

Draft Wildlife Habitat Management Plan Unit 4

Updated March 19, 2016

Location: Unit 4 occupies most of T2S, R1E section 2. The east boundary is the east section line of section 2. Neighbors to the east are Unit 6, Quality Hardwoods and the State of Michigan. The south border is Unit 6, and Seymour Road. West boundary is Unit 1 and Unit 2. The north boundary is the north line of Section 2 and Unit 5. Zone 4 owns the drive along the north side of Section 2.

Size: 475- 480 acres

Soil Types: See Figure 1. Unit 4 soil map.

Soil Name	Acres	Percent
14B Spinks sand	2.4	0.5
14D Spinks sand	1.1	0.2
18 Gilford-Colwood	6.1	1.3
20 Houghton muck	62.8	13.8
30 Edwards muck ~28", substrate marl	82.0	17.0
35B Arkport-Okee loamy sand	2.4	0.5
37 Palms muck	51.6	10.7
43A Dixboro sandy loam	1.1	0.2
45 Martisco muck ~8", substrate marl	25.7	5.3
47 Histosols & Aquents	238.7	49.4
63 Henrietta muck	3.5	0.7
W Water	1.9	0.4
Total	479.7	100.0

Presettlement Vegetation:

Inland Wet Prairie

Emergent Marsh

See *A Conservation Assessment of the Phyllis Haehnle Memorial Sanctuary*, Presettlement Vegetation Map.

Current Cover Types: See Figure 2. Unit 4 vegetation cover map.

Cover Type	Acres	Percent
Emergent marsh	173	36
Wetland shrub	198	42
Aquatic bed	79	17
Wetland forest	13	3
Oak forest	11	2
Beech forest	2	<1
Lake	1	<1
Total	477	100

Human Impacts: Mud Lake became Mud Lake Marsh (MLM) when water levels were lowered about 4 feet after construction of the Portage River Drain in 1920-21. A network of ditches and drain tile made farming possible in the north part of Unit 4. Casper Haehnle constructed two dams in Unit 4.05: 1) was referred to as "Old Dam" that was downstream from the northwest corner of Unit 4.13 (42.32987^o and -84.28454^o) and 2) another was called "New Dam" is about 1,500 feet further downstream (42.3304^o and -84.28687^o). Both are labeled on a 1944 Michigan Department Conservation map. Halbeisen dredged a pond in the southeast corner of Unit 4.13.

Michigan Audubon acquired the land in this unit from six sources: 1) most of the land was donated by Casper Haehnle in 1955, 2) about 40 acres is part of the purchase of 160 acres from Charles Wipfler in

1963, 3) purchase of 0.5 acre from Russell and Dorothy Morton in 1966, 4) purchase of 30 acres from Arrow and Cartridge, Inc. (Halbeisen) in 1971, 5) purchase of 2.5 acres from Richard and Betty Jo Knechtges in 1977, and 6) purchase and land exchange of 45 acres from the State of Michigan in 1994. Two small parcels north of Seymour Road in Unit 4.25 are not owned by Michigan Audubon: 1) 0.25 acres by Josephine Krezeczkowski, and 2) 0.10 acres by Leland and Mary Shinnaberry. Both of these parcels are part of larger holdings on the south side of Seymour Road.

Eight trumpeter swans that were released in MLM in 1991 ingested lead shot. One died from lead poisoning, one disappeared and six were removed from the sanctuary. The gizzard of the dead swan contained 241 lead pellets and the six swans that were removed had between 0 and 30 pellets. No hunting had been allowed in most of MLM since 1955.

The northeast part of Unit 4 is enrolled in the Wetland Reserve Program.

Unit 4 Goals and Objectives

- 1.00 Conserve the native flora and fauna at the sanctuary, especially Sandhill Cranes.
 - 1.03 Restore water levels to elevations that occurred prior to construction of the Portage Drain.
 - 1.04 Restore, enhance and maintain native biotic communities i.e. grasslands, savannahs, fens, and wetlands.
 - 1.05 Manage individual native plants and animals.
 - 1.07 Reduce invasive plants and animals.
- 2.00 Increase public understanding of the sanctuary, its wildlife and environment.
 - 2.03 Provide opportunities for self-guided wildlife viewing.

