23-194 REEF MONITORING FOR DORTHEY LOUISE, DESCO, AND 9 MILE CULVERTS REEF SITES

P.O. 20232440

Sonar Survey Corporation

1/29/24

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
720 E. New Haven Ave, Suite 7
Melbourne, Fl 32901
Attn: Scott Meyer, scott@sonarsurvey.com
Phone Number: 727-408-0118

Reference: 23-194 REEF MONITORING FOR DORTHEY LOUISE, DESCO, AND 9 MILE CULVERTS REEF SITES

P.O. Number 20232440

Subject: Please find the following report dated Feb 1, 2024, which completes the contract. Invoice to be submitted separately.

Contents

CONTRACT SPECIFICATIONS

Supplier shall be responsible for providing monitoring at Dorthey Louise, Desco, and 9 Mile Culverts Reef Sites in order to provide St Johns County a holistic overview of the current standing of each reef. Each Reef has permits for the placement of material and this is a one-time follow up assessment of the site.

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:
    - Current condition of the reef.
    - Current GPS location of the reef.
    - Anticipated amount of use the site receives.
    - Breakdown of the perceived amount of recreational diving and fishing interest of the site.
    - The uniqueness of the site; does it tend to lead to fishing or diving experiences.
    - Current fish counts and fish species utilizing the site.
- Provide video footage of each reef site along with the submitted report.

Reef Locations:

1. Dorthey Louise Reef- 29.56.316, 80.57.508
2. Desco Reef- 29.53.242. 81.00.960
3. 9 Mile Culverts Reef- 29.54.670, 81.07.180

Project Overview

Sonar Survey Corporation was contracted to perform Artificial Reef Monitoring for three sites off the coast of St. Augustine Florida.

Dorthey Louise wreck Description:

The Dorthey Louise Barge is a 175’ long steel barge deployed Dec 31, 1988
It is located approximately 17.5 nautical miles (NM) from the sea buoy in Matanzas Inlet, St. Augustine, Fl.

9-Mile Culverts Reef Description:

Concrete Culverts (tonnage unknown) deployed Dec 31, 1983
The site is located approximately 8.9 NM from the sea buoy in Matanzas Inlet, St. Augustine, Fl

Desco Reef (Culverts)

The reef site is made up of 2000 tons of concrete culverts deployed June 3, 1987, and an additional 2000 tons of concrete culverts deployed Dec 21, 1992

Reef location Map

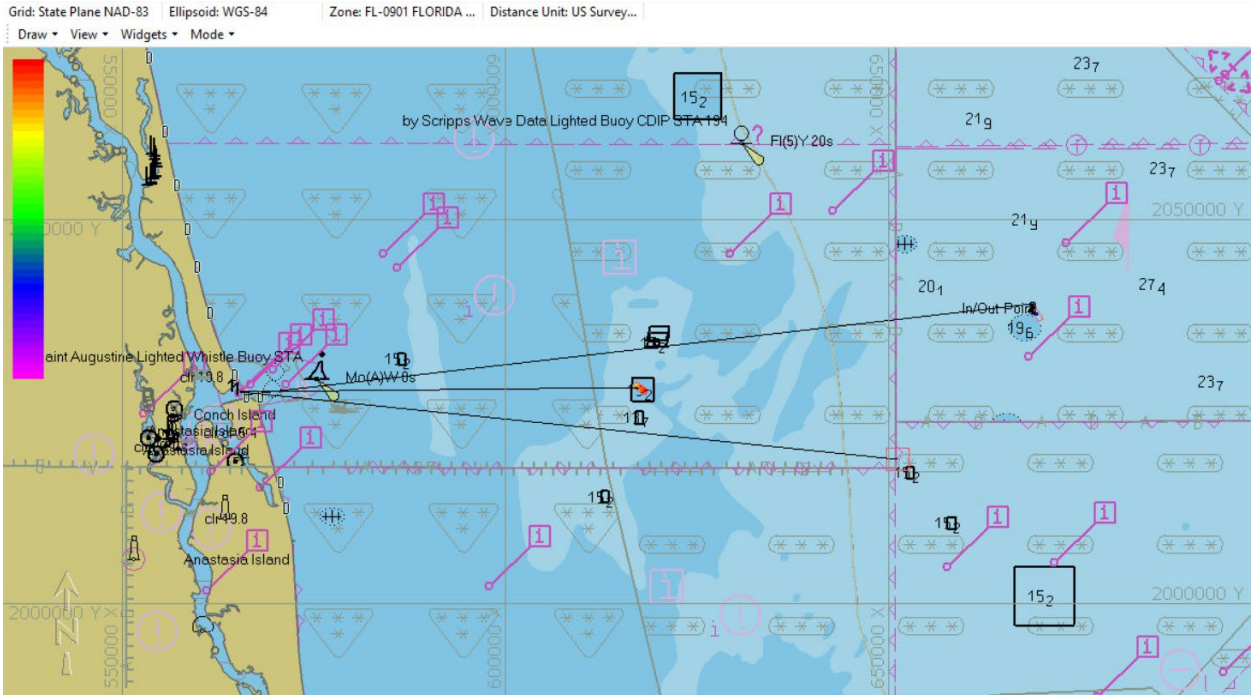


Figure 1 - Note the three black lines from the sea buoy out to the three sites.

Weather

The weather pattern in 2023 was quite rough for the Northern Atlantic Region of Florida. The offshore conditions surrounding the project site were elevated throughout the season.

