



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

May 19, 2022

Group Chair's Factual Report

SEARCH AND RECOVERY

DCA21FA174

Attachment 7 - EFH Report
(82 pages)

EFH Environmental Statement Prepared for NOAA NMFS

RECOVERY OF TRANSAIR FLIGHT 810,
BOEING 757-257C, N810TA



Submitted to:
Anne Chung
Marine Resource Specialist
NOAA Fisheries | U.S. Department of Commerce
Mobile: [REDACTED]
Work: [REDACTED]

Submitted by:
Eclipse Group, Inc.
1997 Annapolis Exchange Parkway, Suite 300
Annapolis, MD 21401
Ph.: 410.533.3041
Fax: 410.972.4701
www.eclipse.us.com

NOTE: It is a violation of Federal Regulation 49 CFR Part 831.13 for any party other than the NTSB to release any information about wreckage or the accident. This includes any photos, sketches, written descriptions, or statements.

Copyright Eclipse Group, Inc. 2021. All rights reserved. For permissions contact Steven Saint Amour – ssaintamour@eclipse.us.com. This Recovery Plan shall not be disclosed or duplicated, used, or disclosed – in whole or in part – for any purpose other than to secure the Search and Recovery Services Agreement between Eclipse Group, Inc. ("EGI") and the Insurers ("SRSA"). However, if the SRSA is executed and the Insurers pay the amounts due under the SRSA, then the Insurers shall have the right to duplicate, use or disclose the Recovery Plan to the extent provided in the resulting contract.

Contents

INTRODUCTION	3
PROJECT BACKGROUND	3
JUSTIFICATION	3
ENVIRONMENT	4
ESSENTIAL FISH HABITAT - BEST MANAGEMENT PRACTICES	8
REMOVAL OF THE WRECKAGE	12
EVALUATION TO ESSENTIAL FISH HABITAT	13
PHYSICAL CONTACT WITH SUBSTRATE	14
BOLD HORIZON CONTACT WITH SUBSTRATE	14
POLLUTION CONTROL	18
AQUATIC INVASIVE SPECIES	19
CONCLUSION	21
Appendix A: Release Report to the Hawaii Department of Health	22
Appendix B: Environmental Summaries	31
Appendix C: DAR Report - Bold Horizon Substrate Injury Assessment	66

INTRODUCTION

Eclipse Group Inc. (EGI), under contract to AIG Aerospace, was tasked with the recovery of the TransAir Flight 810 aircraft fuselage, engines and associated debris. At the completion of the operation, all recovered materials were delivered to Kalealoa Barbers Point Port. EGI provided the vessel, ROV and subsea navigation services in the form of EGI's R/V Bold Horizon Research Vessel (BH), derrickbarge - D/B SALTA VERDE (DBSV), Barge assist Tug, GP-50 ROV System and all personnel required for the operation of this equipment. Darla White was retained as an environmental consultant to serve as part of the executive planning team and protected species observer during recovery operations.

PROJECT BACKGROUND

A Boeing 737-257C, operated by Rhoades Aviation as TransAir Flight 810 and registered as N810TA operating under 14 Code of Federal Regulations Part 121 as a cargo flight departed from Daniel K. Inouye International Airport (HNL) to Kahului International Airport (OGG), Kahului, Hawaii on July 2, 2021.

At approximately 0145 local time the airplane ditched into the Pacific Ocean south of the island of Oahu, about two nautical miles south of the Kalaheo Airport. The occupants were two pilots who were subsequently rescued. The area is known as Mamala Bay. A preliminary survey was conducted by use of a remote operated vehicle (ROV), which found that seafloor depths ranged from 340 – 440 feet seawater (FSW).

JUSTIFICATION

The aircraft recovery effort was classified as an emergency recovery effort by the National Transportation Safety Board (NTSB). The flight recorders and aircraft needed to be recovered in order to ascertain the probable cause in order to prevent future accidents. Additionally, the cargo onboard, at least in part, was known to contain pharmaceuticals, although none were listed as hazardous materials.

EGI has prepared the following EFH Environmental Statement for NOAA, in compliance with EFH consultation requirements.

ENVIRONMENT

The wreckage of the TransAir 810 aircraft covered an area of seafloor approximately 200 m x 130 m in depths of 340' - 440' (103 m - 134 m; Figures 1-3). The area was characterized as having a large slope running from shore seaward at a southeast bearing for a depth change of 100' (30 m) over the wreckage field. Areas of steep slope were present, though no vertical drop-offs were found. This area was characterized as predominantly soft sediment over hard substrate with low vertical complexity (< 1 m). Due to the lack of structural habitat complexity, this area was expected to have few benthic, demersal, and nektonic species associated with the habitat. The aircraft structure on the bottom attracted fishes and invertebrates over the three months that the wreckage was present, and had the potential to attract curious protected species such as monk seals or cetaceans. This area borders critical habitat for ESA-listed species Hawaiian Monk Seals (*Neomonachus schauinslandi*) and the Hawaii Distinct Population Segment of Insular False Killer Whales (*Pseudorca crassidens*).

The temporary nature of the salvage operation was likely to disturb infaunal communities (e.g., worms, molluscs, crustaceans, small burrowing fishes, etc.) over anchorage areas around the wreckage site. The impact to the anchor sites would likely damage or kill infauna directly under the anchors and in areas that the anchors may drag. This was not expected to have lasting impacts on the infaunal community over the region as these were relatively small disturbance areas. Additionally, some unavoidable yet minor disturbance was expected with the lifting operations necessary to retrieve the aircraft. The anchorage areas were surveyed prior to and after removal of the anchors using the ROV to record the disturbance impact.

There were two features nearby that would be avoided. To the east of the wreckage is the Ewa Deep Artificial Reef zone, the boundary of which is depicted by four dots in Figures 1 and 2, and a wastewater outfall pipe approximately 300 m shoreward of the wreckage, shown as a red bar in Figures 1 and 2.

The following three charts overlay the wreckage site with the critical habitat for both false killer whales and Hawaiian monk seals. The wreckage falls outside of both but close enough to be considered when placing anchors for the DBSV. The debris area is in a military exclusion zone.

Eclipse Group retained the services of Marine Ecologist, Darla White, to serve as the protected species observer and environmental consultant on this project. She observed all operations to ensure that best management practices were implemented (see list below) in the event of visits from ESA-listed species, and to identify sensitive species (e.g., deep-sea corals) to avoid in the operation area.

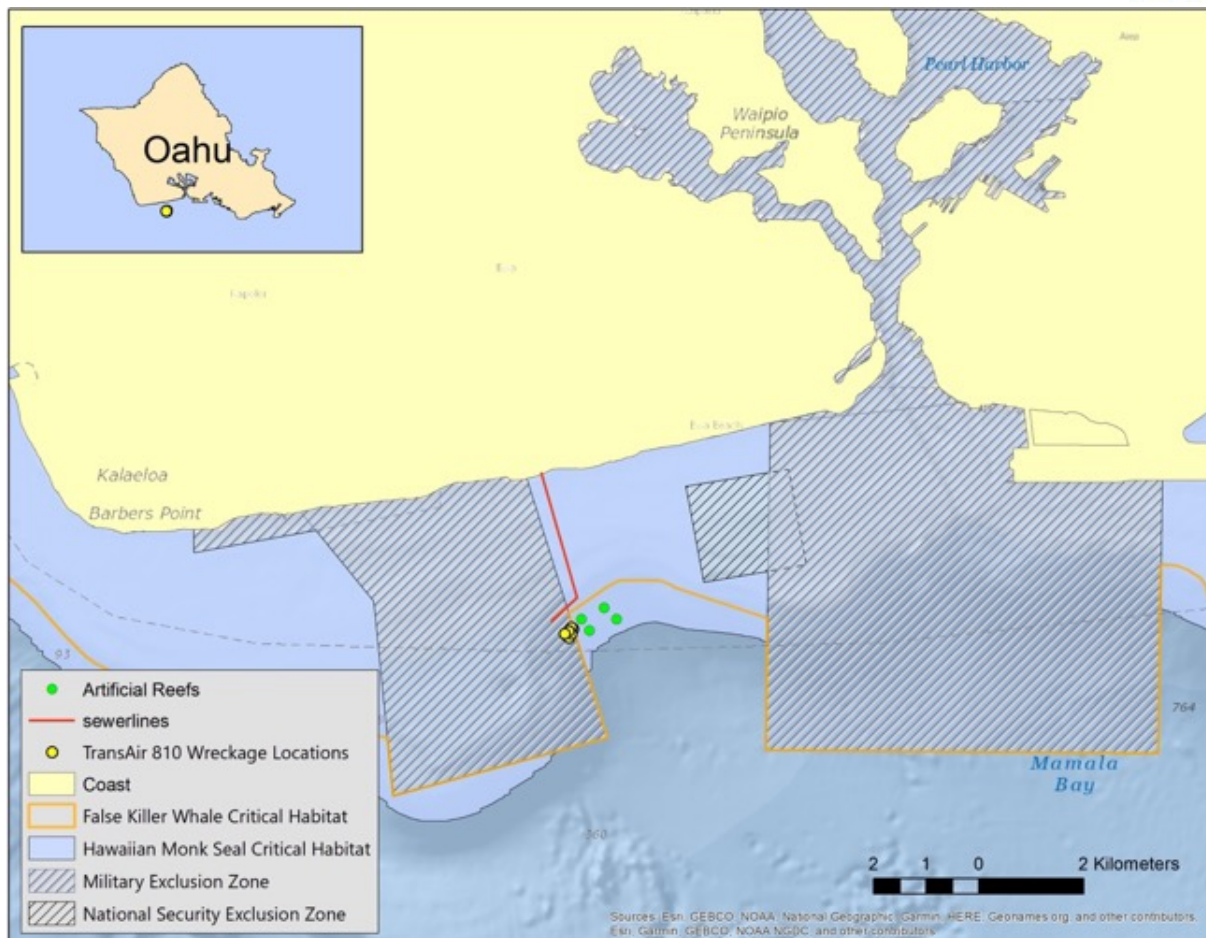


Figure 1. Location of operation and related zones.

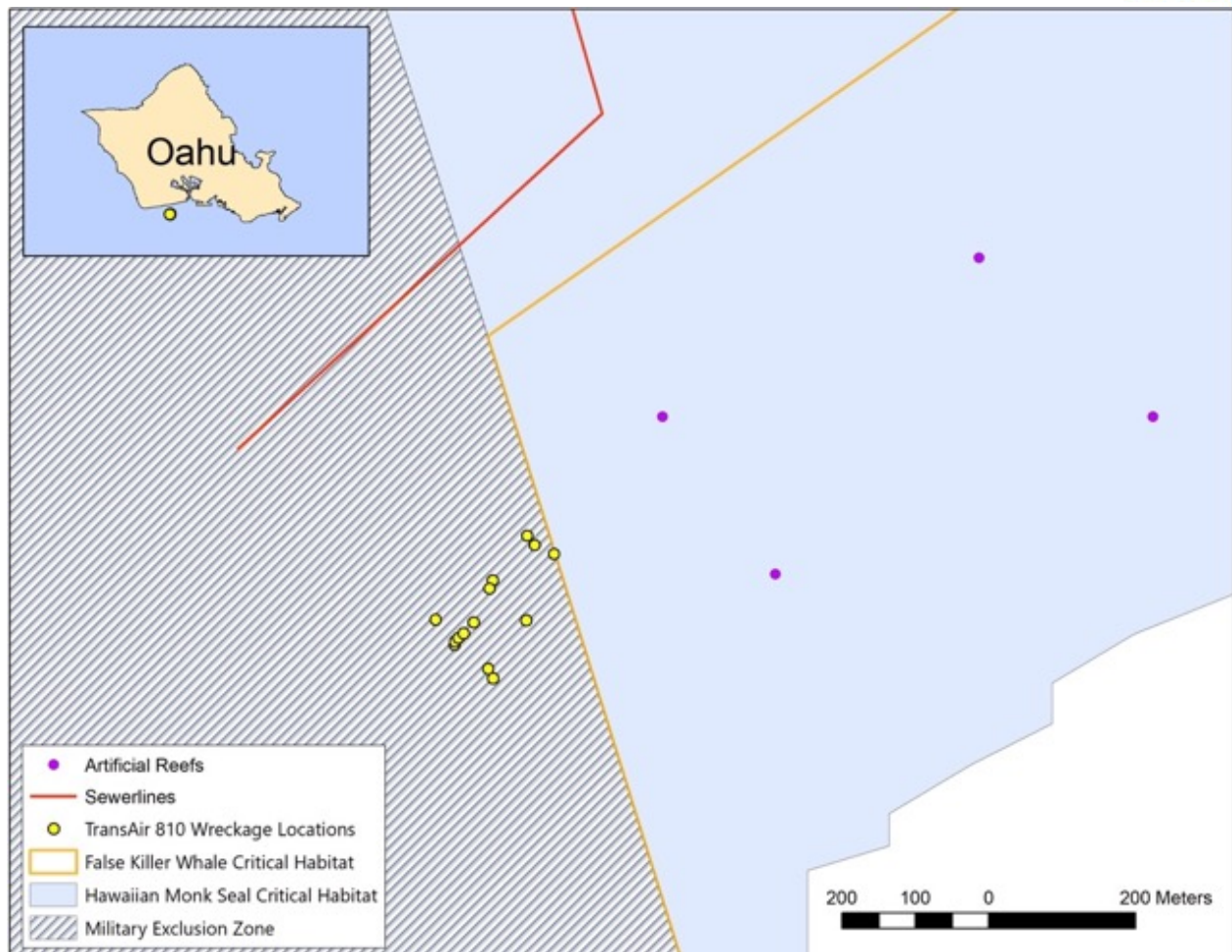


Figure 2. Closer view of location of features near operation.

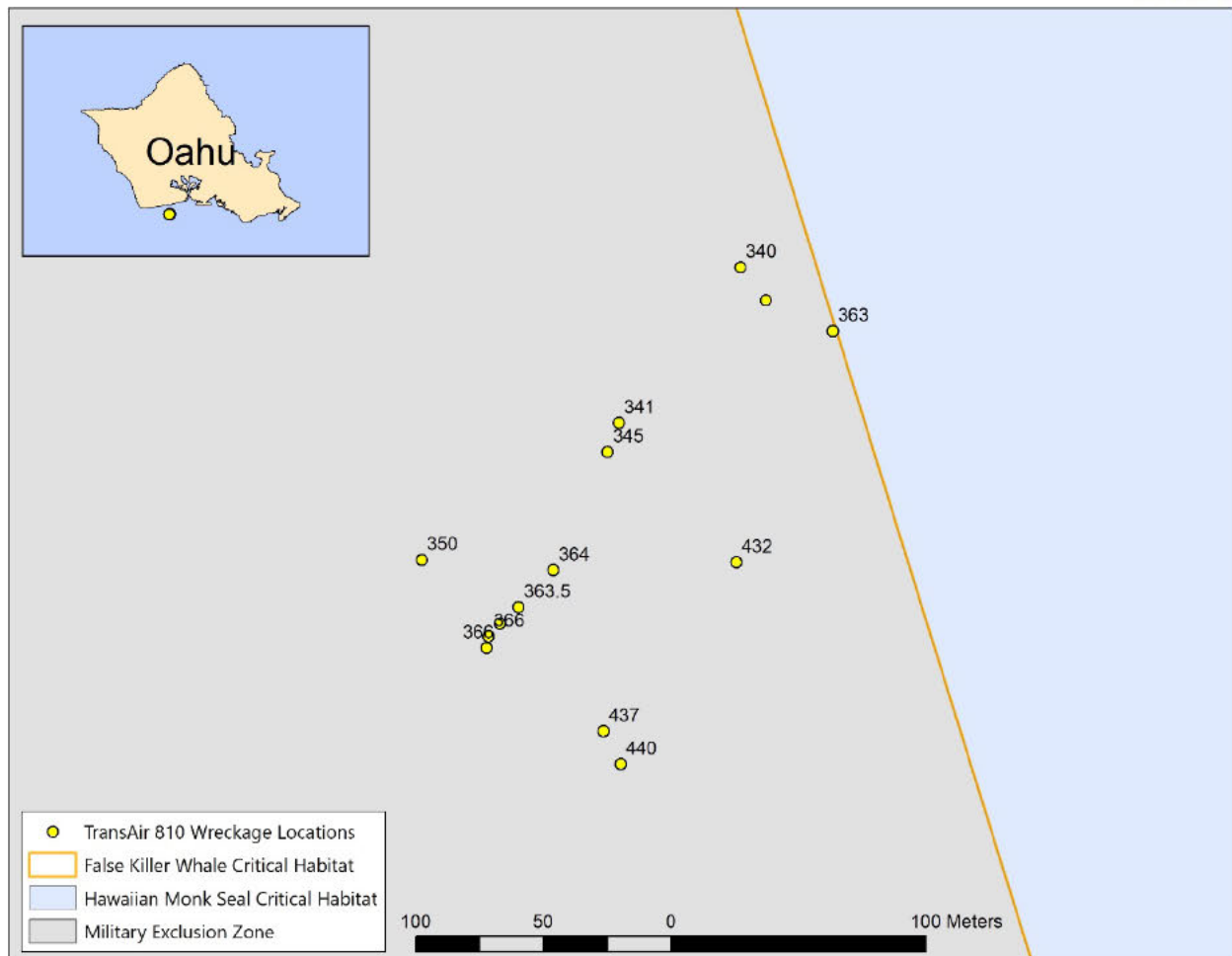


Figure 3. Recorded wreckage locations and depths.

Table 1. Aircraft wreckage coordinates.

Target Name	X	Y	Latitude	Longitude	Depth (Ft)	Video time
Tail Section (with Main Wings)	601212.4 2	2353304.3 8	21° 16' 43.2873" N	158° 01' 27.6581" W		7/7/2021 16:45:36
Aft of Tail Section	601236.9 7	2353292.7 4	21° 16' 42.9038" N	158° 01' 26.8086" W	363	7/7/2021 16:56:41
Forward of Tail Section	601203.0 3	2353317.2 3	21° 16' 43.707" N	158° 01' 27.9811" W	340	7/7/2021 17:01:06
APU	601111.1 3	2353168.3 6	21° 16' 38.8839" N	158° 01' 31.2017" W	366	7/8/2021 9:19:12

Engines	601111.8 4	2353172.9 4	21° 16' 39.0325" N	158° 01' 31.176" W	366	7/8/2021 9:21:30
Nose Landing Gear	601115.9 3	2353177.8 3	21 °16' 39.1909" N	158° 01' 31.0332" W	354.5	7/8/2021 9:29:28
Forward of Cockpit Section	601122.7 9	2353184.3 1	21° 16' 39.4002" N	158° 01' 30.7938" W	363.5	7/8/2021 9:33:16
Aft of Cockpit Section	601135.3 9	2353198.8 6	21° 16' 39.871" N	158° 01' 30.3533" W	364	7/8/2021 9:36:25
Thrust Reverser Engine 1	601154.0 4	2353136.1 9	21° 16' 37.829" N	158° 01' 29.7198" W	437	7/8/2021 9:58:48
Inlet Guide Vane	601160.4 2	2353123.4 6	21° 16' 37.4135" N	158° 01' 29.5009" W	440	7/8/2021 10:06:15
Tires	601202.3 6	2353202.3 7	21° 16' 39.9715" N	158° 01' 28.029" W	432	7/8/2021 10:24:50
FedEx Cargo Can (SAA 34562 FX)	601158.9 6	2353256.4 2	21 °16' 41.7382" N	158° 01' 29.5234" W	341	7/8/2021 10:36:19
TransAir Cargo Can (SAA 4054 TXHA)	601154.9 1	2353244.9 9	21° 16' 41.3671" N	158° 01' 29.6662" W	345	7/8/2021 10:39:18
Keel Beam	601087.2	2353202.5 2	21° 16' 40" N	158° 01' 32.0246" W	350	7/8/2021 13:52:59

X and Y coordinates are UTM North Zone 4 meters. Depth is from ROV pressure sensor.

ESSENTIAL FISH HABITAT - BEST MANAGEMENT PRACTICES

This operation is classified as an emergency operation and although only minimal residual fuel was believed to remain in the wreckage, all efforts were taken to prevent further impact on the local environment, habitat, and species, regardless of protection status.

Best Management Practices (BMPs) as provided by NOAA consultations were implemented at all times and are detailed below. Eclipse Group has retained Marine Field Ecologist, Darla White to coordinate for the protected species related environmental monitoring requirements and BMP implementation in the

event of animal interaction with operations. Ms. White was part of the project planning, and ensured all parties were knowledgeable of the BMPs, recorded observation data, and summarized the observations into a report upon completion of the recovery operation.

Below is the list of NOAA EFH consultation BMPs and responses with each as were addressed:

1. Equipment, anchors, structures, or fill shall not be deployed in areas containing live corals, sea grass beds, or visible benthic organisms. Perform pre-deployment reconnaissance (e.g., divers, drop cameras) to ensure these resources are avoided.

The only vessel anchored on site was the DBSV, in a 4-point mooring. The tug sought shallow, sandy anchorages in shallower waters inshore from the wreckage site where they could assess the sand patch. The proposed anchor locations for the DBSV were reviewed with the State of Hawaii and NOAA.

The Bold Horizon used the ROV to survey the proposed anchor locations. The sites were surveyed within a 25 m radius using an east/west transect pattern throughout the buffer zone. Video and photos were collected, as well as written descriptions of observations (Appendix B). The barge's actual anchorage had to be modified based on prevailing wind, seas, and currents (Figure 4). The barge anchored twice, once for the recovery of the nose section which was taken to shore shortly thereafter, and a second time for the recovery of the aft section of the fuselage. Four of these anchorage sites fell within the critical habitat area for monk seals and false killer whales. Two were on the north side of the Ewa Deep Artificial Reef and two were downslope on the south side of the artificial reef zone. All actual anchor sites were surveyed on the last day of operations using the ROV to record the environmental disturbance. Video and screen shots were acquired of the sites and are available upon request. These areas are characterized as very low relief (< 1m), with sand/sediment over hard substrate (pavement), and infrequent signs of life, especially in the deeper region. The anchor and cable scars were clear and most were found. No sensitive habitats were disturbed and with one exception (NW site where there was a lot of fleshy algae), the substrate was pretty desolate. There were several cement blocks and pipes that were apparently intended for the artificial reef site.

The DBSV was fitted with a version of heavy Danforth anchor design (Figure 5). To prevent wire rope from cutting back and forth on bottom features, chain was used between each anchor and the wire rope leading to the barge.

2. Minimize physical contact by divers and construction related tools, equipment, and materials with benthic organisms, regardless of size, especially corals and seagrass.

The substrate where the wreckage field was located was characterized as predominantly sand/sediment over pavement, with some exposed pavement and occasional rocks and very low complexity (< 1 m). Echinoderms, sponges, *Codium* sp., and crustose coralline algae were the most prevalent and visible benthic organisms (Appendix B). Visual coverage estimates of mobile invertebrates and live rock were less than 0.01%.

The ROV contact with the substrate was minimal, and all visible marine life was avoided when contact was necessary. Contact with the substrate occurred when the baskets were set out for the collection of debris, but no visible life was covered. Contact with the substrate occurred during the rigging of the larger pieces for lift, and during removal efforts, though all efforts avoided visible benthic marine life. The ROV made

contact with fleshy algae when surveying the northwestern-most anchor site for anchor disturbance.

3. Prevent trash and debris from entering the marine environment during the project.

No additional trash or debris entered the marine environment during the project that was not a part of the aircraft wreckage. The wreckage debris sluffed paint chips and insulation that were water-soaked and small enough to be filtered out of the baskets when lifting onto the ship. Additionally, some small debris still remains. EGI estimated that 99% of the aircraft wreckage was recovered. Some small debris (< 3' x 3') remains. One of the cargo containers that was located during the original survey was not located during the three weeks that the ROV spent recovering debris and the search had to be concluded.

4. Maintain all structures, gear, instrumentation, mooring lines, and equipment to prevent failures.

All equipment was inspected for cleanliness and leaks prior to daily operations. Operations were to be postponed when a leak was detected until repaired and cleaned.

One instance of damage to a hydraulic hose on the ROV occurred and one pint of hydraulic fluid was released. The hydraulic fluid used was biodegradable and expected to do no harm. A report was submitted to the Hawaii Department of Health and is attached in Appendix A of this report, along with documentation of the hydraulic fluid.

5. All objects lowered to the bottom shall be lowered in a controlled manner. Note: This can be achieved by the use of buoyancy controls such as lift bags, or the use of cranes, winches, or other equipment that affect positive control over the rate of descent.

The ROV, baskets, and rigging were all lowered and raised in a controlled manner. All used the ROV and/or winch with four cameras, ship positioning, and deck crew oversight for all operations.

6. In order to minimize malfunction, prior to operations employing submersibles, a pre-deployment test of all operating systems should be run to ensure that equipment is operating correctly, there are no visually apparent physical defects, and conditions are conducive to operations.

The ROV was thoroughly checked before each deployment as standard operating procedure.

7. All submersible missions should have a plan that details the mission, geographic locations, and deployment and retrieval plans to minimize the potential for collisions and groundings and ensure proper retrieval.

The operations plan was disseminated to all agencies for review prior to operations.