Unit 4.01 Oak Woods

Size: 7 acres

Soil: 35B Arkport-Okee loamy sand, 43A Dixboro sandy loam

Vegetation: White oak, black oak, wild black cherry and spicebush are common.

Human Impact: Part of the drive/nature trail passes through this unit.

Objectives and Actions:

- 1.04 Restore, enhance and maintain dry-mesic hardwood biotic community.
 - 1.04a Protection management is prescribed. No active management is needed at this time.
- 2.03 Provide opportunities for self-guided wildlife viewing and understanding the environment.
 - 2.03a Trim and chemically treat stumps of brush encroaching on the drive. Ongoing
 - 2.03b Mow drive/nature trail several times a year. Ongoing
 - 2.03c Establish a nature trail with educational stations. Completed 2006
 - 2.03d Maintain nature trail signs and benches. Ongoing

Units 4.02 - 4.04 Prairie Fen Also see Management Plan for Bogus Lake Fen

Unit	Size (Ac.)	Soil Type	Vegetation Zone	Dominant Plants
4.02	47.6	Gilford-Colwood, Edwards muck, Palms muck, Martisco muck	Wetland Shrub-tree	Glossy buckthorn monoculture
4.03	11.1	Edwards muck, Martisco muck	Sedge Meadow	Shrubby cinquefoil
4.04	1.31	Water	Inundated Flat	Hardstem bulrush
Total	60.0			

Palms muck often includes small areas of poorly drained Edwards muck which are included in the Edwards muck acreage. Soils adjacent to the fen include: Houghton muck, and Histosols and Aquents, ponded.

Presettlement Vegetation: Inland Wet Prairie

Current Rare Animals: Several Threatened (T) and Special Concern (SC) species that are associated with fens have been seen at the Haehnle Sanctuary, but none of them have been recorded in the Bogus Lake Fen. They include barrens buckmoth (SC), Blanding's turtle (SC), eastern massasauga (SC) and northern harrier (SC).

Human Impacts: Dredging the Portage River in 1921-22 and subsequent construction of ditches and sub-surface drain tile lines lowered water levels. Fires started by lighting, native Americans and later the early European settlers suppressed wood plants. In recent times fire has been eliminated from this area. Invasive plants, especially glossy buckthorn, have invaded the Bogus Lake Fen as a result of disrupted hydrology and fire suppression.

That part of the fen in Section 2 was donated to Michigan Audubon by Casper Haehnle in 1955. Michigan Audubon purchased the small acreage of the fen in Section 3 from Charles Wipfler in 1963.

Objectives and Actions:

3.01 Maintain an inventory of plants, insects, fish, amphibians, reptiles, birds and mammals. Most of these surveys are outside the restoration area so they are different from the management action 1.04e prescribed below.

3.01a Conduct a plant survey along 100-meter transect from stake 4.03 -to stake 4.04. Needs to be implemented.

3.01b Continue to conduct bird point counts at 4.03 stake. Unfortunately, stake 4.03 is near the edge of the fen so birds recorded here include ones from several biotic communities. Ongoing

3.01c Take panoramic photos at 4.04 stake. Ongoing.

3.01d Continue conduct butterfly surveys along Transect F. Ongoing

Objectives and Actions Unit 4.02:

1.04 Restore, enhance and maintain prairie fen biotic communities i.e. grasslands, savannahs, oak forests, and wetlands.

1.04a Cut(grind) glossy buckthorn beginning at the southern part of the fen in the area of Martisco muck. Begun in 2015.

1.04b Apply herbicides (e.g. Garlon 3) in fall to suppress glossy buckthorn after natives have gone dominant. Begun in 2015.

1.04c. Burn every 3-5 years, or as needed to encourage native plants. Needs to be implemented.

1.04d Once glossy buckthorn has been reduced, consider planting native species normally found in fens.

