Cruise Report for Deep Fish Habitat at Flower Garden Banks National Marine Sanctuary and Proposed Expansion Areas. September 4-8, 2016.

Prepared by Travis Sterne, Marissa Nuttall, and Emma Hickerson of NOAA's Flower Garden Banks National Marine Sanctuary (FGBNMS).

Introduction

NOAA's Flower Garden Banks National Marine Sanctuary is engaged in a sanctuary expansion proposal to protect additional critical habitat in the Gulf of Mexico. The sanctuary currently encompasses only three among dozens of reefs and banks scattered along the continental shelf in the Northwestern Gulf. The banks surveyed during this expedition contain critical ecosystems made up of nationally and ecologically significant features and biological communities. Survey sites were selected to support proposed boundaries and address concerns expressed by stakeholders.

Researchers from NOAA's FGBNMS, University of Texas Rio Grande Valley (UTRGV), The City University of New York (CUNY), and remotely operated vehicle (ROV) pilots from the University of North Carolina Wilmington (UNCW) conducted ROV operations onboard the NOAA Research Vessel MANTA with the Mohawk ROV to capture high definition video and imagery, as well as conduct benthic and fish surveys around the areas of interest. See **Table 1** for full cruise participant list. This research cruise was funded by NOAA's Deep Sea Coral Research and Technology Program (DSCRTP) and National Marine Sanctuary Foundation.

The primary objectives of this research cruise were:

1) to continue documenting the biological communities on Parker, Bryant, Bouma, Rezak, Sidner, and Elvers banks (see **Figure 2**) - all of which are under review for the proposed boundary expansion of the FGBNMS.

2) to analyze the benthic habitat in the areas of interest by conducting transects using a forward-facing still camera and video camera mounted to the ROV to capture high resolution imagery and video, following DSCRTP protocols.

3) to collect samples of mesophotic black corals and octocorals for analysis by researchers from CUNY and UTRGV, respectively.

See **Table 2** for an outline of the DFH30 Cruise Itinerary.

Narrative of Cruise Results

Objective 1: The research team covered a large amount of area with focus on observed features shown in multibeam bathymetry maps. Additional dives were conducted on and near the Alternative 3 proposed boundary lines at each bank in order to ensure comprehensive coverage of data sources for biological habitat. The following is a brief summary of interesting observations from each underwater location. **Table 3** includes detailed time and location information for each dive.

- **Parker Bank (Sept 4-5):** A total of 7 dives were conducted on this bank (See **Figure 3**). Located approximately 40 kilometers East of the Bouma-Bryant-Rezak-Sidner complex, it is the eastern-most location visited during the research cruise. Habitats observed at this bank include low- and medium- relief deep coral outcroppings **(Dives 355, 359, & 360)**, algal nodule fields with low-relief outcroppings (356 & 361), and soft bottom communities **(357 & 358)**. Important biology observed at Parker includes abundant octocorals, black corals, sponges, and grouper species.

- **Bryant Bank (Sept 5-6):** Six dives were completed on this feature (See **Figure 4**). It is located approximately 9.5 kilometers southwest of Rezak Bank. The majority of observations revealed low- to medium- relief deep coral habitats **(362 – 364)** and few high-relief areas **(367)**. The deep coral habitats surveyed contain many octocoral species, solitary cup corals, few branching stony corals, and black corals such as *Aphanipathes pedata*.

- **Bouma Bank (Sept 6):** Five dives were conducted at Bouma (See **Figure 5**). This feature is located approximately 5.6 kilometers north-northeast of Bryant Bank. Observed habitats include low relief rubble fields **(368),** soft bottom communities **(369 & 371)**, algal nodule fields **(370)**, and coralline algae reefs **(372)**. The low relief rubble fields are inhabited by abundant *Swiftia* spp.and *Ellisella* spp.. Soft bottom habitats contain dense fields of *Stichopathes spp.* and crinoids, suggesting a potential sediment veneer. The algal nodule fields and coralline algae reefs are occupied by abundant large black coral sea fans (*A. atlantica, A.gracilis* and *Plumapathes pennacea*).

- **Rezak Bank (Sept 7):** A total of four dives were completed at this bank (See **Figure 6**). Rezak is located approximately 4.6 kilometers north of Sidner Bank. Habitats observed around this bank include medium-relief coralline algae reefs and deep coral reefs **(373 & 376)**, algal nodule fields **(374)**, and soft bottom communities **(375)**. Important benthic species featured in and around these habitats consist of dense accumulations of yellow gorgonians, black corals such as *Tanacetipathes* spp*., Stichopathes* spp*., Aphanipathes pedata,* and *Elatopathes abietina.* A number of grouper species, including rare marbled grouper (*Dermatolepis inermis*), were also observed during operations around Rezak.

- **Sidner Bank (Sept 7):** A total of four dives were carried out at Sidner Bank, located approximately 4.5 kilometers directly south of Rezak Bank (See **Figure 7**). During these dives, extensive medium to high-relief coralline algae and deep reef habitats were observed **(377 & 379)**. These areas were inhabited by abundant octocorals such as *Hypnogorgia* spp.and *Nicella* spp*.*, as well as black coral species such as *Elatopathes abientina* and *Acanthopathes thyoides.* A considerable amount of rope and long line fishing gear was also observed around these features.

- **Tressler Bank (Sept 7)**: This small feature is located approximately 6.5 kilometers South of Sidner Bank, outside the proposed preferred alternative boundary (See **Figure 7**). One exploratory dive was conducted on this bank **(380)**. Habitat mainly consists of isolated coralline

algae outcroppings surrounded by small algal nodules and coarse sand. Benthic species consist of sea whips, white branching stony corals, *Tanacetipathes* spp., *Ellisella* spp., *A.furcata,* and green and red leafy algae. Substantial evidence of human impact was noted in the form of large draglines in the sand-bottom habitat areas.

- **Elvers Bank (Sept 8):** Two dives **(381 & 382)** were completed on this feature located approximately 50 kilometers southwest of the Bouma-Rezak-Sidner complex (See **Figure 8**). The areas explored during these dives revealed low and medium-relief deep reef habitats covered in black corals such as *Plumapathes* spp. and many vase-like (possible glass) sponges. A potential new species of black coral was also observed at this location. Inhabiting these areas were also some unique fish species such as sea robins, boarfish, and snipe fish.

Objective 2: The forward-facing video camera was used to capture 5 minute transects while the ROV traveled at approximately 0.5 knots, 1 meter above the seafloor. For scale, two reference points, in the form of scaled lasers spaced 10 centimeters apart, are visible. These transects will be processed for colony counts and density calculations. In addition, the forward-facing still camera was used to capture photos approximately every 5 seconds (or when the lasers aligned with a coral colony) during each 5-minute transect. These images will be processed to obtain the size of 15-20 colonies of the major taxa observed.

Objective 3: Due to technical malfunction, the collection skid attached to the ROV was removed after the first dive. A ground fault in the manipulator arm interrupted communication and caused loss of power to the ROV. Without the collection skid and manipulator arm, selective sampling methods became impossible. However, opportunistic samplings of specimens entangled in the ROV propellers.

Following this research cruise, analyses will be performed by Travis Sterne (FGBNMS) to quantify benthic organisms observed along transect paths and confirm in-situ fish surveys. Upon completion, all ROV video footage, photos, and data will be archived at FGBNMS and DSCRTP. Black Coral samples collected by CUNY will be processed for taxonomic ID using morphological and genetic techniques by Dr. Mercer Brugler. Upon completion, all black coral samples will be archived at (See **Table 4** for sample list) at the Smithsonian NMNH.

