

# Final Field Report for Baseline Marine Resources Surveys for the Sea Port in Yap, Federated States of Micronesia

Submitted to:



Naval Facilities Engineering Systems Command, Pacific

Prepared by:

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## EXECUTIVE SUMMARY

This field report summarizes the results of baseline marine surveys conducted in the Federated States of Micronesia in 2023. Baseline marine surveys were conducted between April 28 and May 7, 2023, to assess the existing conditions of the marine habitat, coral, and fish within the identified marine survey area. The marine survey efforts included four components: 1) marine habitat mapping, 2) benthic/biotic surveys, 3) ecotourism investigation, and 4) remote sensing. The marine habitat mapping recorded the habitat boundaries within the survey area, and benthic/biotic surveys captured the existing species coverage/abundance and species richness within representative portions of the survey area. Information was also gathered regarding ecotourism in the survey areas, which involved preliminary research of publicly available data and subsequent communication with local tour operators. Lastly, a remote sensing survey was conducted to collect bathymetric and drop camera data where depths exceeded diveable limits.

Marine habitat mapping recorded medium and high coral cover areas along Tamil Channel (East and West) (Survey Area 2). Coral reef habitat also extended to the boundary of the Tamil Channel Entrance (East and West) (Survey Area 3). The Yap Port (Survey Area 4) and port-adjacent areas (Survey Areas 5–7) had low coral coverage, high sand, rubble, and macroalgae coverage, and low visibility compared to Tamil Channel (East and West) and the Tamil Channel Entrance (East and West) (Survey Areas 2 and 3, respectively). The Cardno GS – AECOM Pacific Joint Venture survey team noted mixed seagrass patches (e.g., *Cymodocea rotundata*, *Enhalus acoroides*, and/or *Thalassia hemprichii*) near the east boundary of Tamil Channel (West) (Survey Area 2), in Yap Port–North (Survey Area 7), and in Yap Port–Southwest (Survey Area 5). The final marine habitat mapping produced for coral and seagrass provides an overview of the distribution and abundance of these two important marine resources.

The consistent patterns of benthic coverage and species richness (number of species in an area) observed on the forereef and reef crest on both sides of the Tamil Channel Entrance (East and West) (Survey Area 3) indicate a coral reef ecosystem with high coverage and species richness. The survey team noted conditions within the reef flat zones (shallow reef top areas) at both sides of the Tamil Channel Entrance (East and West) (Survey Area 3) for the lack of species richness and percent cover, which are typical conditions of reef flats characterized by high wave action, intense irradiance (sun exposure), and frequent aerial exposure during low tide events. The inner reefs surrounding the Yap Port (Survey Area 4) and Yap Port–Southwest (Survey Area 5) are noteworthy for their abundance of a delicate and fragile branching *Acropora* species, even at the fringe of seagrass beds.

Overall, the survey team recorded 121 species of reef fish during the reef fish assessments, with the *Labridae* (20 species), *Chaetodontidae* (13 species), *Pomacentridae* (13 species), and *Gobiidae* (12 species) families having the highest number of species recorded despite species complexes (e.g., *Pomacentrus* spp., *Halichoeres* spp.) being used during the surveys. The survey team found the highest species richness and abundance for reef fish species in the Tamil Channel Entrance (East and West) (Survey Area 3) and, within that survey area, the forereef and the reef crest zones had the highest species richness and abundance of reef fishes.

Yap's economy relies heavily on ecotourism. Scuba diving occurs year-round and is a main tourist attraction, as Yap's reefs host diverse marine life and a large manta ray population. Yap is known among the diving community for its resident manta rays and is a leader in conservation and protection laws (Yap Visitors Bureau, n.d.). Small watercraft activities, including kayaking and canoeing, occur primarily in protected areas, such as the mangrove forests, and in canals. Yap Port is used commercially for smaller (fewer than 500 passengers) tourist cruises.

Bathymetric survey results show the gradient of water depth in the Offshore Mooring (Survey Area 1) from 0 to 984 feet (0 to 300 meters). Sandy and mixed bottom types were generally observed at survey points offshore, while the survey areas closest to the inshore-most drop camera points consisted of coral-covered seafloor. Coral cover decreases with increasing depth, although coral was observed at some mid-depth range survey points.

## **ACRONYMS AND ABBREVIATIONS**

CAP JV	Cardno GS – AECOM Pacific Joint Venture	FSM GIS	Federated States of Micronesia Geographic Information System
CCA	crustose coralline algae		

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# 1 Introduction

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## 1.1 Background

The Federated States of Micronesia (FSM) is one of the three sub-regions of Pacific Ocean islands, which also include Melanesia and Polynesia (Figure 1-1). The FSM is composed of four states—Yap, Chuuk, Kosrae, and Pohnpei—that collectively include over 607 islands (CIA 2023). Yap consists of four main islands, Yap Island (Maraba'-Numagil), Gagil-Tamil, Maap, and Rumung (Figure 1-2). The outer 134 small, low coralline Yap islands span more than 100,000 square miles (259 square kilometers) and are collectively referred to as the outer or neighboring islands, or "Remathau" (FSM 2018).

Yap State's total land area is 46 square miles (119 square kilometers). The maximum elevation of Yap Island (Maraba'-Numagil) is 571 feet (174 meters), while the outer islands' maximum height is 16.4 feet (5 meters) (FSM 2018). While many European traders and explorers ventured to Yap throughout the 16th and 18th centuries, Spain was the first European power to establish a colony on Yap in 1886, constructing a fort for defensive fortification and developing a trading post at Colonia, the capital of Yap State, which contains Colonia (Tamil) Harbor. Throughout the 19th century, German merchants began transporting goods throughout the region, ushering in a new era of commerce and tension between Spanish rule and German interest. The conflict culminated in Spain selling Yap to Germany in 1899 (Lévesque 2005, 354–355). With the onset of World War I, Japanese forces took control over Yap in 1914 (CIA 2023). During the Japanese administration (1914–1945), the landscape around Colonia changed as the Japanese built up Colonia and developed the harbor (Yap Visitors Bureau, n.d.). Extensive dredging destroyed many of the traditional fish weirs that were located in the harbor (Hunter-Anderson 1981). Military installations including concrete foundations, buildings, harbor piers, and other types of infrastructure were built around Yap during a fortification effort from the Japanese administration until the United States' occupation of Yap in 1945 (DON 2022a). Following the United States' island-hopping campaign across the Pacific during World War II, Yap came under United States administration in the Trust Territory of Pacific Islands in 1947 (CIA 2023).

Tamil Harbor is surrounded by coral reef and mangrove habitat. Yap Port is located on the north side of the largely developed peninsula and provides services for international and domestic cargo, fuel tankers, interisland passenger ships, and occasional longline-fishing vessels (Figure 1-3). Ships travel through a 1.5-mile-long (2.5-kilometer-long) reef passageway, Tamil Channel, to the 230-foot-long (70-meter-long) wharf in Yap Port.

The CAP JV prepared a marine desktop analysis report in 2022 and used this report for planning purposes to inform what marine resources may exist in the marine survey areas (DON 2022b). The CAP JV prepared a work plan and dive operations plan in 2023 that outlined proposed methodology, data management, reporting, planning contingencies, schedule, and personnel roles during the prescribed fieldwork (CAP JV 2023c). This field report summarizes the marine resources surveys that occurred between April and May 2023.

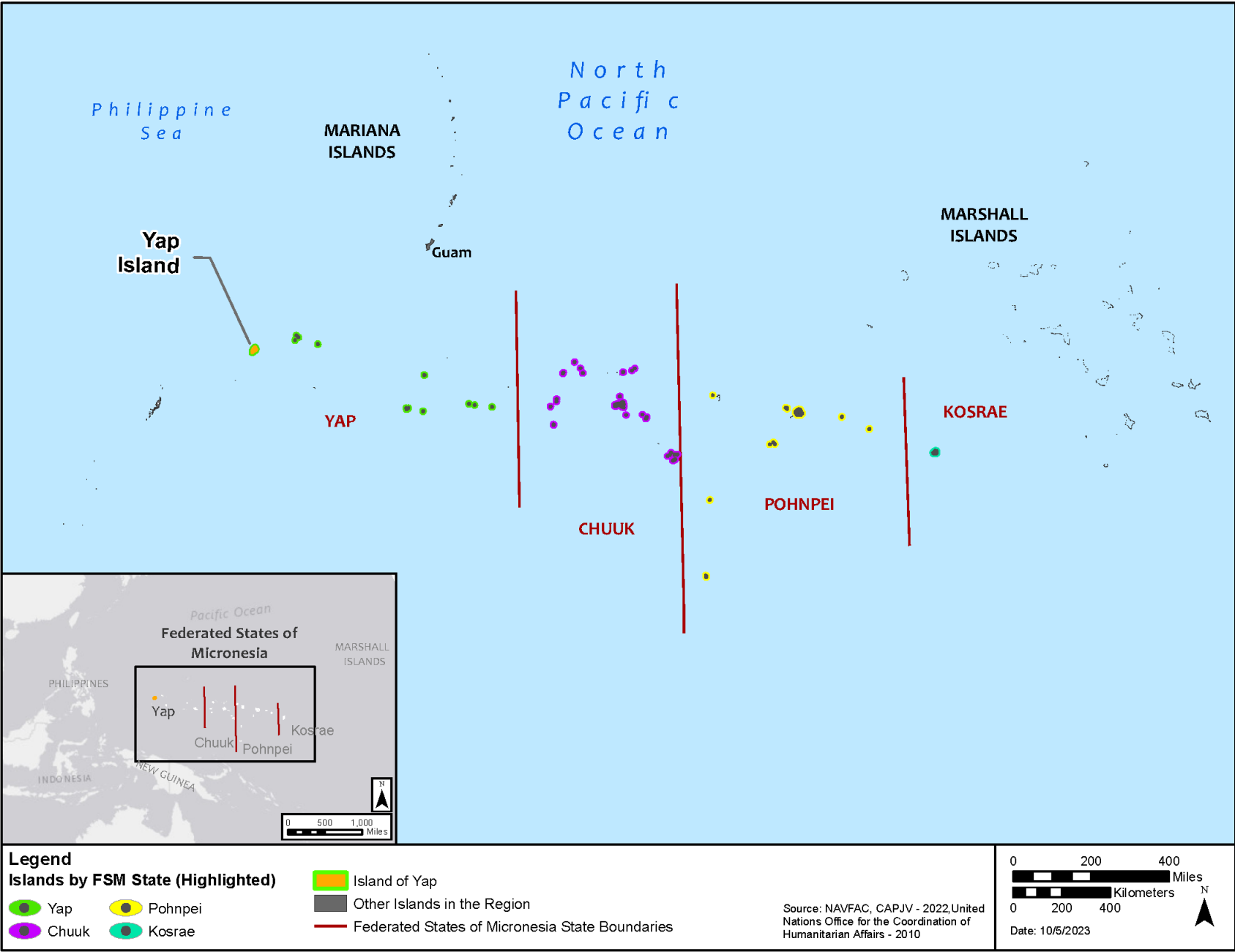


Figure 1-1 Federated States of Micronesia Location Map

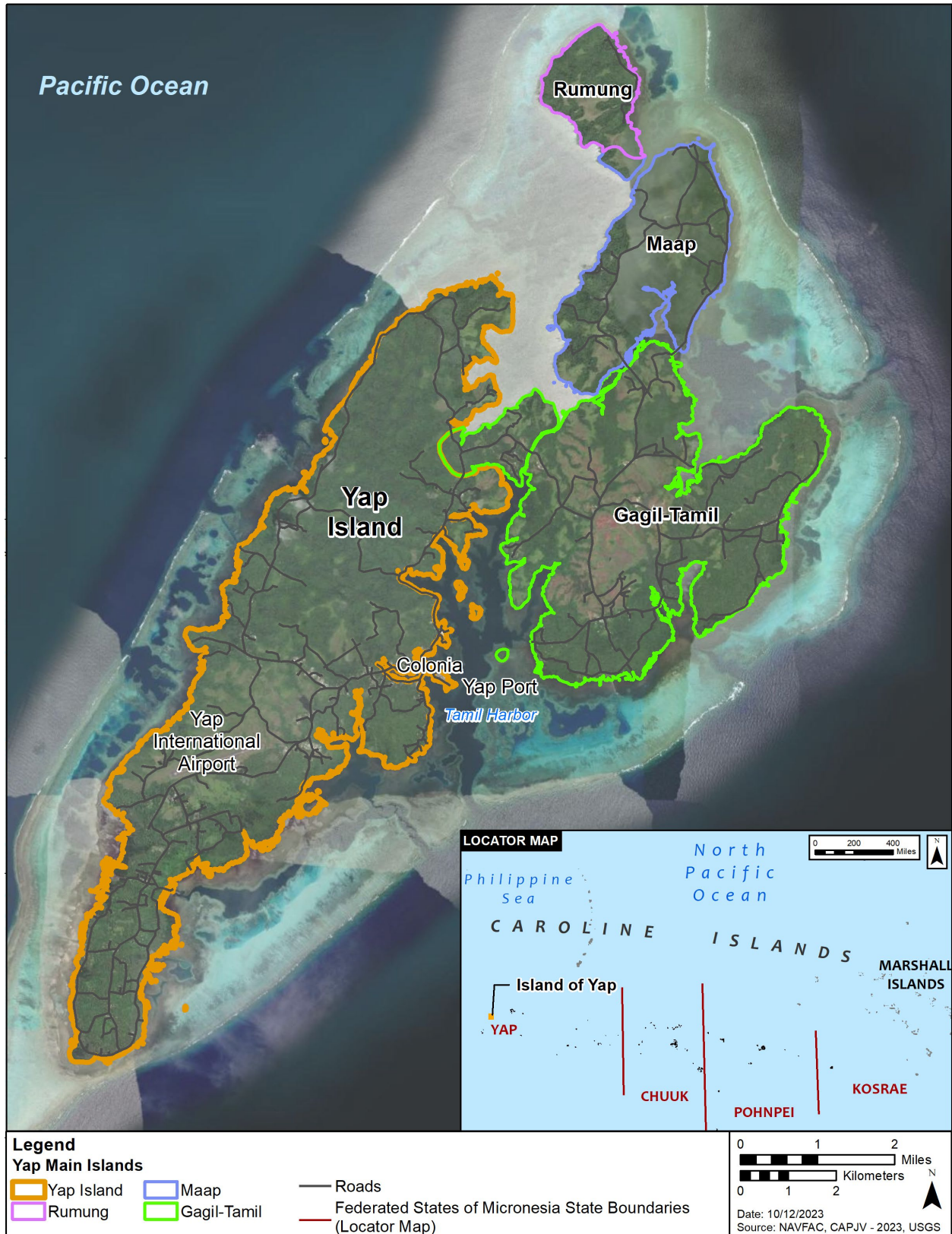


Figure 1-2 Yap Location Map



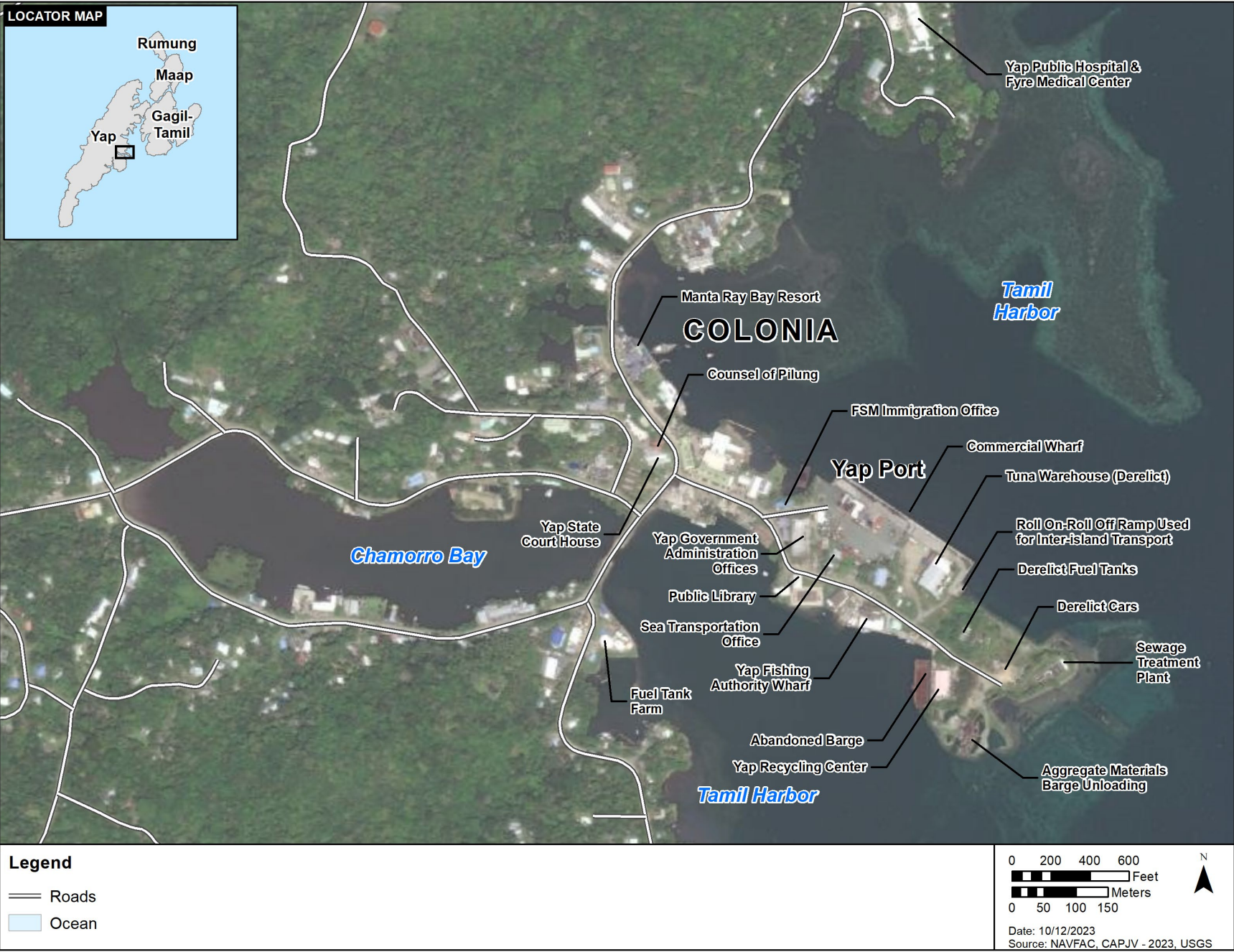


Figure 1-3 Yap Port Location Map

## **1.2 Purpose and Objectives of the Marine Surveys**

The purpose of the marine surveys was to document marine resources within the marine survey areas at Yap Port, port-adjacent areas, and within Tamil Channel (Figure 1-4) by documenting and evaluating the marine habitat and coral and reef fish species in the survey area. The primary objective of the marine surveys was to identify what resources exist within the port and associated survey areas in Yap to support any environmental evaluations and consultations potentially required by laws, regulations, or policies.

The survey report will provide the U.S. Indo-Pacific Command with the necessary information regarding harbor development on marine habitats and species to comply with U.S. federal, FSM, or Yap State environmental laws, regulations, and policies applicable to federal actions.

## **1.3 Survey Area**

The marine survey areas were located around Yap Port and the Tamil Channel which connects the open ocean to Yap Port (Figure 1-4). The Offshore Mooring Area (Survey Area 1) is an offshore area outside of Tamil Channel where remote sensing and drop camera surveys were conducted, but marine habitat mapping and benthic/biotic surveys were not conducted since the water depth exceeded divable limits (>50 feet) and the visibility was too poor to conduct a snorkeling survey from the surface. Tamil Channel (East and West) (Survey Area 2) included defined areas on the east and west sides of the Tamil Channel and were inclusive of exisiting channel markers on both sides. Tamil Channel Entrance (East and West) (Survey Area 3) consisted of east and west areas within the Tamil Channel entrance, but excluded the Tamil Channel itself where water depths exceeded divable limits (>50 feet). Yap Port (Survey Area 4) included the immediate areas at Yap Port, while three adjacent sides of the port were also surveyed. Those adjacent sides of the port were: Yap Port–Southwest (Survey Area 5), which included the inner peninsula of Yap Port into Chamorro Bay; Yap Port–Southeast (Survey Area 6), which included the area north of the Tamil Channel (East) (Survey Area 2); and Yap Port–North (Survey Area 7), which included the area north of Yap Port peninsula. The survey areas are listed below and in shown on Figure 1-4.

- Offshore Mooring (Survey Area 1)
- Tamil Channel (East and West) (Survey Area 2)
- Tamil Channel Entrance (East and West) (Survey Area 3)
- Yap Port (Survey Area 4)
- Yap Port–Southwest (Survey Area 5)
- Yap Port–Southeast (Survey Area 6)
- Yap Port–North (Survey Area 7)

## **1.4 Survey Schedule and Personnel**

Surveys were conducted on 10 consecutive days from April 28 to May 7, 2023 (Yap time zone). Survey start/end times and weather descriptions for each survey are included in Table 1-1. The approach for scheduling the surveys was to complete assessments of the high and medium priority survey areas first, as weather and environmental conditions allowed, and then utilize contingency days to complete the assessments of the low priority survey areas. Because the full 3-day contingency was not needed for weather or other delays, the survey team was able to assess all survey areas as described in the work plan (DON 2023) and dive operations plan (CAP JV 2023c).



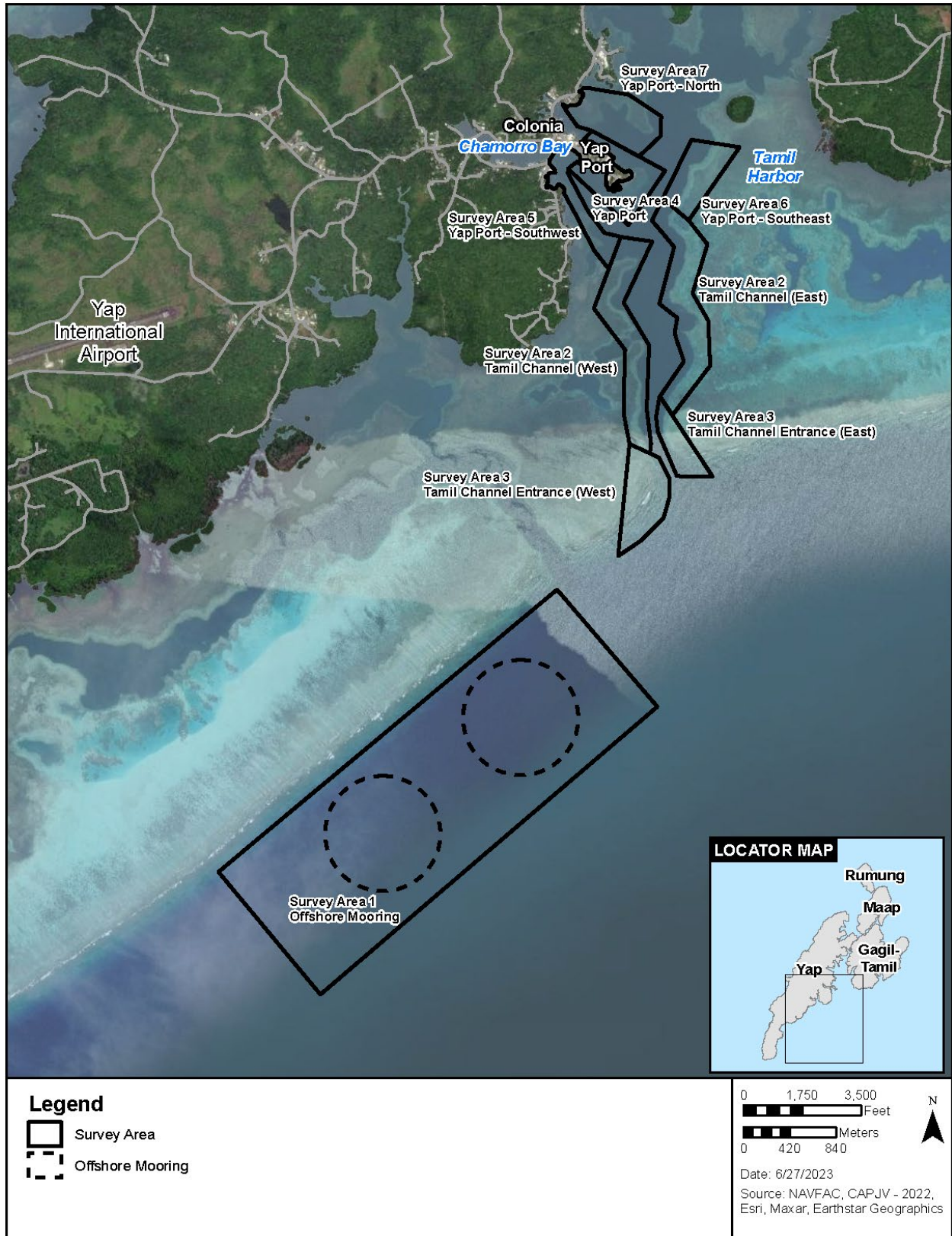


Figure 1-4 Project Survey Areas

**Table 1-1 Survey Dates, Times, and Weather Conditions**

<b>Survey Date <sup>a</sup></b>	<b>Start Time</b>	<b>End Time</b>	<b>Total On-Water Time (Hours) <sup>b</sup></b>	<b>Weather Conditions</b>
April 28, 2023	8:30 a.m.	4:30 p.m.	8	Partly cloudy, little wind, no rain, mid-80s (°F)
April 29, 2023	8:30 a.m.	4:30 p.m.	8	Cloudy, windy, thunderstorm, mid-80s (°F)
April 30, 2023	8:30 a.m.	4:30 p.m.	8	Cloudy, wind, scattered rain showers, mid-80s (°F)
May 01, 2023	8:30 a.m.	4:30 p.m.	8	Cloudy, wind, scattered rain showers, mid-80s (°F)
May 02, 2023	8:00 a.m.	5:00 p.m.	9	Partly cloudy, little wind, no rain, mid-80s (°F)
May 03, 2023	8:00 a.m.	4:00 p.m.	8	Cloudy, slight wind, scattered rain, mid-80s (°F)
May 04, 2023	8:00 a.m.	4:30 p.m.	8.5	Partly cloudy, wind, scattered rain showers, mid-80s (°F)
May 05, 2023	7:00 a.m.	2:30 p.m.	6.5	Cloudy, slight wind, scattered rain, mid-80s (°F)
May 06, 2023	7:00 a.m.	2:00 p.m.	7	Partly cloudy, little wind, no rain, mid-80s (°F)
May 07, 2023	7:00 a.m.	1:30 p.m.	6.5	Partly cloudy, little wind, scattered rain, mid-80s (°F)

**Legend:** °F = degree Fahrenheit; QA = quality assurance; QC = quality control.

<sup>a</sup> Survey date noted in Yap time zone (YAPT).

<sup>b</sup> Total on-water durations do not include the time needed for daily coordination with dive operations (Yap Divers), mobilization (e.g., gear preparation, calibration, safety meetings), demobilization (gear clean up), and data entry and QA/QC.

The team members involved in performing the project tasks are listed in Table 1-2 along with their project-specific roles. The survey personnel consisted of Alonso González Cabello (marine biology lead subject matter expert, dive team co-lead, dive supervisor, site safety coordinator, scientific diver, and field data collector), Chris Marshall (dive team co-lead, dive supervisor, site safety coordinator, scientific diver, and field data collector), Joel Tracey (dive team co-lead, dive supervisor, site safety coordinator, scientific diver, and field data collector), Michelle Maloney (data manager, scientific diver, field data collector, and surface support), Dawn Bailey (scientific diver and field data collector), Ashley Matthews (scientific diver and field data collector), Craig Raffenberg (scientific diver and field data collector), and Isaiah Mosley (scientific diver and field data collector). Survey methods were executed in accordance with the approved work plan (DON 2023), accident prevention plan (CAP JV 2023a), dive operations plan (CAP JV 2023c), and hazard analysis and critical control point plan (CAP JV 2023b).

**Table 1-2 Project Team and Survey Personnel**

<b>Role</b>	<b>Name</b>	<b>Organization</b>
Lead SME, Remote Sensing Specialist	Marc Ericksen	Sea Engineering, Inc.
Remote Sensing Specialist	Gabrielle Dunkle	
Remote Sensing Specialist	Ian Hardy	
CAP JV/Stantec GS Inc. Deputy Project Manager	Clint Scheuerman	Stantec GS Inc.
Stantec GS Inc. Project Manager	Ben Berridge	
CAP JV Program Manager	William Halperin	
Marine Biology Lead, SME, Dive Team Co-Lead, Dive Supervisor, Site Safety Coordinator, Scientific Diver, and Field Data Collector	Alonso González Cabello	AECOM
Dive Team Co-Lead, Dive Supervisor, Site Safety Coordinator, Scientific Diver, and Field Data Collector	Chris Marshall	
Dive Team Co-Lead, Dive Supervisor, Site Safety Coordinator, Scientific Diver, and Field Data Collector	Joel Tracey	
Data Manager, Scientific Diver, and Field Data Collector	Michelle Maloney	
Scientific Diver and Field Data Collector	Dawn Bailey	
Scientific Diver and Field Data Collector	Ashley Matthews	
Scientific Diver and Field Data Collector	Craig Raffenberg	
Scientific Diver and Field Data Collector	Isaiah Mosley	
Field Coordinator	Christian Warren	
AECOM Deputy Project Manager	Brittany Obando	
CAP JV Project Manager and QA/QC Manager	Kevin Butterbaugh	
GIS Analyst	Daniel Arellano	
GIS Analyst	Selena Qiu	
GIS Analyst	Chris Stoll	
TPOC	Lorraine Shaughnessy	NAVFAC
Alternate TOCOR	Jill Sears	
Alternate TOCOR	Maria Carnevale	
Contracting Specialist	Casey Sugihara	
NAVFAC Marine SME	Kevin Lino	
NAVFAC Marine SME	Michelle Bejder	
NAVFAC Marine SME	Brittany Bartlett	

Legend: AECOM = AECOM Technical Services, Inc.; CAP JV = Cardno GS – AECOM Pacific Joint Venture;  
 GIS = Geographic Information System; QA = quality assurance; QC = quality control; SME = subject matter expert;  
 TPOC = Technical Point of Contact; NAVFAC = Naval Facilities Engineering Systems Command.



## 2 Survey Methodology

The marine surveys included four components: 1) marine habitat mapping, 2) benthic/biotic surveys, 3) ecotourism investigation, and 4) remote sensing. The Cardno GS – AECOM Pacific Joint Venture's (CAP JV's) survey team (Section 1.4) conducted the marine habitat mapping using the manta tow methodology (Section 2.1), the benthic/biotic surveys using the line-intercept and belt transect methodologies (Section 2.3), and performed the ecotourism investigation using a desktop analysis and on-island verification (Section 2.2.2). Sea Engineering, Inc. conducted remote sensing surveys using multibeam sonar and drop cameras to investigate the bathymetry and seafloor characteristics in the Offshore Mooring (Survey Area 1) (Section 2.3 and Appendix A).

Survey areas, methodologies, and priorities were implemented based on the assigned survey priorities shown in Table 2-1, and in accordance with the approved work plan (DON 2023). Although weather and tidal conditions resulted in minor schedule delays, not all of the allotted 3-day contingency window was needed or used. The CAP JV was able to collect data in all survey areas (Survey Areas 1–7). Marine habitat mapping surveys were completed in the high priority survey areas (Survey Areas 2–4), medium priority survey areas (Survey Area 5), and low priority survey areas (Survey Areas 6 and 7). In accordance with the approved work plan (DON 2023), benthic/biotic surveys were completed in Survey Areas 3 and 4, as well as in the northern half of the Survey Area 5 (Table 2-1).

**Table 2-1 Marine Survey Areas**

Survey Priority	Survey Area Number	Survey Area Name	Survey Methodologies	Marine Habitat Mapping	Benthic/Biotic Survey
				Total Distance Surveyed	Total Area Surveyed
High	1 <sup>a</sup>	Offshore Mooring	Multibeam Sonar and Drop Camera	N/A	N/A
	2	Tamil Channel (East and West)	Marine Habitat Mapping	5.5 linear miles	N/A
	3	Tamil Channel Entrance (East and West)	Marine Habitat Mapping + Benthic/Biotic Surveys	1.4 linear miles	61,354.2 ft <sup>2</sup>
	4	Yap Port	Marine Habitat Mapping + Benthic/Biotic Surveys	2.4 linear miles	22,604.2 ft <sup>2</sup>
Medium	5 <sup>b</sup>	Yap Port–Southwest	Marine Habitat Mapping + Benthic/Biotic Surveys <sup>c</sup>	2.2 linear miles	11,302.1 ft <sup>2</sup>
Low	6 <sup>b</sup>	Yap Port–Southeast	Marine Habitat Mapping	1.3 linear miles	N/A
	7 <sup>b</sup>	Yap Port–North	Marine Habitat Mapping	1.4 linear miles	N/A
<b>Total</b>				<b>14.2 linear miles</b>	<b>95,260.5 ft<sup>2</sup></b>

Legend: ft<sup>2</sup> = square foot; N/A = not applicable.

<sup>a</sup> Survey Area 1 included multibeam sonar and drop camera surveys only to collect marine habitat mapping data; no benthic/biotic surveys were conducted.

<sup>b</sup> Yap Port-adjacent areas.

<sup>c</sup> Benthic/biotic Surveys only occurred in the northern half of Yap Port–Southwest (Survey Area 5).

The survey team conducted a total of 14.2 linear miles (22.9 kilometers) of marine habitat mapping in Survey Areas 2–7. The greatest combined distance within individual survey areas was in the Tamil Channel (East and West) (Survey Area 2) at 5.5 linear miles (8.8 kilometers) total, or 2.8 linear miles (4.5 kilometers) for the eastern portion of the channel and 2.7 linear miles (4.3 kilometers) for the western portion of the channel. The survey team conducted a total of 59 benthic/biotic survey transects in Survey

Areas 3–5, with 39 of these transects established within the Tamil Channel Entrance (East and West) (Survey Area 3) near the southern end of the Tamil Channel. The survey team surveyed a total area of 95,260.5 square feet (8,850 square meters) during the benthic/biotic survey transects (Table 2-1). Habitat distribution was considered throughout the selection of biotic transect locations to adequately represent the different environments present within the survey areas.

During all surveys, the incidental observation of any species of concern was noted. Species of concern were defined as either charismatic megafauna (e.g., rays, reef sharks, sea turtles), species noted for its detrimental effects as a coral predator (e.g., crown-of-thorns starfish [*Acanthaster planci*]), or species of fish suspected to be of importance to the Yap State Government based on the Yap State prohibition against harvesting (Yap State Law 9-2) (e.g., green humphead parrotfish [*Bolbometopon muricatum*] and Napoleon wrasse [*Cheilinus undulatus*]; see Photo 3-1). The location and abundance of marine species of concern were also recorded during surveys, as were other notable conditions such as visibility, depth/slope, and reef zone.

Methodologies for marine habitat mapping, benthic/biotic surveys, ecotourism, and remote sensing are discussed below.

## **2.1 Marine Habitat Mapping**

The survey team conducted marine habitat mapping using the manta tow methodology (towed observer protocols; English, Wilkinson, and Baker 1997). This method allowed for rapid coverage of large areas during biotic cover estimation (e.g., coral, seagrass, algae), dominant habitat type determination, habitat uniformity and congruity assessment, and detection of potential broad-scale mortality and/or large-scale impacts. The nature of this methodology also allowed for a species of concern search during surveys, due to its wide viewing area.

The survey team used marine habitat mapping data (manta tows) to ground-truth aerial imagery and available existing habitat data as identified in the marine desktop analysis report (DON 2022b). The survey team developed predetermined habitat polygons using aerial imagery of the survey areas. The ArcGIS REST imagery services of the ArcGIS Online Map Viewer base map World Imagery tile layer was the aerial imagery source used to create the polygons. Marine habitat mapping data collected through manta tow surveys provided a fine scale determination of location and coverage of the main marine resources (e.g., coral, seagrass, and dead coral) present within each of the survey areas. The marine habitat mapping data collected, and presented herein, were visually compared against the predetermined polygons created based on data presented in the desktop report and the available aerial imagery to confirm or modify habitat coverage determinations. Furthermore, the survey team compared the marine habitat mapping determinations for each polygon to the cover data collected through benthic/biotic surveys, when available, for confirmation and consistency purposes. The survey team estimated the total acreage for each of the verified polygons and calculated the cumulative totals for each habitat cover category (coral and seagrass). Marine habitat map polygons were developed at a resolution conducive to representing areas at an appropriate scale and are provided in Section 3.

### **2.1.1 Survey Equipment and Standards**

Marine habitat mapping followed the manta tow methodology (towed observer protocols for snorkeling used by the Australian Institute of Marine Science Long-Term Monitoring Program (English, Wilkinson, and Baker 1997) with similarly outfitted towboards. The snorkeling observer was towed at the surface inside each of the survey areas as conditions allowed with a visual scanning depth of 50 feet (15 meters) or deeper habitats, as visibility allowed. Marine habitat mapping recorded the coverage of coral and seagrass for each polygon, as well as the presence of sand, rubble, macroalgae, and dead coral visually observed by a scientific snorkeler. Coral and seagrasses were divided into categories to represent the

percent cover: high (greater than >40 percent), medium (>20–40 percent), low (1–20 percent), trace (<1 percent), and not present. Marine habitat mapping surveys occurred in the marine survey areas illustrated in Figure 2-1.

The survey team conducted visual data collection via data collection forms as described in the approved work plan (DON 2023). The survey team collected video using high-definition solid-state video cameras. The survey team mounted a camera to the towboard on a swivel bracket so the snorkeler could direct the camera toward features of interest before returning it to a typical view of the seafloor. The snorkeler's typical view was downward-facing, perpendicular to the seafloor, providing a relatively comprehensive view of the seafloor while allowing a semiquantitative imagery-based data collection method.

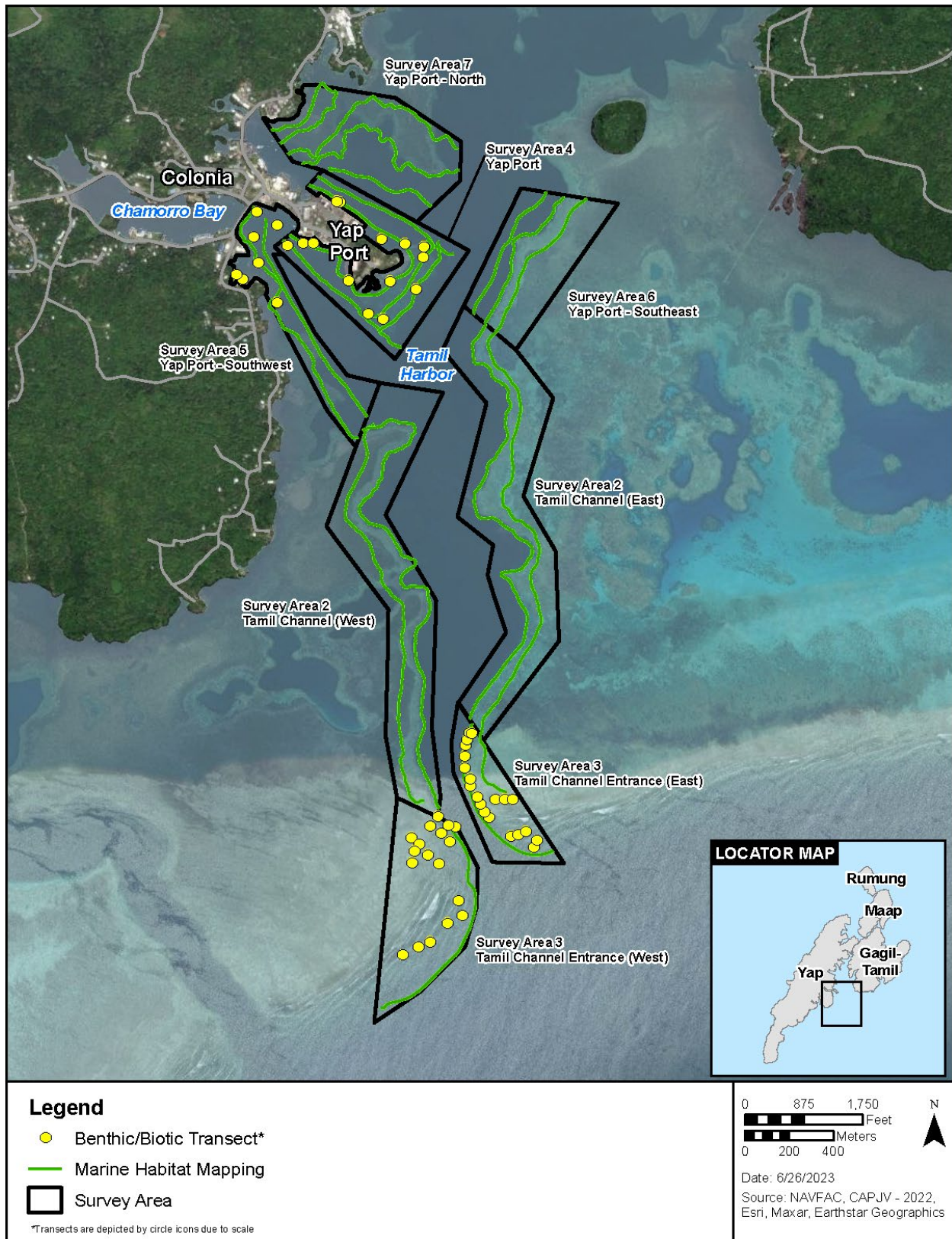
## 2.2 Benthic/Biotic Surveys

The benthic/biotic surveys recorded the presence and abundance of coral, fish, and invertebrate species that occurred in Tamil Channel Entrance (Survey Areas 3), Yap Port (Survey Area 4), and the northern half of Yap Port–Southwest (Survey Area 5) (Figure 2-1). Benthic/biotic cover data represent the proportion of biotic (living) and abiotic (non-living) elements occupying the seafloor. The cover for each of these elements was quantified using a predetermined taxonomic (e.g., species or genus) or functional (e.g., sponges, seagrass) level. Many coral reefs have a small percentage of cover by scleractinian (hard/stony) corals; therefore, other components are important to characterize benthic communities and habitat. Substrate type records the abiotic cover of hard bottom, dead coral structures, rubble, and sand. Biotic cover records different functional groups of coral morphologies (e.g., massive, boulder, branching), algae (e.g., turfs, macroalgae and crustose coralline algae [CCA]), and other sessile (e.g., organisms attached at the base/immobile) invertebrates (e.g., gorgonians and sponges) (NOAA 2021).

The survey team recorded the location and abundance of marine species of concern (e.g., manta rays, sea turtles, sharks, green humphead parrotfish), if observed during benthic/biotic.

The survey team strategically placed transects to ensure a representative sample of the primary zones within a coral reef ecosystem. The survey team segregated the survey areas into four ecologically distinct reef zones: the forereef, reef crest, reef flat, and inner reef. Each zone is described in further detail below:

- *Forereef* (also referred to as the reef slope; 15–35-foot [4.5–10.6-meter] water depth) generally supports a diverse assemblage of coral species and various types of corals, including branching, massive, and encrusting forms. Coral colonies in the forereef adapted to the wave energy and water motion, and displayed sturdy structures and robust growth forms.
- *Reef crest* (5–15-foot [1.5–4.5-meter] water depth) is the highest point of a coral reef. It is exposed to intense wave action, making it a dynamic and challenging environment for corals and other organisms to flourish. The reef crest can be exposed at very low tides and is subject to higher irradiance.
- *Reef flat* (also referred to as back reef; 0–10-foot [0–3-meter] water depth) (Henkel 2010) is a shallow part of the reef located between the reef crest and the shore or lagoon. It is characterized by a relatively flat or gently sloping areas with less wave action but more tidal current influences than the rest of the reef.
- *Inner reef* occurs in a shallow, sheltered lagoon-type environment with freshwater influence and is protected from wave action (NOAA 2023).



**Figure 2-1 Location Marine Habitat Mapping Surveys and Benthic/Biotic Transects**

The Tamil Channel Entrance (East and West) (Survey Area 3) included forereef, reef crest, and reef flat zones. Yap Port and Yap Port–Southwest (Survey Areas 4 and 5, respectively) included inner reefs. Benthic/biotic survey transect details, including the survey dates and reef zones, are provided in Table 2-2.

**Table 2-2 Benthic/Biotic Surveys**

<b>Survey Date</b>	<b>Survey Area</b>	<b>Transect ID</b>	<b>Reef Zone</b>
April 28, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE01	Reef crest
April 28, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE02	Reef crest
April 28, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE03	Reef flat
April 28, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE04	Reef flat
April 28, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE05	Reef flat
April 28, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE07	Reef crest
April 28, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE06	Reef crest
April 28, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE08	Reef crest
April 28, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE09	Reef crest
April 28, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE10	Reef crest
April 28, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE11	Reef crest
April 28, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE12	Reef crest
April 29, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW01	Reef crest
April 29, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW02	Reef crest
April 29, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW03	Reef crest
April 30, 2023	Yap Port (Survey Area 4)	YP01	Inner reef <sup>a</sup>
April 30, 2023	Yap Port (Survey Area 4)	YP02	Inner reef <sup>a</sup>
April 30, 2023	Yap Port (Survey Area 4)	YP03	Inner reef <sup>a</sup>
April 30, 2023	Yap Port (Survey Area 4)	YP04	Inner reef <sup>a</sup>
April 30, 2023	Yap Port (Survey Area 4)	YP05	Inner reef <sup>a</sup>
April 30, 2023	Yap Port (Survey Area 4)	YP06	Inner reef <sup>a</sup>
April 30, 2023	Yap Port (Survey Area 4)	YP07	Inner reef <sup>a</sup>
May 1, 2023	Yap Port (Survey Area 4)	YP08	Inner reef <sup>a</sup>
May 1, 2023	Yap Port (Survey Area 4)	YP09	Inner reef <sup>a</sup>
May 1, 2023	Yap Port (Survey Area 4)	YP10	Inner reef <sup>a</sup>
May 1, 2023	Yap Port (Survey Area 4)	YP11	Inner reef <sup>a</sup>
May 2, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW04	Reef flat
May 2, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW05	Reef flat
May 2, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW09	Forereef
May 2, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW06	Forereef
May 2, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW07	Forereef
May 2, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW08	Reef crest
May 3, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW10	Forereef
May 3, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW11	Forereef
May 3, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW12	Forereef
May 3, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE13	Forereef
May 3, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE14	Forereef
May 3, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE15	Forereef
May 3, 2023	Yap Port (Survey Area 4)	YP12	Inner reef <sup>a</sup>
May 3, 2023	Yap Port (Survey Area 4)	YP13	Inner reef <sup>a</sup>
May 3, 2023	Yap Port–Southwest (Survey Area 5)	YPSW01	Inner reef <sup>a</sup>
May 3, 2023	Yap Port–Southwest (Survey Area 5)	YPSW02	Inner reef <sup>a</sup>
May 3, 2023	Yap Port–Southwest (Survey Area 5)	YPSW03	Inner reef <sup>a</sup>
May 3, 2023	Yap Port–Southwest (Survey Area 5)	YPSW04	Inner reef <sup>a</sup>
May 3, 2023	Yap Port–Southwest (Survey Area 5)	YPSW05	Inner reef <sup>a</sup>
May 5, 2023	Yap Port–Southwest (Survey Area 5)	YPSW06	Inner reef <sup>a</sup>
May 5, 2023	Yap Port–Southwest (Survey Area 5)	YPSW07	Inner reef <sup>a</sup>
May 6, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW13	Reef flat

Survey Date	Survey Area	Transect ID	Reef Zone
May 6, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW14	Reef flat
May 6, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW15	Reef flat
May 6, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE16	Reef flat
May 6, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE17	Reef flat
May 6, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE18	Reef flat
May 6, 2023	Yap Port (Survey Area 4)	YP14	Inner reef <sup>a</sup>
May 7, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW16	Reef flat
May 7, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW17	Reef flat
May 7, 2023	Tamil Channel Entrance (West) (Survey Area 3)	ECW18	Reef flat
May 7, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE19	Forereef
May 7, 2023	Tamil Channel Entrance (East) (Survey Area 3)	ECE20	Forereef

Legend: ID = identification.

<sup>a</sup> Survey Areas 4 and 5 (Yap Port and Yap Port–Southwest, respectively) were considered inner reefs and no further distinction of reef zones was necessary.

## 2.2.1 Survey Equipment and Standards

The benthic/biotic surveys included two different techniques to best capture population density based on species modality, the line-intercept transect method, and the belt transect method. Details on the two methods are provided below:

- *The line-intercept transect method* was used to measure coral and sessile invertebrate densities as well as non-living benthic cover. Line-intercept transects were 98.4 feet (30 meters) in length. To estimate benthic cover, each benthic cover type encountered under the transect line and its length directly under the tape was recorded. All recorded lengths were then grouped by lifeform and divided by the total transect length to determine the individual lifeform's relative cover. Taxonomic specificity was recorded at the lowest level possible, and general comments on the condition for coral species were included when possible. Selection of benthic/biotic survey transects were stratified according to depth while representing the reef zones (as defined in Section 2.2) present in the survey areas. Benthic cover was categorized into seven cover types (biotic and abiotic/living and non-living): coral, dead coral, CCA, algae, seagrass, sand/rubble, and other.
- *The belt transect method* was used to record fish densities during biotic surveys targeting reef fish. The belt transect sampling area incorporated a 16.4-foot-wide (5-meter-wide) window from the surface to the seafloor of the 10-foot (3-meter) depth contour, and a 16.4-foot-wide by 16.4-foot-tall (5-meter by 5-meter) window, defined by 8.2 feet (2.5 meters) on either side of the transect line. Belt transects were 98.4 feet (30 meters) in length. Belt transects were always completed first to prevent fish from fleeing the sampling area before the beginning of the survey.

The survey team conducted benthic/biotic surveys (line-intercept and belt transects) on the same transect tape at each transect location and included video and still photography. The survey team completed belt transects as the transect tape was laid out, so as not to disturb the reef fish species. Once the transect tape was laid and the reef fish data recorded, the survey team collected the benthic data along the same transect.

## 2.2.2 Vessel and Dive Crew

Diving was based aboard a 33-foot (10-meter) dive vessel. Two pairs of scientific divers and one dive surface support (five staff total) crewed the dive vessel each day. Two scientific divers remained on land to rest, and to conduct photo and video review and processing, data processing and entry, and quality assurance/quality control. Dive operations met or exceeded the standards outlined in the United States Army Corps of Engineers Engineering Manual 385-1-1, Safety and Health Requirements Manual (USACE 2014) and the American Academy of Underwater Sciences Standard for Scientific Diving Manual (AAUS 2019), and followed the dive operations plan prepared for the field effort (CAP JV 2023c).



## **2.3 Data Management**

Data was collected by hand-written notes, photography, and videography. Details of the daily field conditions were recorded throughout the surveys. Photographs and video were taken during data collection, depending on the type of survey. Generally, benthic/biotic surveys (line-intercept transects) were supported with photo data collection, and reef fish assessments (belt transects) were supported with video data collection. The survey team conducted quality assurance/quality control of data periodically to ensure data integrity and to identify any potential data gaps. The survey team backed up and uploaded the data collected to a server daily. The survey team digitized and saved the datasheets on a secure server along with the daily photographic documentation. The survey team processed and saved the spatial data collected during the survey as Geographic Information System (GIS) layers.

## **2.4 Ecotourism**

Ecotourism investigations involved desktop research of major attractions and hotspots for tourist activities near the survey areas and communication with local marine tour businesses while the marine survey team was on Yap. The survey team began their research of public data by determining the primary types of marine tourism, including activities such as scuba diving and snorkeling, kayaking and canoeing, deep sea fishing, and cruising. After developing a list of activities, the locations where activities occur were researched. Resources for determining locations included the following:

- FSM Federal and Yap State Government websites
- Books and online publications (i.e., TripAdvisor)
- Geolocated applications that provide names of popular destinations (i.e., Google maps)
- Social media outlets (i.e., Instagram, TikTok, and YouTube, which show popular travel destinations and experiences)

Following online searches, the next step to collect data on ecotourism activities was for the marine survey personnel to gather information from local Yap hospitality staff. The results of the ecotourism investigation are provided in Section 3.3.

The CAP JV's marine biologist, Aubrey Mathews, completed the preliminary desktop research of the ecotourism investigation. The results of the research were relayed to the project's on-island survey team members (Alonso González Cabello, Michelle Maloney, Dawn Bailey, and Ashley Matthews) for their verification in person or via email while in Yap.

## **2.5 Remote Sensing**

Concurrent with the marine habitat mapping and benthic/biotic surveys, Sea Engineering, Inc. conducted remote sensing surveys using a multibeam sonar, drop camera, to investigate the bathymetry and seafloor characteristics in the Offshore Mooring (Survey Area 1).

Survey methodologies for bathymetry and drop camera techniques are discussed below.

### **2.5.1 Bathymetry**

The multibeam sonar survey area consisted of an approximately 13,123-foot-long by 4,921-foot-wide (4,000-meter-long by 1,500-meter-wide) area in the Offshore Mooring (Survey Area 1). The multibeam sonar survey was conducted in this location between May 4 and May 12, 2023.

