V. WILDLIFE HABITAT MANAGEMENT UNIT 3

Revision/Review History
Updated July 25, 2012, Undated by Ron Hoffman March 18, 2016

Location: Unit 3 is located in the northwest part of the sanctuary T2S, R1E, west ½ of section 3. Wooster Road forms the west boundary, George Harvey and Judy Cory's property the south boundary, an arbitrary line following the tree line forms the east boundary with Unit 2, landowners Daniel C. and Sylvia G. Wymer, and Charles A. and Charles F Morton property north of Unit 3.16 , Marshall Johnson land north of Unit 3.17, and Zone 4 land north of Unit 3.18.
Size: ~180 acres
Soil Types: See Figure 1. Unit 3 soil map.

Soil Name	Acre	Percent
18 Gilford-Colwood	27.2	15.1
22 Cohoctah fine sand	0.6	0.4
35B Arkport-Okee loamy fine sand, 2-6% slope	1.9	1.0
37 Palms muck	38.2	21.3
43A Dixboro very fine sandy loam	5.3	2.9
49B Hillsdale-Riddles sandy loam	3.0	1.7
55 Eleva sandy loam	17.5	9.7
63 Henrietta muck	79.9	44.4
W Water	6.1	3.4
	179.7	100.0

Presettlement Vegetation:
Oak Hardwood Forest
Emergent Marsh
(See Presettlement Vegetation Map in *Concept of Management for the Phyllis Haehnle Memorial Sanctuary)*
Current Cover Types: (see Figure 2. Unit 3 vegetation cover type map.

Cover Type	%	Acres
Emergent marsh	67	123
Upland grass	10	17
Wetland shrub	7	11
Oak forest	5	9
Wetland forest	5	8
Portage River	3	6
Upland scrub	3	5
		179

Human Impacts: Man -made features include the Wetland and Grassland Demonstration Site, a Wetland Reserve Program (WRP) restoration area, parking lot, two vehicle trails and the Portage River Drain. The demonstration site includes a large sign, an informational kiosk, and a trail leading to a dug pond. The WRP project includes two water control structures, an emergency spillway, dike repair, and 5 dug ponds. Vehicle drives parallel the Portage River Drain, one on the north side and one on the south. Gates at Wooster Road restrict access to the drives. Remains of farming include ditches, drain tile, a well, and piles of stones. The Portage River was deepened and channeled in 1920-21 and renamed the Portage River Drain. The original Portage River bed is the boundary between Leoni and Henrietta Townships. Wood duck nest boxes and small bird nest boxes are located in the unit.

Judy Cory donated much of the land in this unit to Michigan Audubon in 1986. Michigan Audubon purchased Units 3.01 - 3.08 (35 ac) from Smith family for $202,798.00 in June, 2001. August 2,

2001, 6 acres mostly in Unit 3.16 and a small part in 3.14 and 3.15 were purchased from Albert and Linda Cole for $10,429.54 using a grant from Ducks Unlimited. March 11, 2003, Zone 4 donated 9 acres of Unit 3.14 to MAS in exchange for deer hunting rights in Unit 2.08.

Much of Unit 3 is enrolled in the Wetland Reserve Program (WRP) in 2001. Land use of Units 3.08 - 3.15 and 3.18 are restricted by conditions of WRP.

Unit 3 Goals and Objectives

1.00 Conserve the native flora and fauna at the sanctuary, especially Sandhill Cranes.
- 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 their environment.
- 2.01 Conduct guided tours.
- 2.02 Provide educational materials.
- 2.03 Provide opportunities for self-guided wildlife viewing.

3.00 Increase scientific knowledge of wildlife and their environment through research.
- 3.02 Permit scientific studies of wildlife.

Unit 3.01 Smith West Grassland

Size: 8 acres

Soil: 55B Eleva, sandy loam, bedrock is close to the surface in northwest part of the unit.

Vegetation: Big bluestem is dominant. Indian grass, and various forbs present. Multiflora rose and autumn olive widely.

Human Impact: Row crops were grown for several years, beans being the last in 2000. Small parking lot is in northwest corner.

