

ArcGIS and Microsoft Access Solution for Marine Benthic Surveys

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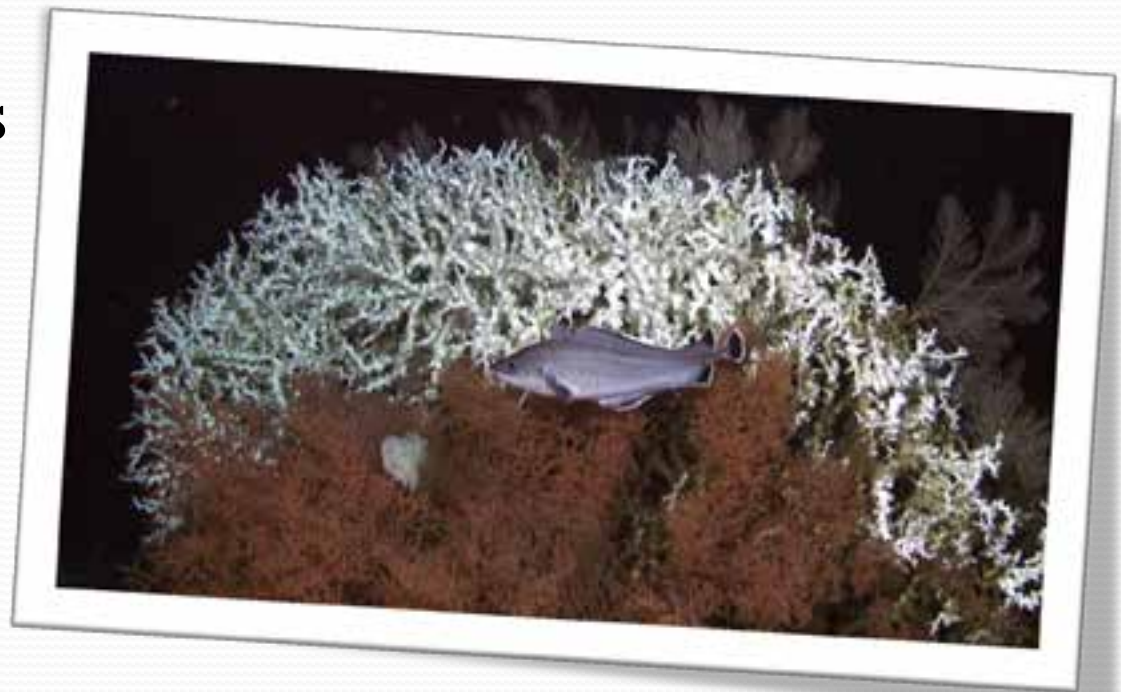
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Outline

- 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



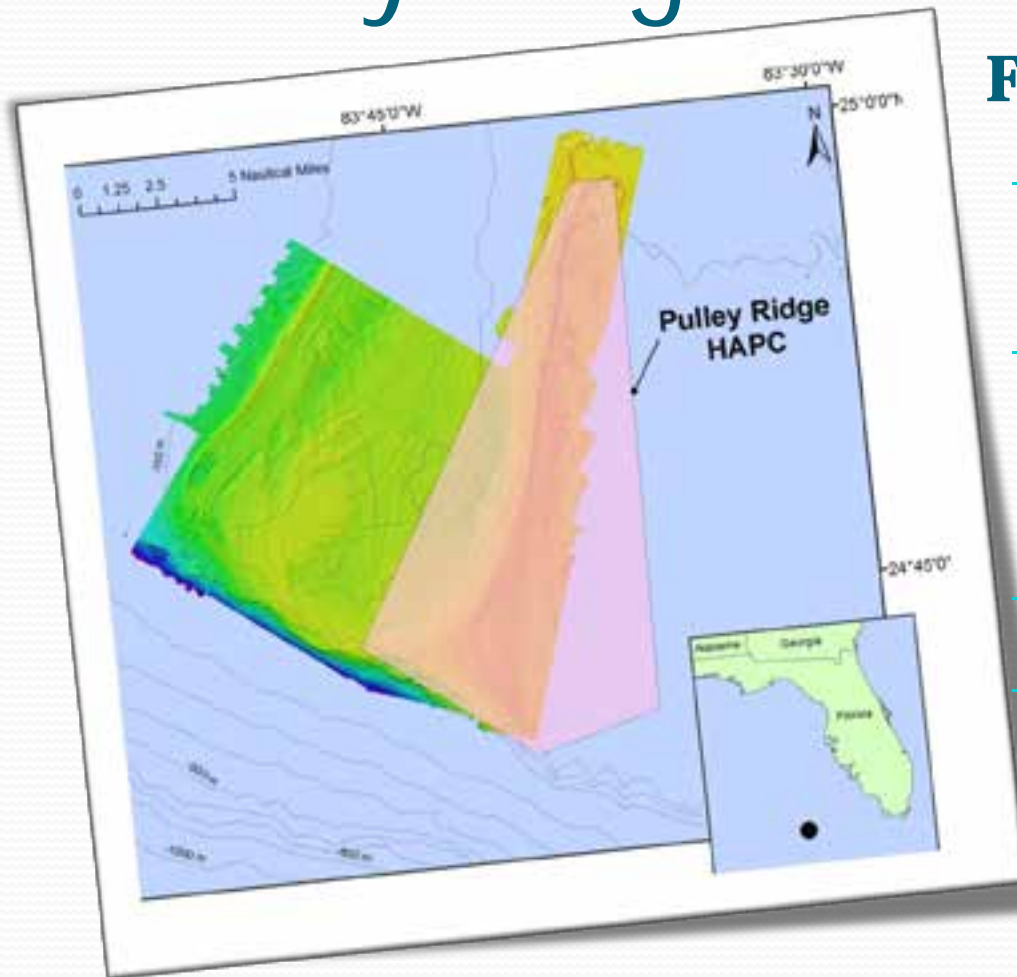
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Pulley Ridge



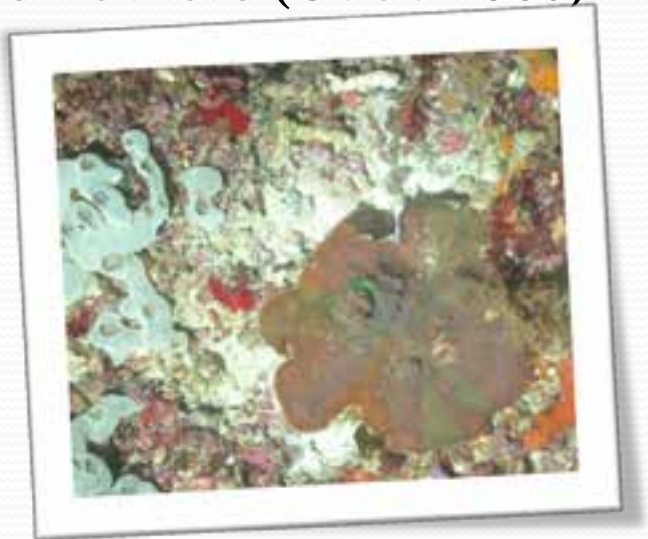
Facts about Pulley Ridge

- 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 than 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 Stipboard Operated MOBIUSSONAR II

