ArcGIS and Microsoft Access Solution for Marine Benthic Surveys

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Ocean Science for a Better World

Outline

- Purpose
- Research Objectives
- Expedition
  - Data collected
- Background
  - Pulley Ridge
- Data Collected
  - management
- Microsoft Access and ArcGIS

Purpose

- To discover and characterize mesophotic and deepwater reef habitats
  - These data are of use to researchers, fishers, and state and federal agencies for conservation, protection, and regulating use of these critical resources.
  - SAFMC, NOAA Fisheries, NOAA Sanctuaries, NOAA Deep Sea Coral Program, NOAA Mesophotic Ecosystem Program, DOE, BOEM, DEP, etc.
- Define species distributions- important benthic species that are of interest to state and federal agencies (hard corals, black coral, gorgonians, sponges)
- Define important habitats and Essential Fish Habitats for commercially and recreationally important species.

Research Objectives

- Characterize community composition and structure of mesophotic reefs
- Determine connectivity between deep and shallow reefs; specifically as refugia
- Determine vulnerability to anthropogenic stress

COIERT Expeditions

- Harbor Branch Oceanographic Institute (HBOI), Florida Atlantic University
- Mapped and characterized mesophotic and deep-water reefs in eastern GOM and southeastern U.S.
  - Pulley Ridge HAPC- the deepest tropical coral reef ecosystem known off the southeast U.S.
  - Southeastern U.S. shelf-edge MPAs
  - Deep-water Coral HAPCs off southeastern U.S.
  - Oculina HAPC and newly discovered deep-water Oculina Reefs
  - Eastern GOM shelf-edge mesophotic reefs- BP oil response
- Funded by:
  - NOAA's Cooperative Institute for Ocean Exploration, Research and Technology (CIOERT), NOAA CRCP, NOAA OER, and NOAA DSCRPT

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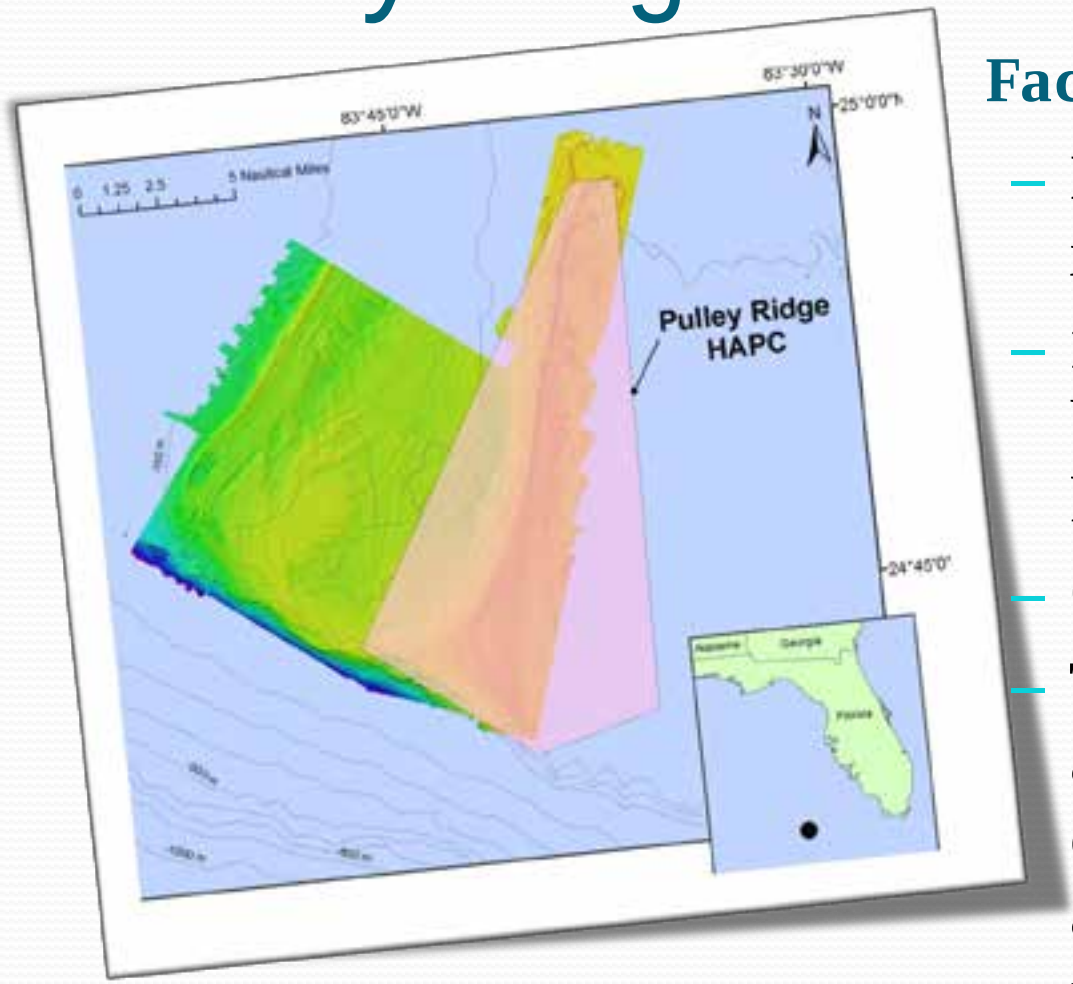
Pulley Ridge



Facts about Pulley Ridge

- Deepest shallow-water reef in the US.
- 100+ km-long drowned, barrier islands ~ 250 km west Key West, FL
- 60 m to 70 m deep
- Thriving on 1-2% of the available surface light ~ 5% of the light typically available to shallow-water reefs

Pulley Ridge

Protection

- Habitat Area of Particular Concern 2005
- *Agaricia* sp. is common, up to 18% hard coral coverage in some areas (USGS 2005)

VS. Shallow Water Corals

- Corals are considerably healthier then their shallow counterparts
  - Experiencing stress from disease
  - Global climate change
  - Habitat loss
  - Other human impacts
- Genetic interaction between shallow and deep reefs

Data Collection Techniques

UCONN Kraken ROV

Shipboard

(Remote Operated

Shipboard

Shipboard

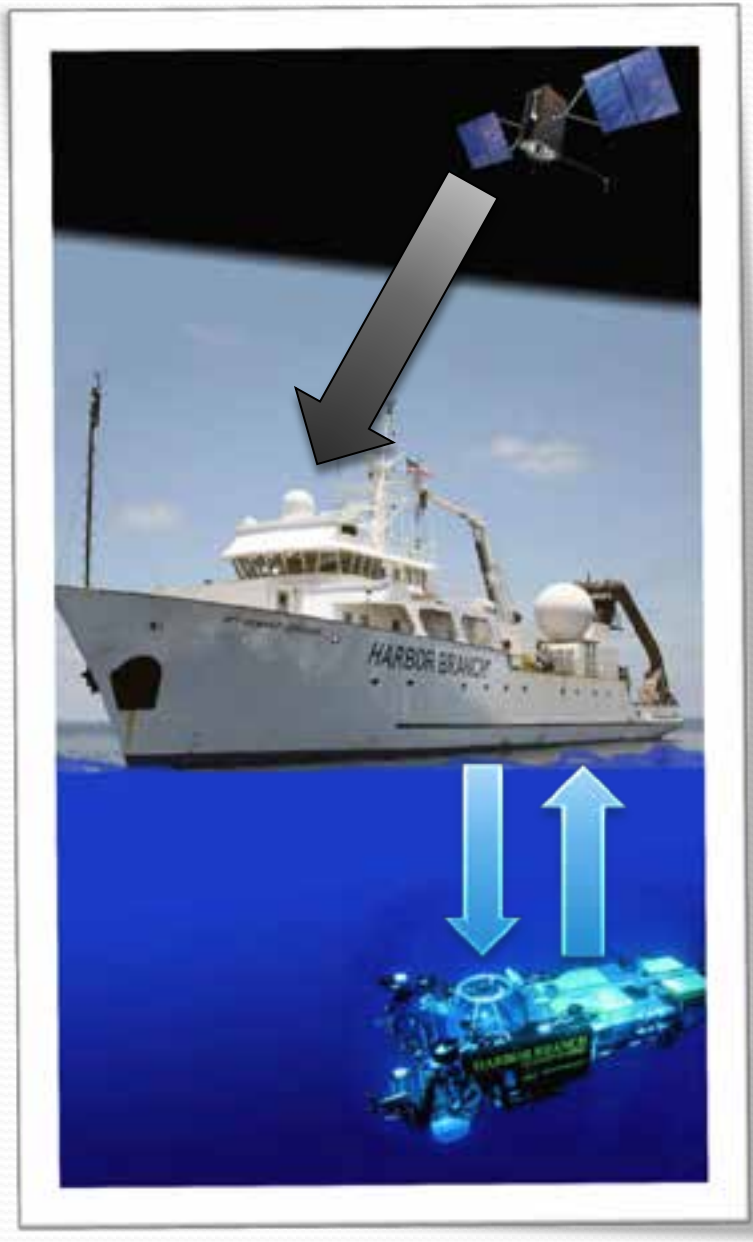
Shipboard

- Used for:
  - Dive planning
  - Data analysis
  - Bottom type determination

Data Collected

Raw data

- ROV and Sub
  - Georeferenced Bottom location
  - Every 1-2 seconds
- CTD
  - ROV or Sub
  - Deck
- In situ Images
  - Transect and general habitat
- Video footage
- Hand typed dive notes
  - Species sightings
  - Bottom type
  - Habitat
- Samples Collected



