

# U.S. Coast Guard Research & Development Center FY25 Research Program Portfolio





CG RDC FY25 Research Program Portfolio  
A. Arsenault | January 2025

CG Research & Development Center  
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Command Video

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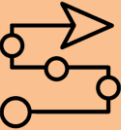


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# Autonomy Research Program



## Program Definition

The strategic application of automation and autonomous technologies to advance the capabilities of physical, virtual, and other systems. Integration of autonomy/autonomous systems with legacy assets and infrastructure also comprises a key focus. Unique expertise will also include how autonomy may be used by other maritime stakeholders and/or adversaries, how that use will impact the service, and how the service will need to adapt to maintain a competitive edge. The transition goal of this program is to provide clear opportunities for USCG adoption and incorporation of autonomous technology across its operational missions and support functions and how it will interact with autonomy within the Marine Transportation System (MTS) and the public.



Cutter-Based UxS Integration – Mock USV Recovery



Beyond Visual Line of Sight UAS Detect & Avoid System Technology

## Program Team

### Program Champion:

RADM Gilreath (CG-7)  
RDML Ore (CG-2)

### RDC Research Program Chief:

Mr. Evan Gross

### CG-7R9 Portfolio Manager:

Dr. David Wiesenhahn

### RDC Experimentation Lead:

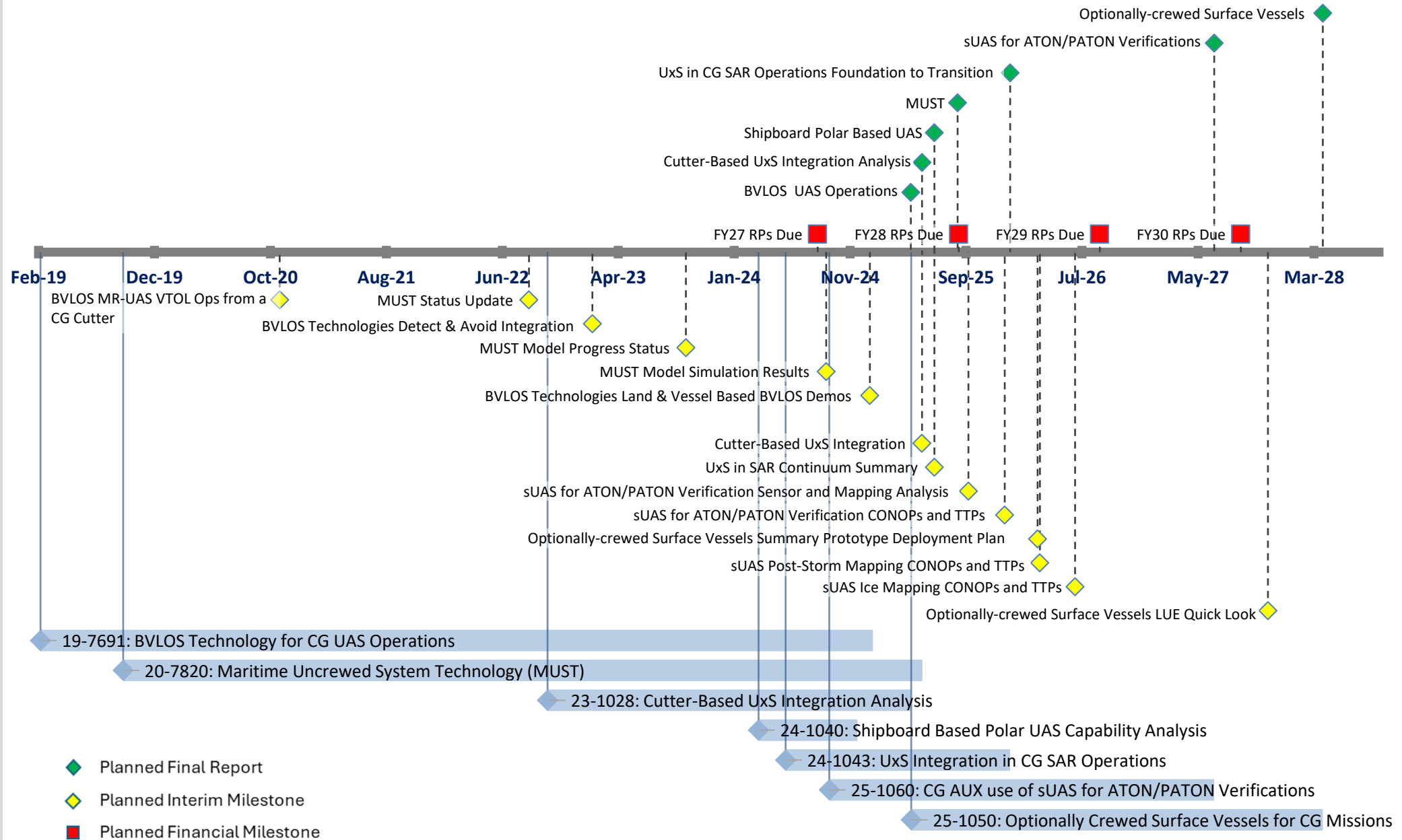
LCDR Ryan Cassidy

### RDC Transition Lead:

Mr. Scott Fields



# Research Program Roadmap | Autonomy



# Beyond Visual Line of Sight (BVLOS) Technology for Coast Guard (CG) Uncrewed Aircraft System (UAS) Operations

19-7691

## Mission Need: BVLOS operations for CG UAS.

### Objectives

- Leverage U.S. Southern Command (SOUTHCOM), Joint Inter Agency Task Force-South (JIATF-S), and Navy Research Laboratory (NRL) efforts to explore Medium Range UAS (MR-UAS) Vertical Takeoff and Landing (VTOL) operations from a CG Cutter (CGC).
- Integrate Detect and Avoid (DAA) technologies for conducting BVLOS operations [sUAS 1st].
- Conduct land and vessel-based evaluations using DAA technology [sUAS 1st].
- Conduct a VTOL BVLOS Limited User Evaluation (LUE) from a CGC.
- Inform due regard parameters for CG BVLOS UAS operations.
- Establish a BVLOS Certificate of Authorization for CG operations.
- Conduct a land-based Medium Range-UAS Search and Rescue (SAR) demonstration, followed by a LUE onboard a CGC.

### Notes

- Legislative requirement.
- Establish Memoranda of Understanding and Cooperative Research and Development Agreements as necessary with industry partners.
- Leverage efforts of the Federal Aviation Administration, SOUTHCOM, National Oceanic and Atmospheric Administration, Office of Naval Research (ONR), JIATF-S, U.S. Navy 4th Fleet and other government agencies.

**Sponsor's Rep:** CG-711  
**Ops Rep:** LANT-3

**Stakeholder(s):** CG-751, CG-931, CG-41, SOUTHCOM, JIATF-S, NRL, CGCYBER, ONR

**RDC Principal Investigator:**  
Mr. Stephen Dunn

**CG-7R9 Portfolio Manager:**  
Dr. David Wiesenbahn

**Anticipated Outcome/Transition:** Recommendations for Acquisition Milestone Support  
Recommendations for Standards/Regulations/Policy



### Project Timeline / Key Milestones

**Project Start:** 13 Mar 19

<b>MR-UAS VTOL Operations from a CGC (Brief)</b>	<b>9 Nov 20</b> ✓ ★
BVLOS Technologies Integrated into Small UAS (sUAS) and MR-UAS Complete	24 Dec 22 ✓
<b>Detect and Avoid Technologies Integration (Brief)</b>	<b>27 Jan 23</b> ✓ ★
Vessel-based sUAS BVLOS Limited User Evaluation D-7 Complete	17 Aug 23 ✓
Initial Vessel-Based MR-UAS DAA Technologies Demonstration Complete	11 Oct 23 ✓
Combined Land-based BVLOS sUAS and MR-UAS Demonstration Complete	4 Dec 24 ✓
<b>Land and Vessel-Based BVLOS Demonstrations (Brief)</b>	<b>14 Jan 25</b> ✓ ★
<b>Beyond Visual Line of Sight UAS Operations (Report)</b>	<b>Apr 25</b> ★
<b>Project Completion:</b> Apr 25	



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# Cutter-Based Uncrewed Systems (UxS) Integration Analysis

23-1028

**Mission Need:** Integrated UxS across cutter fleet to augment operational capabilities.

## Objectives

- Determine the capacity for FRC/WLM/WLB cutter classes to integrate, deploy, and support UxS.
- Identify applicable UxS classes, based on space, weight, power, capability, and personnel requirements for specified afloat platforms.
- Strategize and assess possible cutter/UxS combinations and integration considerations through facilitated stakeholder workshops.
- Identify design efficiencies related to human, mission, system and infrastructure integration.
- Deliver decision support information regarding UxS integration by performing and documenting results of Operational Demonstration (OP DEMO).
- Inform future capability and operational documents.
- Help inform the operationalization of the U.S. Coast Guard (CG) UxS Strategic Plan while leveraging the results of the Autonomy Evergreen event.

## Notes

- UxS integration considers maritime air, surface, and subsurface systems of all scales that can be based onboard a cutter.
- Leverages RDC Project 7820, "Maritime Uncrewed System Technology," to highlight capabilities.
- Addresses imperatives highlighted by National Academies of Science UxS study.
- Leverage research by the Naval Postgraduate School, Navy Surface Warfare Centers, Naval War College, and Naval Research Laboratory.

**Sponsor's Rep:** CG-751

**Ops Rep:** D7 (dre)

**RDC Principal Investigator:**

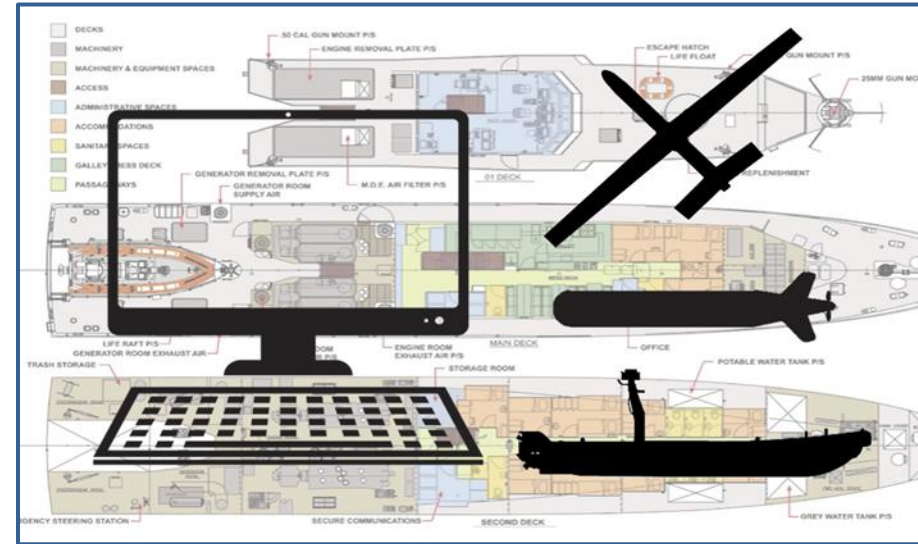
LTJG Jorge Wismar

**Stakeholder(s):** CG-7 UxS, CG-731, CG-711, CG-721, CG-771, CG-4, CG-2, CG-93, DCMS DPR-23

**CG-7R9 Portfolio Manager:**

Dr. David Wiesenbahn

**Anticipated Outcome/Transition:** Recommendations for Product Line Tech Insertion  
Recommendations on Tech Availability & Applicability



## Project Timeline / Key Milestones

**Project Start:** 3 Oct 22

Cutter Capacities and UxS Characterization Crosswalk 28 Sep 23 ✓

Cutter / UxS Teaming Concept of Operations Exercises 23 Apr 24 ✓

D7 OP DEMO 27 Sep 24 ✓

D7 OP DEMO 1.1 Feb 25

Cutter-based UxS Integration (Brief) May 25 ★

Cutter-based UxS Integration (Report) May 25 ★

**Project Completion:** May 25



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**Mission Need:** Uncrewed aircraft technologies to extend awareness and logistics for polar operations.

Objectives	<ul style="list-style-type: none"><li>Identify and evaluate emerging Uncrewed Aircraft System (UAS) technologies to enhance U.S. Coast Guard (CG) operations in arctic regions.</li><li>Analyze possible UAS and identify integration considerations tailored for CG Polar Security Cutter assets.</li><li>Cultivate joint arctic UAS efforts, interagency cooperation and allied nation information sharing to gain better understanding of uncrewed aerial sensor capability in characterizing marine domain awareness in polar conditions.</li><li>Inform future capabilities and operational documents.</li></ul>
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Notes	<ul style="list-style-type: none"><li>Most project 1040 objectives were addressed by International Cooperative Engagement Program for Polar Research (ICE PPR) and Office of Naval Research (ONR) Global in 2023 and 2024 through field experiments. Plan to analyze data from the ONR Global Frozen Flyer project which was created by the executive officer for the ICE PPR, Office Symbol: DCNO, N9.</li></ul>
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<b>Sponsor’s Rep:</b> CG-7 UxS <b>Ops Rep:</b> PAC-3	<b>Stakeholder(s):</b> CG-711, CG-931, CG-6, CG-751, D17, LANT-5, NOAA, CG-MER
<b>RDC Principal Investigator:</b> Mr. Ross Vassallo	<b>CG-7R9 Portfolio Manager:</b> Dr. David Wiesenbahn
<b>Anticipated Outcome/ Transition:</b> Recommendations on Tech Availability & Applicability	

Project Timeline / Key Milestones	<b>Project Start:</b> 1 Apr 24	
	Complete Initial Review of ONR Frozen Flyer Data	26 Jun 24 ✓
	Complete Technology Focus Analysis on ONR Data	9 Aug 24 ✓
	Shipboard Based Polar UAS Capability Analysis (Report)	Jun 25 ★
	<b>Project Completion:</b> Jun 25	



Mission Need: Persistent maritime domain awareness using AUSVs.

Objectives

- Assess potential employment options using Autonomous Underwater and Surface Vehicles (AUSV) to support U.S. Coast Guard (CG) mission areas. Using modeling and simulation techniques, assess AUSV Concept of Operations, including:
  - Effectiveness of single and multiple AUSVs; and
  - Effectiveness of AUSV and unmanned aerial system teaming.
- Inform field testing using modeling analysis results.



Notes

- Partner with the U.S. Department of Homeland Security (DHS) Science, Technology Directorate (S&T) Borders, Immigration and Maritime (BIM), U.S. Naval Research Laboratory, Naval Undersea Warfare Center, Naval Surface Warfare Center – Dahlgren Division.

Sponsor’s Rep: CG-26  
Ops Rep: LANT-3

RDC Principal Investigator:  
Mr. Ross Vassallo

Anticipated Outcome/  
Transition:

Stakeholder(s): DHS S&T BIM, CG-721, CG-MLE,  
CGCYBER, FORCECOM

CG-7R9 Portfolio Manager:  
Dr. David Wiesenbahn

Recommendations on Tech Availability & Applicability  
Recommendations for Tactics, Techniques & Procedures

Project Timeline / Key Milestones	Project Start: 1 Oct 19	
	In House or Contracted Modeling KDP	23 Sep 20 ✓
	Vehicle Operations and Control Training	20 Jun 21 ✓
	Contract for Modeling Effort Established	14 Sep 21 ✓
	MUST: Status Update (Brief)	16 Aug 22 ✓ ★
	MUST: Model Progress Status (Brief)	26 Sep 23 ✓ ★
	Support for DHS MUST Operational Testing Completed	1 Nov 23 ✓
	MUST: Model Simulation Results (Brief)	13 Sep 24 ✓ ★
	Maritime Uncrewed System Technology (Report)	Aug 25 ★
	Project Completion: Aug 25	



**Mission Need:** Improved response outcomes through UxS integration into CG SAR operations.

Objectives

- Identify critical gaps in current U.S. Coast Guard (CG) Search and Rescue (SAR) operations where integration of UxS technologies could significantly enhance operational effectiveness.
- Characterize current capabilities within the UxS market, focusing on technological maturity and potential adaptability to SAR operations.
- Investigate how other SAR organizations, both domestic and international, currently utilize UxS.
- Conduct targeted trials to evaluate the feasibility and integration potential of selected UxS technologies within simulated SAR scenarios.
- Deliver SAR-specific UxS integration recommendations to facilitate the implementation and operationalization of the CG UxS Strategic Plan.



Notes

- Leverages RDC Project 1028 “Cutter-Based Uncrewed Systems (UxS) Integration Analysis.”
- Benchmark U.S. Department of Defense, Other Government Agencies, and allied nations’ UxS programs.
- Addresses imperatives highlighted by Unmanned Systems Strategic Plan to integrate UxS in CG operations.