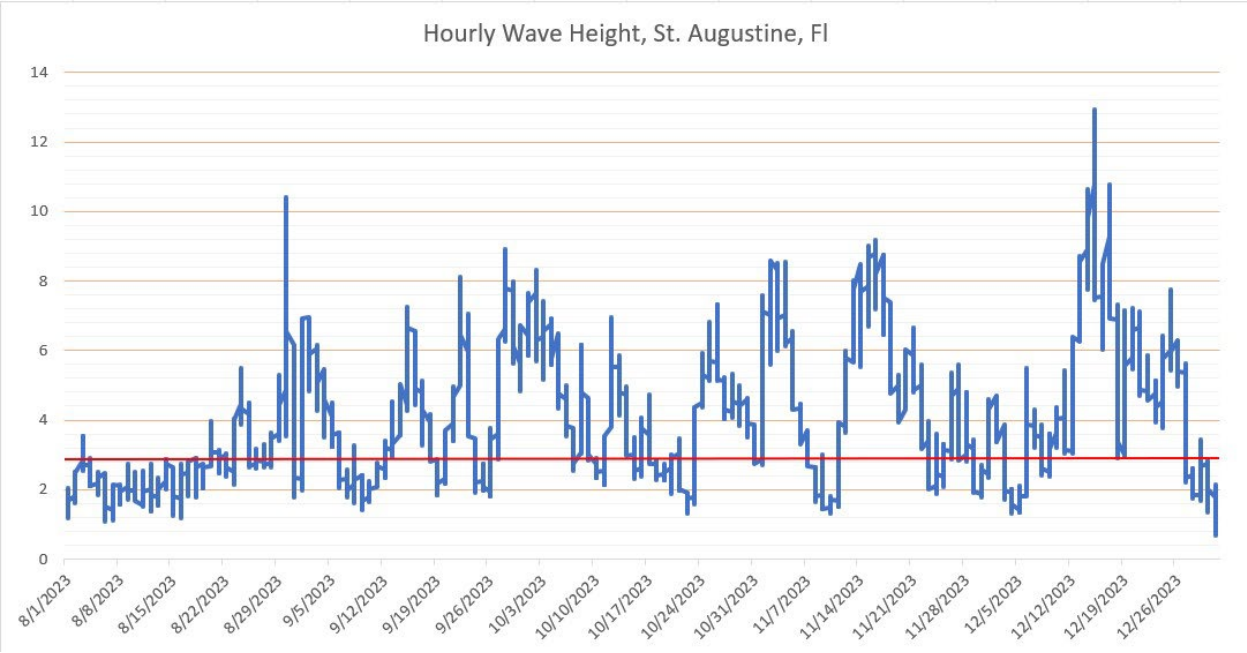


Figure 2 - Wave heights from August to December 2023 averaged well over 1m

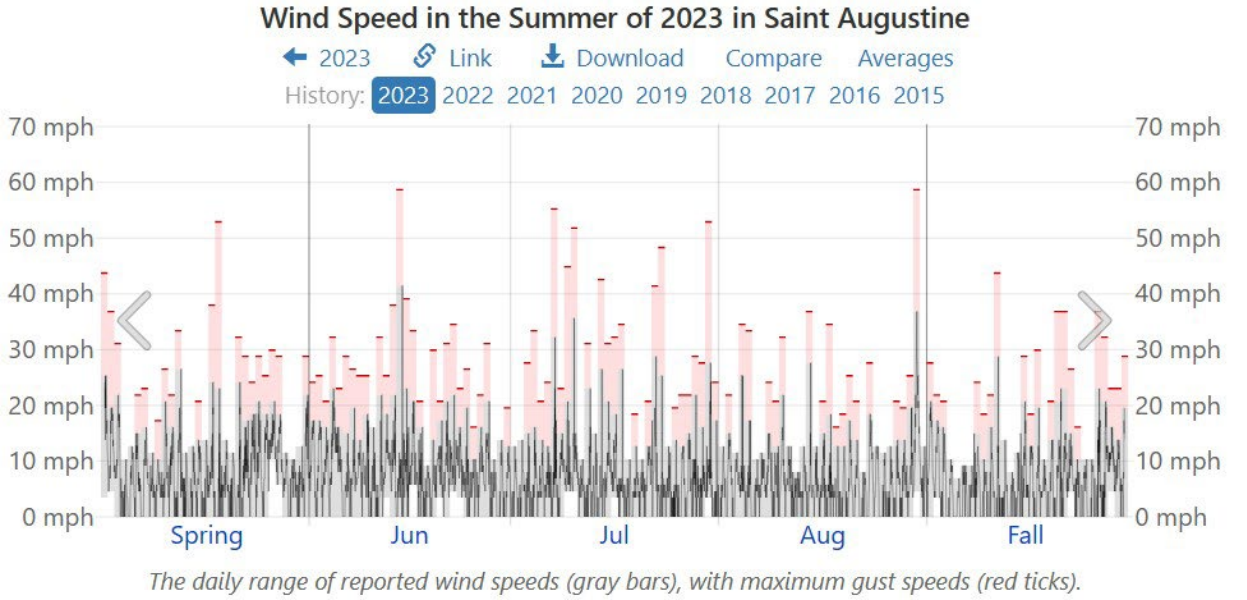


Figure 3 - Wind Speeds were typically between 15 and 20 knots

Water Clarity

Sonar Survey Corp. monitored the NASA Satellite imagery for ocean reflectivity around the project area. There were notable plumes of siltation in the area causing poor visibility this year. The image below was taken on January 15, 2024. The plume can easily be seen. The water clarity and visibility for each site reflected this pattern as well. The 9-Mile Reef and Desco Reef sites are within the plume and had very limited viability, whereas the Dorthey Louise Reef fall outside the plume, and had very good visibility.

Figure 4 - NASA Ocean Reflectivity Image Jan 15, 2024

Project Mobilization

Survey/Dive Crew:

Scott Meyer	Owner/Hydrographic Surveyor/Diver
Patrick Meyer	Dive Master
Christopher Wright	Commercial Diver
Alexa Rae Meyer	Biologist/Diver
Alec 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 5 - C-Hawk loaded with equipment at Vilano Bridge Boat Ramp

Brief Summary of Survey/Dive Trips:

1) 1/14/24 9-Mile Reef Noth - Dive Video /Multibeam Hydrographic Survey
   - Consumables: 15 Gals Fuel – 3 Dive Tanks
2) 1/18/24 Dorthey Louise & Desco Culverts – Dive Video / Multibeam Hydrographic Survey
   - Consumables: 22 Gals Fuel – 4 Dive Tanks
3) 1/19/24 Dorthey Louise & Desco – Fish Counting by divers / Debris Removal Dorthey Louise
   - Consumables: 22 Gals Fuel – 5 Dive Tanks
4) 1/20/24 Desco & 9-Mile Culverts Reef – Fish Counting by divers / Debris Removal
   - Consumables: 20 Gals Fuel – 5 Dive Tanks

Hydrographic Survey Operations

Although not required by this contract. Sonar Survey decided to utilize our in-house hydrographic survey equipment to help map the existing reef sites. 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

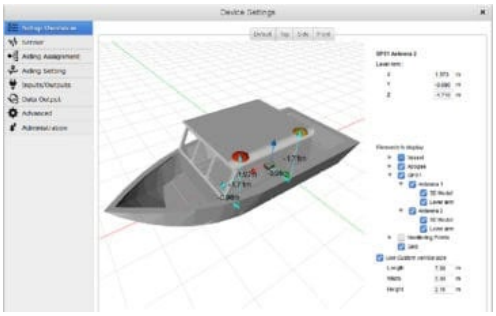
The coordinate systems are referenced to either WGS84 in Degrees Decimal Minutes (DD MM.MM) format and all depths are referenced to NAVD88 Feet. State Plane coordinates are in FL-E 0901 Feet.