Objectives and Actions:

1.04 Restore, enhance and maintain a grassland biotic community.
- 1.04a Prepare the site for planting native warm season grasses (NWSG) and forbs. No preparation was needed because of herbicides used in the previous farming operation.
- 1.04b1 Plant native warm season grasses and forbs. Completed 2001-2007
- 1.04b2 Because part of Unit 3.01was accidentally sprayed with a herbicide in 2011, the affected area was replanted with NWSG and forbs with a no-till drill. Completed June 27, 2012

- 1.04c Burn the grassland every 3 – 5 years, or as needed to control woody plant invasion. Ongoing
- 1.04d Spot spray woody plants with herbicides. Ongoing
- 1.04e Use transects to monitor and evaluate grassland annually. Needs to be implemented
- 1.04f Use point count to monitor bird abundance. Needs to be implemented

2.03 Provide opportunities for self-guided wildlife viewing at a Grassland and Wetland Demonstration Site.
- 2.03a Construct a parking lot. Completed
- 2.03b Maintain parking lot. Ongoing

Unit 3.02 Smith Middle Grassland

Size: 6 acres

Soil: 55B Eleva, sandy loam and 43A Dixboro very fine sandy loam

Vegetation: Little bluestem dominant, multiflora rose and autumn olive widely scattered.

Human Impact: Once farmed, but weeds and grass were dominate prior to 2000.

Objectives and Actions:

1.04 Restore, enhance and maintain a grassland biotic community.
- 1.04a Prepare the site for planting warm season grasses and forbs. Completed 2004
- 1.04b1 Plant NWSG and forbs. Completed 2005

1.04b2 Because part of Unit 3.02was accidentally sprayed with a herbicide in 2011, the affected area was replanted with NWSG and forbs with a no-till drill. Leave 20-ft fire break planted to clover along Unit 3.05. Completed June 27, 2012

1.04c Burn the grassland every 3 – 5 years, or as needed to control woody plant invasion. Ongoing
1.04d Spot spray woody plants with herbicides. Ongoing
1.04e Use transects to monitor and evaluate grassland annually. Needs to be implemented
1.04f Use point count to monitor bird abundance. Needs to be implemented
1.05 Manage individual plant and animals.
1.05a Maintain honey bee hives. Ongoing

Unit 3.03 Smith East Grassland
Size: 3.4 acres
Soil: Hillsdale-Riddles, sandy loam
Vegetation: Little bluestem dominant
Human Impact: Farmed until 1999.
Objectives and Actions:
1.04 Restore, enhance and maintain a grassland biotic community.
1.04a Prepare the site for planting warm season grasses and forbs. Completed 2004
1.04b1 Plant NWSG and forbs. Completed 2005
1.04b2 Because part of Unit 3.01was accidentally sprayed with a herbicide in 2011, the affected area was replanted with NWSG and forbs with a no-till drill. Completed June 27, 2012
1.04c Burn the grassland every 3 – 5 years, or as needed to control woody plant invasion. Ongoing
1.04d Spot spray woody plants with herbicides. Ongoing
1.04e Use transects to monitor and evaluate grassland annually. Needs to be implemented

Units 3.04 Old Field
Size: 4.0 acres
Soil: 18 Gilford-Colwood Complex, black fine sandy loam, wet
Vegetation: Sapling size willow dominant.
Human Impact: Farmed until 1999.
Present Vegetation: Late stage old field with grass, autumn olive, multiflora rose, and willow common. One white birch present North part is wetter and dominated by reed canary grass.
Objectives and Actions:
1.04 Restore, enhance and maintain grassland in west part and shrub community in east part. The whole unit was originally recommended to be managed as a grassland community, but based on monitoring report only part can be managed as a grassland unless excessive effort is used.
1.04a Burn the west part every 3 – 5 years, or as needed to control woody plant invasion. Ongoing
1.04b Spot spray woody plants with herbicides. Ongoing
1.04c Use site survey to monitor size of woody plant stand. Ongoing

Unit 3.05 Wetland Shrub Willow
Size: 1.5 ac.
Soil: 18 Gilford-Colwood Complex, black fine sandy loam, wet
Human Impact: None, area was too wet to farm.
Present Vegetation: Sapling size willow and reed canary grass