The R2 Sonic 2020 multibeam sonar system generated a swath of 256 beams with a user variable swath width from 10 degrees to 130 degrees. The operating frequency of 200 kHz was used for this survey. The

multibeam sonar survey required rigid mounting of the R2 Sonic 2020 sonar head off the side of the boat. This was accomplished by using a specialized universal sonar mount system that clamped onto the starboard boat gunnel. The boat gunnel required reinforcing with a wooden 2-foot by 12-foot (0.6-meter by 3.7-meter) wooden beam spanning the width of the boat and secured atop a 2-foot by 10-foot (0.6-meter by 3-meter) aluminum beam. Bathymetry data were collected from an approximately 16.4-foot (5-meter) depth to a 290-meter depth, which was the maximum range of the multibeam sonar system.

Standard hydrographic surveying methodology and quality control procedures were followed during the remote sensing survey, as provided in the U.S. Army Corps of Engineers Engineering Manual 1110-2-1003, dated November 30, 2013 (USACE 2013). Quality control procedures for multibeam sonar survey systems include:

- Survey documentation
- Multibeam patch tests
- Vertical position check at project vertical benchmarks, tide level check, and real-time kinematic tide data collection
- Horizontal position check at project benchmarks
- Velocity cast measurements

Patch testing is a critical procedure used to calibrate the multibeam sonar installation for angular misalignment between the sonar head and the inertial navigation system and heading sensor. The patch test was performed by surveying a shoal area near the Yap Port prior to commencing the survey to reveal residual biases after the mobilization of the survey vessel, including pitch, roll, latency, and azimuthal offsets. The patch testing procedure consisted of data collection along several coincident or parallel survey lines at different speeds and directions where the results were then numerically evaluated for offsets, calibrated, and corrected using post-processing software designed for multibeam sonar surveying. For more detailed information regarding the bathymetry survey methodology, see Appendix A.

### **2.5.2 Drop Camera**

The survey areas targeted for drop camera investigations were the Offshore Mooring (Survey Area 1) and Tamil Channel (Survey Area 2). Photographs and videos of the navigation aids in Tamil Channel (Survey Area 2) were collected at 18 locations. Depths of the drop camera data collected in Tamil Channel (Survey Area 2) range from 0 to 19.7 feet (0 to 6 meters).

The deepwater drop camera survey was completed at 60 locations within the Offshore Mooring (Survey Area 1), along 11 inshore-offshore transects approximately 1,312 feet (400 meters) long and 1,312 feet (400 meters) apart. Depths of drop camera data collected in this area ranged from 33 to 607 feet (10 to 185 meters). A GoPro 11 cased in a deepwater housing with an LED light was used to capture imagery for the deepwater drop camera survey. The housing unit was secured to a line, which was spooled onto an electric fishing reel. A heavy-duty fishing pole was used to facilitate the lowering and raising of the system. For the navigation aids within Tamil Channel (Survey Area 2), a SideWinder 360 underwater camera tethered to 197 feet (60 meters) of cable was used. The SideWinder 360 consists of one camera pointing straight down to the seafloor and another that pans 360 degrees horizontally. The operator had access to live video feed and was able to switch between the two cameras and manually pan the horizontal camera.

Drop camera imagery was reviewed and still images of the navigation aids were captured. For the deepwater drop camera survey, still images of the seafloor were extracted from the videos. Approximate coral cover was estimated for the deepwater drop camera survey points. For more detailed information regarding the drop camera survey methodology, see Appendix A.



### 3 Survey Results

This section presents the results of the marine resources surveys. The results for each survey are organized by location. Survey data tables are provided in Appendix B.

#### 3.1 Marine Habitat Mapping

The CAP JV survey team completed marine habitat mapping in all survey areas except for the Offshore Mooring (Survey Area 1) where depths exceeded diveable limits and visibility was too poor to conduct a snorkeling survey from the surface. Table 3-1 lists the coral and seagrass areas (cumulative acreages), cover category (high, medium, low, trace, and not present), and total areas that were not surveyed due to depth (>50 feet [15-meter] contour), by survey area.

Visibility was greatest in the Tamil Channel (East and West) and Tamil Channel Entrance (East and West) (Survey Areas 2 and 3, respectively) ranging from 20 to 50 feet (6 to 15 meters). The lowest visibility was in the Yap Port (Survey Area 4) and Yap Port-adjacent areas (Survey Areas 5–7) ranging from 15 to 40 feet (4.5 to 12 meters).

Following the marine habitat mapping polygon determination described in Section 2.1, the survey team developed polygons that inform, at a macro level, of the distribution and abundance of each of the relevant marine resources (i.e., coral and seagrass) present in each of the survey areas. These polygons allowed the CAP JV to extrapolate cumulative acreages for each of the resources and their respective cover categories within each of the survey areas. The cumulative acreage calculations are listed in Table 3-1, and the final marine habitat mapping results are presented in Sections 3.1.1 (coral) and 3.1.2 (seagrass).

**Table 3-1 Coral and Seagrass Areas (Acres) by Cover Category and Survey Area**

Resource	Cover Category	Acres by Survey Area <sup>a</sup>					
		Survey Area 2	Survey Area 3	Survey Area 4	Survey Area 5	Survey Area 6	Survey Area 7
Coral	High (>40%)	15.15	31.62	—	0.76	2.52	—
	Medium (>20%–40%)	82.19	15.69	0.69	1.14	9.56	2.50
	Low (1%–20%)	19.72	—	19.06	9.23	23.63	32.53
	Trace (<1%)	48.20	49.10	9.30	19.48	7.15	11.13
	Not Present	1.83	—	10.12	0.31	—	2.88
Seagrass	High (>40%)	29.87	3.40	1.96	—	4.73	26.63
	Medium (>20%–40%)	1.86	—	—	0.69	—	—
	Low (1%–20%)	39.00	—	1.09	0.08	33.19	0.28
	Trace (<1%)	—	—	—	—	—	—
	Not Present	96.35	93.02	36.12	30.14	4.94	22.13
>50-foot (15-meter) Depth Contour		74.33	14.38	30.74	14.95	18.94	29.83

Legend: — = not applicable; % = percent.

<sup>a</sup> The survey team completed marine habitat mapping in all survey areas except for the Offshore Mooring (Survey Area 1).

### **3.1.1 Coral**

As shown in Figure 3-1 to Figure 3-6, the survey team identified medium and high coral cover areas along the Tamil Channel (East and West) (Survey Area 2), particularly the sections of this survey area closest to the channel and the Tamil Channel Entrance (East and West) (Survey Area 3). Coral reef habitat also extended to the boundary of the Tamil Channel Entrance (East and West) (Survey Area 3). The Yap Port (Survey Area 4) and port-adjacent areas (Survey Areas 5–7 had low coral coverage, high sand, rubble, and macroalgae coverage, and low visibility compared to the Tamil Channel (East and West) and Tamil Channel Entrance (East and West) (Survey Areas 2 and 3, respectively).

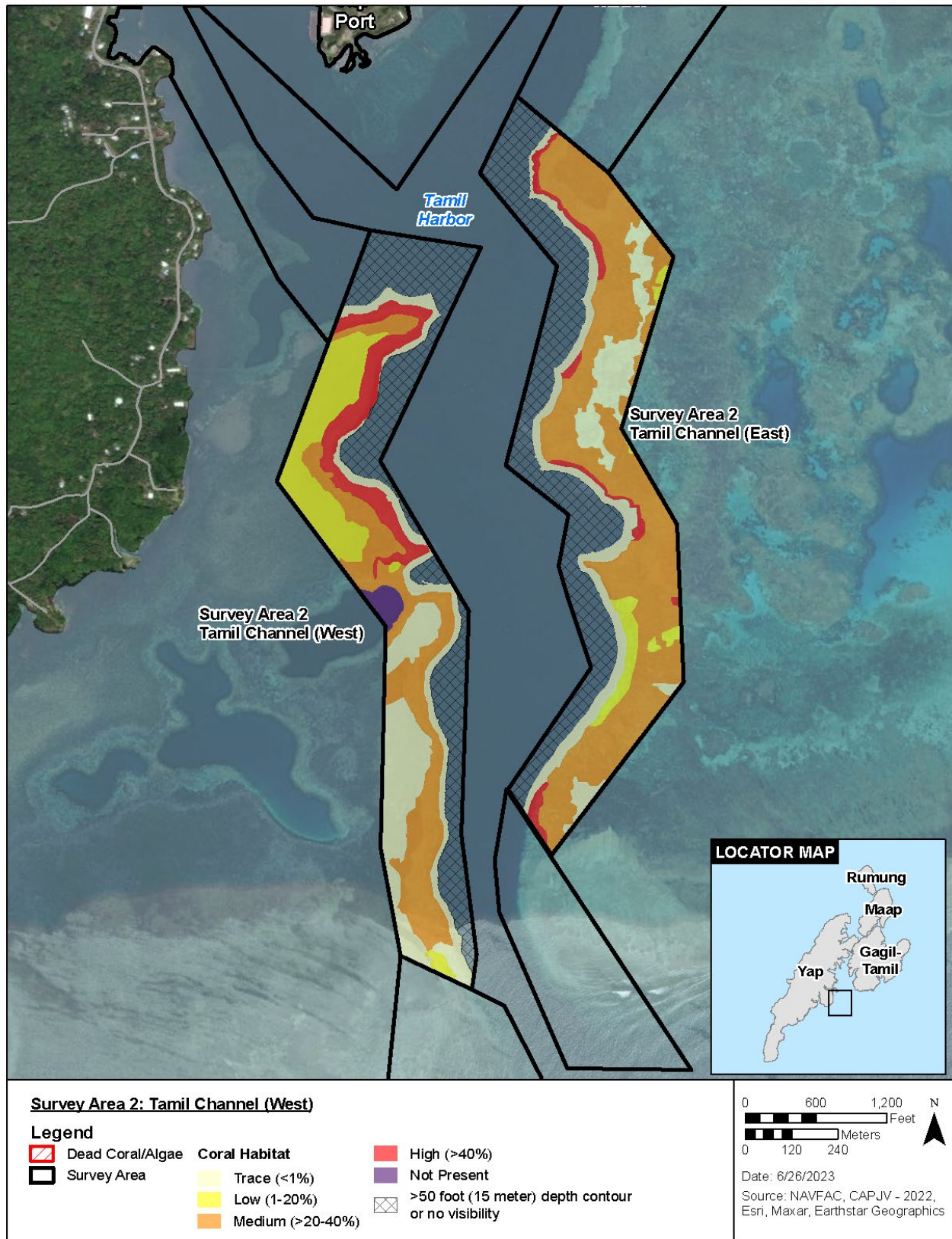


Figure 3-1 Survey Area 2 Marine Habitat Mapping (Coral)



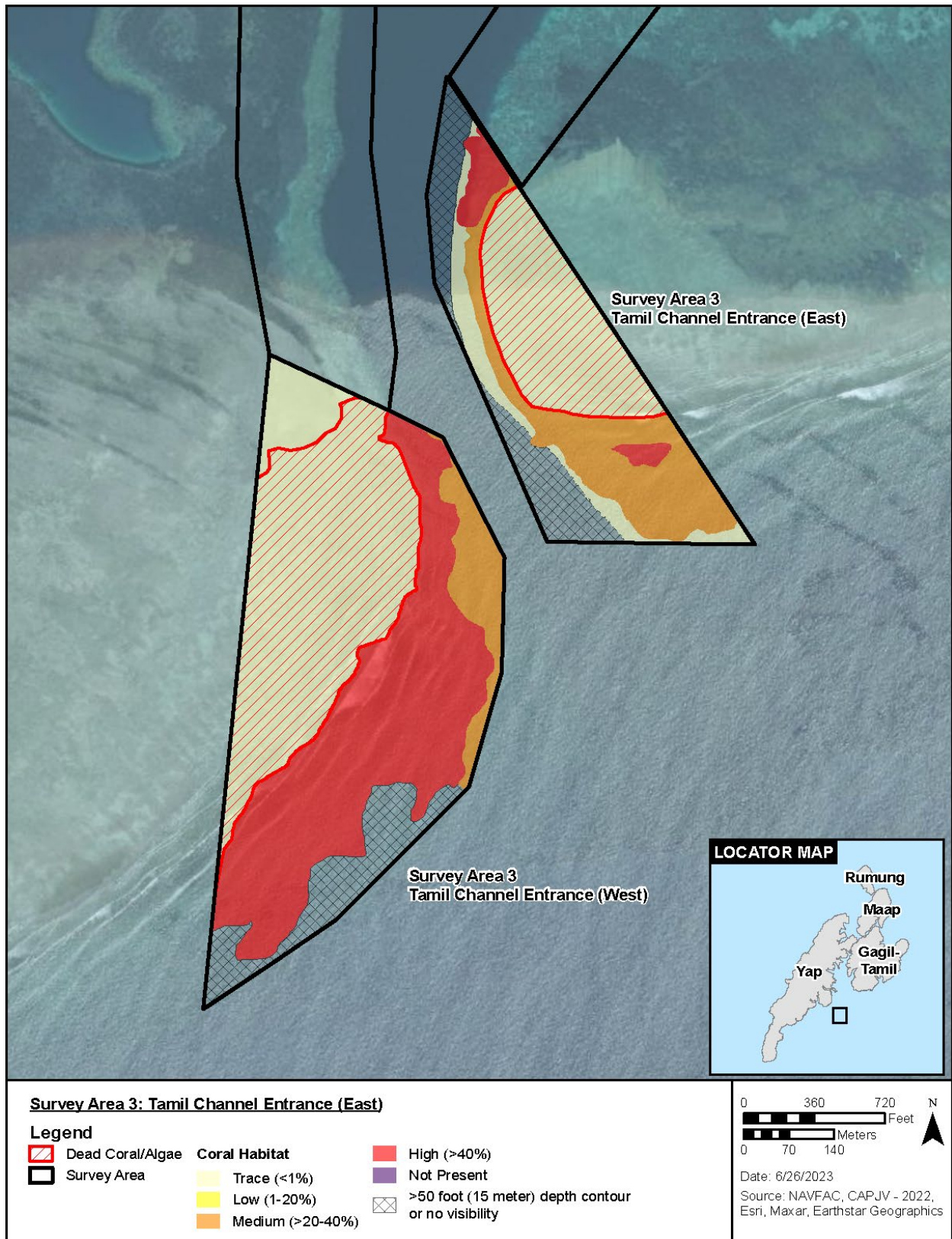


Figure 3-2 Survey Area 3 Marine Habitat Mapping (Coral)

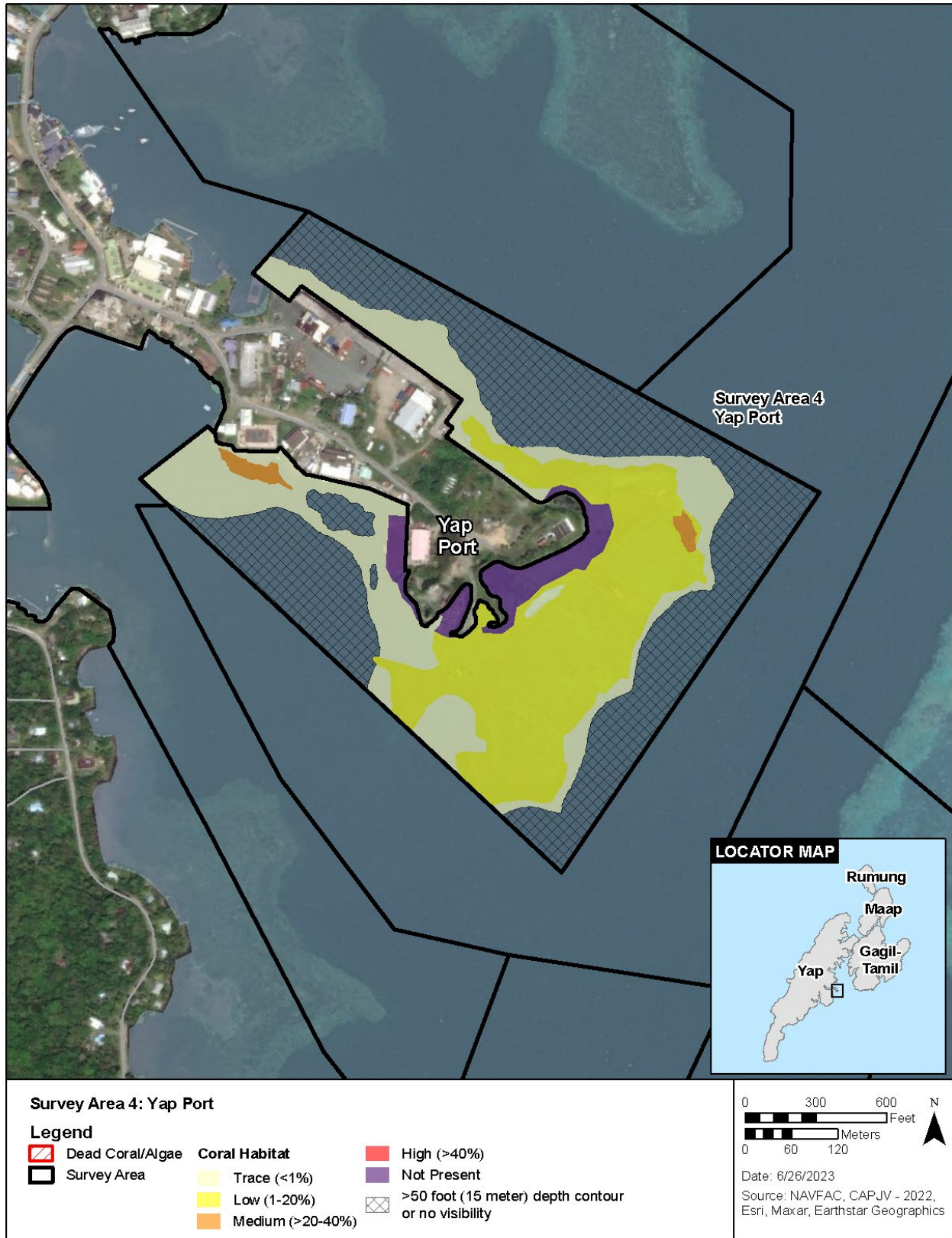


Figure 3-3 Survey Area 4 Marine Habitat Mapping (Coral)



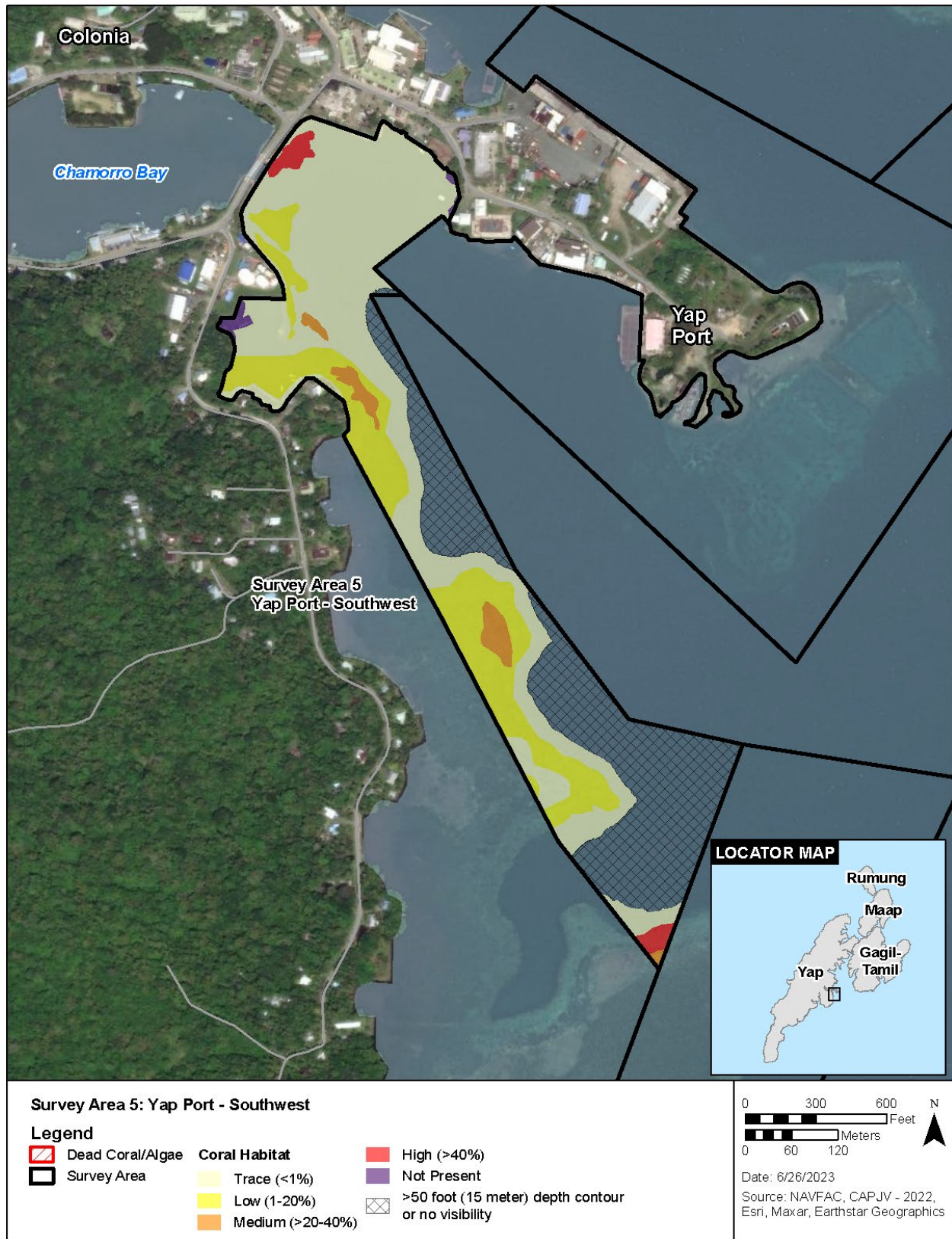


Figure 3-4 Survey Area 5 Marine Habitat Mapping (Coral)

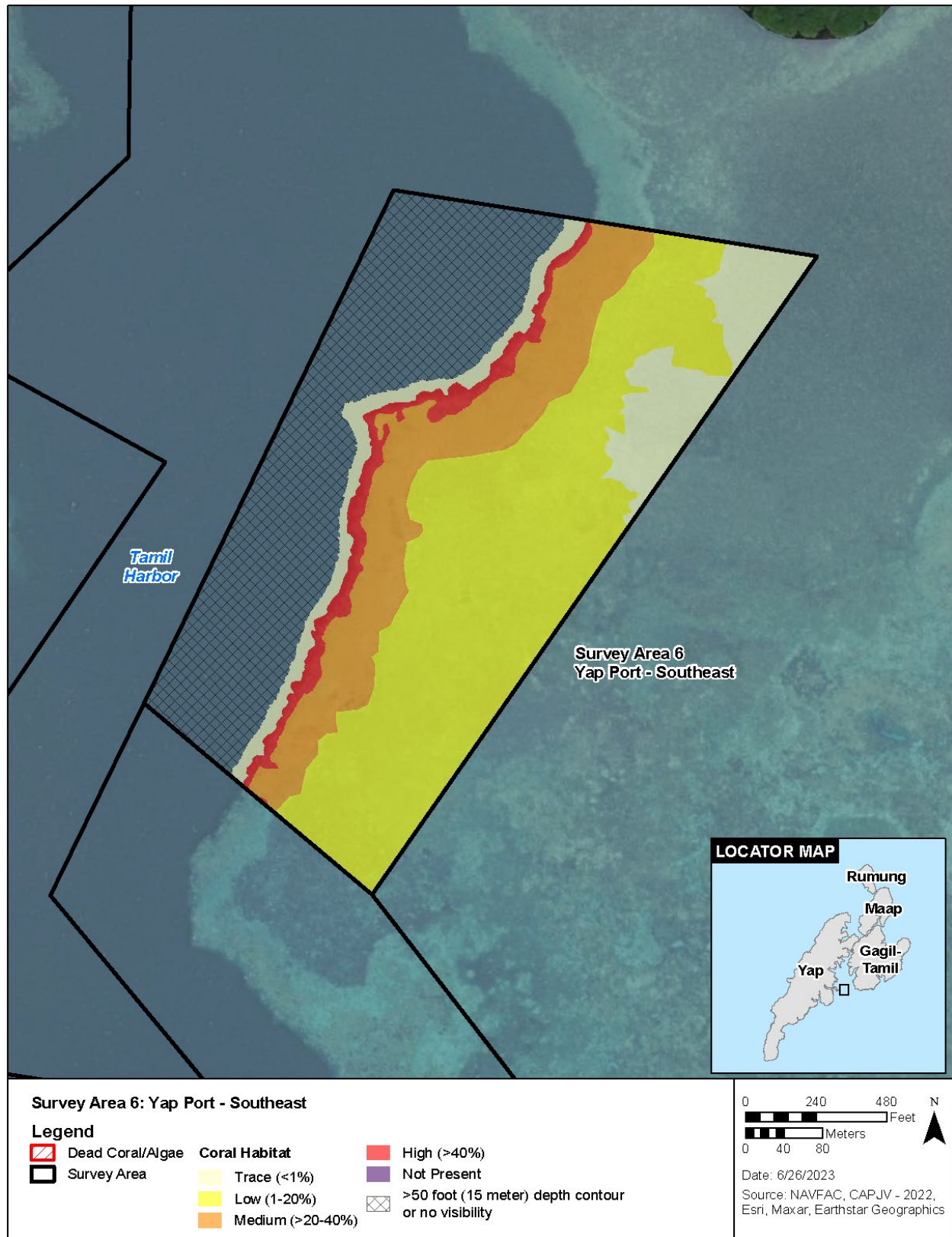


Figure 3-5 Survey Area 6 Marine Habitat Mapping (Coral)



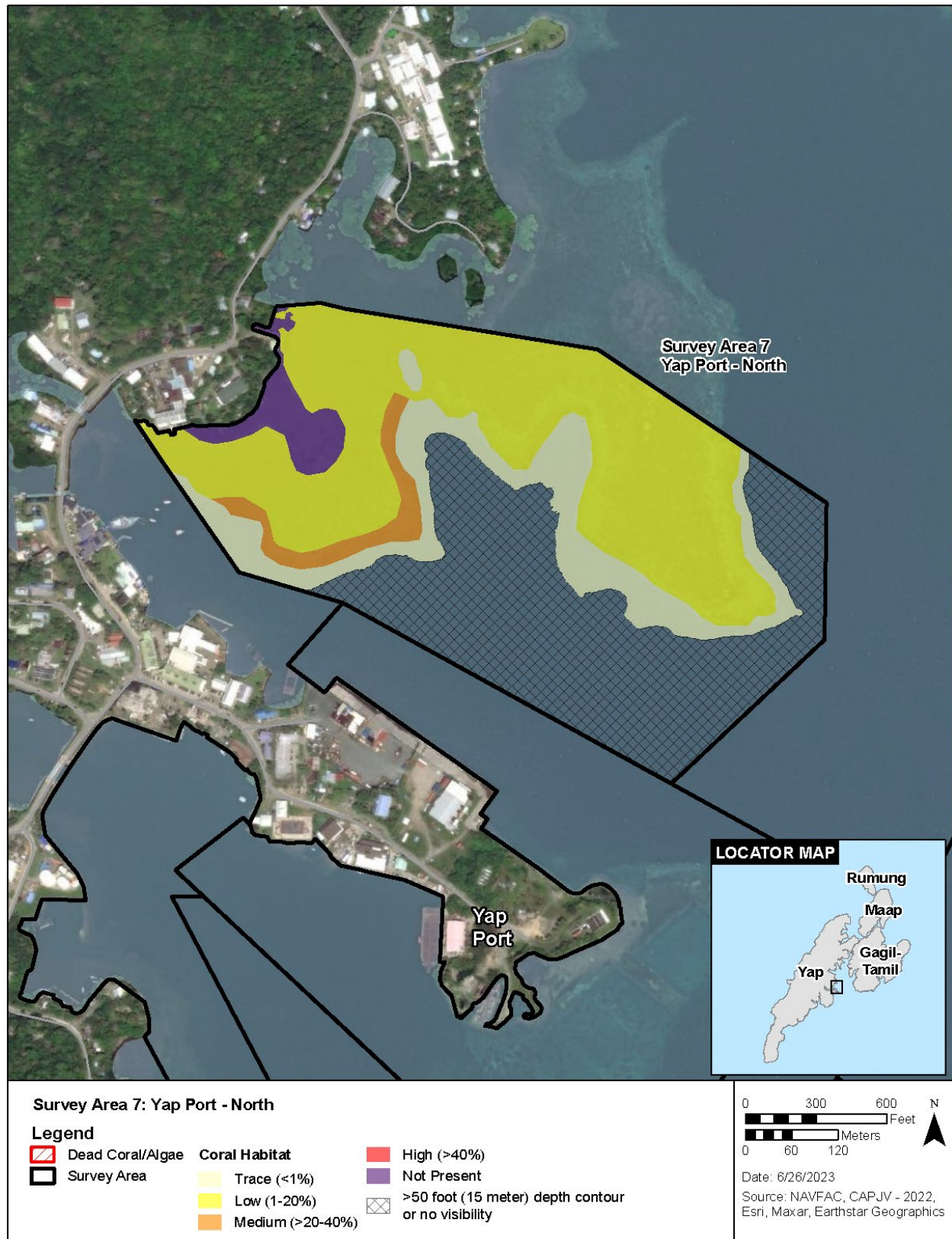


Figure 3-6 Survey Area 7 Marine Habitat Mapping (Coral)



### **3.1.2 Seagrass**

As shown in Figure 3-7 to Figure 3-12, the survey team noted healthy and established mixed seagrass patches near the east boundary of Tamil Channel (West) (Survey Area 2), within Yap Port–Southeast (Survey Area 6), and within Yap Port–North (Survey Area 7). Tamil Channel (East) (Survey Area 2), Tamil Channel Entrance (Survey Area 3), Yap Port (Survey Area 4), and Yap Port–Southwest (Survey Area 5) only included small seagrass patches. Where observed, seagrass beds occupied shallow sandy areas with low coral cover and were located away from high wave action areas.

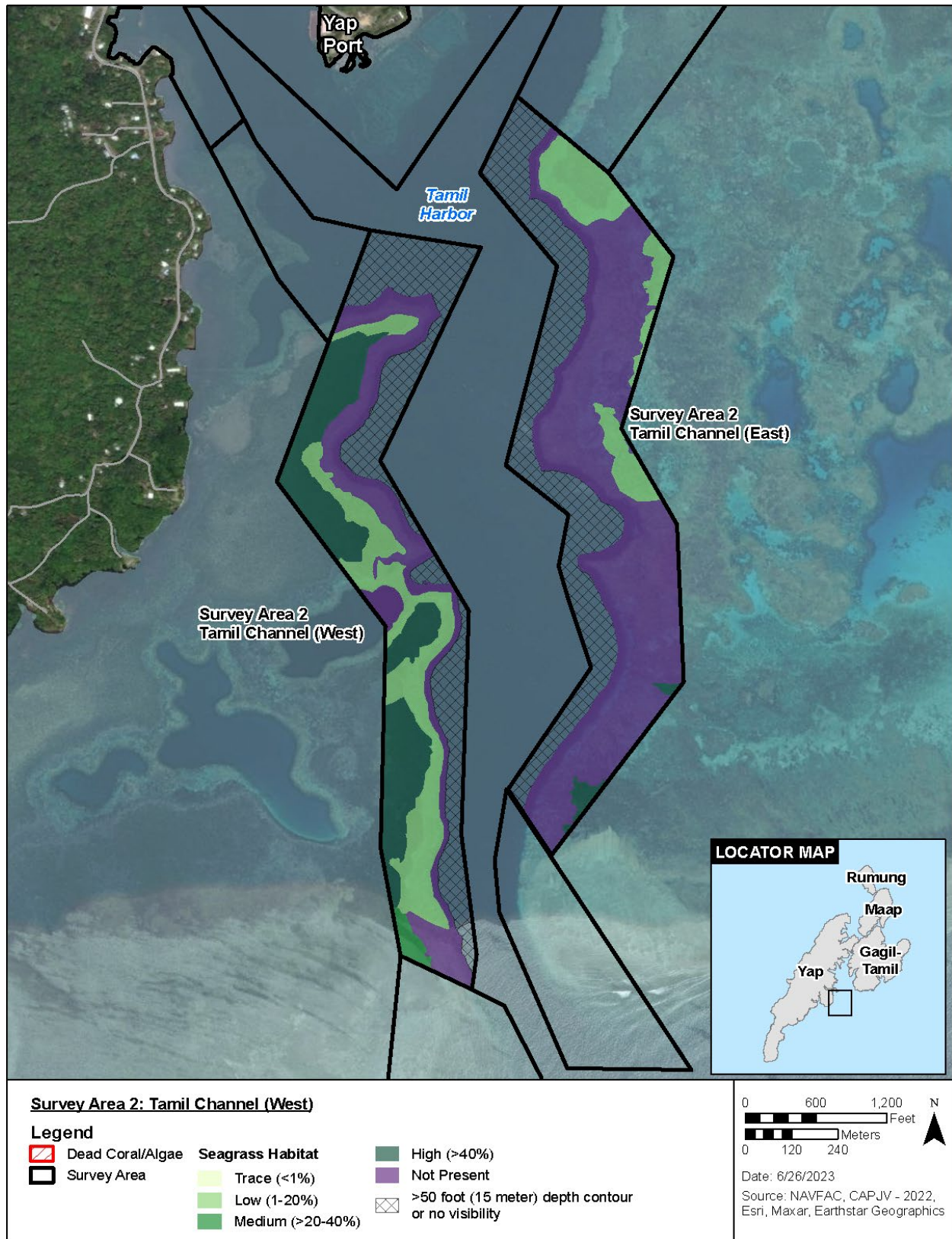


Figure 3-7 Survey Area 2 Marine Habitat Mapping (Seagrass)

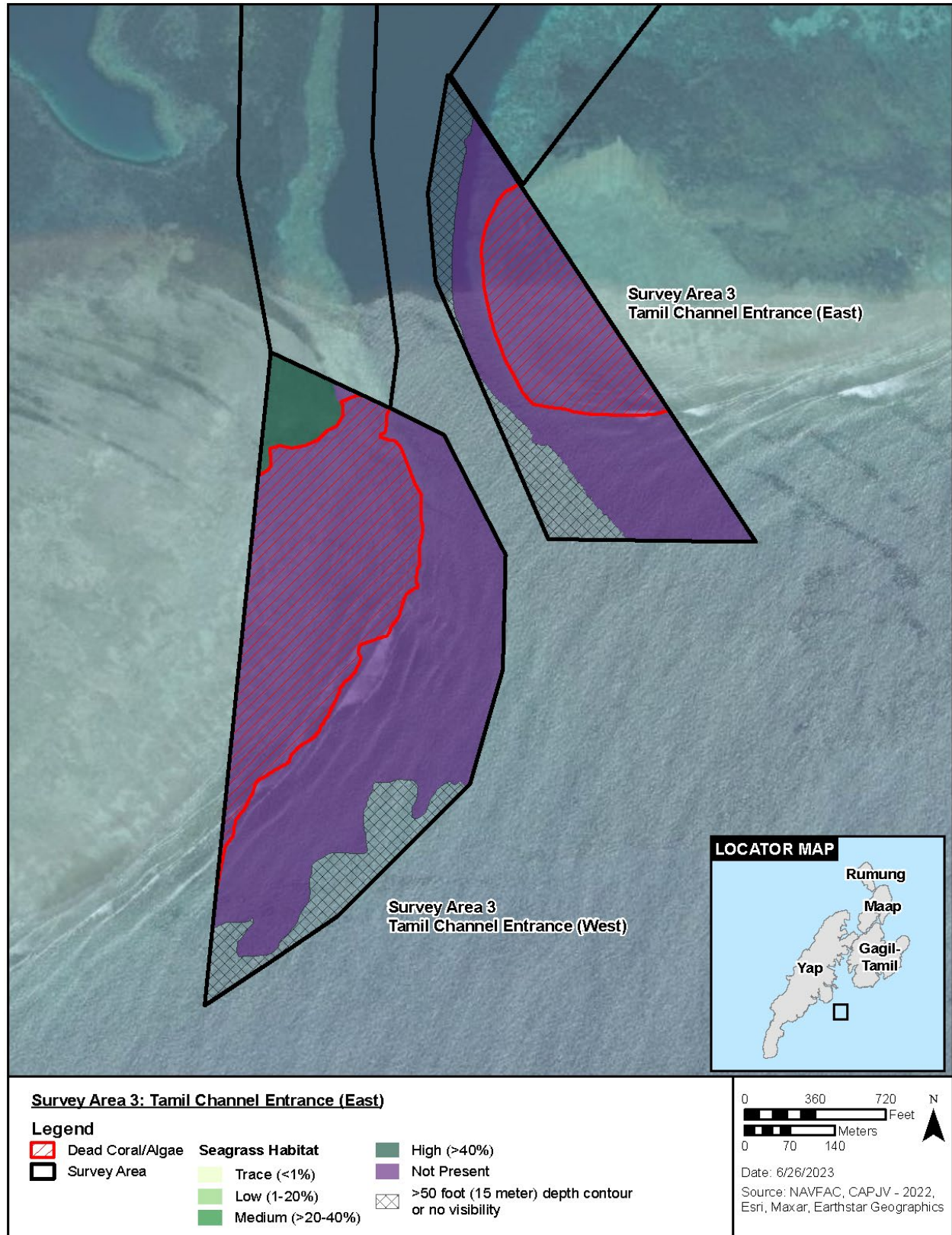


Figure 3-8 Survey Area 3 Marine Habitat Mapping (Seagrass)



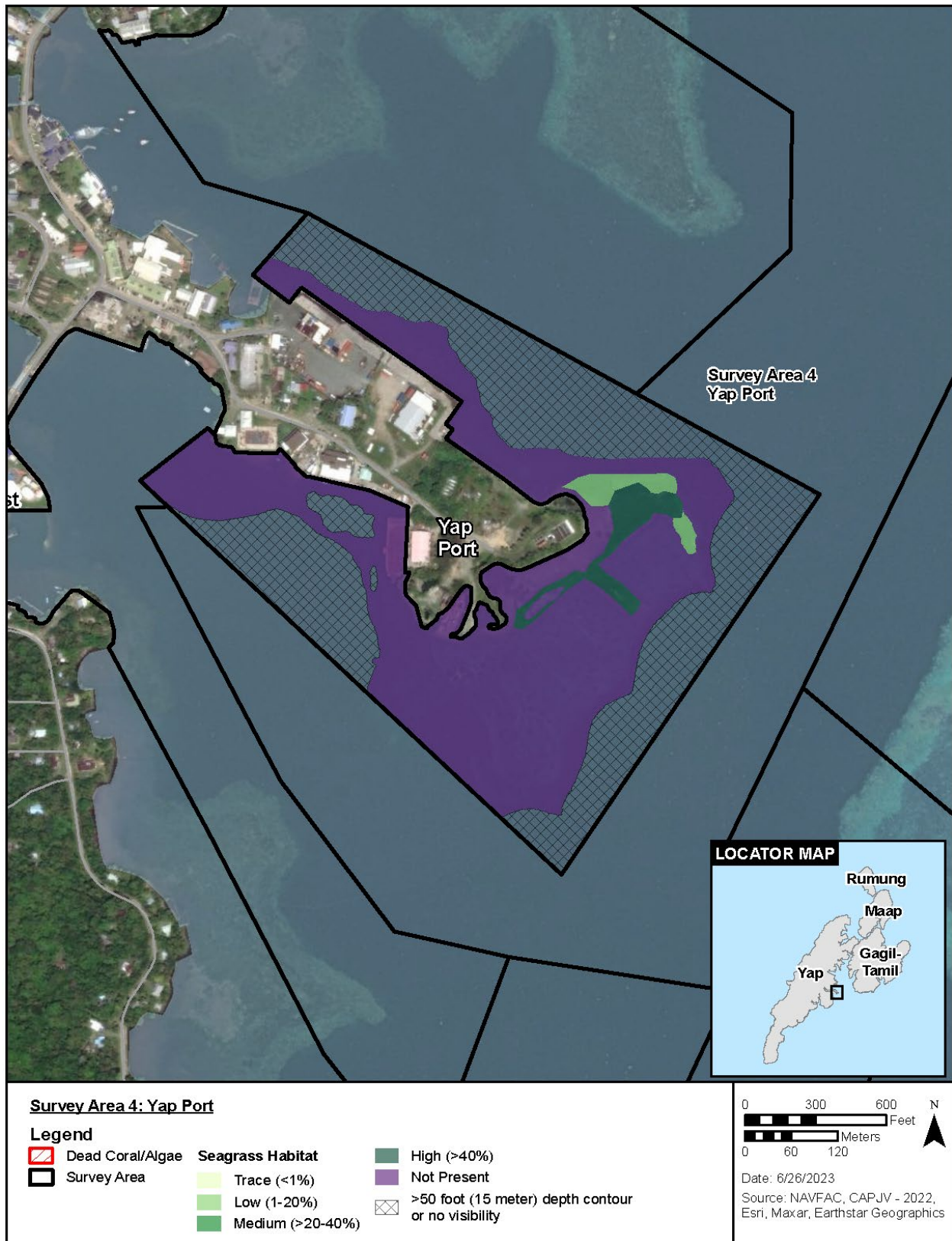


Figure 3-9 Survey Area 4 Marine Habitat Mapping (Seagrass)

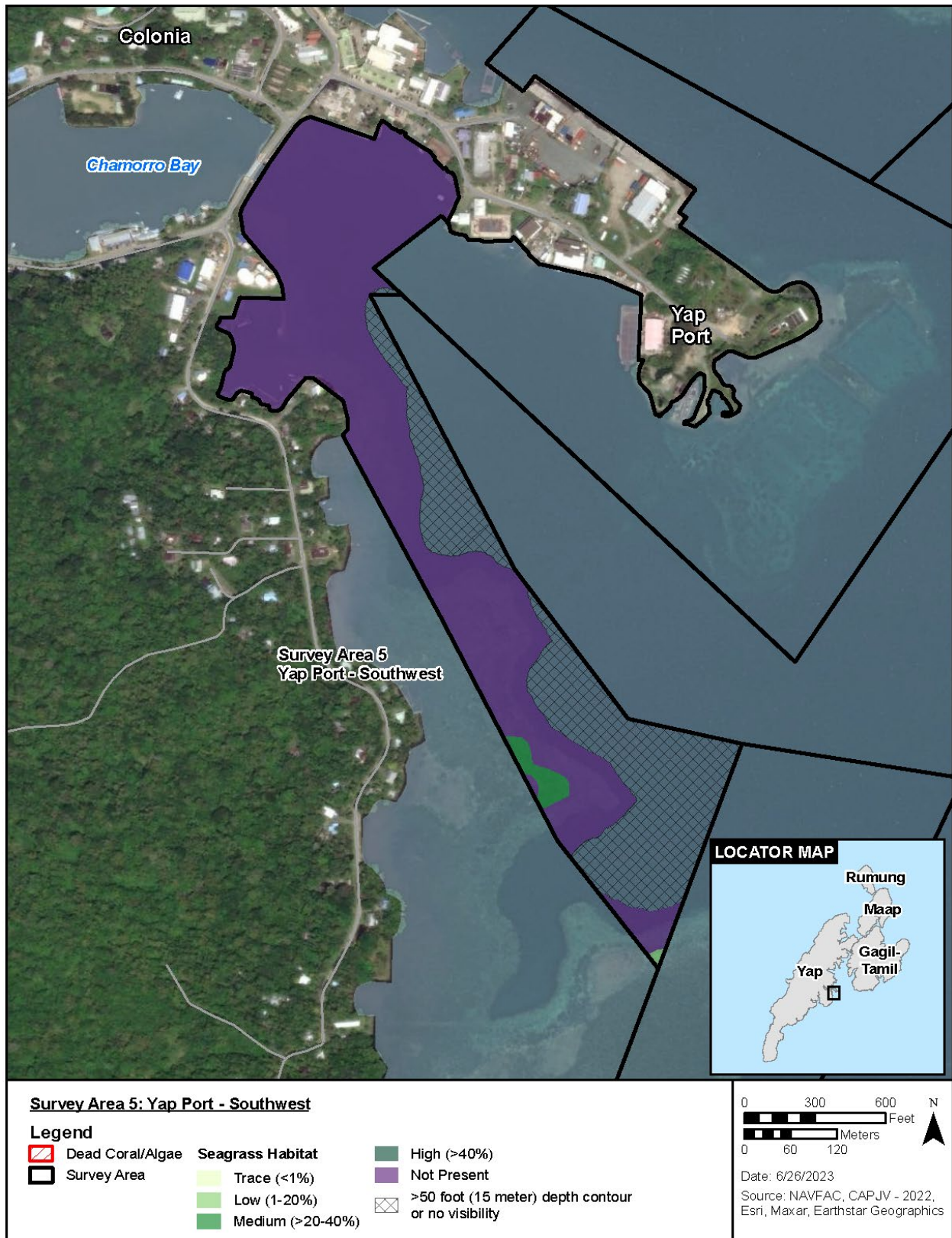


Figure 3-10 Survey Area 5 Marine Habitat Mapping (Seagrass)



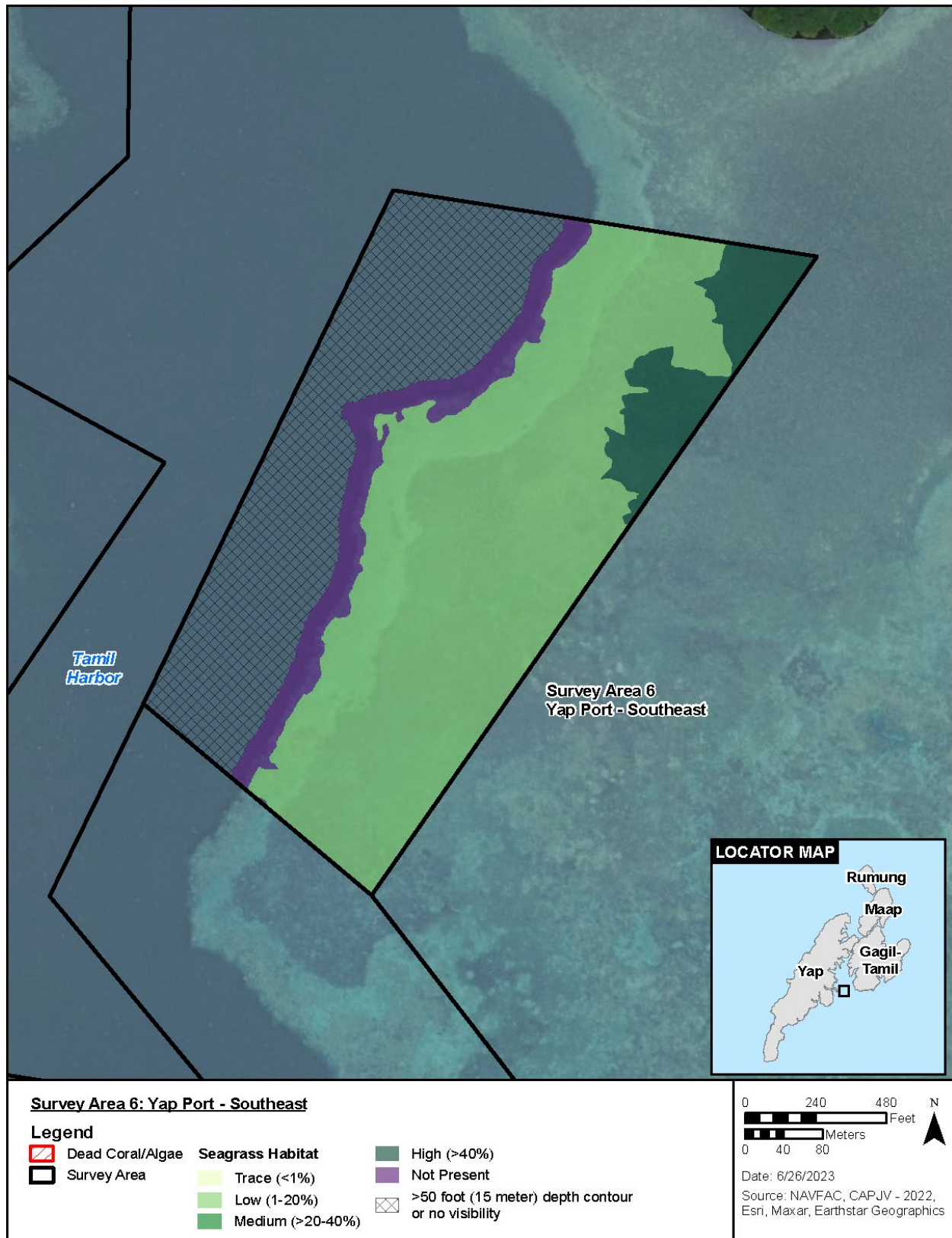


Figure 3-11 Survey Area 6 Marine Habitat Mapping (Seagrass)

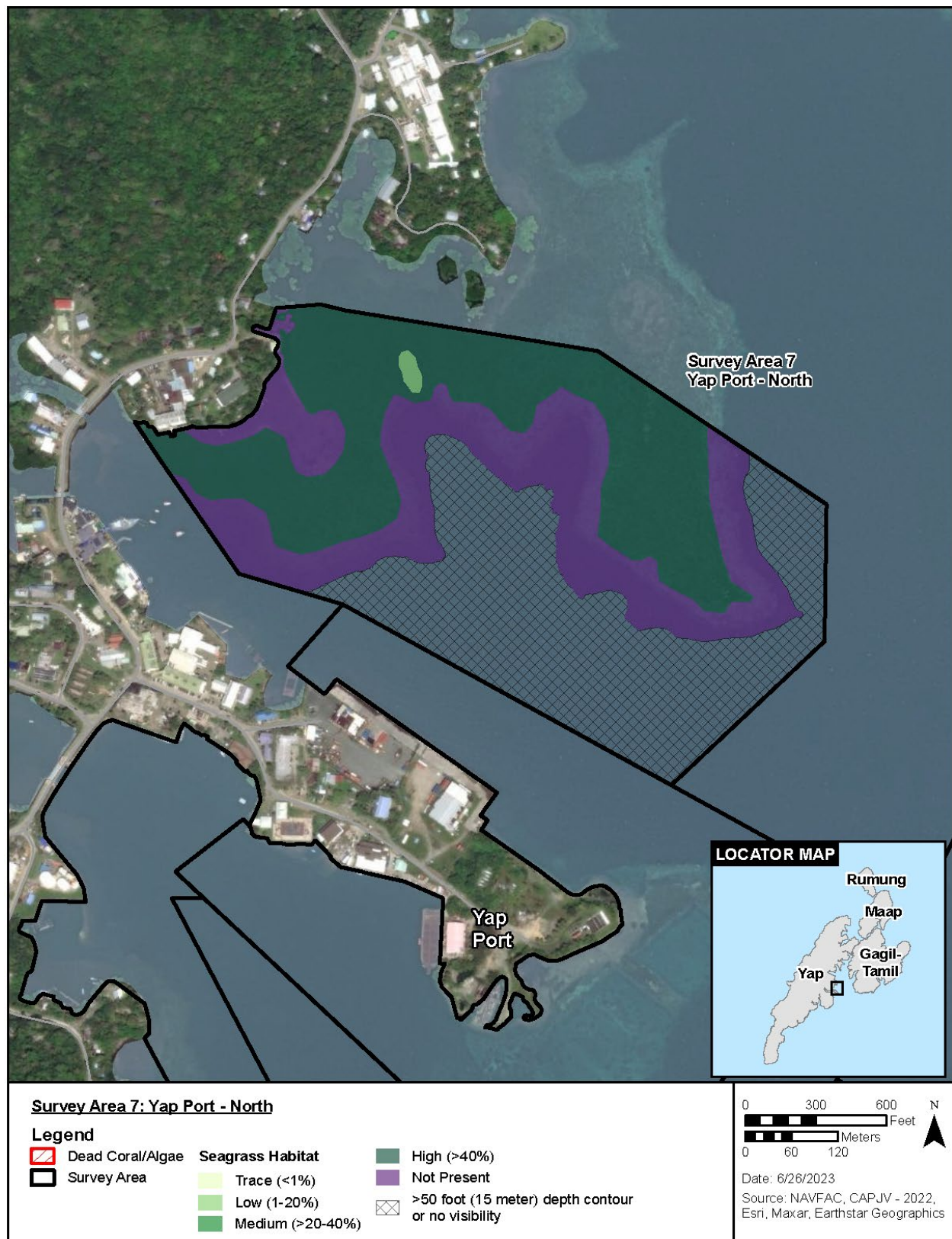


Figure 3-12 Survey Area 7 Marine Habitat Mapping (Seagrass)

### 3.2 Benthic/Biotic Surveys

The survey team conducted benthic/biotic surveys in the Tamil Channel Entrance (Survey Area 3), in the Yap Port (Survey Area 4), and in the northern half of Yap Port–Southwest (Survey Area 5). Benthic composition and mean cover varied among all three survey areas where benthic/biotic line-intercept benthic transects were conducted. Overall, the Tamil Channel Entrance (Survey Area 3) was the most diverse survey area of the three because it included numerous cover types (biotic and abiotic); in addition, only coral cover surpassed 30.0 percent average cover in this area. Yap Port (Survey Area 4) had high sand/rubble (61.7 percent) cover and 12.7 percent coral cover. Yap Port–Southwest (Survey Area 5) showed the lowest benthic cover diversity, with coral (22.0 percent) and sand/rubble (67.8 percent) representing almost 90 percent of the seafloor (Table 3-2).

