Application of Geospatially Enabled Geographic Response Plans for Oil Spill Response in the Western Basin of Lake Erie

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Michigan Tech Research Institute, Ann Arbor, MI
University of Michigan Water Center Annual Conference
Ann Arbor Michigan
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Area Contingency Plans (ACPs) and their associated Geographic Response Plans (GRPs) are site-specific documents designed to outline steps to be taken by responders to protect sensitive sites after an oil or chemical spill.

Designed to improve the speed and efficiency of a response during the critical first few hours after a spill.

Existing paper based plans and their associated maps, tables and graphics can be difficult to update and expensive to distribute on paper.
Project Overview

- Project proposes a GIS based dataset of protection strategies and resources for ecologically and economically sensitive sites in the western basin of Lake Erie.

- Provides a framework for development of GIS based protection strategies and spill response plans elsewhere in the Great Lakes.

- Initial work done in collaboration with the Western Lake Erie Area Committee, US and Ohio EPA and the US Coast Guard Marine Safety Unit Toledo for a Masters thesis at the University of Toledo

- Additional input from USCG MSU Cleveland, USCG Sector Detroit and NOAA
What is a GRP?

- GRPs (aka protection strategies) are an important component of the contingency planning process.
- GRPs make response data more accessible and portable for field crews
  - Crews know where to go and what to do when they get there.
- GRP data is useful for briefing documents
  - Overview of what resources are necessary to execute a response strategy
Existing GRPs for Western Lake Erie

- Existing paper response maps and supporting data tables are not easy to update and may not be kept up to date, potentially leaving response and command personnel with an incomplete picture of conditions during an incident.
Paper based GRPs

CATAWBA ISLAND STATE PARK

Lake Erie Islands State Park
4049 East Moore's Dock Rd.
Port Clinton, Ohio 43452
Point of Contact: Reggie Langle
Work: 419-797-4530
24-hour: 419-797-2323

Location/Directions: Woodville Rd. East from Anthony Wayne Bridge (3/4 mi) To Route 2 East to Port Clinton (62 mi) to Route 33 N (5 mi) to left Schoolhouse Rd. (3/4 mi) left on Catawba Rd. to right on Moore's Ol'Rd. (3/4) to Park Office

Type of Shoreline Habitat: Rock Cliffs/Stone Beach/Fishing Pier

Wildlife/Resource at Risk: Recreational Day use Picnicking and Fishing

First Priority Boom Location: Public Areas at Boat House

Other Shore Access: Beach Areas

Staging/Recovery Area: Fishing Pier with small parking at water’s edge

Local Resources:
Boat: N/A, Sorbent: N/A
Boats: 1 (26)
Trucks: 1 pickup
Radar: 1 base, 1 portable, frequencies: 155.355 Parks
Number of Personnel: 2 Full Time. 1 Seasonal
Boat Ramp: Yes

Additional Significant Information: Open 8-5 P.M. 12-1 P.M. off for lunch.
Paper based GRPs
NOAA’s ERMA:  
A geospatial framework for the project

- **ERMA** – Environmental Response Management Application  
  - Designed as an aid in all phases of spill preparedness and planning  
  - Can assist in coordination emergency response efforts and situational awareness  
  - Supports SCAT (shoreline assessment), Natural Resource Damage Assessment (NRDA) process, recovery and restoration efforts post-incident.

Developed by NOAA Office of Response and Restoration (OR&R) in Seattle, WA and UNH Coastal Response Research Center (CRRC) with US EPA, US Coast Guard  
- Open source application  
- Allows display and analysis of a wide variety of planning and response related geospatial data including model output

Each ERMA has regional focus:  
- Great Lakes, New England, Atlantic, Gulf of Mexico, Southwest (CA), Pacific Northwest (WA, OR), Caribbean (PR, USVI) Pacific Islands, Arctic (AK)  
- Regional approach allows use of locally generated fine resolution data for stakeholders to take advantage of ERMA’s analysis and data management capability

- USCG D9 (Great Lakes) designated ERMA as their Common Operating Picture (COP) GIS application
Great Lakes ERMA went live 7-10-13

Standard base maps/datasets/layers
- Google Maps base map set – Streets, physical, hybrid and satellite
- Administrative boundaries
- Bathymetry & Hydrology
- Environmental Quality and Monitoring
- Imagery and Remote Sensing
- Natural Resources, Habitats & Managed Areas
- Navigation and Marine Infrastructure
- Public Safety & Infrastructure
- Response Planning
- Weather, Oceanography & Natural Hazards
- ...