Objectives and Actions:
1.04 Restore, enhance and maintain an emergent marsh biotic community.
1.04a Burn every 3 – 5 years, or as needed to prevent woody plant invasion into Unit 3.02. Ongoing
1.04b Use site survey to monitor size of woody plant stand. Ongoing

Unit 3.06 Wetland Shrub and Emergent Marsh
Size: 2 acres.
Soil: 18 Gilford-Colwood Complex, black fine sandy loam, wet
Human Impact: An old drainage ditch reduces water levels in cattail community at the south end of the unit.
Present Vegetation: Dogwood around cattails wetland.
Objectives and Actions:
1.04 Restore, enhance and maintain an emergent marsh biotic community.
1.04a Burn the west part every 3 – 5 years, or as needed to control woody plant invasion. Ongoing
1.04b Plug the ditch. See Unit 3.07.
1.04c Use site survey to monitor size of woody plant stand. Ongoing

Unit 3.07 Oak Woods
Size: 4.6 acres
Soil: 18 Gilford-Colwood Complex, black fine sandy loam, wet; and 49B Hillsdale-Riddles sandy loam
Human Impact: An old drainage ditch reduces water levels in cattail community at the south end of the Unit 3.06. Large pile of stones.
Present Vegetation: White oak, black oak, black cherry, aspen, multiflora rose are common.
Objectives and Actions:
1.04 Restore, enhance and maintain oak forest biotic community.
1.04a No management is needed at this time.
1.04 Restore, enhance and maintain an emergent marsh biotic community in Unit 3.06.
1.04b Plug the ditch that drains pond in Unit 3.06. Needs to be implemented.
1.05 Manage individual native plant and animal species.
1.05a Preserve stone pile for snakes. No active management needed at this time.

Unit 3.08 Wetland Shrub
Size: 6.1 acres
Soil: 18 Gilford-Colwood Complex, black fine sandy loam, wet
Human Impact: None
Present Vegetation: Silky dogwood, gray dogwood, aspen, black cherry are common.
Objectives and Actions:
1.04 Restore, enhance and maintain wetland shrub biotic community.
1.04a No management is needed at this time.

Unit 3.09 Oak Woods
Size: 0.9 acres
Soil: 35B Arkport-Okee loamy fine sand, 2-6% slope
Human Impact: None
Present Vegetation: White oak, black oak, black cherry are common.
Objectives and Actions:
1.04 Restore, enhance and maintain oak forest biotic community.
1.04a No management is needed at this time.

Unit 3.10 Upland Scrub
Size: 1.9 acres
Soil: 55B Eleva, sandy loam
Human Impact: None
Present Vegetation: Winged sumac is common. autumn olive, black oak, black cherry, honeysuckle are common. Yucca (Adam's Needle) is present.
Objectives and Actions:
1.04 Restore, enhance and maintain oak savanna biotic community.
1.04a Burn the west part every 3 – 5 years, or as needed to reduce invasive shrubs. Ongoing
1.01b Use photo monitoring to monitor and evaluate trend in invasive shrub abundance. Needs to be implemented.

Unit 3.11 Oak Scrub
Size: 1.6 acres
Soil: 35B Arkport-Okee loamy fine sand, 2-6% slope
Human Impact: Kiosk , mowed drive, nest box, wood duck nest box and spoil from pond are present. A 4- inch well casing is located at 42º3288 and 84. 30301º. Several stone piles present.
Present Vegetation: White oak, black oak, black cherry are present. Pole-sized sassafras stand is present along south side of the unit.
Objectives and Actions:
1.04 Restore, enhance and maintain oak savanna biotic community.
1.04a Burn every 3 – 5 years, or as needed to reduce invasive shrubs. Ongoing
1.04b Use photo monitoring to evaluate trend in invasive shrub abundance. Needs to be implemented.
1.05 Manage individual native plants and animals species.
1.05a Erect, maintain, and monitor small bird nest box. Ongoing
1.05b Erect, maintain, and monitor wood duck nest box. Ongoing
1.05c Preserve stone pile for snakes. No active management needed at this time.
2.01 Conduct guided tours. Ongoing
2.03 Provide opportunities for self-guided Grassland and Wetland Demonstration Site.
2.03a Constructed educational display (kiosk). Completed 2006
2.03bMaintain the interpretative display at the Wetland and Grassland Demonstration Site including information on the streambank restoration and mow trails. Ongoing
3.02 Permit scientific studies of wildlife.
3.02a Participate in a eagle banding program conducted by USF&WS and MDNR. Ongoing
3.02b Remove deer carcasses in spring. Ongoing