**Sponsor’s Rep:** CG-SAR  
**Ops Rep:** LANT-3

**Stakeholder(s):** CG-7 UxS, CG-711, CG-731, CG-741, CG-751, CG-5RI, DCMS-DPR-23

**RDC Principal Investigator:**  
Ms. Marie Whalen

**CG-7R9 Portfolio Manager:**  
Dr. David Wiesenbahn

**Anticipated Outcome/ Transition:** Recommendations on Tech Availability & Applicability

Project Timeline / Key Milestones	Project Start: 3 Jun 24	
	UxS SAR Capabilities Baseline	Feb 25
	UxS Use Curve Development	Apr 25
	UxS in SAR Response Continuum Summary (Brief)	Jun 25 ★
	UxS for SAR Technical Review Complete	Nov 25
	Uncrewed Systems Integration in CG Search and Rescue Operations Foundation to Transition (Report)	Jan 26 ★
	Project Completion: Jan 26	



# CG Auxiliary use of Small Uncrewed Aircraft Systems (sUAS) for Aids to Navigation (ATON)/Private ATON (PATON) Verifications

25-1060

**Mission Need:** A reliable and repeatable method for conducting ATON/PATON verifications.

Objectives

- Analysis of the sensor uncertainties associated with the current blue UAS platforms participating in the U.S. Coast Guard's (CG) Short Range UAS program, specifically focusing on the Parrot, Skydio, and Puma systems.
- Replicate high-priority field demands in test vignettes, including: ATON/PATON Mapping, Ice Mapping, and Post-Storm Mapping.
- Concept of Operations (CONOPS) and Tactics, Techniques and Procedures (TTPs) for each testing vignette, outlining the operational framework, procedures, best practices, efficiency and process improvements for deploying UAS in these scenarios.
- A secure user interface that seamlessly integrates with official databases (i.e., ArcGIS, SEXTANT, Looking Glass, U.S. Aids to Navigation Information Management System (USAIMS)). Include the use of CG Auxiliary Aid Verification Assistant (AVA) app.



Notes

- Builds on work completed by RDC Project 1020, PATON Improvements.
- Use CG Auxiliary/PATON as first testbed for expansion to ATON. Leverage AVA mobile application tool methodology for data transference.
- Partner with Sectors and Districts for vignette development and testing.
- Partner with CG Academy for mapping development.
- Potential partnership with Canadian and U.K. Coast Guard.
- Potential contracting with the U.S. Army Engineer Research and Development Center, Naval Air Systems Command, or Air Force Research Laboratory for mapping requirements.

**Sponsor's Rep:** CG-NAV  
**Ops Rep:** Districts

**Stakeholder(s):** CG-711, CG-751, CG-AUX, D9, D1

**RDC Principal Investigator:**  
Ms. Shelly Wyman, P.E.

**CG-7R9 Portfolio Manager:**  
Dr. David Wiesenbahn

**Anticipated Outcome/Transition:**

Recommendations for Tactics, Techniques & Procedures  
Recommendations on Tech Availability & Applicability

Project Timeline / Key Milestones

Project Start: 1 Oct 24		
Conduct sUAS Sensor Uncertainties Tests	Apr 25	
Conduct ATON Mapping Vignette	Jul 25	
sUAS Sensor and Mapping Analysis (Report)	Sep 25	★
Conduct Post Storm-Mapping Vignette	Sep 25	
sUAS PATON/ATON Verification CONOPs & TTPs (Brief)	Dec 25	★
Conduct Ice Mapping Vignette	Jan 26	
sUAS Post-Storm Mapping CONOPs & TTPs (Brief)	Mar 26	★
sUAS Ice Mapping CONOPs & TTPs (Brief)	Jun 26	★
Develop Mapping User Interface and Integration	Nov 26	
CG Auxiliary use of sUAS for ATON/PATON Verifications (Report)	Jun 27	★
Project Completion: Jun 27		





**Mission Need:** Increase cutter capability through remote and autonomous controlled surface vessels.

Objectives	<ul style="list-style-type: none"><li>Determine operational perception sensor requirements for USCG uncrewed vessels.</li><li>Determine communication requirements between cutter and cutter boat to include redundant communications and fail-safe’s.</li><li>Determine integration requirements for uncrewed surface vessel (USV) on both cutter and cutter boat.</li><li>Determine safety requirements for USV operation.</li><li>Determine launch and recovery requirements for USV operation.</li><li>Determine concept of operations for use of uncrewed cutter boat.</li><li>Determine crew impact on operating an uncrewed vessel.</li><li>Collect crew feedback on use of uncrewed cutter boat.</li><li>Evaluate human-machine teaming requirements for operation.</li><li>Provide project sponsors and stakeholders a road map on how to incorporate the technology on other cutters.</li></ul>



Notes	<ul style="list-style-type: none"><li>Leverage research completed by the Naval Surface Warfare Centers, Naval Research Laboratory, and Naval Postgraduate School.</li><li>Potential partners include the Office of Naval Research, Naval Research Laboratory, Naval Postgraduate School, and Naval Surface Warfare Center’s Corona, Crane, and Carderock divisions.</li></ul>

<b>Sponsor’s Rep:</b> CG-7 UxS <b>Ops Rep:</b> N/A	<b>Stakeholder(s):</b> CG-45, CG-721, CG-731, CG-751, CG-761, CG-791, SFLC, DCMS DPR-23, AREAs
<b>RDC Principal Investigator:</b> Mr. Derek Meier	<b>CG-7R9 Portfolio Manager:</b> Dr. David Wiesenbahn
<b>Anticipated Outcome/ Transition:</b> Provide Sponsor/Product Line Tested Prototype Recommendations on Tech Availability & Applicability	

Project Timeline / Key Milestones	<b>Project Start:</b> May 25	
	Identify Candidate Cutter/Boat Test Bed for Limited User Evaluation	Dec 25
	<b>Optionally-crewed Surface Vessels for CG Missions: Summary of Prototype Deployment Plan (Brief)</b>	<b>Mar 26</b> ★
	Prototype Contract Award	Jul 26
	Initiate Limited User Evaluation	Jan 27
	<b>Optionally-crewed Surface Vessels for CG Missions: Limited User Evaluation Quick Look (Report)</b>	<b>Nov 27</b> ★
	<b>Optionally-crewed Surface Vessels for Coast Guard Missions (Report)</b>	<b>Mar 28</b> ★
	<b>Project Completion:</b> Mar 28	



# Connectivity Research Program

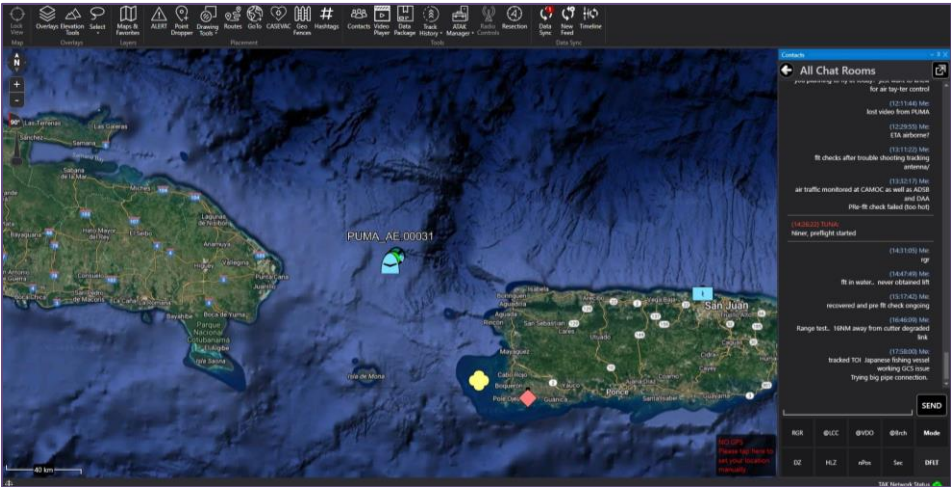


## Program Definition

Traditional Command, Control, Communications, Computers, Cyber, and Intelligence (C5I) focus extended to include Information Technology (IT) and networking, mobile device solutions, data connectivity from all sensors and platforms (crewed or uncrewed), at any latitude and longitude. This also includes next generation remote command and control and bringing data to decision makers wherever they are, enabling tasking to flow automatically to all assets, and maintaining consistent and reliable communication pathways.



Starlink Aboard CGC Healy



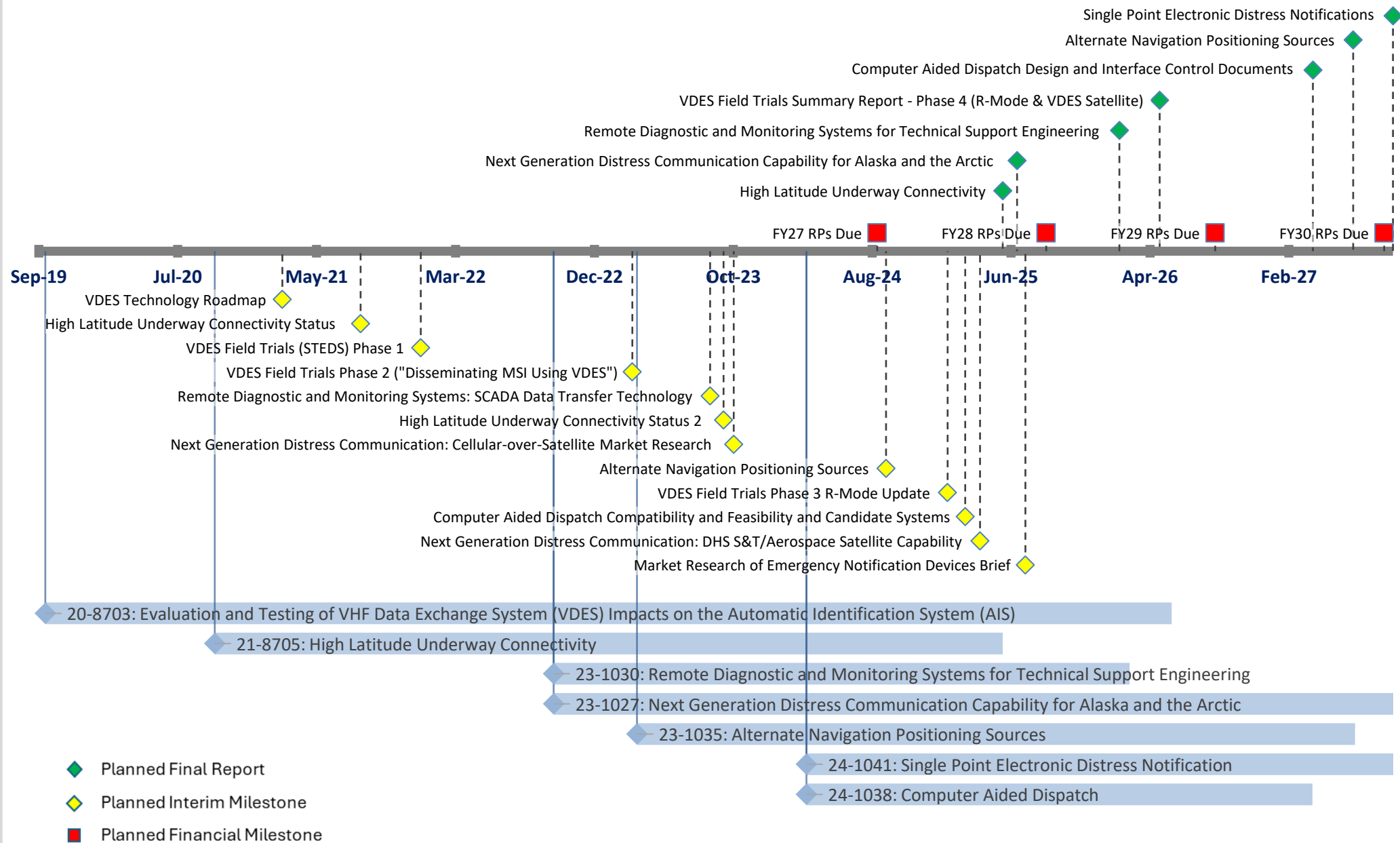
Team Awareness Kit (TAK) Op Demo COQUI

## Program Team

<b>Program Champion:</b>	<b>RDC Experimentation Lead:</b>
RDML Dash (CG-6)	LCDR Ryan Cassidy
RADM Gilreath (CG-7)	
<b>RDC Research Program Chief:</b>	<b>RDC Transition Lead:</b>
Mr. Sean Lester	Mr. Scott Fields
<b>CG-7R9 Portfolio Manager:</b>	
Mr. Brian Page	



# Research Program Roadmap | Connectivity





**Mission Need:** Provide network connectivity to Cutters operating at high latitudes.

Objectives

- Influence the desired minimum connectivity functional characteristics by analyzing previous U.S. Coast Guard (CG) Research and Development Center (RDC) arctic communications and cutter connectivity projects within last 10 years.
- Influence the desired minimum connectivity functional characteristics by analyzing prior U.S. Department of Defense (DOD) High Latitude (Hi-Lat) research projects within last 10 years, including U.S. Navy (USN) and North Atlantic Treaty Organization Combined Joint Operations from the Sea.
- Deploy a prototype solution and perform a limited user evaluation and report on system capabilities.

Notes

- Leverage RDC Projects 6208, “Arctic Communications Technology Assessments,” 8702, “Evaluate Network Accelerator Technology to Improve Cutter Information Technology Performance,” and 7759, “Evaluation of Potential CG Use of CubeSats.”
- Partner with the U.S. Department of Homeland Security Science and Technology Directorate; Command, Control, Communications, Computers, Cyber, and Intelligence Service Center (C5ISC) Deployed Connectivity Section; Air Force Research Lab; Naval Information Warfare Center.
- Inform C5ISC SATCOM procurement.
- Link with DOD Lab Sync Arctic Comms effort and International Cooperative Engagement Program for Polar Research.

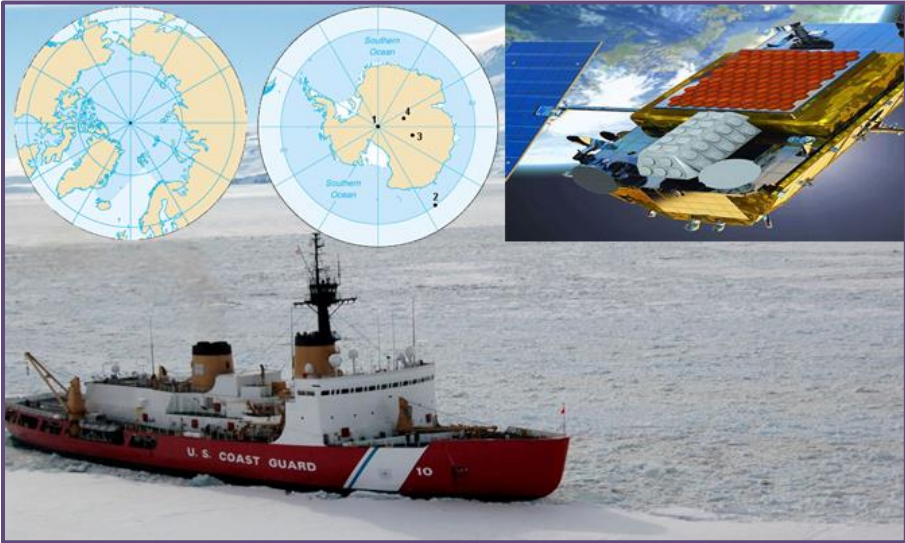
**Sponsor’s Rep:** CG-761  
**Ops Rep:** AREA-6

**Stakeholder(s):** CG-67, CG-68, CG-751, C5ISC, ALC, CGCYBER

**RDC Principal Investigator:**  
Mr. Jon Turban, P.E.

**CG-7R9 Portfolio Manager:**  
Mr. Brian Page

**Anticipated Outcome/Transition:** Provide Sponsor/Product Line Tested Prototype Recommendation for Acquisition Milestone Support



Project Timeline / Key Milestones

Project Start: 1 Oct 20		
Review of Previous Projects and Research Completed	18 Mar 21	✓
High Latitude Satellite Systems Market Research Completed	18 Mar 21	✓
High Latitude Underway Connectivity – Status Update (Brief)	12 Aug 21	✓ ★
High Latitude Underway Connectivity – Status Update 2 (Brief)	5 Oct 23	✓ ★
Cooperative Research & Development Agreement (CRADA) Established	10 Jun 24	✓
Limited User Evaluation Complete	Mar 25	
CGC POLAR STAR Hughes (OneWeb) CRADA Complete	May 25	
High Latitude Underway Connectivity – Final Report (Report)	May 25	★
Project Completion: May 25		





# Next Generation Distress Communication Capability for Alaska and the Arctic

23-1027

**Mission Need:** Effective and modernized distress communications for Alaska and Arctic.

Objectives

- Evaluate current environmental and geographic challenges of the existing emergency communications system, Rescue 21 (R21) Alaska, in D17.
- Identify potential i911 integration opportunities with commercial Satellite (SAT) phones.
- Support U.S. Department of Homeland Security (DHS) Science and Technology Directorate’s (S&T) satellite payload testing for Digital Selective Calling (DSC) relay.
- Perform testing of new Iridium Global Maritime Distress and Safety System (GMDSS) and aid in the integration and training of command centers.

