

# Monitoring Report

## Permit # SU-C-002-15

Municipality of Central Manitoulin

November 2019

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## **Report from 2019 Survey at Providence Bay Beach with analyses of results of activity and enhancement work**

Prepared for Municipality of Central Manitoulin

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November 1, 2019

### **Background**

This report discusses survey work done in 2019 to support overall benefit permit #SU-C-002-15 issued in 2016 to the Municipality of Central Manitoulin. The permit allows the municipality to do maintenance work on the Providence Bay beach that could potentially damage some individuals of Pitcher's Thistle (*Cirsium pitcheri*) or alter its habitat. The activity (maintenance) area contains the playground, the land directly lake-ward of the Harbour Centre (including the former volley ball court), and the east side of the river mouth going east roughly half way to the first staircase. It also includes a strip a few metres wide running parallel along both sides of the boardwalk. The benefit area, in which actions must be done to improve the situation for Pitcher's Thistle, consists of all of the beach area to the east of the activity area and lake-ward of the boardwalk.

The purpose of the survey discussed in this report was to provide data to be compared to 2017 baseline data to show that a benefit is occurring, and to ensure that work being done causes as little harm to Pitcher's Thistle as possible.

Conditions of the permit require the following:

- 1) Training for all personnel who will be working on the beach as part of the permit activities.
- 2) Surveys to fulfill sections 13.1, 13.2, and 13.3 of the overall benefit permit, including: evaluation of any impacts to Pitcher's Thistle from activity work and benefits to the species from enhancement work.

### **Methods**

#### 1) Training

Training was provided to the municipality's public works staff on site at Providence Bay beach on May 14, 2019. A copy of the outline used for the training is attached as Appendix A. The training addressed:

- The presence of Pitcher's Thistle on the beach, the permit, and obligations to work within the permit conditions;
- How to identify Pitcher's Thistle and its habitat;
- The need to avoid unnecessary harm to Pitcher's Thistle and its habitat;
- What to do if a thistle is found and must be removed;
- What to note down and what to do if a thistle has to be moved.

Pitcher's Thistles were pointed out to staff and the difference between the thistle and its look-a-like Wormwood (*Artemisia campestris*) was discussed. After training, all staff were able to distinguish the thistles from other plants. The activity area was walked and specific spots to be worked were discussed.

Thistles in these areas were pointed out and ways to avoid them mentioned. The intention of this was to avoid having to move any thistles because generally they do not transplant successfully. However, a protocol for how to move the thistle and its long tap root was discussed.

## 2) Survey Work

The permit calls for surveys to document or include:

- The abundance of thistles by life form;
- Georeferencing (GPS) and mapping patches of thistles;
- Vegetation cover by percent in each section including a list of all plant species and their prevalence;
- In the enhancement area, an evaluation of the effectiveness of the actions done;
- In the enhancement area, an assessment of the amount of exposed sand available as suitable habitat for Pitcher's Thistle;
- Invasive species control results and continued control needs, quantified when possible (also include photos of results/needs).
- Photo documentation of each section.

Surveys were conducted at Providence Bay on July 4, July 16, and August 5, 2019. All work was conducted by Judith Jones. Documentation was done in defined, georeferenced areas (Figures 1 and 2). These were:

- Polygon 1: the playground and sand running west to an access trail;
- Polygon 2: volleyball court area;
- Polygon 3: land directly lake-ward of the Harbour Centre;
- Polygon 4: bench area on the east side of the river mouth;
- Polygon 5 from the eastern boundary of the activity area to staircase 3-4;
- Polygon 6 from staircase 3-4 to a georeferenced point halfway between staircases 5 and 6;
- Polygon 7 from the eastern side of Polygon 6 to the eastern end of the beach.



Figure 1. Activity area polygons.