Unit 3.12 Upland Scrub
Size: 2.5 acres
Soil: 35B Arkport-Okee loamy fine sand, 2-6% slope
Human Impact: Once was farmed. A Wetland and Grassland Demonstration Site sign is present.
Present Vegetation: Black cherry widely scatter and some autumn olive is present.
Objectives and Actions:
1.04 Restore, enhance and maintain oak savanna biotic community.
1.04a Burn every 3 – 5 years, or as needed to reduce invasive shrubs. Ongoing
1.04b Use site photo monitoring to evaluate effectiveness of prescribe burn to reduce invasive shrubs. Needs to implemented.
2.03 Provide opportunities for self-guided Grassland and Wetland Demonstration Site.
2.03a Construct a Grassland and Wetland Demonstration Site sign. Completed in 2006

Unit 3.13 Willow Windbreak
Size: 1.5 acres
Soil: 37 Palms Muck, deep muck; and 63 Henrietta Muck, thin muck layer
Human Impact: Ditches and a network of drain till lower the water level permitting the area to be farmed after the Portage River Drain construction in 1920-21. Willows were planted to reduce wind erosion. Farming continued until late 1950s - 1960s.
Vegetation: Large willow trees.
Objectives and Actions:
1.04 Restore, enhance and maintain emergent marsh biotic community.
1.04a Allow trees to die. No action required

Units 3.14 WRP Pool 1
Size: 113 acres
Soil: Palms Muck, deep muck; Henrietta Muck, thin muck layer
Human Impact: Ditches and a network of drain tile lower the water level permitting the area to be farmed after the Portage River Drain construction in 1920-21. Farming continued until late 1950s - 1960s. Ditches were plugged, five shallow ponds excavated, a dike (ditch spoil) repaired, and a water control structure installed in 2005.
Vegetation: Reed canary grass was dominant prior to 2008. Cattails, wool grass, and smartweed increased after 2007. Boxelder common along border with Unit 3.15.
Objectives and Actions
1.04 Restore, enhance and maintain emergent marsh biotic community.
1.04a Conduct a feasibility study of restoring degraded wetlands using the Wetland Reserve Program funds, including mapping elevations; impact on neighbors, presence of species of concern, historic site review, cost analysis, etc. Completed 2002-04
1.04b Plug a drainage ditches. Completed 2005
1.04c Install a inline water control structure in Pool 1at 42.33175° N and 84.30576° W with the pool elevation set at 909.0 ft., construct 5 shallow ponds and repair dike. Completed 2005
1.04d Maintain operation of structures by removal of debris at outlet/inlet and monitor for muskrat activity. Ongoing
1.04e1 Repair a dike (spoil from drainage ditch) at 42.33317°N and 84.30246°W. Completed 2005
1.04e2 A section of the dike washed out in 2011-12 and needs to be repaired. Needs to be implemented.
1.04f Monitor and control water levels in the impoundments to create seasonal wetlands. Ongoing.
1.04g Use transects to monitor for vegetation changes in the impoundment, e.g. conversion to reed-canary grass to sedges, such as wool grass (*Scripus cyperinus*). Needs to be implemented.
1.04h Monitor changes in birds and other wildlife use. Needs to be implemented.
1.05 Manage individual native plant and animal species.
1.05a Erect and maintain nest boxes. Ongoing
1.05b Monitor use of nest boxes. Ongoing

Unit 3.15 South Streambank
Size: 3.3 acres
Soil: Two soil types are found in Unit 3.15, Palms Muck and Henrietta Muck. When the Portage River was dredged in 1921-22, spoil was placed on the streambank resulting in a mixture of topsoil, subsoil and substratum that rises 2 to 10 feet above the river.
Human Impact: An emergency spillway, and a gated, two-track drive are located in the unit. The Jackson County Road Commission right-of-way is wider south of the Wooster Road bridge before the gate. People park here and it is used by fisherman. Littering is a problem there.
Present Vegetation: An inventory of woody plants during the 2009 winter found 9 species of trees and 18 species of shrubs (see Table). Many of the American elms and ash trees were either dead or dying from

disease. Seven non-native species (white mulberry, oriental bittersweet, common buckthorn, glossy buckthorn, multiflora rose and Tartarian honeysuckle) were common.