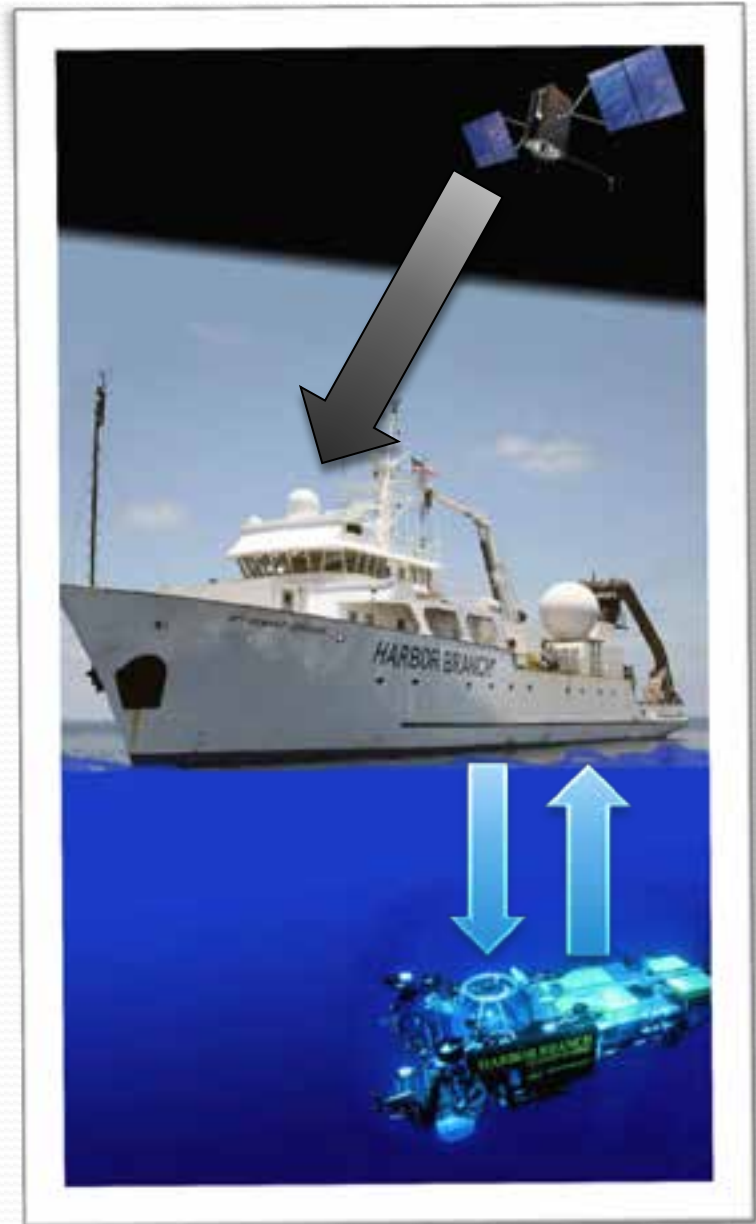
- Multidirectional sub
- Opening/Closing Net and
- Environmental Sensing
- System
- High resolution data, so
- can handle more
- challenges weather,
- and longer dives.
- Used for:
 - Dive planning
 - Data analysis
 - Bottom type determination



