

Habitat Monitoring and Management Plan MUSKEGON LAKE RESTORATION Pointe Marine Site

MUSKEGON COUNTY, MICHIGAN

June 2013

Prepared For:

Landowner
Address
City, ST Zip

Prepared by:



11181 Marwill Avenue
West Olive, Michigan 49460
616-847-1680



Muskegon Lake Watershed Partnership

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HABITAT MONITORING AND MANAGEMENT PLAN MUSKEGON LAKE RESTORATION POINTE MARINE SITE MUSKEGON COUNTY, MICHIGAN

1.0 INTRODUCTION

The successful development and long-term viability of this shoreline and habitat restoration project will require monitoring and management of the site in order to address arising concerns and maintain the intended project functions. While site monitoring should be performed regularly, management activities will depend largely on how the site develops and whether problems are encountered.

Regular monitoring of the restoration area will be critical in assessing native vegetation establishment, evaluating the success of the restoration efforts performed, and observing overall site development. The site should be visited a minimum of two to three times during each growing season to document site conditions, and the same person or people should be assigned to perform this task regularly to maintain consistency in site evaluation. Photographs and a written log will be useful in maintaining records for the long term. Any problem areas should be noted, including invasive species populations, signs of erosion, large areas devoid of vegetation, vandalism, and noticeable damage to bioengineered structures. A sample checklist for use during monitoring visits is included in Appendix A.

Management efforts should be tailored to the site's development based on observations made during monitoring visits. A suggested timeframe for various annual maintenance tasks is provided in Appendix B.

2.0 FUNCTION

All bioengineering components of the project are intended to provide shoreline stabilization using a combination of native vegetation and plant-based structural materials. Extreme conditions such as strong wave action, public destruction, or flooding may cause damage to these areas. Erosion and/or sedimentation may appear in the form of gullies, washed out areas, or silt deposits, and can impact the stability of the shoreline. Any areas of erosion observed should be immediately filled and/or re-vegetated, as appropriate, to stabilize the soils and discourage further damage.

In the event that functional value or structural integrity of bioengineered components is damaged or impacted, repairs may be necessary. Contact the West Michigan Shoreline Regional Development Commission or the Muskegon Lake Watershed Partnership Habitat Committee (Appendix C) to discuss needed repairs and potential remedial options.

3.0 VEGETATION

Areas planted with native seed and plant materials may be damaged by flooding, erosion, wildlife predation, invasive species competition, or other factors. Irrigation, replanting, and invasive species control measures may be necessary to address these issues.

3.1 Irrigation

Native plantings should receive approximately one inch of water per week during the first growing season. Irrigation may be necessary when the amount of rainfall is insufficient to meet this standard. In subsequent growing seasons, the planted areas should need to be watered only during extreme dry periods. Irrigation should occur during the early morning or late evening hours, three to four times per week. The water should soak the soil among the plantings, but not to the point of runoff. If normal rainfall amounts are received, supplemental irrigation should not be necessary.

3.2 Replanting

If areas of bare soil or sparse vegetation are present after the first growing season, replanting or supplemental planting may be necessary. Native species equivalent to those installed in the original plantings should be used for replanting purposes. The original specified planting lists are included in Appendix D. Seed and plant materials should be obtained from a native plant nursery located within the same (or an adjacent) Environmental Protection Agency Level III Ecoregion in order to maintain consistency in genotypes. The following list includes several native plant nurseries for consideration:

1. Muskegon Conservation District
940 North Van Eyck
Muskegon, MI 49442
Phone: 231-773-0008
Email: jeff.auck@macd.org
Website: <http://muskegoncd.org>

2. Michigan Wildflower Farm
11770 Cutler Road
Portland, MI 48875-9452
Phone: 517-647-6010
Email: wildflowers@voyager.net
Website: <http://www.michiganwildflowerfarm.com>

3. WILDTYPE Design, Native Plants and Seed
900 North Every Road
Mason, MI 48854
Phone: 517-244-1140
Email: wildtype@msu.edu
Website: <http://www.wildtypeplants.com>

4. Cardno JFNew Native Plant Nursery
128 Sunset Drive
Walkerton, IN 46574
Phone: 574-586-2412
Email: nurserysales@jfnew.com
Website: <http://www.cardnojfnew.com>

Seeding should occur in spring (April – May) or fall (October – November). After preparing the soil by very shallow tilling or surface scarification only, lightly rake the seed into the soil no deeper than ¼ inch. Ground disturbance during soil preparation should be minimized, and newly seeded areas should be cultipacked to promote seed-soil contact after seed installation.