An inventory of herbaceous plants is ongoing with emphasis on identifying and marking the locations of rare, unusual or endangered plants.

Objectives and Actions:

1.04 Support the restore, enhance and maintain emergent marsh biotic community in Unit 3.14.

1.04a Construct an emergency spillway at 42.33317º N and 84.30246ºW. Completed 2005

1.04 Restore, enhance and maintain an riparian forest biotic community.

1.04a Inventory streambank vegetation. Completed 2005

1.04b. Non-native plants will be reduced either by stump treatment with *Tordon* (picloram/2,4-D) during the winter and/or spot spraying foliage with *Garlon 3A* (triclopyr) or *Crossbow* (2,4-D and tricloypr) during the summer to prepare site for planting native trees and shrubs.

1.04c Plant native trees and shrubs. Streambank vegetation is divided into three distinct management zones:

Zone 1 is closest to the river and will consist fast growing (cottonwood, willows and maples) and slow growing (oaks, hickory, sycamore) trees. This riparian zone should be about 15-20 ft. wide.

Zone 2 is further up the streambank from Zone 1 and consists of an area of shrubs. Examples included dogwoods, elderberry, highbush cranberry, and spicebush. In some sections, Zone 2 is missing because the trail is close to the river.

Zone 3 is on top of the dike and consists of cool season grasses (timothy, fescue, brome, etc.). The two-track trail is located in this zone.

Rabbit/rodent guards and deer fencing probably will be needed to protect against browsing by deer, especially in winter. Wire cages (not plastic tubular shelters) should be placed around the woody plants and firmly secured so flood waters do not move them. Completed 2011

1.04d. Monitor planted species and invasive species. Ongoing

1.05 Manage individual native plant and animal species.

1.05a Erect, maintain and monitor Prothonotary Warbler nest boxes. Ongoing

1.05b Erect, maintain and monitor Wood Duck nest boxes. Ongoing

2.03 Provide opportunities for self-guided wildlife viewing (see Unit3.11).

2.03a Mow drive as needed. Ongoing

Unit 3.16 North Streambank

Size: 3.0 acres

Soil: Two soil types are found in Unit 3.15, Palms Muck and Henrietta Muck. When the Portage River was dredged in 1921-22, spoil was placed on the streambank resulting in a mixture of topsoil, subsoil and substratum that rises 4 to 10 feet above the river.

Human Impact: A gated, two-track drive are located in the unit. The neighbor, Morton family, use this drive and park vehicles and equipment in the unit. They extend irrigation pipes into the river across this unit sometimes during the summer.

Present Vegetation: Boxelder, silver maple, cottonwood are common. Cardinal flower is present.

Objectives and Actions:

1.04 Restore, enhance and maintain an riparian forest biotic community.

1.04a Monitor use of Morton's for incompatible use such as littering. Ongoing

Unit 3.17 Emergent Wetland

Size: 9.4 acres

Soil: 37 Palms Muck and 63 Henrietta Muck.

Human Impact: The two-track drive from Unit 3.16 extends into this unit, but it is not maintained. Remains of cement bridge and culvert are located next to Unit 3.16 where the Portage River used to flow to the south.
Present Vegetation: Mostly reed canary grass.
Objectives and Actions:
1.04 Restore, enhance and maintain an riparian forest biotic community.
1.04a Monitor use of Morton's for incapable use such as littering. Ongoing