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

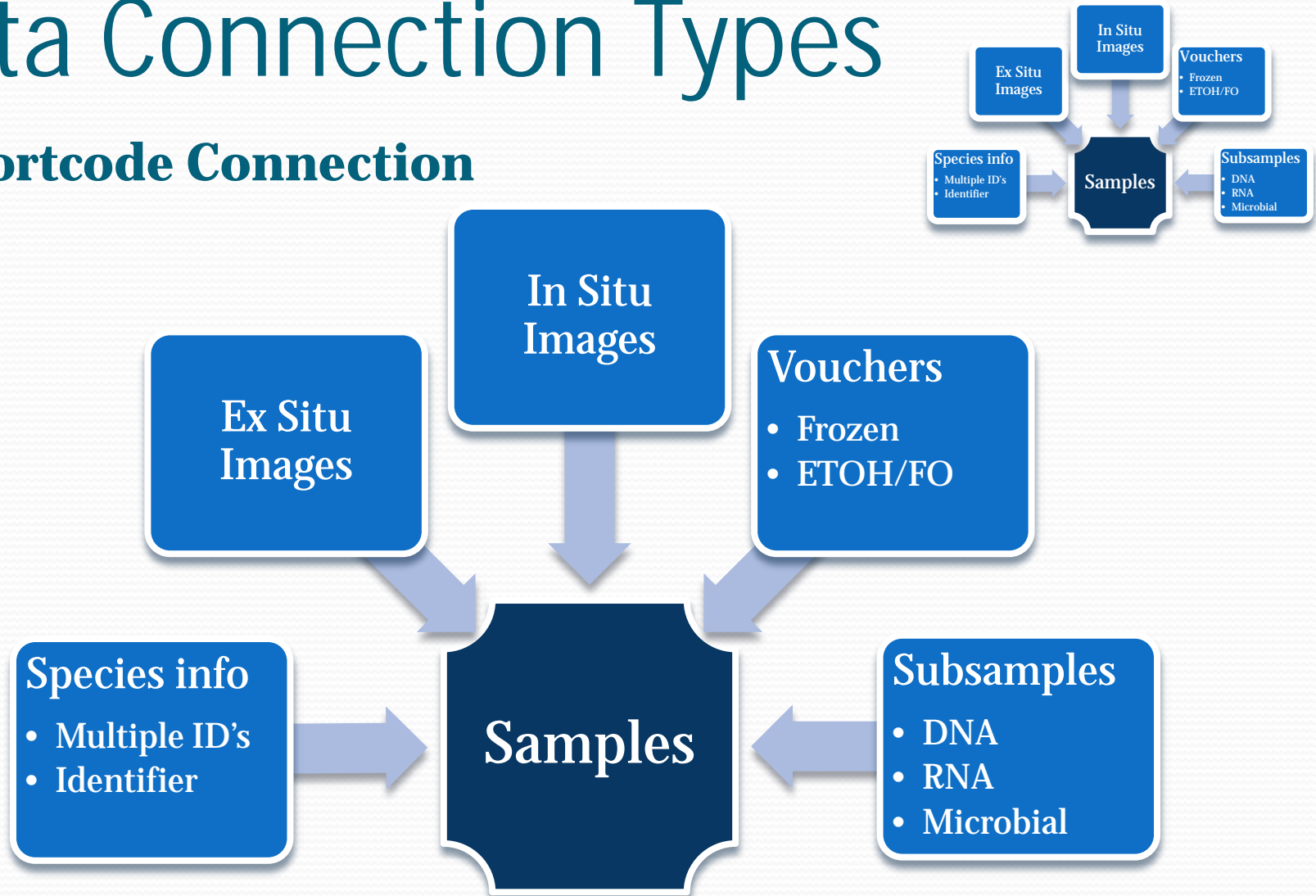
Sample Data

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



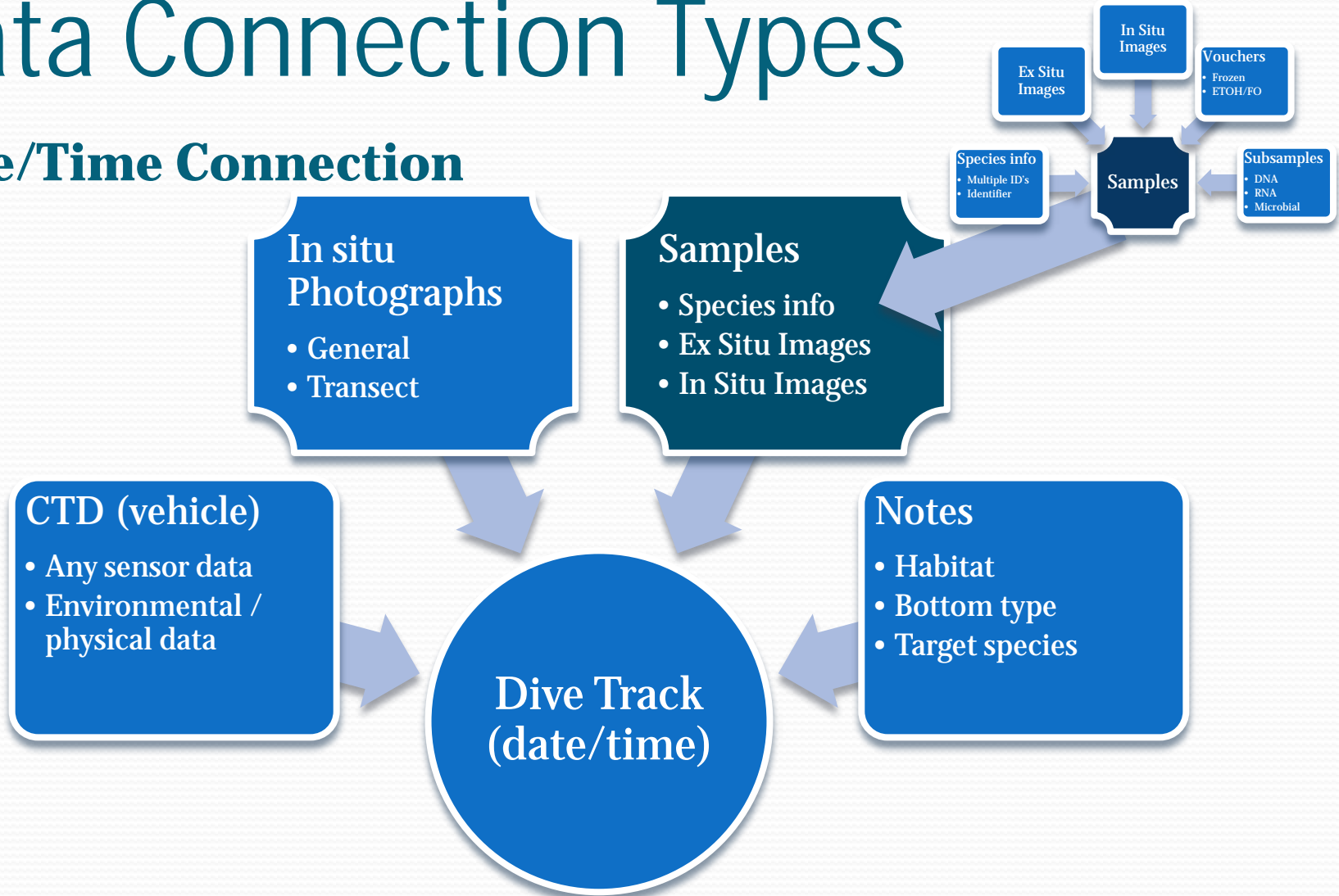
Data Connection Types

Milsortcode Connection



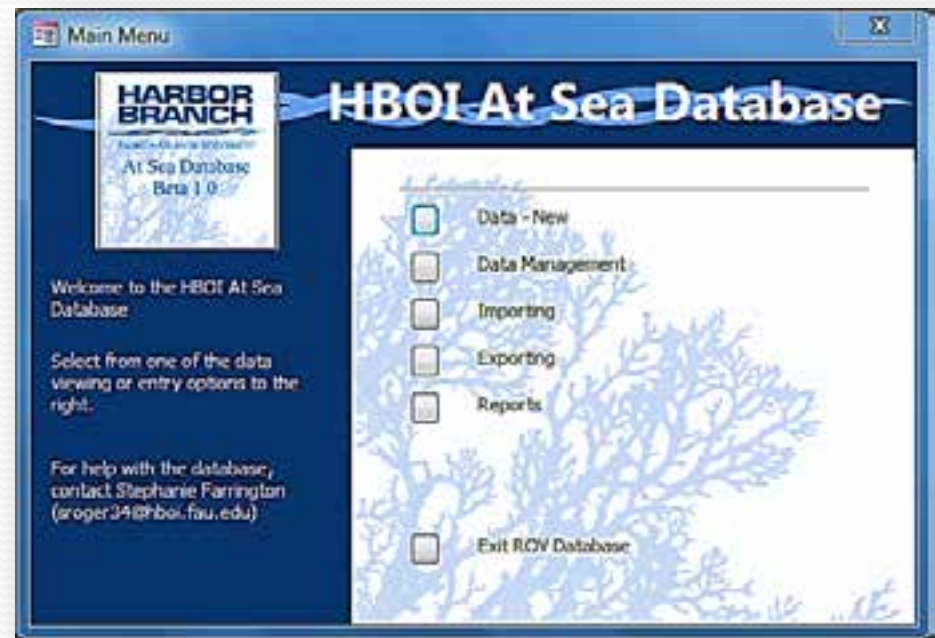
Data Connection Types

Date/Time Connection



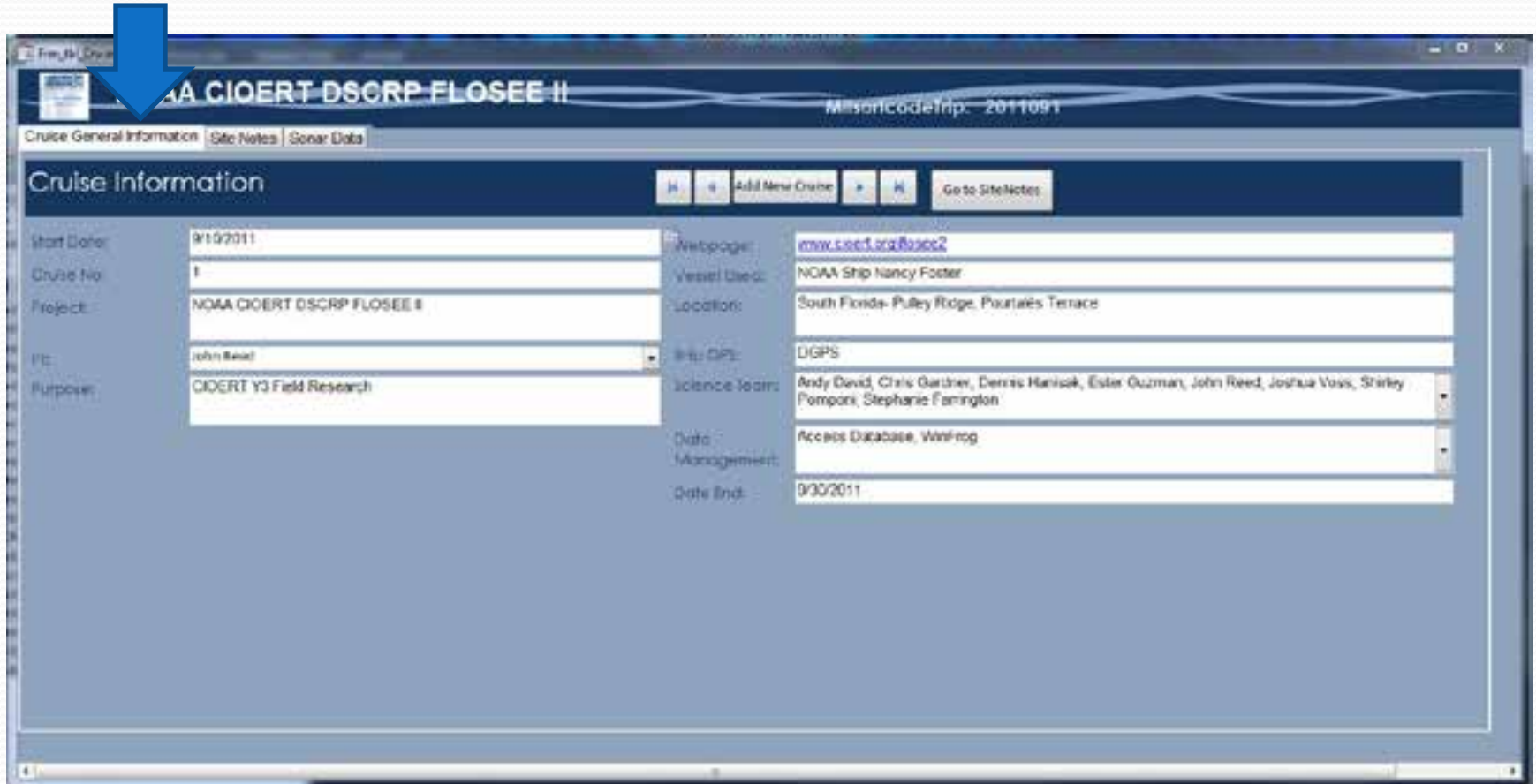
Data Management

- 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



The screenshot displays a web application window titled "NOAA CIOERT DSCRIP FLOSEE II" with a mission code of "2011091". The interface includes tabs for "Cruise General Information", "Site Notes", and "Sonar Data". The "Cruise Information" tab is active, showing a form with the following fields:

Field	Value
Start Date	9/19/2011
Cruise No	1
Project	NOAA CIOERT DSCRIP FLOSEE II
PI	John Reed
Purpose	CIOERT Y3 Field Research
Webpage	www.sioed.org/flosee2
Vessel Desc	NOAA Ship Nancy Foster
Location	South Florida- Pulley Ridge, Pourtales Terrace
Info OPS	DGPS
Science Team	Andy David, Chris Gardner, Dennis Hanisak, Ester Guzman, John Reed, Joshua Voss, Shirley Pomponi, Stephanie Farrington
Data Management	Access Database, Winlog
Date End	9/30/2011

Navigation buttons include "Add New Cruise" and "Go to Site Notes".

Site Entry

Site Info Tab

Photos Info Tab

Dive Notes

The screenshot displays the NOAA CIOERT DSCR P FLOSEE software interface. The main window title is "Fm_Lbl_Cruise_Form". The header includes "NOAA CIOERT DSCR P FLOSEE" and "MissionCodeTrip: 2011091". Below the header, there are tabs for "Cruise General Information", "Site Notes", and "Sonar Data". The "Site Notes" tab is active, showing "Add New SITE NOTE" and "Most Recent Site Note" buttons. The "Site Number" is 13-IX-11-1 and "MissionCodeSite" is 201109131. Below this, there are tabs for "Target Information", "On Bottom", "Sample Notes", "Videos (Site)", "Off Bottom", "Photos (Site)", "Site Summary", and "Seadesc". The "Photos (Site)" tab is active, showing "Photo Info" and "Observations" sections. The "Photo Info" section includes fields for "File name" (201109131-T-16-26-31_8419.jpg), "Default name" (84192011-62631.P16), "Default file" (In Site), "Thumbnail Name/F", "Select of GeoData Image", and "GeoData Control". A large photo of a coral reef is displayed. Below the photo are fields for "Date of #", "MissionCode" (20110913101), and "Associate As a Sample Image". The "Observations" section has a table with columns "sd_name", "count", and "comment". The "Dive Notes" tab is also visible, showing fields for "Dive #", "Dive Date" (8/13/2011 5:31:52 PM), "Sample to", "Bottom Type", "Hand/Lens", "Time", "DV Cams tapes and DVD started", "Good Photo", "Good View", "Sample Collected", "Latitude", "Depth", "Longitude", "COG", and "SOC".