Notes

- Leverage findings from RDC Project 8503, “Radio Frequency (RF) Communications in a Cloud Environment.”
- Leverage partnerships within the U.S. Department of Defense (DOD) and DHS for alternative distress communications methods.
- Identify possible synergies with the DOD Lab Commander Sync and seek to leverage the Ted Stevens Center for Arctic Security Studies.
- Liaise with International partners to include Canadian Coast Guard/ Defense Research and Development Canada (DRDC).

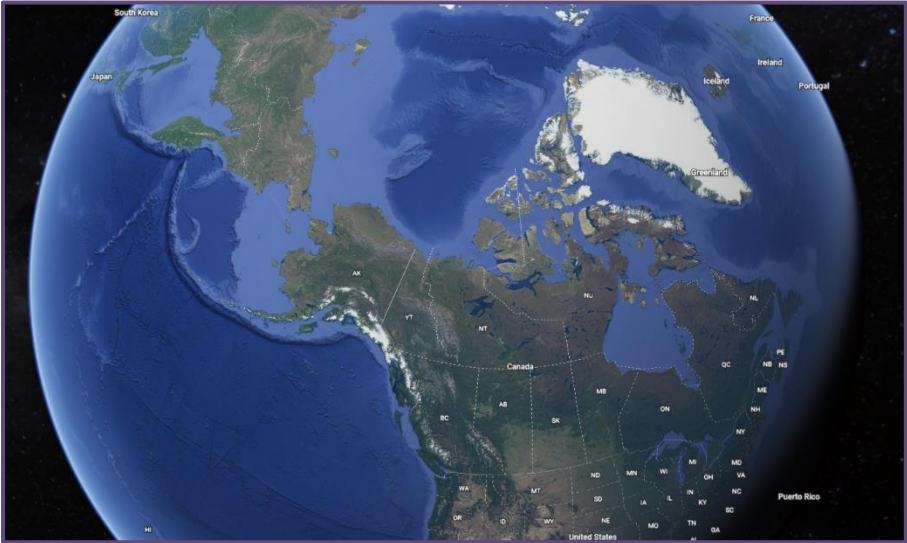
**Sponsor’s Rep:** CG-761  
**Ops Rep:** N/A

**Stakeholder(s):** CG-68, CG-67, CG-741, CG-SAR, C5ISC, CGCYBER, AFRL, Space Force, DHS S&T

**RDC Principal Investigator:**  
LT Clifford Rosenberg

**CG-7R9 Portfolio Manager:**  
Mr. Brian Page

**Anticipated Outcome/ Transition:** Recommendations in Tech Availability & Applicability



Project Timeline / Key Milestones

**Project Start:** 3 Oct 22

Initial Cellular-Over-Satellite D17 Field Demonstration 31 Aug 23 ✓

Conclude Cellular-Over-Satellite Market Research 31 Aug 23 ✓

Arctic Demonstration of Iridium GMDSS on HEALY 31 Oct 23 ✓

**Cellular-Over-Satellite Market Research (Brief)** 27 Nov 23 ✓ ★

**DHS S&T/Aerospace Satellite Capability Alternative Analysis (Report)** Apr 25

**Next Generation Distress Communication Capability for Alaska and the Arctic (Report)** Jul 25 ★

**Project Completion:** Jul 25



# Remote Diagnostic and Monitoring Systems for Technical Support Engineering

23-1030

**Mission Need:** Improve shore-side access to cutter engineering data.

Objectives

- Assess Supervisory Control and Data Acquisition (SCADA) implementation across U.S. Coast Guard (CG) cutter classes.
- Investigate Military/Other Government Agency (OGA)/Commercial vessel SCADA data transfer technology maturity and implementation framework.
- Creation of SCADA Working Group to develop use cases and roadmap SCADA solutions.
- Develop a demonstration plan for a data transfer system on a selected CG asset.
- Perform demonstration of selected SCADA technologies.
- Deliver decision support information and technology transition report and use case roadmaps.

Notes

- Leverage Naval Sea Systems Command and Military Sealift Command for technology framework application.
- Partner with Surface Forces Logistics Center (SFLC) and RDC Project 9204, “Condition Based Maintenance for Coast Guard Asset Product Lines,” Project Manager for solution integration with CG systems (e.g., CG-LIMS, ALMIS, etc.).
- Collaboration with Naval Surface Warfare Center Philadelphia for SCADA prototype and demonstration.
- Potential collaboration with the Naval Postgraduate School and Johns Hopkins Applied Physics Laboratory.

**Sponsor’s Rep:** SFLC  
**Ops Rep:** N/A

**Stakeholder(s):** CG-761, CG-751, CG-45, CGCYBER, CG-ODA

**RDC Principal Investigator:**  
Mr. Matthew Lees

**CG-7R9 Portfolio Manager:**  
Mr. Brian Page

**Anticipated Outcome/Transition:** Recommendations for Product Line Tech Insertion  
Provide Sponsor/Product Line Tested Prototype



Project Timeline / Key Milestones

**Project Start:** 3 Oct 22

Cutter Surveys and SCADA Assessment	31 May 23 ✓
Military/OGA/Commercial SCADA Data Transfer Technology Benchmarking	30 Jun 23 ✓
<b>Supervisory Control and Data Acquisition Data Transfer Technology Investigation (Brief)</b>	<b>6 Sep 23 ✓ ★</b>
SCADA Prototype Demonstration	Jun 25
SCADA Demonstration Evaluation Complete	Sep 25
<b>Remote Diagnostics and Monitoring Systems for Technical Support Engineering (Report)</b>	<b>Feb 26 ★</b>
<b>Project Completion:</b> Feb 26	



# Evaluation and Testing of VHF Data Exchange System (VDES) Impacts on the Automatic Identification System (AIS)

20-8703

**Mission Need:** Determine VDES benefits and path to implementation to support CG operations.

## Objectives

- Understand the capabilities and limitations of VDES.
- Identify steps for U.S. Coast Guard (CG) Implementation of VDES.
- Identify steps to shift CG tactical data transmissions from AIS channels to VDES application specific message channels.
- Evaluate VDES capabilities to disseminate various types of Maritime Safety Information (MSI).
- Understand the requirements for CG shore-side management of VDES.
- Develop AIS/VDES-transmit application to disseminating search patterns.
- Assess feasibility, accuracy and technical limitations of VDES Ranging Mode (R-Mode) implementation in the United States.
- Investigate the ability to use VDES R-Mode to detect position spoofing efforts by bad actors.
- Evaluate VDES satellite capabilities and limitations for transmitting MSI in the high-latitudes, offshore, and other remote regions.

## Notes

- Work closely with the Canadian Coast Guard; Electronics and Information Services, Quebec; U.S. Army Corps of Engineers, Engineer Research & Development Center.
- Leverage prior CG Research and Development Center work completed concerning options and impacts for VDES and AIS.
- Establish Cooperative Research and Development Agreement with VDES satellite commercial providers on test evaluation.

**Sponsor's Rep:** CG-761  
**Ops Rep:** D1

**Stakeholder(s):** CG-67, CG-68, CG-933, CG-NAV,  
NAVCEN, C5ISC, CGCYBER

**RDC Principal Investigator:**  
LCDR Ryan Cassidy

**CG-7R9 Portfolio Manager:**  
Mr. Brian Page

**Anticipated Outcome/Transition:** Recommendations for Standards/Regulations/Policy  
Recommendations for Product Line Tech Insertion



## Project Timeline / Key Milestones

**Project Start:** 1 Oct 19

Technology Roadmap Investigation Complete	30 Sep 20 ✓
<b>Very High Frequency Data Exchange System (VDES) Technology Roadmap (Report)</b>	<b>27 Jan 21 ✓ ★</b>
Phase 1 Field Trials – VDES Evaluation of CG Tactical Data Transmission	1 Oct 21 ✓
<b>Sensitive but Unclassified Tactical Information Exchange and Display System Using VDES (Report)</b>	<b>13 Dec 21 ✓ ★</b>
Phase 2 Field Trials – VDES Evaluation of the Dissemination of MSI	8 Dec 22 ✓
<b>Disseminating MSI Using VDES Field Trial Summary (Report)</b>	<b>22 Mar 23 ✓ ★</b>
<b>VDES R-Mode Field Trial Update (Report)</b>	<b>27 Jan 25 ✓ ★</b>
Complete Phase 3 & Phase 4 Field Trials – Evaluation of R-Mode & VDES-Satellite	Dec 25
<b>VDES R-Mode and Satellite Field Trial Summary (Report)</b>	<b>May 26 ★</b>
<b>Project Completion:</b> May 26	



CG Research & Development Center  
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Indicates RDC Product ★

January 2025 19



**Mission Need:** Comprehensive and cohesive dispatch system to enhance effectiveness of CG operations.

Objectives

- Capability and limitation understanding of candidate Search and Rescue (SAR) systems from a technical integration and intercommunications standpoint.
- Comprehensive knowledgebase of capabilities of Commercial Off-The-Shelf (COTS) Computer Aided Dispatch (CAD) solutions.
- Compatibility understanding of candidate SAR systems with COTS CAD solutions based on SAR system capability evaluation.
- Feasibility understanding of the implementation of a CAD system in Coast Guard command centers.
- Concept of operations plan based on feasibility assessment.
- Ready design for potential Coast Guard integration of a CAD system to include interface design and control documentation.

Notes

- Computer Aided Dispatch project is related to project Minerva. CAD project will need to be cognizant of the direction and outcome of Minerva.
- Partner with Next Generation (NG) 911 call centers, including the U.S. Department of Defense base dispatch centers to determine a best fit for CG operations. Possible use of a Cooperative Research and Development Agreement with NG 911 vendors.
- Leverage prior RDC Project 8112, “Maritime Smartphone Public Safety Answering Point (PSAP) Forwarding into CG-IT/Rescue21.”

**Sponsor’s Rep:** CG-SAR  
**Ops Rep:** N/A

**Stakeholder(s):** CG-68, CG-67, CG-741, C5ISC, CGCYBER

**RDC Principal Investigator:**  
Mr. Robert Riley

**CG-7R9 Portfolio Manager:**  
Mr. Brian Page

**Anticipated Outcome/Transition:**

Recommendations for Product Line Tech Insertion  
Recommendations for Cost/Risk Avoidance



Project Timeline / Key Milestones	Project Start: 1 Apr 24	
	Complete COTS CAD Systems Capability Market Research	20 Dec 24 ✓
	Complete Candidate Systems Capability Analysis	Feb 25
	Candidate Systems and Computer Aided Dispatch Compatibility and Feasibility (Brief)	Mar 25 ★
	Complete Development of Concept of Operations Plan	May 25
	Request for Information Responses Received from Potential Software Vendors	Sep 25
	Complete Contract Action for Interface and Control Design Development	Jan 26
	Receive Vendor Interface and Control Design	Jan 27
	Computer Aided Dispatch Design and Interface Control Documents (Report)	Mar 27 ★
	Project Completion: Mar 27	





**Mission Need:** Navigation alternatives for the Global Positioning System (GPS).

Objectives

- Identify alternate positioning, navigation, and timing (APNT) solutions that provide robustness and resilience to platforms navigating in areas where the critical GPS signal may be spoofed or jammed.
- Understand and analyze the state of research, both within the U.S. and North Atlantic Treaty Organization, regarding navigation in GPS –degraded or –denied environments.
- Partner with government and contractors to drive APNT system and sensor development and testing by providing polar research transits and operational afloat systems for testing opportunities.



Notes

- Office of Naval Research Electro-optical/Infrared Celestial Navigation efforts ongoing.
- Leverage ongoing work of Naval Surface Warfare Center Dahlgren Division, Office of Naval Research, and U.S. Fleet Forces Command, and Air Force Research Laboratory.
- Coordinate with CG-NAV and CG Navigation Center (NAVCEN) Positioning, Navigation, and Timing Working Group on alternative solutions.

**Sponsor’s Rep:** CG-761  
**Ops Rep:** N/A

**Stakeholder(s):** CG-NAV, C5ISC, NAVCEN, CG-67, CG-68, CG-751, CG-7511, CG-9335

**RDC Principal Investigator:**  
APNT Research Team

**CG-7R9 Portfolio Manager:**  
APNT Research Team

**Anticipated Outcome/Transition:**

Provide Sponsor/Product Line Tested Prototype  
Recommendations on Tech Availability & Applicability

Project Start:

Project Timeline / Key Milestones

Please e-mail [RDC-Info@uscg.mil](mailto:RDC-Info@uscg.mil) for information concerning the milestones and deliverable schedule.

Project Completion:



# Single Point Emergency Notification System

24-1041

**Mission Need:** Ability to directly receive and respond to all types of mariner emergency communications.

Objectives

- Standardize communication pathway for all electronic emergency notifications.
- Create table of emergency notification devices currently monitored by the CG and those coming available in the next few years to include data transmitted, signal type, and data receiver.
- Examine how current devices are transferring emergency data to the CG or other Search and Rescue (SAR) service providers, including Search and Rescue Satellite-Aided Tracking Program (SARSAT).
- Work with industry partners to create a prototype uniform emergency notification signal to be received by Command Centers.
- Work with Radio Technical Commission for Maritime Services (RTCM) committees to propose a Federal standard for all maritime emergency communications, so that industry partners and other organizations can implement pathway in current and future products.

Notes

- Leverage RTCM special committees on Emergency Beacons, Maritime Survivor Locating Devices, and Satellite Emergency Notification and Location Devices; and integration work that SARSAT has accomplished.
- Leverage RDC Project 1027, “Next Generation Distress Communication Capability for Alaska and the Arctic.”
- Coordinate with USAF Emergency Coordination Center and potentially with similar Canadian or British entities.
- Utilize Cooperative Research and Development Agreements with industry.
- Potentially collaborate with the National Association of SAR Coordinators.



**Sponsor’s Rep:** CG-SAR  
**Ops Rep:** PAC-3

**Stakeholder(s):** CG-761, SILC, CG-68, C5ISC

**RDC Principal Investigator:**  
Mr. Robert Riley

**CG-7R9 Portfolio Manager:**  
Mr. Brian Page

**Anticipated Outcome/Transition:** Recommendations for Standards/Regulations/Policy  
Recommendations on Tech Availability & Applicability

Project Timeline / Key Milestones

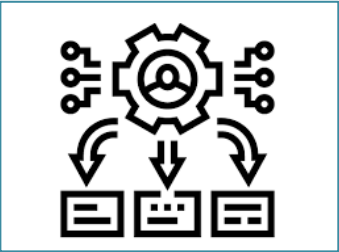
**Project Start:** 1 Apr 24

Kickoff Meeting with CG-SAR and Stakeholders	14 Aug 24 ✓
Conduct Market Research of Emergency Notification Devices	Jun 25
<b>Market Research of Emergency Notification Devices (Brief)</b>	<b>Jul 25 ★</b>
Cooperative Research and Development Agreement (CRADA) with Industry Partners	Oct 25
Work with Industry to Assist in Prototype Development	May 26
Conduct Initial Research, Testing, Training, and Evaluation (T&E) with CRADA Partners	Aug 26
Conduct 2 <sup>nd</sup> Iterative T&E with CRADA Partners	Nov 26
Give Demo to Present Solution to CG-SAR and Other Government Agencies	Feb 27
<b>Single Point Emergency Notification System (Report)</b>	<b>Sep 27 ★</b>
<b>Project Completion:</b> Sep 27	



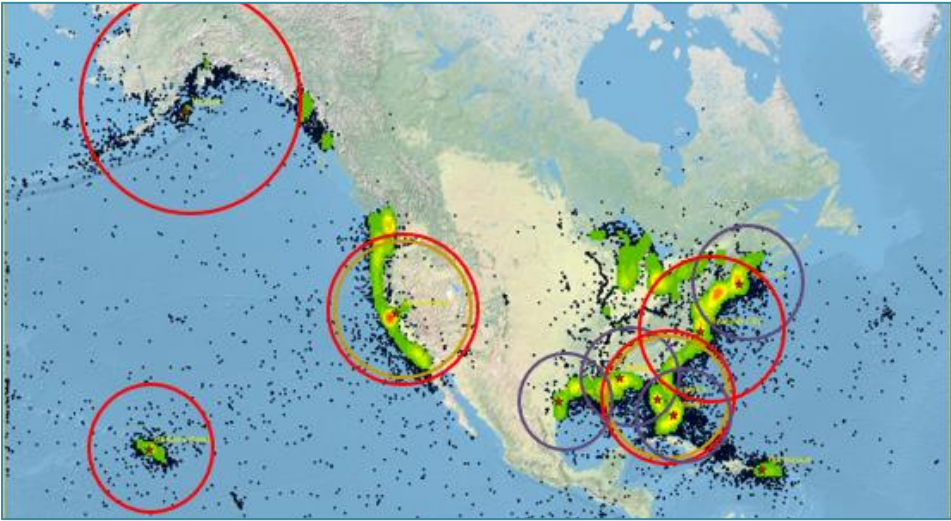


# Data, Modeling, and Decision Support Research Program

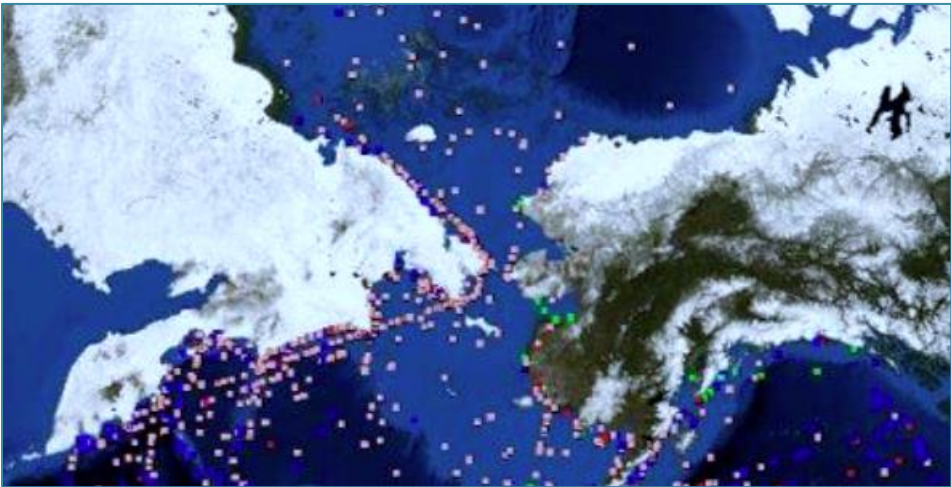


## Program Definition

The focus of DMDS is on enhancing Coast Guard effectiveness through the use of data, with research supporting incorporation and development of advanced methodologies, use of emerging data technologies, and complex analytics. The end goal is to provide operators, support personnel, and leadership effective decision support tools. Research Program areas include domain awareness and target of interest identification, artificial intelligence and natural language processing, modeling and simulation, and data analytics. Research also supports the investigation of emerging data and decision support tools, technologies, and capabilities.