Units 3.18 WRP Pool 2
Size: 2.2 acres
Soil: 63 Henrietta Muck, thin muck layer
Human Impact: A water control structure was placed in a drainage ditch as part of the WRP project. It mainly controls water level in Zone 4. It appears this area was never farmed because of flooding.
Vegetation: Wetland shrub that appears to be thinning because of high water.
Objectives and Actions:
1.04 Restore, enhance and maintain emergent marsh biotic community.
1.04a Conduct a feasibility study of restoring degraded wetlands using the Wetland Reserve Program funds, including mapping elevations; impact on neighbors, presence of species of concern, historic site review, cost analysis, etc. Completed 2004
1.04b Plug drainage ditch. Completed 2005
1.04c Install a inlet water control structure for Pool 2 at 42.33544°N and 84.29842°W. Pool design elevation is 908.6 ft. Completed 2005
1.01d Maintain operation of structures by removal of debris at outlet/inlet and monitor for muskrat activity. Ongoing
1.01e Monitor and control water levels in the impoundments to create seasonal wetlands. Ongoing.

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

Action	Description	Season of Year 2012	2013	2014	2015	2016
	Unit 3.01 Smith West Grassland					
1.04b 1	Plant grass and forbs	sp				
1.04c	Burn grassland every 3-5 years		sp			
1.04d	Spot spray woody plants	su	su	su	su	su
1.04e	Monitor vegetation	su	su	su	su	su
1.04f	Monitor bird abundance	su	su	su	su	su
2.03b	Maintain parking log	su	su	su	su	su
	Unit 3.02 Smith Middle Grassland					
1.04b 1	Plant grass and forbs	sp				
1.04c	Burn grassland every 3-5 years			sp		
1.04d	Spot spray woody plants	su	su	su	su	su
1.04e	Monitor vegetation	su	su	su	su	su
1.04f	Monitor bird abundance	su	su	su	su	su
	Unit 3.03 Smith East Grassland					
1.04c	Burn grassland every 3-5 years		sp			
1.04d	Spot spray woody plants	su	su	su	su	su
1.04e	Monitor vegetation	su	su	su	su	su
1.04f	Monitor bird abundance	su	su	su	su	su
	Unit 3.04 Old Field					
1.04a	Burn grassland every 3-5 years			sp		
1.04b	Spot spray woody plants	su	su	su	su	su
1.04c	Monitor vegetation	su	su	su	su	su
	Unit 3.05 Wetland Shrub Willow					
1.04a	Burn grassland every 3-5 years			sp		
1.04b	Monitor vegetation	su	su	su	su	su
	Unit 3.06 Wetland Shrub/Marsh					
1.04a	Burn grassland every 3-5 years		sp			
1.04c	Monitor vegetation	su	su	su	su	su
	Unit 3.07 Oak Woods					
1.04b	Plug ditch		f or w			
	Unit 3.10 Upland Shrub					
1.04a	Burn grassland every 3-5 years				sp or f	
1.04b	Monitor vegetation	su	su	su	su	su
	Unit 3.11 Oak Woods					
1.04a	Burn grassland every 3-5 years				sp or f	
1.04b	Monitor vegetation	su	su	su	su	su

1.05a	Maintain and monitor small bird nest boxes	su	su	su	su	su
1.05b	Maintain and monitor Wood Duck nest box	su	su	su	su	su
2.03b	Maintain kiosk	sp	sp	sp	sp	sp
3.02a	Participate in eagle banding	w	w	w	w	w
3.02b	Remove deer carcasses	sp	sp	sp	sp	sp
	Unit 3.12 Old Field					
1.04a	Burn grassland every 3-5 years				sp or f	
1.04b	Monitor vegetation	su	su	su	su	su
	Unit 3.14 WRP Pool 1					
1.04d	Maintain water control structure	all	all	all	all	all
1.04e	Repair dike		su			
1.04f	Monitor water levels	all	all	all	all	all
1.04g	Monitor vegetation	su	su	su	su	su
1.04h	Monitor bird abundance	sp-f	sp-f	sp-f	sp-f	sp-f
1.05a	Maintain and monitor Wood Duck nest box	s	s	s	s	s
	Unit 3.15 South Streambank					
1.04b	Spot spray woody plants	sp or su	sp or su	sp or su	sp or su	sp or su
1.04g	Monitor vegetation	sp or su	sp or su	sp or su	sp or su	sp or su
1.05a	Maintain and monitor small bird nest boxes	su	su	su	su	su
1.05b	Maintain and monitor Wood Duck nest boxes	w	w	w	w	w
2.03a	Mow drive	su	su	su	su	su
	Unit 3.16 North Streambank					
1.04a	Monitor for incapable use	all	all	all	all	all
	Unit 3.17 Emergent Wetland					
1.04a	Monitor for incapable use	all	all	all	all	all
	Unit 3.18 WRP Pool 2					
1.04d	Maintain water control structure	all	all	all	all	all
1.04e	Monitor water levels	all	all	all	all	all
	Number of actions	38	41	39	39	36

