MISC 1794: REEF MONITORING FOR MOODY, TAYLOR, AND INTRUDER REEF SITES

P.O. 20242118

Sonar Survey Corporation

2/11/25

720 E. New Haven Ave, Suite 7
Melbourne, Fl 32901

To: St. John's County
Attn: Leigh A. Daniels, Email: ldaniels@sjfcl.us
500 San Sebastian View-
St. Augustine, Fl 32084

Attn: Nathan Otter, Natural Resources Superintendent, Email: notter@sjcfl.us
2175 Mizell Road
St. Augustine, Fl 32080
Phone Number: 904-209-0328

Attn:
St. John's County
Office of the County Attorney
500 San Sebastian View
St. Augustine, Fl 32084

From: Sonar Survey Corporation
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Phone Number: 727-408-0118

Reference: MISC 1794: REEF MONITORING FOR MOODY, TAYLOR, AND INTRUDER REEF SITES

24-GSA-SON-19689, ARTIFICIAL REEF SURVEYING SERVICE

P.O. Number 20242118

Subject: Please find the following report dated Feb 7, 2025, which completes the contract. Invoice to be submitted separately.

Contents

CONTRACT SPECIFICATIONS

Original Scope of Work

Monitoring services shall include:
• Collection and removal of any and all trash, debris, fishing line and tackle, or other harmful items;
• Provide Report within 30 days of monitoring visit, which must include the following:
  - o current condition of the reef;
  - o current GPS location of the reef;
  - o anticipated amount of use the site receives
  - o Break down of the perceived amount of recreational diving and fishing interest of the site;
  - o The uniqueness of the site; does it tend to lead to fishing or diving experiences
  - o Current fish counts and fish species utilizing the site

• Provide video footage of each reef site along with the submitted report.

Reef Locations:

1. Moody Reef: 29 59.130'N 80 51.270'W

2. Taylor Reef: 29 55.691'N 80 50.731'W

3. Intruder Reefs 29 54.339"N 80 48.167"W and 29 54.186"N 80 45.012'W

Video Download Links

Intruder #1
Intruder #2
Taylor Reef
Moody Reef

Project Overview

Sonar Survey Corporation was contracted to perform Artificial Reef Monitoring for three sites off the coast of St. Augustine Florida. The coordinates below reflect the published locations of the reef sites according to the FWC Maps available online:

https://myfwc.maps.arcgis.com/apps/View/index.html?appid=4675e1db32ac43a9a4308e757965d17d

Intruder #1	
DeployID	SJ0027
County	St. Johns
Reef Name	Intruder Reef
Material	Metal
Tons	0
Relief (ft)	8
Depth (ft)	104
Jurisdiction	Federal
Latitude	29° 54.339' N
Longitude	80° 48.167' W
LocationAccuracy	Medium
Deploy Date	6/21/1995
Description	Airplane Frames A6'S

Intruder #2	
DeployID	SJ0026
County	St. Johns
Reef Name	Intruder Reef
Material	Metal
Tons	0
Relief (ft)	8
Depth (ft)	105
Jurisdiction	Federal
Latitude	29° 54.186' N
Longitude	80° 45.012' W (ERROR)
LocationAccuracy	Medium
Deploy Date	6/16/1995
Description	Airplane Frames A6'S

Taylor Reef	
DeployID	SJ0024
County	St. Johns
Reef Name	Taylor Reef
Material	Concrete
Tons	2500
Relief (ft)	6
Depth (ft)	102
Jurisdiction	Federal
Latitude	29° 55.691' N
Longitude	80° 50.731' W
LocationAccuracy	High
Deploy Date	6/16/1994
Description	Culverts

Moody Reef	
DeployID	SJ0025
County	St. Johns
Reef Name	Moody Reef
Material	Concrete
Tons	2500
Relief (ft)	8
Depth (ft)	100
Jurisdiction	Federal
Latitude	29° 59.130' N
Longitude	80° 51.270' W
LocationAccuracy	Medium
Deploy Date	6/8/1995
Description	Culverts

**As noted in the tables above, there has been an error in the published location of “Intruder #2” This assumed error will be discussed further in the report.

Reef location Map

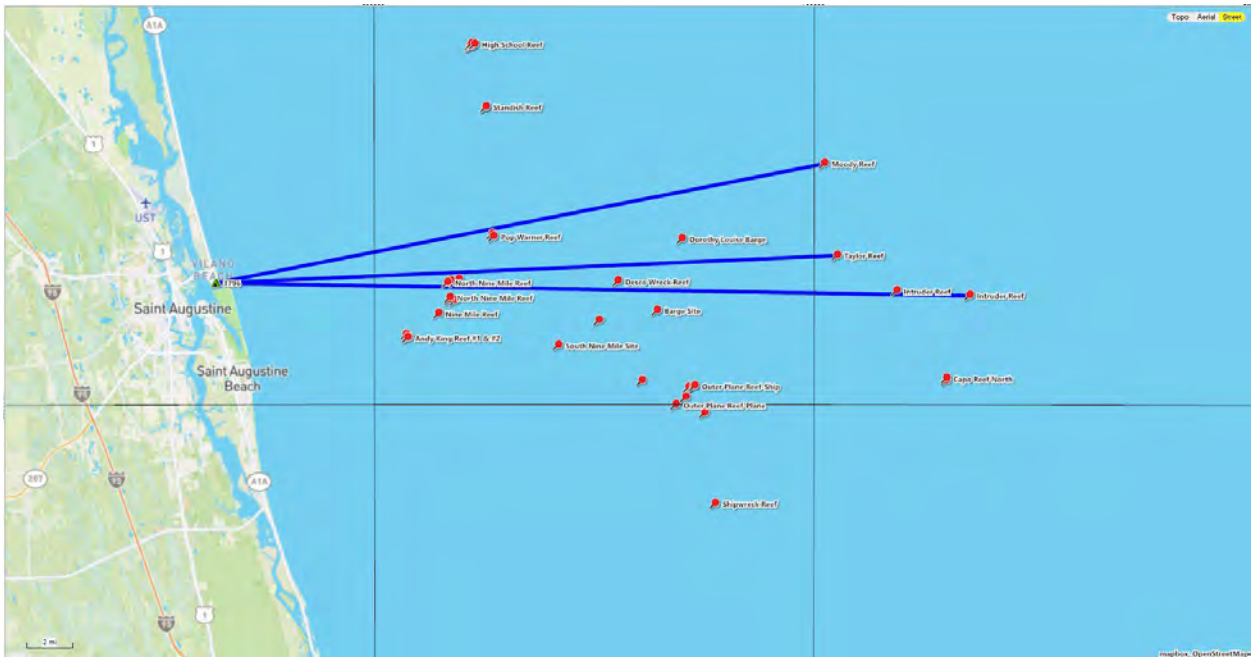


Figure 1 - Note the three blue lines from the sea buoy out to the three sites.

Weather

These reef sites are all located roughly 30 miles offshore. The weather pattern in 2024 was quite rough for the Northern Atlantic Region of Florida. The offshore conditions surrounding the project site were elevated throughout the season.

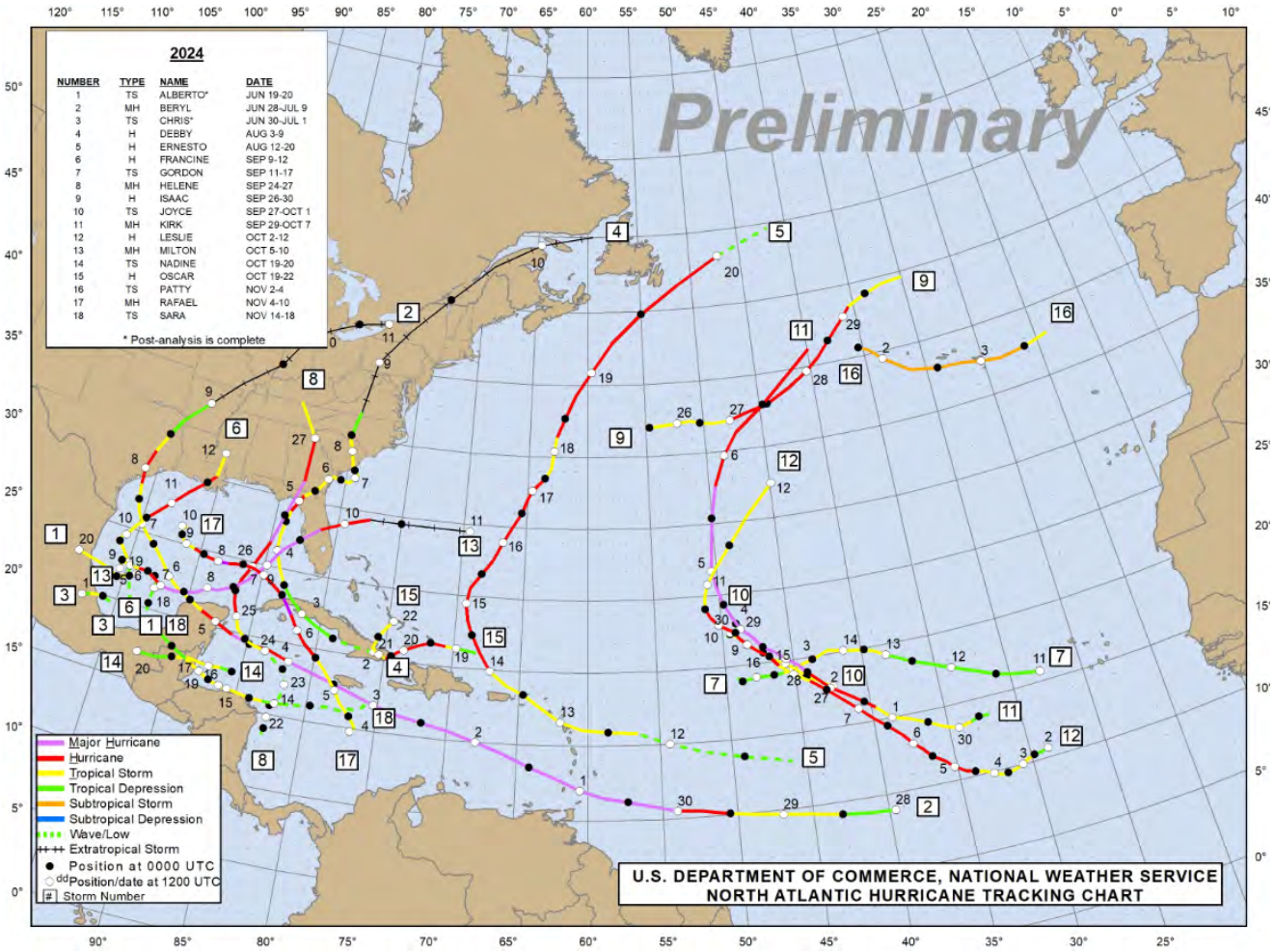


Figure 2 – 2024 Hurricane Season (https://www.nhc.noaa.gov/data/tcr/index.php?basin=atl)

Project Mobilization

Survey/Dive Crew:

Scott Meyer	Owner/Hydrographic Surveyor/Diver
Patrick Meyer	Dive Master
Christopher Wright	Commercial Diver
Alexa Rae Meyer	Biologist/Diver
Shannon Schutkey	Hydrographic Surveyor
Robert Vanelli	Video Editor

Vessel:

C-Hawk	Twenty-Five (25) foot Dive and Survey Vessel
Propulsion	300hp Suzuki 4-Stroke
Fuel Capacity	120 Gallons

Dive Equipment:

2) Tulsa Buoyancy Compensator (BC)
1) Cressi BC
6) 120cf HP Steel Tanks
3) Scuba Pro Regulators
3) Suunto Cobra 3 Dive Computers
2) GoPro Hero Black 11 cameras with underwater housings and lights

Figure 3 - C-Hawk loaded with equipment

Brief Summary of Survey/Dive Trips:

1) 7/27/24 Intruder #2 /Multibeam and Side Scan Sonar Hydrographic Survey
   - Consumables: 45 Gals Fuel *(approx.)*
2) 7/28/24 Intruder #1 /Multibeam and Side Scan Sonar Hydrographic Survey
   - Consumables: 45 Gals Fuel *(approx.)*
3) 8/27/24 Intruder #1 / Multibeam and Side Scan Sonar Hydrographic Survey
   - Consumables: 45 Gals Fuel *(approx.)*
4) 8/28/24 Intruder #1 / Multibeam and Side Scan Sonar Hydrographic Survey
   - Consumables: 45 Gals Fuel *(approx.)*
5) 8/30/24 Moody Reef – Multibeam and Side Scan Sonar Hydrographic Survey
   - Consumables: 45 Gals Fuel *(approx.)*
6) 9/30/24 Taylor Reef – Multibeam and Side Scan Sonar Hydrographic Survey
   - Consumables: 45 Gals Fuel *(approx.)*
   - Diving – Debris Removal – Fish Count Video
   - 4 Dive Tanks
7) 10/01/24 Intruder Reef – Diving – Debris Removal – Fish Count Video
   - Consumables: 30 Gals Fuel *(approx.)*
   - *6 Dive Tanks*
8) 11/20/24 Moody Reef Diving – Debris Removal – Fish Count Video
   - Consumables: 30 Gals Fuel *(approx.)*
   - *6 Dive Tanks*
9) 11/26/24 Intruder Reef Diving – Debris Removal – Fish Count Video
   - Consumables: 45 Gals Fuel *(approx.)*
   - *6 Dive Tanks*
   - *Multibeam and SSS were collected on 9_mile, Desco, and Dorthy Louise as well*

Hydrographic Survey Operations

As an addition to the original contract, Hydrographic Survey elements were added. Sonar Survey utilized our in-house hydrographic survey equipment to help map the existing reef sites as well as the area surrounding the reef sites. The Multibeam Sonar will allow for 3-D tracking of the reef through time. The Side Scan Sonar (SSS) was used to map out the surrounding areas. The exact location and the full extent of the artificial reefs were not fully known. SSS was used to cover approximately 1 square km surrounding the existing reef sites. This broad survey area mapped out the undulating seabed as well and any rock outcrops in the permit area. The use of this equipment enabled the dive team to see the 3D images of the reef locations. The accuracy of the existing reef coordinates was unknown and listed as "Low Accuracy" on the FWC Artificial Reef Program website.

Survey Coordinate System

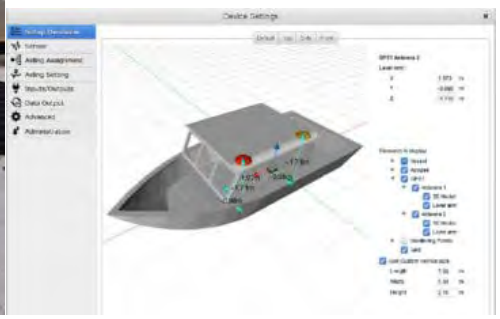
The coordinate systems are referenced to either WGS84 in Degrees Decimal Minutes (DD MM.MM) format and all depths are referenced to NAVD88 Feet. State Plane coordinates are in FL-E 0901 Feet.

WebPDF_20230503_DeploymentList.xlsx (myfwc.com)

The survey data was collected using Real-Time Kinematic survey techniques. This will ensure that the 3D elevations of the reef can be compared to future data with centimeter accuracy. This will allow future assessments of the reef to verify if it is sinking into the sandy seabed.

Survey Equipment:

Specially Customized Survey Vessel: C-Hawk
Multibeam Sonar: R2Sonic 2020
Precision Motion Reference Unit: SBG Ekinox-D
Sound Velocity Sensor: AMX Mini
Sound Velocity Profiler: Unabara Hydrobar X
Acquisition Software: Hypack Hysweep
Processing Software: Bentley Microstation Inroads CADD



Probable Reef Location Error

During the conduct of this survey, our team used the SSS to cover an area nearly 1 square km surrounding each of the sites. The first site which is listed simply as Intruder Reef (Deploy ID SJ0026) was the first site Sonar Survey Corporation chose to begin the survey operations. After a full day of searching with both the SSS and the Multibeam Sonar, the crew was unable to locate any sonar contacts or features on the seabed which resembled an artificial reef. *(For this Report It is referred to as Intruder #2)*

The following day, the attention was focused on the remaining Intruder Reef site (Deploy ID SJ0027) It was expected that we would find only one (1) artificial reef site within the 1 square km area, but we located two (2)

Sonar Survey began tracking the historical coordinates of these two sites. The official FWC Spreadsheet has these locations listed as shown in the spreadsheet below. It appears that the Longitude was keys in as 45.012W rather than 48.012W (Additional Information in Appendix-1)

DESIG.	DATE	NAME	DESCRIPTION	TONS	RELIEF	DEPTH	LAT	LON
SJ0024	6/16/1994	Taylor Reef	2,500 Tons of Concrete & Fiberglass Culverts And Other Precast Concrete	2500	6	102	29° 55.691' N	80° 50.731' W
SJ0025	6/8/1995	Moody Reef	26 Miles East of St. Augustine Inlet	2500	8	100	29° 59.130' N	80° 51.270' W
SJ0026	6/16/1995	Intruder Reef	23 Pieces of A-6 Aircraft, 1 1st of Two Loads, 33 Total	UNK	8	105	29° 54.186' N	80° 45.012' W
SJ0027	6/21/1995	Intruder Reef	17 Numbered Pieces of A-6 Intruder Airplanes, 2nd of Two Loads	UNK	8	104	29° 54.339' N	80° 48.167' W

Atlas Of Artificial Reefs In Florida, Fifth Edition

1997

By Pybas, Donald W.