Air Asset Siting Map



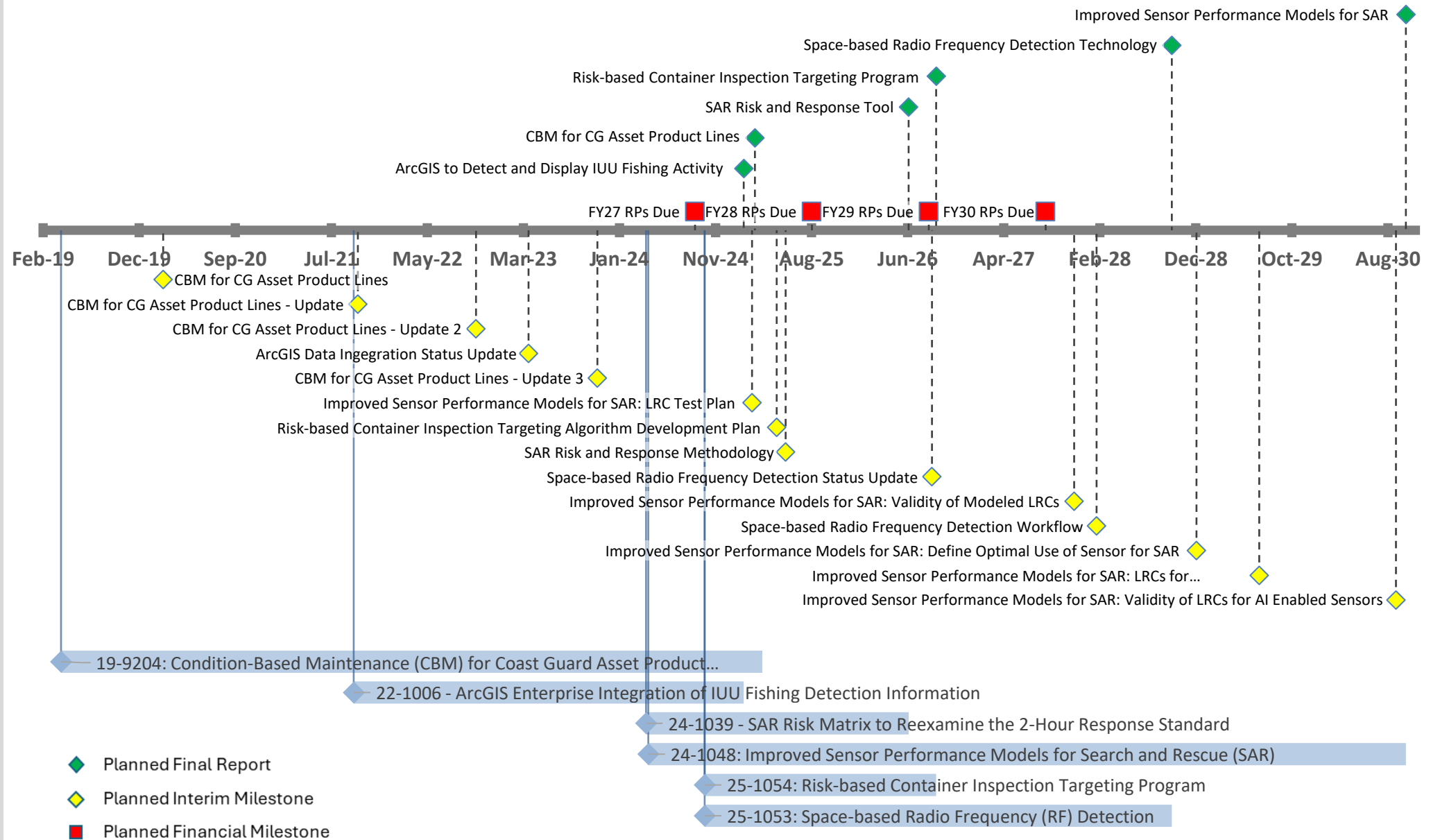
International Maritime Organization Polar Code Survival Time Requirement Simulation

## Program Team

<b>Program Champion:</b>	<b>RDC Experimentation Lead:</b>
RDML Dash (CG-6)	LCDR Paul Larouche
RDML Chamie (CG-5R)	<b>RDC Transition Lead:</b>
<b>RDC Research Program Chief:</b>	Mr. Scott Fields
CDR Julia Harder	
<b>CG-7R9 Portfolio Manager:</b>	
Dr. David Wiesenhahn	



# Research Program Roadmap | Data, Modeling, and Decision Support





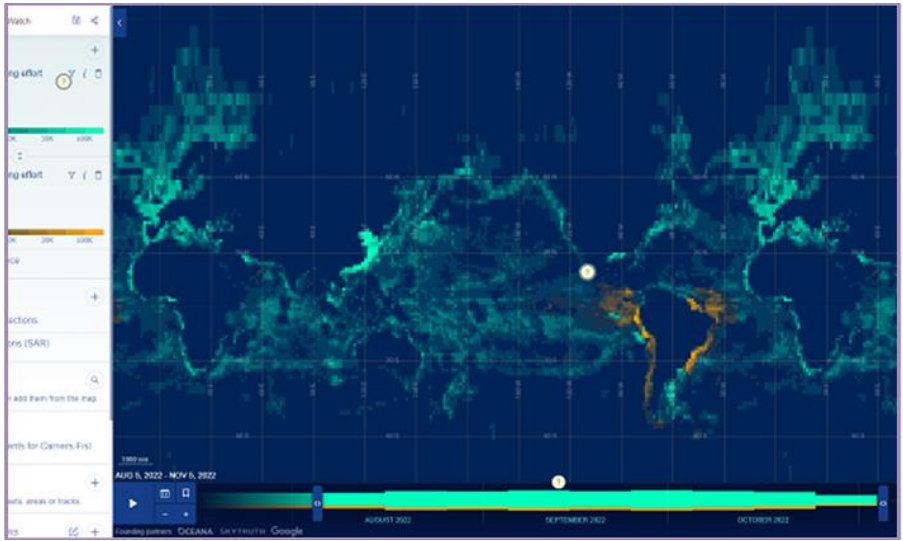
# ArcGIS Enterprise Integration of IUU Fishing Detection Information

22-1006

**Mission Need:** Integrate and display IUU fishing activity for Maritime Law Enforcement operations.

Objectives

- Determine requirements for Illegal, Unreported and Unregulated Fishing (IUUF) Activity detection and display.
- Determine existing and needed sources/sensors/inputs for IUU Fishing display on an Environmental Services Research Institute (ESRI) platform.
- Investigate creation of an ESRI platform that captures and manages data input for C-IUUF.
- Create repeatable and adaptable process for all geographic locations that support C-IUUF.



Notes

- Leverage previous RDC and Maritime Intelligence Fusion Center IUU work as much as possible.
- Explore the link between historical and real-time data within the ESRI system.
- Identify how content and format of data sources come together within the ESRI system. Determine what kind of information would increase system effectiveness.

<b>Sponsor’s Rep:</b> CG-MLE <b>Ops Rep:</b> PAC-53	<b>Stakeholder(s):</b> CG-2, CG-68, MIFC LANT/PAC, ICC, D14, D17, CGCYBER
<b>RDC Principal Investigator:</b> Mr. Jack Cline	<b>CG-7R9 Portfolio Manager:</b> Dr. David Wiesenbahn
<b>Anticipated Outcome/Transition:</b>	Recommendations on Tech Availability & Applicability Provide Sponsor/Product Line Tested Prototype

Project Timeline / Key Milestones	Project Start: 1 Oct 21	
	AIS Data Quality/Analysis Investigation	31 Aug 22 ✓
	IUU Requirements Determined	16 Dec 22 ✓
	ArcGIS Data Integration Status Update (Brief)	29 Mar 23 ✓ ★
	First Round Prototype Development	24 Nov 23 ✓
	Prototype Demonstration	15 Dec 23 ✓
	Prototype Revision	31 Jan 24 ✓
	The Use of ArcGIS to Detect and Display IUU Fishing Activity (Report & Brief)	Feb 25 ★
	Project Completion: Feb 25	



# Condition-Based Maintenance (CBM) for Coast Guard Asset Product Lines

19-9204

**Mission Need:** Targeted CBM for higher asset availability and reduced life cycle costs.

## Objectives

- Implement condition-based and predictive maintenance activities within the surface and aviation communities by researching and documenting significant opportunities for using leading indicators and readily available system information, including the following system characteristics: interfaces, data structure, data analysis, and data display that support a data driven system.
- Develop demonstration case studies using predictive maintenance with U.S. Coast Guard (CG) data to provide recommendations for systems and steps required to accommodate desired functional characteristics of a data driven system.

## Notes

- Partner with the CG Surface Forces Logistics Center (SFLC) and Aviation Logistics Center (ALC) to make recommendations.
- Partner with U.S. Naval Academy (USNA), U.S. Department of Defense Chief Digital and Artificial Intelligence Office (CDAO), U.S. Navy's Naval Air System Command and Naval Sea Systems Command, and U.S. Army Combat Capabilities Development Command Aviation & Missile Center, U.S. Army's Aviation and Missile Research Development and Engineering Center Engineering Directorate Quality Information Systems Branch.

**Sponsor's Rep:** CG-45, CG-41  
**Ops Rep:** N/A

**Stakeholder(s):** SFLC, ALC

**RDC Principal Investigator:**  
Ms. Christine Hansen

**CG-7R9 Portfolio Manager:**  
Dr. David Wiesenbahn

**Anticipated Outcome/Transition:** Recommendations for Cost/Risk Avoidance  
Recommendations on Tech Availability & Applicability



## Project Timeline / Key Milestones

**Project Start:** 1 Apr 19

Initial Surface Asset Review and Benchmarking	1 Dec 19 ✓
<b>CBM for CG Asset Product Lines (Brief)</b>	<b>14 Feb 20 ✓ ★</b>
Initial Aviation Asset Review and Benchmarking	1 Oct 20 ✓
<b>CBM for CG Asset Product Lines: Update Brief (Brief)</b>	<b>7 Oct 21 ✓ ★</b>
DoD CDAO Predictive Maintenance Representative	1 Jan 22 ✓
<b>CBM for CG Asset Product Lines: Update Brief Two (Brief)</b>	<b>17 Oct 22 ✓ ★</b>
DoD H-60 Health and Usage Monitoring System Data Translation Complete	1 Oct 23 ✓
<b>CBM for CG Asset Product Lines: Update Brief Three (Brief)</b>	<b>30 Oct 23 ✓ ★</b>
DoD ASET H-60 Sensor Data Analytics	Feb 25
USNA NSC Sensor Data Analysis	Apr 25
<b>CBM for CG Asset Product Lines Summary Report (Report)</b>	<b>Jun 25 ★</b>

**Project Completion:** Jun 25



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# SAR Coverage Model to Evaluate Alternatives to the 2-hour Response Standard

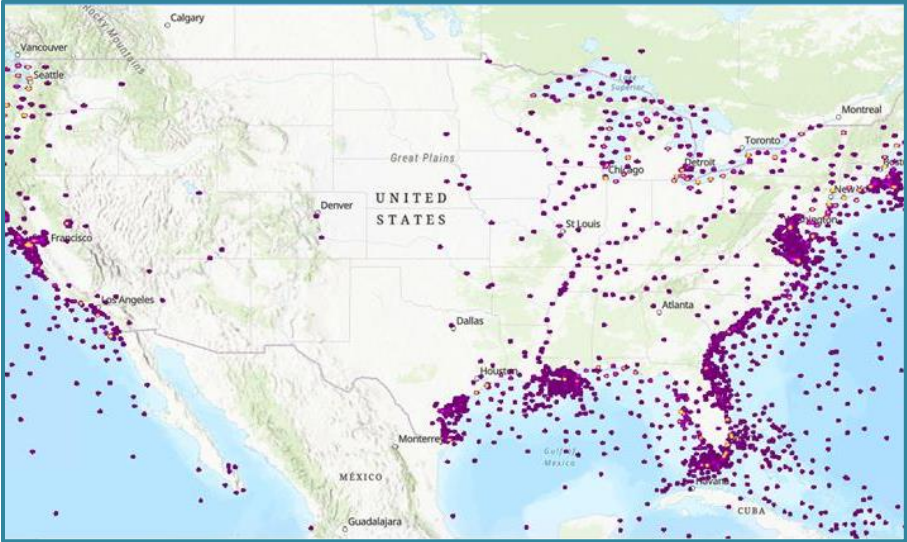
24-1039

**Mission Need:** Position response resources efficiently around the CG’s Area of Responsibility.

Objectives

Current U.S. Coast Guard (CG) asset siting is based, in part, on a 2-hour Search and Rescue (SAR) response standard, but this standard is based on limited, and potentially outdated, factors.

- Identify and evaluate potential risk and response paradigms for CG SAR.
- If a feasible paradigm is identified, develop a prototype SAR risk and response tool that leverages the new methodology.
- Improve effectiveness of SAR system.
- Optimize basing and siting of SAR resources.



Notes

- Research may benefit from existing tools for siting decision support:
  - CG SAR Visual Analytic (cgSARVA) model (Purdue) is a tool to support surface asset siting.
  - CG SAR Simulation and Value Modeling of Air Station Closures (SAVMASC) is analysis proposing methodology for making risk-based decisions on CG Air Station siting and closures.
- Emergency response organizations employ a host of risk factors in siting determinations. Potential partners include National Urban Security Technology Laboratory, State/local response organizations, and Department of Energy National Laboratories.

**Sponsor’s Rep:**CG-SAR  
**Ops Rep:**

**Stakeholder(s):** CG-MLE, CG-MSR, CG-MER, CG-771, CG-731, CG-741, AREAs, CG-PAE

**RDC Principal Investigator:**  
Ms. Christine Mahoney

**CG-7R9 Portfolio Manager:**  
Dr. David Wiesenbahn

**Anticipated Outcome/Transition:**

Recommendations for Standards/Regulations/Policy  
Provide Sponsor/Product Line Tested Prototype

Project Timeline / Key Milestones

**Project Start:** 1 Apr 24

Literature Review of SAR Response Standard and Emergency Response Siting Methodologies Complete	30 Aug 24	✓
Definition of Constraints for New Siting Methodology Complete	16 Oct 24	✓
Develop Analytical Approach to Model SAR Risk and Response Complete	May 25	
<b>SAR Risk and Response Methodology (Brief)</b>	<b>Jun 25</b>	★
Prototype Risk and Response Tool Complete	Apr 26	
<b>SAR Risk and Response Tool (Report)</b>	<b>Jun 26</b>	★
<b>Project Completion:</b> Jun 26		





# Risk-based Container Inspection Targeting Program

25-1054

**Mission Need:** Efficient identification of high-risk cargo for targeted inspection.

## Objectives

- Motivation:
  - Reduce the rate of container fires at sea and in port.
- Objective:
  - Increase the likelihood of target container inspections revealing safety deficiencies by leveraging data already available and/or easily accessible to the U.S. Coast Guard (CG).
- Approach:
  - Understand the container inspection process.
  - Familiarize with available data sources.
  - Develop method and metrics for evaluating targeting effectiveness.
  - Identify and develop initial rule-based solution.
  - Prototype initial rule-based method at various locations.
  - Develop and test Machine Learning (ML) method from curated data.

## Notes

- Driven by previous work performed in partnership between Sector NY, Stevens Institute of Technology, and Customs and Border Protection's National Targeting Center (NTC).
- Hazcheck Detect (commercial service used by NTC) is a potential benchmark.
- Leverage lessons learned in ML application from RDC Project 7532, "Improved Efficiency in Domestic Inspections" and extensive academic research on container targeting.

