Acquisition Directorate

Research & Development Center

USCG Research and Development Center Oil Spill Response Research Update

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UNCLAS | 2023 CA OSPR Chevron Response Technology Workshop | RDC Adewale & Balsley | March 2023

Emerging Pollution Response Technology Evaluation

1011

Mission Need: Understand the capability of emerging mechanical pollution-response technology.

Objectives

- Conduct market research to identify new and emerging pollution response technologies.
- Conduct independent evaluation of select technologies using the U.S. Coast Guard's (CG) Oil Spill Response Technology Evaluation Process.
- Collaborate with other Federal agencies (Bureau of Safety and Environmental Enforcement (BSEE), Environmental Protection Agency, etc.) to conduct in-water testing of the most promising technologies.
- Provide feedback to equipment providers for consideration in advancing their technologies to enhance the nation's pollution response capability.
- Provide a knowledge product for Federal On-Scene Coordinator (FOSC) awareness of new technologies.

Notes

- Oil Spill Liability Trust Fund funding.
- Partnership with BSEE.
- Possible use of Cooperative Research and Development Agreements.
- Opportunity to partner with Interagency Coordinating Committee for Oil Pollution Research (ICCOPR) members, Federal Laboratory Consortium members, and academic institutions involved in this area of research.
- Possible collaboration with Blue Technology Center of Expertise (BTCOE) for technology market research.

Project Timeline / Key Milestones

Project Start: 1 Oct 21	
Request for Information (RFI) Issued for Sorbents	5 Jan 22 ✓
In-house Technology Evaluation Conducted	17 May 22 ✓
Emerging Pollution Response Technology (Sorbents), Preliminary Evaluation Results/Way Forward (Brief)	**13 Jul 22 ✓ ★**
Ohmsett Testing of Sorbents Complete	28 Oct 22 ✓
Emerging Pollution Response Technology (Sorbents), Evaluation Findings (Report)	**Jun 23 ★**
Emerging Pollution Response Technology (Mechanical Recovery/Containment), Preliminary Evaluation Results/Way Forward (Brief)	**Aug 23 ★**
Ohmsett Testing of Mech Recovery Complete	Nov 23
Emerging Pollution Response Technology (Mechanical Recovery/Containment), Evaluation Findings (Report)	**Jun 24 ★**
Project Completion: Jun 24	

Sponsor: CG-MER

Stakeholder(s): ICCOPR, CG-721, District Response Advisory Teams, FOSCs, National Strike Force

RDC Research Lead:
Mr. Alexander Balsley, P.E.

CG-926 Domain Lead:
Ms. Karin Messenger

Anticipated Outcome/ Transition: Recommendations on Tech Availability & Applicability

Emerging Pollution Response Technology Evaluation

- **Mission Need: Understand the capability of emerging mechanical pollution-response technology.**
  - Partnering with Bureau of Safety and Environmental Enforcement Oil Spill Preparedness Division (BSEE OSPD)
  - Federal On-Scene Coordinators (FOSCs) and other responders receive product "suggestions" during active oil spills with unverified data; they do not have access to useful information/data about full range of equipment capability
    - Completed *Oil Spill Response Technology Evaluation Guidance* in 2020 to aid in evaluating submittals
  - Project team discussed specific focus with sponsor and stakeholders; consensus was to address **Type I sorbents** first
    - Tested four adsorbents at Ohmsett in October 2022
      - Aquaflex®, MFNS Tech (OHM Sponge™), Earthwise, and Imbibitive Technologies (Imbiber Beads®)

Emerging Pollution Response Technology Evaluation

AquaFlex® Open-Cell Foam

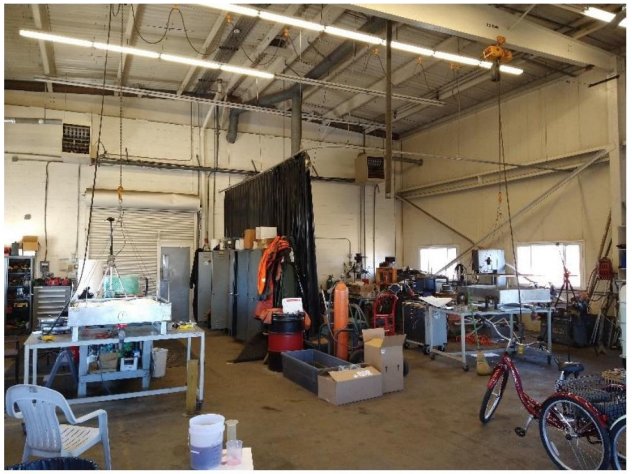
Earthwise Sorbents Oil-Only Heavyweight Pads