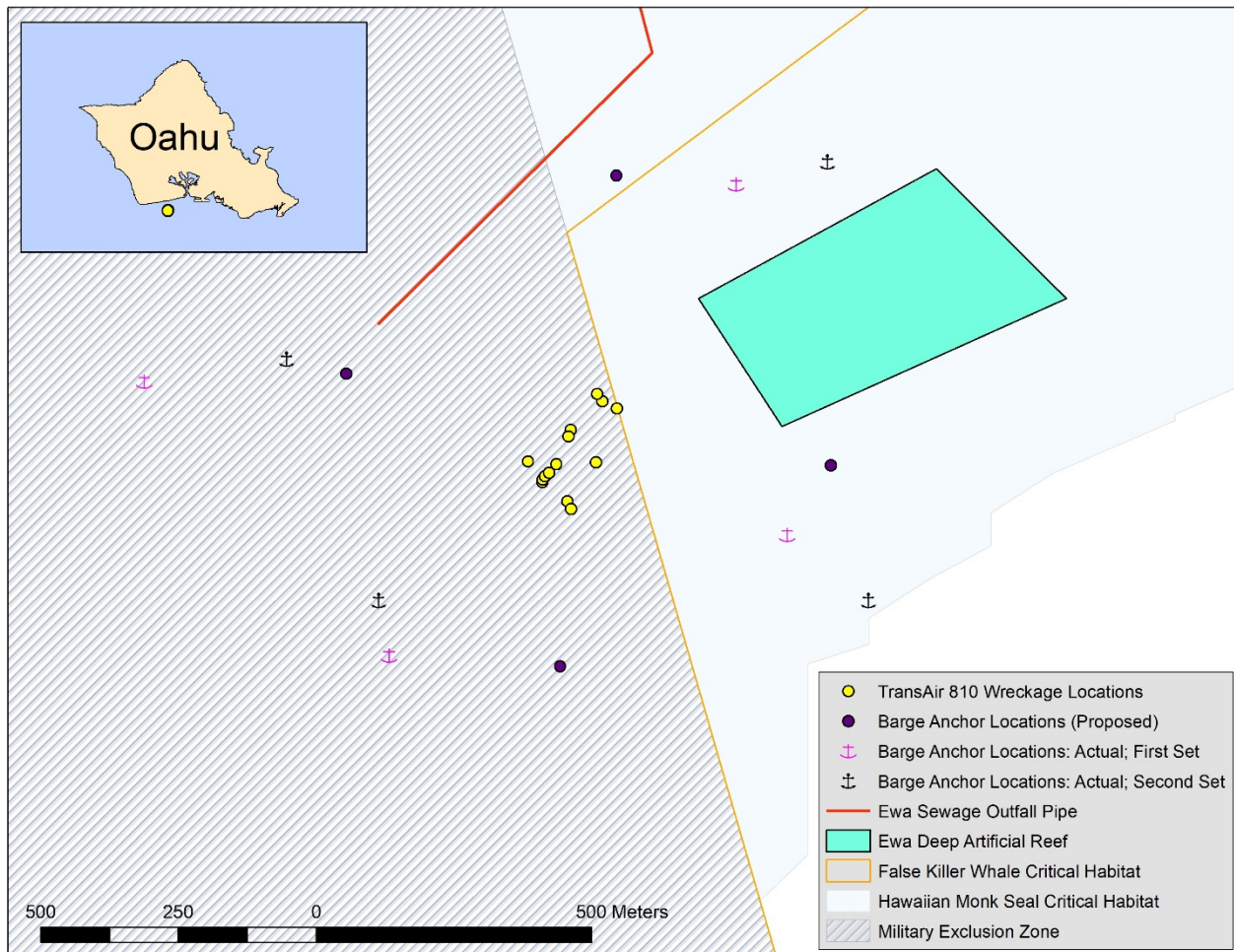


Figure 4. Proposed and actual barge anchor sites.

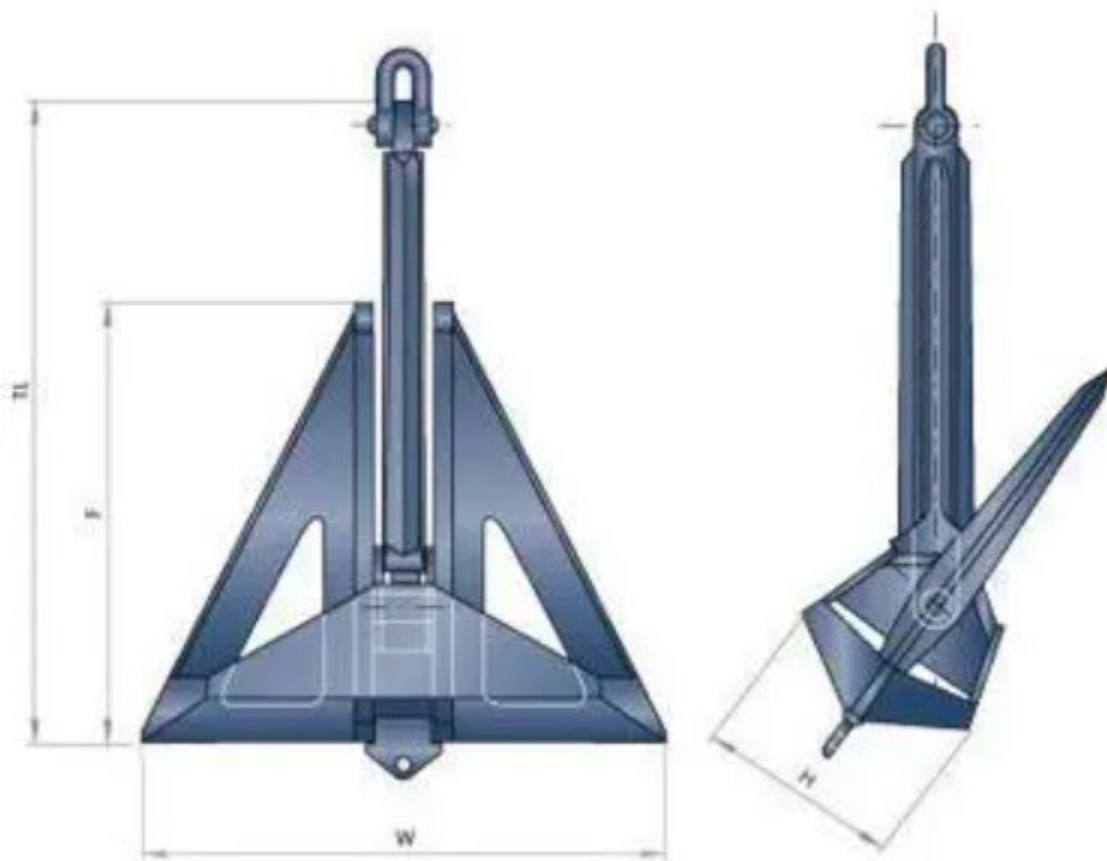


Figure 5. DBSV anchor style (typical). Photo credit www.nauticexpo.com

REMOVAL OF THE WRECKAGE

Removal operations commenced on Tuesday, October 12th and concluded on Sunday, October 31st. All operations were engineered by a team of very experienced professionals at all levels. Removal of the wreckage was dependent on ocean and wind conditions due to the weight of the wreckage, the ROV cable, the winch and crane cables used to extract the wreckage from the water, and the safety of deck operations. The removal of the larger sections of the fuselage required ideal conditions (i.e., flat sea state; light to no wind). Ocean and wind conditions were not optimal for most of the time frame and ROV operations were scheduled at 4am to utilize the best part of the day for most of the time as winds picked up late morning most days. The ROV team was on site the maximum possible time to achieve the recovery objectives.

Recovery Objectives:

- All items identified by the NTSB essential to the investigation during the course of the operations.
- Specific items identified for recovery include the following:
 - Aircraft cockpit
 - Main fuselage – to include:

- Flight data recorders
- Internal Cargo Containers
- Engines
- Thrust Reversers
- Removal of misc. wreckage to include:
 - Forward landing gear
 - Separated Aircraft components
 - Cargo containers
 - Airplane debris, sheet metal etc.

There were two weather windows in which the two large pieces of the fuselage were lifted and taken to Barber's Point Harbor. All objectives were successfully met during the specified time frame, with one exception. One of the TransAir cargo containers was not located. It was not present at the site where it was identified on the initial survey immediately after the crash, even with the updated adjustments to the coordinates (based on the other wreckage). The ROV team thoroughly searched the area surrounding the wreckage site both visually and with sonar. The sonar can search 50-100m out from the ROV and they were unable to locate it over the nearly three weeks of search and recovery. There was reportedly a field of tires near the missing container, and that was not seen either. NTSB representatives onboard verified seeing them in the initial survey. The NTSB was present on all ROV operations. Given the extended project time and extensive search for the container, the effort had to be concluded.

The ROV did a thorough sweep of the wreckage site and surrounding area looking for remaining debris. Photos and video were taken of remaining debris. The main debris field where the bottom of the nose of the plane was ripped off upon impact still had a bit of debris (n= 20 - 30 pieces), but all small stuff. The largest pieces were removed. EGI estimates that 99% of the debris was recovered.

No sensitive habitats were disturbed (e.g., coral, live rock, complex habitat). Minimal disturbance to the sandy substrate was made by the ROV and rigging during operations. All lifts were vertical and there was no dragging of wreckage or baskets. NOAA and other agencies were sent a daily summary of activities which are attached.

EVALUATION TO ESSENTIAL FISH HABITAT

EFH in the main Hawaiian Islands has been designated in the marine water column from the surface to a depth of 1,000 meters (m), from the shoreline to the outer boundary of the Exclusive Economic Zone (200 nautical miles), and the seafloor from the shoreline out to a depth of 700 m. All of the wreckage site and operations took place within EFH. For emergency situations, 50 CFR § 600.920 of the EFH Final Rule discusses requirements for consultation if the actions may adversely affect EFH. Due to the emergency nature of this recovery effort, the consultation may take place after the fact.

The aircraft recovery operation had the potential to cause direct and indirect adverse effects to EFH and NOAA trust resources in the following ways:

- Physical damage from anchoring, rigging of the fuselage for lifting, ROV operations, basket deployment and retrieval, and secondary wreckage damage.
- Pollution stress from contaminants potentially still within the aircraft, vessels, and/or the ROV.
- Invasive species from ballast water, hulls, or equipment.

PHYSICAL CONTACT WITH SUBSTRATE

Surveys of the proposed anchor locations indicated vast expanses of low relief (< 1 m) sloped substrate with shallow sediment on top of pavement, and infrequent visible life (e.g. sea stars; *Codium* spp.). No sensitive complex habitats were observed. We encountered occasional rectangular cement slabs and 3' diameter cement pipe which were on the surface of the substrate (Figures 5 and 6). These were likely intended for the Ewa Deep Artificial Reef Area nearby. The barge anchored at four locations in order to lift the larger pieces of the wreckage from the bottom vertically (Figure 4). The two large pieces of the fuselage required two trips and therefore two anchor sets. The ocean sea state, currents, and winds were major factors in the positioning of the barge and anchors. The impact and disturbance to the substrate by the anchors was minimal and no sensitive habitat was impacted. Surveys of the anchor sites revealed indications of the anchor cable and minimal disturbance to the habitat (Figures 7 - 9). These photos are representative samples of the overall area. The ROV video recordings and numerous screen grabs are available upon request. More representative photos were disseminated with the daily environmental summaries in Appendix B.

The ROV contact with the substrate was minimal, and all visible marine life was avoided when contact was necessary. Contact with the substrate occurred when the baskets were set out for the collection of debris, but no visible life was covered. Contact with the substrate occurred during the rigging of the larger pieces for lift, and during removal efforts, though all efforts avoided visible benthic marine life. The ROV made brief contact with fleshy algae when surveying the northwestern-most anchor site for anchor disturbance.

BOLD HORIZON CONTACT WITH SUBSTRATE

On October 23, at approximately 7:30 pm, the Bold Horizon made contact with shallow substrate briefly before heading back to deeper water approximately one mile south of Ewa Beach. The Hawaii Division of Aquatic Resources (DAR) sent a dive team out to assess the damage to the substrate and get a more accurate GPS location. Figures 10 and 11 shows the three sites listed in the report, the Bold Horizon's original reported location, DAR's Diamondhead Marker 2, and DAR's approximate midway point. These were mapped using ESRI ArcGIS ArcMap, by Darla White. The three GPS coordinates fall within the National Security Exclusion Zone boundary, as sourced from NOAA's Hawaiian Monk Seal Critical Habitat GIS files. The damage occurred 3 m and 16 m distance from the Diamondhead Marker 2 (see report Appendix C). The habitat was predominantly fleshy algae over pavement substrate. No corals were involved. The total area of the contact scar is 5.46 square meters. DAR will seek monetary fines from Eclipse Group Inc. for the live rock damage and survey costs.

Based on the above observations, activities, interactions, and the employment of BMPs to avoid and mitigate potential adverse effects to EFH, EGI determined that the physical interactions with the substrate during the aircraft recovery operations were minimal, temporary, or short-term effects to EFH.

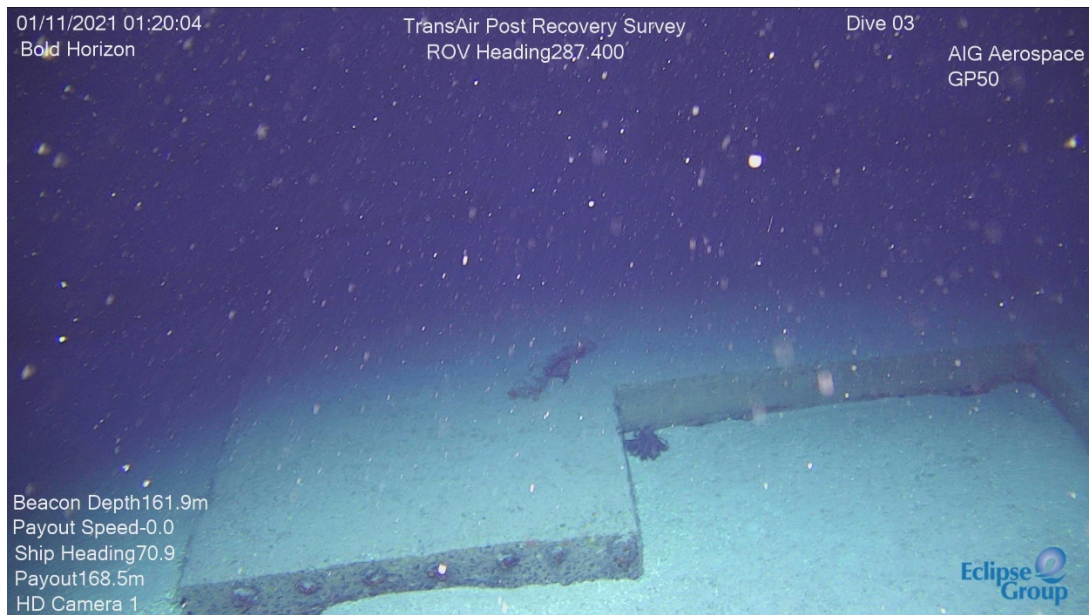


Figure 5. Cement slabs found in the anchorage region south of the artificial reef site.

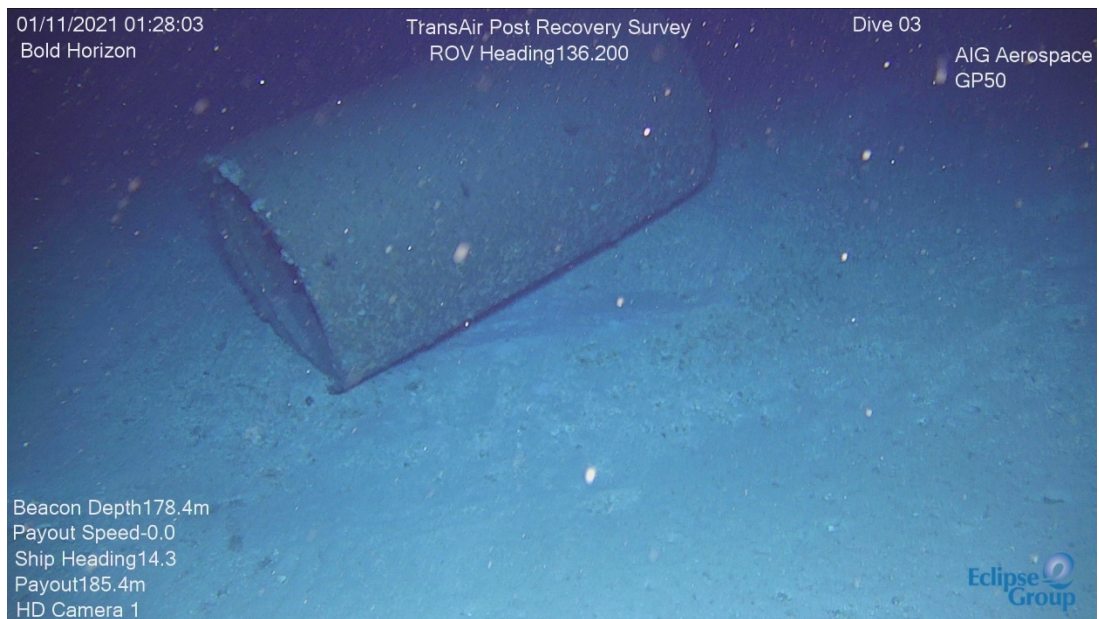


Figure 6. Cement pipe found in the anchorage region south of the artificial reef site.

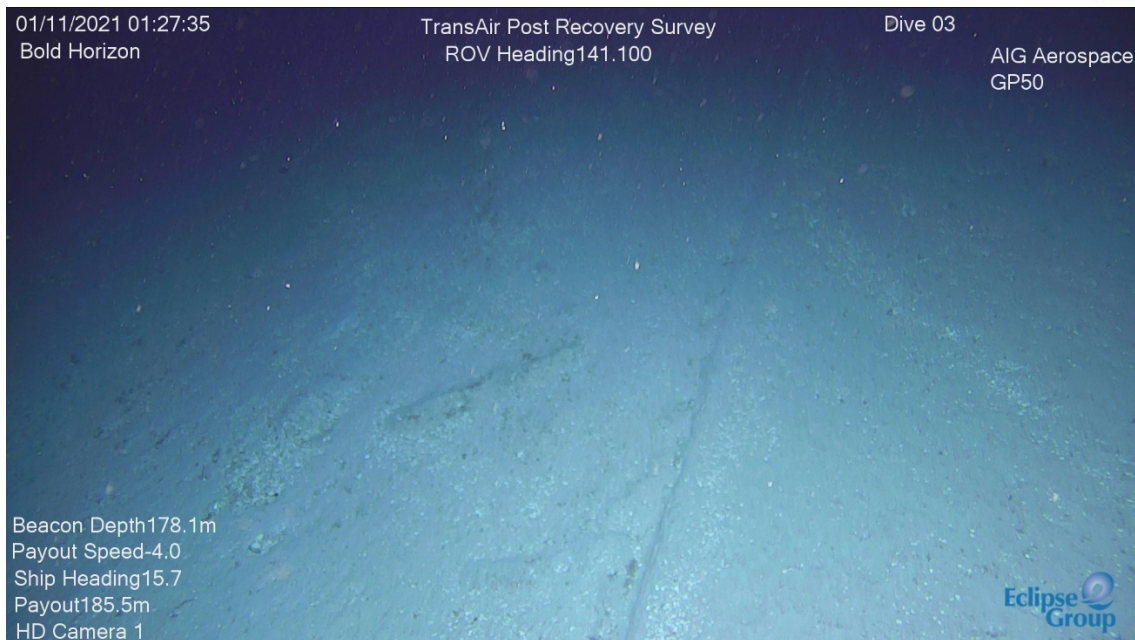


Figure 7. Anchor cable scar on the substrate in critical habitat zone south of artificial reef area.



Figure 8. Anchor scar on the substrate in critical habitat zone south of artificial reef area.

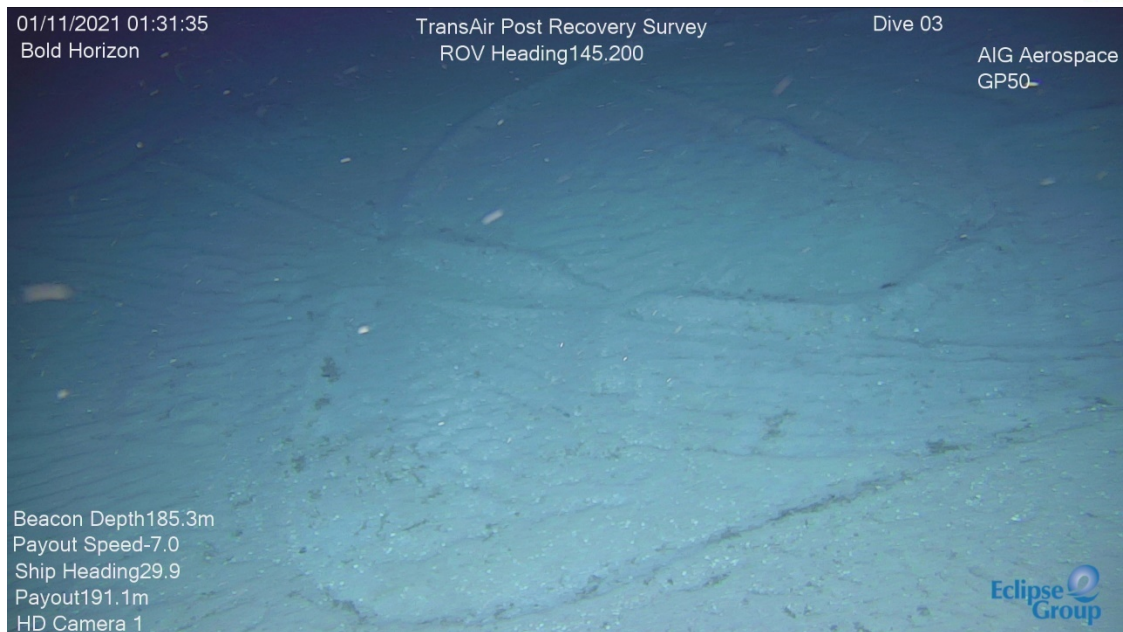


Figure 9. Anchor and cable scar on the substrate in critical habitat zone south of artificial reef area.

POLLUTION CONTROL

CHEMICAL, FUEL, OIL

Lone Star Retrieval (LSR) was responsible for defueling, which was done on the DBSV by LSR subcontractor Pacific Environmental Company (PENCO). PENCO had the oil spill response vessel (OSRV) NRC SENTRY on scene prior to and during lifting of the large section which contained the fuel tanks.

OSRV NRC SENTRY was on site positioned down-current from potential sources of release. The OSRV was fitted with containment boom, 2 skimming systems, outrigger arms, and recovered oil storage, but due to the light-end nature of the jet fuel, SENTRY would have likely opted to deploy her outrigger arms along with a wide, U-shaped "pocket" of sorbent material. This wide-sweep method would result in the most efficient and efficacious recovery, given the operating environment and product to be recovered. On-scene adjustments to this plan would have been made by NRC's response personnel in collaboration with the salvage master, based on experience and on-scene conditions. NRC SENTRY and her crew are the best equipped to make best efforts to recover spilled oil, but made no guarantees of recovering every drop of released product.

While no loss of fluid was anticipated, the BH ROV utilizes a biodegradable hydraulic fluid.

All equipment was inspected for cleanliness and leaks prior to daily operations. Operations were to be postponed when a leak was detected until repaired and cleaned. One instance of damage to a hydraulic hose on the ROV occurred and one pint of hydraulic fluid was released. The hydraulic fluid used was biodegradable and expected to do no harm. A report was submitted to the Hawaii Department of Health and is attached in Appendix A of this report, along with documentation of the hydraulic fluid.

As detailed elsewhere and discussed with both State of Hawaii and NOAA, very little fuel was expected to remain in the airplane fuel tanks by virtue of both the accident and fuel tank venting designs. Regardless, to capture the maximum possible amount of petroleum products, the recovery plans included:

1. Extensive absorbent materials to be placed around the wing tanks and edge of the barge deck.
2. A specialized Honolulu-based maritime environmental response company, Pacific Environmental Group (PENCO), stationed an oil skimmer (OSRV SENTRY) downstream of the wreckage prior to the raising in order to capture all possible leakage as soon as it was known.
3. PENCO personnel experienced in de-fueling safely were aboard the barge to perform the de-fueling operation when the wing section was brought aboard.
4. A 6,000 gallon ISO tank was placed adjacent to the wing for defueling as efficiently as possible and in as limited of a space as possible. As a contingency, the barge was originally built and certified to transfer oil products and if something were to happen to the ISO tank, the water/fuel mix could be temporarily captured in the barge.
5. Deck spills would have been remediated with absorbents. These included placement of a cofferdam of fuel absorbents at the periphery of the barge deck and around the portions of wing which contain

fuel tanks that may leak. Further, absorbent material is normally preventively placed near heavy hydraulics.

6. Once at a pier and with the wings unloaded to shore, the water/fuel mixture in the ISO tank was moved from the barge to shore. A PENCO truck moved the mix to a dedicated waste facility in accordance with PENCO standard procedures already in place with the State of Hawaii. PENCO personnel cleaned any remaining spillage from the barge.

No spills occurred.