Sample Entry

Sample Entry Site Note Photos Sub Sample Vouchers

The screenshot displays the NOAA CIERT DSCR FLOEE software interface. The main window title is "Free_Mr_Cruise_Form". The interface is divided into several sections:

- Site Notes:** Includes "Add New SITE NOTE" and "Move Site" buttons. It shows "Site Number: 13-IX-11-1" and "MISortCodeSite: 201109131".
- Sample Notes:** Includes "Add New SAMPLE NOTE" button. It shows "Sample ID: 13-IX-11-1-001" and "MISortCode: 201109131001". The "Field ID" is set to "Prinnoidae".
- Vouchers:** A table for recording voucher details. The current entry shows:
 - Size: Large
 - Container: 4 oz Jar
 - Preservative: 95 ETOH
 - Relative: [blank]
 - Fixation: [blank]
 - Final Recting Location Voucher: [blank]
 - Note: [blank]
- Dive Notes:** Includes "Add New DIVE NOTE" button. It shows "Dive ID: 71" and "Dive Time: 01/02/11 3:21:50 PM".

A large blue arrow points from the "Sample Entry" text above to the "Sample Notes" section of the interface.

Sonar/Multibeam Entry Form

Sonar Info Tab

NOAA CIOERT CRP FLOSEE II

MissionCodeTrip: 2011091

Cruse General Information | Site Notes | **Sonar Data**

NF1109_CIOERT_PullyRidge_South_1m.tif

MissionCodeSonar: 201109152

Date Sonar: 6/15/2011

Sonar Number: 2

Sonar Name: NF1109_CIOERT_PullyRidge_South

Sonar Type: Multibeam

Collector Sonar:

Resolution: 1 m

Latitude North: Longitude East

24°49.7562N 83°41.8332W

24.829273 -83.694335

24°49.7562N 83°41.8332W

24.829273 -83.694335

Latitude South: Longitude East

24°47.2914N 83°41.8332W

24.786583 -83.694335

24°47.2914N 83°41.8332W

24.786583 -83.694335

Hyperlink Shapefile: J:\008 STEPHANIE\2011 NOAA CI Foster Cruise- Original Multibeam Data\GeoTIFFs\Pully Ridge\NF1109_CIOERT_PullyRidge_South_1m.tif

Hyperlink (.RT): J:\008 STEPHANIE\2011 NOAA CI Foster Cruise- Original Multibeam Data\GeoTIFFs\Pully Ridge\NF1109_CIOERT_PullyRidge_South_1m.tif

Estimated_Challenge.html: 118

Sonar Sites Association

MissionCodeSonar: 201109152

MissionCodeSite: 201109151

ID	MissionCodeSite
18	201109151
19	201109152
* (New)	

Records: 18 | 1 | 1 | 2 | Search

Photo and Tracks Importing

F_Import_Data_Step1

Import and connect Dive Data

Import Winfrog Nav Data

Import Nav Data From The Processor

Import Image Data

Connect Images to New Nav Data	Connect Samples to New Nav Data	Connect Dive Notes to New Nav Data
Connect ALL Images to Nav Data	Connect ALL Samples to Nav Data	Connect ALL Dive Notes to Nav Data

F_Photo_to_Nav

Connect Photos to Tracks

Connect

Image Date: 9/17/2011 6:24:08 PM

Nav Date: Year Month Day Hour Minute

2011	9	17	18	24
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1/1/2001= No Match
2962 of 6960 records.