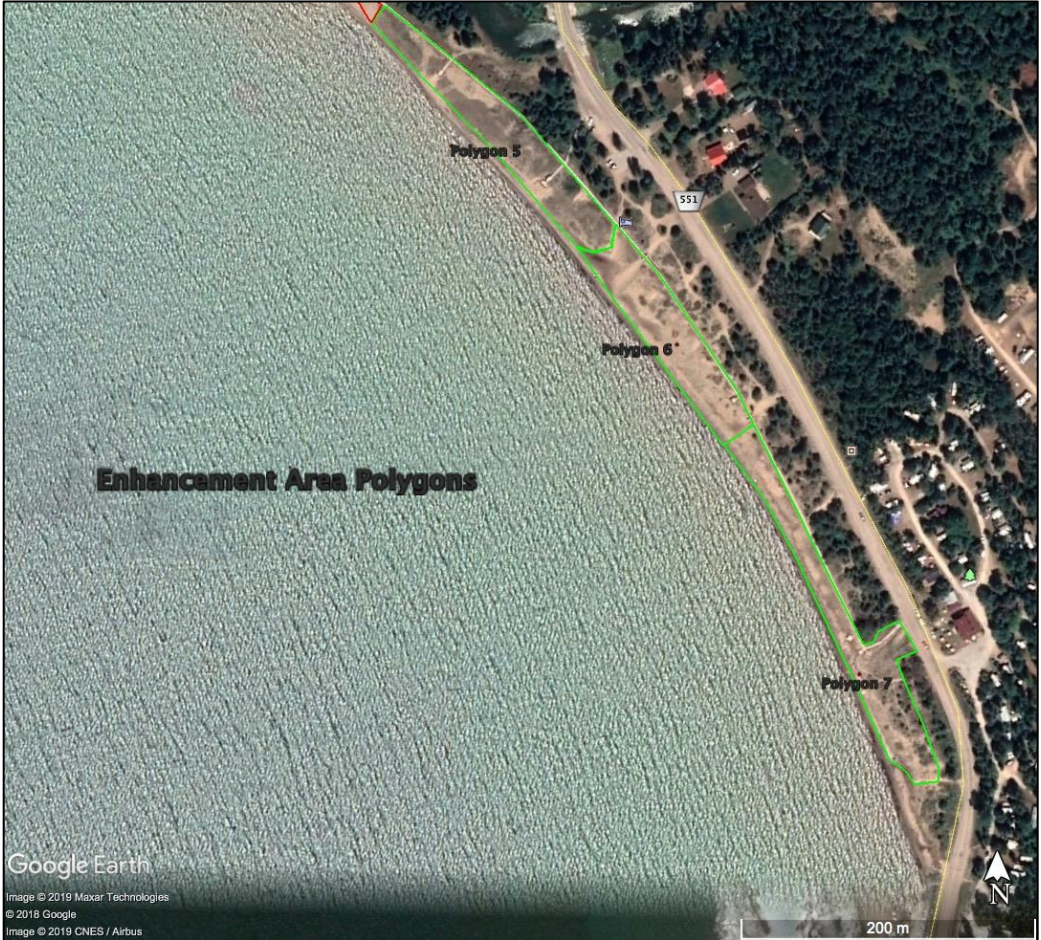


Figure 2. Enhancement area polygons.

### *Abundance Census and Georeferencing of Patches*

In each polygon, the number of individual Pitcher's Thistle plants was counted by life form (rosettes, mature (flowering/fruited) plants, seedlings). Patches with particularly high numbers of mature plants were georeferenced so that in future years these same spots can be checked for establishment of new thistles.

### *Vegetation Cover and Photo Documentation*

A list of all plant species present in each polygon was created, and the vegetation composition was documented by estimating the percent cover of each layer and each prevalent species within each layer. For example, layers included trees >5 m tall, saplings 2-5 m tall, shrubs (or any woody species) 0 – 2 m tall, herbaceous species, mosses and lichens, and duff, woody debris, rocks and/or bare sand or soil. Species that did not make up at least 1% cover were just noted P for present. Photos were taken of each polygon.

### *Invasive Species Control Results and Assessment of Future Needs*

The presence and location of invasive species was documented during vegetation surveys and their impact on Pitcher's Thistle assessed based on their proximity to the thistles and on the degree to which they were covering up available open sand.

### *Evaluation of the Effectiveness of Enhancement and Amount of Open Sand*

Criteria to be used to judge the effectiveness include:

- An increase in the number or percentage of maturing plants over previous years;
- An increase in the amount of open sand (as documented during vegetation surveys);
- Presence of maturing plants in enhanced areas and patches of dense maturation;
- Presence of seedlings (documented sometime after mid-summer) to show new establishment in the enhancement area.
- Continued presence of all dominant native dune species a good diversity of dune species in both activity and enhancement areas;
- A reduction in the number of and cover of invasive plant species.