Based on the above observations, activities, interactions, and the employment of BMPs to avoid and mitigate potential adverse effects to EFH, EGI determined that pollution discharges during the aircraft recovery operations were minimal, temporary, or short-term effects to EFH.

AQUATIC INVASIVE SPECIES

The operation was coordinated with NOAA and the State of Hawaii to best prevent biological contamination by vessels from other environments. These mitigations included:

1. The BOLD HORIZON (BH) had the hull cleaned prior to departure. Images of the bottom of the hull have been provided. The BH was inspected upon arrival.
2. Derrick Barge Salta Verde was inspected for lack of organisms prior to leaving Long Beach.
3. Tug Shirley C was inspected for lack of organisms prior to leaving Long Beach.
4. None of the vessels anticipate bringing ballast for discharge into Hawaiian waters.

Based on the above mitigative activities and the employment of BMPs to avoid and mitigate potential adverse effects to EFH, EGI determined that threat of aquatic invasive species introduction during the aircraft recovery operations was minimal to EFH.

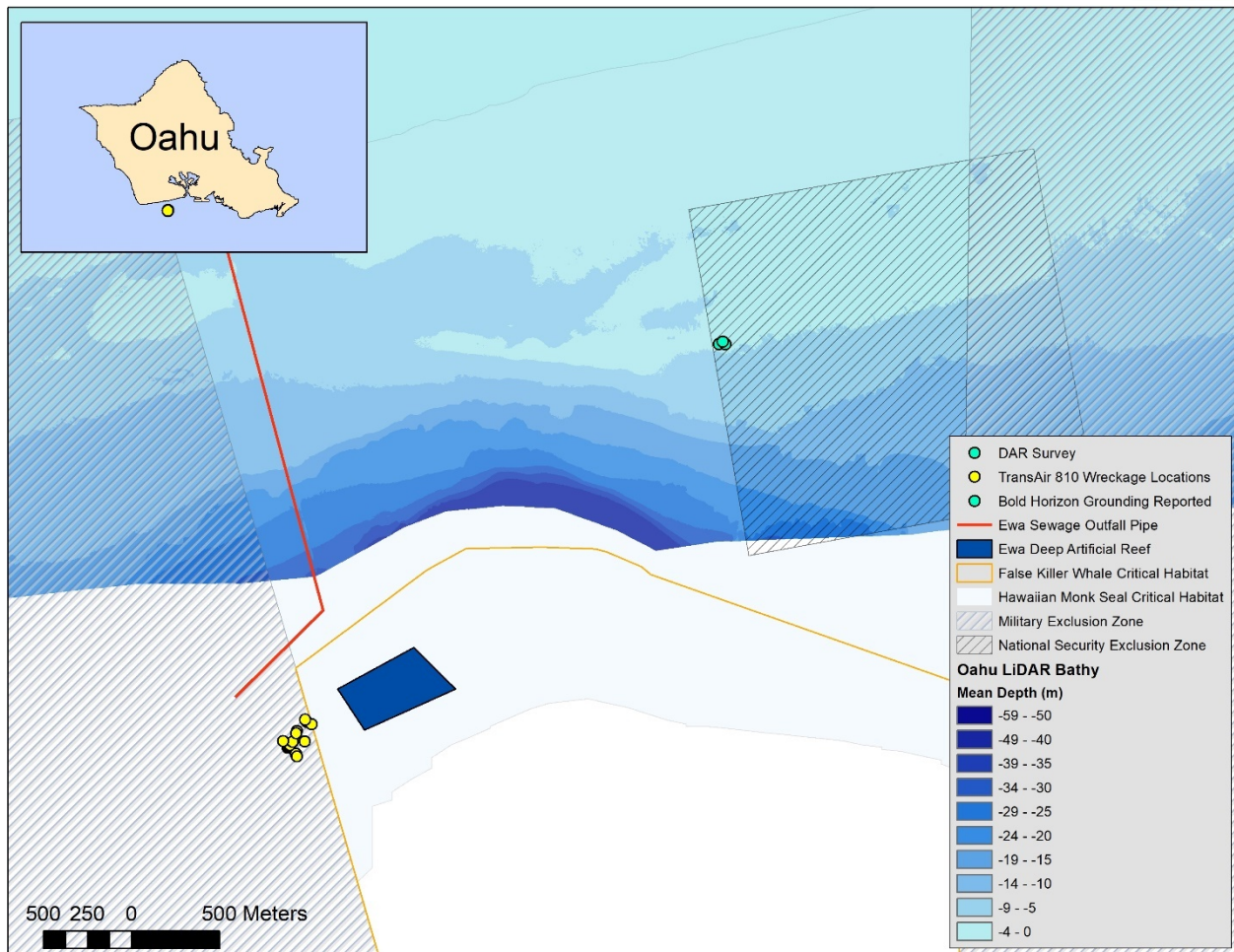


Figure 10. Bold Horizon substrate contact site in relation to the TransAir 810 wreckage site with management zones.

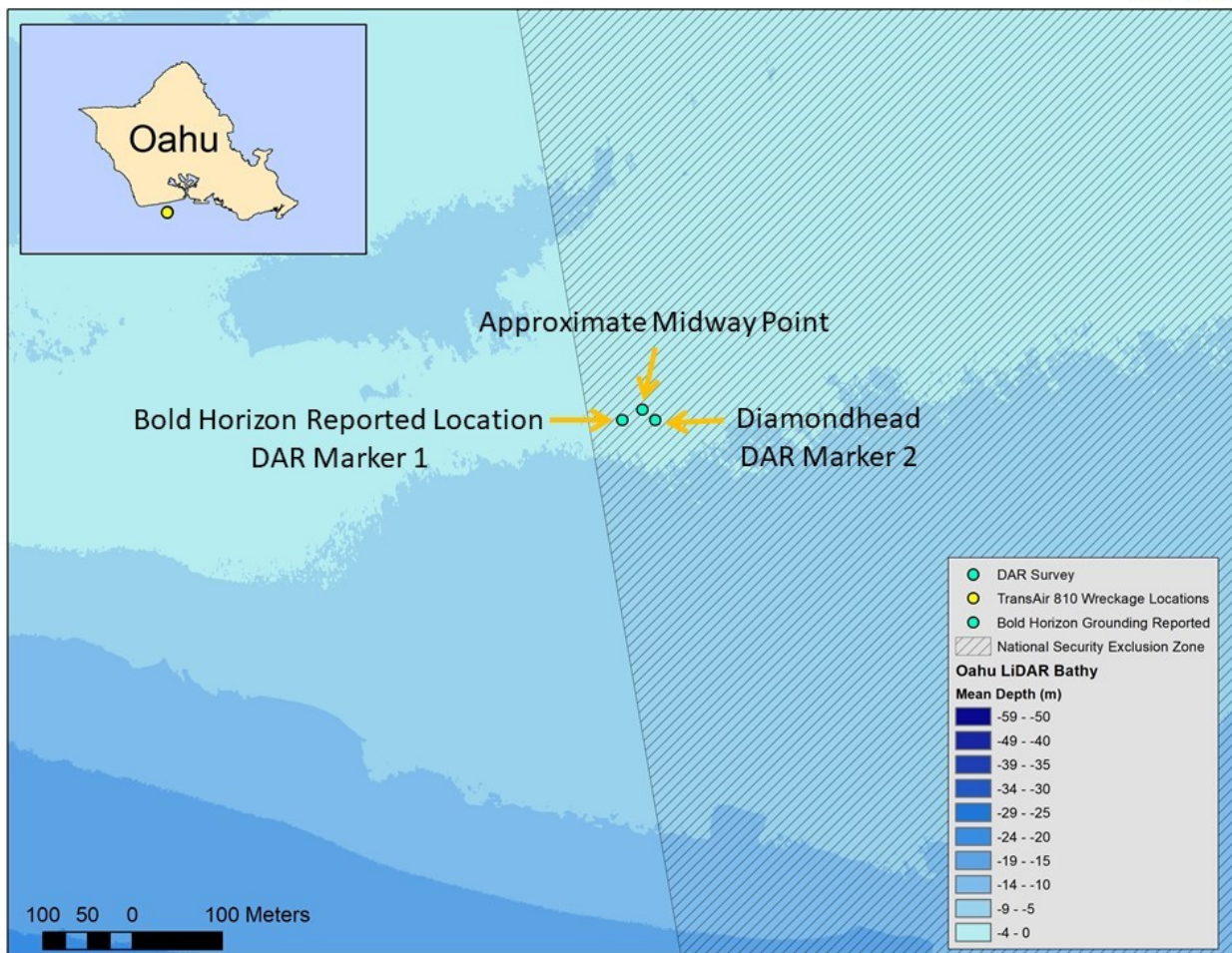


Figure 11. The three GPS sites as reported in the DAR substrate survey along with LiDAR depth profiles.

CONCLUSION

In conclusion, the recovery operation of the TransAir 810 aircraft imposed minimal, temporary, or short-term effects to EFH. The ROV video of the wreckage site and barge anchor sites indicated minimal disruption to sand and no impacts to sensitive habitats. Additionally, the Bold Horizon's contact with the substrate indicated minimal impact or disturbance to live rock, and no sensitive habitats were encountered.



Appendix A: Release Report to the Hawaii Department of Health

Hawaii Hazardous Substance Written Follow-Up Notification Form

PLEASE PROVIDE THE FOLLOWING INFORMATION

Incident Case No.: _____

Contact Information

Caller's Information

Name: Darla White

Address: [REDACTED]

City: [REDACTED] State [REDACTED] Zip [REDACTED]

Telephone number: [REDACTED]

Owner's Information

Name: Steve Saint Amour

Title: Managing Director

Company: Eclipse Group, Inc.

Address: 1997 Annapolis Exchange Parkway Suite 300

City: Annapolis State MD Zip 21401

Telephone number: 410-533-3041

Operator's Information

Name: same as owner



Title: _____

Company: _____

Address: _____

City: _____ State _____ Zip _____

Telephone number: _____

Name of a contact person at the facility or vessel where the release has occurred: Steve Saint Amour

RV Bold Horizon, Eclipse Group, Inc.

Telephone number: 410-533-3041



Hazardous Substance Released:

Name (trade and chemical) of the hazardous substance which has been released: Hydraulic Fluid

Royal Purple Marine Hydraulic Fluid

Chemical Abstract Service (CAS) Number (if applicable): _____

Approximate quantity of the hazardous substance released: approximately one pint (16 ounces)

Incident Information

Location of the release: 21.278691, -158.024349

Approximately 2.5 miles south of Ewa Beach, in approximately 100 m (328 ft) depth

A brief description of the release: A hose on the left seven-function manipulator arm of the ROV was damaged on a piece of jagged metal and released ~one pint of hydraulic fluid.

Media into which the release occurred or is likely to occur (Indicate all those that apply):

☐ Air ☐ Soil ☐ Groundwater ☐ Concrete ☐ Asphalt ☐ Stream ☒ Ocean ☐ Other

Cause of the release: A hose on the left arm of the ROV was damaged on a piece of metal during an aircraft recovery operation and released ~ 1 pint (16 ounces) of hydraulic fluid

Date of the release: October 28, 2021

Time of the release: 1500 hours



Duration of the release: instantly

Date: 10/30/2021

Time that the person in charge of the facility or vessel where the release occurred obtained knowledge of the release: Steve Saint Amour

Source of the release: ROV seven-function manipulator arm hose

Response Information

Response measures taken thus far: The ROV was immediately brought to the surface and the hose was replaced before continuing operations. DOH was alerted on the daily SITREP

Any appropriate information relating to the ability of the owner or operator of the facility or vessel where the release has occurred to pay for or perform any proposed or required response actions: n/a

The names of other federal, state, or local government agencies that have been notified of the release: _____

NOAA, USFWS, NTSB, DAR

Health Information

Known or anticipated acute health risks: none

Known or anticipated chronic health risks: none



Advice regarding medical attention necessary for exposed individuals: none

Potential impacts to public health or welfare: none

Potential impacts to the environment: none - biodegradable

"I certify under penalty of law that I have personally examined and am familiar with the information submitted and believe the submitted info is true, accurate, and complete."

Signature: [REDACTED]

Date: 30 October 2021

Printed Name: Darla White

Title:

Marine Scientist

Company:

Eclipse Group, Inc.



MARINE HYDRAULIC OIL™

HIGH PERFORMANCE SYNTHETIC BLEND HYDRAULIC OIL

BEYOND SYNTHETIC™

Royal Purple's Marine Hydraulic Oil is an inherently biodegradable, ashless, environmentally responsible, high performance hydraulic oil formulated for those users that need a high performance oil to protect their equipment yet are concerned about the environment.

Marine Hydraulic Oil meets the U.S. Fish and Wildlife Department's and the EPA's toxicity test requirements for marine life. Marine Hydraulic Oil is an excellent, high-performance, hydraulic oil for use in sensitive environments such as on off-shore platforms and other marine related services.

The long life and high film strength of Marine Hydraulic Oil greatly increases equipment reliability. Marine Hydraulic Oil also provides excellent protection in highly corrosive environments. It gains its performance advantage over competing oils through its superior blend of base oils plus Royal Purple's proprietary Synerlec additive technology. This unique, synthetic additive technology is proven to make bearings and equipment run smoother, cooler, quieter, longer and more efficiently.

SYNERLEC® ADDITIVE TECHNOLOGY MAKES THE DIFFERENCE!

Synthetic oils enable Royal Purple to make superior lubricants, but it is Royal Purple's advanced Synerlec additive technology that gives its lubricants their amazing performance advantages. Synerlec additive technology truly is beyond synthetic.

Synerlec additive technology forms a tough, slippery, synthetic film on all metal surfaces. This proprietary film significantly improves lubrication: first, by increasing the oil film's thickness, and second, by increasing the oil film's toughness, both of which help to prevent metal-to-metal contact. It displaces moisture from metal surfaces and protects all metals against rust and corrosion. It also fortifies the oil against the detrimental effects of heat, which causes oil to oxidize.



Royal Purple's Marine Hydraulic Oil components are TSCA listed and meet EPA, RCRA and OSHA toxicity requirements.

PERFORMANCE ADVANTAGES

- High Film Strength**
 Royal Purple's Marine Hydraulic Oil with Synerlec additive technology protects hydraulic components beyond the ability of other environmentally friendly hydraulic oils.
- Longer Oil Life**
 Marine Hydraulic Oil has outstanding oxidation stability and keeps equipment clean.
- Extremely Clean Oil**
 Clean oil is critical to the life and reliability of hydraulic systems. Marine Hydraulic Oil is packaged in new poly containers that will not rust in salty atmospheres. It has a typical ISO 4406:99 Cleanliness Level of 14/13/11 (currently for ISO viscosity grades 32, 46 & 68 only). This is up to 250 times cleaner than other new hydraulic oils delivered in steel drums, which will rust in salty atmospheres, or by bulk delivery.
- Excellent Corrosion Protection**
 Royal Purple's Marine Hydraulic Oil with Synerlec additive technology's tough oil film forms an ionic bond on metal surfaces. This film not only protects during operation and acts as a preservative oil during shutdown, but it also provides instant lubrication upon startup to prevent wear.
- Improved System Performance**
 Marine Hydraulic Oil frequently lowers operating temperatures and restores smooth, consistent performance to erratically operating hydraulic systems.
- Rapidly Separates from Water**
 Marine Hydraulic Oil rapidly and completely separates from water, which can easily be drained from the bottom of oil reservoir to keep the oil dry.
- Synthetic Solvency**
 Marine Hydraulic Oil's natural solvency cleans up dirty equipment and keeps it clean.
- Compatible with Seals**
 Marine Hydraulic Oil has excellent seal compatibility.
- Environmentally Responsible**
 The components of Marine Hydraulic Oil are TSCA listed and meet EPA, RCRA and OSHA requirements. It is inherently biodegradable, meets the U.S. Fish and Wildlife Department's toxicity requirements and has passed the EPA/600/4-90-027F* toxicity test requirement. It extends oil drain intervals due to longer oil service life, eliminates premature oil changes due to oil / water emulsions, greatly reduces oil purchases and disposal costs and conserves energy.

* Superseded by EPA 821/R-02-012



MARINE HYDRAULIC OIL™

HIGH PERFORMANCE SYNTHETIC BLEND HYDRAULIC OIL

TYPICAL PROPERTIES*	ASTM METHOD	ISO GRADE		
		32	46	68
Viscosity	D-445			
cSt @ 40°C		32	46	68
cSt @ 100°C		5.4	6.8	8.7
Viscosity Index	D-2270	104	101	100
Flash Point, °F	D-92	415	445	475
Pour Point, °F	D-6892	-38	-35	-27
Copper Corrosion Test	D-130			
3 Hrs @ 50°C		1A	1A	1A
Rust Test	D-665			
Fresh Water		PASS	PASS	PASS
Salt Water		PASS	PASS	PASS
Foam Test, Seq II	D-892			
Initial/Final/Time(sec)		0/0/0	0/0/0	0/0/0
Demulsibility Test	D-1401			
Mins @ 130°F		5	5	5
Cincinnati Millicron "A"	D-2070			
Corrosion / Oxidation		PASS	PASS	PASS
ISO Cleanliness Level	ISO 4406	14/13/11	14/13/11	14/13/11
Density, lbs/g	D-4052	7.33	7.37	7.41

*Properties are typical and may vary

Marine Hydraulic Oil meets or exceeds the requirements of these manufacturers:

- Cincinnati Milacron P-68, 69, 70
- Denison P-46; T-5D; HF- 0, 1 & 2
- Vickers 104C Vane; 35VQ-25
- Sperry Vickers I-286-S; M-2950-S
- Lee Morse 100-1
- Jeffery No. 87
- Ford M-6C32
- U.S. Steel 127, 136
- B.F. Goodrich 0152
- General Motors LH-04-1, 06-1, 15-1

Royal Purple LLC / One Royal Purple Lane / Porter, TX 77365 / 281.354.8600 / royalpurpleindustrial.com

THE PERFORMANCE OIL THAT OUTPERFORMS*

REVISED 01 / 27 / 2014



Royal Purple, Ltd.

Material Safety Data Sheet

I.

Product Name: Marine Hydraulic Oil™

Chemical Family: Synthetic based lubricating oil

Use: Lubricant and corrosion inhibitor

Manufacturer: Royal Purple, Ltd.

Address: 1 Royal Purple Lane, Porter, Texas 77365 USA

Phone: 281-354-8600 Emergency Phone: 281-354-8600 Fax: 281-354-7600

Date Issued/Revised: October 8, 2005

II.

Components:

- Base Oil (synthetic with highly refined mineral oil) — Synthetic additives with iso-paraffinic diluents.
- The precise composition of this oil is proprietary. A more complete disclosure will be provided to a physician or nurse in the event of a medical emergency.
- All components of this product are listed on the U.S. TSCA inventory.
- This product contains no hazardous substances within the definition of OSHA Regulation 29 CFR 1910.1200.
- Royal Purple certifies that this product has been evaluated for RCRA characteristics and does not meet the criteria of a hazardous waste if discarded in its purchased form.

III.

Main Hazards / Health Effects:

Eyes: May cause irritation.

Inhalation: Oil mist may line breathing passages with oil making breathing difficult.

Ingestion: May cause diarrhea.

Skin: May irritate the skin after prolonged periods of contact.

IV.

First Aid:

Eyes: Flush with water until all residual material is gone. If irritation persists, seek medical help.

Inhalation: Clear air passage. If respiratory difficulty continues, seek medical help.

Ingestion: Wash out mouth immediately. Do not induce vomiting. Consult physician.

Skin: Wash thoroughly with hand cleanser, followed by soap and water. Contaminated clothing should be dry cleaned before reuse.

V.

Extinguishing Media:

Suitable: Foam, dry powder, Halon®, carbon dioxide, sand, earth and water mist.

Unsuitable: Water jet.

Protective Equipment for Fire Fighting: Self-contained breathing apparatus.

VI.

Accidental Release Measures:

Personal Precautions: Wear gloves and protective overalls.

Environmental Precautions: Do not allow it to enter drains.

Spillage: Contain spill and keep from entering waterways. Absorb on porous material. Large quantities can be pumped.

VII.

Handling and Storage:

Handling: No special handling precautions necessary.

Storage: Do not store at elevated temperatures.

VIII.

Exposure Control / Personal Protection:

Respiratory Protection: Hydrocarbon absorbing respirator if misting.

Hand Protection: Oil-proof gloves for hypersensitive persons.

Eye Protection: Glasses, if applied to parts in motion.

Body Protection: Overalls.

IX.

Physical and Chemical Properties:

Physical State: Liquid

Color: Pale Amber

Odor: Lube Oil

pH: Neutral

Boiling Range / Point °F (°C): 650-800 (343-427)

Pour Point °F (°C): <20 (<29)

Flash Point (COC) °F (°C): >425 (>218)

Autoignition Temperature °F (°C): >600 (>315)

Evaporation Rate (Butyl Acetate): Negligible

Vapor Pressure (kPa): <0.1

Percent Volatiles: None

Density (g/cm³): >0.86

Flammability: Not flammable at ambient temp.

OAR Value: UN

Oxidizing Properties: None

Water Solubility: Insoluble

Vapor Density: Greater than air

Product Name: **Marine Hydraulic Oil™**

- X. Stability and Reactivity:**
 Stability: Chemically stable under normal conditions. No photoreactive agents.
 Conditions to Avoid: Powerful sources of ignition and extreme temperatures.
 Materials to Avoid: Strong inorganic and organic acids, oxidizing agents.
 Hazardous Decomposition Products: Burning generates smoke, airborne soot, hydrocarbons and oxides of carbon, sulfur and nitrogen. Residue mainly comprised of soot and mineral oxides.
-
- XI. Toxicological Information:**
 Acute Toxicity: Not known
 Irritancy-Skin: Very mild
 Skin Sensitization: Not known
 Subacute / Sub-chronic Toxicity: Not known
 Genotoxicity: None known
 Chronic Toxicity: None known
- California Prop 65: N/A
 Carcinogen: NTP: No
 IARC: No
 OSHA: No
 EC Classification (67 / 548 / EEC): No
 LC-50: >2000mg/l - extrapolated from component data
 LD-50: Not applicable
-
- XII. Ecological Information:**
 Possible Effects: When released into the environment, adsorption to sediment and soil will be the predominant behavior.
 Behavior: Relatively well behaved. Bioaccumulation potential nil.
 Environmental Fate: Due to its fluid nature and specific gravity, this product will float or spread across water making it a nuisance contaminant. It is not thought to be toxic to marine or land organisms.
-
- XIII. Waste and Container Disposal:**
 Waste Disposal: Consider recycling. This product, as sold, does not meet the RCRA characteristics of a hazardous waste. Under RCRA, it is the responsibility of the user, at the time of disposal, to determine whether the product meets the RCRA criteria for hazardous waste. Contact a waste disposal company or local authority for advice.
 Container Disposal: See waste disposal section listed above.
-
- XIV. Transport Information:**
 DOT: Nonhazardous
 UN No.: N/A
 DOT: Nonhazardous
- Air Transport (ICAO, IATA): Bulk Nonhazardous
 Sea Transport (IMO, IMDG): Bulk Nonhazardous
 Road and Rail Transport (ADR / RID): Bulk Nonhazardous
-
- XV. Regulatory Information:**
 Labeling Information: None needed
 EC Annex 1 Class.: N/A
 R Phrases: N/A
 SARA 311 / 312: None
 S Phrases: S-3 keep cool, S-16 keep away from ignition sources
 Ozone Depleting Chemicals: N/A
- CERCLA: Nonhazardous
 TSCA: All components are listed
 WHMIS (Canada): Not regulated
 Canadian DSL: All components are listed
 40 CFR Part 372 (SARA Section 313): N/A
 RCRA Hazard Class: Nonhazardous
 TSCA 12B Components: None
-
- XVI. Other Information:**

Signature: _____

Prepared By: A. J. Gustavsen, Ph.D.

Date Issued/Revised: May 21, 2002

As of issue date, the information contained herein is accurate and reliable to the best of Royal Purple's knowledge. Royal Purple does not warrant or guarantee its accuracy or reliability and shall not be liable for any loss or damage arising out of the use thereof. It is the user's responsibility to satisfy itself that the information offered for its consideration is suitable for its particular use.

LEGEND

- I. Identification of the Substance / Preparation and Company
- II. Composition Information on Ingredients
- III. Hazards Identification
- IV. First Aid Measures
- V. Fire Fighting Measures
- VI. Accidental Release Measures
- VII. Handling and Storage
- VIII. Exposure Control / Personal Protection
- IX. Physical and Chemical Properties
- X. Stability and Reactivity
- XI. Toxicological Information
- XII. Ecological Information
- XIII. Waste Disposal
- XIV. Transport Information
- XV. Regulatory Information
- XVI. Other Information

NFPA SYMBOL



HMIS SYMBOL

HEALTH	0
FLAMMABILITY	1
REACTIVITY	0
PPI	B

Appendix B: Environmental Summaries

Environmental Summary
Wednesday, October 13, 2021 (a)
Prepared by Darla White

Assessment of proposed barge anchor locations.

Proposed barge anchor point 4 (NE point) - ROV

We started by investigating the eastern most edge of the zone near the military exclusion zone boundary in approximately 52 m depth, and 62 m to the east of the proposed anchor site 4.