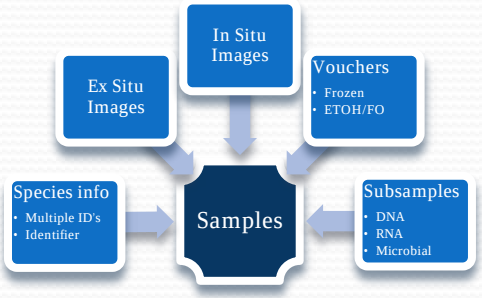
Samples Collected

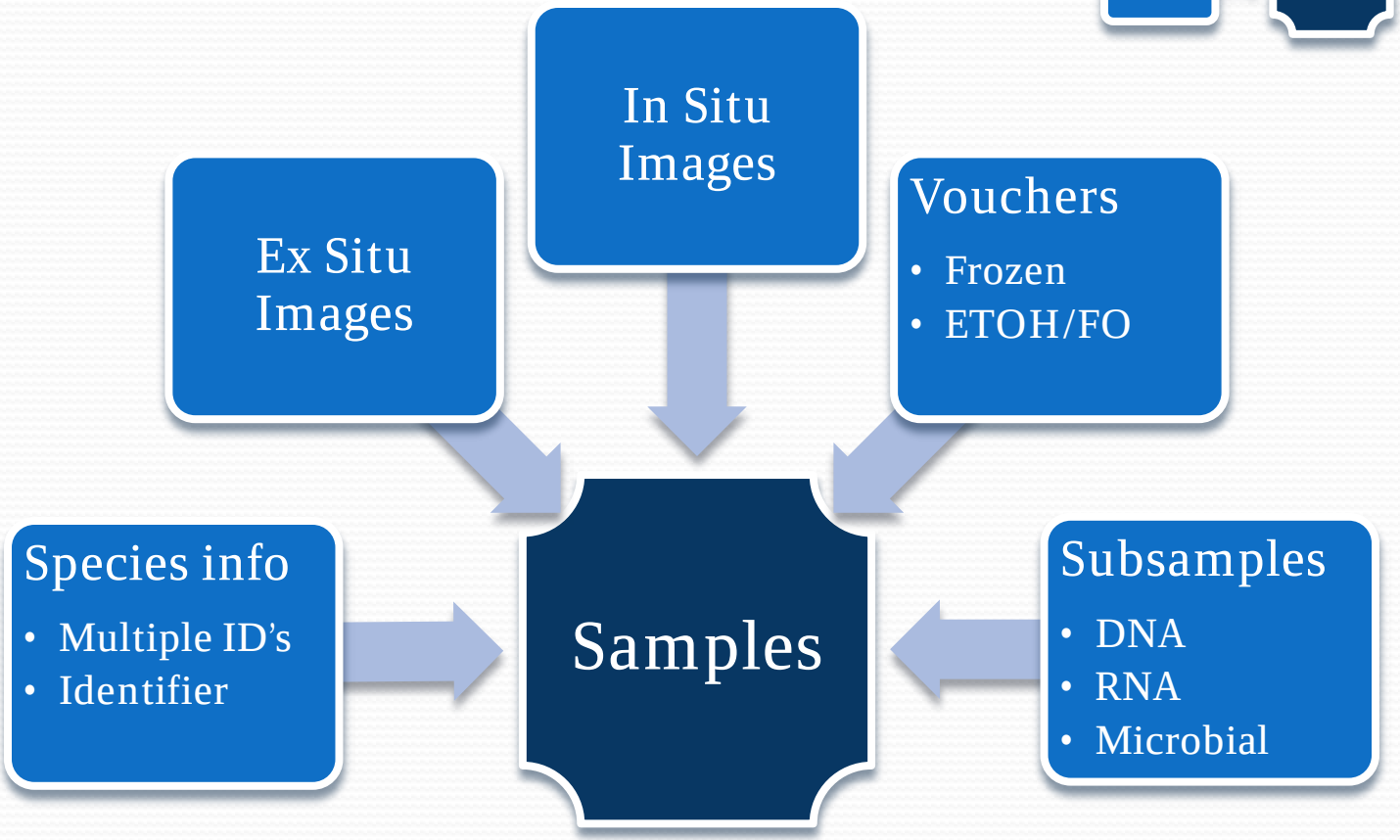
Sample Data

- Sample number
  - Eg. 29-IX-11-2-3
- Milsortcode (database #)
  - 201109292003
- In situ sample images
- Ex situ (deck) images
- Sub samples
- Vouchers
- Frozen samples

