Hawaii National Marine Renewable Energy Center (HINMREC)

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Task 4: Environmental Impact Monitoring at WETS

Ecological Survey Field Reports, Diving #1-4

Prepared by:
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Prepared for:
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2015 - 2016

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FIELD REPORT

DATE:	March 4th, 2015
TO:	Luis Vega
FROM:	Patrick Anderson
SUBJECT:	WETS Task 5A Ecological Survey Field Report Diving

Date: January 15, 2015

Locations & Activity: WETS 30 m Mooring Diving Ecological Survey

Crew: T. Harris, A. Rocheleau, C. Conger, T. Borge, W. Redongo

Vessel: Bob R.

Task 5A Ecological Survey: SEI conducted a diving ecological survey at the 30 m wave energy test site. This survey included a fish count and replicate quadrats at the two chain boxes. Also two replicate transects were conducted along the cable route. One 50 meter transect was completed from the shelf (~12 meters deep) along the cable towards shore, and the other transect started at the base of the shelf (~24 meters deep) and continued up the slope to the shelf.

Work Completed:

Fish Count: The first diving task at the 30 m mooring site was completing a fish count and video of the chain boxes (AB) and surrounding area. The divers were oriented on opposite corners of the chain boxes (one on offshore side and one on the inshore side). During this fish count there were faint whale sounds. The fish count was also conducted a second time by the same dive team later in the day when the lighting was improved. The results of the fish counts are shown in Table 1 below. For reference the long side of the chain box is 31 feet 11 inches and the short side is 20 ft 7 inches.

Table 1. Fish Count Results

Location	Coordinates	Time	Fish count
Chain Boxes AB	21° 27’ 54.9574” N 157° 45’ 2.8103” W	7:44	100-200
		10:37	200-250

Video and photographs were taken during each of the fish counts; however, only the photographs from the second fish count at 10:37 AM are shown in this report. These photographs are shown

in Figure 1 through Figure 8 and are described the photo log in Table 2. The images from the first fish count are not useable due to low light conditions. All the photographs were edited to improve color and clarity.

Replicate Transects: Two 50 m transects were surveyed along the cable route. The bathymetry of the area has a shelf. The shallow transect was completed from the top of the shelf at a depth of approximately 12 m along the cable towards shore. The shallow transect was completed between 8:55AM to 9:03AM. The deep transect began at the base of the shelf (~24 m depth) and continued up the slope to the shelf. The deep transect was completed between 8:18 AM to 8:27AM.

Each transect was surveyed by a diver swimming from the deep end to the shallow end taking video along the way and then taking photographs during the return swim from the shallow end to the deep end. The photographs are centered on a PVC frame quadrat that measures 50 cm square. The photographs were taken in 5 locations 10 m apart along the cable. The photographs are cataloged in a photo log in Table 3. The tape used is delineated in inch and foot increments. Marks for 10m spacing were added by hand.

After the survey of the shallow transect, a dive team surveyed an inshore trench along the possible new cable route. Videos and photographs were taken on along the length of the trench. The photographs are cataloged in Table 5. This survey was conducted from 9:39AM to 9:47AM.

Replicate Quadrats: The final task of the ecological survey involves collecting photographs of replicate quadrats on the chain box. The photographs were taken using a 50 cm square frame quadrat hung vertically on the side of each box, and a 100 cm square frame quadrat placed horizontally on top of the chain in the corner of each box. In addition to the photographs of the chain box with the quadrats, a general overview of the coral was taken. This included photographs of coral colonies with a ruler delineated in inches to determine scale. These images are cataloged in Table 7.

Table 2. Photo Log of Fish Count around Chain Boxes

Figure Number	Description
Figure 1	View inshore of chain box AB
Figure 2	View inshore of chain box AB
Figure 3	View inshore of chain boxes and diver
Figure 4	View from above
Figure 5	Chain box view from above
Figure 6	View offshore of chain box AB
Figure 7	Chain box and surrounding area
Figure 8	Chain box and surrounding area

Table 3. Photo Log of Deep Transect

Figure Number	Description
Figure 9	Deep Transect: 0m Location
Figure 10	Deep Transect: 10m Location
Figure 11	Deep Transect: 20m Location
Figure 12	Deep Transect:30m Location
Figure 13	Deep Transect: 40m Location
Figure 14	Deep Transect: 50m Location

Table 4. Photo Log of Shallow Transect

Figure Number	Description
Figure 15	Shallow Transect: 0m Location
Figure 16	Shallow Transect: 10m Location
Figure 17	Shallow Transect: 20m Location
Figure 18	Shallow Transect: 30m Location
Figure 19	Shallow Transect: 40m Location
Figure 20	Shallow Transect: 50m Location

Table 5. Photo Log of Inshore Trench

Figure Number	Description
Figure 21	Inshore Trench Opening
Figure 22	Inshore Trench Opening Detail
Figure 23	Inshore Trench from Above
Figure 24	Inshore Trench Walls
Figure 25	Inshore Trench End

Table 6. Photo Log of Chain Box Quadrats

Figure Number	Description
Figure 26	Chain Boxes Quadrat 1 100 X 100cm
Figure 27	Chain Boxes Quadrat 2 50 X 50cm
Figure 28	Chain Boxes Quadrats 1 and 2
Figure 29	Chain Boxes Quadrat 3 100 X 100cm
Figure 30	Chain Boxes Quadrat 4 50 X50cm

Table 7. Photo Log of Fish and Coral around Chain Boxes

Figure Number	Description
Figure 31	School of Fish Around Chain Boxes
Figure 32	Fish above Chain Boxes
Figure 33	Coral Colony on the Chain Box Edge
Figure 34	Coral Colony on the Chain

