

CRCP Project Title: *Effectiveness of the Oculina HAPC: Monitoring coral health and use of the closed and adjacent areas by groupers*

Project #: 1755-05

Project PI: Margaret Miller, NOAA Fisheries, Southeast Fisheries Science Center

GENERAL DESCRIPTION OF ACCOMPLISHMENTS
January 2007 Progress Report

This project had multiple task components with the common purpose of supporting management of the Oculina Banks HAPC via assessment (habitat mapping and fish census) and monitoring.

TASK 1 (October 2005 ROV habitat characterization cruise):

Objectives:

- Ground-truth multi-beam habitat map obtained in June 2005 (A. David, PI, CRCP project)
- Video and photo documentation of coral habitat condition, and to assess fish communities by habitat type (e.g., live coral, dead standing coral, coral rubble, rocky outcrops, sand) and management area: 1) inside Oculina Experimental Closed Area, 2) Oculina HAPC outside OECA, and 3) outside protected area;
- Selection of ROV dive sites and cruise objectives closely coordinated w/ SAFMC.

Accomplishments (NURC Progress Report in ATTACHMENT 1): 19 ROV dives surveys over approximately 44 linear kilometers of seafloor.

Outcomes and Importance:

- First stratified baseline survey designed to quantify impacts of management (closures)
- Results presented to SAFMC in 2006 at Coral Advisory Panel meeting (ATTACHMENT 2); contributed to Panel advice and Council decision to continue closure indefinitely.
- Results from video transects on fish populations was presented at International Symposium on Deep Sea Corals (ATTACHMENT 3); NMFS scientists at Panama City Lab are working on quantifying habitat and sessile community coverage from digital stills from 2005 dives—related paper expected by end of 2007.
- Ground-truth basis for development of habitat map for the entire Oculina Bank region, based on analysis of multi-beam bathymetry, backscatter, and imagery using seabed classification software (QTC MultiView); habitat map to be completed by May 2007.
- ROV dives documented past recolonization experiments; new growth of Oculina corals on concrete substrate suggests related experiments may help restore healthy coral and fish populations; related proposal submitted to NURC for 2006 and will be proposed to NMFS Proactive Protected Species Conservation Program in 2007.

TASK 2 (Acoustic observatory):

Objectives:

- develop in situ acoustic hydrophone (Automated Listening and Monitoring System, ALMS) to allow remote, long term detection, monitoring, and characterization of potential fish spawning aggregations (particularly groupers) in association with Oculina reefs

Accomplishments:

- Mar-July 2005: upgraded electronics and hydrophone for existing ALMS (ECOS Inc., RG Gilmore, co-PI).
- Conducted pilot deployments across the continental shelf from depth of 20 to 90 m from Apr-Aug.
- Deployed ALMS at Jeff's Reef in OECA, 13 August 2005, where it is still located; should be safe at site until retrieval by dive operations; two attempts in 2005-2006 failed due to weather and

visibility; onboard computer stores data indefinitely; recovery plan is in place (ATTACHMENT 4), however, NURC funding was cut by 40% in 2006 and 2007 and is limiting our ability to do required technical diving.

Outcomes and Importance:

- SAFMC Oculina Experimental Closed Area Evaluation Plan recommends development of observing capabilities in the OHAPC.
- Remote system is needed to document reef fish spawning aggregations given the difficulty and expense of in situ observation of these habitats, particularly during winter/spring spawning season
- ALMS also records and remotely monitors boat, scuba activities, and illegal bottom fishing sounds.
- During Oct 2005 cruise, a biological sound library was produced for Oculina coral habitats via in situ recording of drift acoustic transects, allowing isolation of target organisms in the universe of underwater sounds associated with Oculina coral habitats.
- Partnered with the CRCP outreach project titled “Deep water Coral Reefs are Coral Reefs Too” to perform a range of public outreach activities listed in its Accomplishments report (e.g., ROV cruise Web site with daily Web logs at <http://www.at-sea.org/missions/oculinabanks/resources.html>). In addition, personnel and contractors on this project performed numerous public outreach activities including address of local public schools, angler, and conservation groups; led to development of Deep Coral Web site on SAFMC Web site, including Oculina HAPC pages (<http://www.safmc.net/HabitatManagement/DeepwaterCorals/tabid/229/Default.aspx>).

TASK 3 (*Oculina varicosa* metapopulations):

Objectives:

- Determine genetic variability of *O. varicosa* specimens throughout its depth range off NC to FL

Accomplishments:

- 12 Oculina colonies were sampled from Jeff’s Reef (~ 90m depth within the OECA) for inclusion in an ongoing genetic analysis.
- Collaborators at Louisiana State University are completing development of nuclear sequence markers to allow the discernment of relative levels of genetic variability between deep Oculina Bank colonies and a library of samples from a broad geographic range (North Carolina to Panama City FL), 3 or 4 different nominal species, and both shallow (<8m) and mid-depth (25-30m) locations; analyses are ongoing.

Outcomes and Importance:

- NOAA-Fisheries named *O. varicosa* as a Species of Concern in 2003 largely based on concerns about declines in the Oculina Bank populations. If preliminary result is born out, it would lend strength to the possibility of ESA protection for the Oculina Bank corals.
- Preliminary results suggest that the deep Jeff’s Reef samples may contain novel genetic sequences indicating a level of genetic differentiation from all the other shallow and mid-depth colonies so far analyzed.

SUMMARY OF RELEVANCE TO CORAL REEF CONSERVATION:

In 2005, the SAFMC posted a new “Evaluation Plan for the Oculina Experimental Closed Area” on its web site (www.safmc.net). The plan calls for outreach, research, assessment and monitoring activities, and details critical deadlines for reviewing the status and effectiveness of the OHAPC in 2007 and 2014. Project activities undertook in situ (fish and habitat characterization in different management zones) and laboratory assessments (genetic analyses to assess species boundaries) to directly support management plans and decisions related to MPA effectiveness (SAFMC) and potential additional species-level protection (NMFS-PR; Species of Concern) of habitat-forming coral in the Oculina Banks area.

NURC/UNCW
Management Information System

Project Summary Report

PI Surname: Miller

Project #: 2005-22

Region: SAB

Title of Project: *Effectiveness of the Oculina HAPC: Monitoring coral health and use of the closed and adjacent areas by groupers.*

Start Date: 5/1/2005

End Date: 12/31/2006

Year 1 of 2

Principal Investigator: *complete name, affiliation, department, mailing address, e-mail, phone and fax number*

Dr. Margaret Miller
NOAA Fisheries – Miami Lab
75 Virginia Beach Dr.
Miami, Fl 33149
305-361-4561
margaret.w.miller@noaa.gov

Co-Principal Investigator:

Andrew Shepard
NOAA Undersea Research Center
5600 Marvin Moss Ln
Wilmington, NC 28409
910-962-2446
sheparda@uncw.edu

Other Investigators:

Dr. John Reed
Harbor Branch Oceanographic Institute
Fort Pierce, FL

Dr. Grant Gilmore
ECOS Inc.
Fort Pierce, FL

Cooperating Institutions: *other institutions involved in the mission that are not shown above*

NOAA Fisheries-Panama City Lab, South Atlantic Fisheries Management Council, NOAA Fisheries- St. Petersburg

Number of Participants: *total number of science participants* 12

OPERATIONAL INFORMATION

System	for extended ops only		Weather Days	Other (e.g. mech. prob.)	OPS Days	Total Dives ¹	Total Bottom Time ²
	Port Days	Transit Days					
SCUBA (air)							
SCUBA (nitrox)					10		
Aquarius							
ROV					20		
SUB							
Center Facilities: lodging <input type="checkbox"/> dockage <input type="checkbox"/> shore lab <input type="checkbox"/> small boats <input type="checkbox"/>							
Center Equipment: CTD <input type="checkbox"/> Video camera(s) <input type="checkbox"/> still camera(s) <input type="checkbox"/> Other: _____							
Support Vessel(s) used: M/V Liberty Star, unknown dive boat							

