



Mapping Marine Mammal Activity In and Near U.S. Navy Training Areas

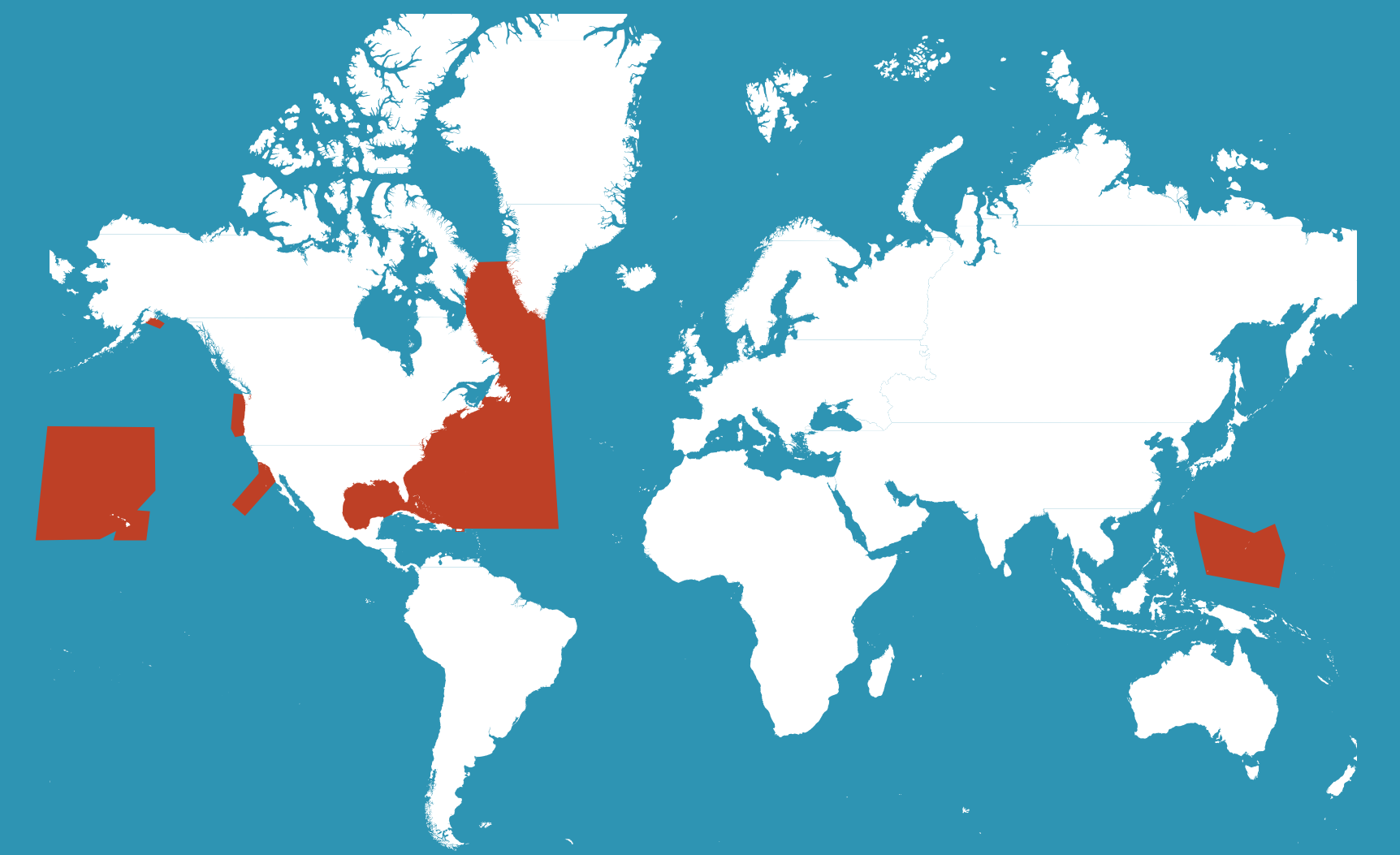


U.S. Navy Marine Species Monitoring (MSM) Program

The U.S. Navy conducts monitoring of protected marine species, including marine mammals and sea turtles, in order to:

- Assess potential effects from at-sea activities
- Improve data on regional animal distribution
- Support basic science for environmental assessments

Marine species monitoring surveys are conducted in the Atlantic, Gulf of Mexico, Gulf of Alaska, Pacific Northwest, Hawaii, Southern California, and the Mariana Islands

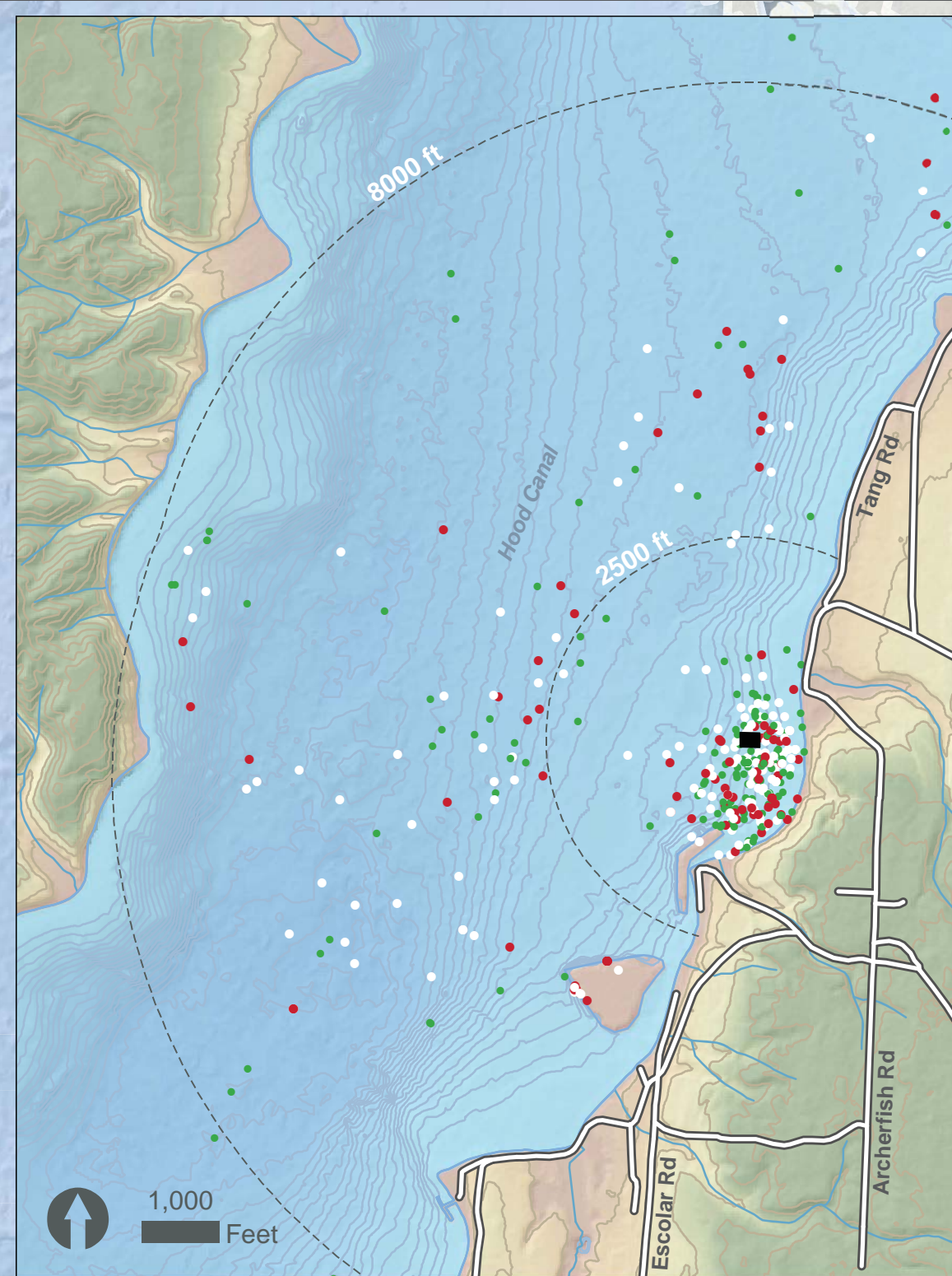


Kristen Ampela, Jessica Aschettino, Andrea Balla-Holden, Joel Bell, Anders Burvall, Matthew Cooper, Jonathan Crain, Michael Davis, Andrew DiMatteo, Daniel Engelhaupt, Peter Hille, Grant Miller-Francisco, Morgan Richie, Michael Richlen, Nicholas Stadille, Robert Ueyayama

Marine Mammal Monitoring during Pile Driving at Naval Base Kitsap Bangor, Washington

