Survey Toolkit for Marine Mammal Visual Observations

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COMPASS

Cetacean Observation and Marine Protected Animal Survey Software

Abstract

A new survey toolkit was created in order to provide robust data collection and reporting capability for the U.S. Navy's regulatory requirements for biological surveys and monitoring associated with training and testing activities. Using the U.S. Navy Marine Species Monitoring (MSM) program's data standard as its template, the lifecycle of the relational data is streamlined to maximize efficiency and consistency among surveys and between projects. The toolkit is comprised of two main components; a web application (app) for survey management and a mobile app for data collection in the field. ESRI ArcGIS™ Software Development Kit was used for the primary development and to construct the mobile app for use on Apple® iPads. ESRI ArcGIS™ has become the industry standard for geospatial products and the intuitive interface with a high-resolution map-based field application is user friendly with familiar gestures and features. Researchers have the ability to control the data displays, customize the data fields, and add map layers for significant features in their study areas. The web-based component is the central interface for the management of marine species surveys and data. It allows access from any Internet-connected computer, allowing field crews, researchers, and project managers from multiple locations to collaborate on active surveys. The toolkit is customizable for aerial, vessel, and shoreline theodolite surveys. All data is synchronized wirelessly via secure connection with an enterprise geodatabase server for data integrity and to facilitate remote access for survey management, to complete quality control checks of the data, generate summary reports, and prepare data deliverables. The integrated workflow has successfully streamlined MSM marine species surveys and enhanced collaboration.

Thanks to NAVFAC Atlantic for project management and contractual support as well as U.S. Fleet Forces Command and Navy LMR for funding this project under the U.S. Navy's Marine Species Monitoring Program.

Marine Species Monitoring Data Standard

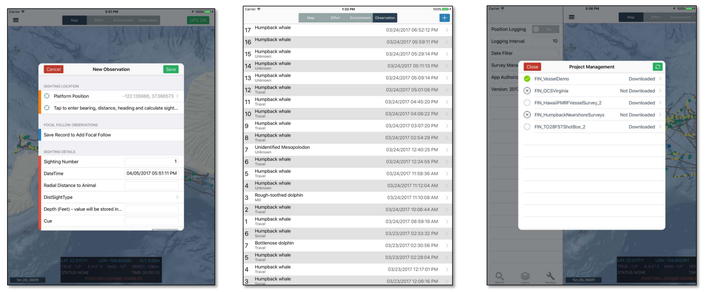
- Data collection app outputs data compliant with the U.S. Navy's MSM *Data Standard* (set of ~200 approved attribute fields and their definitions)
- Standardization of multiple data types:
  - Provides a common vocabulary for datasets collected by multiple Navy-funded performers using a variety of protocols
  - Allows comparison and meta-analysis of multiple datasets
  - Provides a common structure for delivery of U.S. Navy-funded data to various data repositories (EIMS and OBIS-SEAMAP)

Technical Approach

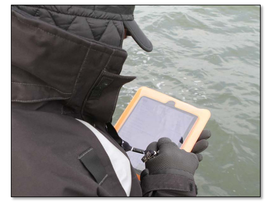
- Integrated data collection system
  - standardized database
  - mobile application
  - web application
- The mobile collection system initially supports 3 survey platforms: vessel, aerial, and shore station (theodolite)
- Powered by ArcGIS Server

Field Data Collection

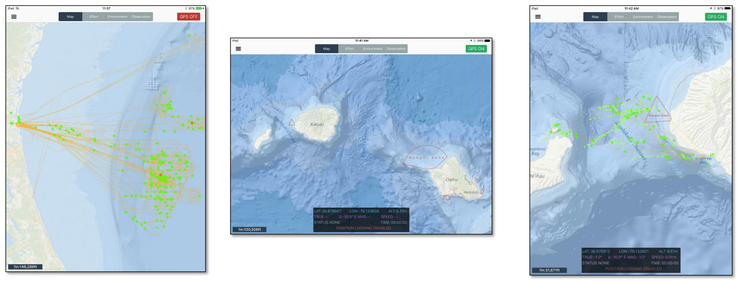
- Mobile App
  (iOS, Objective C, ArcGIS iOS Runtime SDK)
  - iPad-based native app that is fully functional offline
  - Supports many simultaneous surveys and multiple configurations
  - Detailed basemaps and base layers that can be independently queried and edited
  - Customizable data forms specific to each survey type for efficient data collection and reporting



Map View on Mobile App



- High performance basemaps
- Independent baselayers
  - e.g. navigation hazards or areas of interest
- Operational layers
  - e.g. vessel track, sightings, tracklines, or bathymetry
- Location Display
  - Latitude, longitude, and altitude
  - True course, magnetic declination, and magnetic course
  - Current effort status and effort running time
- GPS log with background location tracking (user-specified intervals)



Web Portal

- Web Portal (ASP.NET, MVC, ArcGIS JavaScript API)
  - Secure portal accessible from any internet connection
  - Create surveys, manage surveys, data, and users
  - Select data fields to sync with the iPad for mobile data collection
  - View/Query/Edit collected data on a web map
  - Export survey data to multiple formats (ESRI Map Package and MS Excel) that are compatible with U.S. Navy data deliverable requirements
  - Web based map products display all sighting information and survey trackline
  - Customizable for data product export including data filtering functions