1. For SCUBA, SCUBN or Aquarius = man dives or excursions; for ROV/SUB = system dives
2. Bottom Time = surface to surface interval (hours)

Operating Depth Range(meters): 50-110

Project Location(s): geographic name = area of research, e.g., Hatteras slope or Conch Reef; latitude and longitude = center of area; no more than four areas

Site	Geographic Name	Latitude (dd-mm.m N)	Longitude (ddd-mm.m W)
1	Oculina Banks Habitat Area of Particular Concern, east coast Florida	28-00	80-00
2			
3			
4			

COST INFORMATION

NURC/UNCW Support (input by Center):

Variable Costs = direct costs, including supplies, equipment, services, subcontracts provided by the Center for this project

\$ NURC input

Fixed Costs = value of Center system support based on estimated day rate for the system times number of operations days

\$ _____

Total = \$ _____

Co-funding Support (input by PI):

Agency	Status (Approved, Submitted)	Period (dates)	\$ Amount
NOAA Coral Reef conservation Program	A	1/1/2005-12/31/2006	\$123,000
			\$
			\$
			\$
			\$
			\$
Total Co-Funding =			\$

PROJECT DESCRIPTION

I. SUMMARY OF PROJECT: *objectives, methods, and the significance of the proposed activity to the advancement of research field, environmental management, or education. Please avoid use of first person.*

Background:

Ivory tree coral, *Oculina varicosa*, occurs on the continental shelf throughout the southeastern U.S. and Caribbean. The deep water form is ahermatypic, delicately branching, and forms large mounds on the shelf edge off the east coast of Florida, known as the Oculina Banks. The mounds lie in 60-110 m of water, are thousands of years old, and rise as high as 30 m above the surrounding bottom. They are slow-growing, averaging about 1-2 cm per year. In 1984, the South Atlantic Fishery Management Council (SAFMC) established 92 nm² OHAPC in order to protect the fragile coral from damage caused by bottom-tending fishing gear including bottom trawls, bottom longlines, dredges, and fish traps. Subsequent protection was afforded to the OHAPC by prohibiting anchoring, trawling for rock shrimp, and by requiring the use of vessel monitoring systems (VMS) on rock shrimp vessels. In 1994, the area encompassed by the 92 nm² OHAPC was declared the Oculina Experimental Closed Area, and possession of or fishing for snapper/grouper species was prohibited for 10 years to allow for scientific studies. Designation of an area where deepwater species such as grouper and tilefish can grow and reproduce without being subjected to fishing mortality provides a unique opportunity for study. The former OHAPC was expanded in 2000 to include an additional 300 nm². Illegal trawling and bottom fishing continue today as evidenced by recent seizures and arrests. Since the 1994 closure, 56 ROV dives and 15 research submersible dives explored 0.11% of the 300 mi² OHAPC. We need to begin annual, repeat transects at the same sites, seasonal transects, and increase coverage to unprotected banks recently discovered with multibeam mapping. The Banks are known spawning sites for federally-managed grouper species including gag, scamp, snowy, and speckled hind. The dominant grouper species in the OHAPC, now gag and scamp, appear to spawn in the late winter (Feb-Mar) at a time that is difficult to conduct undersea research on the Banks due to weather and seas. A new observatory approach is required to provide documentation of these populations and their reproductive activities year-round. Oceana has petitioned the federal government to include the deep-water form of *O. varicosa* under the Endangered Species Act. Although the species, as currently taxonomically defined, is common, there has never been a genetic analysis of the deep-versus shallow-water forms required to address this petition. Outreach efforts are needed to spread the story of deep sea corals and marine protected areas to the general public and education community. This project addresses the 'fishing, diving and other uses' focus area of the Local Action Strategy (LAS) for the Southeast Florida Coral Reef Initiative. The OHAPC was established to ameliorate heavy fishing pressure, thus evaluation of the OHAPC efficacy addresses fishing uses.

Objectives/Approach:

Objective 1-- Document grouper spawning and other reproductive activities on a living Oculina reef:

We propose to establish a long-term Oculina Acoustic and Video Observing System (Ocu-Doc) on Jeff's Reef, one of 2 known intact reefs left in the OHAPC. The station will include: passive acoustic hydrophone, 360° low-light digital video camera, temperature, and salinity. These units were successfully tested, recording Goliath groupers and several other sound-producing fish just inshore of the OHAPC.

Objective 2-- Monitor and compare live coral cover, fish populations, and biodiversity in and outside the OHAPC:

In 2002, a multi-beam survey covered about 60% of the reefs inside the OHAPC. Abiotic surveys alone are inadequate to map habitat. ROV transects were conducted in 2003 to ground-truth the survey and describe biological components. Multi-beam survey data allows us to conduct within-habitat ROV transects in three target study areas: OHAPC north & south and outside OHAPC. Thus, the proposed ROV transect sampling scheme per expedition involves: 3 dive areas x 5 major habitat types (determined from 2003 ROV survey excluding live coral mounds) x 3 replicates = 45 dives. Initial dive sites will be chosen based on the 2003 cruise. Divers will be used to conduct video transects, fish point counts, and coral sampling on the live reefs. Transects will be continuous strip transects used for quantification of habitat and sessile invertebrates, while point counts will be used as a less intrusive method to estimate fish abundance. Individual frames from the transects will be captured every 3-5 secs and analyzed for percent cover and megafaunal abundance.

Objective 3: Oculina varicosa genetics:

Divers will collect coral samples from the OHAPC for genetic analysis. A current contract from NOAA to conduct these analyses will be used to compare to shallow Oculina samples collected from sites across the southeast (NC to FL). Genome will be assessed by PCR fragmentation analysis. Objective 4: Outreach and education. The research cruises will serve as focal activities in support of outreach proposal also submitted to the CRCP for 2005 support. This project will fund a variety of outreach activities designed to inform the public about deep sea corals and provide teachers and students with marine science education content and hands-on experience. Deliverables: Images, transect data, and Ocu-Obs data will be incorporated into an on-going Oculina GIS (www.uncw.edu/oculina). Data will contribute to peer-reviewed publication in preparation comparing OHAPC from 1978 to present; to be orally presented at 2005 International Symposium of Deep Sea Corals, Miami, FL. Technical reports will report initial results. Ship and Dive Schedule: Spring & Fall ROV & technical dive cruises will be completed in May & October 2005, respectively, addressing objectives 2-4. Completion of Ocu-Obs (objective 1) development & testing will be done during summer 2005, while deployment and recovery will be done from Dec. 2005 to March 2006.

Funding:

This project was peer-reviewed by the NOAA Coral Reef Conservation Program for FY 2005. The total award of \$153,000 includes:

- \$10,000 for NOAA Fisheries-Miami Lab (Miller Objective 3)
- \$20,000 for NOAA Fisheries- Panama City Lab (S. Harter contract to support objectives 1 and 2)
- \$123,000 for NOAA Undersea Research Center at UNCW (shiptime to support all objectives, subawards for co-non-NOAA investigators, ROV support).

II.SUMMARY OF RESULTS: *Accomplishments, benefits, and new research topics: 1) preliminary results and significance; 2) success of the mission in terms of project goals; 3) plans for use of the data, for example, management needs, publications, or other products; 4) new research ideas or directions generated.*

During this six day cruise, the following operations were done:

- Nineteen ROV dives surveys over approximately 44 linear kilometers of seafloor; 36 one-hour mini-DV video tapes and 1500 digital still camera shots were collected.
- Sixteen grab sample stations for substrate data to ground-truth habitat map
- Five acoustic hydrophone lowerings were done one night from small boat to record natural sounds on Jeffs Reef.

