# Acquisition Directorate

## Research, Development, Test & Evaluation

# Quarterly Status Reports
# Environment and Waterways Branch

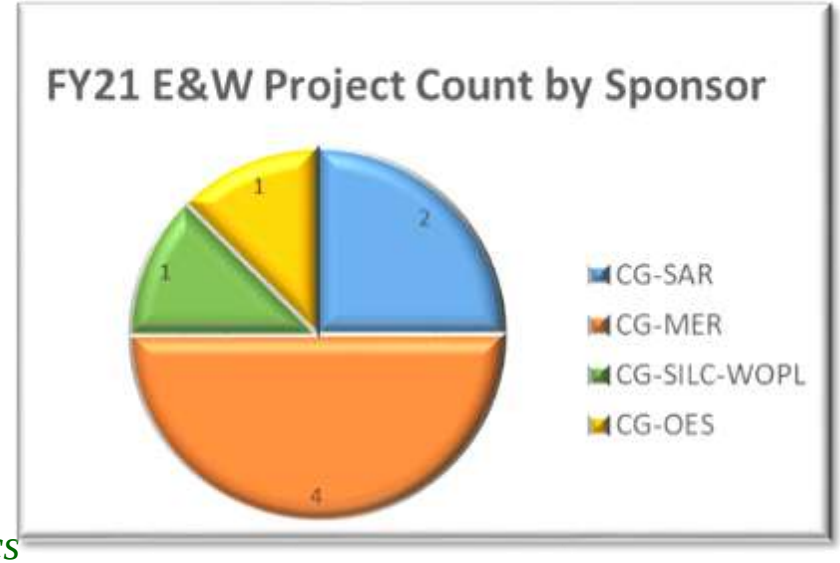
*FY 2021 – Quarter 2 Update*

RDC Environment and Waterways Team | Project Sponsors & Stakeholders

CG R&D Center

# RDC Environment and Waterways (E&W) Branch

| *E&W Branch Team – Mr. M.J. Lewandowski* | |
|---|---|
| Dr. Benedette Adewale | LT Elizabeth Murphy |
| Mr. Alex Balsley | Ms. Gail Roderick |
| Ms. Monica Cisternelli | Mr. James Spillbury |
| Ms. Irene Gonin | Mr. Mike Wurl |




- (8) FY2021 projects (1 FY2021 new-start )
- RDC E&W Branch FY2021 Projects:
  - **1008** *[CG-SAR]* : *Survival Modeling, Reporting, and Statistics*
  - **1205** *[CG-SAR]* : *Mass Rescue Lifesaving Appliance*
  - **2703** *[SILC-WOPL]* : *Next Generation Aids to Navigation Buoys & Alternative Moorings*
  - **4135** *[CG-OES]* : *Ballast Water Management Research and Development*
  - **4204** *[CG-MER]* : *Behavior of Diluted Bitumen (Dilbit) in Fresh Water*
  - **47041** *[CG-MER]* : *Freshwater In-Situ Oil Burn Research*
  - **4710** *[CG-MER* : *Nearshore and Inland Evaluation of the Estimated Recovery System Potential(ERSP) Calculator*
  - **4711** *[CG-MER]* : *Advancing UAS and AUV Capabilities to Characterize Water Column and Surface Oil in Ice Environments*
  - **99932122**: *FY21-22 Environment & Waterways (E&W) Branch Support*

Click on project titles for more information

**OTHER RDC RESOURCES/ NEWS**

- RDT&E FY21 Project Portfolio: *[click here for link]*
- RDC Blog (internal CG only): *[click here for link]*