**Table 3-2 Mean Benthic Type Cover by Survey Area**

Benthic Cover Type	Tamil Channel Entrance (Survey Area 3) (%)	Yap Port (Survey Area 4) (%)	Yap Port–Southwest (Survey Area 5) (%)
Coral	28.6	12.7	22.0
Dead Coral	36.3	7.4	9.4
CCA	4.2	<0.1	0.0
Algae	11.2	7.1	0.0
Seagrass	1.0	3.6	0.1
Sand/Rubble	14.9	61.6	67.8
Other	3.7	7.6	0.9
<b>Total<sup>a</sup></b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Legend: % = percent; CCA = crustose coralline algae.

<sup>a</sup> Total cover percentages do not total 100.0% due to rounding.

A combined total of 30 coral genera were recorded in all three survey areas. Three species of *Porites* (*P. cylindrica*, *P. lobata*, and *P. rus*) consistently exhibited the highest abundance of live coral and dominated the overall percentage of live coral present on the reef, across reef types (Table 3-3). The highest observed diversity was in the Tamil Channel Entrance (East and West) (Survey Area 3). Within the Tamil Channel Entrance (Survey Area 3), the forereef and crest had the highest coral coverage and diversity, while the reef flats were relatively impoverished in all indicators (Figure 3-13). Benthic survey results for each survey area, including reef zone comparisons within the Tamil Channel Entrance (Survey Area 3), are presented in Table 3-3.

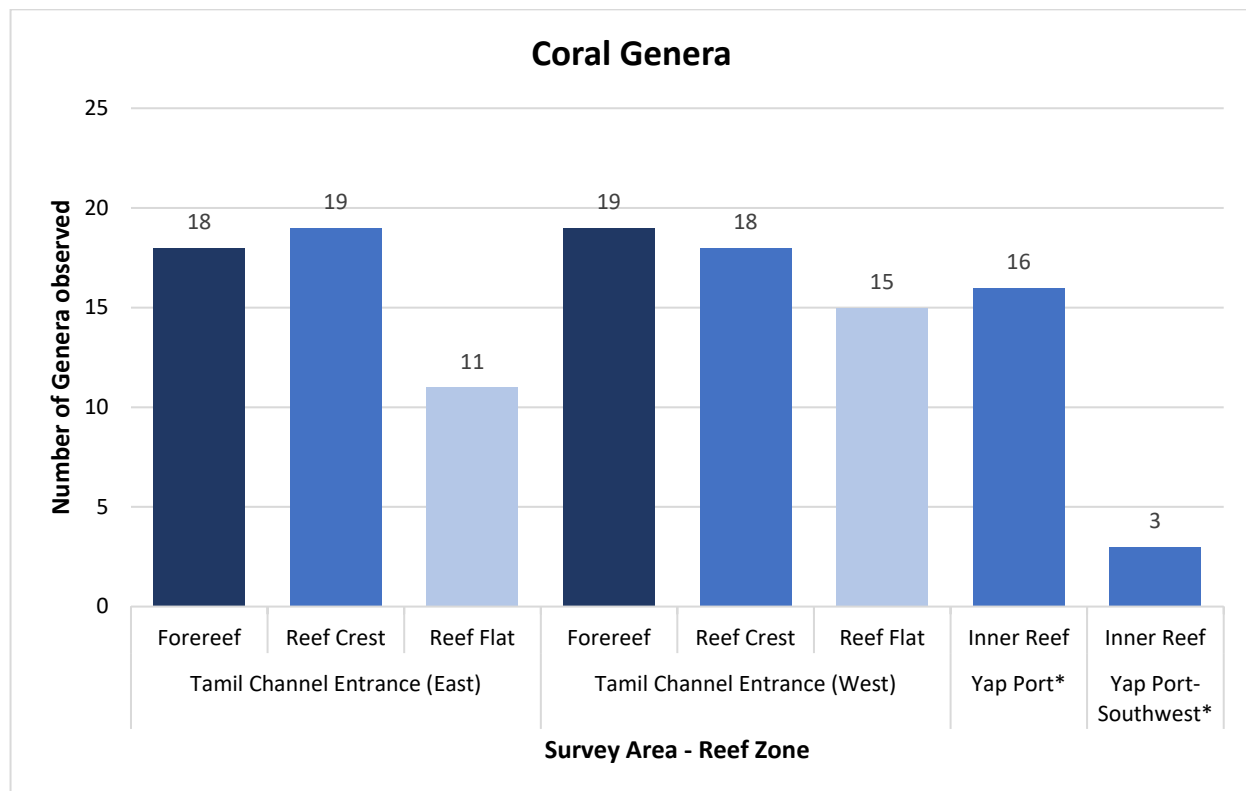
**Table 3-3 Mean Coral Cover by Genus/Species by Survey Area**

Coral Genus/Species	Tamil Channel Entrance (Survey Area 3)	Yap Port (Survey Area 4)	Yap Port–Southwest (Survey Area 5)
<i>Acropora</i> sp.	2.1%	22.2%	—
<i>Alveopora</i> sp.	1.1%	—	—
<i>Astreopora</i> sp.	—	0.5%	—
<i>Coscinaraea</i> sp.	0.2%	—	—
<i>Cyphastrea</i> sp.	0.2%	—	—
<i>Diploastrea</i> sp.	2.1%	—	—
<i>Echinophyllia</i> sp.	—	16.2%	—
<i>Favia</i> sp.	2.4%	3.0%	—
<i>Favites</i> sp.	2.8%	1.2%	—
<i>Fungia</i> sp.	0.1%	0.6%	—
<i>Galaxea</i> sp.	1.2%	—	—
<i>Goniastrea</i> sp.	1.3%	0.6%	—
<i>Hydnophora</i> sp.	3.0%	—	—
<i>Isopora</i> sp.	0.2%	—	—



Coral Genus/Species	Tamil Channel Entrance (Survey Area 3)	Yap Port (Survey Area 4)	Yap Port–Southwest (Survey Area 5)
<i>Leptastrea</i> sp.	0.7%	0.3%	—
<i>Leptoria</i> sp.	3.4%	—	—
<i>Leptoseris</i> sp.	—	—	—
<i>Millepora</i> sp.	4.6%	—	—
<i>Montastraea</i> sp.	2.1%	1.4%	—
<i>Montipora</i> sp.	9.7%	3.1%	0.5%
<i>Pachyseris</i> sp.	0.2%	6.4%	—
<i>Pavona</i> sp.	1.6%	—	—
<i>Pectinia</i> sp.	—	—	—
<i>Platygyra</i> sp.	2.3%	—	—
<i>Pocillopora</i> sp.	3.5%	—	—
<i>Porites</i> sp.	1.1%	—	—
<i>Porites cylindrica</i>	8.2%	37.3%	70.7%
<i>Porites lobata</i>	15.7%	3.0%	28.8%
<i>Porites rus</i>	28.5%	3.0%	—
<i>Psammocora</i> sp.	0.3%	—	—
<i>Stylophora</i> sp.	1.2%	—	—
<i>Symphyllia</i> sp.	—	0.8%	—
<i>Turbinaria</i> sp.	0.1%	0.6%	—
<b>Total Genera Recorded</b>	<b>28</b>	<b>16</b>	<b>3</b>

Legend: — = not applicable; % = percent.



**Figure 3-13 Number of Coral Genera Observed by Survey Area and Reef Zone**

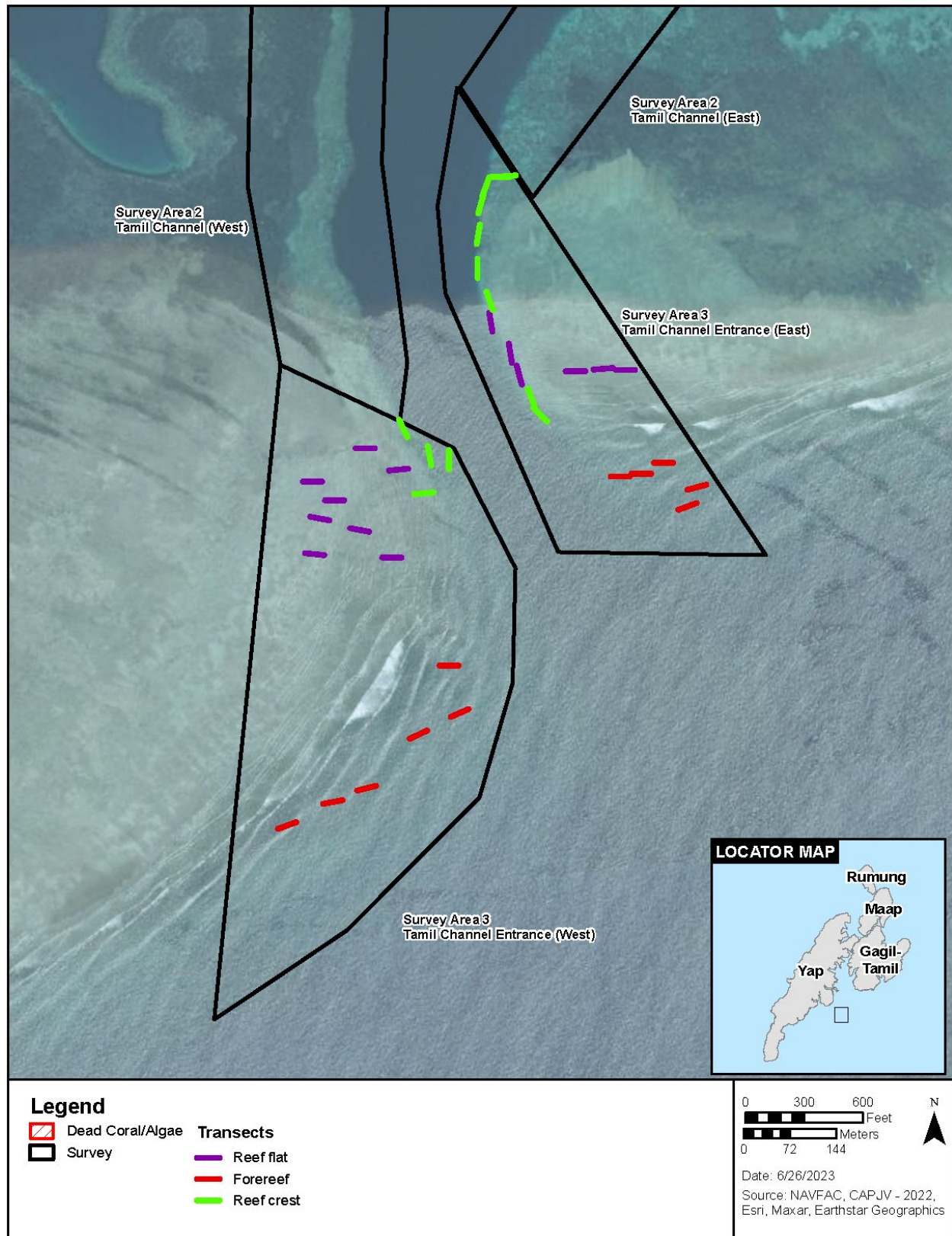
\* Yap Port and Yap Port–Southwest (Survey Areas 4 and 5, respectively) were considered inner reefs and no further distinction of reef zones was necessary.

### **3.2.1 Tamil Channel Entrance (East and West) (Survey Area 3)**

The Tamil Channel Entrance (East and West) (Survey Area 3) is a distinct area where the reef meets the Pacific Ocean and the deeper channel basin. As the forereef wraps into Tamil Channel, the substrate transitions from solid, rocky substrate composed of coral skeletons, boulders, and reef framework to a mixture of rocky surfaces, live coral formations, sandy patches, and dead boulder coral structures. These substrate types provided attachment surfaces for various marine organisms and supported different ecological communities. Figure 3-14 illustrates the locations of each of the benthic/biotic transects conducted in the Tamil Channel Entrance (East and West) (Survey Area 3), and identifies the reef zone assigned to each transect.

Across reef zones in the Tamil Channel Entrance (East and West) (Survey Area 3), the surveys recorded coral reef with high coral cover (mainly encrusting or massive growth forms), moderate levels of CCA, and low algal cover. However, the survey team also observed a high presence of dead coral and bare substrate (20-53 percent).

Although both sides of the Tamil Channel Entrance (East and West) (Survey Area 3) are structurally similar, their benthic compositions varied noticeably, especially when compared to the reef flat zones (Figure 3-14). The survey team compared benthic compositions of the east and west sides of the Tamil Channel Entrance (East and West) (Survey Area 3) by reef zones to illustrate the differences (Figure 3-15, Figure 3-16, and Figure 3-17).

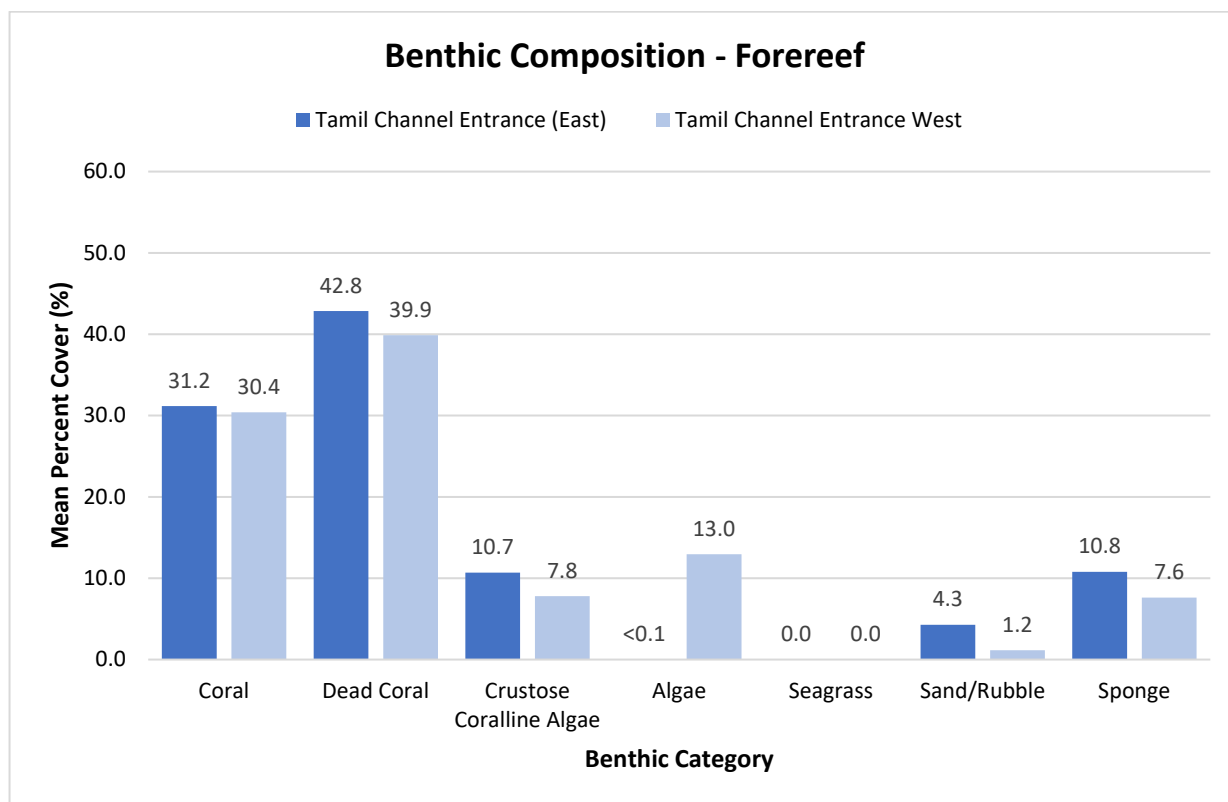


**Figure 3-14 Benthic/Biotic Transect Locations by Reef Zone within Tamil Channel Entrance (Survey Area 3)**

### 3.2.1.1 Forereef Zone

In the forereef zone (Figure 3-14) of Tamil Channel Entrance (East) (Survey Area 3), dead coral represented more of the seafloor (42.8 percent) than live coral cover (31.2 percent). CCA made up 10.7 percent of the seafloor in this zone, sand/rubble accounted for 4.3 percent, and sparse algae (<0.1 percent) occupied the forereef (Figure 3-15). *P. rus* was the dominant species of coral in this reef zone, comprising 46.5 percent of the live coral cover.

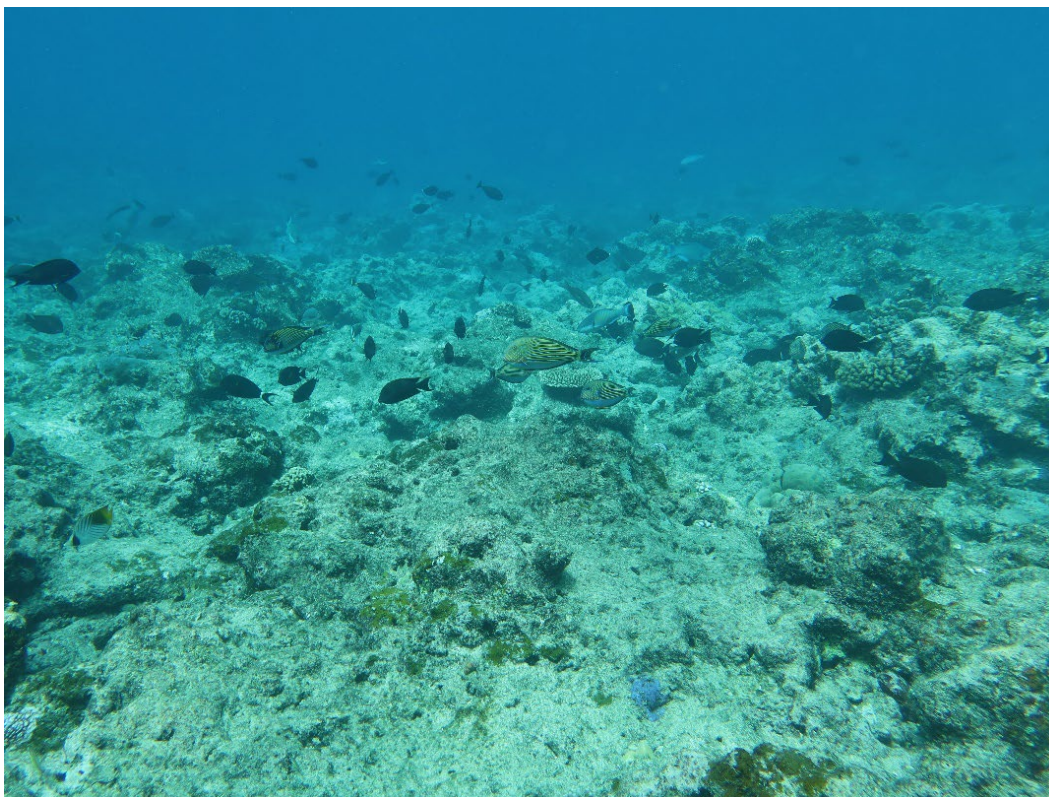
The forereef area of Tamil Channel Entrance (West) (Survey Area 3) exhibited a moderate proportion of live coral cover (30.4 percent) and a CCA (7.8 percent), but had comparatively high dead coral (39.9 percent). The remaining benthic cover included algae (13.0 percent) and sponge (7.6 percent), indicating a reef ecosystem in moderate condition. Together, *Montipora* sp. (22.4 percent) and encrusting *P. rus* (21.9 percent) accounted for more than 44 percent of the live coral cover recorded in this reef zone (Figure 3-15).



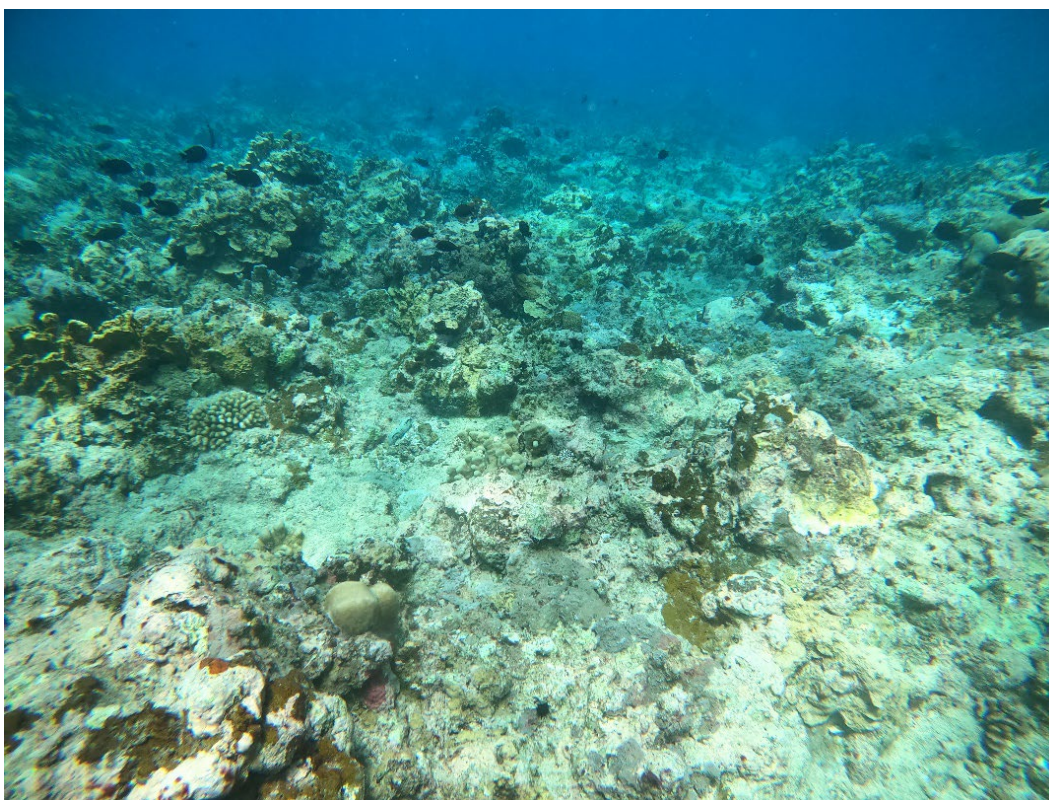
**Figure 3-15 Benthic Composition Comparison of the Forereef Zone in the East and West Sides of the Tamil Channel Entrance (Survey Area 3); Number Above Each Bar Represents Mean Percent Cover**

Representative photographs of the Tamil Channel Entrance (East and West) (Survey Area 3) forereefs are presented as Photo 3-1 and Photo 3-2.





**Photo 3-1 Forereef within Tamil Channel Entrance (East) (Survey Area 3)**

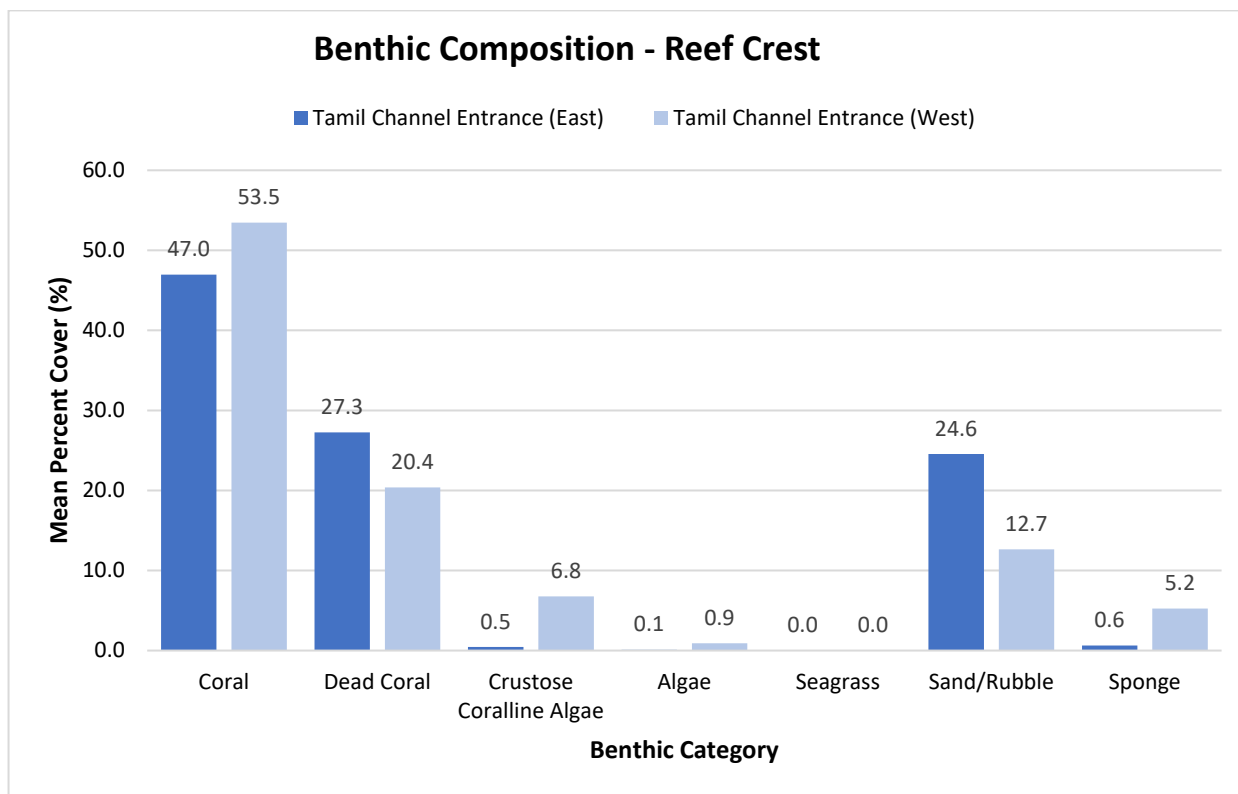


**Photo 3-2 Forereef within Tamil Channel Entrance (West) (Survey Area 3)**

### 3.2.1.2 Reef Crest Zone

The survey team found the highest coral cover of the Tamil Channel Entrance (East) (Survey Area 3) on the reef crest (Figure 3-14), with 19 coral genera recorded (Table 3-3). This area exhibited a high percentage of live coral (47.0 percent) compared to dead coral (27.3 percent), sand/rubble (24.6 percent), algae (0.1 percent), and scarce CCA (0.5 percent) (Figure 3-16). Encrusting *P. rus* was the dominant coral, comprising 36.1 percent of the live coral cover.

The survey team found the highest coral cover in the Tamil Channel Entrance (West) (Survey Area 3). The seafloor in this reef zone consisted of live coral (53.5 percent) growing around dead coral (20.4 percent). A moderate amount of CCA (6.8 percent) covered the crest, with algae making up 0.9 percent of the seafloor. In this reef zone, *P. rus* also accounted for most of the live coral (47.7 percent) (Figure 3-16).



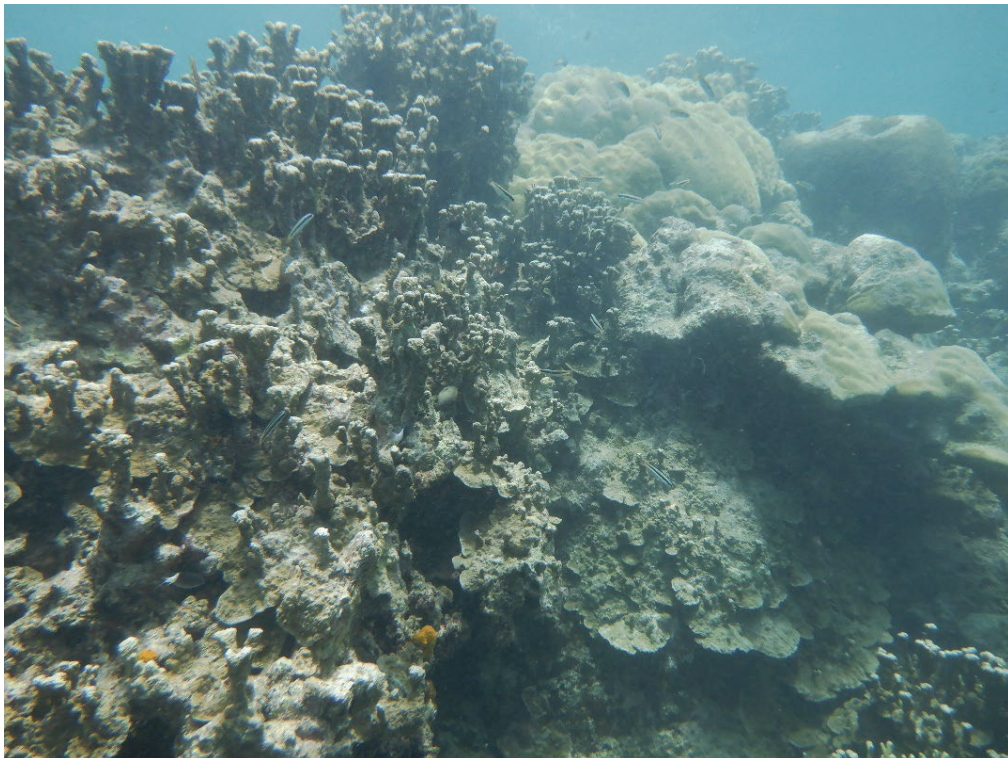
**Figure 3-16 Benthic Composition Comparison of the Reef Crest Zone in Both East and West Sides of the Tamil Channel Entrance (Survey Area 3); Number Above Each Bar Represents Mean Percent Cover**

Representative photographs of the Tamil Channel Entrance East and West reef crest (Survey Area 3) are presented as Photo 3-3 and Photo 3-4.





**Photo 3-3** Reef Crest within Tamil Channel Entrance (East) (Survey Area 3) with Saddleback Butterflyfish (*Chaetodon ephippium*)

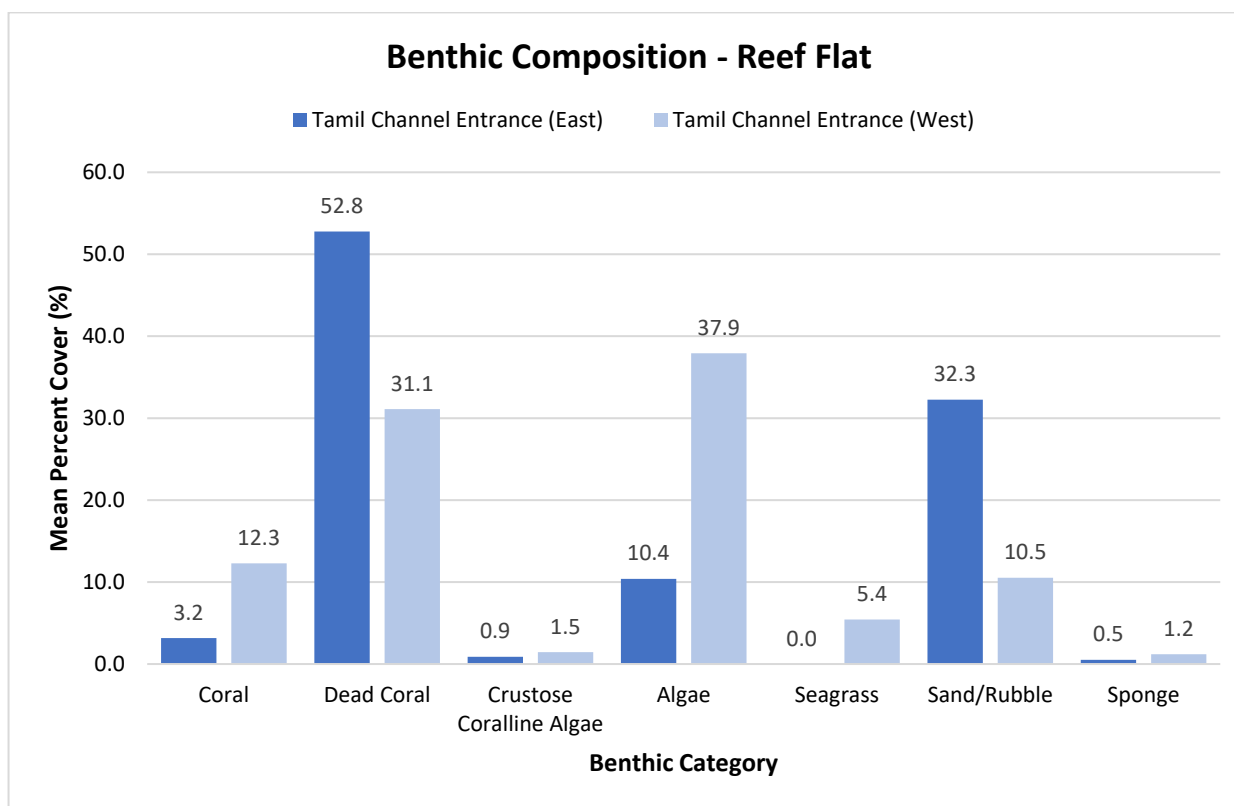


**Photo 3-4** Reef Crest within Tamil Channel Entrance (West) (Survey Area 3)

### 3.2.1.3 Reef Flat Zone

The reef flat zone within the Tamil Channel Entrance (East) (Survey Area 3) showed typical conditions of a shallow exposed reef zone: low live coral cover (3.2 percent), moderate algal cover (10.4 percent), and proportionally high cover of dead coral (52.8 percent). Sand/rubble made up 32.3 percent of the benthic cover (Figure 3-17). Although coral cover was low, the survey team found 11 genera of coral (Figure 3-13), including two out of four *Porites* species.

The reef flat within the Tamil Channel Entrance (West) (Survey Area 3) had low live coral cover (12.3 percent), high algal cover (37.9 percent), and moderate cover of dead coral (31.1 percent). In addition, small patches of seagrass (5.4 percent cover combined) were on the northern portion of this area (Figure 3-17). The greatest contributor to live coral cover was *P. lobata*, making up 34.1 percent of the total live coral, which is consistent with typical reef flats.

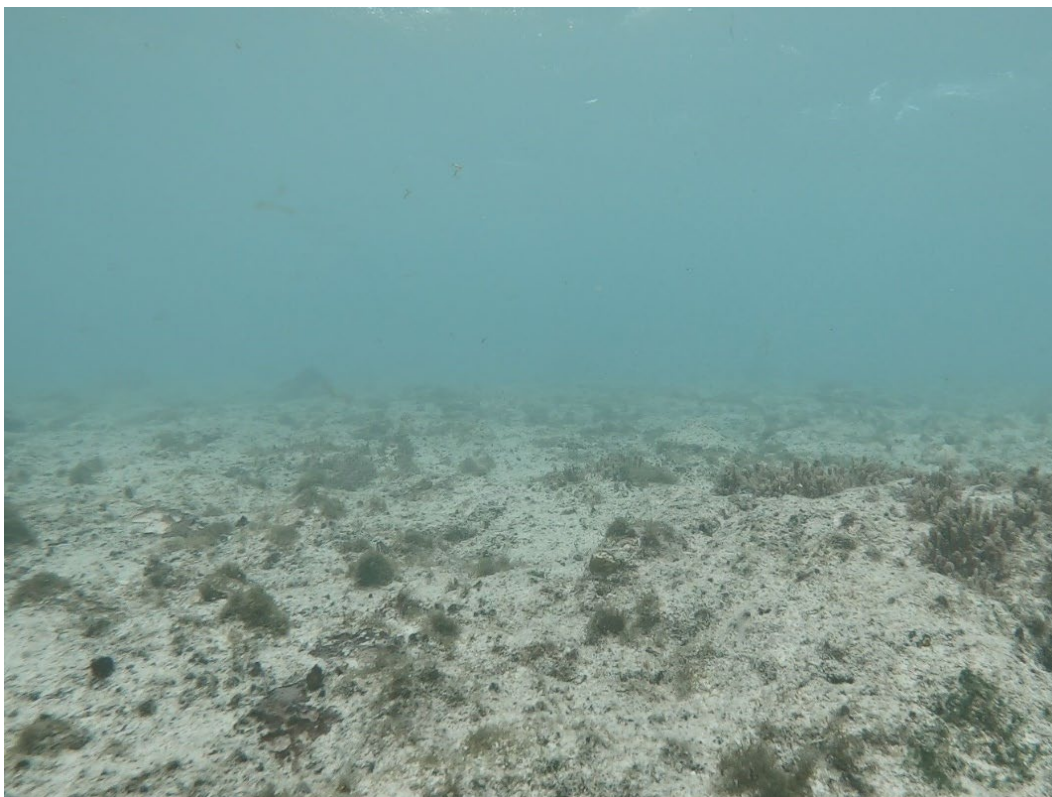


**Figure 3-17 Benthic Composition Comparison of the Reef Flat Zone in the East and West Sides of the Tamil Channel Entrance (Survey Area 3); Number Above Each Bar Represents Mean Percent Cover**

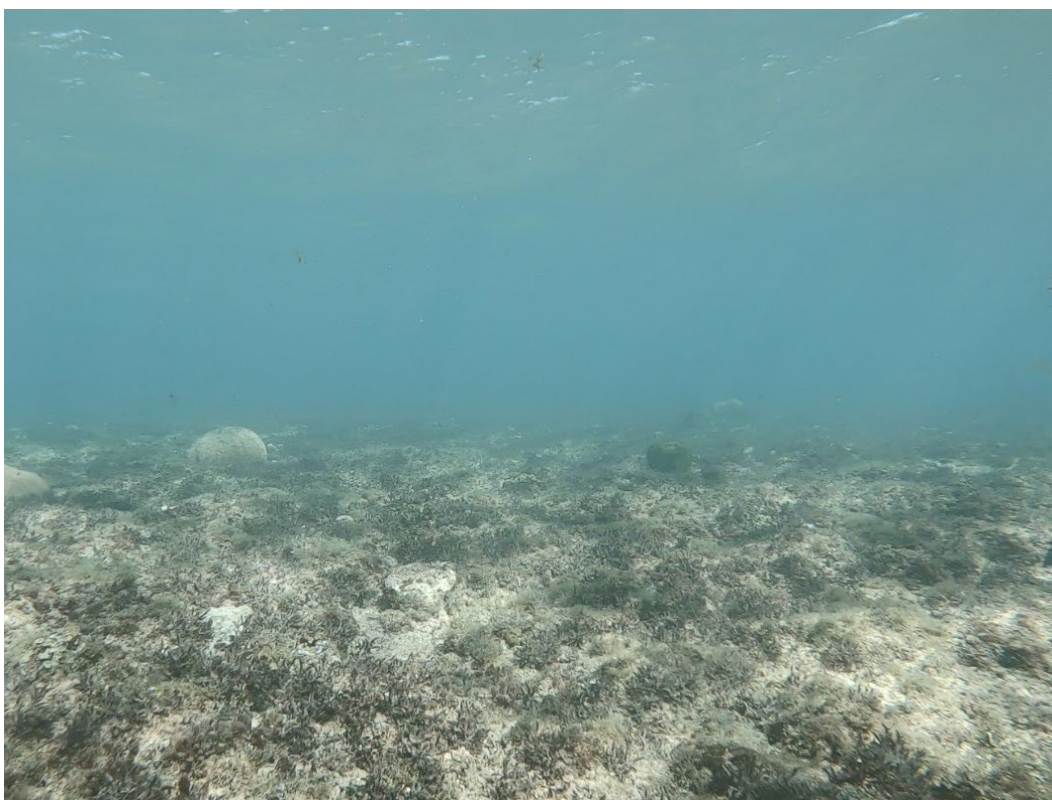
A small section in the northernmost portion of the Tamil Channel Entrance (East) (Survey Area 3) resembled the inner reefs and exhibited 45 percent of live coral cover. Notably, *P. cylindrica* accounted for 41 percent of the total live coral in this area.

Representative photographs of the Tamil Channel Entrance (East and West) reef flat (Survey Area 3) are presented as Photo 3-5 and Photo 3-6.





**Photo 3-5      Reef Flat within Tamil Channel Entrance (East) (Survey Area 3)**



**Photo 3-6      Reef Flat within Tamil Channel Entrance (West) (Survey Area 3)**

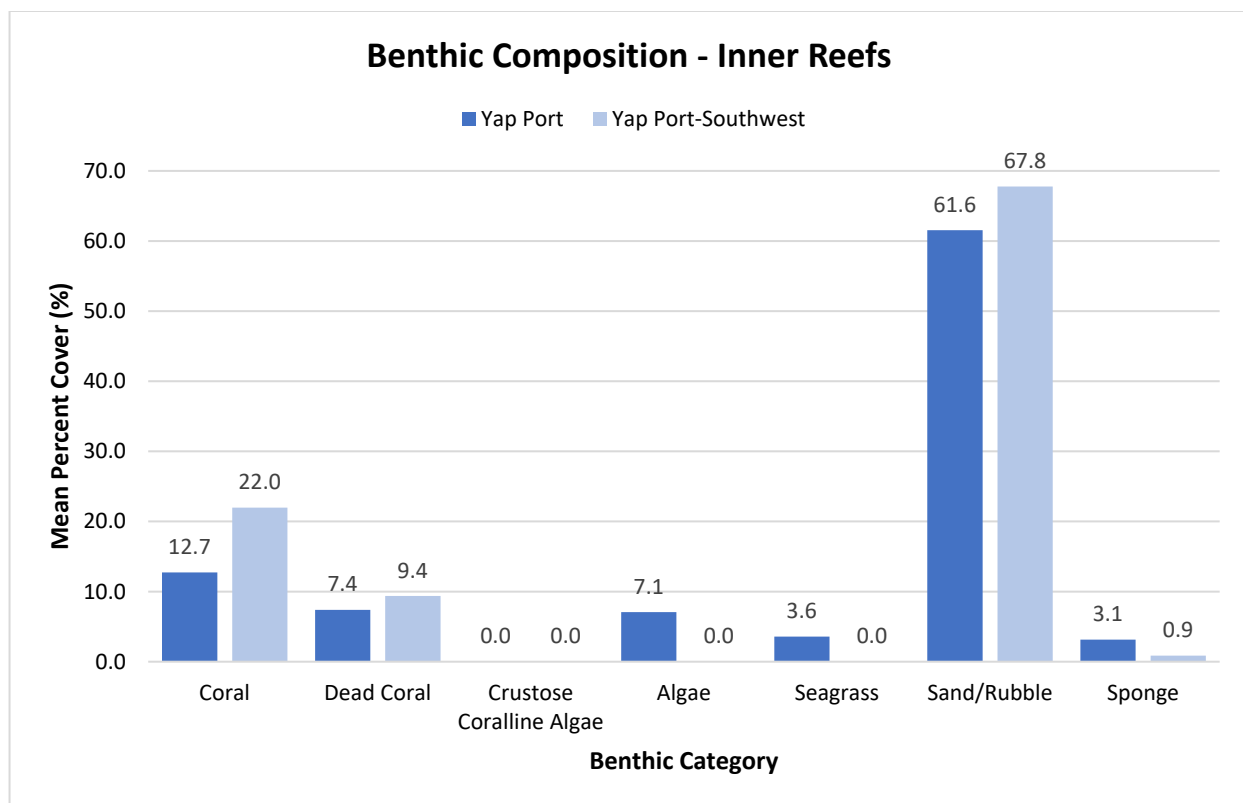
### 3.2.2 Yap Port (Survey Area 4) and Yap Port–Southwest (Survey Area 5)

In general, inner reefs experience less wave energy compared to the forereef and reef crest, creating calmer conditions suitable for the growth of diverse coral species and other benthic organisms. This zone typically gives way to the establishment of seagrass beds and/or mangroves. Port habitats provide important ecological niches for various marine organisms, including corals, fish, crustaceans, and mollusks. The various artificial structures found within a port, such as breakwaters, piers, docks, and jetties, create novel habitats, serving as attachment surfaces for marine organisms such as corals, mussels, and algae.

When comparing coral diversity among the inner reefs survey areas, the survey team observed the lowest values in Yap Port–Southwest (Survey Area 5) (Figure 3-13). Although Yap Port (Survey Area 4) exhibited high live coral cover (up to 49 percent) in a small reef area on the south side of the port peninsula, and Yap Port–Southwest (Survey Area 5) reported 69 percent coral cover at a small reef area in the northern part of that survey area, low levels of live coral cover are typical for both survey areas (Figure 3-18). Additionally, these two survey areas (Survey Areas 4 and 5) were characterized by significant amounts of sand and coral rubble (>60 percent) (Figure 3-18). Nevertheless, the team found delicate branching *Acropora* sp. and sturdy branching *P. cylindrica* individuals in abundance within the small reef areas around Yap Port (Survey Area 4). A small area within Yap Port–Southwest (Survey Area 5) exhibited the greatest transect cover of *P. cylindrica* found across all transects (69 percent).

Apart from the shallow coral reef habitat on the western edge of Yap Port (Survey Area 4), the survey area mostly consists of sandy bottom and rubble. Overall, live coral (13 percent) exceeded dead coral (7 percent), algal cover was moderate (7 percent), and CCA was very low (<0.1 percent). Yap Port (Survey Area 4) supports an inner reef habitat with delicate *Acropora* interspersed among seagrass and algae. The survey team observed brown algae peacock's tail (*Padina pavonica*) in small numbers within the survey areas, but recorded none on the benthic/biotic line-intercept transects.

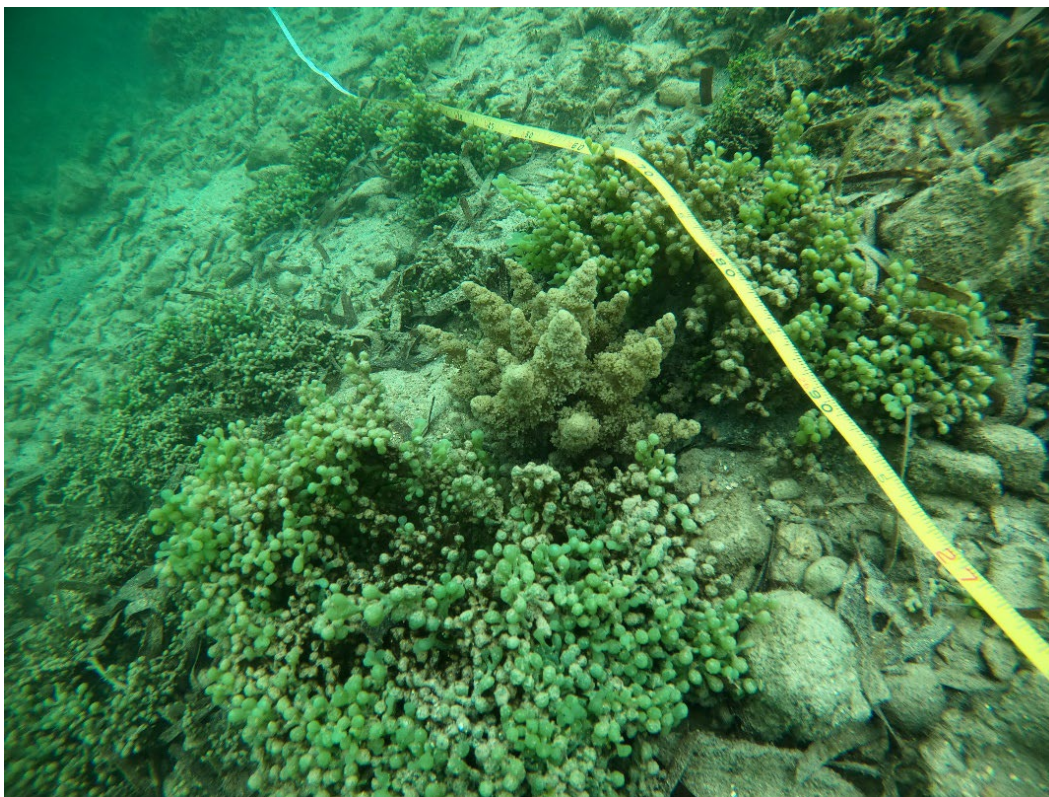
While *P. cylindrica* was the dominant coral (37 percent of live coral) in the survey area, *Acropora* accounted for 22 percent of total live coral found. Although additional observations along the port sea wall consisted of an unusually high abundance of *Echinophyllia* sp., the dominant coral found within Yap Port (Survey Area 4) was *P. cylindrica*. Of the surveys within Yap Port–Southwest (Survey Area 5), two nearshore locations had very high coral cover of *Porites* spp. Other areas in this survey area consisted of sand, coral rubble, and/or a combination of both (68 percent overall). *P. cylindrica* represents 71 percent of all the live coral found within Yap Port (Survey Area 4), forming long branches in the calmer waters on the port.



**Figure 3-18 Benthic Composition Comparison Between Inner Reef Areas at Yap Port and Yap Port-Southwest (Survey Areas 4 and 5)**

Representative photographs of Yap Port and Yap Port-Southwest (Survey Area 4) benthic categories are presented as Photo 3-7 to Photo 3-10.





**Photo 3-7      Algae Present within Yap Port (Survey Area 4)**



**Photo 3-8      *Acropora* sp. Coral Present within Yap Port (Survey Area 4)**





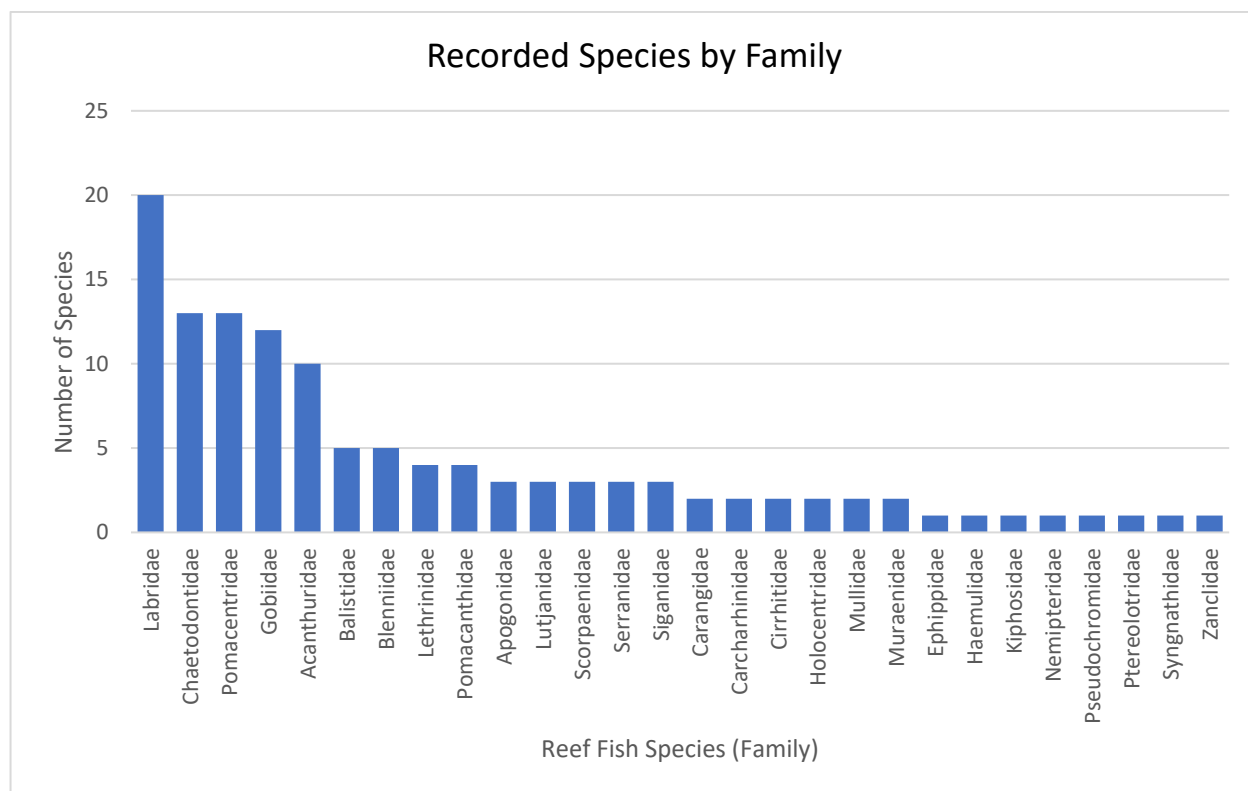
**Photo 3-9      Coral Rubble Present within Yap Port (Survey Area 4)**



**Photo 3-10      Seagrass Present within Yap Port (Survey Area 4)**

### 3.2.2.1 Reef Fish Assessments

Overall, the reef fish surveys recorded 121 species and 28 families of reef fish across all survey areas (Figure 3-19, Table 3-4), with Labridae (wrasse family) (20 species), Chaetodontidae (butterflyfish family) (13 species.), Pomacentridae (damselfish/clownfish family) (13 species) and Gobiidae (goby family) (12 species) having the highest number of species present despite species complexes (e.g., *Pomacentrus* spp., *Halichoeres* spp.) being used during the surveys (Figure 3-19). The striped bristletooth (*Ctenochaetus striatus*) was the most abundant and ubiquitous species throughout the Survey Areas 2 through 7, recorded in 50 of the 59 reef fish transects and in all reef zones. Other species of surgeonfish (e.g., *Acanthurus blochii*, *Acanthurus lineatus*) and a triggerfish (*Rhinecanthus rectangulus*) were also regularly observed, but not in the abundances of the striped bristletooth. Small and gregarious species like *Chromis* spp., *Apogon* spp., *Thalassoma* spp., and several goby species were abundant but showed a marked affinity for particular reef zones and even particular coral types (e.g., *Chromis viridis* and several species of *Apogon* inhabiting *Acropora* corals within the inner reefs).