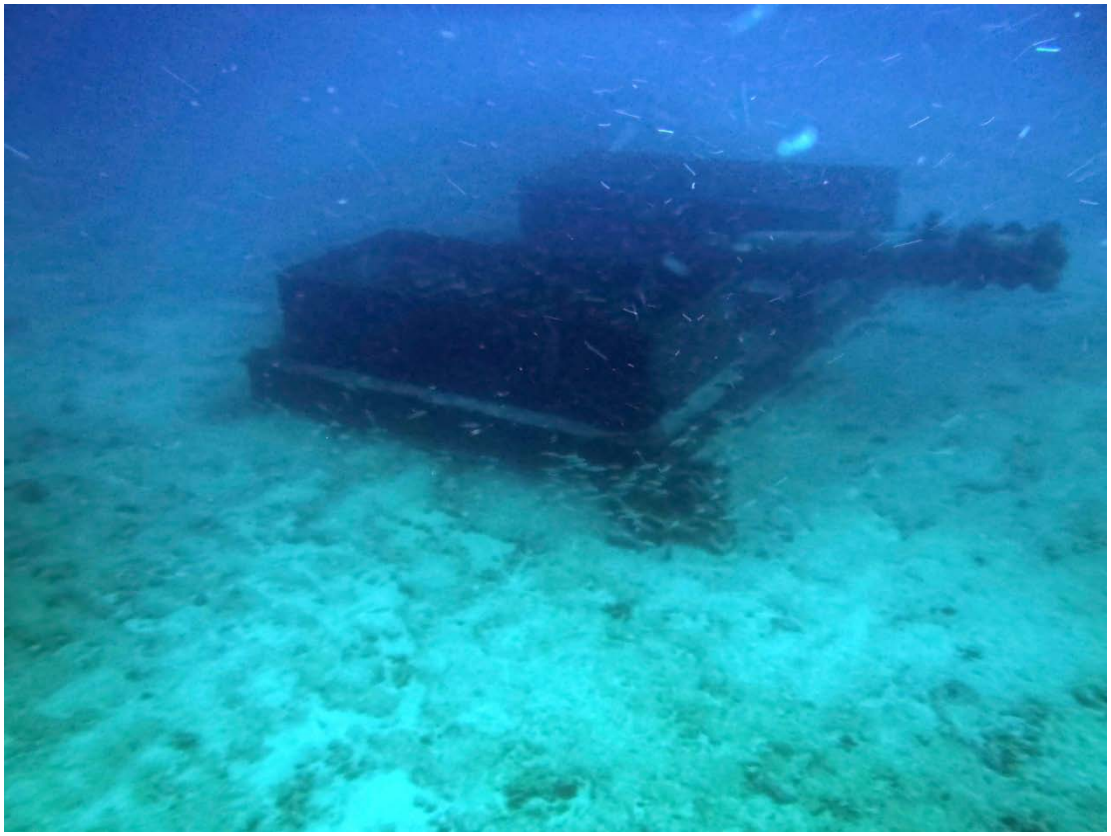

Figure 1. View inshore of chain box AB

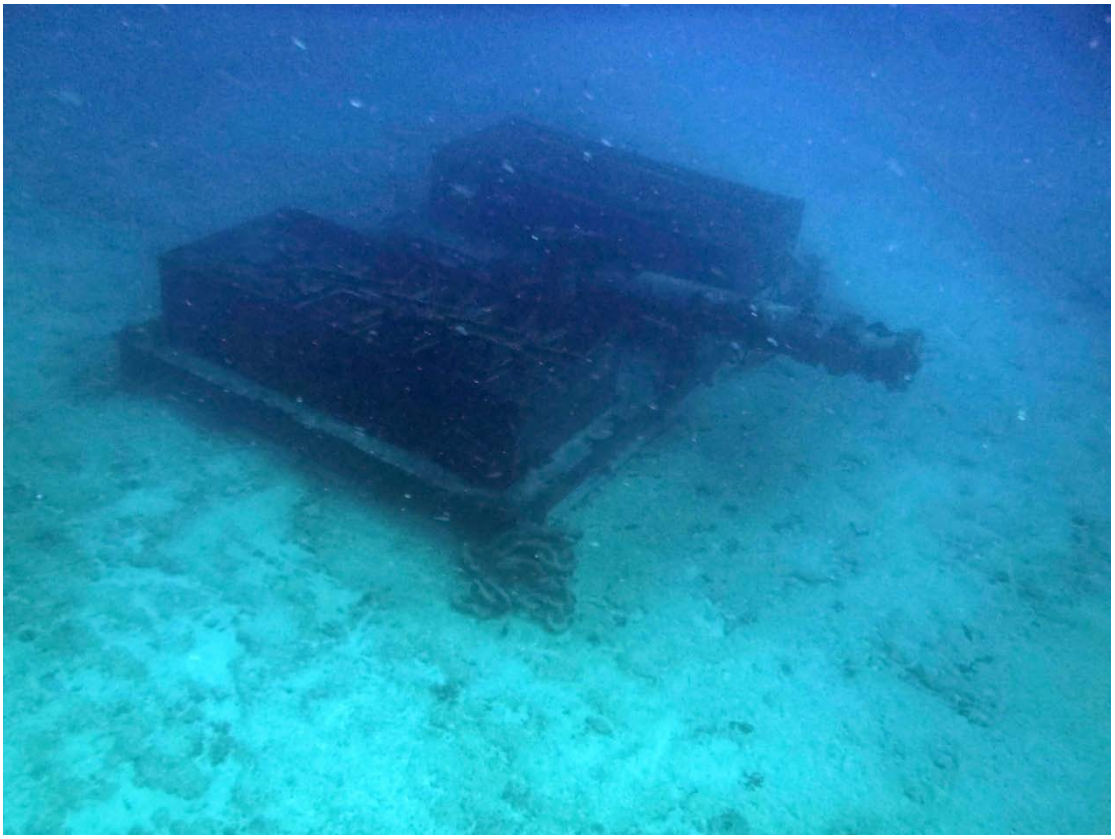

Figure 2. View inshore of chain box AB

Figure 3. View inshore of chain boxes and diver

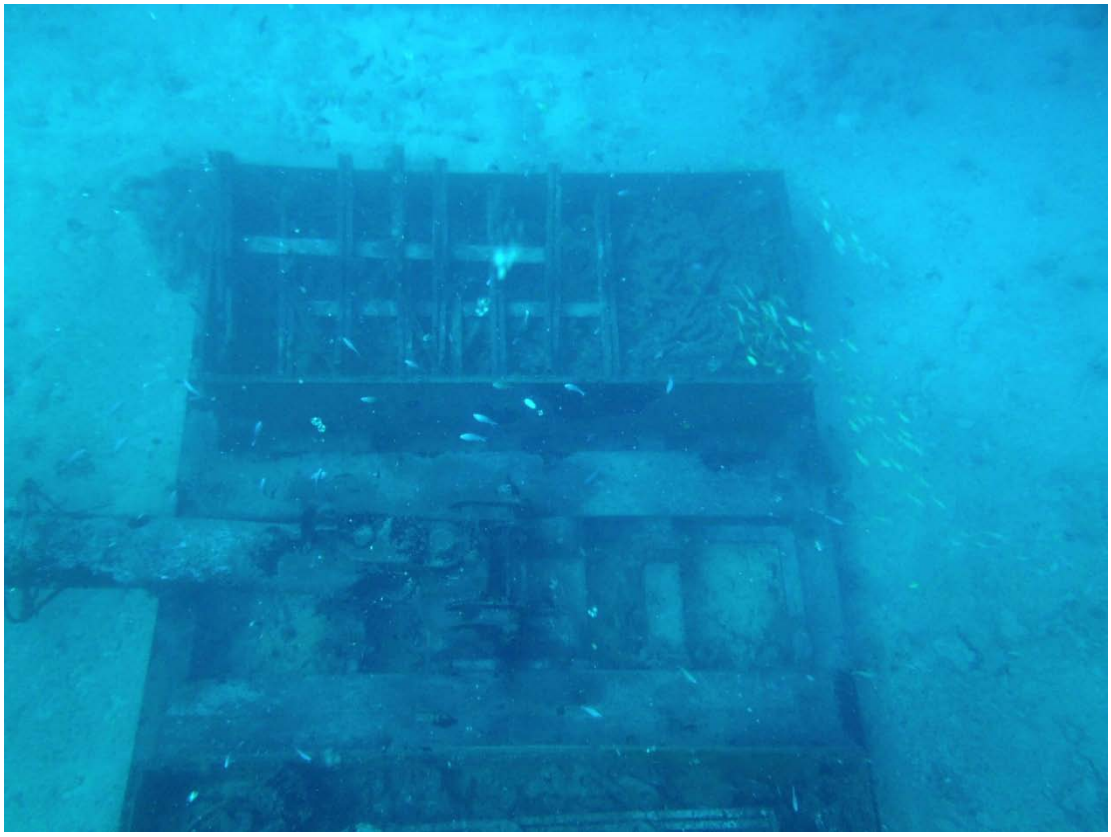

Figure 4. View from above

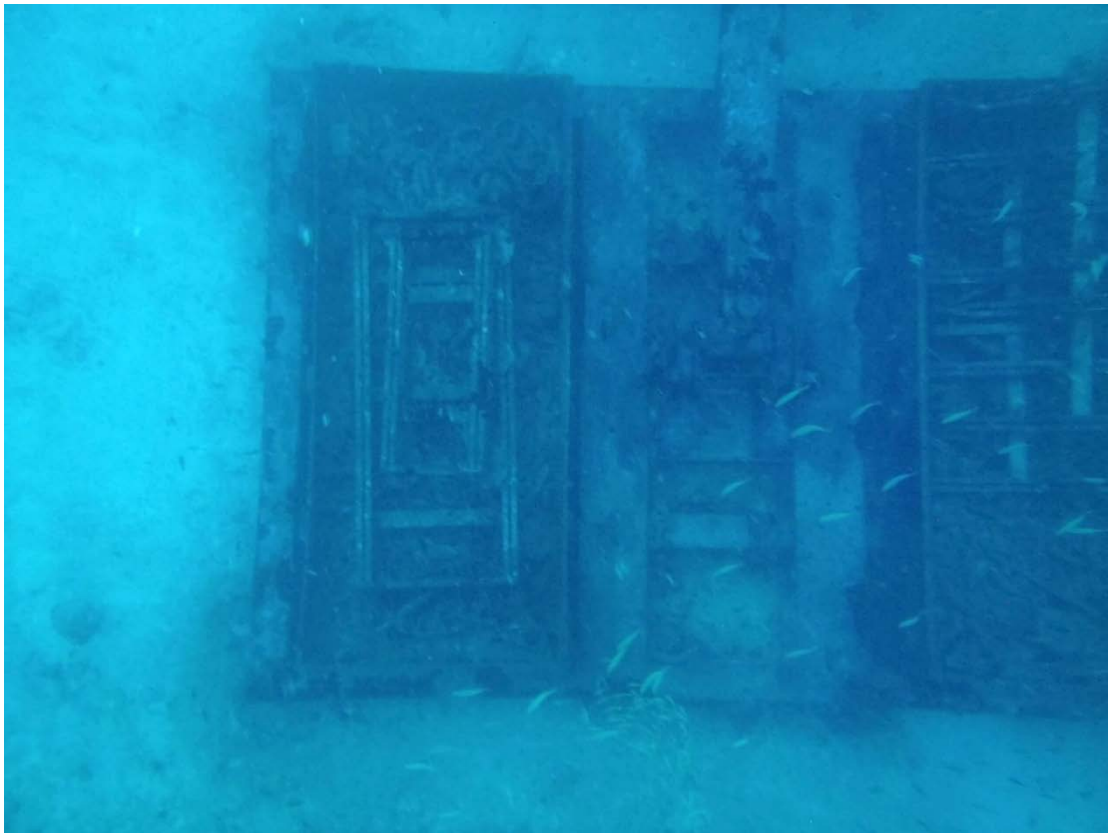

Figure 5. Chain box view from above

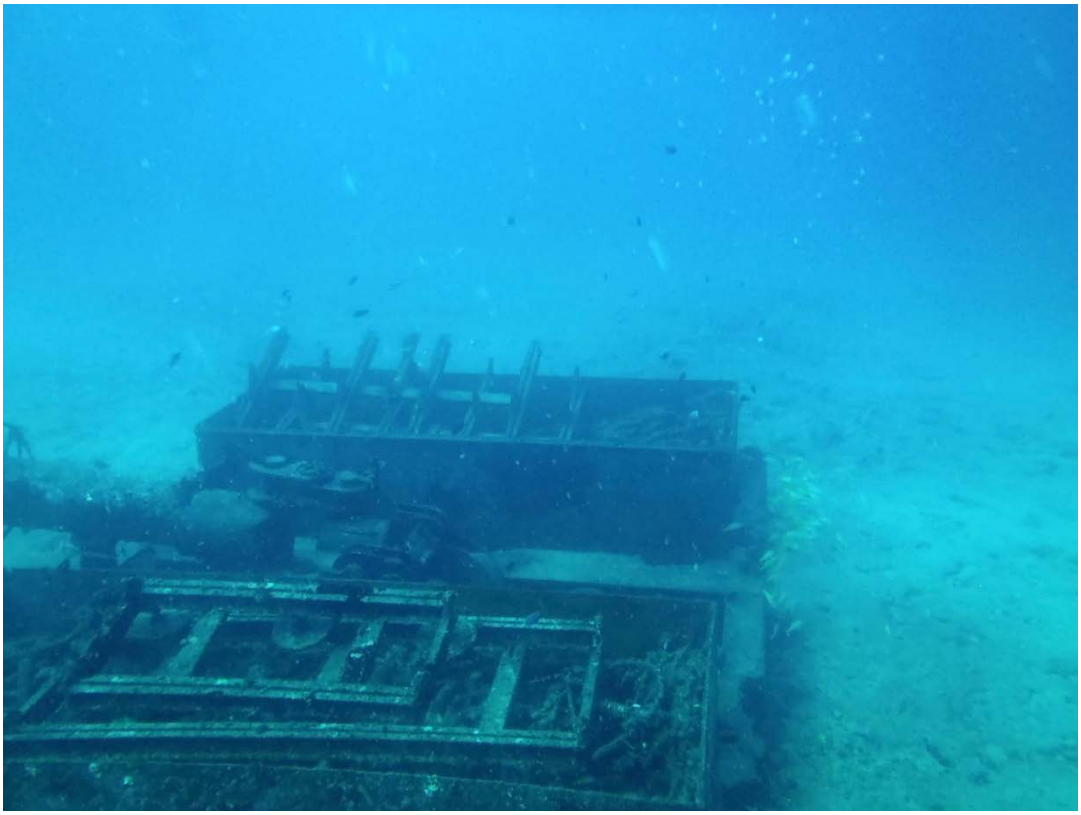

Figure 6. View offshore of chain box AB

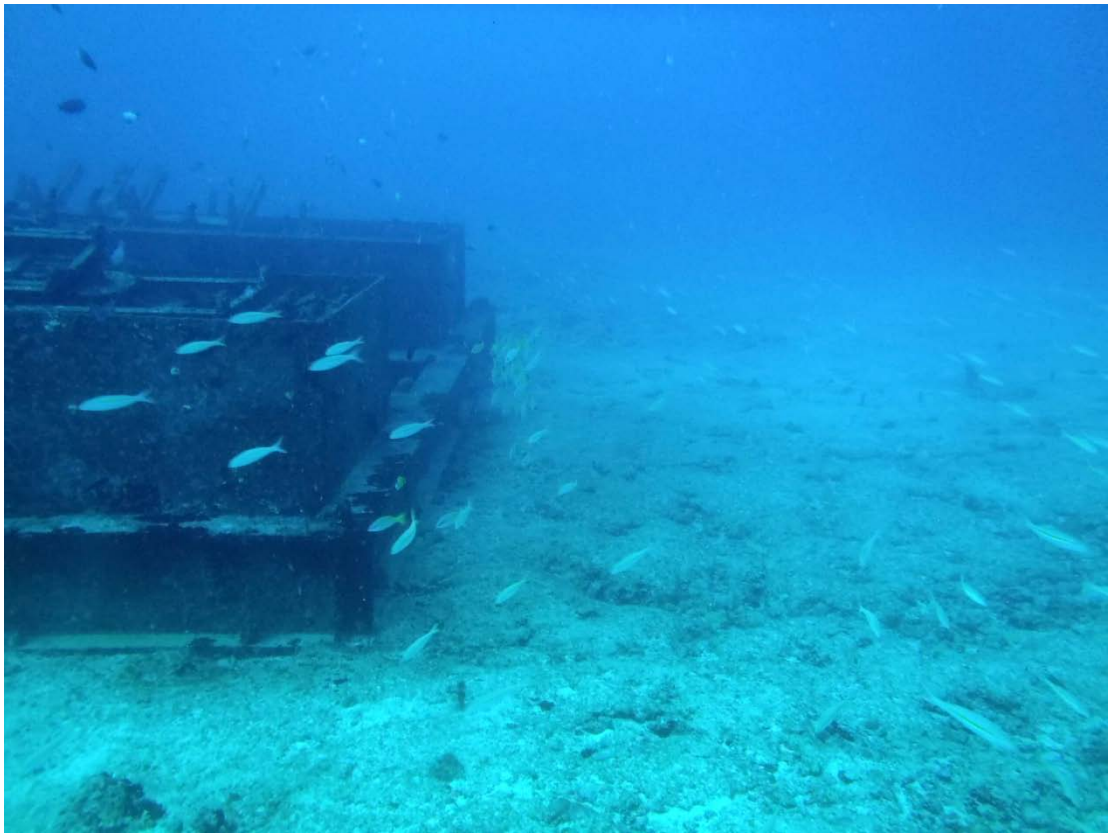

Figure 7. Chain box and surrounding area

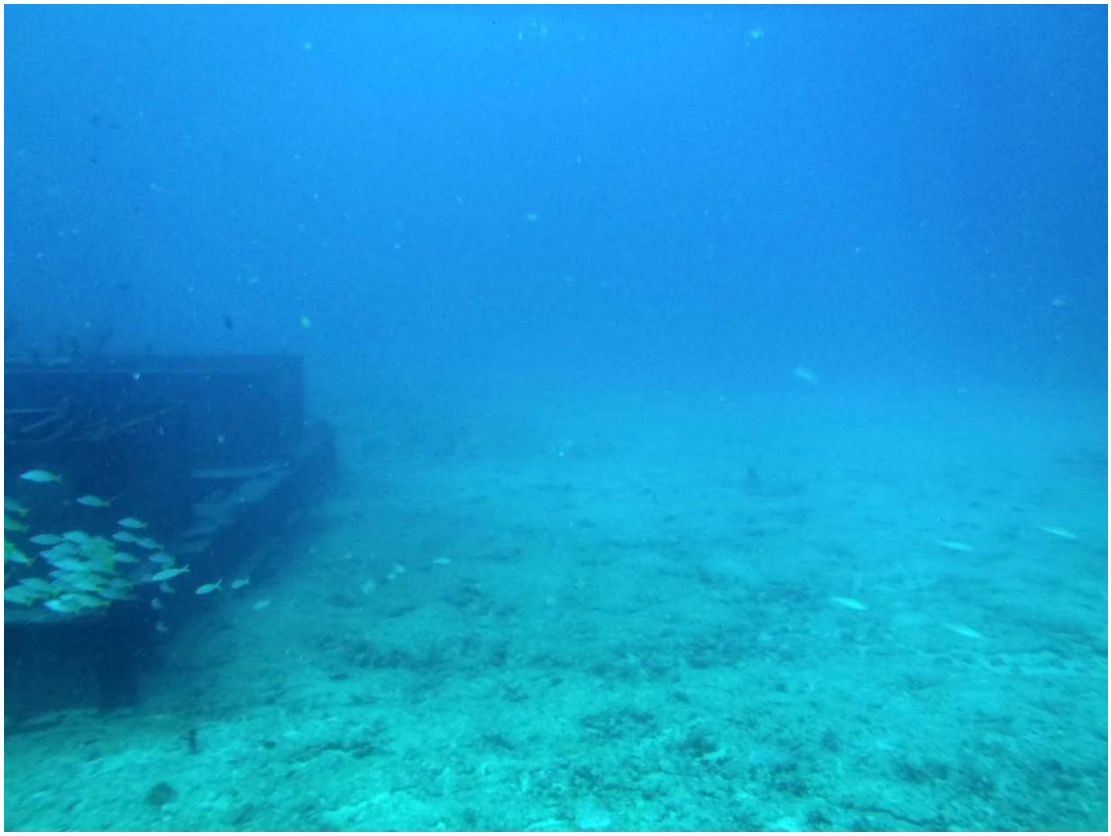

Figure 8. Chain box and surrounding area

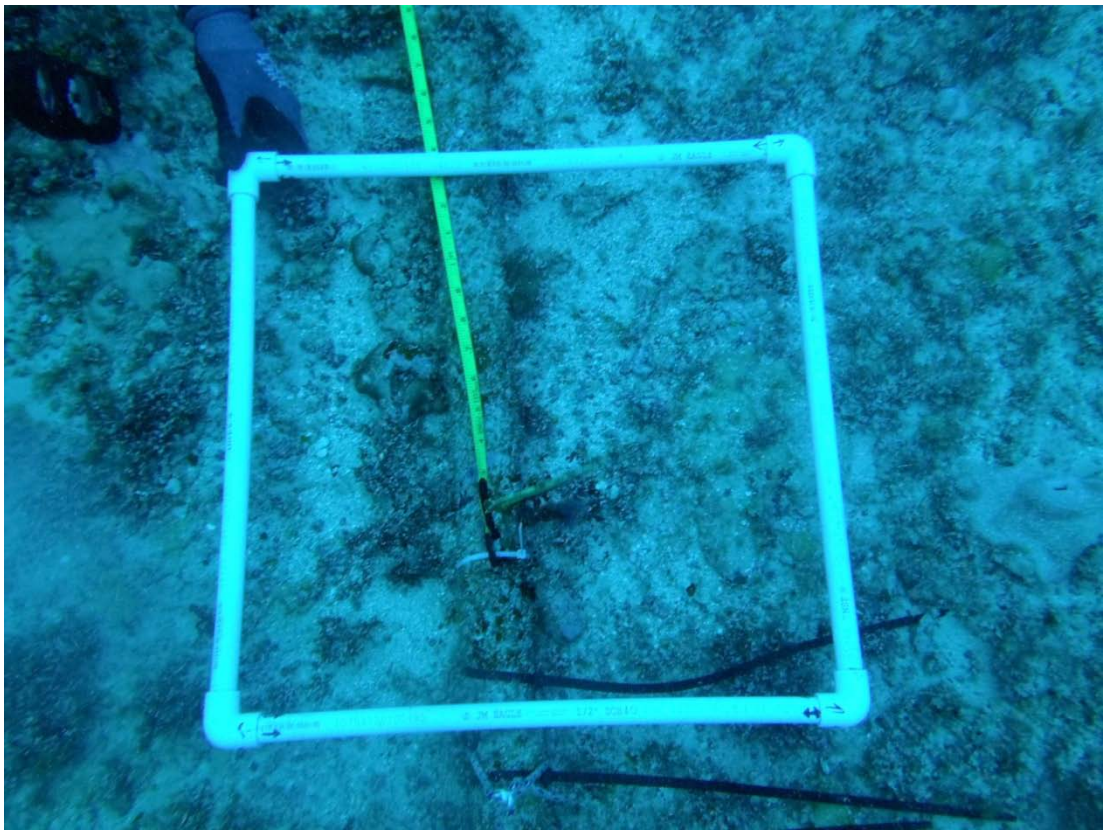

Figure 9. Deep Transect: 0m Location

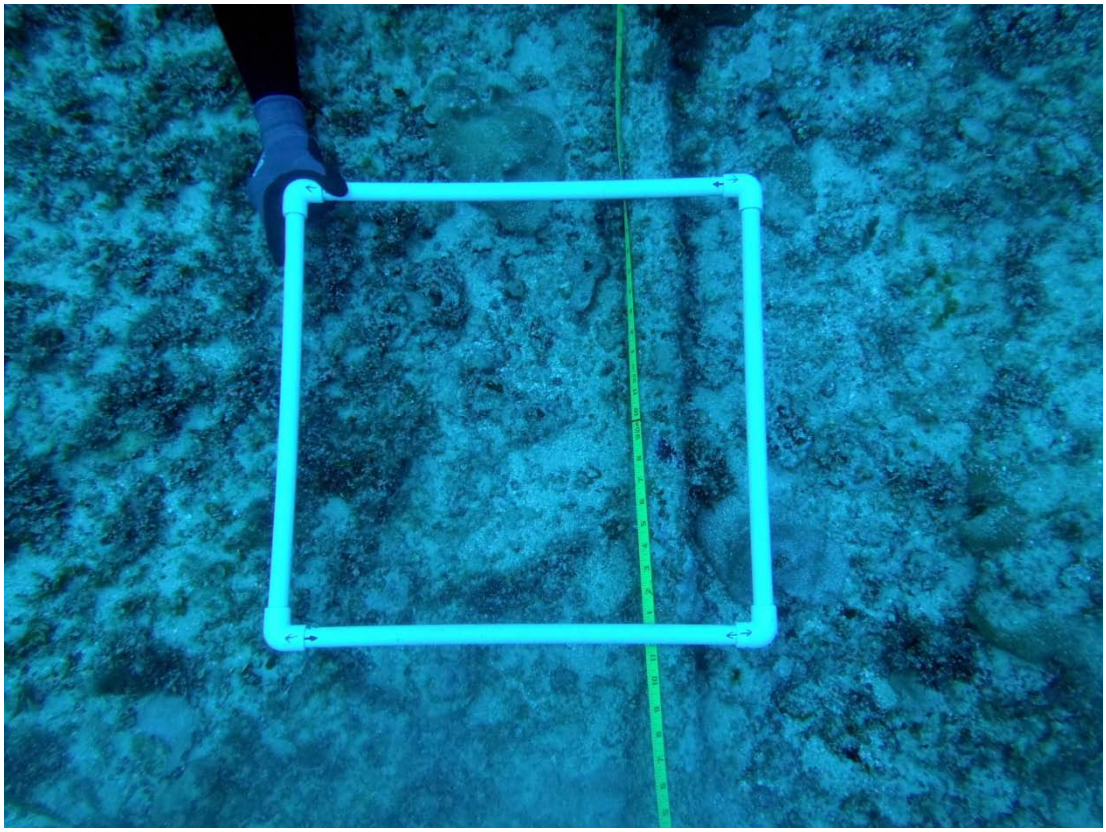

Figure 10. Deep Transect: 10m Location

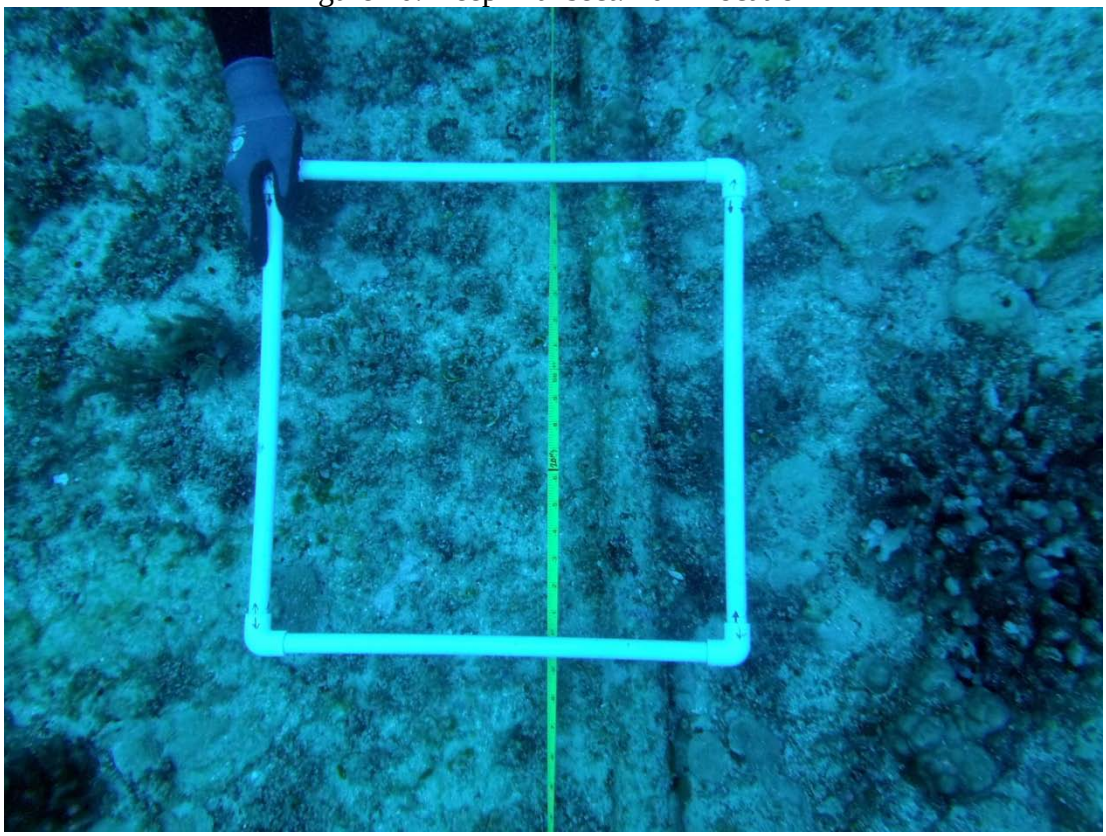

Figure 11. Deep Transect: 20m Location

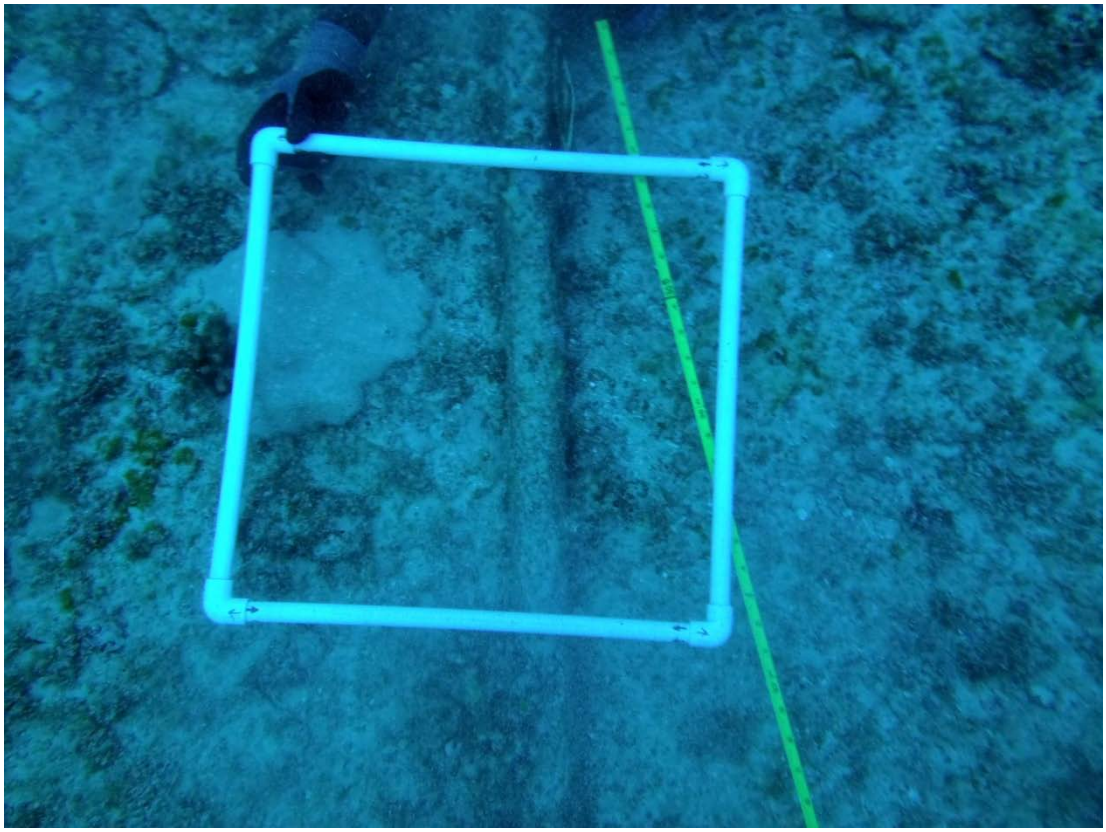

Figure 12. Deep Transect:30m Location

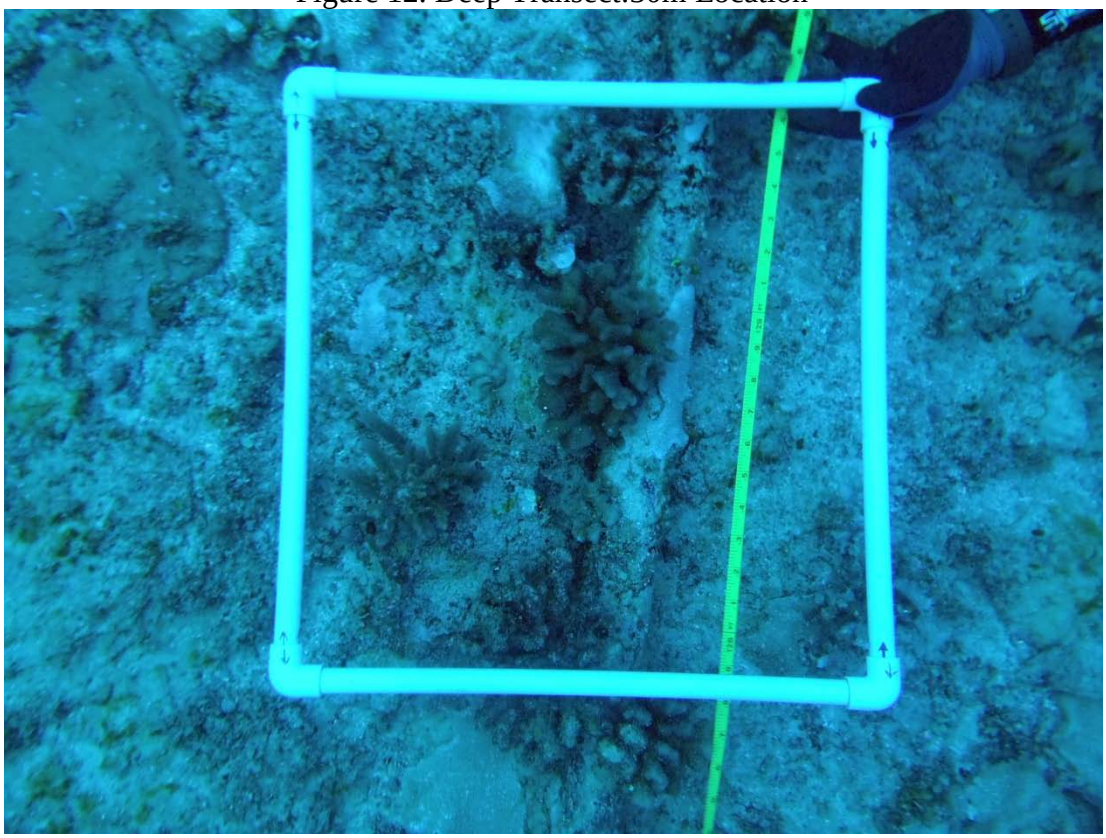

Figure 13. Deep Transect: 40m Location

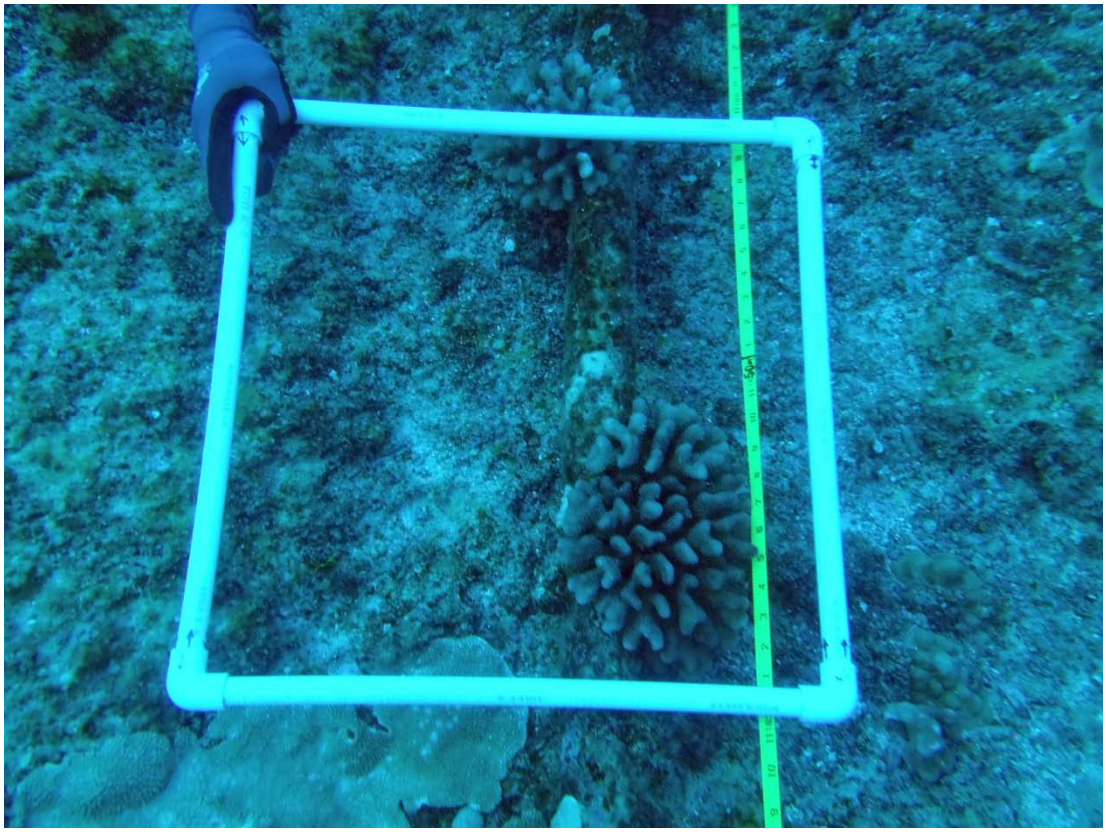

Figure 14. Deep Transect: 50m Location

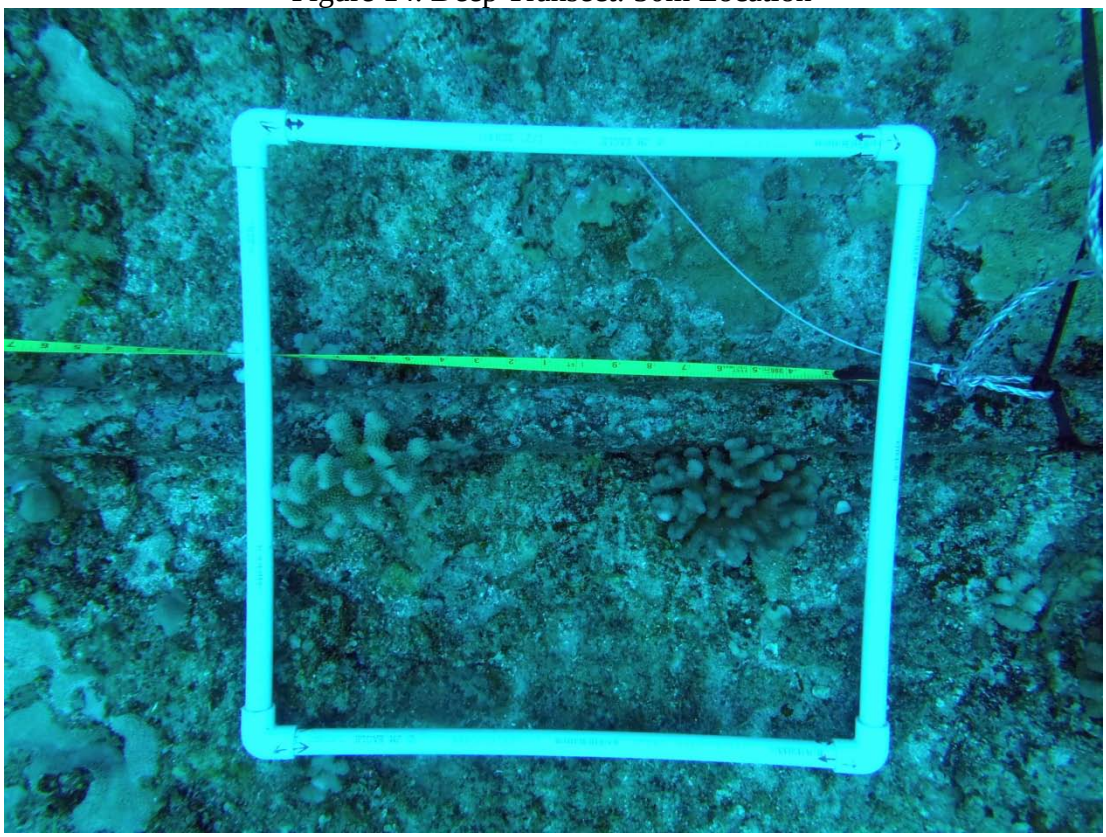

Figure 15. Shallow Transect: 0m Location

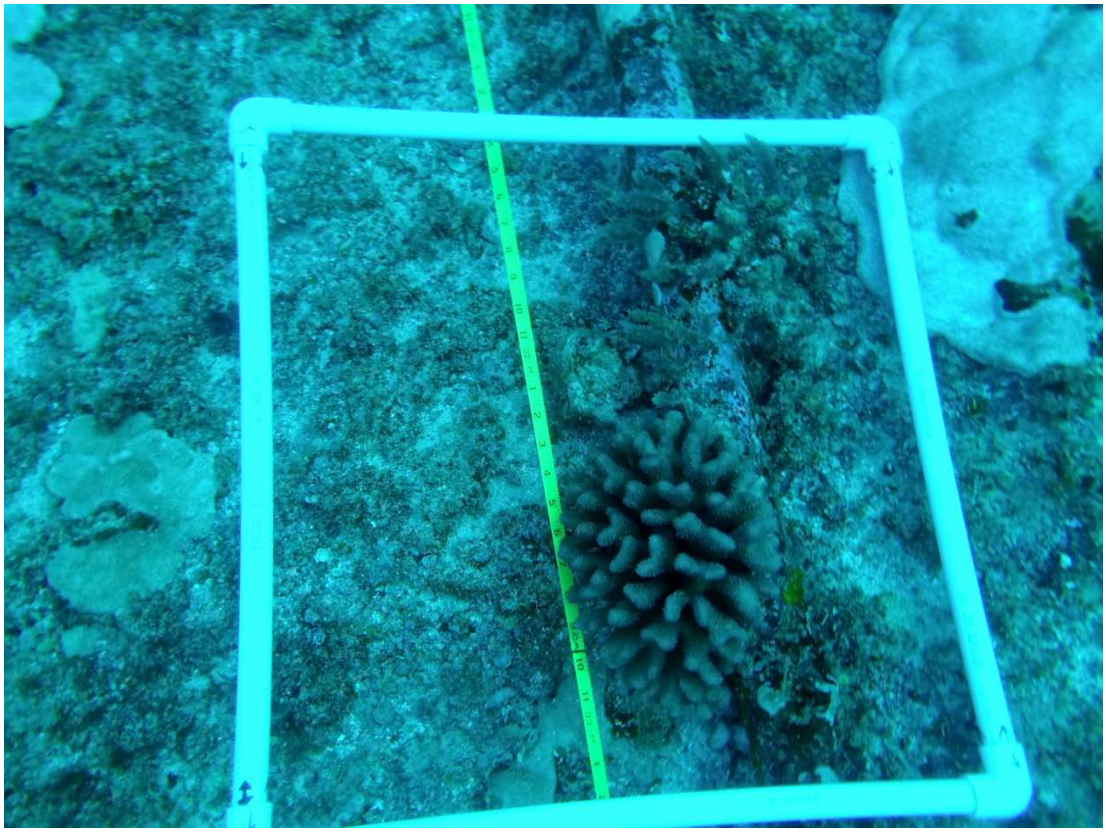

Figure 16. Shallow Transect: 10m Location

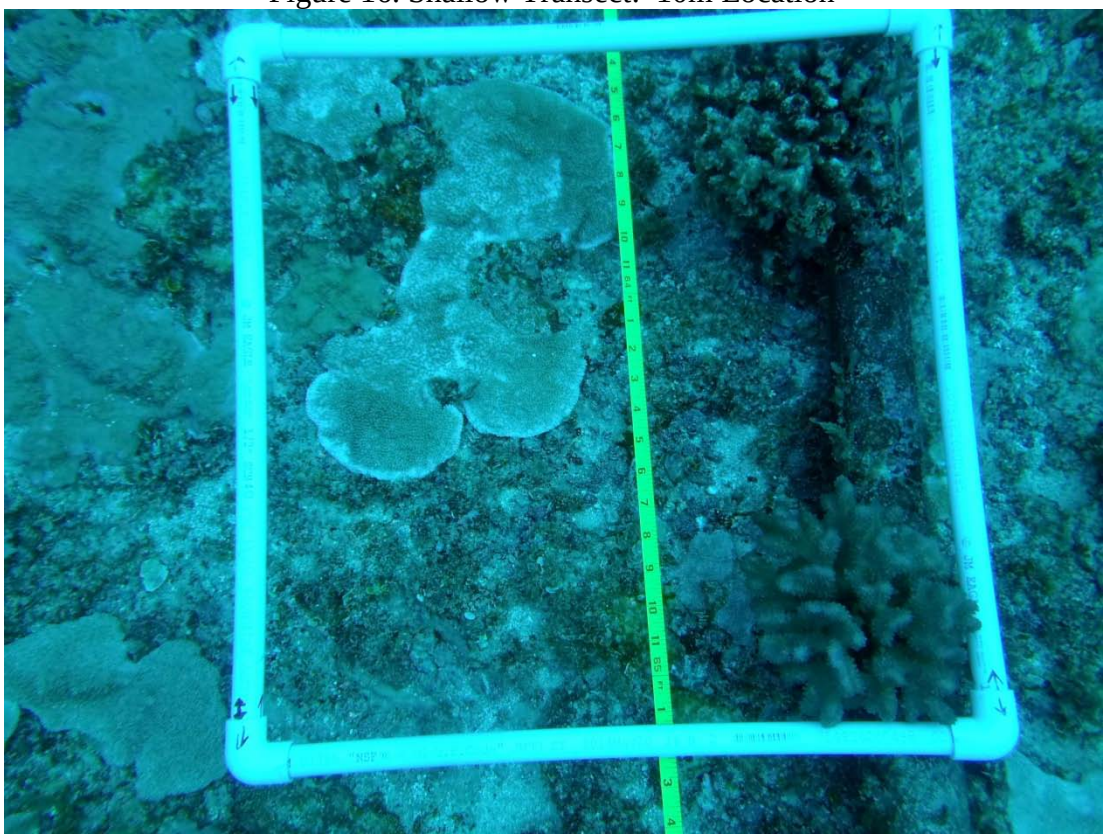

Figure 17. Shallow Transect: 20m Location

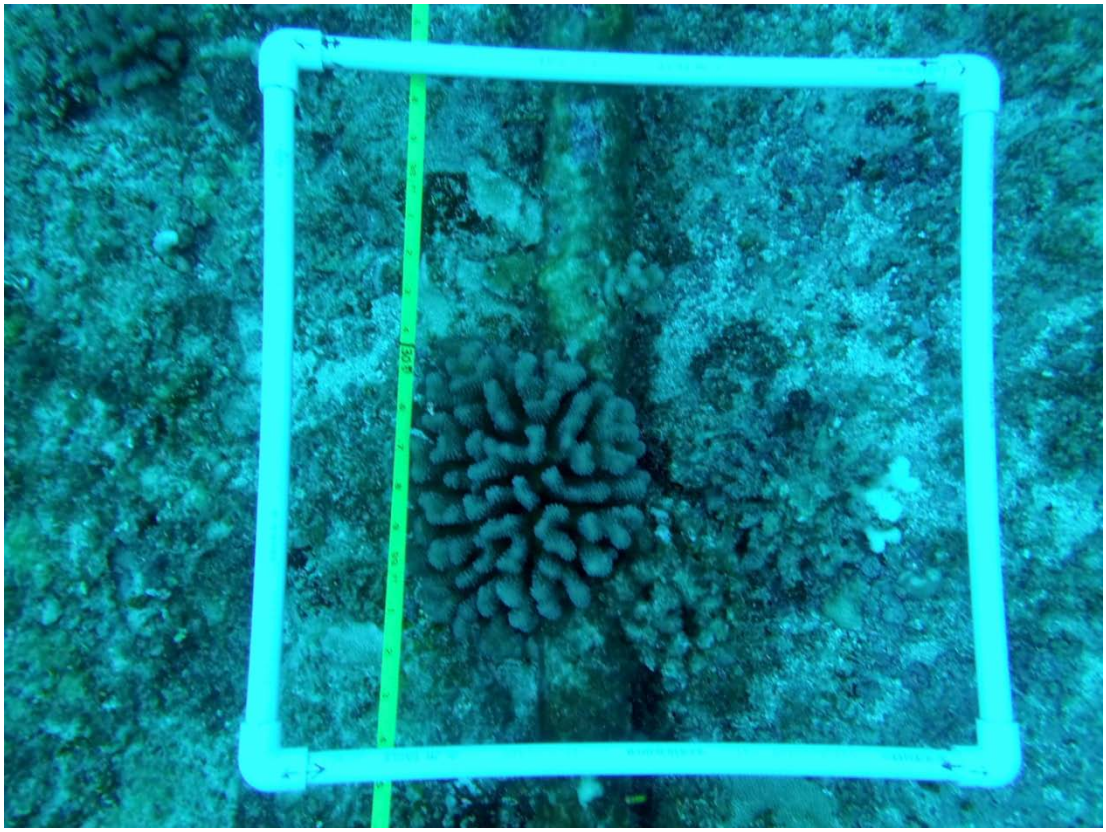

Figure 18. Shallow Transect: 30m Location

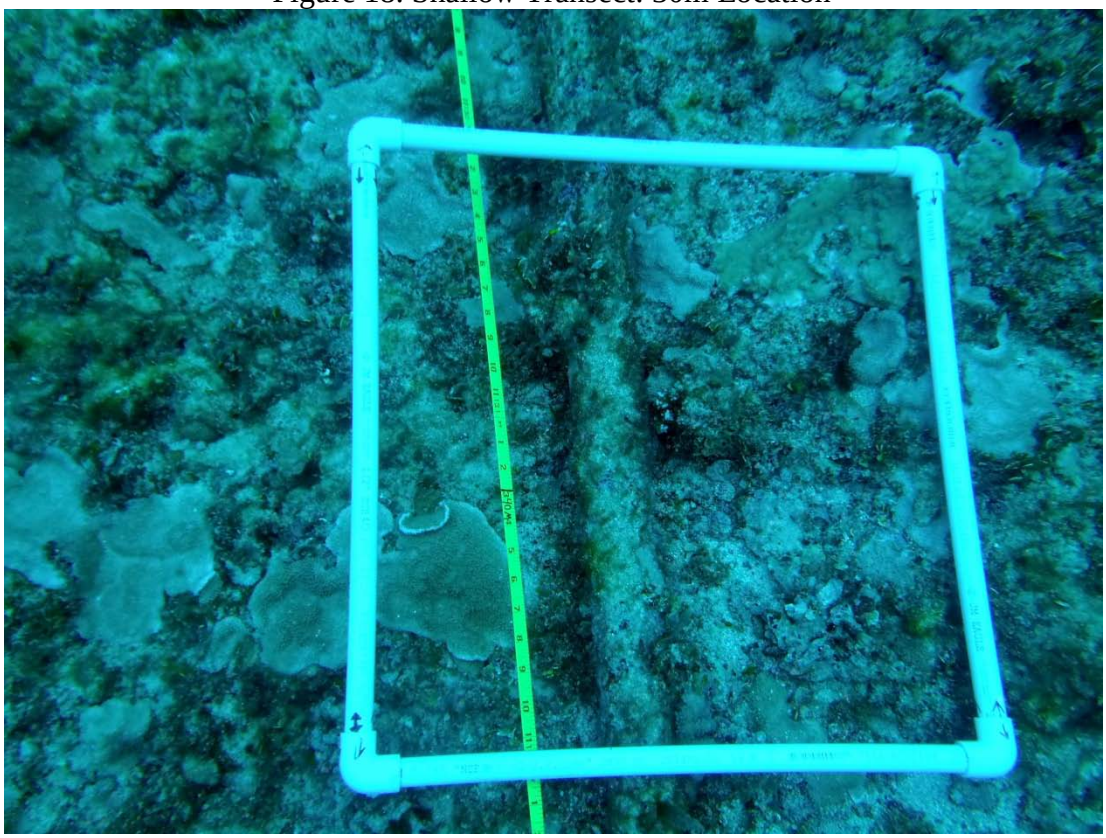

Figure 19. Shallow Transect: 40m Location

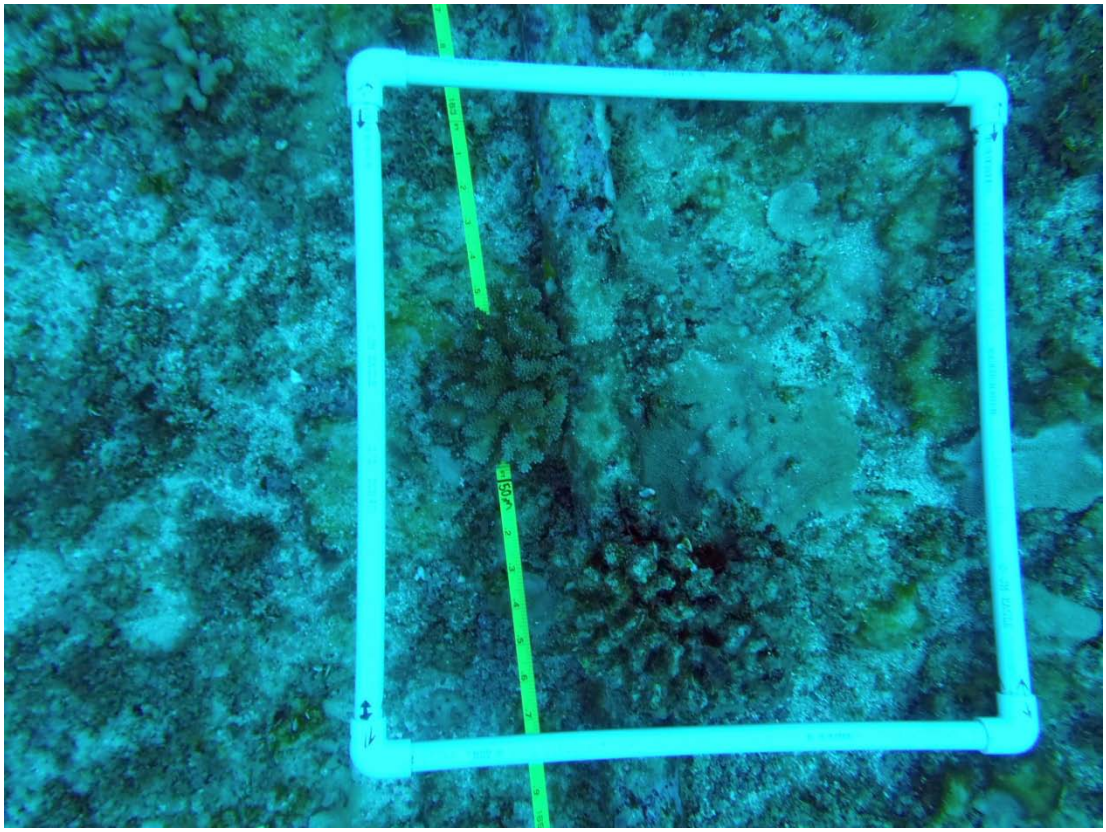

Figure 20. Shallow Transect: 50m Location

Figure 21. Inshore Trench Opening

Figure 22. Inshore Trench Opening Detail

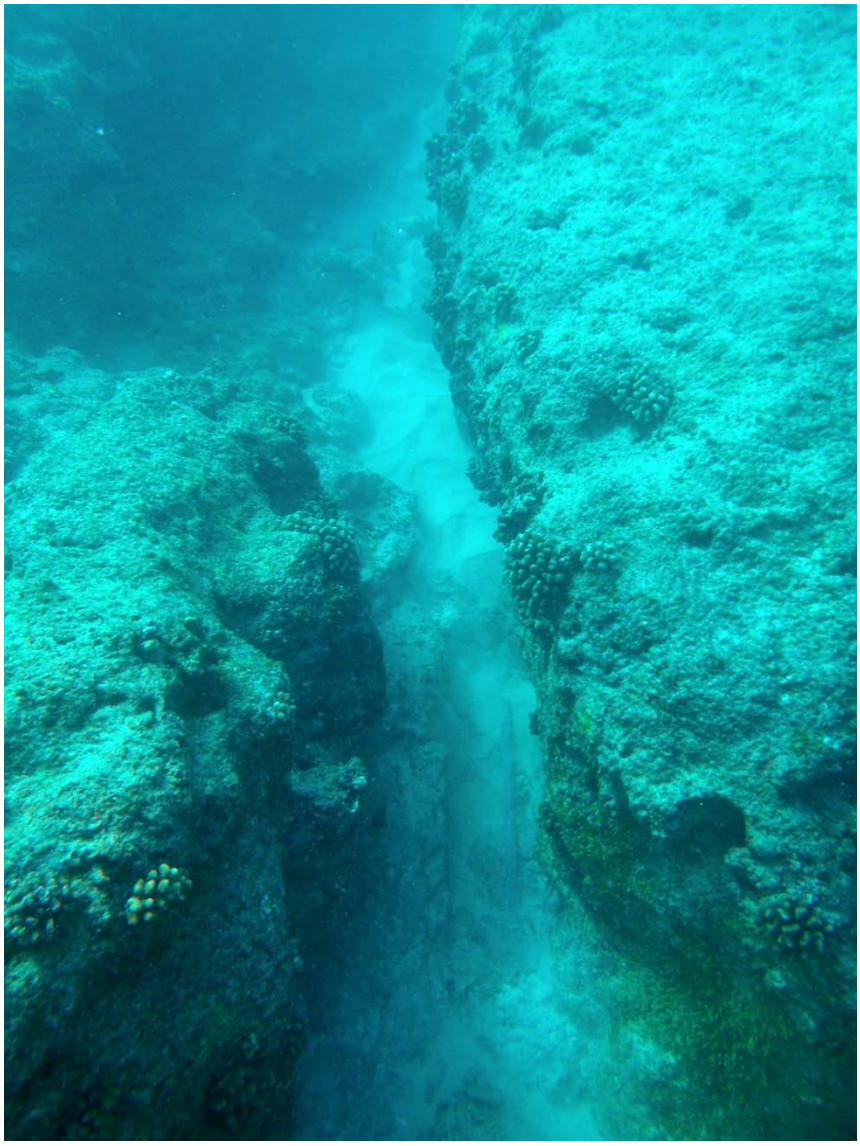

Figure 23. Inshore Trench from Above

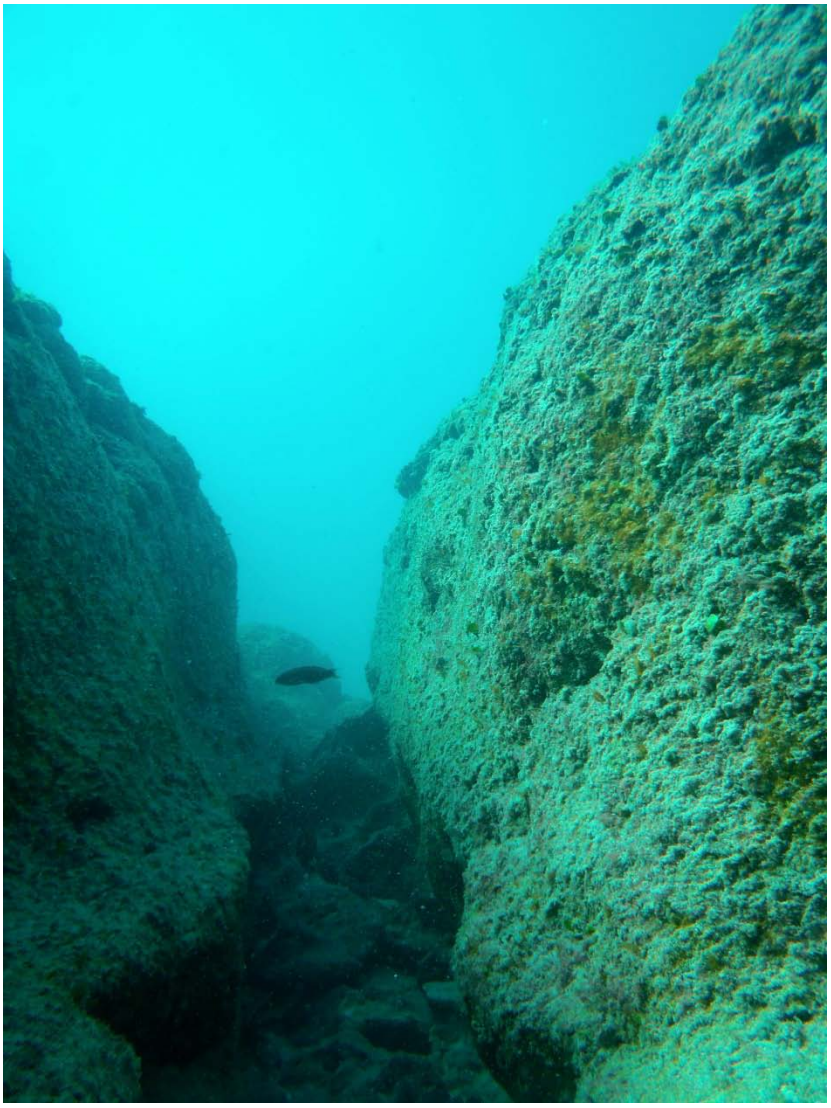

Figure 24. Inshore Trench Walls

Figure 25. Inshore Trench End

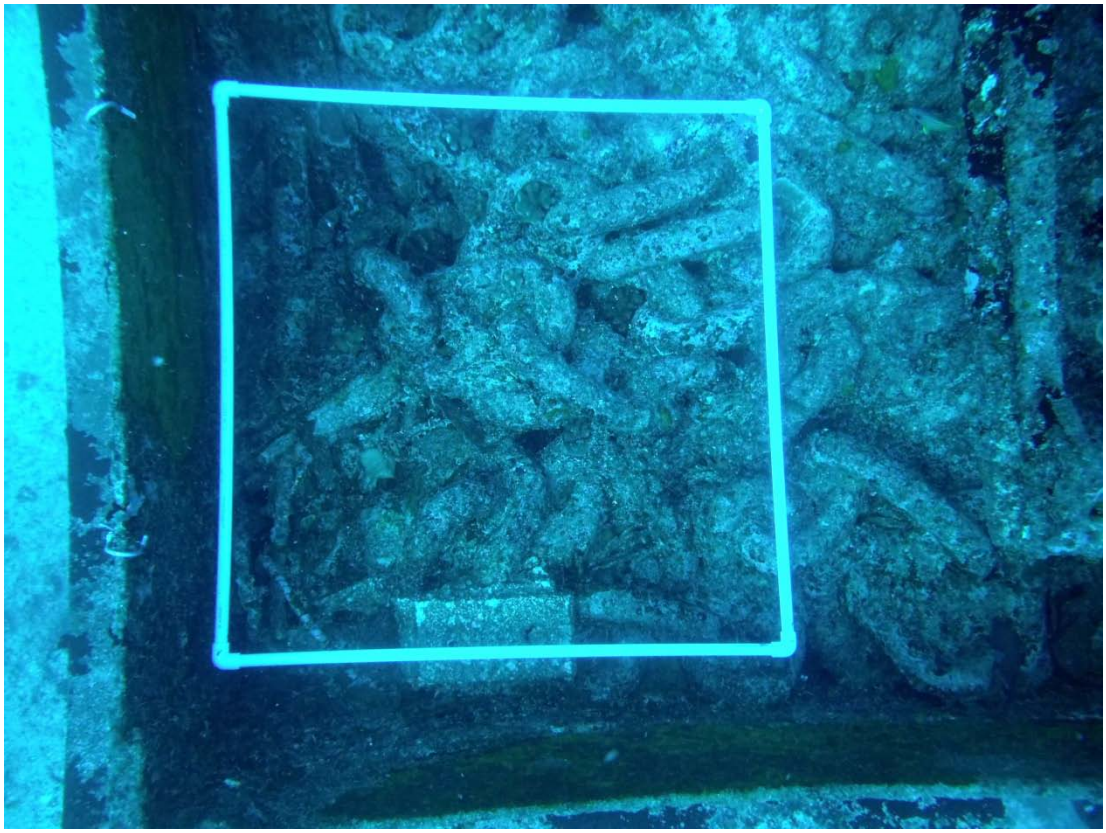

Figure 26. Chain Boxes Quadrat 1 100 X 100cm

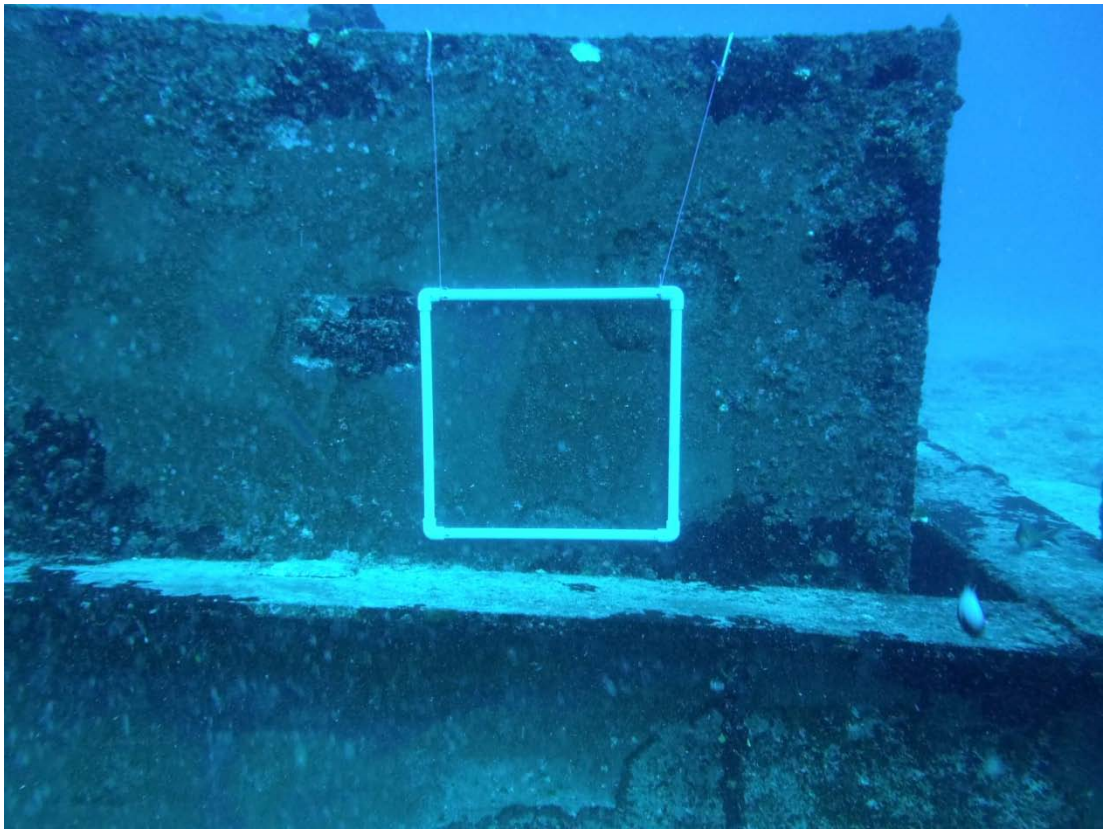

Figure 27. Chain Boxes Quadrat 2 50 X 50cm

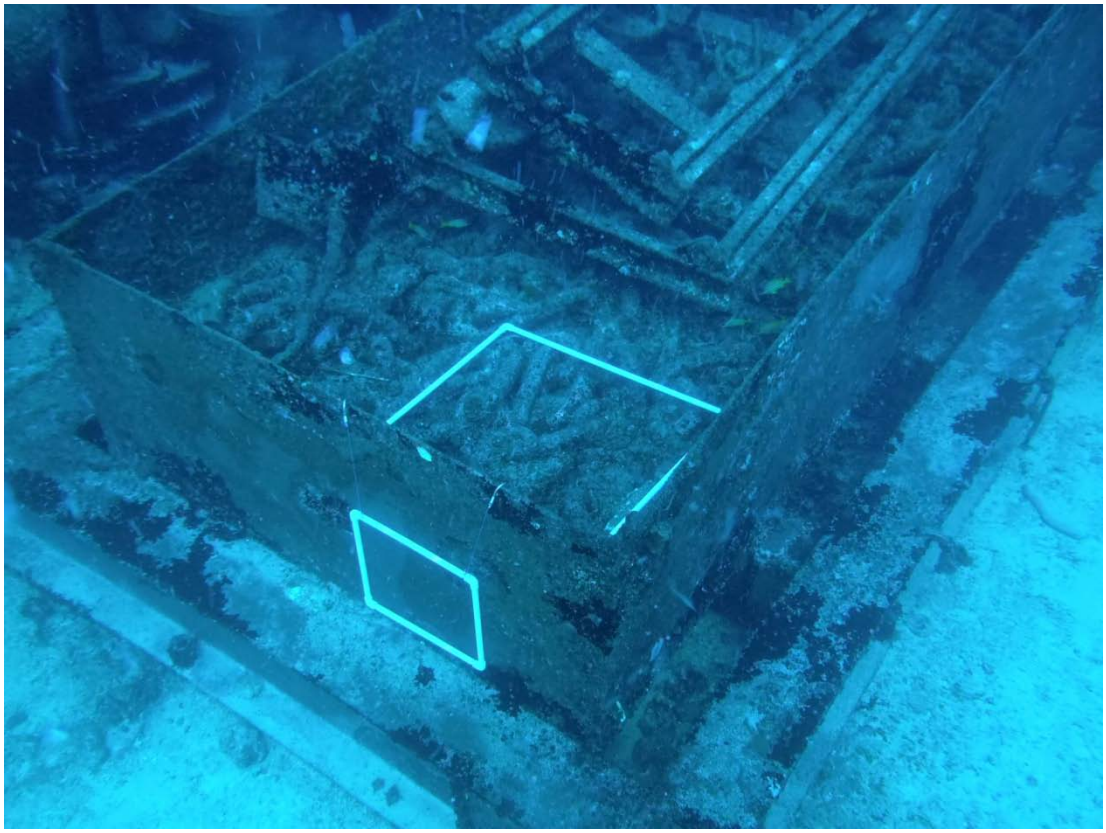

Figure 28. Chain Boxes Quadrats 1 and 2

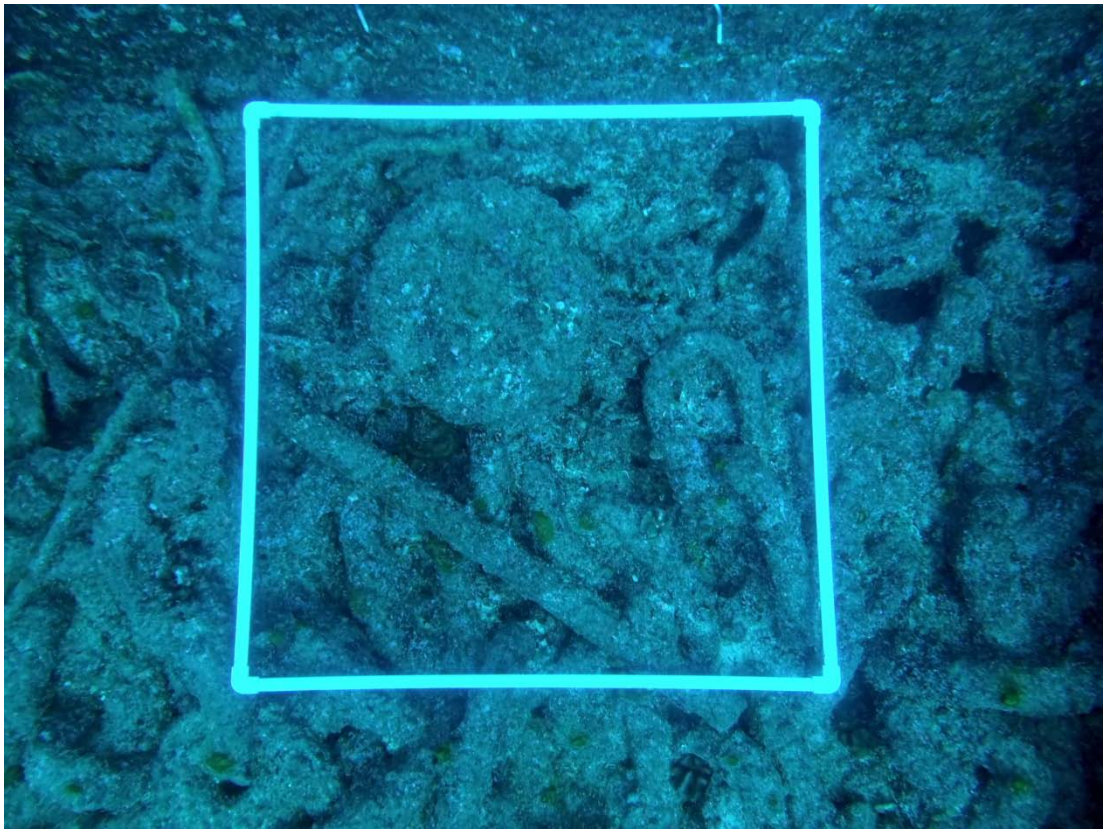

Figure 29. Chain Boxes Quadrat 3 100 X 100cm

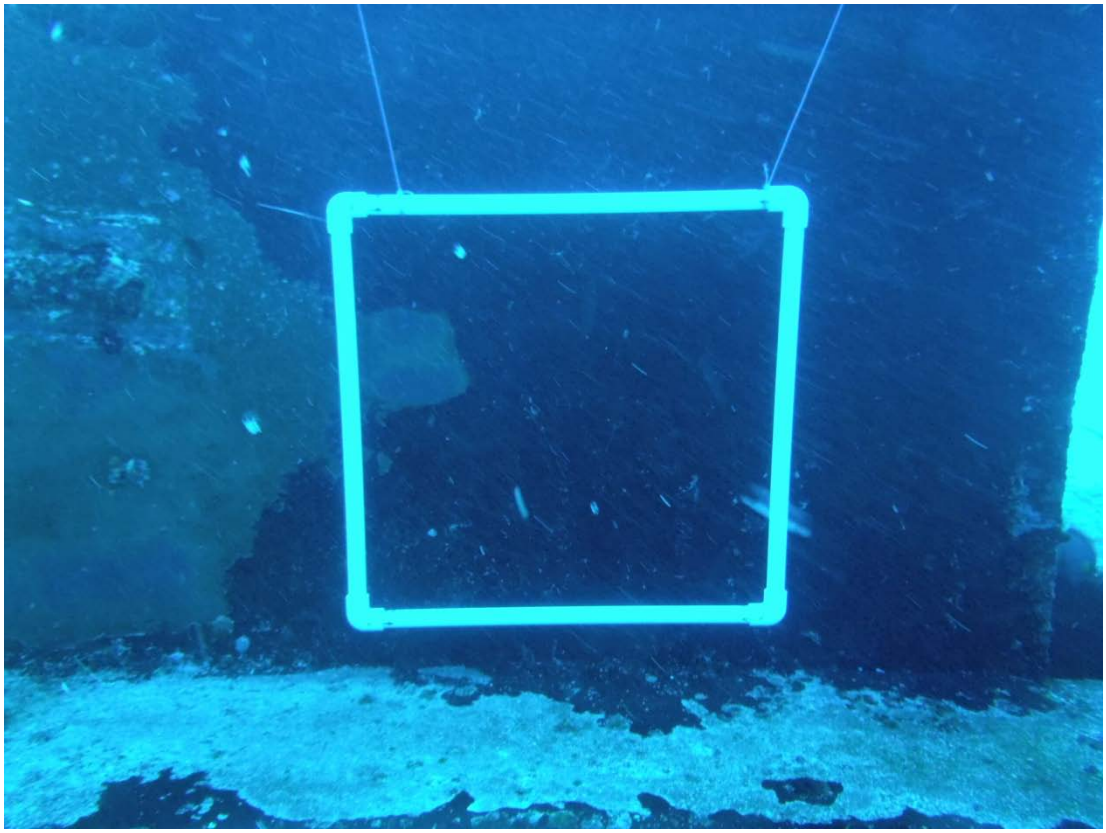

Figure 30. Chain Boxes Quadrat 4 50 X50cm

Figure 31. School of Fish Around Chain Boxes

Figure 32. Fish above Chain Boxes

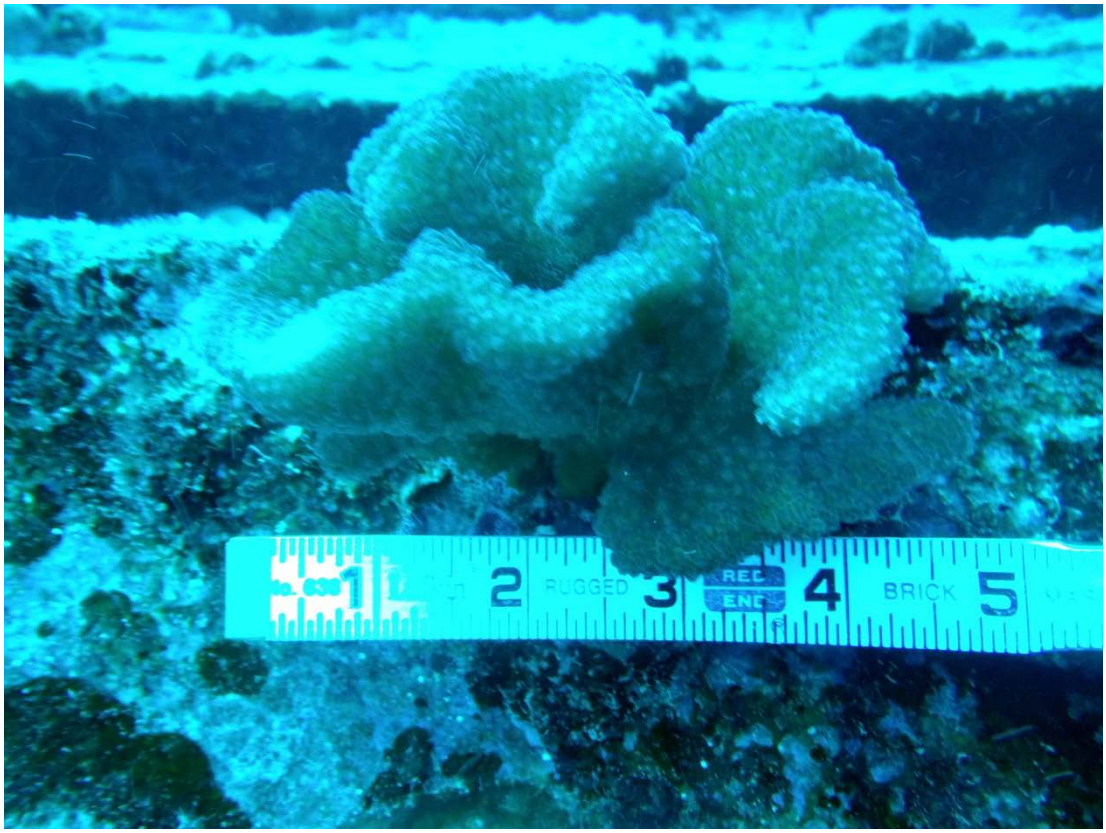

Figure 33. Coral Colony on the Chain Box Edge

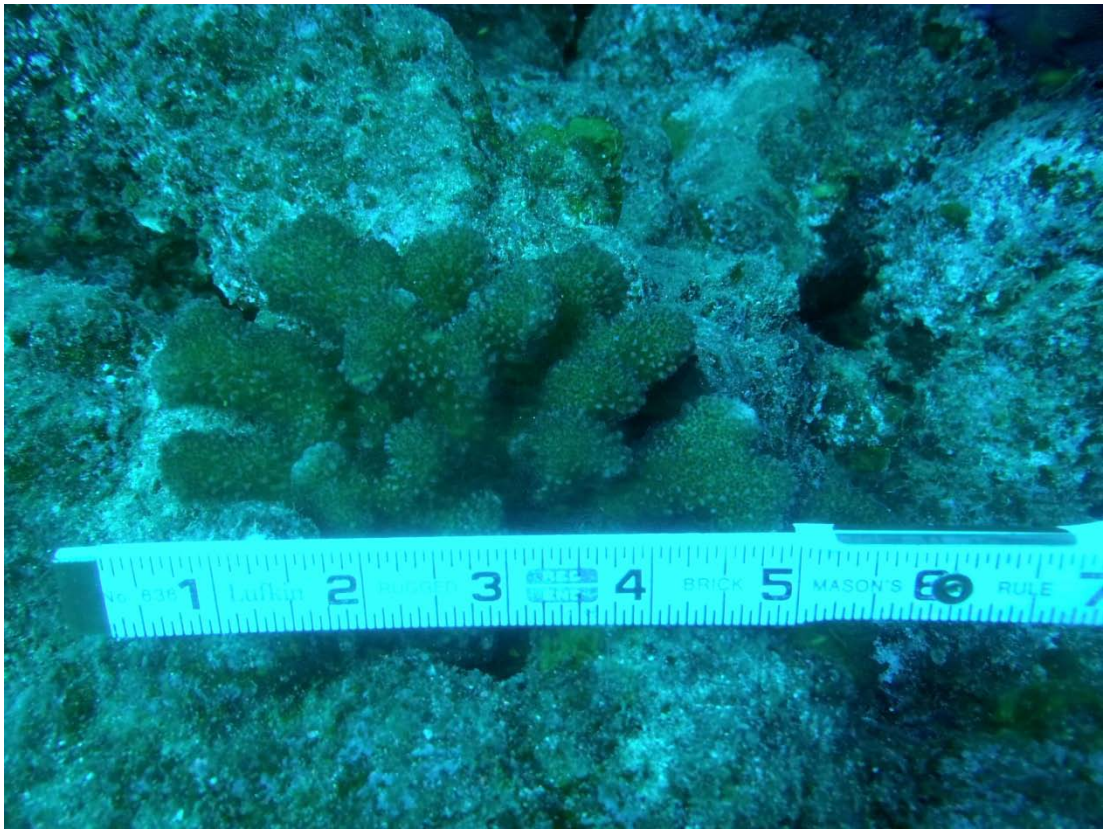

Figure 34. Coral Colony on the Chain

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FIELD REPORT

DATE:	April 16th, 2015
TO:	Luis Vega
FROM:	Tor Harris
SUBJECT:	WETS Task 5B Ecological Survey Field Report Diving

Date: April 3, 2015

Locations & Activity: WETS 30 m Mooring Diving Ecological Survey

Crew: T. Harris, A. Rocheleau, T. Borge, W. Redongo, R. Coley, P. Anderson

Vessel: Bob R.

Task 5B Ecological Survey: SEI conducted a diving ecological survey at the 30 m wave energy test site. This survey included a fish count and replicate quadrats at the two chain boxes. Also two replicate transects were conducted along the cable route. One 50 meter transect was completed from the shelf (~12 meters deep) along the cable towards shore, and the other transect started at the base of the shelf (~24 meters deep) and continued up the slope to the shelf.

Work Completed:

Fish Count: The first diving task at the 30 m mooring site was completing a fish count and video of the chain boxes (AB) and surrounding area. The divers were oriented on opposite corners of the chain boxes (one on offshore side and one on the inshore side). The results of the fish count are shown in Table 1 below. For reference the long side of the chain box is 31 feet 11 inches and the short side is 20 ft 7 inches.