1.04e Annually, monitor and evaluate results of management actions to restore the fen, including panoramic photos, maintain a list of plants, Lepidoptera, and vertebrates in the management area before and after management actions. Needs to be implemented.

2.02 Provide educational materials.

2.02a Write articles for newsletters about fens and restoration efforts. Ongoing.

2.02b Develop an display in the kiosk about fens and restoration efforts. Ongoing.

2.03 Provide opportunities for self-guided wildlife viewing.

2.03a. Add an informational station about fens where restoration work in the fen can be seen from the nature trail.

Unit 4.05 Mud Lake Marsh Outlet

Size: 34 acres

Soil: 47 Histosols and Aquents, 20 Houghton muck, stream

Water: A small stream flows north out of MLM. Bottom elevations in the channel ranged from 906.9 ft. at edge of Unit 4.13 (42.32840⁰ -84.28430⁰) to 908.0 ft. just upstream from the beaver dam (42.32957⁰ -84.28461⁰)

Vegetation: Sedges, cattail, and bulrush are common. South half of this Unit and Unit 4.08 are dominated by hybrid cattails, reducing outflow from MLM. Cattails had significantly encroached over 500 ft. of the outlet upstream from the beaver dam by the fall of 2014.

Animals: A beaver dam was discovered April 17, 2014 at 42.32957 -84.28461. It was removed during August, 2014 and the beaver did not repair it.

Human Impact: Two historic dams were constructed by previous land owners to control the water level of Mud Lake Marsh (see Human Impact Unit 4).

Threats: Cattails have reduced biodiversity.

Objectives and Actions:

1.03 Restore water levels to elevations that occurred prior to construction of the Portage Drain.

1.03a Allow water levels to rise due to beaver, siltation and vegetation. No action required.

1.04 Restore, enhance and maintain an emergent marsh biotic community.

1.04a Burn area south of the beaver dam every 3-5 years, or as needed to reduce invasive cattails. Needs to be implemented.

Unit 4.06 Wetland Shrub

Size: 96 acres

Soil: 20 Houghton muck, 37 Palms muck

Vegetation: Silky dogwood, red osier dogwood, willow, aspen, and sedges are common.

Human Impact: Minimal

Objectives and Actions:

1.04 Restore, enhance and maintain emergent marsh biotic community. Fire would help to suppress wood plant, but it would be hard to control. No action is recommended.

Units part of 4.05, 4.07 - 4.20 Mud Lake Marsh (overview)

Mud Lake marsh is the center piece of the sanctuary. The birds attracted to it, especially sandhill cranes, are the main attraction of the Phyllis Haehnle Sanctuary. Its importance is stated in Goal 1.00 Conserve the native flora and fauna at the sanctuary, especially sandhill cranes.

Size: 196 acres

Soil: 47 Histosols and Aquents

Human Impact and Threats: The four main threats to Mud Lake marsh are:

1. Purple loosestrife - This nonnative, invasive plant has become common in Unit 4.14, Unit 4.09 and is growing in other areas of Mud Lake Marsh.

2. Narrow-leaved cattail (*Typha angustifolia*) and hybrid cattail (*T. x glauca*) - Dense, monotype stands of these nonnative, invasive plants dominate Units 4.08, 4.09, part of 4.15, 4.16 and 4.19.

3. Fluctuating water levels - Cycles of variable water levels are a normal part of emergent marshes. However during 2008, 2009, 2011, 2013 and 2014 water levels in Mud Lake marsh were elevated for prolonged periods because the Portage River Drain could not accommodate runoff in the watershed and reduced flow in the outlet. Water was too deep for sandhill cranes to roost in the fall and cattail increased crowding out other vegetation.

4. Lead poisoning (see above)

Vegetation: These cover types are group together based on soil type and that they are mostly within the boundary of the "approximate old shore line" (elevation 910.2 feet) of Mud Lake indicated on the 1944 Michigan Conservation map. Unit 4.