## **Results**

Lists of plant species and vegetation in each polygon are presented in Appendix B. The number of thistles of each life form in each polygon in 2019 is presented in Table 1. Baseline data collected in early 2017 on thistle distribution in the enhancement area concentrated only on specific spots such as around each staircase. However, the 2019 results look at larger polygons (which include the staircases and intervening area) to see broader habitat trends.

Table 1. Numbers of thistles of each life form in each polygon in 2019.

Polygon #	Rosettes	Mature (fruiting)	Seedlings	Amount of open sand
Activity Area				
1 Playground	11	4	3	25%
2 Volleyball court	11	7	0	45%
3 Building	0	0	0	80%
4 Benches	17	9	0	45%
Enhancement Area				
5 Western	23	62	0	18%
6 Centre	456	436	163 (120 in one spot)	70%
7 Eastern	92	76	2	50%

Note: no Pitcher's Thistles were required to be removed or transplanted in the course of the work since 2017.

## Discussion

### *Maturing Plants*

During the time of the project, a great reduction in total population abundance has occurred in both the activity and enhancement areas due to submerging of part of the beach by higher lake levels. In the activity area, the habitat lost included a strip of occupied, natural foredune that was to be left in place across the front of the beach. The reduction in the population somewhat obscures the positive results from enhancement.

Despite the overall reduction, a large proportion of thistles matured in both areas in 2019 (Tables 2 & 3), probably due to improved habitat conditions (increased open sand, reduction of surrounding vegetation). In the activity area, despite a smaller population, a greater percentage of the whole matured (Table 2). In the enhancement area (Table 3), there was a great deal of new establishment in 2019, which is visible as follows: In 2018 there were 626 rosettes. In 2019, 574 of these plants became mature, so only 52 rosettes in 2019 were plants from the previous year. Thus, 519 rosettes were new in 2019.

Table 2. Abundance in the activity area in 2017 and 2019.

Year	Rosettes	Mature
2017	81	10
2019	39	20

Table 3. Total abundance at eastern Providence Bay since 2016 (source: Judith Jones unpublished data).

Year	Rosettes	Mature
2016	1209	213
2017	1427	337
2018	626	175
2019	571	574

## *Open Sand*

### Activity Area

Polygon 1: In 2017, the amount of bare sand in Polygon 1 was ~80%. This amount has stayed the same, and the vegetation at the west side of the polygon has been left intact.

Polygon 2: In 2017, before the activity Polygon 2 contained approximately 20 – 40% open sand. After the activity, this increased to 40 – 60% open sand. In 2019, the amount of open sand was slightly less because part of the former beach that was open sand has been submerged. Of the area now available to Pitcher's Thistle, approximately 45% is open sand.

Polygon 3: In 2017, Polygon 3 was fully vegetated non-dune native and Eurasian species, appearing somewhat like an old field. In 2019, this area was cleared and the sand exposed. It is not yet occupied by Pitcher's Thistle. Approximately 80% of the area was open sand.

Polygon 4: In 2017, Polygon 4 before the activity contained approximately 40-60% open sand and the activity increased this to 60-80%. In 2019, the polygon contained ~45% open sand which is fairly consistent with what was available after the activity, minus the part lost to higher lake levels. The vegetation behind the benches has remained intact.

### Enhancement Area

Baseline documentation in 2017 divided the area into areas in front of the staircases and areas between the staircases. In 2017, most of the enhancement area contained 40-60% open sand. After enhancement in 2017, open sand was increased to 80 – 100% around the staircases.

In 2019, the enhancement area was divided up differently to create better defined polygons for data collection (Figure 2). The polygons are roughly the same size.

Polygon 5: This polygon contained only 18% open sand and a low amount of thistles. This polygon may still require more enhancement.

Polygon 6: This polygon contains the bulk of the population (Table 1). It contains ~ 70% open sand, an increase from 2017.

Polygon 7: The beach is narrower in this area, so some open sand became submerged here. The polygon now contains ~50% open sand which is the same or an increase from 2017.

The distribution of thistles in the enhancement area correlates well to the amount of open sand (Table 1).