[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



3D Rendering of Reef Sites

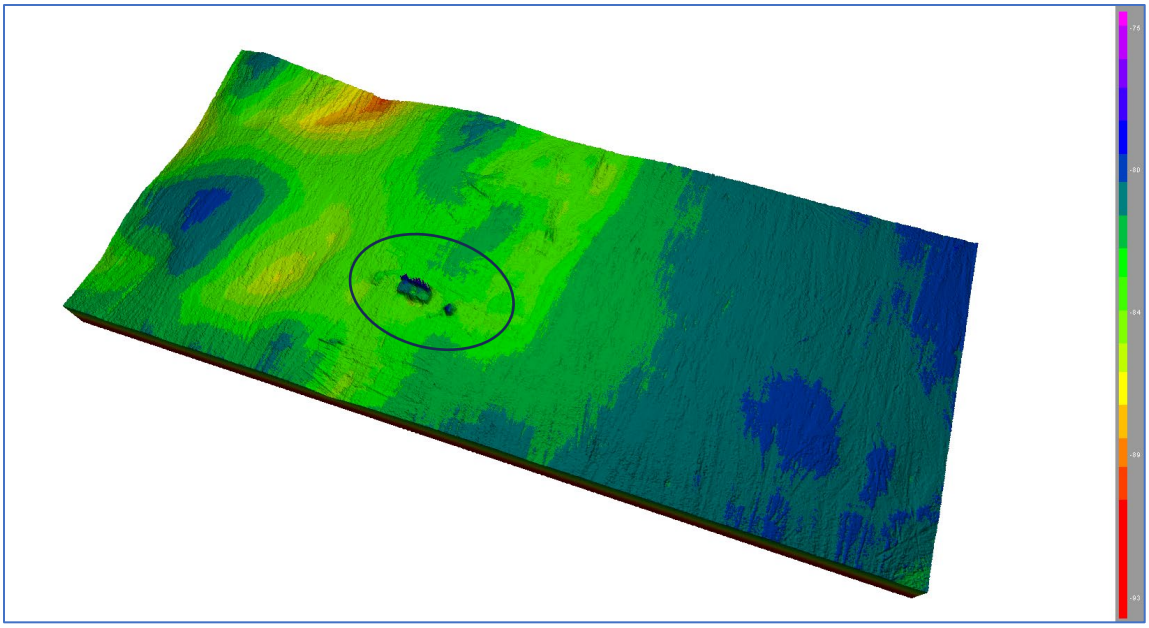


Figure 6 - Dorthey Louise Reef

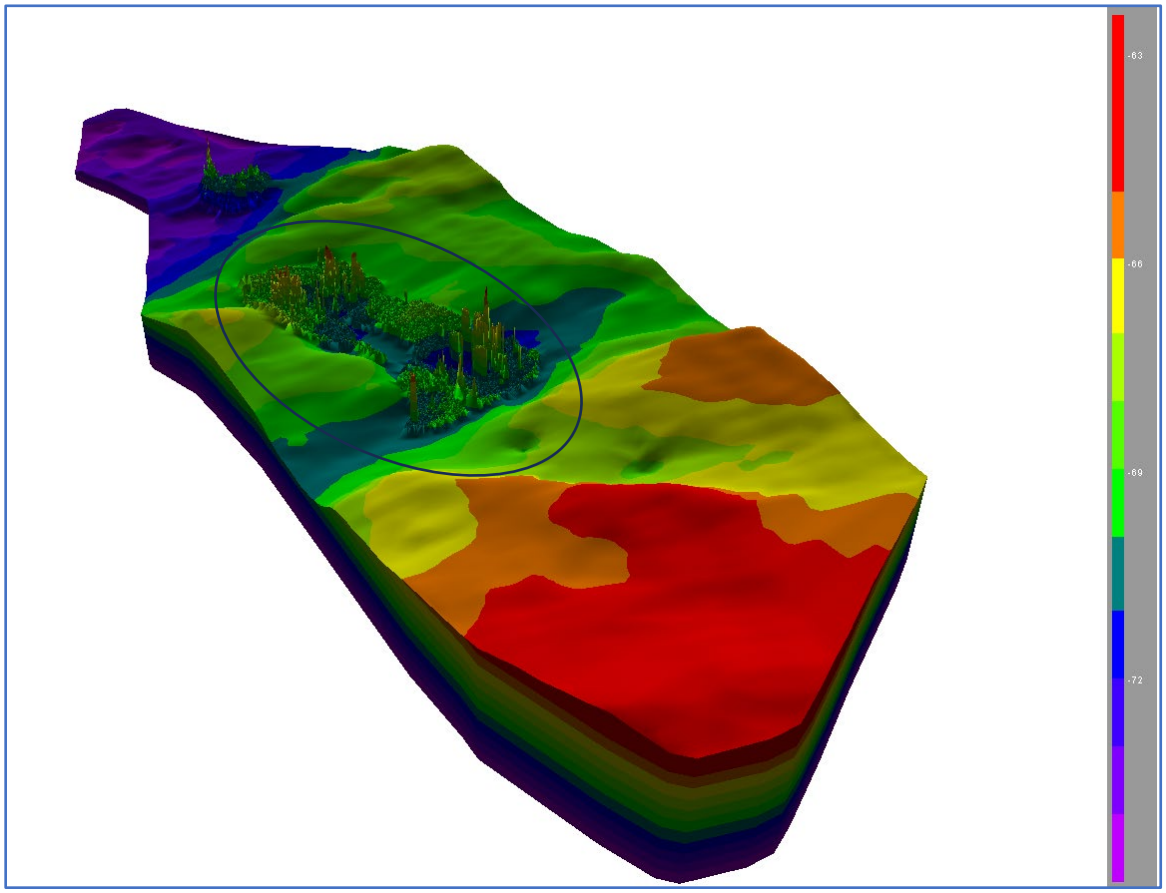


Figure 7 - 9-Mile Culverts Reef

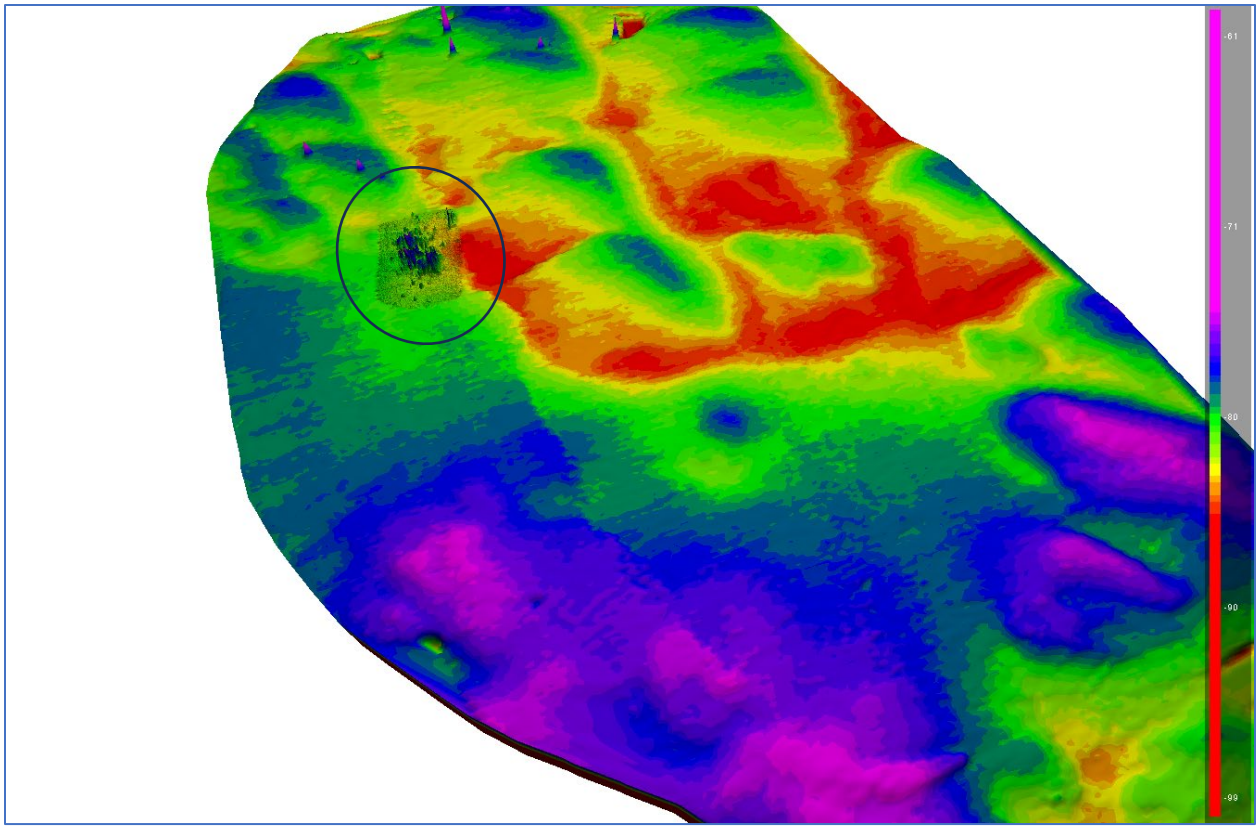


Figure 8 - Desco Reef (Culverts)

The data for all 3 sites was then post-processed and converted to Google Earth KML files that can be downloaded and overlaid in real world coordinate. The data can be interacted with directly.

Download: Earth Versions – Google Earth

Download Dorthey Louise Reef:

https://drive.google.com/file/d/1M2LZCnx1tGFOkXBdeAmDo85r81HilMjb/view?usp=drive_link

Download 9-Mile Culverts Reef:
https://drive.google.com/file/d/1MDNVmAMD56sbEiN_Nn2fve5vF04F6ZAz/view?usp=drive_link

Download Desco Reef (Culverts):

https://drive.google.com/file/d/1xmSag1Esr1X0iCiyI53u6dE7wB2CP95n/view?usp=drive_link

GPS Locations from Survey Data

9-MILE CULVERT REEF LOCATION - PROVIDED VERSUS SURVEYED					
Description	**Easting**	**Northing**	**NAVD88 Elevation**	**Lat (DD MM.MM)**	**Lon (DD MM.MM)**
Coordinates provided	618,255.00	2,027,641.10	56'	N29 54.67000	W081 07.18000
Surveyed Coord. Area 1	617,706.14	2,027,920.49	65'	N29 54.71600	W081 07.28400
Surveyed Coord. Area 2	617,927.82	2,027,835.40	70'	N29 54.70200	W081 07.24200
Surveyed Coord. Area 3	617,410.77	2,028,223.85	70'	N29 54.76600	W081 07.34000

DORTHEY LOUISE REEF LOCATION - PROVIDED VERSUS SURVEYED					
Description	**Easting**	**Northing**	**NAVD88 Elevation**	**Lat (DD MM.MM)**	**Lon (DD MM.MM)**
Coordinates provided	669,322.51	2,037,600.22	70'	N29 56.31600	W080 57.50800
Surveyed Coord. Barge	669,323.80	2,037,666.42	83'	N29 56.32693	W080 57.50775

DESCO REEF LOCATION - PROVIDED VERSUS SURVEYED					
Description	**Easting**	**Northing**	**NAVD88 Elevation**	**Lat (DD MM.MM)**	**Lon (DD MM.MM)**
Coordinates provided	651,097.30	2,018,966.57	85'	N29 53.24200	W081 00.96000
Surveyed Coord. Barge	650,949.40	2,018,827.19	85'	N29 53.21900	W081 00.98800

State Plane Coordinates are in feet relaive to FL-E 0901 Elevations in NAVD88

Geographic Coordinates are in WGS84 Degree Decimal Minutes

Reef Conditions Section:

Dorthey Louise

Current Condition of the Reef:

Dorthey Louise reef appears to be very healthy with an abundance (90%) of living marine growth and very healthy population of fish. It is located at a depth of approx. 70 feet.

As we pulled up to the site there were millions of glass minnows at the surface and a pod of Atlantic Spotted Dolphin.

Current GPS Location

(The actual Reef location is very close to the provided coordinate, but it is 13’ deeper than published)

Original Location Provided	N29 56.316	W080 57.508 Depth 70’
Surveyed Coordinate Area 1	N29 56.327	W080 57.508 Depth 83’