- In-water construction using pile driving creates underwater noise that may affect marine life
- Project objectives: Characterize the occurrence of cetaceans, pinnipeds and seabirds in waters adjacent to NBK at Bangor
- Monitor reactions of marine mammals and seabirds in conjunction with pile driving activities
- Marine mammal sighting locations were categorized by time relative to vibratory pile driving
- This enabled biologists to evaluate animal position before, during, and after construction, and in relation to the ensonified zone

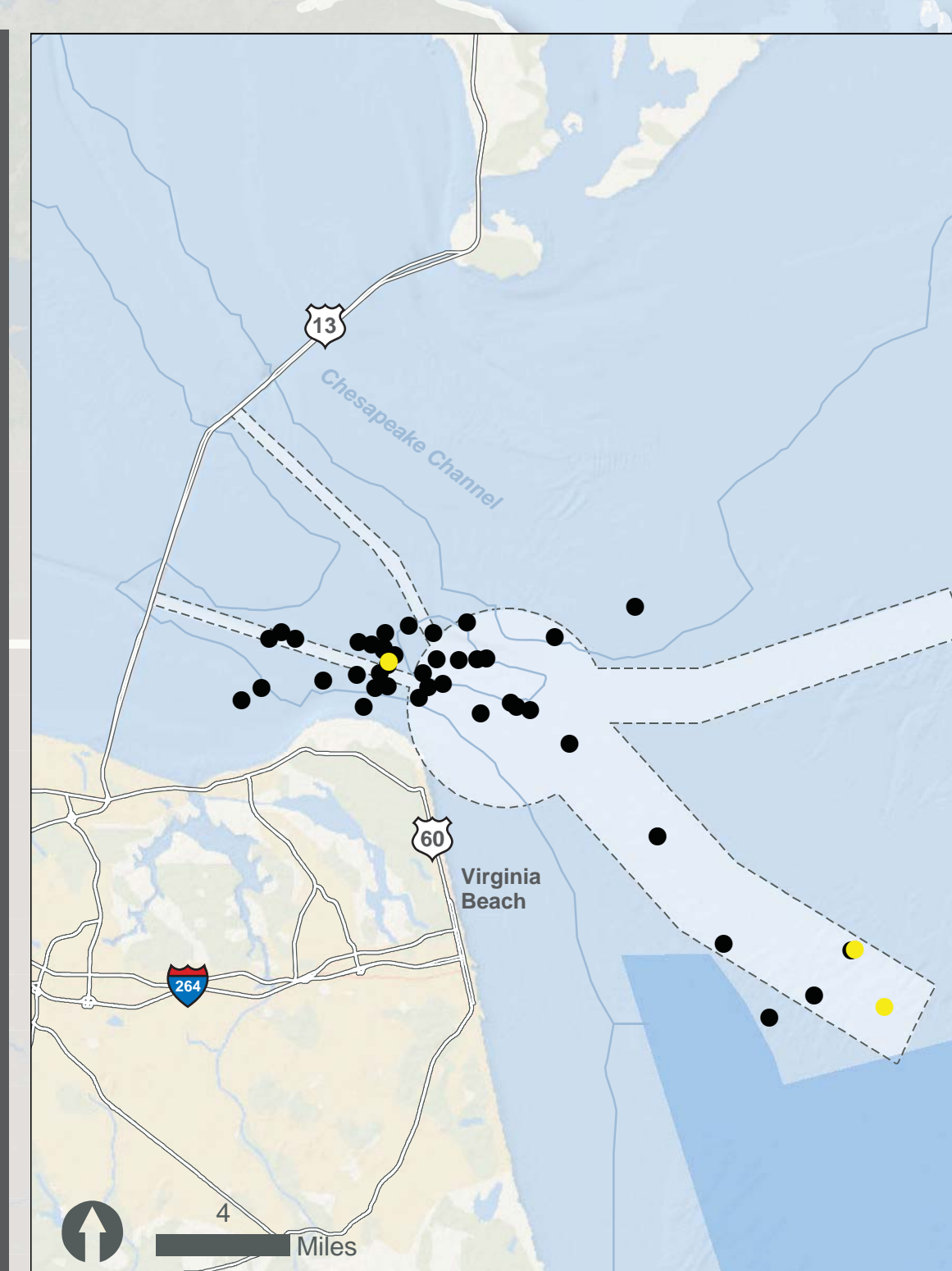
Pile Driving Location	Average Distance to Activity
Harbor Seal Sighting	
Pre Activity	2000 ft
During Activity	2600 ft
Post Activity	3100 ft