16 of 59 — Automatic Zoom

ID	Built	Name	Latitude	Longitude	Loran-C	Loran-C	Depth	Relief	N. Miles	Composition
ST. JOHNS										
1	1989	Navy Drydock	30/07.06 C	80/33.57 C	44839.4	61710.9	125	57	42.00	615' Navy Drydock
2	1995	Moody Culverts	29/59.12 C	80/51.51 C	44888.3	61881.8	102	8	23.00	1000 Tons Precast Concrete, to 886 /82.0
3	1974	Four Mile Reef	29/56.43 C	81/10.45 C	44986.0	62091.2	60			Inshore Wreck
3	UNKN	Four Mile Reef	29/56.43 C	81/10.45 C	44997.5	62045.6	60			Natural Bottom and Dumpsters
4	1976	Pop Warner Reef	29/56.39 C	81/05.51 C	44960.0	62008.3	65		7.60	Tires, Fiberglass Boat
4	1990	Pop Warner Reef	29/56.39 C	81/05.51 C	44961.0	62005.1	66	8	12.00	2000 Tons Concrete Culverts, Other Precast Concrete
5	UNKN	Dorothy Louise - Tug	29/56.30 C	80/57.40 C	44902.9	61938.0	70		19.50	Tug Boat 'DOROTHY LOUISE'
5	1988	Dorothy Louise - Barge	29/56.30 C	80/57.40 C	44904.8	61939.0	70		19.50	175' Barge
6	1994	Taylor Reef - Culverts	29/55.49 C	80/50.89 C	44856.1	61889.8	100	6	21.00	2500 Tons Precast Concrete
7	1995	Intruder Reef 2	29/54.28 C	80/48.09 C	44829.0	61872.1	92	8	24.00	17 A6 Intruder Aircraft

Figure 4 - Original Publication Coordinates 1997

Sample 3D- Survey Results

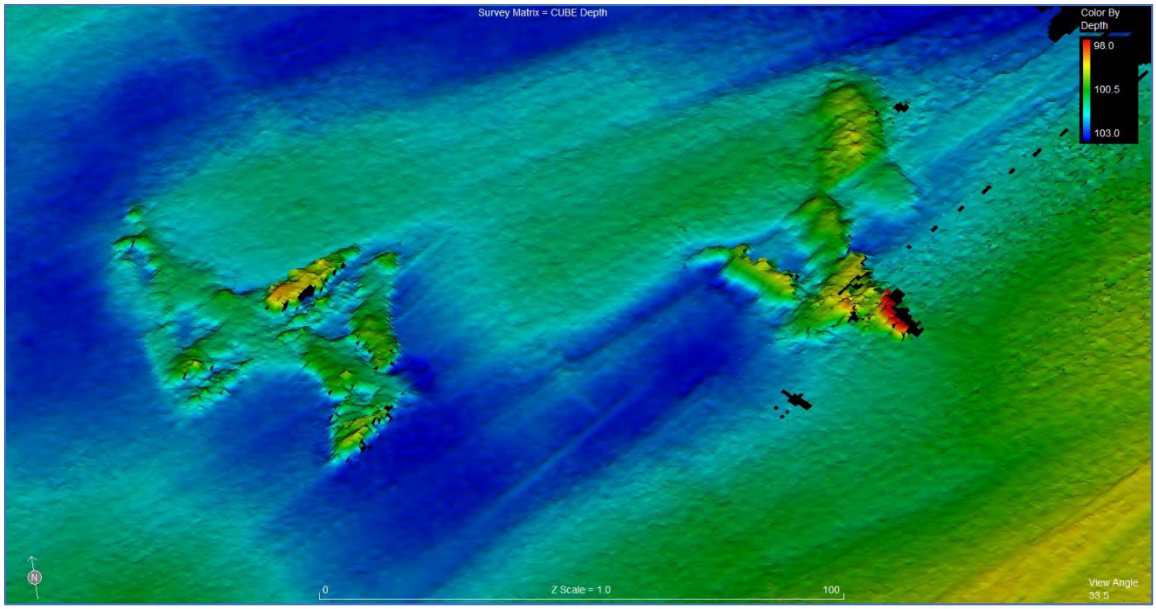


Figure 5 – Intruder #1 (North)

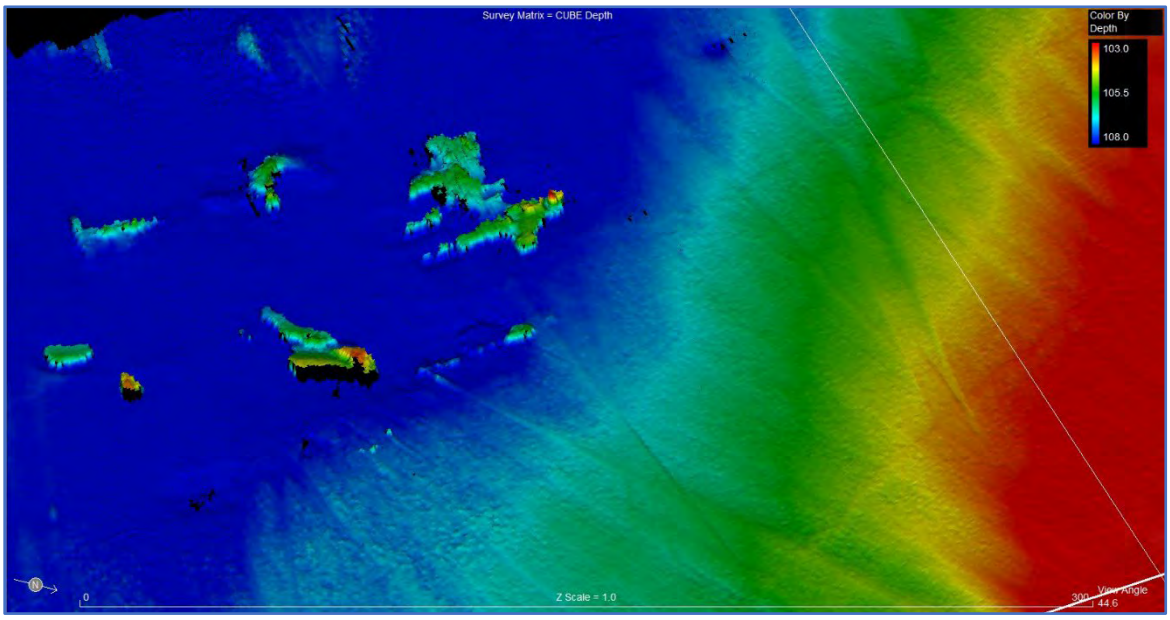


Figure 6 – Intruder #2 (South)

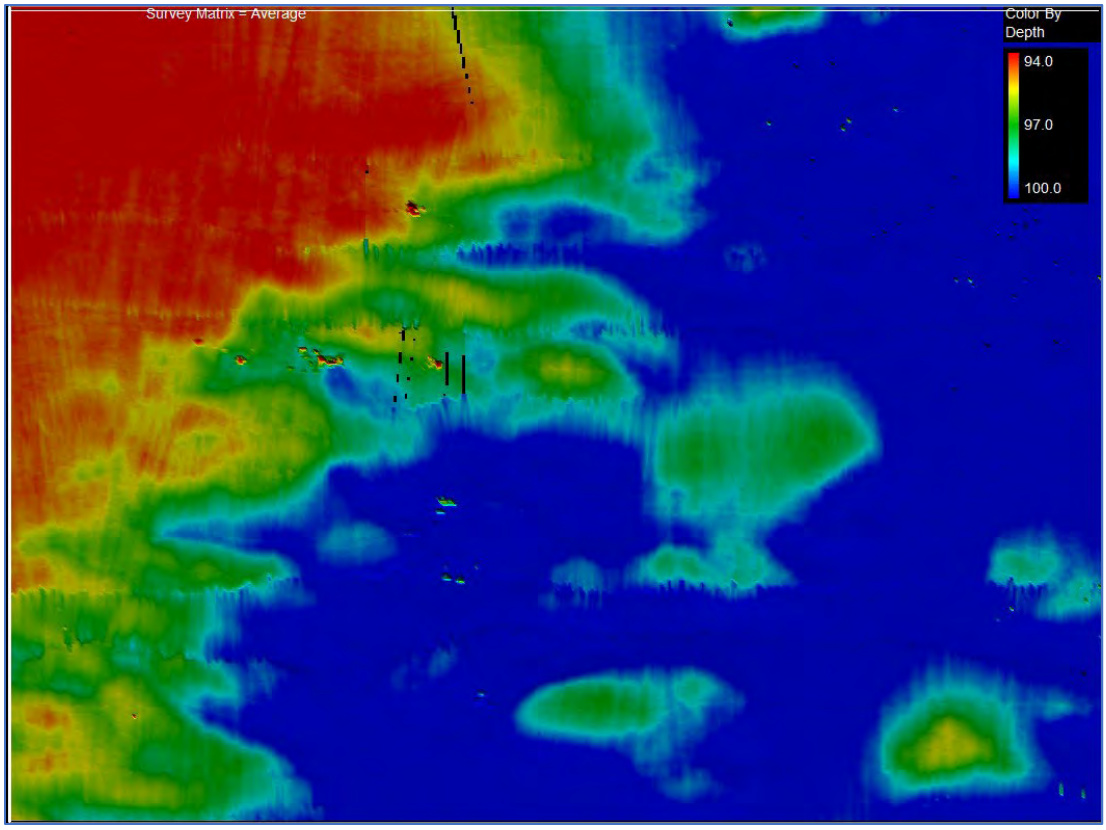


Figure 7 - Moody Reef (Culverts)

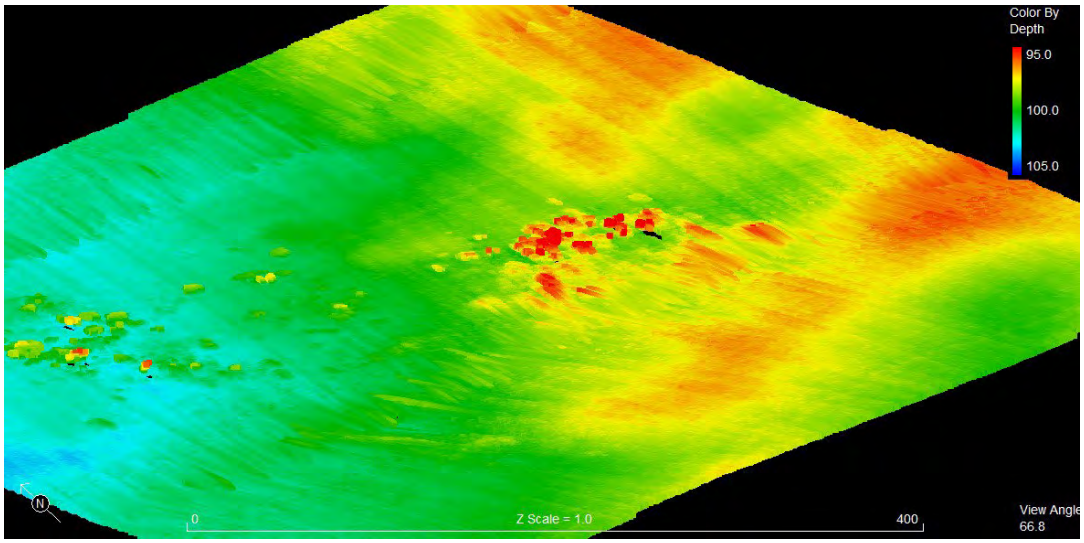


Figure 8 - Taylor Reef (Culverts)

GPS Locations from Survey Data

INTRUDER REEF #1 (NORTH)			
Description	NAVD88 Elevation	Lat (DD MM.MM)	Lon (DD MM.MM)
Coordinates Provided	104	29° 54.339' N	80° 48.167' W
Surveyed Coordinates	**101**	**29° 54.333' N**	**80° 48.159' W**
INTRUDER REEF #2 (SOUTH)			
Description	NAVD88 Elevation	Lat (DD MM.MM)	Lon (DD MM.MM)
Coordinates Provided	105	29° 54.186' N	80° 45.012' W
Surveyed Coordinates	**107**	**29° 54.215' N**	**80° 48.015' W**
TAYLOR REEF			
Description	NAVD88 Elevation	Lat (DD MM.MM)	Lon (DD MM.MM)
Coordinates Provided	102	29° 55.691' N	80° 50.731' W
Surveyed Coordinates	**102**	**29° 55.679' N**	**80° 50.762' W**
MOODY REEF			
Description	NAVD88 Elevation	Lat (DD MM.MM)	Lon (DD MM.MM)
Coordinates Provided	100	29° 59.130' N	80° 51.270' W
Surveyed Coordinates	**100**	**29° 59.120' N**	**80° 51.469' W**

COORDINATES ARE IN WGS84 DEGREE DECIMAL MINUTES

Reef Conditions Section:

Intruder #1 (North) and Intruder Reef #2 (South)

The Two Reefs were found to be only 1100’ apart from each other. For this reason, the two reefs are grouped together in this report. **The fish counts, however, are separated.**

Current Condition of the Reef:

The reef appears to be very healthy with an abundance (95%) of living marine growth and a very healthy population of fish. It is located at a depth of approx. 101 feet.

As we pulled up to the site there many Atlantic Spotted Dolphin and a large bull shark at the surface.

Current GPS Location

INTRUDER REEF #1 (NORTH)			
Description	NAVD88 Elevation	Lat (DD MM.MM)	Lon (DD MM.MM)
Coordinates Provided	104	29° 54.339' N	80° 48.167' W
Surveyed Coordinates	**101**	**29° 54.333' N**	**80° 48.159' W**
INTRUDER REEF #2 (SOUTH)			
Description	NAVD88 Elevation	Lat (DD MM.MM)	Lon (DD MM.MM)
Coordinates Provided	105	29° 54.186' N	80° 45.012' W
Surveyed Coordinates	**107**	**29° 54.215' N**	**80° 48.015' W**

Figure 10 - Intruder Airplane During Deployment to Reef Site (1995)