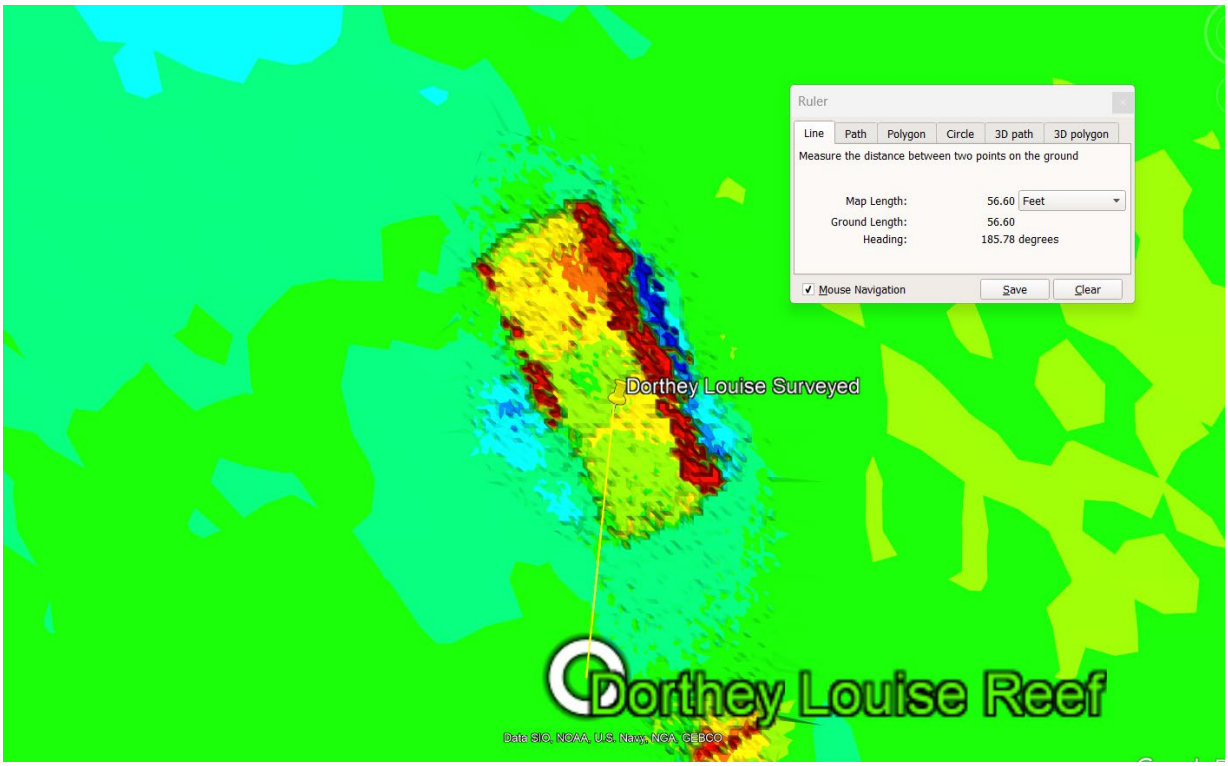


Figure 9 - Map of Surveyed Location Versus Published Location

Questionnaire to Determine Site Use

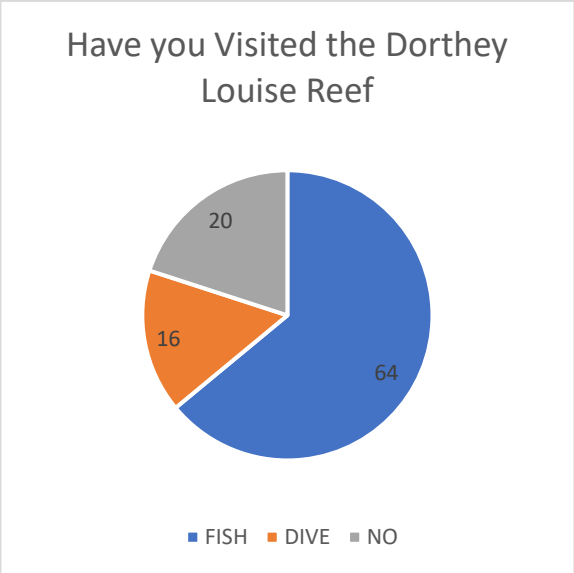
A Questionnaire was completed by online polls through social media as well as in-person interviews from locals and charter companies in the area. The charter companies were given a weighted scale of 5 due to multiple passengers on each trip. This brought the total sample size to 100.

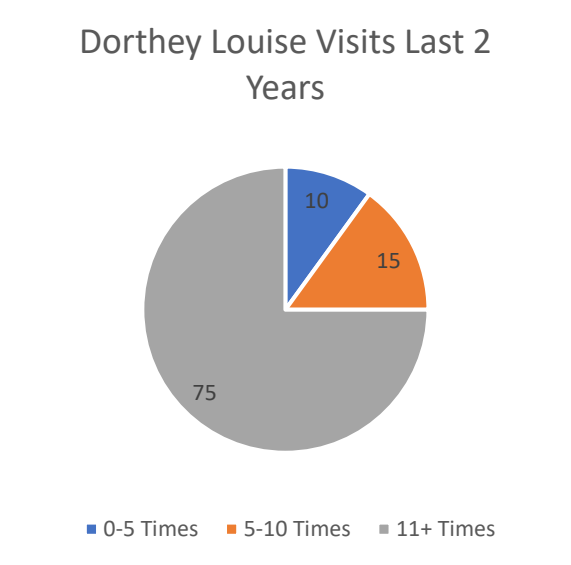
Anticipated Amount of Use the Site Receives

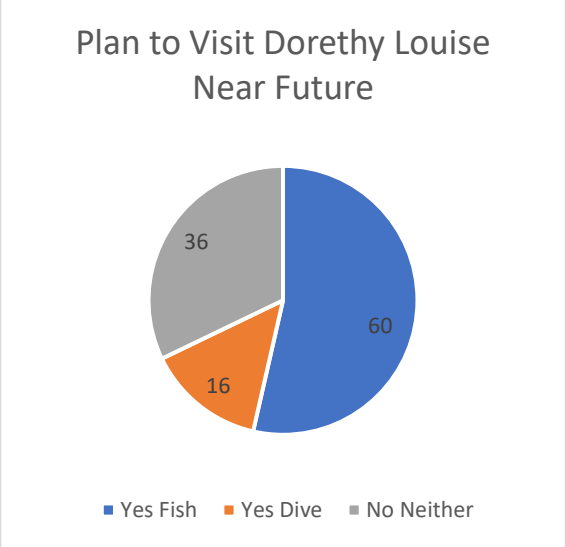
How many times have you visited each site in the last two years?	05- Times	5-10 Times	More Than 11
Dorthey Louise Reef (Barge)	10	15	75
Do you plan to visit any of these reefs in the near future?	Yes Fish	Yes Dive	No Neither
Dorthey Louise Reef (Barge)	60	16	36
Would you utilize the area if a new artificial reef was created near the existing site	Yes Fish	Yes Dive	No Neither
Dorthey Louise Reef (Barge)	70	16	14

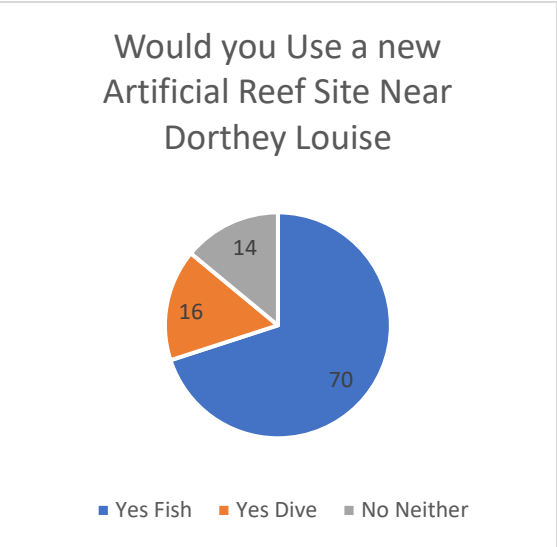
Perceived Amount of Recreational Diving and Fishing Interest

Have you visited the following reefs to fish or dive?	Yes Fish	Yes Dive	No Neither
Dorthey Louise Reef (Barge)	64	16	20









Uniqueness of the Site for Diving and Fishing

In-person and phone surveys with locals indicated that this reef is extremely popular to both scuba diving and fishing because of its unique structure and length yielding a nice long scuba dive site with lots to see as well as being able to accommodate multiple boats fishing at once. This became evident as 4 other fishing boats arrived and left during our underwater debris clean-up efforts. The debris cleanup efforts were also indicative of the amount of use the Dorthey gets based on the amount of snagged fishing line and boat anchors that were hung up on the structure.

Current Fish Counts and Species Utilizing the Site

Fish counts survey was performed by visual census while scuba divers were performing approx. 4 hours of debris clean-up efforts on this reef, as well as underwater video. The visibility was about 25 feet.

A large variety of fish species are on the Dorthey as it is a very healthy marine habitat.

DORTHEY LOUISE BARGE REEF			
APPROXIMATE NUMBER - DIVER OBSERVED FISH			
Species	**Counted**	**Species**	**Counted**
Nurse shark	1	Flounder	2
Spade Fish	500+	Star Fish	12
Barracuda	5	Sand Dollars	30+
Crevalle Jack	30+	Red Snapper	30+
Blue Angel Fish	30+	Gray Mangrove Snapper	200+
Sheepshead	30+	Vermilion Snapper	50+
Porkfish	50+	Mutton Snapper	25+
Gag Grouper	20+	Schoolmaster Snapper	50+
Toad Fish	3	Lionfish	2
Spotted Dolphin	2	Sea Turtle	1

Note: Most notable species observed: (not counting baitfish pods that were plentiful)

Figure 10 - Numerous fish and sea life as well as a sea turtle

Figure 11 - Many Jack, Snapper and Grunts

Figure 12 – Schoolmaster and other Snapper

Figure 13 - Showing some of the barge structure.