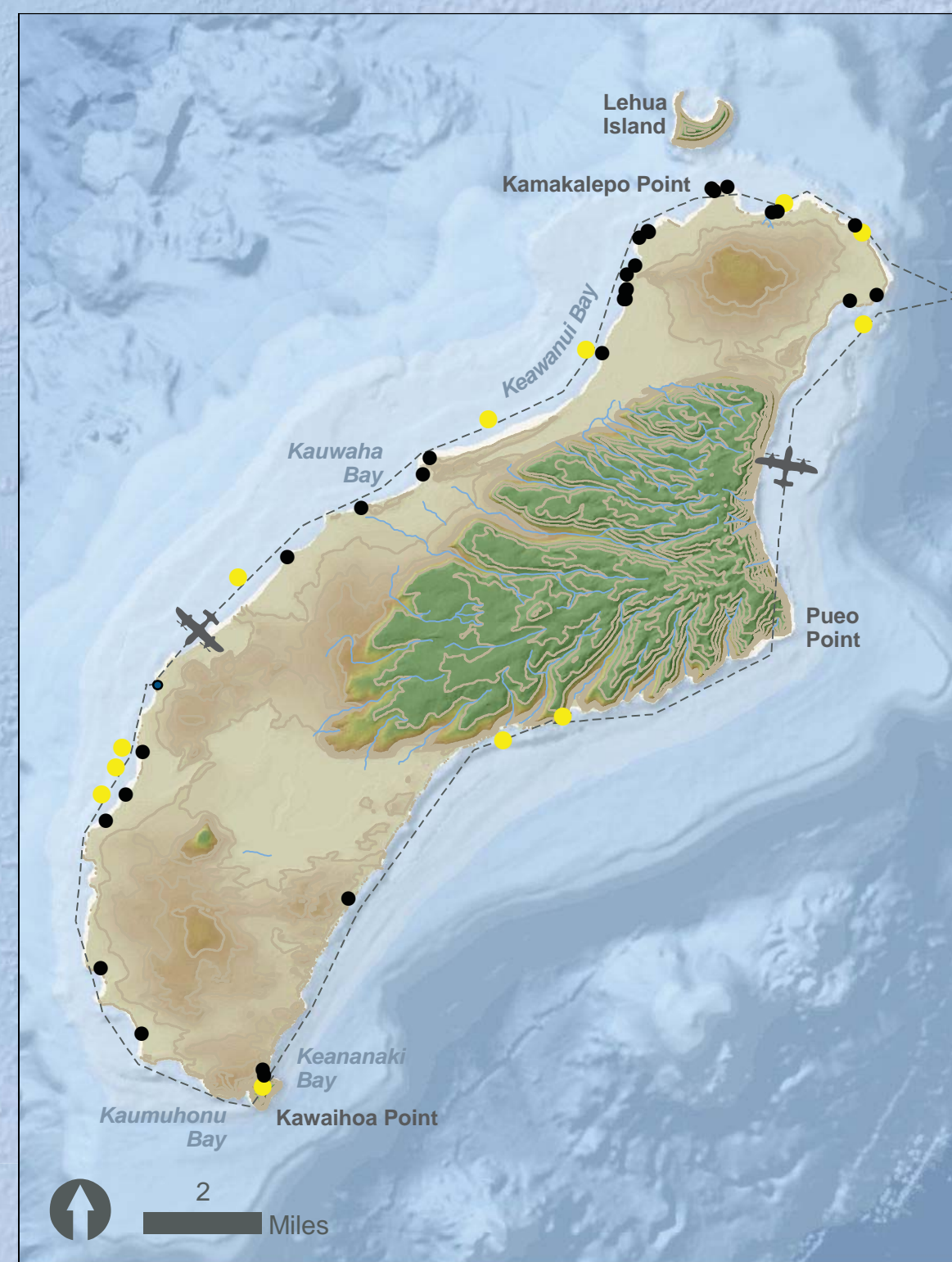
Humpback Whale Tagging off Virginia Beach Virginia

