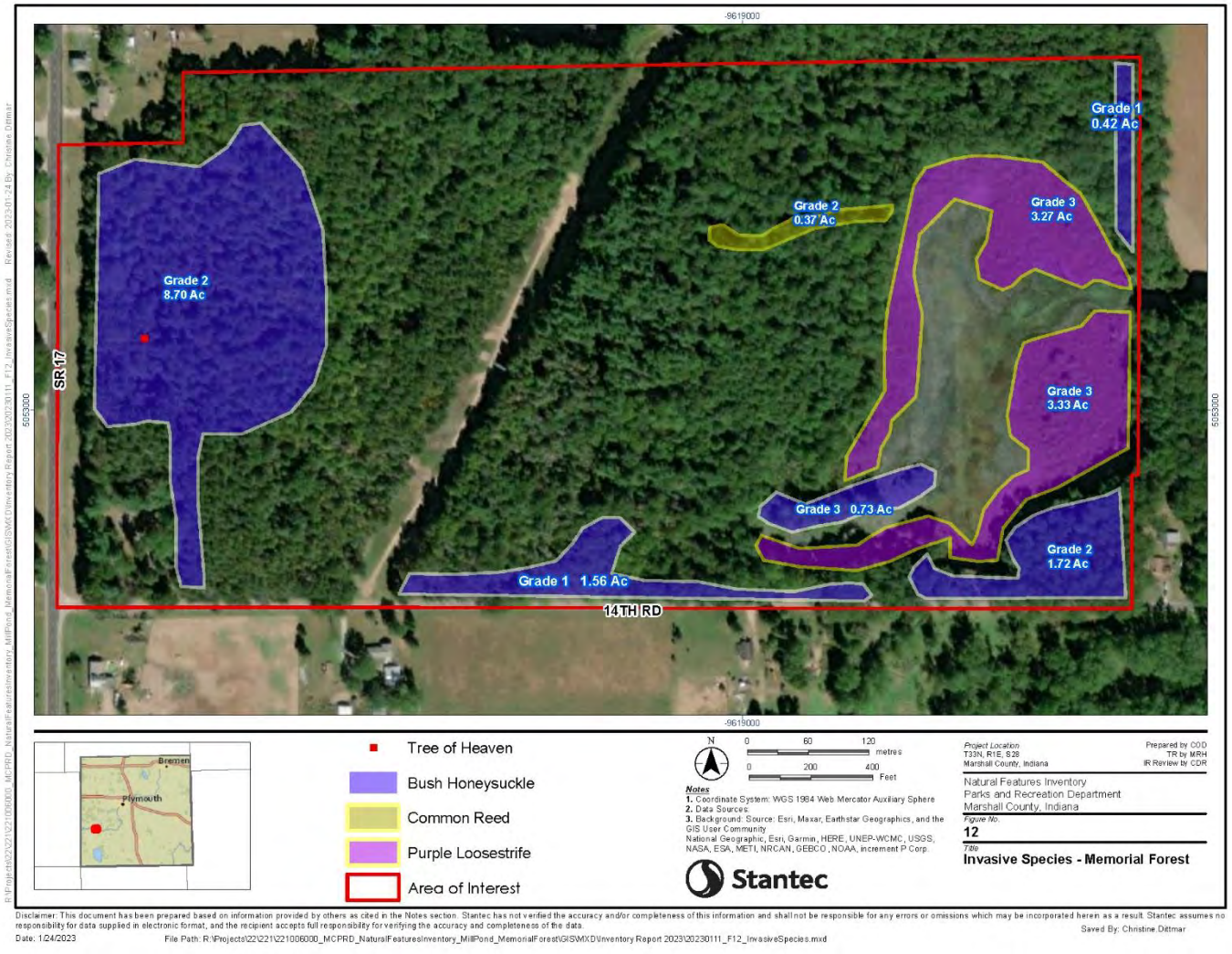
Biodiversity at Memorial Forest

- **Botanical Inventory Summary**
  - Total Plant Species Recorded: 314 (Native: 257, Non-native: 57)
- **Avian Inventory Summary** (MCPRD volunteers Carol Goodall & Mark Gidley)
  - Total Avian Species Recorded: 39 (Native: 39, Non-native: 0)
- **Herptile Inventory Summary**
  - Total Herptile Species Recorded (Reptile: 3, Amphibian: 4)

Ribbon Snake
(*Thamnophis saurita*)

Invasive Species Assessment – Memorial Forest. Figure 12

- **Purple loosestrife** within the sedge meadow and **bush honeysuckle** within the reforested conifer plantation *pose the greatest risks to management goals and natural ecosystems*.
  - The monoculture of **purple loosestrife** within the sedge meadow will require a multi-year management plan to eradicate the species.
- **Road edges** are at high risk for woody invasive plants within this site.
- A small population of **common reed** occurs within the Northeastern corner of the property along a small drainage outflow from the freshwater pond.



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Management Recommendations – Memorial Forest

> West of Right-of-Way

- **Conifer Plantation**
  - Less diversity, but soil regeneration occurring within southern potions of this plant community (pipsissewa, ferns, woodland sedges)
  - Future development of trails within this area should include preliminary surveys
  - If fire is applied to the landscape as a management method in the future, care should be taken to protect the evergreen pipsissewa, as regeneration is notably slow in this particular species.

> East of Right-of-Way

- **Sedge Meadow**
  - Plant community with highest potential for diversity.
  - Develop a purple loosestrife management plan to be implemented over the next several years, including aggressive application of herbicides and planting/seeding of affected area.
- **Mesic Flatwoods**
  - Generally invasive-free, with the exception of a small pocket of common reed.
  - Area considered remnant and therefore should be managed as a mature community where general invasive plant control is conducted annually.

Prescribed Fire at Memorial Forest

- Aid in **invasive control**, chemicals still necessary for resprouts
  - In conifer plantation and sedge meadow
- Overall benefit by **reduction of**:
  - Fire intolerant woody species
  - Removal of excess leaf litter and organic material
  - Fire management in red pine heavy areas
- **Smaller intensity controlled burns** in mosaic within conifers

- *Protect the evergreen pipsissewa, as regeneration is notably slow in this particular species.*
- *Careful timing around eastern box turtle hibernation*

Thank you

For more information

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Questions?

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