Preliminary results include:

- First stratified baseline survey designed to quantify impacts of management (closures)
- Results presented to SAFMC in 2006 at Coral Advisory Panel meeting; contributed to Panel advice and Council decision to continue closure indefinitely.
- Results from video transects on fish populations was presented at 2005 International Symposium on Deep Sea Corals; NMFS scientists at Panama City Lab are working on quantifying habitat and sessile community coverage from digital stills; related paper expected by end of 2007.
- Ground-truth basis for development of habitat map for the entire Oculina Bank region, based on analysis of multi-beam bathymetry, backscatter, and imagery using seabed classification software (QTC MultiView); habitat map to be completed by May 2007.
- ROV dives documented past recolonization experiments; new growth of Oculina corals on concrete substrate suggests related experiments may help restore healthy coral and fish populations; related proposal submitted to NURC for 2006 and will be proposed to NMFS Proactive Protected Species Conservation Program in 2007.

III. CENTER SUPPORT: *Advantages of NURC/UNCW program, particularly in situ support, to the project and your research program. Please comment on operations and highlight both strong and weak points; suggestions for improvement are appreciated.*

Operations were completely successful. Liberty Star is ideal platform to support ROV operations at these depths and in high current conditions due to capability of crew and dynamic positioning system.

Multi-beam products from previous surveys were extremely valuable in selecting dive transects and grab sample locations.

IV. PUBLIC INFORMATION RELEASE: *please help us promote undersea science by writing a paragraph highlighting the importance of the research that may be used for public distribution and press releases.*

Cruise web site at <http://www.at-sea.org/missions/oculinabanks/resources.html> includes press materials.

Oculina Experimental Closed Area (OECA): Assessment Status and Needs

Andy Shepard, NURC/UNCW

SAFMC Meeting, August 21, 2006

Cocoa Beach, FL

Outline

- OECA Evaluation Plan
- Status of Assessment Work
 - Mapping/characterization
 - Coral habitat assessment
 - Fish Assessment
- Future Priorities



2005 OECA Partners:

Federal: NOAA/NURP, NOAA Fisheries, SAFMC, NASA

Academia: HBOI, ECOS Inc., Smithsonian

Industry: Seafloor Systems, Inc., Dixie Crossroads Seafood, United Space Alliance

State: FWRI, FFWC, Port Authority, local teachers

OECA Evaluation Plan

http://ocean.floridamarine.org/efh_coral/pdfs/Oculina/FINALEvaluationPlan.pdf

- ❑ ASSESSMENT
(fish census and habitat mapping)
- ❑ RESEARCH & MONITORING
- ❑ OUTREACH
- ❑ LAW ENFORCEMENT



OECA Evaluation Plan

Table 3. Assessment timeline

1) Fish stocks:

- Commercial spp. in/out- 06, 09, 14
- Community in/out- 06, 09, 14
- Connectivity- 14

2) Habitat:

- High rez mapping and characterization- 06 (OECA), 07 (OHAPC & adj. coral), 08 (new areas)

3) Magnitude/causes of change

4) Oceanography

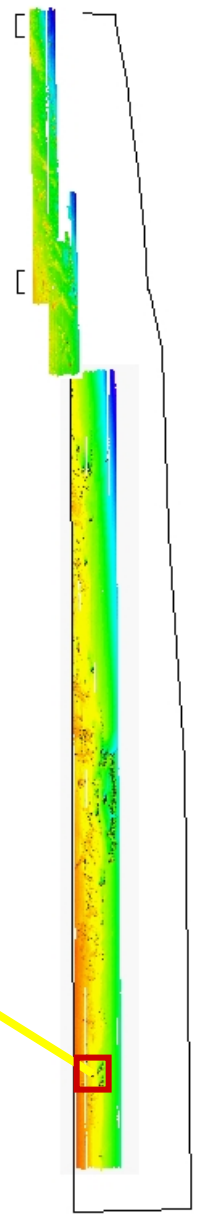
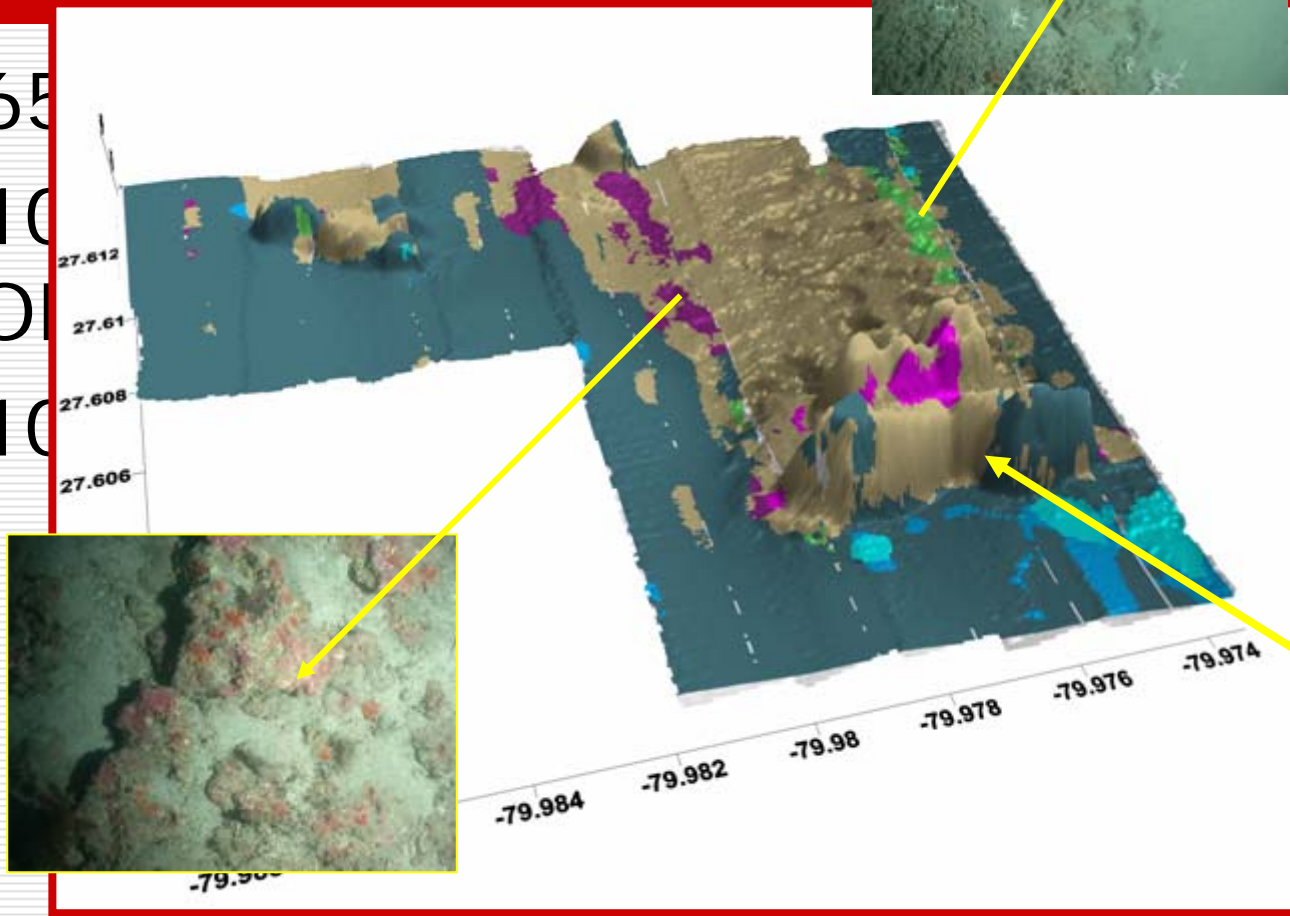
CRCP Deliverables (2002-2006)

- ❑ Science (\$280k): >3 publications, 3 posters at ISDSC+
- ❑ Technology: ALMs station, AUV tests
- ❑ Outreach (\$130k): TV coverage & documentary (pending), Web site (www.at-sea.org), GIS– Oculina (www.uncw.edu/oculina) and SAFMC regional site
- ❑ Education: lesson plans, teacher network, CD, Web