Figure 14 - Diver removing rope debris.

Figure 15 - Barge Structure and marine growth

Figure 16 - Snapper, Jack and Sheepshead

Figure 17 - Reef is quite healthy.

Download Diver Video for Dorthey Louise

https://drive.google.com/file/d/1ZrTK8DTu6scCuVKpWvaFHq7JUQbXK15n/view?usp=sharing

Page Intentionally Left Blank to Separate Different Reef Reports

9-Mile Culverts

Current Condition of the Reef:

The 9-Mile Culverts Reef appears to be moderately healthy with a moderate (50%) living marine growth with a moderate sized population of fish. It is located at a depth of approx. 65 feet.

Current GPS Location:

(The actual Reef location is broken up into 3 separate areas)

Original Location Provided	N29 54.670	W081 07.180 Depth 56’
Surveyed Coordinate Area 1	N29 54.716	W081 07.284 Depth 65’
Surveyed Coordinate Area 2	N29 54.702	W081 07.242 Depth 70’
Surveyed Coordinate Area 3	N29 54.766	W081 07.340 Depth 70’

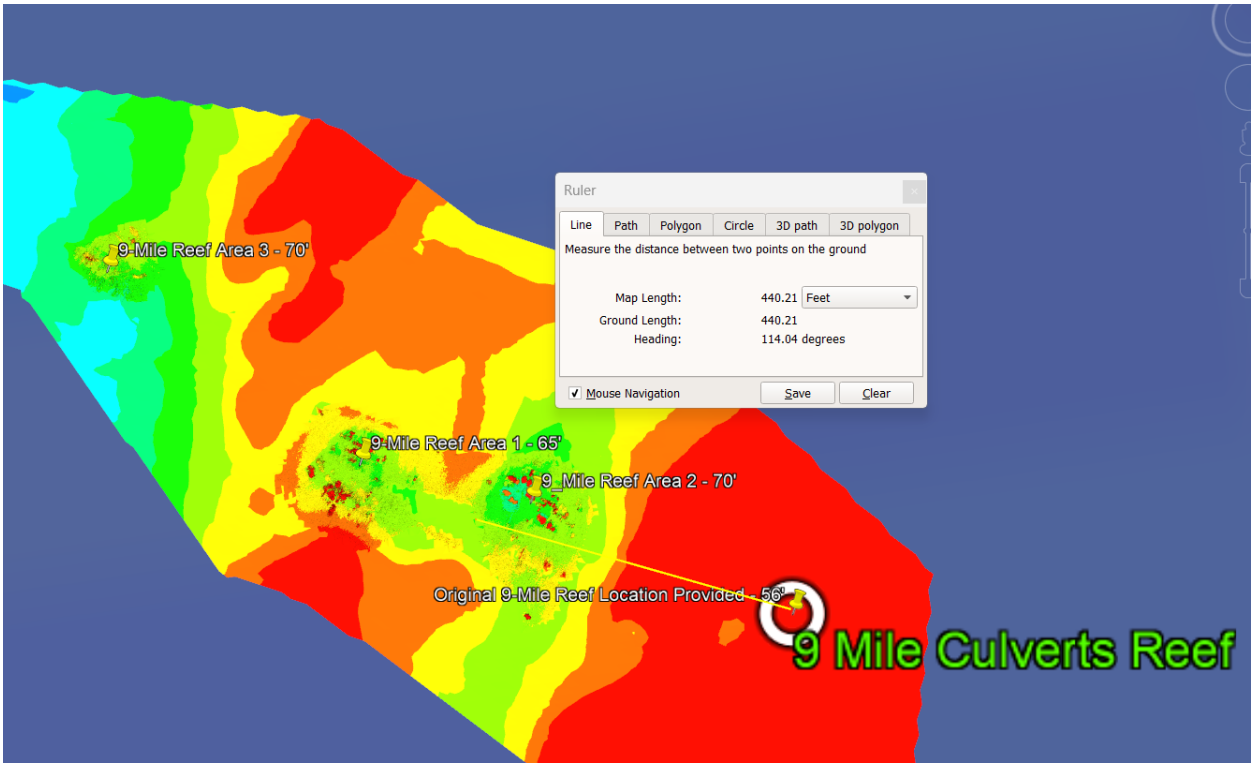


Figure 18 - Map of Surveyed Location Versus Published Location

Questionnaire to Determine Site Use

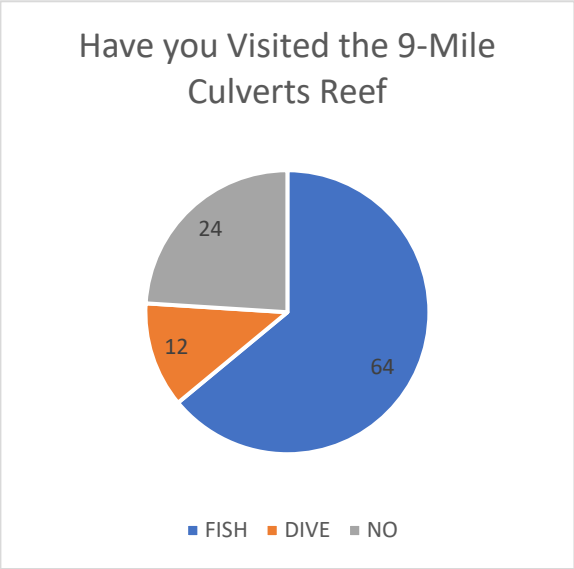
A Questionnaire was completed by Online Polls through social media as well as in-person interviews from locals and charter companies in the area. The charter companies were given a weighted scale of 5 due to multiple passengers on each trip. This brought the total sample size to 100.

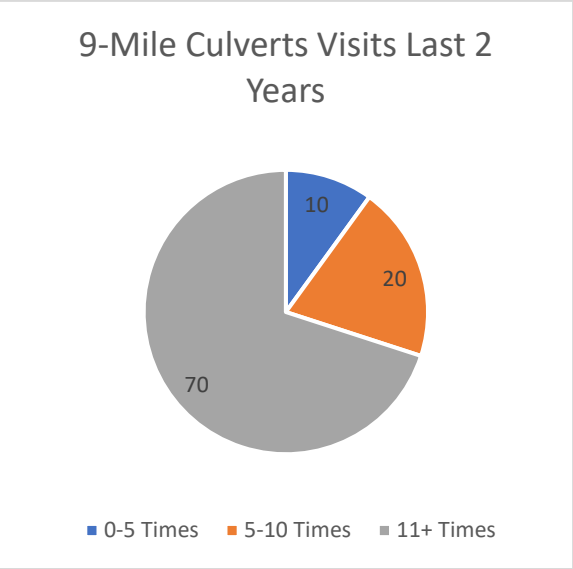
Anticipated Amount of Use the Site Receives

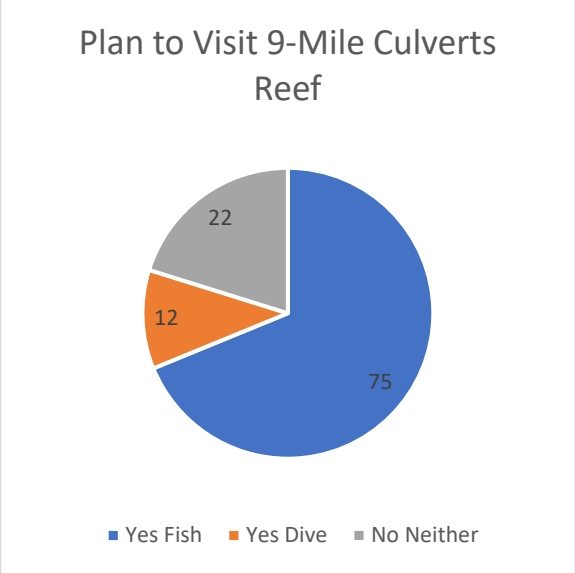
How many times have you visited each site in the last two years?	05- Times	5-10 Times	More Than 11
9-Mile Culverts Reef	10	20	70
Do you plan to visit any of these reefs in the near future?	Yes Fish	Yes Dive	No Neither
9-Mile Culverts Reef	75	12	22
Would you utilize the area if a new artificial reef was created near the existing site	Yes Fish	Yes Dive	No Neither
9-Mile Culverts Reef	70	16	14

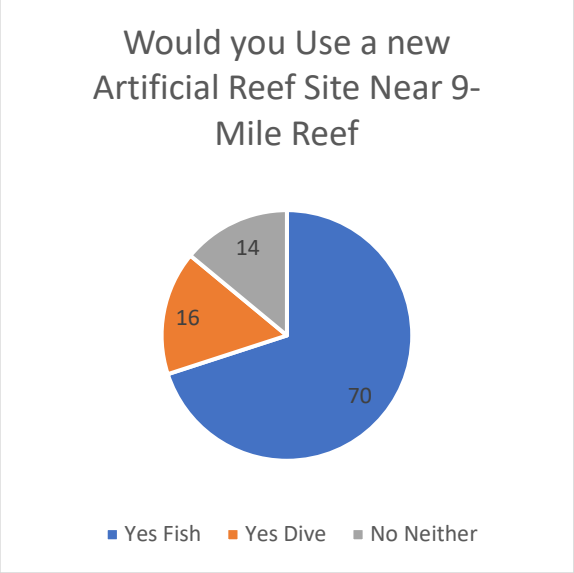
Perceived Amount of Recreational Diving and Fishing Interest

Have you visited the following reefs to fish or dive?	Yes Fish	Yes Dive	No Neither
9-Mile Culverts Reef	64	12	24









Uniqueness of the Site for Diving and Fishing

In-person and phone surveys with locals indicated that this reef is extremely popular for fishing, but not as much for scuba diving due to consistent low visibility. The unique location of the reef is very close to the Matanzas Inlet leads most local fishermen to frequent this spot. Even the larger deep-water charters stated that they typically stop at this location to catch fresh bait before proceeding offshore.