Figure 1: The R/V Manta

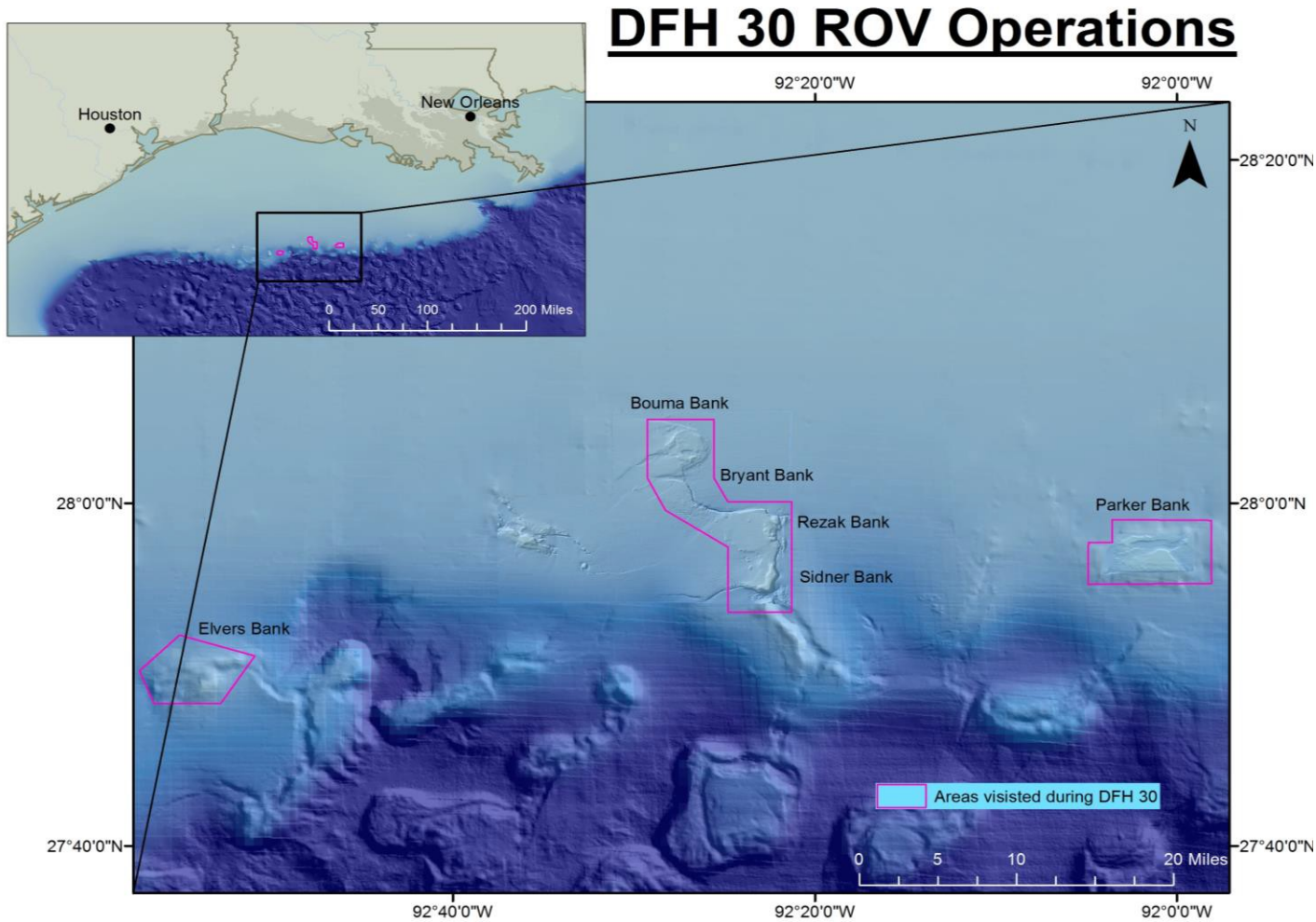


Figure 2: Locations visited during DFH 30.

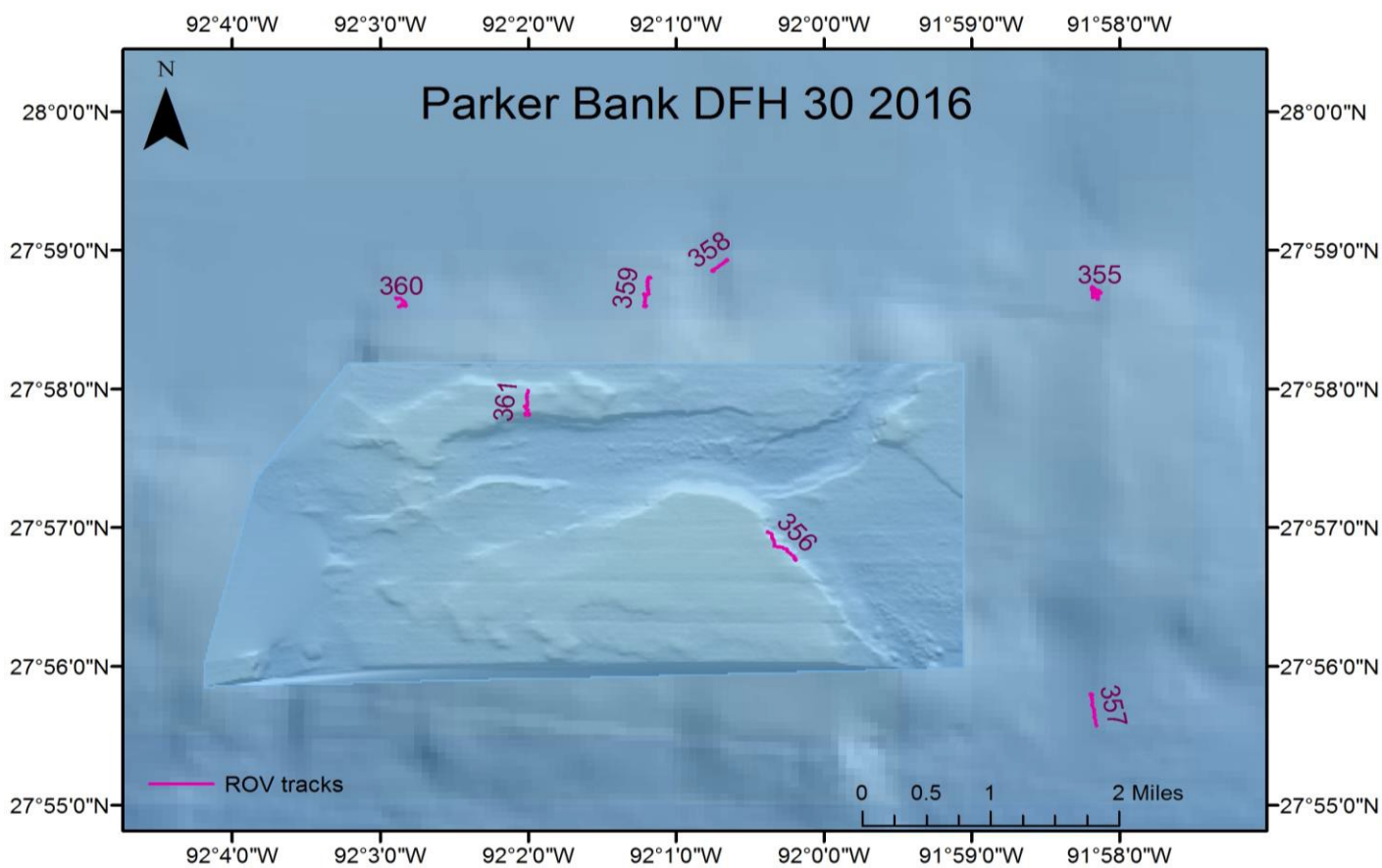


Figure 3: Locations visited at Parker Bank during DFH 30.

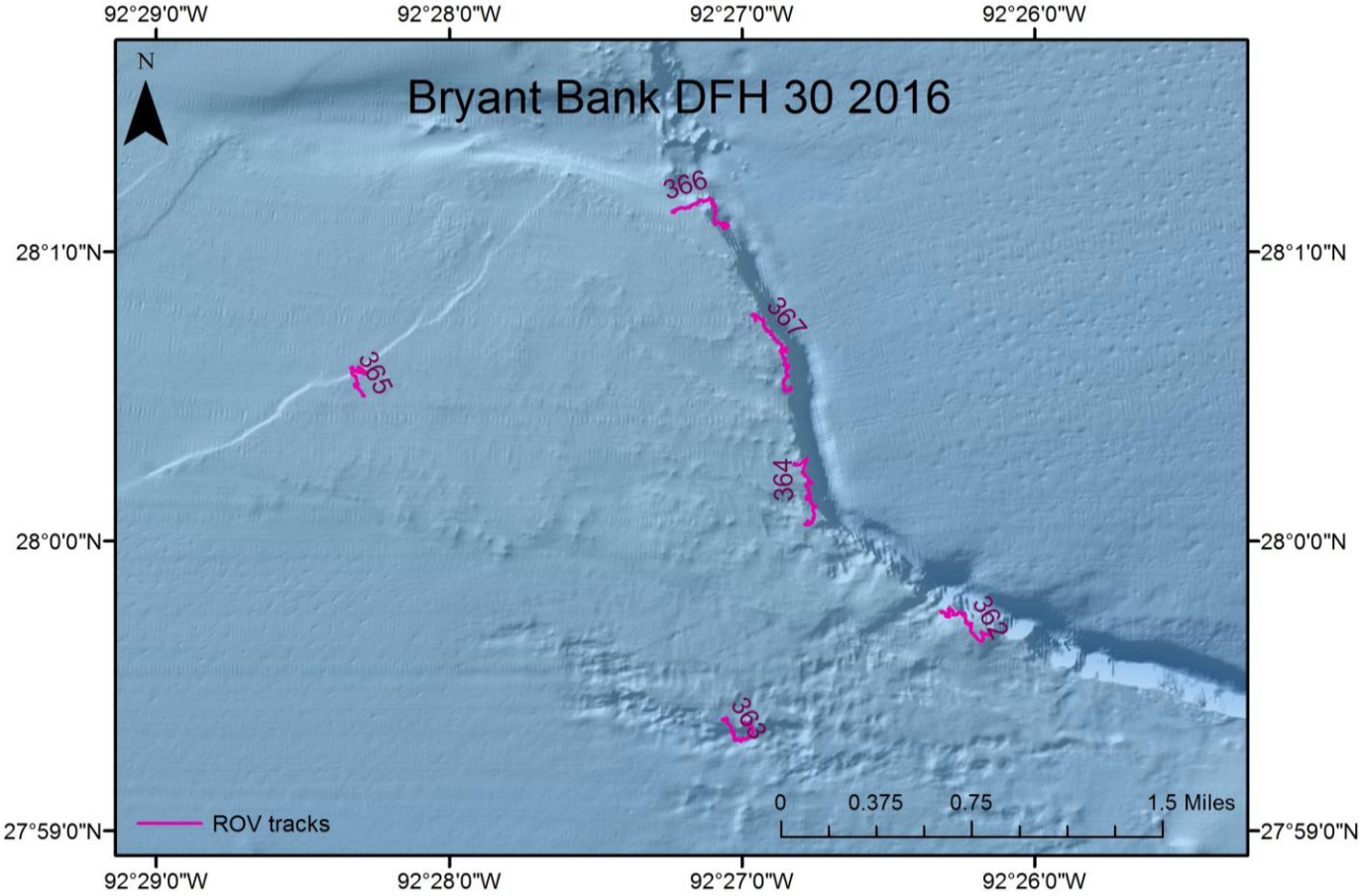


Figure 4: Locations visited at Bryant Bank during DFH 30.