Table 1. Fish Count Results

Location	Coordinates	Time	Fish Count
Chain Box AB	21° 27’ 54.9574” N 157° 45’ 2.8103” W	11:55 am	~200 fish

Video and photographs taken during the fish count are located after the text of this report. These photographs are shown in Figure 1 through Figure 9 and are described in the photo log in Table 2. All the photographs were edited to improve color and clarity.

Replicate Transects: Two 50 m transects were surveyed along the cable route. The bathymetry

of the area has a shelf. The shallow transect was completed from the top of the shelf at a depth of approximately 12 m along the cable towards shore. The shallow transect was completed between 1:26PM to 1:56PM. The deep transect began at the base of the shelf (~24 m depth) and continued up the slope to the shelf. The deep transect was completed between 12:56PM to 1:15PM.

Each transect was surveyed by a diver swimming from the deep end to the shallow end taking video along the way and then taking photographs during the return swim from the shallow end to the deep end. The photographs are centered on a PVC frame quadrat that measures 50 cm square. The photographs were taken in 6 locations 10 m apart along the cable. The photographs are cataloged in a photo log in Table 3 and Table 4. A sea turtle was observed crossing the cable roughly 35 meters into the shallow transect. SEI personnel have identified it as a green sea turtle with shell size in the 50-100 centimeters range. The sea turtle is captured on the video for the shallow water transect, and a still image can be seen in Figure 22 in the photo section of this report. A soft tape in meters, and tied off cable markers were used to locate the photo stations at 10m intervals along the cable.

Replicate Quadrats: The final task of the ecological survey involves collecting photographs of replicate quadrats on the chain box. The photographs were taken using a 50 cm square frame quadrat hung vertically on the side of each box, and a 100 cm square frame quadrat placed horizontally on top of the chain in the corner of each box. These images are cataloged in Table 5.

Table 2. Photo Log of Fish Count around Chain Boxes

Figure Number	Description
Figure 1	. View inshore of chain box AB
Figure 2	View inshore of chain box AB
Figure 3	. View inshore of chain boxes and diver
Figure 4	View offshore of chain boxes and diver
Figure 5	View offshore of chain boxes and diver
Figure 6	View offshore of chain box AB
Figure 7	View inshore and above chain box AB
Figure 8	Close up of fish at chain box AB
Figure 9	Close up of fish at chain box AB

Table 3. Photo Log of Deep Transect

Figure Number	Description
Figure 10	Deep Transect: 0m Location
Figure 11	Deep Transect: 10m Location
Figure 12	Deep Transect: 20m Location
Figure 13	Deep Transect:30m Location
Figure 14	Deep Transect: 40m Location
Figure 15	Deep Transect: 50m Location

Table 4. Photo Log of Shallow Transect

Figure Number	Description
Figure 16	Shallow Transect: 0m Location
Figure 17	Shallow Transect: 10m Location
Figure 18	Shallow Transect: 20m Location
Figure 19	Shallow Transect: 30m Location
Figure 20	Shallow Transect: 40m Location
Figure 21	Shallow Transect: 50m Location
Figure 22	Shallow Transect: Sea Turtle

Table 5. Photo Log of Chain Box Quadrats

Figure Number	Description
Figure 23	Chain Boxes Quadrat 1 100 X 100cm
Figure 24	Chain Boxes Quadrat 2 50 X 50cm
Figure 25	Chain Boxes Quadrats 1 and 2
Figure 26	Chain Boxes Quadrat 3 100 X 100cm
Figure 27	Chain Boxes Quadrat 4 50 X50cm
Figure 28	Chain Boxes Quadrats 3 and 4