**Figure 3-19 Number of Reef Fish Species Recorded Across All Survey Areas**

The overall distribution of reef fish species across survey areas and among reef zones mirrored the coral cover results described in Section 3.2.1. The survey team found the highest species richness (Figure 3-20) and abundances (Figure 3-21) of reef fish in the Tamil Channel Entrance (East and West) (Survey Area 3), with the forereef and reef crest zones being the most diverse zones in the survey area. Yap Port (Survey Area 4) does not differ significantly in abundance and species richness from the reef flat zone in the Tamil Channel Entrance (East and West) (Survey Area 3), while Yap Port–Southwest (Survey Area 5) was the lowest in both parameters.

Table 3-4 Species Recorded During Reef Fish Assessments

Family	Species Name	Common Name	Tamil Channel Entrance (Survey Area 3)	Yap Port (Survey Area 4)	Yap Port – Southwest (Survey Area 5)
<b>Elasmobranchii (Cartilaginous Fish)</b>					
Carcharhinidae	<i>Carcharhinus melanopterus</i> <sup>a</sup>	Blacktip reef shark	X		
	<i>Triaenodon obesus</i>	Whitetip reef shark	X		
<b>Teleostei (Bony Fish)</b>					
Acanthuridae	<i>Acanthurus blochii</i>	Ringtail surgeonfish	X	X	
	<i>Acanthurus lineatus</i>	Lined surgeonfish	X		
	<i>Acanthurus nigricans</i>	Whitecheek surgeonfish	X		
	<i>Acanthurus olivaceus</i>	Orange-spot surgeonfish	X		
	<i>Acanthurus</i> sp.	Surgeonfish	X		
	<i>Acanthurus triostegus</i>	Convict surgeonfish	X		
	<i>Ctenochaetus striatus</i>	Striped bristletooth	X	X	X
	<i>Naso lituratus</i>	Orange-spine unicornfish	X		
	<i>Naso unicornis</i>	Bluespine unicornfish	X		
	<i>Zebрасoma flavescens</i>	Yellow tang	X	X	
Apogonidae	<i>Apogon</i> sp.	Cardinalfish	X	X	
	<i>Cheilodipterus quinquelineatus</i>	Five-lined cardinalfish		X	
	<i>Sphaeramia</i> sp.	Cardinalfish		X	
Balistidae	<i>Balistapus undulatus</i>	Orange-lined triggerfish	X		
	<i>Balistoides viridescens</i>	Titan triggerfish	X		
	<i>Rhinecanthus aculeatus</i>	White-banded triggerfish		X	
	<i>Rhinecanthus rectangulus</i>	Wedge-tail triggerfish	X		
	<i>Sufflamen chrysopteron</i>	Halfmoon triggerfish	X	X	X
Blenniidae	<i>Cirripectes</i> sp.	Blenny	X		
	<i>Ecsenius</i> sp.	Blenny	X	X	
	<i>Plagiotremus laudandus</i>	Bicolor fangblenny	X	X	
	<i>Plagiotremus rhinorhynchus</i>	Bluestriped fangblenny	X		
	<i>Salarias</i> sp.	Blenny	X	X	
Carangidae	<i>Caranx melampygus</i>	Bluefin trevally	X	X	
	<i>Caranx</i> sp.	Jack	X		
Chaetodontidae	<i>Chaetodon auriga</i>	Threadfin butterflyfish	X	X	X
	<i>Chaetodon ephippium</i>	Saddle butterflyfish	X	X	X
	<i>Chaetodon kleinii</i>	Sunburst butterflyfish		X	
	<i>Chaetodon lunulatus</i>	Oval butterflyfish	X	X	X
	<i>Chaetodon mertensii</i>	Atoll butterflyfish		X	
	<i>Chaetodon rafflesii</i>	Latticed butterflyfish	X		
	<i>Chaetodon</i> sp. 1	Butterfly fish	X		

Family	Species Name	Common Name	Tamil Channel Entrance (Survey Area 3)	Yap Port (Survey Area 4)	Yap Port – Southwest (Survey Area 5)
Chaetodontidae (cont'd)	<i>Chaetodon</i> sp. 2	Butterfly fish	X		
	<i>Chaetodon speculum</i>	Mirror butterflyfish	X		
	<i>Chaetodon vagabundus</i>	Vagabond butterflyfish	X		
	<i>Forcipiger flavissimus</i>	Longnose butterflyfish	X	X	
	<i>Heniochus monoceros</i>	Masked bannerfish	X		
	<i>Heniochus</i> sp.	Bannerfish	X	X	
Cirrhitidae	<i>Cirrhitichthys oxycephalus</i>	Coral hawkfish	X		
	<i>Paracirrhites arcatus</i>	Arc-eye hawkfish	X		
Ephippidae	<i>Platax teira</i>	Longfin batfish	X		
Gobiidae	<i>Amblygobius</i> sp.	Goby	X	X	
	<i>Asterropteryx semipunctata</i>	Starry goby	X	X	
	<i>Coryphopterus</i> sp.	Sailfin goby	X		
	<i>Ctenogobius</i> sp.	Sandgoby	X	X	
	<i>Eviota bifasciata</i>	Twostripe dwarfgoby	X	X	
	<i>Eviota pellucida</i>	Transparent dwarfgoby	X	X	
	<i>Eviota sigillata</i>	Adorned dwarfgoby	X	X	
	<i>Eviota</i> sp.	Dwarfgoby	X		X
	<i>Fusigobius signipinnis</i>	Sailfin goby	X	X	
	<i>Istigobius</i> sp.	Sandgoby		X	
	<i>Koumansetta rainfordi</i>	Old glory		X	
	<i>Valenciennesa strigata</i>	Blueband goby	X		
Haemulidae	<i>Plectorhinchus lineatus</i>	Yellowbanded sweetlips	X		
Holocentridae	<i>Myripristis kuntzei</i>	Shoulderbar soldierfish	X	X	
	<i>Neoniphon argenteus</i>	Clearfin squirrelfish	X	X	X
Kipphosidae	<i>Kipphosus</i> sp.	Chub	X		
Labridae	<i>Bolbometopon muricatum</i> <sup>a</sup>	Green humphead parrotfish	X		
	<i>Cheilinus undulatus</i> <sup>a</sup>	Humphead wrasse	X		
	<i>Chlorurus microrhinos</i>	Steephead parrotfish	X	X	
	<i>Chlorurus sordidus</i>	Daisy parrotfish	X	X	X
	<i>Coris batuensis</i>	Batu coris	X		
	<i>Coris gaimard</i>	African coris	X		
	<i>Coris</i> sp.	Coris	X	X	X
	<i>Gomphosus varius</i>	Bird wrasse	X		
	<i>Halichoeres hortulanus</i>	Checkerboard wrasse	X	X	X
	<i>Halichoeres melanurus</i>	Tail-spot wrasse	X	X	
	<i>Hipposcarus</i> sp.	Parrotfish	X	X	
	<i>Labrichthys unilineatus</i>	Tubelip wrasse	X		
	<i>Labroides dimidiatus</i>	Bluestreak cleaner wrasse	X	X	



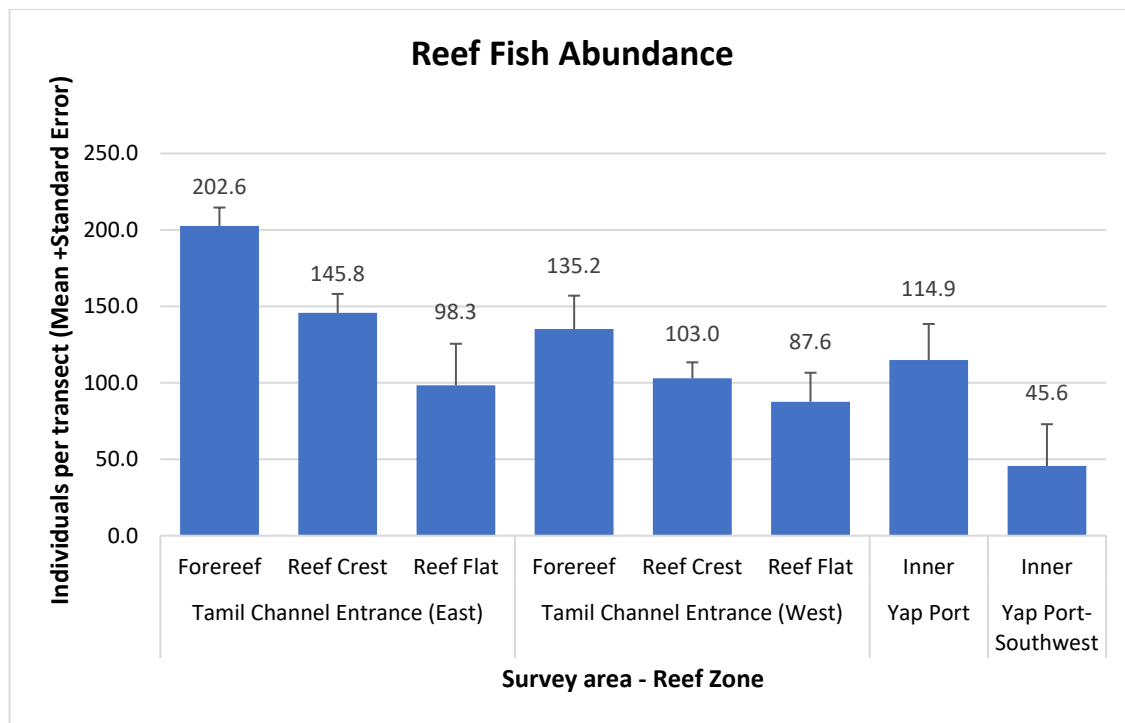
Family	Species Name	Common Name	Tamil Channel Entrance (Survey Area 3)	Yap Port (Survey Area 4)	Yap Port – Southwest (Survey Area 5)
Labridae (cont'd)	<i>Novaculichthys taeniourus</i>	Rockmover wrasse	X		
	<i>Scarus frenatus</i>	Bridled parrotfish	X		
	<i>Scarus ghobban</i>	Blue-barred parrotfish	X		
	<i>Scarus oviceps</i>	Dark capped parrotfish	X		
	<i>Thalassoma lunare</i>	Moon wrasse	X	X	X
	<i>Thalassoma lutescens</i>	Yellow-brown wrasse	X		
	<i>Thalassoma</i> sp.	Wrasse	X	X	
Lethrinidae	<i>Gnathodentex aureolineatus</i>	Striped large-eye bream	X		
	<i>Lethrinus harak</i>	Thumbprint emperor	X	X	
	<i>Monotaxis heterodon</i>	Redfin emperor		X	
	<i>Scolopsis</i> sp.	Bream			X
Lutjanidae	<i>Lutjanus bohar</i>	Two-spot red snapper	X		
	<i>Lutjanus gibbus</i>	Humpback snapper	X	X	
	<i>Lutjanus viridis</i>	Blue and gold snapper	X	X	
Mullidae	<i>Parupeneus barberinus</i>	Dash-and-dot goatfish	X	X	
	<i>Parupeneus multifasciatus</i>	Manybar goatfish	X	X	
Muraenidae	<i>Echidna nebulosa</i>	Starry moray	X		
	<i>Gymnothorax flavimarginatus</i>	Yellow-edged moray	X		X
Nemipteridae	<i>Scolopsis lineata</i>	Striped monocle bream		X	
Pomacanthidae	<i>Centropyge bicolor</i>	Bicolor angelfish	X	X	X
	<i>Pomacanthus imperator</i>	Emperor angelfish		X	
	<i>Pomacanthus</i> sp.	Angelfish	X	X	X
	<i>Pygoplites diacanthus</i>	Regal angelfish	X		
Pomacentridae	<i>Abudefduf</i> spp.	Sergeant-major	X	X	
	<i>Chromis</i> spp.	Chromis	X		
	<i>Chromis viridis</i>	Blue-green chromis	X	X	X
	<i>Chrysiptera brownriggii</i>	Surge damselfish	X	X	
	<i>Dascyllus aruanus</i>	Whitetail dascyllus		X	
	<i>Dascyllus reticulatus</i>	Reticulate dascyllus	X	X	
	<i>Dischistodus chrysopoecilus</i>	White-spot damsel		X	
	<i>Dischistodus perspicillatus</i>	White damsel		X	X
	<i>Plectroglyphidodon leucozonus</i>	Singlebar damsel		X	X
	<i>Pomacentrus coelestis</i>	Neon damselfish	X	X	
	<i>Pomacentrus</i> sp.	Damselfish	X	X	

Family	Species Name	Common Name	Tamil Channel Entrance (Survey Area 3)	Yap Port (Survey Area 4)	Yap Port – Southwest (Survey Area 5)
<i>Pomacentridae</i> (cont'd)	<i>Pycnochromis margaritifer</i>	Bicolor chromis	X		
	<i>Segastes</i> spp.	Farmerfish	X	X	
<i>Pseudochromidae</i>	<i>Pseudochromis</i> sp.	Dottyback		X	
<i>Ptereleotridae</i>	<i>Ptereleotris monoptera</i>	Lyre-tail dart-goby	X		
<i>Scorpaenidae</i>	<i>Pterois antennata</i>	Broadbarred firefish	X		
	<i>Pterois volitans</i>	Red lionfish	X		
	<i>Sebastapistes cyanostigma</i>	Yellowspotted scorpionfish	X		
<i>Serranidae</i>	<i>Cephalopholis argus</i>	Peacock hind	X		X
	<i>Cephalopholis miniata</i>	Coral hind	X	X	X
	<i>Epinephelus hexagonatus</i>	Starspotted grouper	X		
<i>Siganidae</i>	<i>Siganus doliatus</i>	Barred spinefoot	X		
	<i>Siganus lineatus</i>	Golden-lined spinefoot	X		
	<i>Siganus</i> sp.	Spinefoot	X	X	
<i>Syngnathidae</i>	<i>Corythoichthys</i> sp.	Pipe fish	X	X	
<i>Zanclidae</i>	<i>Zanclus cornutus</i>	Moorish idol	X	X	

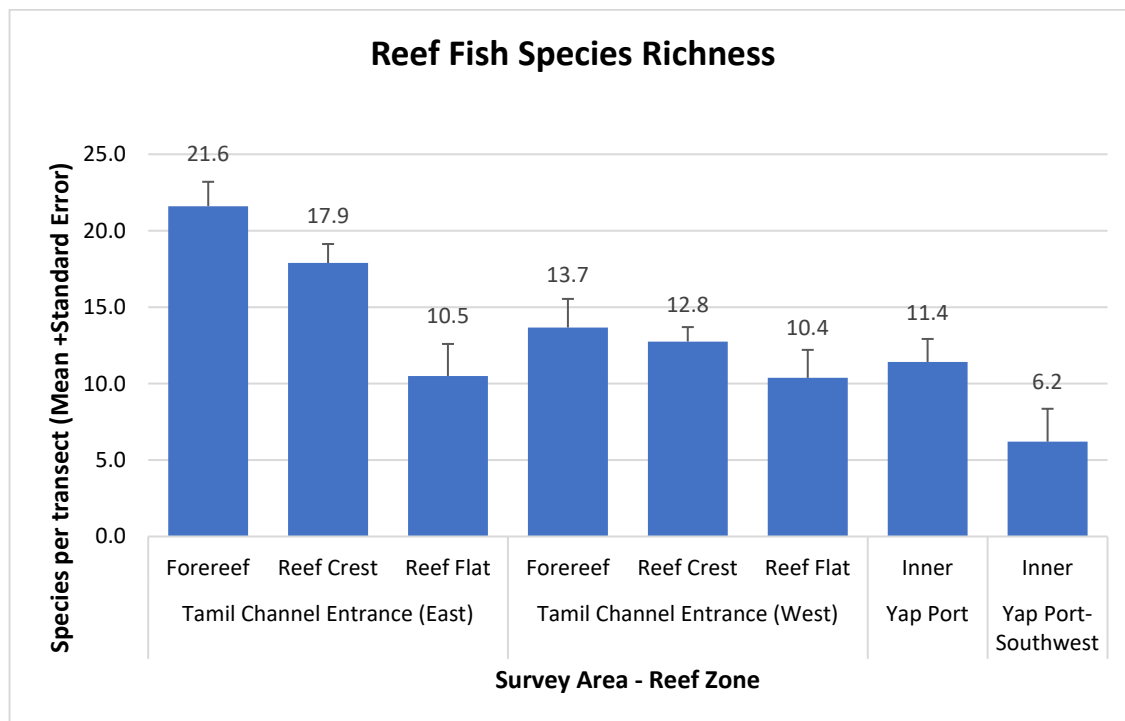
<sup>a</sup> Reef fish species of concern.

Aside from the striped bristletooth, each survey area, and even each reef zone, appears to support a consistent reef fish assemblage. Large multi-species schools of surgeonfishes and parrotfishes, as well as many species of butterflyfish, favor the forereefs and reef crest zones within the Tamil Channel Entrance (East and West) (Survey Area 3), whereas the adjacent reef flat areas consistently support abundant small labrids (e.g., *Thalassoma* spp., *Halichoeres* spp., *Coris* spp.) and the surge damselfish (*Chrysiptera brownriggii*). Schools of juvenile humpback snappers (*Lutjanus gibbus*) and several species of damselfishes (particularly the white damsel, *Dischistodus perspicillatus*) showed a preference for rubble/reef areas within Yap Port (Survey Area 4). The isolated small reef patches within Yap Port – Southwest (Survey Area 5) attracted big groups of blue-green chromis (*C. viridis*) and several pairs of oval butterflyfish (*Chaetodon lunulatus*).

Notable observations of rare species include the yellowspotted scorpionfish (*Sebastapistes cyanostigma*), the rockmover wrasse (*Novaculichthys taeniourus*), the starry moray (*Echidna nebulosa*), and two species of pipe fishes (*Corythoichthys* spp.) Appendix B includes a full list of species in each survey area and reef zone.



**Figure 3-20 Mean Number of Reef Fish Species Recorded by Survey Area and Reef Zone**



**Figure 3-21 Mean Abundance of Reef Fish Species Recorded by Survey Area and Reef Zone**

Additionally, the survey team recorded several reef fish species of concern during the reef fish assessments within the forereef portion of the Tamil Channel Entrance (East and West) (Survey Area 3) (Figure 3-22, Table 3-4). Recorded reef fish species of concern included blacktip and whitetip reef sharks (*Carcharhinus melanopterus* and *Triaenodon obesus*, respectively), Napoleon wrasse (*Cheilinus undulatus*), and green humphead parrotfish (*Bolbometopon muricatum*); for the latter two species, juvenile and adult individuals were observed.

### 3.2.2.2 Species of Concern

The survey team noted species of concern if observed during any of the marine surveys (i.e., marine habitat mapping, benthic/biotic [including reef fish] assessments). The team noted the majority of the species of concern as positive indicators of a reef in good condition. However, species like the crown-of-thorns starfish was noted for its detrimental effects as it is a coral predator. These observations are illustrated in Figure 3-22.

The majority of species of concern observations are on the east side of Tamil Channel (East) and the Tamil Channel Entrance (East) (Survey Areas 2 and 3), and in Yap Port–Southeast (Survey Area 6). Of the 28 sea turtles observed, 12 (hawksbill sea turtle [*Eretmochelys imbricata*] and green sea turtle [*Chelonia mydas*]) were observed within Yap Port–Southeast (Survey Area 6), whereas all reef sharks (blacktip and whitetip) were observed within Tamil Channel (Survey Area 2) and the Tamil Channel Entrance (Survey Area 3). A variety of species of concern (Napoleon wrasse, green humphead parrotfish, spotted eagle ray [*Aetobatus narinari*], and blacktip reef shark) were also found in the Tamil Channel Entrance (East) (Survey Area 3). Additionally, a privately owned giant clam (*Tridacna gigas*) farm was observed within Yap Port–Southeast (Survey Area 6). One crown-of-thorns starfish was observed during the field effort. This observation was in the northern part of the western side of Tamil Channel (East) (Survey Area 3).

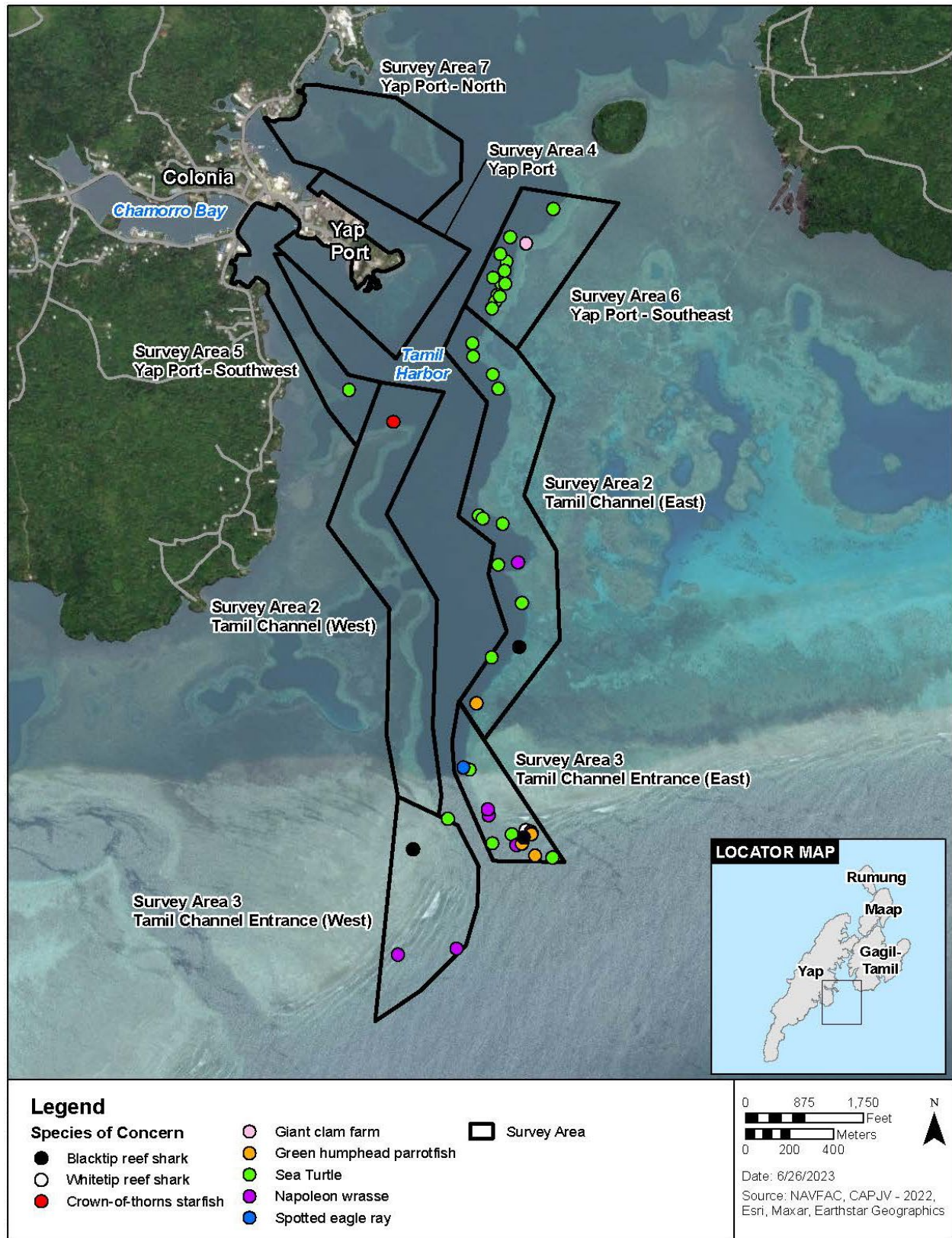


Figure 3-22 Observed Species of Concern



### 3.3 Ecotourism

The following is a summary of results for the ecotourism investigation organized by the following recreational categories: scuba diving and snorkeling, kayaking and canoeing, deep sea fishing, and cruising.

#### 3.3.1 Scuba Diving and Snorkeling

Scuba diving and snorkeling occurs year-round in Yap and is a main tourism attraction as Yap's reefs host diverse marine life and a large manta ray population. Yap is known among the diving community for its resident manta rays, for which Yap has been a leader in conservation and protection laws (Yap Visitors Bureau, n.d.). Manta ray dives are popular in the Mi'l Channel where manta rays are known to congregate. Dive excursions are particularly popular from June to October, increasing tourism numbers and marine excursions during this timeframe. MantaFest, a marine photography event, occurs annually (August 26–September 9 in 2023) and includes diving with manta rays during the day. BlackwaterFest is a new event that will include blackwater (nighttime) dives to photograph night organisms in open waters near the Yap Trench (September 9–24 in 2023).

Due to the distance of the reefs from shore, no beach diving occurs in Yap. Two commercial diving operations, Yap Divers Dive Center and Nature's Way, service diving trips and offer boat transportation to dive locations. Yap Divers Dive Center is a full-service Professional Association of Diving Instructors 5-star diving facility associated with Manta Ray Bay Resort, a popular lodging accommodation near Yap Port, and can accommodate multiple simultaneous diving operations. Manta Ray Bay Resort operates approximately three dive boats, which are moored near the shore of the resort and can be accessed from a floating dock at the resort. Nature's Way is a locally owned and operated business that offers charter dive trips for up to four passengers at a time. Nature's Way does not offer gear or tank rental, and their patrons often rent from Yap Divers Dive Center.

Most popular diving sites are a 20–30-minute boat ride from Yap Port (Bluewater Dive Travel 2021). Dive sites within or adjacent to the survey areas included the following and are depicted in Figure 3-23. These descriptions are based on interviews with Manta Ray Bay Resort:

- *Slow 'N Easy*: Depth of 20–60 feet (6–18 meters) with visibility of 15–60 feet (5–18 meters); an inshore reef with many crevices and outcroppings that serve as shelter for small fish and invertebrates. A popular site for night dives due to the rich nutrition of inshore waters that provide good conditions for anemones, crinoids, sponges, and other popular animals for macro photography.
- *Hide 'N Seek*: Depth of 20–60 feet (6–18 meters) with visibility of 15–60 feet (5–18 meters); an inshore reef with many crevices and outcroppings that serve as shelter for small fish and invertebrates.
- *Halimeda Passage*: No specific details on depth or profile were provided.
- *O'Keefe's Passage*: Depth of 30–120 feet (9–37 meters) with visibility of 30–70 feet (9–21 meters); includes a sand-bottom ship channel with a World War II-era landing craft mechanized wreck and torpedo. Corals, black snapper fish, humphead parrotfish, lobsters, and pelagic species are commonly found at this site. This is a popular night dive location (Manta Ray Bay Resort 2023d).
- *Circus Wreck*: An 80-foot (23-meter) former circus boat named the Laura Marie sunk by Yap Divers in 1992 on the side of the channel near Marker 10. In recent years, this site has been used to conduct blackwater (nighttime pelagic) and bonfire (shallower blackwater) diving.

- *Torpedo Reef*: No specific details on depth or profile were provided.
- *Telegraph Reef*: Depth of 30–80 feet (9–24 meters) with visibility of 50–100 feet (15–30 meters); includes large coral bommies (outcrop of columnar coral reef) with rocky shelves and a subsea telegraph cable. Hard corals, rocks, and crinoids can be found here along with lionfish, red stonefish, sea hares, and nudibranchs. This site is a popular night dive location (Manta Ray Bay Resort 2023e).
- *Crescent Reef*: Depth of 45–90 feet (14–27 meters) with visibility of 50–100 feet (15–30 meters), located within the Gabach Channel. Barracudas, striped snappers, black snappers, fusiliers, green humphead parrotfish, big groupers, Napoleon wrasses, and hammerhead sharks are present at this site (Manta Ray Bay Resort 2023b).
- *Fan Dancer*: Depth of 5–120 feet (1.5–37 meters) with visibility of 30–50 feet (9–15 meters); includes a sandy bottom channel and coral walls with large sea fans, hard and soft corals, reef sharks, and nurse sharks. A World War II-era torpedo, machine guns, and artillery shells can be found along the channel bottom. This site is very popular for night dives (Manta Ray Bay Resort 2023c).
- *Aliko Reef*: Depth of 15–65 feet (5–20 meters) with visibility of 60–100 feet (18–30 meters); includes a mini wall from 20–50 feet (6–15 meters) with a broad coral plateau of cabbage patch and boulder star coral. Hosts lionfish, white tip reef sharks, sting rays, and nurse sharks (Manta Ray Bay Resort 2023a).
- *Deco Garden*: No specific details on depth or profile were available. Yap Divers' divemasters mentioned similarities with neighboring site Aliko Reef.
- *White House Slope*: No specific details on depth or profile were available. Yap Divers' divemasters mentioned similarities with neighboring site Aliko Reef.

### **3.3.2 Kayaking and Canoeing**

Small watercraft activities including kayaking and canoeing occur primarily in protected areas, such as the mangrove forests, and in canals. The German Canal, a narrow channel excavated in the 1900s that allows small vessels to pass between the north and south sides of the island, is a popular area for these activities. These excursions are facilitated by hotels, dive shops, and tour operators. Tourists also can participate in traditional outrigger canoe sailing. The Yap Traditional Maritime Institute, through the Yap Traditional Navigation Society, offers traditional canoe tours which can be booked through hotels. Information regarding the exact location and routes of these small watercraft tours is limited because the tours are dependent on weather and marine conditions (Manta Ray Bay Resort, Kayak Tours; Nature's Way, Kayaking Tour) (Yap Visitors Bureau, n.d.).

### **3.3.3 Deep Sea Fishing**

Deep sea fishing in Yap often targets yellowfin and skipjack tuna, wahoo, mahi-mahi, rainbow runner, barracuda, red snapper, grouper, and trevally. Manta Ray Bay Resort offers half-day and full-day charters. While information regarding the fishing location of the tours is limited, Manta Ray Bay Resort uses the dive boats described in Section 3.3.1 for deep sea fishing charters and transit through and/or around the survey areas to access offshore deep sea fishing areas from the Manta Ray Bay Resort dock via the Tamil Channel.

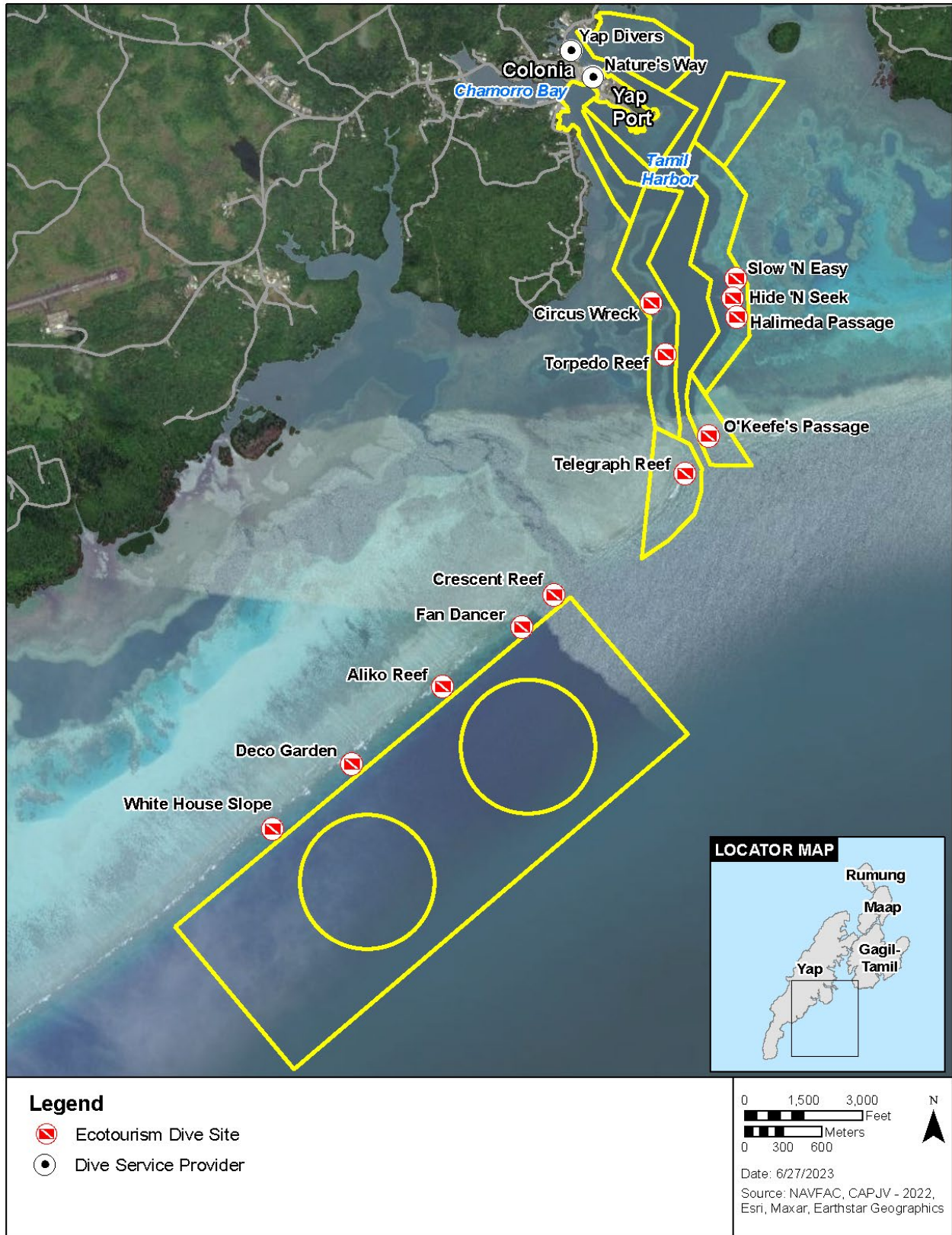


Figure 3-23 Ecotourism Dive Sites Near the Survey Areas

### **3.3.4 Cruising**

Yap Port is used commercially for smaller (fewer than 500 passengers) tourist cruises, as Yap does not typically accommodate large visitor loads. Historical data on the number and frequency of major cruise ship visits is limited except for Hanseatic Cruises, which have multiple itineraries that include a port call on Yap one to two times per year (Hapag-Lloyd Cruises 2023). The most recent port call was in April 2023, and the next is projected to be in September 2023 (personal communication with Darlene Giley, Manta Ray Bay Resort, May 9, 2023). Aside from commercial vessels, there are no cruise ship docking fees in the FSM. This allows vessels to remain docked for extended periods of time (Apex Expeditions 2023; WhatsInPort 2023; PSDI 2021).

## **3.4 Remote Sensing**

Concurrent with the marine habitat mapping and benthic/biotic surveys, Sea Engineering, Inc. conducted remote sensing surveys using a multibeam sonar and drop camera to investigate the bathymetry and seafloor characteristics in specific survey areas. The multibeam sonar data were used to inform the bathymetric conditions of the survey areas (Figure 3-24). In addition, the drop camera images were used to estimate coral cover in Offshore Mooring (Survey Area 1), as shown in Figure 3-25 and Figure 3-26.

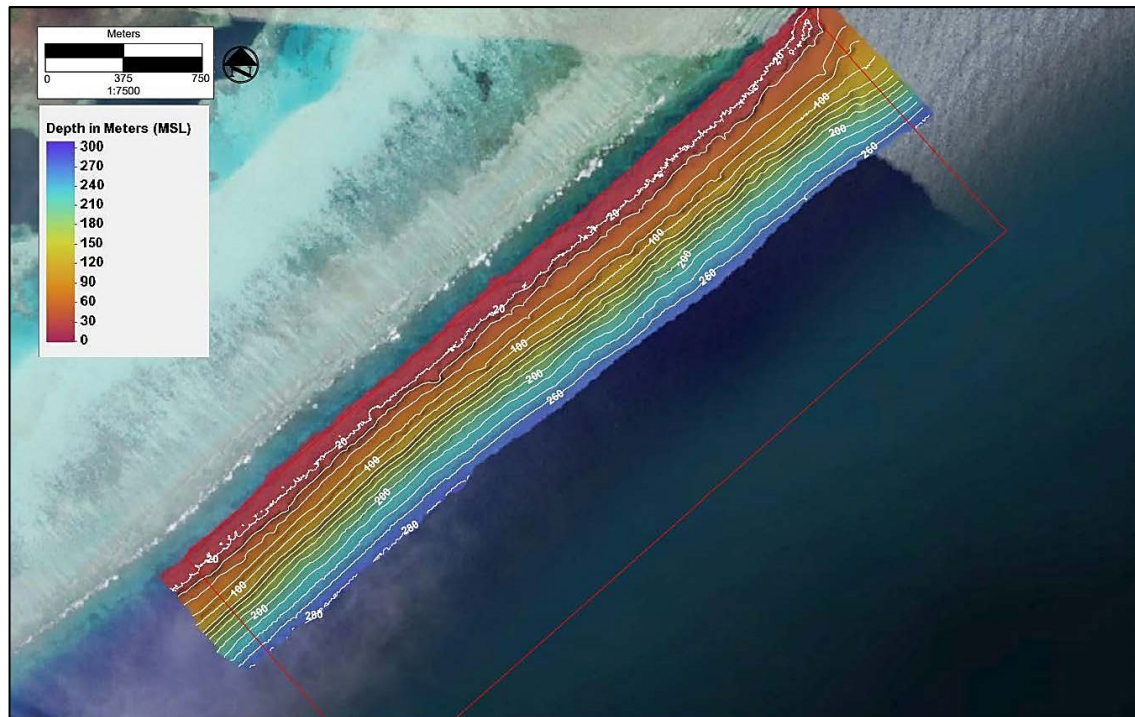
### **3.4.1 Bathymetry**

The multibeam sonar bathymetry results for Offshore Mooring (Survey Area 1) are presented in Figure 3-24, including a bathymetry contour plot and shaded relief image. Based on the high relief of the color contour, the irregular seafloor extends down to a depth of approximately 131 feet (40 meters). Beyond that, the seafloor slopes steeply at approximately 30 degrees to the range limit of the sonar system at approximately 918.6 feet (280 meters).

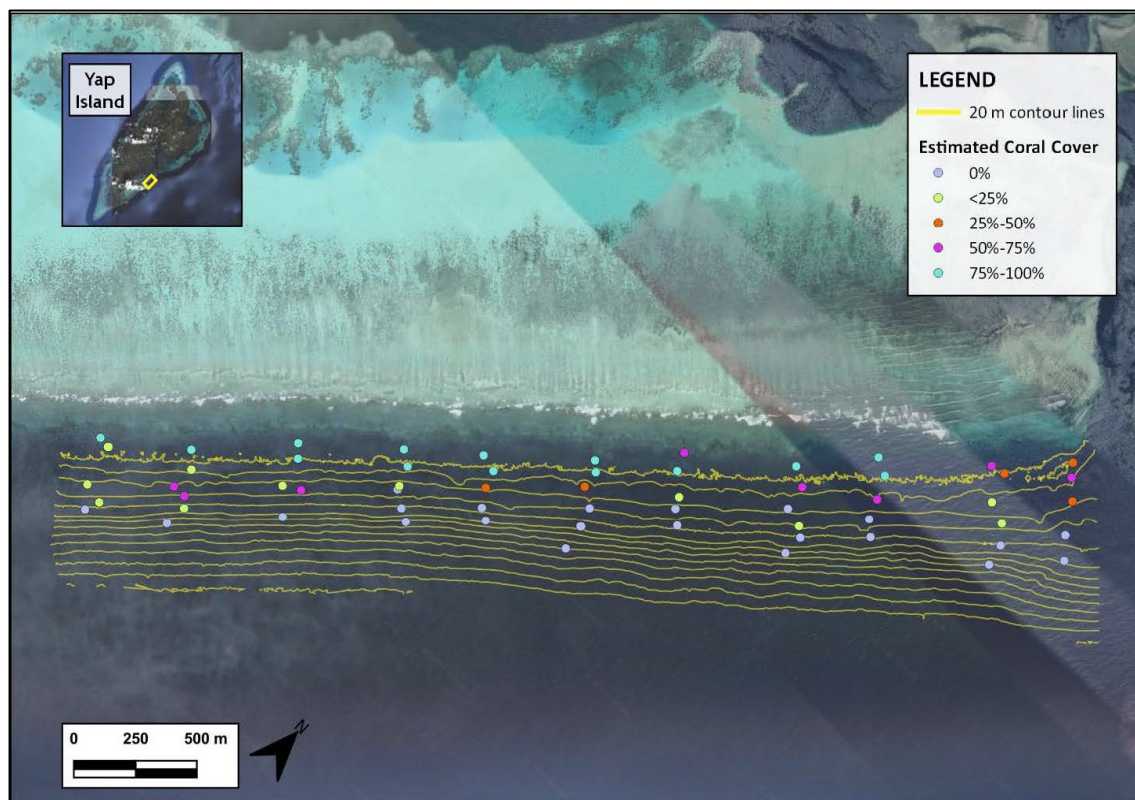
### **3.4.2 Drop Camera**

In Offshore Mooring (Survey Area 1), drop camera points extend approximately 1,230 feet (375 meters) offshore from the inshore boundary of the survey. Due to the deep bathymetry of the offshore survey area, the drop camera survey was limited to depths of less than 656 feet (200 meters). The survey team observed three different general bottom types in the offshore area: coral, sand, and mixed sparse coral/rock/sand/algae. An example of each bottom type is shown in Figure 3-26. Sandy and mixed bottom types were generally observed at survey points offshore, while the survey areas closest to the inshore-most drop camera points consisted of coral-covered seafloor. (Figure 3-26). Coral cover decreases with increasing depth, although coral was observed at some mid-depth range survey points.



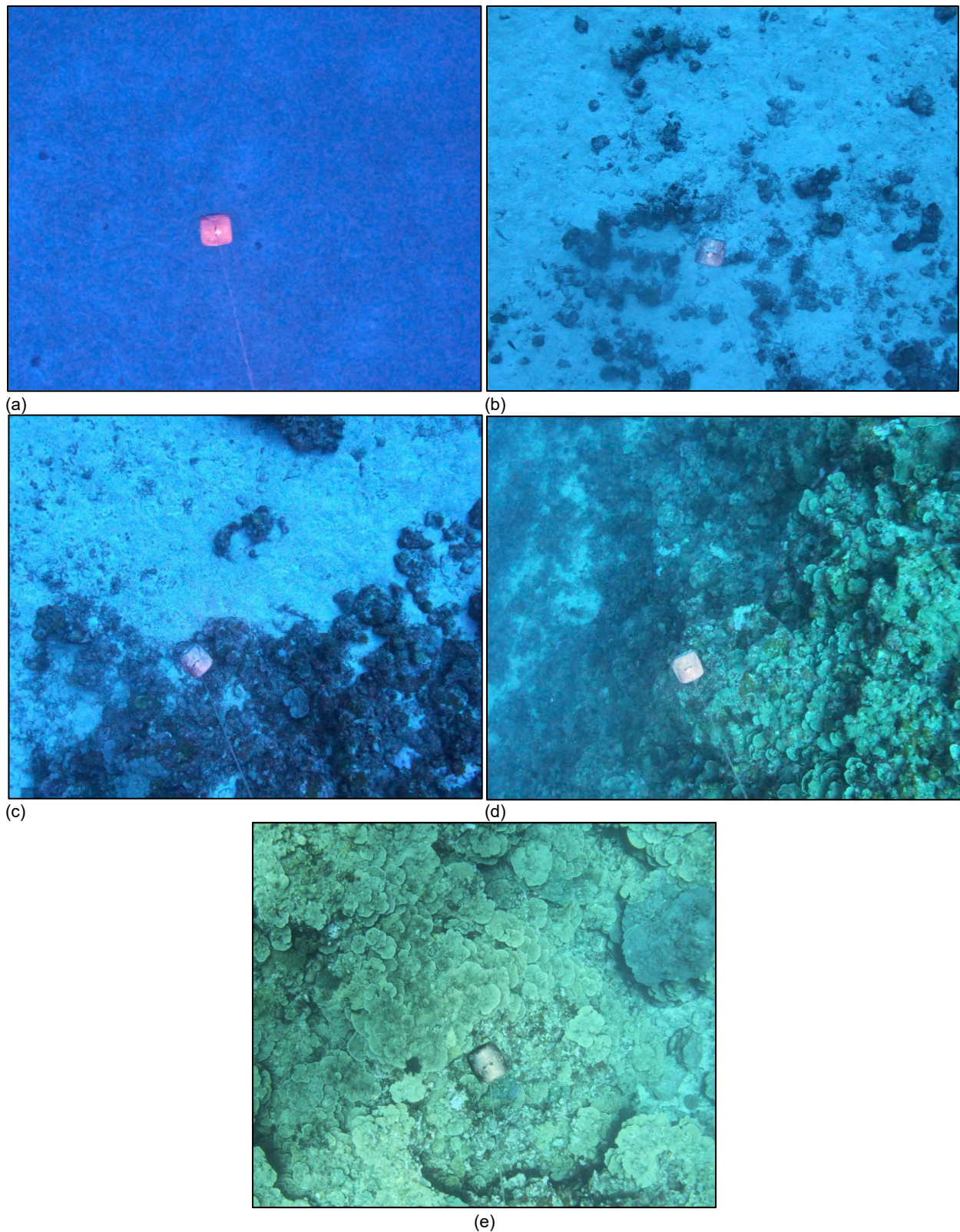


**Figure 3-24** Yap Multibeam Sonar Survey Bathymetry Results at Offshore Mooring (Survey Area 1) (May 4–12, 2023).



**Figure 3-25** Estimated approximate coral cover at the Deepwater Drop Camera Survey Locations in the Offshore Mooring (Survey Area 1); Contours at 20-Meter Intervals





**Figure 3-26 Examples of Coral Gradation Used to Determine Spatial Distribution of Coral Cover in Offshore Mooring (Survey Area 1)**

(a) Shows 0% cover, (b) shows < 25% cover, (c) shows 25–50% cover, (d) shows 50–75% cover, and (e) shows 75–100% coral cover.

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## 4 Discussion

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This section discusses the findings of the marine resources surveys and provides a general evaluation of the resources surveyed.

### 4.1 Marine Habitat Mapping

As described in Section 3.1, proximity to Yap Harbor (and its direct anthropogenic influence) has a direct impact on coral distribution. Generally, reefs with high coral cover (>40 percent) were recorded within the Tamil Channel (East and West) and the Tamil Channel Entrance (East and West) (Survey Areas 2 and 3, respectively), with a few pockets of high coral cover areas on the west side of the Yap Port (Survey Area 4) (Figure 3-1). High and medium coral cover were generally recorded at areas with high water exchange, whereas low and trace coral covers were common in the flat reef zone and reefs around the Yap Port (Survey Area 4) where water quality and visibility were significantly reduced. Yap Port–Southwest (Survey Area 5) and Yap Port–Southeast (Survey Area 7) had only trace and low coverage of coral with small areas of medium coral coverage. Yap Port–Southeast (Survey Area 6) had a narrow strip of high-coral cover at the deepwater harbor edge. A deeper discussion on coral cover recorded across Survey Areas 3 through 5 from benthic/biotic surveys is provided in Section 4.2.

Seagrass beds within the survey areas clearly favored sandy, shelter, and shallow areas with freshwater input, with discrete and large beds observed near the east boundary of Tamil Channel (West) (Survey Area 2), and near the port areas in Yap Port–Southeast (Survey Area 6), Yap Port–North (Survey Area 7) (Figure 3-7).

The final marine habitat mapping produced for coral (Figure 3-1 through Figure 3-6) and seagrass (Figure 3-7 through Figure 3-12) provide an overview of the distribution and abundance of these two important marine resources.

### 4.2 Benthic/Biotic Surveys

Coral cover and diversity, as well as reef fish species richness and abundance, are parameters commonly used as a measure of general reef condition in tropical reef systems. CCA cover is also used as an indicator of condition or resilience, as CCA is necessary for new coral to settle onto the reef. Typical indicators of a healthy coral reef are CCA (5–20 percent), low algal cover (5–15 percent), and low dead coral (5–10 percent) (Perry et al. 2015). The base of a coral reef is the accumulation of calcium carbonate skeletons of various coral species over time.

The consistent patterns of benthic cover observed in the Tamil Channel Entrance (East and West) (Survey Area 3) indicate a relatively healthy coral reef ecosystem. While a larger proportion of the forereef exhibits bare substrate compared to live coral, the higher levels of CCA and moderate amount of live coral coverage falls within the range typically associated with a healthy coral reef, which is also supported by the high abundance of herbivorous fish (i.e., parrotfishes and surgeonfishes) recorded in the Tamil Channel Entrance (East and West) (Survey Area 3). Reef fish herbivory plays a crucial role in shaping the habitat quality of coral reefs, since they graze on macroalgae and benthic turf algae, preventing their overgrowth and promoting the dominance of corals. The effects of steady herbivory on a coral reef area creates a positive feedback loop, where healthy coral cover provides suitable habitat for herbivorous fish while their grazing activities maintain the health of the coral reef ecosystem (Bellwood et al. 2004). Consequently, coral-dominated reefs with higher fish herbivory rates tend to exhibit greater structural complexity, biodiversity, and resilience to disturbances, making them more resilient to factors such as climate change and human impacts.



Although no benthic/biotic transects were conducted within the Tamil Channel (East and West) (Survey Area 2), the combined patterns of high live coral cover and low dead coral abundance observed during marine habitat mapping assessments on the reef crest indicate that its coral reef ecosystem is in good condition.

The impoverished conditions observed within the reef flat zones in the Tamil Channel Entrance (East and West) (Survey Area 3) are reflective of typical conditions found on reef flats. Reef flats are characterized by high wave action, exposure to sun and heat, and frequent aerial exposure during low tide events. The bare substrate dominating the landscape indicates a lack of coral recruitment and growth, likely due to typical conditions of physical disturbances or unfavorable environmental conditions that exist on shallow reef flats (0–10-foot [0–3-meter] water depth). The absence of live coral cover leaves the substrate exposed and vulnerable to erosion, algae colonization, and potential degradation of the reef habitat. Numerous studies have highlighted the detrimental impacts of the lack of quality coral reef habitat on reef fish populations and demonstrated that impoverished habitats, characterized by a reduced coral cover and increased algal cover, were associated with reduced fish biomass and species richness (Graham et al. 2007), as observed in the reef flats within the Tamil Channel Entrance Survey Area. Low live coral habitat diminishes essential resources such as food, shelter, and breeding grounds for reef fish, limiting population growth and diversity. The presence of a rich and numerous herbivore fish assemblage in the abutting reef crest and forereef zones, provides a mechanism to prevent algal expansion into the highly diverse reef zones.

The inner reefs surrounding the Yap Port (Survey Area 4) are noteworthy for the abundance of a delicate and fragile branching *Acropora* species, even at the fringe of seagrass beds. These fragile structures indicate favorable environmental conditions for corals, including improved water quality, appropriate light levels, and minimal wave action. The intricate branching formations of the *Acropora* corals provide vital habitat complexity, offering shelter and nursery areas for numerous reef-associated organisms with coral-specific preferences for shelter and/or sustenance. In addition, the balanced abundance of seagrass and algae enhances the ecological significance of this habitat. In particular, seagrasses provide a range of valuable resources and ecosystem services that are vital for the survival and well-being of reef fish, especially as nursery habitats for numerous reef fish species that will eventually inhabit coral reefs through their adult phases. The presence of seagrass beds enhances fish recruitment, growth, and survival, ultimately contributing to the maintenance of diverse and healthy reef fish assemblages (Nagelkerken, Grol, and Mumby 2012). The inner reef in Yap Port–Southwest (Survey Area 5) was noted for having slightly higher coral coverage than Yap Port (Survey Area 4), no algae coverage, and higher rubble.

The absence of *Padina* algae in all survey transects and the low densities observed throughout the project area, particularly within the inner reef survey areas, suggest a nutrient-balanced environment. *Padina*, specifically *P. pavonica*, is considered a useful indicator species for eutrophication (excessive nutrients) (Geeraert et al. 2020) when found in high densities. Its proliferation is associated with hypertrophic conditions (advanced eutrophication) commonly stemming from anthropogenic (human-caused) activities like agricultural runoff and sewage discharge (Geeraert et al. 2020). Recognizing the lack of a presence of *Padina* in the surveyed areas suggests that the Yap Port exhibits minimal signs of nutrient enrichment, despite its proximity to a populated shoreline and a sewage treatment outfall.

### 4.3 Ecotourism

The tourism industry in Yap remains relatively underdeveloped and is inhibited by its remote location, minimal interisland connectivity, and limited marketing/data collection on regional tourism. Tourism accounted for 6.5 percent of the gross domestic product in the FSM in 2019, and the tourism sector has

been in decline in recent years (PSDI 2021). During the 2019 Coronavirus Disease pandemic, numbers continued to fall and have yet to recover. The opportunity for growth is further limited by job scarcity, vulnerability to climate change effects, and limited infrastructure.

The Yap State Government has been working to develop policies to promote tourism and make the region a leading destination for sustainable tourism (SDG Working Group 2020). Yap's reef ecosystems and manta ray diving remain attractions for visitors and have the potential to be major economic stimulators. The climate on Yap allows for consistent scuba diving and snorkeling tours year-round, as well as kayaking, canoeing, and cruises.