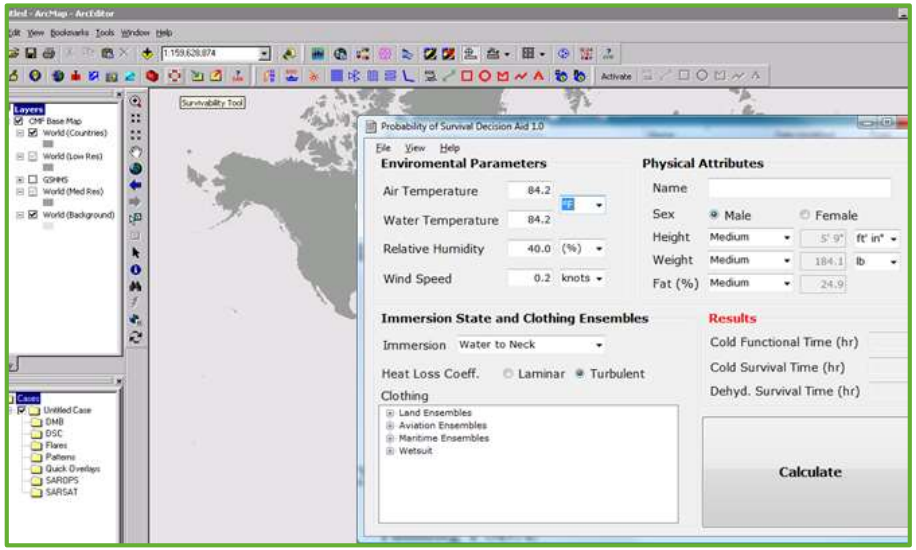
# Survival Modeling, Reporting, and Statistics

1008

**Mission Need:** Improve SAROPS utility by incorporating better survival modeling and statistics.

## Objectives

- Improve Search and Rescue survival decision tools by incorporating methods that better account for survival time in warmer water (15°C (59°F)) and incorporating survival factors beyond heat production and heat loss.
- Develop a dynamic database to validate model(s) against statistics, and permit model fine-tuning as the database grows.
- Provide the Search and Rescue program an easily-integrated survival module that allows two-way compatibility with existing Search and Rescue Optimal Planning System (SAROPS) processes.




## Notes

- Carries forward U.S. Coast Guard (CG) Research and Development Center survival-related work with U.S. Department of Defense labs (John Hopkins University/Applied Physics Lab).
- Explore partnerships with National Labs and University Centers.

## Project Timeline / Key Milestones

| | |
|---|---|
| **Project Start:** 1 Nov 17 | |
| Investigated Requirements and Applications | 30 Apr 18 ✓ |
| Investigated State of Survival Models | 6 Jul 19 ✓ |
| Conducted Facilitated Workshop | 28 Aug 19 ✓ |
| Completed Survival Statistics Brief | 16 Dec 19 ✓ |
| Completed Key Decision Point to Progress to Model Implementation | 2 Sep 20 ✓ |
| **Enhanced USCG Survival Model and Implementation (Brief)** | **30 Nov 20** ✓ ★ |
| Complete USARIEM Clothing Studies | Aug 21 |
| Complete NEDU Immersion Tests | Jan 22 |
| **Enhanced USCG Survival Model and Implementation Guidance (Report)** | **Jul 22** ★ |
| **Project Completion:** Jul 22 | |

**Sponsor:** CG-SAR

**Stakeholder(s):** CG-5R, CG-761, C5ISC

**RDC Research Lead:** Ms. Monica Cisternelli

**CG-926 Domain Lead:** Ms. Karin Messenger

**Anticipated Transition:** Knowledge Product
*Influence Tactics, Techniques, & Procedures*

# Mass Rescue Lifesaving Appliance (MRLSA)

1205

**Mission Need:** Lightweight, easy to use, temporary, mass rescue survivor platform.

## Objectives

- Find, promote, or develop the technology to manufacture an extremely compact, lightweight, rescue intervention device to safely keep 100+ persons out of the water for up to 24 hours.
- Transition the developmental result to the Office of Search and Rescue and capability stakeholders for implementation as a mass rescue tool.

## Notes

- Partnership with Air Force Research Laboratory.
- Department of Homeland Security (DHS) Science & Technology (S&T) funded Broad Agency Announcement for prototype development.
- Investigate National Aeronautics and Space Administration or other government agency partnership.