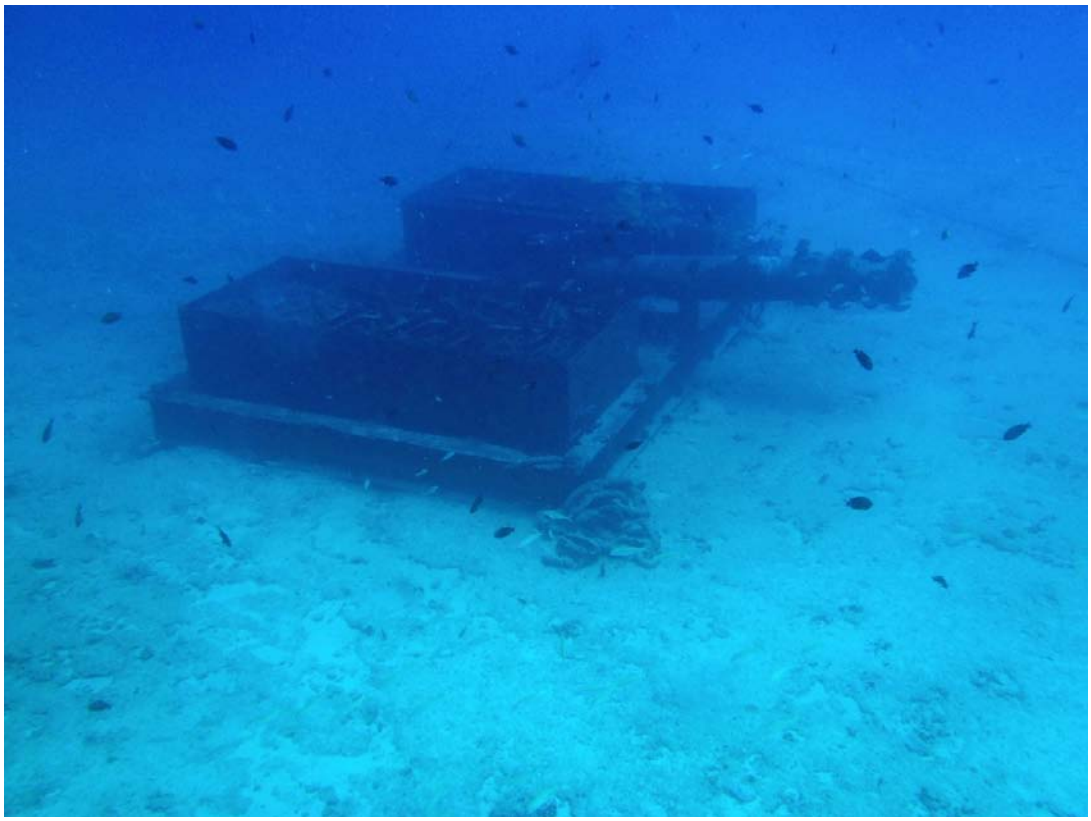

Figure 1. View inshore of chain box AB

Figure 2. View inshore of chain box AB

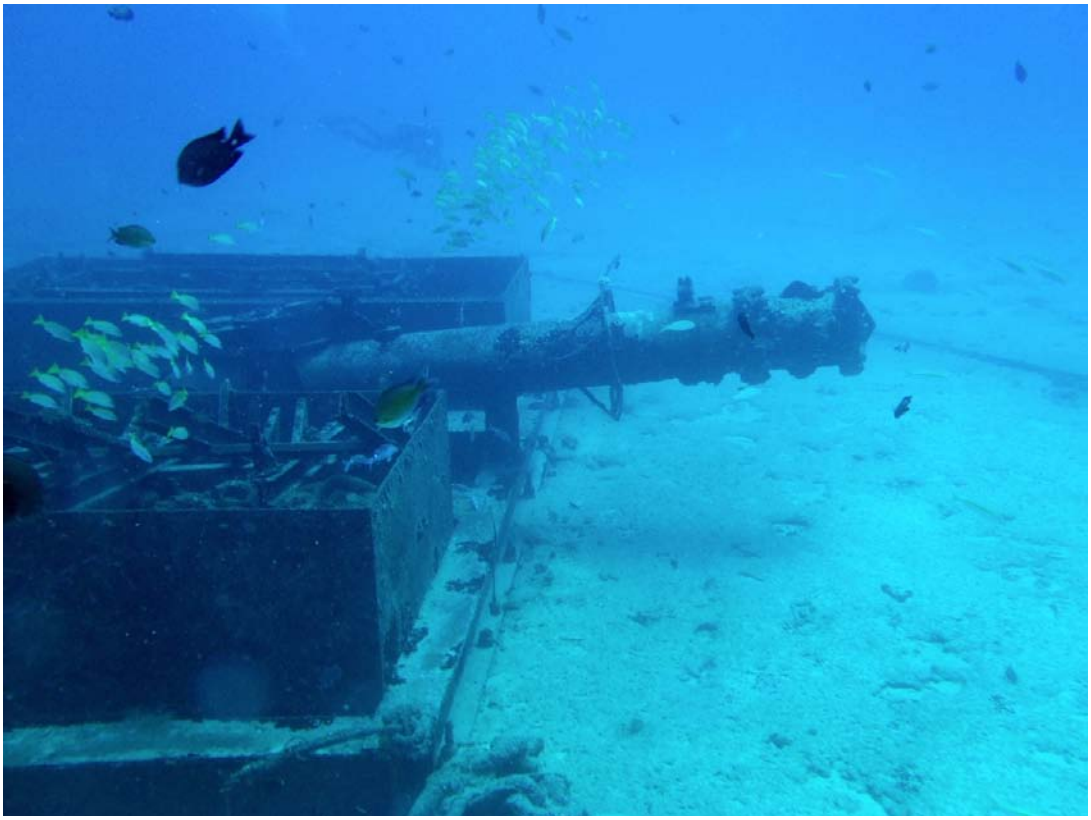

Figure 3. View inshore of chain boxes and diver

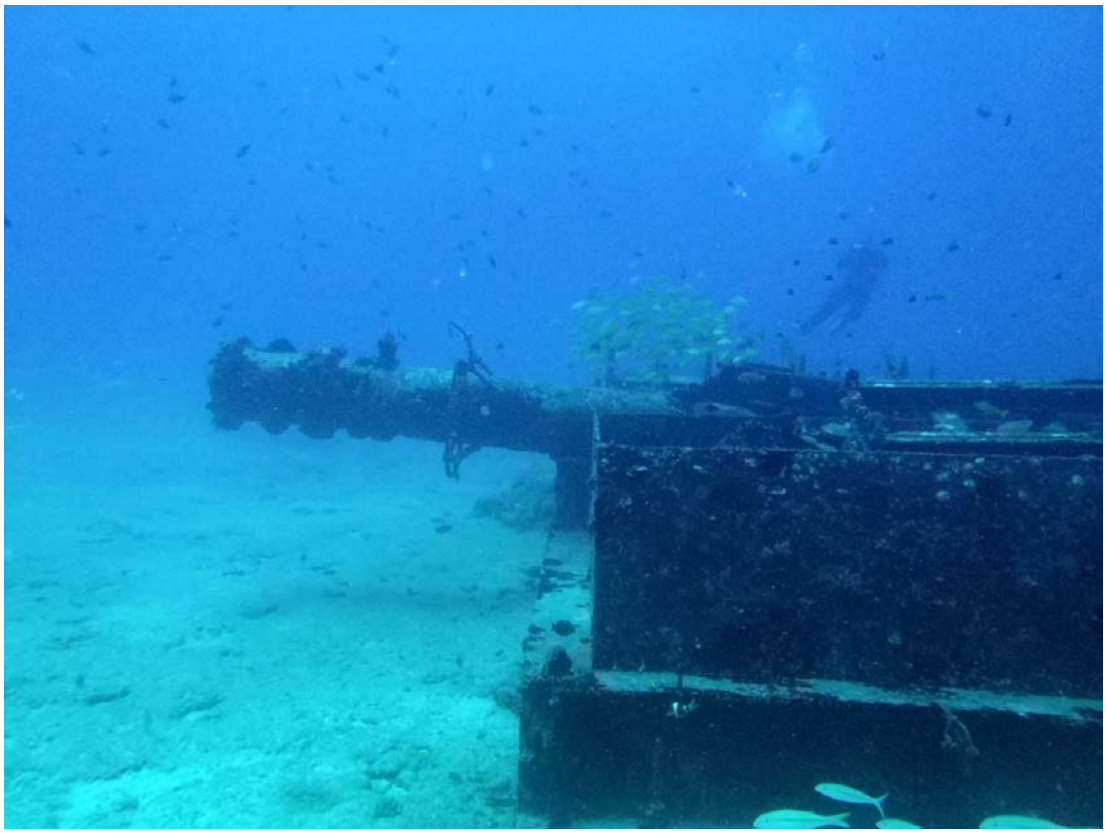

Figure 4. View offshore of chain boxes and diver

Figure 5. View offshore of chain boxes and diver

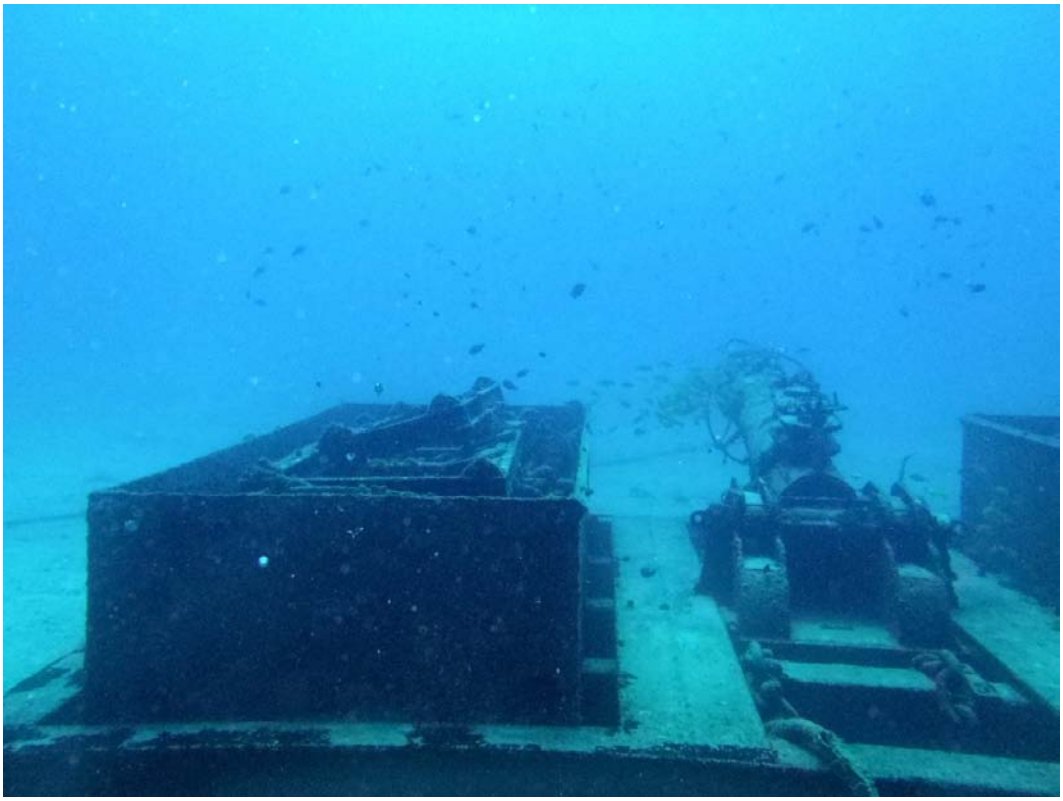

Figure 6. View offshore of chain box AB

Figure 7. View inshore and above chain box AB

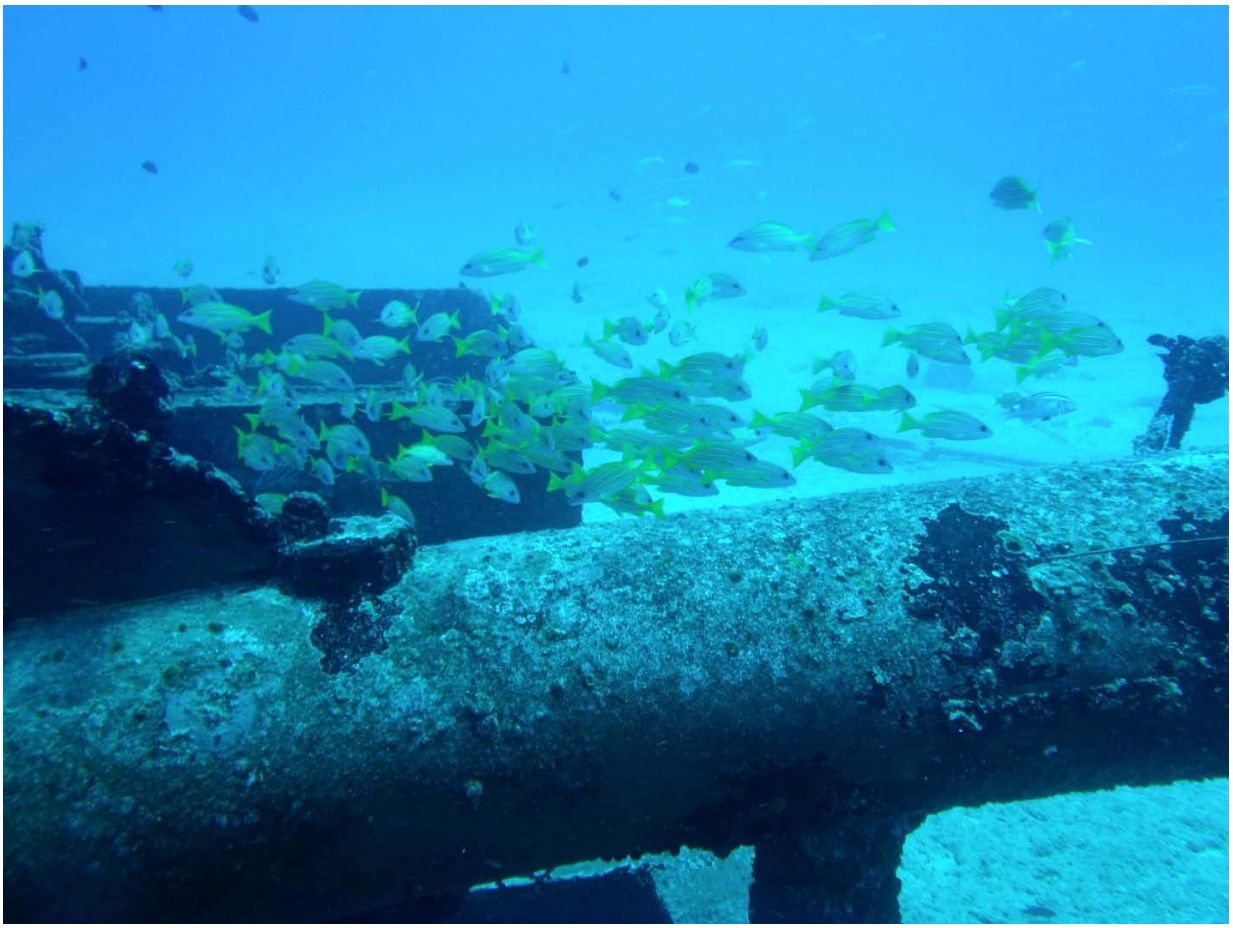

Figure 8. Close up of fish at chain box AB

Figure 9. Close up of fish at chain box AB

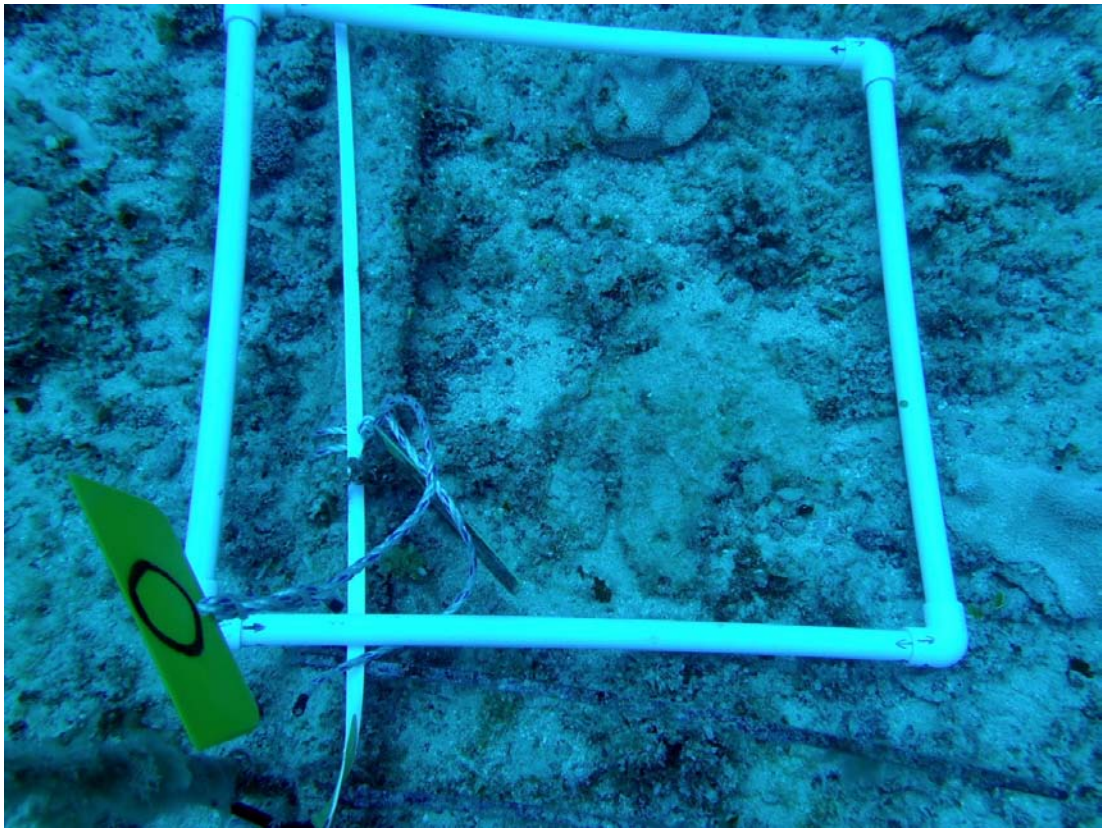

Figure 10. Deep Transect: 0m Location

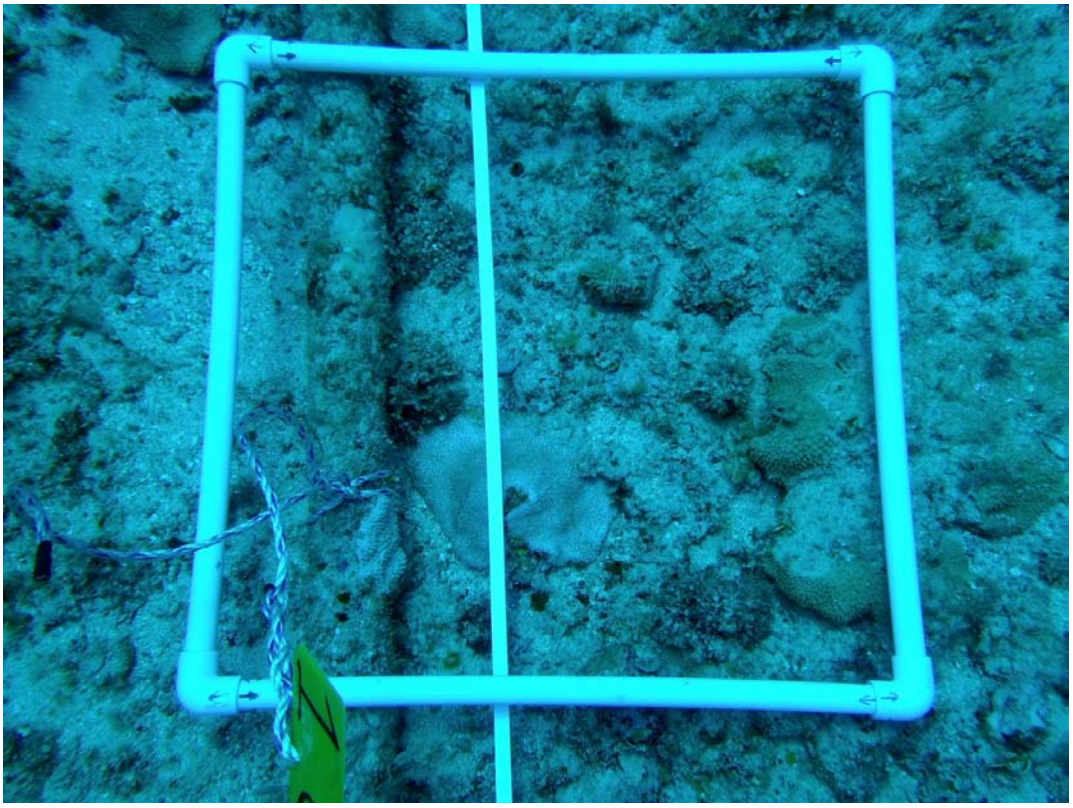

Figure 11. Deep Transect: 10m Location

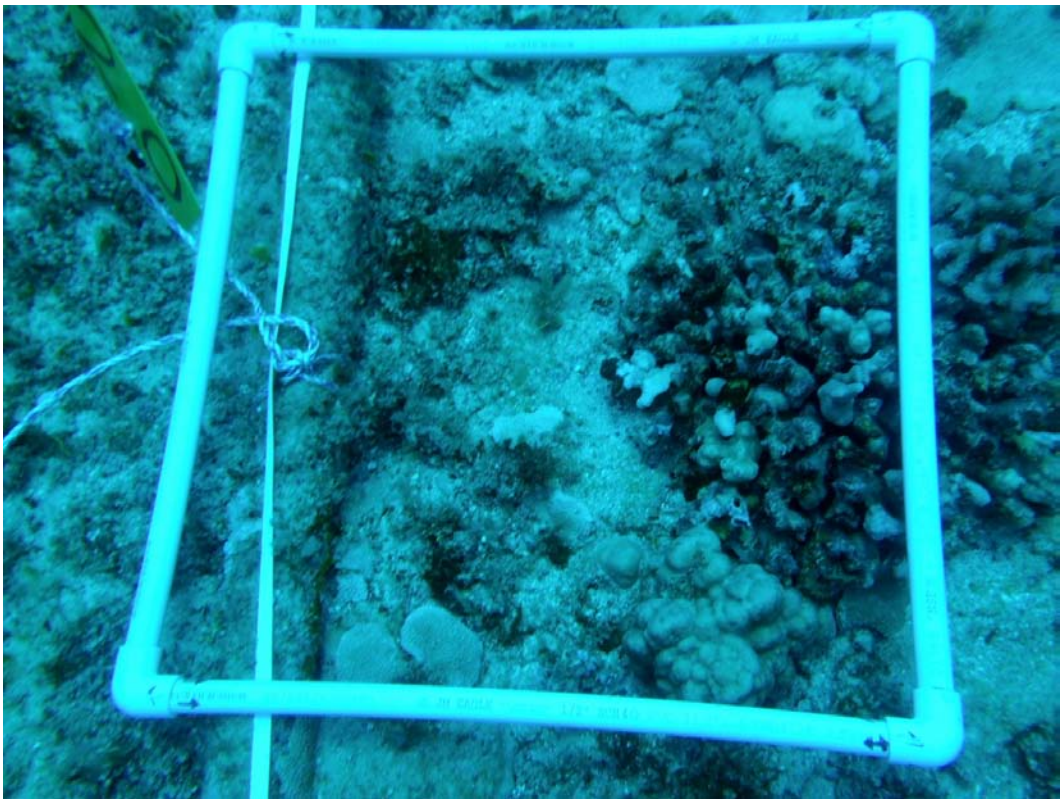

Figure 12. Deep Transect: 20m Location

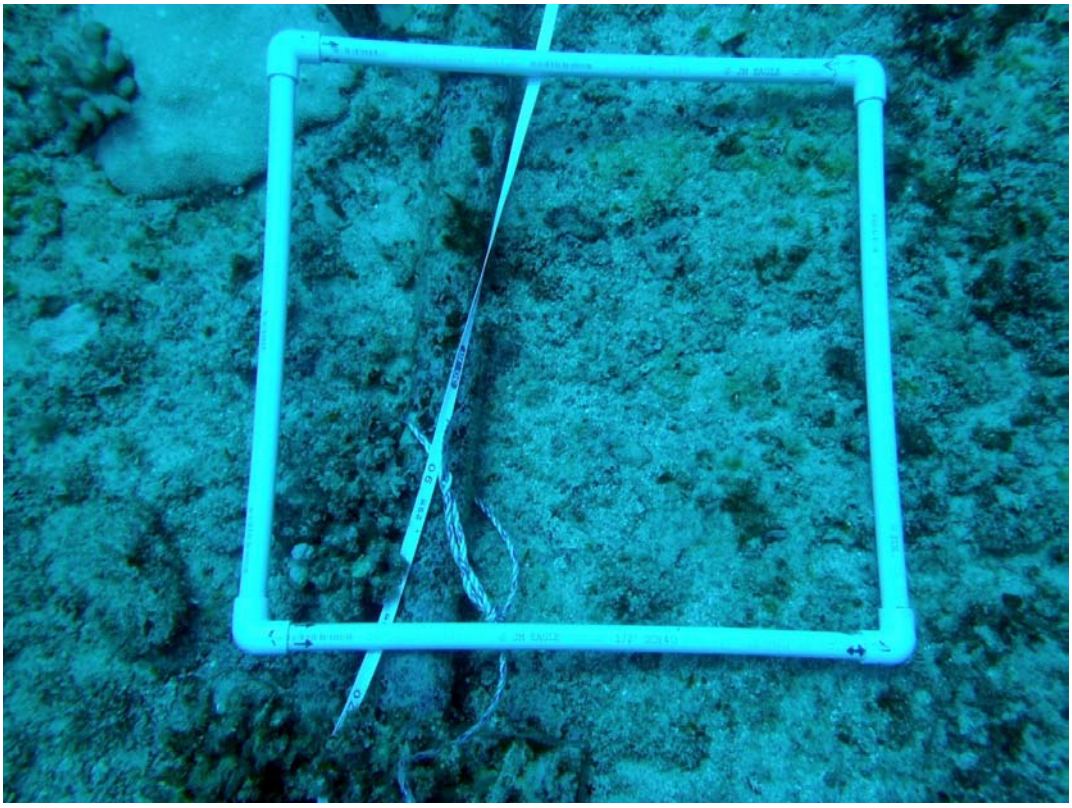

Figure 13. Deep Transect:30m Location

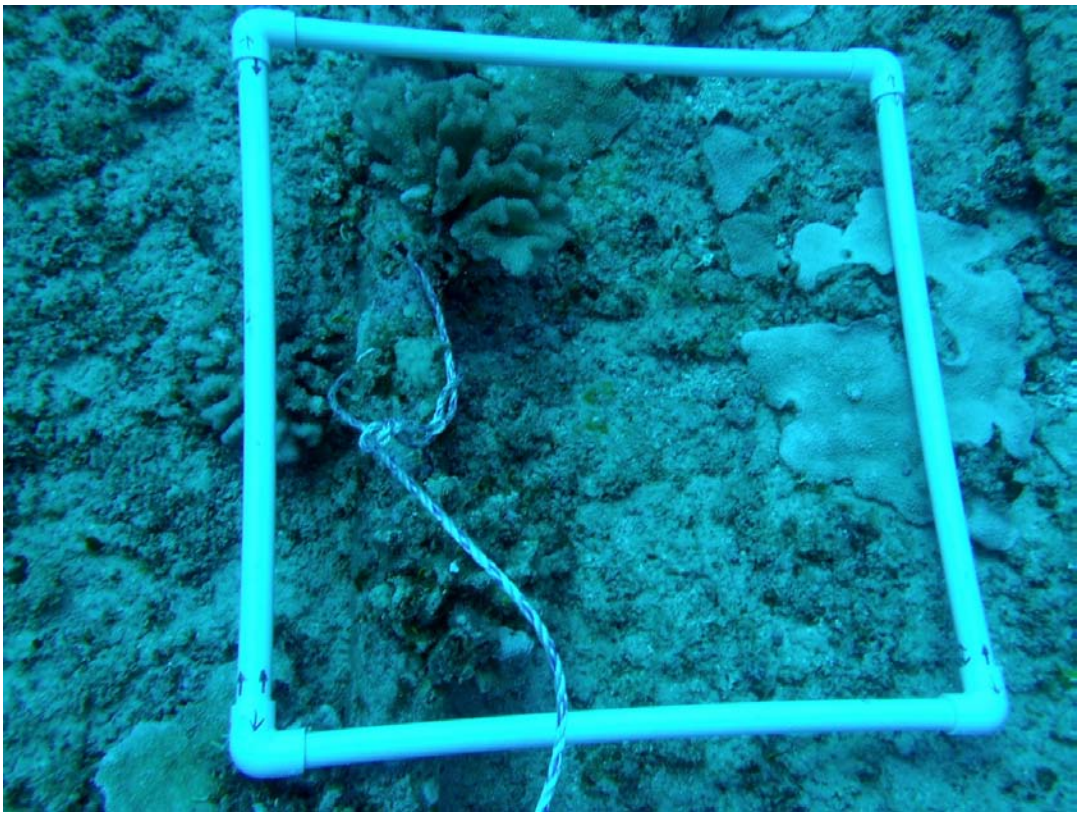

Figure 14. Deep Transect: 40m Location

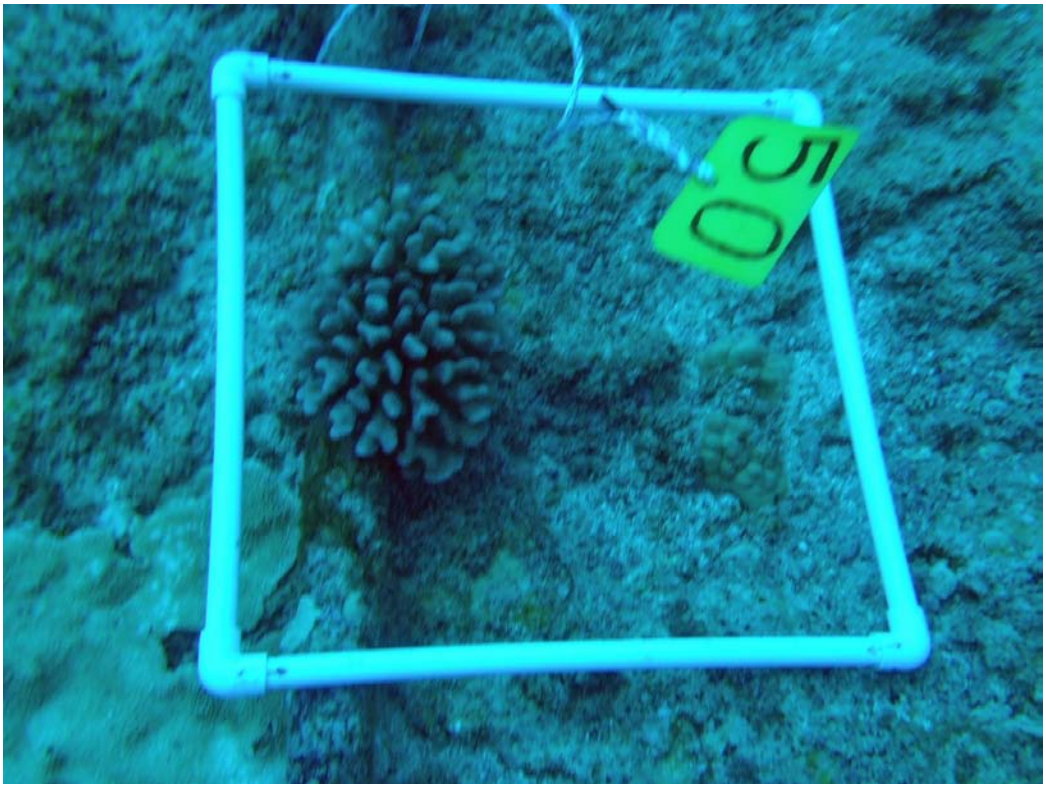

Figure 15. Deep Transect: 50m Location

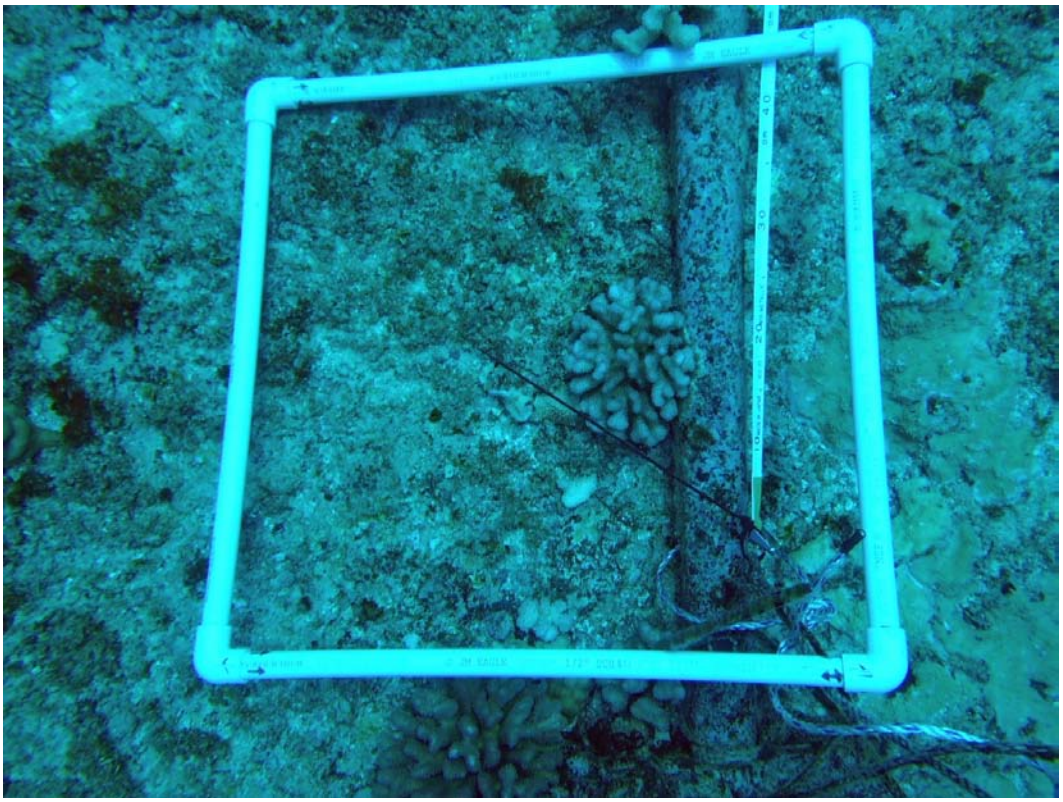

Figure 16. Shallow Transect: 0m Location

Figure 17. Shallow Transect: 10m Location

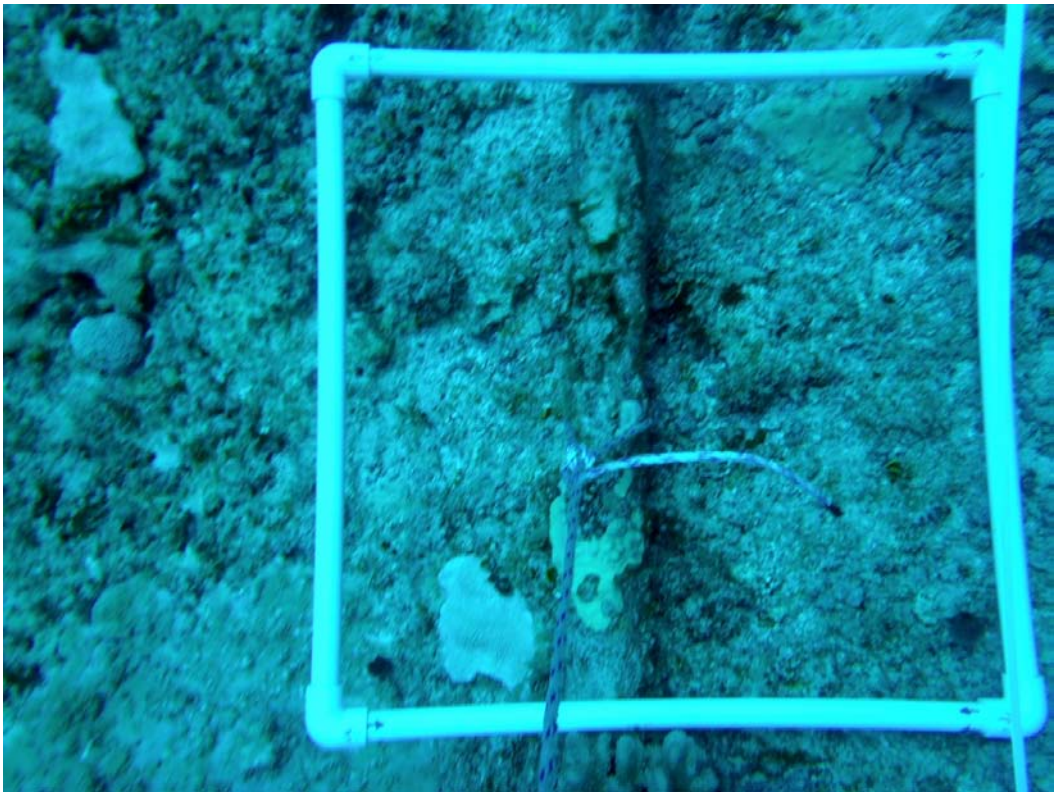

Figure 18. Shallow Transect: 20m Location

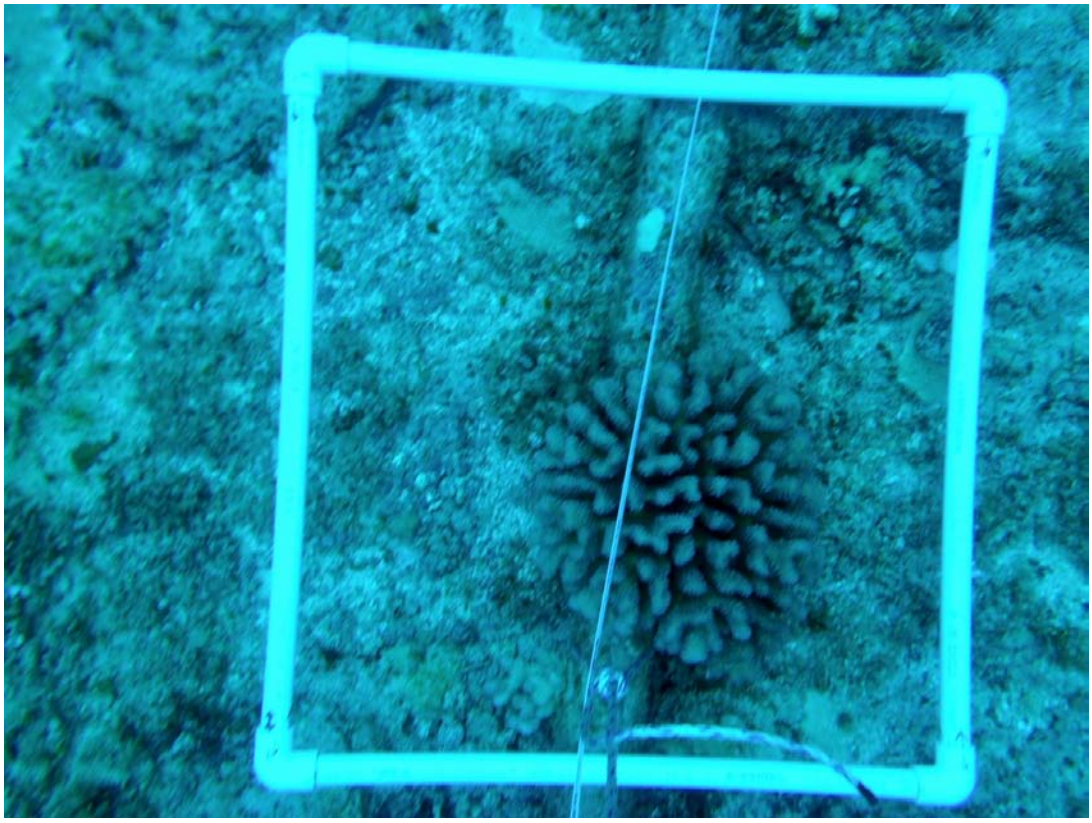

Figure 19. Shallow Transect: 30m Location

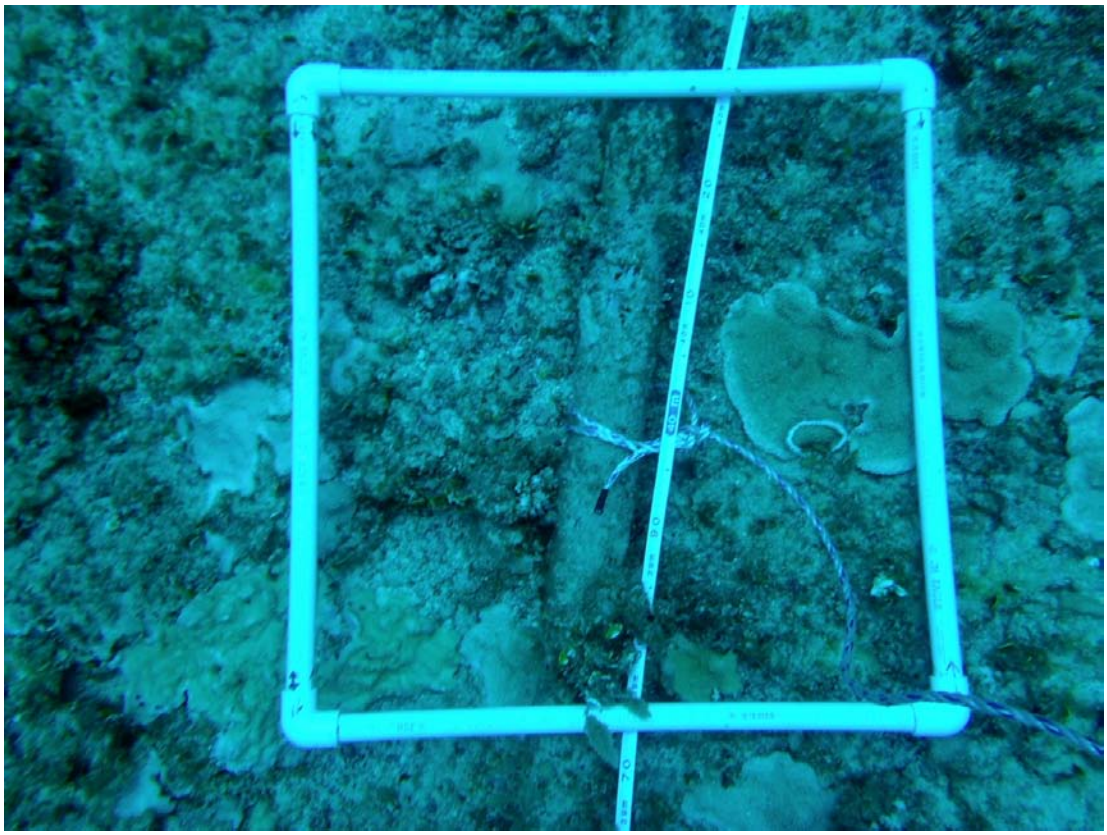

Figure 20. Shallow Transect: 40m Location

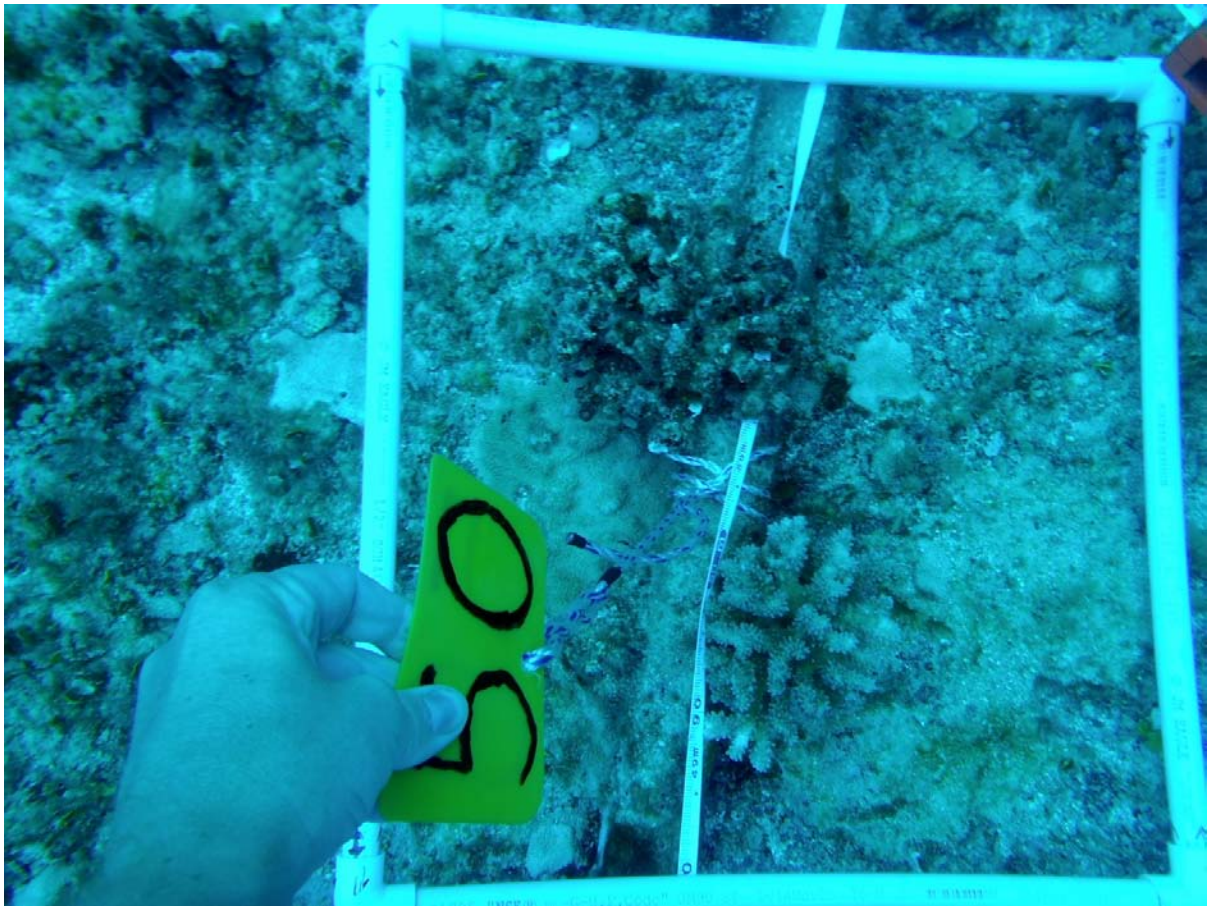

Figure 21. Shallow Transect: 50m Location

Figure 22. Shallow Transect: Sea Turtle

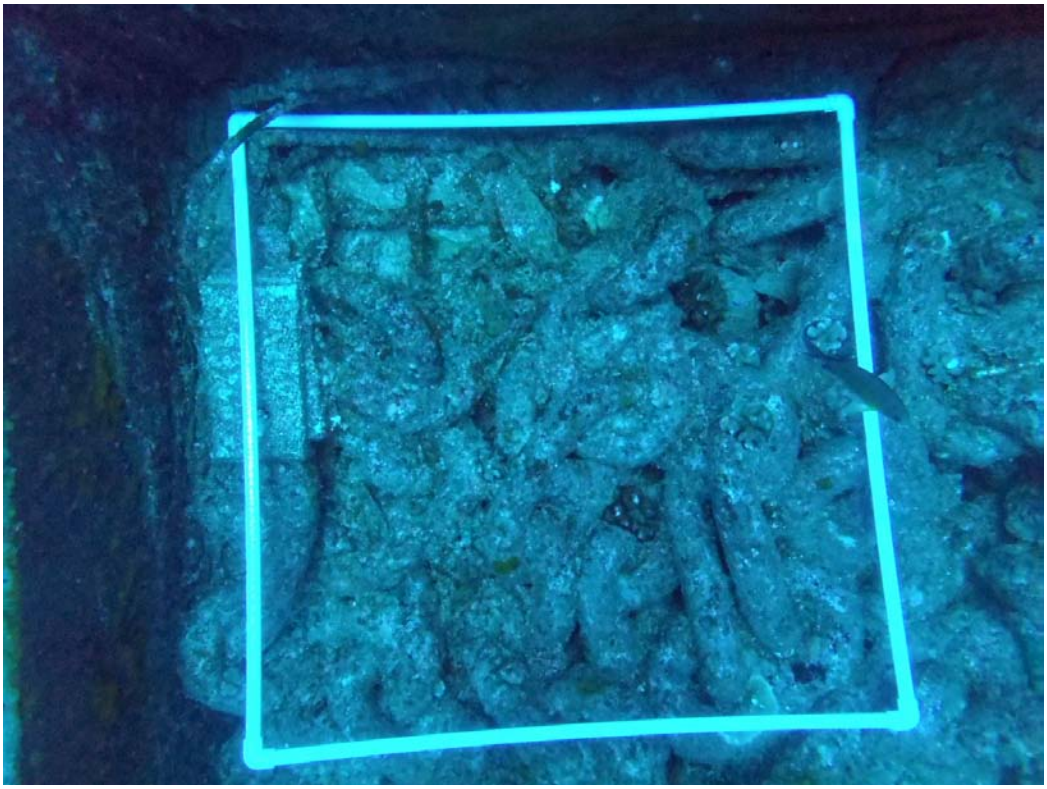

Figure 23. Chain Boxes Quadrat 1 100 X 100cm

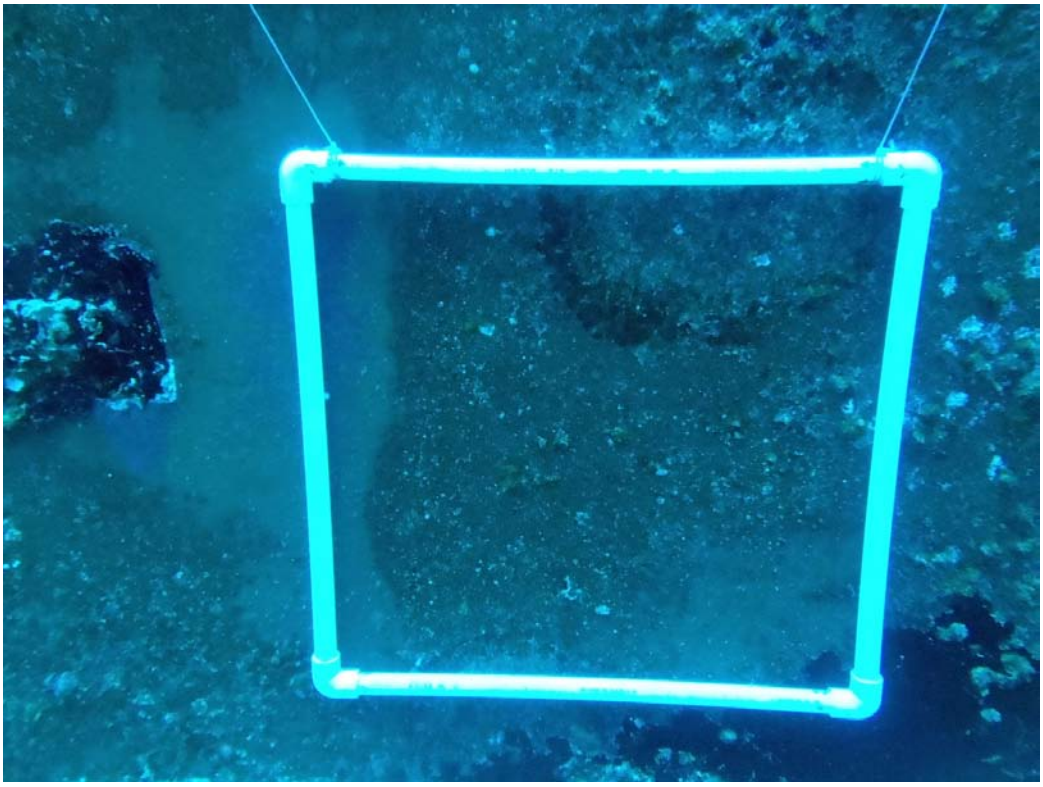

Figure 24. Chain Boxes Quadrat 2 50 X 50cm

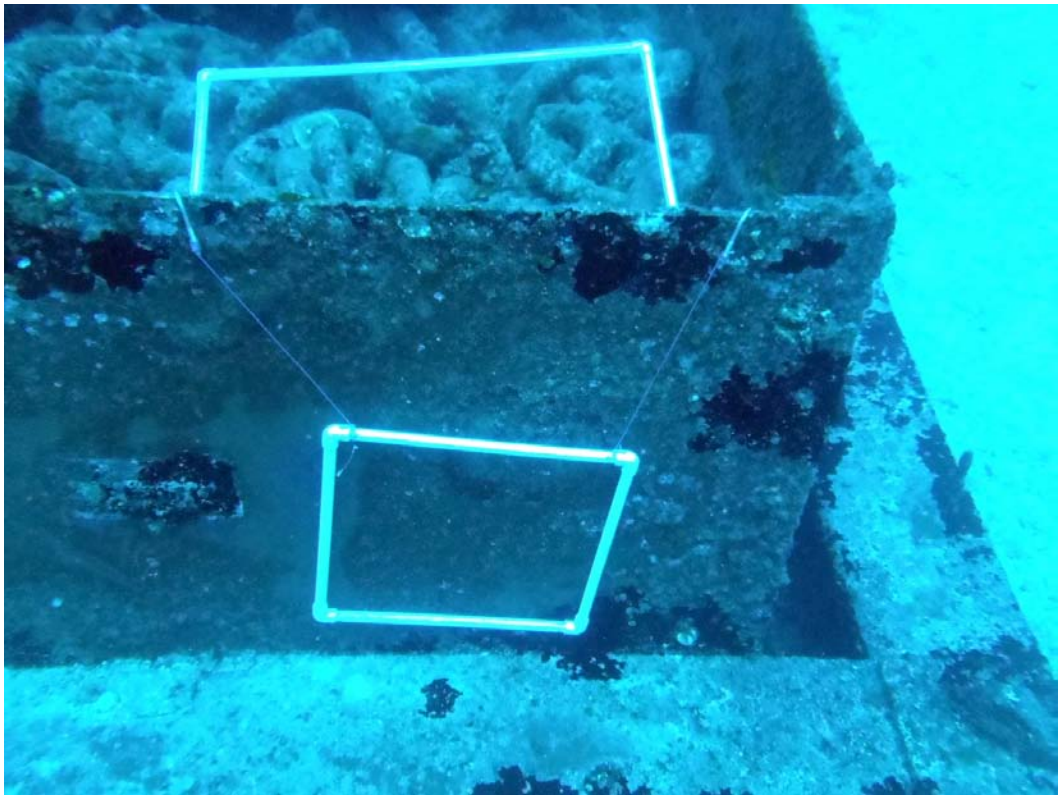

Figure 25. Chain Boxes Quadrats 1 and 2

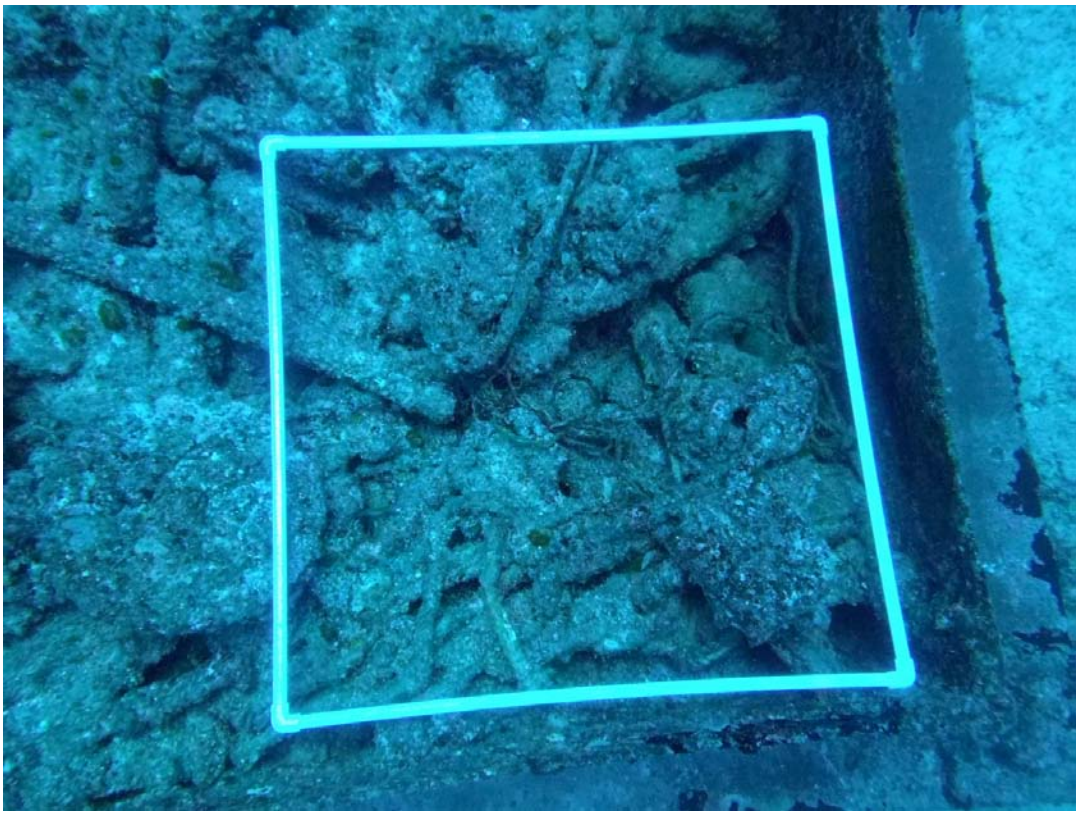

Figure 26. Chain Boxes Quadrat 3 100 X 100cm

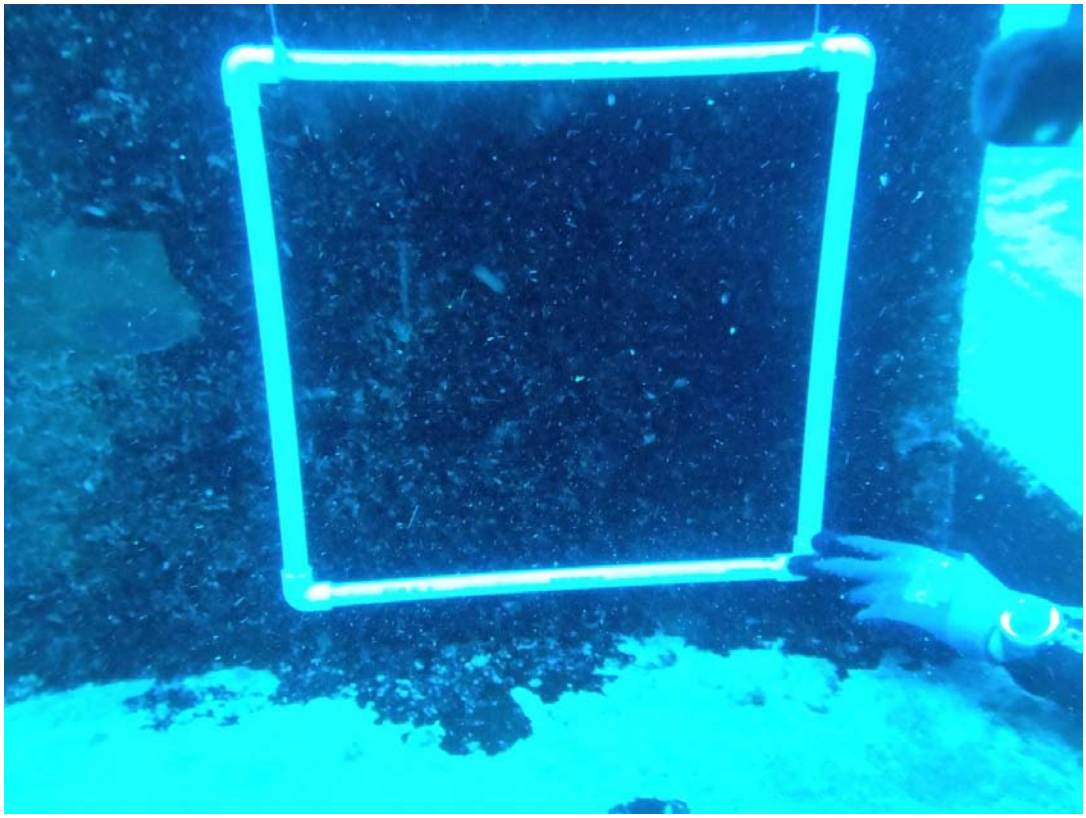

Figure 27. Chain Boxes Quadrat 4 50 X50cm

Figure 28. Chain Boxes Quadrats 3 and 4

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Website: www.seaengineering.com

FIELD REPORT

DATE:	October 22nd , 2015
TO:	Luis Vega
FROM:	Patrick Anderson
SUBJECT:	WETS Task 5C Ecological Survey Field Report Diving

Date: August 12th, 2015 and October 9th, 2015

Locations & Activity: WETS 30 m Mooring Diving Ecological Survey

Crew August 12th: P. Anderson, T. Harris, C. Goody, C. Conger, B. Chang
Crew October 9th: P Anderson, A. Rocheleau, T. Borge, W. Redongo, S. Neilsen

Vessel: Bob R.

Task 5C Ecological Survey: SEI conducted a diving ecological survey at the 30 m wave energy test site. This survey included a fish count and replicate quadrats at the two chain boxes. Also two replicate transects were conducted along the cable route. One 50 meter transect was completed from the shelf (~12 meters deep) along the cable towards shore, and the other transect started at the base of the shelf (~24 meters deep) and continued up the slope to the shelf. The shallow transect conducted on August 12th was not correctly located and was resurveyed on October 9th.

Work Completed:

Fish Count: The first diving task at the 30 m mooring site was completing a fish count and video recording of the chain boxes (AB) and surrounding area. The divers were oriented on opposite corners of the chain boxes (one on offshore side and one on the inshore side). The results of the fish count are shown in Table 1 below. For reference the long side of the chain box is 31 feet 11 inches and the short side is 20 ft 7 inches.

Table 1. Fish Count Results

Location	Coordinates	Observation Date	Observation Time	Fish Count
Chain Box AB	21°27'54.9574" N 157°45'2.8103" W	1/15/2015	7:44 AM	100-200
			10:37 AM	200-250
		4/3/2015	11:55 AM	200
		8/22/2015	8:13 AM	250

Photographs taken during the fish count are presented in Figure 1 through Figure 6. Descriptions of each photograph are provided in the photo log in Table 2. All the photographs were edited to improve color and clarity. Video was also recorded.

Replicate Quadrats: Photographs of replicate quadrats on the chain box were taken using a 50 cm square frame quadrat hung vertically on the side of each box, and a 100 cm square frame quadrat placed horizontally on top of the chain in the corner of each box. These images are cataloged in Table 5 and are presented in Figure 19 through Figure 24. A diagram of the locations of the quadrats on the chain box is provided in Appendix A.

Replicate Transects: Two 50 m transects were surveyed along the cable route. The seafloor in the transect vicinity consist of a relatively flat shelf at a water depth of approximately 12 m and a ledge the drops to a depth of approximately 24m. The deep transect began at the base of the ledge (~24 m depth) and continued up the slope to the shelf. The shallow transect was completed from the top of the shelf at a depth of approximately 12 m along the cable towards shore.

Each transect was surveyed by a diver swimming from the deep end of the transect to the shallow end recording video or photographs along the way. The photographs are centered on a PVC frame quadrat that measures 50 cm on each side. The photographs were taken in 6 locations 10 m apart along the cable. The photographs are cataloged in a photo log in Table 3and Table 4 .

Location	Coordinates
Shallow Transect	21° 27’ 51.7061” N 157° 45’ 6.6588” W
Deep Transect	21° 27’ 50.208” N 157° 45’ 7.479” W

Table 2. Photo Log of Fish Count around Chain Boxes

Figure Number	Description
Figure 1	View inshore of chain box AB
Figure 2	View inshore of chain box AB
Figure 3	View offshore of chain boxes and diver
Figure 4	View offshore of chain boxes
Figure 5	View from above the chain boxes
Figure 6	Close up of fish at chain box AB

Table 3. Photo Log of Deep Transect

Figure Number	Description
Figure 7	Deep Transect: 0m Location
Figure 8	Deep Transect: 10m Location
Figure 9	Deep Transect: 20m Location
Figure 10	Deep Transect: 30m Location
Figure 11	Deep Transect: 40m Location
Figure 12	Deep Transect: 50m Location

Table 4. Photo Log of Shallow Transect

Figure Number	Description
Figure 13	Shallow Transect: 0m Location
Figure 14	Shallow Transect: 10m Location
Figure 15	Shallow Transect: 20m Location
Figure 16	Shallow Transect: 30m Location
Figure 17	Shallow Transect: 40m Location
Figure 18	Shallow Transect: 50m Location

Table 5. Photo Log of Chain Box Quadrats

Figure Number	Description
Figure 19	Chain Boxes Quadrat 1 100 X 100cm
Figure 20	Chain Boxes Quadrat 2 50 X 50cm
Figure 21	Chain Boxes Quadrats 1 and 2
Figure 22	Chain Boxes Quadrat 3 100 X 100cm
Figure 23	Chain Boxes Quadrat 4 50 X50cm
Figure 24	Chain Boxes Quadrats 3 and 4