Regional and local data layers are added as identified and quality checked by NOAA OR&R.
GRP Review

- Looked for logical, consistent format in GRPs
- Great Lakes have unique regional data requirements
  - All other GRPs reviewed are in coastal/salt water environments
  - Shoreline/Riverine/Open water, highly productive wetlands (particularly western Lake Erie)
- Two sets of GRPs were of particular interest:
  - Florida Fish and Wildlife Research Institute (FWRI)
    - GRPs for Alabama, Florida, Georgia, South Carolina
  - California Office of Spill Prevention and Response (OSPR)
    - GRPs for California coast
- Both have GRPs on ERMA
Great Lakes ERMA
Maumee Bay State Park
### Proposed Digital GRPs

**Maumee Bay State Park OH**

<table>
<thead>
<tr>
<th>Site Name:</th>
<th>Maumee Bay State Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site ID:</td>
<td>TBD</td>
</tr>
</tbody>
</table>

#### Geospatial Information

| Latitude (DSM): | 41°11'55.5"N |
| Longitude (DMS): | 83°22'41.451"W |
| Location Description: | Coastal, open water |
| Latitude (DD): | 41.198555 |
| Longitude (DD): | -83.378175 |
| ESRI Map: | WU61 |
| ESRI Name: | Waterway 61 |
| NOAA Chart: | 14847_1 |
| Chart Name: | Toledo Harbor |
| USGS Quad 1: | Oregon |
| USGS Quad 2: | Rerto Beach |

#### Contact Information

| Contact Name: | Jim Brower |
| Contact Phone: | 419.836.7758 |
| 24 hour Phone: | 419.836.7758 |
| Site Name: | Maumee Bay State Park |
| Site Address 1: | 1400 State Park Road |
| Admin City: | Oregon |
| Admin State: | OH |
| Admin ZIP Code: | 43618 |
| Township: | Lucas Township |
| Site Address 2: | 1400 State Park Road |
| Site City: | Oregon |
| Site State: | OH |
| Site Zip Code: | 43618 |
| Site Township: | Lucas Township |

#### Google Maps Link:

https://www.google.com/maps/place/Maumee+Bay+State+Park/@41.6830886,83.3679563/16z/data=!4m8!1m2!4m5!1s0x0:0x0!2m4!3m1!1s0x3c85388169ebebed0997:c602!4m5!1s0x3c85388169ebebed0997:c602!2m1!4m2!3m1!1s0x3c85388169ebebed0997:c602!2m1

#### Google Maps Directions:

From Ohio Turnpike (East):
https://www.google.com/maps/dir/41.4570744,-83.2872823/Maumee+Bay+State+Park,+1400+State+Park+Rd,+Oregon,+OH,+43618/@41.570171,83.312575/data=!4m8!1m2!4m5!1s0x0:0x0!2m4!3m1!1s0x3c85388169ebebed0997:c602!4m5!1s0x3c85388169ebebed0997:c602!2m1!4m2!3m1!1s0x3c85388169ebebed0997:c602!2m1

From I-280:
https://www.google.com/maps/dir/41.6360909,-83.491093/Maumee+Bay+State+Park,+1400+State+Park+Rd,+Oregon,+OH,+43618/@41.65311,83.4647022/data=!4m8!1m2!4m5!1s0x0:0x0!2m4!3m1!1s0x3c85388169ebebed0997:c602!2m1!4m2!3m1!1s0x3c85388169ebebed0997:c602!2m1

#### Resources at Risk Information

<table>
<thead>
<tr>
<th>Resource Type:</th>
<th>Mixed sand beach in front of riprap armored shoreline along state park shoreline.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitat:</td>
<td>Coastal Wetland</td>
</tr>
<tr>
<td>Wildlife:</td>
<td>Shorebirds, geese, ducks, herons, egrets, cranes, eagles, hawks, muskrats, mink, fox, deer</td>
</tr>
<tr>
<td>Threatened or Endangered Species:</td>
<td>State park and beach, seasonal heavy recreational activity</td>
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</tbody>
</table>