Trees and shrubs should be planted in spring, and herbaceous plants may be planted from May through July. Contact the West Michigan Shoreline Regional Development Commission or the Muskegon Lake Watershed Partnership for volunteer assistance under the Shoreline Stewards program or to discuss specific replanting measures.

Muskegon Lake Watershed Partnership - Shoreline Stewards
c/o Kathy Evans, West Michigan Shoreline Regional Development Commission
316 Morris Avenue, Suite 340
P.O. Box 387
Muskegon, MI 49443-0387
(231) 722-7878 x17
kevans@wmsrdc.org

3.3 Invasive Species Control

Several non-native, invasive plant species were present on the site prior to restoration construction activities, including common reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*), yellow sweet clover (*Melilotus officinalis*), garlic mustard (*Alliaria petiolata*), spotted knapweed (*Centaurea maculosa*), black locust (*Robinia pseudoacacia*), and glossy buckthorn (*Rhamnus frangula*). Appendix E contains sample photographs of commonly encountered invasive plants in the project area. There is a high probability that these plants will continue to infiltrate the site's vegetative community from the existing seed bank or mature populations in the vicinity if not controlled. The prevalence of these invasive species will impede the establishment and long-term survival of the native planted species; therefore, control of invasive plant populations is recommended. The following control measures may be used to effectively reduce the presence of invasive plants on the site.

3.3.1 Hand Removal

Small patches or scattered individuals may be removed by hand and disposed of by burning or other disposal methods (do not compost). It is important to remove the entire root of each plant in order to prevent re-sprouting. This method is recommended for garlic mustard, sweet clover and small populations of spotted knapweed. Hand removal efforts should occur before the plants flower and set

seed (garlic mustard – April/May, spotted knapweed - May/June, sweet clover - June/July).

3.3.2 Selective Herbicide Application

Large populations of invasive plants and species that are difficult to remove by hand may be more efficiently controlled using herbicides. A glyphosate formulation approved for use in wetlands (such as Rodeo or AquaNeat) may be selectively applied to the foliage of target plants. Mix the chemical in a solution of 2% active ingredient with water to treat common reed, purple loosestrife, reed canary grass, and spotted knapweed. Include a wetland-safe surfactant such as Cygnet Plus in the solution at a rate of 0.6 ounce per gallon of solution. Treatments to spotted knapweed should occur prior to the flowering period (May/June). Treatments to common reed, purple loosestrife, and reed canary grass should occur when the majority of plants are blooming (August/September).

Herbicide treatments should be performed by certified pesticide applicators. Always follow chemical manufacturer label instructions for herbicide application. Please note that the use of herbicides over standing water may require a permit from the Michigan Department of Environmental Quality (MDEQ).

3.3.3 Mowing/Cutting

Certain annual and biennial invasive plants, such as sweet clover, may be effectively reduced through mowing. This technique may be preferable to hand pulling when larger populations are present. A mower or mechanical weed trimmer may be used to cut the plants close to the ground just prior to flowering (May/June). Cutting may need to be repeated once or twice during this timeframe.

3.3.4 Cut-Stump Treatments to Woody Vegetation

Invasive trees and shrubs, including glossy buckthorn and black locust, may be controlled by cutting the stems within two to four inches of the ground (using handsaw, loppers, or chainsaw) followed by application of herbicide to the cut surface. A glyphosate formulation approved for use in wetlands (such as Rodeo or AquaNeat) may be selectively applied in a solution of 75% active ingredient with water, or undiluted. Include a wetland-safe surfactant such as Cygnet Plus in the solution at a rate of 0.6 ounce per gallon of solution. Treatments may occur any time throughout the year, except during spring sap flow (mid March through May).