Data Connection Types

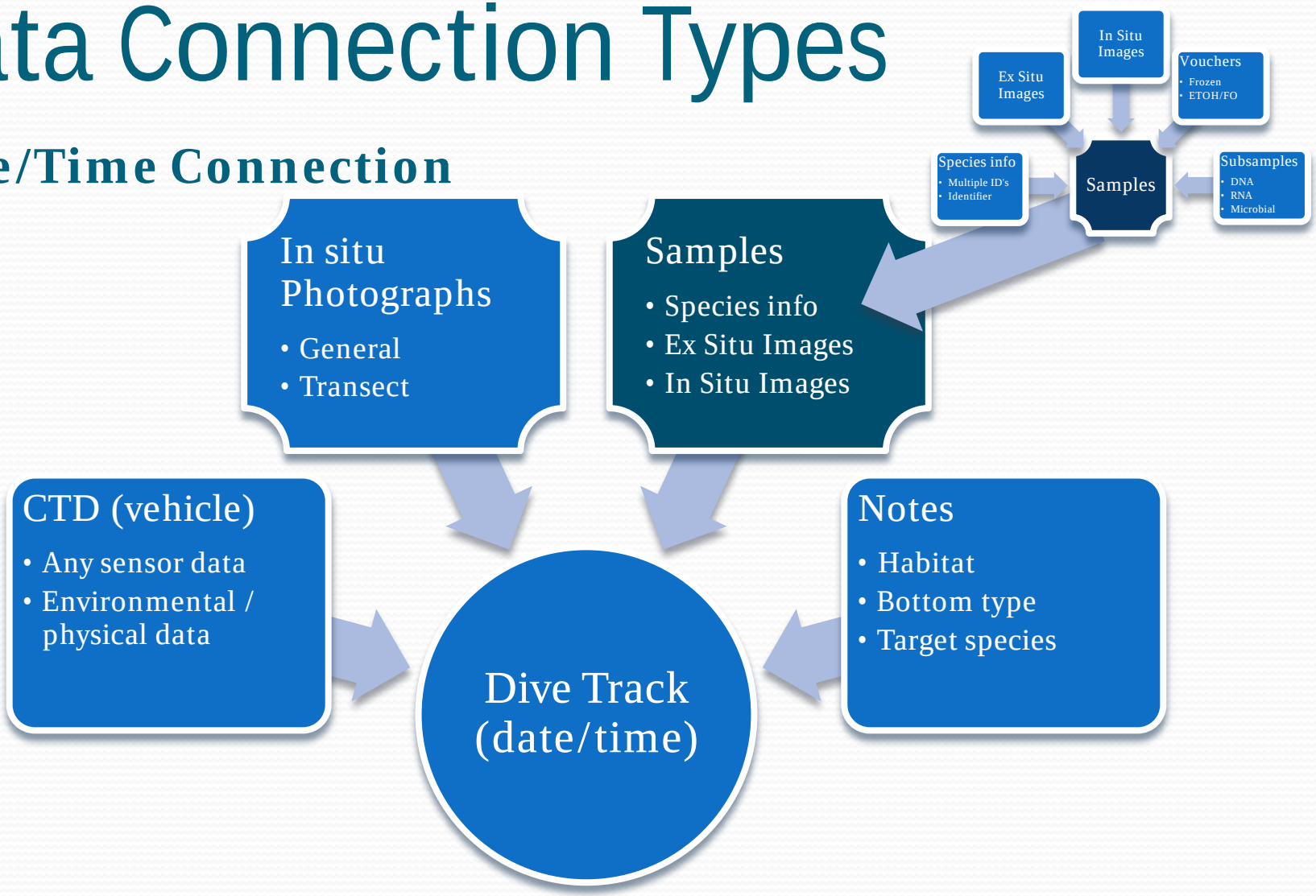
Milsortcode Connection





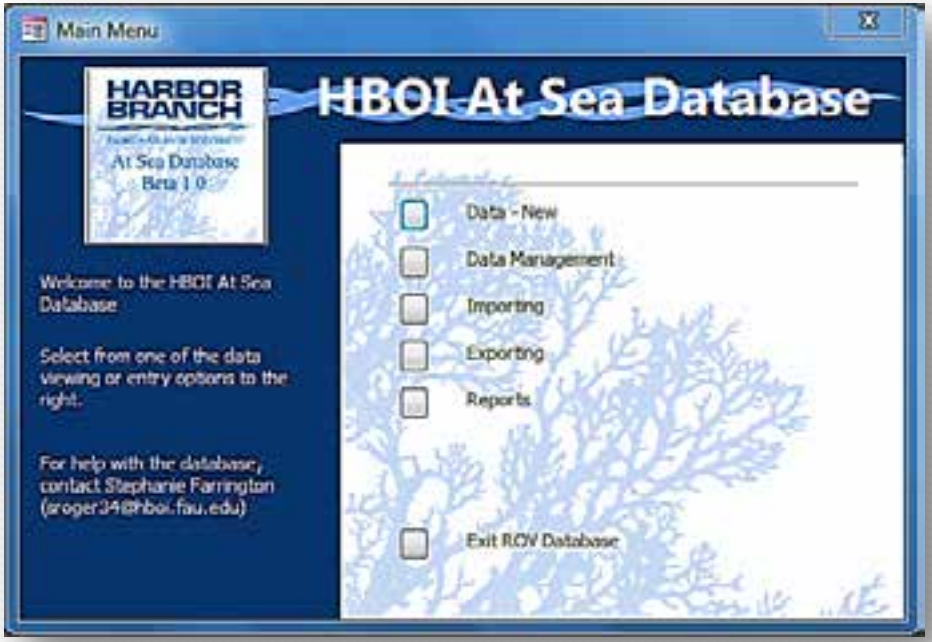
Data Connection Types

Date/Time Connection



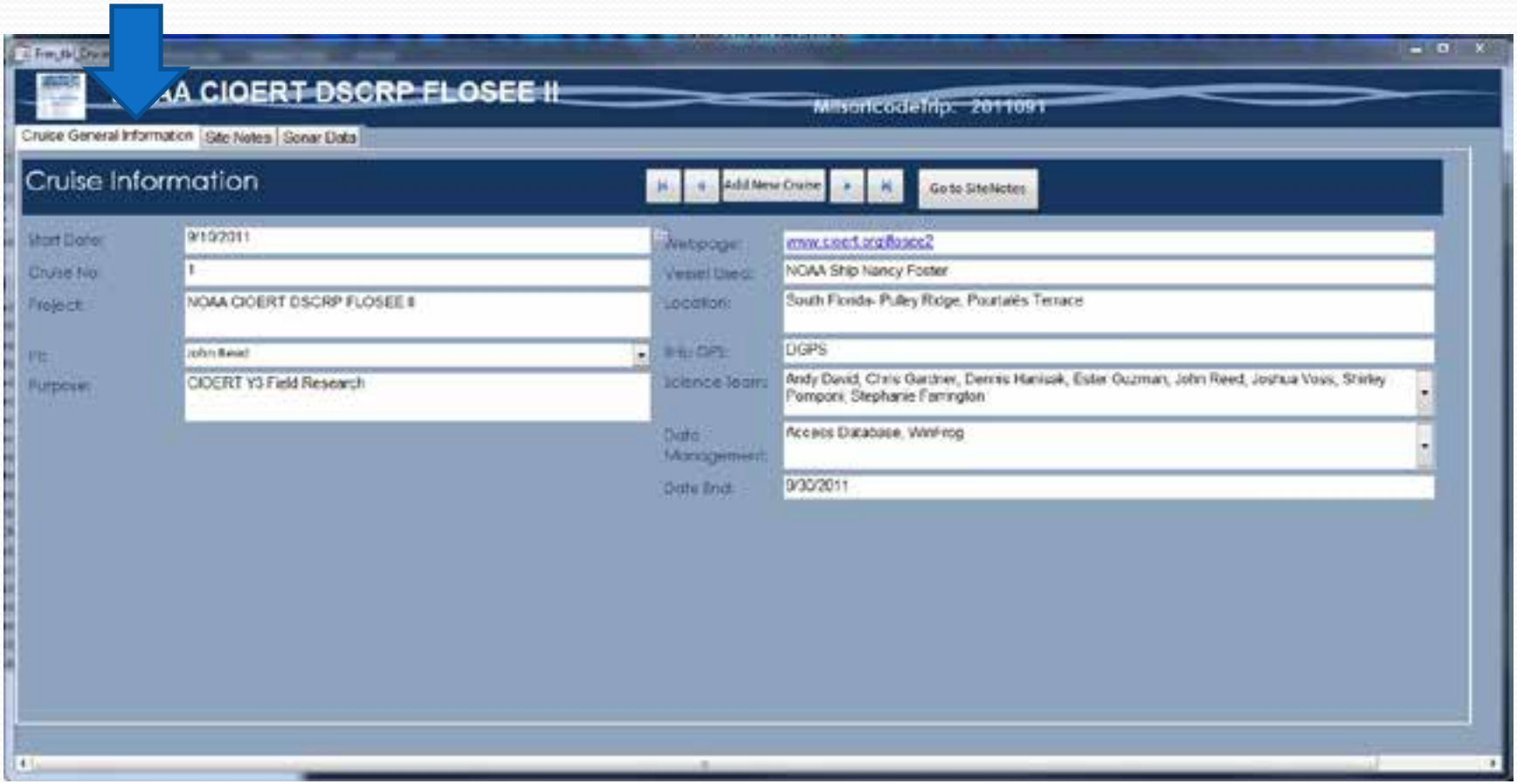
Data Management

- Microsoft Access
- User Friendly
  - Anyone can use forms with minimal training
- Speeds up data processing
- Increases accuracy
  - Limiting data entry types
- Compiles extensive datasets in one place
- Easily connected to ArcCatalog via ODBC