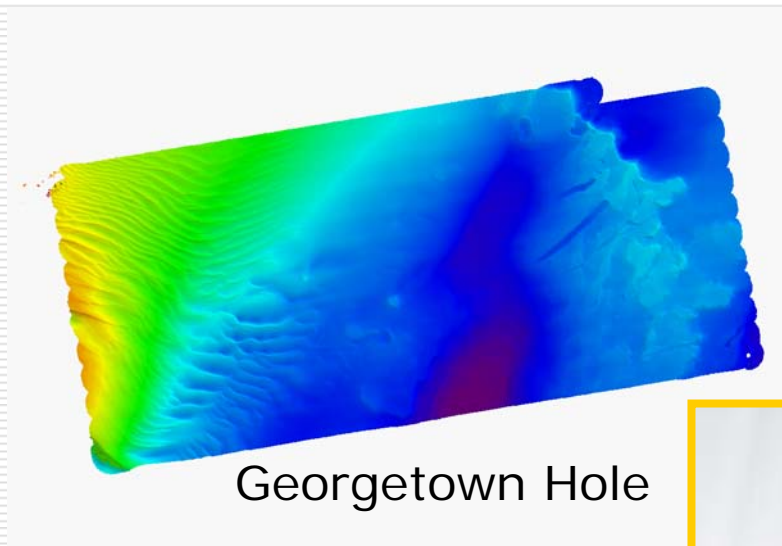
Mapping & Characteriza

s

- 65
- 10
- 0
- 10



Eagle Ray AUV



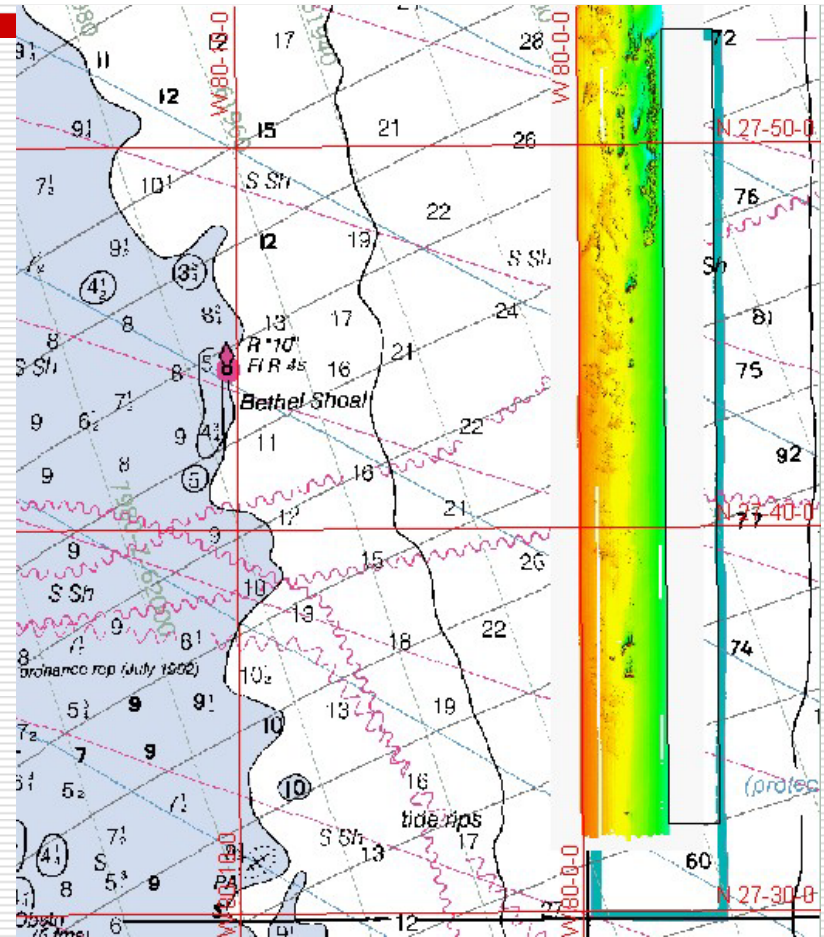
Mapping & Characterization Priorities

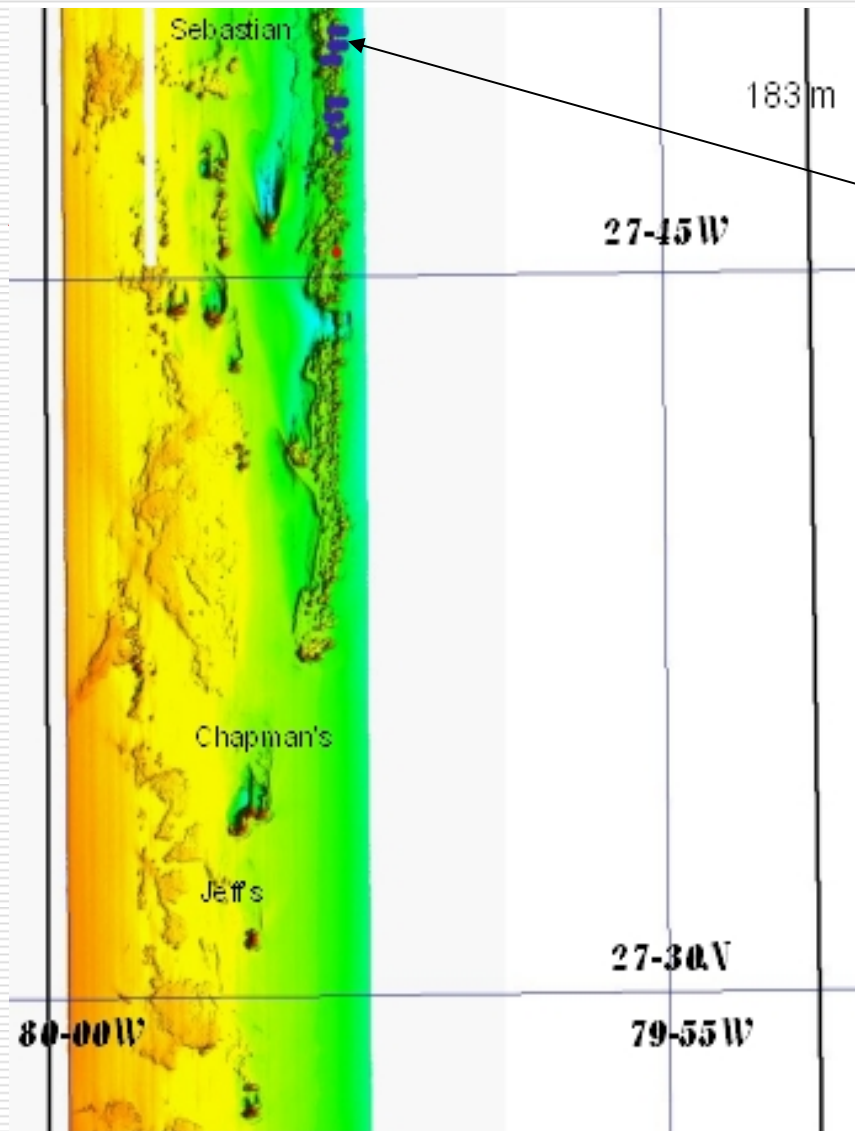
- 2006 Survey
- Finish OECA and OHAPC using AUV
- New areas to north
- Experiments to determine threshold of change detection for AUV MBES
- Repeat in 5 years to detect physical changes and guide dives
- Repeat in 10 years for final change assessment

2006 AUV OECA Survey Plan

Approach:

- *Eagle Ray* AUV with EM2000 MBES
- NURC *Phantom S2* ROV
- *Liberty Star*
- Image coral restoration modules
- Map OECA, from 79-56.0W to 79-57.5W, and from 27-33N to 27-53N





- Precisely locate structures
- Validate/compare AUV MBES versus 2002 ship survey
- Measure of detection threshold for AUV system

Schedule (tentative)

- Port Location: Port Canaveral, FL
 - Port – October 9 and 10
 - Operations – October 11-16
 - Port – October 17
- Dive plan:
 - AUV survey of restoration modules (0.5 day)
 - AUV survey of OECA (6.5 days)
 - ROV ground-truth dives, sites TBD (3 days)