As discussed in Section 3.3, numerous recreational dive sites occur near or within the survey areas. These recreational dive sites occur in shallow/mid-range reef areas (0–164 feet [0–50 meters]) where marine resources (e.g., coral, seagrass) are generally more abundant.

## **4.4 Remote Sensing**

### **4.4.1 Bathymetry**

The bathymetry data plot has a scale of 1:7500. Contours drawn every 66 feet (20 meters) were generated from a merged data set using the following sounding grid averages:

- 3.3-foot (1-meter) cell average grid for depths of 0–98 feet (0–30 meters)
- 16.4-foot (5-meter) cell average grid for depths of 90–328 feet (30–100 meters)
- 32.8-foot (10-meter) cell average grid for depths greater than 328 feet (100 meters)

The resolution of the sonar data is much higher in shallow water than deep water. Using a variable grid cell averaging maintains the high-resolution integrity of the shallow water data, while allowing for the larger beam footprints and data noise in the deeper water. The plot has been reproduced in a reduced size in Figure 3-24, which shows the bathymetry contour plot and shaded relief image, respectively.

Based on the high relief of the color contour, the irregular seafloor extends down to a depth of approximately 131.2 feet (40 meters). Beyond that, the seafloor slopes steeply at approximately 30 degrees to the range limit of the sonar system at approximately 918.6 feet (280 meters).

### **4.4.2 Drop Camera**

Offshore Mooring (Survey Area 1) drop camera points extend about 1,230 feet (375 meters) offshore from the inshore boundary of the survey boundary area. Due to the depth of the Offshore Mooring (Survey Area 1), the drop camera survey was limited to depths less than 656 feet (200 meters). Three different general bottom types were observed at Offshore Mooring (Survey Area 1): coral, sand, and mixed sparse coral/rock/sand/algae. An example of each bottom type is shown in Figure 3-26. Sandy and mixed bottom types were generally observed at Offshore Mooring (Survey Area 1), while the inshore-most drop camera points consisted of coral-covered seafloor. Approximate coral cover was estimated based on the deepwater drop camera imagery, ranging from 0 percent to 100 percent coral cover. Coral cover decreases with increasing depth, although coral was observed at some mid-depth range survey points.

## **4.5 Challenges Encountered**

During the surveys, the survey team experienced minor weather and mechanical delays, but due to the planned contingency days, the team was able to complete all survey areas with no impact to the project schedule.

One challenge encountered before mobilization involved the lack of air quality certificates for diving air compressors in Yap. Project prerequisites, including those in the dive operations plan (CAP JV 2023c), required all diving cylinders to be filled with air from a recently (no more than 6 months prior) certified air compressor. However, Yap COVID restrictions and island shutdown resulted in a 3-year gap of required testing and subsequent certification of on-island dive air compressors. To mitigate for the lack of air quality certificates throughout the island, the CAP JV purchased air compressor testing kits and arranged transport to/from Yap Island so Yap Divers staff (dive provider within Manta Ray Bay Resort) could perform the required testing. If Yap Divers' air compressor testing came back positive then it could be certified and good for project use, but if negative, the air compressor would not be certified and could not be used for project diving activities. To prevent a disruption in the schedule in the event of a negative air quality result for the Yap Divers' compressor, the CAP JV also purchased two portable dive air compressors and had them transported to San Diego, California, where they underwent required air quality testing prior to transport to Yap, which resulted in approved certification for both compressors. The CAP JV hand-carried both compressors to Yap for use by the survey team, should they have been needed. Ultimately, the portable air compressors were not needed since the certificate of air quality for Yap Divers' air compressor was received on April 27, 2023, one day before project diving activities began.

#### **4.6 Recommended Improvement of Methodology**

During the benthic/biotic surveys, the CAP JV used open-reel transect tapes that were weighted on both ends to prevent it from moving due to wave and current action. Changing to a lead-core rope could be beneficial for coral and benthic transects to reduce underwater transect swaying. Because the lead-core rope sinks and maintains its position on the area being surveyed, it promotes consistency across all surveys conducted while minimizing damage to benthic resources.

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# **Appendix A**

## **Remote Marine Sensing Survey Report**

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# **Remote Marine Sensing Survey Report**

## **Yap, Federated States of Micronesia**

*June 2023*



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## 1. INTRODUCTION

Yap Port is located on the southeast coast of Yap Island along the north side of a largely developed peninsula and services international and domestic maritime traffic. Yap Port is being evaluated for potential improvements. Sea Engineering, Inc. (SEI) was subcontracted by AECOM on this Naval Facilities Engineering Systems Command (NAVFAC), Pacific project to conduct remote marine sensing surveys in support of these proposed improvements. The project scope of work included multibeam sonar, side scan sonar, magnetometer, and drop camera surveys of the project areas. Survey operations were conducted in April and May 2023. These remote marine sensing surveys were conducted in support of both the cultural and marine surveys. The project location and survey areas are shown in Figure 1-1.



Figure 1-1. Regional project map with survey areas outlined in yellow

## 2. METHODOLOGY

### 2.1 Survey Schedule

SEI conducted the survey fieldwork between April 26, 2023, and May 12, 2023, Yap time zone. The beginning of the survey period was marked by large ocean swell creating hazardous sea conditions at and outside the channel entrance.

### 2.2 Units and Coordinate System

The survey data was collected in the Universal Transverse Mercator (UTM) Zone 54 North (54N) for horizontal positioning and referenced to Benchmark BM-2 in the Fisheries Pier, established by the Naval Oceanographic Office (NOO) and cited in Tidal Processing Report, FST Archive No. 19FSM02, Yap Island, September 3-October 10, 2019 (NOO, 2019). Benchmark BM-2 location is within the Yap Fisheries Pier, on the southwest of the Yap town peninsula, shown in Figure 2-1. Within the pier, the benchmark is approximately 15 meters north of the pier wall and consists of a silver bolt with a pin-sized indentation in the middle, shown in Figure 2-2. The elevation of the project vertical benchmark references the vertical control network established by the University of Hawaii Sea Level Center (UHSLC), including benchmarks UH 3, UH 4, UH5A, USGS2 and USGS3. The listed elevation of BM-2 is relative to mean sea level (MSL) for the 1983-2001 tidal epoch. Project benchmarks are listed in Table 2-1. The elevation of BM-2 referenced to UHSLC MSL is 1.67, compared to 1.57 reported by NOO in 2019 (NOO, 2019).

**Table 2-1: Project Control**

<b>Benchmark</b>	<b>Northing (m)</b>	<b>Easting (m)</b>	<b>MSL elevation (m)</b>
BM-2	1,053,027.61	184,299.14	1.67
UH 3	N/A	N/A	2.07
UH 4	N/A	N/A	1.72
UH 5A	N/A	N/A	1.66
USGS2	N/A	N/A	3.10
USGS3	N/A	N/A	3.56





Figure 2-1. Benchmark BM-2 (YAP 2) location marked in red, with respect to the harbor survey areas outlined in yellow



Figure 2-2. Benchmark BM-2 (YAP 2) outlined in red



### **2.3 Survey Vessel**

One survey vessel was used to conduct all remote marine sensing surveys throughout the project. An 8.5-meter twin outboard engine operated by Ruuemau Import and Export was used for all survey operations. The survey vessel is shown in Figure 2-3. and Figure 2-4.



**Figure 2-3. Survey vessel used for side-scan, magnetometer, multibeam sonar, and drop camera surveys**



**Figure 2-4. Survey vessel used for side-scan, magnetometer, multibeam sonar, and drop camera surveys**

## **2.4 Navigation and Positioning**

A Leica GS-16 GPS base station system was used for horizontal positioning for the multibeam survey. The Real Time Kinematic (RTK) corrections were transmitted to the rover (vessel) via radio and stored internally for post processing Kinetics (PPK). RTK and PPK are standard signal processing protocols to correct for errors in satellite positioning and allows for centimeter accuracy in position and elevation. The radio and base station were positioned on a tripod at a secure location inside of Chamorro Bay, near the Yap Port survey areas (Figure 2-5). RTK corrections were received via an Intuicom RTK Bridge-X transceiver on the survey vessel for calibrations. Position and heading during the survey were acquired using a dual-antenna global navigation satellite system (GNSS) receiver with Marinestar DGPS corrections providing decimeter-level accuracy.

A Trimble SPS 461 with Marinestar DGPS corrections providing decimeter-level accuracy was used for the magnetometer and side-scan surveys.

Horizontal control was established using Benchmark BM-2 described previously. The project control is listed in Table 2-1 and is also shown on the survey drawings.

HYPACK survey software was used to integrate the Global Positioning System (GPS) positions with the remote marine sensing survey data. Static offsets (i.e., “layback”) for the magnetometer and side scan sonar towfish were used during post-processing to generate corrected track lines.





Figure 2-5. Leica GS-16 GPS base station

## 2.5 Multibeam Sonar Survey Methods

### 2.5.1 Multibeam Sonar Survey Methods

The multibeam sonar survey area consisted of an approximately 4000-meter long by 1500-meter wide area offshore of the reef southeast of the Tamil Channel (Figure 2-6). This area is a possible location for offshore mooring buoys. The multibeam sonar survey was conducted between May 4 and May 12, 2023. Ocean conditions were variable throughout the survey period, with wave heights ranging between 0 to 0.25 meters in Yap Port, 0 to 0.5 meters in Tamil Channel, 0.25 to 1 meters at the mouth of Tamil Channel, and up to 1.5 meters at the offshore survey area.

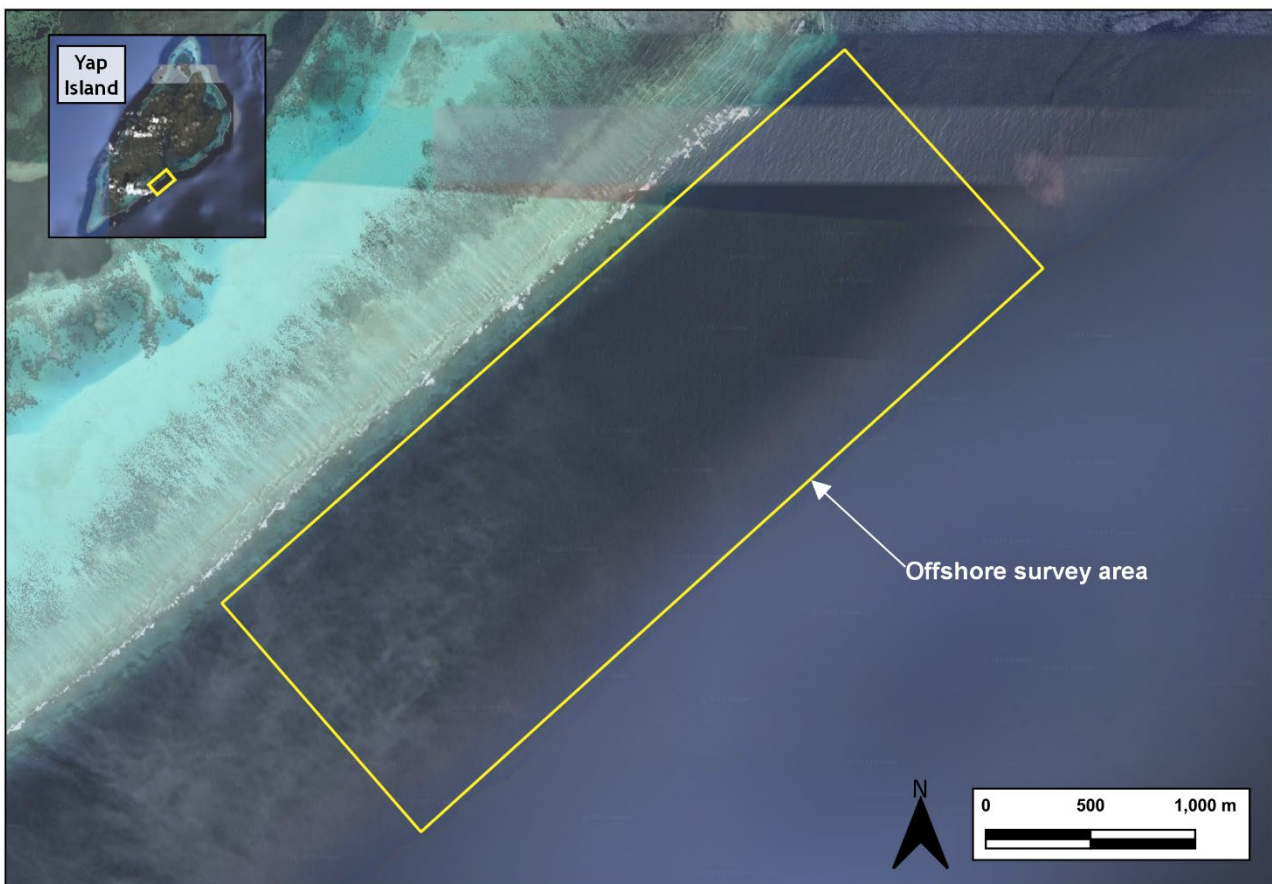
The multibeam sonar system collected bathymetric data and used an R2 Sonic 2020 which generates a swath of 256 beams with a user variable swath width from 10° to 130°. The operating frequency is selectable from 200 to 400 kilohertz (kHz) with a beam width of 2° x 2°. The 200 kHz frequency was used for this survey. The multibeam sonar survey required rigid mounting of the R2 Sonic 2020 sonar head off the side of the boat. This was accomplished using a specialized universal sonar mount system that clamped onto the starboard boat gunnel. The boat gunnel required reinforcing with a wooden 2 x 12 foot wooden beam spanning the width of the boat, secured atop a 2 x 10 foot aluminum beam. The final sonar mount system setup is shown in Figure 2-7.

Bathymetry data were collected from approximately 5 meter water depth to a depth of 290 meter which is the maximum range of the multibeam sonar system. Breaking waves and shallow hazards prevented data collection inshore of approximately 5-meter depth.

Standard hydrographic surveying methodology was followed during the remote marine survey, as provided in the U.S. Army Corps of Engineers EM 1110-2-1003, dated November 30, 2013 (manual). Quality control procedures for multibeam sonar survey systems are detailed in Chapter 6 Section IV of the manual and include:

- Survey documentation
- Multibeam patch tests
- Vertical position check at project vertical benchmarks, tide level check, and RTK tide data collection
- Horizontal position check at project benchmarks
- Velocity cast measurements

Patch testing is a critical procedure used to calibrate the multibeam sonar installation for angular misalignment between the sonar head and the inertial navigation system and heading sensor. The patch test was performed by surveying a shoal area near the Yap Port prior to commencing the survey to reveal residual biases after the mobilization of the survey vessel, including pitch, roll, latency, and azimuthal offsets. The patch testing procedure consisted of data collection along several coincident or parallel survey lines at different speeds and directions, where the results were then numerically evaluated for offsets, calibrated, and corrected using post processing software designed for multibeam sonar surveying.



**Figure 2-6. Offshore area where multibeam sonar and drop camera surveys were conducted**





**Figure 2-7. Final multibeam sonar system setup on the survey vessel**

### *2.5.2 Inertial Measurement Unit*

The inertial navigation system or inertial measurement unit is a critical element of multibeam surveying, which supplies the data acquisition system with highly accurate vessel motions such as heave, roll, pitch, and yaw displacements in real time. This survey utilized the SBG Ekinox-E inertial measurement unit. The SBG Ekinox-E achieves 0.02-degree pitch and roll accuracy, and 5 centimeter real time heave accuracy with 2.5 centimeter delayed heave accuracy.

### *2.5.3 Vessel Heading*

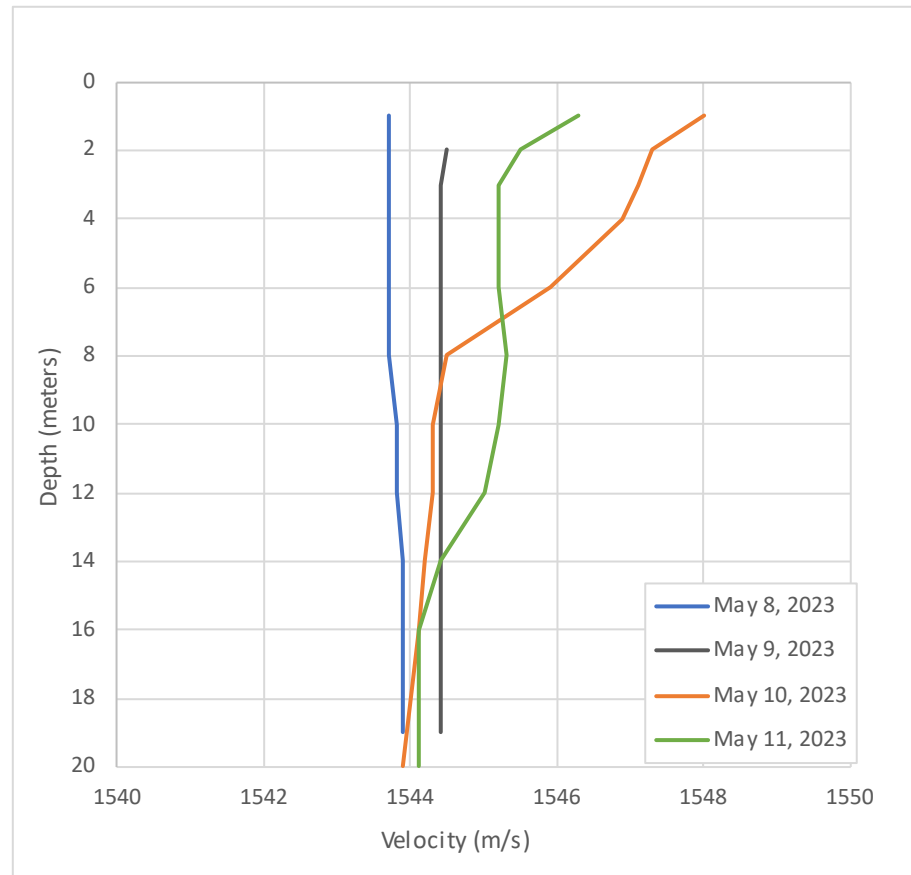
Vessel heading was measured using a dual GPS antenna connected to the SBG Ekinox-E with an accuracy of 0.05 degrees.

### *2.5.4 Sound Velocity Measurement*

Acoustic depth measurements in the water column are dependent on the speed of sound for that particular water column, which is primarily a function of salinity and temperature. To accurately account for the variability of the speed of sound in the survey area, a sound velocity (SV) profiler was deployed prior to and immediately following each day of surveying to correct for local water conditions. Speed of sound measurements were recorded using an Odom Digibar Pro SV probe. Two casts were made with the SV probe each day (at the start and finish of surveying) to determine the sound velocity profile (SVP) for multibeam acquisition and to generate SVPs for use in post-processing efforts where needed. Once collected, the profile information was entered into the data acquisition system. In addition to the SV profiler, a separate and continuously operating sound velocity probe was



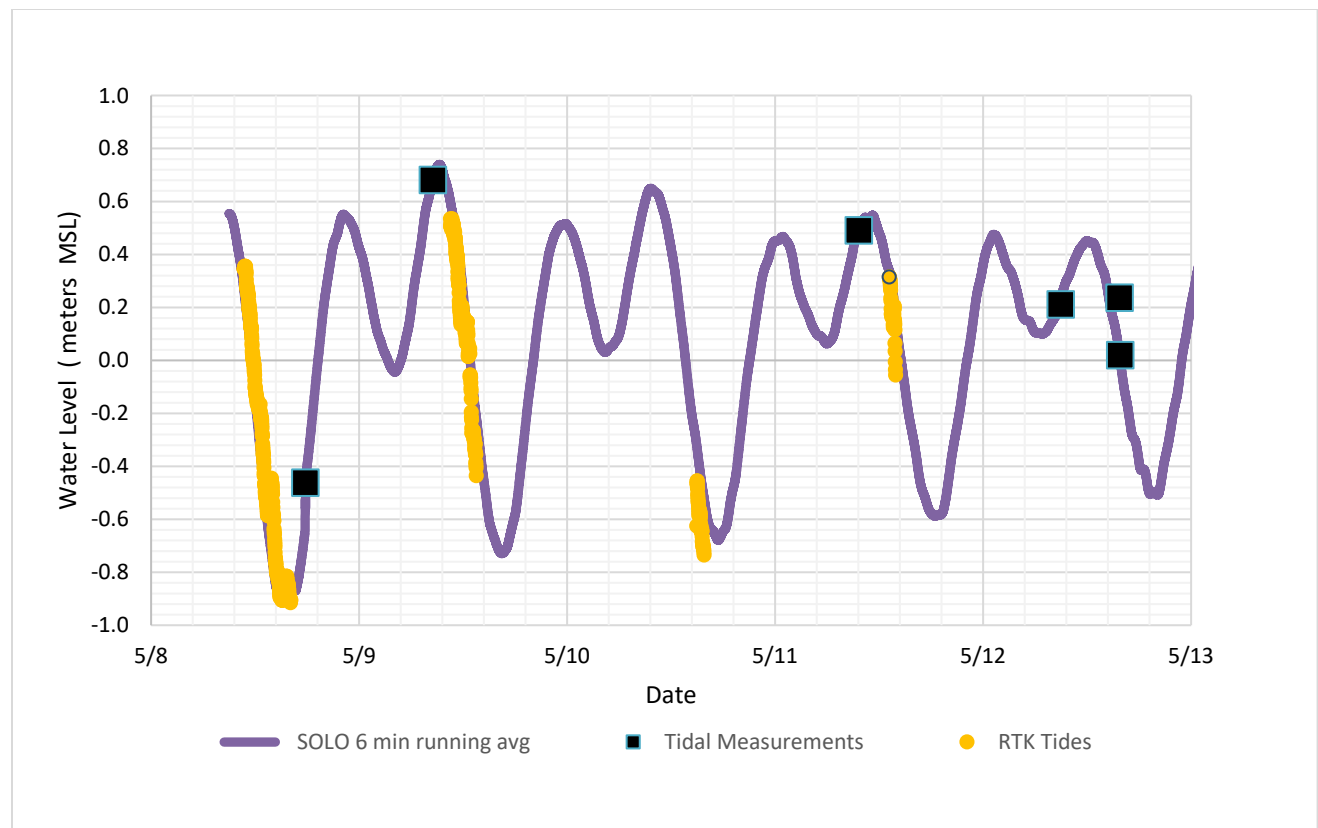
mounted to the sonar head and was used to pass instantaneous SV data to the sonar receiver. This real-time SV data was used by the sonar control system to continuously optimize signal processing and beam forming to adjust for changing water conditions in order to yield the most accurate slant range measurements. Examples of an SVP from May 8, 9, 20, and 11, 2023 are presented in Figure 2-8. The profiles indicate a well-mixed water column with variation in sound velocity of only 0.1%.



**Figure 2-8. Water column sound velocity, May 2023**

### 2.5.5 Tide Corrections

Tidal variations in Yap are typically 1.1 meter and can reach as high as 1.9 meter based on the tidal datums provided by the UHSLC. Bathymetry data collected from a survey vessel must be corrected for the tide level to the reference vertical datum of MSL. Tide levels during the survey were measured using three methods: the vessel mounted RTK GPS system; a tide gauge pressure sensor deployed at BM-2, and manual measurements. The tide gauge was an RBR Solo water level logger with an accuracy of 0.1% of water depth. The tide gauge recorded tidal levels every second for the duration of the multibeam sonar survey. Tidal levels were measured manually by using a survey tape to measure the distance from water level to the elevation of BM-2. Manual measurements were typically conducted at the beginning and end of each multibeam sonar survey day. Graphs of measured tides at BM-2 during the multibeam sonar surveys and RTK measured tides from the survey vessel are presented in Figure 2-9. The graphs show close agreement between the manual and tide gauge readings.



**Figure 2-9. Tidal measurements at BM 2 (in meters) and survey vessel-measured RTK Tides May 8 through May 12**

#### 2.5.6 Data Acquisition

Xylem's HYPACK/HYSWEEP 2023 navigation and data collection software was used for the collection of multibeam sonar data and all other device data, and for integration of the data with vessel position, heave, pitch, and roll motion. HYPACK/HYSWEEP 2023 was also used for survey data post-processing. A basic description of the complete data acquisition system used for this survey consists of the following elements:

- An inertial measurement unit rigidly installed near the survey vessel's center of gravity and cabled directly to the SBG control box in the main cabin;
- Twin heading antennas mounted directly to the sonar pole;
- R2Sonic 2020 sonar head, side mounted and directly cabled to the R2Sonic SIM (control) box in the main cabin;
- Data acquisition computer, connected to both the SBG control box and the R2Sonic SIM box via network cable connections.

### 2.5.7 System Offsets

Multibeam system offsets were measured from the center of the boat (horizontal) and the waterline (vertical). These offsets were inputted into HYPACK/HYSWEEP.

**Table 2-2. Multibeam sonar system offsets from center of boat for the survey period**

	<b>SBG</b>	<b>R2 Sonic head</b>
<b>Port-starboard</b>	1.53 m	1.93 m
<b>Fore-aft</b>	-1.07 m	-1.53 m
<b>Vertical (measured from waterline)</b>	-1.34 m	0.43 m

### 2.5.8 Quality Control Procedures

Rigorous quality control procedures are required to ensure successful completion of a multibeam survey. These include the patch test, GPS position checks, draft/bar checks, beam angle check, and performance check.

#### 2.5.8.1 Patch Test

A patch test was performed to quantify residual biases from the alignment between the motion reference unit and the multibeam sonar (yaw, pitch, and roll). The patch test also calculated the latency of the GPS system which is the difference in time between when positioning data was received and the when the computed position was logged by the acquisition system. The SBG and R2Sonic 2020 both utilize a 1 pulse per second timing signal that minimizes the problems of GPS latency and was verified in the patch test.

The patch test was conducted using parallel control lines across a subsea ridge located near the survey area. Data processing was completed using HYPACK/HYSWEEP 2023, and patch test corrections were calculated within HYSWEEP using the patch test calibration program and applied prior to the start of the survey. The calculated patch test values were found to be as follows:

- Static Roll 1.25°
- Static Pitch 3.86°
- Patch Test Corrected
  - Roll 1.35°
  - Pitch 4.36°
  - Yaw -0.5°
  - Latency 0.00 second

#### 2.5.8.2 Bar Check

The system draft (the transducer depth) was measured using the bar check technique, which consists of lowering a calibration plate a measured distance below the transducer head and comparing that distance to the sonar readings. The bar check was done at the beginning and end of the survey day. Bar check results are included in Appendix A.

### 2.5.8.3 Horizontal Position Check

GPS system position checks were conducted daily at BM-2. The position checks revealed no variation from the BM-2 coordinates.

### 2.5.8.4 Cross Line Beam Angle Check

Several 'cross lines' were run perpendicular to the primary survey line direction to check for roll offsets, timing delays, or offsets due to tidal fluctuations. The cross-line data were compared with the primary survey data using HYPACK/HYSWEEP 2023. The HYPACK/HYSWEEP data processing software allows the user to calculate the difference in measurements for various beam angles compared to the primary survey data. Beam angle checks were performed up to a swath width of 110 degrees, and was compared with data collected at 90 degrees. Results are presented in Figure 2-10. Cross line beam angle check show good agreement throughout the range of angles.

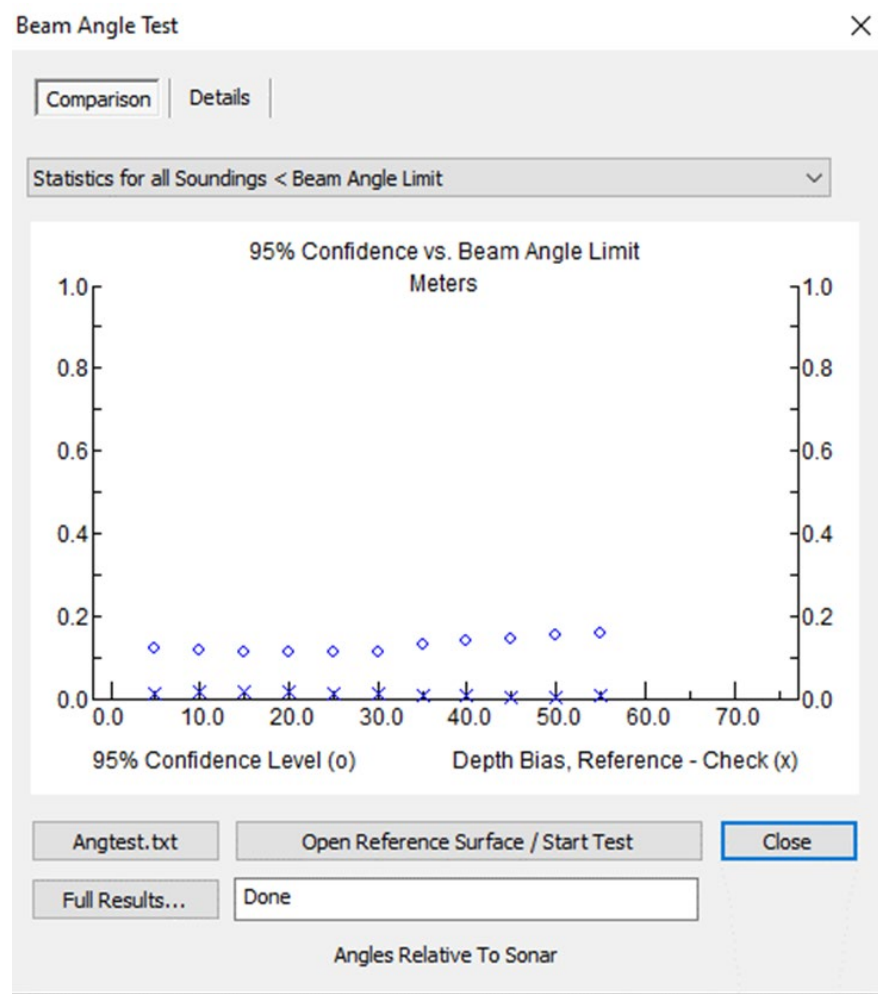


Figure 2-10. Cross line beam angle check

### 2.5.8.5 Performance Test

A performance test comparing depth measurements made in the same area by two or more independent measurement systems in the primary method recommended by the U.S. Army Corps of Engineers EM



1110-2-1003 manual for assessing the quality of a hydrographic survey. Independent measurement systems were not available for this remote survey. The performance test was conducted by comparing depths measured by the survey systems on survey days at the start and end of the survey, one week apart. A mean bias of -0.04 and standard deviation (95%) of 0.1 indicates excellent agreement between the two surveys days.

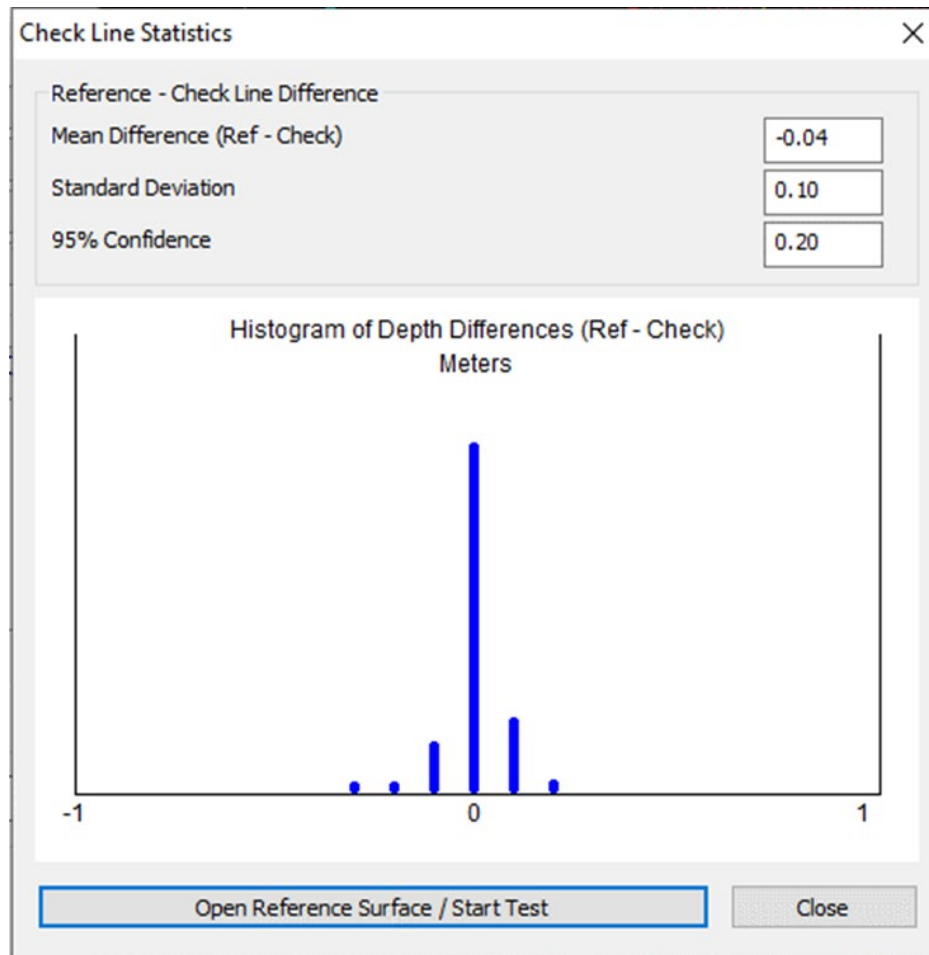


Figure 2-11. HYSWEEP comparison of patch test results from May 8 and May 15, 2023

## 2.6 Side Scan Sonar Methods

A side-scan sonar transmits acoustic signals with wide vertical beam widths out to either side of the sonar towfish. A receiver records the signals that are reflected from the seafloor to the towfish. Hard bottom areas and features produce more intense reflections than sediments. The result is a plan view acoustic image of seafloor characteristics. The side scan imagery allows identification of objects with high relief that are potential navigation hazards.

The side scan survey was performed from April 26 to May 3, 2023. The side scan survey consisted of areas where depths were generally shallower than 15 meters (50 feet) in the regions shown in Figure 2-12. These areas consist of the eastern channel wall at the mouth of the Tamil Channel Entrance, Yap Port, and the areas north, southeast, and southwest of the Yap Port peninsula. Ocean conditions were

variable throughout the survey period, with wave heights ranging between 0 to 0.25 m in Yap Port, 0 to 0.5 meters in Tamil Channel, and 0.25 to 1 meters at the Tamil Channel Entrance.

An EdgeTech 4125 Side Scan Sonar System was used for the survey (shown in Figure 2-13). The system contains dual frequency 400 and 900 kHz transducers. Both transducers were used throughout the side-scan survey to produce base and high-resolution imagery. The sonar range was adjusted during the survey between 50, 75, and 100 meters per side to ensure the towfish altitude was within 10-15% of the range. Survey lines were conducted in 30-meter spaced parallel lines where possible, and along the steep edge of the reef in the Tamil Channel.

Due to variable and steep bathymetry in the survey areas, the towed systems were kept shallow to avoid collision with the seafloor and impact to sensitive bottom substrate. Poor weather conditions during the survey window limited the survey over several days particularly at the east side of the Tamil Channel Entrance which is exposed to open ocean swells.

The side scan towfish was deployed in three (3) configurations including off the starboard stern, starboard midship, and forward bow of the survey vessel. Offsets of the three configurations relative to the GPS position are summarized in Table 2-3 below. The side scan location was then determined in HYPACK (layback) based on the cable out from the towfish location. The cable out varied throughout the survey.

**Table 2-3. Towfish offsets relative to GPS**

<b>Configuration</b>	<b>Starboard Offset (m)</b>	<b>Forward Offset (m)</b>
Starboard Stern	+1.676	-3.627
Starboard Midship	+1.676	-0.914
Forward Bow	+0.37	+4.97

Side scan data were reviewed on-site using HYPACK 2023 software and post processed into a GeoTiff mosaic imagery using HYPACK. It should be noted that the version of HYPACK used throughout the survey contains a system bug where the 900 kHz frequency collected by the side scan is flagged as being 264 kHz. HYPACK support confirmed that the 264 kHz identification is a typo within the software and that the data is 900 kHz as collected by the side scan. Appendix E shows email communication with HYPACK support regarding this system bug.



Figure 2-12. Yap Port and Tamil Channel Entrance areas investigated during side-scan and magnetometer surveys outlined in yellow Non-navigable survey areas are shown in green





Figure 2-13. EdgeTech 4125 Side-Scan towfish used during the survey period

## 2.7 Magnetometer Methods

The magnetometer survey was performed between April 27 and May 3, 2023. The survey areas for the magnetometer are shown in Figure 2-12 and were also focused on depths shallower than 15 meters. These areas consist of the eastern channel wall at the mouth of the Tamil Channel Entrance, Yap Port, and the areas north, southeast, and southwest of the Yap Port peninsula. Ocean conditions were variable throughout the survey period, with wave heights ranging between 0 to 0.25 meters in Yap Port, 0 to 0.5 meters in Tamil Channel, and 0.25 to 1 meters at the mouth of Tamil Channel.

A Geometrics G-882 Marine Magnetometer was used to collect magnetic field values in the project areas (shown in Figure 2-14). Survey lines were run at 30-meter spacing; due to variable and steep bathymetry in the survey areas, the towed systems were kept shallow to avoid collision with the seafloor and impact to sensitive bottom substrate. A constant altitude was difficult to achieve due to the survey area's variable bottom relief.

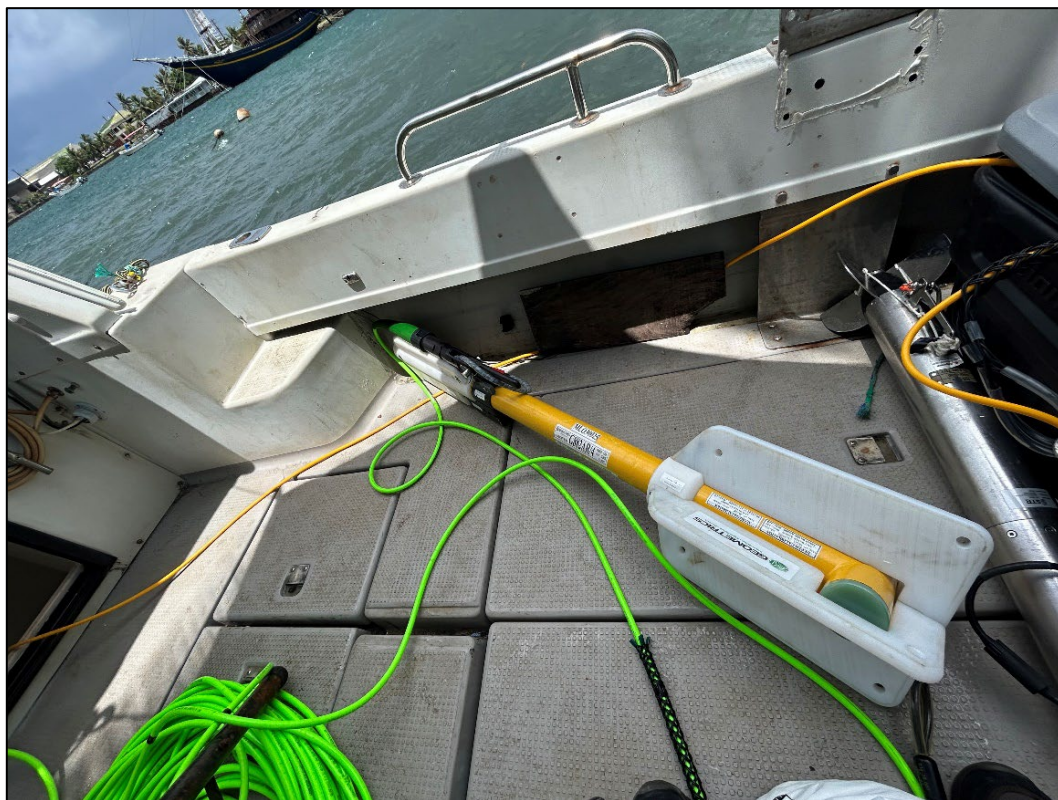
The magnetometer towfish was deployed in three (3) configurations including off the starboard stern, starboard midship, and forward bow of the survey vessel. Offsets of the three configurations relative to the GPS position are summarized in Table 2-3 in the previous section. The magnetometer location was then determined in HYPACK (layback) based on the cable out from the towfish location. The cable out varied throughout the survey.

The magnetometer measures the local magnetic field. Ferrous or field-inducing objects will create aberrations, or anomalies, in the local field values. Due to the weak background magnetic field in Yap, magnetometer survey lines could only be oriented east-west and vary up to +/- 25 degrees from the east-west alignment. Outside of this range the magnetic signal was too weak to observe any magnetic

anomalies (see Figure 2-15). The cesium sensor on the magnetometer was rotated 45 degrees to account for the weak background magnetic field. Poor weather conditions during the survey window limited the survey over several days particularly at the east side of the Tamil Channel Entrance which is exposed to open ocean swells.

Magnetometer data were processed using HYPACK 2023 software to correlate position and field values. The presence of steel piles, steel sheet piles, and reinforcing steel in concrete structures will cause large variations in the magnetic field that can mask smaller anomaly values. Therefore, data was processed by correcting the background magnetic signal to a zero-baseline to show the smaller magnetic anomalies of interest.

Magnetometer data were reviewed on-site using HYPACK 2023 software and post-processed into color-coded track lines using HYPACK, for better visual representation of magnetic anomalies.



**Figure 2-14. Geometrics G-882 Marine Magnetometer used to collect magnetic field values during the survey period**



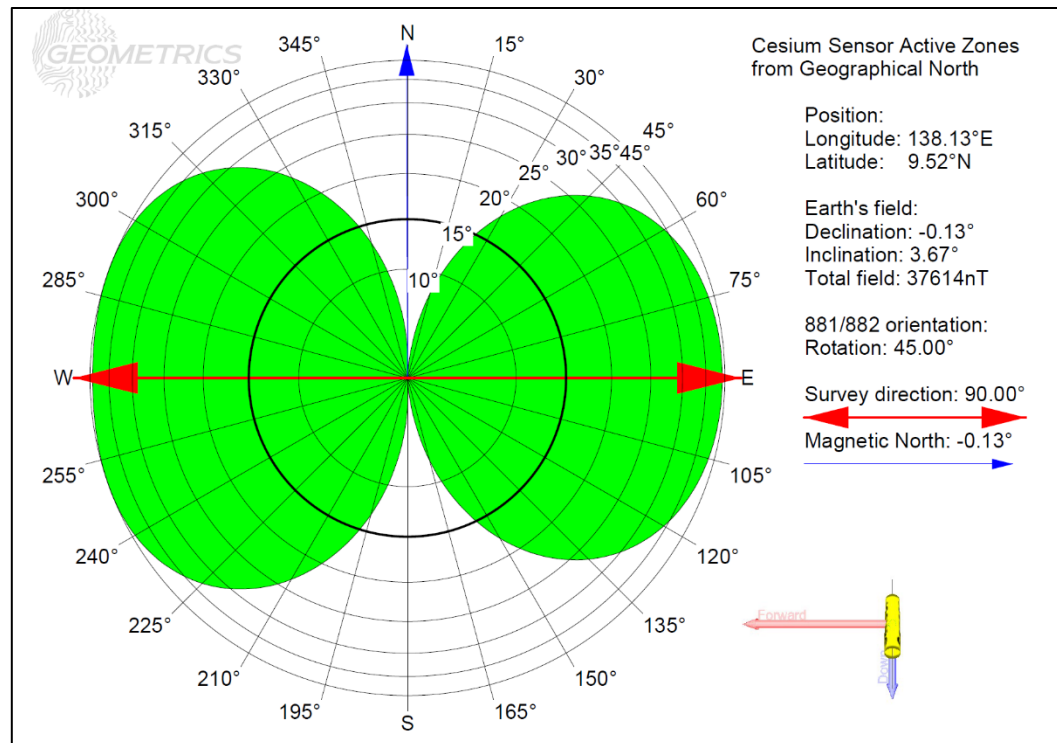


Figure 2-15. Cesium Sensor Active Zones (CSAZ) output for Yap

## 2.8 Drop Camera Methods

Drop camera surveys were completed in support of both the cultural marine surveys. The areas targeted for drop camera investigations were Tamil Channel and the offshore survey area (Figure 1-1). Photographs and videos of the navigation aids in Tamil Channel were collected at 18 locations. Depths of the drop camera data collected in the channel range from 0 meters to 6 meters.

For the navigation aids within Tamil Channel, a SideWinder 360 underwater camera tethered to 60 meters of cable was used (shown in Figure 2-16). The SideWinder consists of one camera pointing straight down to the seafloor and another that pans 360° horizontally. The operator may view live video feed, switch between the two cameras, and manually pan the horizontal camera.

The deepwater drop camera survey was completed at 60 locations within the offshore multibeam survey area, along 11 inshore-offshore transects approximately 400 meters long and 400 meters apart. Depths of drop camera data collected in this area range from 10 to 185 meters. For the deepwater drop camera survey, a GoPro 11 cased in a deepwater housing with an LED light was used to capture imagery. The housing unit was secured to a line, which was spooled onto an electric fishing reel. A heavy-duty fishing pole was used to facilitate the lowering and raising of the system. An example of a field engineer utilizing this system is shown in Figure 2-17.

Drop camera imagery was reviewed and still images of the navigation aids were captured. For the deepwater drop camera survey, still images of the seafloor were extracted from the videos. Approximate coral cover was estimated for the deepwater drop camera survey points.



**Figure 2-16. SideWinder 360 camera used to investigate channel markers and other areas of interest in Tamil Channel (Splashcam, 2018)**



**Figure 2-17. Field engineer operating the deepwater drop camera system at the offshore survey area**

### 3. SURVEY RESULTS

#### 3.1 Bathymetry

Bathymetry data plot has a scale of 1:7500. Contours drawn every 20 meters were generated from merged data set using the following sounding grid averages:

- 1 meter cell average grid for depths 0-30 meters,
- 5 meter cell average for grid depths 30-100 meters
- 10 meter cell averaged grid for depths greater than 100 meters

The resolution of the sonar data is much higher in shallow water than deep water. Using a variable grid cell averaging maintains the high-resolution integrity of the shallow water data, while allowing for the larger beam footprints and data noise in the deeper water. The plot has been reproduced in a reduced size in Figure 3-1, which shows the bathymetry contour plot and shaded relief image, respectively. Based on the high relief of the color contour, the irregular sea floor extends down to a depth of approximately 40 meters. Beyond that, the sea floor slopes steeply at approximately 30 degrees to the range limit of the sonar system at approximately 280 meters.

#### 3.2 Side Scan Sonar

Side scan survey targets are listed in Table 3-1 and results are shown in Figure 3-2 through Figure 3-5, along with the location of survey targets. Figure 3-2 and Figure 3-3 show the processed side scan mosaics for the 400 kHz frequency while Figure 3-4 and Figure 3-5 show the processed mosaics for the 900 kHz frequency. The 900 kHz data provides higher detail in the processed imagery compared to the 400 kHz data; however, the signal is more attenuated with distance away from the transducer. These areas of weak signal returns show up as whiter colors in the mosaics and typically occur outside of the focused survey areas. Collection of full side scan imagery was difficult because of the very steep reef walls that comprised much of the survey area. This type of morphology typically produces high intensity backscatter rather than contrasting intensities resulting from flatter morphologies. However, the side scan sonar results correlated with the multibeam sonar survey results, showing numerous coral heads and bottom features, including the steep dredge cuts along the Tamil Channel. The channel walls are clearly visible, indicated by the stark color gradient along the drop off. The survey area also has some high-relief areas due to rock fragments and coral heads.

Side scan targets of interest were chosen based on those identified in the 2019 Naval Oceanographic Office survey (NOO, 2019). Additional targets were chosen for analysis because of their backscatter intensity, angular geometry, peculiar shape suggesting a human origin, or because of their association with magnetometer targets. Some side scan target items also correlated with magnetic anomalies from the magnetometer survey.

Eleven (11) targets were identified from the side scan data. Seven (7) of these targets were previously identified by the 2019 NOO multibeam survey (NOO, 2019).

Table 3-1 lists the targets identified in the side scan and magnetometer surveys. The HYPACK survey reports for these targets are presented in Appendix B. A representative target report of target F-10 is shown Figure 3-6. This target was thought to be a shipwreck.

### 3.3 Magnetometer

The magnetometer survey results are shown in Figure 3-7 and Figure 3-8. The color scale indicates total anomaly values after processing. The processing corrected the background anomalies to a zero-baseline value, which enables magnetic dipole anomalies to be more easily observed. The color contours range from  $> 1000$  to  $< -1000$  nanoteslas (nT). The nT unit and the “gamma” unit are identical and are measures of magnetic flux density.

Magnetometer surveying was also challenging due to the steep slopes of the dredge cuts along the Tamil Channel, which prevented towing the magnetometer close to the seafloor, and due to the weak magnetic field, restricted surveying to east-west survey lines. At various points in Yap Port and Tamil Channel, magnetic fields from large field anomalies overshadowed any smaller magnetic anomalies that may have been in the vicinity. A decommissioned barge was moored at the southeast corner of the peninsula, causing any smaller anomalies to be masked. Along the northeast shoreline of the peninsula, large vessels were docked throughout the survey period, causing potential smaller anomalies to be masked. These large ferrous entities caused relatively large spikes in the magnetometer survey data, hence the wide range of nT values between  $> 1000$  and  $< -1000$  nT. No targets were observed at the eastern channel wall at the mouth of the Tamil Channel Entrance. Due to the weak background magnetic field in Yap and resulting survey constraints, the magnetometer survey results were limited.

Eleven (11) targets were identified from the side scan data. Seven (7) of these targets were previously identified by the 2019 NAVFAC multibeam survey. Three (3) of these targets were verified by the magnetometer, and three (3) additional targets were identified that were not previously found in the 2019 NAVFAC or side scan surveys.

Table 3-1 lists the targets identified in the magnetometer surveys. The HYPACK survey report for these targets can be found in Appendix B. A representative target report of target F-10 is shown in Figure 3-6. This target was thought to be a shipwreck.

### 3.4 Drop Camera

The drop camera survey results for both the channel navigation aids and the offshore survey region are shown in Figure 3-9 through Figure 3-15. The navigation aids within Tamil Channel were located on shallow reef flats (0 – 1 meter), while the aids at the channel mouth were in deeper water (4.5 – 6 meter). All markers were surrounded by coral heads. An example of a typical channel marker inside Tamil Channel is shown in Figure 3-10. An example of a channel marker at the Tamil Channel entrance is shown in Figure 3-11.

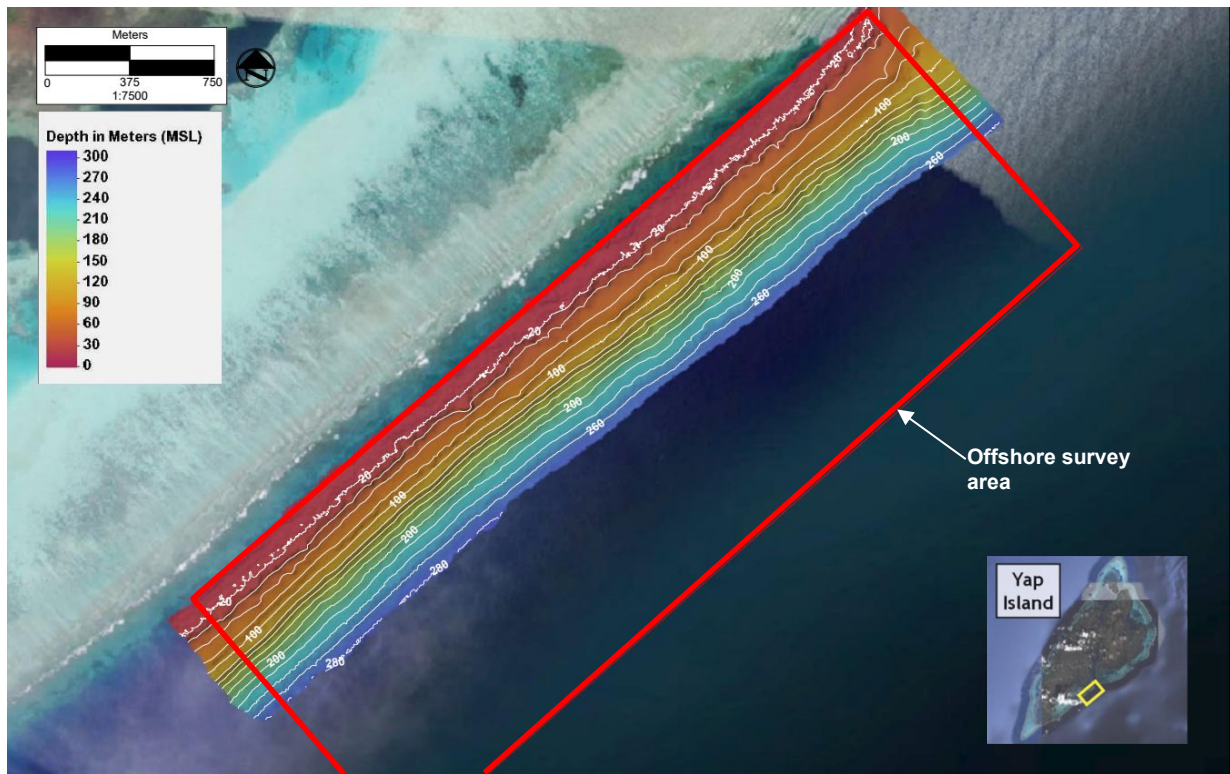
In the deepwater drop camera survey region, drop camera points extend about 375 meters offshore from the inshore boundary of the survey boundary. Due to the deep bathymetry of the offshore survey area, the drop camera survey was limited to depths less than 200 meters. Three (3) different general bottom types were observed in the offshore area: coral, sand, and mixed sparse coral/rock/sand/algae. An example of each bottom type is shown in Figure 3-13. Sandy and mixed bottom types were generally observed at survey points offshore, while the inshore-most drop camera points consisted of coral-covered seafloor. Approximate coral cover was estimated based on the deepwater drop camera imagery, ranging from 0% to 75%-100% coral cover. Examples of each gradation are shown in Figure 3-14. The spatial distribution of the results is shown in Figure 3-15. Coral cover decreases



with increasing depth, although coral was observed at some mid-depth range survey points. Imagery and details for all 60 drop camera points are presented in Appendix D.