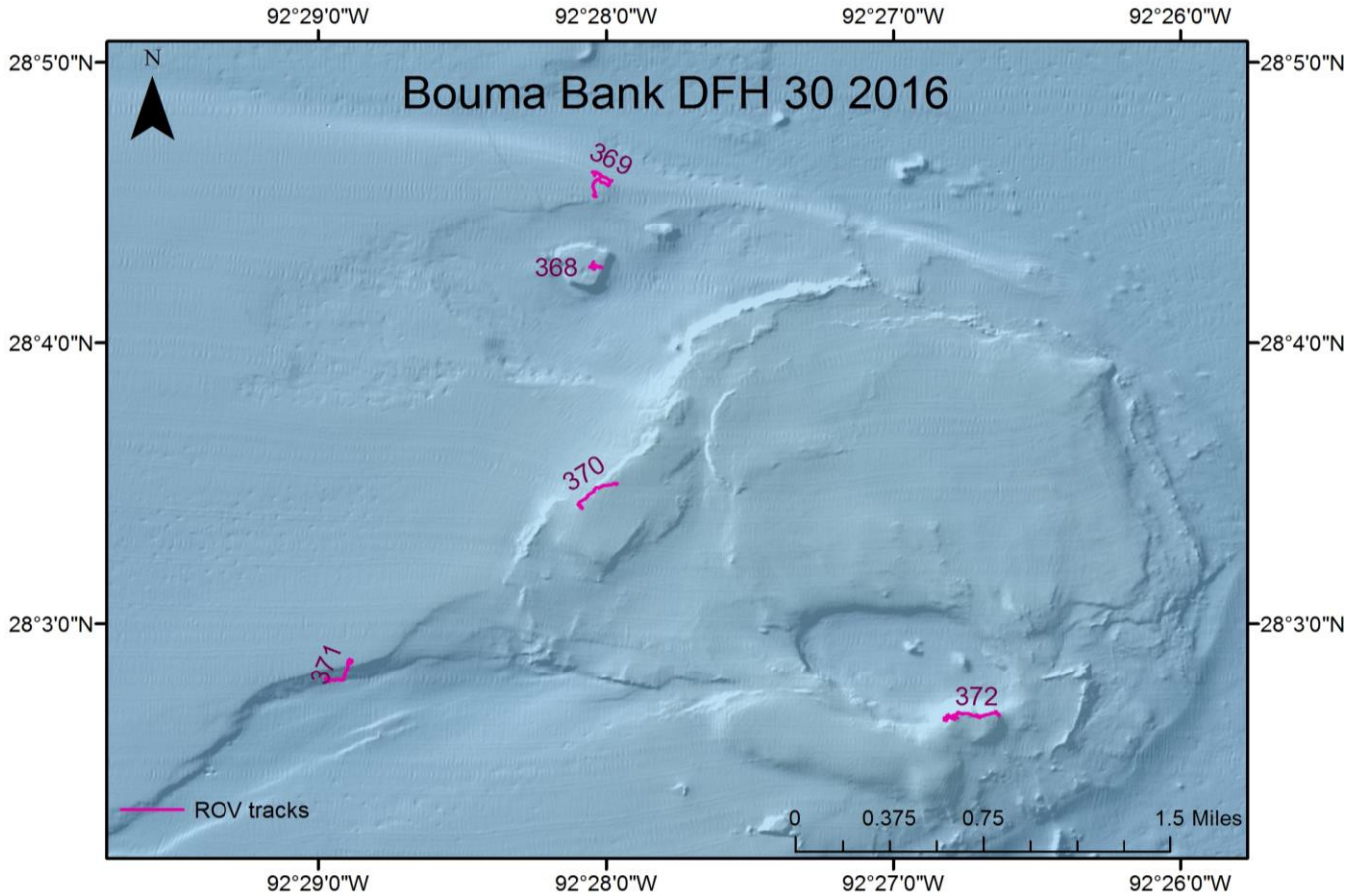


Figure 5: Locations visited at Bouma Bank during DFH 30.

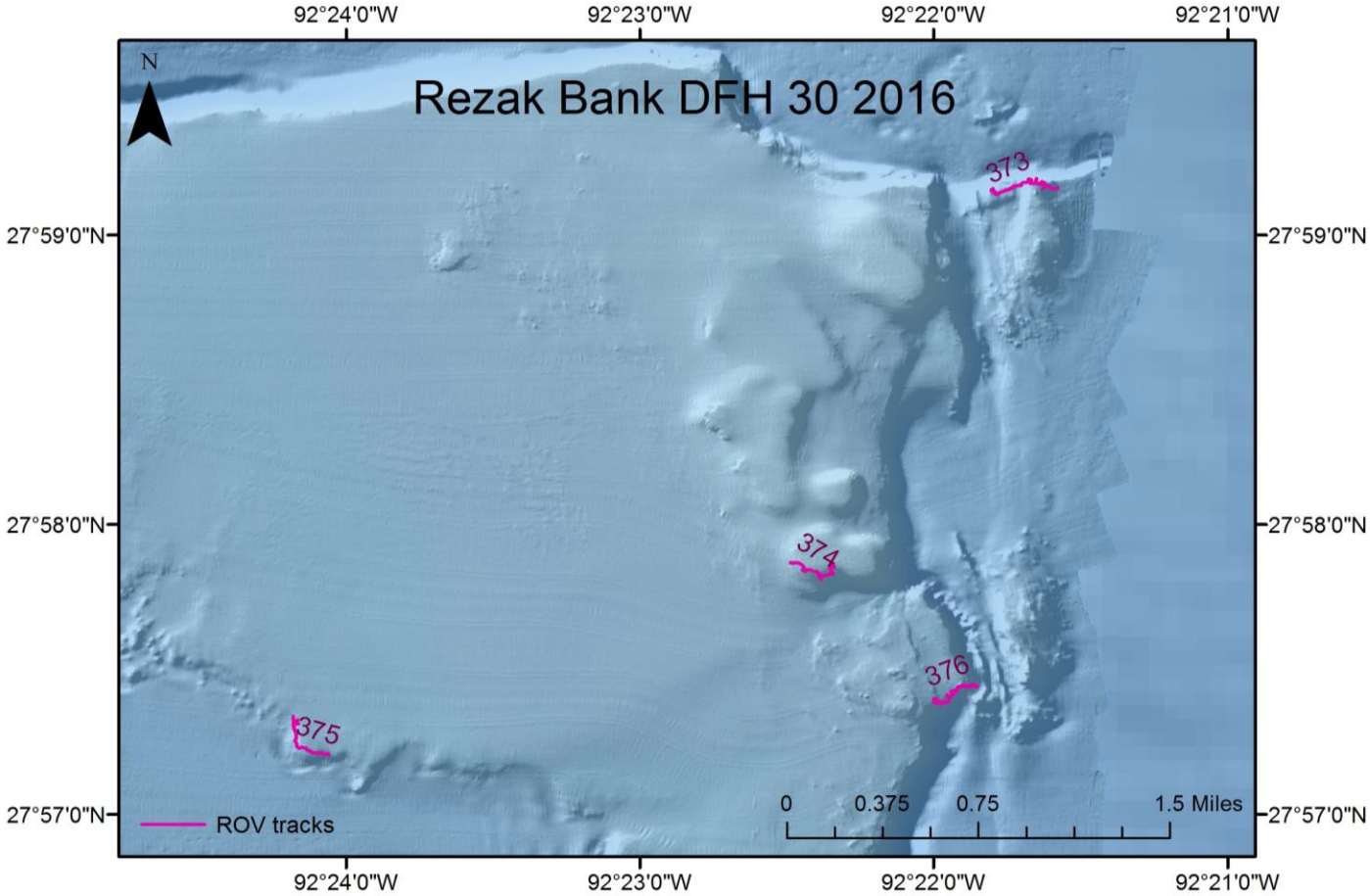


Figure 6: Locations visited at Rezak Bank during DFH 30.