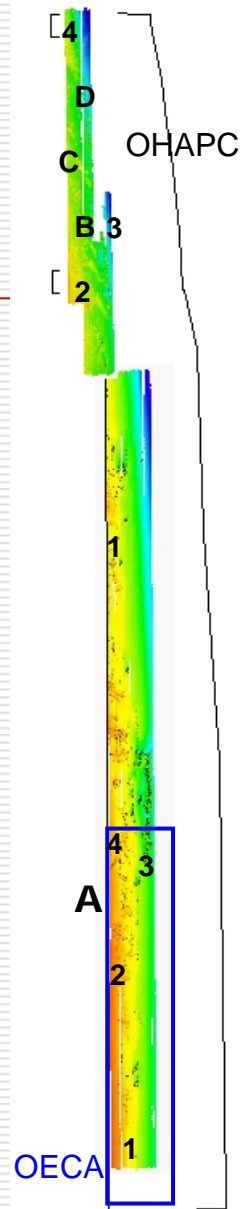
Participants

- ❑ Andy Shepard, co-PI, Cruise Chief Scientist, NURC/UNCW, sheparda@uncw.edu, 910-962-2446
- ❑ John Reed, co-PI, Harbor Branch Oceanographic Inst. jreed@hboi.edu, ROV dive annotation
- ❑ Stacey Harter, NMFS-Panama City, ROV transect analysis/fish census, Stacey.harter@noaa.gov
- ❑ Marta Ribera, NMFS-Panama City, ROV imagery data technician, marta.ribera@noaa.gov
- ❑ Amanda Maness, UNCW, MBES data manager, ROV tender, amm0682@uncw.edu
- ❑ Amanda Williams, UNCW, GIS tech, ROV tender, acw4429@uncw.edu
- ❑ Lance Horn, NURC AUV team, ROV pilot, hornl@uncw.edu
- ❑ Glenn Taylor, NURC AUV team, ROV tender/co-pilot, taylorg@uncw.edu, taylorg@uncw.edu
- ❑ Jeff Williams, NURC AUV team, jeff.williams@usm.edu
- ❑ Aaron Alexander, NURC AUV team, ROV tender, data manager for AUV and ROV tapes, alexandera@uncw.edu
- ❑ Dorien McGee, Univ. of S. FL, water and geological sampling, dmcgee11@tampabay.rr.com
- ❑ Jocelyn Karazcia, NOAA/SAFMC, outreach/education lead, Jocelyn.Karazcia@noaa.gov
- ❑ Tina Udouj, FL Wildlife Research Institute, SAFMC rep, Tina.Udouj@fwc.state.fl.us
- ❑ TBD, NOAA Coastal and Geodetic Survey

- ❑ Alternates: Sandra Brooke, Steve High, Chris Koenig

Coral Assessment Status

- Stations for 2005
- % cover 2003 dives (2 dives, Harter & Shepard, In rev.)
- 2005 dives analyzed by Panama City Lab, report and paper in 2007
- QTC map by Dec. 2006 for 2005 survey, thesis and paper (Maness et al.)



Point Data (20)

POINT	ID	NOTES
A	3SA	TUB
B	3SA	TUB
C	3SA	TUB
D	3SA	TUB
E	3SA	
F	3SA	TUB
G	3SA	TUB
H	3SA	
I	3SA	TUB
J	3SA	
K	3SA	
L	3SA	TUB
M	3SH	
N	3SA	
O	3SA	
P	3SA	
Q	3SA	
R	3SA	TUB
S	3SA	TUB
T	3SA	

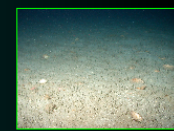
Zoom: 100%

Left click Right click

100% 300% 600%

MAJOR CATEGORY	CPC %	Gross* CPC%	Video %
HARD BOTTOM WITH LIVE CORAL	0.69	4.4	7.6
HARD BOTTOM WITHOUT LIVE CORAL (rubble, standing dead, pavement, outcrops)	16.06	34.3	35.1
SOFT BOTTOM (sand)	83.24	61.3	57.3

* - Gross = rare habitat not hit by dots but seen in image

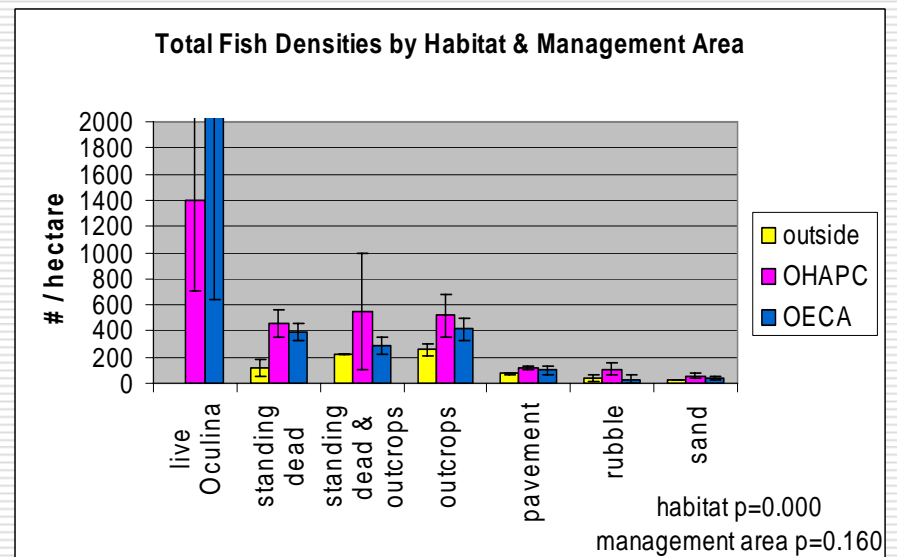
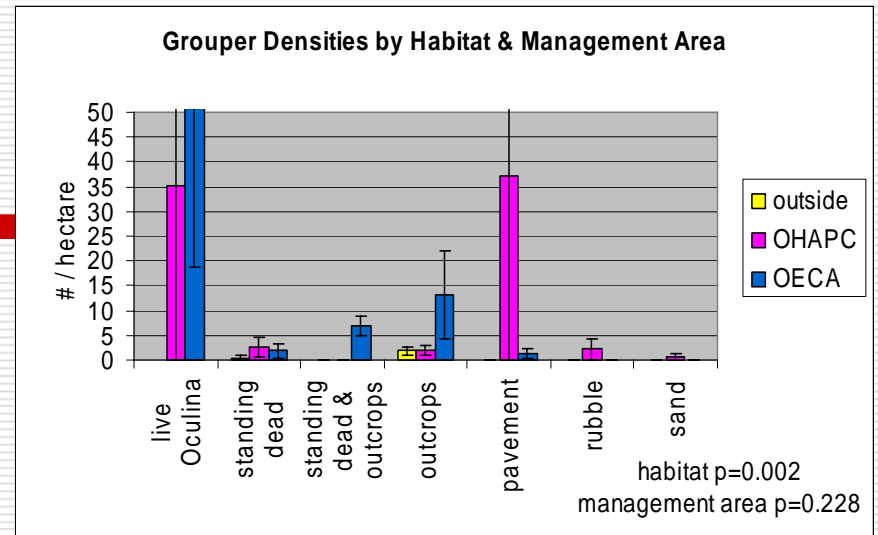


Coral Assessment Priorities

- ❑ Supervised QTC map for OHAPC and adjacent/new coral habitat
- ❑ Permanent stations to monitor specific coral heads over time
- ❑ More **N** (samples!)
- ❑ Long term strategy based on shallow coral monitoring programs, adapted for deep ecosystem