- Migrating humpback whales can occur in the vicinity of shipping lanes and U.S. Navy training areas in the Hampton Roads mid-Atlantic region
- Project objectives: Collect data on the occurrence and behavior of humpback whales in the region
- Investigate whether humpback whales congregate in shipping lanes and/or U.S. Navy training areas
- Locations of humpback and fin whales during behavioral "focal follow" surveys were plotted in relation to shipping lanes and Navy training areas

Shipping Lane Study Area	
Exercise Area	
Fin Whale	
Humpback Lane	



Monk Seal Surveys at Niihau Hawaii



- The island of Niihau is adjacent to the U.S. Navy's Pacific Range Missile Facility, and supports a population of Hawaiian monk seals
- Project objectives: Assess the relative detectability of stranded animals, using hauled-out seals as "proxies", from aerial vs. ground-based survey platforms
- Assess the feasibility of circumnavigating the island from aircraft while maintaining continual visual coverage of shoreline areas
- The total number of monk seal sightings observed from aircraft vs. ground were compared
- 43 monk seal sightings were observed from the ground, vs. 17 from the air

Flight Path	
Monk Seal Sightings	
Ground	
Aerial	

Niihau Hawaii

Bangor Washington

Virginia Beach Virginia

North Pacific Ocean

Gulf of Mexico

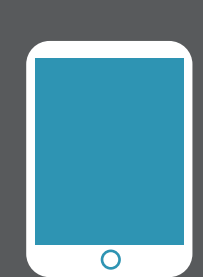
North Atlantic Ocean

Caribbean Sea



Cetacean Observation & Marine Protected Animal Survey Software

- Visual survey data collection and data management for Navy marine species monitoring (MSM) surveys
- Integrated data collection System
- Multiple survey platforms Vessel, aerial, and shore station
- Data collection app outputs data compliant with the Navy's MSM Data Standard



Field Data Collection

- iPad-based native app, fully functional offline
- Supports many simultaneous surveys and multiple configurations
- Detailed basemaps and base layers that can be independently queried and edited
- Data forms specific to each survey type for efficient data collection and reporting
- Secure authentication against COMPASS web portal



Standardized MSM Data Model

- Standardization of multiple data types collected by multiple Navy-funded performers using a variety of protocols
- Allows comparison and meta-analysis of multiple datasets
- Provides a common structure for delivery of Navy-funded data to various data repositories (EIMS, OBIS-SEAMAP)



Web Portal

- Secure portal accessible from any internet connection
- Manage surveys, data, and users
- Initiate and configure new surveys
- View/Query collected data on a web map
- Export survey data to multiple formats and as a deliverables compatible with the Navy Environmental Information Management System (EIMS)