In addition to the drop camera surveys, the Cultural Resource Team required assistance identifying potential items of interest on the seafloor. The SideWinder and deepwater drop camera setup were both used to investigate four (4) sites of interest, shown in Figure 3-16. The imagery from these investigations is shown in Figure 3-17 through Figure 3-20.

Target 1 for the focused cultural survey is shown in Figure 3-17. This target was thought to be remnants from a German vessel, dated from World War I era. The wreckage was in approximately 35 meters of water depth. Target F-7 is shown in Figure 3-18, and appeared to be a metal barrel/drum-like object. Target F-9 is shown in Figure 3-19, and was thought to be a mooring anchor. Target F-12 imagery is shown in Figure 3-20 and its object type is unknown.



**Figure 3-1. Yap multibeam sonar survey bathymetry results at the offshore survey area  
(May 4-May 12, 2023)**

**Table 3-1. Identified targets from side-scan and magnetometer surveys, conducted between April 26 and May 3, 2023**

Name	Date Acquired (YAPT)	Latitude (dd mm ss)	Longitude (dd mm ss)	X (UTM Z54N, m)	Y (UTM Z54N, m)	Approx. Depth (m)	Side-scan (Y/N)	Mag. (Y/N)
F-6_wreck	4/29/2023 10:09	09 30 59.9417 N	138 07 25.9302 E	184208.100	1053283.700	20	Y	N
F-15_wreck	4/28/2023 14:29	09 30 2.2235 N	138 07 43.2252 E	184721.300	1051504.600	20	Y	N
F-4_wreck	5/2/2023 13:55	09 29 50.4962 N	138 07 44.8561 E	184768.100	1051143.600	10	Y	N
F-16_wreck	5/2/2023 14:04	09 30 8.9633 N	138 07 41 E	184654.800	1051712.400	20	Y	N
F-13_wreck	5/1/2023 14:13	09 30 55.8059 N	138 07 21.7092 E	184078.200	1053157.600	10	Y	Y
F-10_wreck	5/1/2023 13:56	09 30 49.9522 N	138 07 27.2751 E	184246.600	1052976.200	13	Y	Y
Barge	5/1/2023 13:56	09 30 51.2774 N	138 07 27.0609 E	184240.400	1053017.000	5	Y	Y
Potential Wreck 1	5/6/2023 16:37	09 30 46.4001 N	138 07 17.6056 E	183950.540	1052869.430	5	Y	N
Potential Wreck 2	5/6/2023 16:37	09 30 47.209 N	138 07 19.7502 E	184016.210	1052893.760	5	Y	N
F-5_wreck	4/29/2023 12:36	09 31 7.6231 N	138 07 36.9263 E	184545.700	1053517.100	12	Y	N
Potential Plane	4/29/2023 11:05	09 30 40.6918 N	138 07 34.619 E	184468.400	1052689.600	10	Y	N
MAGNET TARGET 1	5/2/2023 10:08	09 30 45.2855 N	138 07 42.9106 E	184722.666	1052828.749	5	N	Y
MAGNET TARGET 2	5/2/2023 10:36	09 30 40.2154 N	138 07 32.7763 E	184412.034	1052675.419	5	N	Y
MAGNET TARGET 3	5/2/2023 10:42	09 30 38.3106 N	138 07 39.5572 E	184618.530	1052615.134	5	N	Y

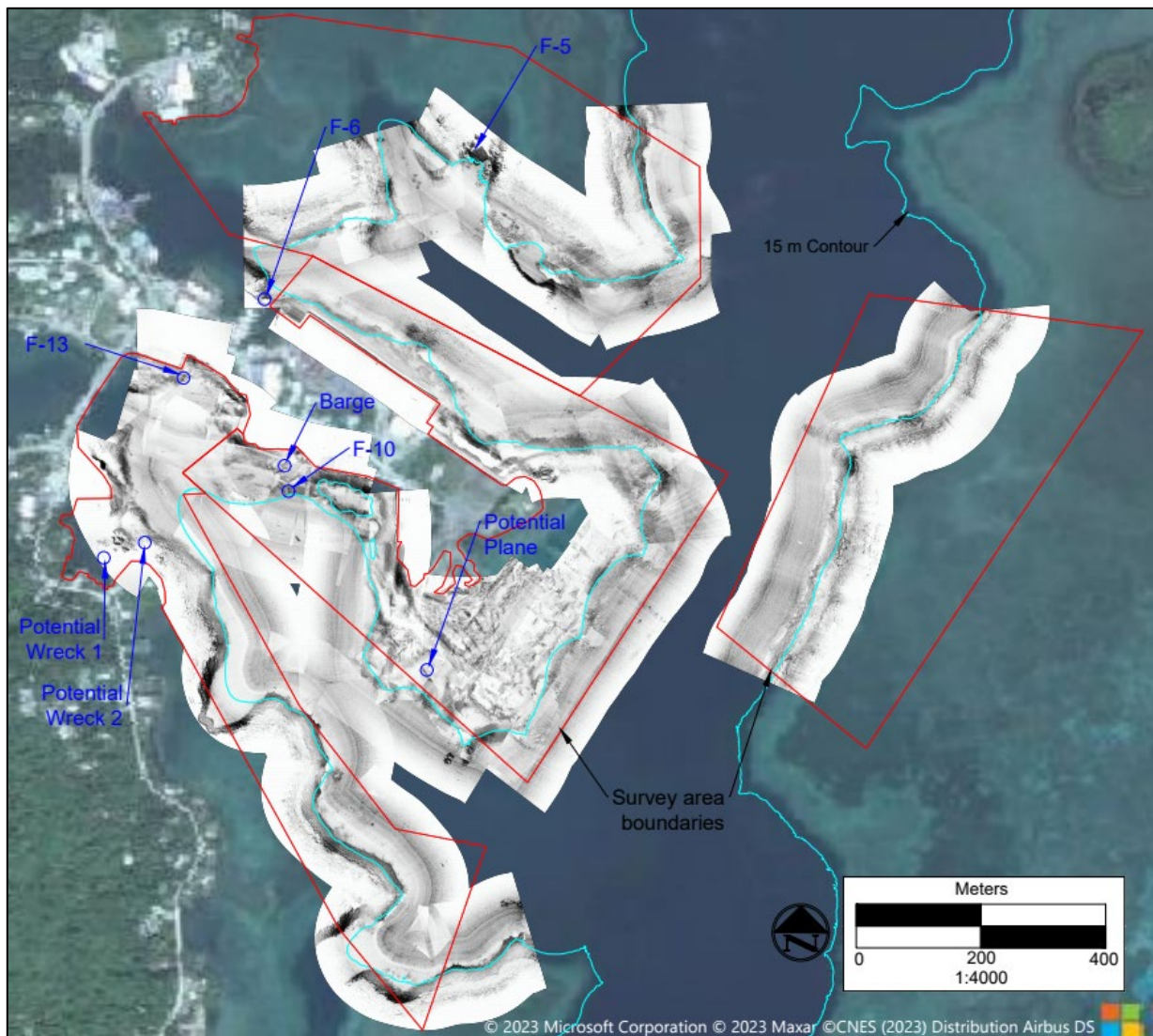


Figure 3-2. Yap side-scan survey results for 400 kHz sonar return at Yap Port and the surrounding area (April 26-May 3, 2023)



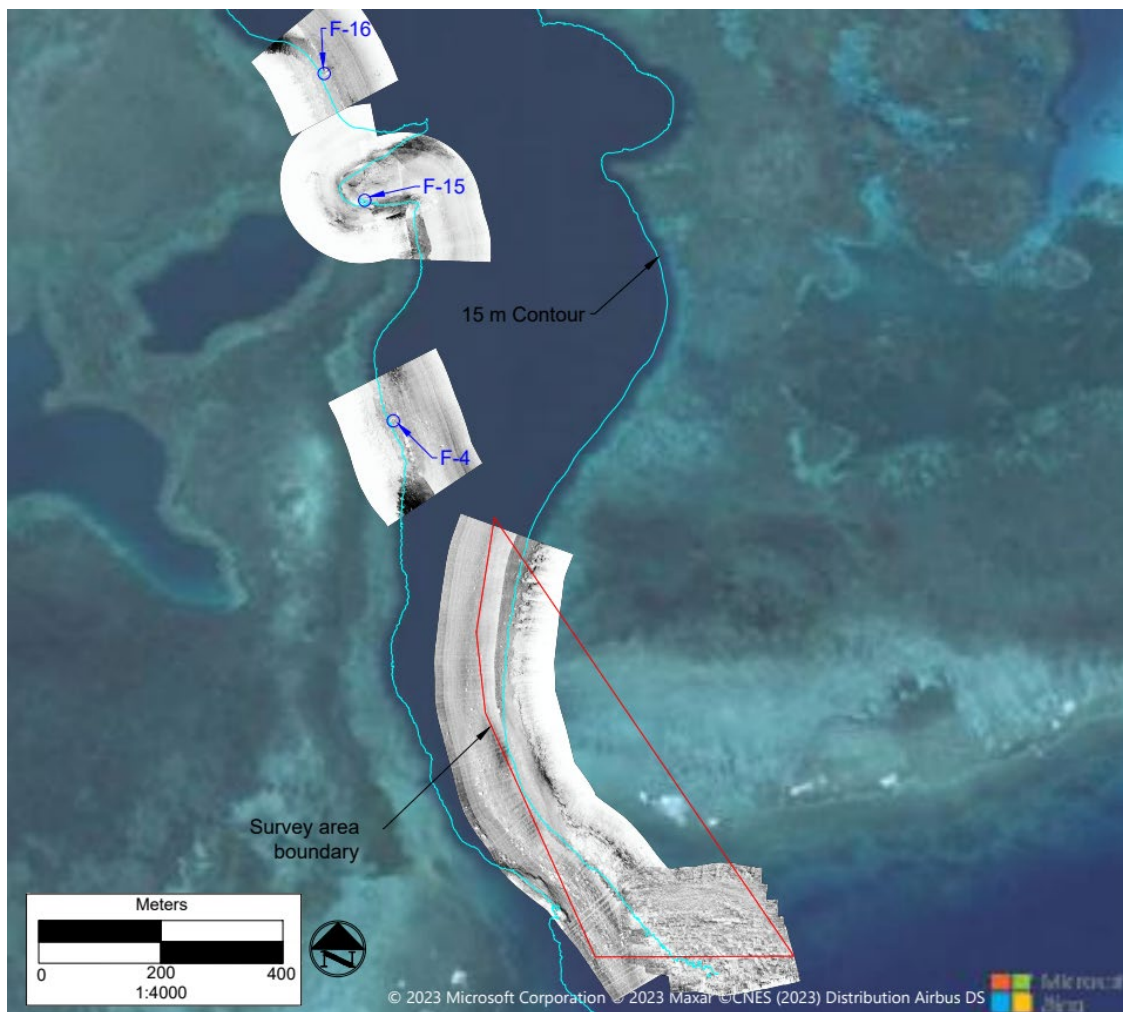


Figure 3-3. Yap side-scan survey results for 400 kHz sonar return in Tamil Channel (April 26- May 3, 2023)

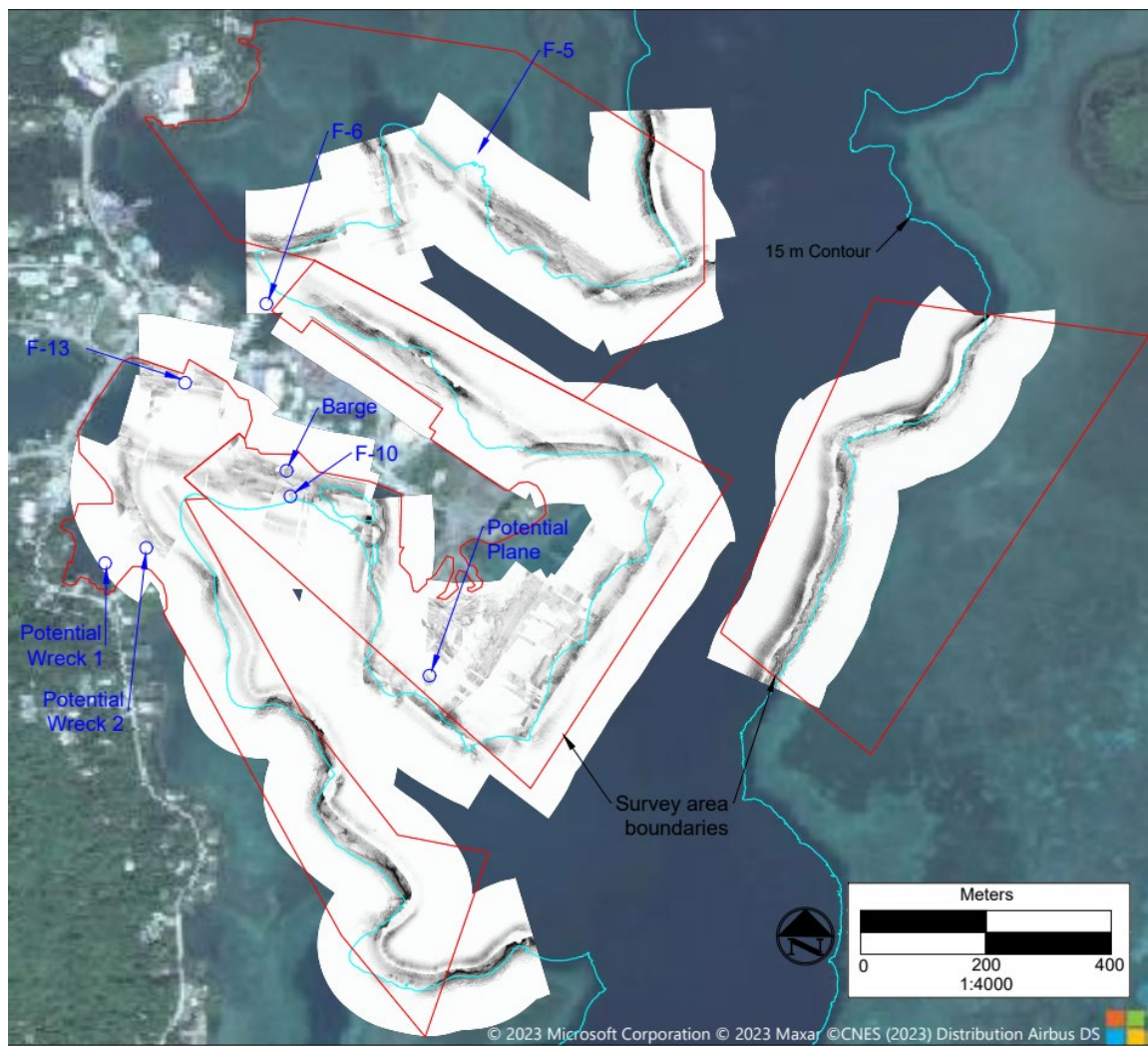


Figure 3-4. Yap side-scan survey results for 900 kHz sonar return at Yap Port and the surrounding area (April 26-May 3, 2023)

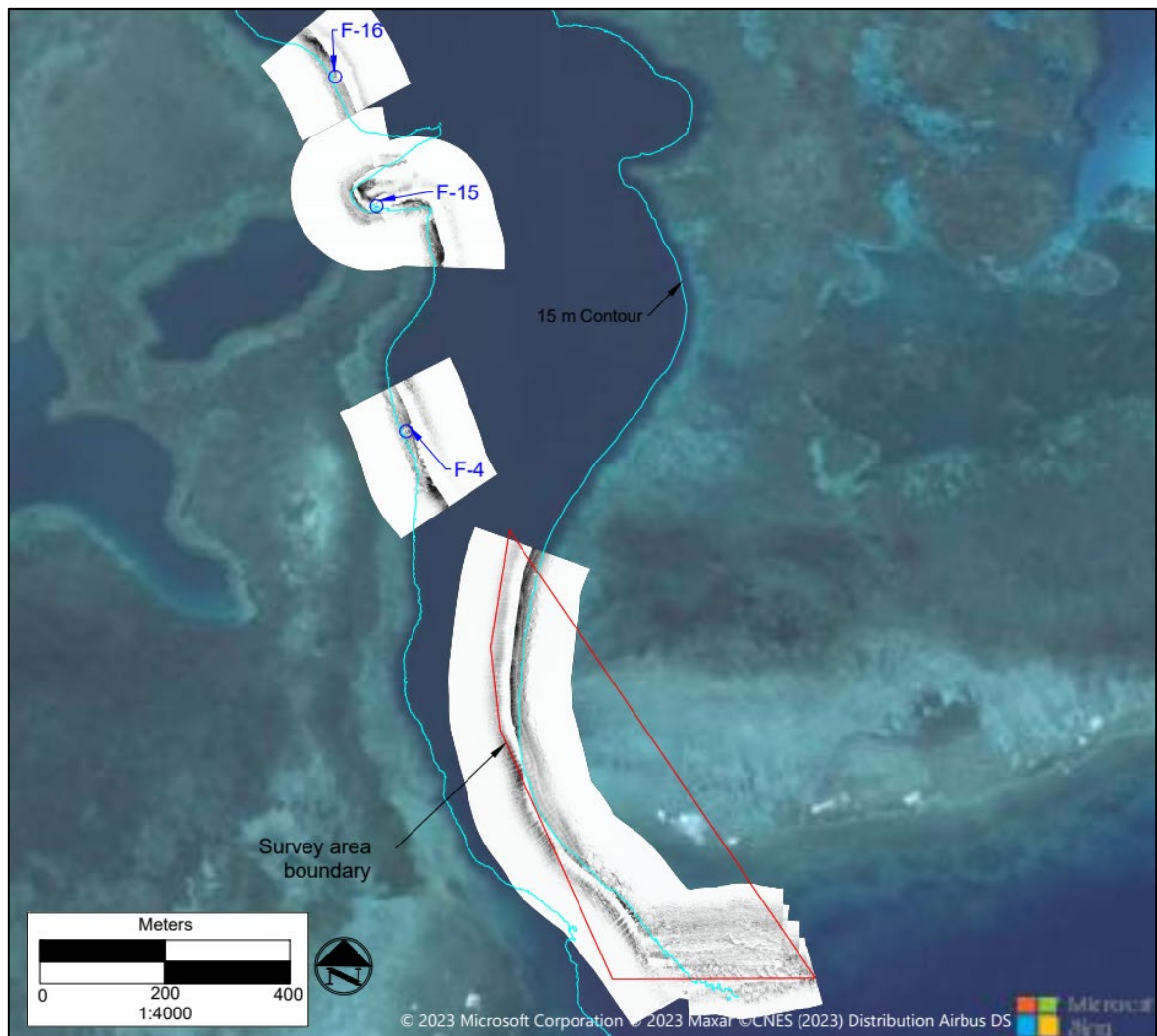


Figure 3-5. Yap side-scan survey results for 900 kHz sonar return in Tamil Channel (April 26-May 3, 2023)


**Target Name:** F-10\_wreck  
**Navy Multibeam:** Yes  
**Magnetometer Hit:** Yes  
**HYPACK Report**  
**(Distance/Bearing/Code/**  
**Quality/Orientation not**  
**defined):**

<b>Name</b>	F-10_wreck
Date Acquired	2023-05-01 13:56:35
Date Modified	2023-05-06 15:33:43
WGS84 Latitude	09 30 49.9522 N
WGS84 Longitude	138 07 27.2751 E
X	184246.600
Y	1052976.200
Depth	13.00
Event	0
Survey File	0007_1355
Source	HYSCAN

Attribute	Value
Distance	0.00
Bearing	0.00
Code	0
Quality	0.00
Orientation	0.00
Height	3.20
Length	16.50
Width	9.40
Range	9.40
Tow Fish Altitude	4.70
Tow Fish Heading	284.90
Capture File	F-10_wreck.JPG



**Symbol**

**Rotation**

**Notes**  
 Height: 3.2 Length: 16.5 Width: 9.4 400 KHz

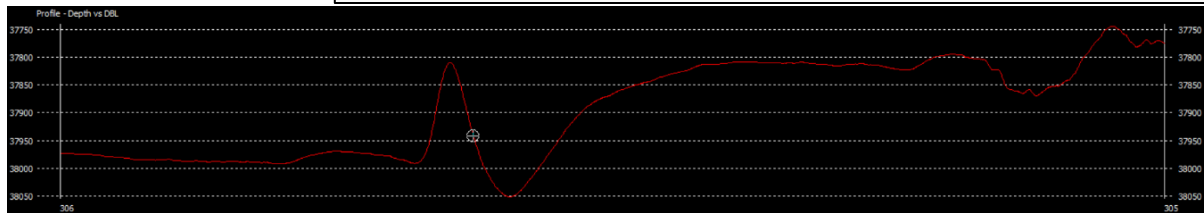


Figure 3-6. HYPACK report (top) and raw gamma profile (bottom) for target F-10, thought to be a shipwreck



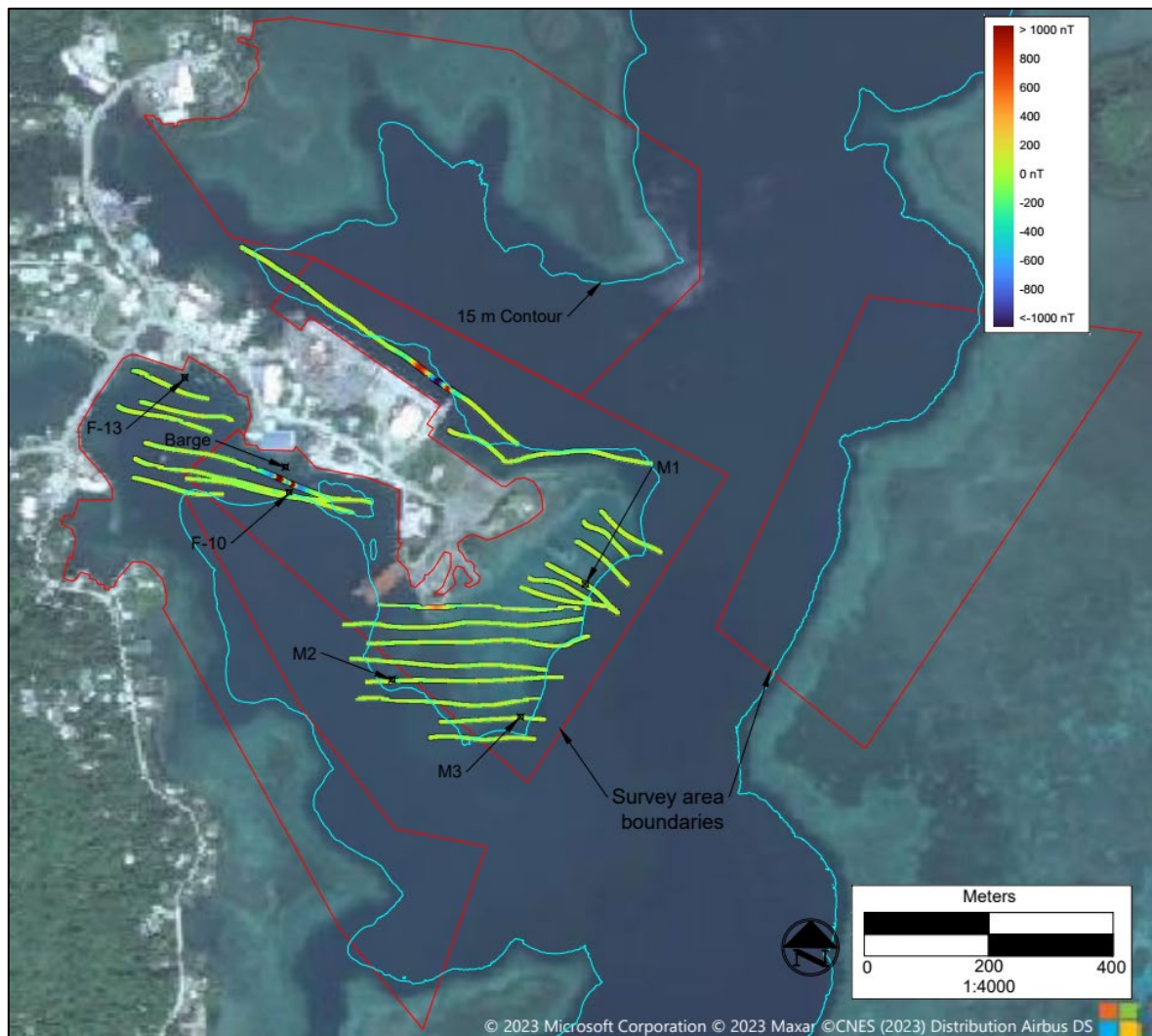


Figure 3-7. Yap magnetometer survey results at Yap Port and the surrounding area (April 26-May 3, 2023)

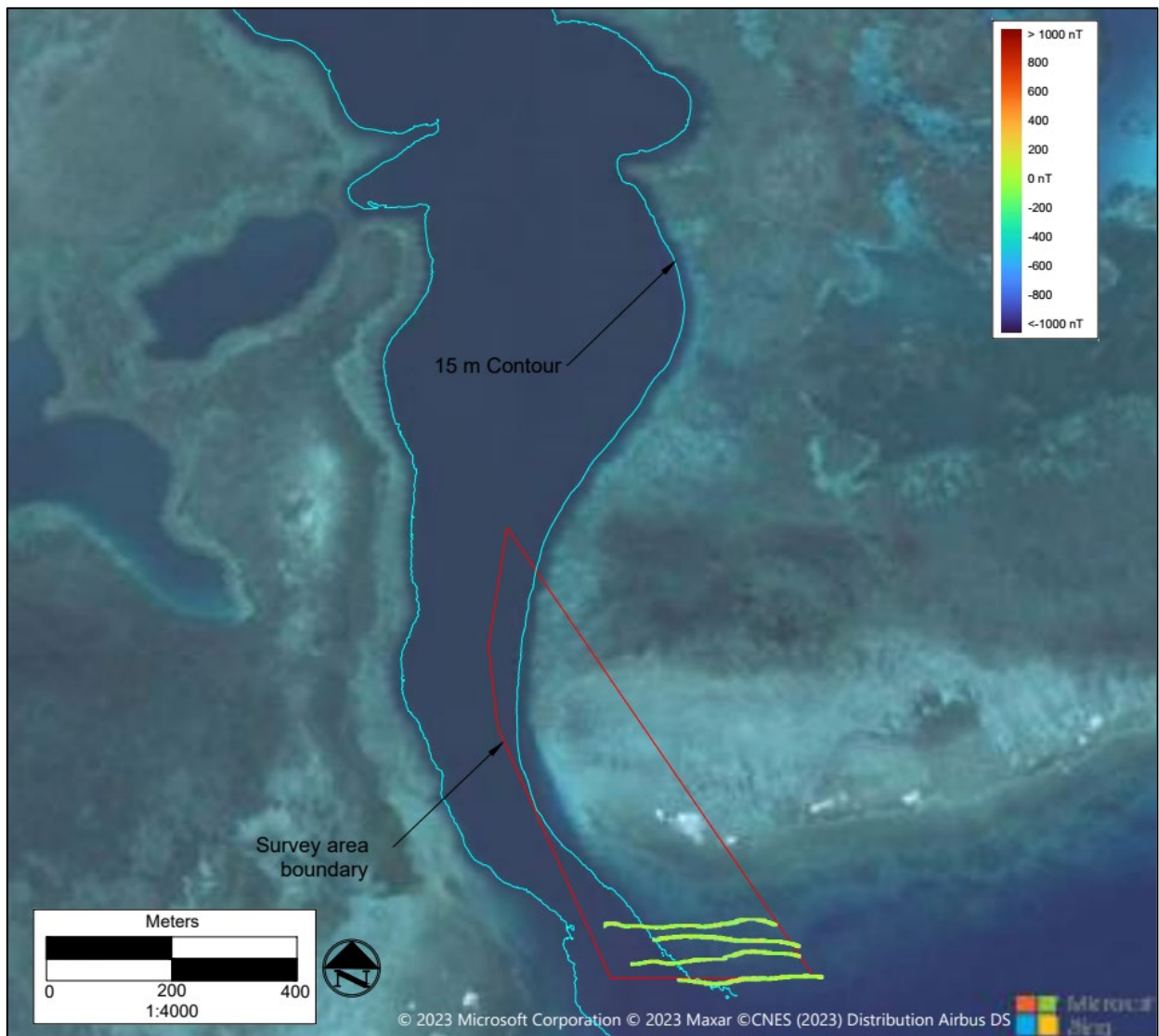


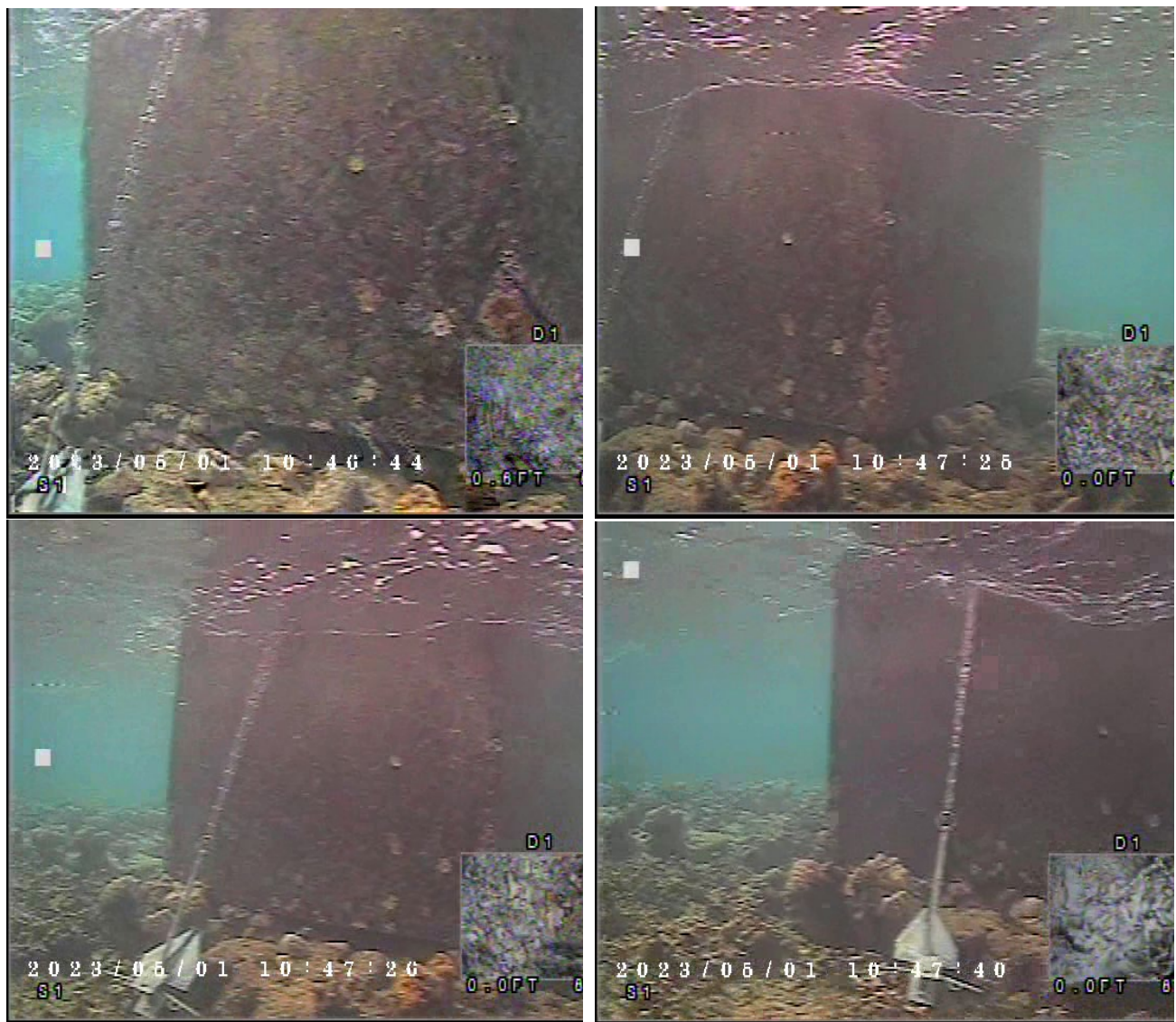
Figure 3-8. Yap magnetometer survey results in Tamil Channel (April 26-May 3, 2023)





Figure 3-9. Navigation aids in Yap Port and Tamil Channel where drop camera surveys were conducted





**Figure 3-10. Typical environment for navigation aids in Tamil Channel. Still images of Channel Marker GREEN 11, facing northeast (May 1, 2023)**





Figure 3-11. Typical environment for navigation aids at the Tamil Channel Entrance. Still images of Channel Marker RED 2, facing southwest (May 2, 2023)

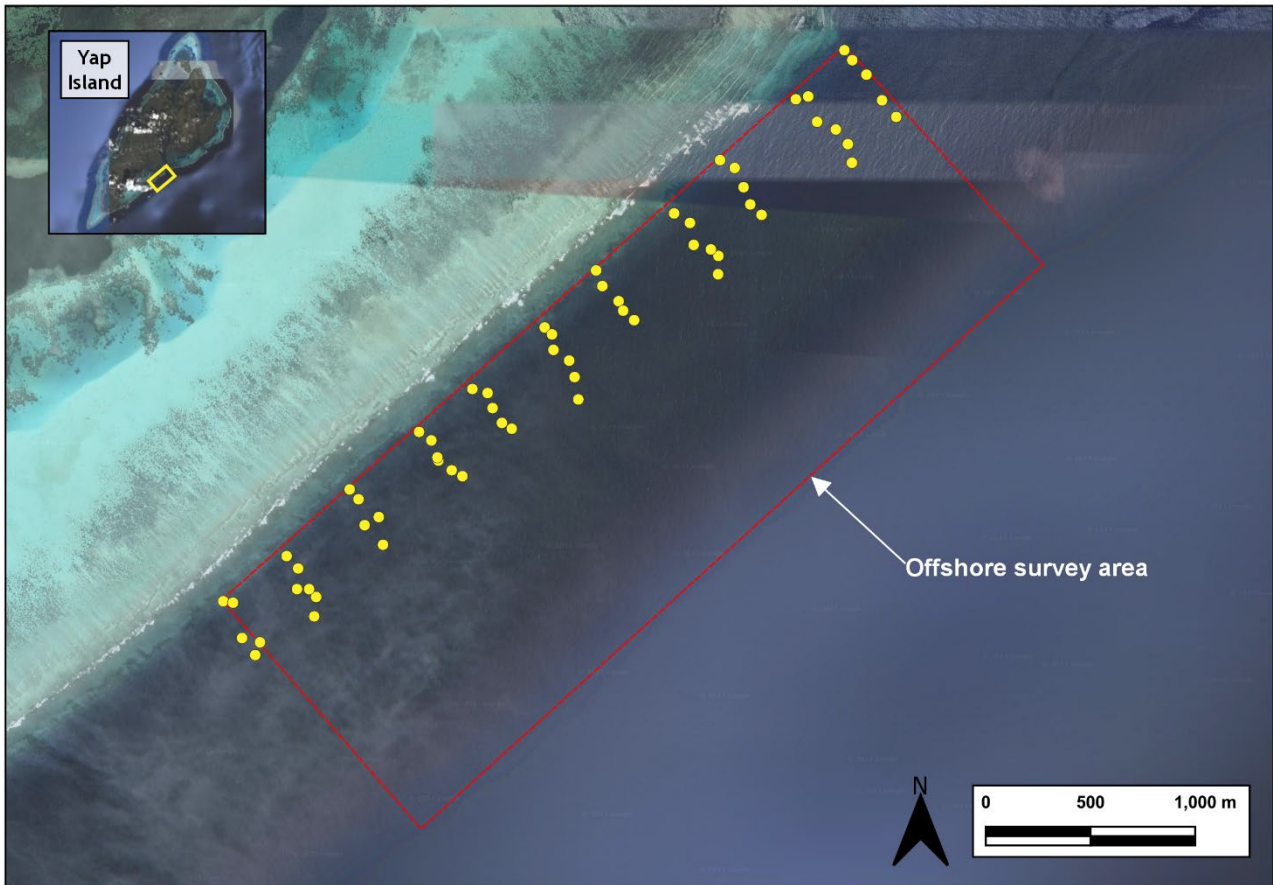
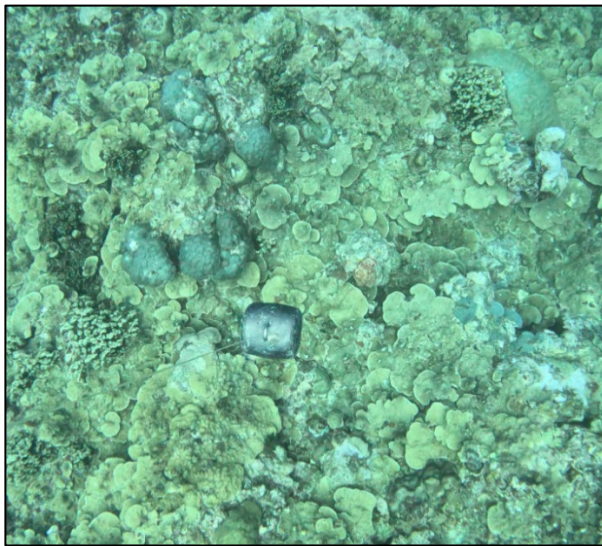
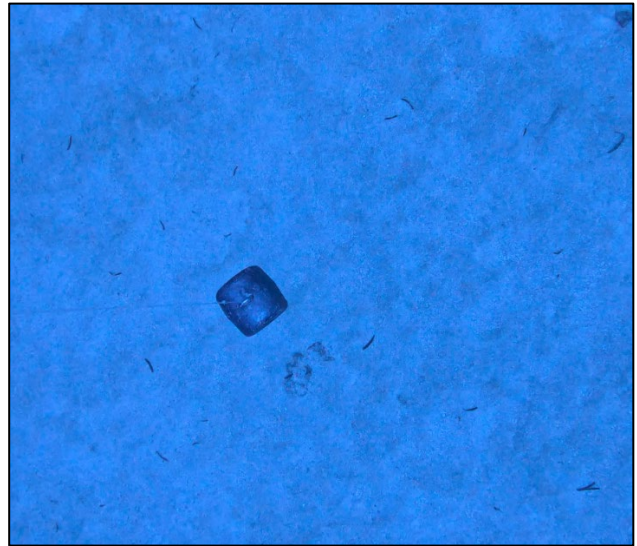


Figure 3-12 Deepwater drop camera survey points and survey area boundary





(a)

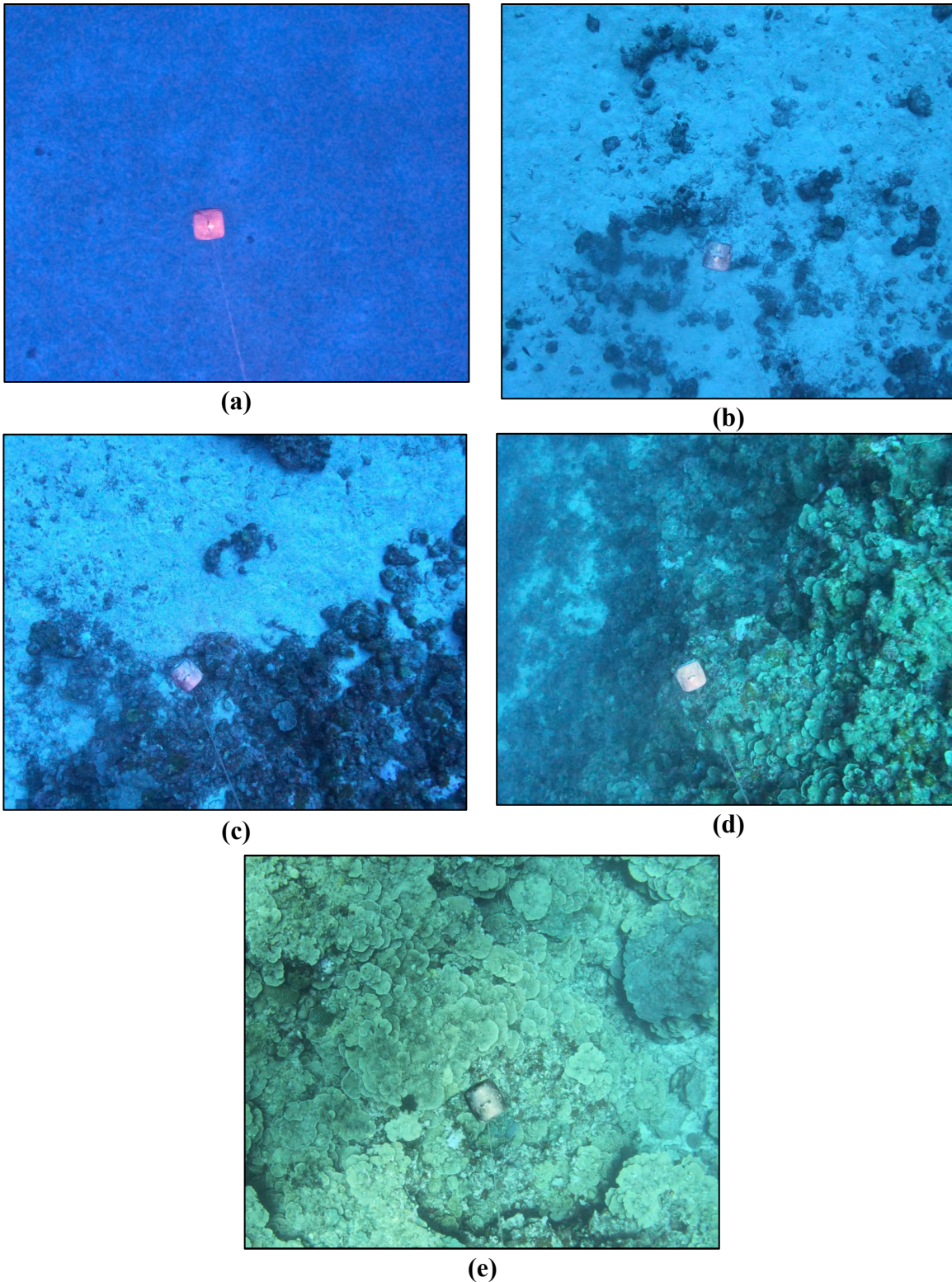


(b)



(c)

**Figure 3-13. Different bottom types observed in the deepwater drop camera survey: (a) typical coral covered seafloor; (b) typical sandy bottom; (c) typical sparse coral/rock/sand seafloor**



**Figure 3-14. Examples of coral gradation used to determine spatial distribution of coral cover in the offshore survey area**

(a) 0% (b) < 25% (c) 25%-50% (d) 50%-75% (e) 75%-100%



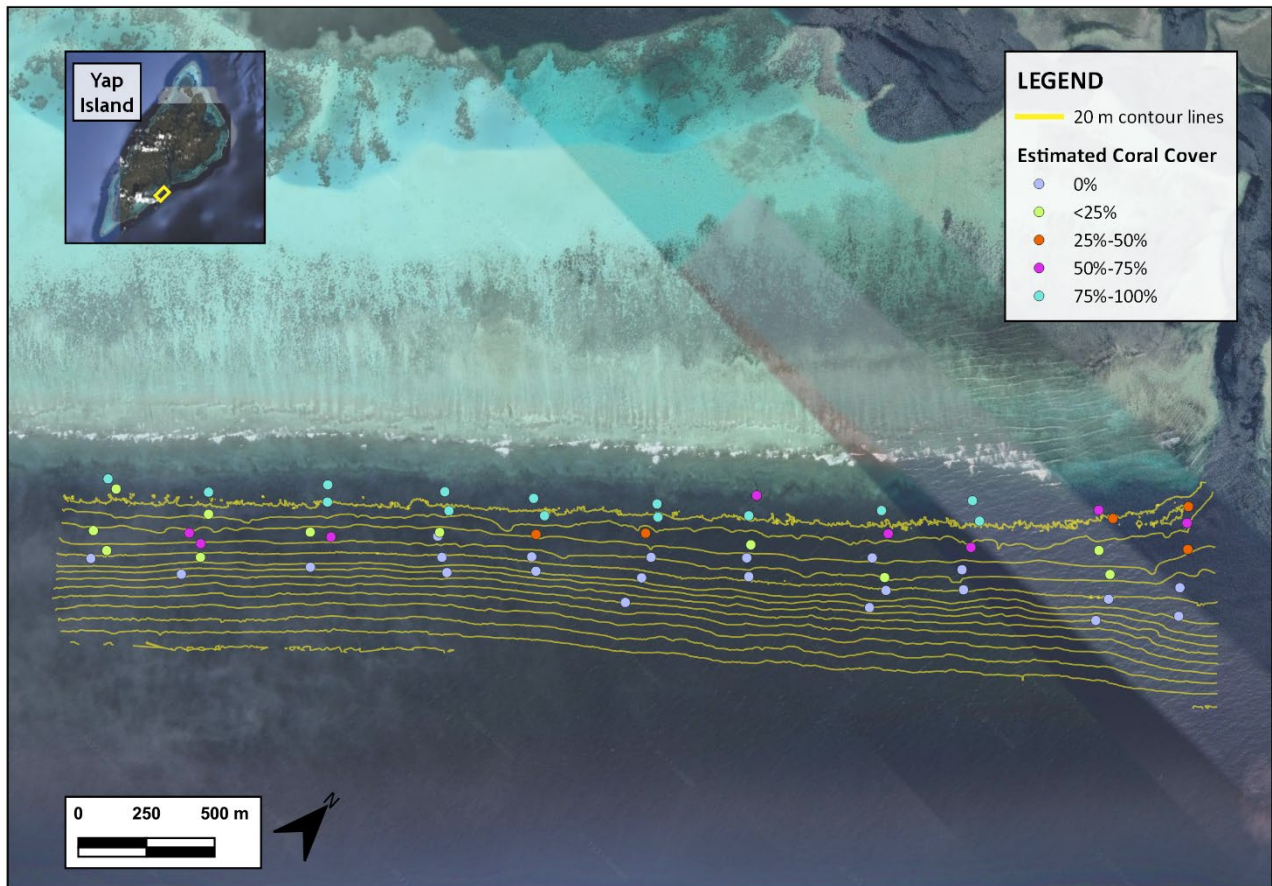


Figure 3-15. Estimated approximate coral cover at the deepwater drop camera survey locations.  
Contours are at 20-meter intervals

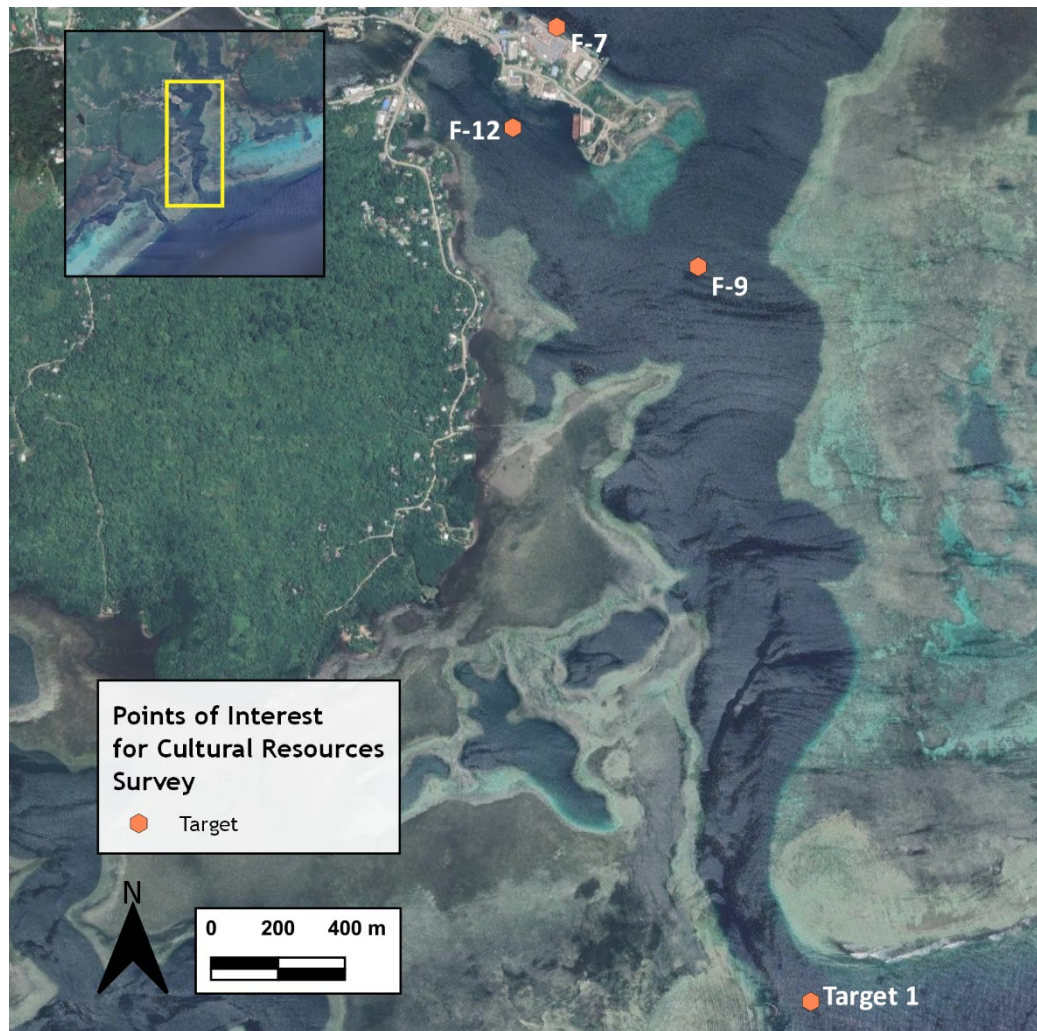
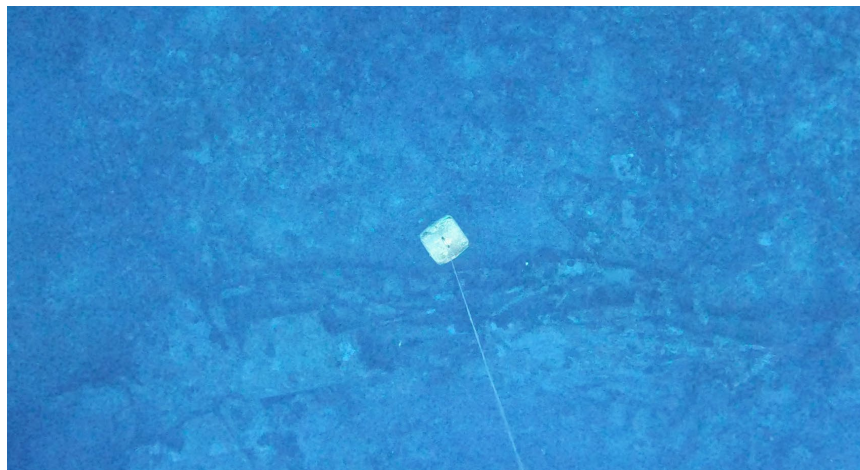
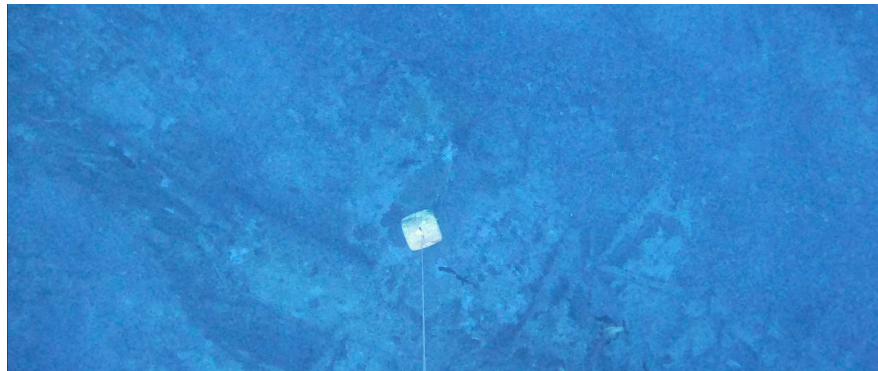
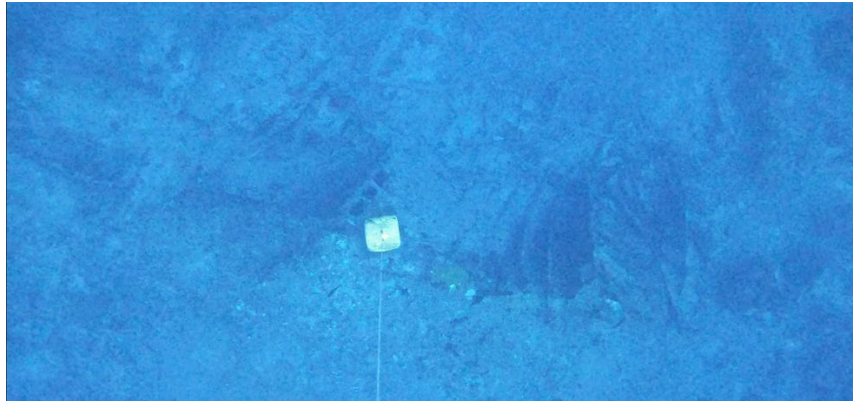