Update Photo Nav ID and Close Form

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**

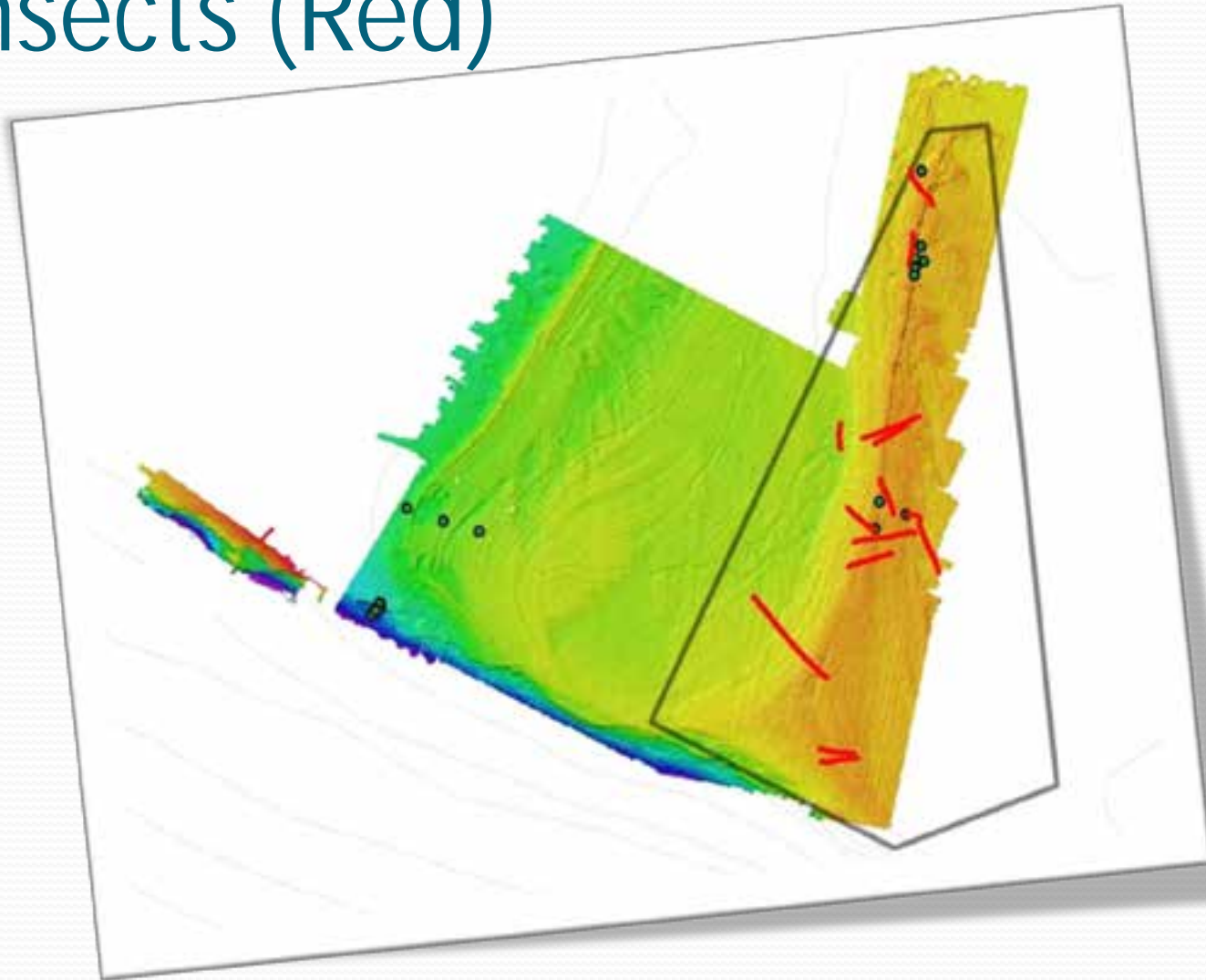
SRI's AnthoSOA

The screenshot displays the AnthoSOA web application interface, which is designed for managing and visualizing dive data. The interface is divided into several sections:

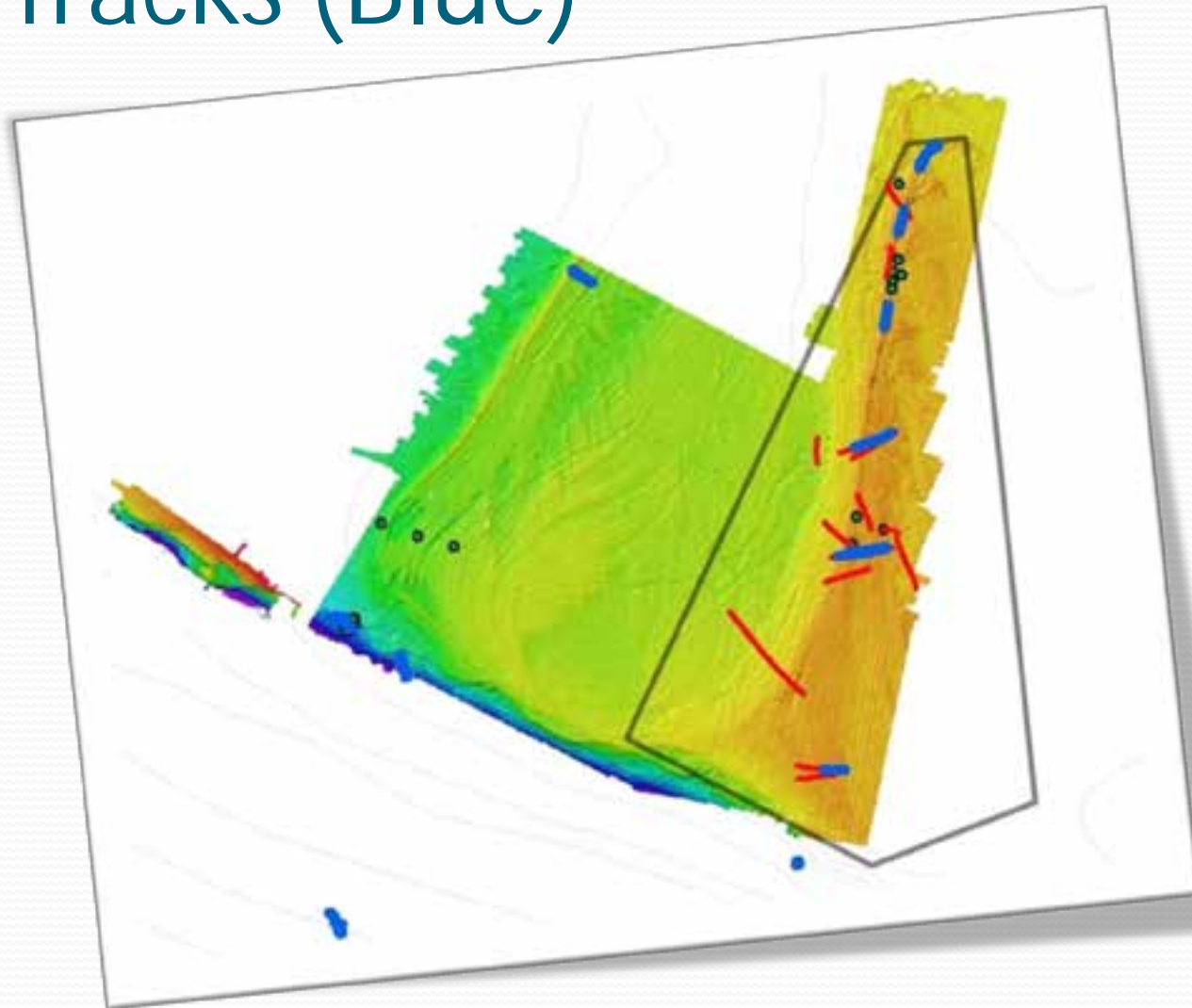
- Import Data:** A central panel for adding new data. It includes a "Data Type" dropdown (set to "TriPoint"), a "File Location" field, and a "Choose File" button. Below this, there are sections for "General" (checked), "Navigation" (warning icon), "CDT" (info icon), and "Photo" (info icon). A "Close" button is at the bottom.
- AnthoSOA Header:** The main title of the application, with a "Displayed Data" field showing "3015083701".
- Add Data:** A section for selecting existing dive data to add, with a "Choose One" dropdown and an "Import" button.
- Add View:** A section for adding new views, with an "Add View" button.
- Map:** A large map area showing a series of green location markers. A callout box for a specific marker displays the following data:
 - MissionCodeSite: 30002901
 - Date/Time: Thu Jul 20 2010 05:00:00 GMT-04:00 (EDT)
 - ROW Heading: 25.14 DEG
 - ROW CDR: 343 30 DEG
 - ROW Speed: 0.4 knots
 - ROW Pitch: 0 deg
 - ROW Roll: 0.95 DEG
 - ROW Displacement: 0 ft
 - ROW Total Displacement: 0 ftA small photo thumbnail is also visible below the text.
- Dive Notes:** A text area containing a detailed description of a dive event, mentioning "Current ADCP" and "flotation surface".
- Graph: Oxygen Sat:** A line graph showing oxygen saturation levels over time, with a blue line for "On Bottom" and a red line for "Off Bottom".
- Dive Data:** A table comparing "On Bottom" and "Off Bottom" metrics:

Mission	Bottom Depth (m)	Bottom Depth (ft)	On Bottom (Time GMT)	Off Bottom (Time GMT)	Wet
Total Insect Length (m)	402	1319	14:33:42Z	17:45:15Z	
Surface Camera (deg)	4.10	12.40	14:33:42Z	17:45:15Z	
- Graph: Oxygen by Depth:** A graph showing oxygen levels at different depths, with a red line for "On Bottom" and a blue line for "Off Bottom".

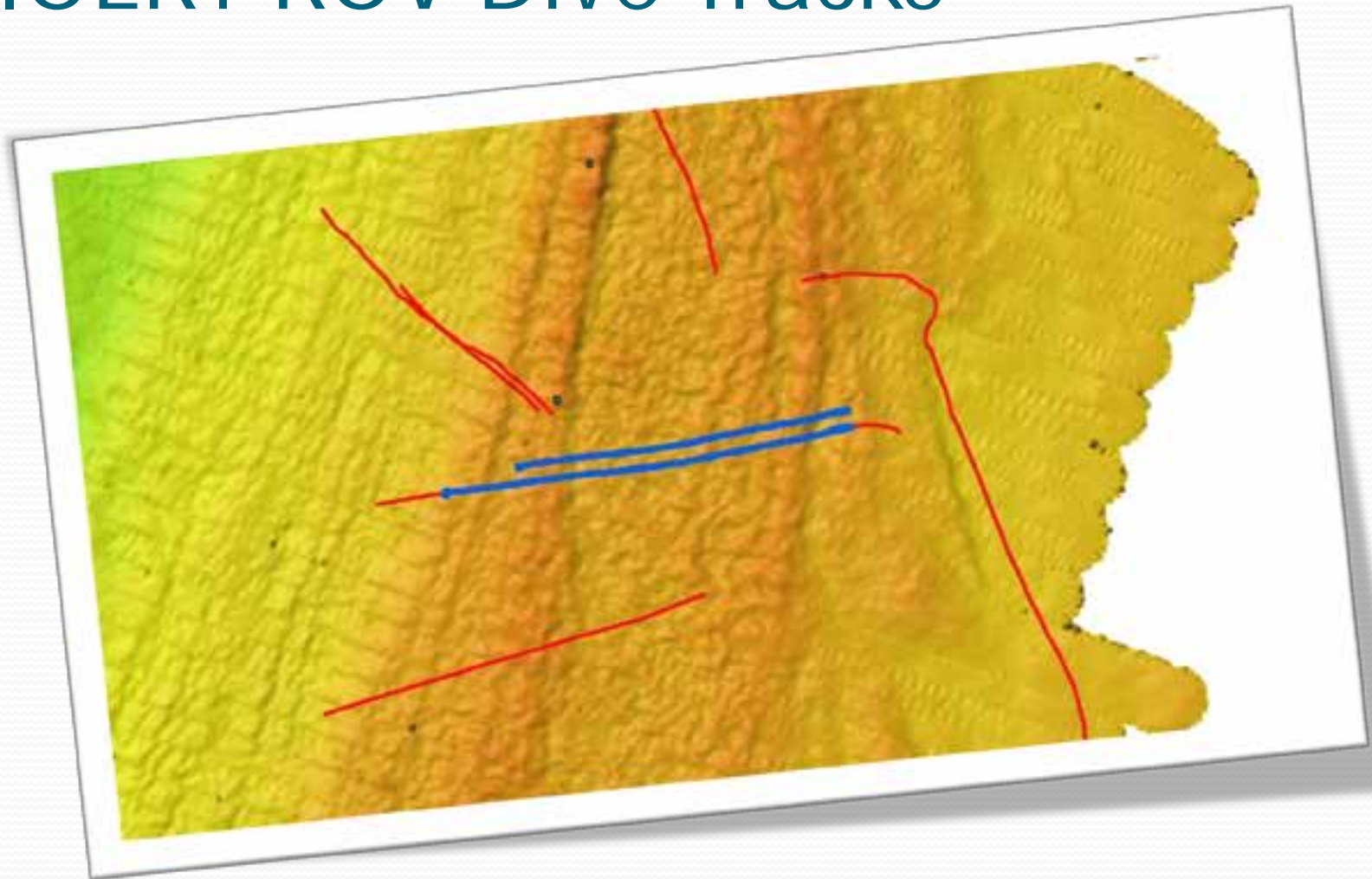
2004 USGS SEABOSS Video Transects (Red)