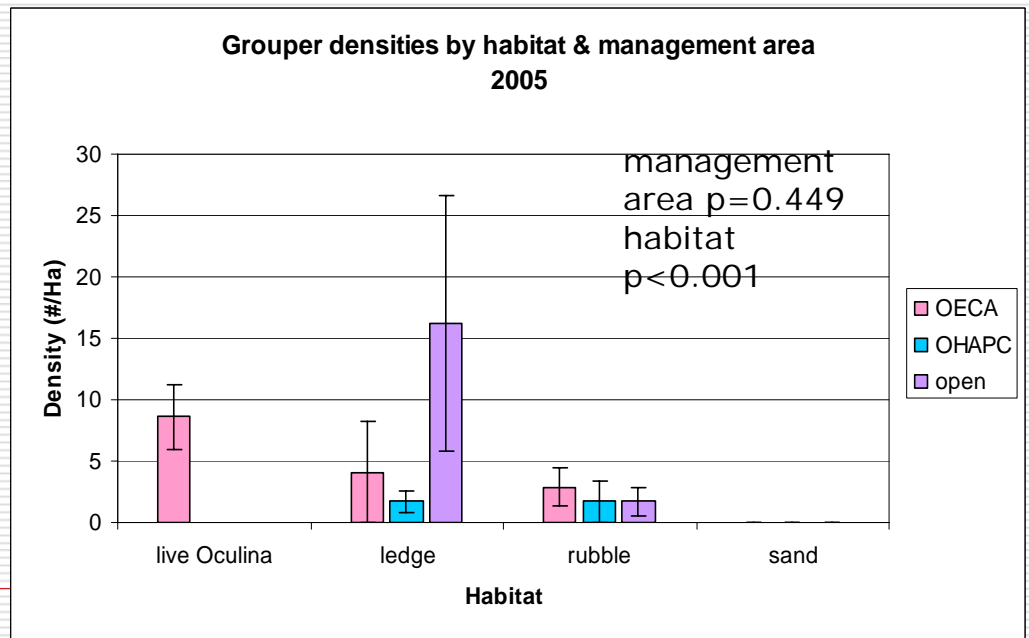
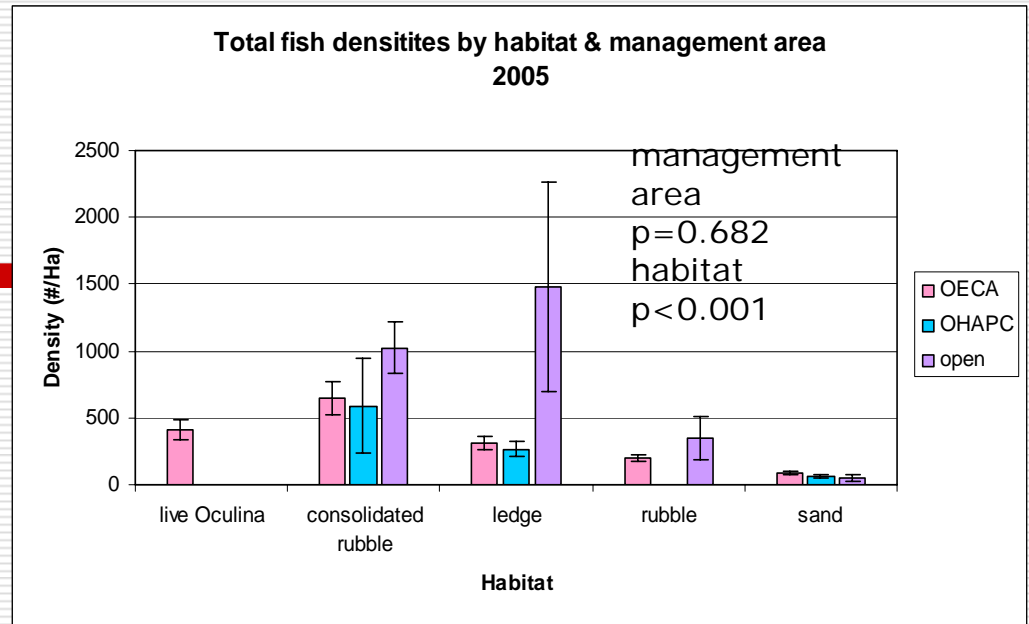
Fish Assessment Status

- 2001-2003 videotapes (Harter & Shepard, in rev.)
- Fish higher on relief
- Management areas not significantly diff., but sampling too low
- ROVs not preferred method for commercial snapper/grouper assessment



2005 Dives

- Similar conclusions to 2003
- Note- results always confounded by complex of variables (e.g., on-going management); see Ault et al. 2006)



AUTOMATED LISTENING AND MONITORING SYSTEM (ALMS)- Grant Gilmore)



BATTERY



COMPUTER



HYDRO. # 1

HYDRO. # 2

TEMP. PROBE

SONY DAT

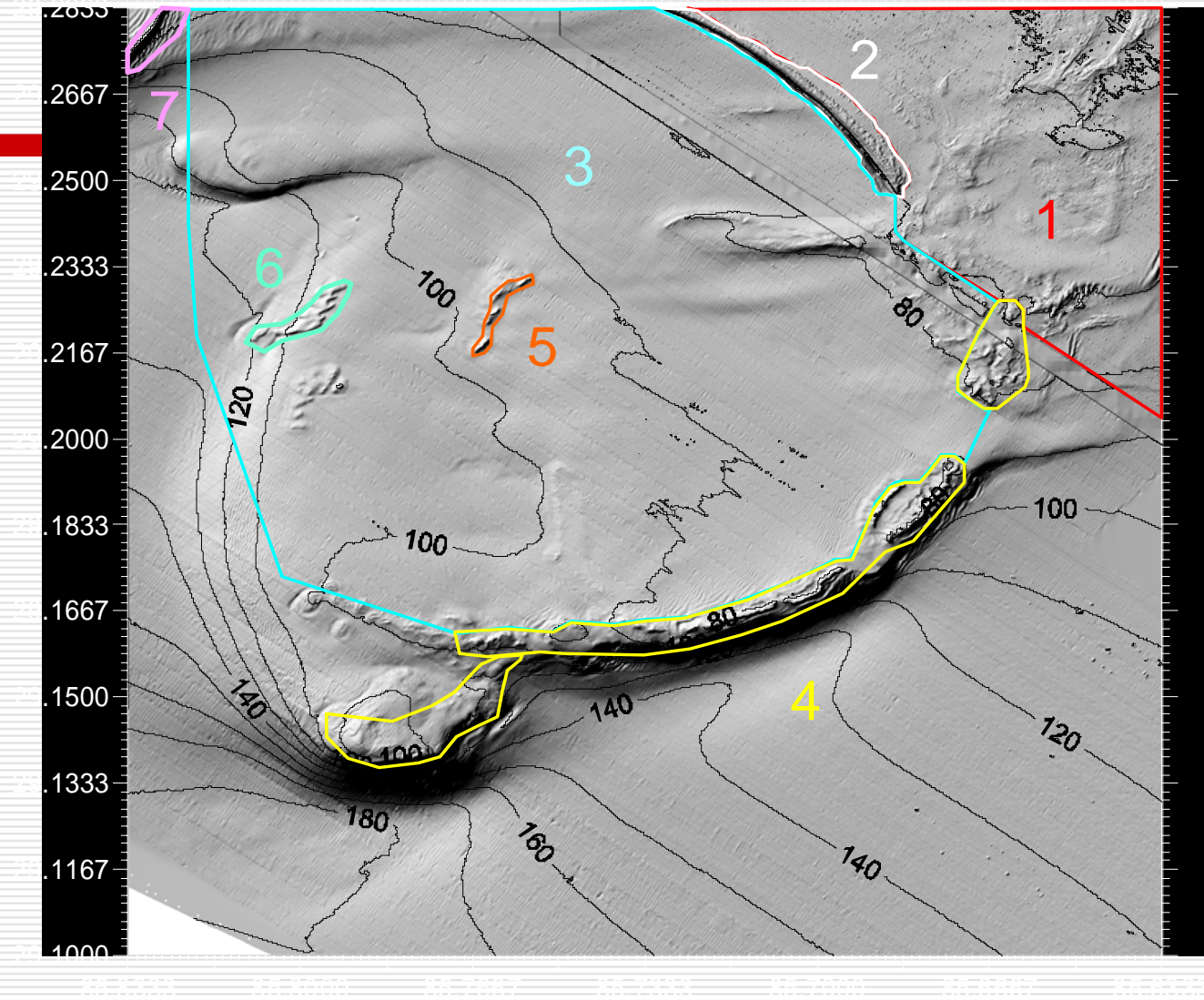
Fish Assessment Priorities

- ❑ Annual fisheries independent surveys required
- ❑ Drop camera for snapper/grouper- subs and divers not likely affordable for this purpose of trophic studies!
- ❑ Two times per year (March/Oct)- once with ROV (Oct) and twice with drop camera array
- ❑ Long-term observatories on aggregation sites