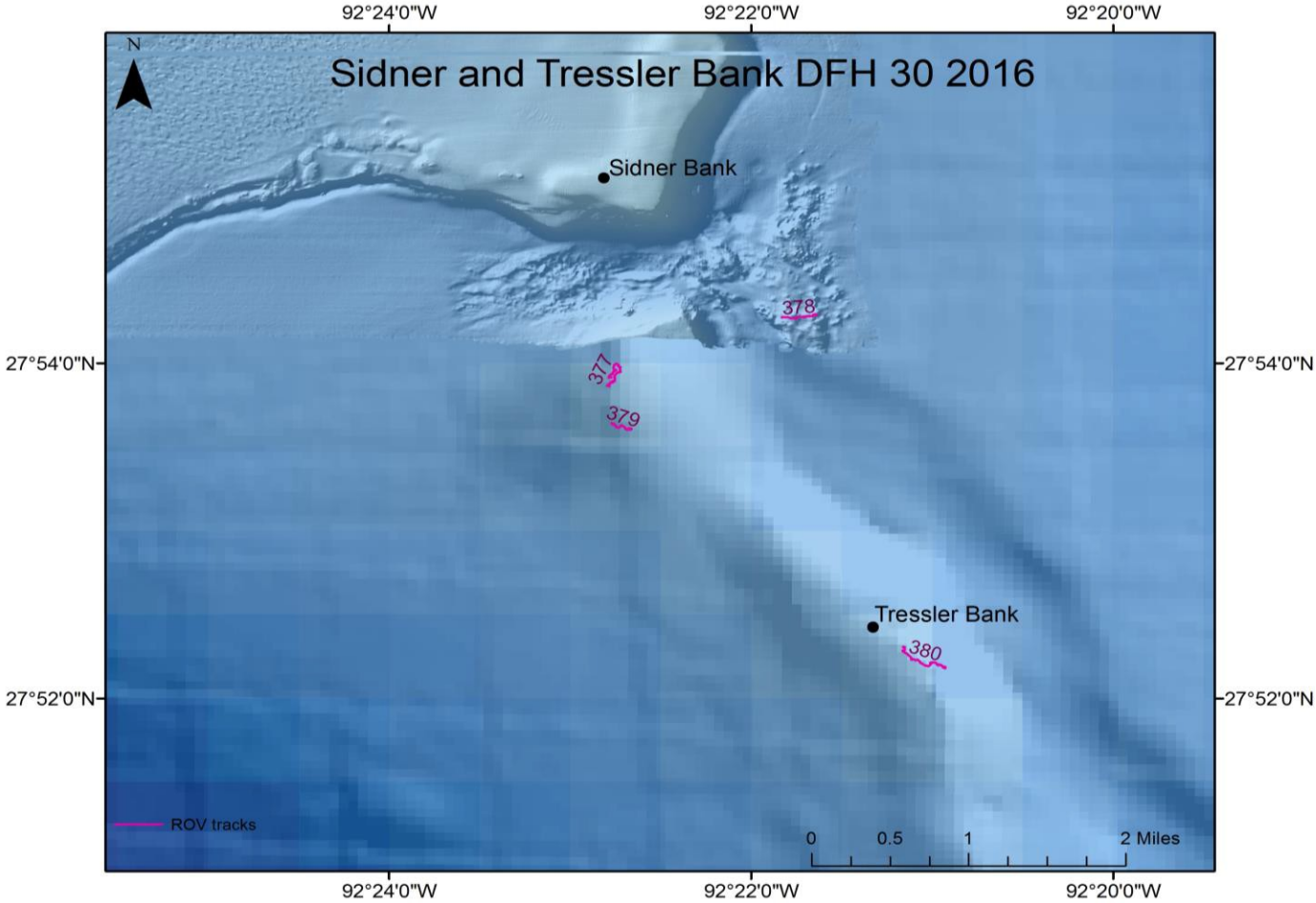


Figure 7: Locations visited at Sidner and Tressler Bank during DFH 30.

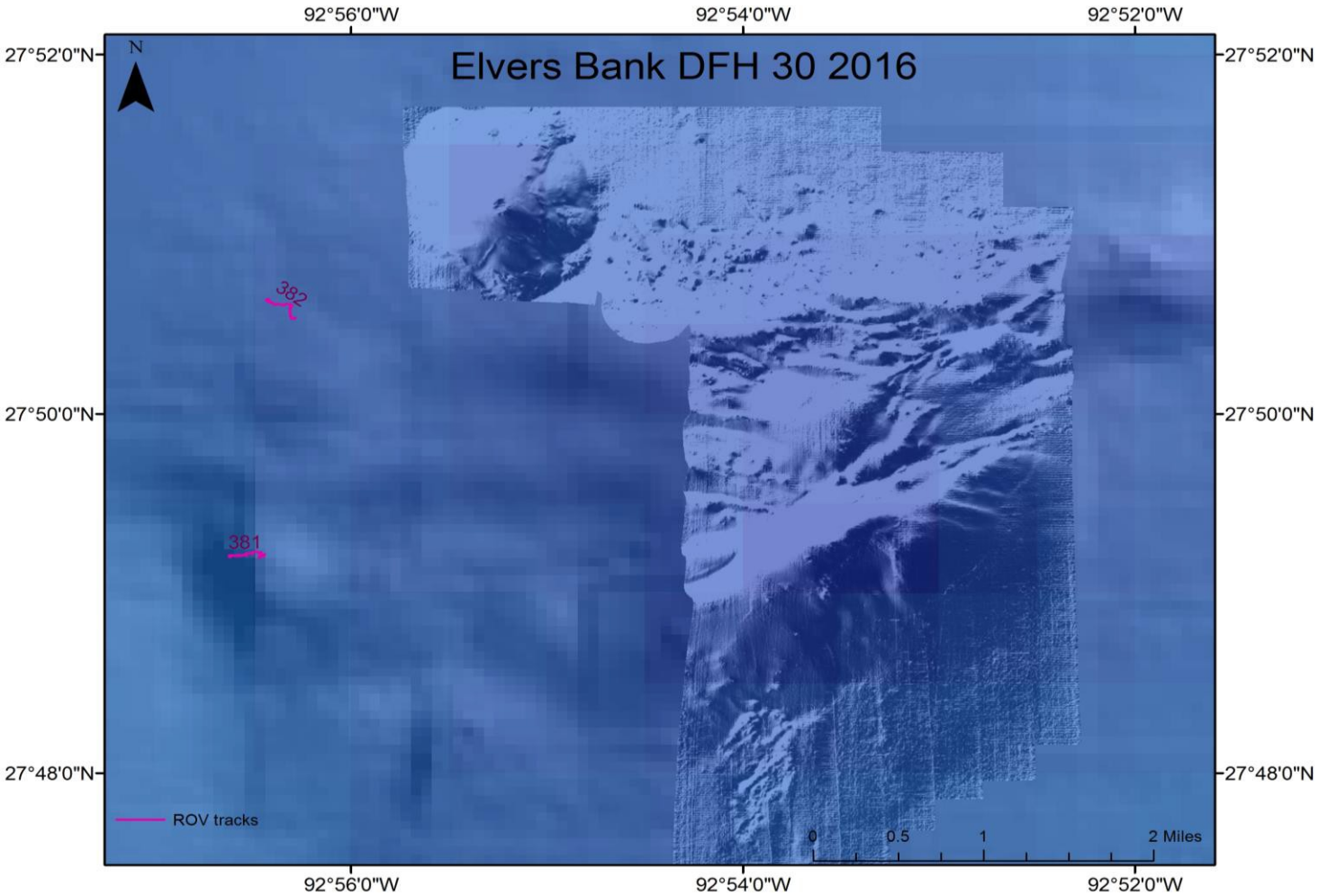


Figure 8: Locations visited at Elvers Bank during DFH 30

Table 1: DFH30 Cruise Participant List

Name	Affiliation	Position
Seth Leo	CPC	Captain
Michael Allison	CPC	Mate
Brett Mayberry	CPC	Deckhand
Jennifer Idema	CPC	Galleyhand
Lance Horn	UNCW	ROV Technician
Jason White	UNCW	ROV Technician
Emma Hickerson	FGBNMS	Lead Scientist
Marissa Nuttall	FGBNMS	Scientist
Travis Sterne	FGBNMS	Scientist
Nicole Bellaflores-Meija	CUNY	Scientist
Sheila Moaleman	CUNY	Scientist
Elissa Connolly-Randazzo	UTRGV	Scientist
Linda Jordan	UTRGV	Scientist

Table 2: DFH30 Cruise Itinerary

Date	Time	Task
Saturday, Septmber 3, 2016	**20:00**	**Depart TAMUG dock for Parker Bank**
Sunday, September 4, 2016	**8:00**	**Arrive at Parker Bank**
	09:00-18:45	**ROV Operations - Parker Bank**
Monday, September 5, 2016	**07:00-12:30**	**ROV Operations - Parker Bank**
	13:00	**Depart Parker for Bryant Bank**
	14:30	**Arrive at Bryant Bank**
	14:45-18:10	**ROV Operations - Bryant Bank**
Tuesday, Septmeber 6, 2016	**07:00-12:30**	**ROV Operations - Bryant Bank**
	12:30	**Depart Bryant for Bouma Bank**
	13:00	**Arrive at Bouma Bank**
	13:00-18:15	**ROV Operations at Bouma Bank**
Wednesday, September 7, 2016	**07:00-12:30**	**ROV Operations - Rezak Bank**
	12:30	**Depart Rezak for Sidner Bank**
	13:00	**Arrive at Sidner Bank**
	13:15-18:00	**ROV Operations at Sidner/Tressler Bank**
Thursday, Septmeber 8, 2016	**07:00-9:30**	**ROV Operations at Elvers Bank (halted early due to computer failure)**
	11:30	**Depart for TAMUG dock**
	20:00	**Arrive at TAMUG dock, Galveston, Texas**

Table 3: Dive Log for DFH 30. Start time is the time at which the ROV was deployed. Start Latitude and Longitude reflect the location at which the ROV reached bottom. End Time, Latitude, and Longitude are the time and location at which the ROV left bottom.