- The eastern side of the boundary was steeply sloped.
- Within our exploration zone (west side of boundary) we encountered a cone-shaped burrow approximately 1 m in diameter and an estimated 20-25 cm high with what looked like soft-textured filaments lining a small (~15 cm) crater on top at the entrance, very much like a cinder cone. Based on its size, it may be a crustacean burrow.
- A dark cluster, possibly algae or basalt, was visible amidst a largely sand/sediment area and we were heading toward it to investigate when we had to bring the ROV to the surface.
- The limited area that we were able to survey was low complexity (< 0.5 m).
- Time on the bottom was less than 10 minutes.

Environmental Summary - ROV operations
Thursday, October 14, 0421 (a)
Prepared by Darla White

Surveys of proposed barge anchor locations. Each GPS coordinate was given a 25 m radius buffer zone to survey for sand patches ideal for anchoring, and sensitive habitat features to be avoided. Each proposed anchor 'zone' was surveyed in an east-west transect pattern, from south to north, with exception of the first one (anchor 4), which was thoroughly covered but in a haphazard pattern.

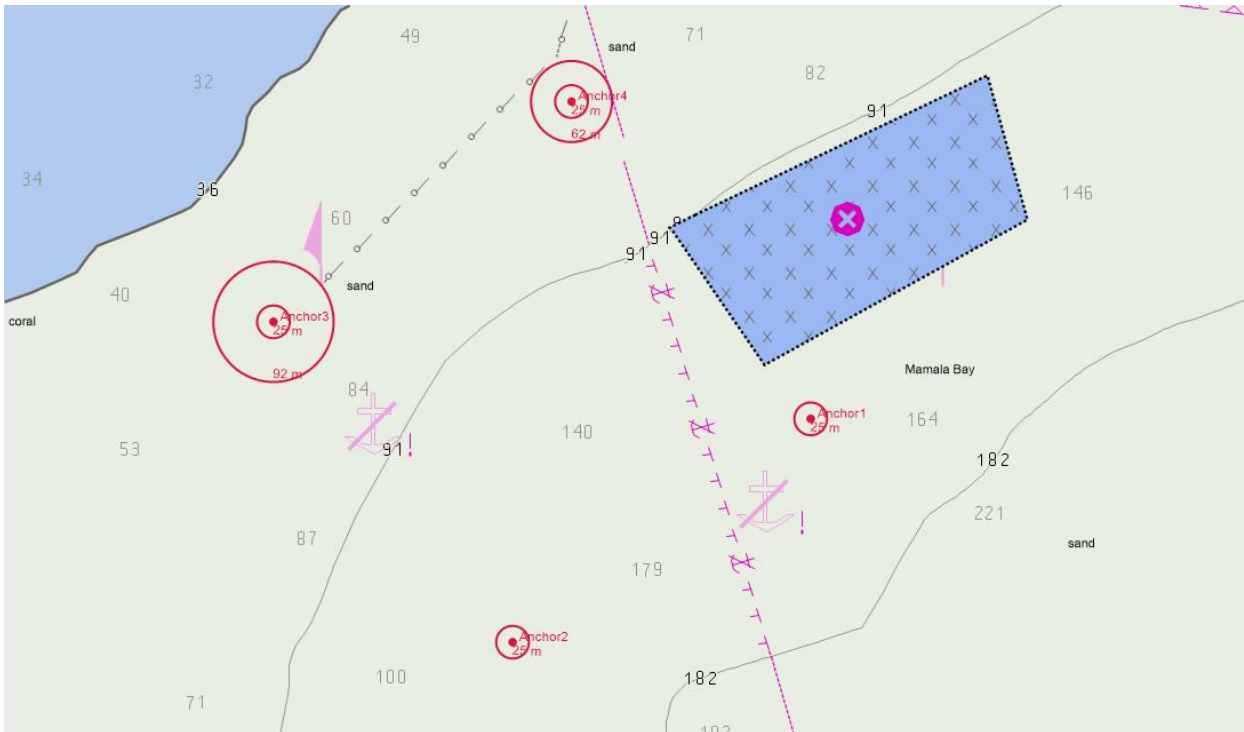


Figure 1. The proposed barge anchor locations plotted on the NOAA navigation chart.

Dive 1: Anchor Point 4 (NE) 0420 hours; approximately 62 m depth

- We dropped southwest of the proposed anchor point 4 zone and found a number of pipe lengths (n=~10) from 2-5' long at 63.1m (photo and fix captured) (Figures 2 & 3)
- Habitat is of very low complexity (< 0.25m), consisting on sparse rubble with pavement (Figure 4 & 5). There appears to be a thin layer of sand/soft sediment over pavement/hard bottom in the sediment areas.
- We observed numerous fishes including ulua (*Caranx ignobilis*) and kahala (*Seriola dumerili*), occasional sea stars - cushion (*Culcita novaeguineae*; n=1) and purple velvet (*Leiaster leachi*; n=4) observed; small golden sponges (Figure 4).
- The NW quadrant of anchor 4 zone is the sandiest area; 50-60 m depth.



Figure 2. Pipe lengths located southwest of survey zone.

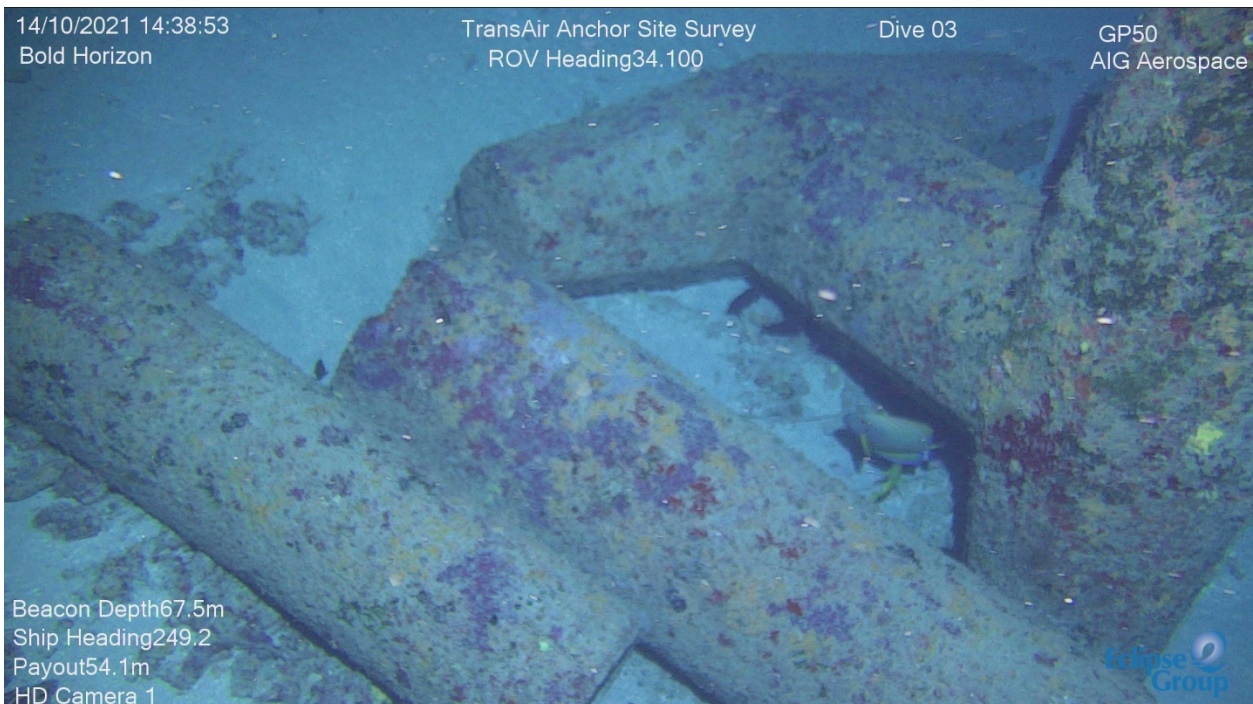


Figure 3. Additional structure and pipe debris near survey zone.

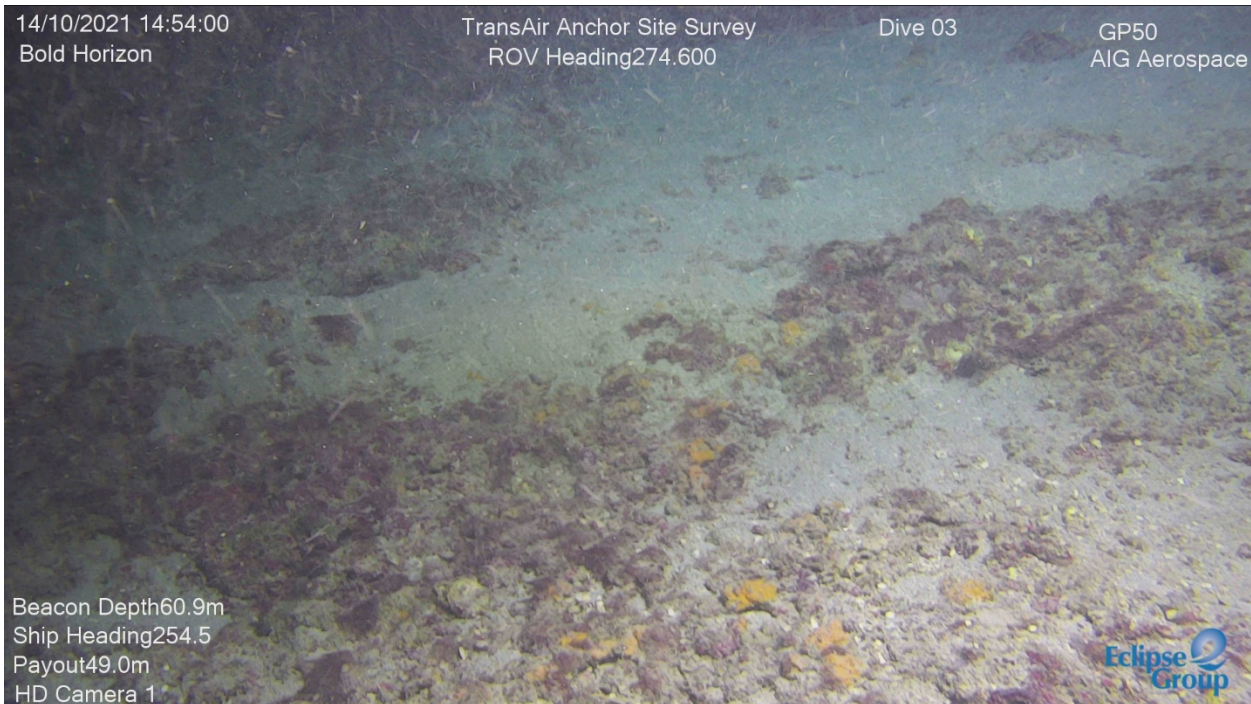


Figure 4. Example of substrate areas with pavement and rubble within the survey zone.

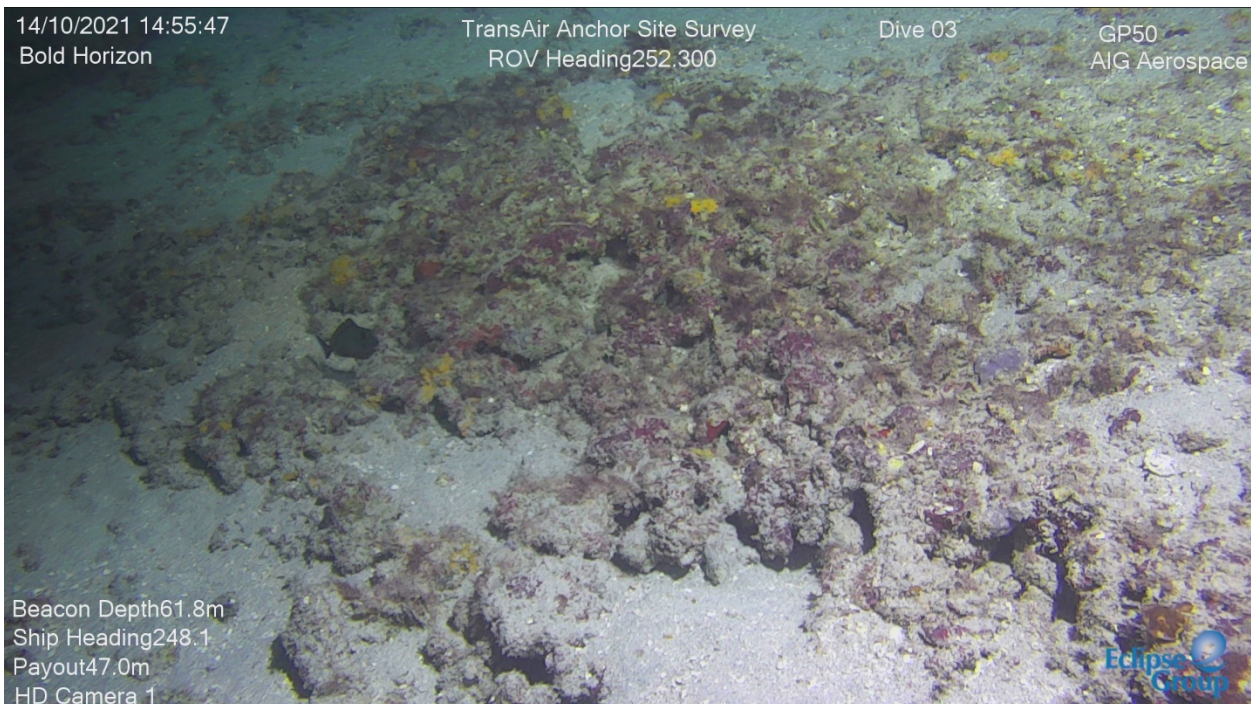


Figure 5. Close up of pavement and rubble area within the zone. Extension of Figure 3.

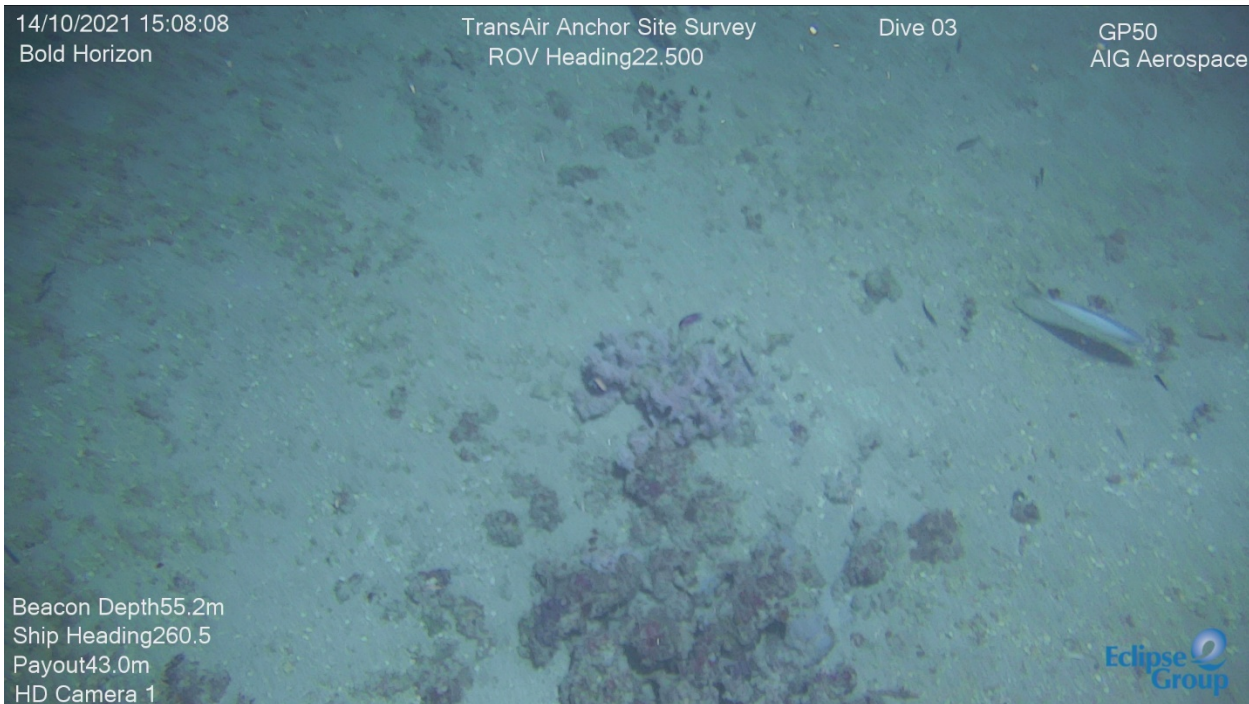


Figure 6. CCA and rubble location in sand/sediment dominant area.

Sewage Outfall Pipe

The ROV moved to investigate sewage outfall pipe at 1517 hours. The pipe had numerous leaks in it (Figures 7 & 8); several visible holes with plumes coming off the side of it that were visible in the sonar. The holes that we investigated are on the video recording. The pipe is in approximately 55 m depth. We took at least two photos of different leaking holes in the pipe, but did not capture the sonar image which elucidated more and larger plumes along a greater length than our field of view in the ROV cameras. These two holes had smaller plumes than some of the other plumes that we observed in the sonar, indicating that the other holes/leaks are likely larger. This pipe is in need of repair, or insert of a sleeve to block the leaks. The observed plumes indicate that the end of pipe pollution measures are underestimating the pollutant load.

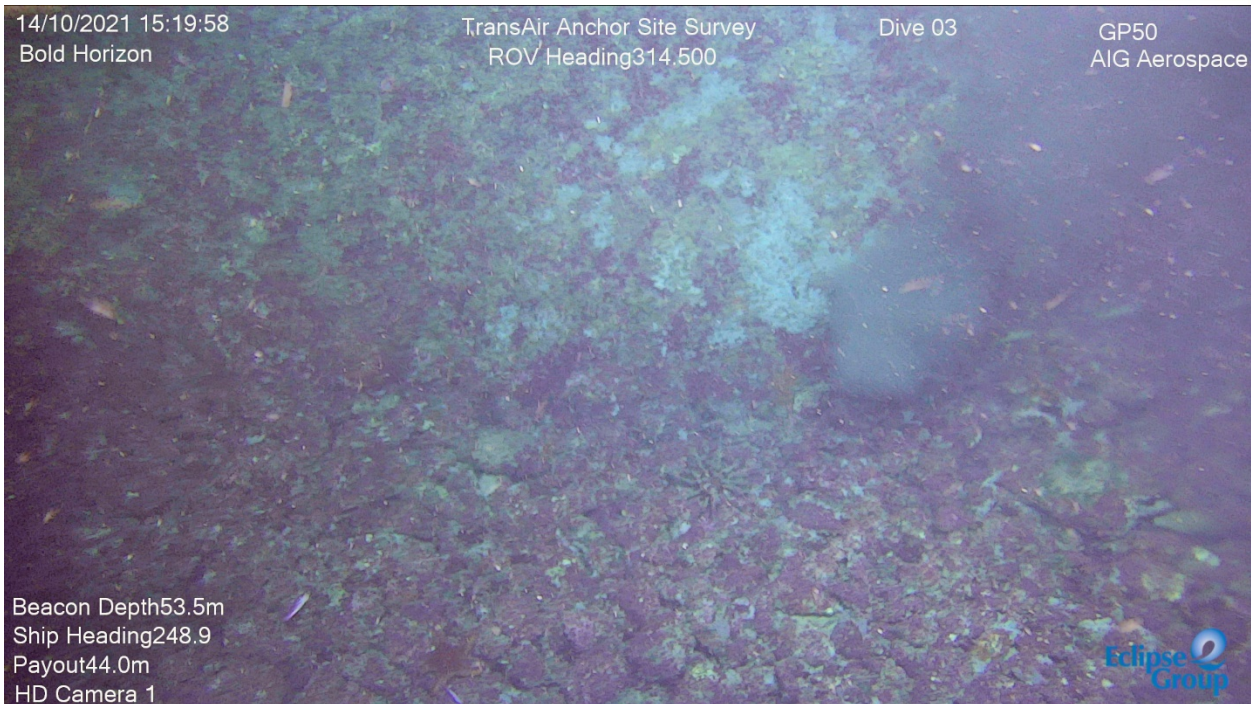


Figure 7. Hole 1 in the sewage outfall pipe with plume.

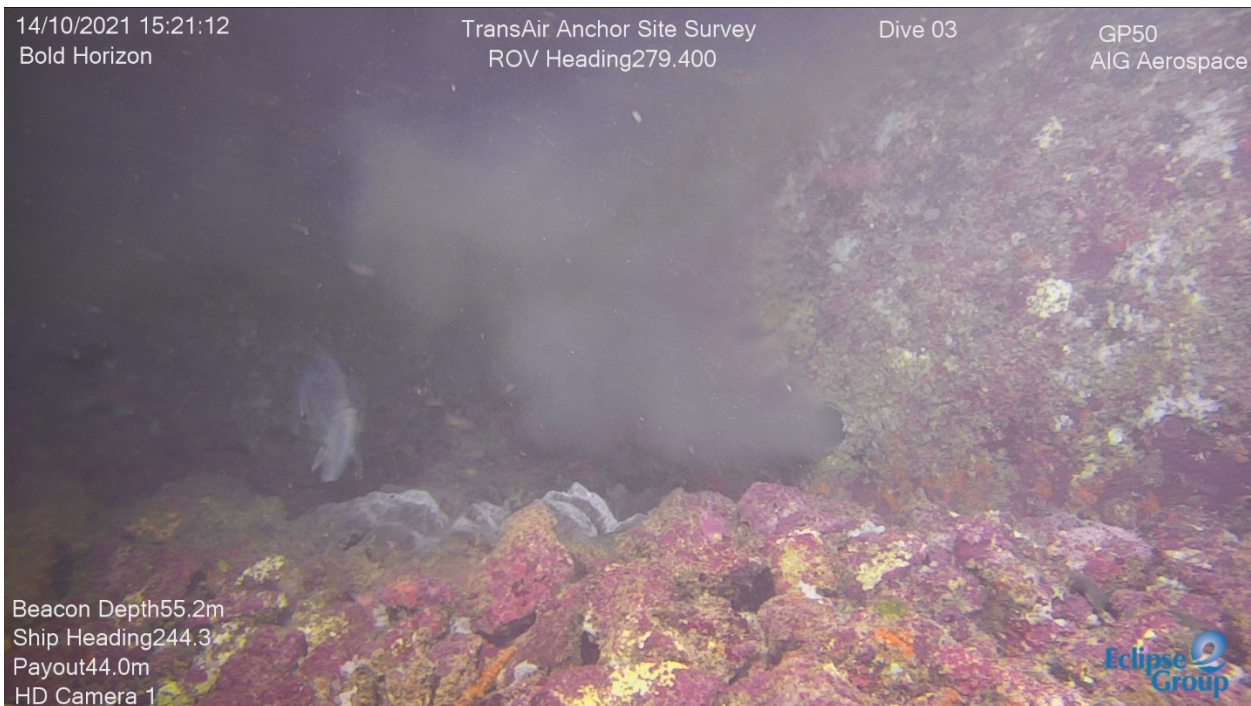


Figure 8. Hole 2 in the sewage outfall pipe with plume. This one is located a few meters west of the Hole 1.

Dive 2: Anchor Point 3 (NW) 0550 hours, approximately 50 m depth; winds 17 knots

- Deployed approximately 50 m south of the drop zone (25 m radius boundary) - pretty sandy here.
- Ran east/west transects from south to north.
- Area is mostly sand with small rock rubble areas (Figures 9 -16) and very low complexity overall (less than 0.25). The southern half of quadrant is good sandy spot.

- Around the gps point are small rocky spots with cca and small gold features that are likely sponges; the surrounding area is soft sediment with short algal growth.
- Organisms observed included three sea stars with large discs and 5 arms slender pointed arms were observed (dark from our perspective). There were several round mounds/burrows approximately 8in diameter (screenshots). There were several clusters of small sponges (*Spirastrealla vagabunda*) and a variety of crustose coralline algae (Figure 10 & 12) and a couple of very small hard substrate/rock areas with echinoderms present (e.g. sea stars/ cucumber; Figures 10, 11, & 16).
- There is a tire partially buried in sand on the western boundary of the survey zone.
- In the northern half of the zone there are small and sparse rocky bits. The area appears to have more pavement with shallow sediment or at least more dark material on the surface (could be algae or darker sediments). We observed a couple of small rock features and occasional echinoderms (cucumbers and sea stars with the large central disc and slender pointed arms), and a couple of small bright golden features that were possibly a sponge; also red algae (i.e. *Amansia*; *Halymenia*). The upper boundary of the zone had a couple of small rocky features that we took screen shots of. Mostly sandy.