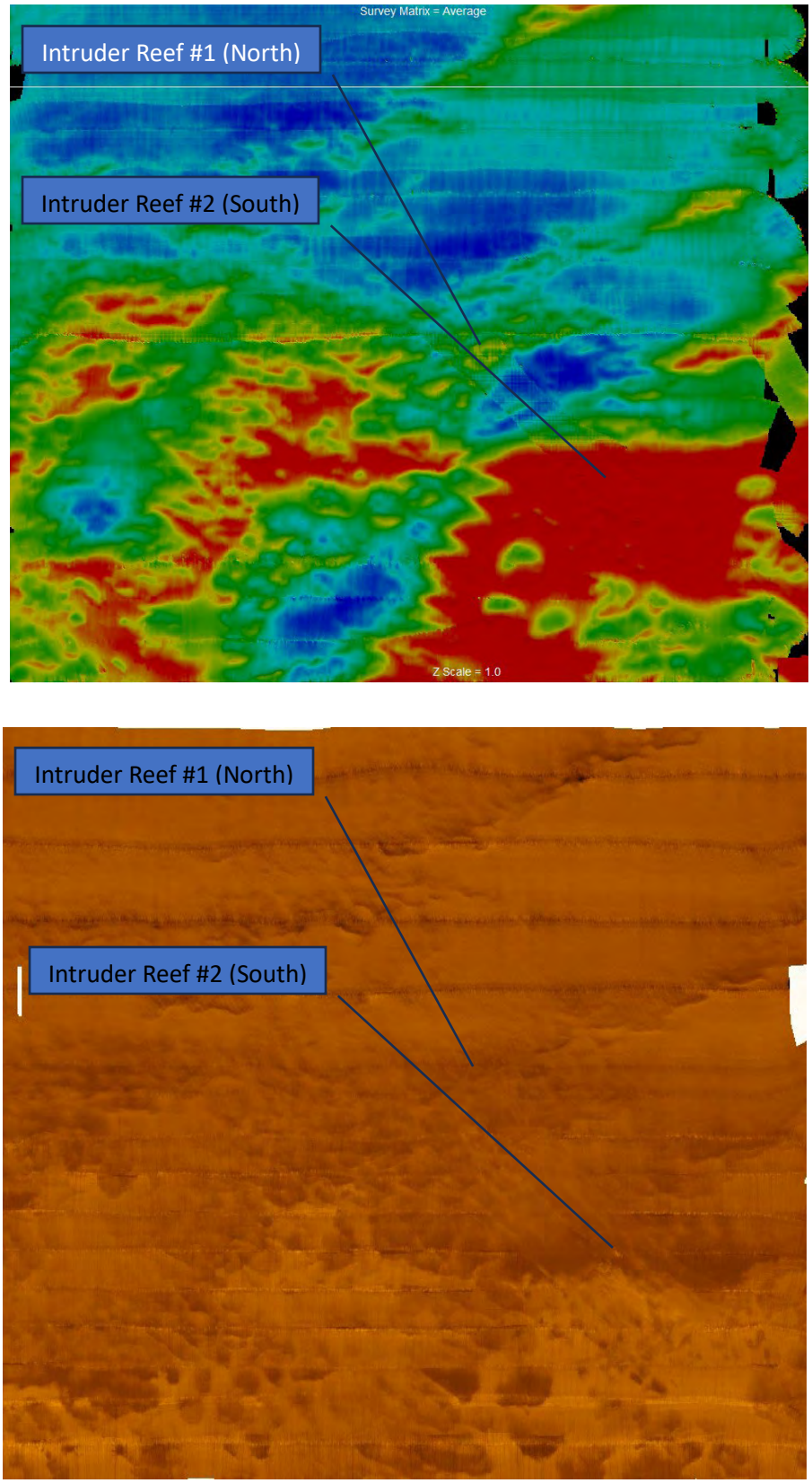


Figure 11 - Multibeam and Side Scan Sonar

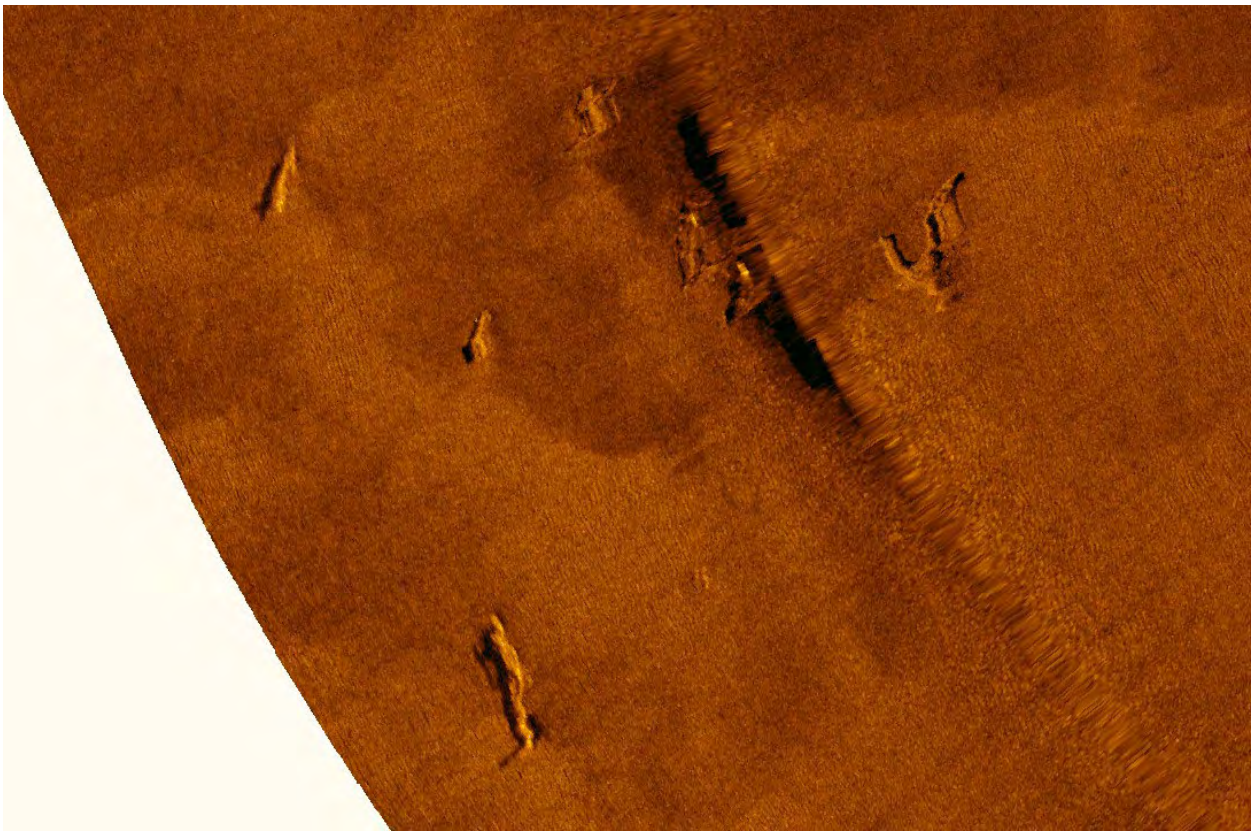


Figure 12 - Intruder #1 North – Side Scan Sonar

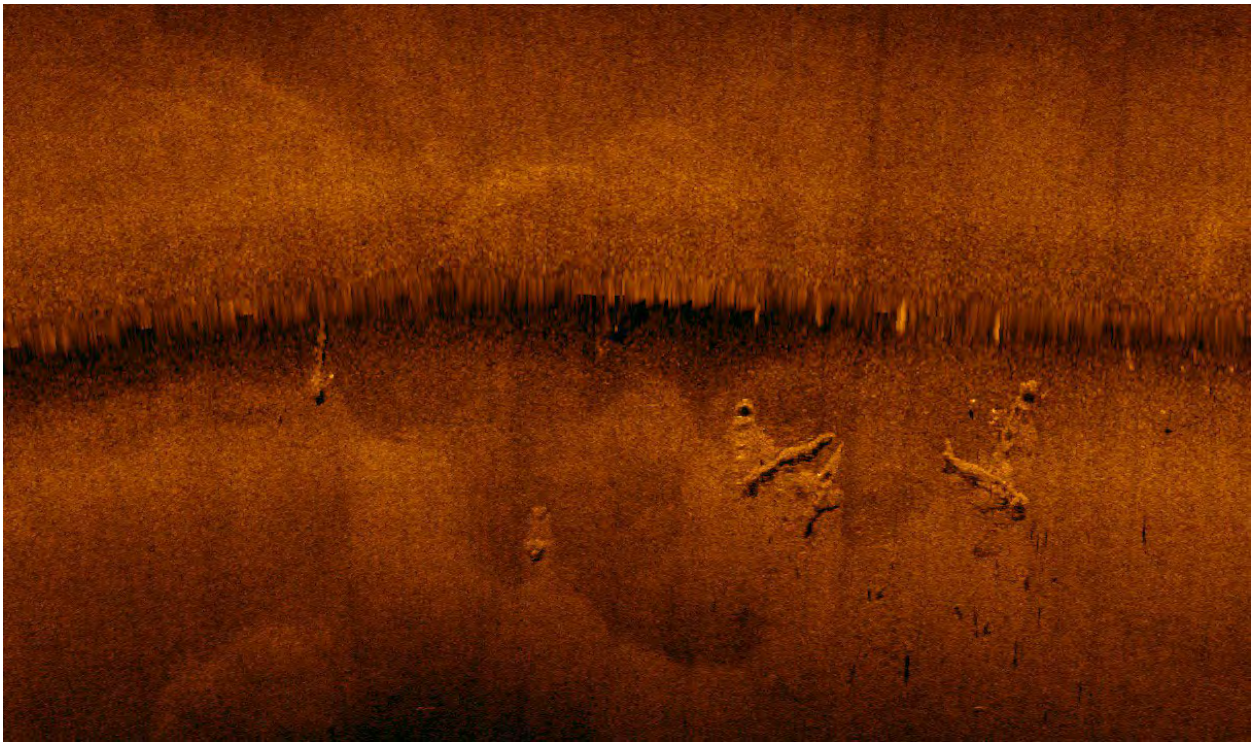


Figure 13- Intruder #1 North – Side Scan Sonar

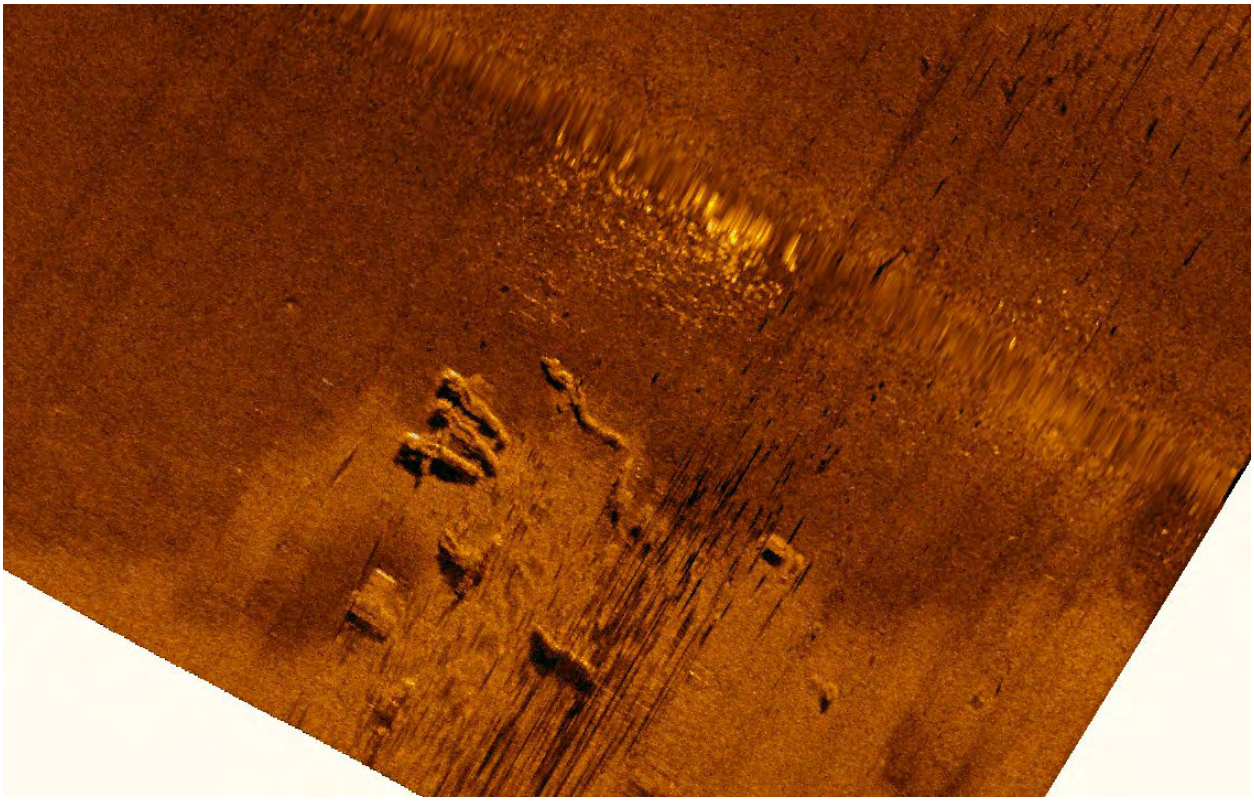


Figure 14- Intruder #2 South – Side Scan Sonar – 3 Fuselage Laying Next to Each Other