Herbicide treatments should be performed by certified pesticide applicators. Always follow chemical manufacturer label instructions for herbicide application. Please note that the use of herbicides over standing water may require a permit from the Michigan Department of Environmental Quality (MDEQ).

Note that many invasive plant populations will require consistent treatments over two or more years for complete removal. In some situations, total eradication may not be feasible, and routine maintenance may be needed.

4.0 PUBLIC USE

Due to occasional use of this area by the public, excessive foot traffic through vegetation could impact the stabilized areas. Preventative measures should be taken to minimize damage. Signage may be placed in appropriate locations to educate and discourage visitors from walking in the restoration area if warranted.

5.0 SUMMARY

Long-term monitoring and management of the project site will help to encourage the success of the restoration project over time. A list of restoration and habitat management website resources is provided for reference (Appendix F). Regular evaluations of site conditions will enable you to address any problem areas quickly, and will shape the focus of management efforts. If appropriate management techniques are implemented early and consistently, the site should develop as designed and provide the intended functions and benefits of a natural shoreline.

FIGURES

APPENDIX A

Monitoring Checklist

MONITORING CHECKLIST

1. Assess native vegetation development. The following problems should be surveyed for and identified.
 - a. Large areas of bare soil
 - b. Severe wildlife predation
 - c. Stressed vegetation (due to drought, erosion, etc.)
2. Check site for evidence of erosion or sedimentation problems.
 - a. Gullies or rills
 - b. Silt deposits
3. Assess presence of invasive plant species.
 - a. Note all invasive species present
 - b. Approximate population size and plant density for each species
4. Note any damage from public use or vandalism.
5. Take photographs of site, including any potential problems noted from items 1-4 above.
6. Determine if maintenance activities are needed.
 - a. Replanting, irrigation, or installation of wildlife exclusion barriers
 - b. Repair of erosion areas
 - c. Replacement of erosion control fabric or other bioengineering materials
 - d. Invasive plant control
7. Evaluate results of any prior maintenance activities performed.

APPENDIX B
Suggested Maintenance Schedule

APPENDIX C

Contact Information

Contact Information

1. West Michigan Shoreline Regional Development Commission

316 Morris Avenue, Suite 340

Muskegon, MI 49443-0387

231-722-7878 ext. 17

<http://wmsrdc.org>

Attention: Kathy Evans, kevans@wmsrdc.org

2. Muskegon Lake Watershed Partnership

316 Morris Avenue, Suite 340

Muskegon, MI 49443-0387

231-903-7442

<http://www.muskegonlake.org>

APPENDIX D

Planting Lists

Wetland Plugs – Area A

SCIENTIFIC NAME

COMMON NAME

FORBS

Acorus calamus

Sweet flag

Decodon verticillatus

Swamp loosestrife

Iris virginica

Blue flag iris

Peltandra virginica

Arrow arum

Pontederia cordata

Pickerel weed

Sagittaria latifolia

Common arrowhead

GRASSES

Carex lacustris

Common lake sedge

Scirpus pungens

Threesquare rush

Scirpus validus

Great bulrush

Scirpus fluviatilis

River bulrush

Wetland Plugs – Area B

SCIENTIFIC NAME

COMMON NAME

FORBS

Alisma subcordatum

Common water plantain

Hibiscus laevis

Smooth rose mallow

Hibiscus moscheutos

Swamp rose mallow

Iris virginica

Blue flag iris

Mimulus ringens

Monkey flower

Potamogeton pectinatus

Sago pondweed

GRASSES

Carex lacustris

Common lake sedge

Scirpus acutus

Hard-stemmed bulrush

Sparganium americanum

American bur reed

Habitat Shrubs

SCIENTIFIC NAME

COMMON NAME

Cornus sericea

Red-osier dogwood

Wetland Shrubs

SCIENTIFIC NAME

Cornus amomum
Cornus sericea
Physocarpus opulifolius
Viburnum opulus v. americanum