Unit	Size (Ac.)	Cover Type	Species
4.05	~5	Emergent Marsh	Cattail monotype (only part of 4.05 included)
4.07	1	Aquatic Bed	Needs field verification
4.08	7	Emergent Marsh	Cattail monotype
4.09	14	Emergent Marsh	Cattail, bulrush, purple loosestrife, buttonbush
4.10	4	Emergent Marsh	Buttonbush, bulrush, swamp loosestrife
4.11	1	Wetland Shrub	Buttonbush
4.12	2	Wetland Shrub	Buttonbush, bulrush, swamp loosestrife, red maple
4.13	76	Aquatic Bed	Yellow water lily, pondweed, wild rice
4.14	3	Emergent Marsh	Swamp loosestrife
4.15	18	Emergent Marsh	Cattail, purple loosestrife
4.16	33	Emergent Marsh	Cattail monotype
4.17	7	Emergent Marsh	Needs field verification
4.18	12	Emergent Marsh	Bulrush
4.19	9	Emergent Marsh	Cattail monotype
4.20	4	Emergent Marsh	Bulrush

Total 196

Objectives and Actions:

- 1.03 Restore water levels to elevations that occurred prior to construction of the Portage Drain.
- 1.04 Restore, enhance and maintain emergent marsh biotic community. Prescribed actions are restricted because of the size of the unit, cost, and laws regulating wetlands limit the use of fire and water control structures.
 - 1.04a Use a water level gauge to monitor water levels in Unit 4.13, Halbeisen dugout. Ongoing
 - 1.04b. Use aerial photos to monitor changes in the size of plant communities. Ongoing
- 1.05 Establish a nesting pair of Osprey.
 - 1.05a Erect an Osprey nest platform. Completed winter, 1985
 - 1.05b Maintain the nest platform. Repaired winter, 2007
- 1.07 Reduce invasive plants and animals.
 - 1.07a. Introduce purple loosestrife-eating species of beetles. Completed 2011
 - 1.07b Monitor for presences purple loosestrife-eating species of beetles. Ongoing
 - 1.07c Use aerial photos to monitor changes in the size of cattail stands. Ongoing

Unit 4.08 Emergent Marsh

Size: 7 acres

Soil: 47 Histosols and Aquents

Vegetation: A monotype of cattails

Animals: A beaver lodge made of cattails was found December 15, 2014 at 42.32774⁰ and -84.28328⁰. What was believed to beaver scat was also found in the Unit.

Human Impact: Minimal

Threats: Invasive cattails have reduced biodiversity.

Objectives and Actions:

- 1.04 Restore, enhance and maintain emergent marsh biotic community.
 - 1.04a Burn every 3-5 years, or as needed to reduce invasive cattails. Needs to be implemented

Unit 4.09 Emergent Marsh

Size: 14 acres

Soil: 47 Histosols and Aquents

Vegetation: Cattails are dominant, bulrush, water willow, sedges present.

Animals: Least bittern (Threatened) , American bittern, (Special Concern) Virginia rail, sora rail, and common moorhen (Threatened) are noteworthy species found in this Unit.

Human Impact: Minimal

Threats: Invasive cattails have reduced biodiversity and the amount of edge. Without management this Unit will become a monotype of cattails.

Objectives and Actions:

1.04 Restore, enhance and maintain emergent marsh biotic community.

1.04a Burn every 3-5 years, or as needed to reduce invasive cattails. Needs to be implemented.

1.04b Apply herbicides as needed to reduce invasive cattails. Needs to be implemented.

Unit 4.10 Wetland Shrub/ Emergent Marsh

Size: 4 acres

Elevation: 909.1 - 909.3 ft.

Soil: 47 Histosols and Aquents

Vegetation:

- Edge - buttonbush is dominant, present bulrush, willow, water-willow
- Interior - *Carex sp.*, ?blue-joint grass, purple loosestrife

Animals:

- Beaver have eaten some of the willow but not the buttonbush.
- Large numbers of sandhill cranes roost in the open water around Unit 4.10 during the fall when water levels are at or below 908.8 ft. Water levels in 2009, 2011, 2013 and 2014 averaged 909.3 during November.