Figure 1. View inshore of chain box AB

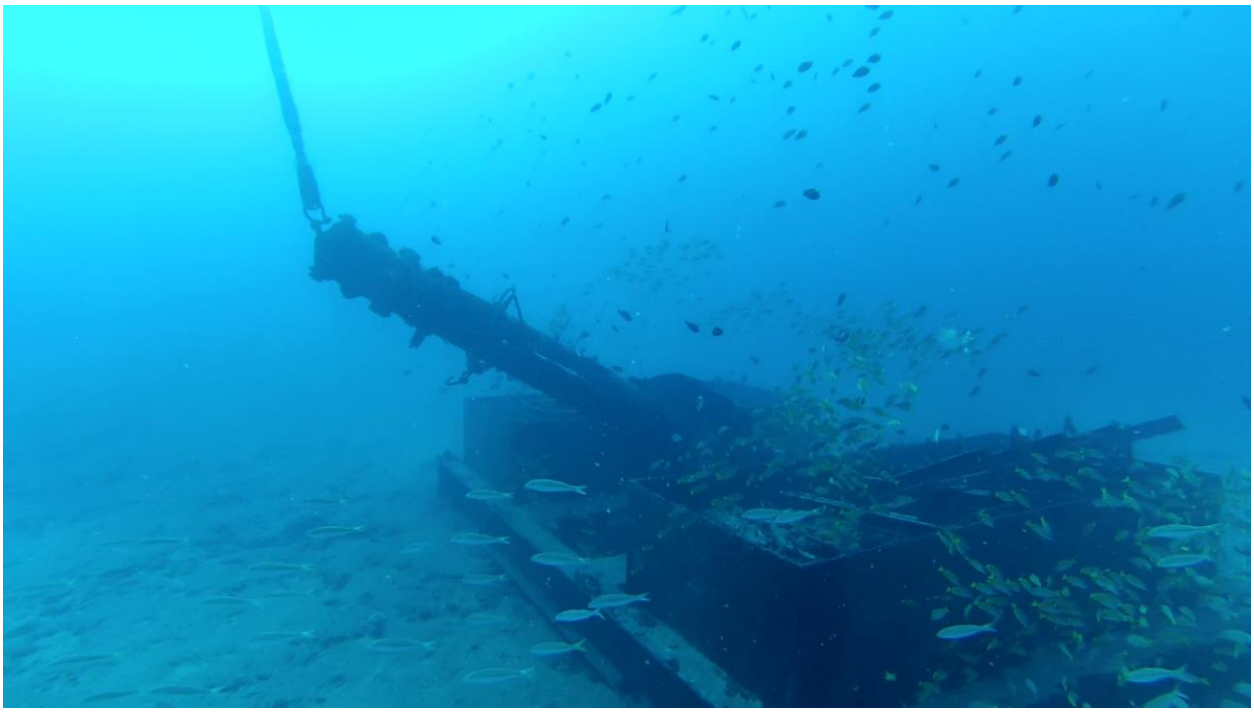


Figure 2. View inshore of chain box AB

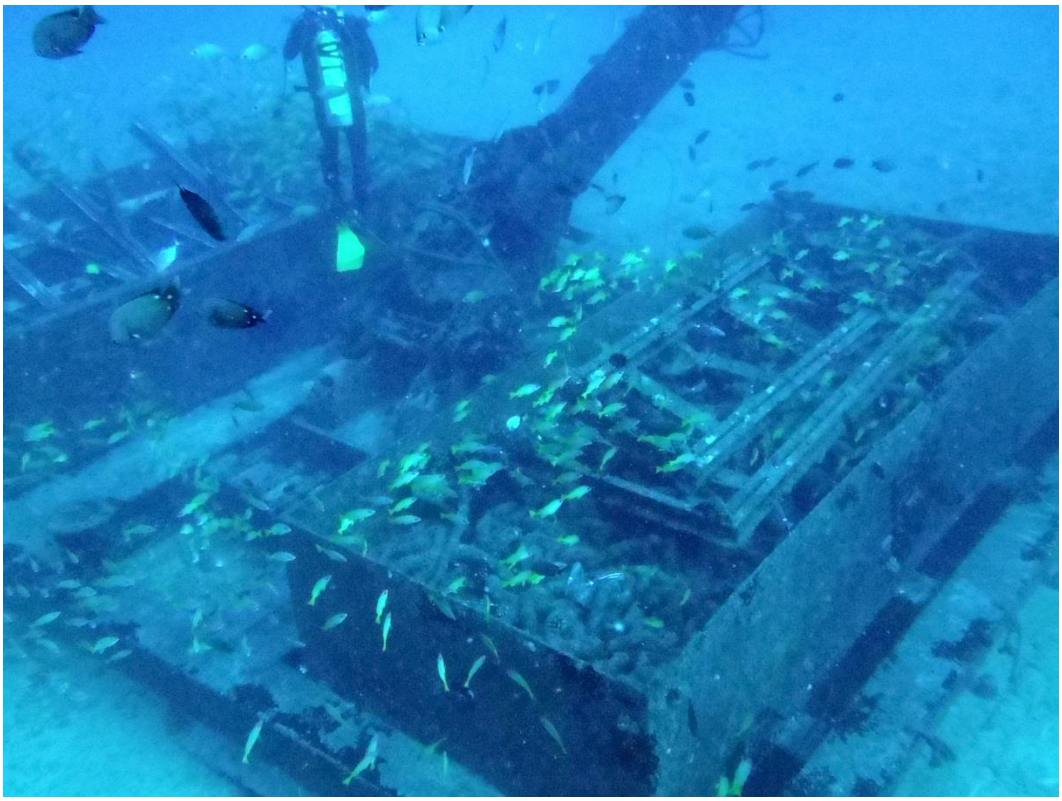


Figure 3. View offshore of chain boxes and diver

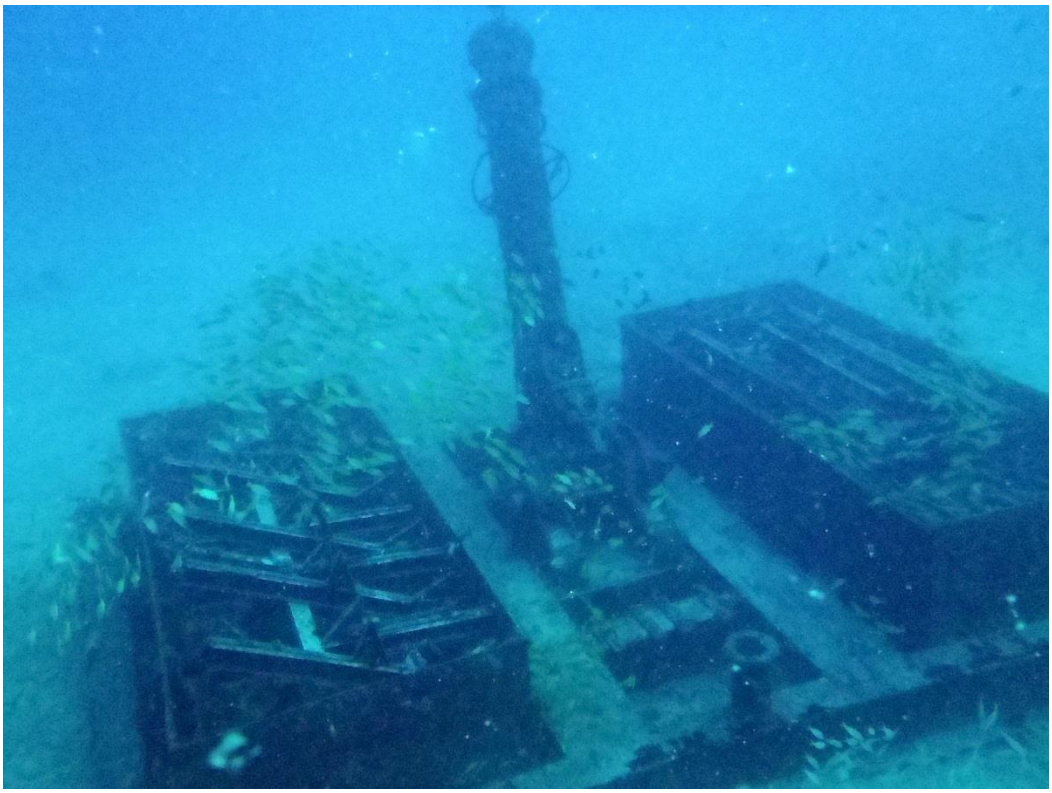


Figure 4. View offshore of chain boxes

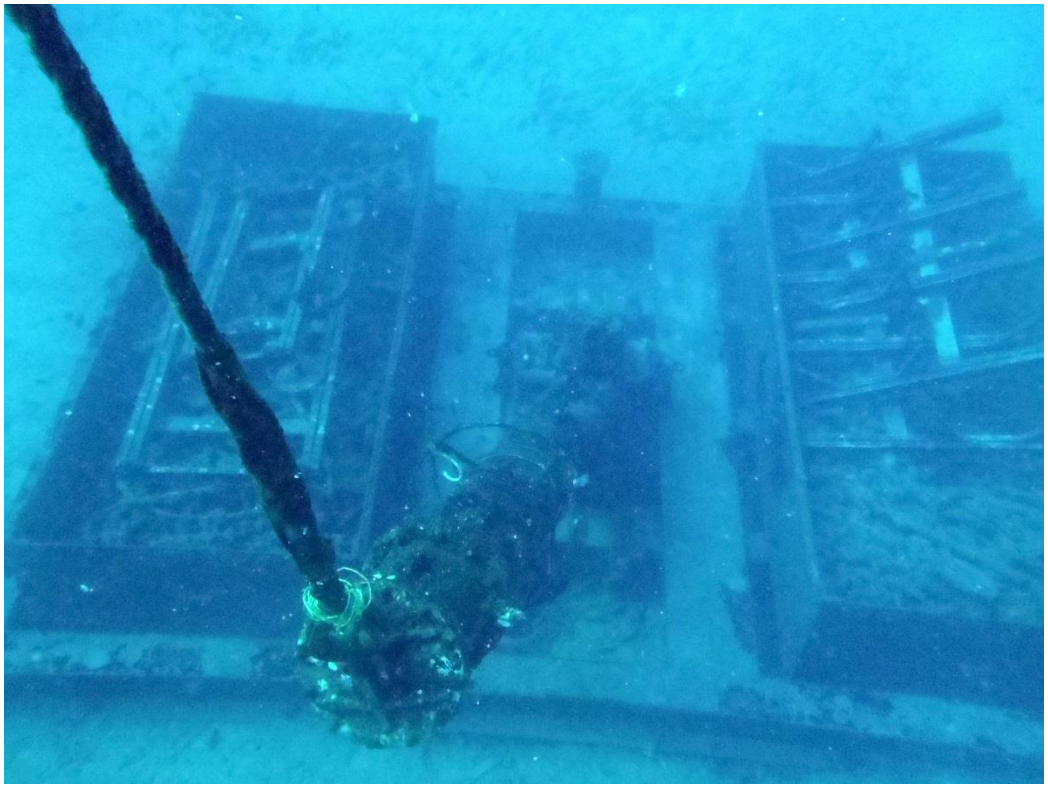


Figure 5. View from above the chain boxes

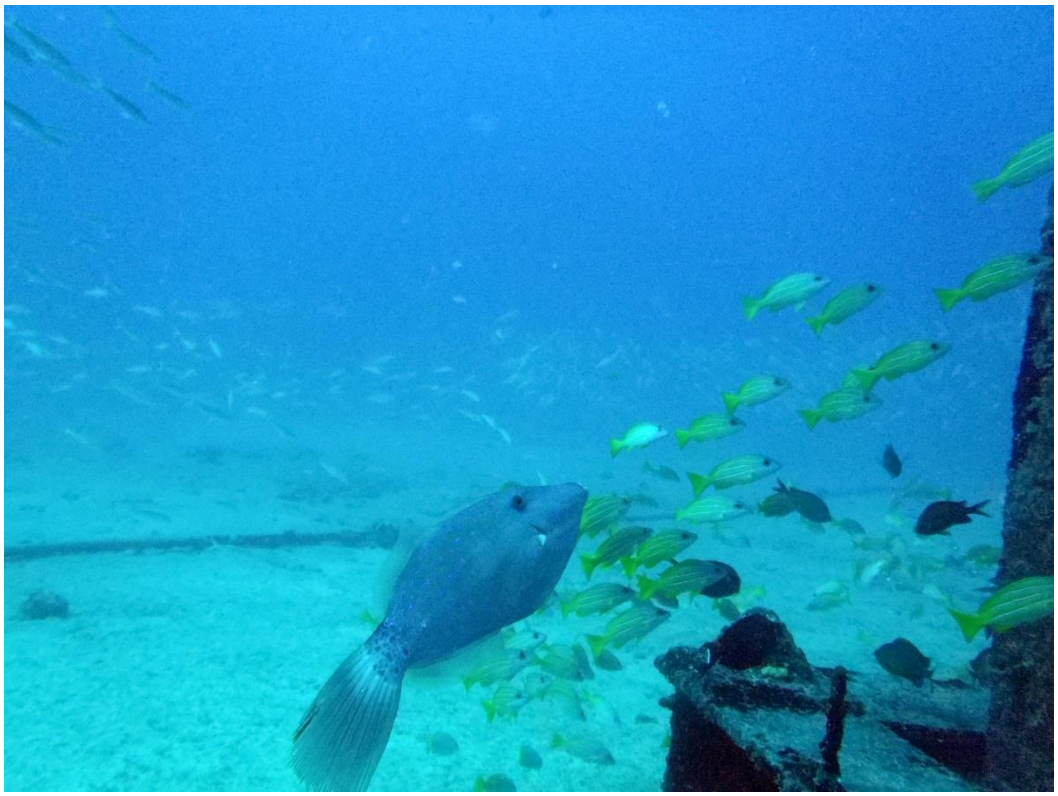


Figure 6. Close up of fish at chain box AB

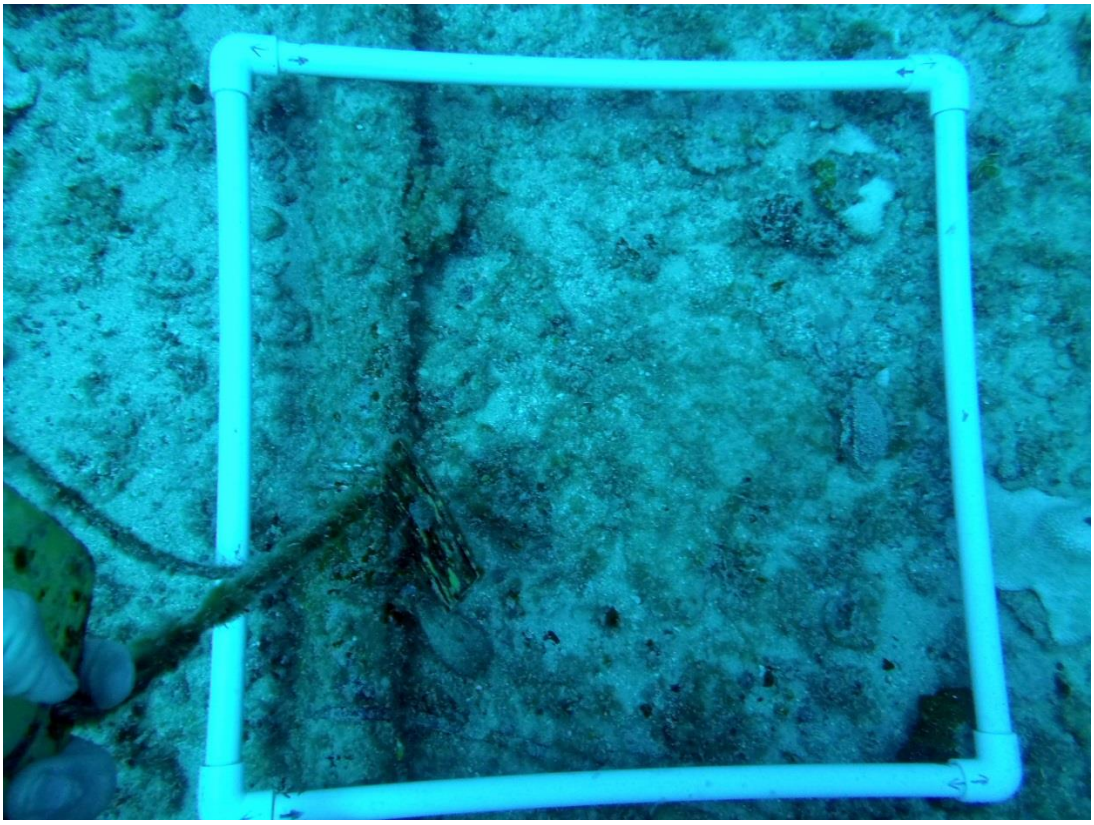


Figure 7. Deep Transect: 0m Location

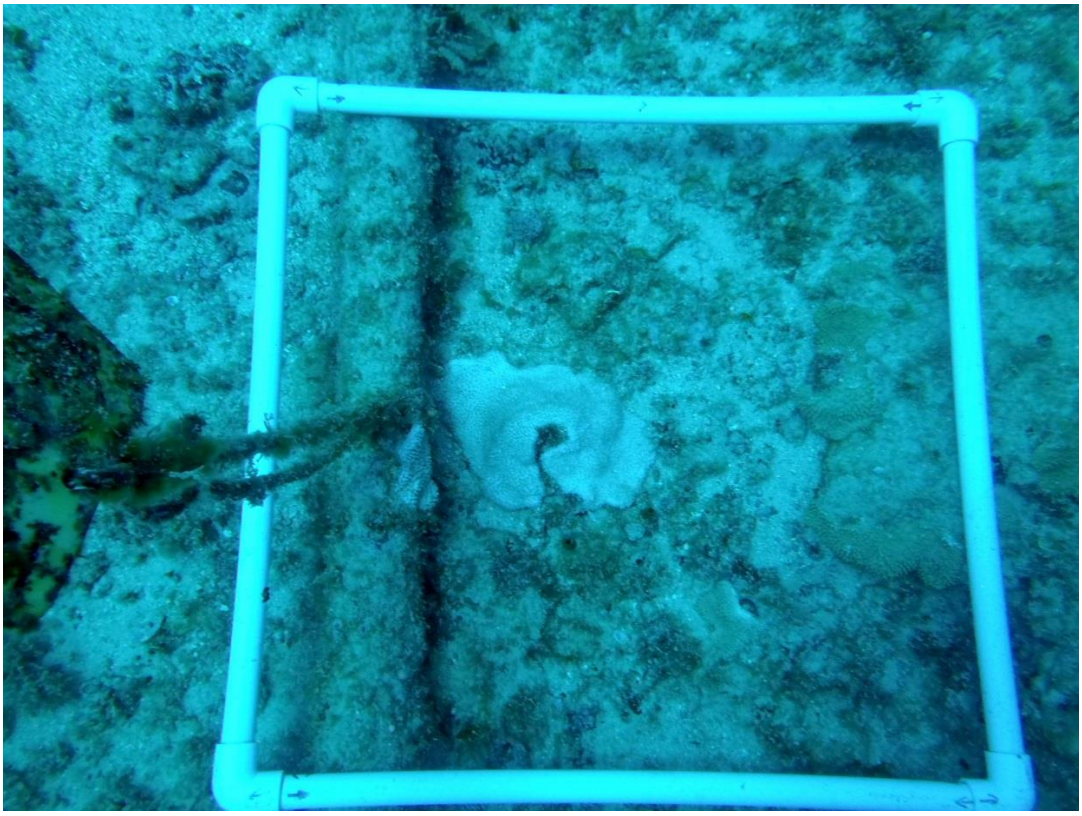


Figure 8. Deep Transect: 10m Location

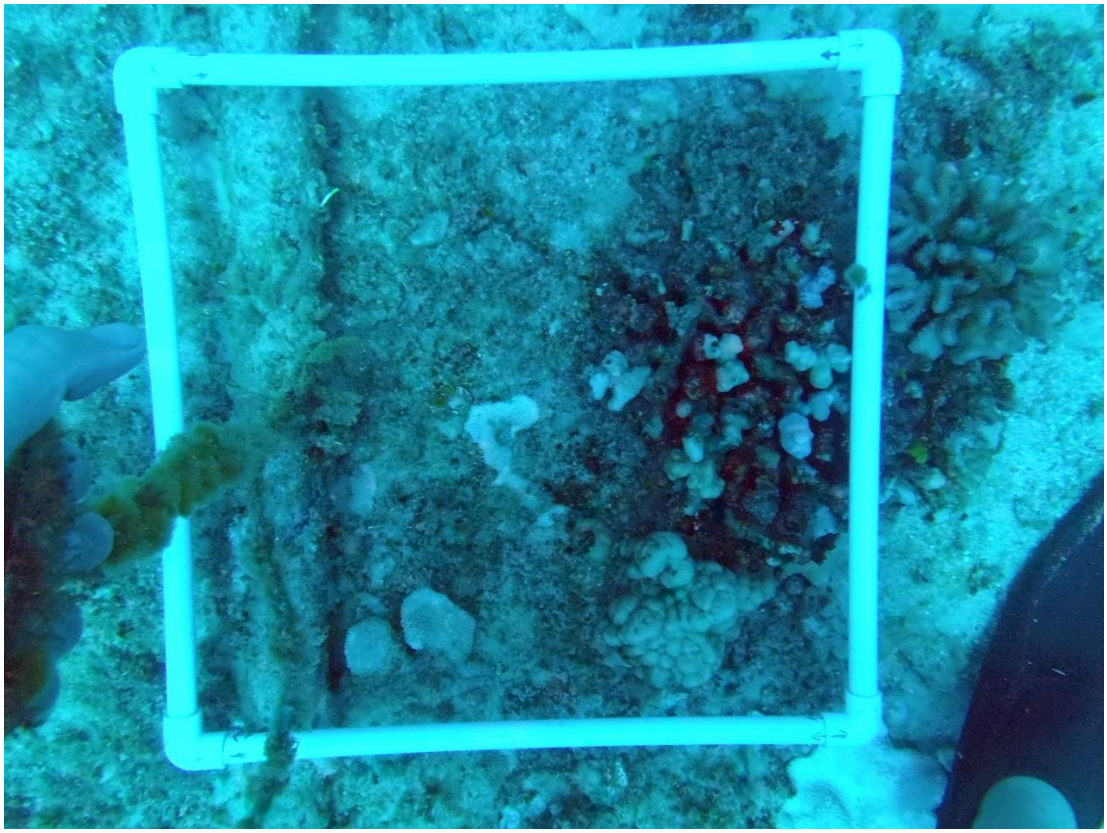


Figure 9. Deep Transect: 20m Location

Figure 10. Deep Transect: 30m Location

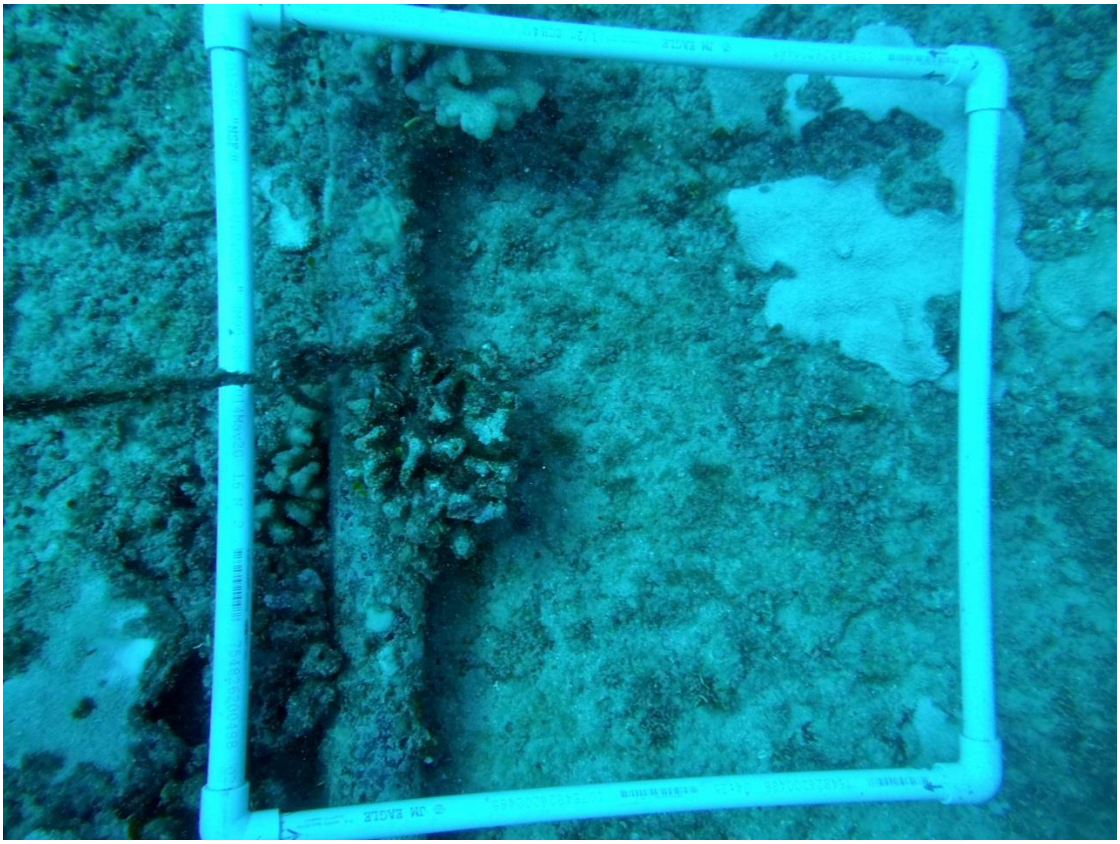


Figure 11. Deep Transect: 40m Location

Figure 12. Deep Transect: 50m Location

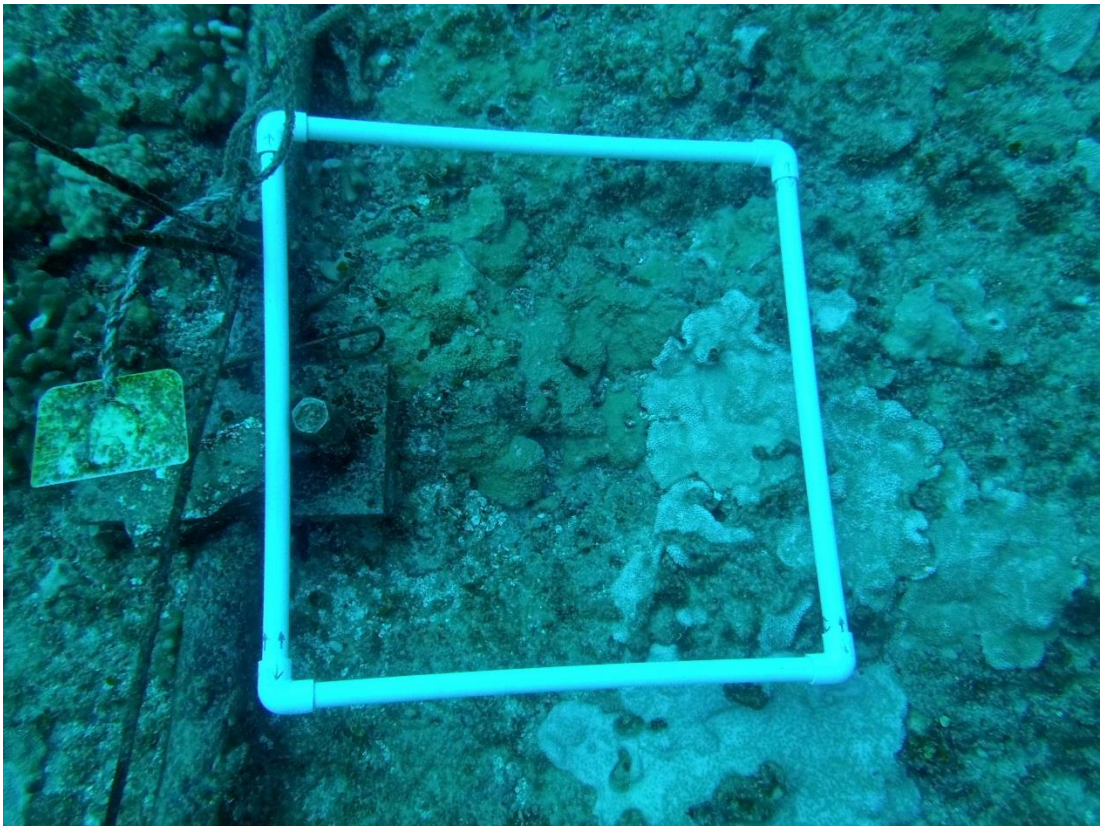


Figure 13. Shallow Transect: 0m Location

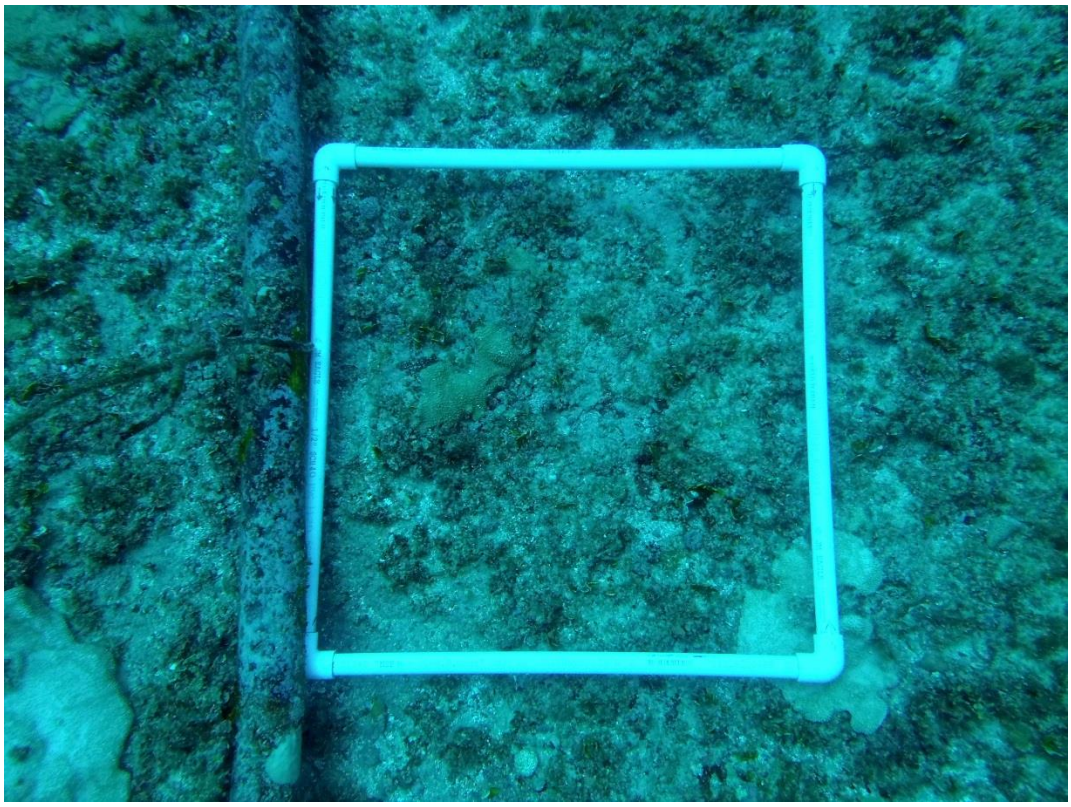


Figure 14. Shallow Transect: 10m Location

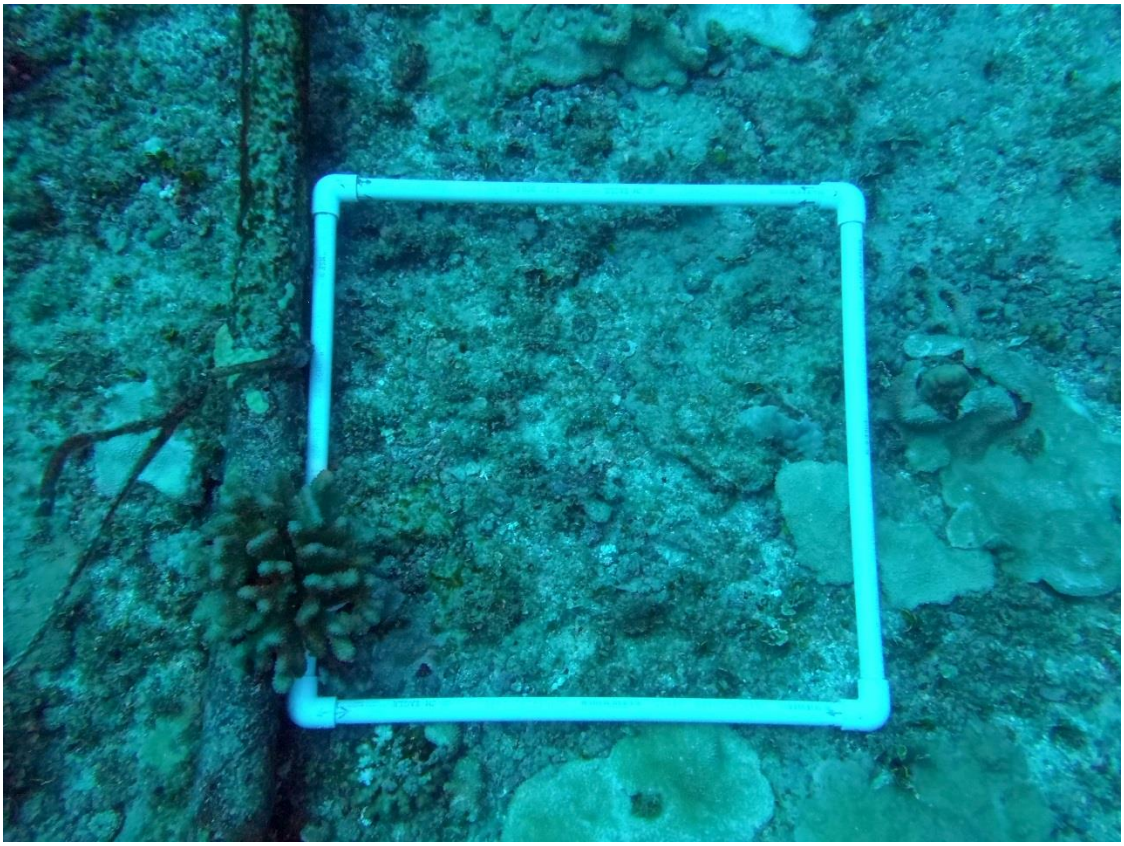


Figure 15. Shallow Transect: 20m Location

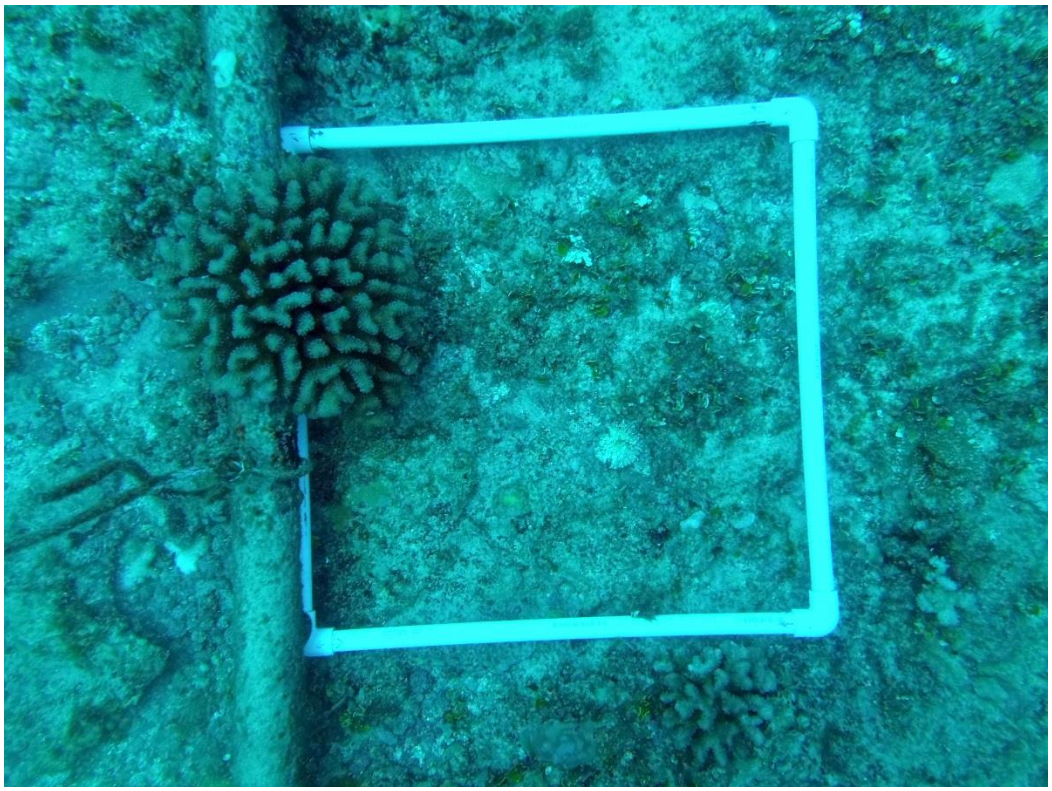


Figure 16. Shallow Transect: 30m Location

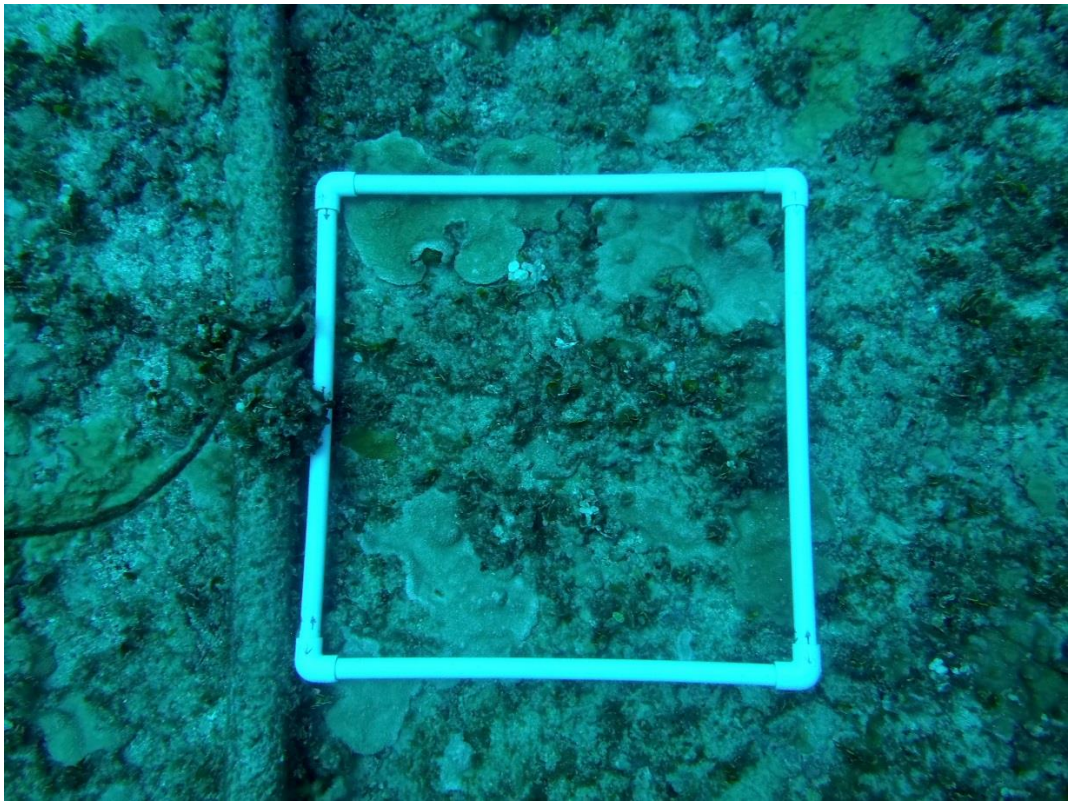


Figure 17. Shallow Transect: 40m Location

Figure 18. Shallow Transect: 50m Location

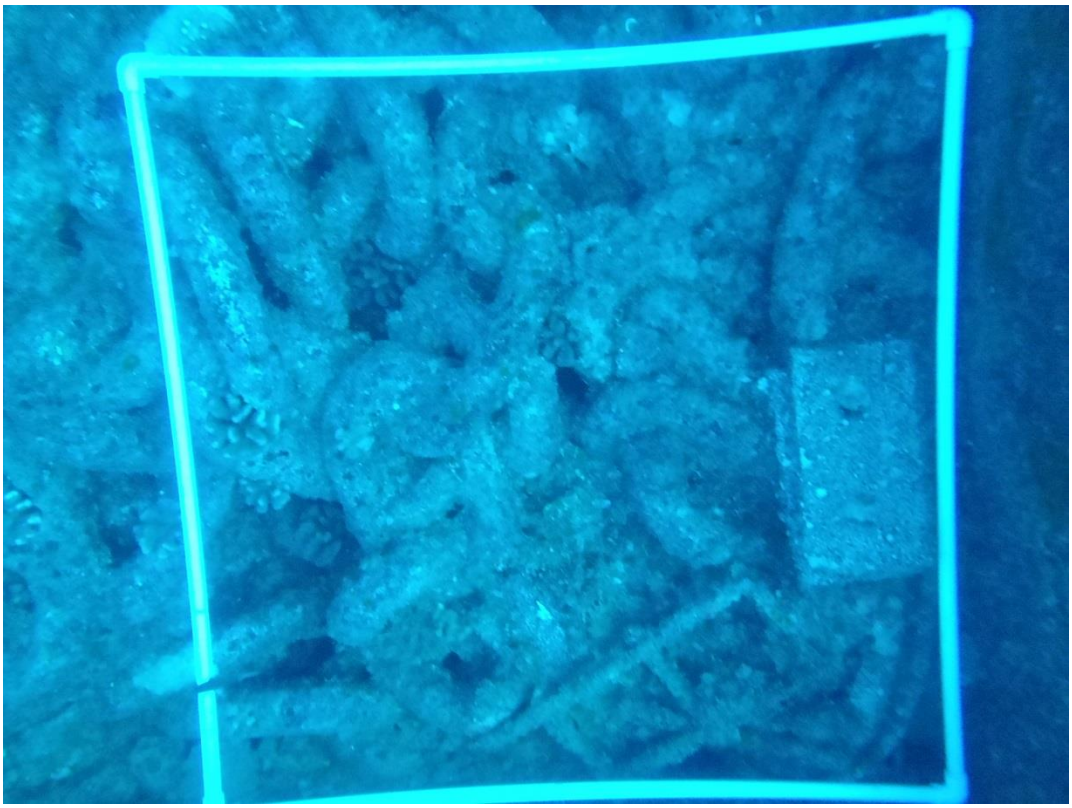


Figure 19. Chain Boxes Quadrat 1 100 X 100cm

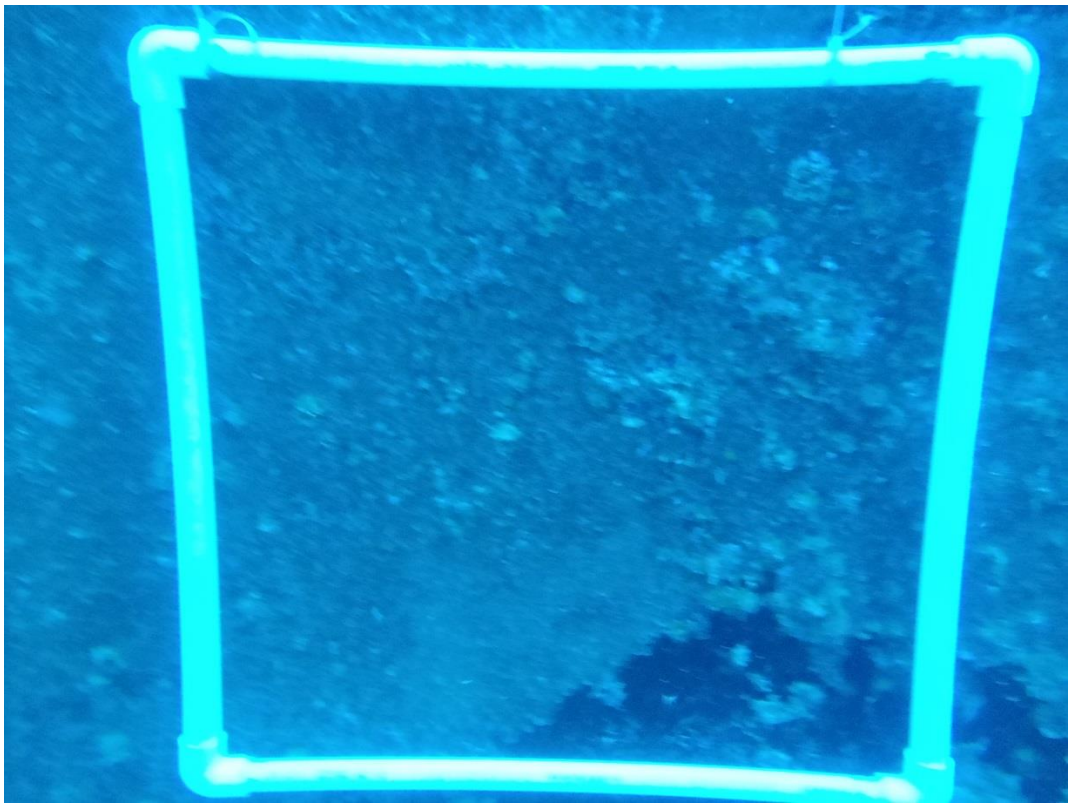


Figure 20. Chain Boxes Quadrat 2 50 X 50cm

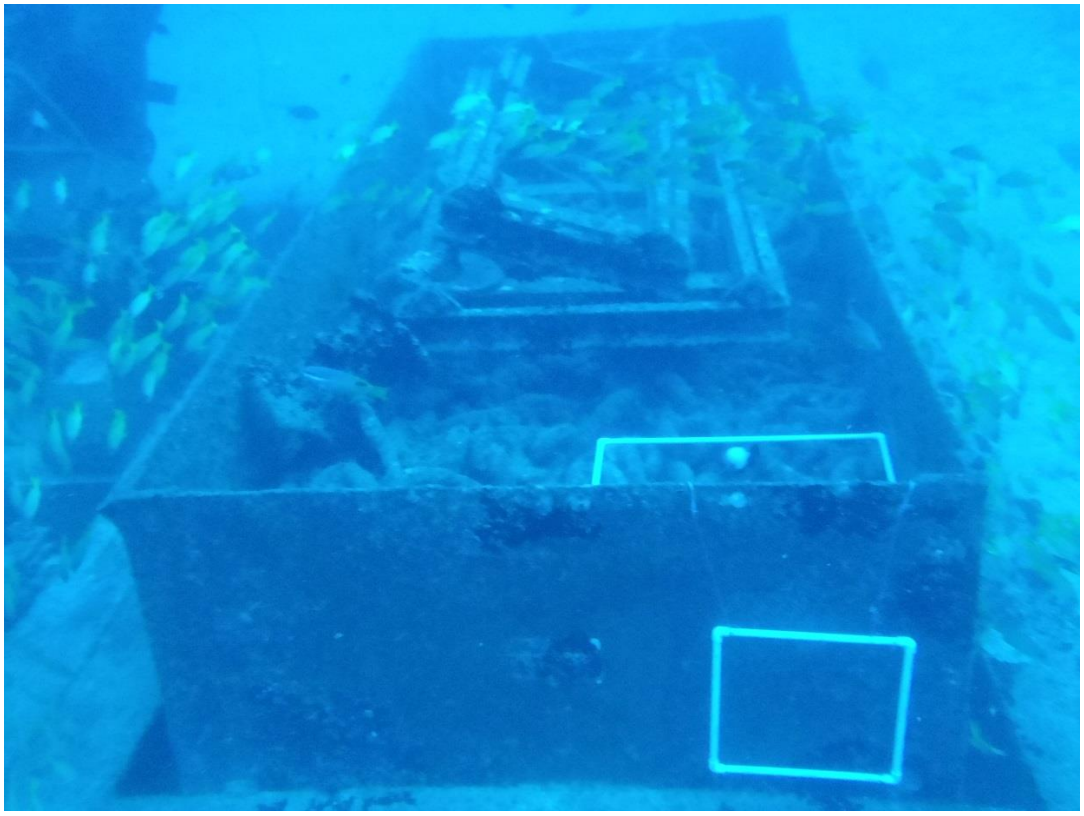


Figure 21. Chain Boxes Quadrats 1 and 2

Figure 22. Chain Boxes Quadrat 3 100 X 100cm

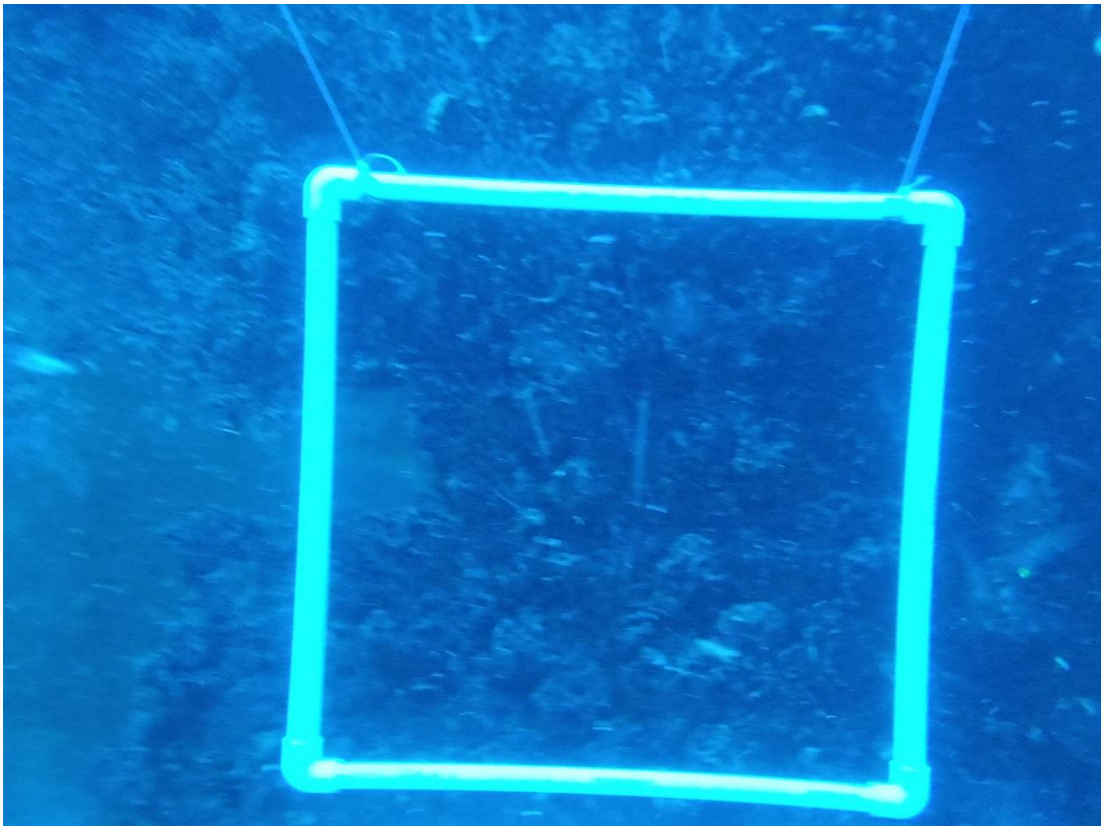


Figure 23. Chain Boxes Quadrat 4 50 X50cm

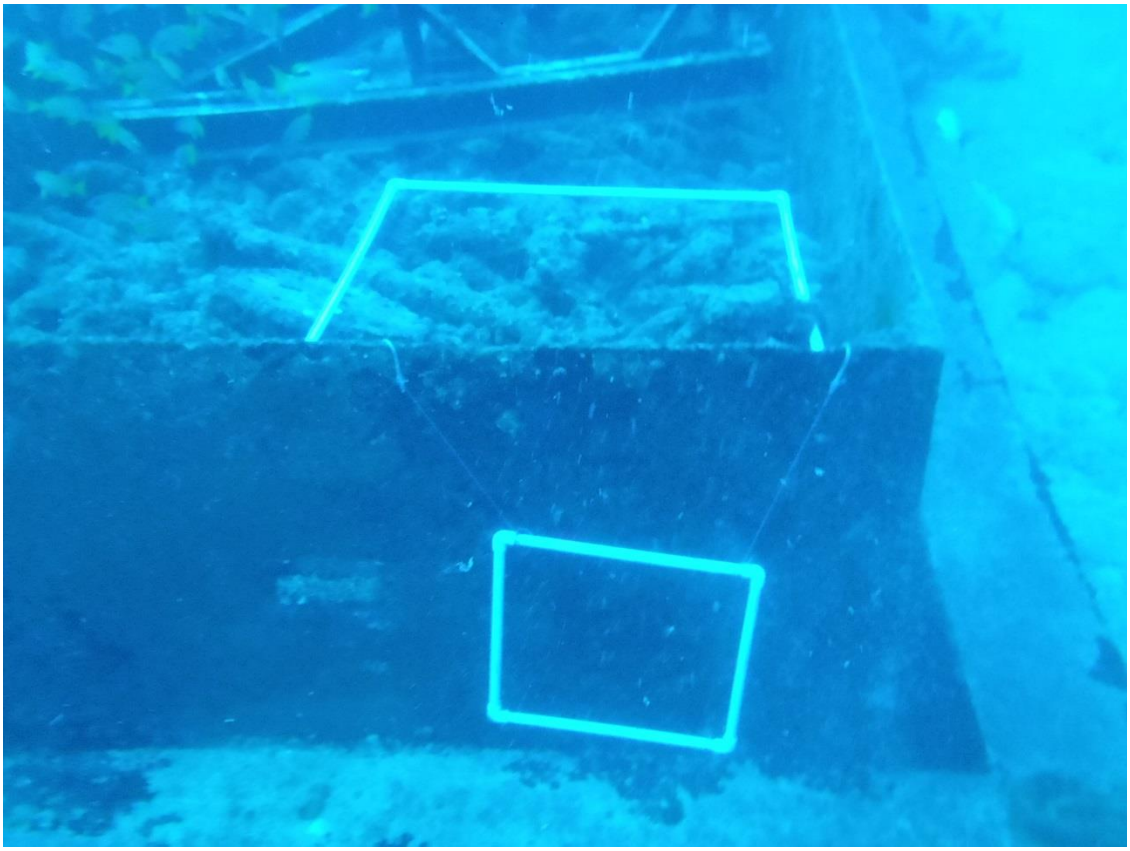
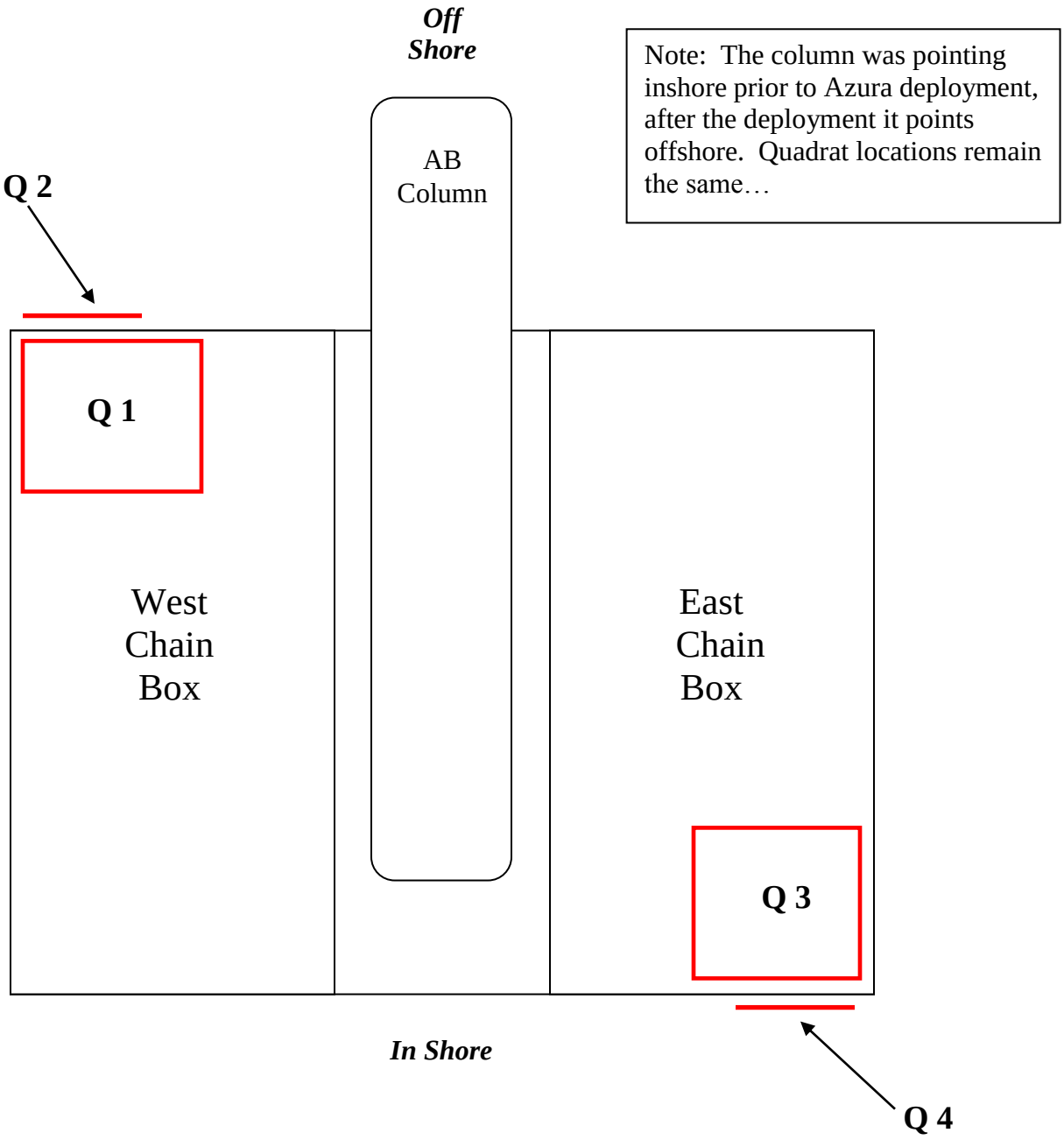


Figure 24. Chain Boxes Quadrats 3 and 4

Appendix A: Chain Box AB Quadrat Locations

(not to scale)



Q 1 & Q 3 - 100cmx100cm

Q 2 & Q 4 - 50cmx50cm

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Email: sei@seaengineering.com
Website: www.seaengineering.com

FIELD REPORT

DATE:	March 17, 2016
TO:	Luis Vega
FROM:	Patrick Anderson
SUBJECT:	WETS Task 5D Ecological Survey Field Report Diving

Date: January 26, 2016

Locations & Activity: WETS 30 m Mooring Diving Ecological Survey

Crew: P. Anderson, D. Lindsey, C. Conger, A. Commons, T. Borge

Vessel: Bob R.