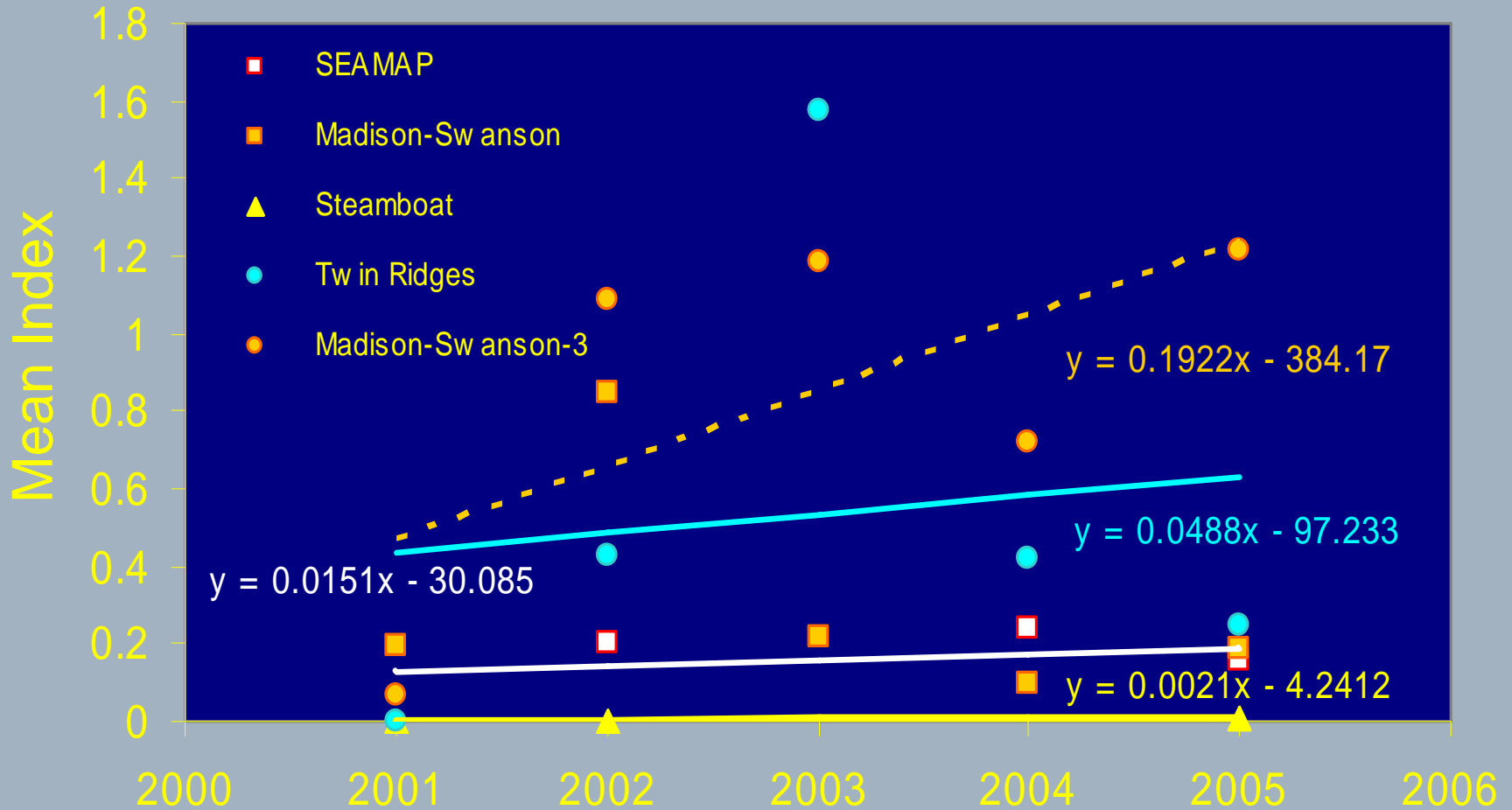


Five camera array using 4 Sony VX1000 digital camcorders in Gates housings, and a single, down-looking Sony PC110 or PC120 digital camcorder in a Gates housing

Site Stratification within Madison-Swanson



GAG



Outreach & Education

- ❑ Teacher development workshop
- ❑ Public awareness and literacy
- ❑ Mass media (TV, newspaper, magazine)
- ❑ Port Day
- ❑ Web products



HARBOR BRANCH OCEANOGRAPHIC

Sea exploring the ocean frontier

CURRENT MISSION ARCHIVES ABOUT @SEA

PROTECTING A NATIONAL TREASURE:
FLORIDA'S OCULINA
DEEPWATER CORAL REEFS

OCTOBER 12 - 18, 2005

Scientists will embark on a seven-day expedition to explore one of Florida's most vital but least familiar marine resources—the spectacular deepwater coral reefs of the Oculina Bank. Among the team's goals is the start of a sustained and critically needed monitoring and protection program, exploring new portions of the reef revealed by a recently developed high-resolution seafloor map and assessing populations of snappers, groupers, and other fish species which depend on this unique and threatened ecosystem.

The Marine Event

JOIN HBI'S SCIENTIST MARSH YOUNGQUITH IN HIS LATEST CRUISE TO THE GULF OF MEXICO STUDYING PREDATION HABITS OF GELATINOUS ZOOPLANKTON...

HARBOR BRANCH OCEANOGRAPHIC

© 2005 Harbor Branch Oceanographic Institute
@SEA is a Registered U.S. Trademark



Opportunities

- 2008-2013 NOAA Ship time (David, NMFS), 20 d per year
- OER (OE and NURP) merger

NOAA CORAL REEF CONSERVATION PROGRAM
Progress Report for CRCP Project # 1755-05

BIO-ACOUSTIC MONITORING TECHNOLOGIES:
OCULINA-GROUPER SOUND SIGNATURES

R. Grant Gilmore, Jr., Ph.D., ECOS, 5920 First St. SW, Vero Beach, FL 32968.

The objective of this portion of the research program entitled: "Monitoring Coral Health and Use by Groupers" was to develop systems that would allow long term monitoring of animal activities in association with *Oculina* coral reef structures, particularly serranid groupers, and deploy them within the *Oculina* deep reef system off East Central Florida. In addition, to technology development, a biological sound library was to be produced for *Oculina* coral habitats. This work will allow isolation of target organisms in the universe of underwater sounds associated with *Oculina* coral habitats. Incidental to biological sound classification, this project has also recorded a variety of human sounds including diagnostic scuba equipment sounds, boat motors, fishing gear sounds and ship sounds. The latter library may be used to determine human use and activity type on protected reef formations.

From March to July an Automated Listening and Monitoring System (ALMS) developed by R. Grant Gilmore and colleagues 1990-1993 was upgraded with new electronics and hydrophones. This system allows continuous recording of underwater sounds for several weeks based on sampling rates, preprogrammed sampling periods and power limitations. However, it was only deployed for 48 hr periods due to equipment deployment and retrieval security concerns as well as logistic limitations.

ALMS was deployed across the continental shelf from depth of 20 to 90 m from April to August 2005. The last deployment was on Jeff's Reef (27° 32.540 - 27° 32.618 N., 79° 58.783 - 79° 32.618 W), 13 August, where it is still located (Figure 1). Mixed gas divers deployed the ALMS, but were not able to locate it on the following day due to diver bottom time limitations relative to the size of Jeff's reef. If the ALMS is still anchored on the reef (west grotto area on north side of reef), it may be recovered in 2006 when sub operations or NOAA dive operations permit. The on board computer will store recorded data indefinitely, so valuable data could be retrieved if the ALMS is recovered. If the ALMS system (worth approximately \$15,000), is retrieved it will have valuable information on coral invertebrate and vertebrate sounds as well as boat, scuba diver and illegal bottom fishing sounds as fishing boats were fishing illegally on the bottom at Jeff's Reef when the ALMS was deployed there.