2011 CIOERT Cruise- Kraken ROV Dive Tracks (Blue)

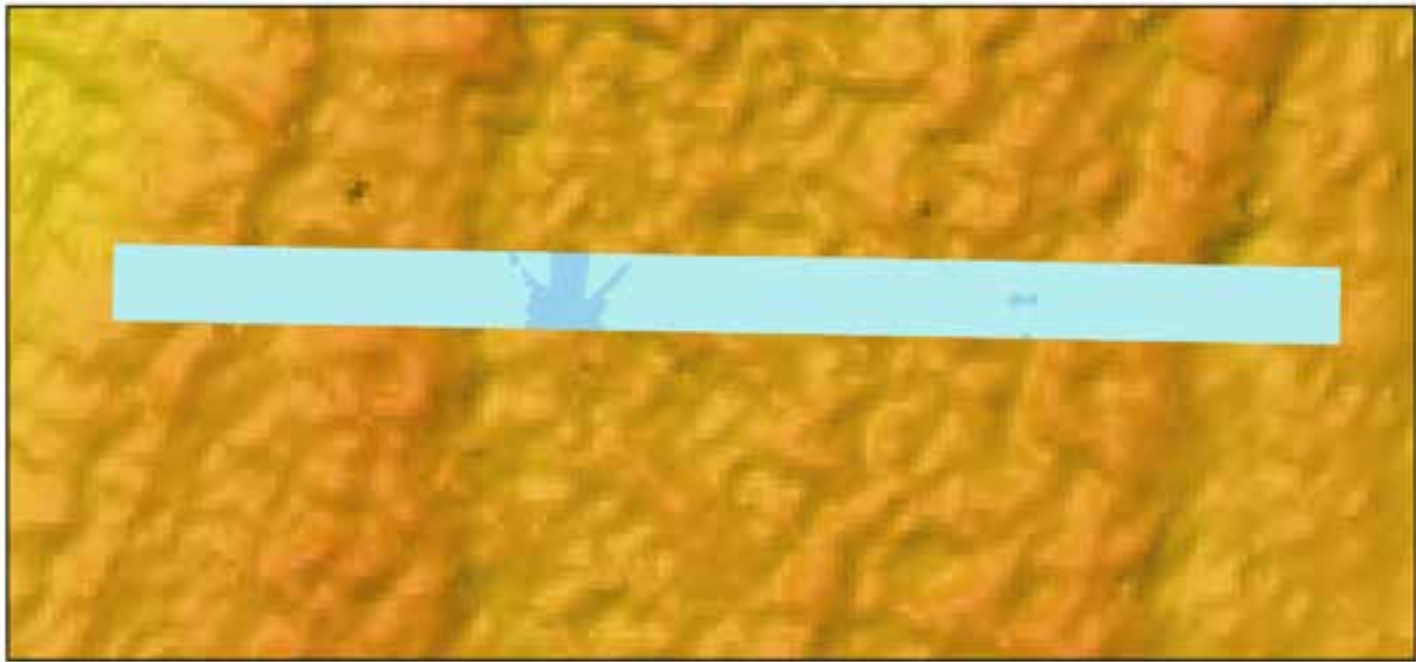


USGS SEABOSS Sites with 2011 CIOERT ROV Dive Tracks

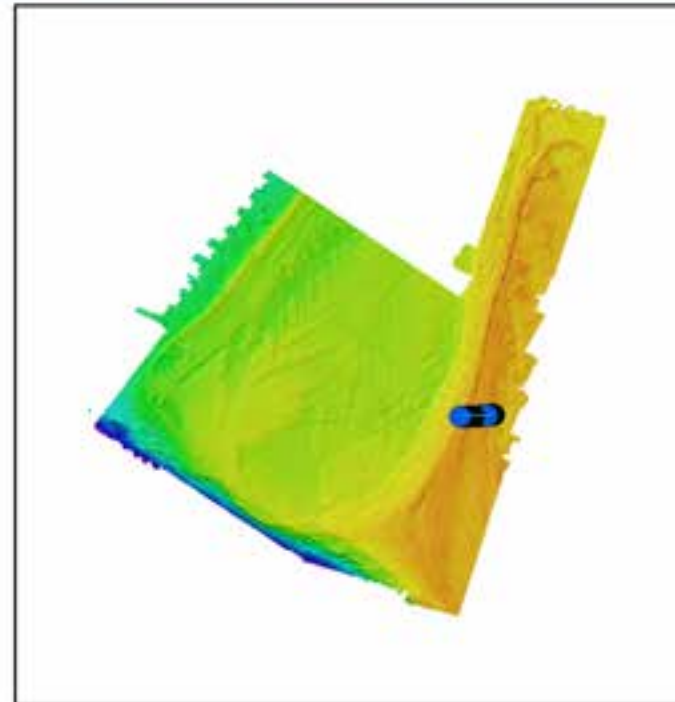
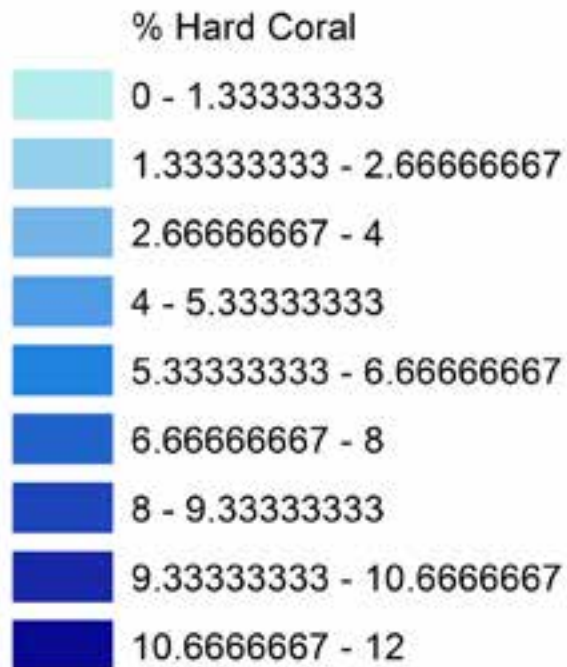