## Project Timeline / Key Milestones

| | |
|---|---|
| **Project Start:** 1 Oct 19 | |
| Request for Information/Technology Assessment Complete | 1 Mar 20 ✓ |
| **MRLSA: Market Research Summary (Report)** | **13 May 20** ✓ ★ |
| DHS Issues BAA | Apr 21 |
| Industry Day Webinar Complete | May 21 |
| Interim Brief Complete | Sep 21 |
| Prototype Development Complete | May 22 |
| **Mass Rescue Lifesaving Appliance (Report)** | **Sep 22** ★ |
| **Project Completion:** Sep 22 | |

**Sponsor:** CG-SAR

**Stakeholder(s):** DHS S&T, CG-711, CG-731, CG-751

**RDC Research Lead:** Ms. Monica Cisternelli

**CG-926 Domain Lead:** Ms. Karin Messenger

**Anticipated Transition:** Product
*Fielded Prototype*

# Next Generation Aids to Navigation Buoys & Alternative Moorings

2703

**Mission Need:** Modernize U.S. Coast Guard (CG) Aids to Navigation (AtoN) buoys and moorings.

## Objectives

- Determine the world-wide state of non-ferrous, aids to navigation (AtoN) buoys.
- In conjunction with CG managers, field trial the most-promising prospects for replacing steel buoys.
- Provide CG managers technical, cost, and operational benefits (if any) to modernize buoy inventory.
- Conduct follow-up investigation of an alternative buoy-mooring system to determine CG applicability.

## Notes

- Establish Cooperative Research and Development Agreements with vendors willing to work with the CG Research and Development Center for mutual benefit.
- Coordinate with CG-NAV and the Data Center Optimization Initiative to involve to involve International Association of Marine Aids to Navigation and Lighthouse Authorities as partners.

## Project Timeline / Key Milestones

| | |
|---|---|
| **Project Start:** 1 Oct 19 | |
| Complete World Wide Market Study of Buoys | 31 Mar 20 ✓ |
| Gather Feedback from Sponsor and Stakeholders | 30 Jun 20 ✓ |
| Selection Most Promising Buoys for Testing Complete | 31 Aug 20 ✓ |
| **Next Generation Aids to Navigation Buoys: Market Study Report (Report)** | **17 Sep 20** ✓ ★ |
| Draft Test Plan for Buoys and Moorings Complete | 20 Oct 20 ✓ |
| Engineering Design and Fabrication of Alternative Moorings Complete | Aug 21 |
| **Next Generation Buoy and Alternative Mooring Field Test Update (Brief)** | **Sep 21** ★ |
| Field Test for Buoys and Moorings Complete | Oct 22 |
| **New Buoy Field Trial and Alternative Moorings Summary (Report)** | **Jul 23** ★ |
| **Project Completion:** Jul 23 | |

| | |
|---|---|
| **Sponsor:** SILC-WOPL | **Stakeholder(s):** CG-NAV, Districts |
| **RDC Research Lead:** Mr. James Spilsbury | **CG-926 Domain Lead:** Ms. Karin Messenger |

**Anticipated Transition:** Knowledge Product
*Acquisition Milestone Support*

# Ballast Water Management (BWM) Research and Development

4135

**Mission Need:** Reduce Nonindigenous Invasive Species (NIS) transport risks in U.S. waters by vessel.

## Objectives

- Determine the most practical BWM practices for Laker operators to reduce the risks of transporting NIS from one region of the Great Lakes (GL) to another when they are introduced from the outside by ocean-going ships.
- Research and develop robust, science-based technical Quality Assurance (QA) protocols to validate sub-Independent Lab (IL) QA/Quality Control shipboard test programs that support BWM System (BWMS) Type Approval (TA).
- Provide a tested Ballast Water Discharge Standard (BWDS) compliance tool to the field.
- Provide robust, science-based, shipboard-test technical protocols to validate IL test programs.
- Assess CG's Ballast Water Management Regulatory Program.

## Notes

- FY18-FY20 Great Lakes Restoration Initiative funding (DW-070-95926401-0), (DW-070-20000108-0), (DW-70-95953301–0).
- Collaboration with Naval Research Laboratory.
- Collaboration with Smithsonian Environmental Research Center.
- Collaboration with the U.S. Department of Transportation Maritime Administration, Canadian Department of Fisheries & Oceans, and Transport Canada.

