



Crowd Sourced Bathymetry

CSB On the Great Lakes and Beyond

Collaborative Bathymetry

CIDCO – April 2023



Who We Are and Our Background

Mission

The goal of Orange Force Marine (OFM) is to provide safe, professional, efficient commercial vessel services, marine consulting services, project management and operations expertise, while improving mariner competency, reducing risk and enhancing safety of life at sea through education & training.

Experience and Qualifications

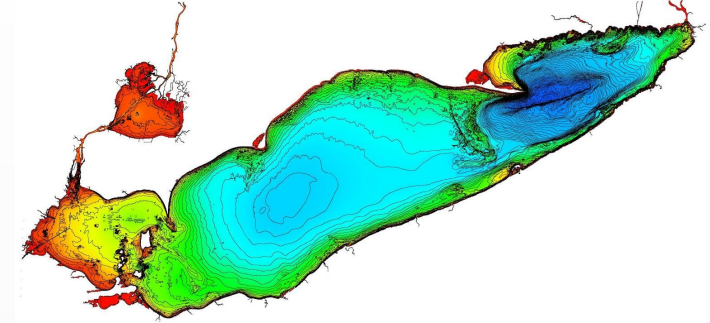
- Commercial Marine Services with operational expertise
- Hydrographic & Bathymetric Survey
- Specialized Marine Consulting & Technical Services
- Maritime Project Management

- *Royal Canadian Navy and Canadian Coast Guard experience*
- *Search and Rescue expertise*
- *Training Development and Delivery*

- Enterprise IT Solution Development
- IT project Management
- Enterprise Risk Management
- Utility and Infrastructure Inspection Data Management

Lakebed 2030

- Extension of Seabed 2030, but focussed on Great Lakes
- Only 7% of Great Lakes surveyed to acceptable degree of accuracy
 - 100-2500m between soundings
 - Most surveys from the 1950-1960s
- Fully mapping via traditional survey means (MBES, LiDAR, SDB) has significant cost (\$130-\$200M)
- Crowd Sourced Bathymetry as an incremental, contributing option



GLOS Project Scope and Timelines

Objectives

Adopt a system integrator approach to implement a CSB solution to:

- Gather and process CSB data
- In near real time
- In an automated manner
- Format data for use by GLOS
- Format data for submission to IHO DCDB

Timelines

- 2021
 - Development Prototype
 - Pilot – Spring (2 Vessels)
 - GLOS Rollout (Additional 10)
- 2022
 - Development v2
 - GLOS Rollout (Additional 10)
- 2023
 - Additional Trusted Node Instances
 - Pilot data collection outside of the Great Lakes
 - Development v3
 - GLOS Rollout (Additional 10)
 - National and global rollout



Growing Beyond the Great Lakes

Seabed 2030 and Orange Force Marine announce new partnership in support of citizen science

27 February 2023



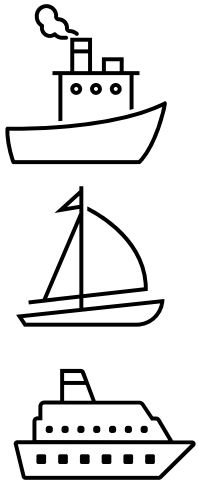
[Seabed 2030 and Orange Force Marine announce new partnership in support of citizen science | The Nippon Foundation-GEBCO Seabed 2030 Project](#)



Connecting Oceans, Connecting People

CSB Pipeline Ecosystem

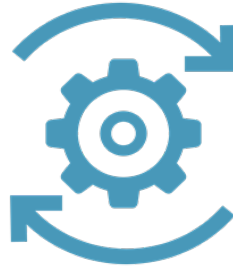
Participating Vessels



Data Collection



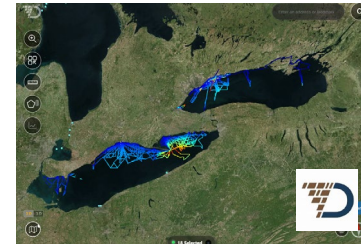
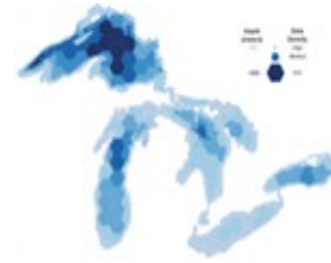
Processing and Auto Analysis