Cruise Entry Form

Cruise Info Tab

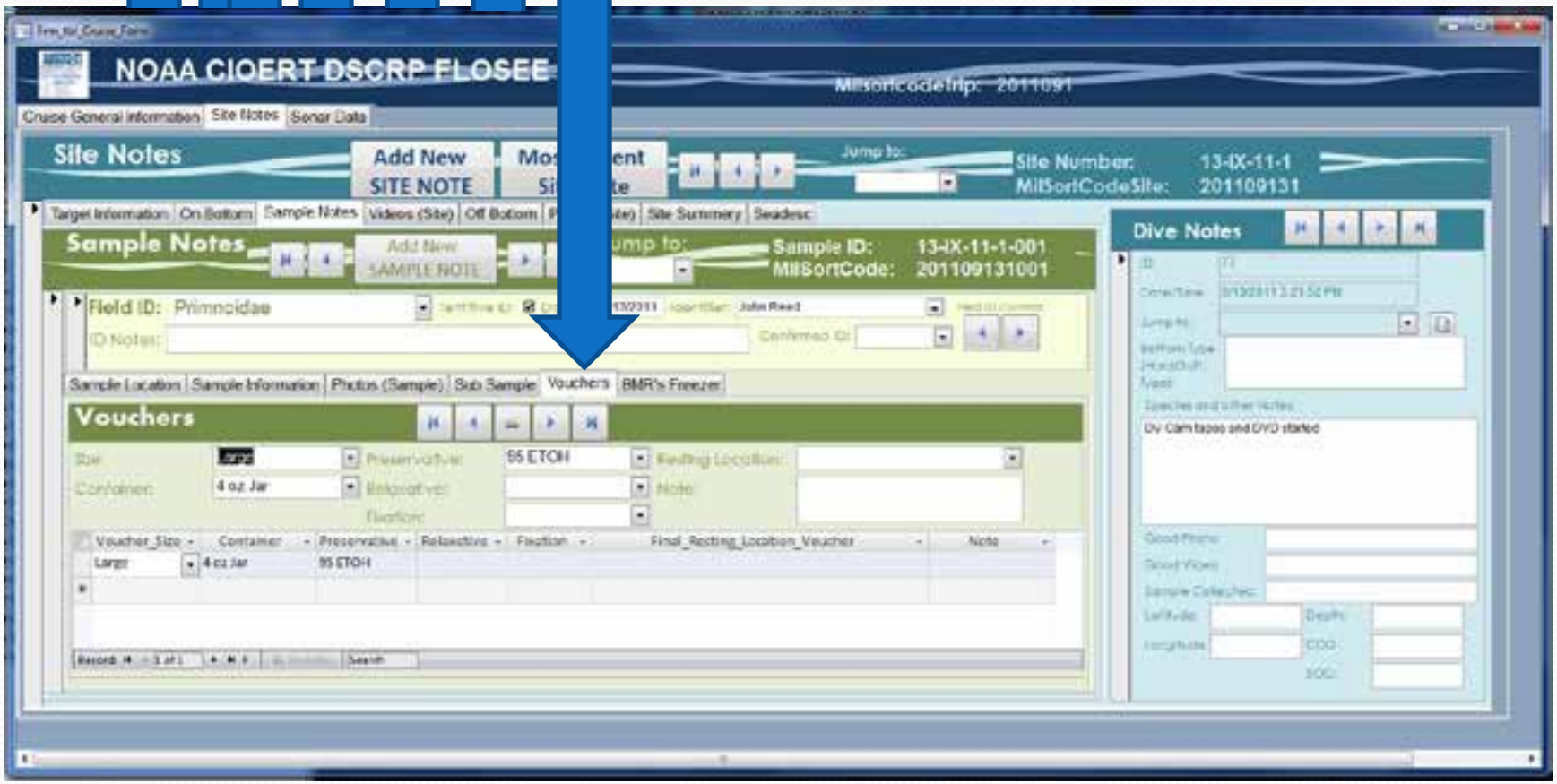


Site Entry


Site Info Tab
Photos Info Tab
Dive Notes
NOAA CIOERT DSCRP FLOSEE
Site Notes
Add New SITE NOTE
Most Recent Site Note
Site Number: 13-IX-11-1
MilSortCodeSite: 201109131
Photo Info:
Observations
Dive Notes
Associate As a Sample Image