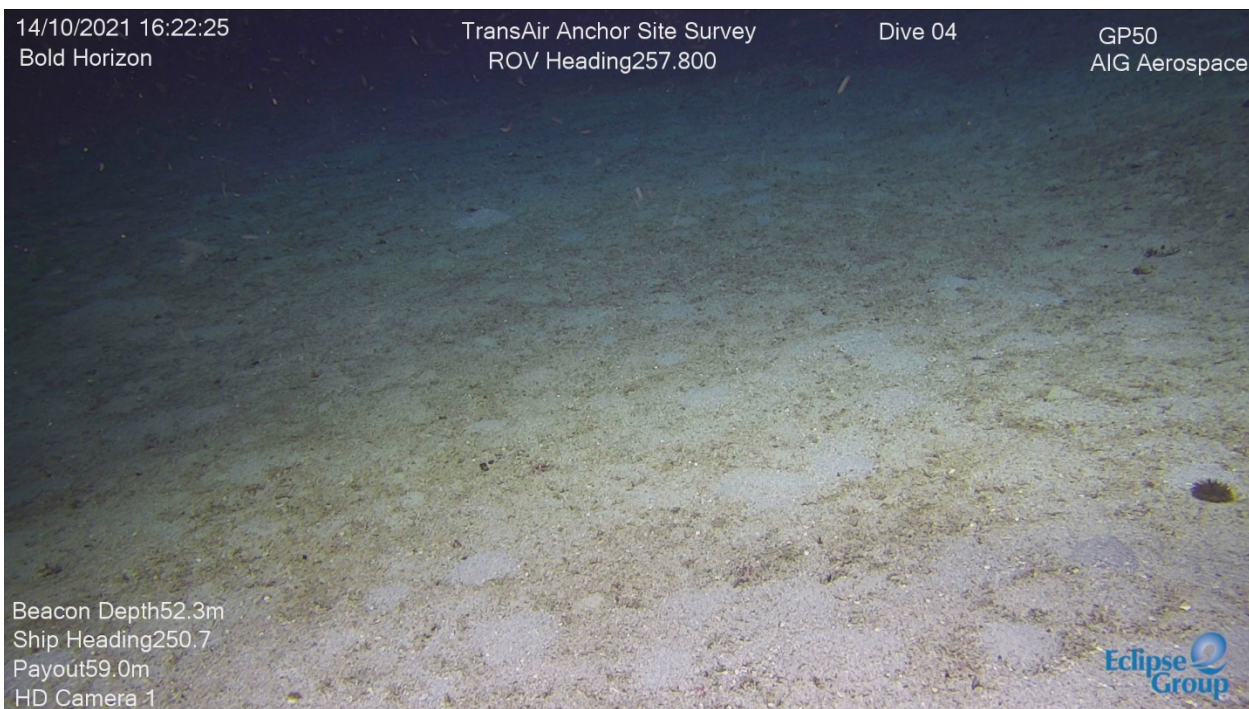


Figure 9. Example of the dominant substrate within the survey zone.

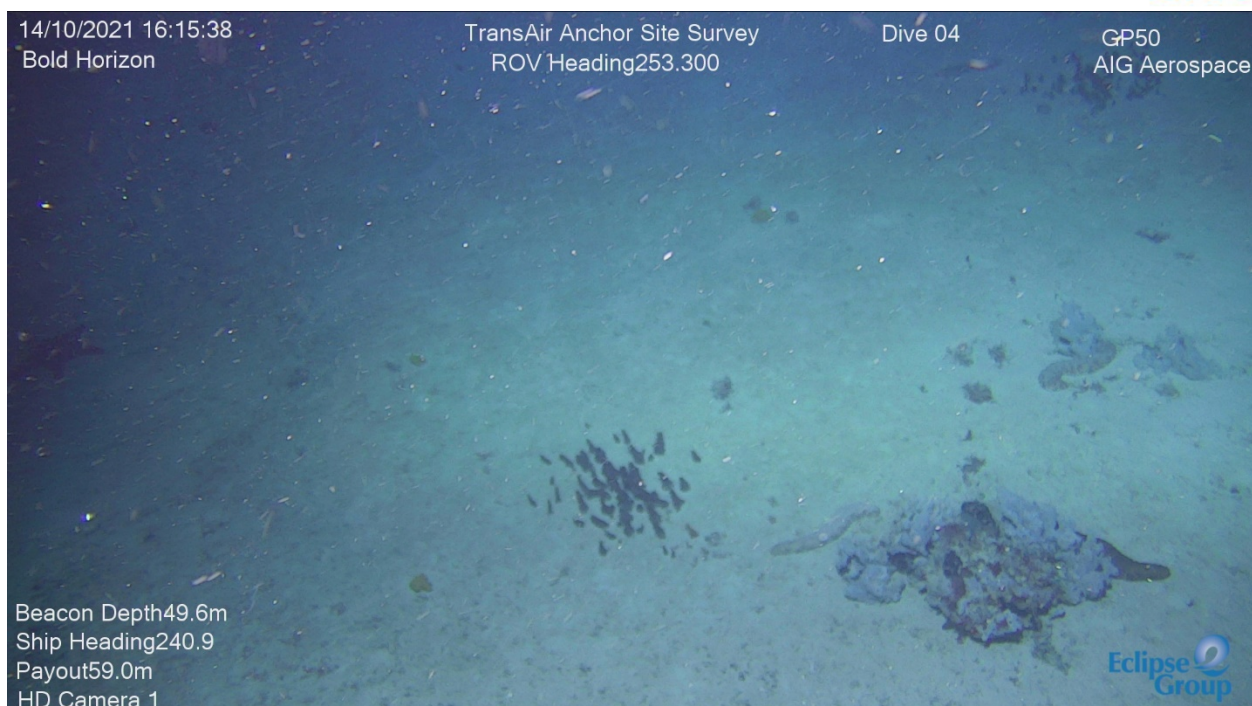


Figure 10. Example of the patchy life within the zone. Sponges, cucumbers, and CCA.



Figure 11. Example of the patchy life within the zone. Sea star, sponges, and CCA. This is the most common sea star in the region. No close photos available.

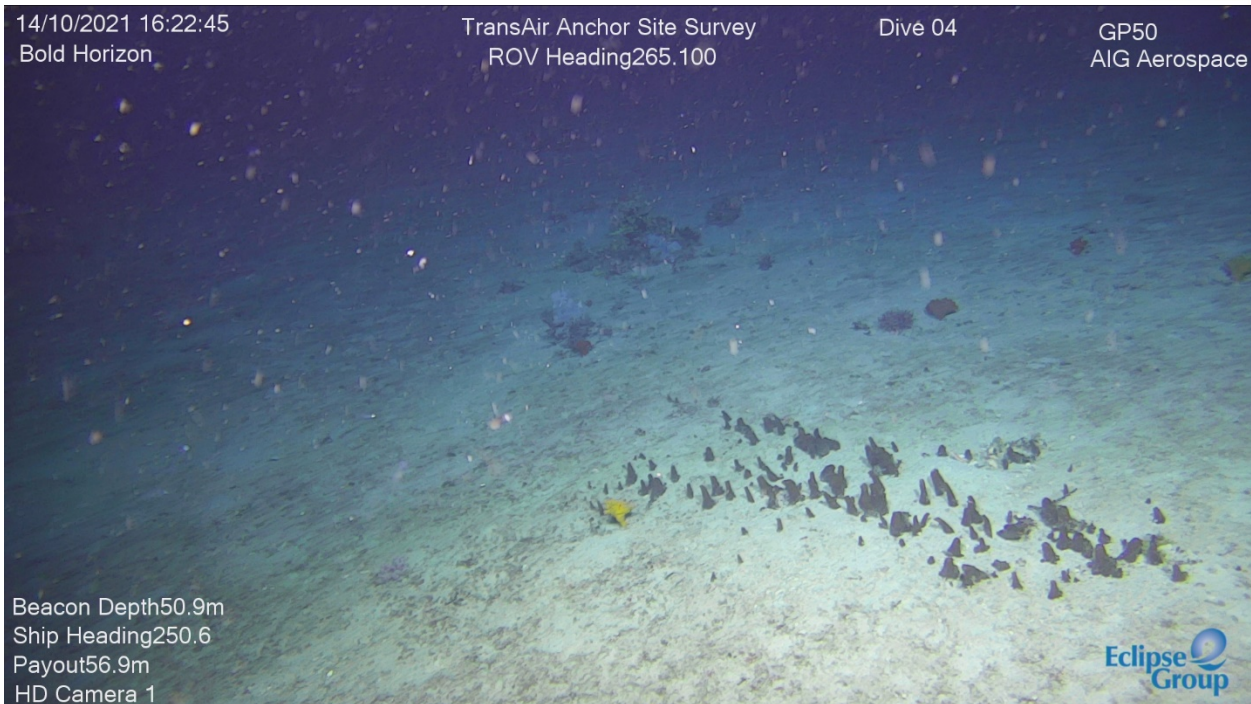


Figure 12. Example of the patchy life within the zone. Sponges, cucumbers, and CCA.

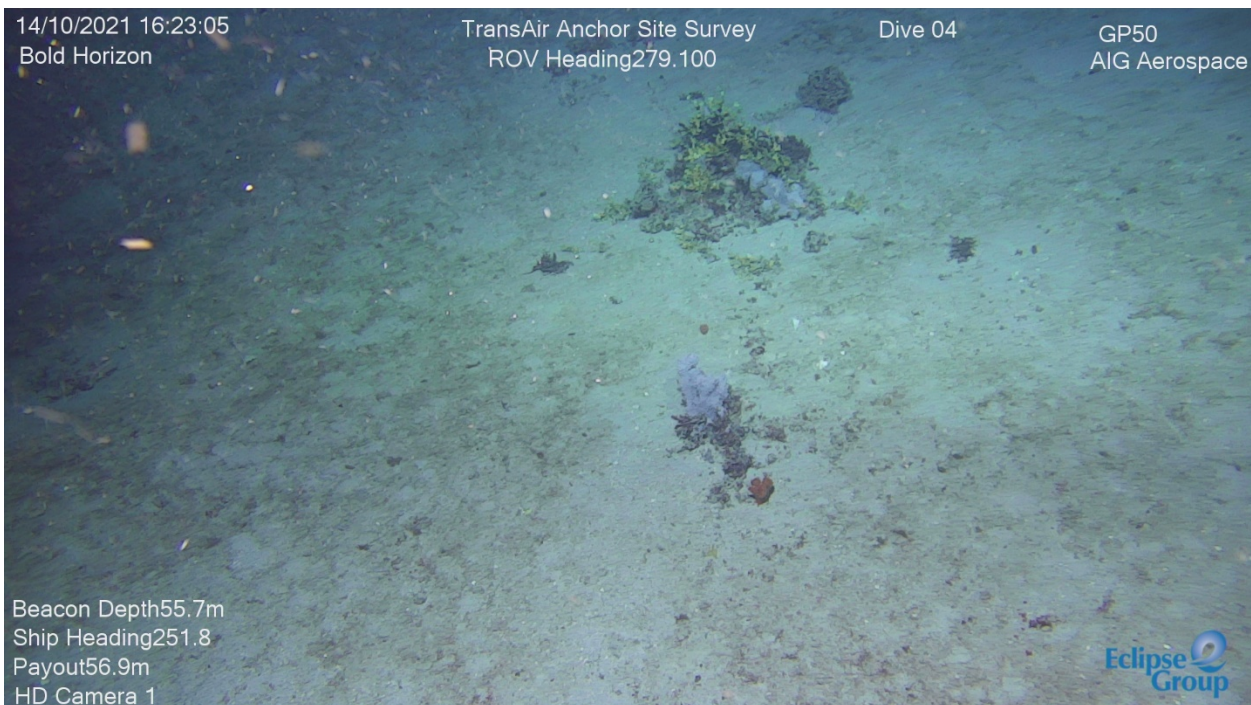


Figure 13. Example of the patchy life within the zone. Sponges, *Halimeda* spp (?), and CCA.



Figure 14. Unidentified organism. Possibly a sponge.

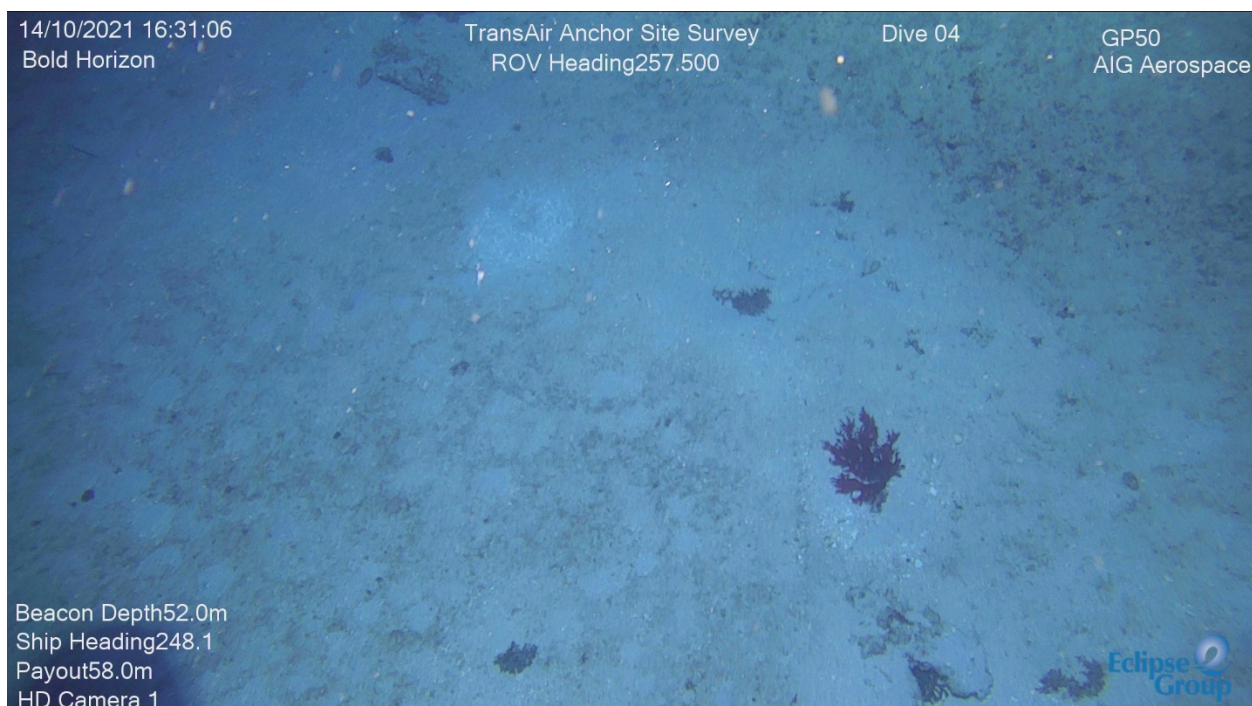


Figure 15. *Halymenia* spp.

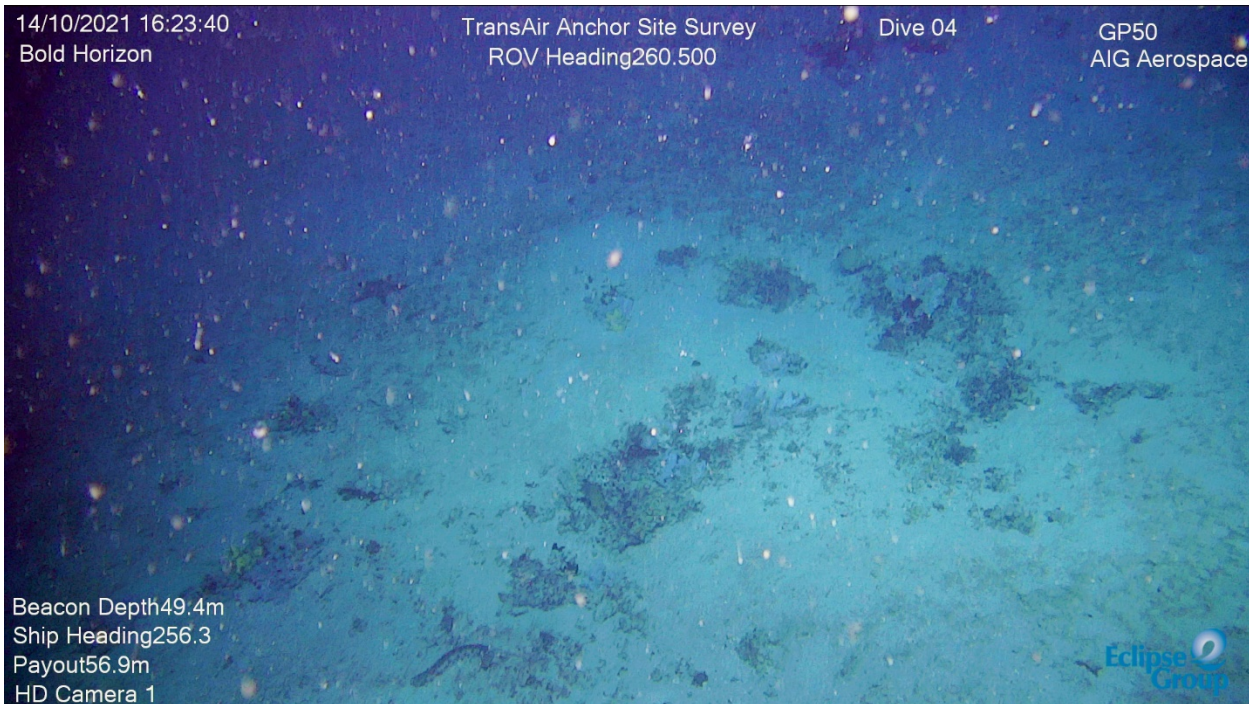


Figure 16. Example of pavement/hard substrate area.

Dive 3: Anchor Point 2 (SW) 0744 hours, 140 m depth, give or take a few meters

Arriving on site - southern rim of the zone 0754 hours.

- Southern part of this zone is fairly steeply sloped
- Possibly small Halimeda and small gold objects (Figures 17); occasional burrows about 6-8 inches across (Figure 18); one urchin - no ID (Figure 19). Gold objects might be feather duster worms of some variety or anemones, about the size of a quarter or half dollar; up close (within 2m) they have an oval configuration, like an eye or a mouth with gold on the outside and orange on the inside
- Looks sandy/soft sediments with very low relief; slight slope and then more slope. Took a representative screen shot.
- East side is sloped - not sharply - enough that we have to keep asking for scope; still very low relief (basically flat) soft sediment.
- Patterns in the northern half of the circle appear more like pavement with shallow sediment on top. Small algae (?) on surface of sediments; patchy distribution.
- Slope runs down to the east; east edge of circle is about 148 m.

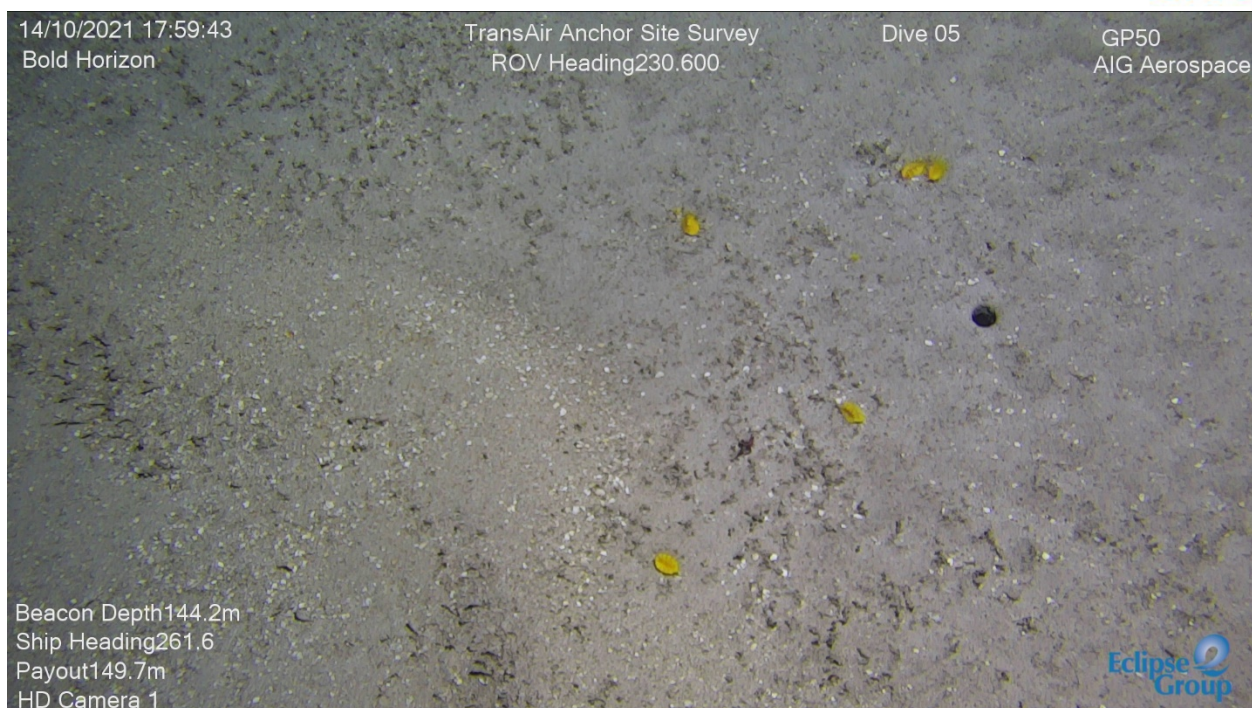


Figure 17. Examples of the gold organism.

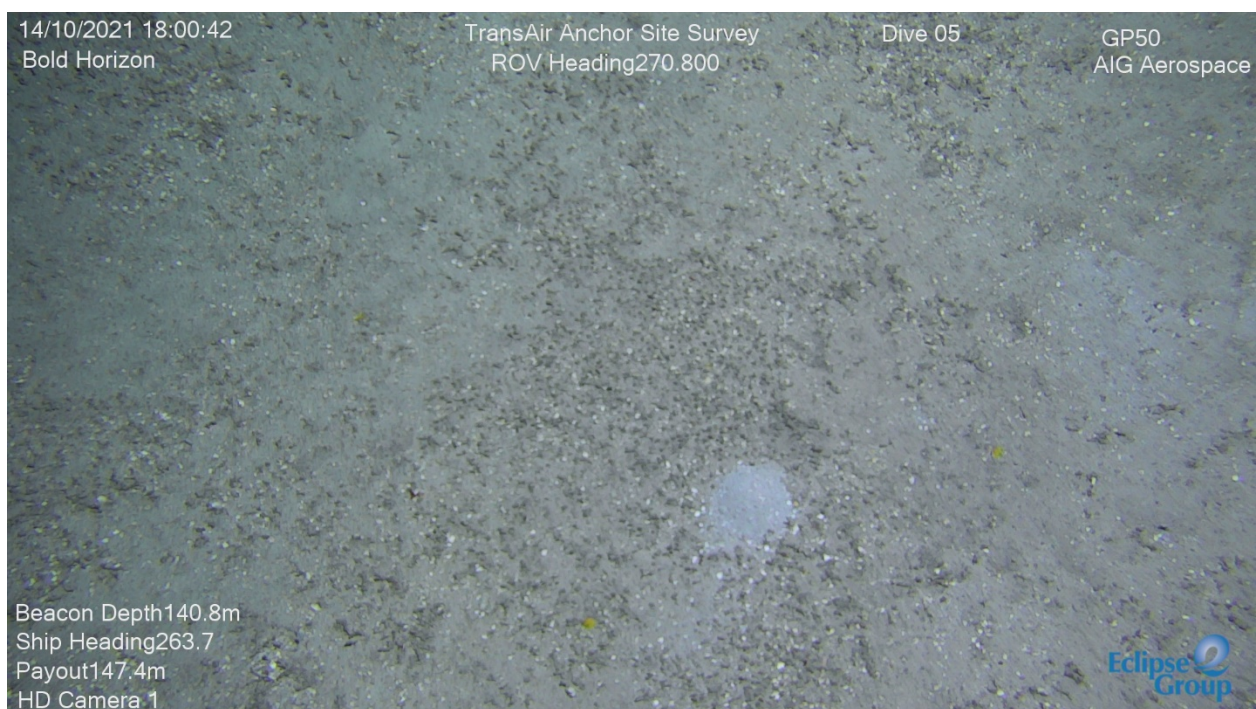


Figure 18. Example of one of the burrows.

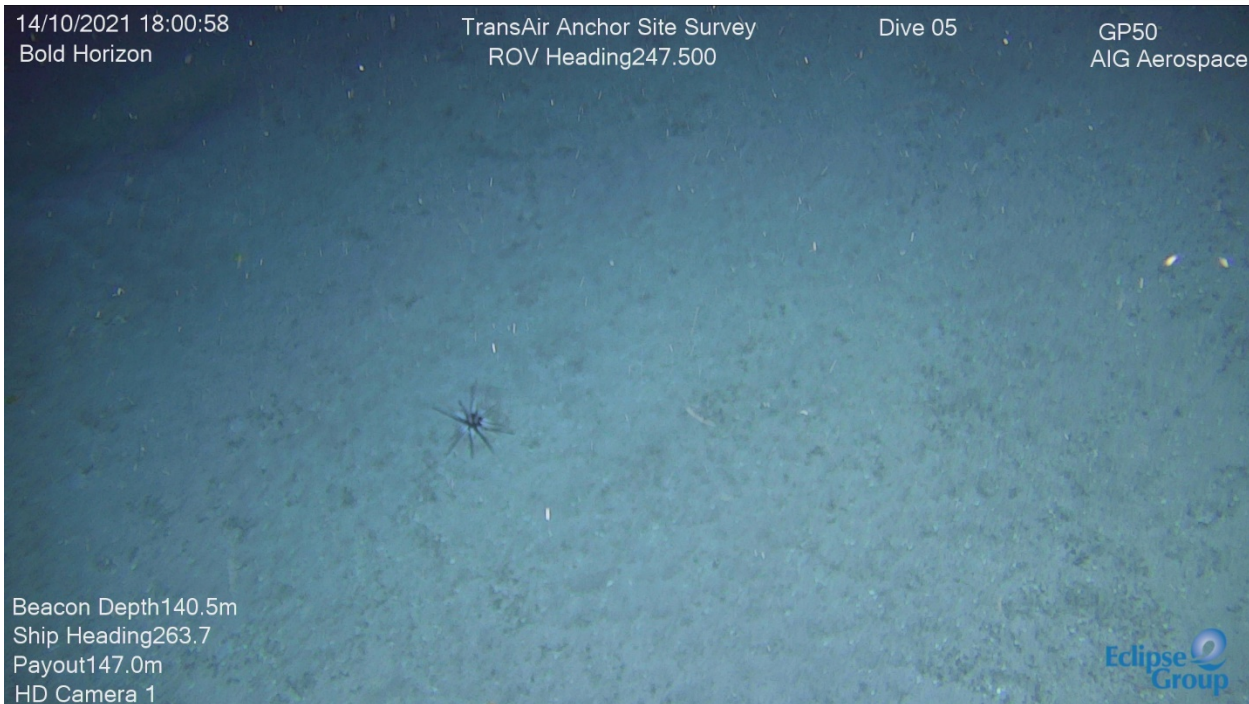


Figure 19. Example of the sea urchin.