Cruise ID	Date	**Dive Number**	Location	Start Time	Start Latitude	Start Longitude	# of Transects Completed	End Time	End Latitude	End Longitude	Depth min (m)	Depth max (m)	Dive Time (mins)
DFH 30	09/04/16	**355**	Parker Bank	12:14:06	27.9786	-91.9697	1	12:56:38	27.9789	-91.9698	101	109	67
DFH 30	09/04/16	**356**	Parker Bank	16:31:10	27.9494	-92.0064	3	17:41:04	27.9463	-92.0035	61	75	71
DFH 30	09/04/16	**357**	Parker Bank	18:16:47	27.9299	-91.9698	0	18:46:20	27.9264	-91.9694	136	139	29
DFH 30	09/05/16	**358**	Parker Bank	7:14:58	27.9821	-92.0110	0	7:40:26	27.9809	-92.0127	124	125	31
DFH 30	09/05/16	**359**	Parker Bank	8:12:34	27.9800	-92.0198	3	9:55:39	27.9766	-92.0204	113	119	76
DFH 30	09/05/16	**360**	Parker Bank	10:39:26	27.9775	-92.0482	2	11:14:42	27.9767	-92.0473	105	116	41
DFH 30	09/05/16	**361**	Parker Bank	11:47:03	27.9664	-92.0334	3	12:31:50	27.9636	-92.0337	62	68	67
DFH 30	09/05/16	**362**	Bryant Bank	14:53:57	27.9638	92.0333	3	15:43:28	27.9959	92.4383	104	116	55
DFH 30	09/05/16	**363**	Bryant Bank	16:24:58	27.9895	-92.4499	1	16:54:06	27.9898	-92.4508	113	125	36
DFH 30	09/05/16	**364**	Bryant Bank	17:21:55	27.9897	-92.4511	3	18:08:44	28.0039	-92.4465	99	105	47
DFH 30	09/06/16	**365**	Bryant Bank	7:08:05	28.0099	-92.4718	2	7:54:58	28.0085	-92.4717	91	93	45
DFH 30	09/06/16	**366**	Bryant Bank	8:32:30	28.0189	-92.4540	3	9:41:03	28.0183	-92.4511	96	115	64
DFH 30	09/06/16	**367**	Bryant Bank	10:20:28	28.0086	-92.4474	4	12:17:35	28.0129	-92.4493	93	101	124
DFH 30	09/06/16	**368**	Bouma Bank	13:12:32	28.0711	-92.4677	1	13:36:40	28.0711	-92.4673	80	82	30
DFH 30	09/06/16	**369**	Bouma Bank	14:05:18	28.0754	-92.4674	2	14:26:08	28.0769	-92.4674	84	88	25
DFH 30	09/06/16	**370**	Bouma Bank	15:03:07	28.0570	-92.4682	3	15:31:07	28.0582	-92.4661	61	64	33
DFH 30	09/06/16	**371**	Bouma Bank	16:03:38	28.0479	-92.4816	2	10:40:12	28.0467	-92.4829	85	92	27
DFH 30	09/06/16	**372**	Bouma Bank	17:30:34	28.0447	-92.4441	3	18:14:24	28.0443	-92.4463	62	74	49
DFH 30	09/07/16	**373**	Rezak Bank	7:16:14	27.9860	-92.3598	3	8:18:34	27.9858	-92.3632	101	118	62
DFH 30	09/07/16	**374**	Rezak Bank	8:58:55	27.9644	-92.3748	3	9:58:58	27.9644	-92.3724	64	75	64
DFH 30	09/07/16	**375**	Rezak Bank	10:30:09	27.9533	-92.4012	3	11:04:58	27.9552	-92.4028	103	106	39
DFH 30	09/07/16	**376**	Rezak Bank	11:43:10	27.9574	-92.3644	3	12:29:42	27.9566	-92.3666	96	111	52
DFH 30	09/07/16	**377**	Sidner Bank	13:19:10	27.8977	-92.3800	3	14:28:13	27.8986	-92.3799	81	87	74
DFH 30	09/07/16	**378**	Sidner Bank	15:04:10	27.9047	-92.3606	3	15:52:07	27.9046	-92.3627	134	144	48
DFH 30	09/07/16	**379**	Sidner Bank	16:39:50	27.8939	-92.3795	2	16:59:20	27.8934	-92.3777	92	93	20
DFH 30	09/07/16	**380**	Tressler Bank	17:33:30	27.8718	-92.3526	3	18:19:29	27.8697	-92.3489	93	98	46
DFH 30	09/08/16	**381**	Elvers Bank	7:08:58	27.8202	-92.9438	3	8:00:05	27.8203	-92.9407	170	192	56
DFH 30	09/08/16	**382**	Elvers Bank	8:43:54	27.8438	-92.9406	3	9:21:48	27.8422	-92.9385	172	185	38
	Total # of Dives	28				Total # of Transects	68					Total Dive Time (hrs)	24

Table 4: DFH30 Sample Log (Click Specimen ID to jump to photo). Photos of *Elisella* sp. are unavailable.

Specimen ID	Tentative Identification	Collection Date	Collection time	Preservation Type	# of Tubes	Collection Site	Lat	Long	Depth, m
DFH30-361A	*Stichopathes* sp.	09/05/16	12:31	100% EtOH	2 15mL	Parker Bank 12	27.9502	-92.0333	64
DFH30-362A	*Stichopathes* sp.	09/05/16	15:43	100% EtOH	1 15mL	Bryant Bank 2	27.9502	-92.0333	116
DFH30-363	*Stichopathes* sp.	09/05/16	16:54	100% EtOH	1 15mL	Bryant Bank 2	27.9895	-92.4510	115
DFH30-364A	*Stichopathes* sp.	09/05/16	18:08	100% EtOH	2 15mL	Bryant Bank 3	27.9897	-92.4511	105
DFH30-364B	*Stichopathes* sp.	09/05/16	18:08	100% EtOH	1 15mL	Bryant Bank 3	27.9897	-92.4511	105
DFH30-364C	*Stichopathes* sp.	09/05/16	18:08	100% EtOH	2 15mL	Bryant Bank 3	27.9897	-92.4511	105
DFH30-364D	*Ellisella* sp.	09/05/16	18:08	100% EtOH	1 15mL	Bryant Bank 3	28.9897	-92.4511	105
DFH30-366	*Stichopathes* sp.	09/06/16	9:41	100% EtOH	1 15mL	Bryant Bank 4	28.0189	-92.4540	115
DFH30-366B	*Stichopathes* sp.	09/06/16	9:41	100% EtOH	1 15mL	Bryant Bank 4	28.0189	-92.4540	115
DFH30-366C	*Stichopathes* sp.	09/06/16	9:41	100% EtOH	1 15mL	Bryant Bank 4	28.0189	-92.4540	115
DFH30-366D	*Stichopathes* sp.	09/06/16	9:41	100% EtOH	1 15mL	Bryant Bank 4	28.0189	-92.4540	115
DFH30-366AA	*Stichopathes* sp.	09/06/16	9:41	100% EtOH	1 15mL	Bryant Bank 4	28.0189	-92.4540	115
DFH30-366AB	*Stichopathes* sp.	09/06/16	9:41	100% EtOH	2 15mL	Bryant Bank 4	28.0189	-92.4540	115
DFH30-366AC	*Stichopathes* sp.	09/06/16	9:41	100% EtOH	3 15mL	Bryant Bank 4	28.0189	-92.4540	115
DFH30-366AD	*Stichopathes* sp.	09/06/16	9:41	100% EtOH	2 15mL	Bryant Bank 4	28.0189	-92.4540	115
DFH30-366BA	*Stichopathes* sp.	09/06/16	9:41	100% EtOH	1 15mL	Bryant Bank 4	28.0189	-92.4540	115
DFH30-367D	*Ellisella* sp.	09/06/16	12:07	100% EtOH	1 15mL	Bryant Bank 8	28.0086	-92.4474	99
DFH30-368	*Stichopathes* sp.	09/06/16	13:36	100% EtOH	2 15mL	Bouma Bank 3	28.0668	-92.4667	82
DFH30-368B	*Stichopathes* sp.	09/06/16	13:36	100% EtOH	2 15mL	Bouma Bank 3	28.0668	92.4667	82
DFH30-368C	*Stichopathes* sp.	09/06/16	13:36	100% EtOH	1 15mL	Bouma Bank 3	28.0668	92.4667	82
DFH30-368D	*Ellisella* sp.	09/06/16	13:36	100% EtOH	1 15mL	Bouma Bank 3	28.0711	-92.4677	82
DFH30-372A	*Stichopathes* sp.	09/06/16	18:14	100% EtOH	2 15mL	Bouma Bank 7	28.0447	-92.4441	74
DFH30-372B	*Stichopathes* sp.	09/06/16	18:14	100% EtOH	2 15mL	Bouma Bank 7	28.0447	-92.4441	74
DFH30-373	*Ellisella* sp.	09/07/16	16:54	100% EtOH	1 15mL	Rezak Bank 8	27.9859	-92.3598	118