Sample Entry

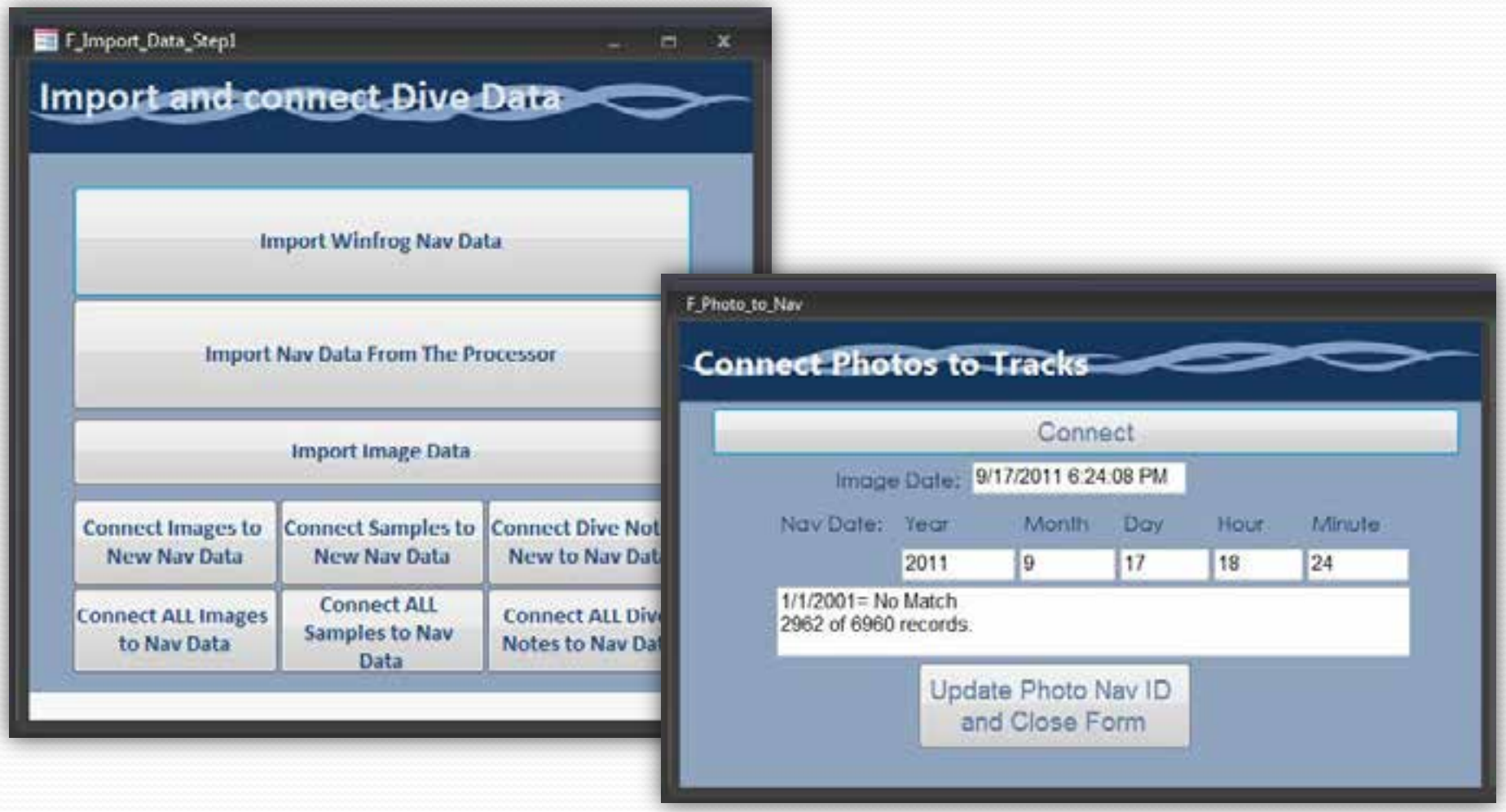
Sample Specimen Subsample Photo Voucher



Sonar/Multibeam Entry Form

Sonar Info Tab

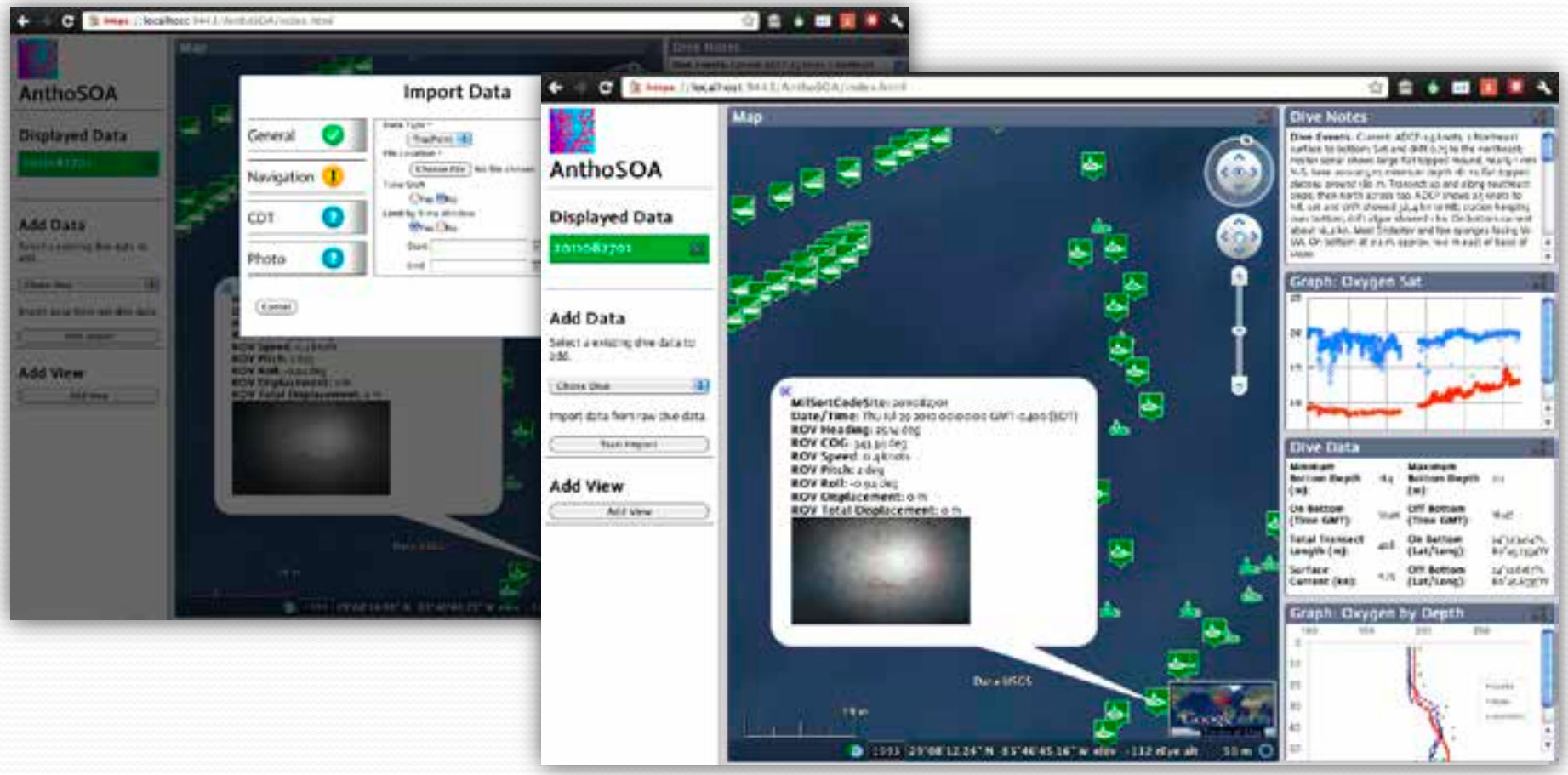
Photo and Tracks Importing



SRI's Graphical User Interface AnthoSOA

- Import and filter raw dive track data
- Import and standardize CTD data
- Import dive images
- Links data sets for import into AnthoSOA, Access at-Sea Database, and ArcGIS

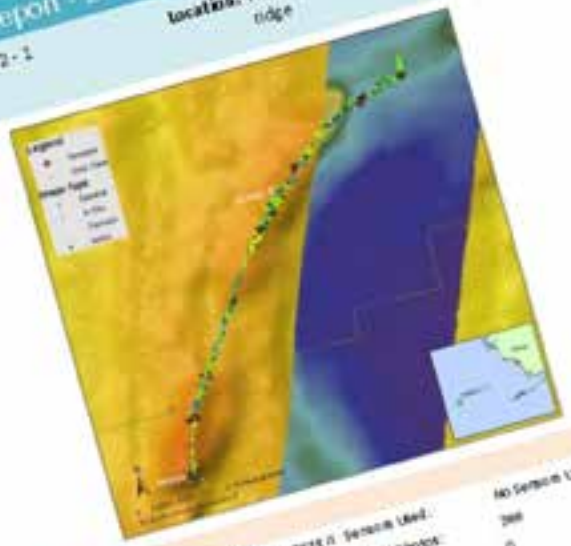
SRI's AnthoSOA



SEADESC Report - 2011 NOAA Pisces Cruise

Dive Number: Kraken 2 - 1

location: Florida, Pulley Ridge HAPC, main ridge



Dive Overview:

Project:	NOAA DEEP DISCOVERER	Sensors Used:	No Sensors Used
Principal Investigator:	John Reed	Digital Photos:	368
PI contact info:	5600 U.S. 1, North Fort Pierce FL 34946	Hard Drive:	0
Purpose:	DISCOVERER Field Research	HDCam:	4
Expedition:	www.nsuv.org/nsuv2	DVD:	4
Dive #:	Kraken 2 - 1	ROV Navigation Data:	Track Point 2, Winfrog
Vessel:	NOAA Ship Nancy Foster	Ship Position System:	DGPS
Location:	Florida, Pulley Ridge HAPC, main ridge	Sonar Data:	NF1109_DISCVR_PulleyRidge_Nor 15.1 m
Report Analyst:	John Reed, Stephanie Farrington	Specimens:	
Data Management:	Access Database, winfrog	Scientific Observers:	Dennis Hensley, John Reed, Joshua Voss, Shirley Pomponi, Stephanie Farrington
Date of Dive:	6/13/2011	Date Compiled:	11/28/2011

Dive Number: Kraken 2 - 1

location: Florida, Pulley Ridge HAPC, main ridge

Dive Data:

Minimum Bottom Depth (m):	59	Total Transect Length (m):	
Maximum Bottom Depth (m):	60	Surface Current (kn):	1
On Bottom (Time- GMT):	19:43	On Bottom (Lat/Long):	24°57.6744' N 83°39.3606' W
Off Bottom (Time- GMT):	22:44	Off Bottom (Lat/Long):	24°58.2004' N 83°37.7328' W
Physical (bottom) Temp (°C):		Salinity:	
		Visibility (ft):	30-50 Current (kn): 0.5

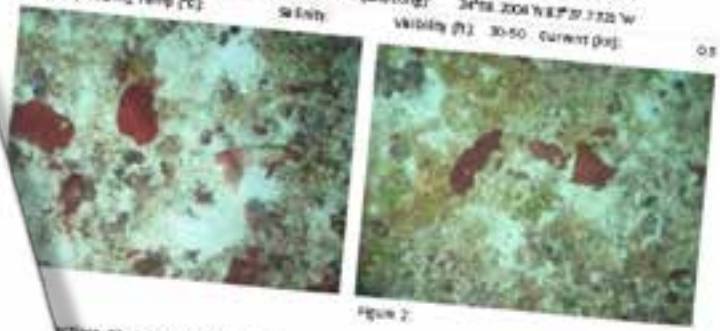


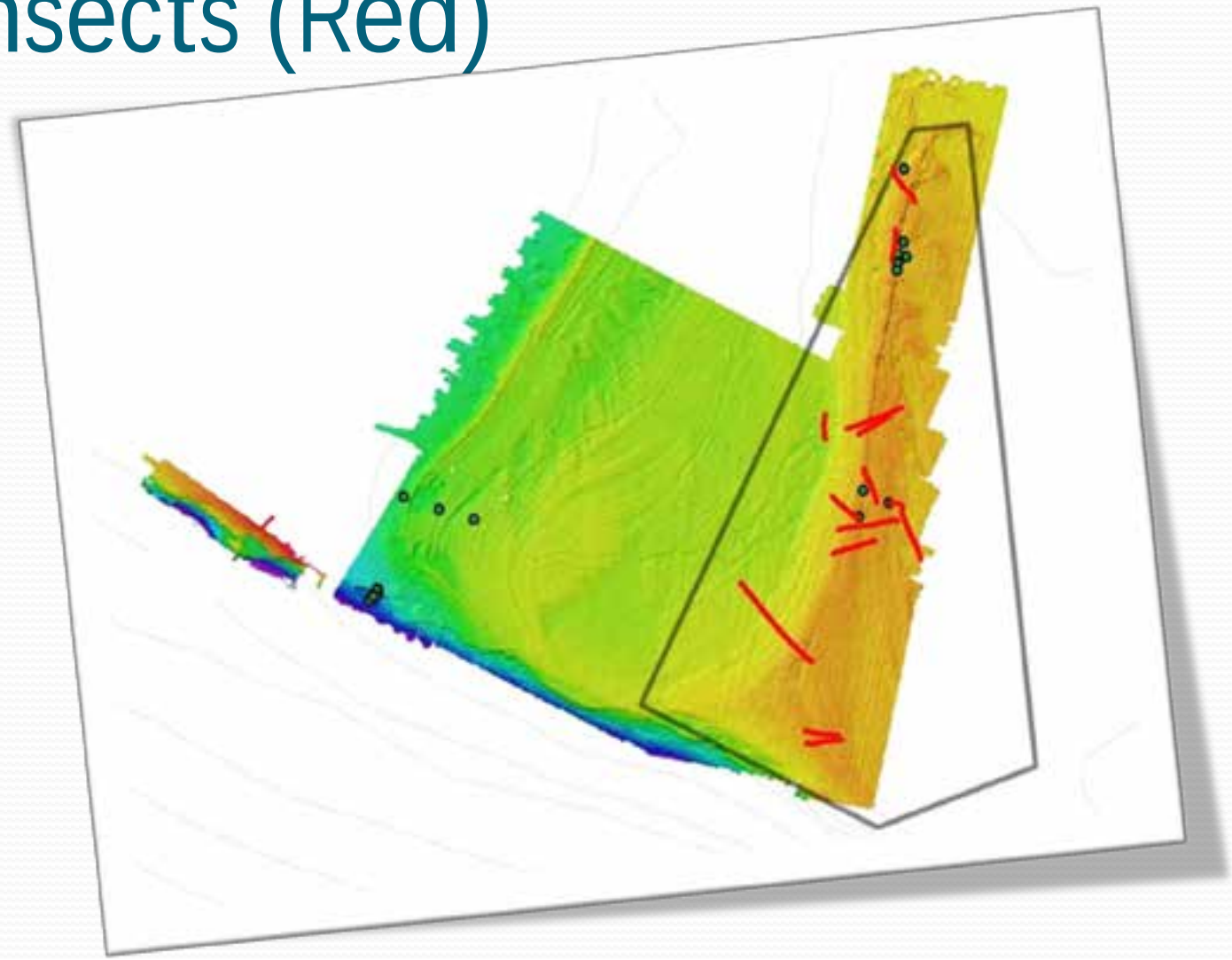
Figure 2:

...tives, Site Description, Habitat, Fauna)

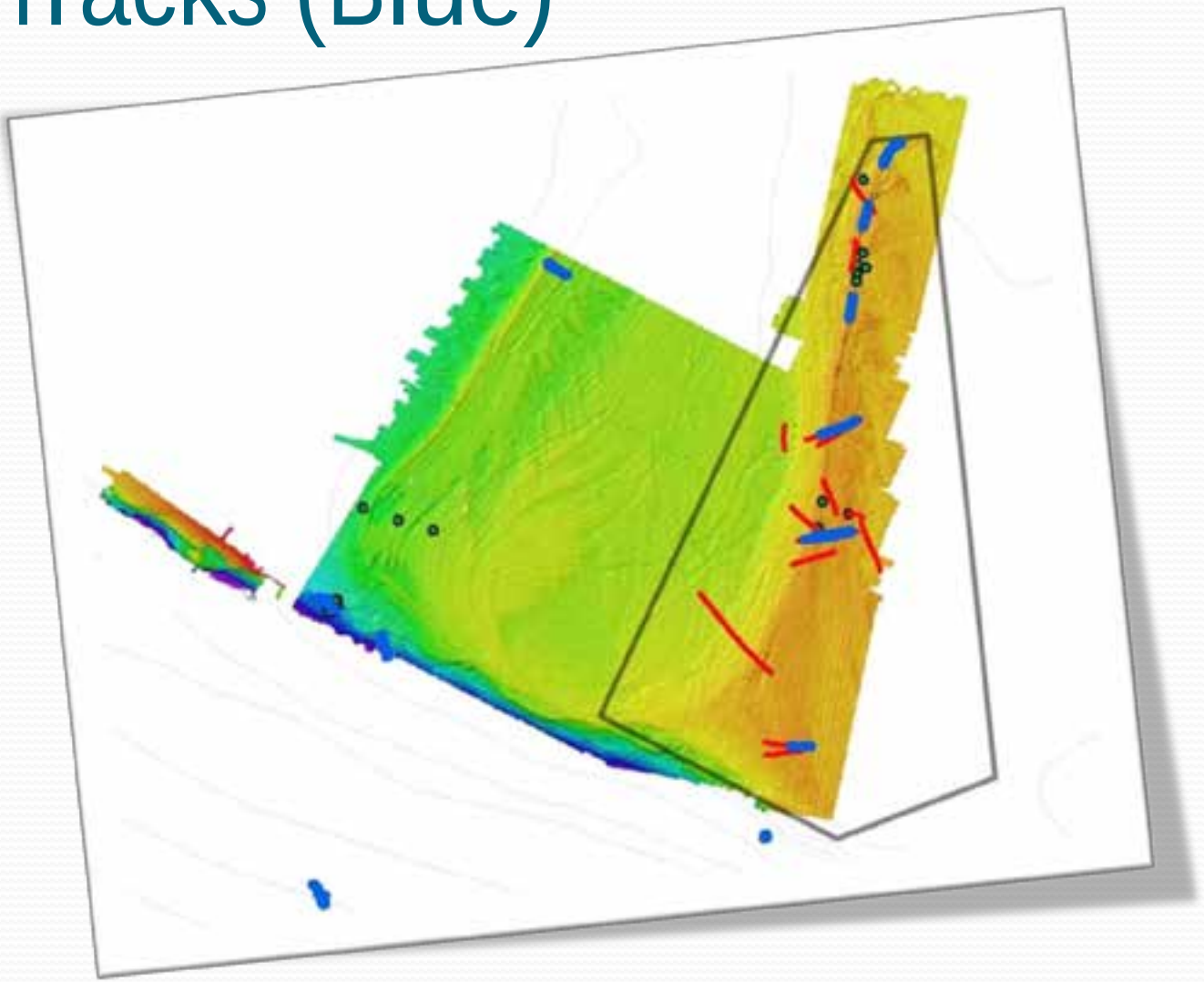
...ed 3 30-cm wade 1 long dive 19:00. N-S transect along north end of main ridge, ~xx mm. ...300-meter quantitative digital still photo transects.

...ral species; Xestospongia ? 30 - 100+ cm flat blades, abundant, branching styles, common, ...and nubble encrusted with coralline algae sheets. C Monophyta ...Sodium, turf algae. No large Phaeophyte observed. Patches of greenish brown ...er. Gorgonacea - Primnoidae ?, common; Plexauridi, sparse. Porifera - Xestospongia ...ng Spirastrellidae, Chondrosia, Ircinia, Smenidae, Plakinastrella, Plakortis/Corallidae ...ommon to - uncommon; no other hard coral observed. Ascidiacea - Didemnidae, white ...hermata - Crinoidea, Antedonidae, no Echinoidea. Fish- Greater Amberjack, Reef ...ish, Bicolor Damsel, Chalk Bass, Wrasse, 2 Mutton Snapper. Numerous 2-2 ...nds, Sand Tile burrows. Several 1-2 meter sand depressions, possible red grouper ...on fish.

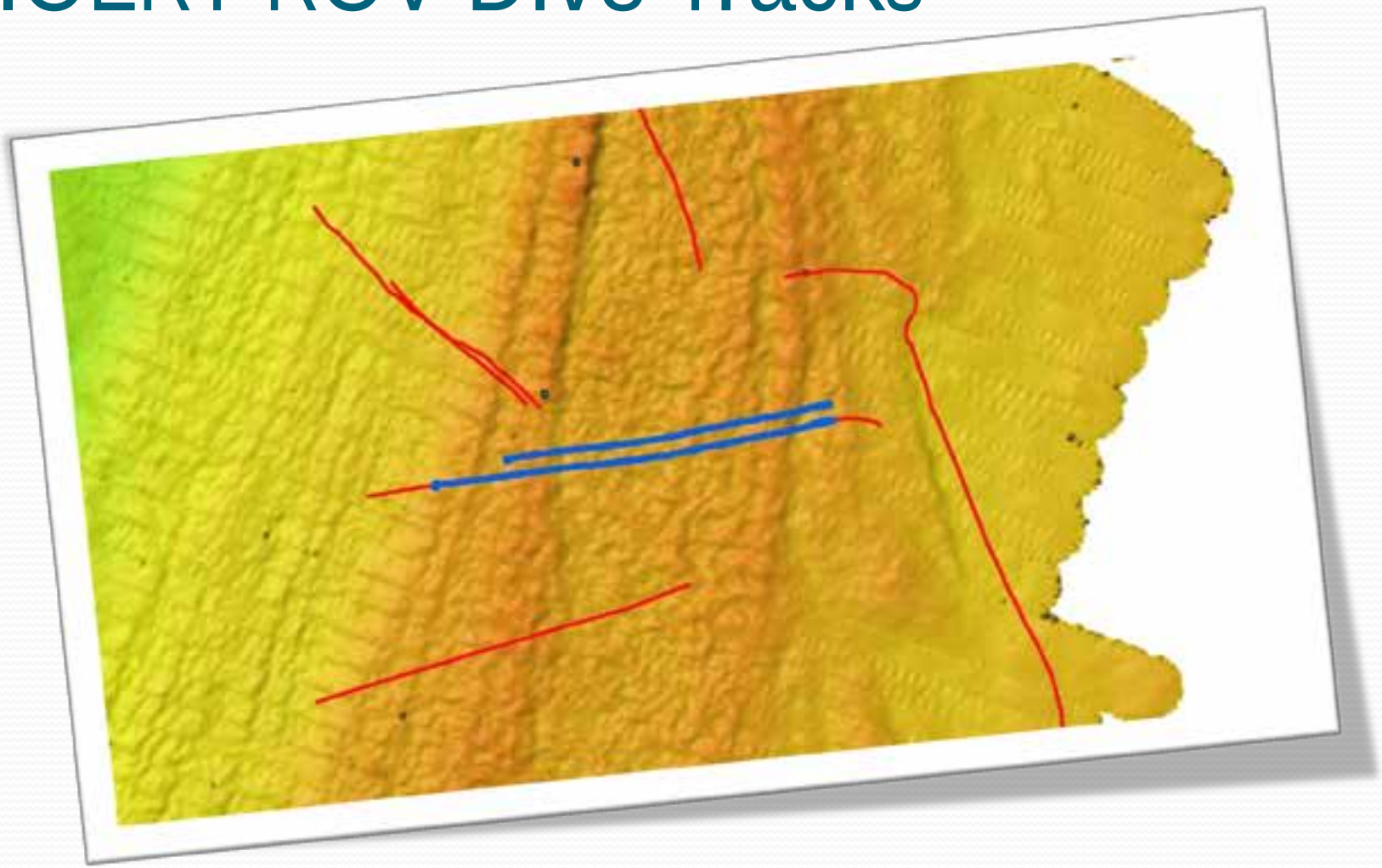
2004 USGS SEABOSS Video Transects (Red)