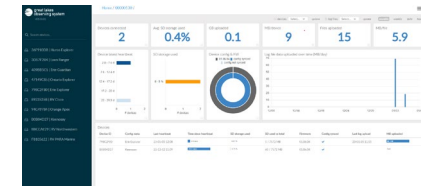
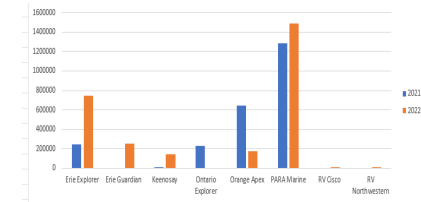
Data Consumers



Visualization and Tools Partners



Reporting & IoT Management



Configuration Management & Analysis



Solution Benefits

Data Collection



1. "Mussel" kit
 - a. Non intrusive install
 - b. Industry proven data logger
 - c. IMU (optional)
 - d. Local storage
 - e. Data transfer communications (Wi-Fi / cellular) without operator intervention
 - f. Message filtering (optional)
 - g. Remote management of IoT devices
2. IHO Quality levels (verified against existing data sets)

Processing Environment



1. Pre-deployed cloud environment
2. Configurable for multiple IHO Trusted Nodes
3. Quality Control data checks
4. NMEA library licence
5. Automated processing pipeline to convert data formats
6. Automated transfer data for various external uses
7. Data management processes and archive
8. Dashboards and metrics
9. Fully auditable workflow

Configuration Management and Analysis Environment

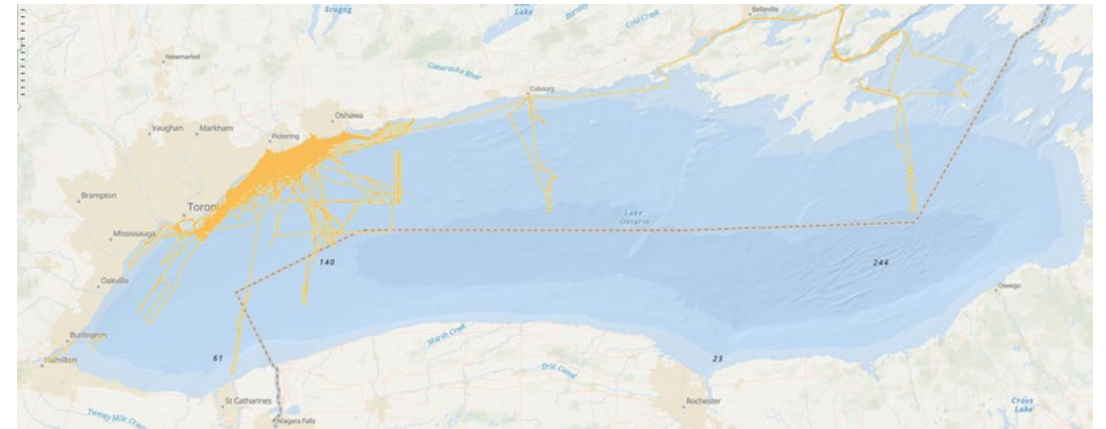
COMING SOON

1. Self Configuration management tools
2. Data mining capability for fleet management
3. Realtime integration with personalized project data with visualization partners

Successes - Statistics

In two Great Lakes boating seasons:

1. 12 participating vessels across various US and Canadian government and industry organizations
2. Data collected on 3 of the 5 Great Lakes (Lake Michigan started fall in 2022)
3. 5.7M depth records collected & sent to IHO DCDB
4. 1600 sea hours
5. 13,500 nm travelled



Operational Successes and Challenges

Successes

- Able to get vessels online quickly – equipment installed and offset measurements recorded
- Monitoring and managing the fleet