Task 5D Ecological Survey: SEI conducted a diving ecological survey at the 30 m wave energy test site. This survey included a fish count and replicate quadrats at the two chain boxes. Also two replicate transects were conducted along the cable route. One 50 meter transect was completed from the shelf (~12 meters deep) along the cable towards shore, and the other transect started at the base of the shelf (~24 meters deep) and continued up the slope to the shelf.

Work Completed:

Fish Count: The first diving task at the 30 m mooring site was completing a fish count and video recording of the chain boxes (AB) and surrounding area. The divers were oriented on opposite corners of the chain boxes (one on offshore side and one on the inshore side). The results of the fish count are shown in Table 1 below. For reference the long side of the chain box is 31 feet 11 inches and the short side is 20 ft 7 inches.

Table 1. Fish Count Results

Location	Coordinates	Observation Date	Observation Time	Fish Count
AB Anchor Chain Box	21°27'54.9574" N 157°45'2.8103" W	1/15/2015	7:44 AM	100-200
			10:37 AM	200-250
		4/3/2015	11:55 AM	200
		8/22/2015	8:13 AM	250
		1/26/2016	9:36 AM	500+

Photographs taken during the fish count are presented in Figure 1 through Figure 4. Descriptions

of each photograph are provided in the photo log in Table 2. All the photographs were edited to improve color and clarity. Video was also recorded.

Replicate Quadrats: Photographs of replicate quadrats on the chain box were taken using a 50 cm square frame quadrat hung vertically on the side of each box, and a 100 cm square frame quadrat placed horizontally on top of the chain in the corner of each box. These images are cataloged in Table 5 and are presented in Figure 17 through Figure 20. A diagram of the locations of the quadrats on the chain box is provided in Appendix A.

Replicate Transects: Two 50 m transects were surveyed along the cable route. The seafloor in the transect vicinity consists of a relatively flat shelf at a water depth of approximately 12 m and a ledge the drops to a depth of approximately 24 m. The deep transect began at the base of the ledge (~24 m depth) and continued up the slope to the shelf. The shallow transect was completed from the top of the shelf at a depth of approximately 12 m along the cable towards shore.

Each transect was surveyed by a diver swimming from the deep end of the transect to the shallow end recording video or photographs along the way. The photographs are centered on a PVC frame quadrat that measures 50 cm on each side. The photographs were taken in 6 locations 10 m apart along the cable. The photographs are cataloged in a photo log in Table 3 and Table 4.

Location	Coordinates
Start of Shallow Transect	21° 27’ 51.7061” N 157° 45’ 6.6588” W
Start of Deep Transect	21° 27’ 50.208” N 157° 45’ 7.479” W

Table 2. Photo Log of Fish Count around Chain Boxes

Figure Number	Description
Figure 1	View inshore of chain box AB
Figure 2	View offshore of chain boxes and diver
Figure 3	View from above the chain boxes
Figure 4	Close up of fish at chain box AB

Table 3. Photo Log of Deep Transect

Figure Number	Description
Figure 5	Deep Transect: 0m Location
Figure 6	Deep Transect: 10m Location
Figure 7	Deep Transect: 20m Location
Figure 8	Deep Transect: 30m Location
Figure 9	Deep Transect: 40m Location
Figure 10	Deep Transect: 50m Location

Table 4. Photo Log of Shallow Transect

Figure Number	Description
Figure 11	Shallow Transect: 0m Location
Figure 12	Shallow Transect: 10m Location
Figure 13	Shallow Transect: 20m Location
Figure 14	Shallow Transect: 30m Location
Figure 15	Shallow Transect: 40m Location
Figure 16	Shallow Transect: 50m Location

Table 5. Photo Log of Chain Box Quadrats

Figure Number	Description
Figure 17	Chain Boxes Quadrat 1 100 X 100cm
Figure 18	Chain Boxes Quadrat 2 50 X 50cm
Figure 19	Chain Boxes Quadrat 3 100 X 100cm
Figure 20	Chain Boxes Quadrat 4 50 X50cm