COMMON NAME

Silky dogwood
Red-osier dogwood
Ninebark
American highbush cranberry

Upland Buffer Plugs

SCIENTIFIC NAME

FORBS

Asclepias tuberosa
Aster sericeus
Aster shortii
Geranium maculatum
Liatris aspera
Lupinus perennis
Monarda fistulosa
Penstemon hirsutus
Rudbeckia hirta
Solidago speciosa
Zizia aurea

COMMON NAME

Butterfly weed
Silky aster
Short's aster
Wild geranium
Rough blazing star
Wild lupine
Bergamot
Hairy beard tongue
Black-eyed Susan
Showy goldenrod
Golden Alexanders

GRASSES

Ammophila breviligulata

Dune grass

SHRUBS

Rhus aromatica 'Gro-low'

Fragrant sumac 'Gro-low'

Trees

SCIENTIFIC NAME

Acer rubrum
Quercus macrocarpa

COMMON NAME

Red maple
Bur oak

Native Low Growing Seed Mix

SCIENTIFIC NAME

Anemone cylindrica
Asclepias syriaca
Asclepias tuberosa

COMMON NAME

Thimbleweed
Common milkweed
Butterfly weed

PLS OZ/AC

1.00
4.00
4.00

<i>Aster ericoides</i>	Heath aster	0.50
<i>Aster laevis</i>	Smooth blue aster	1.50
<i>Aster lateriflorus</i>	Side-flowering aster	0.50
<i>Aster novae-angliae</i>	New England aster	1.00
<i>Aster oolentangiensis</i>	Sky-blue aster	1.00
<i>Avena sativa</i>	Seed oats	512
<i>Baptisia australis</i>	Blue wild indigo	2.50
<i>Baptisia lactea</i>	White wild indigo	2.50
<i>Baptisia tinctoria</i>	Yellow wild Indigo	1.00
<i>Bouteloua curtipendula</i>	Side-oats grama	12.0
<i>Chamaecrista fasciculata</i>	Partridge pea	16.0
<i>Coreopsis lanceolata</i>	Sand coreopsis	7.00
<i>Coreopsis palmata</i>	Prairie coreopsis	5.00
<i>Dalea candida</i>	White prairie clover	3.00
<i>Dalea purpurea</i>	Purple prairie clover	2.00
<i>Echinacea pallida</i>	Purple coneflower	5.00
<i>Echinacea purpurea</i>	Broad-leaved purple coneflower	7.00
<i>Eryngium yuccifolium</i>	Rattlesnake master	4.00
<i>Euthamia graminifolia</i>	Grass-leaved goldenrod	0.25
<i>Gentiana andrewsii</i>	Bottle gentian	0.25
<i>Glyceria striata</i>	Fowl manna grass	0.50
<i>Koeleria pyramidata</i>	June grass	2.00
<i>Lespedeza capitata</i>	Round-headed bush clover	4.00
<i>Liatris aspera</i>	Rough blazing star	2.00
<i>Liatris pycnostachya</i>	Prairie blazing star	2.00
<i>Lolium multiflorum</i>	Annual rye	160
<i>Lupinus perennis occidentalis</i>	Wild lupine	4.00
<i>Monarda fistulosa</i>	Wild bergamot	1.00
<i>Parthenium integrifolium</i>	Wild quinine	2.00
<i>Penstemon digitalis</i>	Foxglove beard tongue	1.00
<i>Potentilla arguta</i>	Prairie cinquefoil	1.00
<i>Pycnanthemum virginianum</i>	Common mountain mint	2.00
<i>Ratibida pinnata</i>	Yellow coneflower	4.00
<i>Rudbeckia hirta</i>	Black-eyed Susan	10.0
<i>Schizachyrium scoparium</i>	Little bluestem grass	50.0
<i>Silphium integrifolium</i>	Rosin weed	3.00
<i>Solidago nemoralis</i>	Old-field goldenrod	1.00
<i>Solidago rigida</i>	Stiff goldenrod	2.00
<i>Solidago speciosa</i>	Showy goldenrod	1.00
<i>Tradescantia ohiensis</i>	Common spiderwort	1.00
<i>Zizia aptera</i>	Heart-leaved meadow parsnip	1.00