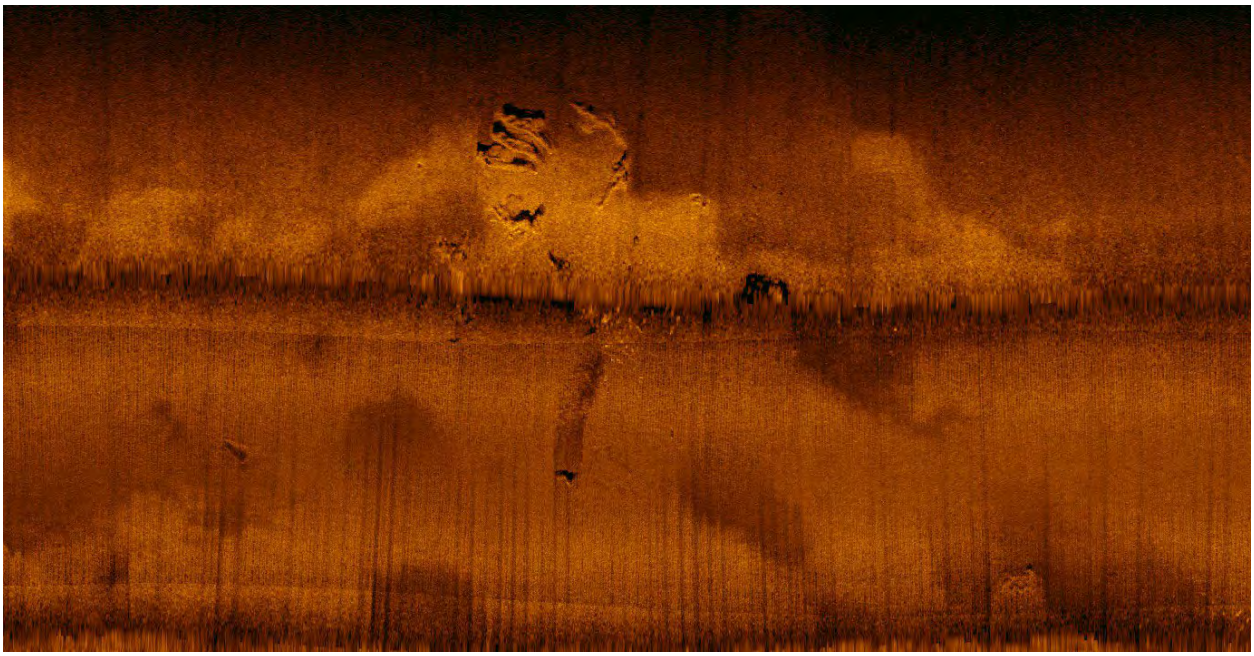


Figure 15- Intruder #2 South – Side Scan Sonar

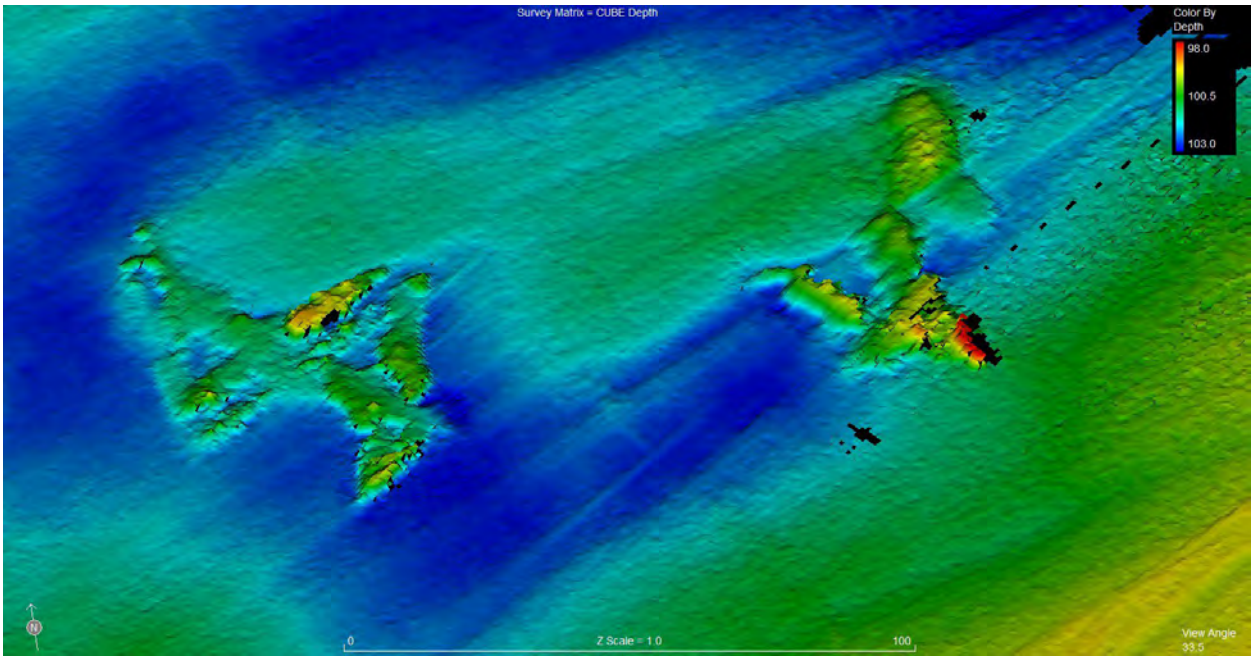


Figure 16 - Intruder #1 (North) Multibeam

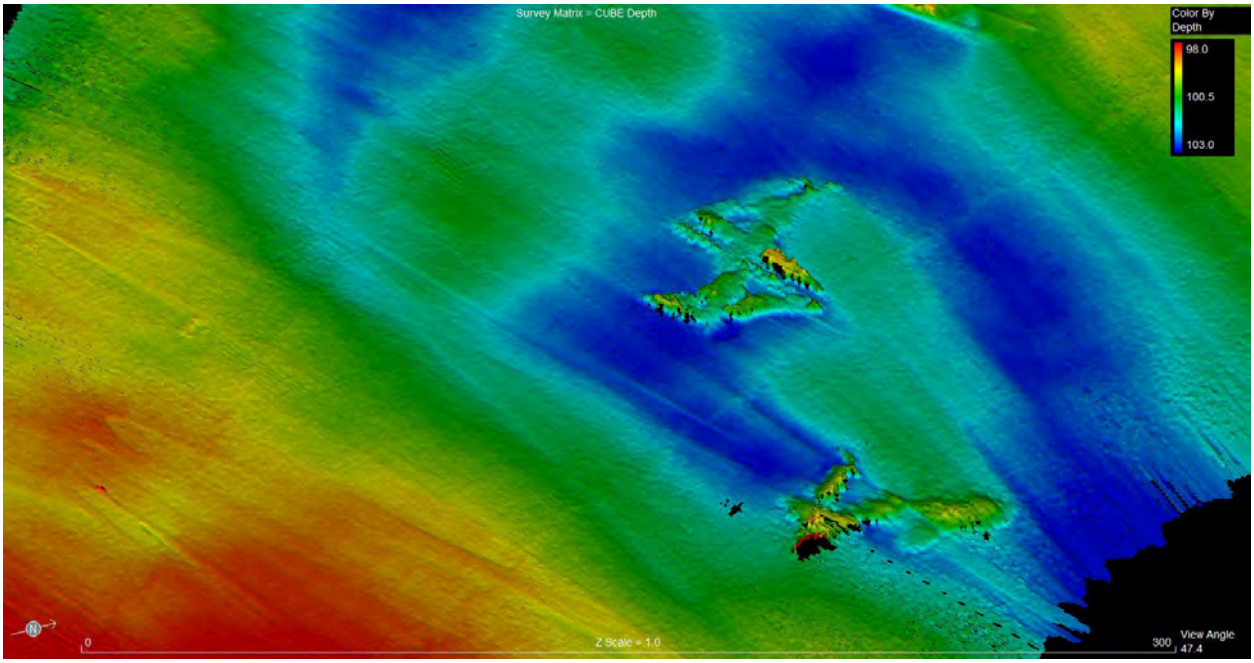


Figure 17 - Intruder #1 (North) Multibeam

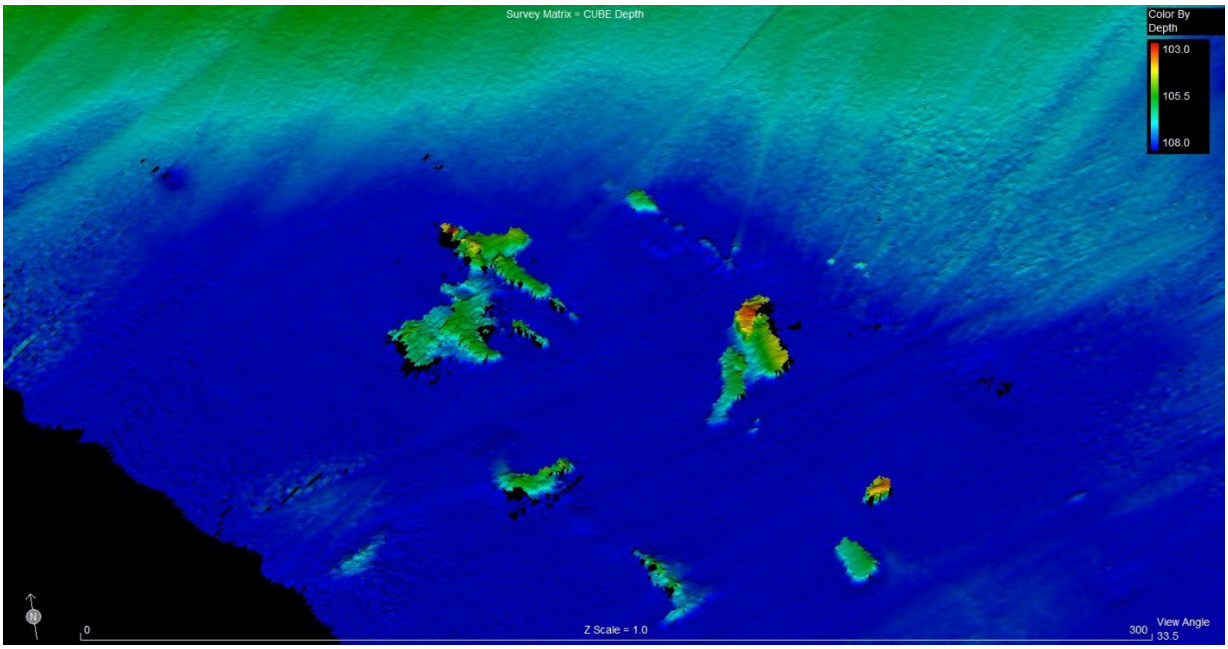


Figure 18 - Intruder #2 (South) Multibeam

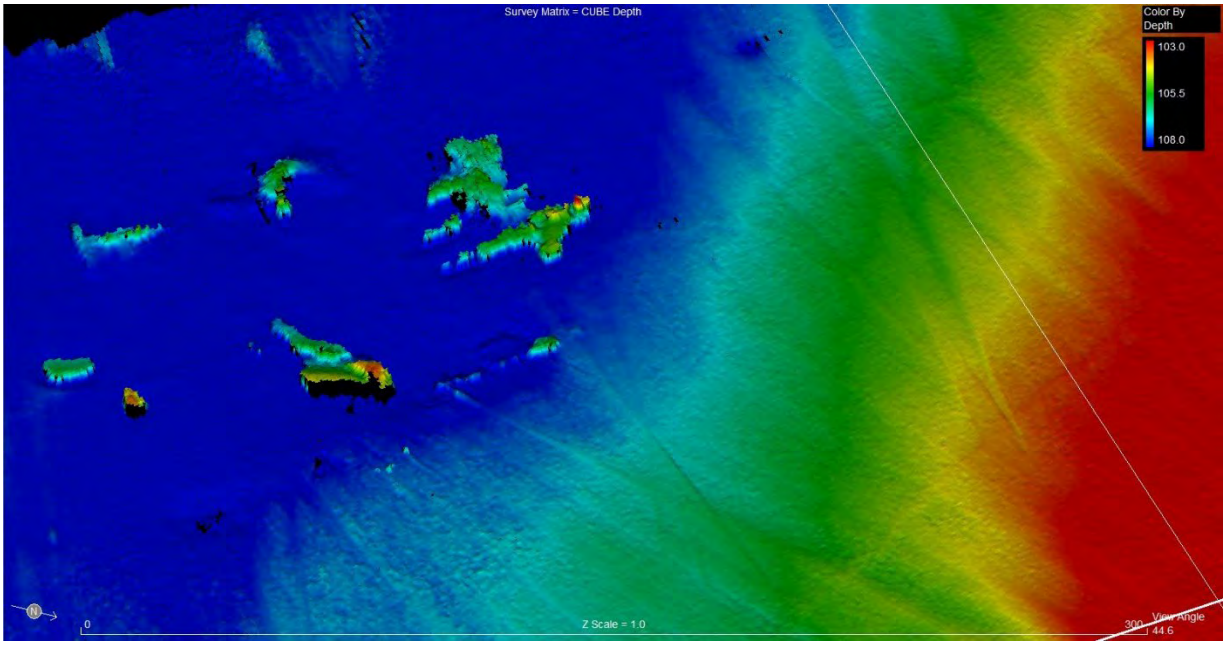


Figure 19 - Intruder #2 (South) Multibeam

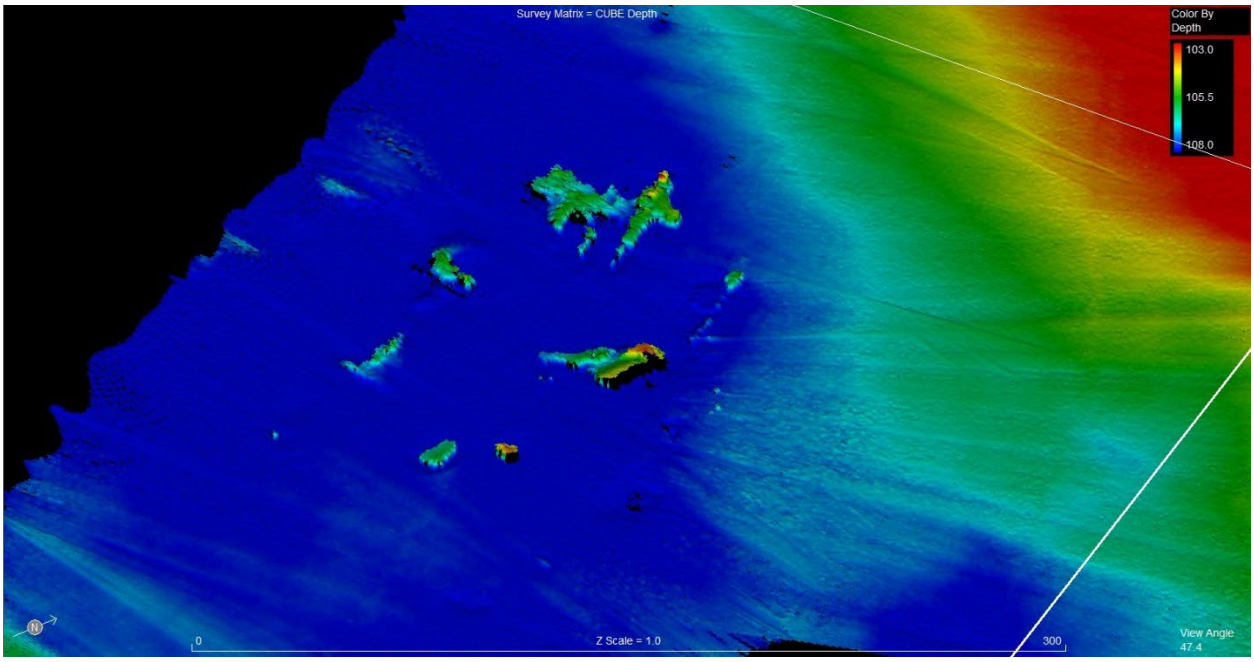


Figure 20 - Intruder #2 (South) Multibeam

During our Research, Sonar Survey Located sketches from an old publication “JaxSpots”

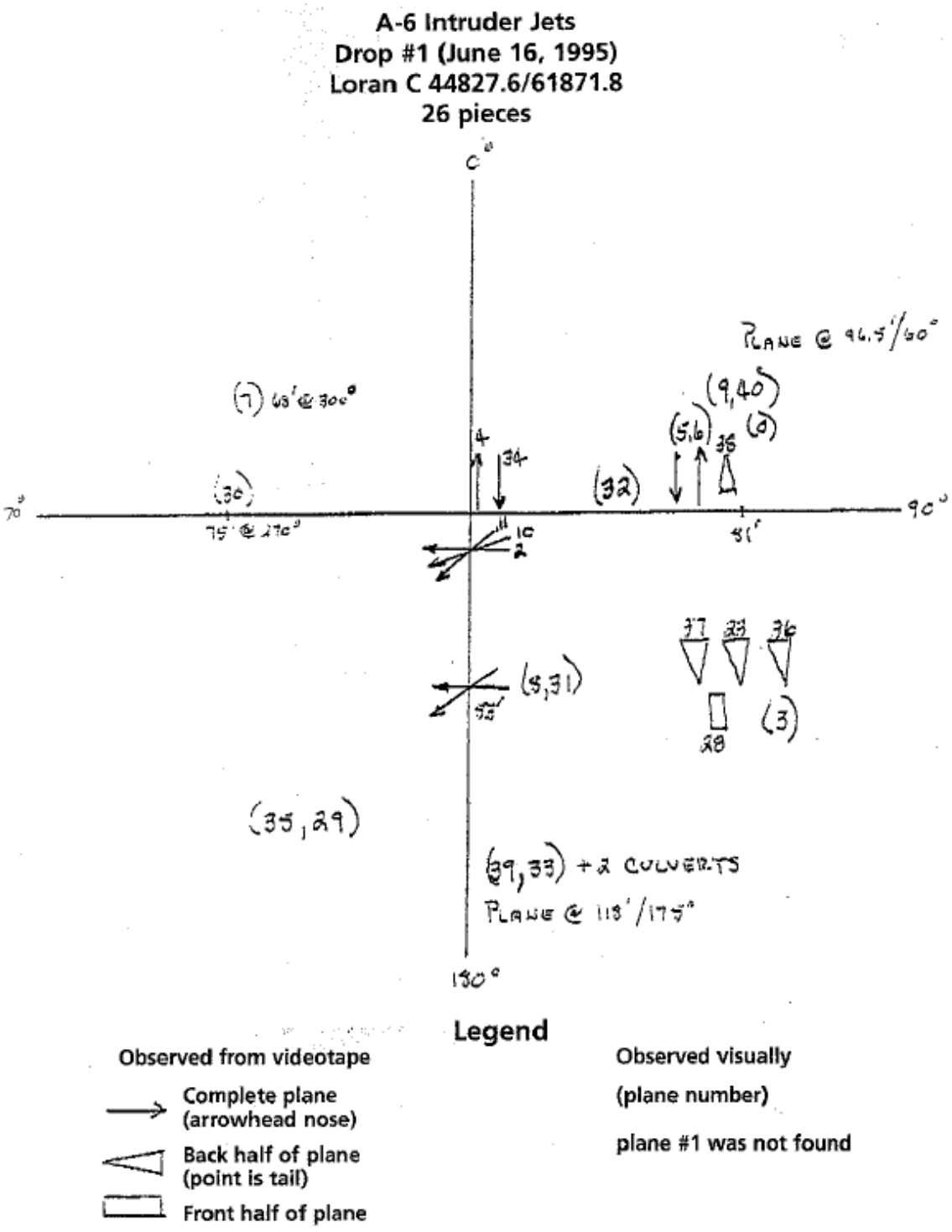


Figure 21 – Sketch of Intruder #2 (South) Published in JAXSPOTS Fishing Book

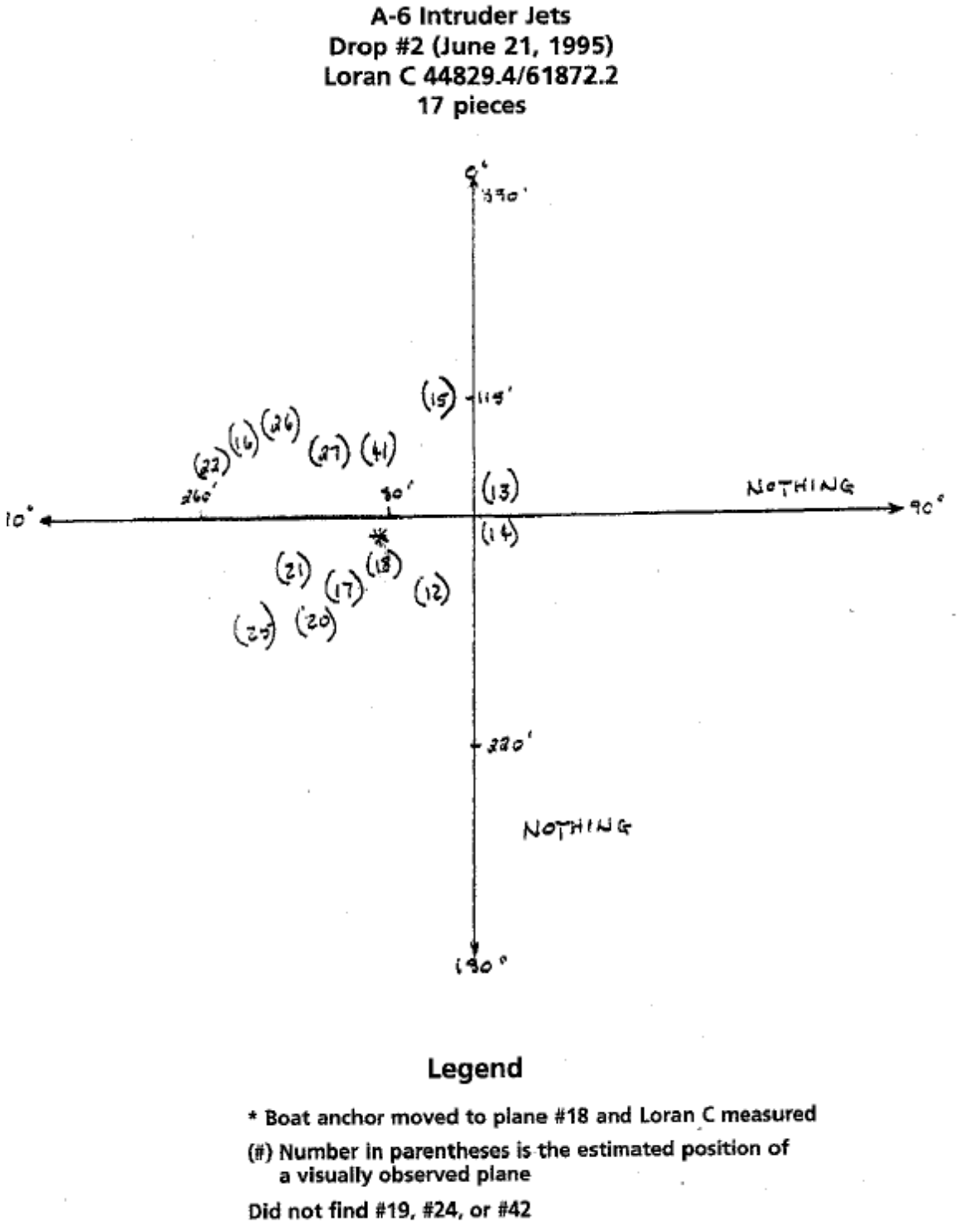


Figure 22 - Sketch of Intruder #1 (North) Published in JAXSPOTS Fishing Book

Diving Observations and Fish Population

Intruder #1 (North)

Sonar Survey Corp. covered the entire permitted area yielded 42 distinct aircraft or large parts of aircraft inside of this permitted area. Reef is very healthy. There is 95% marine growth on all airplanes covered by a small silt layer. The predominant fish on this reef is Red Snapper and Mangrove Snapper. The area surrounding the planes appears to be scoured out. The depth varies from 101' to 105' due to this. More than likely this scouring is due to the fish pushing the sand out and keeping the areas cleared.

Although the diving operations occurred in full daylight, it was very dark on the seabed due to the depth. The video camera was equipped with six (6) 5000 lumen lights.

There were many anchor ropes and fishing lines which the divers removed. This reef appears to be a very active anchoring and fishing site. * As noted later: the local Charter Captains hit this site on every trip.