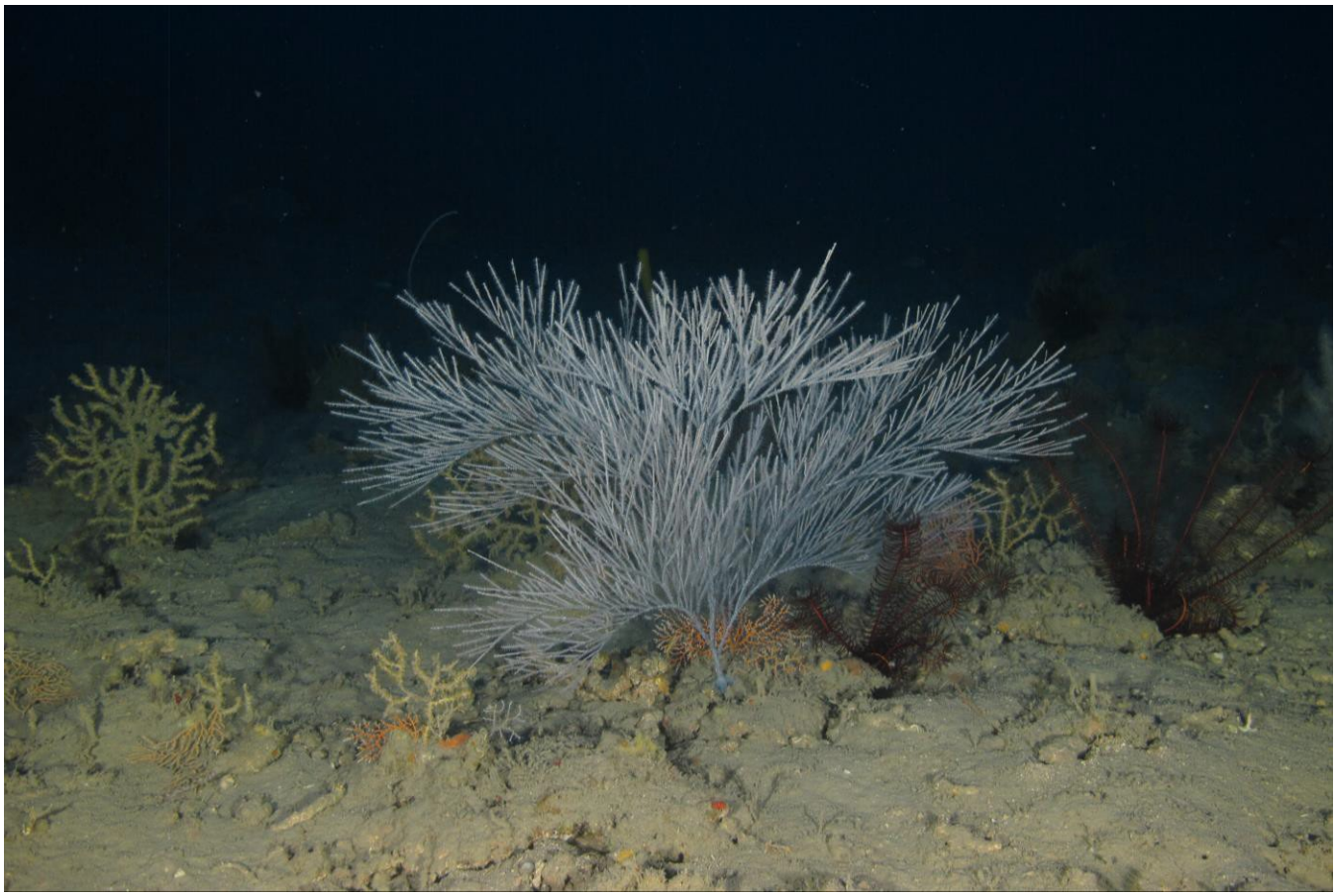


Figure 9: *Aphanipathes pedata* black coral at Parker Bank. Dive 360.

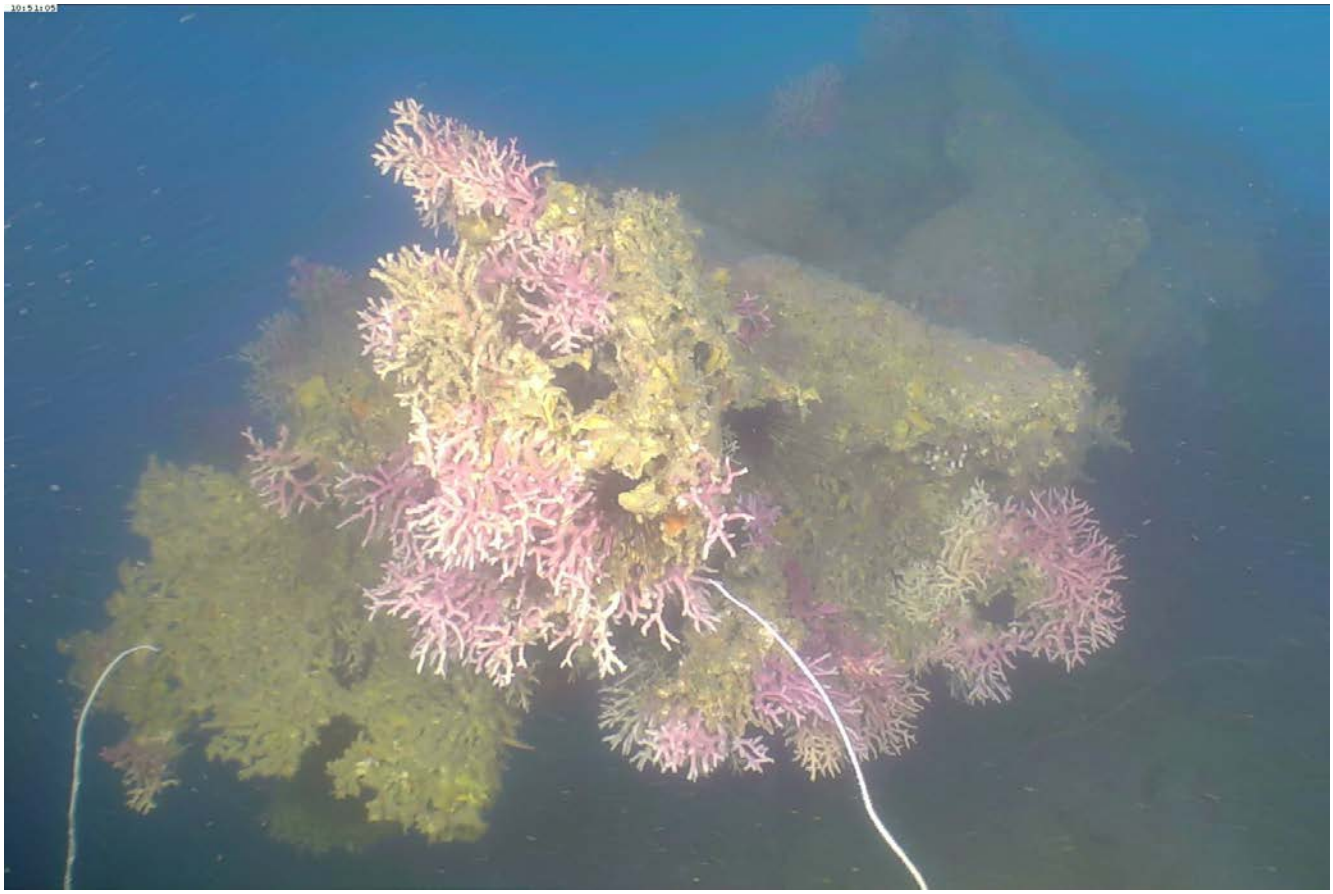


Figure 10: Branching stony coral atop high-relief deep coral habitat at Bryant Bank. Dive 367.

Figure 11: Black coral sea fans among coralline algae reef habitat at Bouma Bank. Dive 370.

Figure 12: Large *Condylactis gigantea* in algal nodule field at Rezak Bank. Dive 374.

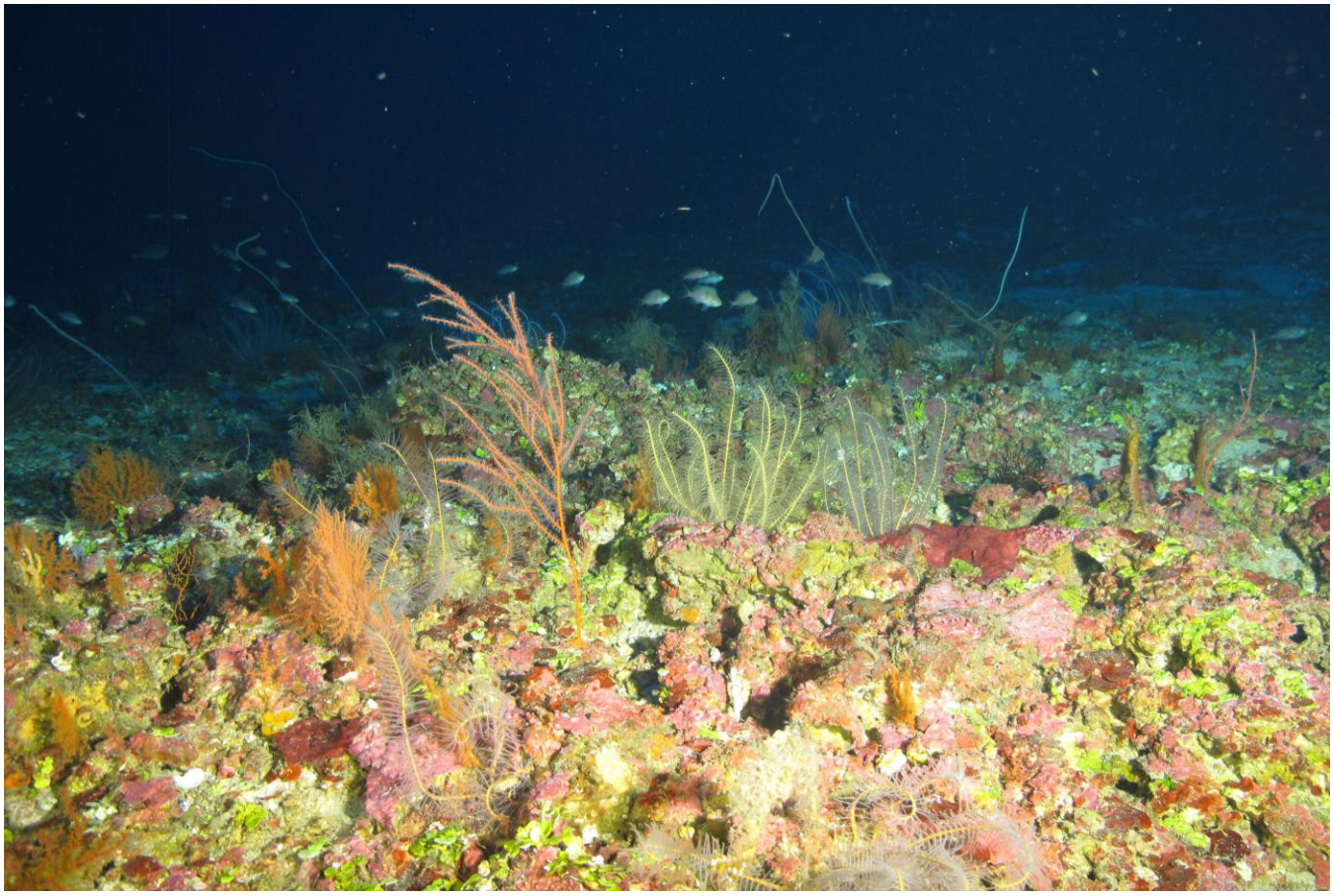


Figure 13: Orange *Hypnogorgia* spp., rinoids, and *Ellisella* spp. colonize the coralline algae reef at Sidner Bank. Dive 377.