**Sponsor's Rep:** CG-FAC  
**Ops Rep:** MIFC LANT

**Stakeholder(s):** NTC, Sector NY, Sector LA/LB, CG Container Inspection Training and Assistance Team

**RDC Principal Investigator:**  
Ms. Kathleen Rice

**CG-7R9 Portfolio Manager:**  
Dr. David Wiesenbahn

**Anticipated Outcome/Transition:** Recommendations for Tactics, Techniques & Procedures  
Provide Sponsor/Product Line Tested Prototype



## Project Timeline / Key Milestones

**Project Start:** 1 Oct 24

Virtual Kickoff Meeting with Sponsor & Stakeholders	31 Oct 24	✓
Database Research	Feb 25	
Initiate Data Engineering/Analysis	Apr 25	
Port Container Inspection Visits (Sector NY, MSU Savannah, Sector LA-LB)	Apr 25	
<b>Risk-based Container Inspection Targeting Algorithm Development Plan (Brief)</b>	<b>May 25</b>	★
Develop Rule-Based Method & Evaluation Process	Jul 25	
Prototype and Evaluate Rule-Based Method	Nov 25	
Develop ML Method from Newly Collected Data	Mar 26	
Prototype and Evaluate ML Method	May 26	
<b>Risk-based Container Inspection Targeting Program (Report)</b>	<b>Sep 26</b>	★
<b>Project Completion:</b> Sep 26		



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**Mission Need:** Increase Maritime Domain Awareness (MDA) through space-based RF detection.

## Objectives

- Recommendations on technology applicability and workflow procedures.
- Provide a roadmap to utilize promising space sensor tech.
- Determine Space-Based RF detection and display requirements.
- Investigate existing Space-Based RF detection capabilities.
- Identify business use cases to use Government-Off-The Shelf (GOTS)/Commercial-Off-The Shelf (COTS) solutions for real-world missions (SAR; Illegal, Unreported and Unregulated Fishing; drug interdiction; alien ops).
- Develop mitigation strategies for identified gaps and analyze workflows and procedures.
- Investigate the capabilities of U.S. Coast Guard (CG) systems to display Space-Based RF detection information and assess the scope of displaying data to provide actionable information.

## Notes

- National Reconnaissance Office, National Security Agency, Air Force Research Laboratory, Space Force collaboration.
- Leverage Defense Innovation Unit Hybrid Space Architecture II project.
- Leverage joint DHS S&T/RDC Digital Selective Calling detection from space effort under RDC Project 1027, "Next Generation Distress Communication Capability for Alaska and the Arctic."

**Sponsor's Rep:** CG-2D  
**Ops Rep:** Sector Boston

**Stakeholder(s):** CG-2AI, CG-68, CG-MLE, MIFC, AREAs

**RDC Principal Investigator:**  
Mr. Paul Harvey

**CG-7R9 Portfolio Manager:**  
Dr. David Wiesenbahn

**Anticipated Outcome/Transition:** Recommendations on Tech Availability & Applicability  
Recommendations for Tactics, Techniques & Procedures



## Project Timeline / Key Milestones

**Project Start:** 1 Oct 24

Determine Space-based RF Detection Capabilities	Jun 25
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Determine Requirements for Data Display	Sep 25
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Space-based RF Detection Workflow Analysis	Jul 26
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<b>Space-based RF Detection Status Update (Brief)</b>	<b>Sep 26</b> ★
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Hardware and Software Requirements	Oct 26
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Develop Display Method for Data Collected	Jul 27
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Automate Ingestion and Display of Target Data	Dec 27
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<b>Space-based RF Detection Workflow (Brief)</b>	<b>Feb 28</b> ★
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Demonstrate Capability in Test Environment	Apr 28
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Demonstrate Automation for Workflows	May 28
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<b>Space-based RF Detection Technology (Report)</b>	<b>Sep 28</b> ★
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**Project Completion:** Sep 28



**Mission Need:** A time and cost-effective methodology to incorporate sensor capabilities in SAROPS.

Objectives

- Establish empirical Lateral Range Curves (LRC) for one selected sensor type through field experiments.
- Determine if LRCs produced by physics-based models appropriately estimate empirical LRCs for selected sensor type.
- Define the optimal employment of the selected sensor type for Search and Rescue (SAR) missions.
- Define LRCs for inclusion in the Search and Rescue Optimal Planning System (SAROPS). The basis of these LRCs will be either physics-based models or the traditional analysis approach, based on the findings of the second objective.
- Define a process to compute LRCs for sensors enabled with object detection algorithms.
- Determine if LRCs computed for AI enabled sensors appropriately estimate empirical LRCs.



Notes

- Validates LRC modeling approaches identified in RDC Project 7937, “Incorporating Sensor Performance in SAROPS.”
- Leverages RDC’s previous work developing SAROPS sensor inputs.

Sponsor’s Rep: CG-SAR  
Ops Rep: N/A

RDC Principal Investigator:  
Dr. Maggie Exton

Anticipated Outcome/  
Transition:

Stakeholder(s): CG-931, CG-7, AREAs, Districts,  
Sectors, FORCECOM

CG-7R9 Portfolio Manager:  
Dr. David Wiesenbahn

Recommendations on Tech Availability & Applicability  
Recommendations for Cost/Risk Avoidance

Project Timeline / Key Milestones

Project Start: 4 Apr 24

Definition of Combinations of Sensor, Search Asset,  
and Search Object for Validation Complete

Sep 25

Develop Improved Sensor Performance Models for  
SAR: LRCs Test Plan (Brief)

Feb 26

★

Develop Improved Sensor Performance Models for  
SAR: Validity of Modeled LRCs (Brief)

Nov 27

★

Define Optimal Use of Sensor for SAR (Brief)

Dec 28

★

Develop Improved Sensor Performance Models for  
SAR: LRCs for SAROPS (Report)

Jun 29

★

Develop Improved Sensor Performance Models for  
SAR: Validity of LRCs for AI Enabled Sensors (Brief)

Aug 30

★

Develop Improved Sensor Performance Models for  
Search and Rescue (Report)

Sep 30

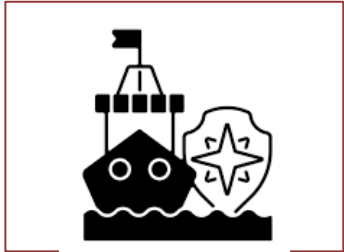
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Project Completion: Sep 30





# Defense and Safety Systems Research Program



Program Definition

Ensuring the safety of Coast Guard members, the Maritime Transportation System (MTS), and the public now and into the future.

Defensive systems including non-lethal vessel stopping technologies, counter uncrewed systems (C-UxS), cybersecurity and redundancy in Operational Technology (OT) and navigation systems will protect our assets from evolving threats.

Safety systems focused on improvements to mariner safety will bolster fire protection systems and fire response, enhance lifesaving equipment, and increase the probability of successful search and rescue.

Assessing modern vessel construction techniques and materials will ensure that the service knows how to regulate, respond to emergencies, and utilize advancements in ship design.



USCGC Munro interdicts suspected drug smuggling vessel. Defensive systems will provide increased domain awareness to enforce borders and security zones.



Abandon ship drills provide an opportunity to assess improvements to maritime safety systems.

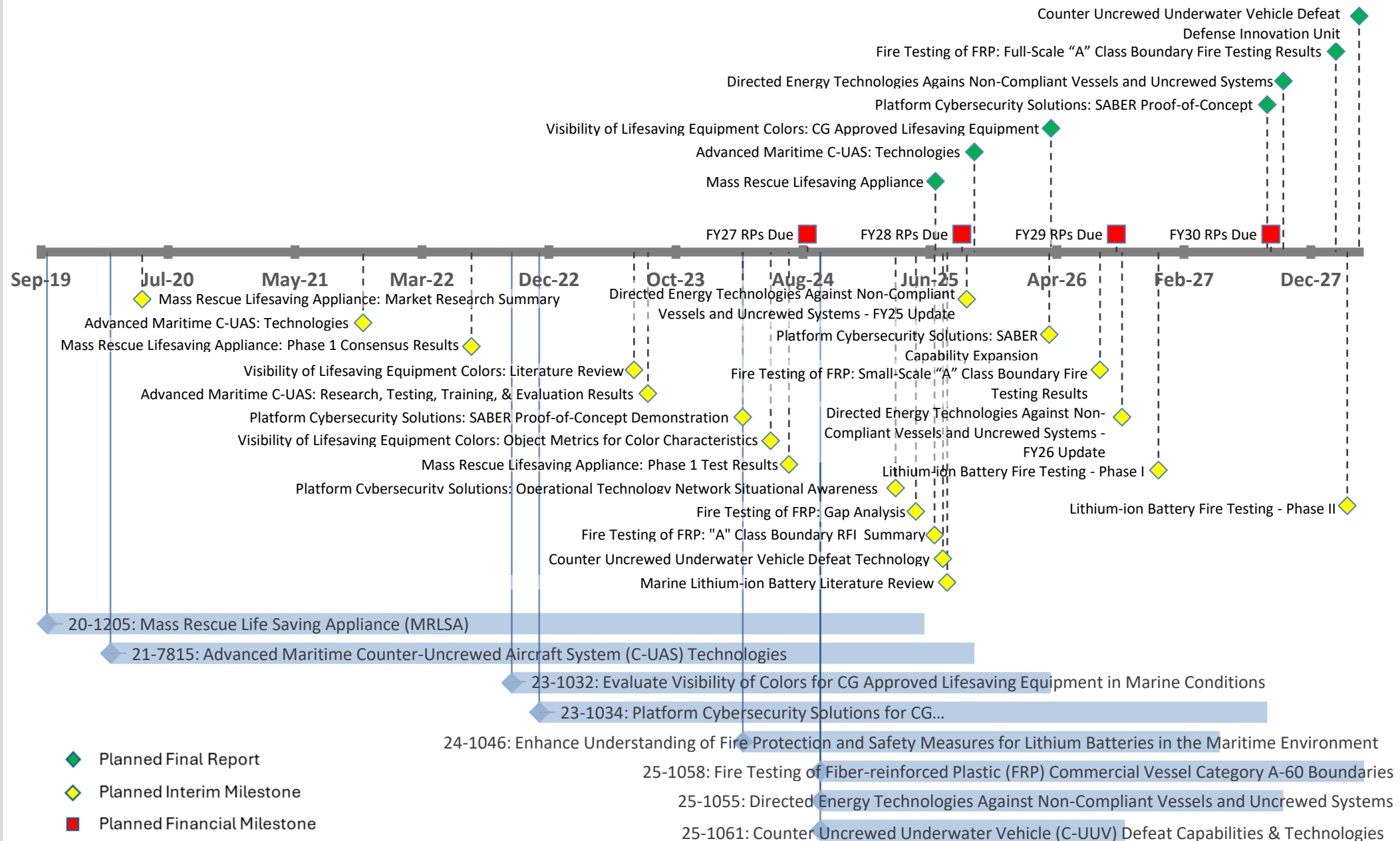
Program Team

<b>Program Champion:</b>	<b>RDC Experimentation Lead:</b>
RADM Gilreath (CG-7)	LCDR Ryan Cassidy
RADM Arguin (CG-5P)	
<b>RDC Research Program Chief:</b>	<b>RDC Transition Lead:</b>
Ms. Amy Cutting	Mr. Scott Fields
<b>CG-7R9 Portfolio Manager:</b>	
LCDR Stephen Thomsen	





# Research Program Roadmap | Defense and Safety Systems



# Mass Rescue Lifesaving Appliance (MRLSA)

20-1205

**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.
- Phase 1 includes developing a prototype device and testing in a controlled environment, including weight tests, and human subject boarding exercises.
- Phase II option includes final design for testing in open water including deploying from USCG assets (air, afloat).
- 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.
- U.S. 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.

**Sponsor's Rep:** CG-SAR  
**Ops Rep:** N/A

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

**RDC Principal Investigator:**  
Ms. Monica Cisternelli

**CG-7R9 Portfolio Manager:**  
LCDR Stephen Thomsen

**Anticipated Outcome/Transition:** Provide Sponsor/Product Line Tested Prototype Recommendations for Standards/Regulations/Policy

## 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 ✓ ★

Industry Day Webinar Complete

25 May 21 ✓

DHS Issues BAA

21 Jun 21 ✓

Interim Brief Complete

28 Sep 21 ✓

**MRLSA: Phase 1 Consensus Results (Brief)**

30 Mar 22 ✓ ★

DHS Contract Award

12 Sep 22 ✓

Prototype Development Complete, Phase 1 Testing

19 Apr 24 ✓

**MRLSA: Phase 1 Test Results (Brief)**

19 Jul 24 ✓ ★

Phase 2 Testing

Mar 25

**Mass Rescue Lifesaving Appliance (Report)**

Jun 25 ★

**Project Completion:** Jun 25



# Advanced Maritime Counter-Uncrewed Aircraft System (C-UAS) Technologies

21-7815

**Mission Need:** Operationally effective C-UAS force protection capability.

Objectives

- Assess new developments in kinetic C-UAS solutions in the open market and with other government agencies as technologies evolve.
- Automate object detection and classification based on Electro-Optical/Infrared camera data by collaborating with optics companies to incorporate additional sensor modalities to aid UAS detection and target discrimination.
- Explore applicability of data fusion algorithms and machine learning to combine multiple data types into single threat track to reduce operator workload, uncertainty, and response time.
- Provide technical guidance on system employment for various mission sets based on legal authority and tactics, techniques, and procedures.



Notes

- Follow-on for RDC Project 7812, “Maritime Counter Unmanned Aircraft Systems.”

**Sponsor’s Rep:** CG-MSR  
**Ops Rep:** D1 (dr)

**Stakeholder(s):** CG-711, CG-721, CG-751, LANT-3, PAC, D1, NSWC Dahlgren, CGCYBER

**RDC Principal Investigator:**  
C-UAS Research Team

**CG-7R9 Portfolio Manager:**  
C-UAS Research Team

**Anticipated Outcome/Transition:**

Provide Sponsor/Product Line Tested Prototype  
Recommendations for Acquisition Milestone Support

Project Start:

Project Timeline / Key Milestones

Please e-mail [RDC-Info@uscg.mil](mailto:RDC-Info@uscg.mil) for information concerning the milestones and deliverable schedule.

Project Completion:



# Evaluate Visibility of Colors for CG Approved Lifesaving Equipment in Marine Conditions

23-1032

**Mission Need:** Optimal lifesaving equipment detectability.

## Objectives

- Conduct literature review of High Visibility Safety Apparel (HSVA) and lifesaving equipment visibility/probability of detection research.
- Carry out industry/professional society review of standards for HSVA and Search and Rescue (SAR) equipment colors and/or color schemes.
- Perform domestic and international governmental review of approved/required colors in SAR scenarios.
- Define optimal visual detectability and conspicuity color characteristics in marine conditions via a marine environment high visibility color standard.
- Conduct field trials to validate high visibility color standard from shore, afloat and aviation assets in various weather, light and sea-state conditions.
- Enable sponsor and stakeholders to use for lifesaving equipment color evaluations and standards revision, if appropriate.



## Notes

- Engage RDC Human Factors Subject Matter Experts and CG-926 Portfolio Manager, as well as CG Aux for experiment support.
- Review previous RDC visibility, visual distress signal, and detectability projects for experiment techniques, findings and conclusions.
- Involve global maritime stakeholders in results review for possible revisions to international policy and regulations.
- Leverage DOD, North Atlantic Treaty Organization, Maritime Administration, and Cruise Lines Industry Association interest.

**Sponsor's Rep:** CG-ENG  
**Ops Rep:** N/A

**Stakeholder(s):** CG-BSX, CG-5P, CG-5R, CG-711, CG-731, CG-751, WOPL, NMC, NBSAC, IMO NCSR

**RDC Principal Investigator:**  
Mr. Josh Pennington

**CG-7R9 Portfolio Manager:**  
LCDR Stephen Thomsen

**Anticipated Outcome/Transition:** Recommendations for Standards/Regulations/Policy

## Project Timeline / Key Milestones

**Project Start:** 3 Oct 22

Technical Review	8 Mar 23 ✓
<b>Lifesaving Equipment Colors; Literature Review (Report)</b>	<b>19 Jul 23 ✓ ★</b>
Research & Define Color Characteristics	27 Oct 23 ✓
<b>Objective Metrics for Lifesaving Equipment Color Characteristics (Report)</b>	<b>6 Jun 24 ✓ ★</b>
KDP – Sponsor Concurrence on Color Characteristics	14 Jun 24 ✓
Field Trial Test Plan	30 Aug 24 ✓
Field Trials Complete	Oct 25
Data Analysis Complete	Dec 25
<b>Visibility of Potential Colors for CG Approved Lifesaving Equipment (Report)</b>	<b>Mar 26 ★</b>
<b>Project Completion:</b> Mar 26	



# Counter Uncrewed Underwater Vehicle (C-UUV) Defeat Capabilities & Technologies

25-1061

**Mission Need:** Modular response asset capabilities to deter and defeat adversarial UUVs.

Objectives

- Deliver decision support information regarding improved C-UUV capabilities for deterring and defeating UUVs.
- Refine U.S. Coast Guard Concepts of Operation (CONOPs) for response to adversarial UUVs.
- Establish procedures for control/custody of defeated UUVs with domestic security partners.
- Provide USCG support and participate in Defense Innovation Unit (DIU) C-UUV effort.