INTRUDER #1 (NORTH REEF)			
APPROXIMATE NUMBER - DIVER OBSERVED FISH			
Species	**Counted**	**Species**	**Counted**
Red Snapper	200+	Sheepshead	60
Jack-Knife fish	40+	Porkfish	40
Moray Eel	2	Queen Angelfish	8
Greater Amberjack	200+	Spotted Pinfish	100+
Tomtate Grunt	2000+	Red Grouper	1
Cocoa Damselfish	20	Gag Grouper	7
Red Hind Grouper	6	Gray Snapper	40
Goliath Groper	2	Blue Angelfish	10
Mangrove Snapper	500+	Lionfish	30
Atlantic Spotted Dolphin	Numerous/migratory		

Figure 23 - Tomtate Grunt, Greater Amberjack and Mangrove Snapper

Figure 24 - Greater Amberjack and Red Snapper

Figure 25 - Red Snapper

Figure 26 - Moray Eel and Lion Fish

Figure 27 - Jack-Knife Fish

Figure 28 - Grouper, mangrove snapper, jack-knife fish

Figure 29 - Red Hind Grouper

Figure 30 - Cocoa Damselfish (Purple/Yellow) and Greater Amberjack

Figure 31 - Fishing line and Tomtate Grunt

Figure 32 - Gag Grouper

Figure 33 - Mangrove Snapper and yellow plastic trash

Figure 34 - Red Snapper and Blue Angelfish

Figure 35 - Gag Grouper

Figure 36 - Lionfish and anchor rope

Figure 37 - Cocoa Damselfish and anchor rope

Figure 38 - Fishing line and anchor rope on Tail-section

Figure 39 - Airplane wing section with Jack-Knife fish, sheepshead, Tomtate Grunt, Cocoa Damselfish

Figure 40 - Airplane wing section with Jack-Knife fish

Figure 41 - Airplane wing section with anchor rope

Figure 42 - Goliath Grouper

Figure 43 - Airplane wiring harness and Jack-Knife fish

Figure 44 - Queen Angelfish(juvenile)

Figure 45 - Porkfish

Figure 46 - Airplane cockpit , blue angelfish

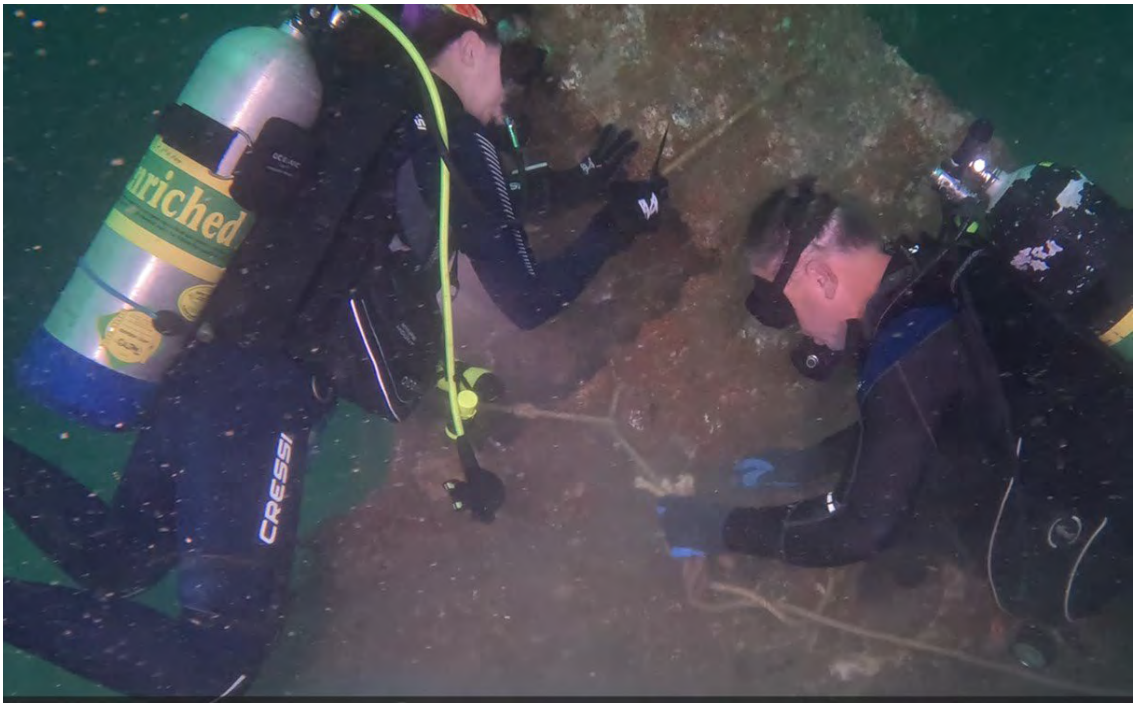


Figure 47 - Removal of anchor rope, fishing line, and fishing jig lures

Figure 48 - Removal of anchor rope, fishing line, and fishing jig lures (1 Stone Crab Found)

Figure 49 - Red Snapper

Figure 50 - Atlantic Spotted Dolphin

Figure 51 - Atlantic Spotted Dolphin

Figure 52 - Dive Vessel at Surface

Intruder #2 (South)

Sonar Survey Corp. covered the entire permitted area yielded 42 distinct aircraft or large parts of aircraft inside of this permitted area. Reef is very healthy. There is nearly 100% marine growth on all airplanes covered by a small silt layer. The predominant fish on this reef is Mangrove Snapper and Tomtate Grunt. Similar to the other Intruder Site the area surrounding the planes appears to be scoured out. The depth varies from 105' to 107' due to this. More than likely this scouring is due to the fish pushing the sand out and keeping the areas cleared.

Although the diving operations occurred in full daylight, it was very dark on the seabed. The video camera was equipped with six (6) 5000 lumen lights.

There were many anchor ropes and fishing lines which the divers removed. This reef appears to be a very active anchoring and fishing site. * As noted later: the local Charter Captains hit this site on every trip.

INTRUDER #2 (SOUTH REEF)			
APPROXIMATE NUMBER - DIVER OBSERVED FISH			
Species	**Counted**	**Species**	**Counted**
Jack-Knife fish	20	Blue Angelfish	32
Pork fish	100	Gray Angelfish	10
Spottail Pinfish	300-400	Almaco Jack	50+
Mangrove Snapper	400+	Red Snapper	100+
Tomtate grunt	4000+	Gag Grouper	8
Lookdown Fish	400	Lionfish	50+
Barracuda	50	Nurse Shark	1
Greater Amberjack	200+	Bull Shark	1
Goliath Grouper	13		

Figure 53 - Goliath Group and lots of anchor lines

Figure 54 - Anchor stuck in hole in airplane wing

Figure 55 - Anchor ropes on engine bay

Figure 56 - Anchor stuck in hole in airplane wing

Figure 57 - Abandoned Anchor

Figure 58 - Goliath Grouper

Figure 59 - Multiple Goliath Grouper

Figure 60 - Multiple Goliath Grouper

Figure 61 - Red Snapper

Figure 62 - Jack-Knife Fish (bottom left)

Figure 63 - Airplane wiring - Wiring Harness Still Installed

Figure 64 - Partial Wing & fuselage and anchor rope

Figure 65 - Nurse Shark sleeping in fuselage

Figure 66 - More Anchor Rope

Figure 67 - Typical airplane fuselage

Figure 68 - Airplane Tail w/mangrove snapper

Figure 69 - Airplane mid-section

Figure 70 - Airplane mid-section

Figure 71 - Airplane nose section

Figure 72 - Lookdown fish

Figure 73 - More Anchor Rope on Wing

Figure 74 - More Anchor Rope on Cockpit

Figure 75 - 2 airplanes side by side

Figure 76 - Fishing line and rope

Figure 77 - Airplane parts

Figure 78 - Almaco Jack

Figure 79 - Greater Amberjack

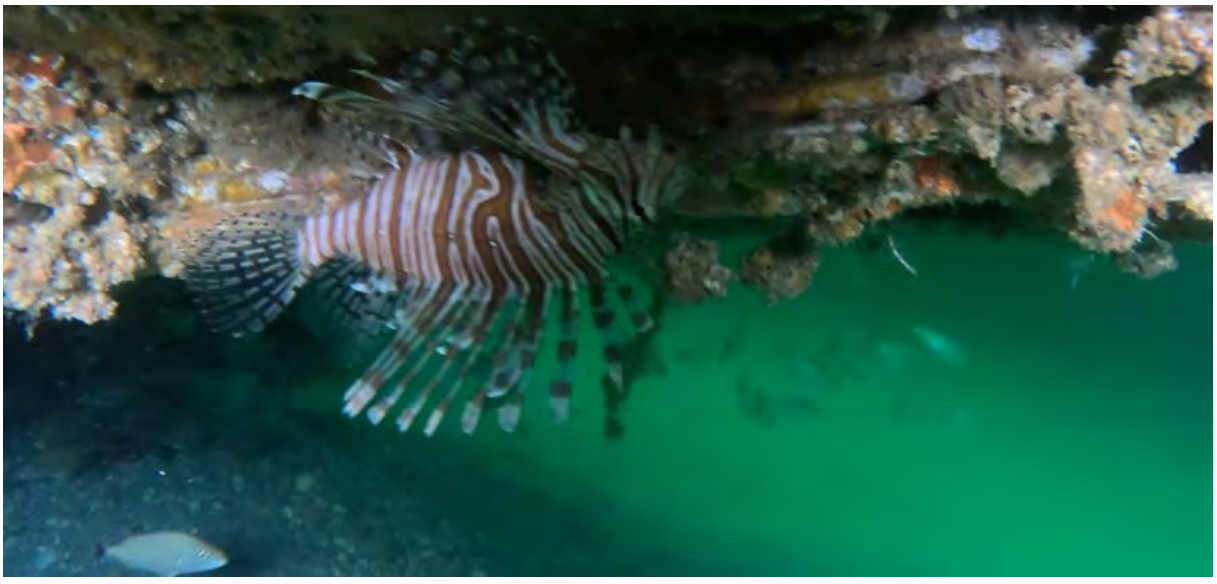


Figure 80 - Lionfish under wing

Reef Conditions Section:

Taylor Reef

Concrete Culverts appear to have almost 100% marine growth coverage. Reef is very healthy.

The fish species is predominantly Tomate Grunts but holds a good variety of other fish.

Clean up efforts: anchor ropes and fishing line

Current Condition of the Reef:

The reef appears to be very healthy with an abundance (100%) of living marine growth and a very healthy population of fish. It is located at a depth of approx. 102 feet.

Published Coordinates were very close to actual survey coordinates. Numerous vessels fished this site while surveying and diving operations were ongoing.

TAYLOR REEF			
Description	NAVD88 Elevation	Lat (DD MM.MM)	Lon (DD MM.MM)
Coordinates Provided	102	29° 55.691' N	80° 50.731' W
Surveyed Coordinates	**102**	**29° 55.679' N**	**80° 50.762' W**

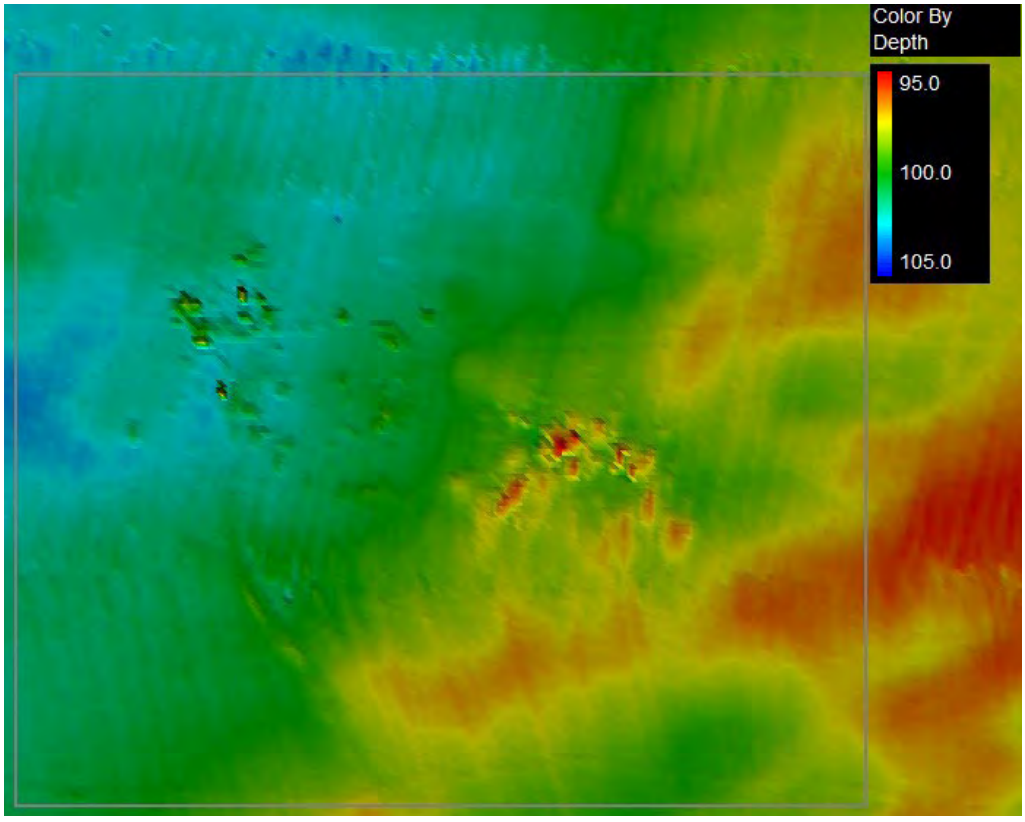
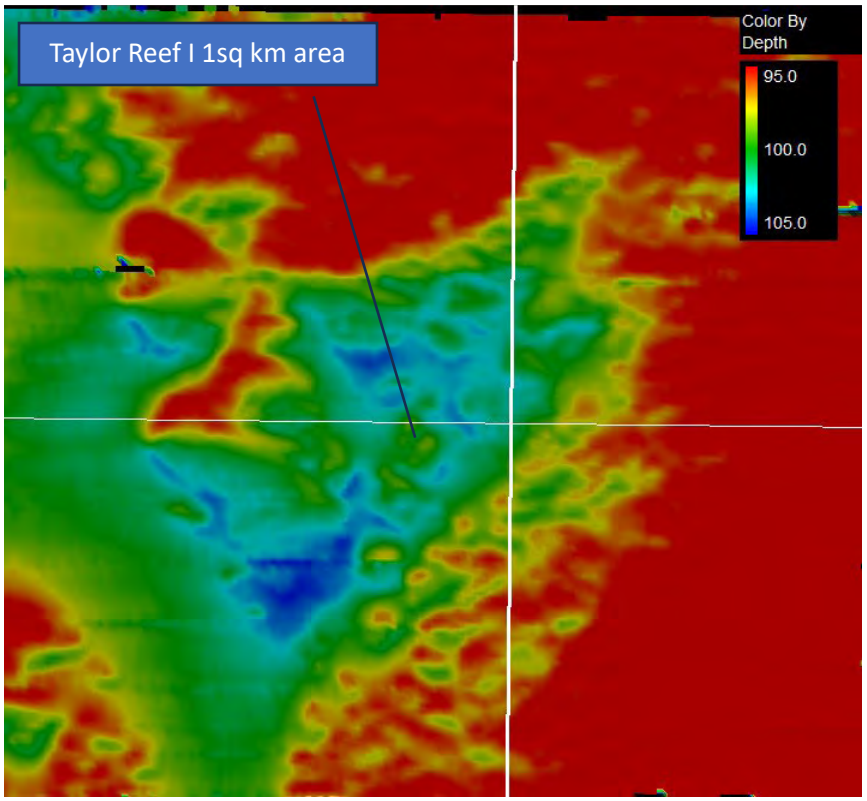


Figure 81 - This is not a large reef structure. It is clustered primarily in one area