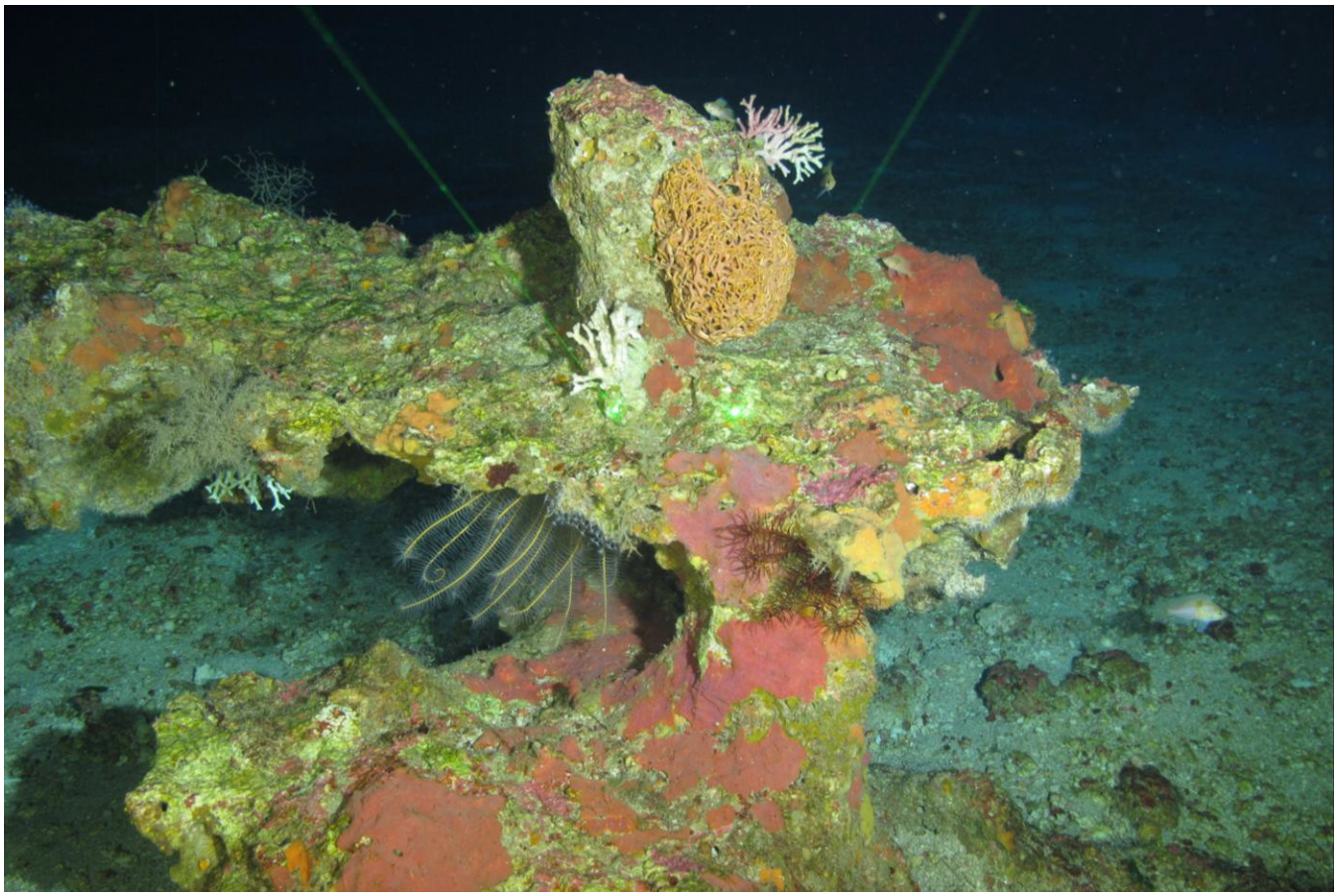


Figure 14: A basket star clings to a highly eroded outcropping at Tressler Bank. Dive 380.

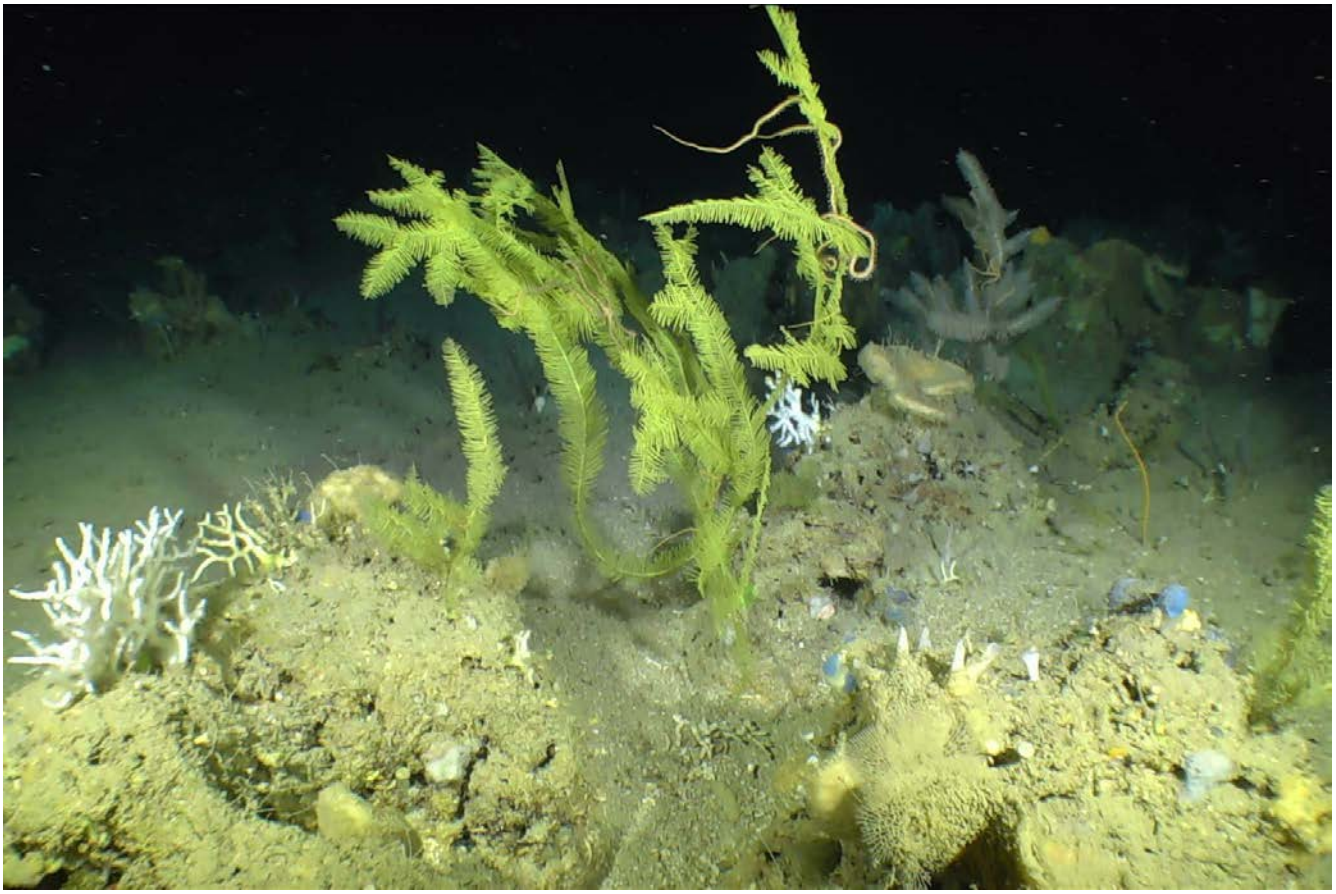
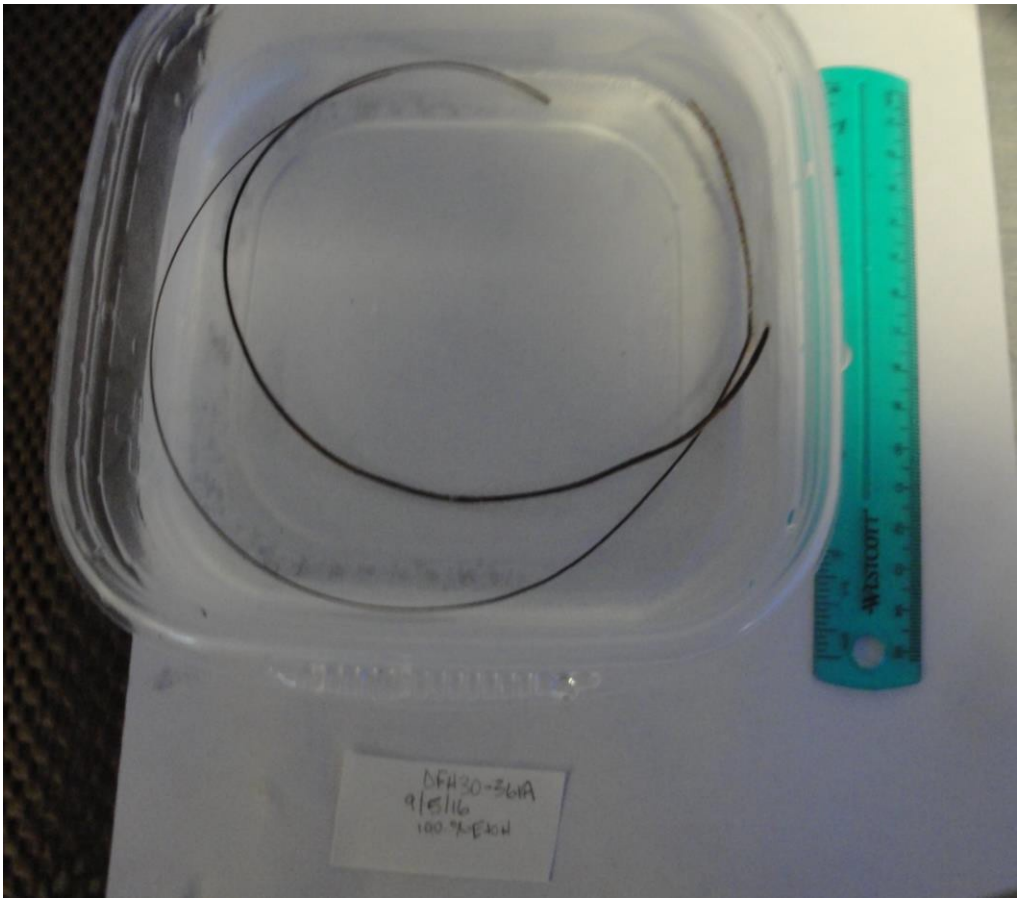