Notes

- Leverages results from RDC Project 5922, “Counter Uncrewed Underwater Vehicle (C-UUV) Technology.”
- Coordinated with C-UUV Community of Interest (COI) prior and ongoing work.
- Research informed by the interagency C-UUV National Action Plan.
- Aligned with goals of CG Unmanned Systems Strategic Plan.
- Possible partnership opportunities with Office of Naval Research (ONR) Global, North American Treaty Organization (NATO) allies, U.S. Navy Fleet Forces Command, and U.S. Navy’s numbered fleet Science Advisors.

**Sponsor’s Rep:** CG-721  
**Ops Rep:** N/A

**Stakeholder(s):** CG-45, CG-731, CG-5R, CG-ODO, CG-761

**RDC Principal Investigator:**  
C-UUV Research Team

**CG-7R9 Portfolio Manager:**  
C-UUV Research Team

**Anticipated Outcome/ Transition:** Recommendations on Tech Availability & Applicability

Project Start:

Project Timeline / Key Milestones

Please e-mail [RDC-Info@uscg.mil](mailto:RDC-Info@uscg.mil) for information concerning the milestones and deliverable schedule.

Project Completion:



Mission Need: Cyber resilient Operational Technology (OT) systems on CG cutters.

Objectives

- Explore how the US Navy’s Situational Awareness Boundary Enforcement and Response (SABER) program of record for ship/carrier cyber defense could be used to monitor CG Cutter (CGC) OT systems and protect against cyber threats.
- Survey CGC OT systems and determine how SABER could be integrated with a critical OT system to improve cutter cyber resiliency.
- Perform an analysis of SABER’s ability to inform cutter crews of anomalies and cybersecurity threats to OT systems on a Fast Response Cutter (FRC) and a National Security Cutter (NSC).
- Explore, develop, and test SABER’s Boundary Enforcement and Response for the NSC’s Coast Guard Machinery Control System (CGMCS).
- Inform requirements for new acquisition systems to improve cyber resiliency for future CG assets.

Notes

- Effort aligns with Cyber Strategic Outlook 2021 Line of Effort 1: Defend and Operate the Enterprise Mission Platform, by ensuring secure and resilient OT networks on CG assets to support all missions.
- Partnerships with Naval Sea Systems Command (NAVSEA) Cyber Engineering and Digital Transformation Directorate (SEA 03) and the Naval Surface Warfare Center Philadelphia Division for a proof-of-concept demonstration on the FRC Machinery Control and Monitoring System (MCMS).
- NSC CGMCS demonstration integrates with RDC Project 1030, “Remote Diagnostic and Monitoring Systems for Technical Support Engineering.”

Sponsor’s Rep: CG-791  
Ops Rep: CG Cyber D11 CPT

Stakeholder(s): CGCYBER, CG-45, CG-68, CG-751, CG-761, CG-932, CG-933, SFLC, C5ISC

RDC Principal Investigator:  
Mr. Rob Coburn

CG-7R9 Portfolio Manager:  
LCDR Stephen Thomsen

Anticipated Outcome/  
Transition: Recommendations for Product Line Tech Insertion  
Provide Sponsor/Product Line Tested Prototype



Project Timeline / Key Milestones

Project Start: 7 Dec 22	
SABER Working Group Sessions with NAVSEA 03	29 Mar 23 ✓
MCMS Trainer SABER Lab Test and Data Collection	22 Nov 23 ✓
SABER Proof-of-Concept Demonstration (Brief)	1 Apr 24 ✓ ★
FRC MCMS Pier Side SABER Test and Data Collection	7 May 24 ✓
FRC MCMS Pier Side CGCYBER Red Team Exercise	13 Sep 24 ✓
OT Network Situational Awareness (Report)	Mar 25 ★
NSC CGMCS SABER Validation	Sep 25
CG SABER Capability Expansion (Brief)	Mar 26 ★
NSC CGMCS Pier Side SABER Demonstration	Nov 26
Perform Analysis of Logistics for CG SABER Sustainment	Mar 27
SABER Proof-of-Concept for CG Cutter Operational Technology Cybersecurity (Report)	Aug 27 ★
Project Completion: Aug 27	





# Directed Energy Technologies Against Non-Compliant Vessels and Uncrewed Systems

25-1055

**Mission Need:** Non-lethal capabilities to deter and defeat crewed and uncrewed systems.

Objectives

- Analyze the application of Directed Energy (DE) technology to Non-Compliant Vessel (NCV) stopping and Counter-Uncrewed System (C-UxS) operations.
- Assess the technical readiness of existing and emerging DE technologies.
- Characterize the threats and targets for which DE represents an improved non-lethal solution.
- Integrate DE deployment into the Use of Force continuum.
- Identify the Size, Weight and Power constraints of CG response assets.
- Leverage the Depart of Defense, Department of Homeland Security Science and Technology Directorate, and Other Government Agency (OGA) investments in DE.
- Participate in technology demonstrations sponsored by OGA's.
- Map DE technology maturity for non-lethal maritime use.
- Develop plans for integration and testing of DE prototypes on afloat platforms.
- Identify U.S Coast Guard policy gaps and influence the development of future authorization(s).

Notes

- Leverages results from RDC Project 5678, "Non-Compliant Vessel Stopping Using Less-Than-Lethal Radio Frequency Technologies," Project 7815, "Advanced Maritime Counter-Uncrewed Aircraft System (C-UAS) Technologies," and Project 7812, "Counter Unmanned Aerial System (cUAS)."
- Focus on both air and surface targets.
- Joint DHS S&T/RDC project.

**Sponsor's Rep:** CG-721  
**Ops Rep:** D7, D11

**Stakeholder(s):** CG-MLE, CG-MSR, CG-932, SFLC, CG-68, CG-761, LANTAREA, PACAREA

**RDC Principal Investigator:**  
DE Research Team

**CG-7R9 Portfolio Manager:**  
DE Research Team

**Anticipated Outcome/Transition:** Recommendations on Tech Availability & Applicability  
Recommendations for Tactics, Techniques & Procedures



**Project Start:**

Project Timeline / Key Milestones

Please e-mail [RDC-Info@uscg.mil](mailto:RDC-Info@uscg.mil) for information concerning the milestones and deliverable schedule.

**Project Completion:**



# Fire Testing of Fiber-reinforced Plastic (FRP) Commercial Vessel Category A-60 Boundaries

25-1058

**Mission Need:** Address fire-safety knowledge gaps concerning use of FRP for A-60 boundaries.

Objectives

- Provide comprehensive FRP boundary fire-testing data to fire protection engineers in CG-ENG-4 to assess the viability of FRP for use in the construction of A-60 or other classed (e.g., A, B, or F class) boundaries.
- Inform Marine Safety Center (MSC) staff engineers for technical analysis of FRP A-60 boundaries in vessel design during plan review.
- Provide guidance to CG commercial vessel regulatory and compliance offices for policy and regulatory consideration.
- Provide guidance to CG platform managers for future policy and procurement consideration.
- Enhance vessel safety and emergency fire response through an enhanced understanding of FRP in fire scenarios.
- Support knowledge transfer to global organizations including the International Maritime Organization (IMO).

Notes

- Leverage FRP fire testing projects conducted by U.S. Department of Defense (DOD) and U.S. Department of Energy (DOE).
- Engage community of interest: CG fire protection engineers; DOD, DOE, Bureau of Alcohol, Tobacco, Firearms and Explosives, and other government agencies; National Fire Protection Association; classification societies; marine fire and salvage; etc.



**Sponsor’s Rep:** CG-ENG  
**Ops Rep:** Districts (dpi) (dr)

**Stakeholder(s):** CG-5P, CG-5R, CG-731, CG-751, CG-LMI, MSC, CGA, DOE, IMO, MARAD

**RDC Principal Investigator:**  
Mr. Josh Pennington

**CG-7R9 Portfolio Manager:**  
LCDR Stephen Thomsen

**Anticipated Outcome/Transition:** Recommendations for Standards/Regulations/Policy  
Recommendations on Tech Availability & Applicability

Project Timeline / Key Milestones

**Project Start:** 1 Oct 24

Issue FRP Request for Information (RFI) to Industry	Feb 25	
Knowledge, Policy, & Regulatory Gap Analysis Complete	Feb 25	
FRP Use in “A” Class Boundaries Knowledge Gap Analysis (Brief)	May 25	★
FRP “A” Class Boundary Request for Information Submission Summary (Brief)	Jun 25	★
Commence Small-Scale FRP Fire Testing	May 25	
Results of Small-Scale FRP “A” Class Boundary Fire Testing (Report)	Jul 26	★
KDP – Sponsor to Determine Project Continuation	Aug 26	
Commence Full-Scale FRP Fire Testing	Nov 26	
Results of Full-Scale FRP “A” Class Boundary Fire Testing (Report)	Feb 28	★
Project Completion: Feb 28		



# Enhance Understanding of Fire Protection and Safety Measures for Lithium Batteries in the Maritime Environment

24-1046

**Mission Need:** Address vessel and personnel safety knowledge gaps concerning lithium-ion batteries.

Objectives

- Inform fire mitigation strategies, suppression technologies, shipboard battery storage space classifications, and emergency response actions through marine lithium-ion (li-ion) battery literature review.
- Determine effect of differing marine li-ion battery chemical properties, configuration, and quantity on fire behavior and propagation.
- Identify knowledge, policy, and regulatory gaps in safety, fire protection, and vessel survivability for marine li-ion batteries.
- Assist sponsor in developing fire experimental test plans to address fire risks, personnel hazards, optimal fire suppression procedures, and post-fire safety guidelines.
- Conduct laboratory li-ion battery fire testing to develop fire data for advanced fire modeling and marine li-ion battery hazard categorization.
- Inform future policy, procurement, and regulatory considerations among CG-ENG, CG-5RI, and CG platform managers through literature review and fire-test data analysis.

Notes

- Engage community of interest including RDC power/propulsion project staff; CG fire protection engineers; U.S. Department of Defense, U.S. Department of Transportation (DOT), U.S. Department of Energy, and other government agencies; classification societies; marine fire and salvage; maritime industry leaders, etc. to leverage expertise.
- International Maritime Organization (IMO), DOT, Maritime Administration and first responder organization interest.

**Sponsor’s Rep:** CG-ENG  
**Ops Rep:** Districts (drm) (dpi)

**Stakeholder(s):** CG-5P, CG-5R, CG-5PS, CG-45, CG-47, CG-731, CG-751, CG-LMI, MSC, DOT, IMO

**RDC Principal Investigator:**  
Mr. Josh Pennington

**CG-7R9 Portfolio Manager:**  
LCDR Stephen Thomsen

**Anticipated Outcome/Transition:**

Recommendations for Standards/Regulations/Policy  
Recommendations on Tech Availability & Applicability



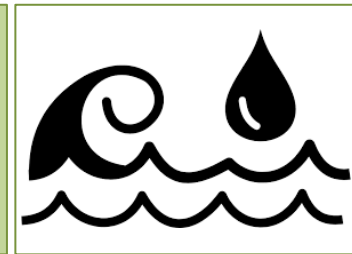
Project Timeline / Key Milestones

Project Start: 1 Apr 24		
Marine Li-ion Battery Literature Review Complete	Apr 25	
Marine Lithium-ion Battery Literature Review (Report)	Jul 25	★
Marine Li-ion Battery Fire Test Plan Complete	Nov 25	
Li-ion Battery Fire Testing (FY26) – Phase I Complete	Jun 26	
Lithium-ion Battery Fire Testing – Phase I (Report)	Dec 26	★
Li-ion Battery Fire Testing (FY27) – Phase II Complete	Jul 27	
Lithium-ion Battery Fire Testing – Phase II (Report)	Feb 28	★
Marine Li-ion Battery Hazard Classification System Complete	May 28	
Marine Lithium-ion Battery Hazard Classification System (Report)	Sep 28	★
Project Completion: Sep 28		





# Environment and Waterways Research Program



Program Definition

Develop methods and technologies to promote Marine Transportation System efficiency, marine environmental protection, safe navigation, safety of life at sea, and maritime domain resilience during natural and man-made changes. Some of these changes include increased commercialization of the nearshore and offshore marine zones, unknown or increased risks associated with different marine fuels and cargoes, larger vessels transporting larger volumes of raw and processed materials, goods, and people, competing waterway uses, and the increase of maritime-related activity in areas and seasons not historically known for such.



Visual Aids to Navigation Retain a Vital Role in Marine Safety



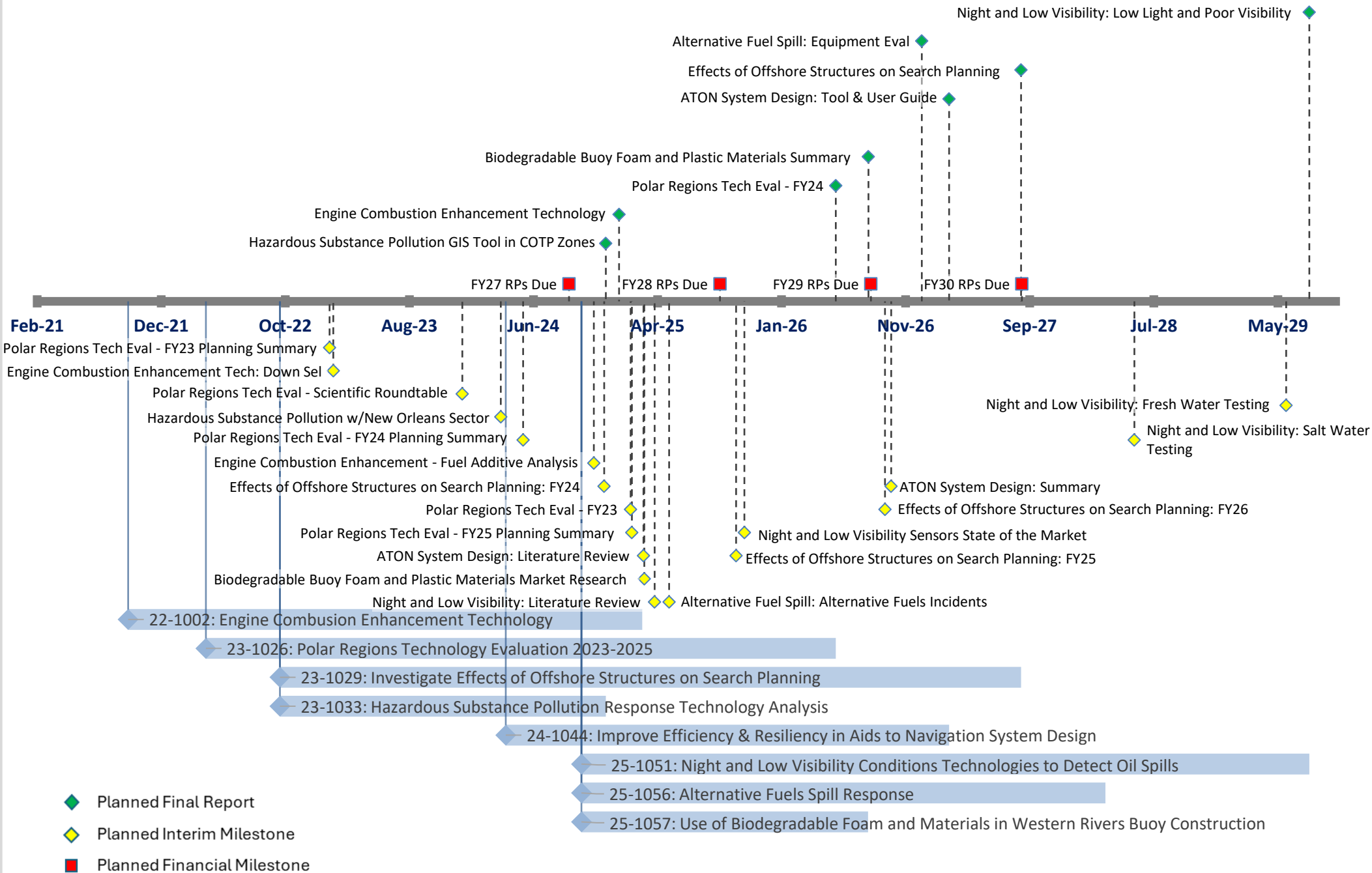
Evaluating Technology for Dielectric Fluid Recovery

Program Team

<b>Program Champion:</b>	<b>RDC Experimentation Lead:</b>
RADM Arguin (CG-5P)	LCDR Paul Larouche
RDML Chamie (CG-5R)	
<b>RDC Research Program Chief:</b>	<b>RDC Transition Lead:</b>
Mr. M. J. Lewandowski	Mr. Scott Fields
<b>CG-7R9 Portfolio Manager:</b>	
Ms. Karin Messenger	



# Research Program Roadmap | Environment and Waterways



# Engine Combustion Enhancement Technology

22-1002

**Mission Need:** Enhance combustion efficiency to improve engine performance and reduce pollution.

## Objectives

- Query the U.S. Navy (USN) and other organizations to leverage possible solutions for enhancing combustion efficiency in diesel fuel for energy/propulsion.
- Identify quantitative parameters for testing the efficacy of using new fuel additives, and combustion enhancement products.
- Perform field evaluations of available commercial technology with the goal of countering incomplete combustion to improve fuel efficiency, reducing pollution, and reduce maintenance costs.
- Assess cost and benefits for technology based on test results.
- Report results on product performance and provide recommendations.
- Evaluate technologies on engines representative of U.S. Coast Guard (CG) assets.