Imbibitive Technologies Imbiber Fiber™

MFNS Technologies OHM Sponge™

Emerging Pollution Response Technology Evaluation

ASTM F726-17 tests in Ohmsett's chemistry lab



Two metal trays in Ohmsett's high bay area for water uptake tests

Public report with results available Summer 2023

AquaFlex®'s wringer system for reusability tests

Nearshore and Inland Evaluation of the Estimated Recovery System Potential (ERSP) Calculator

4710

Mission Need: ERSP calculator to include response systems for nearshore/inland operating environment.

Objectives

- Determine if an enhanced version of the existing offshore ERSP calculator provides improved efficiency for planning and response to oil spills.
- Develop an inland ERSP calculator prototype tool.
- Validate ERSP calculator functionality and usefulness through an independent evaluation by a group of National Academies of Sciences, Engineering, and Medicine reviewers.

Notes

- Oil Spill Liability Trust Fund funding.
- Partnership with Bureau of Safety and Environmental Enforcement (BSEE).
- Transition partnership with Great Lakes National Center of Expertise.

Sponsor: CG-MER	**Stakeholder(s):** BSEE, AREAs
RDC Research Lead: Mr. Alexander Balsley, P.E.	**CG-926 Domain Lead:** Ms. Karin Messenger
Anticipated Outcome/ Transition:	Provide Sponsor/Product Line Tested Prototype *Enter Optional Second Outcome/Transition*

Project Timeline / Key Milestones

Project Start: 1 Oct 16

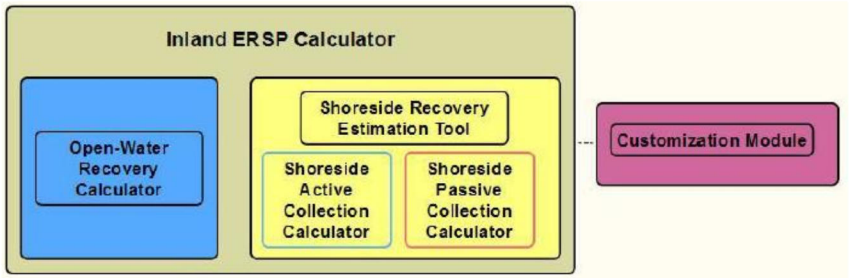
Feasibility Workshop Completed	21 Jun 17 ✓
Feasibility of Extending the ERSP Calculator for Nearshore and Inland Waterways (Report)	**20 Sep 17 ✓ ★**
Inland ERSP Preliminary Factors, Requirements and Conceptual Model (Report)	**14 Nov 19 ✓ ★**
Inland ERSP Operational Environment Calculator (Design Document)	**29 Jun 20 ✓ ★**
Initial Development of Inland ERSP Calculator Complete	4 Jun 21 ✓
National Academy of Sciences (NAS) Review Complete	9 Sep 22 ✓
NAS Recommended ERSP Calculator Updates Complete	Dec 23
Inland Evaluation of the ERSP Calculator (Prototype & User Guide)	**Apr 24 ★**

Project Completion: Apr 24

Nearshore and Inland Evaluation of the Estimated Recovery System Potential (ERSP) Calculator

Mission Need: ERSP calculator to include response systems for nearshore/inland operating environment.

- RDC developed Inland ERSP Calculator prototype (2019-2022)
- National Academies of Sciences, Engineering and Medicine (NASEM) completed independent review (September 2022)
- RDC in discussions with potential contractor to include recommended changes from NASEM into new prototype calculator version



Behavior of Diluted Bitumen (Dilbit) in Fresh Water

4204

Mission Need: Enhanced decision-making for response to dilbit spills in the fresh water environment.

Objectives

- Provide the U.S. Coast Guard (CG) Federal On-Scene Coordinators with decision–making guidance as they relate to the fate and transport of dilbit in the freshwater environment.
- Study the behavior (density and weathering) and response tools of dilbit spills in the freshwater environment.