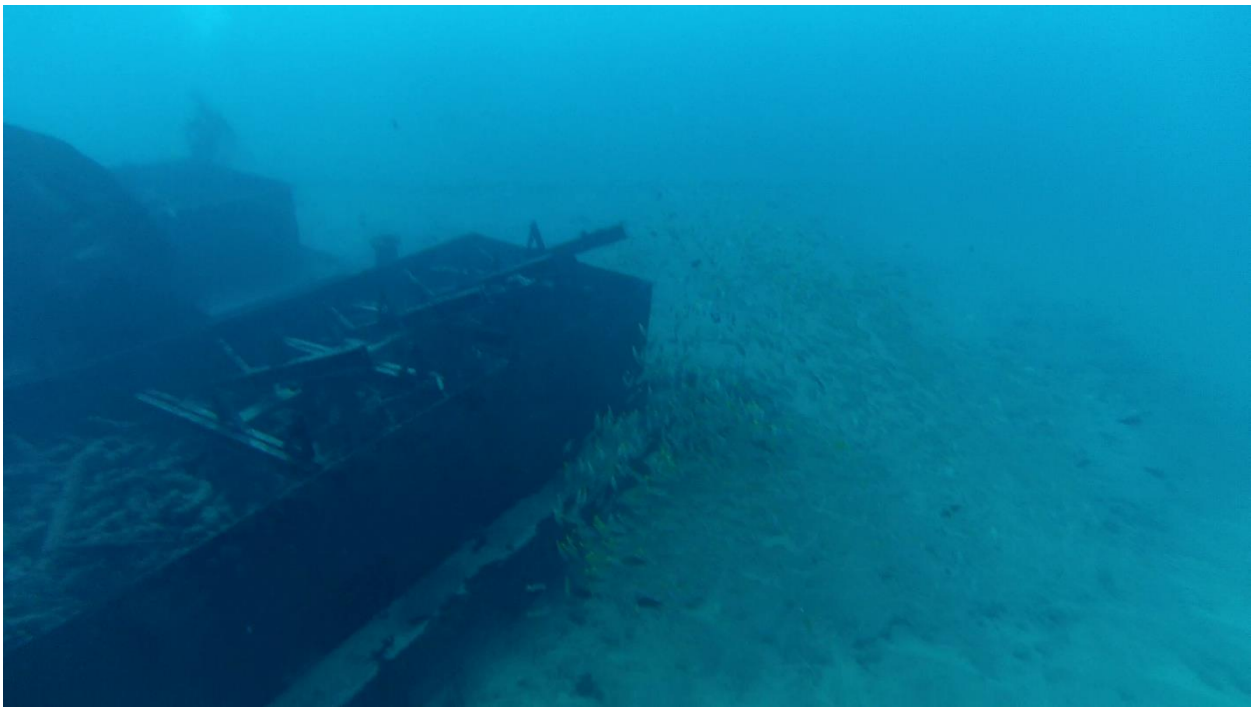


Figure 1. View inshore of chain box AB

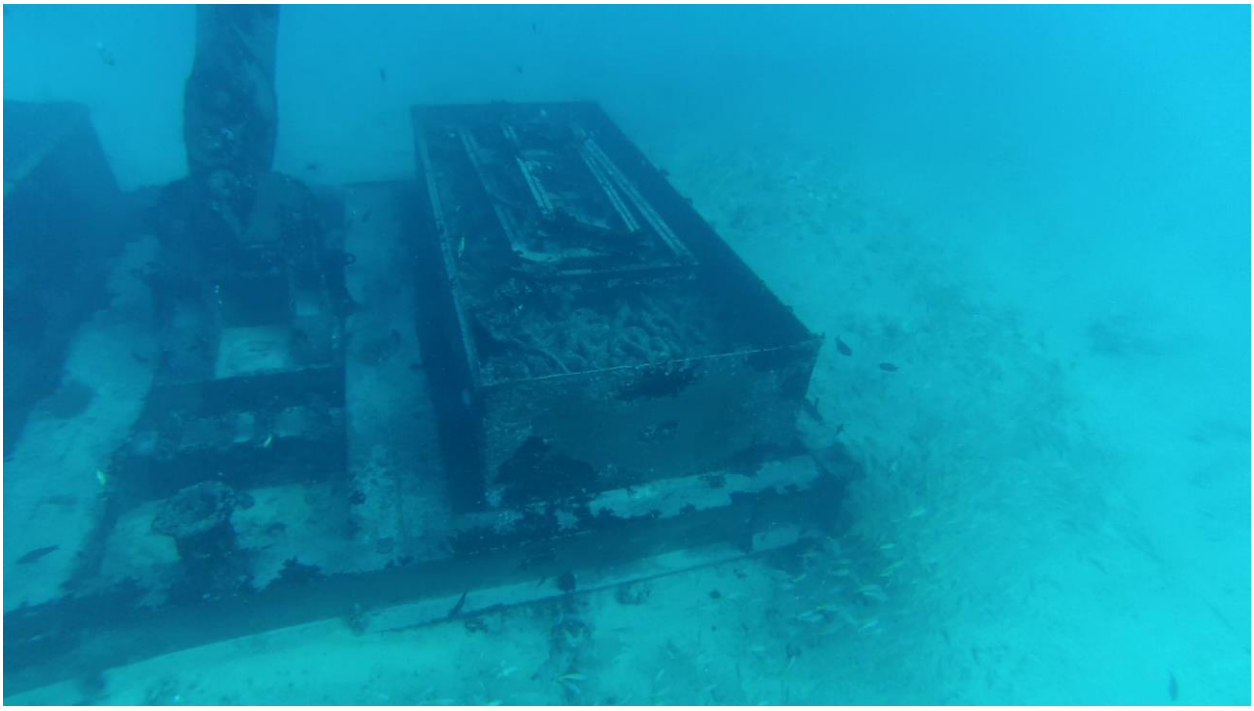


Figure 2. View offshore of chain boxes and diver

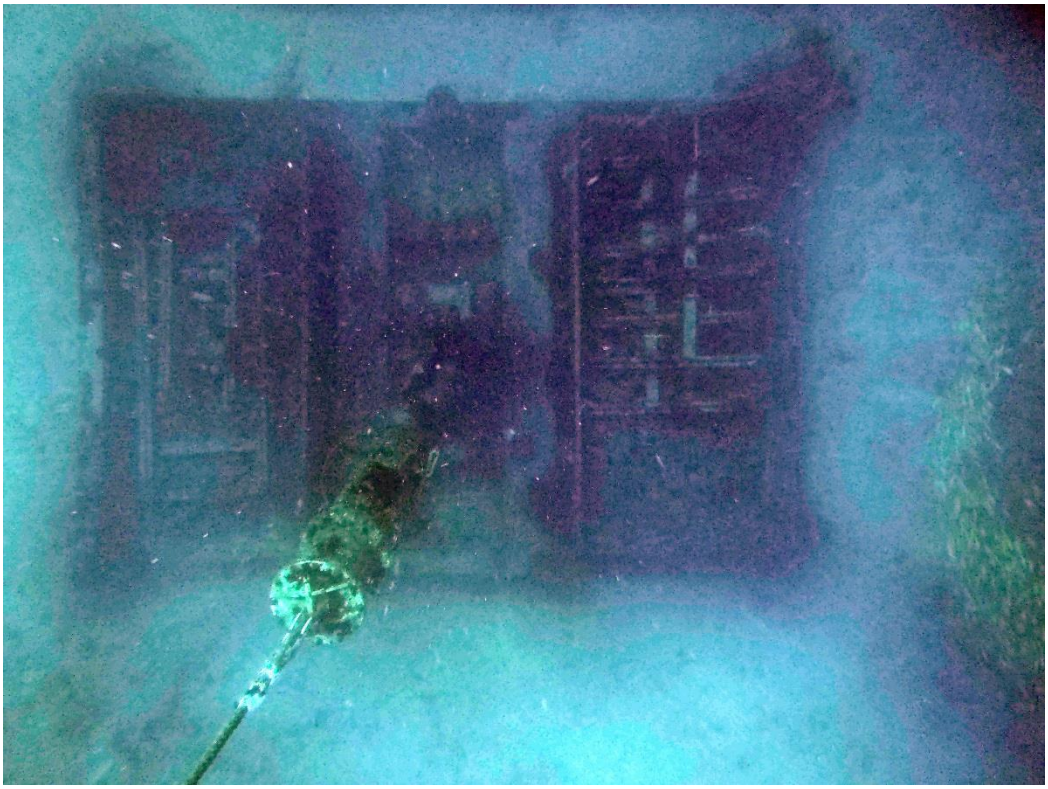


Figure 3. View from above the chain boxes

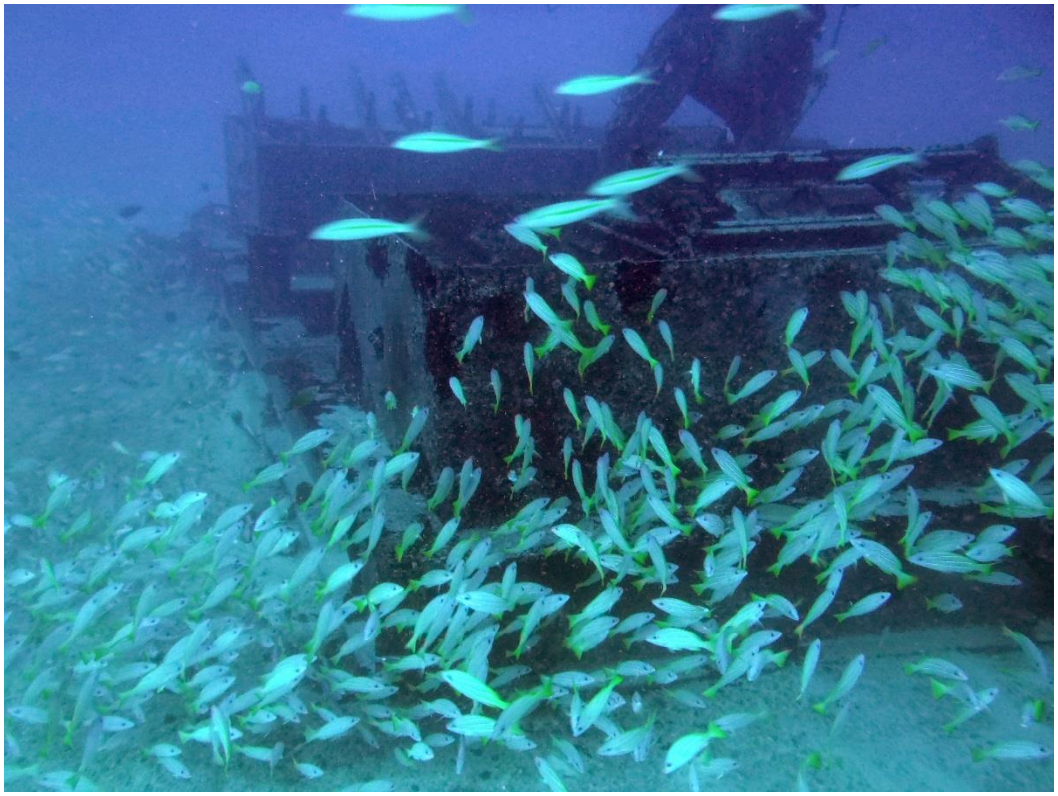


Figure 4. Close up of fish at chain box AB

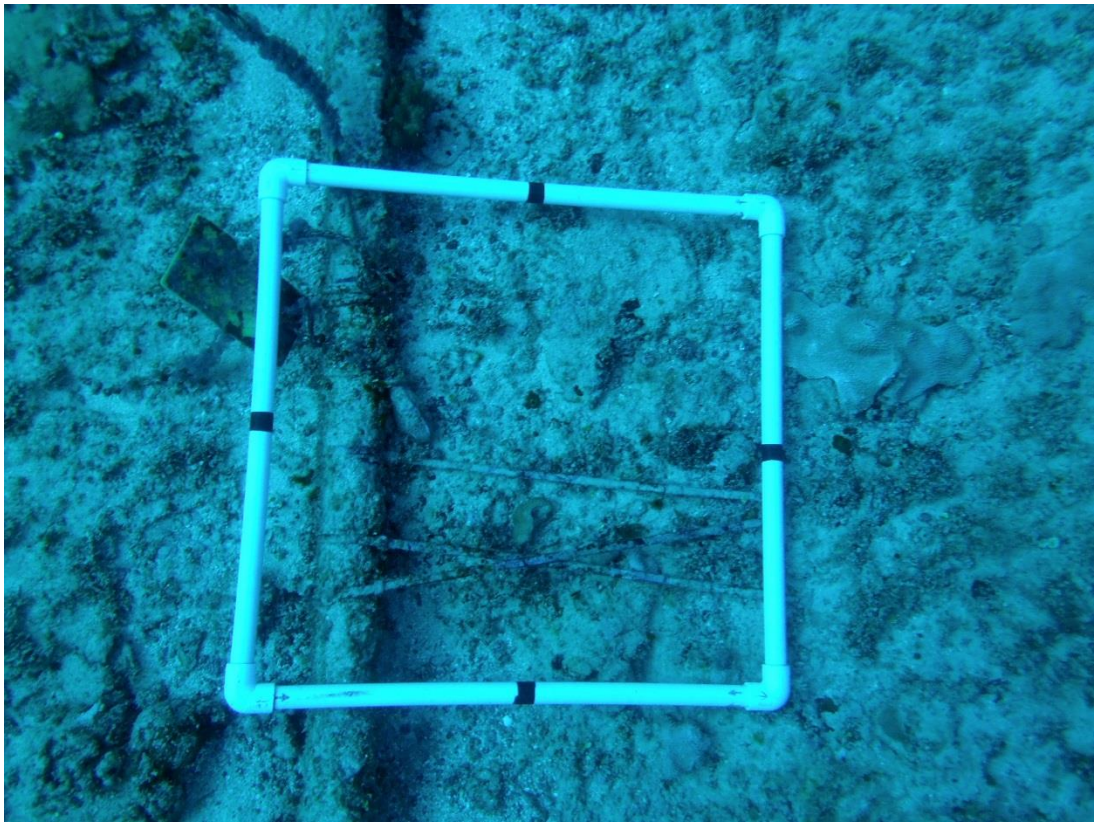


Figure 5. Deep Transect: 0m Location

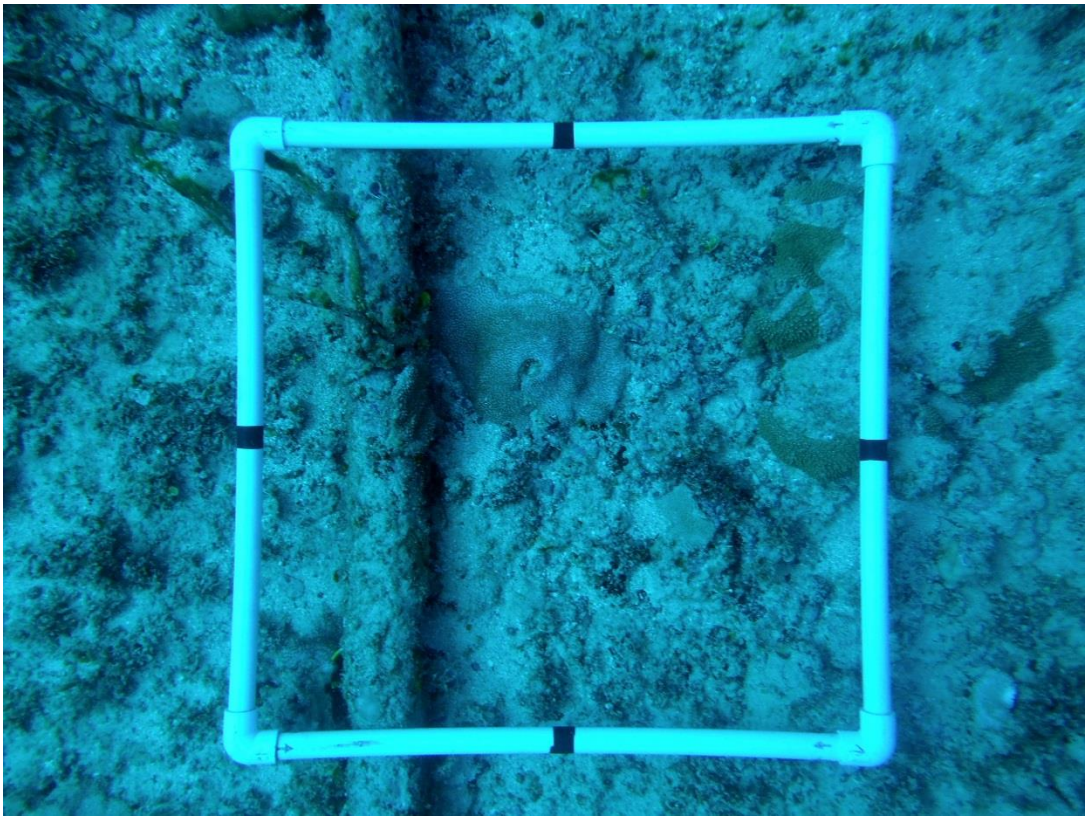


Figure 6. Deep Transect: 10m Location

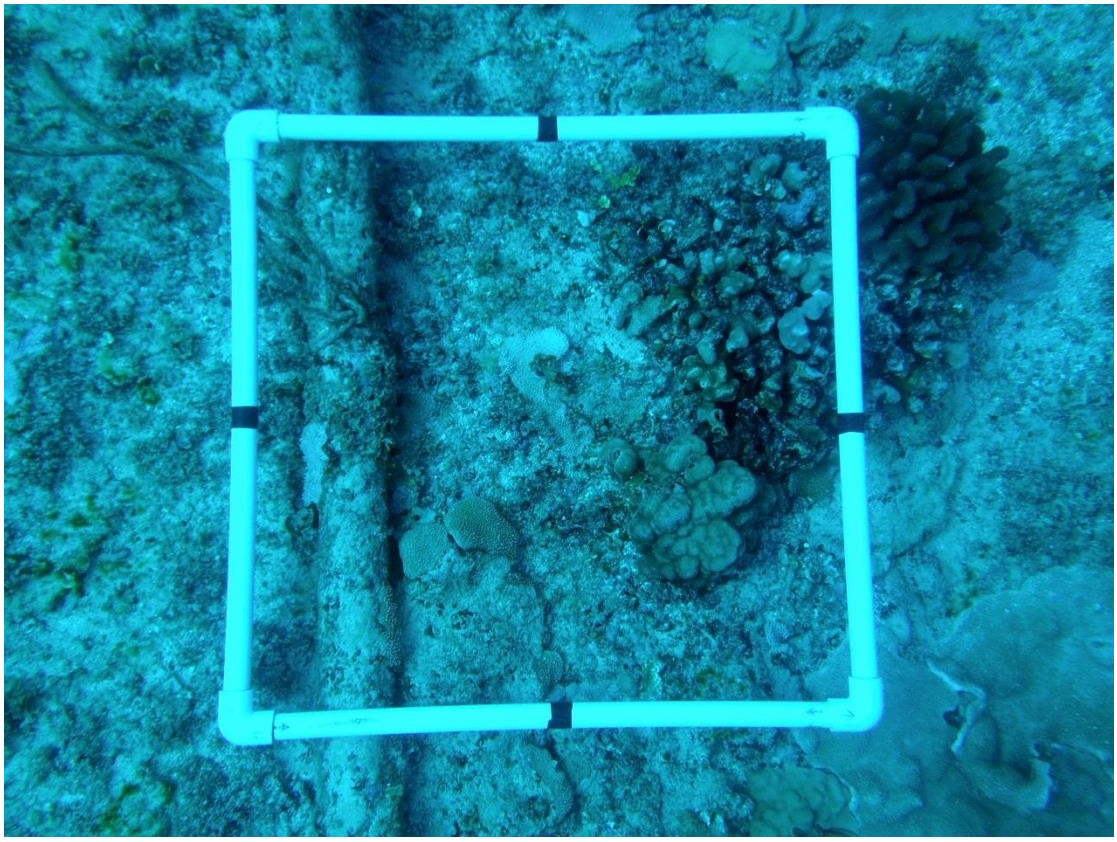


Figure 7. Deep Transect: 20m Location

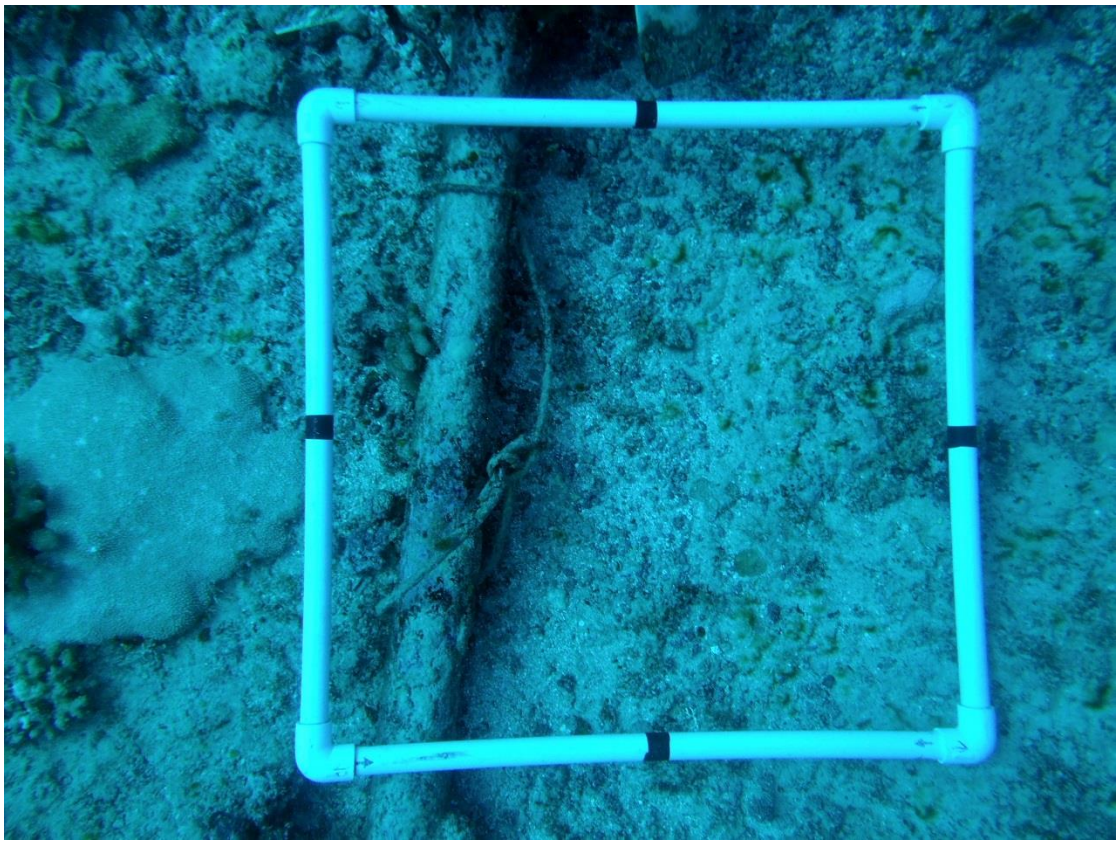


Figure 8. Deep Transect: 30m Location

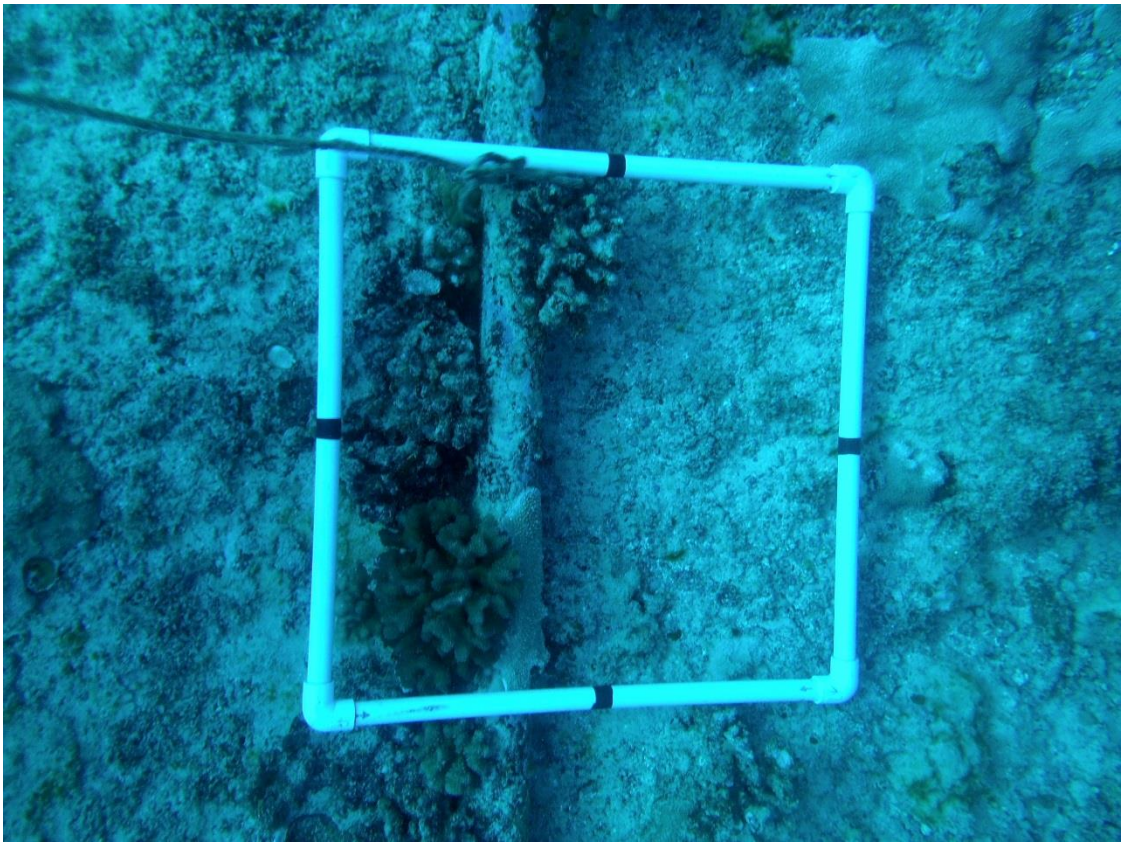


Figure 9. Deep Transect: 40m Location

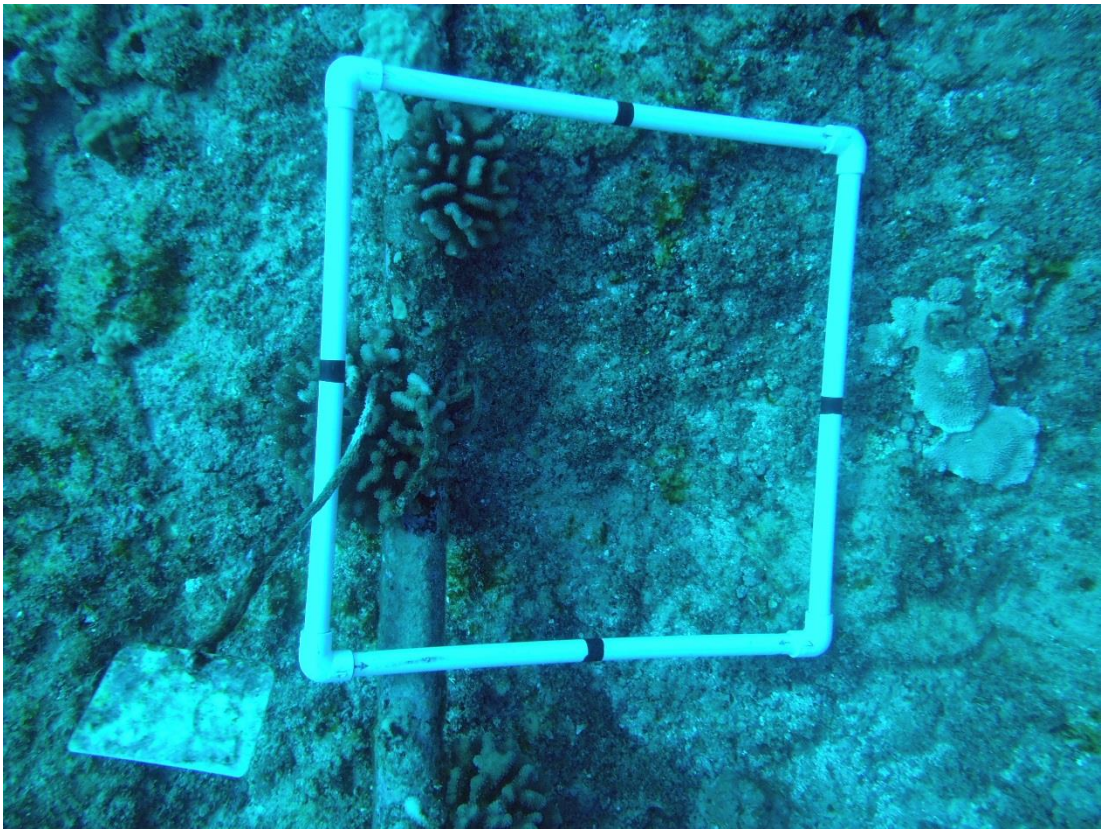


Figure 10. Deep Transect: 50m Location

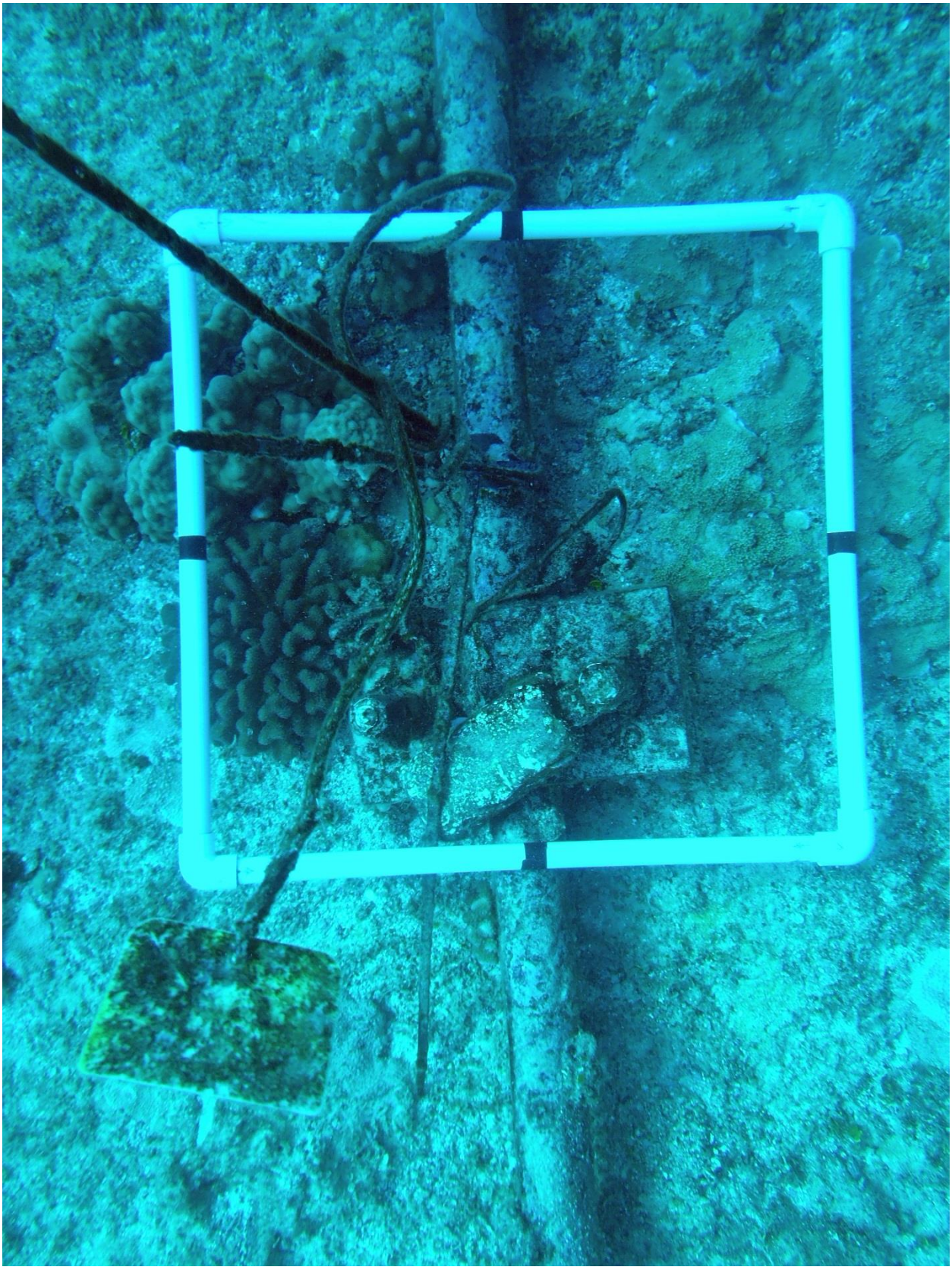


Figure 11. Shallow Transect: 0m Location