Native Emergent Wetland Seed Mix

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>PLS OZ/AC</u>
<i>Acorus calamus</i>	Sweet flag	0.5
<i>Alisma subcordatum</i>	Common water plantain	2.00
<i>Asclepias incarnata</i>	Swamp milkweed	2.00
<i>Avena sativa</i>	Seed oats	512
<i>Carex comosa</i>	Bristly sedge	2.50
<i>Decodon verticillatus</i>	Swamp loosestrife	1.00
<i>Eleocharis ovata</i>	Blunt spike rush	1.00
<i>Eupatorium maculatum</i>	Spotted joe-pye weed	2.00
<i>Hibiscus laevis</i>	Smooth rose mallow	3.00
<i>Hibiscus moscheutos</i>	Swamp rose mallow	2.00
<i>Iris virginica shrevei</i>	Blue flag iris	4.00
<i>Juncus effusus</i>	Common rush	2.00
<i>Leersia oryzoides</i>	Rice cut grass	4.00
<i>Lobelia cardinalis</i>	Cardinal flower	0.50
<i>Lobelia siphilitica</i>	Great blue lobelia	2.00
<i>Lolium multiflorum</i>	Annual rye	160
<i>Mimulus ringens</i>	Monkey flower	2.00
<i>Peltandra virginica</i>	Arrow arum	20.0
<i>Penthorum sedoides</i>	Ditch stonecrop	1.00
<i>Sagittaria latifolia</i>	Common arrowhead	2.00
<i>Scirpus acutus</i>	Hard-stemmed bulrush	3.00
<i>Scirpus fluviatilis</i>	River bulrush	0.50
<i>Scirpus pungens</i>	Chairmaker's rush	4.00
<i>Scirpus validus creber</i>	Great bulrush	8.00
<i>Sparganium eurycarpum</i>	Common bur reed	4.00
<i>Zizania aquatica</i>	Wild rice	160

APPENDIX E
Sample Invasive Plant
Photographs

APPENDIX F

Resources

The following list of website resources may be helpful in providing more extensive information.

Native Plants

<http://muskegoncd.org/index.html>
http://www.mi.gov/dnr/0,1607,7-153-10370_12146---,00.html
<http://www.cardnojfnew.com/Nursery/Material/Benefits.aspx>
<http://www.epa.gov/greenacres>
<http://plants.usda.gov>
<http://herbarium.lsa.umich.edu>

Habitat Restoration

<http://www.habitat.noaa.gov/restoration/programs/greatlakes.html>
<http://www.glc.org/restoration/index.html>
http://www.mi.gov/dnr/0,1607,7-153-10370_12148---,00.html
http://www.mi.gov/dnr/0,1607,7-153-10370_12148_25071---,00.html

Invasive Species

<http://glc.org/ans>
<http://www.glerl.noaa.gov/res/Programs/ais>
http://www.mi.gov/dnr/0,1607,7-153-10370_12146_12214---,00.html
http://muskegoncd.org/invasive_species.html
<http://www.invasivespeciesinfo.gov/plants/main.shtml>
<http://tncinvasives.ucdavis.edu>

Soil Erosion and Sedimentation Control

<http://glc.org/basin>
http://www.michigan.gov/deq/0,1607,7-135-3311_4113---,00.html
<http://www.wes.army.mil/rsm>

Coastal Wetlands and Areas of Concern

<http://glc.org/rap>
<http://glc.org/wetlands>
<http://www.noaa.gov/coasts.html>
<http://www.seagrant.noaa.gov/aboutsg/index.html>