Current Fish Counts and Species Utilizing the Site

Fish counts survey was performed by visual census while scuba divers were performing approx. 1 hour of debris clean-up efforts on this reef, as well as underwater video. The visibility was about 8 feet.

The 9-Mile Reef appears to be moderately healthy with a moderate (70%) living marine growth with a moderate population of fish. It is located at a depth of approx. 75 feet.

9-MILE REEF NORTH			
APPROXIMATE NUMBER - DIVER OBSERVED FISH			
Species	**Counted**	**Species**	**Counted**
Almaco Jack	1	Mangrove Snapper	25+
Sheepshead	100+	Spadefish	20
Gag Grouper	1	Pinfish	50+
Blue Tang	4	Tomtate (Grunt)	50

Note: Most notable species observed: (not counting baitfish pods that were plentiful)

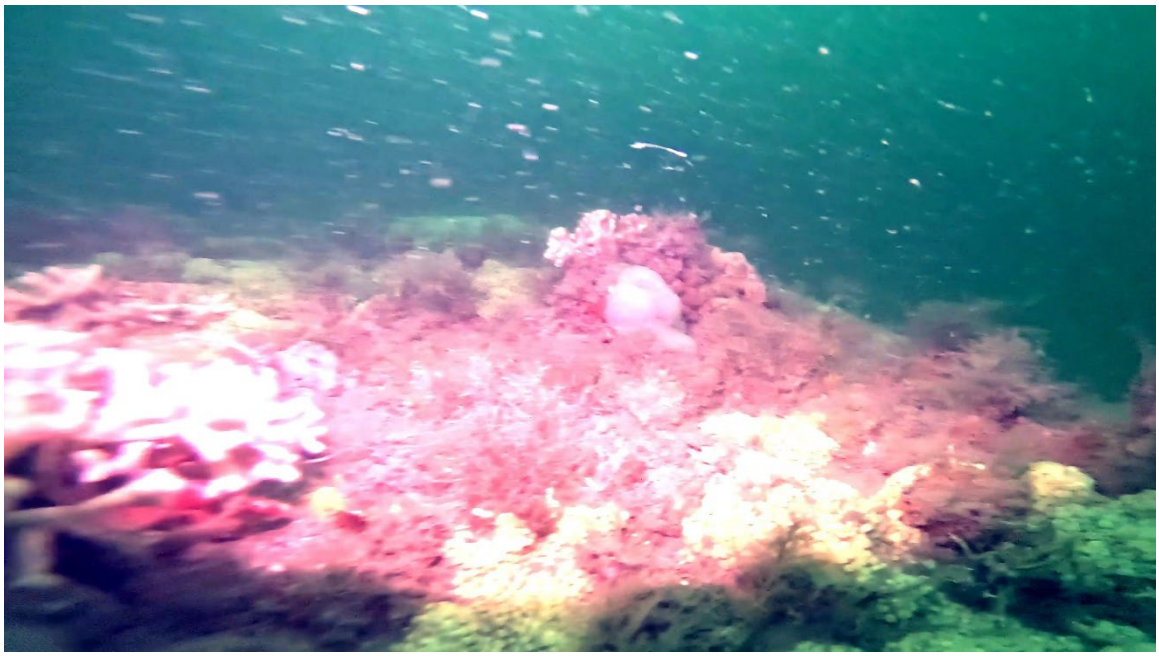


Figure 19 - Marine growth is quite thick in some areas, 70% coverage of all surfaces.

Figure 20 - There are Box Culverts as well as Round Culverts

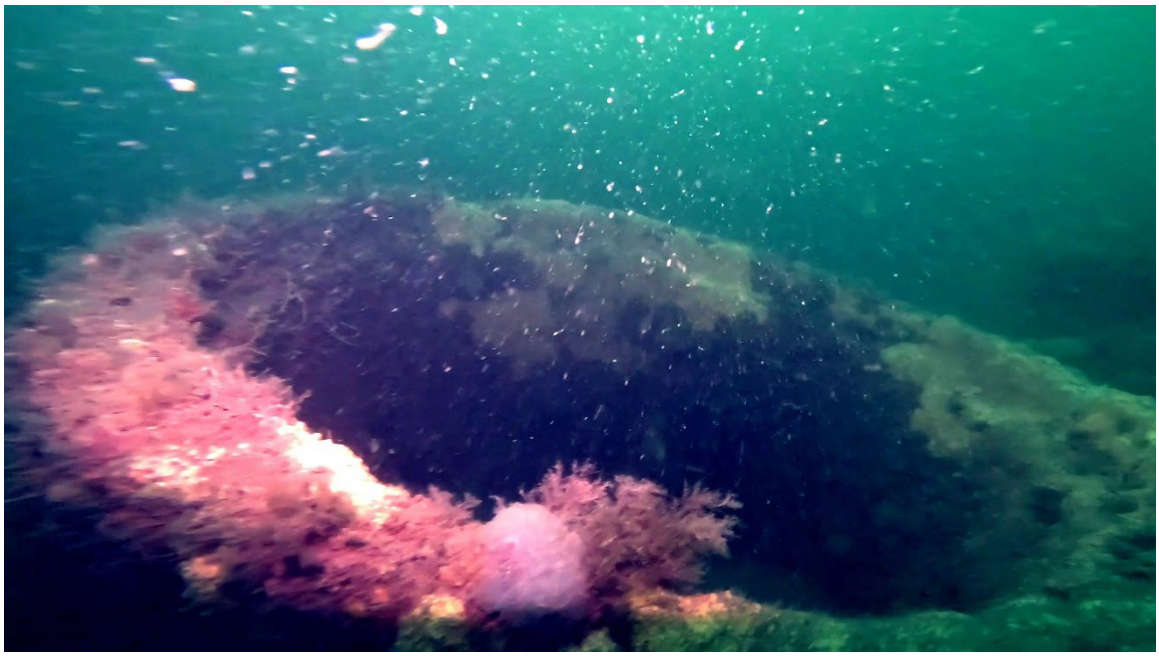


Figure 21 - Thick Marine Growth and Soft Corals

Figure 22 - Snapper population is abundant.

Figure 23 - Some areas the marine growth is not as prevalent.

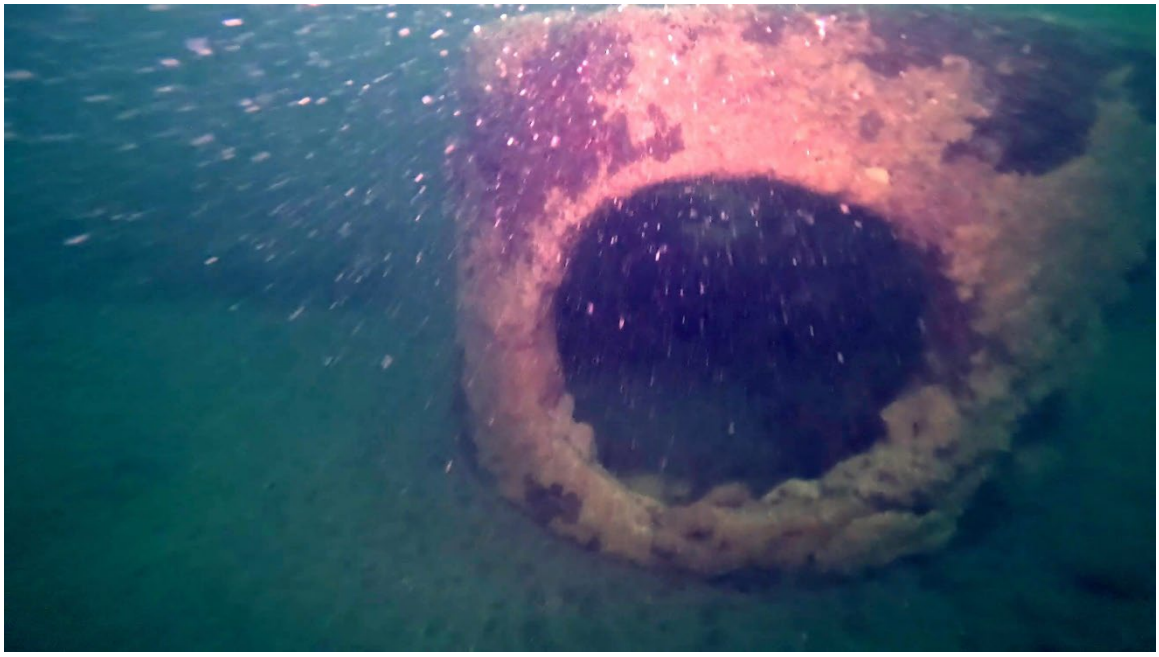


Figure 24 - Another example of the typical reef structure.