Dive 4: Anchor Point 1 (SE) 1032 hours. Approximately 160 m depth.

- Inside the critical habitat area, south of the artificial reef area
- First landing & screenshot on boundary east of point. Sand, not deep. We barely made a puff upon touch down. It was pretty soft and made shallow footprints. ROV is 5000 lbs.
- Slope at southern edge of the zone.
- We found hard debris just south of the zone; rectangular block and round pipe; screenshot and gps taken; approx 160m depth; concrete pipe (fix & pic) approx 3' diameter; encrusting algae and a couple of white spine urchins.
- More hard debris in SW boundary area; fix& pic; rectangular concrete; inside of anchor zone.
- Habitat: Moderate slope; very low relief; soft sediment, presumably over pavement. Pipe that we found is pretty much on tip of it. SE boundary is a pretty good slope & difficult to see but appears largely the same low complexity soft sediment 155 m depth.
- Video is better on the E to W transect due to slope direction.
- More hard debris (two lengths of pipe in tandem) along the eastern side of the zone just north of center (pic & fix).
- The northern end of this appears to have thicker sediment based on a series on depressions that give the impression of sediment depth. Top edge of the zone is 155m depth.
- This zone appears to be a good anchor zone.

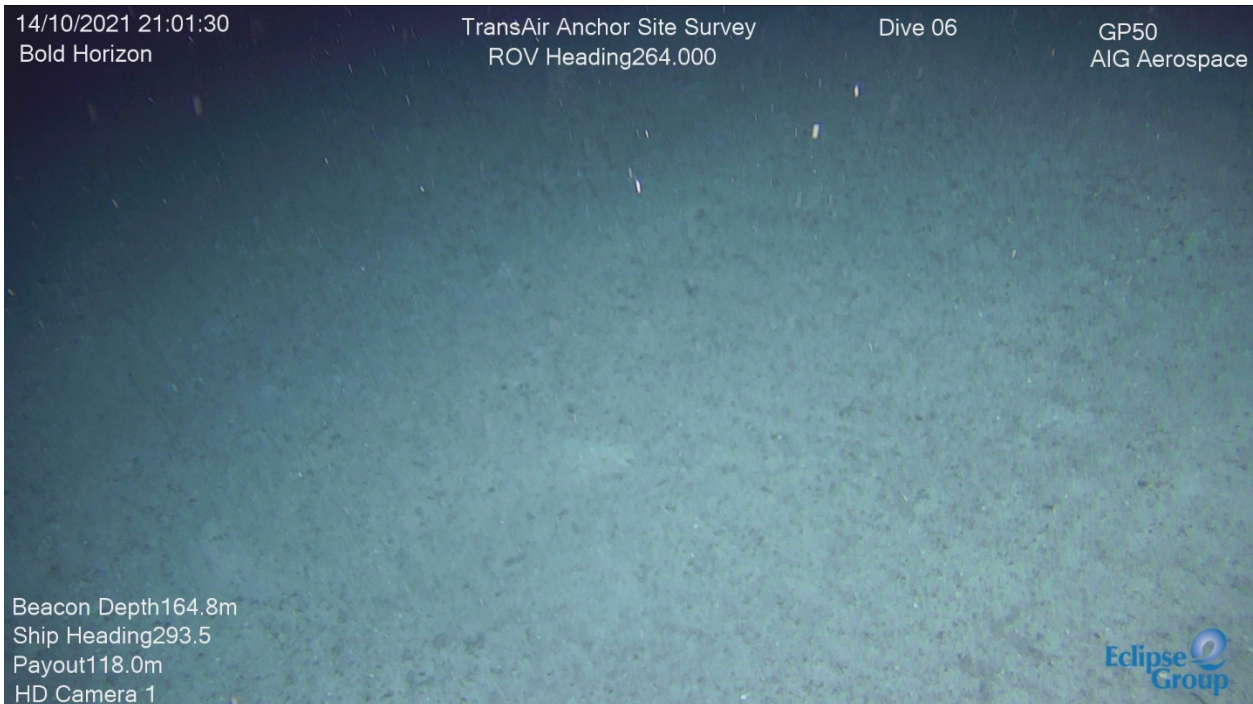


Figure 20. Representative shot of the substrate.

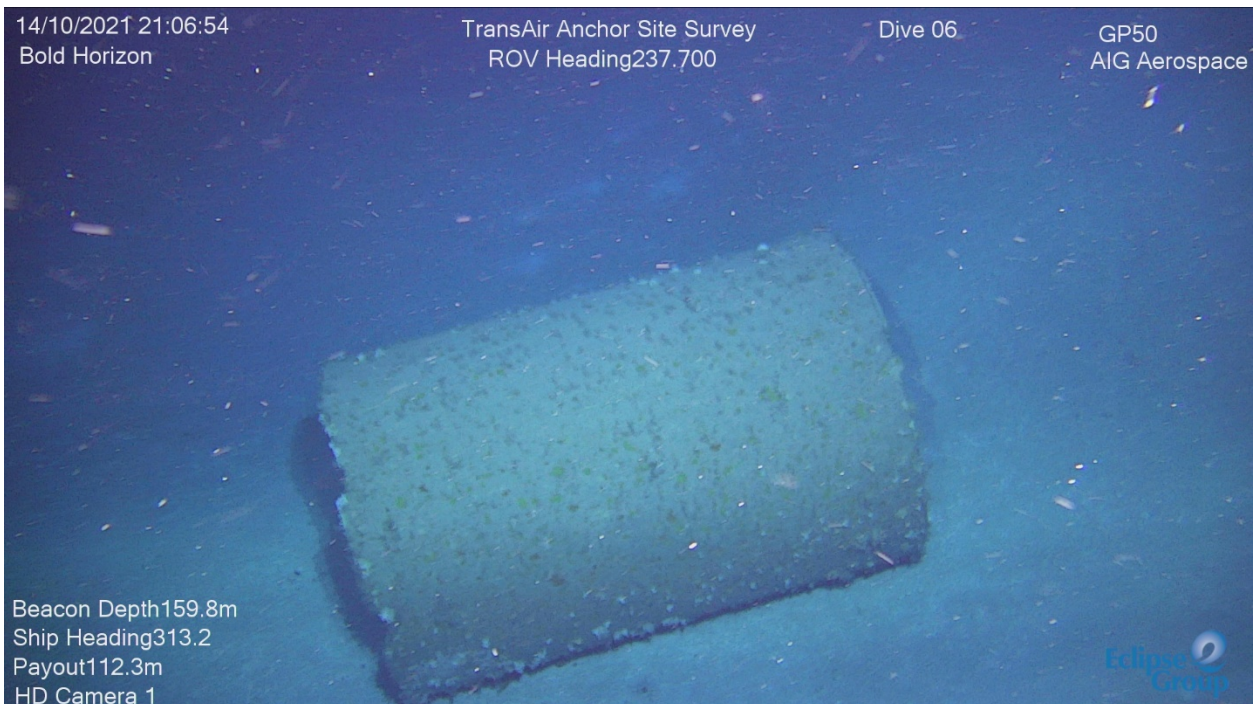


Figure 21. Pipe debris found. Estimated 3' diameter.

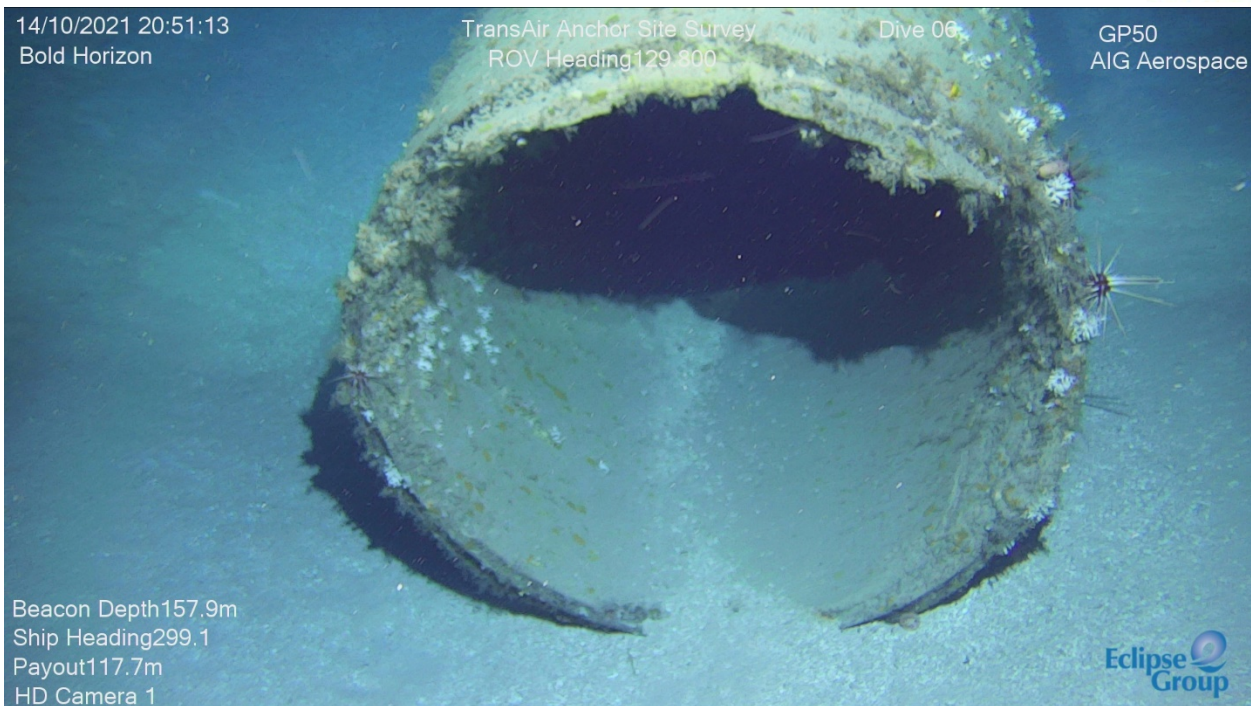


Figure 22. Second view of the same pipe as Figure 21. Appears to be cement. Curious white coral or bryozoan and an urchin on the right side.



Figure 23. More debris in the zone.



Figure 24. More debris in the zone.

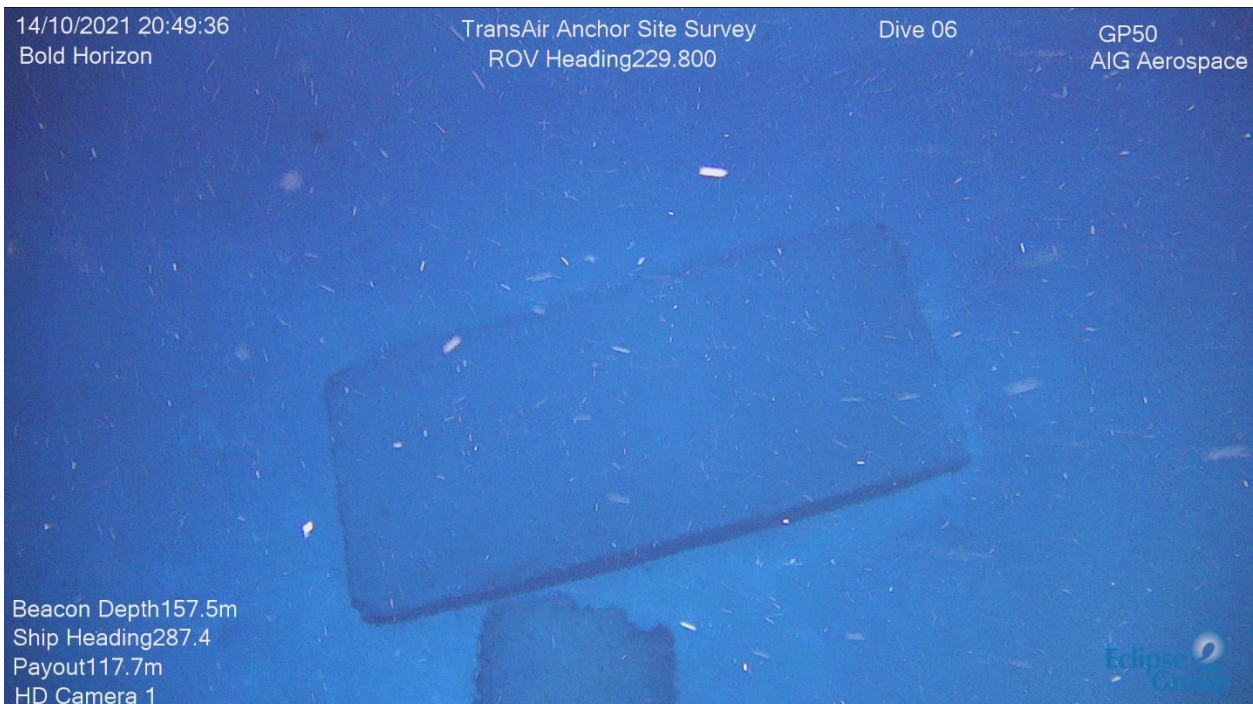


Figure 25. More debris in the zone.



Figure 26. More debris in the zone.

Dive 5: Set basket 1 on the bottom (leave closed) and retrieve front landing gear, 1320 hours. Approximately 100 m depth

Basket was set on target location near the cockpit/nose of the aircraft. The basket is closed securely. The area is moderately sloped with very low complexity, and small oblong basalt (?) formations, almost like large oblong nodules, and sediment.

The nose landing gear was located, a new gps fix marked at 103 m depth. The ROV pilots worked to secure a strap around one of the tires which was facing up. The section was vertically lifted to the surface by the ROV. No sensitive habitat was observed in the area thus far.

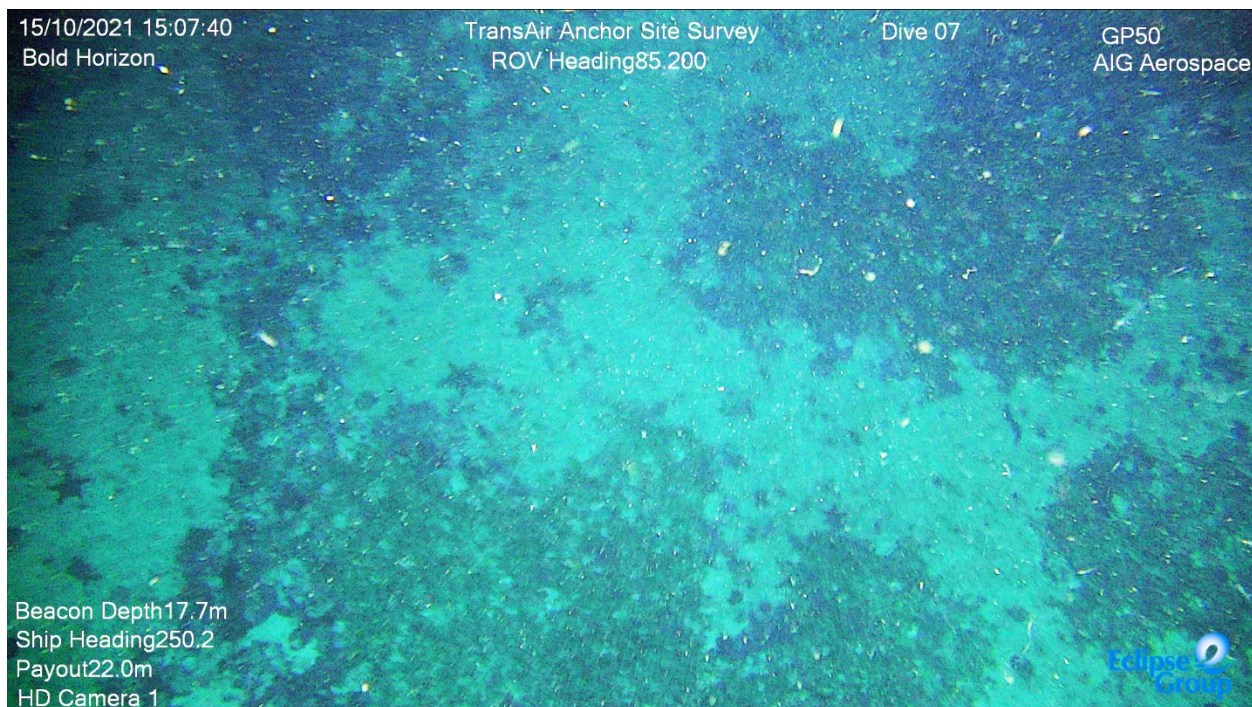
Environmental Summary - ROV operations
Friday, October 15, 2021 (a)
Prepared by Darla White

Surveys of proposed tug anchor location. The GPS coordinate was given a 25 m radius buffer zone to survey for sand patches ideal for anchoring, and sensitive habitat features to be avoided. Each proposed anchor 'zone' was surveyed in an east-west transect pattern,

Dive 1 (7): Anchor Point 5 (Tug) 0455 hours; approximately 19 m depth

On site 0505 hours

- The ROV started the survey at the north end of the zone due to prevailing winds and currents.
- Just north of the zone is a sand patch.
- The ROV lost power and returned to the surface for maintenance after approximately 10 minutes of survey time. Dives were cancelled for the remainder of the day.
- The site was deemed too shallow to survey with the ROV.
- Below is a representative photo of the substrate that was observed. The area observed was very low complexity with hard substrate encrusted with predominately algae (CCA, Halimeda, and turf). Sea stars are present (*Pentaceraster cumingi*).



Environmental Summary
Saturday, October 16, 2021 (a)
Prepared by Darla White

Engine Recovery

Operations commenced at 0430 hours and concluded at 1740 hours. Two of the engines were recovered.

Depth was 105 m. The substrate is sloped with very low relief (< 0.25 m); pavement and sediment. The initial landing attracted some opelu and the lights attracted plankton, but it was uneventful otherwise. No ESA-listed species were sighted, and no habitat of concern was disturbed during the operation.

Environmental Summary
Sunday, October 17, 2021 (a)
Prepared by Darla White

Targeted retrieval of engine-associated parts.

Operations commenced at 0300 hours and concluded at 0900 hours. The nsecowlings (n=2) and one inlet guide vein were recovered.

No oil is associated with these components and no sheen was detected on the surface. Additionally, no oil, fuel, or sheen was detected upon retrieval of either engine.

Depth was approximately 110 m. The substrate is sloped with very low relief (< 0.25 m); pavement and sediment. A brown stingray (*Bathytoshia lata*) passed through the area but did not linger. One trumpetfish (*Aulostomus chinensis*) investigated the ROV. No ESA-listed species were sighted, and no habitat of concern was disturbed during the operation.

The ship arrived at the dock at 1020 hours to offload the recovered pieces.

The barge has arrived and plans to set anchors tomorrow. The anchor site survey and recommendations were sent to the barge team and they have confirmed receipt. Steve Saint Amour will be meeting with the barge lead today.

The ship will stay in port until tomorrow morning.

Environmental Summary
Monday, October 18, 2021 (a)
Prepared by Darla White

Targeted rigging of the cockpit for retrieval.

The Bold Horizon left port approximately 1130 hours to return to the site. The barge DB Salta Verde and tug Shirley C were on site setting anchors. Due to the anchor configuration and similar lengths of the Salta Verde and Bold Horizon, operations for the larger aircraft pieces will only proceed during daylight hours.

ROV operations commenced at 1500 hours and concluded at 1700 hours. The ROV successfully rigged the front of the cockpit for lift and after examining the aft portion of the wreckage, returned to the ship for a longer length of pole. This front portion of the plane broke off just in front of the wings. The rigging was placed at the site and will continue in the morning.

Depth was approximately 110 m. No ESA-listed species were sighted, and no habitat of concern was disturbed during the operation. No drop-offs or areas of habitat complexity have been observed in any of the operations thus far.



Environmental Summary
Tuesday, October 19, 2021
Prepared by Darla White

Targeted rigging of the cockpit for retrieval.

Due to the anchor configuration and similar lengths of the Salta Verde and Bold Horizon, operations for the larger aircraft pieces will only proceed during daylight hours.

ROV operations commenced at 0600 hours and concluded at 1630 hours. The ROV successfully rigged the front portion of the aircraft. The barge winch had maintenance issue and needed repair before lifting the piece. Operations will resume in the morning. The Bold Horizon ROV will rig the larger portion of the fuselage including the wings and tail all day tomorrow.

Depth was approximately 110 m. No ESA-listed species were sighted, and no habitat of concern was disturbed during the operation. No drop-offs or areas of habitat complexity have been observed in any of the operations thus far.

It was a beautiful moonrise over Le'ahi.





Environmental Summary
Wednesday, October 20, 2021
Prepared by Darla White

Objective: retrieve the forward section of the plane and rig the aft section; deploy another basket.

Due to the anchor configuration and similar lengths of the Salta Verde and Bold Horizon, operations for the larger aircraft pieces will only proceed during daylight hours.

ROV operations commenced at 0600 hours. The ROV attached the rigging to the barge winch. The ROV stayed on site to get a visual on the lift and to ensure that the rigging was secure around the section for a successful extraction. The ROV returned to the ship. Several experts moved over to the barge (via the tug) to observe the plane section as it was brought onto the barge. This group included NTSB, Navy salvage, the project manager, and the insurance representative. A small boat of Navy personnel arrived for the retrieval and joined the barge as well. The team returned to the Bold Horizon after documenting the salvage.

The retrieval was successful. This section of the plane was missing the bottom section below the cargo deck. The bottom section of the plane had apparently been sheared away, to the surprise of all, during the crash and its current location is unknown. It is not with the rest of the debris.

Due to the size of the section, the barge made the decision to offload it on the dock today. The tug proceeded to bring the anchors in so that the ROV could resume rigging the aft section of the plane and deploy another basket.

The barge is having difficulty getting permissions to unload at this time. We are not sure when they will be able to. The NTSB is working to figure out permissions. Any assistance anyone on this thread could provide would be greatly appreciated. The ROV plans to continue rigging the aft section in the morning.

The sea state was excellent today and we hope it holds. There is a strong storm brewing in the northeast Pacific.

Depth was approximately 110 m. No ESA-listed species were sighted, and no habitat of concern was disturbed during the operation. No drop-offs or areas of habitat complexity have been observed in any of the operations thus far.

Environmental Summary
Thursday, October 21, 2021
Prepared by Darla White

Objective: rig up the aft section of the plane for extraction and retrieve two engine thrust reversers.

The DB Salta Verde is at Barber's Point and it is anticipated that the barge will begin offloading tomorrow morning at 0700 hours and then return to the wreckage site to set anchor, which will take most of the day.

ROV operations commenced at 0630. The ROV successfully rigged the aft section and then retrieved the remaining two engine reverse thrusters. The thrusters were brought aboard the deck of the Bold Horizon. Operations were completed at 1930 hours. The first lift included at least five small yellow-orange fish (likely anthias) that didn't make it. There was also a very small/light patchy sheen (~1m² aggregated) left on the surface of the water that dissipated within about three minutes. The last lift was completed after dark and hung off the side of the ship for a few minutes as it was transferred to the crane. The activity attracted a couple of larger fish, one of which was gray and either a small shark or large jack and the other was described to likely be a barred knifejaw (angelfish shape with dark bars) by crew on deck during ops and closer to the fish than I was. They left as soon as the crane started to pull the part out of the water. No sheen was detected.

The sea state was excellent today but conditions are changing. It is anticipated that the next weather window for the large section of the plane will be next week. Stay tuned for updates.

Depth was approximately 110 m. No ESA-listed species were sighted, and no habitat of concern was disturbed during the operation. No drop-offs or areas of habitat complexity have been observed in any of the operations thus far.

Environmental Summary
Friday, October 22, 2021
Prepared by Darla White

Objective: put smaller wreckage in baskets, especially electronics

The DB Salta Verde will stay at Barber's Point until Monday and then return to the wreckage site to set anchor, which will take most of the day. The weather window is anticipated to be Tuesday/Wednesday for the larger piece of the aircraft. The Bold Horizon will collect debris in the interim.

ROV operations commenced at 0630 and ended at 1630. The ROV successfully brought aboard several of the larger pieces and spent the day collecting smaller debris and filling the baskets. There are three baskets on the bottom. No sheen was detected when the larger parts were lifted to the deck.