Human Impact: none

Threats: Absences of fire has resulted in woody plants replacing herbaceous plants.

Objectives and Actions:

1.04 Restore, enhance and maintain an emergent marsh biotic community. This will also improve fall sandhill crane roosting habitat (Objective 1.05 Manage native animals, sandhill cranes.).

1.04 a Cut brush. Accomplished March 4, 2015.

1.04b. Burn Unit early late fall to suppress woody plants. Needs to be implemented

1.04b Burn every 3 - 5 years would to suppress woody plants. Needs to be implemented.

1.04c May need to apply herbicides to suppress buttonbush if burning does not suppress woody vegetation . Needs to be implemented.

Unit 4.13 Aquatic Bed

Size: 76 acres

Soil: 47 Histosols and Aquents, marl

Water: Known bottom elevations range from 905.8 ft in old river channels to 908.3 in shallower areas in the northeast part of the unit.

Vegetation: Wild rice is dominant in some areas forming a dense mat, also present yellow water lily, pondweeds, muskgrass, spadder dock, water lily, duckweed

Animals:

- Large numbers of sandhill cranes roost in the open water around Unit 4.10 during the fall when water levels at or below 908.8 ft.
- Large numbers of waterfowl are attracted to the open water and wild rice.

Human Impact: This unit is suspected to be the site where the trumpeter swans ingested lead pellets.

Threats: Lead pellets

Objectives and Actions:

1.03 Restore water levels to elevations that occurred prior to construction of the Portage Drain.

1.03a Allow water levels to rise due to beaver, siltation and vegetation. No action required.

1.04 Restore, enhance and maintain aquatic bed biotic community.

No action recommended at this time.

Unit 4.21 Fen

Size: 12 acres An additional 4 acres of the fen are privately owned.

Soil: 45 Martisco muck ~8", substrate marl

Vegetation: Shrubby cinquefoil was dominant until 2011 when narrow-leaved cattail began to take over. Sedges, bulrushes and cattails common. White lady's slipper was found in 1984, but deer apparently destroyed the plants. Zone of cattails along south side.

Human Impact: A pond dug in Unit 4.13 by Halbeisen prior to acquisition by Michigan Audubon remains with shrubby cinquefoil growing on spoil.

Objectives and Actions:

1.04 Restore, enhance and maintain fen biotic community.

1.04a Use transects to monitor and evaluate vegetation. Needs to be implemented.

Unit 4.22 Wetland Shrub

Size: 33 acres

Soil: 30 Edwards muck, 20 Houghton muck, 37 Palms muck

Vegetation: In wetter areas silky dogwood, buttonbush, winterberry, nannyberry, reed canary grass and sedges are common. In drier parts red maple, spicebush, poison sumac, skunk cabbage and wild black cherry are common. Eastern part of this unit maybe degraded fen.

Human Impact: Corner post for southwest corner of SE1/4 of section 2 was recently established with a metal marker.

Objectives and Actions:

1.04 Restore, enhance and maintain wetland forest community. No action is recommended.

Unit 4.23 Tamarack Swamp (Relict Conifer Swamp)

Size: 8 acres

Soil: 20 Houghton muck, A small intermittent stream flows through the unit into Mud Lake Marsh.

Vegetation: Most of the tamarack trees are dead or dying. Yellow birch, tulip tree, red maple, spicebush and skunk cabbage are now common.

Human Impact: None

Objectives and Actions:

1.04 Restore, enhance and maintain tamarack swamp community. No action is recommended.

Unit 4.24 Beech Forest

Size: 2 acres

Soil: 14D Spinks sand

Vegetation: Mature beech and tuliptrees are dominate. No sugar maples have been found in this unit.

Human Impact: None

Objectives and Actions:

1.04 Restore, enhance and maintain beech maple forest community. No action is recommended.

Unit 4.25 Oak Forest

Size: 3.5 acres

Soil: 14b Spinks sand

Vegetation: White oak, wild black cherry, and black oak are common. Black walnut, flowering dogwood, autumn olive are present.

