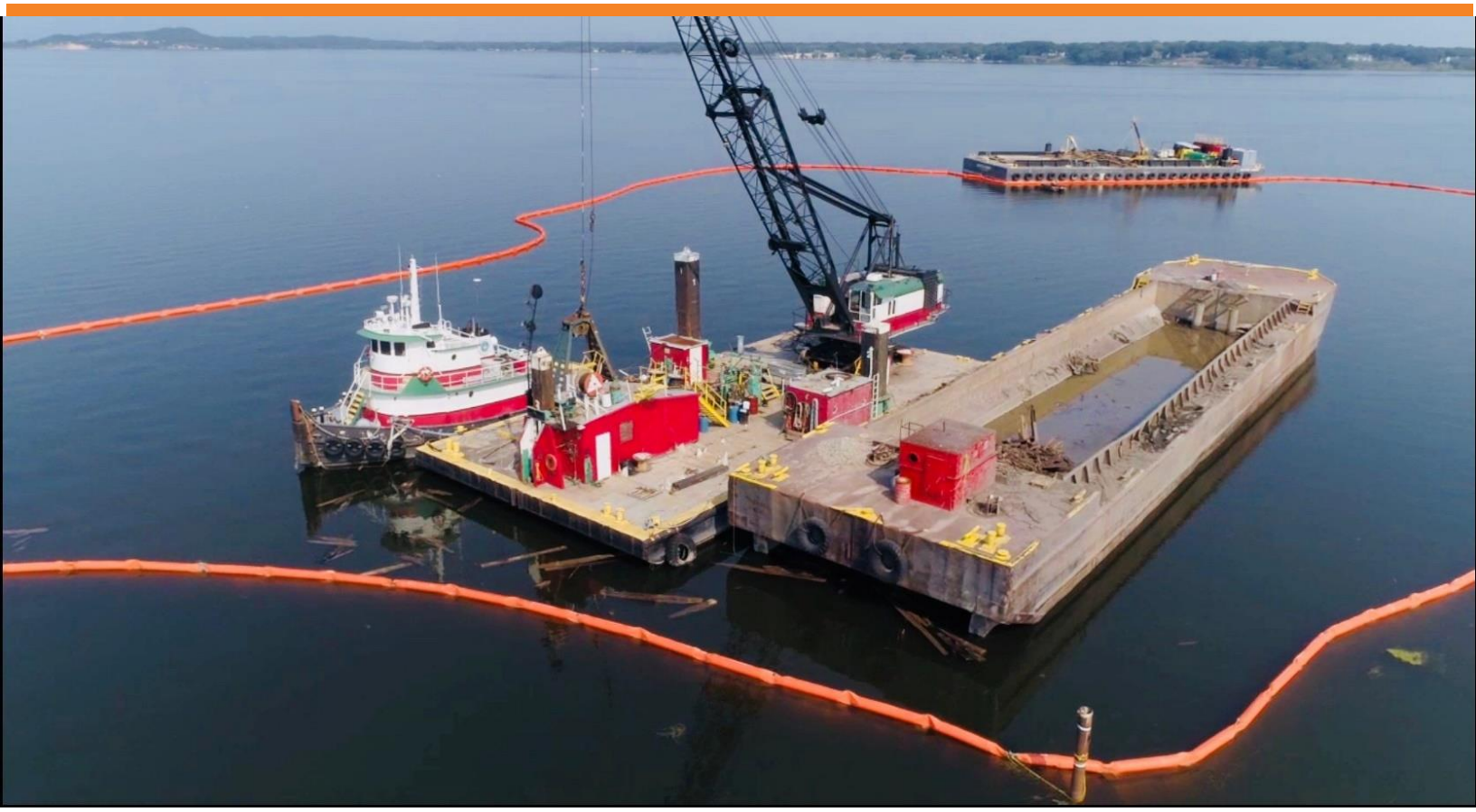
WEST MICHIGAN SHORELINE
REGIONAL DEVELOPMENT COMMISSION



Monitoring and Management Plan

Muskegon Lake Mill Debris Fish & Wildlife Restoration
South Shore Site
Muskegon, MI

December 17, 2018

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NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
UNITED STATES DEPARTMENT OF COMMERCE

Monitoring and Management Plan for Muskegon Lake Mill Debris Fish and Wildlife Restoration at South Shore Site

West Michigan Shoreline Regional Development Commission Muskegon, Michigan

INTRODUCTION

Approximately 55,018 cubic yards of wood debris was excavated from an area near the South Shore Bike Path (see Appendix A) in Muskegon Lake in 2018 in order to restore fish habitat. To ensure the success of this restoration project, monitoring and management must take place by qualified individuals to inspect the Mill Debris Fish and Wildlife Restoration site so adverse impacts do not affect the long-term viability of these improvements or users of Muskegon Lake.