2011 CIOERT Cruise- Kraken ROV Dive Tracks (Blue)



USGS SEABOSS Sites with 2011 CIOERT ROV Dive Tracks



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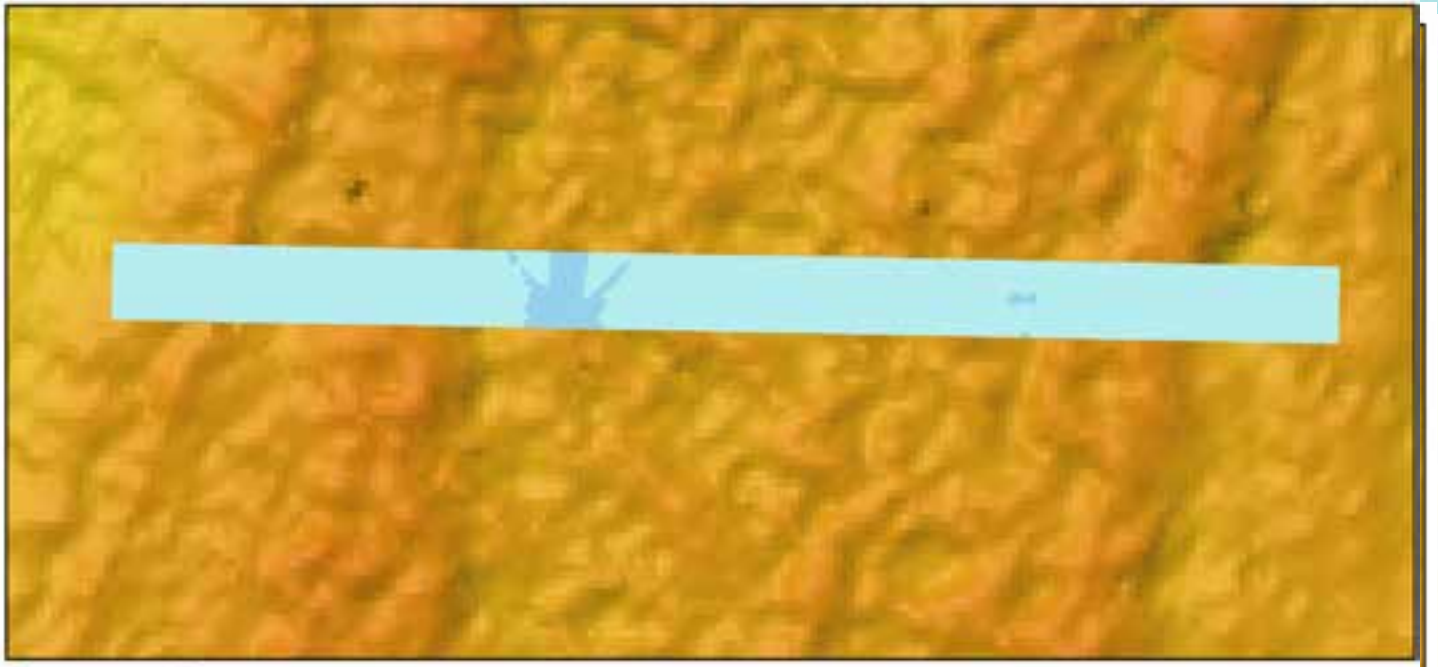
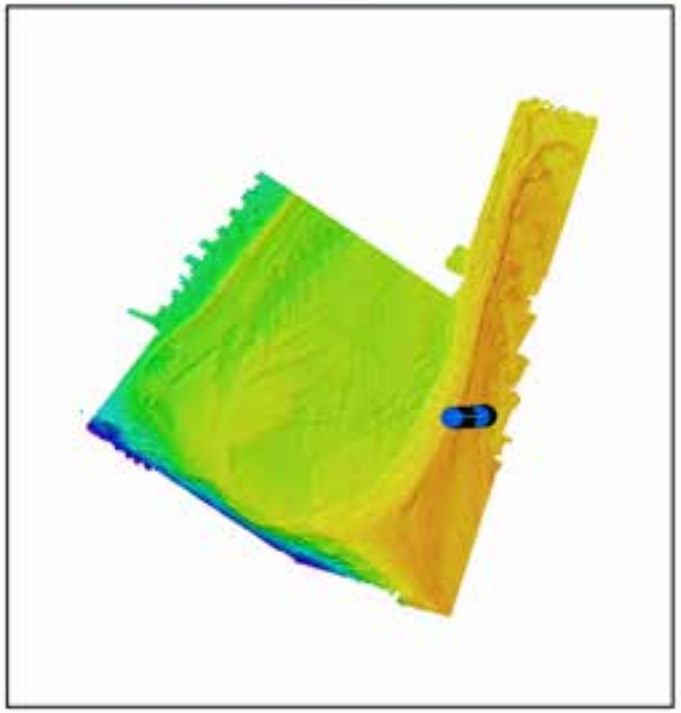


Legend

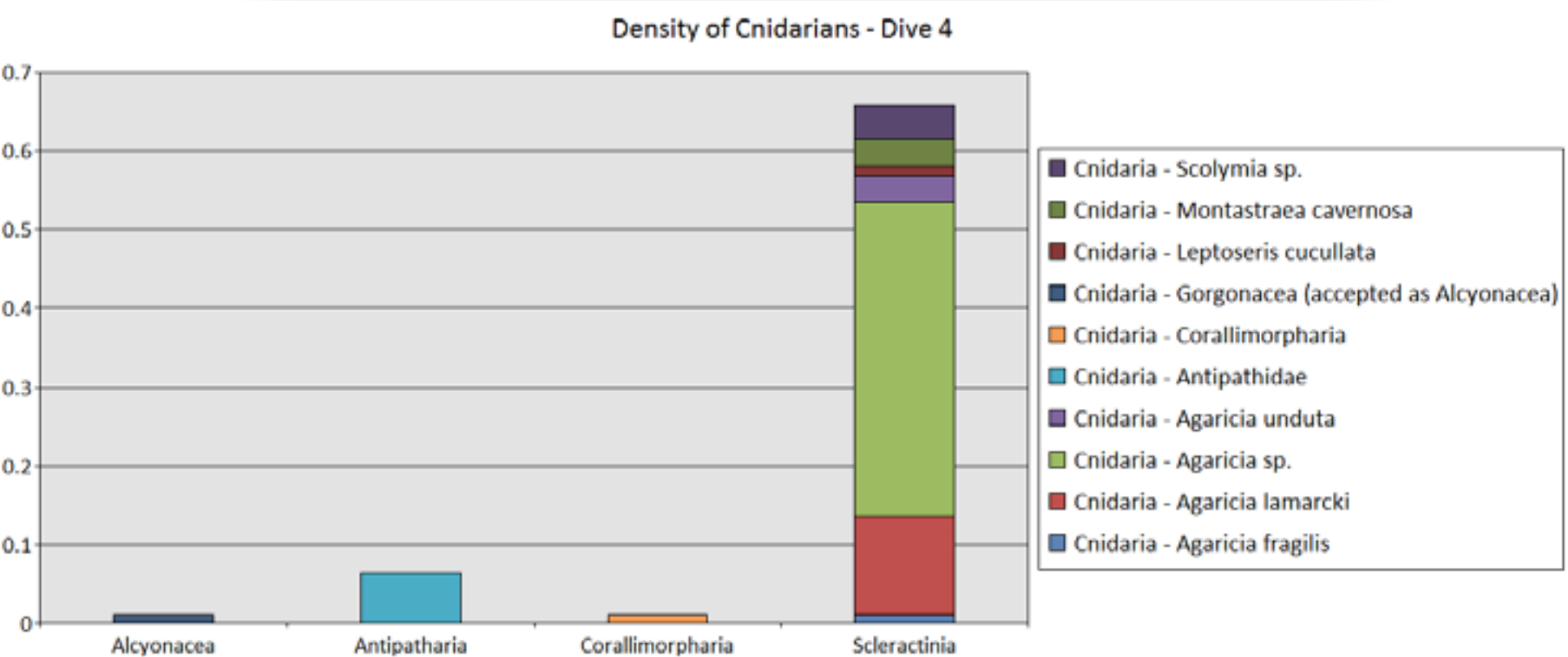
% Hard Coral

- 0 - 1.33333333
- 1.33333333 - 2.66666667
- 2.66666667 - 4
- 4 - 5.33333333
- 5.33333333 - 6.66666667
- 6.66666667 - 8
- 8 - 9.33333333
- 9.33333333 - 10.6666667
- 10.6666667 - 12



Analysis of Images

- Internal Species Counts
  - Automatically calculates density of flora and fauna as the data is added
  - Creates Graphs for reports and analysis




Agaricia sp.