Human Impact: 0.35 acres of this unit is not owned by Michigan Audubon.

Objectives and Actions:

1.04 Restore, enhance and maintain oak forest community. No action is recommended.

Unit 4.26 Eagle Lake

Size: 0.6 acres

Soil: Water

Vegetation: Mostly sand bottom

Human Impact: None

Objectives and Actions:

1.04 Restore, enhance and maintain shallow lake community. No action is recommended.

Unit 4.27 Emergent Marsh

Size: 17 acres

Soil: 30 Edwards muck

Vegetation: Sedges, reed canary grass

Human Impact: None

Objectives and Actions:

1.04 Restore, enhance and maintain emergent marsh community. No action is recommended.

Unit 4.28 Emergent Marsh

Size: 14 acres

Soil: 20 Houghton muck, 30 Edwards muck

Vegetation: Sedges, reed canary grass

Human Impact: An old ditch drained part of the unit which was once farmed.

Objectives and Actions:

1.04 Restore, enhance and maintain emergent marsh community. No action is recommended.

Table 1. Five-year schedule for performing management actions.

Action	Description	Season of Year				
		2012	2013	2014	2015	2016
Unit 4.01 Oak Woods (see Unit 2.04)						
2.03a	Cut & treat with herbicide brush along drive	sp, su	sp, su	sp, su	sp, su	sp, su
2.03b	Mow drive as needed	su	su	su	su	su
2.03d	Maintain nature trail signs, benches	all	all	all	all	all
Unit 4.02 Degraded Fen Wooded Zone (1 acre)						
1.07a	Cut glossy buckthorn & treat stumps with herbicide	w				
1.07b	Spot spray glossy buckthorn with herbicide		s	s		
1.07c	Burn plot every 3-5 years				sp	
1.07d	Use photos & transect to monitor vegetation	s	s	s	s	s
2.03a	Develop educational signage along nature trail		sp			
Units 4.07-4.20 Mud Lake Marsh						
1.04a	Use water level gauge to monitor water levels 4.13	all	all	all	all	all
1.04b	Use aerial photos to monitor size of plant communities	w		w		w
1.07b	Monitor presences of loosestrife beetles	s	s	s	s	s
Unit 4.21 Fen						
1.04a	Use transects to monitor vegetation	s		s		s
Number of actions		9	8	9	7	8

all - all seasons, f - fall, sp - spring, su - summer, w - winter

December 16, 2014 Some parts updated.