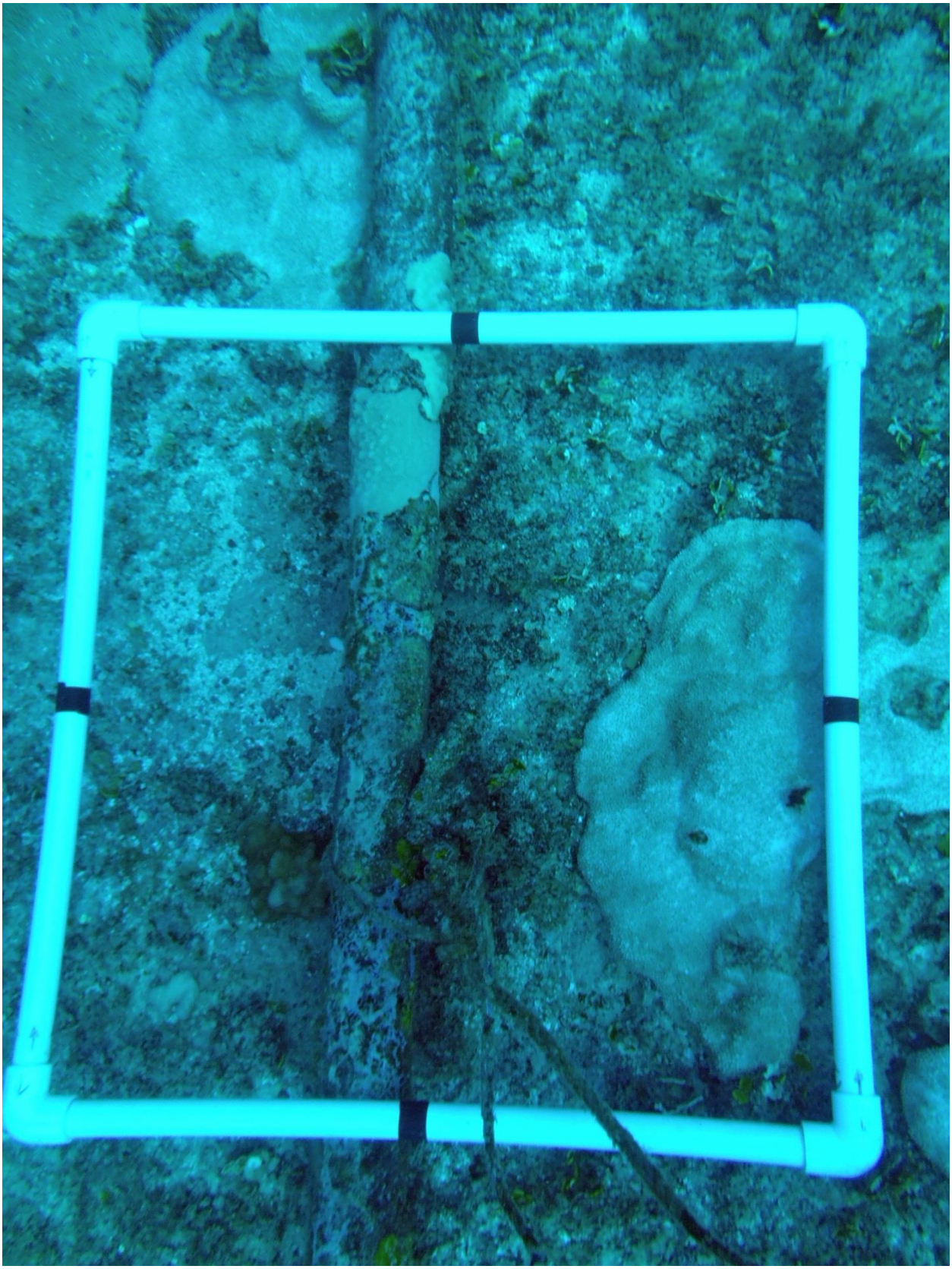


Figure 12. Shallow Transect: 10m Location

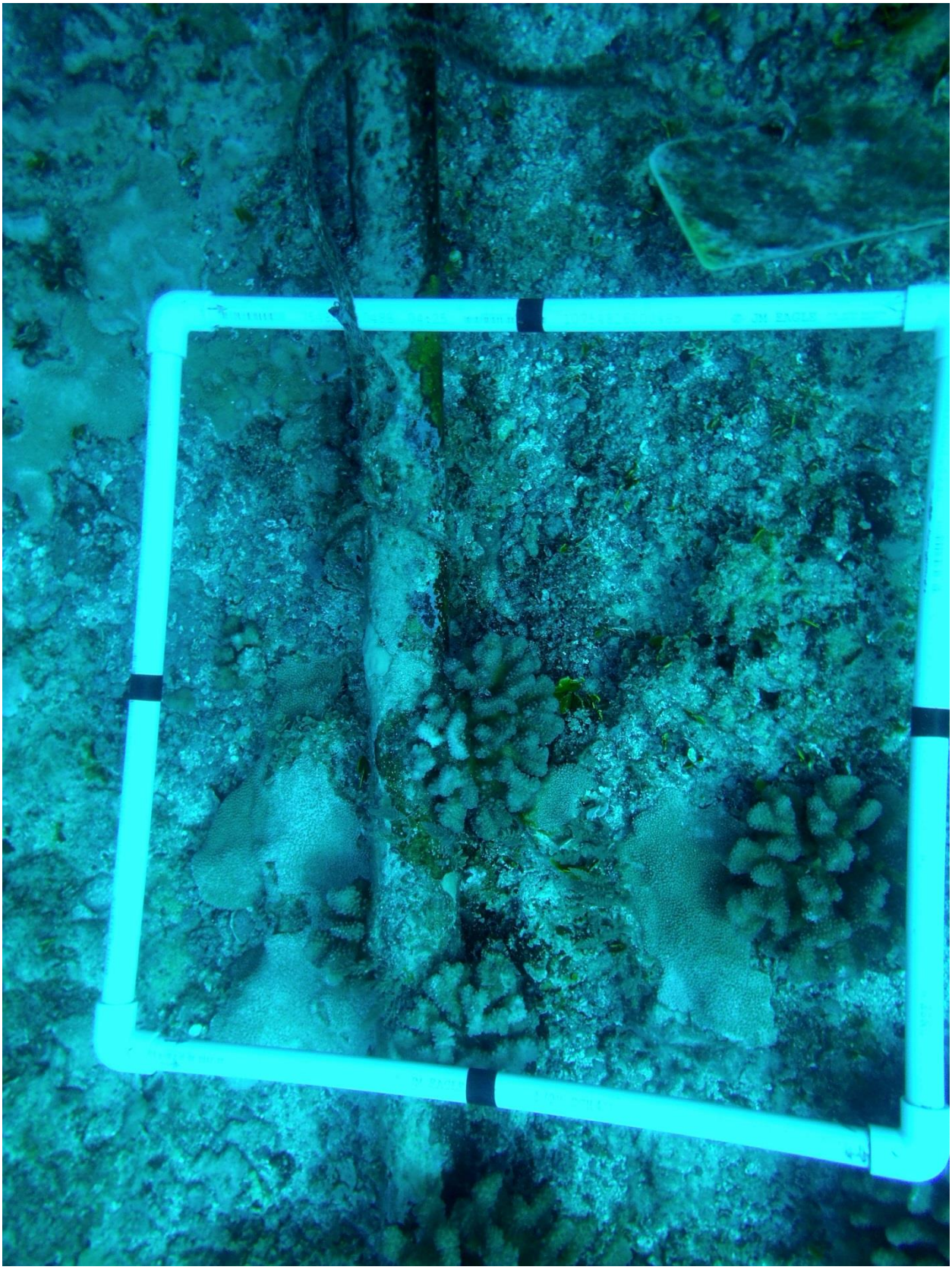


Figure 13. Shallow Transect: 20m Location

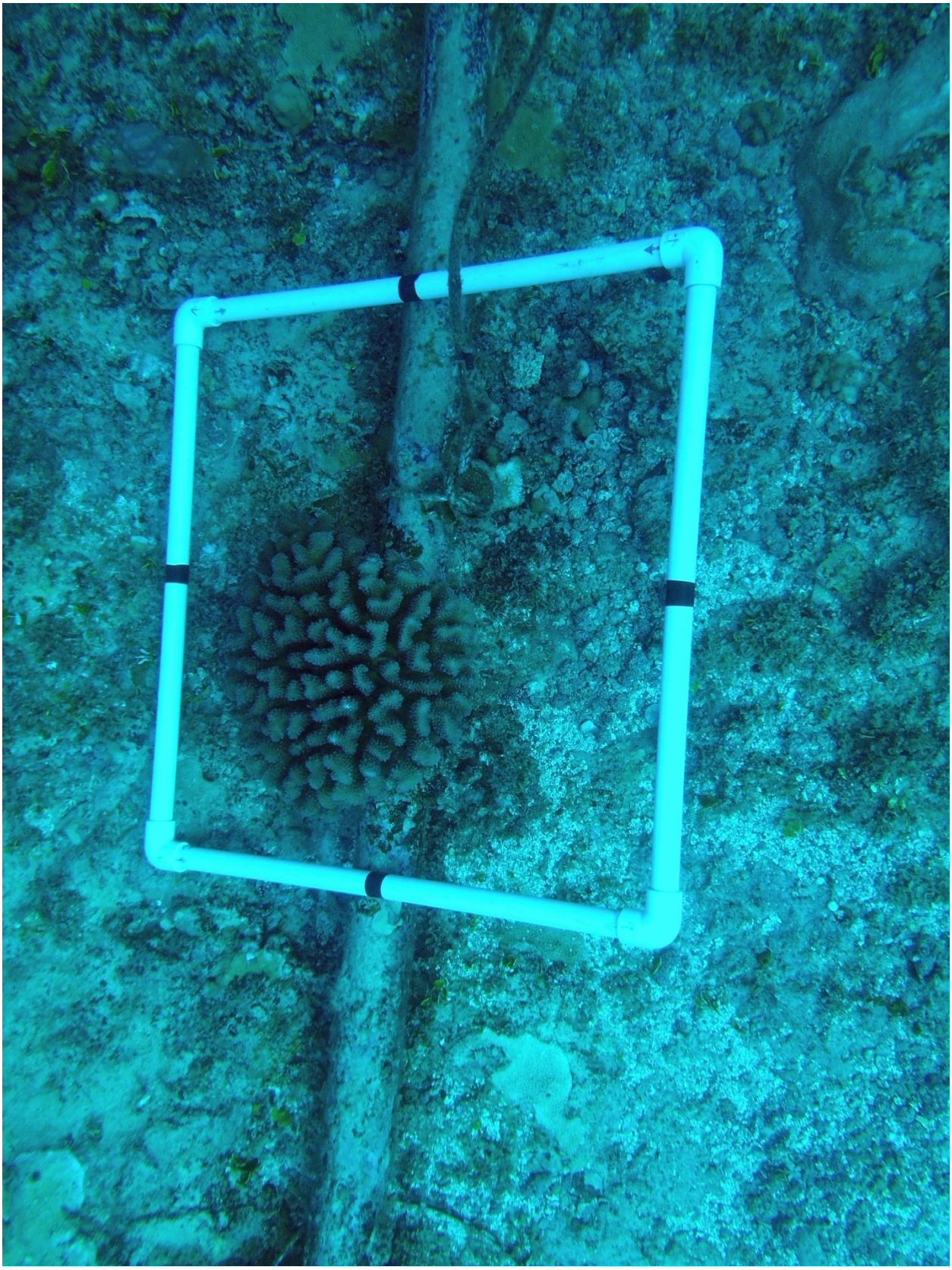


Figure 14. Shallow Transect: 30m Location

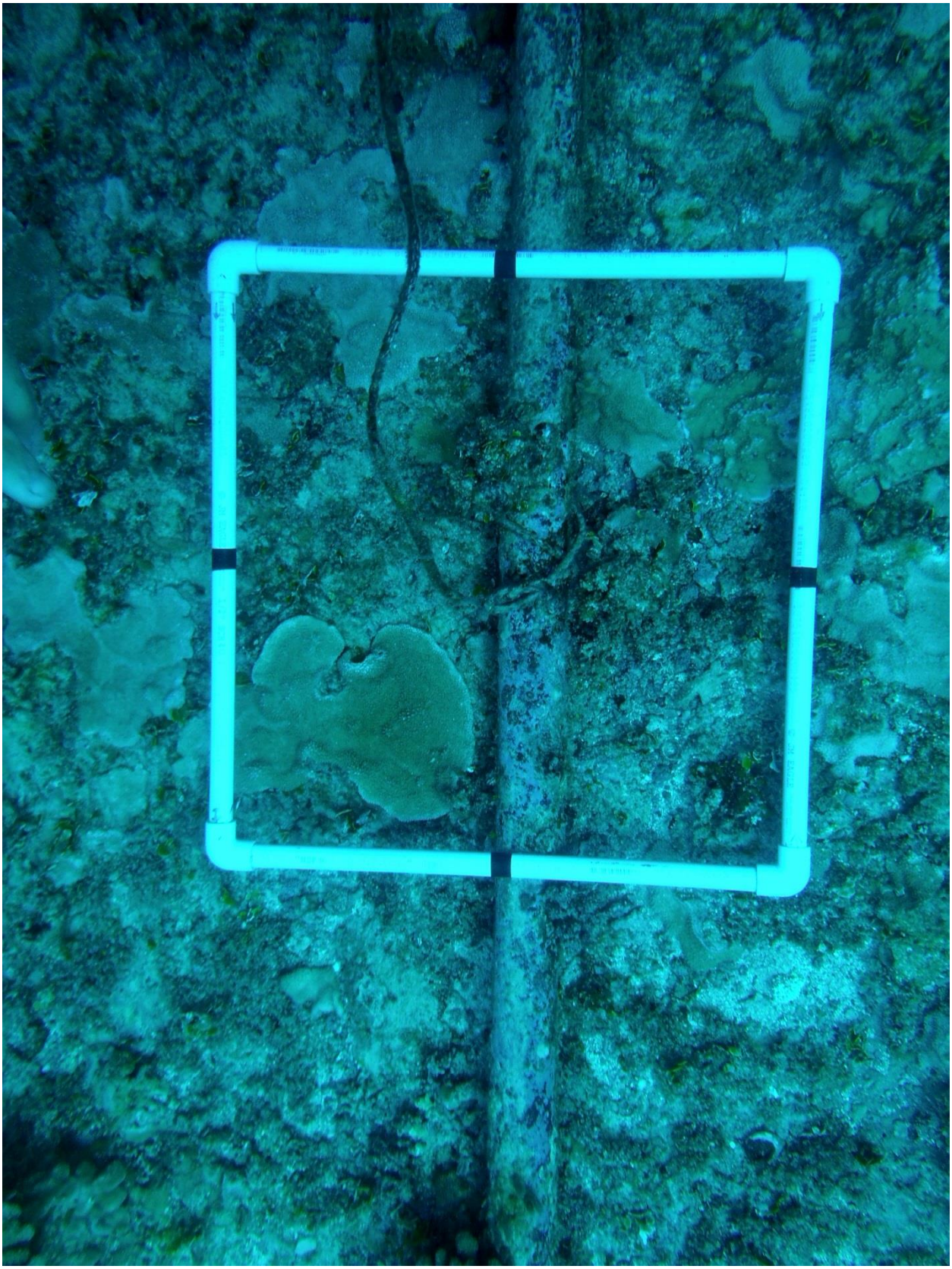


Figure 15. Shallow Transect: 40m Location

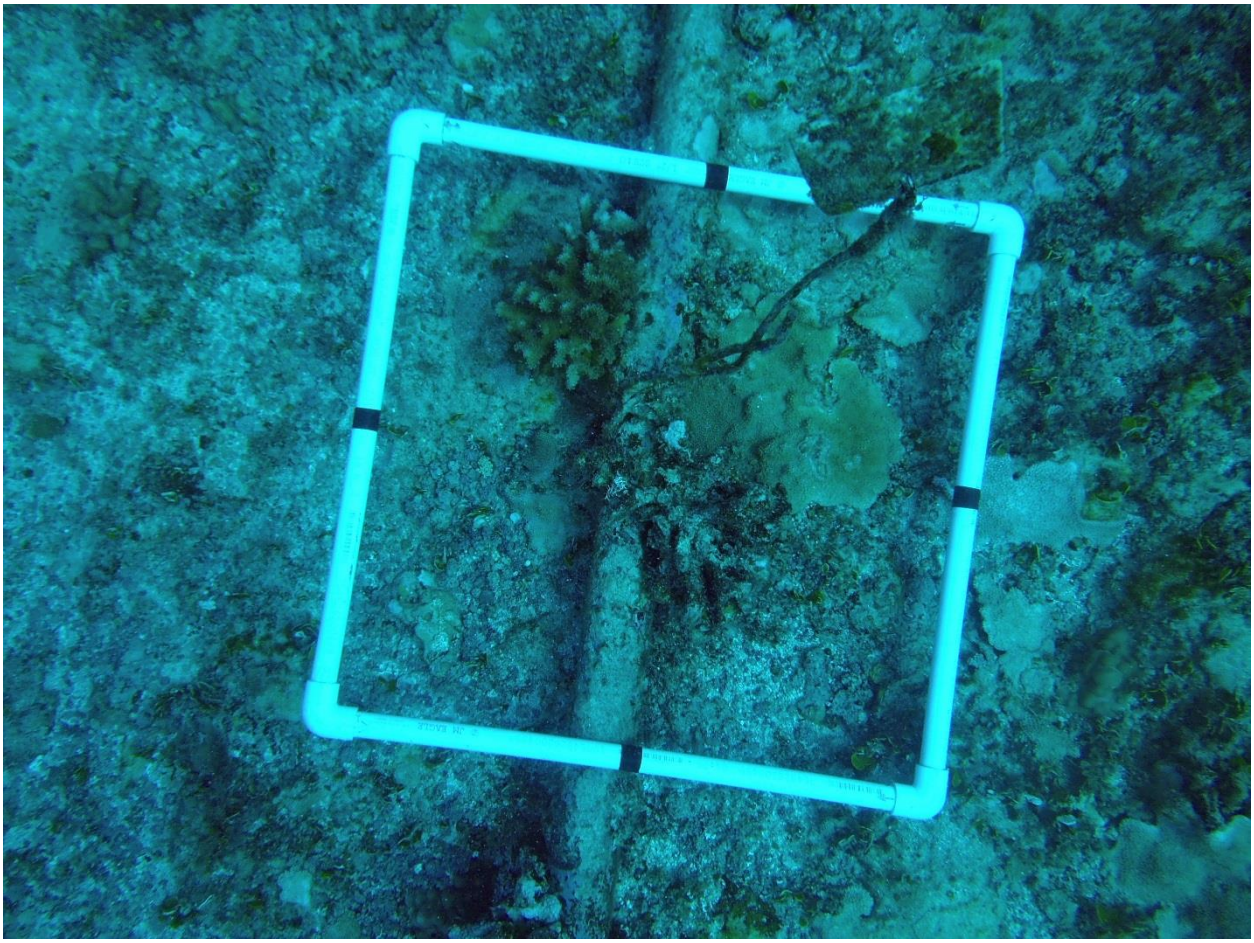


Figure 16. Shallow Transect: 50m Location

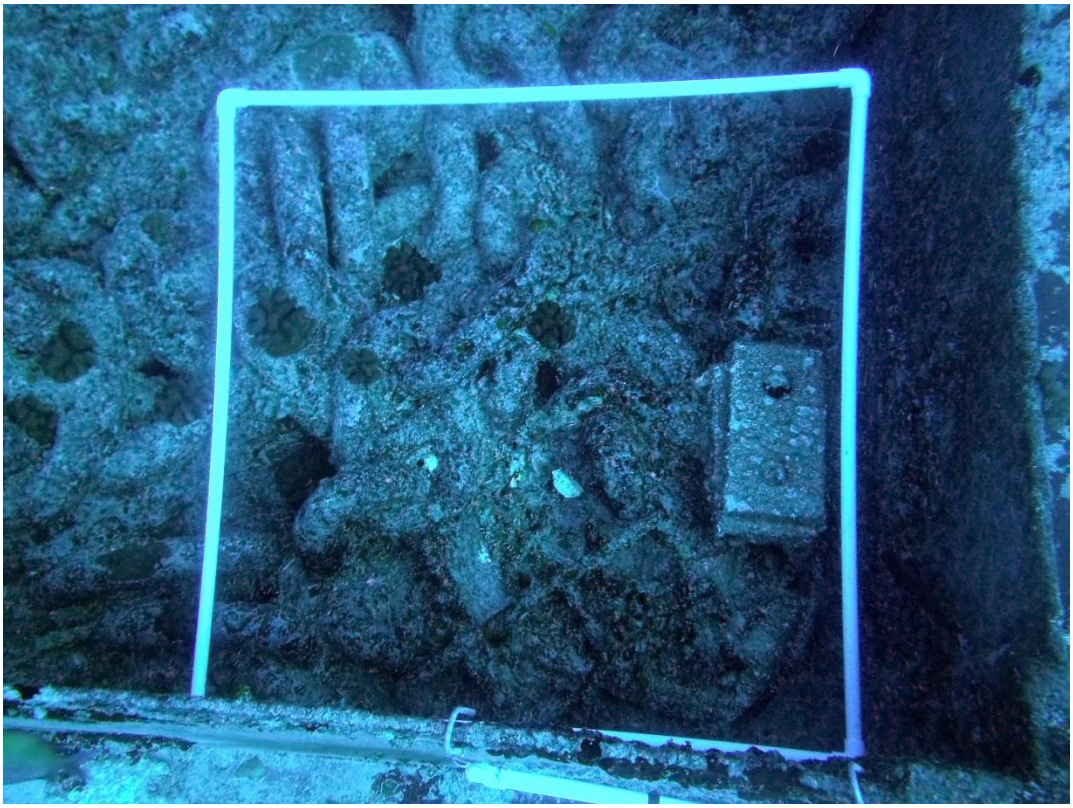


Figure 17. Chain Boxes Quadrat 1 100 X 100cm

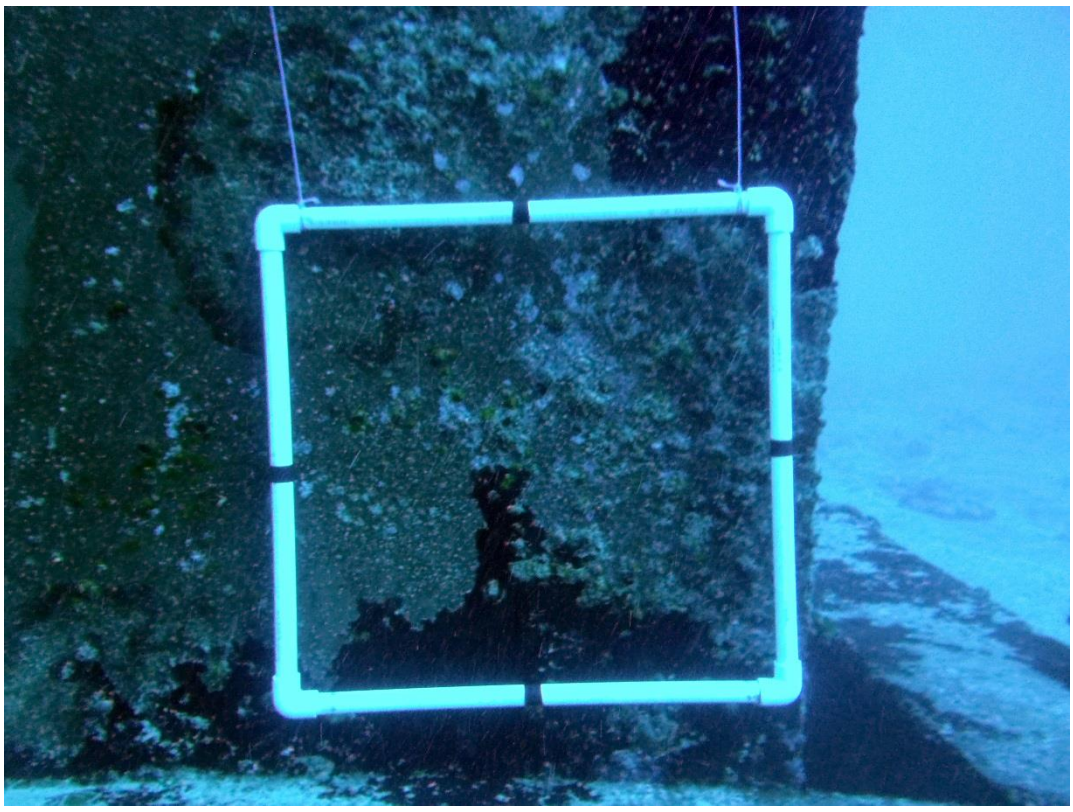


Figure 18. Chain Boxes Quadrat 2 50 X 50cm

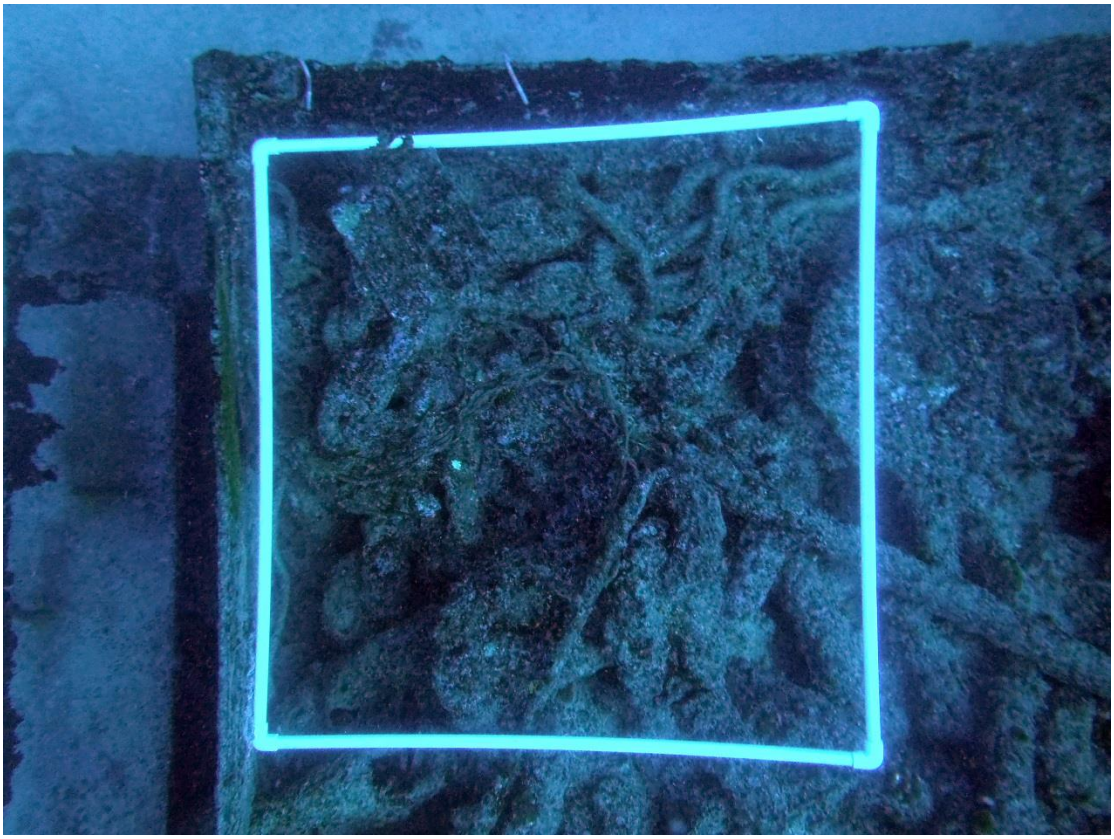


Figure 19. Chain Boxes Quadrat 3 100 X 100cm

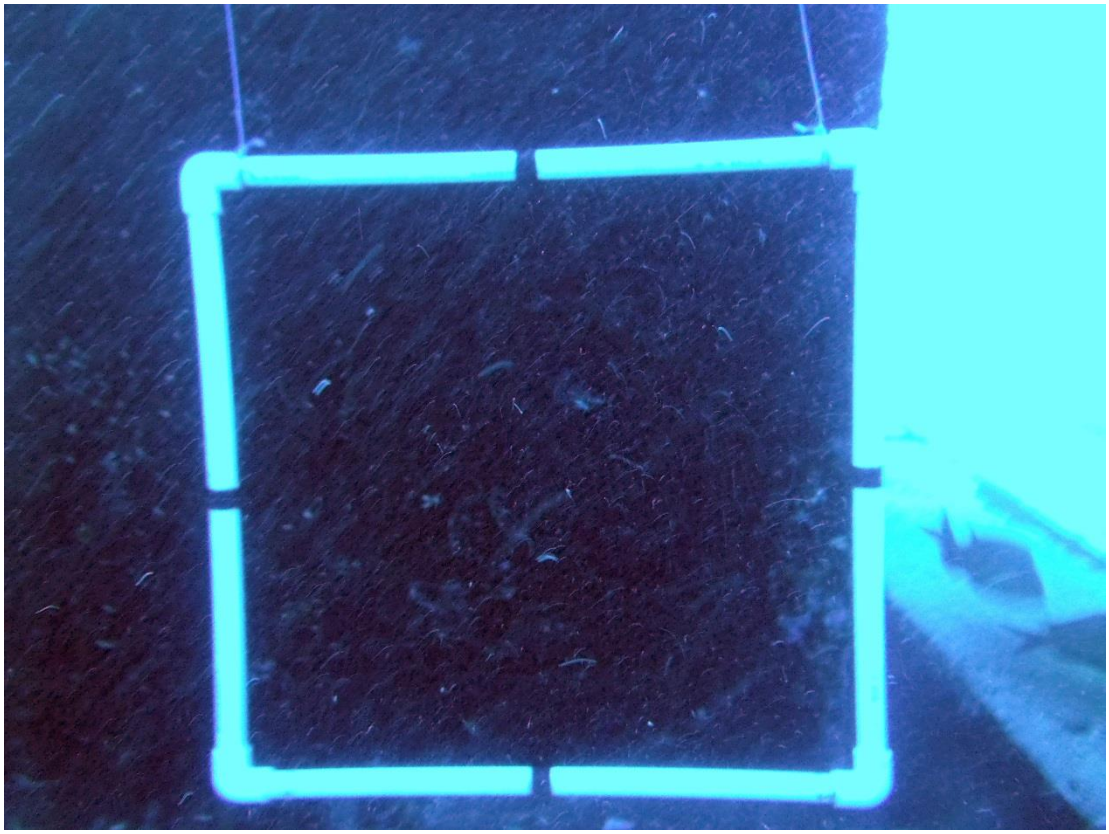
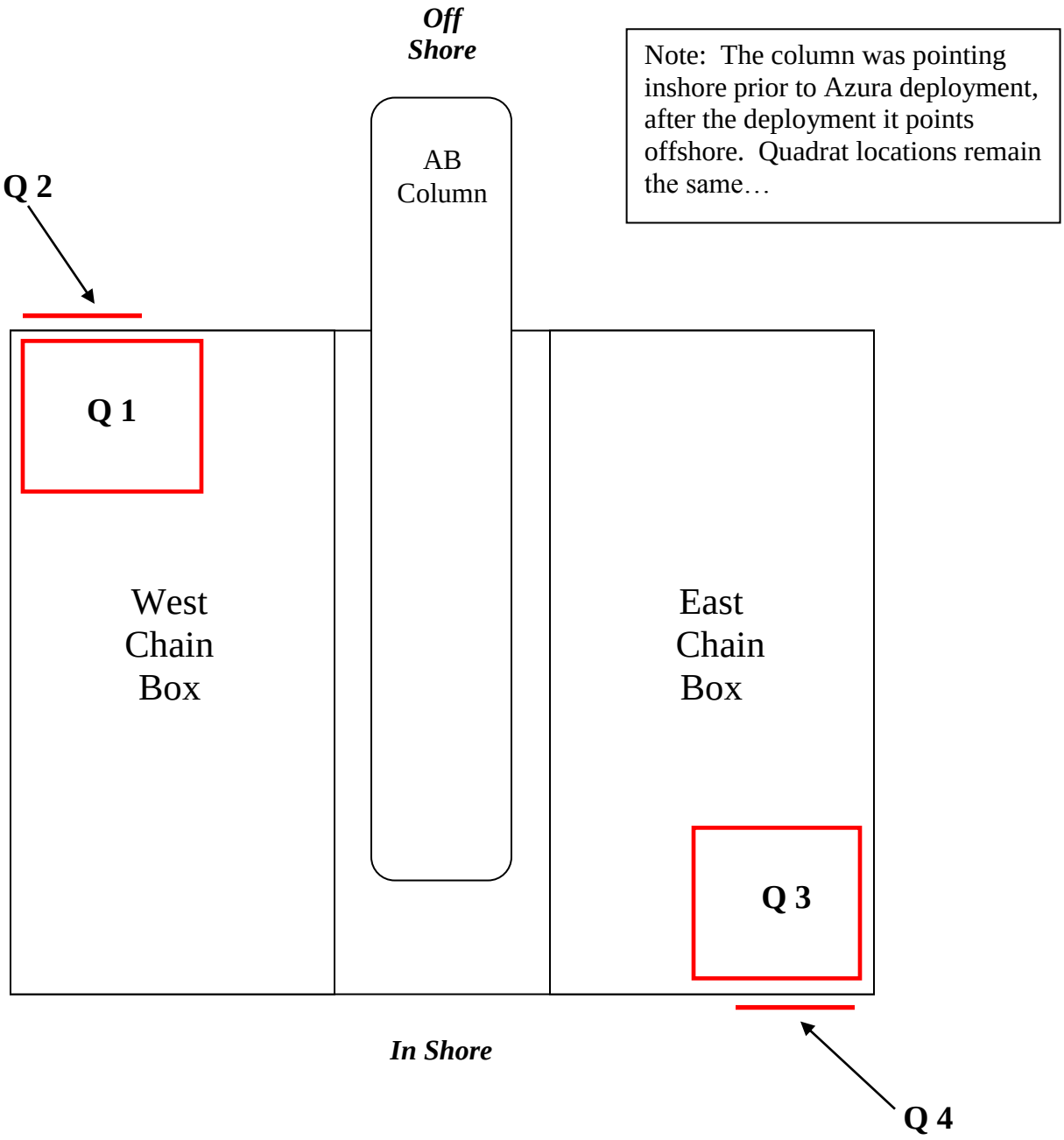


Figure 20. Chain Boxes Quadrat 4 50 X50cm

Appendix A: Chain Box AB Quadrat Locations

(not to scale)



Q 1 & Q 3 - 100cmx100cm

Q 2 & Q 4 - 50cmx50cm