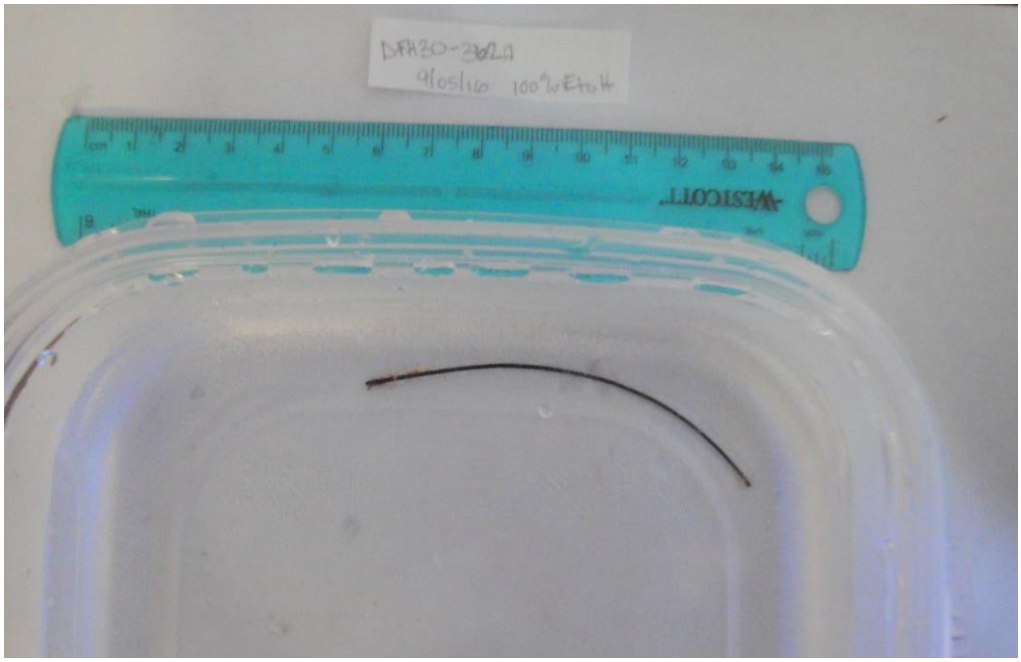
Figure 15: Several colonies of this potential new Antipatharian species were encountered at Elvers Bank. This will be prioritized for collection and processing during 2017 activities. Dive 381.

Sample Photos

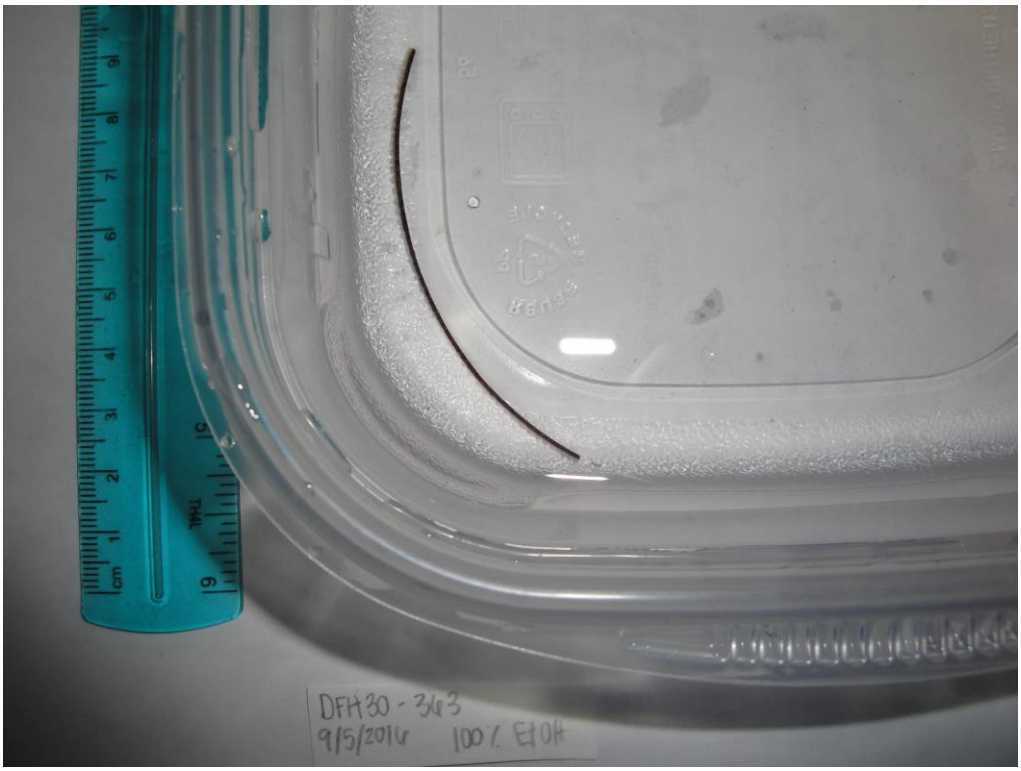
Sample 1: DFH30-361A



Sample 2: DFH30-362A



Sample 3: DFH30-363



Sample 4: DFH30-364A

Sample 5: DFH30-364B

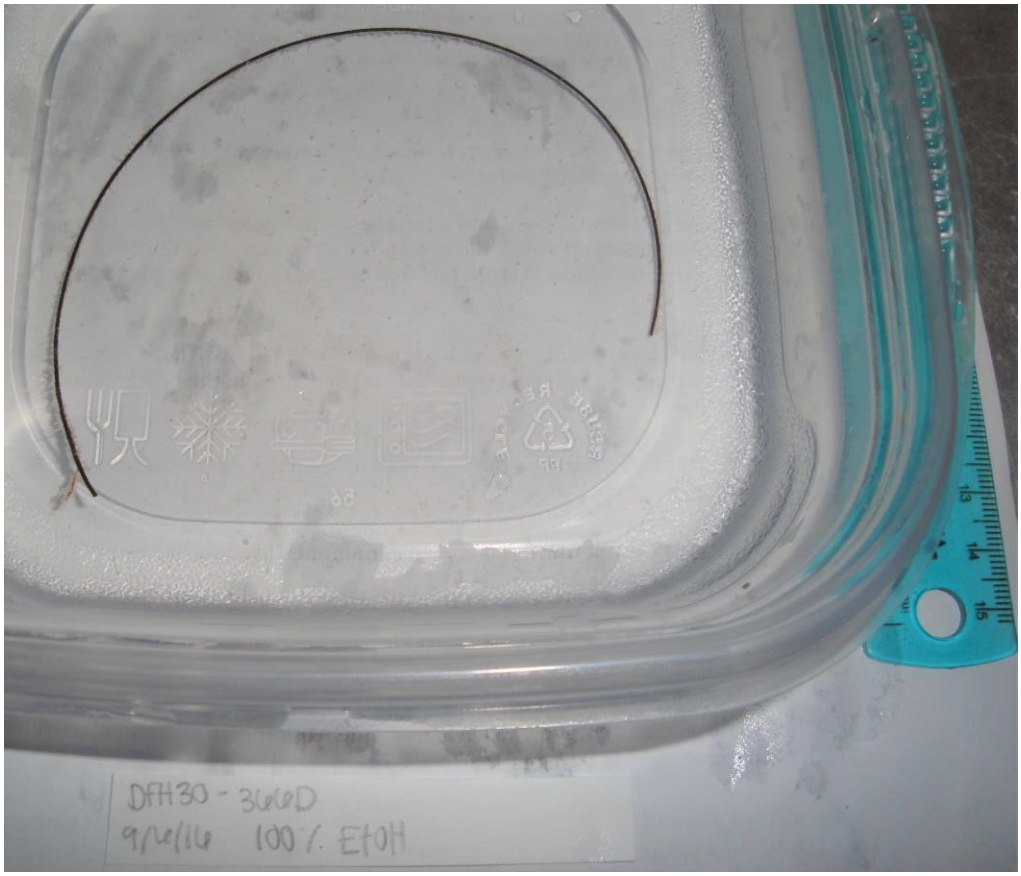
Sample 6: DFH30-364C

Sample 7: DFH30-366A

Sample 8: DFH30-366B

Sample 9: DFH30-366C

Sample 10: DFH30-366D



Sample 11: DFH30-366AA

Sample 12: DFH30-366AB

Sample 13: DFH30-366AC

Sample 14: DFH30-366AD

Sample 15: DFH30-366BA

Sample 16: DFH30-368A

Sample 17: DFH30-368B

Sample 18: DFH30-368C

Sample 19: DFH30-372A

Sample 20: DFH30-372B