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

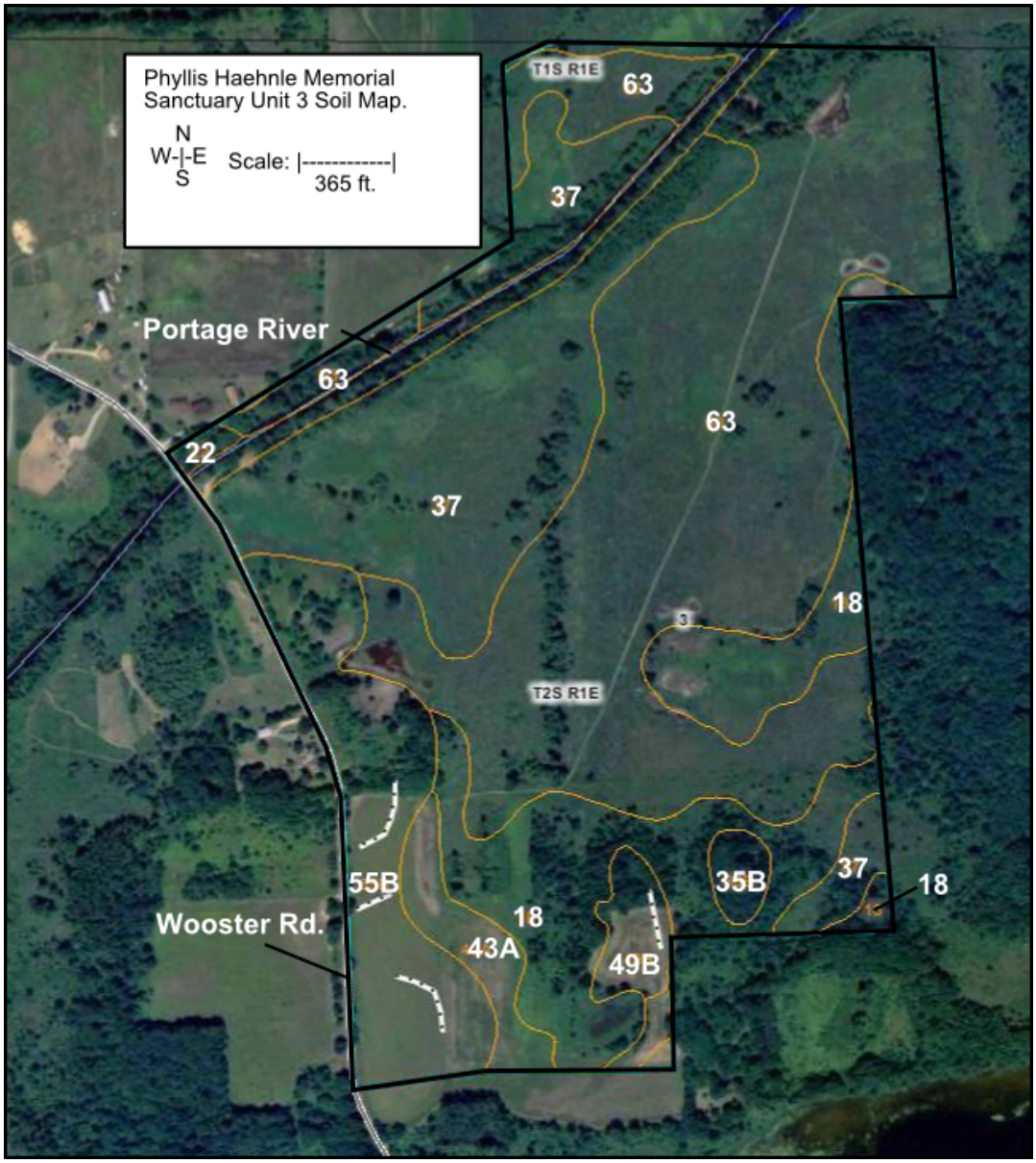

Figure 1. Unit 3 soil map.