Depth was approximately 110 m. No ESA-listed species were sighted, and no habitat of concern was disturbed during the operation. No drop-offs or areas of habitat complexity have been observed in any of the operations thus far.

Environmental Summary
Saturday, October 23, 2021
Prepared by Darla White

Objective: pick up remaining debris and put smaller wreckage in baskets

The DB Salta Verde will stay at Barber's Point until Monday and then return to the wreckage site to set anchor, which will take most of the day. The weather window is a moving target for the larger piece of the aircraft. The Bold Horizon will collect debris in the interim using the ROV to fill the baskets.

ROV operations commenced at 0630 and ended at 1800. The ROV spent the day collecting smaller debris and filling the baskets. A number of electronic boxes of interest to the NTSB were recovered and more to be collected tomorrow. This wreckage is likely from the underside of the cockpit where the avionics and electronics live. One basket was lifted and emptied and returned to the bottom. One basket is on deck full. There was a lot of small debris that escaped the baskets as they were lifted from the water. It appeared to be small bits of paint and foam and pieces of wreckage small enough to fit through the basket walls.

Average depth was approximately 115 m. No ESA-listed species were sighted, and no habitat of concern was disturbed during the operation. No drop-offs or areas of habitat complexity have been observed in any of the operations thus far.

Other fish observations of interest this past few days includes another brown sting ray and a gray-colored shark reported by one of the ROV pilots with the dorsal fin out of the water, likely a Galapagos or a gray reef shark based on the description. There are a number of trumpet fish (*Aulostomus chinensis*) that are very curious about the ROV and are seen frequently. The bridled triggerfish (*Sufflamen fraenatum*) has taken interest in the operation, and bandit angelfish (*Apolemichthys arcuatus*) are occasionally seen in pairs.

I have reached out to Brian Greene about the following species: What I believe is the orange margin butterflyfish (*Prognathodes basabei*; endemic) is the most commonly fish seen. I thought it was the pennant butterfly fish (*Heniochus diphreutes*) at first but it does not have the characteristic long dorsal streamer and generally looks a little different; it does have the rayed dorsal 'crown' that *Prognathodes* has. There is an aggregation of a damselfish species that I am not familiar with that are medium to large for the family with a light body and dark at the posterior edge and caudal fin. There is also a goatfish species that appears different from those in shallower waters. It has two long thick dark stripes on the upper half of the body and appears white otherwise, and possibly a dark spot on the caudal fin. The ambient light during the day makes it challenging to discern colors. I have not seen them during dark ops when the lights really help. And there was a really cute little bubble-faced nocturnal red fish the size of an Apogon spp. but wider of face that escaped a piece of debris that we had just picked up. It looked right into the camera for a few seconds.

Environmental Summary
Sunday, October 24, 2021
Prepared by Darla White

Objective: pick up remaining debris and put smaller wreckage in baskets; offload wreckage at Barber's Point Harbor.

ROV operations commenced at 0600 and ended at 1230. The Bold Horizon continued the collection of debris using the ROV to fill the baskets. The focus has been on the electronic boxes (first priority) and smaller debris to fill the basket. The basket was retrieved with the lid secure (they all have been). Again, small debris filtered through the walls of the basket at the surface with the same apparent paint chips, foam, and small debris, as well as some sediment and rust.

Average depth was approximately 115 m. No ESA-listed species were sighted, and no habitat of concern was disturbed during the operation. No drop-offs or areas of habitat complexity have been observed in any of the operations thus far. The baskets have been securely closed and the cables taught during deployment and retrieval.

The Bold Horizon departed the harbor at sunset (approximately 6pm) and as we sailed into the sunset (literally), a monk seal was spotted off the starboard side by the project manager. I was sitting on the port side of the bridge at the time and he came to get me but it was in our wake at that point. It was low light but he is certain that it was a seal with its head out of the water watching the boat pass. No identifying markings were noted. I estimate that the sighting was approximately one mile (or less) southwest of Ko'olina. The good news is that it was not in the vicinity of the project.

The Bold Horizon sailed west toward Ka'ena Point for calmer seas for the evening, and will return to the project site at first light.



Environmental Summary
Monday, October 25, 2021
Prepared by Darla White

Objective: pick up electronic debris and put larger wreckage in baskets

ROV operations commenced at 0630 and ended at 1630. The Bold Horizon continued the collection of debris using the ROV to fill the baskets. The focus has been on the electronics and now larger debris to fill the basket.

Average depth was approximately 115 m. No ESA-listed species were sighted, and no habitat of concern was disturbed during the operation. No drop-offs or areas of habitat complexity have been observed in any of the operations thus far.

The Bold Horizon will be docked at Pier 29 tonight to exchange personnel, inspect the hull, and take the necessary steps to report the ship's contact with the substrate.

Environmental Summary
Tuesday, October 27, 2021
Prepared by Darla White

The Bold Horizon was at the dock at Pier 29 all day on Monday, October 26th. A summary of events regarding the ship's contact with the substrate was sent out separately.

Objectives today: position the barge over the site and set anchor; deploy a basket; inspect the existing rigging on the tail section; pick up debris

The barge DB Salta Verde and tug Shirley C commenced setting anchor around the wreckage site in the early morning hours.

The Bold Horizon left Honolulu Harbor at 1300 to collect the barge anchor location points, set out another basket, and examine the rigging that was left on the tail of the aircraft previously. All went smoothly. The ROV came across what appears to be a 4x4" wood beam that is not part of this accident and has likely been there a while. More debris from the plane was collected in the basket.

Examination of the forward opening of the fuselage shows the cargo container filling nearly the entire space. Apparently, they are made to fit the shape of the aircraft. Where the floor is bent upward at the bottom, there is a very small space where the canister is bent upward. From the front it appears that there would not be any room for a monk seal or turtle to enter. The cargo door is open at the aft end of the aircraft, though we have not had a good visual on it.

Tomorrow the goal is to continue with rigging the forward section of the aircraft. The ROV team will transfer to the barge to lay out the rigging and coordinate with the barge team. The ROV team will then rig the fuselage and connect it to the barge crane and do a test lift to see how heavy this plane actually is. Current estimates put it at 94,000 lbs.

A note about the barge anchorages:

We surveyed the proposed barge anchor sites at the onset of this project to enable a visual assessment of the anchor impacts. The barge does have the ability to anchor on a particular target point, however, due to prevailing wind, wave, and currents and the reality of positioning the barge in the best orientation for these lifts, the two anchor sets have not been on the proposed/surveyed sites (Figure 1). The new plan is to survey all actual anchor locations and the surrounding areas to get a representative sample of the habitat.

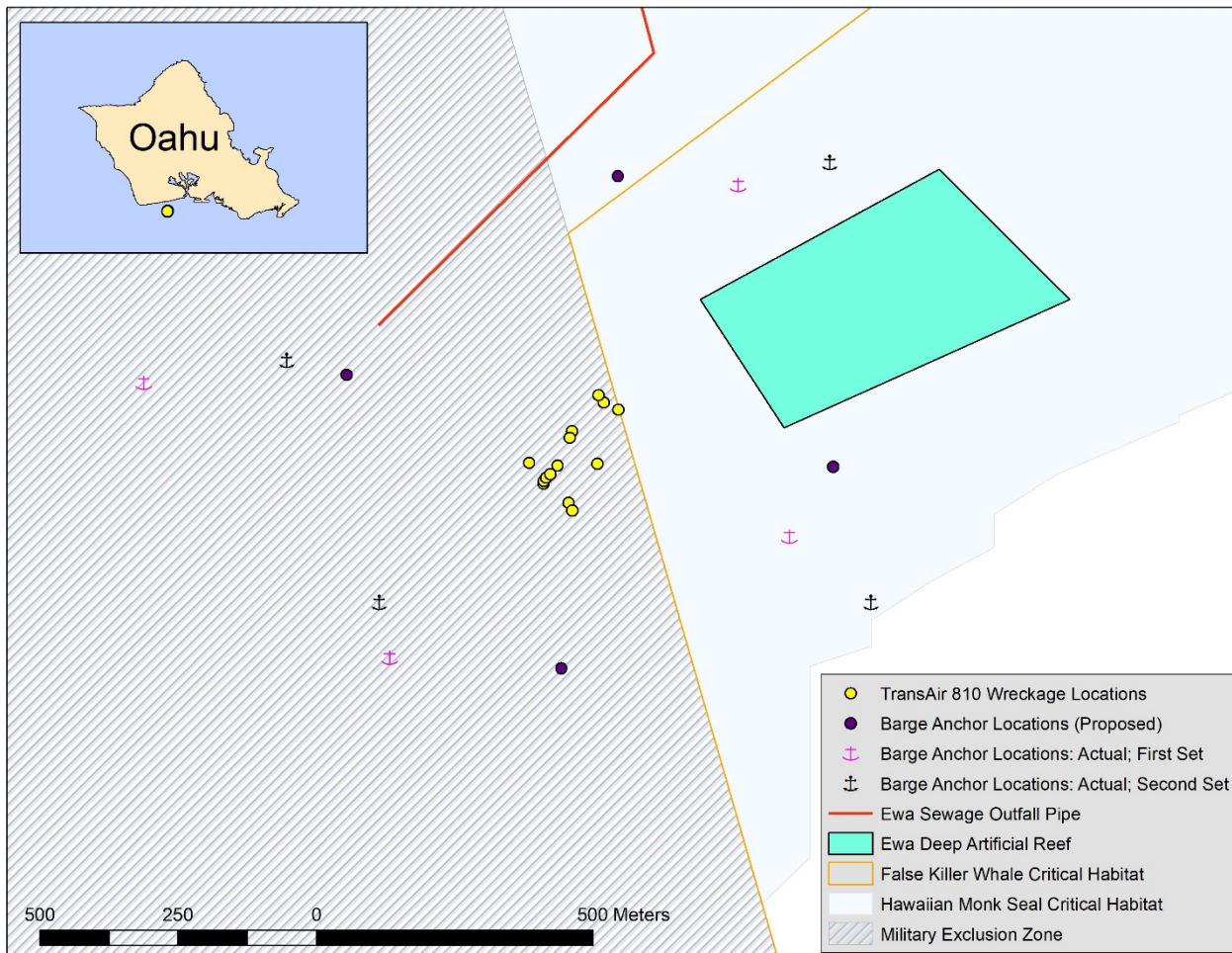


Figure 1. Barge proposed and actual anchor locations.

Environmental Summary
Thursday, October 28, 2021
Prepared by Darla White

Objectives today: rig the wings and forward section; attach to barge; test lift

The ROV team transferred to the DB Salta Verde to lay out the rigging and coordinate with their team around 0600 this morning. They were back in time for breakfast.

ROV ops commenced approximately 0900 and ended at 1700. The operating depth was approximately 100 m. They successfully rigged both wings and the front of the aircraft. The only remaining rigging is the strap that goes between the front and aft rigging and to cinch it, which will continue first thing tomorrow morning.

A small group of dolphins (n= 6 - 8) were sighted approximately 400 m off the bow. This is the first sighting during operating hours. They meandered very slowly by the port side of the ship, catching an occasional small swell/wave. One gave a tail slap. They slowly meandered toward the stern of the ship and then disappeared. It is my guess that they dove down to investigate the activities but I was unable to find them again afterward and they were not visible on the ROV cameras. They did not venture between the ship and the barge at the surface.

A hose on the left seven-function manipulator arm of the ROV was damaged at approximately 1500 hours on a piece of jagged metal from the wreckage and released approximately one pint of hydraulic fluid. The ROV was brought immediately to the surface for maintenance. The part was replaced and the ROV returned to the water at 1530 hours. The hydraulic fluid used is biodegradable and has been tested on shrimp reproductivity and viability of offspring. It passed the Antarctic Commission's requirements for Eclipse's last operation there.

Environmental Summary
Friday, October 29, 2021
Prepared by Darla White

Objectives today: finish rigging the plane (last bit), cinch, test lift, fill baskets

ROV ops commenced approximately 0600 and ended at 1745 hours. They successfully rigged the remaining strap to the aircraft. They were able to cinch it, and the test lift was a success. The ROV commenced filling the baskets with debris, and brought one basket to the ship. Additionally, two larger pieces of wreckage were lifted on the winch, which was some of the forward 'belly' skin. The basket contained a box that was apparently liberated from a shipping container (Figure 1). It will not be opened on the ship but will be taken to the dock with the other wreckage for the NTSB investigation.



Figure 1. Box of cargo that was found at 100.8 m depth and recovered. The straps were in tact and the box was still closed.

Average depth was approximately 110 m. No ESA-listed species were sighted, and no habitat of concern was disturbed during the operation. No drop-offs or areas of habitat complexity have been observed in any of the operations thus far. The baskets have been securely closed and the cables taught during deployment and retrieval.

There was a lot of small debris that escaped the basket as it was lifted from the water. Again, it appeared to be small bits of paint and foam and pieces of wreckage small enough to fit through the basket walls. The aircraft belly sections also shed some smaller loose bits upon retrieval. Three fishes came up in the basket this time. Steve put them back in the water.

The big lift is scheduled for tomorrow morning. If all goes as planned, that is, if it stays in one piece, the barge will pull anchor and head back to Barber's Point Harbor with the NTSB folks. Wreckage removal will continue, and survey of the anchor sites will commence.

There was a lobster on one piece of wreckage today. It abandoned its claim and escaped before the piece was lifted away. And the resident brown sting ray made appearances again. I was able to confirm that *Heniochus diphreutes* is also a resident of these depths. I hope to get better photos of the other species when we survey the anchor sites. Here are some photos of the Gray's spinner dolphins from yesterday:



Environmental Summary
Saturday, October 30, 2021
Prepared by Darla White

Objectives today: apply a 'choke' to the wing and lift the fuselage; continue debris collection

ROV ops commenced approximately 0630 and came back on deck at 0900 hours. The ROV fixed a choke around one of the wings to keep the aircraft from spinning and enable the positioning of the plane on the barge.

The lift of the aircraft commenced at 0830. The ROV stayed for 30 minutes to keep the camera on the operation. The sediment/silt plume was pretty dense but the tail was still in view. The lift appeared to be going well so the ROV came back to the deck. The plane was lifted at 3' per minute. The plane was successfully lifted onto the barge. The water was allowed to drain once it broke the surface, which slowed the lift considerably. It appeared that the water from the cargo cans drained from the forward portion of the plane once it was lowered over the barge. It was decided after the visit to TransAir that drilling holes would not be necessary as the aluminum that made up the cans was strong but flexible and would release the water. No sheen was detected and Penco was on site in the event that one was observed. Only a small amount of debris that appeared to be insulation for the most part floated on the surface. The plane was secured by 1100 hours and the tug worked to pull anchor. The NTSB team was taken to the port with the plane. The recorders were recovered.

Average depth was approximately 100 m. No ESA-listed species were sighted, and no habitat of concern was disturbed during the operation. No drop-offs or areas of habitat complexity have been observed in any of the operations thus far. The baskets have been securely closed and the cables taught during deployment and retrieval.

We had a visit from a group of Gray's spinner dolphins between operations. There were about 15-20 individuals. They came and visited the Bold Horizon for about 20 minutes and left again. This time I was able to get some good photos.

The ROV deployed again at 1530 hours to add more debris to the remaining basket on the bottom and rigged a large container, both of which were lifted onto the Bold Horizon. The ROV returned to the boat at 1730 hours.

Tomorrow the ROV plans to survey the barge anchor sites and conclude the operation.

Environmental Summary
Sunday, October 31, 2021
Prepared by Darla White

Objectives today: lift remaining large debris; survey the anchor sites

ROV ops commenced approximately 0630 and concluded at 0530 hours

ROV ops started with targeting the large survey cans for lift. The first one was empty shell and was successfully retrieved. One of the TransAir containers is missing. It is not where it was identified on the initial survey immediately after the crash. The ROV team has thoroughly searched the area surrounding the points and it does not come up on the sonar either. The sonar can search 100m out and they have been unable to locate it in the past three weeks.

The ROV did a sweep looking at reminding debris. Took photos of interesting but too small pieces. The main debris field still had a bit of debris (n= 20 - 30 m pieces) but all small stuff. The largest piece was targeted for lift. It turned out to be three pieces and the largest of the three was recovered. The rest remains. The team found a part of a broken wooden surfboard on a different date, but this seems like a good place to include it.

Most of the area is sloped with very low rugosity and a mix of pavement with rocky areas and sediment. Some of the sloped area is slightly undulating, but estimated less than 2 m conservatively.

Anchor Site Surveys

As mentioned previously, the barge was unable to anchor on the proposed sites that we surveyed at the beginning of the operation due to wind and swell direction and optimal placement of the barge to lift the larger pieces of the aircraft. The buoys of the anchor sites were marked with the GPS of the Bold Horizon and served as the sites to survey after the barge pulled anchor (Figure 1).

Note: I am leaving these in order of appearance so that I can connect the photos to them soon.

Anchor Site 2 10/27 (SW anchor)

2nd set site: Substrate very low relief consisting of pavement with rock and shallow sediment. The anchor scar is clearly visible and the cable line as well. Lots of pics

1st set site: Anchor scar and scraped substrate visible - cable line straight; some scraping on an arc is visible (see photo). Substrate is mostly flat, slightly sloped, and mostly same as the other site with less rock and visible pavement. Lots of pics, including a kahala that swam up to the camera

Anchor Site 3 (NW anchor)

1st set anchor site 3. Approximately 35 m depth and 10m east of the point we think we found evidence of the anchor. The habitat is slightly sloping with good sized patches with high coverage of fleshy limu and some small brown sponges, on top of pavement with a thin layer of sediment/sand on top. We encountered a purple velvet sea star and a cucumber. It was hard to tell if what we found was the anchor scar based on an apparent missing chain and cable scar. We investigated an area that may have been disturbed but it was hard to say. More of an impact was expected.

2nd set anchor site 3. The anchor scar and cable scar were easily visible. The habitat was flat at about 45 m depth and pavement with shallow sediment. Took lots of pics. No sensitive habitat was disturbed.

Sewage outfall pipe survey:

En route to the pipe we came across a sea of stars to the NW of the end of the pipe. See pics. We have photos and video of the sewage outfall pipe for Liz and Ross.

Anchor Site 4 (NE)

1st set anchor site 80m depth; We found the prominent chain and cable scar. The area is characterized as slightly sloped, flat, and mostly shallow sand over pavement. No sensitive habitat was disturbed.

2nd set anchor site: flat, sloped, thin sediment on pavement. Odd cement and pipes around. We found a straight scar but not convinced that it is the anchor cable. We are close to the artificial reef so the stuff down here is just related to that. It is pretty much desolate otherwise

Anchor Site 1 (SE)

This applies to both anchor sites: Approximately 200 m. Desolate seascape of sand and silt with cement blocks and pipe scattered about from the artificial reef. We believe that we may have found the anchor disturbance, but whether that was it or not, there was no sensitive habitat in the area to be disturbed.

No ESA-listed species were sighted, and no habitat of concern was disturbed during the operation. No drop-offs or areas of habitat complexity have been observed in any of the operations thus far. The baskets have been securely closed and the cables taught during deployment and retrieval.

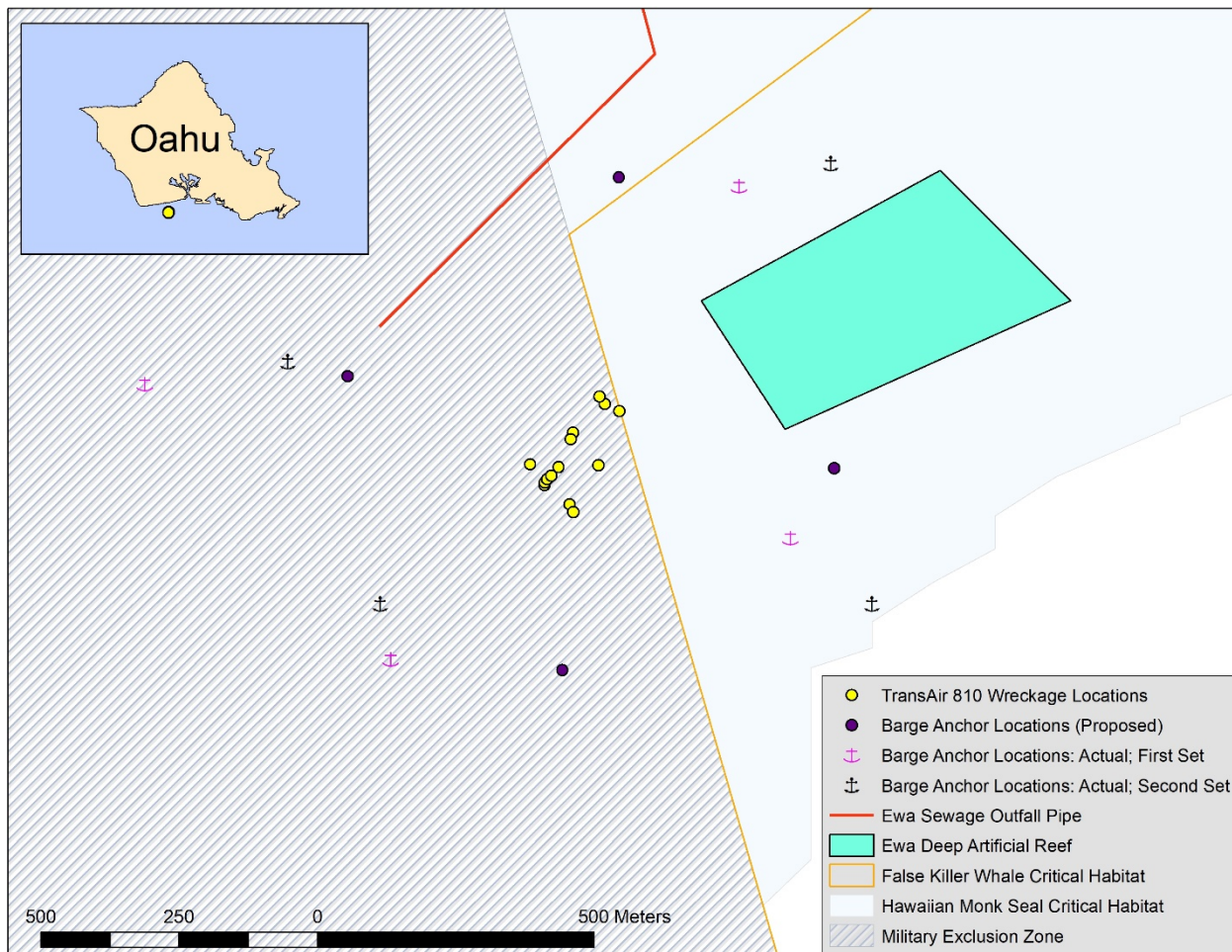


Figure 1. Barge proposed and actual anchor locations.

Appendix C: DAR Report - Bold Horizon Substrate Injury Assessment

Bold Horizon Injury Initial Assessment Report Ewa Beach, Oahu, Hawaii
Field Investigative Report



Division of Aquatic Resources October 2021

Executive Summary

The 52 meter (170') long research vessel, Bold Horizon, was in Hawaii to assist with the recovery of the Boeing 737 cargo jet that went down in the waters two miles off Ewa Beach on July 2, 2021. On the early evening of October 23, 2021, the Bold Horizon was heading east at approximately 9-10 knots when it struck the sea floor.

On October 26th, the incident was finally reported to the United States Coast Guard who then reported it to DAR. On October 29, 2021, DAR staff biologists assessed the grounding of the Bold Horizon off Ewa Beach, Oahu in 3-5 meters (10-15'). Water visibility was about 3 meters (10'). The area is categorized as pavement with sand channels. The pavement is macroalgae and turf dominated with no corals were observed. Some damage was observed. The damage consisted of pulverized live rock and appeared as if only part of the Bold Horizon's hull had briefly come into contact with pavement. GPS coordinate was taken (21d 17.806N, 158d 0.188W).

Staff drew and measured the damage of both impact scars. The first scar consisted of three damage areas. The first was 0.6 m long by 1.2 m wide. The second was 0.8 m long by 0.9 m wide and the third was 2 m long by 0.8 m wide. The second scar was approximately 5 m to the west at marker 1. That scar measured 2.2 m long by 1.1 m wide. The total square meters of live rock damaged is 5.46 square meters. No coral resources were impacted in this incident.

Table of Contents

Executive Summary.....	1
Overview	3
Site Background.....	3
Injury Scene Description.....	3
Post-incident Assessment.....	3
Injury Scene Evaluation.....	7
Assessment Surveys Methods.....	7
Results	7

Overview

The 52 meter (170') long research vessel, Bold Horizon, was in Hawaii to assist with the recovery of the Boeing 737 cargo jet that went down in the waters two miles off Ewa Beach on July 2, 2021. On the early evening of October 23, 2021, the Bold Horizon was heading east at approximately 9-10 knots when it struck the sea floor. The vessel appears to have come in contact with the bottom on its port underside midship sometime between 7 – 8 pm. It was reported that the crew of the Bold Horizon misread the nautical charts and thought they were in 10 fathoms (19 meters or 60'), but in reality, they were in 3-5 meters (10-15') of water (the vessel draws 4 meters or 12').

On October 26th, the incident was finally reported to the United States Coast Guard who then reported it to DAR aquatic biologist David Gulko. On October 27th, DAR administrator Brian Neilson communicated with staff requesting that a site assessment be conducted.