Anadyomene alga


Bleached Agaricia sp.


Lobster and Lionfish


Crustose coralline algae


Rough Tongue Bass


Moray Eel


Giant Isopod

Pelagic Squid


Rocky Habitat

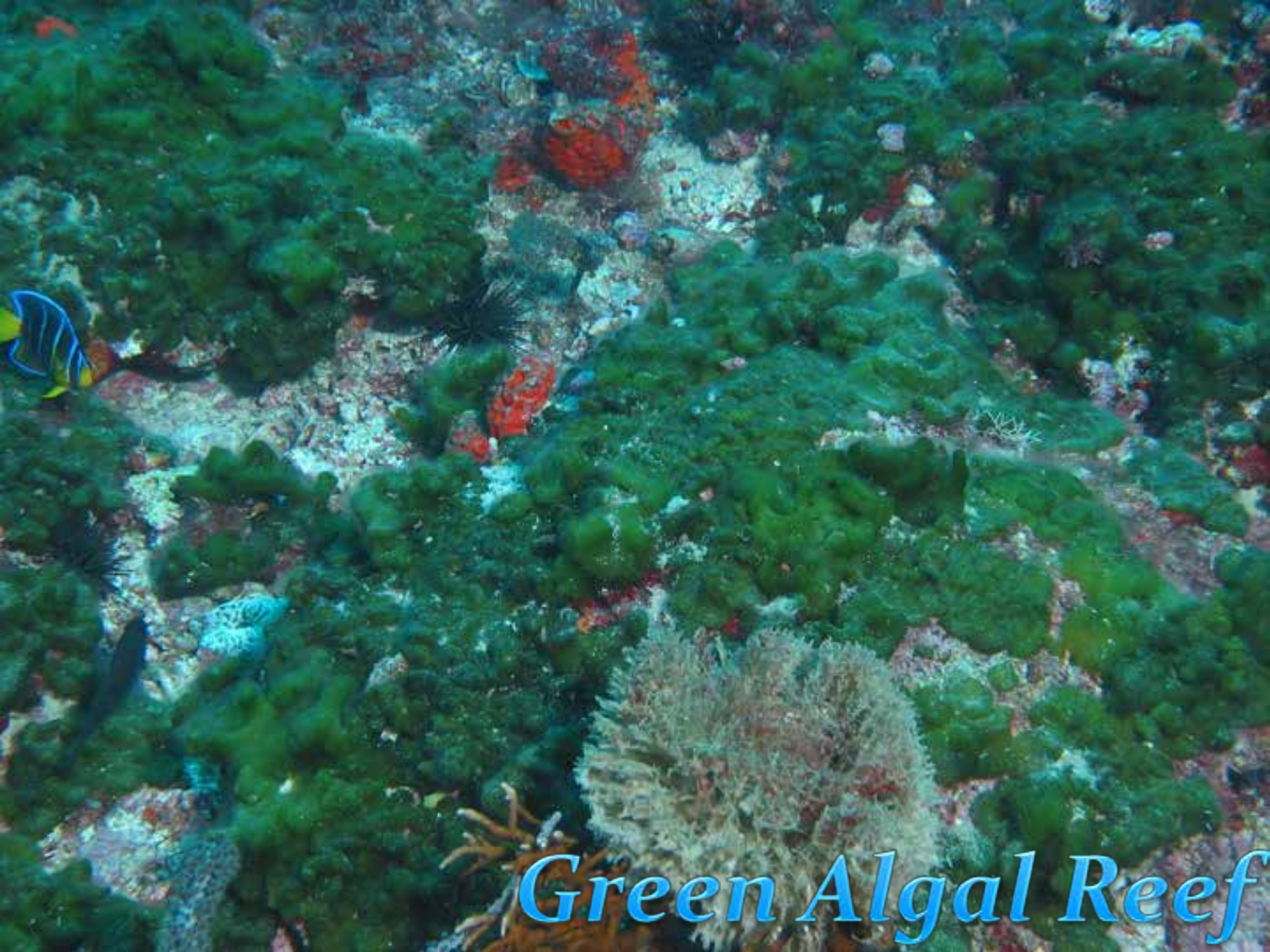

Seafan and Brittlestar


Strawberry Anemone


Giant Sea Slug


Grouper

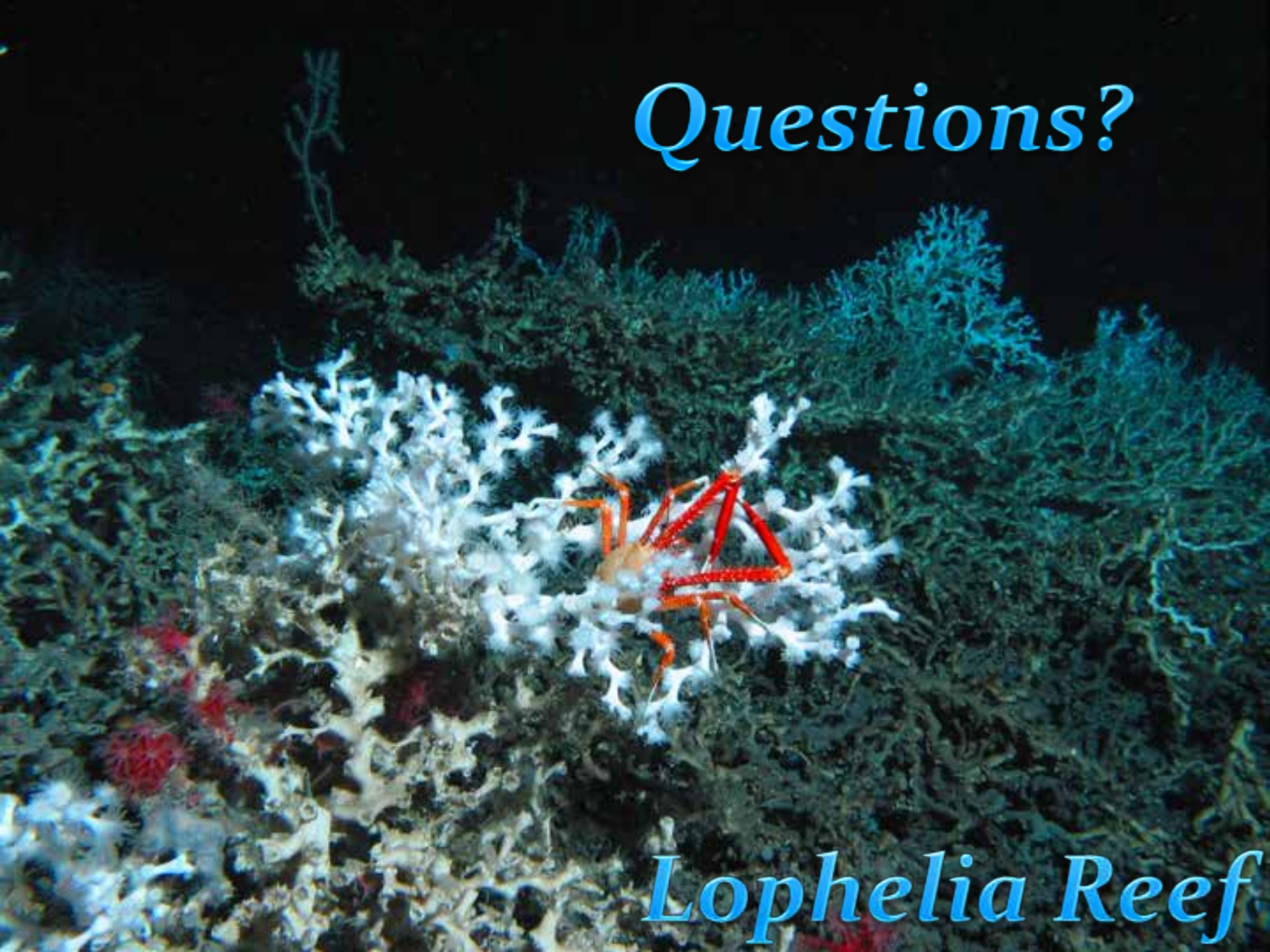

Oculina Habitat


Green Algal Reef


Mesophotic Reef


Mesophotic Reef


Volcano Sponge


Questions?
Lophelia Reef