Notes

- Supported by Great Lakes (GL) Restoration Initiative funding.
- Leverage RDC Project 4705 "Oil Sands Products Spill Response."
- Collaborate with the International Institute for Sustainable Development's Experimental Lakes Area and U.S. Department of Energy labs.

Project Timeline / Key Milestones

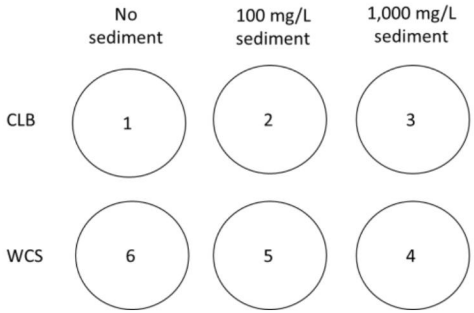
Project Start: 1 Oct 20	
Literature Review Complete	12 Feb 21 ✓
Literature Review – Diluted Bitumen in the Fresh Water Environment (Report)	**23 Jun 21 ✓ ★**
Dilbit Test Plan Complete	30 Sep 21 ✓
CRREL Dilbit Weathering Cold Weather Test Complete	30 Nov 21 ✓
CRREL Dilbit Weathering Warm Weather Test Complete	15 Jul 22 ✓
CRREL Dilbit Weathering Ice-free Cold Weather Test Complete	15 Nov 22 ✓
Dilbit Oil Analysis Complete	Jan 23 ✓
Guidance Document - Behavior of Diluted Bitumen in the Fresh Water Environment (Report)	**Aug 23 ★**
Project Completion: Aug 23	

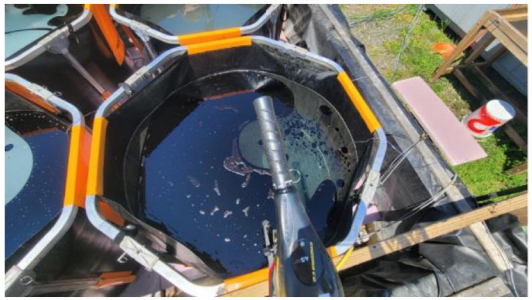
Sponsor: CG-MER, D9	**Stakeholder(s):** EPA GL Nat'l Program Office/ Pollution Response Office, LANT-54, NOAA, FORCECOM
RDC Research Lead: Benedette Adewale, PhD	**CG-926 Domain Lead:** Ms. Karin Messenger
Anticipated Outcome/ Transition:	Recommendations for Tactics, Techniques & Procedures *Enter Optional Second Outcome/Transition*

Behavior of Diluted Bitumen (Dilbit) in Fresh Water

Mission Need: Better decision-making guidance for response to dilbit spills in fresh water.

- Cold weather experiments completed in November 2021
  - Tested with Cold Lake Blend (CLB) and Western Canadian Select (WCS)
  - Dilbit showed 95% sinking on ~Day 10-11 in the control and sediment treated tanks





- Warm weather experiments completed in June 2022
  - Dilbit sank earlier than observed during the cold weather experiment.
  - Collected data on physical and chemical characteristics of dilbit at various time intervals, as well as oil-particle aggregate (OPA) formation and content
- Second cold-weather experiments completed in October 2022
  - Sinking of dilbit took longer than 11 days in the controlled and sediment treated tanks
- Report expected late summer 2023

Behavior of Diluted Bitumen (Dilbit) in Fresh Water (cont.)

Experimental setup at CRREL

Hazardous Substance Pollution Response Technology Analysis

1033

Mission Need: Improve response readiness to hazardous substance pollution release incidents.

Objectives

- Address hazardous substance pollution risk knowledge gaps in Area Contingency Plans.
- Identify and analyze existing hazardous substance response technologies, capabilities, and resources.
- Provide reference guidance for area contingency planners.
- Enhance Captain of the Port (COTP) and Federal On Scene Coordinators (FOSC) response capabilities.
- Support inclusion of hazardous substance release response resources in facility and vessel response plans.

Notes

- Coordinate with area contingency planners to connect project focus with specific field needs.
- Engage with the U.S. Environmental Protection Agency (EPA) emergency response program, CG National Strike Force Coordination Center (NSFCC), firefighters and other local hazardous-materials responders to leverage existing hazardous substance pollution response expertise.