### *Maturing Plants & Seedlings*

The enhancement area contains several areas with high concentrations of maturing plants (Table 2), evidence that enhancement has not harmed reproduction and has likely improved conditions so that more plants are able to mature. Seedlings were observed in Polygons 6 and 7, showing that cross pollination, seed-set and establishment are occurring. Seedlings were not observed in Polygon 5, perhaps due to lack of open sand for establishment.

Table 2. Locations of patches of high numbers of maturing plants in 2019 in the enhancement area.

Polygon #	Number of mature (fruiting) plants	Easting	Northing	Comments
Enhancement Area				
5 enhancement west	13	401290	5057714	Just west of staircase 2
5 enhancement west	10	401342	5057680	
6 enhancement centre (largest)	25 +32 rosettes some very large	401366	5057643	Spot was improved in 2017
7 enhancement east	63	401531	5057367	E of end of boardwalk & W of copse of trees

### *Vegetation*

#### *Activity Area*

Vegetation composition has changed somewhat since 2017. In the activity area, 16 native species are no longer present. There are a number of reasons for this. Some were shrub species that had been on the foredune or were plants in the damp area closest to the water, and these areas have now been submerged by the lake. Some were species in the thick vegetation near the building, which has now been cleared (Polygon 3). Fifteen of the missing species are generalist, non-dune species (such as Canada Goldenrod and Horsetail) that are not necessarily part of a functioning dune ecosystem, so their lack of presence should not have any negative impact. The one dune species that is missing is Lyre-leaved Rock Cress, which is usually out in the early spring and may not have been visible during a July survey.

On the other hand, it is interesting to see that eight new native species now occur in the activity area, many of which are dune specialists (for example Bugseed, Beach Pea, etc.) perhaps indicating that the increased open sand is providing suitable habitat for dune species, despite (or because of) the increased disturbance.

In the activity area, six Eurasian (weed) species are no longer present (Twitch Grass, White Clover, Black Knapweed, Bull Thistle, Yellow Hawkweed, and



Crack Willow). Only one weed species is new since 2017 (Wild Carrot), and only one weed species has > 1 % cover (Bladder Campion in Polygon 3, the former non-dune area), showing that in general, the activity is not introducing a lot of weeds and that natural dune conditions may be improving.

Pitcher's Thistle and all dominant dune species remain present somewhere within each activity area polygon (except Polygon 3 which was not dunes before and was not occupied previously). Nearly all of the dune species present in the enhancement area are also present in the activity area, showing that the dune ecosystem is still fairly functional even with the activity.

#### Enhancement Area

The number of species in the enhancement area appears lower in 2019, but the 2017 survey included the area between the boardwalk and the road, which contained more shrubs and generalist species. Twenty two species present in 2017 were not present in 2019. Six of these were non-native (weed) species and eight were generalist species not confined to dunes. The number of natural dune species present is roughly the same except two dune species appear to be missing in 2019: Lyre-leaved Rock Cress and Silverweed. Again, the former is an early spring species. The latter would have been present on the foredune which has now been submerged. No non-native species has  $\geq 1\%$  cover anywhere in the enhancement area. The disappearance of these species and the very low cover of weeds suggests improved dune conditions which favour species adapted to survive in this habitat.

Nine of the species no longer present were shrub species mainly found on the foredune, which was cleared of shrubs as part of enhancement and ultimately ended up submerged by the lake.

#### *Invasive Species*

Invasive species control since 2017 has been extremely successful. No invasive species has  $\geq 1\%$  cover. Phragmites (*Phragmites australis* ssp. *australis*) has been completely eradicated from Providence Bay beach by the Manitoulin Phragmites Project, and Scotch Pine (*Pinus sylvestris*) has been greatly reduced by the work of municipal staff. White Sweet Clover (*Melilotus alba*) truckloads of which were removed during Beach Action Day in 2016 and 2017, now has <1% cover. Beach Action Day in 2019 targetted Bladder Campion in the enhancement area, and more could still be done to reduce this species because it is still present in both enhancement and activity areas. In the enhancement area, some Bladder Campion plants are still found in proximity to Pitcher's Thistle.

#### *Photo Documentation*

Photos of each polygon, enhancement patches, and dense mature plants have been submitted separately.

## **Conclusions**

The results show that the activity has not been harmful to the overall habitat based on the six measures studied. Pitcher's Thistle continues to reproduce and even mature in great numbers. The habitat continues to have all of its dune species, with loss of only two species to higher lake levels, not to activity or enhancement actions. Improvements have occurred from a reduction in invasive species, weeds, and non-dune native species, and from increased open sand.