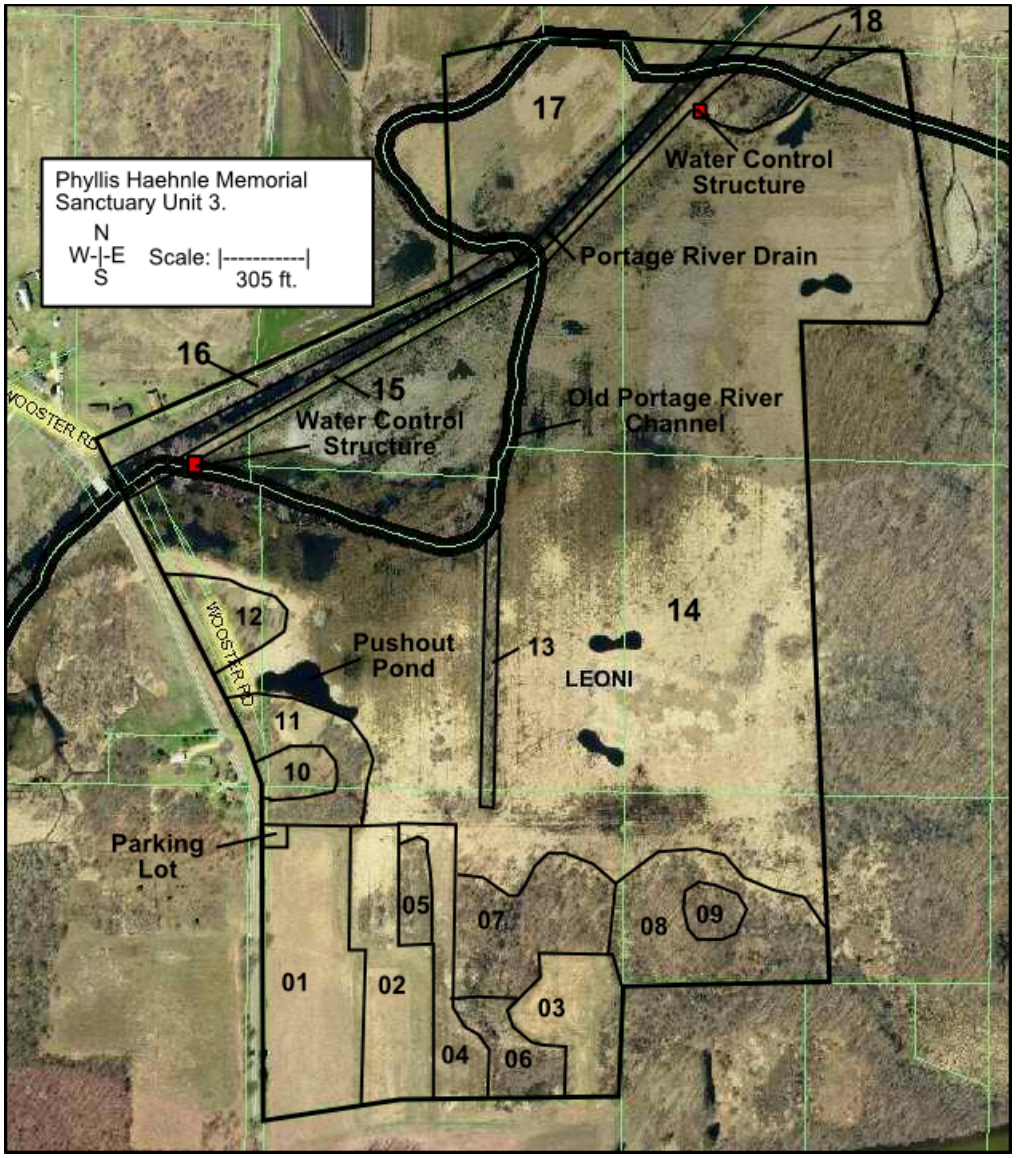

Figure 2. Unit 3 Vegetation cover types map.