## Project Timeline / Key Milestones

**Project Start:** 1 Oct 17

| | | |
|---|---|---|
| BWM Alternatives for Lakers (Report) | 31 Mar 20 ✓ | ★ |
| IL Auditing Protocol; For Facilities Performing TA Testing of BWMS (Report) | 17 Jun 20 ✓ | ★ |
| Current State of BWDS Compliance Technologies (Report) | Apr 21 | ★ |
| Audit Protocols for Shipboard Tests by IL (Report) | Sep 21 | ★ |
| Tech Guidance for Use, Maint & Trng of BWDS Compliance Tools (Report) | Sep 21 | ★ |
| Recommendation on Selection of NIS Sentinel Sites (Report) | Sep 21 | ★ |
| Recommendation on Selection of BW Sentinel Sites (Report) | Sep 21 | ★ |
| Proposed Protocol for NIS Survey Methods for NIS Sentinel Sites (Report) | Dec 21 | ★ |
| Proposed Protocol for Shipboard Plankton Sampling at BW Sentinel Sites | Dec 21 | ★ |
| Functional Char. for BWDS Compliance Tools (Report) | Apr 22 | ★ |
| Validation of Audit Protocols for Shipboard Tests by IL (Report) | Jan 23 | ★ |
| Eval of Commercially Available BWDS Compliance Technologies (Report) | Feb 23 | ★ |
| Results of Year 1 BW Sampling and Sentinel Site Survey in the GL (Report) | Sep 23 | ★ |

**Project Completion:** Sep 23

**Sponsor:** CG-OES, EPA Great Lakes Nat'l Program Office

**Stakeholder(s):** Marine Safety Center, CG-CVC, CG Inspectors

**RDC Research Lead:** Ms. Gail Roderick

**CG-926 Domain Lead:** Ms. Karin Messenger

**Anticipated Transition:** Knowledge Product
*Standards/Regulations*

# 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 Restoration Initiative and Oil Spill Liability Trust Fund resources.
- Leverage CG Research and Development Center 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)** | **Apr 21** ★ |
| Dilbit Test Plan Complete | Apr 21 |
| CRREL Dilbit Weathering Warm Weather Test Complete | Jun 21 |
| CRREL Dilbit Weathering Cold Weather Test Complete | Nov 21 |
| Dilbit Oil Analysis Complete | Jan 22 |
| **Guidance Document - Behavior of Diluted Bitumen in the Fresh Water Environment (Report)** | **May 22** ★ |

**Project Completion:** May 22

**Sponsor:** CG-MER, CGD9

**Stakeholder(s):** EPA Great Lakes Nat'l Program Office/Pollution Response Office, LANT-54, NOAA

**RDC Research Lead:** Benedette Adewale, PhD

**CG-926 Domain Lead:** Ms. Karin Messenger

**Anticipated Transition:** Knowledge Product
*Influence Tactics, Techniques, & Procedures*

# Freshwater In-Situ Oil Burn Research

47041

**Mission Need:** Improve In-Situ Burn (ISB) knowledge base to supplement oil spill response options.

## Objectives

- Evaluate best practices for operational use of ISB in multiple environments, including fresh water and areas with vegetation.
- Develop methods to conduct ISB smoke-plume monitoring that improve sampling accuracy and responder safety.
- Provide reference guidance for Federal On Scene Coordinator and Regional Response Team use.

## Notes

- Multiple funding sources including Oil Spill Liability Trust Fund and Great Lakes Restoration Initiative.
- Partner with academia and national labs to ensure result visibility and access.