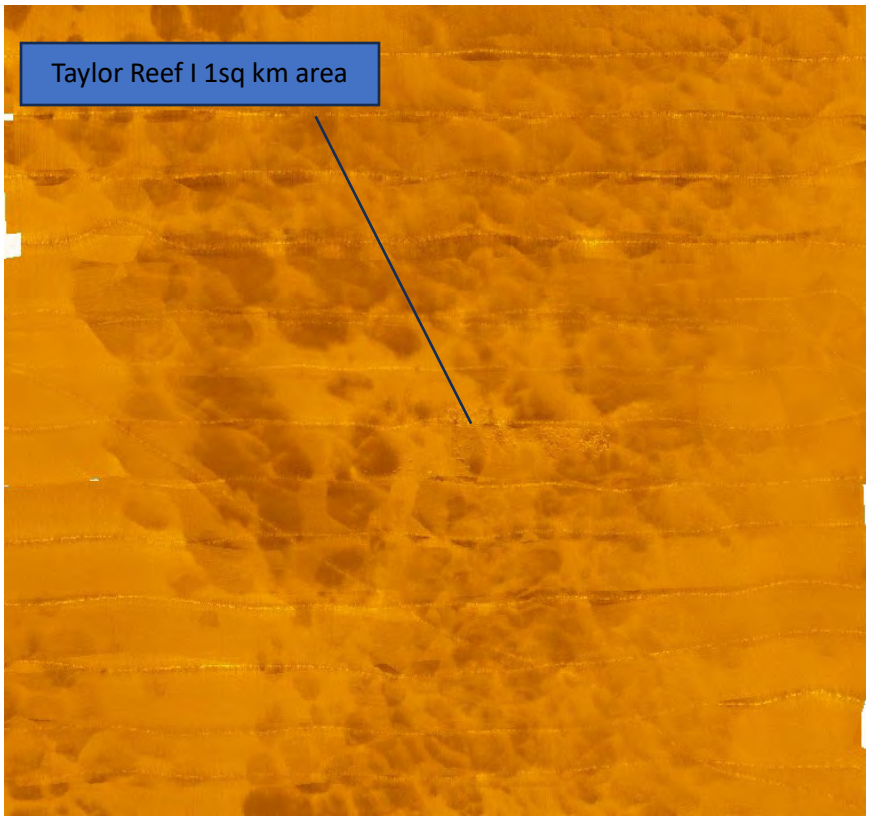


Figure 82 - Side Scan Sonar 1 sq km Area - Taylor Reef

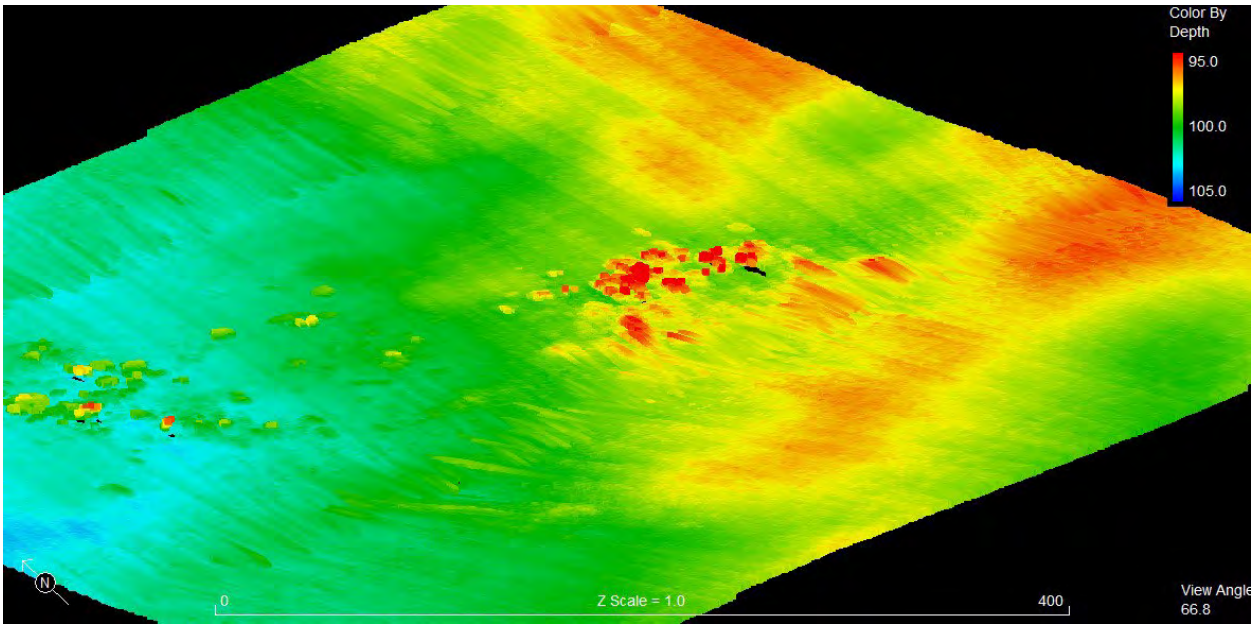


Figure 83 - 3D image of Multibeam over site

Figure 84 - Side Scan Image of Culverts – Taylor Reef

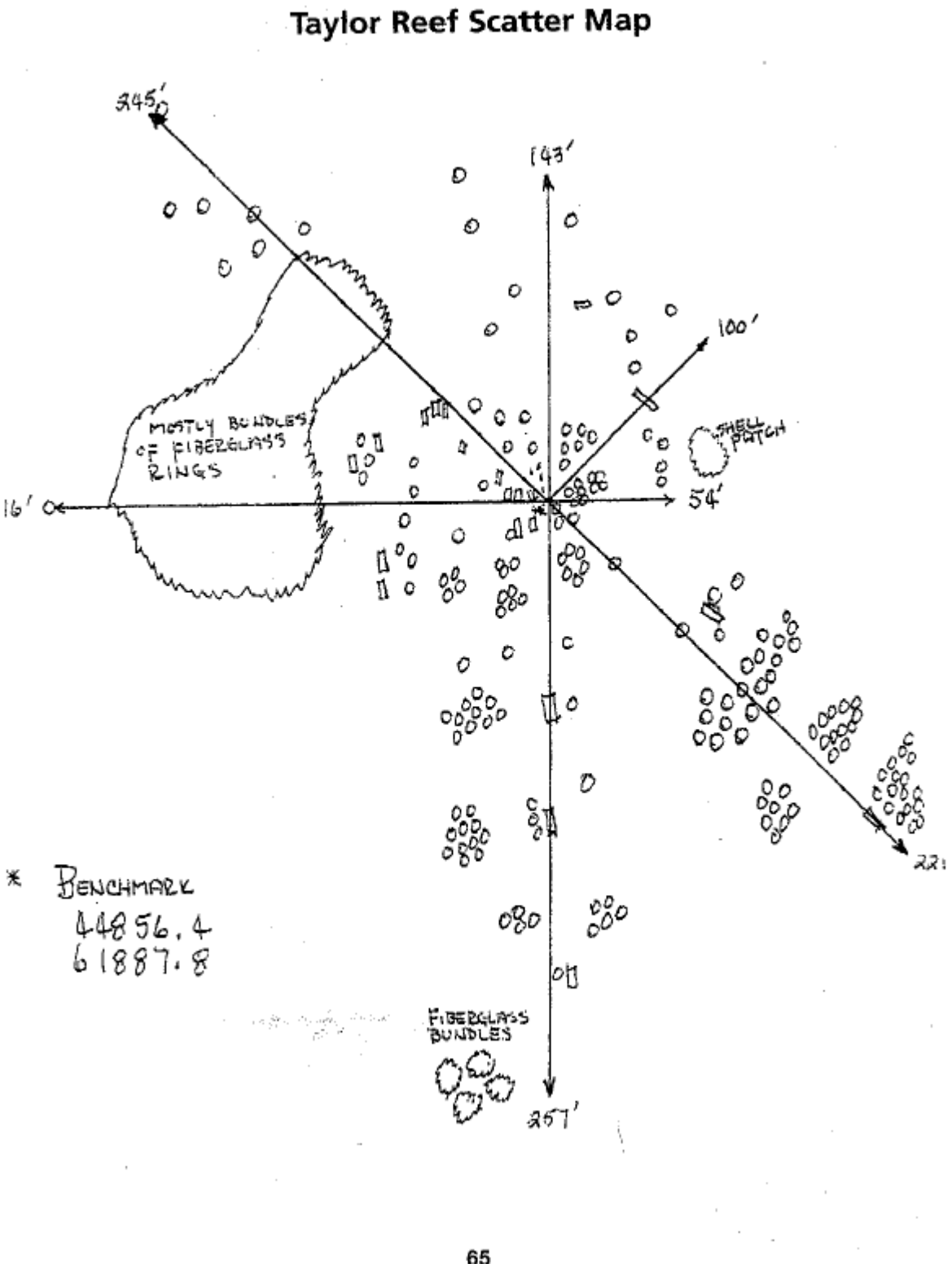


Figure 85 - Taylor Reef Sketch from JAXSPOTS Fishing book

Figure 86 - Typical Round Conc. Culvert

Diving Observations and Fish Population

Taylor Reef

Sonar Survey Corp. covered approximately 1 square km surrounding the reef site. This should encompass the entire permitted area. The seabed is partially consolidated substrate and shell hash. It should be able to support additional artificial reefs in the future.

The reef is very healthy. There is nearly 100% marine growth on all culverts. The predominant fish on this reef is Tomate Grunts. The reef area covers around 500' x 500'.

Although the diving operations occurred in full daylight, it was very dark on the seabed due to the depth. The video camera was equipped with six (6) 5000 lumen lights.

There were many anchor ropes and fishing lines which the divers removed. This reef appears to be a very active anchoring and fishing site. * As noted later: the local Charter Captains hit this site on every trip.

TAYLOR REEF			
APPROXIMATE NUMBER - DIVER OBSERVED FISH			
Species	**Counted**	**Species**	**Counted**
Tomtate Grunt	5000+	Mangrove Snapper	150
Greater Amberjack	100	Gag Grouper	8
Pork Fish	25	Cocoa Damselfish	8
White Grunt	100	Mutton Snapper	50
Almaco Jack	40	Lionfish	10
Sheepshead	10	Gray Snapper	50
Grey Angelfish	15	Spotted Pinfish	20
Blue Angelfish	10	Jack-Knifefish	2
Spiney Sea Urgent	50	Lane Snapper	25
		Barracuda	4

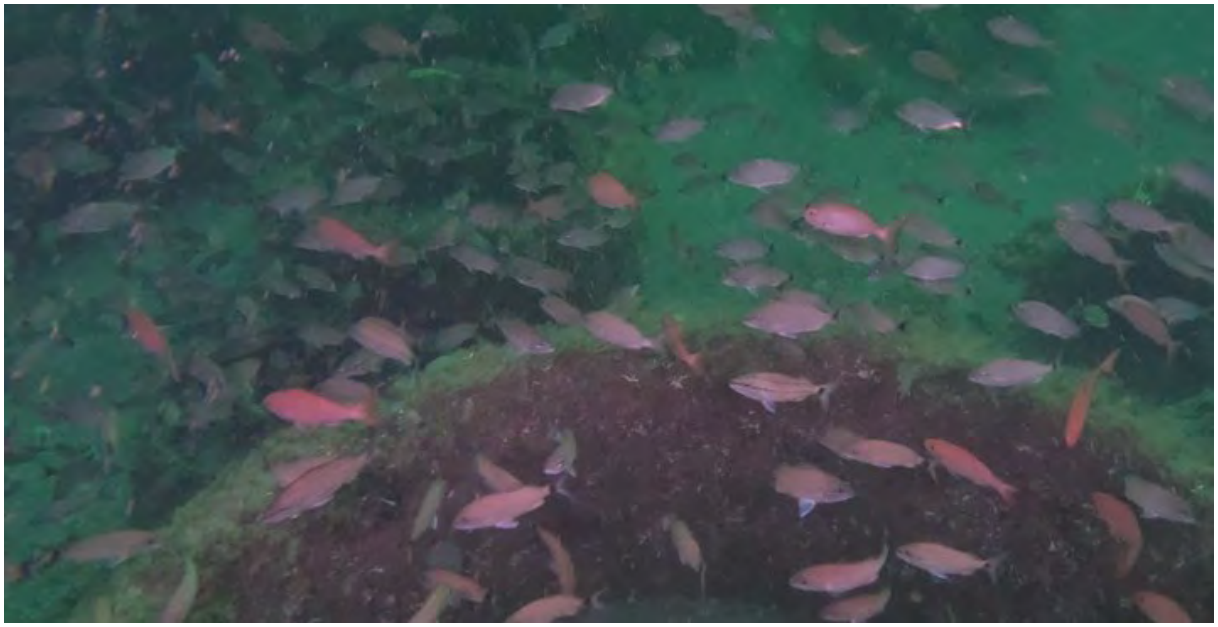


Figure 87 - Tomtate Grunts

Figure 88 - Tomtate Grunts and Marine Growth

Figure 89 - Mangrove Snapper and Tomate Grunts

Figure 90 - Mangrove Snapper

Figure 91 - Mangrove Snapper

Figure 92 - Coral growth / Marine Growth

Figure 93 - Innumerable Tomate Grunts

Figure 94 - Almaco Jack with abandoned anchor rope in background

Figure 95 - Reef Cleanup Efforts, removal of anchors, anchor ropes, and fishing line

Figure 96 - Reef Cleanup Efforts, removal of anchors, anchor ropes, and fishing line

Figure 97 - Cocoa Damselfish (Yellow/Purple)

Figure 98 - Pork Fish(Yello/Black/White) with White Grunts and Tomtate Grunts

Figure 99 - Angel Fish with Tomtate Grunts

Figure 100 - Lionfish

Figure 101 - Red Coral

Figure 102 - Red Coral

Figure 103 - Gag Grouper

Figure 104 - Lane Snapper with Tomtates

Figure 105 - Greater Amberjack, Pork Fish

Figure 106 - Typical Concrete Culverts on Moody

Reef Conditions Section:

Moody Reef

Current Condition of the Reef: Reef is very healthy. Concrete Culverts appear to have almost 100% marine growth coverage. Good healthy coral growth. Fish species is predominantly Greater Amberjack

Water visibility was notably less clear than the other sites. There seemed to be significantly more green algae making the diver swim videos less favorable.

Clean up efforts: Lots of Anchor rope and fishing line. Reef appears to be very well utilized. There was more rope at this single location than all others combined.

Published Coordinates were very close to actual survey coordinates. Numerous vessels fished at this site while surveying and diving operations were ongoing. This reef is spread out over a 600x600' area.

MOODY REEF			
Description	NAVD88 Elevation	Lat (DD MM.MM)	Lon (DD MM.MM)
Coordinates Provided	100	29° 59.130' N	80° 51.270' W
Surveyed Coordinates	**100**	**29° 59.120' N**	**80° 51.469' W**