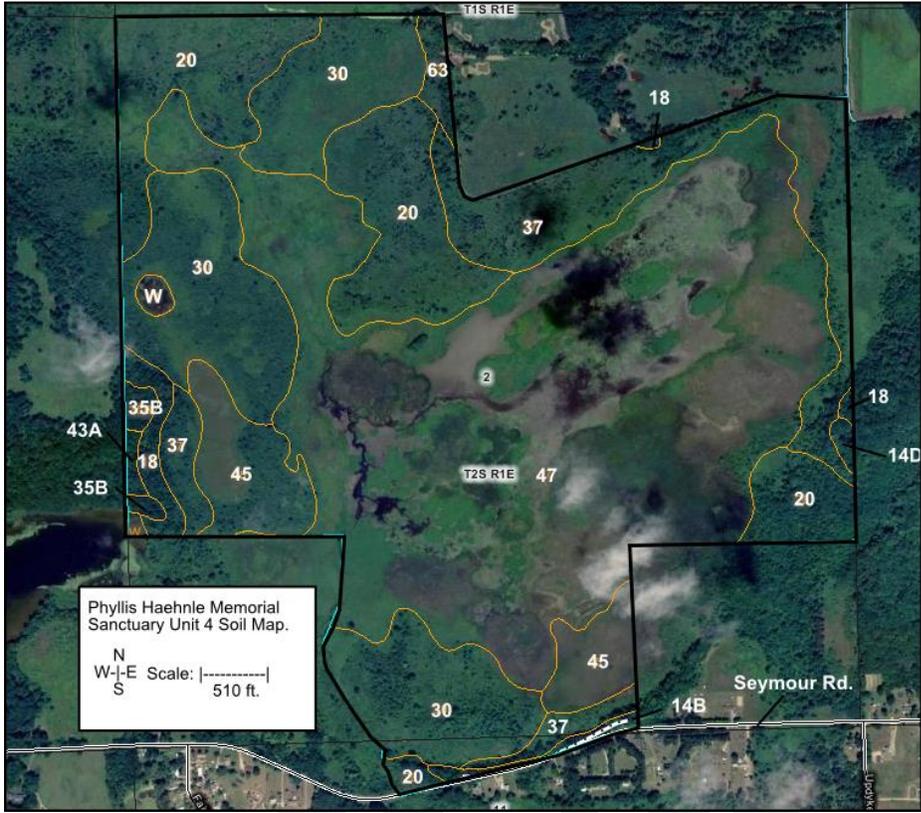


Figure 1. Unit 4 soil map.

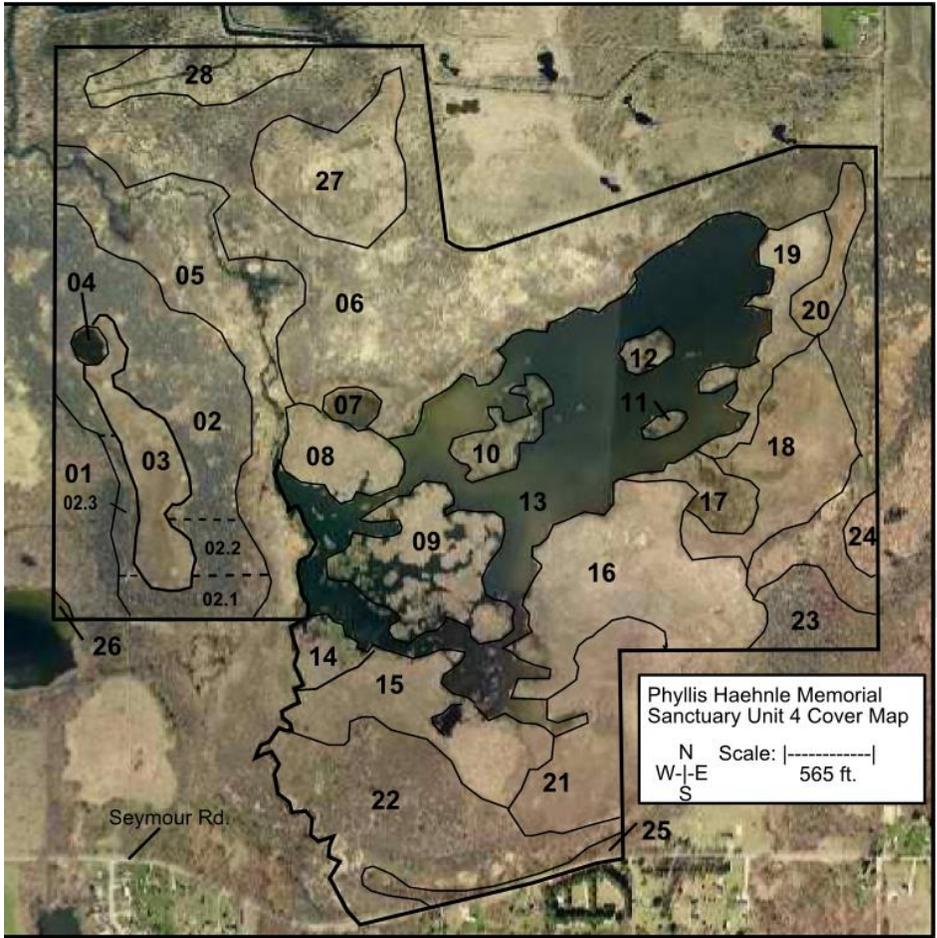


Figure 2. Unit 4 Vegetation cover map.