Sponsor: CG-MER

Stakeholder(s): EPA, NSFCC

RDC Research Lead:
Benedette Adewale, PhD

CG-926 Domain Lead:
Ms. Karin Messenger

Anticipated Outcome/ Transition: Recommendations for Tactics, Techniques & Procedures

Enter Optional Second Outcome/Transition

Project Timeline / Key Milestones

Project Start: 3 Oct 22

Complete Literature Review	Jun 23
Complete COTP/FOSC/Other Agency Information Gathering	Aug 23
Hazardous Substance Materials Incident Literature Review and Identification of Hazardous Substance Materials Locations (Report)	**Sep 23** ★
Complete Request for Information Review/Research of Available Technology among Other Agencies and First Responders	Nov 23
Technologies for Hazardous Substance Pollution Incident Response Market Research (Report)	**Jun 24** ★

Project Completion: Jun 24

Hazardous Substance Pollution Response Technology Analysis

Mission Need: Improve response readiness to hazardous substance pollution release incidents.

- Address hazardous substance pollution risk knowledge gaps in Area Contingency Plans
- Identify and analyze existing hazardous substance response technologies, capabilities and resources
- Enhance Captain of the Port (COTP) and Federal On-Scene Coordinators (FOSC) response capabilities
- Support inclusion of hazardous substance release response resources in facility and vessel response plans
- Began market research in November 2022
- Literature review on-going

Maritime Environmental Response Common Operating Picture

1009

Mission Need: Consolidate disparate data to modernize marine environmental response.

Objectives

- Leverage existing systems such as the National Oceanic and Atmospheric Administration's Environmental Response Management Application (ERMA) to create a central hubs of resources to improve response planning and operations.
- Work with the sponsor office and CGA to build a subsystem to ERMA to incorporate maritime environmental response actions and data layers.
- Connect maritime environmental response data from existing systems to the CG network to enable data fusion and overlay development.
- Collaborate with the ERMA program to create the Maritime Environmental Response (MER) Common Operating Picture (COP) to leverage existing system capabilities and create data overlays, such as chart based depictions of environmentally sensitive areas and legal or doctrinal constraints that could impact the response effort.

Notes

- This effort will also explore the iPAC system from the U.S. Fish and Wildlife services.

Sponsor: CG-MER	**Stakeholder(s):** CG-5R, CG-67, CG-68, CG-741, C5ISC, CGCYBER, CGA
RDC Research Lead: Mr. Benjamin Berman	**CG-926 Domain Lead:** Ms. Holly Wendelin
Anticipated Outcome/ Transition:	Provide Sponsor/Product Line Tested Prototype Enter Optional Second Outcome/Transition

Project Timeline / Key Milestones

Project Start: 1 Oct 21

Target Datasets Gathered	30 Jun 22 ✓
Oil Response Database Built	31 Aug 22 ✓
Integrate Datasets and Oil Response into Prototype	28 Oct 22 ✓
Complete Initial Prototype of Dashboard	8 Jan 23 ✓
Demo Initial Prototype of Dashboard	19 Jan 23 ✓
Maritime Environmental Response Common Operating Picture Prototype (Brief)	**8 Jan 23** ✓ ★
Test Dashboard and OILMAP Integration into ERMA	Mar 23
Demo Final Dashboard Prototype	May 23
Maritime Environmental Response Common Operating Picture (Report)	**Sep 23** ★