## APPENDIX A

### **Awareness & Training** **About Pitcher's Thistle and Species at Risk** Provided in person at Providence Bay on May 14, 2019 by Judith Jones, Winter Spider Eco-Consulting

#### **Why the training is needed**

SAR on site; permit required for work in the habitat  
Whether we agree or not, we will stay within the rules so we can continue  
For years it was hands off—permit allows municipality to do some work  
Benefit work to compensate for losses of habitat and plants in some areas

#### **Pitcher's Thistle: Threatened/Special Concern**

Ontario ESA: can't harm, harass, capture, kill, transport, etc.  
"care taken to avoid unnecessary harm"—How do this?  
Clean machinery: We're working on invasives: Phragmites, Sweet Clover  
(The stuff making the beach brushy wasn't even the dune plants)  
Don't drive over PITH ; follow Nancy's flagging; entry points

#### **Habitat**

Restricted to dunes—never in a garden, hay field, lawn, etc.  
Habitat is open, loose, nearly bare sand (we're helping it!)  
OK with moderate disturbance but not too much  
Dynamics: wind, ice scour, changes in water levels, etc.

#### **Where it lives – why at risk?**

Abundant in our region but geographically restricted (wiped out elsewhere)  
Manitoulin, Cockburn, Ducks, Inverhuron, Pinery, Pukaskwa  
Why here?> Maybe people take better care of their lands?

#### **How to identify it**

Wormwood is look-a-like  
Life cycle: 3 to 14 years from seedling, rosette, mature plant  
Leaves not spiny; thistle head is spiny  
Layer of hairs make it look whitish

#### **What to do if a thistle is in the way of the work**

Attempt transplant: difficulty of digging it out (long root)  
Place in bucket  
Locate in benefit zone in loose, dry sand within 20 ft of other thistles.  
Dig a trench on an angle (down to damp sand) lay root against side then  
fill gently with wet sand.  
Flag new location so Nancy can GPS it for follow up monitoring

## APPENDIX B

Data from surveys done in July, 2019.

### Activity Area

Plant species found in the Activity Area (Polygons 1, 2, 3, and 4).

\* Denotes a non-native species; \*\* denotes a species that is invasive on dunes

<u>Latin Name</u>	<u>English Name</u>
<i>Acer negundo</i>	Manitoba Maple
<i>Achillea millefolium</i>	Yarrow*
<i>Ammophila breviligulata</i>	Marram Grass
<i>Artemisia campestris</i>	Wormwood
<i>Asclepias syriaca</i>	Common Milkweed
<i>Cirsium pitcheri</i>	Pitcher's Thistle
<i>Colvolvulus arvensis</i>	Black Bindweed*
<i>Corispermum pallasii</i>	Bugseed
<i>Daucus carota</i>	Wild Carrot*
<i>Echium vulgare</i>	Bugloss*
<i>Elymus canadensis</i>	Canada Wild Rye
<i>Elymus lanceolatus ssp. psammophilus</i>	Great Lakes Wheatgrass
<i>Elymus trachycaulus</i>	Slender Wheatgrass
<i>Epilobium angustifolium</i>	Fireweed
<i>Equisetum hyemale</i>	Scouring Rush
<i>Equisetum variegatum</i>	Variegated Horsetail
<i>Lathyrus japonicus</i>	Beach Pea
<i>Melilotus alba</i>	White Sweet Clover**
<i>Oenothera biennis</i>	Evening Primrose
<i>Picea glauca</i>	White Spruce
<i>Pinus sylvestris</i>	Scotch Pine**
<i>Poa compressa</i>	Canada Bluegrass
<i>Polygonum sp. (sterile)</i>	Knotweed
<i>Populus balsamifera</i>	Balsam Poplar
<i>Populus tremuloides</i>	Trembling Aspen
<i>Prunus pumila</i>	Sand Cherry
<i>Salix candida</i>	Hoary Willow
<i>Salix exigua</i>	Sand Bar Willow
<i>Silene vulgaris</i>	Bladder Champion*
<i>Solidago altissima</i>	Tall Goldenrod
<i>Sporobolus cryptandrus</i>	Sand Dropseed
<i>Tragopogon dubius</i>	Goat's Beard*

Total 31 Species: 23 native; 8 non-native including 2 which are invasive on dunes.