Consistent monitoring is vital to identify issues at an early stage before they become major impacts to Muskegon Lake. Monthly inspections during the boating season will provide the desired consistent monitoring as well as provide timely intervention.

Monitoring inspections are intended to:

- Identify mill debris that has floated up from the lake bottom.
- Document the condition of the lake bottom to ensure that fish habitat is maintained and viable.

MONITORING PROCESS

Monitoring should be done by knowledgeable personnel who are familiar with the restoration site. To maximize the success of this monitoring effort it is important that the same qualified person do the site inspections, so they are familiar with the project site and provide consistent observations.

Observations should be documented through both written reports and photographs (Appendix B). Photographs should be retained digitally with only a few representative pictures attached to the report.

Inspectors should have a set of as-built construction plans to locate the construction area.

Each inspection report should include a plan of action for issues observed and identify the timing of the intervention. Certain items may need immediate attention while others may be less critical and perhaps will depend on seasonal influences or require consultation with multiple parties.

OBSERVATIONS TO BE MADE

- **Monthly Observations:**
    - Identify mill debris that has floated up from the lake bottom in the area of the restoration site. This observation will include inspection of the lake in the area of the restoration, by boat, to look for loose pieces of mill debris wood. The location, quantity, and size of floating pieces of mill debris should be documented.
    - Identify mill debris that has accumulated on shorelines adjacent to the restoration site. The location of accumulation will depend on the wind direction but is likely to be in all directions from the site due to continually changing wind directions. An understanding of compounding accumulation is important in understanding whether accumulation has continued in the past month. The location, quantity, and size of pieces of mill debris accumulated on the shore should be documented.
- **Annual Observations:** Document the condition of the lake bottom with a hydro-acoustic survey to compare current bathymetry to the as-built bathymetry to determine stability of the restoration site. As-built bathymetry is identified on Drawing 5 of the as-built plans dated November 17, 2018.

RESOURCE INFORMATION

For additional information regarding the project completed to establish and/or enhance the habitat of Muskegon Lake, the following contacts and resources are provided:

West Michigan Shoreline Regional Development Commission (WMSRDC)
316 Morris Avenue, Suite 340
P.O. Box 387
Muskegon, MI 49443-0387
231.722.7878

SUMMARY

Regular observations by the same individual will aid in monitoring the condition of the restoration site. Addressing issues with floating mill debris or unstable lake bottom conditions will help shape the success of intervention measures and the ultimate success of the project's goals of habitat restoration of the restoration area.

Appendix A

Project Area Site Plan


MILL DEBRIS SITE
VICINITY MAP
NOT TO SCALE
Muskegon State Park
Pere Marquette Park
North Muskegon
Muskegon
Fenner Rd
Memorial Dr
Ruddiman Dr
Lakeshore Dr
W Laketon Ave
E Laketon Ave
W Hackley Ave
E Hackley Ave
W Sherman Blvd
E Sherman Blvd
Marquette Ave
Evanston Ave
Milwaukee-Muskegon

Appendix B

Monitoring Form

MUSKEGON LAKE
MILL DEBRIS FISH AND WILDLIFE RESTORATION
MUSKEGON, MICHIGAN

MONITORING FORM

Project Area:	**Date:**
Investigator:	**Time:**
Weather Conditions:	

Monthly Observations

1. Floating Mill Debris:
   a. Location: _____
   _____
   b. Quantity: _____
   _____
   c. Size: _____
   _____
   d. Corrective Measures: _____
   _____
2. Shoreline Debris:
   a. Location: _____
   _____
   b. Quantity: _____
   _____
   c. Size: _____
   _____
   d. Corrective Measures: _____
   _____

Annual Observations

1. Lake level at time of survey: _____
2. Comparison of bathymetry to August 2018 as-built conditions:

_____

_____

_____

_____

_____

Corrective measures: _____

_____