Pro

- C
E

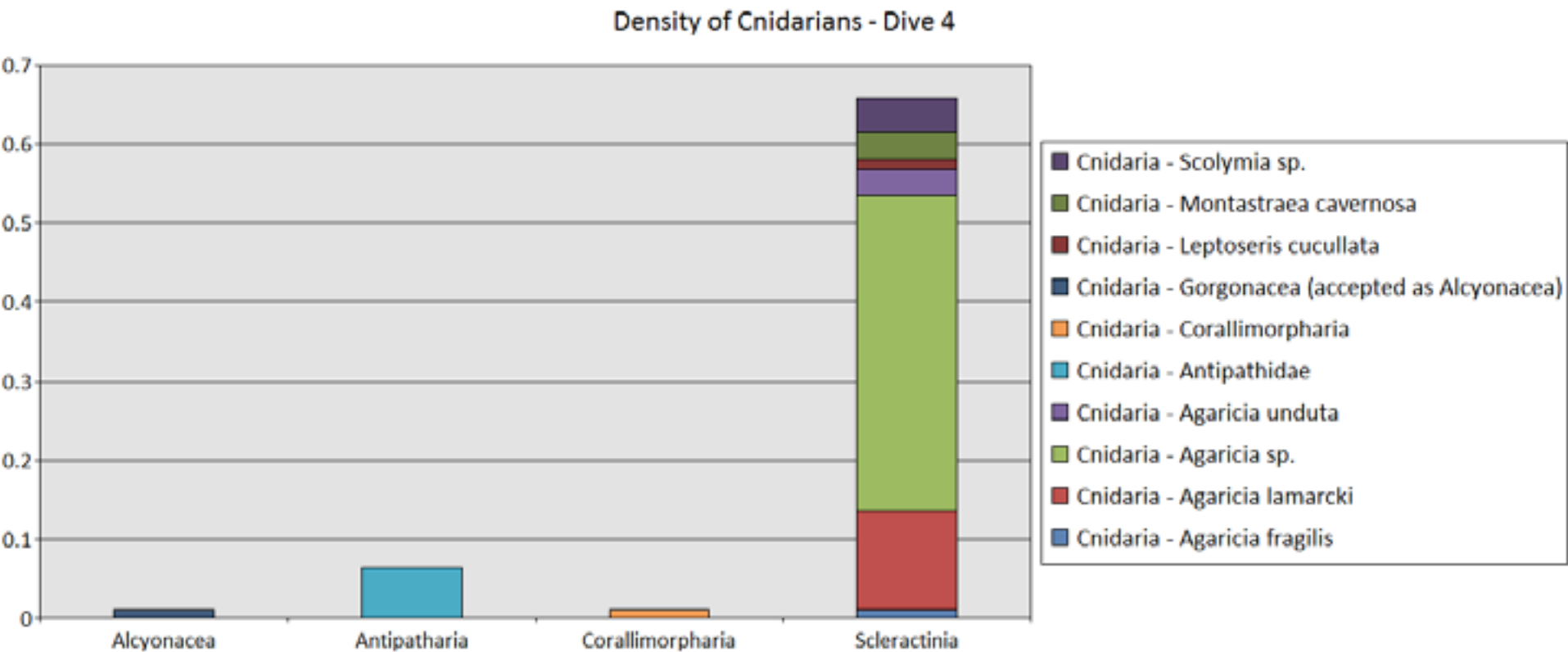


Legend



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



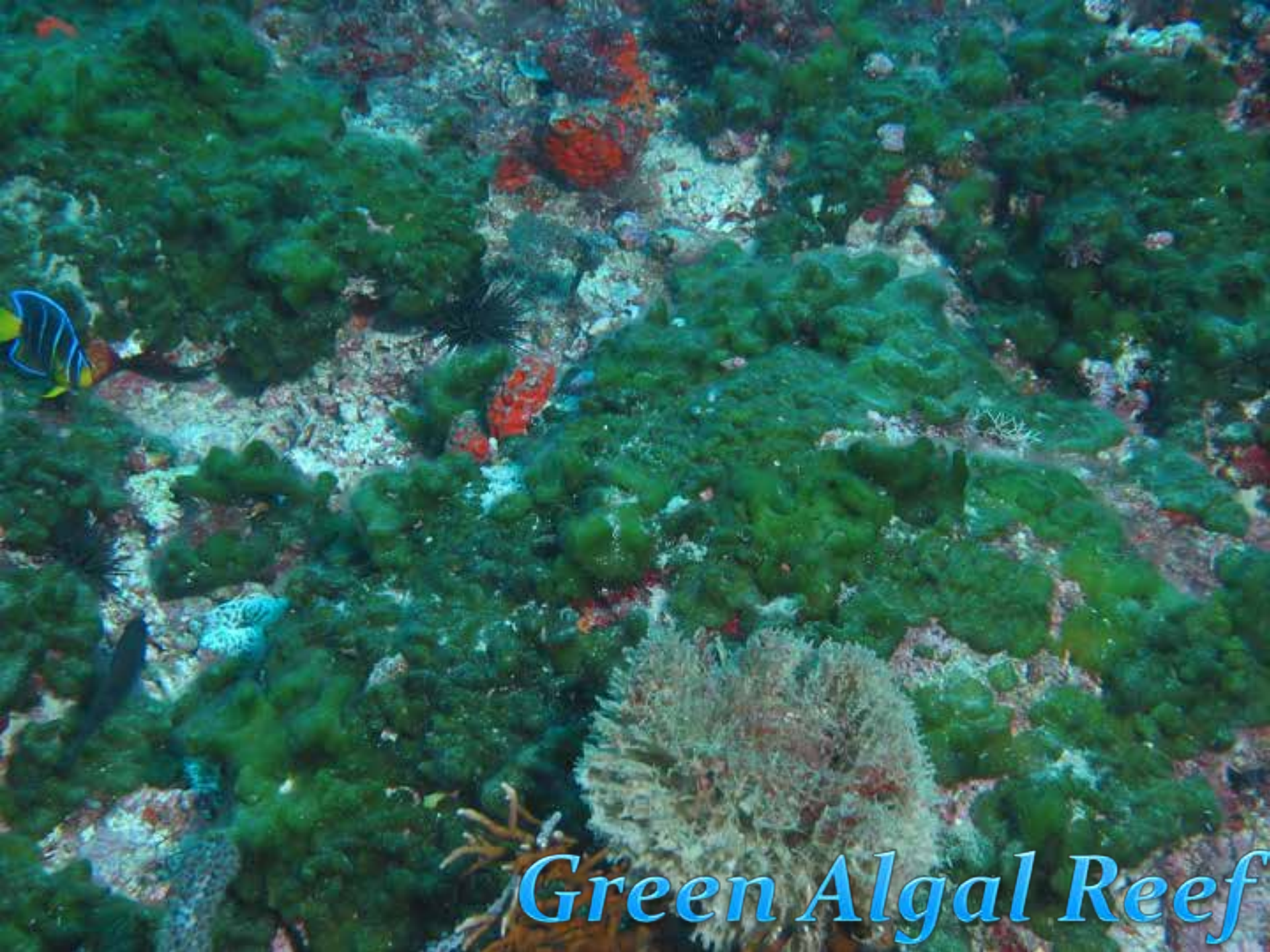
Giant Sea Slug



Grouper



Oculina Habitat



Green Algal Reef



Mesophotic Reef

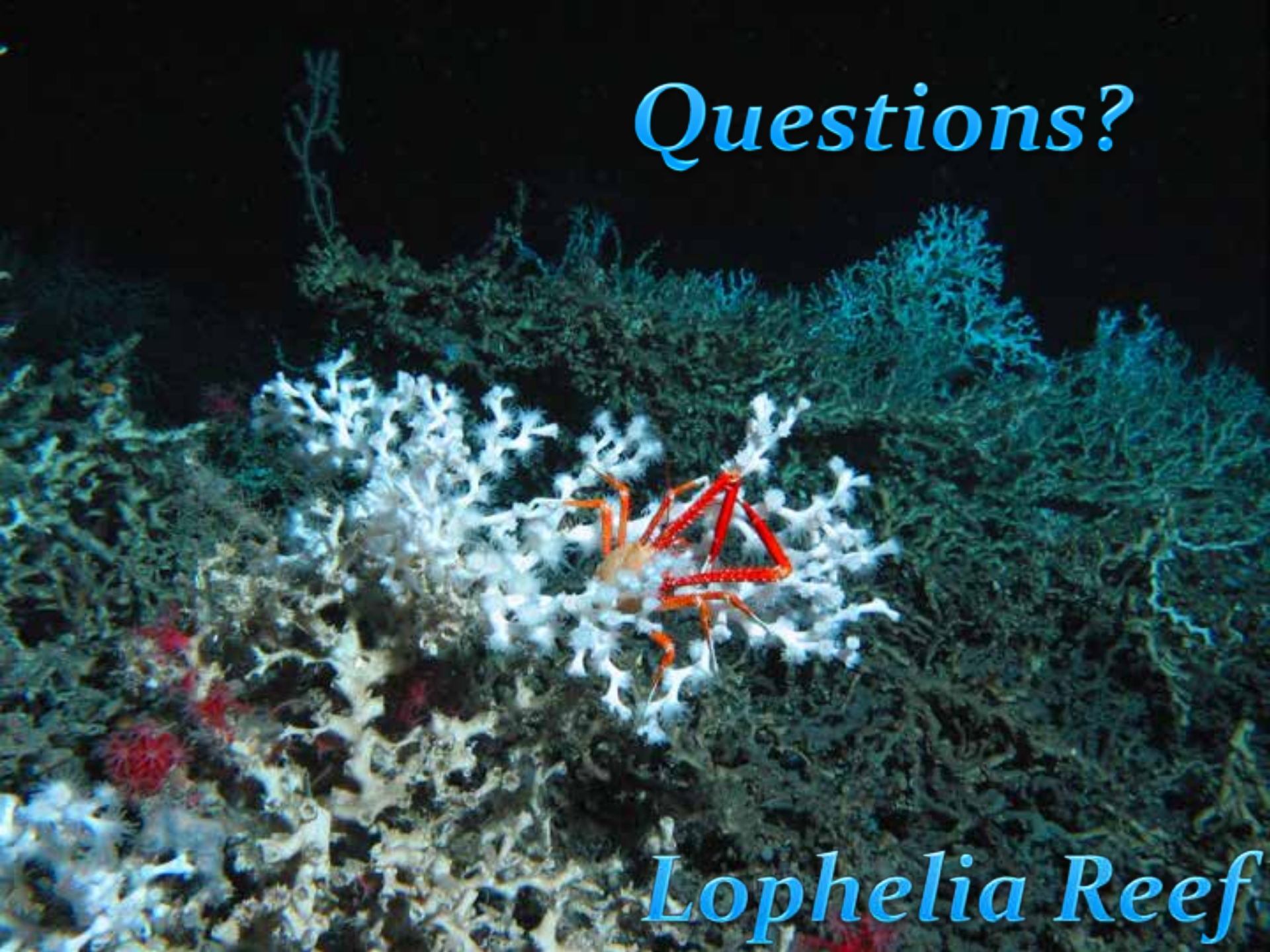


Mesophotic Reef



Volcano Sponge

Questions?



Lophelia Reef