Figure 3-16. Targets investigated for the Cultural Resources Team in Yap Harbor and at the Tamil Channel Entrance





**Figure 3-17. Target 1 of interest identified by the Cultural Resources Team, investigated with the deepwater drop camera setup on May 9, 2023.**

**This target is thought to be remnants of a German vessel from World War I era**



(a)



(b)



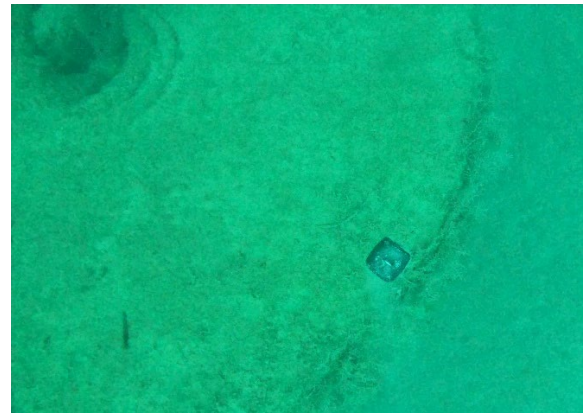
(c)

**Figure 3-18. Target 2 of interest identified by the Cultural Resources Team investigated with the deepwater drop camera setup on May 10, 2023**

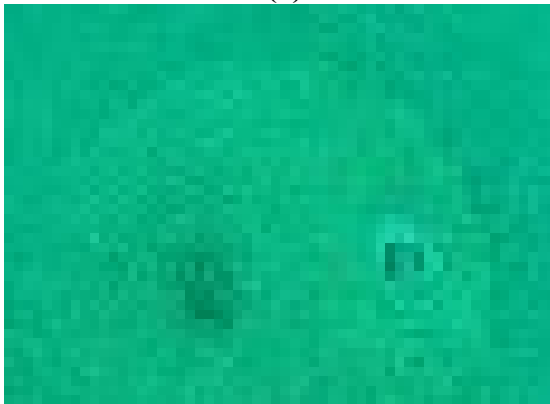




(a)



(b)



(c)



(d)

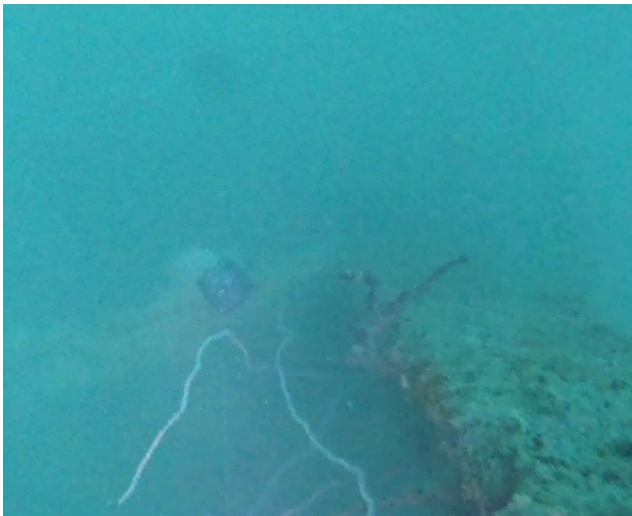
**Figure 3-19. Target 3 of interest identified by the Cultural Resources Team investigated with the deepwater drop camera setup on May 10, 2023**



(a)



(b)



(c)



(d)

**Figure 3-20. Target 4 of interest identified by the Cultural Resources Team investigated with the deepwater drop camera setup on May 10, 2023**

#### **4. REFERENCES**

Naval Oceanographic Office, (2019). Tidal Data Processing Report FST Archive No. 19FSM02, Yap Island, Federated States of Micronesia

## **Appendix B**

### **Survey Data Tables**



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## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	90
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	60
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Alveopora	Coral	110
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	85
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	165
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Stylophora	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	3
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	32
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	65
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	90
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	150
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites lobata	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	190
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Leptastrea	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	235
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	110
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Favites	Coral	2
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	150
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites lobata	Coral	7
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	41
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Sponge	Sponge	5
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	190
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Goniastrea	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	165
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	65
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	75
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Acropora	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Leptoria	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	110
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Rubble	Rubble	110
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	50
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	70
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	30
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Favia	Coral	50
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Porites rus	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE01	Reef Crest	Dead Coral	Dead Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	150
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Leptastrea	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	85
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Pocillopora	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	10

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Sponge	Sponge	12
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	132
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Fungia	Coral	12
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	174
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	10
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Favites	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Porites lobata	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Rubble	Rubble	355
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Porites lobata	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Rubble	Rubble	90
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Sponge	Sponge	25
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Rubble	Rubble	40
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Psammocora	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Goniastrea	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Hydnophora	Coral	2
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	53
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Leptoria	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	55
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Porites rus	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Porites cylindrica	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Porites rus	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	60
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Porites rus	Coral	105
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	75
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Leptastrea	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	130
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Rubble	Rubble	190
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Favia	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Rubble	Rubble	90
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	130
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Leptastrea	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Goniastrea	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Rubble	Rubble	170
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	85
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Porites lobata	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Leptoria	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Porites lobata	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	135
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Porites lobata	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Favia	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	98
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Porites lobata	Coral	2
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Porites lobata	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Dead Coral	Dead Coral	50
4/28/2023	Tamil Channel Entrance (East)	ECE02	Reef Crest	Rubble	Rubble	60
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	30

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Leptoria	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	85
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Sponge	Sponge	25
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	84
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Favites	Coral	4
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	116
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Favites	Coral	2
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Montastrea	Coral	4
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	4
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Favites	Coral	6
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	6
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	179
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Favia	Coral	9
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	39
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Acropora	Coral	3
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	9
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Favia	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	185
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Acropora	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Sand	Sand	20
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Favia	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	310
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Porites lobata	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	50
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Porites lobata	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	110
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Leptoria	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	220
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	15
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	195
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Sand	Sand	480
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Porites lobata	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Sand	Sand	320
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Porites lobata	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Favia	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Dead Coral	Dead Coral	190
4/28/2023	Tamil Channel Entrance (East)	ECE03	Reef Flat	Sand	Sand	110
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Dead Coral	Dead Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Favia	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Dead Coral	Dead Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Favites	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Sand	Sand	178
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Dead Coral	Dead Coral	177
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Montastrea	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Dead Coral	Dead Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	15
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Dead Coral	Dead Coral	210
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Porites cylindrica	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Dead Coral	Dead Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Rubble / Sand	Rubble / Sand	440
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Sand	Sand	210
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Dead Coral	Dead Coral	280



## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Sponge	Sponge	10
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Dead Coral	Dead Coral	70
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Sand	Sand	70
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Rubble	Rubble	30
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Sand	Sand	30
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Dead Coral	Dead Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Pocillopora	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Dead Coral	Dead Coral	285
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	20
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Dead Coral	Dead Coral	340
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Sand	Sand	100
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Dead Coral	Dead Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Porites lobata	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Dead Coral	Dead Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Sand	Sand	50
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Pavona	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE04	Reef Flat	Sand	Sand	180
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble	Rubble	345
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Porites lobata	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble / Sand	Rubble / Sand	10
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Porites lobata	Coral	2
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble / Sand	Rubble / Sand	23
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Porites lobata	Coral	7
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble / Sand	Rubble / Sand	4
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Porites lobata	Coral	9
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble / Sand	Rubble / Sand	25
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Porites lobata	Coral	7
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	38
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Porites lobata	Coral	3
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	22
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Porites lobata	Coral	18
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Sand	Sand	6
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Porites lobata	Coral	3
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Sand	Sand	538
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Porites lobata	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Sand	Sand	340
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Algae	Algae	13
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble / Sand	Rubble / Sand	2
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Goniastrea	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble / Sand	Rubble / Sand	166
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Favites	Coral	7
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble	Rubble	222
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Porites Rus	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble	Rubble	10
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	15
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble	Rubble	62
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Porites	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble	Rubble	16
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Goniastrea	Coral	12
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble	Rubble	8
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Sponge	Sponge	7
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble	Rubble	10
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Porites lobata	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble	Rubble	110
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Porites lobata	Coral	10

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble	Rubble	709
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Pocillopora	Coral	11
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble	Rubble	43
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Clam	Clam	2
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Acropora	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE05	Reef Flat	Rubble	Rubble	60
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Rubble	Rubble	95
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Sand	Sand	7
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites	Coral	110
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Dead Coral	Dead Coral	18
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Sand	Sand	60
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Rubble	Rubble	240
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Favia	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Montastrea	Coral	50
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Dead Coral	Dead Coral	92
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Clam	Clam	13
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Sand	Sand	190
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites	Coral	38
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites rus	Coral	19
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Dead Coral	Dead Coral	23
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites rus	Coral	64
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites lobata	Coral	36
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Dead Coral	Dead Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites lobata	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Sand	Sand	350
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Dead Coral	Dead Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites lobata	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Dead Coral	Dead Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites rus	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Dead Coral	Dead Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites lobata	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites rus	Coral	45
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Sand	Sand	12
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites lobata	Coral	17
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Sand	Sand	61
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites lobata	Coral	67
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Dead Coral	Dead Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites lobata	Coral	83
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Dead Coral	Dead Coral	2
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites lobata	Coral	6
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Dead Coral	Dead Coral	4
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites lobata	Coral	3
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Dead Coral	Dead Coral	8
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites lobata	Coral	7
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Sand	Sand	490
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Dead Coral	Dead Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites rus	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Dead Coral	Dead Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Sand	Sand	40
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites rus	Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Dead Coral	Dead Coral	183
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites lobata	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE07	Reef Crest	Porites rus	Coral	227
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites rus	Coral	110

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Rubble	Rubble	390
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	10
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites rus	Coral	92
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites lobata	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites rus	Coral	100
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	2
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites lobata	Coral	21
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites rus	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites lobata	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Sand	Sand	235
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites lobata	Coral	65
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Dead Coral	Dead Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites lobata	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Dead Coral	Dead Coral	65
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites lobata	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Dead Coral	Dead Coral	8
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Favites	Coral	2
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites lobata	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Dead Coral	Dead Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites lobata	Coral	70
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Rubble	Rubble	470
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites cylindrica	Coral	160
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites lobata	Coral	100
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites rus	Coral	130
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Montastrea	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites lobata	Coral	100
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Dead Coral	Dead Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites lobata	Coral	110
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Dead Coral	Dead Coral	150
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Porites lobata	Coral	90
4/28/2023	Tamil Channel Entrance (East)	ECE06	Reef Crest	Rubble	Rubble	350
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Dead Coral	Dead Coral	70
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites rus	Coral	195
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Sand	Sand	20
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites cylindrica	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites rus	Coral	45
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites cylindrica	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites cylindrica	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Dead Coral	Dead Coral	8
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites rus	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites cylindrica	Coral	207
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites rus	Coral	70
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Dead Coral	Dead Coral	65
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Fungia	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Dead Coral	Dead Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites rus	Coral	45
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites cylindrica	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites rus	Coral	188
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites rus	Coral	332
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Dead Coral	Dead Coral	80
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites cylindrica	Coral	320
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Sponge	Sponge	60
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Rubble	Rubble	120
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites cylindrica	Coral	170
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites lobata	Coral	10

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites rus	Coral	450
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Sponge	Sponge	60
4/28/2023	Tamil Channel Entrance (East)	ECE08	Reef Crest	Porites cylindrica	Coral	410
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	45
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Dead Coral	Dead Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites cylindrica	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Psammocora	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Psammocora	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Psammocora	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Dead Coral	Dead Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Algae	Algae	5
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Psammocora	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Dead Coral	Dead Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Dead Coral	Dead Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites cylindrica	Coral	50
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Dead Coral	Dead Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	85
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Dead Coral	Dead Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites cylindrica	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	85
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Dead Coral	Dead Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Dead Coral	Dead Coral	70
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	100
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites cylindrica	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Dead Coral	Dead Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites cylindrica	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites cylindrica	Coral	110
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Dead Coral	Dead Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	355
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	10
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	60
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	35
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	25
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	70
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	50
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	60



## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	30
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	80
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	100
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	25
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	120
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	45
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	15
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	65
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	5
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites cylindrica	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	90
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	40
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	15
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	45
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	10
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Rubble	Rubble	35
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites cylindrica	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE09	Reef Crest	Porites rus	Coral	155
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	60
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites rus	Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	50
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites rus	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites lobata	Coral	55
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites cylindrica	Coral	45
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites lobata	Coral	91
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites cylindrica	Coral	14
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites lobata	Coral	50
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites lobata	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	70
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites lobata	Coral	45
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	200
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Sand	Sand	90
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Favia	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	70
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites cylindrica	Coral	175
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites lobata	Coral	125
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites cylindrica	Coral	95
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Sand	Sand	15
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites rus	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Sand	Sand	10
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites rus	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	55
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites cylindrica	Coral	30

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites rus	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites cylindrica	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites rus	Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites lobata	Coral	85
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites rus	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites cylindrica	Coral	80
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites rus	Coral	110
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Algae	Algae	2
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites rus	Coral	48
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites cylindrica	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites rus	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Pachyseris	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites rus	Coral	60
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Pachyseris	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites rus	Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites lobata	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites cylindrica	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites rus	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Sand	Sand	30
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites cylindrica	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites lobata	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites lobata	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites lobata	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	85
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites lobata	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites lobata	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites cylindrica	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites cylindrica	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites rus	Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites cylindrica	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites cylindrica	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Porites cylindrica	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Pavona	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Dead Coral	Dead Coral	250
4/28/2023	Tamil Channel Entrance (East)	ECE10	Reef Crest	Rubble / Sand	Rubble / Sand	60
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites Cylindrica	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites Cylindrica	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites Cylindrica	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites Cylindrica	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	20

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites Cylindrica	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	45
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	5
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	20
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	90
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	80
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Sand	Sand	60
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites lobata	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Sand	Sand	180
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites lobata	Coral	60
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	10
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites lobata	Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	60
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Rubble	Rubble	10
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Sand	Sand	40
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Pachyseris	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites lobata	Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites lobata	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites Cylindrica	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	18
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Favia	Coral	2
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites lobata	Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites Cylindrica	Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites lobata	Coral	90
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Goniastrea	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites lobata	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	45
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites lobata	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites Cylindrica	Coral	105
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	45
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites Cylindrica	Coral	50
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Sand	Sand	30
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites cylindrica	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites lobata	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	120
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Sand	Sand	20
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	85
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	80
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites lobata	Coral	55
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites lobata	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites cylindrica	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	65

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites cylindrica	Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites cylindrica	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	105
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites cylindrica	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Sponge	Sponge	5
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Algae	Algae	5
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Rubble	Rubble	20
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites cylindrica	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites cylindrica	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Rubble	Rubble	5
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites cylindrica	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Rubble	Rubble	10
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Rubble	Rubble	75
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Rubble	Rubble	40
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites lobata	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites lobata	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Dead Coral	Dead Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites rus	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE11	Reef Crest	Porites cylindrica	Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites lobata	Coral	60
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites rus	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	55
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites rus	Coral	45
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	115
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	10
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites lobata	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	25
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	55
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	60
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites lobata	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	90
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites lobata	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	90
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Sand	Sand	100
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	90



## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Algae	Algae	2
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	48
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Sponge	Sponge	5
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	100
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Algae	Algae	10
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Sand	Sand	120
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	130
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Rubble	Rubble	10
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Sand	Sand	160
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites lobata	Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Sand	Sand	30
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites lobata	Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Goniastrea	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites lobata	Coral	25
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	80
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	120
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites lobata	Coral	10
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	15
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites lobata	Coral	40
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Sand	Sand	235
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites lobata	Coral	70
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Sand	Sand	20
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Rubble	Rubble	140
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites lobata	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	35
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Rubble	Rubble	10
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	5
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Rubble	Rubble	10
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Rubble	Rubble	40
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites cylindrica	Coral	20
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Dead Coral	Dead Coral	80
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Porites lobata	Coral	30
4/28/2023	Tamil Channel Entrance (East)	ECE12	Reef Crest	Rubble	Rubble	40
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	25
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites rus	Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	15
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites rus	Coral	40
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sponge	Sponge	5
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sponge	Sponge	5
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sponge	Sponge	8
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	57
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	15
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	25
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Pocillopora	Coral	6

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	33
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sand	Sand	51
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	35
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sand	Sand	40
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sand	Sand	70
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	42
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites rus	Coral	6
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	27
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	25
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sand	Sand	30
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites rus	Coral	13
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites rus	Coral	22
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites rus	Coral	25
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites rus	Coral	60
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites lobata	Coral	40
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites rus	Coral	30
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites lobata	Coral	50
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites rus	Coral	15
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Leptoria	Coral	15
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sessile Invert	Sessile Invertebrate	20
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites lobata	Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Galaxea	Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Montipora	Coral	150
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Montipora	Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Montipora	Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sponge	Sponge	20
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Montipora	Coral	55
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Favia	Coral	5
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sponge	Sponge	20
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sand	Sand	40
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	30
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Leptoria	Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites lobata	Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sponge	Sponge	25
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sessile Invert	Sessile Invertebrate	5
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Goniastrea	Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Montastrea	Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sand	Sand	90
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	35
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Leptoria	Coral	5
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	30
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	15
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	75
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Rubble	Rubble	20
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites lobata	Coral	40
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sand	Sand	55

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Turbinaria	Coral	15
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	25
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites rus	Coral	50
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Diploastrea	Coral	35
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites rus	Coral	60
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	25
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sponge	Sponge	5
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Diploastrea	Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	50
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Pavona	Coral	15
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sand	Sand	80
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	5
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Montastrea	Coral	5
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	55
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Leptoria	Coral	15
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sponge	Sponge	15
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sessile Invert	Sessile Invertebrate	20
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sand	Sand	30
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	60
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Rubble	Rubble	20
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	35
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sponge	Sponge	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Rubble	Rubble	100
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	90
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Montastrea	Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	45
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Porites rus	Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	40
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Leptastrea	Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	50
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sessile Invert	Sessile Invertebrate	20
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	60
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sponge	Sponge	30
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Goniastrea	Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Dead Coral	Dead Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW01	Reef Crest	Sponge	Sponge	10
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Dead Coral	Dead Coral	55
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Acropora	Coral	15
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Dead Coral	Dead Coral	70
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Leptoria	Coral	30
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Rubble	Rubble	100
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites rus	Coral	50
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Dead Coral	Dead Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites rus	Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Sand	Sand	270
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Leptoria	Coral	80
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Dead Coral	Dead Coral	30
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	20
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Dead Coral	Dead Coral	40
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	20
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Leptoria	Coral	12
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites rus	Coral	133

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites lobata	Coral	65
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Rubble	Rubble	30
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites rus	Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Rubble	Rubble	70
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites rus	Coral	60
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites lobata	Coral	135
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	5
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Sponge	Sponge	5
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Diploastrea	Coral	25
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites lobata	Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Dead Coral	Dead Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites lobata	Coral	30
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Rubble	Rubble	20
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites lobata	Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Dead Coral	Dead Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites lobata	Coral	40
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites rus	Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Diploastrea	Coral	30
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites rus	Coral	85
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Diploastrea	Coral	50
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites rus	Coral	235
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Diploastrea	Coral	80
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Dead Coral	Dead Coral	30
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites rus	Coral	335
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Dead Coral	Dead Coral	25
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites rus	Coral	100
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites lobata	Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Rubble	Rubble	20
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites rus	Coral	240
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Dead Coral	Dead Coral	35
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites rus	Coral	125
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Dead Coral	Dead Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Sponge	Sponge	0
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites lobata	Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Dead Coral	Dead Coral	5
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Sponge	Sponge	5
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Dead Coral	Dead Coral	5
4/29/2023	Tamil Channel Entrance (West)	ECW02	Reef Crest	Porites rus	Coral	15
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Montipora	Coral	23
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Dead Coral	Dead Coral	67
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Montipora	Coral	15
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Dead Coral	Dead Coral	25
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Sand	Sand	40
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Dead Coral	Dead Coral	30
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Sand	Sand	100
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Dead Coral	Dead Coral	40
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Sponge	Sponge	6
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Dead Coral	Dead Coral	74
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites lobata	Coral	90
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Sessile Invert	Sessile Invertebrate	6
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites lobata	Coral	94
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Dead Coral	Dead Coral	90
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Montipora	Coral	75
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Algae	Algae	109
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Montipora	Coral	251



## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites lobata	Coral	105
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Montipora	Coral	45
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Sand	Sand	55
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Sponge	Sponge	3
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Rubble	Rubble	37
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites rus	Coral	55
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Dead Coral	Dead Coral	45
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Rubble	Rubble	55
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Leptoseris	Coral	5
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Leptastrea	Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Sand	Sand	10
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites rus	Coral	350
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Sponge	Sponge	20
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites rus	Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Dead Coral	Dead Coral	35
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites rus	Coral	35
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Sponge	Sponge	15
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites rus	Coral	125
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites lobata	Coral	30
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Dead Coral	Dead Coral	70
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites lobata	Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Sponge	Sponge	10
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites rus	Coral	30
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites lobata	Coral	40
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Sponge	Sponge	60
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites lobata	Coral	30
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites rus	Coral	70
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites lobata	Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Dead Coral	Dead Coral	10
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites lobata	Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Sponge	Sponge	10
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites lobata	Coral	50
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Sand	Sand	10
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites lobata	Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Dead Coral	Dead Coral	30
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites rus	Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Dead Coral	Dead Coral	20
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Sponge	Sponge	30
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Dead Coral	Dead Coral	35
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites rus	Coral	40
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Porites lobata	Coral	30
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Dead Coral	Dead Coral	65
4/29/2023	Tamil Channel Entrance (West)	ECW03	Reef Crest	Sand	Sand	70
4/30/2023	Yap Port	YP01	Inner Reef	Rubble	Rubble	1220
4/30/2023	Yap Port	YP01	Inner Reef	Porites cylindrica	Coral	85
4/30/2023	Yap Port	YP01	Inner Reef	Sand	Sand	115
4/30/2023	Yap Port	YP01	Inner Reef	Porites cylindrica	Coral	40
4/30/2023	Yap Port	YP01	Inner Reef	Rubble	Rubble	220
4/30/2023	Yap Port	YP01	Inner Reef	Porites cylindrica	Coral	30
4/30/2023	Yap Port	YP01	Inner Reef	Sand	Sand	30
4/30/2023	Yap Port	YP01	Inner Reef	Porites cylindrica	Coral	60
4/30/2023	Yap Port	YP01	Inner Reef	Porites cylindrica	Coral	80
4/30/2023	Yap Port	YP01	Inner Reef	Porites rus	Coral	20
4/30/2023	Yap Port	YP01	Inner Reef	Porites lobata	Coral	30
4/30/2023	Yap Port	YP01	Inner Reef	Porites cylindrica	Coral	90

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/30/2023	Yap Port	YP01	Inner Reef	Rubble	Rubble	20
4/30/2023	Yap Port	YP01	Inner Reef	Porites cylindrica	Coral	20
4/30/2023	Yap Port	YP01	Inner Reef	Porites lobata	Coral	45
4/30/2023	Yap Port	YP01	Inner Reef	Favia	Coral	10
4/30/2023	Yap Port	YP01	Inner Reef	Leptastrea	Coral	5
4/30/2023	Yap Port	YP01	Inner Reef	Porites lobata	Coral	20
4/30/2023	Yap Port	YP01	Inner Reef	Dead Coral	Dead Coral	10
4/30/2023	Yap Port	YP01	Inner Reef	Porites lobata	Coral	10
4/30/2023	Yap Port	YP01	Inner Reef	Rubble	Rubble	65
4/30/2023	Yap Port	YP01	Inner Reef	Sand	Sand	15
4/30/2023	Yap Port	YP01	Inner Reef	Favia	Coral	10
4/30/2023	Yap Port	YP01	Inner Reef	Rubble	Rubble	30
4/30/2023	Yap Port	YP01	Inner Reef	Porites cylindrica	Coral	80
4/30/2023	Yap Port	YP01	Inner Reef	Porites rus	Coral	10
4/30/2023	Yap Port	YP01	Inner Reef	Porites lobata	Coral	50
4/30/2023	Yap Port	YP01	Inner Reef	Porites cylindrica	Coral	180
4/30/2023	Yap Port	YP01	Inner Reef	Sand	Sand	110
4/30/2023	Yap Port	YP01	Inner Reef	Porites rus	Coral	10
4/30/2023	Yap Port	YP01	Inner Reef	Sand	Sand	50
4/30/2023	Yap Port	YP01	Inner Reef	Porites lobata	Coral	20
4/30/2023	Yap Port	YP01	Inner Reef	Sand	Sand	130
4/30/2023	Yap Port	YP01	Inner Reef	Porites cylindrica	Coral	35
4/30/2023	Yap Port	YP01	Inner Reef	Porites lobata	Coral	25
4/30/2023	Yap Port	YP01	Inner Reef	Rubble	Rubble	20
4/30/2023	Yap Port	YP02	Inner Reef	Porites lobata	Coral	15
4/30/2023	Yap Port	YP02	Inner Reef	Favia	Coral	30
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	160
4/30/2023	Yap Port	YP02	Inner Reef	Porites Cylindrica	Coral	30
4/30/2023	Yap Port	YP02	Inner Reef	Sand	Sand	135
4/30/2023	Yap Port	YP02	Inner Reef	Favia	Coral	35
4/30/2023	Yap Port	YP02	Inner Reef	Porites Cylindrica	Coral	205
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	130
4/30/2023	Yap Port	YP02	Inner Reef	Porites Cylindrica	Coral	120
4/30/2023	Yap Port	YP02	Inner Reef	Porites cylindrica	Coral	130
4/30/2023	Yap Port	YP02	Inner Reef	Pachyseris	Coral	110
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	30
4/30/2023	Yap Port	YP02	Inner Reef	Fungia	Coral	10
4/30/2023	Yap Port	YP02	Inner Reef	Porites Cylindrica	Coral	195
4/30/2023	Yap Port	YP02	Inner Reef	Dead Coral	Dead Coral	15
4/30/2023	Yap Port	YP02	Inner Reef	Favia	Coral	20
4/30/2023	Yap Port	YP02	Inner Reef	Porites Cylindrica	Coral	180
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	40
4/30/2023	Yap Port	YP02	Inner Reef	Porites Cylindrica	Coral	55
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	35
4/30/2023	Yap Port	YP02	Inner Reef	Dead Coral	Dead Coral	80
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	50
4/30/2023	Yap Port	YP02	Inner Reef	Porites Cylindrica	Coral	40
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	20
4/30/2023	Yap Port	YP02	Inner Reef	Porites cylindrica	Coral	25
4/30/2023	Yap Port	YP02	Inner Reef	Favites	Coral	15
4/30/2023	Yap Port	YP02	Inner Reef	Favia	Coral	5
4/30/2023	Yap Port	YP02	Inner Reef	Dead Coral	Dead Coral	5
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	15
4/30/2023	Yap Port	YP02	Inner Reef	Porites cylindrica	Coral	25
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	20

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/30/2023	Yap Port	YP02	Inner Reef	Porites cylindrica	Coral	30
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	25
4/30/2023	Yap Port	YP02	Inner Reef	Porites cylindrica	Coral	20
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	10
4/30/2023	Yap Port	YP02	Inner Reef	Porites cylindrica	Coral	15
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	10
4/30/2023	Yap Port	YP02	Inner Reef	Porites cylindrica	Coral	5
4/30/2023	Yap Port	YP02	Inner Reef	Sand	Sand	15
4/30/2023	Yap Port	YP02	Inner Reef	Porites cylindrica	Coral	10
4/30/2023	Yap Port	YP02	Inner Reef	Dead Coral	Dead Coral	50
4/30/2023	Yap Port	YP02	Inner Reef	Porites cylindrica	Coral	20
4/30/2023	Yap Port	YP02	Inner Reef	Favites	Coral	5
4/30/2023	Yap Port	YP02	Inner Reef	Sponge	Sponge	75
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	5
4/30/2023	Yap Port	YP02	Inner Reef	Sponge	Sponge	15
4/30/2023	Yap Port	YP02	Inner Reef	Favia	Coral	5
4/30/2023	Yap Port	YP02	Inner Reef	Sponge	Sponge	20
4/30/2023	Yap Port	YP02	Inner Reef	Montipora	Coral	5
4/30/2023	Yap Port	YP02	Inner Reef	Sand	Sand	40
4/30/2023	Yap Port	YP02	Inner Reef	Sponge	Sponge	50
4/30/2023	Yap Port	YP02	Inner Reef	Porites lobata	Coral	25
4/30/2023	Yap Port	YP02	Inner Reef	Acropora	Coral	5
4/30/2023	Yap Port	YP02	Inner Reef	Sponge	Sponge	40
4/30/2023	Yap Port	YP02	Inner Reef	Dead Coral	Dead Coral	25
4/30/2023	Yap Port	YP02	Inner Reef	Favia	Coral	5
4/30/2023	Yap Port	YP02	Inner Reef	Dead Coral	Dead Coral	10
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	90
4/30/2023	Yap Port	YP02	Inner Reef	Goniastrea	Coral	10
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	90
4/30/2023	Yap Port	YP02	Inner Reef	Favia	Coral	30
4/30/2023	Yap Port	YP02	Inner Reef	Rubble	Rubble	220
4/30/2023	Yap Port	YP02	Inner Reef	Favia	Coral	5
4/30/2023	Yap Port	YP02	Inner Reef	Sponge	Sponge	15
4/30/2023	Yap Port	YP02	Inner Reef	Favia	Coral	20
4/30/2023	Yap Port	YP03	Inner Reef	Sand	Sand	675
4/30/2023	Yap Port	YP03	Inner Reef	Algae	Algae	75
4/30/2023	Yap Port	YP03	Inner Reef	Rubble	Rubble	270
4/30/2023	Yap Port	YP03	Inner Reef	Algae	Algae	30
4/30/2023	Yap Port	YP03	Inner Reef	Sand	Sand	567
4/30/2023	Yap Port	YP03	Inner Reef	Algae	Algae	63
4/30/2023	Yap Port	YP03	Inner Reef	Rubble	Rubble	486
4/30/2023	Yap Port	YP03	Inner Reef	Algae	Algae	54
4/30/2023	Yap Port	YP03	Inner Reef	Sand	Sand	60
4/30/2023	Yap Port	YP03	Inner Reef	Turbinaria	Coral	10
4/30/2023	Yap Port	YP03	Inner Reef	Algae	Algae	20
4/30/2023	Yap Port	YP03	Inner Reef	Favia	Coral	15
4/30/2023	Yap Port	YP03	Inner Reef	Rubble	Rubble	105
4/30/2023	Yap Port	YP03	Inner Reef	Favia	Coral	15
4/30/2023	Yap Port	YP03	Inner Reef	Rubble	Rubble	215
4/30/2023	Yap Port	YP03	Inner Reef	Sand	Sand	180
4/30/2023	Yap Port	YP03	Inner Reef	Dead Coral	Dead Coral	60
4/30/2023	Yap Port	YP03	Inner Reef	Rubble	Rubble	100
4/30/2023	Yap Port	YP04	Inner Reef	Rubble	Rubble	185
4/30/2023	Yap Port	YP04	Inner Reef	Algae	Algae	10
4/30/2023	Yap Port	YP04	Inner Reef	Rubble	Rubble	150

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/30/2023	Yap Port	YP04	Inner Reef	Porites lobata	Coral	21
4/30/2023	Yap Port	YP04	Inner Reef	Sand	Sand	201
4/30/2023	Yap Port	YP04	Inner Reef	Algae	Algae	18
4/30/2023	Yap Port	YP04	Inner Reef	Sand	Sand	145
4/30/2023	Yap Port	YP04	Inner Reef	Algae	Algae	365
4/30/2023	Yap Port	YP04	Inner Reef	Sponge	Sponge	6
4/30/2023	Yap Port	YP04	Inner Reef	Algae	Algae	81
4/30/2023	Yap Port	YP04	Inner Reef	Sand	Sand	993
4/30/2023	Yap Port	YP04	Inner Reef	Algae	Algae	5
4/30/2023	Yap Port	YP04	Inner Reef	Sand	Sand	220
4/30/2023	Yap Port	YP04	Inner Reef	Algae	Algae	5
4/30/2023	Yap Port	YP04	Inner Reef	Rubble	Rubble	122
4/30/2023	Yap Port	YP04	Inner Reef	Seagrass	Seagrass	4
4/30/2023	Yap Port	YP04	Inner Reef	Rubble	Rubble	169
4/30/2023	Yap Port	YP04	Inner Reef	Sand	Sand	190
4/30/2023	Yap Port	YP04	Inner Reef	Rubble	Rubble	110
4/30/2023	Yap Port	YP05	Inner Reef	Rubble	Rubble	35
4/30/2023	Yap Port	YP05	Inner Reef	Acropora	Coral	31
4/30/2023	Yap Port	YP05	Inner Reef	Sand	Sand	4
4/30/2023	Yap Port	YP05	Inner Reef	Porites lobata	Coral	21
4/30/2023	Yap Port	YP05	Inner Reef	Dead Coral	Dead Coral	54
4/30/2023	Yap Port	YP05	Inner Reef	Sponge	Sponge	8
4/30/2023	Yap Port	YP05	Inner Reef	Dead Coral	Dead Coral	51
4/30/2023	Yap Port	YP05	Inner Reef	Montipora	Coral	106
4/30/2023	Yap Port	YP05	Inner Reef	Dead Coral	Dead Coral	105
4/30/2023	Yap Port	YP05	Inner Reef	Porites cylindrica	Coral	26
4/30/2023	Yap Port	YP05	Inner Reef	Dead Coral	Dead Coral	169
4/30/2023	Yap Port	YP05	Inner Reef	Porites cylindrica	Coral	35
4/30/2023	Yap Port	YP05	Inner Reef	Dead Coral	Dead Coral	55
4/30/2023	Yap Port	YP05	Inner Reef	Porites cylindrica	Coral	60
4/30/2023	Yap Port	YP05	Inner Reef	Dead Coral	Dead Coral	11
4/30/2023	Yap Port	YP05	Inner Reef	Montastrea	Coral	27
4/30/2023	Yap Port	YP05	Inner Reef	Favia	Coral	17
4/30/2023	Yap Port	YP05	Inner Reef	Astreopora	Coral	8
4/30/2023	Yap Port	YP05	Inner Reef	Montipora	Coral	8
4/30/2023	Yap Port	YP05	Inner Reef	Favia	Coral	21
4/30/2023	Yap Port	YP05	Inner Reef	Sand	Sand	1088
4/30/2023	Yap Port	YP05	Inner Reef	Dead Coral	Dead Coral	95
4/30/2023	Yap Port	YP05	Inner Reef	Algae	Algae	13
4/30/2023	Yap Port	YP05	Inner Reef	Sand	Sand	19
4/30/2023	Yap Port	YP05	Inner Reef	Algae	Algae	68
4/30/2023	Yap Port	YP05	Inner Reef	Sand	Sand	865
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	82
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	3
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	79
4/30/2023	Yap Port	YP06	Inner Reef	Algae	Algae	16
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	20
4/30/2023	Yap Port	YP06	Inner Reef	Sponge	Sponge	10
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	6
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	4
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	43
4/30/2023	Yap Port	YP06	Inner Reef	Mobile Invert	Mobile Invertebrate	8
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	130
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	18
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	88



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Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	36
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	62
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	10
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	26
4/30/2023	Yap Port	YP06	Inner Reef	Symphyllia	Coral	13
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	64
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	5
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	10
4/30/2023	Yap Port	YP06	Inner Reef	Seagrass	Seagrass	11
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	22
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	10
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	58
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	10
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	55
4/30/2023	Yap Port	YP06	Inner Reef	Porites lobata	Coral	10
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	34
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	8
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	24
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	22
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	30
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	18
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	55
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	585
4/30/2023	Yap Port	YP06	Inner Reef	Sponge	Sponge	15
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	31
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	62
4/30/2023	Yap Port	YP06	Inner Reef	Crustose Coralline Algae	Crustose Coralline Algae	9
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	6
4/30/2023	Yap Port	YP06	Inner Reef	Crustose Coralline Algae	Crustose Coralline Algae	6
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	76
4/30/2023	Yap Port	YP06	Inner Reef	Seagrass	Seagrass	10
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	75
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	50
4/30/2023	Yap Port	YP06	Inner Reef	Seagrass	Seagrass	30
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	15
4/30/2023	Yap Port	YP06	Inner Reef	Sponge	Sponge	10
4/30/2023	Yap Port	YP06	Inner Reef	Montipora	Coral	9
4/30/2023	Yap Port	YP06	Inner Reef	Dead Coral	Dead Coral	41
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	14
4/30/2023	Yap Port	YP06	Inner Reef	Sand	Sand	16
4/30/2023	Yap Port	YP06	Inner Reef	Algae	Algae	6
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	56
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	27
4/30/2023	Yap Port	YP06	Inner Reef	Algae	Algae	60
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	5
4/30/2023	Yap Port	YP06	Inner Reef	Seagrass	Seagrass	10
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	25
4/30/2023	Yap Port	YP06	Inner Reef	Algae	Algae	18
4/30/2023	Yap Port	YP06	Inner Reef	Acropora	Coral	27
4/30/2023	Yap Port	YP06	Inner Reef	Algae	Algae	605
4/30/2023	Yap Port	YP07	Inner Reef	Rubble	Rubble	235
4/30/2023	Yap Port	YP07	Inner Reef	Porites lobata	Coral	55
4/30/2023	Yap Port	YP07	Inner Reef	Dead Coral	Dead Coral	45
4/30/2023	Yap Port	YP07	Inner Reef	Porites lobata	Coral	50
4/30/2023	Yap Port	YP07	Inner Reef	Rubble	Rubble	135

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
4/30/2023	Yap Port	YP07	Inner Reef	Porites rus	Coral	15
4/30/2023	Yap Port	YP07	Inner Reef	Rubble	Rubble	400
4/30/2023	Yap Port	YP07	Inner Reef	Dead Coral	Dead Coral	30
4/30/2023	Yap Port	YP07	Inner Reef	Porites lobata	Coral	15
4/30/2023	Yap Port	YP07	Inner Reef	Rubble	Rubble	1045
4/30/2023	Yap Port	YP07	Inner Reef	Acropora	Coral	25
4/30/2023	Yap Port	YP07	Inner Reef	Rubble	Rubble	150
4/30/2023	Yap Port	YP07	Inner Reef	Sponge	Sponge	10
4/30/2023	Yap Port	YP07	Inner Reef	Rubble	Rubble	10
4/30/2023	Yap Port	YP07	Inner Reef	Favia	Coral	5
4/30/2023	Yap Port	YP07	Inner Reef	Rubble	Rubble	40
4/30/2023	Yap Port	YP07	Inner Reef	Acropora	Coral	5
4/30/2023	Yap Port	YP07	Inner Reef	Rubble	Rubble	20
4/30/2023	Yap Port	YP07	Inner Reef	Acropora	Coral	10
4/30/2023	Yap Port	YP07	Inner Reef	Rubble	Rubble	35
4/30/2023	Yap Port	YP07	Inner Reef	Acropora	Coral	5
4/30/2023	Yap Port	YP07	Inner Reef	Rubble	Rubble	50
4/30/2023	Yap Port	YP07	Inner Reef	Acropora	Coral	30
4/30/2023	Yap Port	YP07	Inner Reef	Rubble	Rubble	190
4/30/2023	Yap Port	YP07	Inner Reef	Dead Coral	Dead Coral	20
4/30/2023	Yap Port	YP07	Inner Reef	Acropora	Coral	10
4/30/2023	Yap Port	YP07	Inner Reef	Rubble	Rubble	30
4/30/2023	Yap Port	YP07	Inner Reef	Acropora	Coral	45
4/30/2023	Yap Port	YP07	Inner Reef	Rubble	Rubble	30
4/30/2023	Yap Port	YP07	Inner Reef	Acropora	Coral	5
4/30/2023	Yap Port	YP07	Inner Reef	Rubble	Rubble	250
5/1/2023	Yap Port	YP08	Inner Reef	Rubble	Rubble	110
5/1/2023	Yap Port	YP08	Inner Reef	Sponge	Sponge	35
5/1/2023	Yap Port	YP08	Inner Reef	Rubble	Rubble	15
5/1/2023	Yap Port	YP08	Inner Reef	Sponge	Sponge	10
5/1/2023	Yap Port	YP08	Inner Reef	Sponge	Sponge	4
5/1/2023	Yap Port	YP08	Inner Reef	Rubble	Rubble	6
5/1/2023	Yap Port	YP08	Inner Reef	Sponge	Sponge	5
5/1/2023	Yap Port	YP08	Inner Reef	Rubble	Rubble	65
5/1/2023	Yap Port	YP08	Inner Reef	Algae	Algae	5
5/1/2023	Yap Port	YP08	Inner Reef	Rubble	Rubble	110
5/1/2023	Yap Port	YP08	Inner Reef	Sponge	Sponge	5
5/1/2023	Yap Port	YP08	Inner Reef	Rubble	Rubble	247
5/1/2023	Yap Port	YP08	Inner Reef	Clam	Clam	8
5/1/2023	Yap Port	YP08	Inner Reef	Rubble	Rubble	265
5/1/2023	Yap Port	YP08	Inner Reef	Sponge	Sponge	30
5/1/2023	Yap Port	YP08	Inner Reef	Rubble	Rubble	20
5/1/2023	Yap Port	YP08	Inner Reef	Sponge	Sponge	130
5/1/2023	Yap Port	YP08	Inner Reef	Dead Coral	Dead Coral	35
5/1/2023	Yap Port	YP08	Inner Reef	Sponge	Sponge	35
5/1/2023	Yap Port	YP08	Inner Reef	Rubble	Rubble	10
5/1/2023	Yap Port	YP08	Inner Reef	Sponge	Sponge	100
5/1/2023	Yap Port	YP08	Inner Reef	Rubble	Rubble	10
5/1/2023	Yap Port	YP08	Inner Reef	Algae	Algae	110
5/1/2023	Yap Port	YP08	Inner Reef	Rubble	Rubble	10
5/1/2023	Yap Port	YP08	Inner Reef	Sand	Sand	240
5/1/2023	Yap Port	YP08	Inner Reef	Algae	Algae	330
5/1/2023	Yap Port	YP08	Inner Reef	Sand	Sand	30
5/1/2023	Yap Port	YP08	Inner Reef	Dead Coral	Dead Coral	650
5/1/2023	Yap Port	YP08	Inner Reef	Porites lobata	Coral	10

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/1/2023	Yap Port	YP08	Inner Reef	Dead Coral	Dead Coral	20
5/1/2023	Yap Port	YP08	Inner Reef	Porites lobata	Coral	20
5/1/2023	Yap Port	YP08	Inner Reef	Dead Coral	Dead Coral	10
5/1/2023	Yap Port	YP08	Inner Reef	Sand	Sand	235
5/1/2023	Yap Port	YP08	Inner Reef	Algae	Algae	10
5/1/2023	Yap Port	YP08	Inner Reef	Rubble	Rubble	45
5/1/2023	Yap Port	YP08	Inner Reef	Algae	Algae	20
5/1/2023	Yap Port	YP08	Inner Reef	Algae	Algae	20
5/1/2023	Yap Port	YP09	Inner Reef	Sand	Sand	160
5/1/2023	Yap Port	YP09	Inner Reef	Porites lobata	Coral	20
5/1/2023	Yap Port	YP09	Inner Reef	Dead Coral	Dead Coral	15
5/1/2023	Yap Port	YP09	Inner Reef	Porites lobata	Coral	35
5/1/2023	Yap Port	YP09	Inner Reef	Rubble	Rubble	90
5/1/2023	Yap Port	YP09	Inner Reef	Favia	Coral	15
5/1/2023	Yap Port	YP09	Inner Reef	Rubble	Rubble	165
5/1/2023	Yap Port	YP09	Inner Reef	Porites lobata	Coral	10
5/1/2023	Yap Port	YP09	Inner Reef	Rubble	Rubble	350
5/1/2023	Yap Port	YP09	Inner Reef	Sponge	Sponge	25
5/1/2023	Yap Port	YP09	Inner Reef	Rubble	Rubble	15
5/1/2023	Yap Port	YP09	Inner Reef	Algae	Algae	120
5/1/2023	Yap Port	YP09	Inner Reef	Rubble	Rubble	440
5/1/2023	Yap Port	YP09	Inner Reef	Algae	Algae	70
5/1/2023	Yap Port	YP09	Inner Reef	Rubble / Sand	Rubble / Sand	360
5/1/2023	Yap Port	YP09	Inner Reef	Sand	Sand	210
5/1/2023	Yap Port	YP09	Inner Reef	Sponge	Sponge	40
5/1/2023	Yap Port	YP09	Inner Reef	Sand	Sand	110
5/1/2023	Yap Port	YP09	Inner Reef	Sponge	Sponge	40
5/1/2023	Yap Port	YP09	Inner Reef	Algae	Algae	70
5/1/2023	Yap Port	YP09	Inner Reef	Rubble	Rubble	60
5/1/2023	Yap Port	YP09	Inner Reef	Dead Coral	Dead Coral	40
5/1/2023	Yap Port	YP09	Inner Reef	Sand	Sand	150
5/1/2023	Yap Port	YP09	Inner Reef	Algae	Algae	20
5/1/2023	Yap Port	YP09	Inner Reef	Sand	Sand	30
5/1/2023	Yap Port	YP09	Inner Reef	Algae	Algae	30
5/1/2023	Yap Port	YP09	Inner Reef	Rubble	Rubble	65
5/1/2023	Yap Port	YP09	Inner Reef	Algae	Algae	15
5/1/2023	Yap Port	YP09	Inner Reef	Rubble	Rubble	135
5/1/2023	Yap Port	YP09	Inner Reef	Algae	Algae	15
5/1/2023	Yap Port	YP09	Inner Reef	Rubble	Rubble	80
5/1/2023	Yap Port	YP10	Inner Reef	Rubble / Sand	Rubble / Sand	3000
5/1/2023	Yap Port	YP11	Inner Reef	Sponge	Sponge	50
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	30
5/1/2023	Yap Port	YP11	Inner Reef	Sponge	Sponge	30
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	120
5/1/2023	Yap Port	YP11	Inner Reef	Sponge	Sponge	70
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	190
5/1/2023	Yap Port	YP11	Inner Reef	Echinophyllia	Coral	5
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	95
5/1/2023	Yap Port	YP11	Inner Reef	Sponge	Sponge	45
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	65
5/1/2023	Yap Port	YP11	Inner Reef	Sponge	Sponge	30
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	195
5/1/2023	Yap Port	YP11	Inner Reef	Sponge	Sponge	5
5/1/2023	Yap Port	YP11	Inner Reef	Porites rus	Coral	10
5/1/2023	Yap Port	YP11	Inner Reef	Sponge	Sponge	150

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/1/2023	Yap Port	YP11	Inner Reef	Dead Coral	Dead Coral	15
5/1/2023	Yap Port	YP11	Inner Reef	Dead Coral	Dead Coral	10
5/1/2023	Yap Port	YP11	Inner Reef	Sponge	Sponge	25
5/1/2023	Yap Port	YP11	Inner Reef	Porites rus	Coral	10
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	60
5/1/2023	Yap Port	YP11	Inner Reef	Sponge	Sponge	70
5/1/2023	Yap Port	YP11	Inner Reef	Montastrea	Coral	20
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	80
5/1/2023	Yap Port	YP11	Inner Reef	Porites Rus	Coral	15
5/1/2023	Yap Port	YP11	Inner Reef	Porites rus	Coral	20
5/1/2023	Yap Port	YP11	Inner Reef	Algae	Algae	45
5/1/2023	Yap Port	YP11	Inner Reef	Sponge	Sponge	50
5/1/2023	Yap Port	YP11	Inner Reef	Porites rus	Coral	10
5/1/2023	Yap Port	YP11	Inner Reef	Echinophyllia	Coral	35
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	85
5/1/2023	Yap Port	YP11	Inner Reef	Echinophyllia	Coral	85
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	25
5/1/2023	Yap Port	YP11	Inner Reef	Echinophyllia	Coral	70
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	130
5/1/2023	Yap Port	YP11	Inner Reef	Echinophyllia	Coral	30
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	25
5/1/2023	Yap Port	YP11	Inner Reef	Echinophyllia	Coral	25
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	130
5/1/2023	Yap Port	YP11	Inner Reef	Porites lobata	Coral	30
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	70
5/1/2023	Yap Port	YP11	Inner Reef	Echinophyllia	Coral	30
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	285
5/1/2023	Yap Port	YP11	Inner Reef	Montipora	Coral	35
5/1/2023	Yap Port	YP11	Inner Reef	Sponge	Sponge	50
5/1/2023	Yap Port	YP11	Inner Reef	Montipora	Coral	50
5/1/2023	Yap Port	YP11	Inner Reef	wall	wall	290
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Dead Coral	Dead Coral	530
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Montipora	Coral	4
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Dead Coral	Dead Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Sponge	Sponge	31
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Diploastrea	Coral	22
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Dead Coral	Dead Coral	328
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Millepora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	110
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Platygyra	Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	290
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Dead Coral	Dead Coral	415
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Algae	Algae	208
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Platygyra	Coral	120
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Dead Coral	Dead Coral	40
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Algae	Algae	30
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Montipora	Coral	40
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Dead Coral	Dead Coral	155
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Algae	Algae	78
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Acropora	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Dead Coral	Dead Coral	190
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Algae	Algae	
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Porites lobata	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Dead Coral	Dead Coral	225
5/2/2023	Tamil Channel Entrance (West)	ECW04	Reef Flat	Algae	Algae	112

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/2/2023	Tamil Channel Entrance (West)	ECW05	Reef Flat	Dead Coral	Dead Coral	492
5/2/2023	Tamil Channel Entrance (West)	ECW05	Reef Flat	Algae	Algae	983
5/2/2023	Tamil Channel Entrance (West)	ECW05	Reef Flat	Seagrass	Seagrass	10
5/2/2023	Tamil Channel Entrance (West)	ECW05	Reef Flat	Algae	Algae	30
5/2/2023	Tamil Channel Entrance (West)	ECW05	Reef Flat	Seagrass	Seagrass	30
5/2/2023	Tamil Channel Entrance (West)	ECW05	Reef Flat	Dead Coral	Dead Coral	251
5/2/2023	Tamil Channel Entrance (West)	ECW05	Reef Flat	Algae	Algae	125
5/2/2023	Tamil Channel Entrance (West)	ECW05	Reef Flat	Montipora	Coral	40
5/2/2023	Tamil Channel Entrance (West)	ECW05	Reef Flat	Dead Coral	Dead Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW05	Reef Flat	Algae	Algae	40
5/2/2023	Tamil Channel Entrance (West)	ECW05	Reef Flat	Algae	Algae	25
5/2/2023	Tamil Channel Entrance (West)	ECW05	Reef Flat	Seagrass	Seagrass	25
5/2/2023	Tamil Channel Entrance (West)	ECW05	Reef Flat	Seagrass	Seagrass	620
5/2/2023	Tamil Channel Entrance (West)	ECW05	Reef Flat	Dead Coral	Dead Coral	192
5/2/2023	Tamil Channel Entrance (West)	ECW05	Reef Flat	Algae	Algae	96
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	200
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Montipora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	40
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	225
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Favia	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	110
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Acropora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	65
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Hydnophora	Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Leptoria	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	115
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Sponge	Sponge	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	35
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Acropora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	100
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Acropora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	170
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Acropora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Rubble	Rubble	60
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	80
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Diploastrea	Coral	60
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	210
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Porites lobata	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Porites lobata	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Favia	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	25
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Leptoria	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Porites rus	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Montipora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	15



## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Favia	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	95
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Porites rus	Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Sessile Invert	Sessile Invertebrate	20
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	25
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Pocillopora	Coral	25
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Porites lobata	Coral	55
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	80
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Porites lobata	Coral	25
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	25
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Favia	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Montipora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	40
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Acropora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	60
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Montastrea	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	35
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Pocillopora	Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Sessile Invert	Sessile Invertebrate	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	40
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Porites lobata	Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	140
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Acropora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	50
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Leptastrea	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Montipora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW09	Forereef	Dead Coral	Dead Coral	250
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Algae	Algae	70
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Dead Coral	Dead Coral	70
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Acropora	Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Dead Coral	Dead Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Algae	Algae	225
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Porites rus	Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Dead Coral	Dead Coral	80
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Algae	Algae	41
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Porites lobata	Coral	38
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Dead Coral	Dead Coral	197
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Montipora	Coral	36
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Dead Coral	Dead Coral	103
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Algae	Algae	52
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Pocillopora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Dead Coral	Dead Coral	110
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Pocillopora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Goniastrea	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	105
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Pocillopora	Coral	35
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Montipora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Porites lobata	Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	60
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	90
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Dead Coral	Dead Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Pocillopora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	70