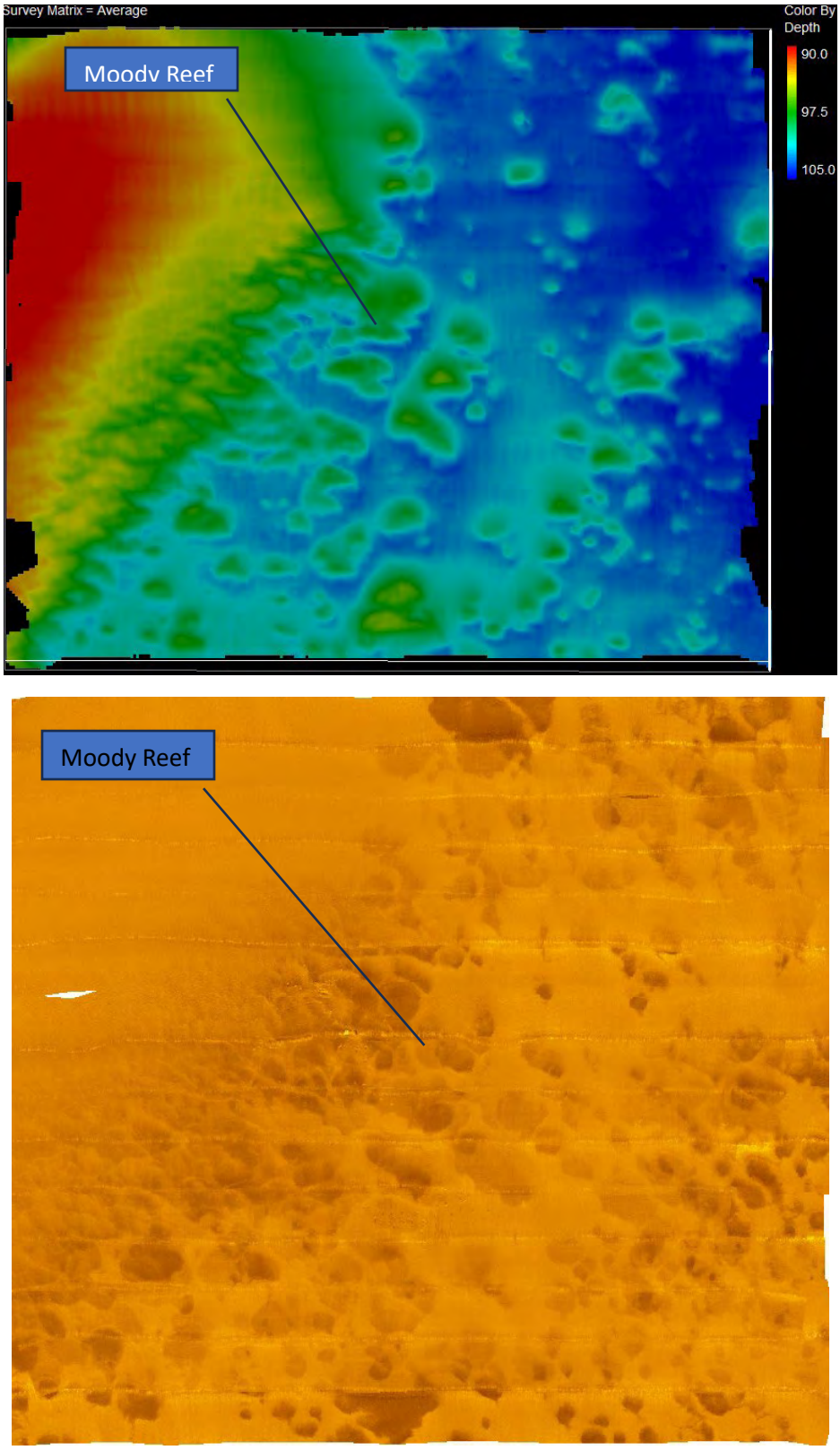


Figure 107 - Side Scan Sonar 1 sq km area - Moody Reef

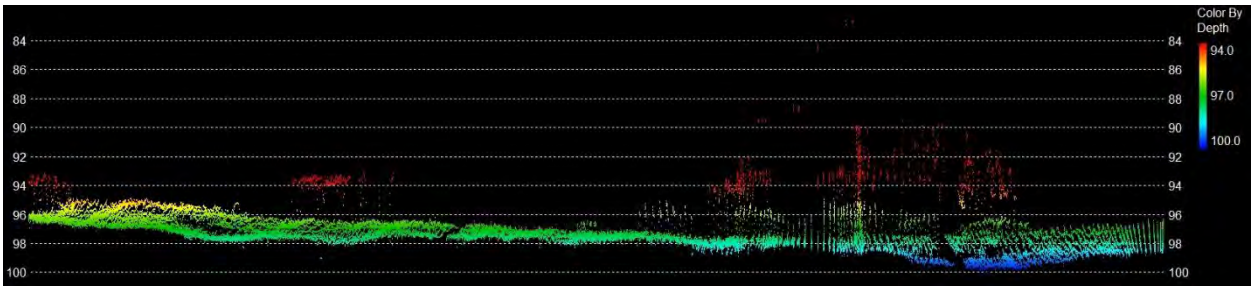


Figure 108 - Cross-Section of Artificial Reef from Multibeam

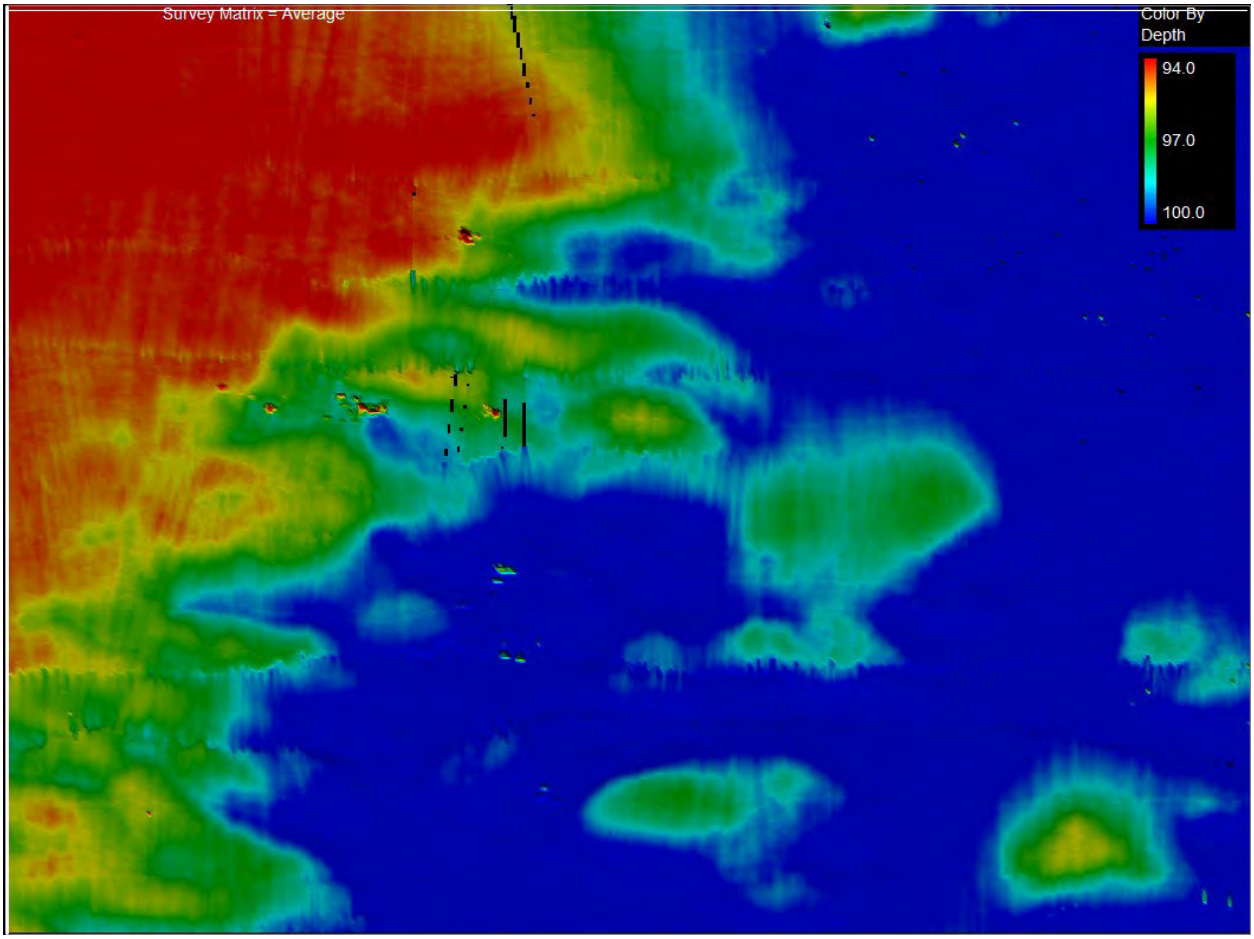


Figure 109 - Multibeam of Moody Reef

Figure 110 - Side Scan Sonar of Moody Reef

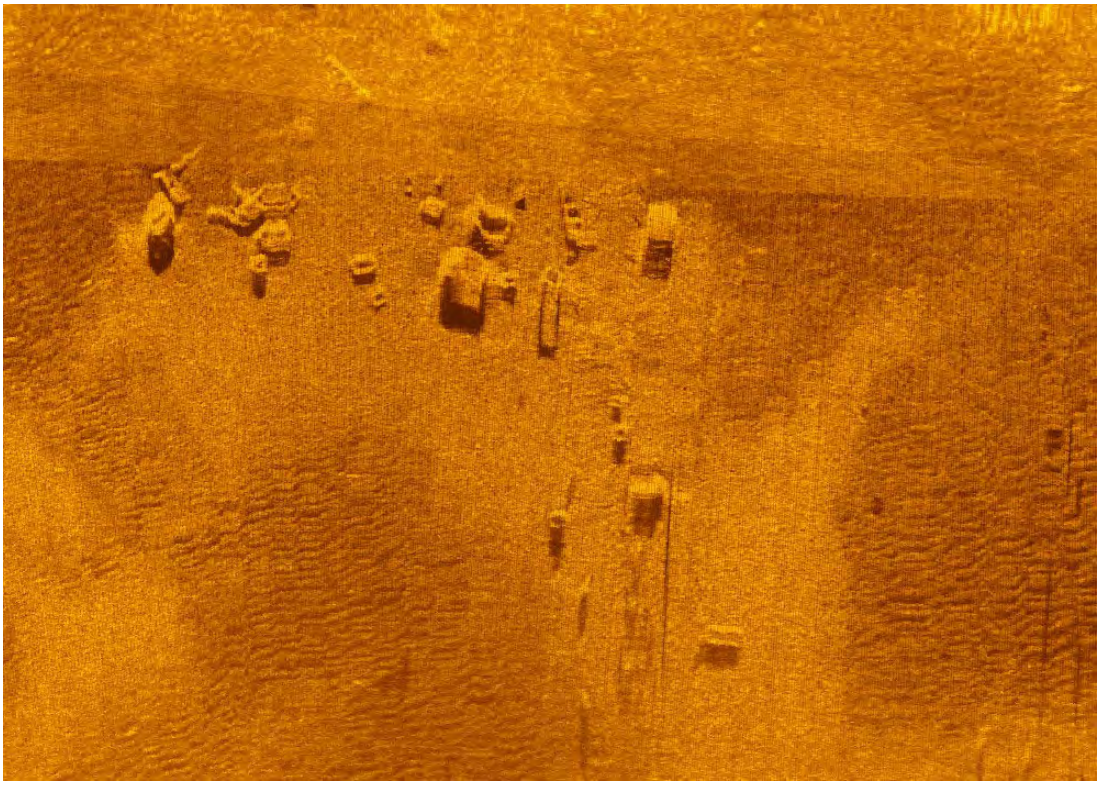


Figure 111 - Side Scan Sonar of Moody Reef

MOODY REEF			
APPROXIMATE NUMBER - DIVER OBSERVED FISH			
Species	**Counted**	**Species**	**Counted**
Lookdown fish	80	Blue Angelfish	4
Spade Fish	60	Gag Grouper	8
Greater Amberjack	500+	Sheepshead	25
Almaco Jack	60	Barracuda	5
Mangrove Snapper	100	Red Snapper	75
Porkfish	80	Gray Snapper	100
Lionfish	200	Cocoa Damselfish	4
Gray Angelfish	30	Spotfin Butterfly fish	20
		Black Seabass	20