### Vegetation cover in the Activity Area

Polygon 1 Playground west to trail

Trembling Aspen >5 m P

Balsam Poplar 4-5 m 3% (overtopping shorter layers)

Manitoba Maple P%

Common Milkweed 8%

Grasses (Canada Wild Rye, Canada Bluegrass, Marram Grass) 15%

Open sand ~80%

Polygon 2 Former volleyball court area; and  
 Polygon 3 Area cleared lake-ward of building  
 (does not include vegetated area along river, which is not dune habitat)  
 Sand Bar Willow 15%  
 Canada Wild Rye 10%  
 Marram Grass 10%  
 Common Milkweed 15%  
 Bladder Campion 5%  
 Open Sand 45%

(Polygon 3 was formerly not habitat; recently cleared to restore open sand conditions. Open sand here now ~80% No Pitcher's Thistle present yet.)

Polygon 4 East side of river near benches  
 Sand Cherry 35%  
 Common Milkweed 15%  
 Grasses (Canada Wild Rye, Canada Bluegrass, Sand Dropseed) 5%  
 Open sand ~45%

### Enhancement Area

Plant species found in the Activity Area (throughout polygons 5, 6, & 7).

\* Denotes a non-native species; \*\* denotes a species that is invasive on dunes

<u>Latin Name</u>	<u>English Name</u>
<i>Achillea millefolium</i>	Yarrow*
<i>Ammophila breviligulata</i>	Marram Grass
<i>Artemisia campestris</i>	Wormwood
<i>Asclepias syriaca</i>	Common Milkweed
<i>Corispermum pallasii</i>	Bugseed
<i>Elymus lanceolatus ssp. psammophilus</i>	Great Lakes Wheatgrass
<i>Epipactis helleborine</i>	Helleborine*
<i>Equisetum hyemale</i>	Horsetail
<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod
<i>Iris versicolor</i>	Blue Flag
<i>Juniperus communis</i>	Common Juniper
<i>Lathyrus japonicus</i>	Beach Pea
<i>Lolium arundinaceum</i>	Meadow Fescue*
<i>Melilotus alba</i>	White Sweet Clover**
<i>Oenothera biennis</i>	Evening Primrose
<i>Picea glauca</i>	White Spruce
<i>Pinus sylvestris</i>	Scotch Pine**
<i>Poa compressa</i>	Canada Bluegrass
<i>Populus balsamifera</i>	Balsam Poplar
<i>Potentilla anserina</i>	Silverweed
<i>Prunus pumila</i>	Sand Cherry
<i>Salix candida</i>	Hoary Willow
<i>Salix exigua</i>	Sand Bar Willow
<i>Salix sericea</i>	Silky Willow
<i>Schizachyrium scoparium</i>	Little Bluestem
<i>Silene vulgaris</i>	Bladder Campion*
<i>Smilacina stellata</i>	Starry False Solomon's Seal
<i>Solidago hispida</i>	Hairy Goldenrod

*Sporobolus cryptandrus*  
*Symphyotrichum lanceolatum*  
*Thuja occidentalis*  
*Tragopogon dubius*  
*Tragopogon pratensis*

Sand Dropseed  
Panicked Aster  
White Cedar  
Goat's Beard\*  
Meadow Goat's Beard\*

Total 33 Species: 25 native; 8 non-native including 2 which are invasive on dunes.

#### Vegetation cover in the Enhancement Area

##### Polygon 5

Balsam Poplar <1 m 2%  
Sand Cherry 8%  
Common Juniper 2%  
Marram Grass 30%  
Common Milkweed 20%  
Great Lakes Wheatgrass 10%  
Dead wood and dried plant thatch 10%  
Open sand ~18%

##### Polygon 6

Hoary Willow and Balsam Poplar <1 m 10%  
Common Juniper P  
Sand Cherry 1%  
Great Lakes Wheatgrass 10%  
Marram Grass 5%  
Common Milkweed 5%  
Open sand ~70%

##### Polygon 7

Marram Grass 30%  
Balsam Poplar 15%  
Canada Wild Rye 2%  
Great Lakes Wheatgrass 1%  
Open sand ~50%