## Project Timeline / Key Milestones

| | |
|---|---|
| **Project Start:** 1 Oct 18 | |
| Mesoscale Freshwater Burns Complete | 19 Jul 19 ✓ |
| Large-scale Freshwater Burns Complete | 25 Oct 19 ✓ |
| **Freshwater In-Situ Oil Burning (Report)** | **16 Feb 21** ✓ ★ |
| Remote Air Monitoring Market Research Complete | 17 Feb 21 ✓ |
| Remote Air Monitoring Process Framework Complete | 11 Mar 21 ✓ |
| Test Plan for Remote Air Monitoring Complete | Apr 21 |
| Air Monitoring During Freshwater ISB | May 21 |
| **Freshwater In-Situ Burning Air Monitoring (Report)** | **Dec 21** ★ |
| **Project Completion:** Dec 21 | |

**Sponsor:** EPA Great Lakes Nat'l Program Office, CG-MER

**Stakeholder(s):** CG-721, NSF, EPA, BSEE, D9, RRT5

**RDC Research Lead:** LT Liz Murphy

**CG-926 Domain Lead:** Ms. Karin Messenger

**Anticipated Transition:** Knowledge Product
*Influence Tactics, Techniques, & Procedures*

# 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.
- Validate ERSP calculator functionality and usefulness using a prestigious national panel to conduct an independent review of the enhanced calculator.

## Notes

- Oil Spill Liability Trust Fund funding.
- Partnership with Bureau of Safety and Environmental Enforcement (BSEE).

## 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 | May 21 | |
| National Academy of Sciences (NAS) Review Complete | Nov 21 | |
| **NAS Response Review of Inland ERSP (White Paper)** | **Apr 22** | ★ |
| NAS Recommended ERSP Calculator Updates Complete | May 23 | |
| **Inland Evaluation of the ERSP Calculator (Prototype & User Guide)** | **Aug 23** | ★ |
| **Project Completion:** Aug 23 | | |

**Sponsor:** CG-MER

**Stakeholder(s):** BSEE, AREA-54

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

**CG-926 Domain Lead:** Ms. Karin Messenger

**Anticipated Transition:** Product
*Fielded Prototype*

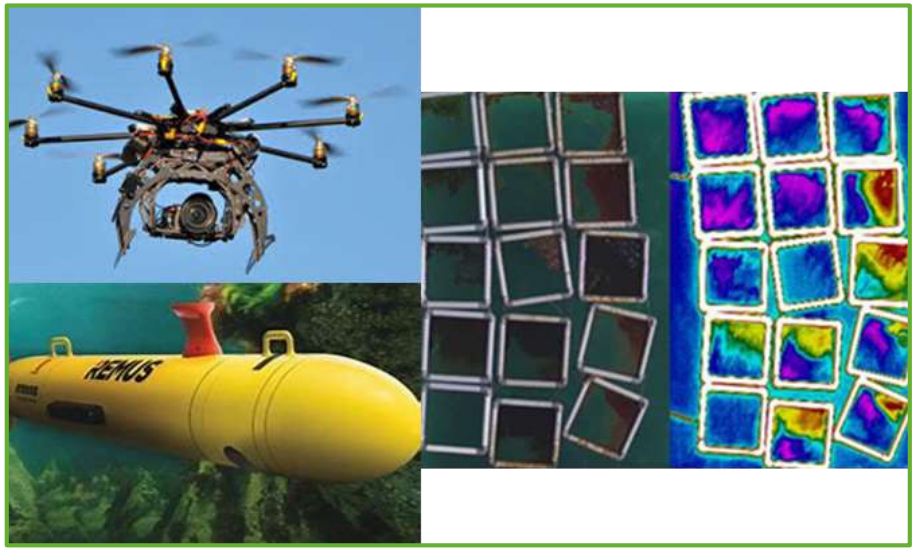
# Advancing UAS and AUV Capabilities to Characterize Water Column and Surface Oil in Ice Environments

4711

**Mission Need:** Technologies to detect and characterize oil spills in ice environments.

## Objectives

- Coordinate and conduct multi-agency lab and field tests to gain better understanding of aerial and underwater sensor capability in characterizing oil on the surface or in the water column in ice conditions.
- Determine remote vehicle telemetry capability to transfer sensor data to on-scene responders or Incident Command as actionable information.




## Notes

- Oil Spill Liability Trust Fund funding.
- Partnerships with Cold Regions Research and Engineering Laboratory (CRREL), Woods Hole Oceanographic Institute (WHOI), U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T) Office of University Programs (OUP), National Oceanic and Atmospheric Administration, Bureau of Safety and Environmental Enforcement, and U.S. Environmental Protection Agency.