Figure 112 - Greater Amberjack and Almaco Jack

Figure 113 - Blue Angle fish and Greater Amberjack

Figure 114 - Lookdown fish

Figure 115 - Red Snapper

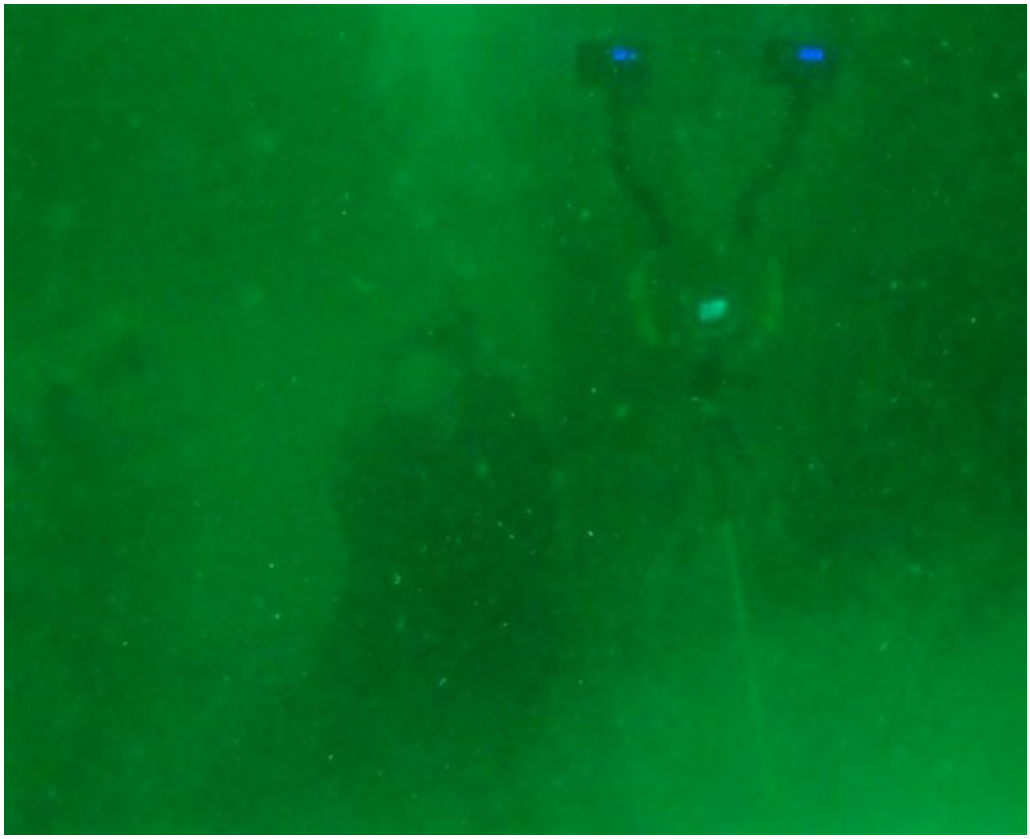


Figure 116 - Underwater Camera System on Tripod

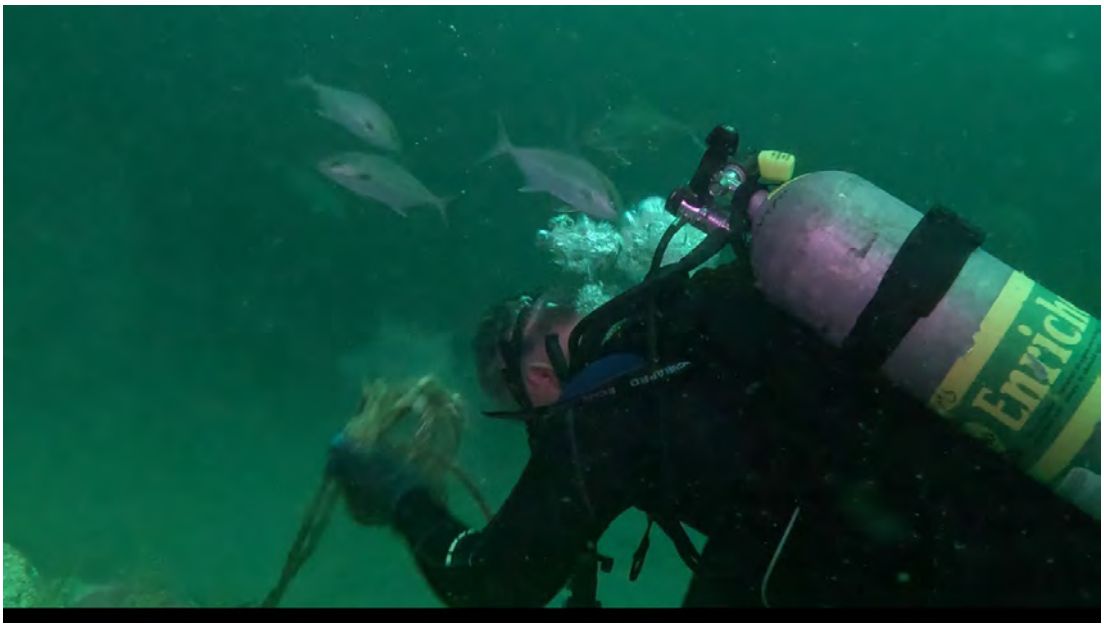


Figure 117 - Clean up efforts, remove rope

Figure 118 - Lots of coral growth

Figure 119 - Lots of coral growth

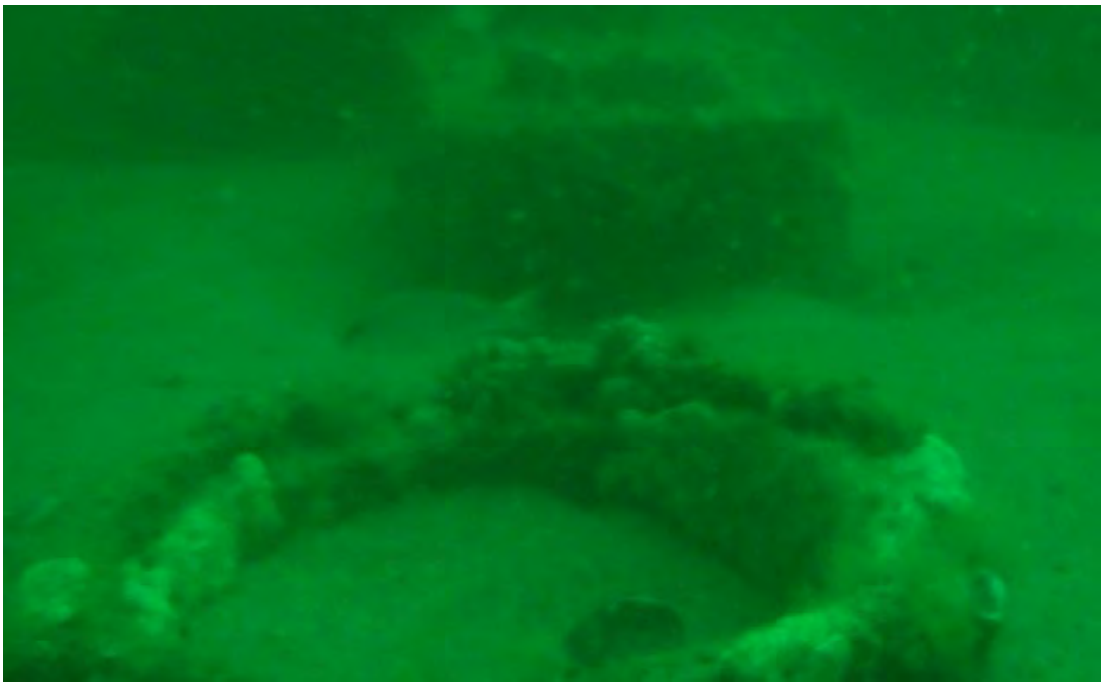


Figure 120 - Lots of coral growth

Figure 121 - Lots of coral growth

Figure 122 - Lots of coral growth and Lionfish

Figure 123 - Cleanup efforts

Figure 124 - Cleanup efforts

Figure 125 - Cleanup efforts

Figure 126 - Cleanup efforts

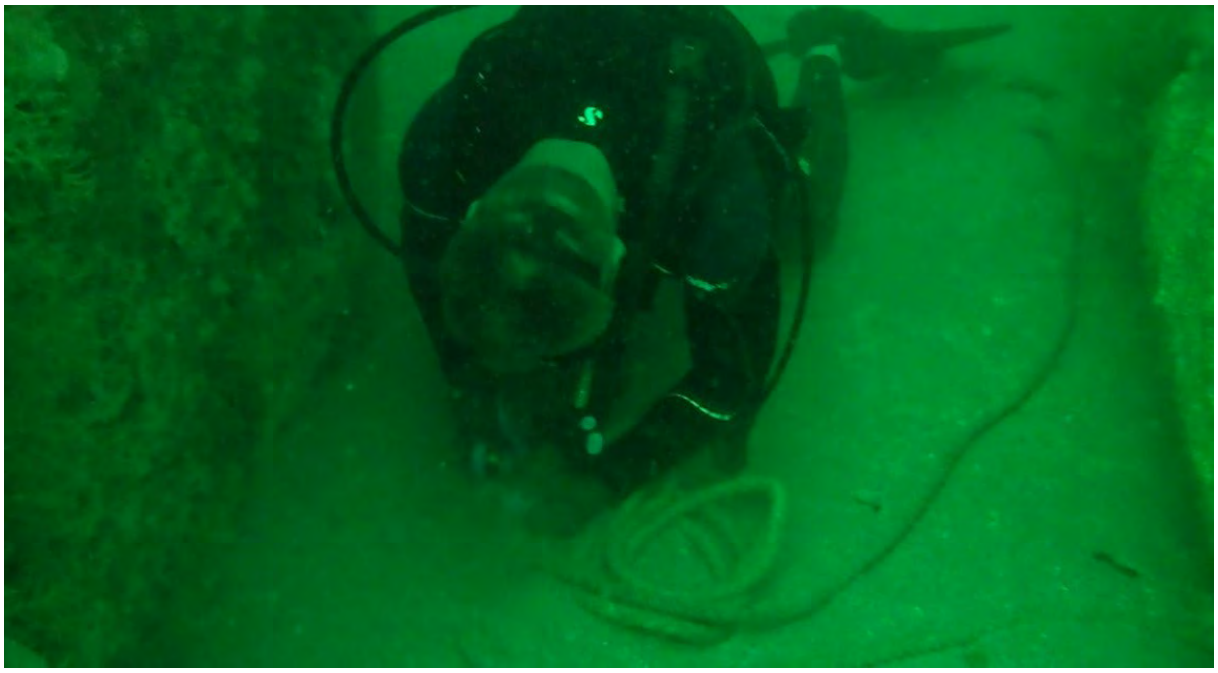


Figure 127 - Cleanup efforts

Figure 128 - Coral Growth and Greater Amberjack

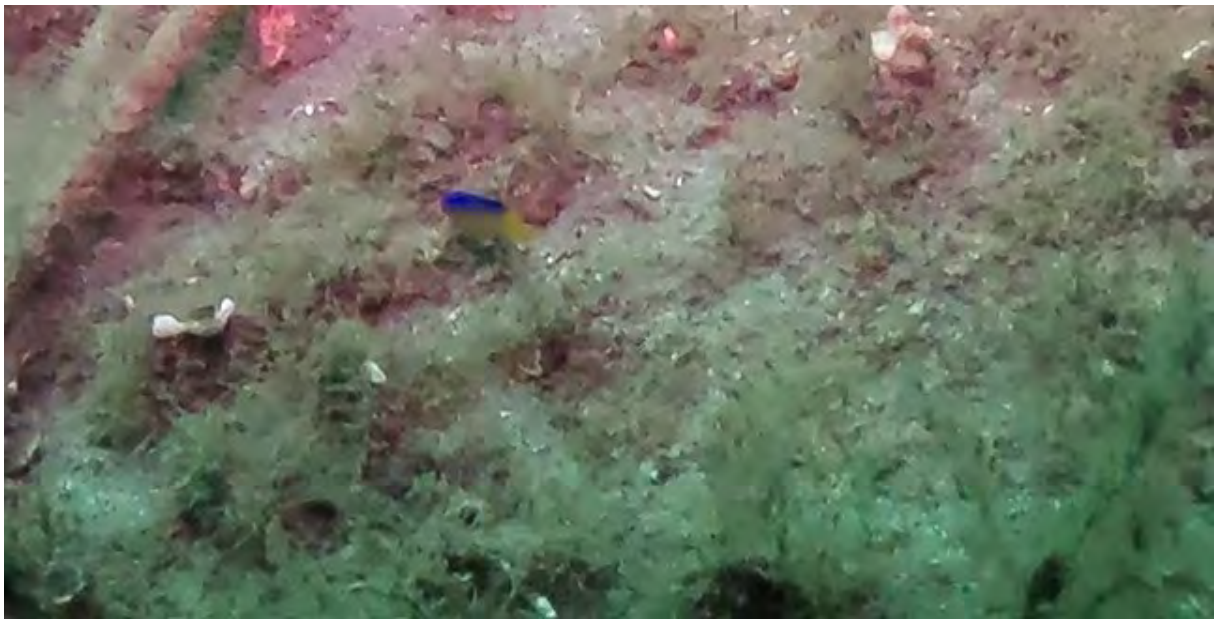


Figure 129 - Cocoa Damselfish

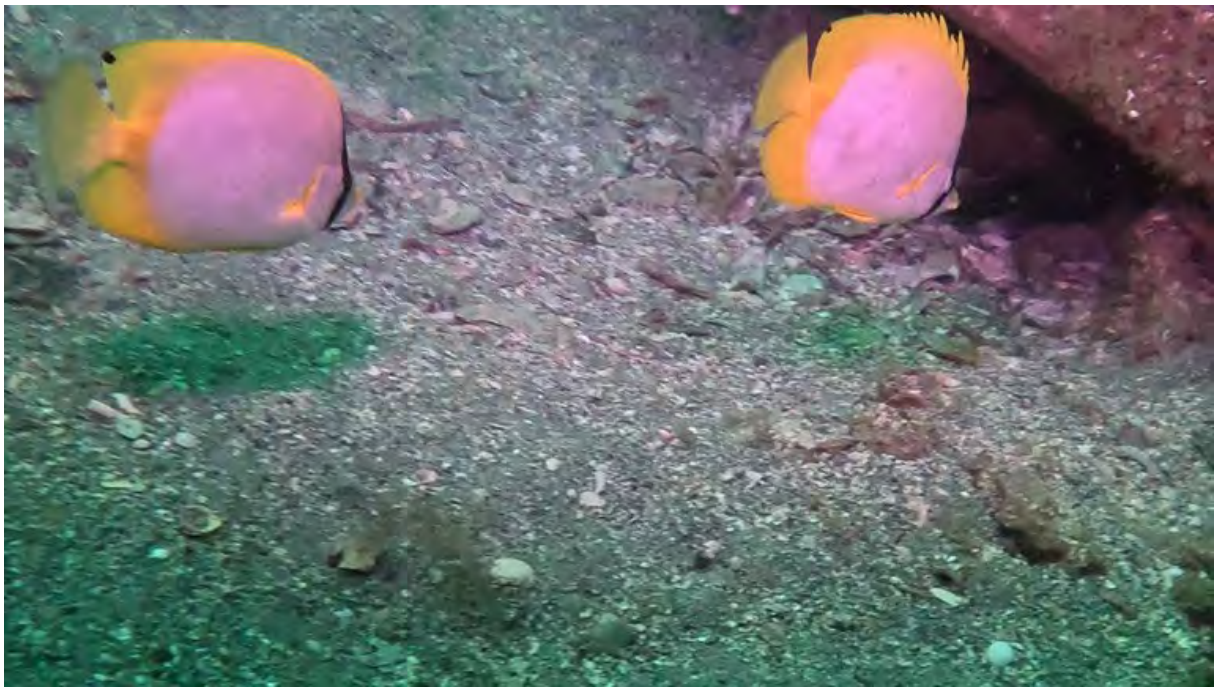


Figure 130 - Spotfin butterflyfish

Figure 131 - Abandoned anchor rope

Figure 132 - Abandoned anchor rope

Figure 133 - Abandoned anchor rope

Figure 134 - Removal of Abandoned Rope

Figure 135 - Grouper and Porkfish

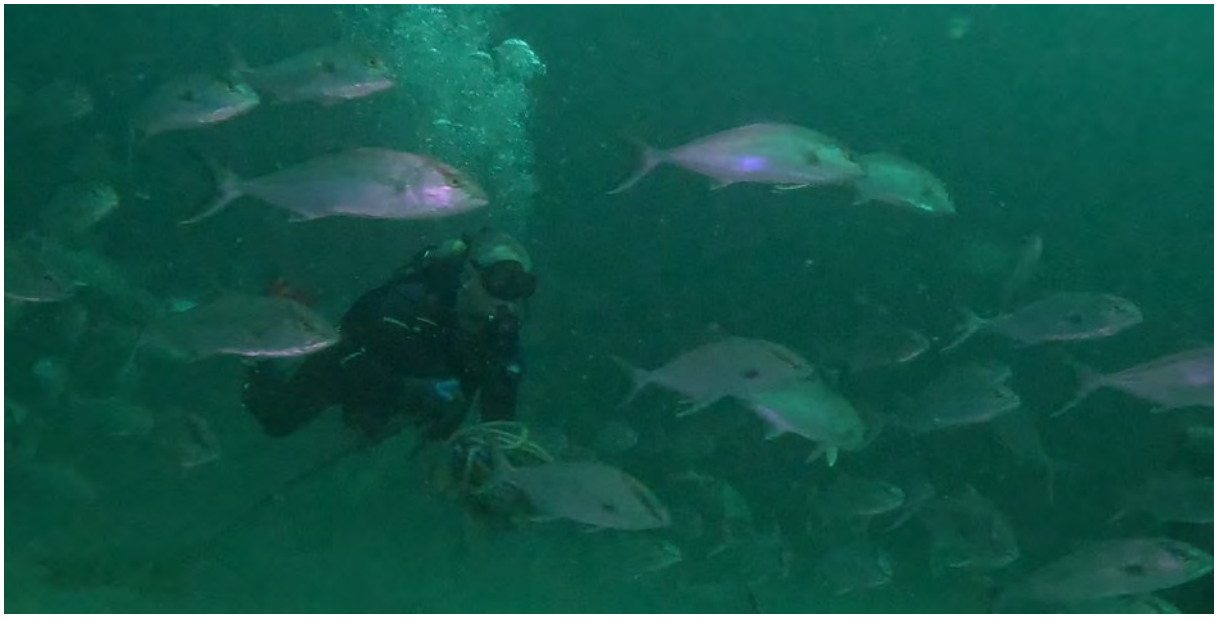


Figure 136 - Anchor rope cleanup with Greater Amberjack

Figure 137 - Lionfish

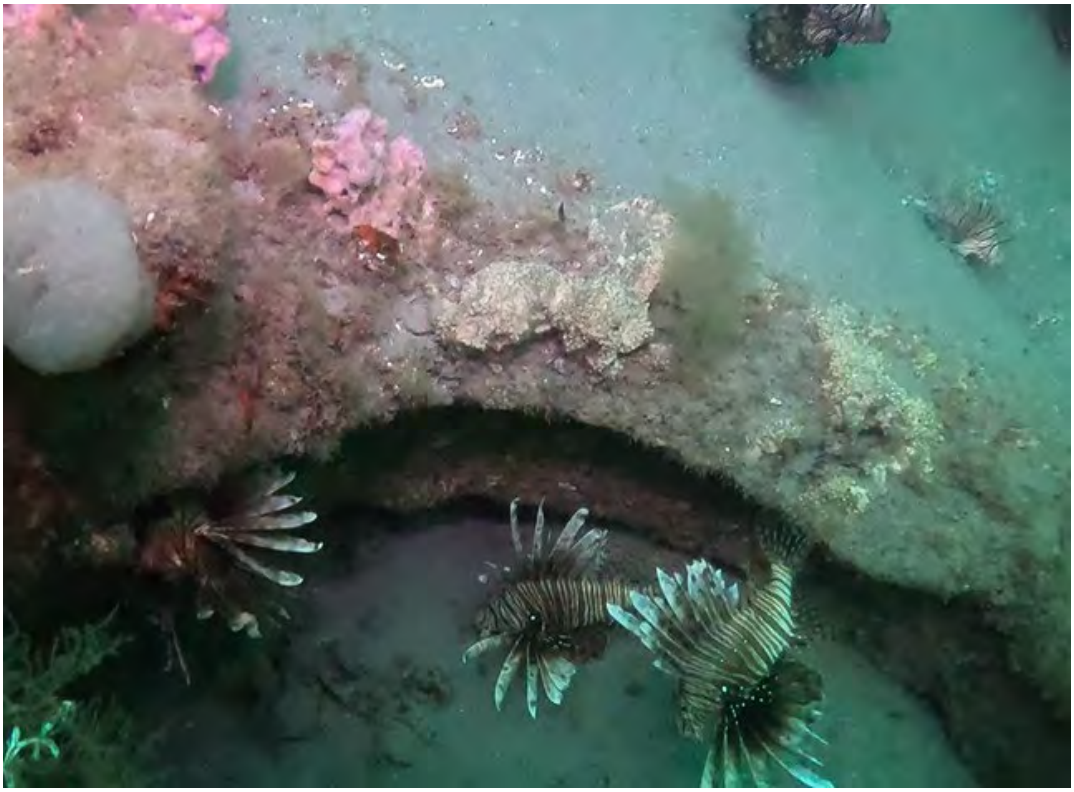


Figure 138 - Lionfish

Figure 139 - Cleanup efforts

Figure 140 - Anchor, rope, grouper, lionfish

Figure 141 - Coral Growth

Figure 142 - Porkfish & anchor rope

Anticipated Amount of Use the Site Receives

Breakdown of the Perceived Amount of Recreational Diving and Fishing Interest

While on site of each artificial reef, there were many small fishing vessels that were trolling and drift-fishing over each of the sites. We did not witness anyone diving on any of the sites. Our team was onsite in July, August, Septembe, October, and again in November.

Charter Fishing:

Many of the charter captains that operate out of St. Augustine were interviewed to determine the annual use of each of these artificial reef sites. Each captain indicated that they frequent each site. Many stated that they hit all of them on every charter.

Local Boaters:

Local fishermen were interviewed at the boat ramp. Nearly all of the boat owners with vessels large enough (25 feet or larger) have been to those sites in the last 12 months.

Boat Club:

The boat handlers at the Freedom Boat Club have a membership of around 1000 local boaters. They stated that only 80-100 people per year travel out to those reefs. They are restricted to 25 miles from the seabuoy. These locations are a little far offshore for them. Most of the club participants utilize the 9-Mile and Pop Warner reef sites.

Diving Interest:

The dive shop in St. Augustine does not know of any locals which frequent any of those reefs. Sonar Survey is part of multiple Online Diving Groups throughout the state. We performed an online poll regarding the sites. Only 4 people responded that they had done dove on the Intruder #1 Reef.

The owner said that the Atlantic Red Snapper moratorium has had a very large impact on his business. Most scuba-divers prefer to go to the West coast of Florida because it does not have the same restrictions.

The uniqueness of the site; does it tend to lead to fishing or diving experiences

The sites tend to lead towards fishing rather than diving. However, for my crew, both Intruder Sites were some of our favorite dives we have participated in.

Effectiveness of the Artificial Reef Program:

While performing the Side Scan Sonar and Multibeam Surveys, the vessel travelled back and forth across pre-laid transect lines. We would encounter very little fish population in the open areas. When we came within a few hundred feet of each site, there was a significant change in fish activity. In some cases, the fish were an indicator that the reef was about to appear on the sonar.

Debris Removal

Following the fish count operations, the divers returned to the site for Debris Removal Operations. All fishing lines and boat anchor ropes that created a hazard for marine life and scuba divers as well as snagged fishing line from above fishermen were removed.

Figure 143 - Debris removed from the reef sites combined.

Debris Removal Summary:

1) Three anchors
2) Chain
3) Fishing Net
4) Fishing Lures/Hooks
5) Lead weights
6) Green Plastic Bucket
7) A few hundred feet of rope
8) Yellow plastic chunks (Wedged under Intruder #1)

Most of the debris was located on or around the Moody Reef. It appeared to have more rope than the other sites.

Additional Notes:

While speaking with local charter captains and fishermen. Some of the comments did not fall into the questionnaire format. Some of those are listed here.

Charter Boat #1: 60 trips last year, 4 people per charter = 240 people fishing days

Hits all 3 reefs every trip Intruder, Taylor, and Moody (Taylor is his favorite as Moody has to many Red Snapper). All 3 reefs get hit hard by Freedom Boat Club that has 125 boats for rent and are limited to 25 miles off shore.

Wishes that there were more reefs closer than 3 miles for year-round Red Snapper catch in State Waters. And wishes there were more reefs near the Intruder, Taylor and Moody, or even beyond as there are no reefs between 25 miles and 40 miles off-shore.

Concerned about NOAA Amendment 59 as it will put him out of business for 3- months per year when the snow birds are down.

Charter Boat #2 30 trips last year, 4 people per charter = 120 people fishing days

Hits all 3 reefs each trip. Knows there is a lot of fishing pressure and wishes there were more reefs located near these 25 miles offshore or even further out to 40-50 miles. Would also love reefs to be withing 3 miles for potential year-round Red Snapper fishing.

Charter Boat #3 40 trips last year, 3 people per charter - 120 people fishing days

Hits all 3 reefs every trip. Wishes more reefs less than 3 miles and farther than 25 miles. Also concerned about NOAA Amendment 59.

Charter Boat #4 25 trips last year 3 people per charter = 75 people fishing days

Hits all 3 reefs each trip. Sees lots of fishing pressure at 25 miles on these reefs.

Wishes more reefs near "Pier Barge" closer than 3 miles as well as more reefs around 25 miles or beyond. Concerned about NOAA Amendment 59.

Charter Boat #5 30 trips last year, 6 people per charter = 180 people fishing days

Hits all 3 reefs every trip.

Wishes more reefs less than 3 miles and 25 miles -40 miles out to the 21 bottom reef.

Concerned about NOAA Amendment 59 and is attending all meetings.