Oculina coral samples were collected on 14 August during the ALMS recovery attempt. These were fixed and transported to Margaret Miller via Doren Mason of NOAA AOML, Miami.

As part of this contract an effort is being made to mate the DIDSON high resolution sonar system to PAMS (Passive Acoustic Monitoring System), developed by R. G. Gilmore and colleagues with NASA, NOAA, and the U.S. Air Force 2001-2003. A complete retrofit and upgrade of PAMS is being conducted. As part of this upgrade work by the United Space Alliance and Peter Johnson of BAE, Mike Lane, met at Cape Canaveral and at the Smithsonian Research Station in Fort Pierce Florida, 22-25 August to field test DIDSON and Biosonics sonar (Laura Kracker, NOAA NOS, Charleston, SC) on fish and invertebrate populations associated with structure in Fort Pierce Inlet. Seminars on the technology were also given to representatives of Florida and Federal agencies. New computer systems, connectors and mechanical support systems have been purchased and used for mating DIDSON and PAMS. Peter Johnson will be flown from the west coast (Portland, Oregon) to complete field trials of this new deep reef monitoring system from January to April, 2006.

In addition to this work, three drift acoustic transects of one hour duration were made by Stacey Harter, NOAA, NMFS, Panama City, FL, within the *Oculina* reef systems during a NOAA sponsored USA cruise, October, 2005, the "Ivory Tree Coral Expedition: Assessing the Effectiveness of the *Oculina* Deep Coral Reserve." These acoustic transects recorded a large (large number of multiple calls, relatively high dB level) choral signature of biological origin and passing cruise ships. It is likely that this choral signature is not from serranid groupers, as they do not produce choral oral displays, only producing sound in pair bonding activities, social interactions and spawning. The choral signature is being analyzed and added to the growing bio-acoustic library recorded this year from east Florida continental shelf habitats. Organisms creating these sounds will be identified where possible, however the sonar signatures that can be produced at sound production sites in 2006 will aid considerably in verifying these sound

sources. Many sounds recorded to date can be placed to family level (ex. ophidiidae, serranidae, haemulidae, carangidae) based on prior experience and comparative recordings made elsewhere in the world, but not to generic or species level, except for some previously documented species such as the goliath grouper, *Epinephelus itajara*.

A series of outreach presentations were given to secondary school children at Port Canaveral prior to R/V Liberty Star departure on October. This work entailed 16 hrs of prep and presentation time. Additional public relations activities were conducted in addressing regional anglers and conservation groups throughout the year (estimated, 100 hrs), and in preparing a movie documentary on Oculina fish/fisheries studies with George Sibley, 15 November,

10 hrs. It is anticipated that by January 1, 2006, over 200 hrs in public presentations and prep for public presentations would have been made by R. G. Gilmore in association with this NOAA sponsored project, exclusive of time spent on technology R & D, field activities and acoustic library preparation.

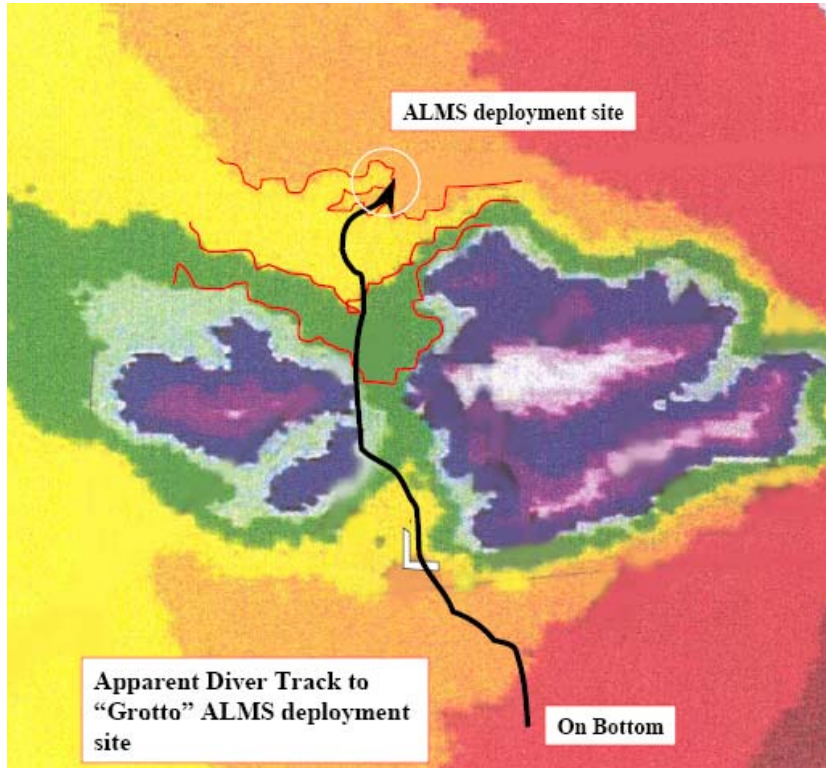


Figure 1. Deployment of ALMS on Jeff's Reef (27° 32.540 - 27° 32.618 N., 79° 58.783 - 79° 32.618 W), 13 August, where it is still located.

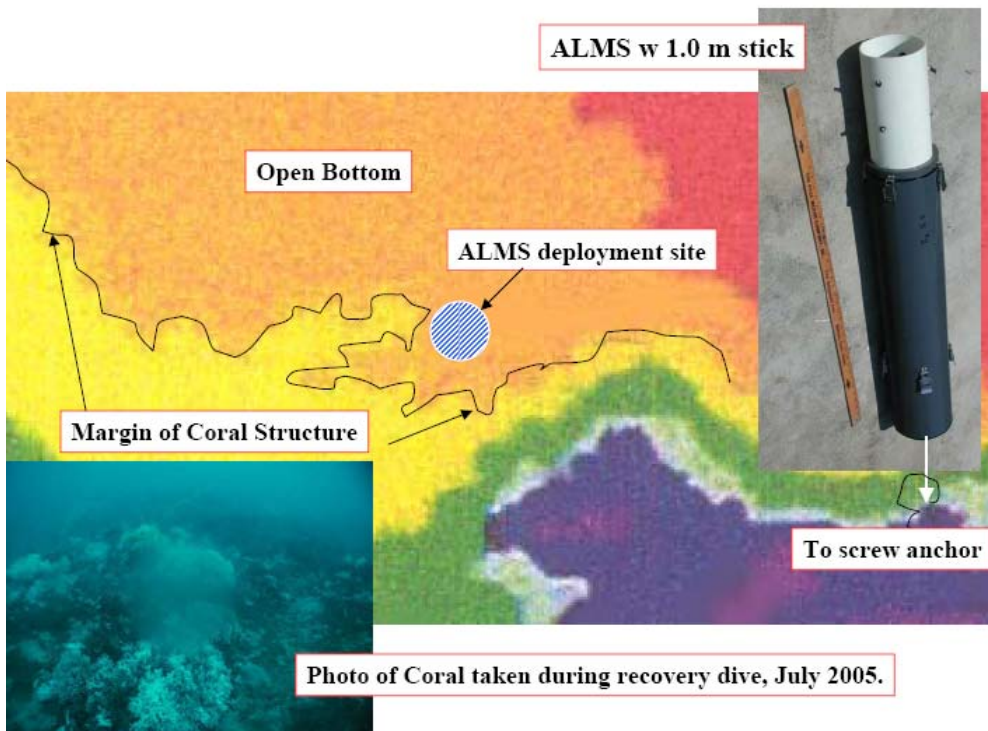


Figure 2. Close up of ALMS deployment site, ALMS and coral mounds at Jeffs Reef.