## Notes

- Partner with Naval Surface Warfare Center Philadelphia Division on ongoing combustion efficiency research.
- Leverage CG Academy (CGA) research on biocide additives.
- Technologies could also be applicable to gasoline and aviation fuel.



## Project Timeline / Key Milestones

**Project Start:** 1 Oct 21

**Engine Combustion Enhancement Technology:  
Down Selection (Brief)**

9 Feb 23 ✓ ★

Biocide Laboratory Testing Complete

29 Sep 23 ✓

Engine Prototype Testing Complete

10 May 24 ✓

**Fuel Additive Analysis for Ultra Low Sulfur Marine  
Gas Oil, JP-5, and F-76 (Application Note)**

Feb 25 ★

**Engine Combustion Enhancement Technology  
(Report)**

Feb 25 ★

**Project Completion:** Feb 25

**Sponsor's Rep:** CG-46  
**Ops Rep:** N/A

**Stakeholder(s):** CG-45, Surface Forces Logistics  
Center, CGA, CG-47D

**RDC Principal Investigator:**  
Mr. Derek Meier

**CG-7R9 Portfolio Manager:**  
Ms. Karin Messenger

**Anticipated Outcome/  
Transition:** Provide Sponsor/Product Line Tested Prototype  
Recommendations for Product Line Tech Insertion



CG Research & Development Center  
UNCLAS//Internet Release is Authorized

Indicates RDC Product ★

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# Hazardous Substance Pollution Response Technology Analysis

23-1033

**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.
- Engage with D8 and LANTAREA to increase efficiency moving forward in the project.

**Sponsor's Rep:** CG-MER  
**Ops Rep:** N/A

**Stakeholder(s):** EPA, NSFCC, FAC, NCR, CG-D8, LANTAREA, CG-721

**RDC Principal Investigator:**  
Benedette Adewale, PhD

**CG-7R9 Portfolio Manager:**  
Ms. Karin Messenger

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

## Project Timeline / Key Milestones

**Project Start:** 3 Oct 22

Complete COTP/FOSC/Other Agency Information Gathering

15 Aug 23 ✓

**Hazardous Substance Pollution for Sector New Orleans Project Status (Brief)**

25 Mar 24 ✓ ★

Complete Geographic Information System Layer for Sector New Orleans and Information of Hazardous Substance and Facilities

28 Jun 24 ✓

Complete Request for Information Review/Research of Available Technology among Other Agencies and First Responders

12 Jul 24 ✓

**Tool to Develop Hazardous Substance Locations Geographic Information System in Captain of the Port Zones (Report)**

Feb 25 ★

**Project Completion:** Feb 25



# Polar Regions Technology Evaluation 2023-2025

23-1026

**Mission Need:** Innovative capability solutions for enhanced operations in the Polar Regions.

## Objectives

- Provide support to projects which develop capability improvements in the execution of U.S. Coast Guard (CG) missions in Polar Regions.
- Cultivate joint efforts and interagency cooperation between government sectors and civilian entities.
- Evaluate emerging technologies to enhance CG operations in Polar Regions including UxS.
- Develop improved ice and near-ice navigation tools and procedures for surface vessels conducting operations in the Polar Regions.

## Notes

- Anticipate partnerships with the U.S. Department of Defense Labs, U.S. Northern Command, National Labs, Office of Naval Research Science, International Cooperative Engagement Program for Polar Research, and the National Science Foundation U.S. Antarctic Program (McMurdo Station).

**Sponsor's Rep:** CG-5PW

**Ops Rep:** PAC-3, LANT-5, D17

**Stakeholder(s):** CG-751, CG-761

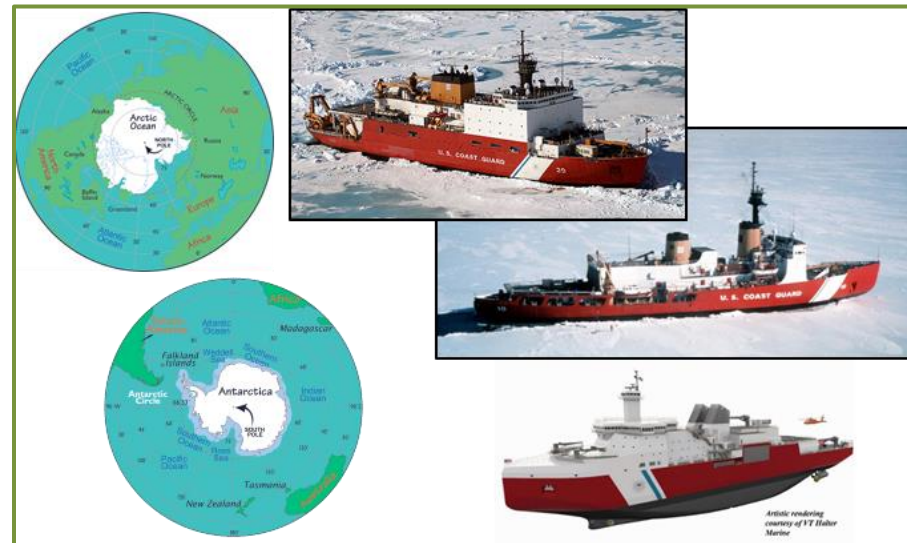
**RDC Principal Investigator:**

Ms. Shalane Regan

**CG-7R9 Portfolio Manager:**

Ms. Karin Messenger

**Anticipated Outcome/Transition:** Recommendations on Tech Availability & Applicability



## Project Timeline / Key Milestones

**Project Start:** 3 Oct 22

<b>Polar Regions Technology Evaluation (PRTE) – FY23 Planning Summary (Brief)</b>	<b>31 Jan 23</b> ✓ ★
HEALY 2023 Tests/Demos Complete	12 Oct 23 ✓
<b>Scientific Roundtable – Tromsø, Norway (Quick-look Report)</b>	<b>18 Dec 23</b> ✓ ★
<b>PRTE – FY24 Planning Summary (Brief)</b>	<b>13 May 24</b> ✓ ★
HEALY 2024 Tests/Demos Complete	12 Dec 24 ✓
<b>FY23 PRTE (Application Note)</b>	<b>28 Jan 25</b> ✓ ★
<b>PRTE – FY25 Planning Summary (Brief)</b>	<b>Feb 25</b> ★
ODF 25 Tests/Demos Complete	Apr 25
Polar Regions Technology Evaluation Exercise	Sep 25
HEALY 2025 Tests/Demos Complete	Nov 25
<b>FY25 PRTE (Application Note)</b>	<b>Jun 26</b> ★
<b>Project Completion:</b> Jun 26	



CG Research & Development Center  
UNCLAS//Internet Release is Authorized

Indicates RDC Product ★

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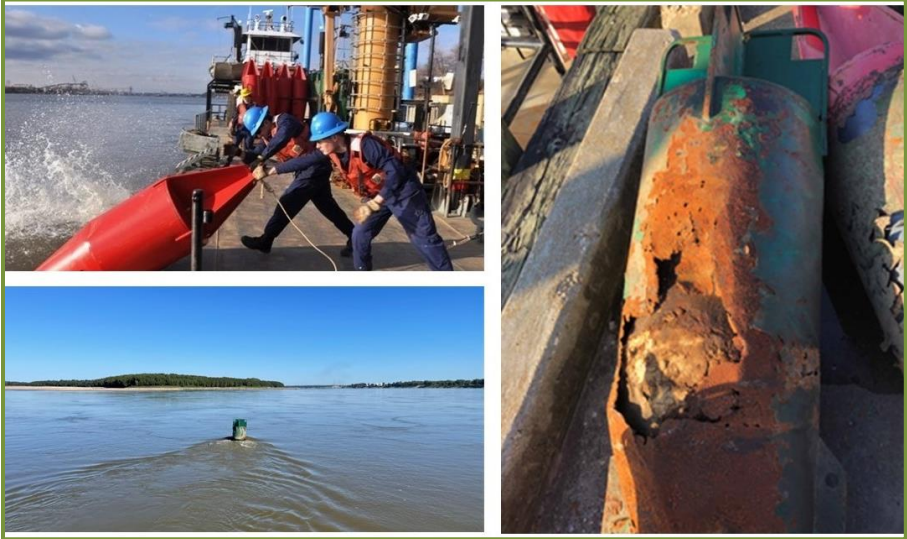
# Use of Biodegradable Foam and Materials in Western Rivers Buoy Construction

25-1057

**Mission Need:** An environmentally sound solution for plastic foam in river ATON buoys.

Objectives

- Determine if there is a cost-efficient alternative to the plastic foam used in river buoys that provides similar performance characteristics but naturally degrades over time and minimizes plastic waste in the environment.
- Develop and test a river buoy prototype(s) with a foam alternative(s).



Notes

- Engage with industry developing bio-degradable plastic alternatives.
- Use results of RDC Project 2703, “Next Generation Aids to Navigation Buoys & Alternative Moorings,” to identify commercially available solutions.
- Partner with government labs (Air Force Research Laboratory, Naval Research Laboratory, etc.) or CG Academy.

**Sponsor’s Rep:** SILC-WOPL  
**Ops Rep:** D8 (dpw)

**Stakeholder(s):** CG-NAV, District 8 (dpw), CG-47, AREAs

**RDC Principal Investigator:**  
Dr. Benedette Adewale

**CG-7R9 Portfolio Manager:**  
Ms. Karin Messenger

**Anticipated Outcome/Transition:**

Recommendations on Tech Availability & Applicability  
Provide Sponsor/Product Line Tested Prototype

Project Timeline / Key Milestones	Project Start: 1 Oct 24	
	Investigate Current River Buoy Manufacturing, Operations, and Disposal Processes	7 Nov 24 ✓
	Identify Biodegradable Buoy Foam and Materials	Mar 25
	Key Decision Point – Path Forward Foam Alternatives & Buoy Prototyping	Mar 25
	Biodegradable Buoy Foam and Plastic Materials Market Research Update (Brief)	Jun 25 ★
	Develop River Buoy Prototype with Foam Alternative at CG Industrial Facility	Jun 25
	Start Lab & Field Trials – River Buoy Prototype	Jun 25
	Complete Lab & Field Trials – River Buoy Prototype	May 26
	Biodegradable Buoy Foam and Materials Summary (Report)	Aug 26 ★
	Project Completion: Aug 26	





# Improve Efficiency and Resiliency in Aids to Navigation (ATON) System Design

24-1044

**Mission Need:** Modernize ATON design standards for the future.

Objectives

- Identify the functional characteristics of the current and future Marine Transportation System needed to be included in ATON system design.
- Identify and review existing CG and international guidelines, studies, and tools on ATON system design.
- Analyze current ATON physical characteristics (lighting, visual, radar signatures and effective ranges).
- Update 1990's-based ATON system design tool standards to reflect the physical characteristics of modern ATON, the characteristics of modern vessels (e.g., increased draft and size), or the emergence of electronic navigation technologies in use today.
- Develop a quantitative, Geographic Information System (GIS)-based tool to aid decision makers with modernizing ATON system design under a range of operating scenarios.

Notes

- Leverage the Coast Guard Academy Ship Control and Navigation Training Simulator.
- Leverage Department of Homeland Security Science and Technology efforts on novel waterway use risks and ATON system resilience.
- Collaborate with U.S. Army Corps of Engineers, National Oceanic and Atmospheric Administration, and maritime industry partners.
- Leverage International Association of Marine Aids to Navigation & Lighthouse Authorities and international partners' work (through DCO-I).
- Leverage previous RDC ATON risk assessment work.

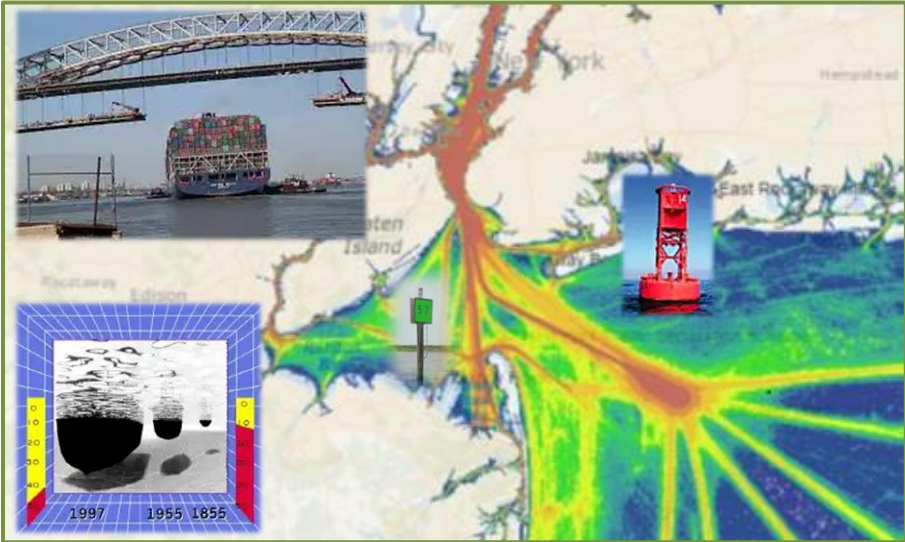
**Sponsor's Rep:** CG-NAV  
**Ops Rep:** Districts (dpw)

**Stakeholder(s):** CG-5PW, WWM, NAVCEN, SILC-WOPL, CG-68, CG-761

**RDC Principal Investigator:**  
Mr. James Spilsbury

**CG-7R9 Portfolio Manager:**  
Ms. Karin Messenger

**Anticipated Outcome/Transition:** Recommendations for Tactics, Techniques & Procedures  
Provide Sponsor Tested Prototype



Project Timeline / Key Milestones

Project Start: 1 Apr 24		
Identify Existing Tools, Guidelines, and Studies used for ATON System Design	31 Oct 24	✓
Complete Literature Review	28 Jan 25	✓
Develop Test Plan for Additional Studies Required	28 Jan 25	✓
Literature Review of ATON System Design (Brief)	Feb 25	★
Key Decision Point 1 – Path Forward on Methodology for Modernizing ATON System Design	Feb 25	
ATON System Design Summary (Report)	Oct 26	★
Key Decision Point 2 - Continue to ATON System Design Visualization Tool Development	Oct 26	
Complete Beta Testing of ATON System Design Tool	Dec 26	
ATON System Design Tool (GIS Layer & User Guide)	Mar 27	★
Project Completion: Mar 27		



**Mission Need:** Determine the impacts of offshore structures on search and rescue operations.

Objectives

- Literature review and workshop with sponsor and stakeholders to determine current state of offshore structures and SAR impacts.
- Collect and analyze real-time wind and current measurements to determine impact of changes due to offshore structures with Leeway Drift Studies.
- Research, verify and implement updates to atmospheric and oceanographic models to account for offshore structures.
- Conduct modeling and field tests to determine the impact to search object detection using prioritized sensors at US or United Kingdom (UK) based offshore structures.

Notes

- Partnership with the Bureau of Safety and Environmental Enforcement, U.S. Coast Guard Academy, National Oceanographic and Atmospheric Administration Integrated Ocean Observing System and, with the Bureau of Ocean Energy Management.
- International partners (UK, Denmark, Norway, Dutch, Sweden).
- Possible collaboration with the State of NY Maritime College - SUNY Maritime.
- Leverage Maritime Risk Symposium.

**Sponsor’s Rep:** CG-SAR  
**Ops Rep:** LANT-3

**Stakeholder(s):** NAVCEN, CG-NAV, CG-MER, CG-711/731/751/741/761, LANT, D1, FORCECOM

**RDC Principal Investigator:**  
LT Brian Hwang

**CG-7R9 Portfolio Manager:**  
Ms. Karin Messenger

**Anticipated Outcome/ Transition:** Recommendations for Standards/ Regulations/Policy



Project Timeline / Key Milestones

Project Start: 3 Oct 22		
UK Leeway Drift	24 Mar 23	✓
US Leeway Drifts: Pre – Construction	3 May 24	✓
Investigate Effects of Offshore Structures on Search Planning: FY24 Annual Update (Brief)	25 Nov 24	✓ ★
Overseas Leeway Drifts: UK and Baltic Sea	May 25	
US Leeway Drifts: Post – Construction	Oct 25	
Investigate Effects of Offshore Structures on Search Planning: FY25 Annual Update (Brief)	Oct 25	★
Detection Modeling and Experiments	May 26	
Investigate Effects of Offshore Structures on Search Planning: FY26 Annual Update (Brief)	Oct 26	★
Investigate Effect of Offshore Structures on Search Planning (Report)	Aug 27	★
Project Completion: Aug 27		



## Mission Need: Response guidance for alternative fuels discharges and spills.

Objectives

- Determine discharge/incident risks for alternative fuels.
- Examine incident likelihood (probability) by alternative fuel type, then identify safety hazards and potential environmental damage (consequences).
- Provide operational guidance to field responders about priority alternative fuels spill response.
- Evaluate adequacy of existing oil spill response equipment and strategies for alternative fuel spills/incidents.
- Test effectiveness of existing oil spill response technologies with several low-sulfur fuel oil blends at a test facility.