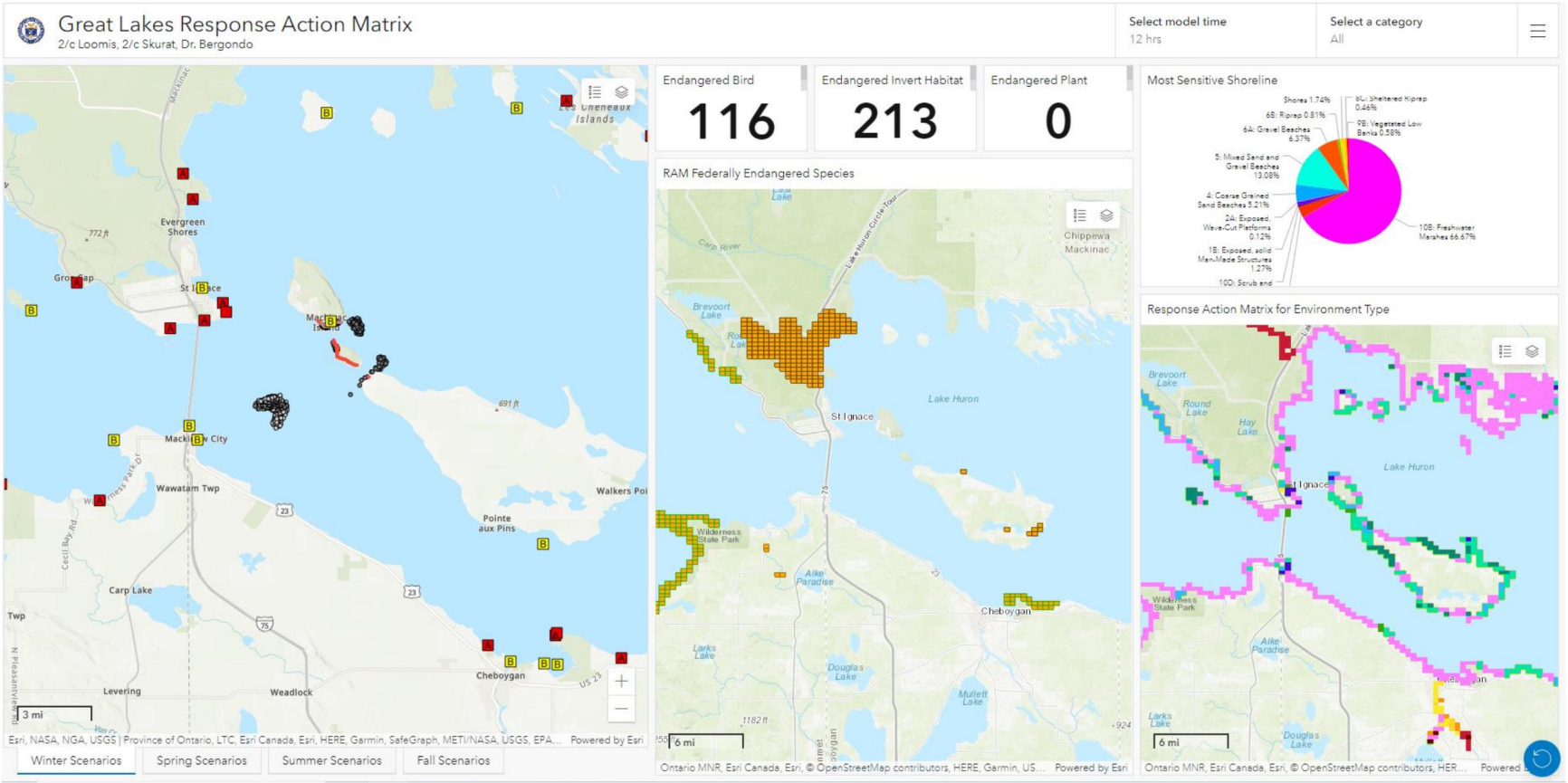
Project Completion: Sep 23

Maritime Environmental Response Common Operating Picture

Mission Need: Consolidate disparate data to modernize marine environmental response.

- Goal is to develop a dashboard prototype that displays the species habitat ranges of Endangered Species Act Section 7, Essential Fish Habitats, and Marine Mammal Protection Act. The interactive dashboard prototype will display risk areas where pollution response actions may impact endangered and critical habitats. The prototype will be incorporated into NOAA's Environmental Response Management Application (ERMA) to improve Coast Guard's response planning and operations for pollution incidents. It will also include limited OILMAP oil spill simulation data for testing and technology proof of concept.
  - Coordinate with Coast Guard Academy (CGA) to create data overlays, such as chart based depictions of environmentally sensitive areas and legal or doctrinal constraints that could impact the response effort
- Final dashboard integration into ERMA to be completed by April 2023
- Report expected September 2023

Maritime Environmental Response Common Operating Picture



Dashboard in ArcPRO: OILMAP simulation result (left), endangered species habitats (middle), and shoreline type and sensitivity (right)

RDC Project Managers

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