Figure 25 - Very limited rope debris on this site

Figure 26 – Possible Juvenile Black and White Spotted Drum (Equetus Punctatus)

Download Diver Video of 9-Mile Culverts Reef

https://drive.google.com/file/d/1Rfa-lvOQH_B7N-6FoeMPwcBAxxFJQrwX/view?usp=drive_link

Page Intentionally Left Blank to Separate Different Reef Reports

Desco Reef (Culverts)

Current Condition of the Reef:

The Desco Reef appears to be fairly unhealthy with a low (30-40%) living marine growth with a low sized population of fish. It is located at a depth of approx. 80 feet. Diver reports that the reef is covered in a thick silt layer. This may be a result of the artificial reef location. The hydrographic survey revealed that the site is located in a “Bowl” shaped area with respect to the surrounding seabed.

Current GPS Location

(The actual Reef location is very close to the provided coordinate)

Original Location Provided	N29 53.242	W081 00.960 Depth 85’
Surveyed Coordinate Area 1	N29 53.219	W081 00.988 Depth 85’

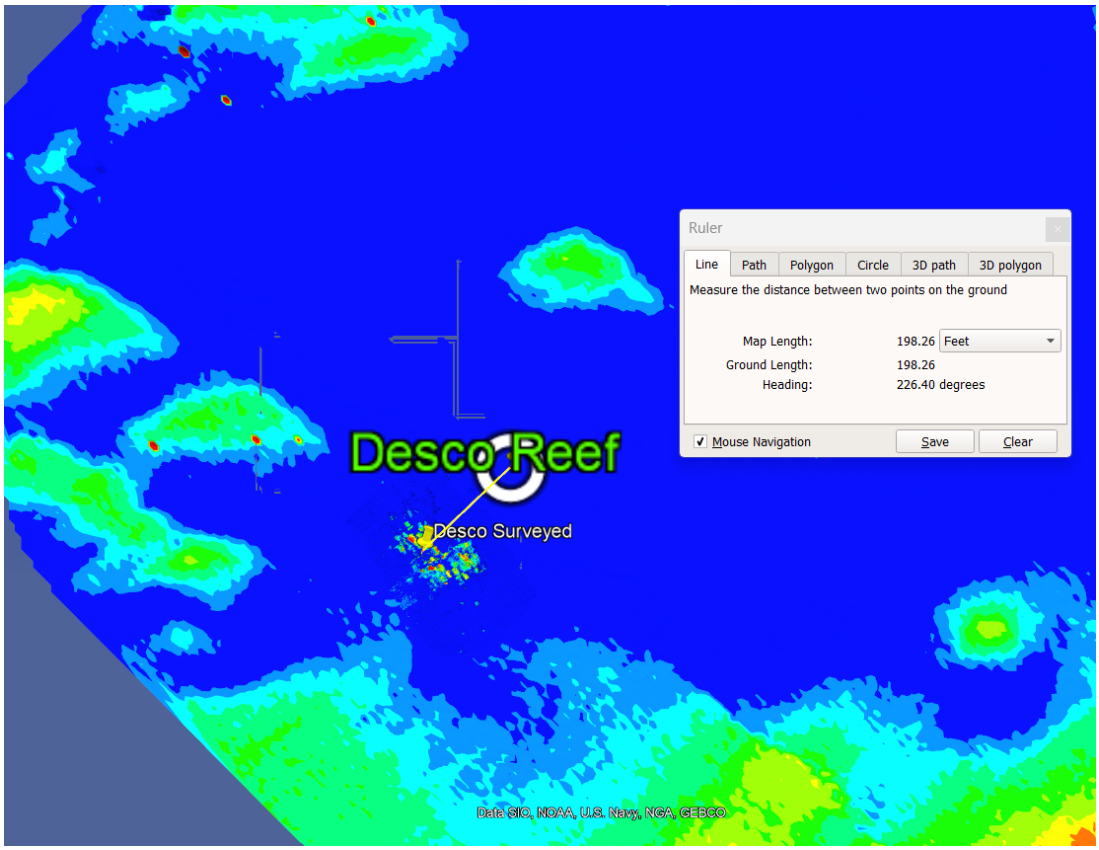


Figure 27 - Map of Surveyed Location Versus Published Location

Questionnaire to Determine Site Use

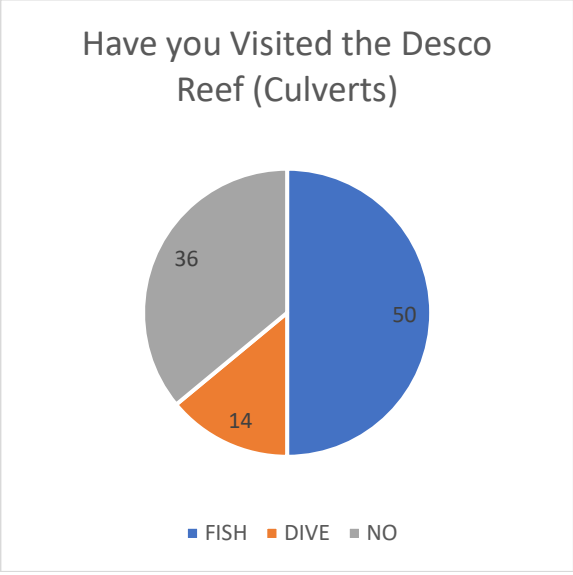
A Questionnaire was completed by Online Polls through social media as well as in-person interviews from locals and charter companies in the area. The charter companies were given a weighted scale of 5 due to multiple passengers on each trip. This brought the total sample size to 100.

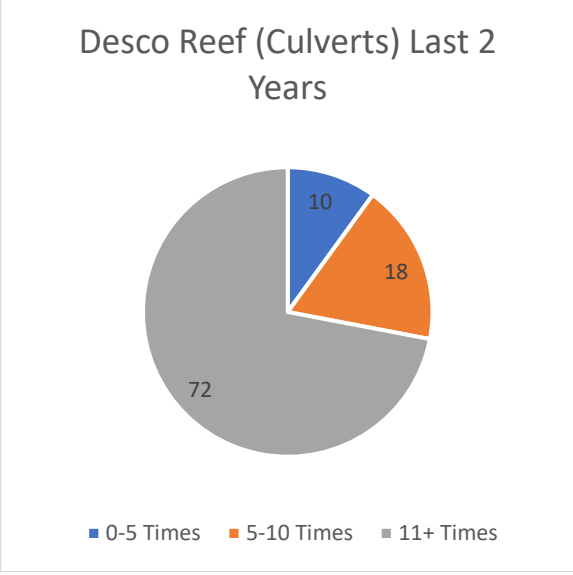
Anticipated Amount of Use the Site Receives

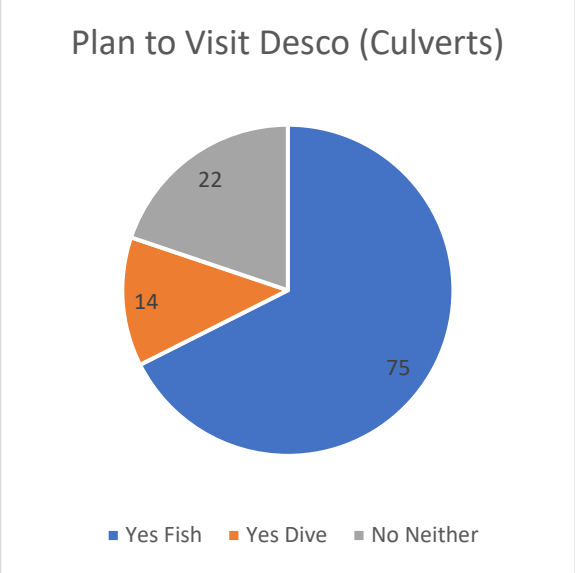
How many times have you visited each site in the last two years?	05- Times	5-10 Times	More Than 11
Desco Reef (Culverts)	10	18	72
Do you plan to visit any of these reefs in the near future?	Yes Fish	Yes Dive	No Neither
Desco Reef (Culverts)	75	14	22
Would you utilize the area if a new artificial reef was created near the existing site	Yes Fish	Yes Dive	No Neither
Desco Reef (Culverts)	70	16	14