#### WLEAC Response Strategies

<table>
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<tr>
<th>First Priority Boom Location:</th>
<th>Protect state park shoreline - swimming beach just west of the lodge. Divert product to collection points along shoreline or to open water recovery.</th>
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</thead>
<tbody>
<tr>
<td>Other site strategies:</td>
<td>Notes: Lake may be very shallow just offshore. Check lake levels at <a href="http://lakelevels.nos.noaa.gov">http://lakelevels.nos.noaa.gov</a> and select station 3063085 Toledo OH. For open water response protocols see <a href="http://umich.org">umich.org</a>.</td>
</tr>
<tr>
<td>Staging Area:</td>
<td>Staging Area (NW240) on site</td>
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</tbody>
</table>

#### Collection Points: Potential collection points on east side of breakwater (NW 238) and in state park marina (NW 239). Another potential collection point just west of the public beach. |

#### Area Access: West half of shoreline accessible from access drive just behind beach, east half accessible by water only. |

#### Local Response Resources: None |

#### Parking access, staging access, etc. at location: Yes, large parking lot at beach, water access across sand beach west of lodge and marina. Staging area on site (Staging Area NW240) |

#### Structures and/or Utilities in Area: Water and power available from Maumee State Park Marina |

#### Boom Type: Diversion |

#### Min. Boom Length (ft): 1000 |

#### Booming Method: Diversion |

#### Protection Strategy: Deploy diversion booms to deflect spilled product to open water collection (or to collection points east and west of the public beach). |

#### Additional Strategy: Nearest Staging Area is Maumee Bay State Park. (Site NW240) |


#### Full extent of aerials of the Maumee Bay State Park shoreline are from image EB-0097 to EB-0119 |

#### GRP Data Source: 1998 edition, Western Lake Erie Area Contingency Plan, aerial photography |

### GRP Information compiled by:

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Proposed Digital GRPs
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Elements included in GRP datasets

- Geospatial information
  - Lat/Long (DMS, DD)
  - NOAA chart number(s)/name(s)
  - Environmental Sensitivity Index map number
  - USGS 7.5 minute quad names

- Site Address /Admin Contact Info
  - Manager contact info/24 hour emergency numbers
  - Google Maps link to site map
  - Google Maps link to directions from nearby major intersections/interchanges

- Resources at Risk
  - Shoreline type
  - Habitats
  - Wildlife
  - Socio-Economic
Elements included in GRP datasets

- **Response Strategies**
  - First priority response locations
  - Collection points
  - Staging areas
  - Local resources
  - Area access
  - Structures/utilities in area
  - Protection strategy
  - Quantity/type/length of boom required
  - Link to USACE oblique shoreline aerial imagery
Elements included in GRP datasets

- Site photos
  - Include significant features of site - landmarks, obstructions, ...

- Maps of boom configuration, location of staging areas, containment points, utilities, etc.

- Maps to site from major nearby interchanges/intersections/landmarks

- Other data as directed by Area Committees/Coast Guard/EPA/OSROs
## Staging Area Sites

### Western Lake Erie GRP - STAGING AREA - USCG Sector Division

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Catawba Island State Park</th>
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</thead>
</table>

#### Geospatial Information
- **Latitude (DDM):** 41°34'29.818"N
- **Longitude (DDM):** 82°34'26.732"W
- **Latitude (DD):** 41.573038
- **Longitude (DD):** 82.57687
- **NOAA Chart:** 14830, 14842
- **Quadrant Name:** Western Lake Erie

#### Contact Information
- **Operator:** Ohio DNR, Division of State Parks
- **Contact Name:** [Name]
- **Contact Phone:** [Phone]
- **Site Name:** Catawba Island State Park
- **Site Address 1:** 4049 E. Moore's Dock Road
- **Site City:** Port Clinton
- **State:** OH
- **Site Township:** Catawba Island
- **ZIP Code:** 43452
- **Admin Address 1:** 1189 North Buck Road [East Harbor State Park]
- **Admin City:** Lakeside-Marblehead
- **Admin State:** OH
- **Admin ZIP Code:** 43440

#### Staging Area Site Description:
- **Location Description:** Located on the west side of Catawba Island, direct access to Catawba Island State Park.
- **Nearby Sensitive Sites:**
- **Notes:** Site is part of an economically sensitive area as well as serving area.