Notes

- Engage community of interest: U.S. Coast Guard (CG) District Response Advisory Teams, CG Sectors, and Regional Response Teams.
- Coordinate with Oil Spill Removal Organizations, FOSCs, and other pollution response organization interest.

**Sponsor’s Rep:** CG-MER  
**Ops Rep:** D1 (dp)

**Stakeholder(s):** CG-721, CG-ENG, NSFCC, ICCOPR, District Response Advisory Teams, FOSCs, AREAs

**RDC Principal Investigator:**  
Mr. Alexander Balsley, P.E.

**CG-7R9 Portfolio Manager:**  
Ms. Karin Messenger

**Anticipated Outcome/Transition:**

Recommendations on Tech Availability & Applicability  
Recommendations for Cost/Risk Avoidance

Project Timeline / Key Milestones

<b>Project Start:</b> 1 Oct 24	
Conduct Literature Review of Alternative Fuels	Mar 25
<b>Operational Guide for Response to Alternative Fuels Incidents (Report)</b>	<b>May 25</b> ★
Key Decision Point – Additional Alternative Fuels Study/Evaluation	Jun 25
Identify Mechanical Response Technologies for Testing with Low-Sulfur Fuel Oils	Sep 25
Develop Test Plan	Apr 26
Low-Sulfur Fuel Oil Mechanical Response Evaluation at Test Facility	May 26
Develop Test Report	Nov 26
<b>Spill Response Equipment Evaluation: Mechanical Recovery, Low-Sulfur Fuel Oils (Report)</b>	<b>Jan 27</b> ★
<b>Project Completion:</b> Jan 27	





# Night and Low Visibility Conditions Technologies to Detect Oil Spills

25-1051

**Mission Need:** Overcome oil spill detection limitations during darkness and low visibility conditions.

Objectives

- Determine the most suitable sensor or combination of sensors that will allow oil detection in darkness or reduced visibility conditions.
- Provide attributes and limitations of each sensor type for determining what sensor or sensor suite is most appropriate for U.S. Coast Guard (CG) field use.
- Incorporate this information in an easy reference guide for CG-MER and Federal On-Scene Coordinators.
- Improve the speed and scale of oil spill response in night and low visibility conditions.



Notes

- Defense Innovation Unit Experimental India-U.S. Defense Acceleration Ecosystem prize challenge.
- The range of application should include sensors that are satellite based, vessel or aircraft mounted, small Uncrewed Systems payload, and handheld.
- Leverage work done by the Bureau of Safety and Environmental Enforcement, other agencies, and Naval Postgraduate School.

**Sponsor’s Rep:** CG-MER  
**Ops Rep:** NSFCC

**Stakeholder(s):** CG-741, CG-721, CG-OEM, CG-NSF, AREAs, NOAA, D9 DRAT, GLCOE

**RDC Principal Investigator:**  
Mr. Michael Wurl

**CG-7R9 Portfolio Manager:**  
Ms. Karin Messenger

**Anticipated Outcome/Transition:**

Recommendations on Tech Availability & Applicability  
Provide Sponsor/Product Line Tested Prototype

Project Timeline / Key Milestones

**Project Start:** 1 Oct 24

Complete Literature Review on Existing Research/Use for Night and During Low Visibility Oil Detection	Feb 25
<b>Literature Review: Night and Low Visibility Oil Detection Capabilities and Research (Report)</b>	<b>Mar 25</b> ★
Complete Market Research on Available Sensors that can Detect Oil at Night or During Low Visibility	Aug 25
<b>State of the Market of Night/Low Visibility Sensors and Sensors Chosen for Testing (Brief)</b>	<b>Oct 25</b> ★
Complete Sensor Purchases/Agreements	Jan 26
Saltwater Sensor Testing in Low Light and Poor Visibility	Nov 27
<b>Night and Low Visibility Oil Detection: Results of Saltwater Experimentation (Brief)</b>	<b>May 28</b> ★
Freshwater Sensor Testing in Low Light and Poor Visibility	Nov 28
<b>Night and Low Visibility Oil Detection: Results of Freshwater Experimentation (Brief)</b>	<b>Jun 29</b> ★
<b>Effectiveness of Sensors to Detect Oil in Low Light and Poor Visibility Conditions (Report)</b>	<b>Jul 29</b> ★
<b>Project Completion:</b> Jul 29	



# Integration, Experimentation, and Transition Section



RDC Section Chief: Mr. Scott Fields

Section Definition

The Integration, Experimentation, and Transition section supports the execution of all lines of effort within the five research program areas. This includes:

- Test Plan Development and Review
- Field Test Approvals
  - CCB, IATT, ATO, NEPA, IRB, & Spectrum
- Field Test Logistics & Request for Forces (RFFs)
- Serving as Experimentation Leads and Support Staff
- Field Unit Coordination
- Engineering Technician Support
- Technical Writing Support
- Internal Quality Assurance
- Serving as Transition Leads
- Sponsor/Stakeholder Engagement
- Resource Proposal Development



Field Testing of 29 RBM Cargo Net Ladder



Field Testing Boat Crew Communication System

Transition Efforts

Title	Program Office	Transition Date
GlobalStar to Track Derelict Vessels	CG-5R	Q2FY24
Garmin InReach 700i	CG-731/ CG-761	Q1FY25
XplorIR	CG-721/NSF	Q1FY25
Element 100 Fire Extinguisher	CG-4	Q1FY25



# Tactical Research Tasks | FY25 Tasking

**Purpose:** Evaluate high Technology Readiness Level Commercial Off-the-Shelf and Government Off-the-Shelf technologies through field tests and limited user evaluations.

Research Program	TR Note Title	Description	Office Supported	Due/ Delivery Date	
DS	GLOROPE Evaluation	Conduct fields tests and obtain feedback from operation units on glow-in-the-dark rope, buoys, life rings, and post bumpers.	CG-731	16 Jan 25	✓
CN	Axon Body 4 - Body Worn Cameras Incident-Driven Video Recording Systems	Evaluate form, fit and function in maritime environment and operational gear.	CG-761	28 Jan 25	✓
CN	Testing and Evaluation of Garmin 700i with inReach	Provide 2-way satellite messaging and SOS capabilities to RBMs operating outside of VHF range.	Sector Charleston and Mobile Training Unit	31 Jan 25	✓
DS	Element 100 Fire Extinguisher Test and Evaluation	Evaluate new fire extinguishing technology for A, B, C and K fire classes.	CG-4	31 Jan 25	✓
DS	XplorIR: Handheld Hazardous Gas Monitor	Test capabilities of direct-read FTIR gas and vapor detector and obtain feedback from Strike Teams.	Sector CG-7214/NSF	Feb 25	
CN	MIO Tracking Application	Support application development and production.	CG-761	Apr 25	
AU	Sharrow Propeller Performance Testing	Conduct field test and evaluate Sharrow Propellor on 29ft RBS to determine power and efficiency.	CG-731/SBPL	May 25	
CN	GoTenna	Evaluate mesh UHF network communications.	C5ISC	Jul 25	
DS	Darley e-P6 Pump Evaluation	Building upon CGA capstone from 2024, conduct test and evaluation of electric P-6 Pump prototype from Darley.	CG-731	Jul 25	





# Operational Test Agent (OTA) for the sUAS for NSC Program Re-compete

OTA

**Mission Need:** Independent and objective evaluation of sUAS operational suitability/effectiveness.

Objectives

- Generate test plan for Small Unmanned Aerial Systems (sUAS) for the National Security Cutter (NSC).
- Perform Operational Testing & Evaluation (OT&E) of sUAS.
- Provide OT&E report to the sponsor program office.



Notes

- Work with Sponsor and CG-926 to develop test plan for sUAS.

**Sponsor’s Rep:** CG-9313  
**Ops Rep:** N/A

**Stakeholder(s):** CG-711, CG-926

**RDC Principal Investigator:**  
Ms. Shelly Wyman, P.E.

**CG-7R9 Portfolio Manager:**  
Mr. Scott Craig

**Anticipated Outcome/ Transition:** Recommendations for Acquisition Milestone Support

Project Timeline / Key Milestones

**Project Start:** 5 Feb 24

Develop Test Plan Mar 25

Conduct OT&E Jun 25

Trip Report of OT&E Jul 25

**NSC Program sUAS OT&E (Report)** Sep 25 ★

**Project Completion:** Sep 25



Mission Need: Develop/sustain relationships across all partners in support of the portfolio.

Objectives

- Identify/engage/collaborate with research focused mission critical stakeholders: federal, state, local, tribal, academic, international and within industry.
- Working with the RDC Technical Director, Program Chiefs, and Principal Investigators, using the approved portfolio as a foundation, identify gaps in command capability or capacity that would be mutually beneficial to both organizations.
- Through constant engagement, understand research areas that are being explored within the National Security Research Enterprise and DHS S&T.
- Capitalize on every opportunity to “tell the RDC story” through public affairs engagement via articles, media collaboration, etc.



Notes

- Weekly stakeholder engagement with the DoD Lab Commander’s Sync.
- ARGONNE National Lab Stakeholder Exchange Planned Summer 2025.
- Federal Laboratory Consortium – TEAMS presentation – Technology Spotlight.

Sponsor’s Rep: N/A  
Ops Rep: Areas

Stakeholder(s): DoD Research Enterprise, DHS S&T, Academia, Industry

RDC Principal Investigator:  
Dr. Joe DiRenzo

CG-7R9 Portfolio Manager:  
N/A

Anticipated Outcome/  
Transition:

Roadmap to Establish New Program of Record  
Recommendations for Product Line Tech Insertion

Project Timeline / Key Milestones

Project Start: 1 Oct 2019

Stakeholder Exchange Johns Hopkins Applied Physics Lab	21 Jan 25	✓
Stakeholder Exchange Stakeholder Exchange USN C3F/NWIC PAC/SURFMINEWARDEVCOM	30 Jan 25	✓
Stakeholder Engagement TRANSCOM (TEAMS)	Mar 25	
Naval Postgraduate School (TEAMS)	Apr 25	
Maritime Risk Symposium (TEAMS)	May 25	
DoD Lab Commander Sync (Army DEVCOM Host)	Jun 25	
Project Completion: Ongoing		



**Mission Need:** Understand strategic research and development science-based issues.

Objectives

- Evergreen was meant not only to develop long-range plans or strategies, but also to instill strategic intent throughout the U.S. Coast Guard (CG). Strategic intent is a shared organizational understanding of where the Service as a whole is going and why.
- Each Evergreen Pinecone frames future CG strategies, operational approaches, and research areas to address impact concerns specific to the topic over the next 10-50 years. The event output will help the Service formulate adaptation, mitigation, resilience strategies and focus research and development initiatives for the coming decades.
- RDC supports Pinecone events as Science Advisors to the Service.
- This joint RDC/DCO-X collaboration provides another opportunity for strategic foresight which will serve the organization for years to come.



Notes

- DCO-X & RDC will collaborate and conduct at least one strategic foresight exercise each year. Each event will involve:
  - Identifying a mutual area of strategic research or emerging technology.
  - Convene leadings Subject Matter Experts to discuss focused questions.
  - Produce a Quick Look and Final Report for Senior service decision makers.

<b>Sponsor’s Rep:</b> DCO-X <b>Ops Rep:</b> LANT-2	<b>Stakeholder(s):</b> LANTAREA/PACAREA
<b>RDC Principal Investigator:</b> Dr. Joe DiRenzo	<b>CG-7R9 Portfolio Manager:</b> N/A
<b>Anticipated Outcome/ Transition:</b>	Recommendations on Tech Availability & Applicability Recommendations for Tactics, Techniques & Procedures

Project Timeline / Key Milestones	Project Start: Ongoing	
	Autonomous Systems Evergreen Pinecone	14 Sep 23 ✓
	Autonomous Systems Evergreen Quick Look	1 Oct 23 ✓
	Autonomous Systems Evergreen (Report)	6 Dec 23 ✓ ★
	Deterrence Evergreen Pinecone	28 Aug 24 ✓
	Deterrence Evergreen Quick Look	25 Sep 24 ✓
	U.S. Coast Guard Deterrence Evergreen (Report)	6 Nov 24 ✓ ★
	Project Completion: Ongoing	



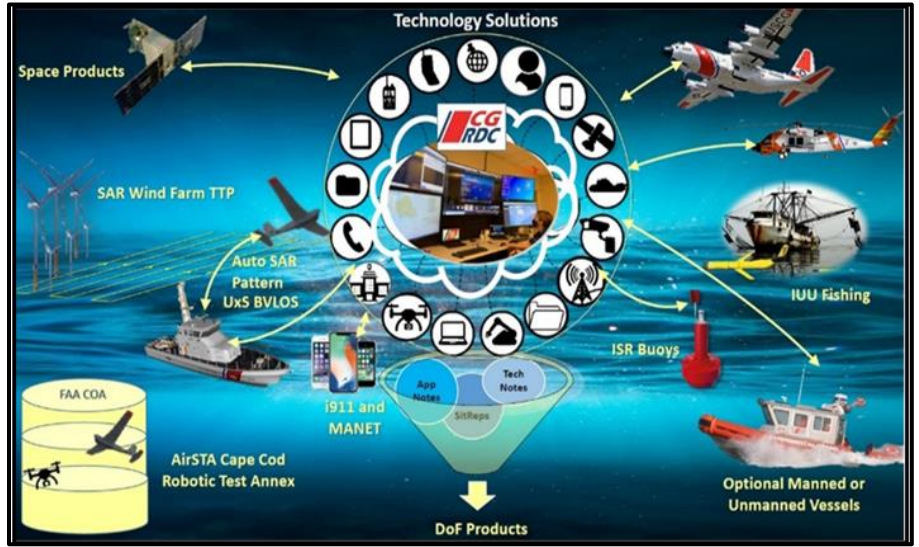


**Mission Need:** Rapid tech evaluation to inform operational, requirement, and acquisition decisions.

- Objectives
- Provide an R&D testbed for exploration/integration of advanced solutions, to help the U.S. Coast Guard (CG) understand, prepare, acquire, operationalize tomorrow’s technologies to achieve more rapid and agile tech transition.
  - Serve as an operational test environment for Technology Readiness Level (TRL) 7-8 technology.
  - Inform operational use cases, Tactics, Techniques and Procedure (TTP), requirements, acquisitions, asset siting, and workforce optimization.
  - Provide a recognized research forum that adheres to enterprise authorities required to integrate/evaluate new IT systems, cybersecurity, privacy, environmental, and human subject research.
  - Provide opportunities to advance emergent technology in CG Concept f Operations (CONOPS) and TTPs through cooperative research and partnerships.

- Notes
- Build on past and future technology and Maritime Domain Awareness (MDA) sprints, e.g., D14 Low-Cost MDA project (2020), D8 MBL Autonomy (2023), and D7 BVLOS (2023).
  - Aligns with 2022 VCG Search and Rescue and Coastal Strategic Study.
  - Agreement with CG-741 focuses initial efforts on Sectors Boston and Long Island Sound. Proximity to RDC researchers, new comms lab, and use of Fisher’s Island STA reduce initial logistics costs.
  - Efforts will primarily focus on higher TRL efforts within the RDC’s research portfolio but will allow for efforts of particular importance to the Sectors.
  - Transition to a continual, standing effort initially targeted to two locations. RDC may also conduct in-situ sprints at other locations where appropriate.

<b>Sponsor’s Rep:</b> CG-741 <b>Ops Rep:</b> D1	<b>Stakeholder(s):</b> CG-PAE, CG-2/5R/5P/6/711/721/731/751/761/771, AREAs, Districts, C5ISC
<b>RDC Principal Investigator:</b> LCDR Paul Larouche	<b>CG-7R9 Portfolio Manager:</b> N/A
<b>Anticipated Outcome/Transition:</b> Recommendations on Tech Availability & Applicability Recommendations for Tactics, Techniques & Procedures	



Project Timeline / Key Milestones	<b>Project Start:</b> Ongoing	
	Initial/Introduction Meeting with Sector Boston and Sector LIS	5 Jun 23 ✓
	Unit Visits	31 Aug 23 ✓
	SAR Pattern Transmit Over AIS (Sector LIS)	12 Mar 24 ✓
	Sector Technology Roll-out(s)	30 Sep 24 ✓
	Aqua Alert (D1, D11)	Feb 25
	RDC Technology Demonstration(s)/Project Updates Invitations to SoF-related Demos/Tech Sprints	As Needed
	<b>Project Completion:</b> Ongoing	