## Project Timeline / Key Milestones

**Project Start:** 23 Jan 20

| | | |
|---|---|---|
| Interagency Reimbursable Work Agreement with NOAA Complete | 3 Jun 20 ✓ | |
| Phase 1: Unmanned Aircraft System (UAS)/Autonomous Underwater Vehicle (AUV) Tests at CRREL Complete | Apr 21 | |
| **Laboratory Results and Way Ahead (Brief)** | **Jun 21** | ★ |
| **UAS/AUV Lab Experiments Results (Report)** | **Aug 21** | ★ |
| Field Exercise Planning Complete | Nov 21 | |
| Phase 2: UAS/AUV Systems Field Testing in Great Lakes or Arctic Complete | Dec 21 | |
| Data Schema for Data Stream Export Complete | Mar 22 | |
| **UAS/AUV Systems Field Exercise Integration (Report)** | **May 22** | ★ |

**Project Completion:** May 22

**Sponsor:** CG-MER

**Stakeholder(s):** CG-5RI, D1, D9, D17, ADAC, NOAA OR&R, WHOI, MBARI, DHS S&T OUP

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

**CG-926 Domain Lead:** Ms. Karin Messenger

**Anticipated Transition:** Product
*Fielded Prototype*

# FY21-22 Environment & Waterways (E&W) Branch Support

99932122

**Mission Need:** Maintain competency/knowledge; provide rapid response; and external liaison.

## Objectives

- Maintain RDC competency and technical knowledge in understanding present and future environment & waterways technology, systems, and regulatory directives/policies, including: environmental protection, pollution detection/response, ballast water standards, marine and navigation safety Improvements, and search & rescue improvements.
- Maintain Branch infrastructure to support RDC portfolio objectives.
- Support E&W Strategic Project Portfolio Alignment and CG DCO/DCMS Research Priorities.
- Provide expert input to CG stakeholders regarding environment & waterways technologies.
- Foster continued relationships with CG sponsors/stakeholders and external DoD labs, DHS S&T, and other government agency/academic partners.
- Provide CG Academy cadets and other academic institution students with internship opportunities.

## Notes

- Distress Signals Policy Council & RTCM meetings and special committees.
- Univ. Texas San Antonio machine learning for leeway (DHS/DoD funds).
- Michigan Technological University mass-rescue capstone effort.
- Ice accretion REACT project for F/V Scandies Rose MBI.
- Interagency Coordinating Committee on Oil Pollution Research.
- Great Lakes Oil Spill Center of Expertise membership.
- Introductory liaison for ballast water research on CGC HEALY.
- NOAA Response, Oil Assay Working Group.

## Project Timeline / Key Milestones

**Project Start:** Ongoing

| | | |
|---|---|---|
| Int'l Search Planning Focus Mtg: Search Plans From a Common Data Set | 24 Jan 21 ✓ | |
| Chicago Sanitary & Ship Canal Electric Dispersal Barrier System Operations Review Memo | 28 Jan 21 ✓ | |
| CA Office of Spill Prevention & Response Tech Mtg | 22 Feb 21 ✓ | |
| BSEE /CG R&D Review and Planning Meeting | 2 Mar 21 ✓ | |
| Quarterly DISPOCO Meeting | 18 Mar 21 ✓ | |
| Quarterly ICCOPR Meeting | 23 Mar 21 ✓ | |
| Ice Accretion Testing at Cold Regions Research and Engineering Lab | Jun 21 | |
| International Oil Spill Conference | May 21 | |
| Machine Learning for Leeway | Aug 21 | |
| **Ice Accretion on Crab Traps (REACT Report)** | **Sep 21** | ★ |

**Project Completion:** Ongoing

**Sponsor:** CG-926

**Stakeholder(s):** CG-5, CG-SAR, CG-MER, CG-ENG, CG-OES, CGD9, CGD11, DHS S&T

**RDC Research Lead:** Mr. M. J. Lewandowski

**CG-926 Domain Lead:** Ms. Karin Messenger

**Anticipated Transition:** Various

# For other RDC resources/relevant news:

## Portfolio

FY21 RDT&E Project Portfolio

## RDC Blog

(internal CG only)