Challenges

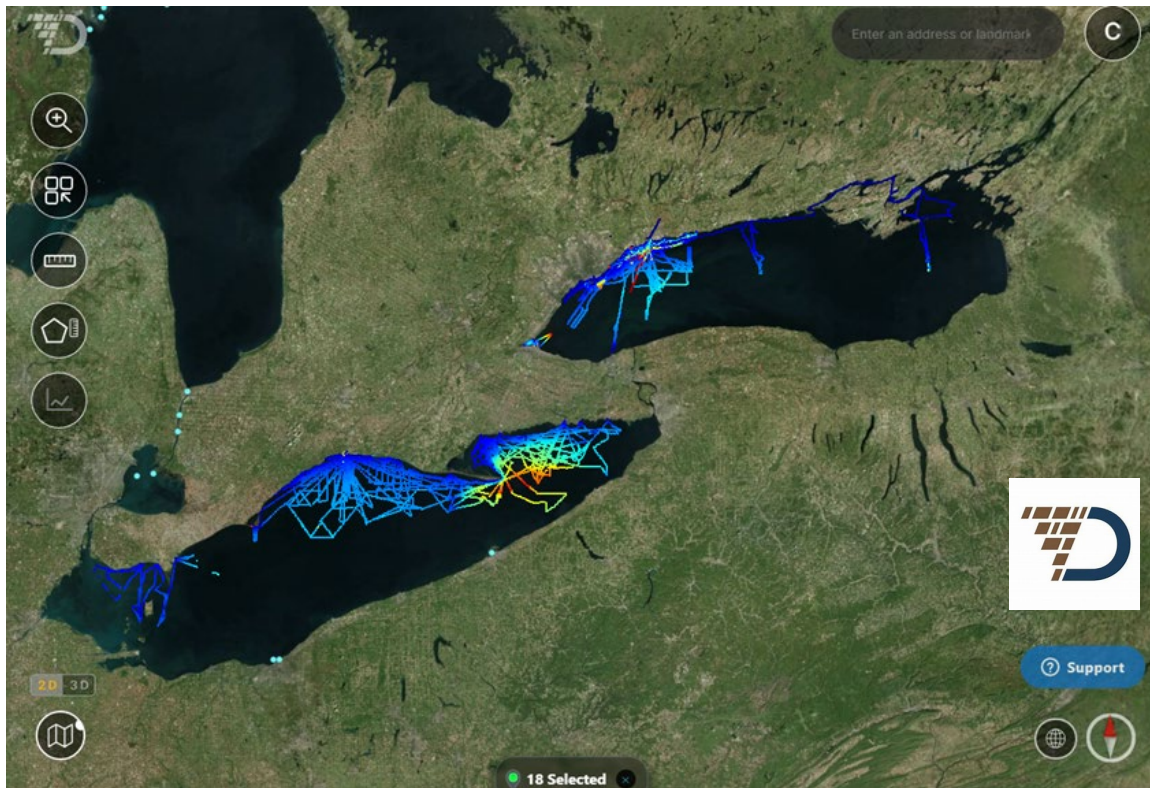
- Vessel equipment age and configuration status
- Vessel electronics complexity – from single to multiple devices
- GNSS coverage areas and quality signals
- Emerging – variable drafts on freighters

Sample of Participating Vessels (types)

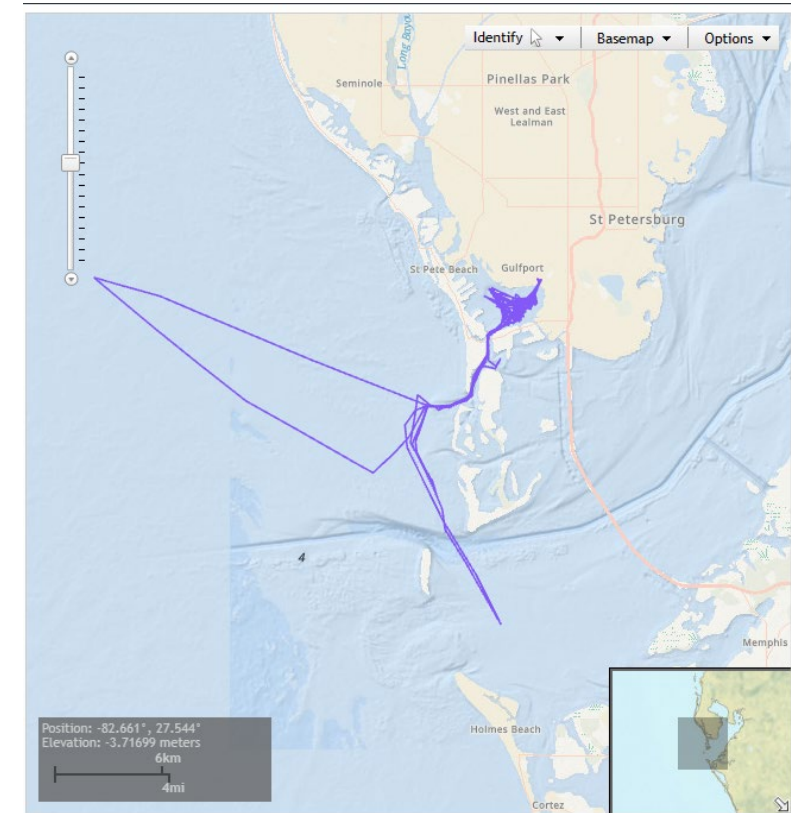


Other Successes

Using Visualization Partners



Outside of the Great Lakes – Pilot 2023



Next steps

Research & Development



Continued Innovation



Continued Integrations



Support the Industry Working
Groups

Operational Deployment



Increase Number of
Trusted Node Pipeline Instances



Increase Number of Geographic
Areas



Increase Number of Participating
Vessels

Questions, Discussion & Contact info



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