Site Background

The impact site is in 3-5 meters (10-15') of water approximately 1500 meters (one mile) off Ewa Beach is located in the Ewa District of Mamala Bay along the southern coast of Oahu. The impact area is generally characterized as limestone pavement with sand channels.

Injury Scene Description

Post-incident Assessment

The function of the post-incident assessment survey was to determine the extent and severity of the damage to coral and live rock. On October 29, 2021, aquatic biologists Cathy Gewecke and Paul Murakawa assessed the grounding of the Bold Horizon off Ewa Beach, Oahu in 3-5 meters (10-15') of water. Two marker floats were deployed into the water at the GPS coordinates provided by the Bold Horizon, one at 21d 17.800N, 158d 0.200W (marker 1-Ewa) and the other at 21d 17.800, 158d 0.180W (marker 2-Diamondhead). Snorkelers jumped in at marker 1 and swam over to marker 2. Water visibility was about 3 meters (10'). The pavement was macroalgae and turf dominated, with no corals observed.

Macroalgae included native red, green, and brown alga.

After reaching marker 2 without finding any damage, snorkelers split up and went inshore and offshore of marker 2 with the intention of swimming back towards marker 1. Inshore and approximately 3 meters (10') away from marker 2, some damage was observed. Marker 2 was moved to the observed damage. Snorkelers continued to swim towards marker 1 and observed additional damage approximately 5 meters (16') away from marker 2. Marker 1 was moved to this area. No other damage was observed in the surrounding area. The damage consisted of pulverized live rock and appeared as if only part of the Bold Horizon's hull had come into contact with pavement.

Staff went back on the boat to don SCUBA gear. A GPS waypoint approximately between the two marker floats. That GPS coordinate was 21d 17.806N, 158d 0.188W.



Figure 1. First scar, first damage area.



Figure 2. First scar, second damaged area.

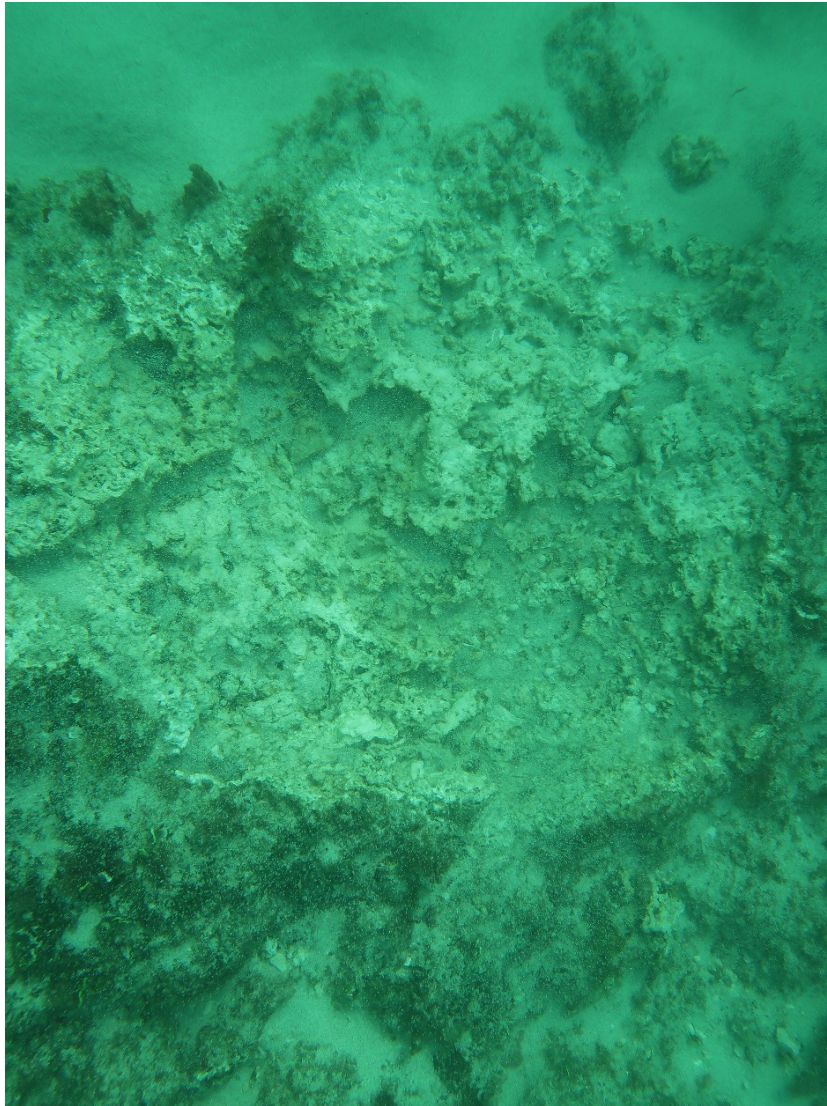


Figure 3. First scar, third damaged area.



Figure 4. Second scar area approximately 5 meters away from first scar.

Injury Scene Evaluation

Assessment Surveys Methods

Staff drew and measured the damage of both impact scars. Measurements were taken with standardized meter measuring tape. Photos were also taken with (not presented in this report) and without a 50 cm reference bar.

Results

The first scar consisted of three damage areas. The first area (Figure 1) was 0.6 m long by 1.2 m wide. The second area (Figure 2) was 0.8 m long by 0.9 m wide and the third area (Figure 3) was 2 m long by 0.8 m wide. The second scar (Figure 4) was approximately 5 m (16') to the west at marker 1. That scar measured 2.2 m long by 1.1 m wide.

The total square meters of live rock damaged was 5.46 square meters. No coral resources were impacted in this incident.

Contact Information Associated with this Investigation

DAR Assessment Report Team:

Paul Murakawa, DAR, Aquatic
Biologist IV Catherine Gewecke,
DAR, Aquatic Biologist IV

DAR Field Investigation Team:

Paul Murakawa, DAR, Aquatic
Biologist IV Catherine Gewecke,
DAR, Aquatic Biologist IV Glenn
Cambra, DAR, Fisheries Technician
IV

Crookshanks Clinton

From: Anne Chung - NOAA Federal <[REDACTED]>
Sent: Friday, December 3, 2021 12:19 PM
To: Darla White
Cc: Stuart Goldberg - NOAA Federal; Crookshanks Clinton; Steven Saint Amour; Gerry Davis - NOAA Federal; Malia Chow - NOAA Federal
Subject: Re: TransAir 810 Environmental Statement - Report to NOAA

[CAUTION] This email originated from outside of the organization. Do not click any links or open attachments unless you recognize the sender and know the content is safe.

Thank you for the correction Darla!

Anne

On Fri, Dec 3, 2021 at 8:48 AM Darla White <[REDACTED]> wrote:

Thanks so much, Anne. And apologies, I realized that I accidentally wrote ESA instead of EFH. So here it is with the correction:

Hi Anne and Stuart,

Thank you for your assessment and EFH consultation after the fact. On behalf of Clint Crookshanks of the NTSB in the TransAir 810 aircraft wreckage recovery effort, in compliance with the Conservation Recommendation, we agree to include your office (those cc'd here) in any continuing discussions with DAR regarding the Bold Horizon's contact with the substrate. At this time, per personal communication with Brian Neilson, DAR intends to fine EGI as is consistent with State law for the value of live rock damage for 5.5 square meters total area and recover survey costs. Restoration of the area is not anticipated. Secondary damage from disturbed substrate is not anticipated. Brian Neilson and Dave Gulko are the DAR contacts in this case.

Many thanks for your coordination and collaboration. Please let me know if you need anything further.
We wish you a joyous holiday season and a very happy new year!
Aloha, Darla

Darla White, MSc., MGIS (she/her)
Owner, Marine Ecological Consulting (MEC), LLC.

[REDACTED]
<https://www.linkedin.com/in/darlawhite>
https://www.researchgate.net/profile/Darla_White

On Fri, Dec 3, 2021 at 8:38 AM Anne Chung - NOAA Federal <[REDACTED]> wrote:

Thank you Darla, we appreciate your coordination and the acceptance of our CRs by the NTSB. I will add your response to our records, this concludes the EFH consultation.

Happy Holidays!

Anne

On Thu, Dec 2, 2021 at 9:14 PM Darla White [REDACTED] > wrote:
Hi Anne and Stuart,

Thank you for your assessment and ESA consultation after the fact. On behalf of Clint Crookshanks of the NTSB in the TransAir 810 aircraft wreckage recovery effort, in compliance with the Conservation Recommendation, we agree to include your office (those cc'd here) in any continuing discussions with DAR regarding the Bold Horizon's contact with the substrate. At this time, per personal communication with Brian Neilson, DAR intends to fine EGI as is consistent with State law for the value of live rock damage for 5.5 square meters total area and recover survey costs. Restoration of the area is not anticipated. Secondary damage from disturbed substrate is not anticipated. Brian Neilson and Dave Gulko are the DAR contacts in this case.

Many thanks for your coordination and collaboration. Please let me know if you need anything further.
We wish you a joyous holiday season and a very happy new year!
Aloha, Darla

Darla White, MSc., MGIS (she/her)
Owner, Marine Ecological Consulting (MEC), LLC.

[REDACTED]
<https://www.linkedin.com/in/darlawhite>
https://www.researchgate.net/profile/Darla_White

On Thu, Dec 2, 2021 at 12:01 PM Anne Chung - NOAA Federal [REDACTED] wrote:
Dear Mr. Crookshanks,

The National Marine Fisheries Service, Pacific Islands Regional Office (NMFS), received the request from the National Transportation Safety Board (NTSB) on November 30, 2021 for an abbreviated essential fish habitat (EFH) consultation for the emergency recovery operations for TransAir Flight 810. We have reviewed the EFH assessment and have determined that there were likely adverse effects to EFH. Pursuant to Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and as described by 50 CFR 600.920(a), "Consultation is required for emergency Federal actions that may adversely affect EFH, such as hazardous material clean-up, response to natural disasters, or actions to protect public safety". The NTSB previously contacted NMFS early in emergency response planning and this correspondence is to complete an after-the-fact EFH consultation. NMFS provided Best Management Practices (BMPs) in July 2021, which along with the NTSB's responses and a new EFH Conservation Recommendation, are described below.

Project Description

On July 2, 2021 a Boeing 737-257C operated by Rhoades Aviation as TransAir Flight 810 ditched into the Pacific Ocean south of the island of Oahu (latitude: 21.276667°; longitude: -158.028333°). The pilots of the cargo flight were rescued, the wreckage of the plane and the cargo onboard settled to the seafloor in 340 – 440 feet of water. The salvage operation was classified as an emergency effort and led by the NTSB and the primary objectives were to recover the flight recorders, aircraft, and cargo which was non-hazardous pharmaceuticals. Because this was an emergency response, on July 16, 2021 NMFS responded to an email

from NTSB providing general information on the information required for an after-the-fact EFH consultation and a list of Best Management Practices (BMPs) to minimize effects to EFH during this type of operation. Eclipse Group Inc. (EGI), under contract to AIG Aerospace, conducted the recovery with the Research Vessel (R/V) *Bold Horizon*, derrick barge, barge assist tug, GP-50 ROV system; and all personnel required for the operation. At the completion of the operation, all recovered materials were delivered to Kalealoa Barbers Point Port. EGI retained the services of Marine Ecologist, Darla White, to serve as the protected species observer and environmental consultant on this project.

Essential Fish Habitat

Currently in the Hawai'i archipelago, the marine water column from the surface to a depth of 1,000 meters from shoreline to the outer boundary of the Exclusive Economic Zone (200 nautical miles), and the seafloor from the shoreline out to a depth of 700 meters around each of the Hawaiian Islands, have been designated as EFH. At the project site, EFH is designated for the following MUS and life stages: eggs, larvae, juveniles, and adults of Bottomfish MUS; eggs, larvae, juveniles, and adults of Crustacean MUS; and eggs, larvae, juveniles, and adults of Pelagic MUS. Specific types of habitat considered as EFH include coral reef, patch reefs, hard substrate, artificial substrate, seagrass beds, soft substrate, mangrove, lagoon, estuarine, surge zone, deep-slope terraces and pelagic/open ocean.

The area surrounding the wreckage covered approximately 200 meters by 130 meters and was characterized as a large slope of predominantly soft sediment over hard substrate devoid of coral.

Adverse Effects

The project activities require in-water work that may cause adverse effects to EFH. During recovery operations, there may be disturbance to soft-bottom EFH substrate. Short-term adverse effects may occur and include the following stressors: sedimentation and turbidity from wreckage removal, increased risk of unintended physical damage (if wreckage is left in place and becomes marine debris or vessels and equipment unintentionally damage habitat), chemical contamination and invasive species from equipment.

Sedimentation (pollution stressor): There is an increased risk of increased sedimentation to nearby habitat due to project operations during rough sea states. Coral reef organisms are easily smothered by sediment (Golbuu et al. 2003), and suspended sediment rates of >10 milligrams per liter (mg/L) and deposited sedimentation rates >1 mg/L can adverse effect juvenile and adult corals (Tuttle et al. 2020) although corals show considerable interspecific variability.

Physical Damage/Removal (physical stressor): Physical damage from falling debris during wreckage recovery could be possible to larval and egg life stages of MUS and benthic habitats. Marine debris is possible if portions of the airplane debris were left in place and travel throughout the surface and water column. This is of particular concern if debris comes into contact with surrounding coral reef areas. In addition, on November 23, 2021, EGI shared an Environmental Statement prepared for NOAA where additional physical contact was described. On October 23, 2021 the R/V *Bold Horizon* made contact with shallow substrate one mile south of the island of Oahu. The Hawai'i Division of Aquatic Resources (DAR) deployed a dive team to assess the damage. The DAR team observed that the bottom habitat where the contact took place was predominantly fleshy algae over pavement substrate. No corals were involved. The total area of the contact scar was 5.46 square meters.

Chemical Contamination (pollution stressor): Chemical pollutants can have a variety of lethal and sub-lethal effects on habitat-forming marine organisms, including alteration of growth, interference with reproduction, disruption of metabolic processes, and changes in behavior. These adverse effects can cascade through ecosystems, altering species composition and ecosystem functions and services.

Invasive Species (biological stressor): Introduced species are organisms that have been moved, intentionally or unintentionally, into areas where they do not naturally occur. Species can be introduced to new biogeographies, typically via transport on vessel hulls or in ballast water, such as those that may be used in the proposed recovery operations.

NMFS Concerns and July 2021 BMPs

NMFS July 2021 BMPs

NMFS provided the NTSB with seven BMPs in July 2021 to avoid and minimize potential adverse effects to EFH from the proposed activities. NMFS was concerned about the possibility that debris from the wreckage could remain at the site and potentially cause physical damage or increase the risk of chemical pollution. NMFS was also concerned about the potential for increased sedimentation and physical damage during ROV and vessel operations. We recognize that the NTSB applied these BMPs during the emergency operations. Our original BMPs and the NTSB responses from November 2021 are described below:

1. Equipment, anchors, structures, or fill shall not be deployed in areas containing live corals, sea grass beds, or visible benthic organisms. Perform pre-deployment reconnaissance (e.g., divers, drop cameras) to ensure these resources are avoided.

NTSB Response: The tug sought shallow, sandy anchorages in shallower waters inshore from the wreckage site where they could assess the sand patch. The proposed anchor locations for the DBSV were reviewed with the State of Hawai'i and NOAA. The *Bold Horizon* used the ROV to survey the proposed anchor locations. All actual anchor sites were surveyed on the last day of operations using the ROV to record the environmental disturbance. No sensitive habitats were disturbed and with one exception (NW site where there was a lot of fleshy algae), the substrate was pretty desolate.

2. Minimize physical contact by divers and construction related tools, equipment, and materials with benthic organisms, regardless of size, especially corals and seagrass.

NTSB Response: The substrate where the wreckage field was located was characterized as predominantly sand/sediment over pavement, with some exposed pavement and occasional rocks and very low complexity (< 1 m). The ROV contact with the substrate was minimal, and all visible marine life was avoided when contact was necessary.

3. Prevent trash and debris from entering the marine environment during the project.

NTSB Response: No additional trash or debris entered the marine environment during the project that was not a part of the aircraft wreckage. The wreckage debris sluffed paint chips and insulation that were water-soaked and small enough to be filtered out of the baskets when lifting onto the ship. Additionally, some small debris still remains. EGI estimated that 99% of the aircraft wreckage was recovered. Some small debris (< 3' x 3') remains. One of the cargo containers that was located during the original survey was not located during the three weeks that the ROV spent recovering debris and the search had to be concluded.

4. Maintain all structures, gear, instrumentation, mooring lines, and equipment to prevent failures.

NTSB Response: All equipment was inspected for cleanliness and leaks prior to daily operations. One instance of damage to a hydraulic hose on the ROV occurred and one pint of hydraulic fluid was

released. The hydraulic fluid used was biodegradable and expected to do no harm. A report was submitted to the Hawai'i Department of Health along with documentation of the hydraulic fluid.

5. All objects lowered to the bottom shall be lowered in a controlled manner. Note: This can be achieved by the use of buoyancy controls such as lift bags, or the use of cranes, winches, or other equipment that affect positive control over the rate of descent.

NTSB Response: The ROV, baskets, and rigging were all lowered and raised in a controlled manner. All used the ROV and/or winch with four cameras, ship positioning, and deck crew oversight for all operations.

6. In order to minimize malfunction, prior to operations employing submersibles, a pre-deployment test of all operating systems should be run to ensure that equipment is operating correctly, there are no visually apparent physical defects, and conditions are conducive to operations.

NTSB Response: The ROV was thoroughly checked before each deployment as standard operating procedure.

7. All submersible missions should have a plan that details the mission, geographic locations, and deployment and retrieval plans to minimize the potential for collisions and groundings and ensure proper retrieval.

NTSB Response: The operations plan was disseminated to all agencies for review prior to operations.

Conservation Recommendations

NMFS recognizes DAR's role in assessing and restoring the bottom substrate damaged by the R/V *Bold Horizon*. Loose rubble may scour nearby hard substrate and corals, reducing the quality and quantity of EFH. In addition to the BMP list above, NMFS offers an additional EFH Conservation Recommendation pursuant to 50 CFR 600.920 and 600.925(a) to further avoid and minimize adverse effects to EFH:

Conservation Recommendation: We respectfully request to be included in any discussions and follow up with DAR to provide any potential additional guidance on the restoration efforts at the R/V *Bold Horizon* impact site. This would allow us to learn more about how loose substrate at the site is/has been removed, contained, or otherwise secured as appropriate.

Conclusions

NMFS greatly appreciates the efforts of the NTSB to comply with the EFH provisions of the MSA during the emergency wreckage recovery operations. NMFS determines that the proposed project may adversely affect EFH, and we provided BMPs in July 2021 to minimize these effects. NMFS determines that the NTSB's adherence to the BMPs is suitable. In addition and herein, NMFS offers one EFH Conservation Recommendation to further ensure that adverse effects to EFH were no more than minimal. Please be advised that regulations (Section 305(b)(4)(B)) to implement the EFH provisions of the Magnuson-Stevens Act require that federal activities agencies provide a written response to this letter within 30 days of its receipt. Please contact Anne Chung at [REDACTED] with any comments or questions.

On Tue, Nov 30, 2021 at 10:19 AM Anne Chung - NOAA Federal [REDACTED] > wrote:

Aloha Darla, we've received the assessment and I will be the POC for this consultation. I will be in touch soon with our response.

Thank you for your coordination,

Anne

On Tue, Nov 30, 2021 at 9:25 AM Darla White [REDACTED] > wrote:
Hi Anne and Stuart,

Thank you so much for your guidance, participation, and EFH consultation on this project. Please find the attached EFH Environmental Statement attached to this email for your review in compliance with the EFH consultation process.

Please let me know if you have any questions or if this requires any additional information. As a gentle reminder, I will be going on leave starting this Friday for two months, so I would greatly appreciate hearing back from you very soon.

Many thanks in advance for your time and consideration.
Aloha, Darla

Darla White, MSc., MGIS (she/her)
Owner, Marine Ecological Consulting (MEC), LLC.

[REDACTED]
<https://www.linkedin.com/in/darlawhite>
https://www.researchgate.net/profile/Darla_White

On Fri, Nov 26, 2021 at 2:43 PM Anne Chung - NOAA Federal [REDACTED] > wrote:

Aloha all - in addition to meeting ESA requirements, the NTSB must also complete an after-the-fact Essential Fish Habitat (EFH) consultation with the Habitat Conservation Division of NMFS. This will require submitting an EFH assessment, including a description of the EFH in the area, the bmps/minimization/offset for the activity, and the EFH determination. Any survey work should also be included, whether it was qualitative or quantitative.

EFH guidance was provided in July, see below for email text from July 16, 2021 to the NTSB, which provides more detail on what is required. Let me know if there are further questions, thanks.

Aloha Clint,

NMFS appreciates NTSB reaching out for coordination on Essential Fish Habitat (EFH) for the ongoing recovery operations for TransAir 810. Similar to ESA, as soon as practicable after the emergency is under control, the action agency should initiate formal EFH consultation for any actions that may have adverse effects to the water column and bottom substrate that occur during the operation.

NMFS recommends, if possible, that applicants and the NTSB try to include any description/survey assessment of the marine habitat in the recovery operation footprint(s), for example photos or videos before and/or after the recovery operation. However, we understand that this may not always be practicable. Avoiding and minimizing potential impacts is therefore recommended, and after-the-fact assessments are another option to document any potential adverse effects due to the operation. I have also included several Best Management Practices (BMPs) below relevant to the recovery operation actions and use of submersibles.

EFH in the main Hawaiian Islands has been designated in the marine water column from the surface to a depth of 1,000 meters (m), from the shoreline to the outer boundary of the Exclusive Economic Zone (200 nautical miles), and the seafloor from the shoreline out to a depth of 700 m. For emergency situations, 50 CFR § 600.920 of the EFH Final Rule discusses requirements for consultation if the actions may adversely affect EFH. Timelines are also discussed, and notes that action agencies "...

may consult after-the-fact if consultation on an expedited basis is not practicable before taking the action."

The EFH consultation process entails the federal action agency contacting NMFS and providing an EFH assessment (EFHA), which contains key information: a description of the proposed action, a determination from the federal agency as to how the action will affect EFH, an assessment of those adverse effects, and proposed ways to mitigate for the adverse effects, if applicable. An adverse effect to EFH is anything that reduces the quality and or quality of EFH. The EFHA can be combined with ESA consultation, as long as the required information listed above is included.

Lastly, we are here to help. We want to help streamline any potential consultation as much as possible during this time. Don't hesitate to reach out with any questions and/or concerns.

Thanks,

Anne

Conservation Recommendations for Physical Impacts to Essential Fish Habitat

1. Equipment, anchors, structures, or fill shall not be deployed in areas containing live corals, sea grass beds, or visible benthic organisms. Perform pre-deployment reconnaissance (e.g., divers, drop cameras) to ensure these resources are avoided.
2. Minimize physical contact by divers and construction related tools, equipment, and materials with benthic organisms, regardless of size, especially corals and seagrass.
3. Prevent trash and debris from entering the marine environment during the project.
4. Maintain all structures, gear, instrumentation, mooring lines, and equipment to prevent failures.
5. All objects lowered to the bottom shall be lowered in a controlled manner. Note: This can be achieved by the use of buoyancy controls such as lift bags, or the use of cranes, winches, or other equipment that affect positive control over the rate of descent.
6. In order to minimize malfunction, prior to operations employing submersibles, a pre-deployment test of all operating systems should be run to ensure that equipment is operating correctly, there are no visually apparent physical defects, and conditions are conducive to operations.
7. All submersible missions should have a plan that details the mission, geographic locations, and deployment and retrieval plans to minimize the potential for collisions and groundings and ensure proper retrieval.

On Tue, Nov 23, 2021 at 11:25 AM Darla White [REDACTED] > wrote:

Hi Danielle and colleagues,

Thank you all so very much for all of your time and consultation on the ESA, BMPs, critical habitat, and the overall project. Please find the environmental report/biological opinion attached for your review.

The report itself is not very long, but the appendices include all of the daily summaries, the DOH report for the hydraulic release and information about the hydraulic fluid used, and the DAR report on the Bold Horizon's brush with the substrate.

Please let me know if you have any questions.

Have a really wonderful Thanksgiving holiday!

Aloha, Darla

I will be on leave from December 3, 2021 - February 2, 2022

Have a lovely holiday season and a happy new year!

Darla White, MSc., MGIS (she/her)
Owner, Marine Ecological Consulting (MEC), LLC.



<https://www.linkedin.com/in/darlawhite>
https://www.researchgate.net/profile/Darla_White

--

Anne Chung, Ph.D.

Marine Resource Specialist, Pacific Islands Regional Office
NOAA Fisheries | U.S. Department of Commerce

Office:



www.fisheries.noaa.gov

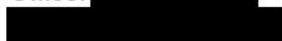


--

Anne Chung, Ph.D.

Marine Resource Specialist, Pacific Islands Regional Office
NOAA Fisheries | U.S. Department of Commerce

Office:



www.fisheries.noaa.gov

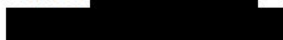


--

Anne Chung, Ph.D.

Marine Resource Specialist, Pacific Islands Regional Office
NOAA Fisheries | U.S. Department of Commerce

Office:



www.fisheries.noaa.gov