#### Photographs
- **Photograph #1**
  - **Direction:** West
  - **Photograph Taken:** 3-Jul-14
- **Photograph #2**
  - **Direction:** East
  - **Photograph Taken:** 3-Jul-14
- **Photograph #3**
  - **Description:** USACE Aerial of the Catawba Island State Park launch ramp.
- **Photograph #4**
  - **Description:** Parking area at Metzger Fishing Access.

#### Data Sources:
- Google Maps, Ohio DNR Office of Coastal Management

#### Information compiled by:
- **Name:** [Name]
- **Phone:** [Phone]

#### Data Verified by:
- **Name:** [Name]
- **Phone:** [Phone]
## Water Access Sites

### Western Lake Erie GRP - Water Access Point - USCG Sector Detroit, MI

#### Site Information
- **Site Name:** Metzger Fishing Access
- **Site ID:** TBD

#### Geospatial Information
- **Latitude (DMS):** 41°18'21.727"N
- **Longitude (DMS):** 83°15'53.366"W
- **Location Description:** Coastal marina, direct lake access
- **NOMA Chart:** 14647
- **Chart Name:** Toledo Harbor
- **USGS Quad:** Metro Beach

#### Contact Information
- **Operator:** Ohio Division of Wildlife
- **Contact Name:** Metzger Fishing Access
- **Address 1:** 12253 Bono Road
- **City:** Middletown
- **State:** OH
- **County:** Lucas
- **Zip Code:** 43542

#### Site Description
- **Location Date:** Located on the south shore of Lake Erie on Wards Canal on Bono Road. Site is on the west side of Metzger Marsh Wildlife Area/Ottawa NWR.
- **Site Description:** 2 lane concrete ramp, small parking area. This site has direct access to Lake Erie via Wards Canal.

#### Nearby Sensitive
- **Sites:** Metzger Marsh and Ottawa NWR (Site XXX) is just east of this site

#### Google Maps Link
- [https://www.google.com/maps/@41.6390027,-83.2512762,4817m/data=!3m1!1e3](https://www.google.com/maps/@41.6390027,-83.2512762,4817m/data=!3m1!1e3)

#### Links to USACE Outlines Imagery:

#### Data Sources
- Google Maps, Ohio DNR Office of Coastal Management, photointerpretation

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### Site Photos

#### Photograph #1
- **Direction Photograph Taken:** West
- **Date Photograph Taken:** 3-31-14
- **Description:** Boat ramp at Metzger Fishing Access

#### Photograph #2
- **Direction Photograph Taken:** East
- **Date Photograph Taken:** 3-31-14
- **Description:** Parking area at Metzger Fishing Access
Other GIS frameworks

- Ohio/Michigan/... Mapping Projects jointly developed by USEPA/State EPA on-scene coordinators
  - Demonstrated by Jon Gulch (USEPA) and Mike Gerber (Ohio EPA) at Toledo National Preparedness for Response Exercise Program (NPREP) Tabletop Exercise 7-10-13
  - Mapping project used in 2014 MSU Toledo Full Scale PREP exercise
  - Contains numerous useful response data layers
  - Has data for Ohio, Michigan, other state data being developed
  - US EPA & Ohio EPA focused on inland response
  - USCG focused on shoreline and offshore
  - USCG and USEPA coordinate response in areas where jurisdictions overlap

- GRPs / Response data should display seamlessly between ERMA, USEPA/state mapping projects
Moving forward with the project

- ERMA provides GIS framework for this project
- Data are provided in standard GIS format (shapefiles, geodatabases)
- Provides multiple options for GRP data display and distribution (GRP as pdf, display different data layer combinations...)
- Easy data sharing between GIS applications ERMA, EPA’s Flex Viewer, ArcGIS, other geospatial applications
- USCG D9 using NOAAs ERMA in the Great Lakes as Common Operating Picture GIS application
  - Integrate GIS data into standard Incident Command System (ICS) forms
- Continuing to work with USCG, EPA, others to develop and populate Geographic Response Plans to accommodate different environments around the Great Lakes
Questions, Comments?