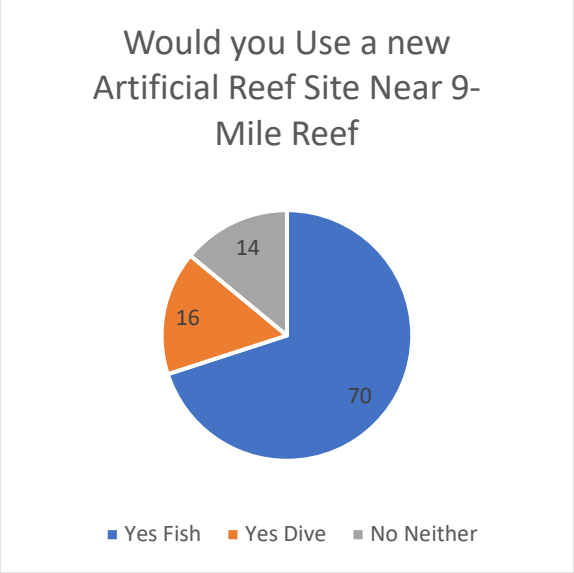
Perceived Amount of Recreational Diving and Fishing Interest

Have you visited the following reefs to fish or dive?	Yes Fish	Yes Dive	No Neither
Desco Reef (Culverts)	50	14	36









Uniqueness of the Site for Diving and Fishing

In-person and phone surveys with locals indicated that this reef is somewhat popular for fishing, but not as much for scuba diving due to consistent low visibility. The unique location of the reef is that it is in close proximity to several other reefs. Even the larger deep-water charters stated that they typically stop at this location to catch fresh bait before proceeding offshore. If the weather in not favorable further offshore, they stated that the mackerel and snapper are plentiful at times.

Current Fish Counts and Species Utilizing the Site

Fish counts survey was performed by visual census while scuba divers were performing approx. 1 hour of debris clean-up efforts on this reef, as well as underwater video. The visibility was about 5 feet.

DESCO REEF			
APPROXIMATE NUMBER - DIVER OBSERVED FISH			
Species	**Counted**	**Species**	**Counted**
Sea Turtle	2	School Master Snapper	5
Blue Tangs	2	Spadefish	20
Mangrove Snapper	20	Pinfish	5
Gag Grouper	1	Notable Lack of Baitfish	

Note: Most notable species observed: (not counting baitfish pods that were plentiful)

Figure 28 - Sand dollar held by diver to show visibility distance.

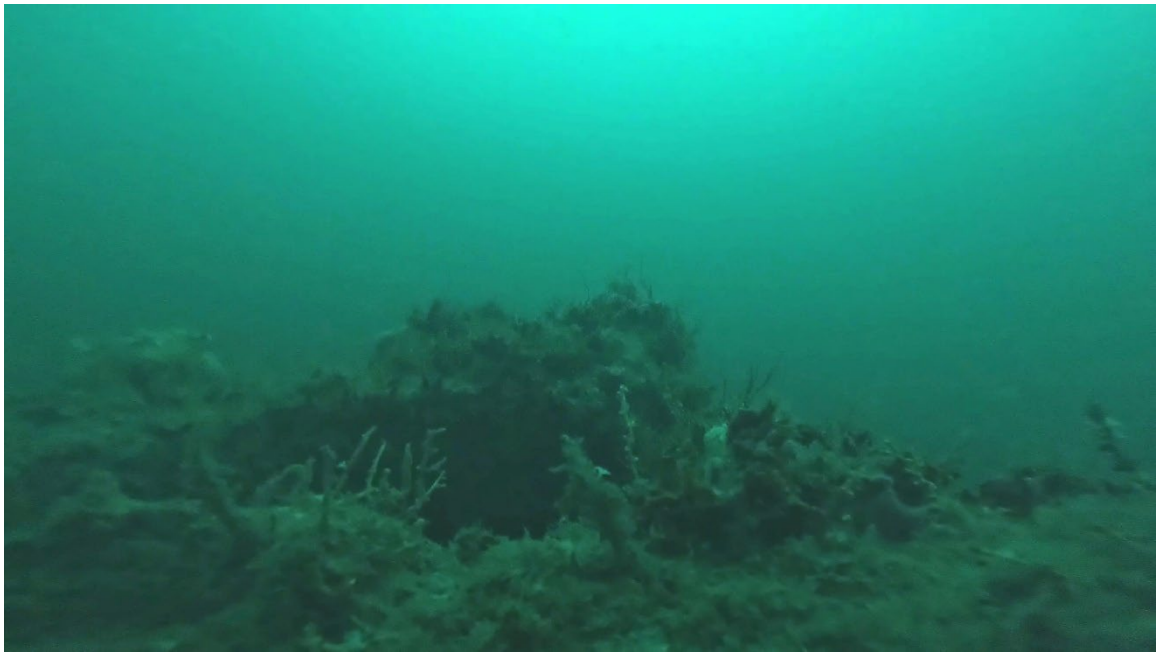


Figure 29 - Thicker marine growth can be found, but living areas appear to be in decline.

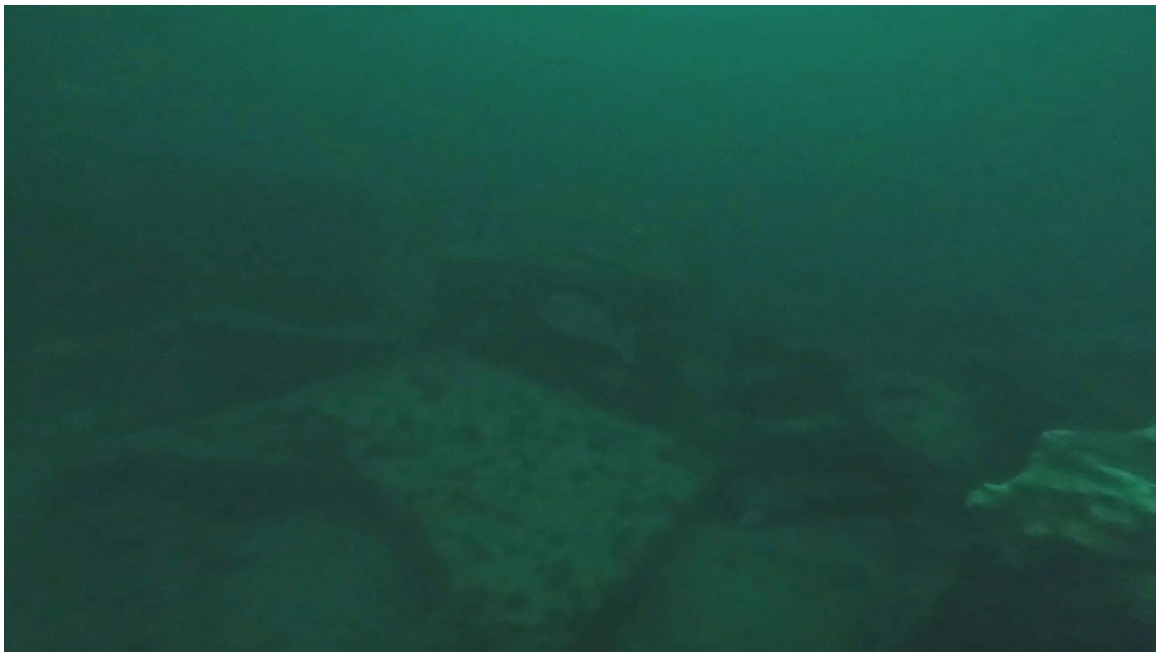


Figure 30 - There is a layer of siltation covering the entire reef.

Figure 31 - Some evidence of hard corals exists.

Figure 32 - More siltation. Culvert sizes vary from 2-feet diameter to 6-foot diameter.

Figure 33 - Spadefish School in Distance.

Figure 34 - Two sea turtles were found on this reef.

Download Diver Video of Desco Reef (Culverts)

https://drive.google.com/file/d/1Hh2Wn1MsH4DqYxczpmS_Lr_i4ApgGwLs/view?usp=drive_link

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 35 - Debris removed from the reef sites combined.

Debris Removal Summary:

1) Five anchors
2) Chain
3) Rope Miscellaneous lengths
4) Fishing Lures
5) Lead weights
6) One fishing pole and reel
7) Outboard engine cowling rubber seal
8) Net material
9) Plastic bags and beer can

Most of the debris was located on or around the Dorthey Louise Barge site. Very little was located on the 9-Mile and Desco Reef 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.

Suggestions for new reef areas from local interviews:
The Charter Captains requested a reef in-between Desco and Taylor reefs.
More reefs around 80’ depth, North of Moody and North of plane wreck.
Local public fishermen requested more reefs between 4-Mile and 9-Mile