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Dead Coral	Dead Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Montipora	Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	35
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Acropora	Coral	25
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	60
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Montipora	Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Pocillopora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	40
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	90
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Montipora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	30
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	40
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Montipora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	100
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Montastrea	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Dead Coral	Dead Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Stylophora	Coral	50
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Porites rus	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Porites rus	Coral	40
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Porites rus	Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	50
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Montipora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Porites rus	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Dead Coral	Dead Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Montipora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Porites rus	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Porites rus	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Montipora	Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	5
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Leptoria	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Pocillopora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Dead Coral	Dead Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Porites rus	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Dead Coral	Dead Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	40
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Porites rus	Coral	40
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Pocillopora	Coral	20

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Sponge	Sponge	35
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Porites lobata	Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW06	Forereef	Porites rus	Coral	60
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	42
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites	Coral	12
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	31
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	40
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	37
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Sponge	Sponge	8
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	15
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Sponge	Sponge	5
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	55
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Sponge	Sponge	15
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Montipora	Coral	18
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	42
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Montipora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Sponge	Sponge	10
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	16
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Sponge	Sponge	4
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	55
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Montipora	Coral	33
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	60
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Dead Coral	Dead Coral	55
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites lobata	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	35
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Diploastrea	Coral	35
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Montipora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Dead Coral	Dead Coral	50
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Montipora	Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites lobata	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Sponge	Sponge	30
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites lobata	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Dead Coral	Dead Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Dead Coral	Dead Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Pocillopora	Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Sponge	Sponge	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Dead Coral	Dead Coral	40
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Dead Coral	Dead Coral	25
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Favia	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	105
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	5
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Leptoria	Coral	25
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Sponge	Sponge	25
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Millepora	Coral	15

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Galaxea	Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Millepora	Coral	60
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Dead Coral	Dead Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Montastrea	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Dead Coral	Dead Coral	40
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Montastrea	Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	60
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Montipora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Favia	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	130
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Montastrea	Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Alveopora	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Dead Coral	Dead Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Hydnophora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	70
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Leptoria	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	50
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites lobata	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	60
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Dead Coral	Dead Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Montipora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Dead Coral	Dead Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Montipora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Hydnophora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Dead Coral	Dead Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Sponge	Sponge	40
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Dead Coral	Dead Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Acropora	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites lobata	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Sand	Sand	60
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	60
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Montipora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	140
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Montipora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Dead Coral	Dead Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Leptoria	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	40
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites lobata	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	130
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites lobata	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Montipora	Coral	60
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Rubble	Rubble	10
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Pocillopora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites rus	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Rubble	Rubble	80
5/2/2023	Tamil Channel Entrance (West)	ECW07	Forereef	Porites lobata	Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Sponge	Sponge	20
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	47
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Acropora	Coral	10

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Favites	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Montipora	Coral	12
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	93
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	23
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Dead Coral	Dead Coral	11
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Sponge	Sponge	30
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Dead Coral	Dead Coral	34
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Montipora	Coral	27
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	21
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Sponge	Sponge	42
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Dead Coral	Dead Coral	46
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	76
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	38
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	185
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Sponge	Sponge	29
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	104
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	17
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Sponge	Sponge	11
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	9
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Sponge	Sponge	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	11
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Acropora	Coral	8
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	21
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Montipora	Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Dead Coral	Dead Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Sponge	Sponge	50
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	40
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Sponge	Sponge	20
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	60
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Montipora	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Leptoria	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Dead Coral	Dead Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites lobata	Coral	85
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	60
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Montipora	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Dead Coral	Dead Coral	45
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Pocillopora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Dead Coral	Dead Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	40
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Montipora	Coral	40
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites lobata	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Dead Coral	Dead Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Dead Coral	Dead Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Montipora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Dead Coral	Dead Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites lobata	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Pocillopora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Dead Coral	Dead Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Montipora	Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Pocillopora	Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Montipora	Coral	20



## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	50
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Sponge	Sponge	40
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	20
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Hydnophora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	120
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Dead Coral	Dead Coral	40
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites lobata	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Pocillopora	Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Rubble	Rubble	5
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	50
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	60
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Montipora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Dead Coral	Dead Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Leptastrea	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Dead Coral	Dead Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Acropora	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Dead Coral	Dead Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Pocillopora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Montipora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	25
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Acropora	Coral	5
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	30
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	55
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Leptastrea	Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Sponge	Sponge	30
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	170
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Montastrea	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Sponge	Sponge	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Hydnophora	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Montipora	Coral	20
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	25
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Galaxea	Coral	15
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	30
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	20
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	40
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	60
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Sponge	Sponge	20
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Crustose Coralline Algae	Crustose Coralline Algae	70
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Porites rus	Coral	10
5/2/2023	Tamil Channel Entrance (West)	ECW08	Reef Crest	Coscinaraea	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	30
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	5
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	40
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	5
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	30
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	35
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	35
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Sponge	Sponge	10
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	10
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	15

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	35
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	25
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	25
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	80
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Sponge	Sponge	20
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	70
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	60
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Acropora	Coral	5
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	30
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Hydnophora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	5
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Millepora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	25
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Sponge	Sponge	45
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	25
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Favia	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	15
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	60
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Sponge	Sponge	20
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	5
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	55
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	100
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Sponge	Sponge	60
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	40
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Favia	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Leptastrea	Coral	5
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	15
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	5
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Sponge	Sponge	25
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Sponge	Sponge	60
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	178
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	89
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	86
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	43
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	50
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	65
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Porites rus	Coral	15
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Porites lobata	Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	106
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	53
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	66
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	34
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Porites rus	Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Porites rus	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	100
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	50
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Porites lobata	Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Acropora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Porites lobata	Coral	15
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	5
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Porites lobata	Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	40
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Hydnophora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Dead Coral	Dead Coral	106
5/3/2023	Tamil Channel Entrance (West)	ECW10	Forereef	Algae	Algae	53
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	66
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	33
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	30
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	40
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	60
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Acropora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Leptastrea	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Sponge	Sponge	70
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Millepora	Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	90
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	60
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	99
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	51
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	40
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Clam	Clam	5
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	115
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Porites rus	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Porites lobata	Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Porites rus	Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Millepora	Coral	25
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	55
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	10

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Platygyra	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	60
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Porites rus	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Millepora	Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Porites rus	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Platygyra	Coral	25
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	35
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	5
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	85
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	5
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	45
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	5
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	45
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Sponge	Sponge	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Favites	Coral	5
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	45
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	50
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Porites lobata	Coral	40
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	66
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	33
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Porites lobata	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	70
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	110
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Porites rus	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Porites rus	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	50
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Porites lobata	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	30
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Millepora	Coral	110
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	50
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	40
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	10
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	90
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Sponge	Sponge	10

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Favia	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Pocillopora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW11	Forereef	Algae	Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	60
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	5
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	15
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Sponge	Sponge	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montastrea	Coral	15
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	15
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	50
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Sponge	Sponge	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	90
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	30
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Hydnophora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	50
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Porites lobata	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	70
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Porites lobata	Coral	50
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Favia	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	120
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Porites lobata	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	40
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Favites	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	10



## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	50
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	130
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Porites lobata	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	50
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	180
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	120
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	50
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Acropora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	30
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Millepora	Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Pocillopora	Coral	40
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Porites lobata	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	50
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Sponge	Sponge	30
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	106
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	53
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Favites	Coral	190
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	30
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Hydnophora	Coral	15
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	15
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	80
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	40
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Porites rus	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (West)	ECW12	Forereef	Algae	Algae	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	60
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Sand	Sand	60
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Acropora	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	15
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Favites	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Montipora	Coral	10

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	155
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Sessile Invert	Sessile Invertebrate	20
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	80
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	110
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Goniastrea	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	35
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Acropora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	55
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Pocillopora	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	70
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Sponge	Sponge	15
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	85
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Porites rus	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Porites rus	Coral	50
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	55
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Acropora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	65
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	140
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Leptastrea	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	115
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Montipora	Coral	2
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	8
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Leptoria	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Sponge	Sponge	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	30
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Montipora	Coral	35
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Sponge	Sponge	30
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	100
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Sponge	Sponge	20
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Sponge	Sponge	20
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Pocillopora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Sponge	Sponge	20
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Acropora	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	85
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Favia	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Rubble	Rubble	35
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	200
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Leptastrea	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	15
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Acropora	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	30
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Acropora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Leptoria	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	10

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Acropora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Favites	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	45
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Montipora	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	25
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	30
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Leptastrea	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Favites	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Sponge	Sponge	20
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	70
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Sponge	Sponge	20
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	30
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Montastrea	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Porites rus	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	170
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Sponge	Sponge	20
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	100
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE13	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	110
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Porites rus	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Porites rus	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Favites	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	50
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Sponge	Sponge	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	50
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	30
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Favia	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	135
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	100
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Porites lobata	Coral	140
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	110
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	100
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Favia	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Sponge	Sponge	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Hydnophora	Coral	15
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	70
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Cyphastrea	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	155

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Porites lobata	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Porites lobata	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	70
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Favia	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	120
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Montipora	Coral	60
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Rubble	Rubble	90
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Pocillopora	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	30
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Porites lobata	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	30
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Sponge	Sponge	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	50
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Porites lobata	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Montipora	Coral	30
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Sponge	Sponge	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Montipora	Coral	40
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	80
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Pocillopora	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Porites rus	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Porites rus	Coral	75
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Leptoria	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Leptastrea	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	15
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	15
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	115
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Favia	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Porites rus	Coral	25
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	15
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	50
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Favites	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	85
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Favites	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	65
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Montipora	Coral	30
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	45
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Pocillopora	Coral	25
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	60
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Pocillopora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE14	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	80

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	50
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Leptastrea	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Acropora	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Acropora	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	55
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Leptoria	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	65
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Hydnophora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	85
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Pocillopora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Isopora	Coral	15
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	15
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Sponge	Sponge	15
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	40
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	30
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	40
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites lobata	Coral	30
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Hydnophora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Rubble	Rubble	30
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	75
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Galaxea	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites lobata	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	85
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Pocillopora	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	20
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Sponge	Sponge	20
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	40
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	50
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Montipora	Coral	30
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Sponge	Sponge	30
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Leptastrea	Coral	15
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	45
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Favites	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Leptoria	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	80
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Stylophora	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	20



## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Montipora	Coral	50
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	60
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Leptoria	Coral	15
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites lobata	Coral	25
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	40
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Acropora	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	20
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	25
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Montipora	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Montipora	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Galaxea	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	35
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Acropora	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	15
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites	Coral	15
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Favia	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	25
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	70
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites lobata	Coral	20
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	25
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Rubble	Rubble	75
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	270
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	70
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Rubble	Rubble	30
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	170
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Favia	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	35
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	30
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Acropora	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Favites	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Alveopora	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Rubble	Rubble	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Leptoria	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	40
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Montipora	Coral	30
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Leptoria	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	60
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Porites rus	Coral	10
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Dead Coral	Dead Coral	30
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Montipora	Coral	5
5/3/2023	Tamil Channel Entrance (East)	ECE15	Forereef	Hydnophora	Coral	5
5/3/2023	Yap Port	YP12	Inner Reef	Sand	Sand	440
5/3/2023	Yap Port	YP12	Inner Reef	Seagrass	Seagrass	2

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/3/2023	Yap Port	YP12	Inner Reef	Sand	Sand	1567
5/3/2023	Yap Port	YP12	Inner Reef	Algae	Algae	12
5/3/2023	Yap Port	YP12	Inner Reef	Sand	Sand	400
5/3/2023	Yap Port	YP12	Inner Reef	Favites	Coral	6
5/3/2023	Yap Port	YP12	Inner Reef	Sponge	Sponge	9
5/3/2023	Yap Port	YP12	Inner Reef	Montipora	Coral	20
5/3/2023	Yap Port	YP12	Inner Reef	Symphyllia	Coral	14
5/3/2023	Yap Port	YP12	Inner Reef	Sponge	Sponge	5
5/3/2023	Yap Port	YP12	Inner Reef	Montipora	Coral	40
5/3/2023	Yap Port	YP12	Inner Reef	Sand	Sand	479
5/3/2023	Yap Port	YP13	Inner Reef	Sand	Sand	3000
5/3/2023	Yap Port-Southwest	YPSW01	Inner Reef	Sand	Sand	1955
5/3/2023	Yap Port-Southwest	YPSW01	Inner Reef	Sponge	Sponge	10
5/3/2023	Yap Port-Southwest	YPSW01	Inner Reef	Sand	Sand	505
5/3/2023	Yap Port-Southwest	YPSW01	Inner Reef	Symphyllia	Coral	10
5/3/2023	Yap Port-Southwest	YPSW01	Inner Reef	Favia	Coral	53
5/3/2023	Yap Port-Southwest	YPSW01	Inner Reef	Sand	Sand	118
5/3/2023	Yap Port-Southwest	YPSW01	Inner Reef	Pectinia	Coral	31
5/3/2023	Yap Port-Southwest	YPSW01	Inner Reef	Sand	Sand	145
5/3/2023	Yap Port-Southwest	YPSW01	Inner Reef	Pectinia	Coral	33
5/3/2023	Yap Port-Southwest	YPSW01	Inner Reef	Sponge	Sponge	5
5/3/2023	Yap Port-Southwest	YPSW01	Inner Reef	Montastrea	Coral	15
5/3/2023	Yap Port-Southwest	YPSW01	Inner Reef	Sponge	Sponge	15
5/3/2023	Yap Port-Southwest	YPSW01	Inner Reef	Porites lobata	Coral	5
5/3/2023	Yap Port-Southwest	YPSW01	Inner Reef	Rubble / Sand	Rubble / Sand	100
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Montipora	Coral	30
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Dead Coral	Dead Coral	120
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites cylindrica	Coral	351
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Rubble	Rubble	215
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites lobata	Coral	28
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Rubble	Rubble	57
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites lobata	Coral	18
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Dead Coral	Dead Coral	29
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Mobile Invert	Mobile Invertebrate	6
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Dead Coral	Dead Coral	55
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites lobata	Coral	32
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Dead Coral	Dead Coral	88
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites cylindrica	Coral	28
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Dead Coral	Dead Coral	63
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites cylindrica	Coral	18
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites lobata	Coral	62
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Dead Coral	Dead Coral	224
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites cylindrica	Coral	262
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Dead Coral	Dead Coral	84
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites lobata	Coral	13
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Dead Coral	Dead Coral	47
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites cylindrica	Coral	43
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Dead Coral	Dead Coral	177
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites lobata	Coral	267
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites lobata	Coral	3
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Rubble	Rubble	60
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites rus	Coral	10
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites cylindrica	Coral	80
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites rus	Coral	35
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites cylindrica	Coral	15

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites rus	Coral	55
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Dead Coral	Dead Coral	15
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites rus	Coral	50
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites cylindrica	Coral	80
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites lobata	Coral	20
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites cylindrica	Coral	170
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites rus	Coral	20
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Porites cylindrica	Coral	70
5/3/2023	Yap Port-Southwest	YPSW03	Inner Reef	Sand	Sand	3000
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Rubble	Rubble	334
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Favia	Coral	23
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Rubble	Rubble	126
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Montipora	Coral	56
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Favia	Coral	11
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sand	Sand	18
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Favia	Coral	21
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Rubble	Rubble	25
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Montipora	Coral	21
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sand	Sand	69
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Montipora	Coral	13
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sand	Sand	77
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Favia	Coral	25
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sand	Sand	50
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sponge	Sponge	21
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sponge	Sponge	35
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sand	Sand	30
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sponge	Sponge	21
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sand	Sand	117
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sponge	Sponge	17
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Favia	Coral	61
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sponge	Sponge	49
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Rubble	Rubble	160
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Favia	Coral	38
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sand	Sand	737
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Montipora	Coral	30
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Favia	Coral	15
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Montipora	Coral	70
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sand	Sand	167
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Porites cylindrica	Coral	62
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Porites lobata	Coral	33
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sponge	Sponge	8
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sand	Sand	30
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Dead Coral	Dead Coral	10
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Porites cylindrica	Coral	30
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sand	Sand	60
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Porites rus	Coral	25
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sand	Sand	45
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Porites cylindrica	Coral	20
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sand	Sand	80
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Porites lobata	Coral	30
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sand	Sand	130
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites lobata	Coral	138
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites cylindrica	Coral	202
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites lobata	Coral	205
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites cylindrica	Coral	29

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites lobata	Coral	11
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites cylindrica	Coral	276
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Dead Coral	Dead Coral	43
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites cylindrica	Coral	122
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Dead Coral	Dead Coral	56
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites cylindrica	Coral	160
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites lobata	Coral	121
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites cylindrica	Coral	117
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Dead Coral	Dead Coral	552
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Montipora	Coral	10
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites cylindrica	Coral	108
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites lobata	Coral	69
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites cylindrica	Coral	30
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Dead Coral	Dead Coral	21
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites cylindrica	Coral	135
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Dead Coral	Dead Coral	75
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites lobata	Coral	50
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Dead Coral	Dead Coral	50
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites cylindrica	Coral	90
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Dead Coral	Dead Coral	140
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Porites cylindrica	Coral	190
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Sand	Sand	570
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Rubble	Rubble	12
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Sand	Sand	871
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Rubble	Rubble	9
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Sand	Sand	51
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Rubble	Rubble	7
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Algae	Algae	2
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Dead Coral	Dead Coral	63
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Sand	Sand	325
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Sand	Sand	690
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Rubble	Rubble	50
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Sand	Sand	145
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Rubble	Rubble	5
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Sand	Sand	200
5/5/2023	Yap Port-Southwest	YPSW07	Inner Reef	Sand	Sand	165
5/5/2023	Yap Port-Southwest	YPSW07	Inner Reef	Dead Coral	Dead Coral	5
5/5/2023	Yap Port-Southwest	YPSW07	Inner Reef	Rubble	Rubble	44
5/5/2023	Yap Port-Southwest	YPSW07	Inner Reef	Dead Coral	Dead Coral	50
5/5/2023	Yap Port-Southwest	YPSW07	Inner Reef	Porites Lobata	Coral	23
5/5/2023	Yap Port-Southwest	YPSW07	Inner Reef	Sand	Sand	81
5/5/2023	Yap Port-Southwest	YPSW07	Inner Reef	Porites Lobata	Coral	20
5/5/2023	Yap Port-Southwest	YPSW07	Inner Reef	Sand	Sand	102
5/5/2023	Yap Port-Southwest	YPSW07	Inner Reef	Favia	Coral	15
5/5/2023	Yap Port-Southwest	YPSW07	Inner Reef	Sand	Sand	2495
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	45
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Platygyra	Coral	35
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Montipora	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	30
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Rubble	Rubble	30
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	5
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Rubble	Rubble	25
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Montipora	Coral	5
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	25

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	20
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Algae	Algae	5
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Sand	Sand	45
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Algae	Algae	15
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites rus	Coral	45
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites rus	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Rubble	Rubble	35
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	60
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Clam	Clam	15
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	40
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	70
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	25
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	15
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	30
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	90
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	80
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	40
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	60
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	15
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	55
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	30
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Pocillopora	Coral	5
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	150
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Rubble	Rubble	75
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites rus	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	180
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	80
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites rus	Coral	30
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	60
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Hydnophora	Coral	5
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Rubble	Rubble	55
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	30
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Rubble	Rubble	60
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Algae	Algae	10
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Sponge	Sponge	10
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Rubble	Rubble	50
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	30
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Rubble	Rubble	60
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	20
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	160
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Favia	Coral	5
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	15
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Sponge	Sponge	110
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	50
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	20
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Rubble	Rubble	50
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Millepora	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Rubble	Rubble	40
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	80



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Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	30
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Sand	Sand	50
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	70
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Algae	Algae	5
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	40
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	5
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites rus	Coral	60
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Porites lobata	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	15
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Millepora	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	5
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Millepora	Coral	30
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Pocillopora	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW13	Reef Flat	Dead Coral	Dead Coral	50
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Rubble	Rubble	45
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Porites lobata	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Rubble	Rubble	205
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Porites lobata	Coral	80
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Favia	Coral	25
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Rubble	Rubble	25
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Porites rus	Coral	50
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Dead Coral	Dead Coral	40
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Porites lobata	Coral	30
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Dead Coral	Dead Coral	120
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Hydnophora	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Dead Coral	Dead Coral	80
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Porites rus	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Rubble	Rubble	50
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	20
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Dead Coral	Dead Coral	40
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Algae	Algae	10
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Sponge	Sponge	10
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Rubble	Rubble	30
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	10
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Dead Coral	Dead Coral	40
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Rubble	Rubble	30
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Algae	Algae	30
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Dead Coral	Dead Coral	80
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Algae	Algae	20
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Rubble	Rubble	60
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Algae	Algae	30
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Dead Coral	Dead Coral	100
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Algae	Algae	50
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Rubble / Sand	Rubble / Sand	40
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Algae	Algae	10
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Rubble / Sand	Rubble / Sand	120
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Porites rus	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Algae	Algae	40
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Porites rus	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Rubble	Rubble	70

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Algae	Algae	70
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Rubble	Rubble	40
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Seagrass	Seagrass	40
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Rubble	Rubble	60
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Algae	Algae	60
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Rubble	Rubble	205
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Seagrass	Seagrass	410
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Sand	Sand	200
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Porites lobata	Coral	140
5/6/2023	Tamil Channel Entrance (West)	ECW14	Reef Flat	Rubble	Rubble	40
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Rubble	Rubble	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites rus	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	50
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Algae	Algae	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites cylindrica	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites rus	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites cylindrica	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	15
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites rus	Coral	55
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Rubble	Rubble	105
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Millepora	Coral	5
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	30
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	70
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	150
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Sponge	Sponge	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Rubble	Rubble	65
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Millepora	Coral	5
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Millepora	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	50
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	5
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	45
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Goniastrea	Coral	5
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	15
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites cylindrica	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	50
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites cylindrica	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Sponge	Sponge	5
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	35

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	30
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	90
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Acropora	Coral	15
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites rus	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	5
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites rus	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	60
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites rus	Coral	30
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Rubble	Rubble	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites cylindrica	Coral	5
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Rubble	Rubble	25
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites cylindrica	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites rus	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites cylindrica	Coral	30
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites rus	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	30
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites rus	Coral	140
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	45
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Algae	Algae	5
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Goniastrea	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	40
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	60
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	40
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	120
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	40
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites rus	Coral	60
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites rus	Coral	40
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Favia	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	140
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	40
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Sponge	Sponge	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Sand	Sand	30
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Millepora	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	60
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	80
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Rubble	Rubble	50
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	50
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites rus	Coral	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Porites lobata	Coral	10

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Sponge	Sponge	10
5/6/2023	Tamil Channel Entrance (West)	ECW15	Reef Flat	Algae	Algae	20
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Dead Coral	Dead Coral	90
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Sponge	Sponge	5
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Dead Coral	Dead Coral	345
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Sponge	Sponge	30
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Dead Coral	Dead Coral	290
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Algae	Algae	20
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Dead Coral	Dead Coral	488
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Sand	Sand	488
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Algae	Algae	325
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Porites lobata	Coral	10
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Dead Coral	Dead Coral	50
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Sand	Sand	50
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Algae	Algae	20
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Millepora	Coral	40
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Dead Coral	Dead Coral	280
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Sand	Sand	280
5/6/2023	Tamil Channel Entrance (East)	ECE16	Reef Flat	Algae	Algae	185
5/6/2023	Tamil Channel Entrance (East)	ECE17	Reef Flat	Dead Coral	Dead Coral	834
5/6/2023	Tamil Channel Entrance (East)	ECE17	Reef Flat	Algae	Algae	277
5/6/2023	Tamil Channel Entrance (East)	ECE17	Reef Flat	Porites lobata	Coral	5
5/6/2023	Tamil Channel Entrance (East)	ECE17	Reef Flat	Dead Coral	Dead Coral	139
5/6/2023	Tamil Channel Entrance (East)	ECE17	Reef Flat	Algae	Algae	46
5/6/2023	Tamil Channel Entrance (East)	ECE17	Reef Flat	Porites lobata	Coral	10
5/6/2023	Tamil Channel Entrance (East)	ECE17	Reef Flat	Dead Coral	Dead Coral	855
5/6/2023	Tamil Channel Entrance (East)	ECE17	Reef Flat	Algae	Algae	285
5/6/2023	Tamil Channel Entrance (East)	ECE17	Reef Flat	Porites lobata	Coral	20
5/6/2023	Tamil Channel Entrance (East)	ECE17	Reef Flat	Dead Coral	Dead Coral	398
5/6/2023	Tamil Channel Entrance (East)	ECE17	Reef Flat	Algae	Algae	132
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Dead Coral	Dead Coral	50
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	10
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Dead Coral	Dead Coral	683
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Algae	Algae	277
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Rubble	Rubble	60
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Dead Coral	Dead Coral	210
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Algae	Algae	70
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Dead Coral	Dead Coral	113
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Algae	Algae	38
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Dead Coral	Dead Coral	30
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Algae	Algae	10
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Hydnophora	Coral	30
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Dead Coral	Dead Coral	158
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Algae	Algae	52
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Dead Coral	Dead Coral	46
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Algae	Algae	23
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Dead Coral	Dead Coral	160
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Porites lobata	Coral	5
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Dead Coral	Dead Coral	280
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Algae	Algae	94
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	20
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Dead Coral	Dead Coral	20
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Algae	Algae	10
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Sponge	Sponge	10
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Dead Coral	Dead Coral	570

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Sponge	Sponge	5
5/6/2023	Tamil Channel Entrance (East)	ECE18	Reef Flat	Dead Coral	Dead Coral	5
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	54
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	36
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	29
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	22
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	35
5/6/2023	Yap Port	YP14	Inner Reef	Rubble	Rubble	19
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	65
5/6/2023	Yap Port	YP14	Inner Reef	Rubble	Rubble	5
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	38
5/6/2023	Yap Port	YP14	Inner Reef	Dead Coral	Dead Coral	19
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	13
5/6/2023	Yap Port	YP14	Inner Reef	Rubble	Rubble	153
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	54
5/6/2023	Yap Port	YP14	Inner Reef	Dead Coral	Dead Coral	387
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	128
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	24
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	3
5/6/2023	Yap Port	YP14	Inner Reef	Acropora	Coral	25
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	511
5/6/2023	Yap Port	YP14	Inner Reef	Acropora	Coral	20
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	20
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	20
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	70
5/6/2023	Yap Port	YP14	Inner Reef	Algae	Algae	60
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	10
5/6/2023	Yap Port	YP14	Inner Reef	Algae	Algae	80
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	40
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	125
5/6/2023	Yap Port	YP14	Inner Reef	Algae	Algae	125
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	25
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	35
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	10
5/6/2023	Yap Port	YP14	Inner Reef	Algae	Algae	80
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	20
5/6/2023	Yap Port	YP14	Inner Reef	Algae	Algae	20
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	20
5/6/2023	Yap Port	YP14	Inner Reef	Algae	Algae	20
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	20
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	60
5/6/2023	Yap Port	YP14	Inner Reef	Algae	Algae	30
5/6/2023	Yap Port	YP14	Inner Reef	Algae	Algae	10
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	60
5/6/2023	Yap Port	YP14	Inner Reef	Algae	Algae	30
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	10
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	100
5/6/2023	Yap Port	YP14	Inner Reef	Algae	Algae	50
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	10
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	60
5/6/2023	Yap Port	YP14	Inner Reef	Algae	Algae	30
5/6/2023	Yap Port	YP14	Inner Reef	Montipora	Coral	10
5/6/2023	Yap Port	YP14	Inner Reef	Seagrass	Seagrass	66
5/6/2023	Yap Port	YP14	Inner Reef	Algae	Algae	33
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Rubble	Rubble	70



## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Dead Coral	Dead Coral	15
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Algae	Algae	45
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Sponge	Sponge	10
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Favites	Coral	10
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Dead Coral	Dead Coral	5
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Algae	Algae	5
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Porites rus	Coral	5
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Dead Coral	Dead Coral	15
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Algae	Algae	40
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Sponge	Sponge	10
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Montipora	Coral	10
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Dead Coral	Dead Coral	30
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Algae	Algae	90
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Dead Coral	Dead Coral	40
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Algae	Algae	15
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Sponge	Sponge	5
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Dead Coral	Dead Coral	48
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Algae	Algae	143
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Montipora	Coral	40
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Dead Coral	Dead Coral	200
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Algae	Algae	600
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Montipora	Coral	20
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Dead Coral	Dead Coral	138
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Algae	Algae	413
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Leptoria	Coral	30
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Dead Coral	Dead Coral	238
5/7/2023	Tamil Channel Entrance (West)	ECW16	Reef Flat	Algae	Algae	713
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Dead Coral	Dead Coral	123
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Algae	Algae	368
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Montipora	Coral	35
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Dead Coral	Dead Coral	53
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Algae	Algae	158
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Montipora	Coral	35
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Dead Coral	Dead Coral	50
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Algae	Algae	
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Sponge	Sponge	30
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Dead Coral	Dead Coral	123
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Algae	Algae	368
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Sponge	Sponge	5
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Dead Coral	Dead Coral	35
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Pocillopora	Coral	5
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Dead Coral	Dead Coral	286
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Algae	Algae	859
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	20
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Dead Coral	Dead Coral	70
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Algae	Algae	210
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Montipora	Coral	10
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Dead Coral	Dead Coral	40
5/7/2023	Tamil Channel Entrance (West)	ECW17	Reef Flat	Algae	Algae	120
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Dead Coral	Dead Coral	90
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Algae	Algae	270
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Rubble	Rubble	30
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Algae	Algae	30
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Dead Coral	Dead Coral	40
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Algae	Algae	120

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Sponge	Sponge	10
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Dead Coral	Dead Coral	98
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Algae	Algae	293
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Favia	Coral	25
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Dead Coral	Dead Coral	63
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Algae	Algae	188
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Acropora	Coral	10
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Dead Coral	Dead Coral	91
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Algae	Algae	274
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	60
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Dead Coral	Dead Coral	168
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Algae	Algae	503
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Crustose Coralline Algae	Crustose Coralline Algae	10
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Dead Coral	Dead Coral	44
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Algae	Algae	131
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Sponge	Sponge	5
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Dead Coral	Dead Coral	105
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Algae	Algae	315
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Millepora	Coral	10
5/7/2023	Tamil Channel Entrance (West)	ECW18	Reef Flat	Montastrea	Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Rubble	Rubble	170
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	40
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Leptoria	Coral	8
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	32
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	35
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	15
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	35
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Pocillopora	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Favia	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	30
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	25
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Montipora	Coral	30
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Leptoria	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	25
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	30
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Porites Rus	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	55
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Porites Rus	Coral	30
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	45
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	175
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	15
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Porites rus	Coral	85
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	50
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	85
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	15
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	80
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Leptoria	Coral	10

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	30
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Galaxea	Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	15
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Porites rus	Coral	50
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Porites rus	Coral	80
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Galaxea	Coral	15
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	30
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Hydnophora	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	35
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	50
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Porites rus	Coral	30
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	50
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	30
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	25
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Montipora	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Montipora	Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Galaxea	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	50
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Acropora	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Porites rus	Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Porites lobata	Coral	25
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Porites rus	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Montipora	Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	30
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Galaxea	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	60
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Montipora	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	70
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	25
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Leptoria	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	70
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Galaxea	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Acropora	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	35
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Porites rus	Coral	40
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Montipora	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	75
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	15
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	40

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Galaxea	Coral	18
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Porites rus	Coral	2
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Porites rus	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	18
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Porites rus	Coral	2
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	30
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Porites rus	Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Algae	Algae	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Galaxea	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	15
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Montipora	Coral	30
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Cyphastrea	Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	15
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	15
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Porites rus	Coral	15
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Montipora	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Galaxea	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	25
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Favia	Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Galaxea	Coral	25
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Sponge	Sponge	15
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Dead Coral	Dead Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE19	Forereef	Galaxea	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	25
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Leptoria	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	25
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sand	Sand	15
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	60
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	15
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	15
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	50
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	40
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	25
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	35
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Acropora	Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Goniastrea	Coral	50
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Dead Coral	Dead Coral	15
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	45
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	30
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Montipora	Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Dead Coral	Dead Coral	150
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Dead Coral	Dead Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	30
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	60

## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Galaxea	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	20
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	45
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	25
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	140
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Dead Coral	Dead Coral	80
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Montipora	Coral	15
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	45
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Montipora	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	15
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Acropora	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	15
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Montipora	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	20
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Leptoria	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	35
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	30
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sand	Sand	55
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Acropora	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	25
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	35
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Favia	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	25
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	15
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	15
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Montipora	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	20
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	5
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	35
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	40
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Dead Coral	Dead Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Galaxea	Coral	15
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	5
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	30
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Favia	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	15
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Favia	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	15
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Leptoria	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	35
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	55
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	40
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sand	Sand	25
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	15
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	30
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	70
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Rubble	Rubble	50
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Montipora	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10



## Appendix B. Benthic/Biotic Data. Line-Intercept Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Benthic Species/Lifeform	Benthic Category	Length (cm)
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Montipora	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	20
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Montipora	Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	40
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Favites	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	35
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Favites	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Dead Coral	Dead Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	20
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites lobata	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	30
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Hydnophora	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Acropora	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Dead Coral	Dead Coral	40
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Dead Coral	Dead Coral	40
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Favia	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Dead Coral	Dead Coral	60
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	60
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	20
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	15
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Galaxea	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	5
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Montipora	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Dead Coral	Dead Coral	45
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Favites	Coral	12
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sponge	Sponge	3
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	40
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	70
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	55
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Leptoria	Coral	5
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Sessile Invert	Sessile Invertebrate	10
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Crustose Coralline Algae	Crustose Coralline Algae	5
5/7/2023	Tamil Channel Entrance (East)	ECE20	Forereef	Porites rus	Coral	5

## Appendix B. Benthic/Biotic Data. Belt Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Acanthurus blochii	12
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Acanthurus lineatus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Ctenochaetus striatus	86
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Chaetodon lunulatus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Chaetodon sp.1	1
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Cheilinus undulatus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Chlorurus sordidus	8
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Hipposcarus sp.	3
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Scarus oviceps	2
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Thalassoma lunare	1
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Thalassoma lutescens	3
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Lutjanus viridis	1
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Chromis spp.	3
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Dascyllus reticulatus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Pomacentrus spp.	6
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Cephalopholis argus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE01	Reef Crest	Ephinephelus hexagonatus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Acanthurus blochii	6
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Acanthurus lineatus	5
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Acanthurus sp.	4
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Ctenochaetus striatus	36
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Caranx melampygus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Chaetodon lunulatus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Chaetodon sp.1	1
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Chlorurus sordidus	19
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Hipposcarus sp.	11
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Labroides dimidiatus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Scarus ghobban	25
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Scarus oviceps	5
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Thalassoma lunare	10
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Thalassoma lutescens	4
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Parupeneus multifasciatus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Abudefduf spp.	12
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Dascyllus reticulatus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Pomacentrus spp.	2
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Cephalopholis argus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Siganus sp.	20
4/28/2023	Tamil Chanel Entrance (East)	ECE02	Reef Crest	Zanclus cornutus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE03	Reef Flat	Ctenochaetus striatus	64
4/28/2023	Tamil Chanel Entrance (East)	ECE03	Reef Flat	Zebrasoma flavescens	1
4/28/2023	Tamil Chanel Entrance (East)	ECE03	Reef Flat	Chaetodon auriga	2
4/28/2023	Tamil Chanel Entrance (East)	ECE03	Reef Flat	Chaetodon lunulatus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE03	Reef Flat	Chaetodon sp.1	1
4/28/2023	Tamil Chanel Entrance (East)	ECE03	Reef Flat	Heniochus sp.	2
4/28/2023	Tamil Chanel Entrance (East)	ECE03	Reef Flat	Chlorurus sordidus	7
4/28/2023	Tamil Chanel Entrance (East)	ECE03	Reef Flat	Hipposcarus sp.	6
4/28/2023	Tamil Chanel Entrance (East)	ECE03	Reef Flat	Scarus ghobban	8
4/28/2023	Tamil Chanel Entrance (East)	ECE03	Reef Flat	Parupeneus multifasciatus	8

## Appendix B. Benthic/Biotic Data. Belt Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
4/28/2023	Tamil Chanel Entrance (East)	ECE03	Reef Flat	Pomacanthus sp.	2
4/28/2023	Tamil Chanel Entrance (East)	ECE03	Reef Flat	Abudefduf spp.	7
4/28/2023	Tamil Chanel Entrance (East)	ECE03	Reef Flat	Pterois antennata	1
4/28/2023	Tamil Chanel Entrance (East)	ECE04	Reef Flat	Ctenochaetus striatus	74
4/28/2023	Tamil Chanel Entrance (East)	ECE04	Reef Flat	Chaetodon sp.1	2
4/28/2023	Tamil Chanel Entrance (East)	ECE04	Reef Flat	Heniochus sp.	2
4/28/2023	Tamil Chanel Entrance (East)	ECE04	Reef Flat	Amblygobius sp.	X
4/28/2023	Tamil Chanel Entrance (East)	ECE04	Reef Flat	Chlorurus sordidus	8
4/28/2023	Tamil Chanel Entrance (East)	ECE04	Reef Flat	Hipposcarus sp.	23
4/28/2023	Tamil Chanel Entrance (East)	ECE04	Reef Flat	Scarus ghobban	10
4/28/2023	Tamil Chanel Entrance (East)	ECE04	Reef Flat	Lethrinus harak	1
4/28/2023	Tamil Chanel Entrance (East)	ECE04	Reef Flat	Parupeneus multifasciatus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE04	Reef Flat	Cephalopholis miniata	1
4/28/2023	Tamil Chanel Entrance (East)	ECE04	Reef Flat	Siganus sp.	5
4/28/2023	Tamil Chanel Entrance (East)	ECE04	Reef Flat	Zanclus cornutus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Acanthurus blochii	2
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Acanthurus olivaceus	3
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Acanthurus triostegus	12
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Ctenochaetus striatus	32
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Chaetodon vagabundus	3
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Amblygobius sp.	X
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Chlorurus microrhinos	2
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Chlorurus sordidus	4
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Halichoeres hortulanus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Hipposcarus sp.	46
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Labroides dimidiatus	9
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Scarus ghobban	5
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Parupeneus multifasciatus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Chromis spp.	11
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Chrysiptera brownriggii	45
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Pomacentrus spp.	15
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Segastes spp.	10
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Pterois volitans	1
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Cephalopholis argus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Corythoichthys sp.	X
4/28/2023	Tamil Chanel Entrance (East)	ECE05	Reef Flat	Zanclus cornutus	3
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Acanthurus blochii	1
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Acanthurus olivaceus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Acanthurus triostegus	4
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Ctenochaetus striatus	26
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Rhinecanthus rectangulus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Plagiotremus laudandus	X
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Chaetodon auriga	1
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Chaetodon vagabundus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Amblygobius sp.	x
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Coryphopterus sp.	X
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Coris sp.	8
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Labroides dimidiatus	2

## Appendix B. Benthic/Biotic Data. Belt Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Scarus ghobban	3
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Scarus oviceps	2
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Thalassoma lunare	12
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Gymnothorax flavimarginatus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Chrysiptera brownriggii	1
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Pomacentrus coelestis	2
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Pomacentrus spp.	14
4/28/2023	Tamil Chanel Entrance (East)	ECE06	Reef Crest	Segastes spp.	5
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Acanthurus blochii	5
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Ctenochaetus striatus	58
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Naso unicornis	2
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Ecsenius sp.	X
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Plagiotremus rhinorhynchus	X
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Chaetodon rafflesii	5
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Chaetodon sp.1	4
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Chaetodon vagabundus	9
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Heniochus sp.	4
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Amblygobius sp.	X
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Coryphopterus sp.	X
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Ctenogobius sp.	X
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Eviota bifasciata	X
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Eviota pellucida	X
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Fusigobius signipinnis	X
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Neoniphon argenteus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Chlorurus microrhinos	9
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Chlorurus sordidus	31
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Hipposcarus sp.	17
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Labroides dimidiatus	9
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Scarus ghobban	12
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Ephinephelus hexagonatus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE07	Reef Crest	Zanclus cornutus	6
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Acanthurus blochii	8
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Acanthurus olivaceus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Ctenochaetus striatus	44
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Chaetodon ephippium	3
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Chaetodon rafflesii	2
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Chaetodon sp.2	2
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Heniochus monoceros	1
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Eviota bifasciata	X
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Eviota pellucida	X
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Chlorurus microrhinos	1
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Chlorurus sordidus	11
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Coris sp.	1
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Hipposcarus sp.	2
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Labroides dimidiatus	7
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Scarus ghobban	6
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Scarus oviceps	2
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Pygoplites diacanthus	1

## Appendix B. Benthic/Biotic Data. Belt Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Chromis spp.	47
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Pomacentrus spp.	22
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Cephalopholis argus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE08	Reef Crest	Zanclus cornutus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE09	Reef Crest	Acanthurus blochii	4
4/28/2023	Tamil Chanel Entrance (East)	ECE09	Reef Crest	Acanthurus lineatus	3
4/28/2023	Tamil Chanel Entrance (East)	ECE09	Reef Crest	Acanthurus sp.	1
4/28/2023	Tamil Chanel Entrance (East)	ECE09	Reef Crest	Ctenochaetus striatus	23
4/28/2023	Tamil Chanel Entrance (East)	ECE09	Reef Crest	Chaetodon auriga	1
4/28/2023	Tamil Chanel Entrance (East)	ECE09	Reef Crest	Chaetodon rafflesii	1
4/28/2023	Tamil Chanel Entrance (East)	ECE09	Reef Crest	Chlorurus sordidus	5
4/28/2023	Tamil Chanel Entrance (East)	ECE09	Reef Crest	Hipposcarus sp.	9
4/28/2023	Tamil Chanel Entrance (East)	ECE09	Reef Crest	Scarus ghobban	8
4/28/2023	Tamil Chanel Entrance (East)	ECE09	Reef Crest	Thalassoma lunare	11
4/28/2023	Tamil Chanel Entrance (East)	ECE09	Reef Crest	Thalassoma lutescens	6
4/28/2023	Tamil Chanel Entrance (East)	ECE09	Reef Crest	Chrysiptera brownriggii	7
4/28/2023	Tamil Chanel Entrance (East)	ECE09	Reef Crest	Pomacentrus spp.	11
4/28/2023	Tamil Chanel Entrance (East)	ECE09	Reef Crest	Siganus doliatus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Acanthurus lineatus	5
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Ctenochaetus striatus	64
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Chaetodon auriga	3
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Chaetodon rafflesii	5
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Chaetodon sp.1	15
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Chaetodon sp.2	4
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Heniochus monoceros	2
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Heniochus sp.	2
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Plectorhinchus lineatus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Myripristis kuntzei	7
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Cheilinus undulatus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Chlorurus microrhinos	5
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Halichoeres hortulanus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Hipposcarus sp.	8
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Scarus ghobban	35
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Thalassoma lunare	11
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Thalassoma lutescens	1
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Lethrinus harak	1
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Lutjanus gibbus	4
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Pygoplites diacanthus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Chrysiptera brownriggii	7
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Pomacentrus spp.	1
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Cephalopholis miniata	2
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Siganus doliatus	5
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Siganus sp.	1
4/28/2023	Tamil Chanel Entrance (East)	ECE10	Reef Crest	Zanclus cornutus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Acanthurus blochii	5
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Acanthurus lineatus	3
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Ctenochaetus striatus	56
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Chaetodon sp.1	10



## Appendix B. Benthic/Biotic Data. Belt Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Chaetodon sp.2	14
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Myripristis kuntze	1
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Hipposcarus sp.	16
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Labroides dimidiatus	1
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Scarus ghobban	6
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Thalassoma lunare	5
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Lethrinus harak	1
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Parupeneus multifasciatus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Pomacanthus sp.	2
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Cephalopholis miniata	8
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Siganus doliatus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Siganus sp.	5
4/28/2023	Tamil Chanel Entrance (East)	ECE11	Reef Crest	Zanclus cornutus	2
4/28/2023	Tamil Chanel Entrance (East)	ECE12	Reef Crest	Acanthurus blochii	7
4/28/2023	Tamil Chanel Entrance (East)	ECE12	Reef Crest	Acanthurus lineatus	12
4/28/2023	Tamil Chanel Entrance (East)	ECE12	Reef Crest	Ctenochaetus striatus	48
4/28/2023	Tamil Chanel Entrance (East)	ECE12	Reef Crest	Naso unicornis	1
4/28/2023	Tamil Chanel Entrance (East)	ECE12	Reef Crest	Chaetodon sp.1	3
4/28/2023	Tamil Chanel Entrance (East)	ECE12	Reef Crest	Chaetodon sp.2	1
4/28/2023	Tamil Chanel Entrance (East)	ECE12	Reef Crest	Myripristis kuntze	4
4/28/2023	Tamil Chanel Entrance (East)	ECE12	Reef Crest	Scarus ghobban	8
4/28/2023	Tamil Chanel Entrance (East)	ECE12	Reef Crest	Gnathodentex aureolineatus	50
4/28/2023	Tamil Chanel Entrance (East)	ECE12	Reef Crest	Lethrinus harak	2
4/28/2023	Tamil Chanel Entrance (East)	ECE12	Reef Crest	Parupeneus multifasciatus	6
4/28/2023	Tamil Chanel Entrance (East)	ECE12	Reef Crest	Pomacanthus sp.	1
4/28/2023	Tamil Chanel Entrance (East)	ECE12	Reef Crest	Pomacentrus spp.	8
4/28/2023	Tamil Chanel Entrance (East)	ECE12	Reef Crest	Cephalopholis miniata	2
4/28/2023	Tamil Chanel Entrance (East)	ECE12	Reef Crest	Siganus doliatus	4
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Acanthurus blochii	6
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Acanthurus lineatus	9
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Acanthurus nigricans	1
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Acanthurus olivaceus	7
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Acanthurus triostegus	21
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Ctenochaetus striatus	54
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Balistapus undulatus	1
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Balistoides viridescens	1
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Sufflamen chrysoptera	1
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Cirripectes sp.	X
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Chaetodon vagabundus	4
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Paracirrhites arcatus	1
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Eviota sigillata	X
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Eviota sp.	X
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Chlorurus sordidus	2
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Halichoeres melanurus	4
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Scarus ghobban	3
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Thalassoma lunare	7
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Thalassoma sp.	49
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Chrysiptera brownriggii	23

## Appendix B. Benthic/Biotic Data. Belt Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
5/3/2023	Tamil Chanel Entrance (East)	ECE13	Forereef	Cephalopholis miniata	1
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Acanthurus blochii	4
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Acanthurus lineatus	35
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Acanthurus olivaceus	5
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Acanthurus triostegus	1
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Ctenochaetus striatus	69
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Balistoides viridescens	1
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Rhinecanthus rectangulus	1
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Chaetodon ephippium	1
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Chaetodon vagabundus	5
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Forcipiger flavissimus	2
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Platax teira	2
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Eviota sigillata	X
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Chlorurus sordidus	5
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Coris batuensis	7
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Scarus ghobban	6
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Scarus oviceps	4
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Thalassoma lunare	10
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Thalassoma sp.	51
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Cephalopholis argus	3
5/3/2023	Tamil Chanel Entrance (East)	ECE14	Forereef	Cephalopholis miniata	1
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Acanthurus lineatus	31
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Acanthurus nigricans	1
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Acanthurus olivaceus	7
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Acanthurus triostegus	3
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Ctenochaetus striatus	73
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Naso lituratus	8
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Naso unicornis	1
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Balistoides viridescens	1
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Rhinecanthus rectangulus	1
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Sufflamen chrysoptera	2
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Cirripectes sp.	X
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Caranx melampygus	1
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Triaenodon obesus	1
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Forcipiger flavissimus	2
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Eviota sigillata	X
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Plectorhynchus lineatus	1
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Scarus ghobban	7
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Scarus oviceps	3
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Thalassoma lunare	2
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Thalassoma lutescens	1
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Thalassoma sp.	40
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Lutjanus bohar	1
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Parupeneus multifasciatus	1
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Gymnothorax flavimarginatus	1
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Chrysiptera brownriggii	45
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Pycnochromis margaritifer	1
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Cephalopholis argus	2

## Appendix B. Benthic/Biotic Data. Belt Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Cephalopholis miniata	2
5/3/2023	Tamil Chanel Entrance (East)	ECE15	Forereef	Zanclus cornutus	5
5/6/2023	Tamil Chanel Entrance (East)	ECE16	Reef Flat	Acanthurus triostegus	9
5/6/2023	Tamil Chanel Entrance (East)	ECE16	Reef Flat	Ctenochaetus striatus	1
5/6/2023	Tamil Chanel Entrance (East)	ECE16	Reef Flat	Rhinecanthus rectangulus	4
5/6/2023	Tamil Chanel Entrance (East)	ECE16	Reef Flat	Asterropteryx semipunctata	1
5/6/2023	Tamil Chanel Entrance (East)	ECE16	Reef Flat	Coris sp.	63
5/6/2023	Tamil Chanel Entrance (East)	ECE16	Reef Flat	Echidna nebulosa	2
5/6/2023	Tamil Chanel Entrance (East)	ECE17	Reef Flat	Acanthurus triostegus	1
5/6/2023	Tamil Chanel Entrance (East)	ECE17	Reef Flat	Ctenochaetus striatus	5
5/6/2023	Tamil Chanel Entrance (East)	ECE17	Reef Flat	Rhinecanthus rectangulus	1
5/6/2023	Tamil Chanel Entrance (East)	ECE17	Reef Flat	Chlorurus sordidus	3
5/6/2023	Tamil Chanel Entrance (East)	ECE17	Reef Flat	Coris sp.	12
5/6/2023	Tamil Chanel Entrance (East)	ECE17	Reef Flat	Thalassoma sp.	12
5/6/2023	Tamil Chanel Entrance (East)	ECE17	Reef Flat	Lethrinus harak	2
5/6/2023	Tamil Chanel Entrance (East)	ECE17	Reef Flat	Chrysiptera brownriggii	4
5/6/2023	Tamil Chanel Entrance (East)	ECE17	Reef Flat	Ephinephelus hexagonatus	1
5/6/2023	Tamil Chanel Entrance (East)	ECE18	Reef Flat	Ctenochaetus striatus	1
5/6/2023	Tamil Chanel Entrance (East)	ECE18	Reef Flat	Valenciennea strigata	2
5/6/2023	Tamil Chanel Entrance (East)	ECE18	Reef Flat	Coris sp.	11
5/6/2023	Tamil Chanel Entrance (East)	ECE18	Reef Flat	Thalassoma sp.	7
5/6/2023	Tamil Chanel Entrance (East)	ECE18	Reef Flat	Chrysiptera brownriggii	1
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Acanthurus blochii	4
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Acanthurus lineatus	7
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Acanthurus nigricans	12
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Ctenochaetus striatus	36
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Naso unicornis	1
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Apogon spp.	1
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Sufflamen chrysopteram	1
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Chaetodon auriga	2
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Chaetodon speculum	2
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Chaetodon vagabundus	4
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Neonippon argenteus	1
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Chlorurus sordidus	27
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Coris batuensis	3
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Coris sp.	6
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Gomphosus varius	2
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Halichoeres melanurus	8
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Scarus frenatus	1
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Scarus ghobban	19
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Scarus oviceps	20
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Thalassoma sp.	17
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Lutjanus bohar	1
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Lutjanus gibbus	6
5/7/2023	Tamil Chanel Entrance (East)	ECE19	Forereef	Pomacentrus spp.	4
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Acanthurus blochii	5
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Acanthurus lineatus	37
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Acanthurus nigricans	11

## Appendix B. Benthic/Biotic Data. Belt Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Ctenochaetus striatus	65
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Sufflamen chrysoptera	2
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Chaetodon auriga	2
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Chaetodon ephippium	1
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Chaetodon speculum	3
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Chaetodon vagabundus	2
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Heniochus sp.	2
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Kipphosus sp.	1
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Coris batuensis	8
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Labroides dimidiatus	2
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Scarus ghobban	10
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Thalassoma sp.	12
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Lutjanus bohar	1
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Parupeneus barberinus	3
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Pygoplites diacanthus	1
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Pomacentrus spp.	3
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Pycnochromis margaritifer	4
5/7/2023	Tamil Chanel Entrance (East)	ECE20	Forereef	Zanclus cornutus	1
4/29/2023	Tamil Chanel Entrance (West)	ECW01	Reef Crest	Acanthurus blochii	2
4/29/2023	Tamil Chanel Entrance (West)	ECW01	Reef Crest	Ctenochaetus striatus	22
4/29/2023	Tamil Chanel Entrance (West)	ECW01	Reef Crest	Chaetodon sp.1	1
4/29/2023	Tamil Chanel Entrance (West)	ECW01	Reef Crest	Chlorurus microrhinos	2
4/29/2023	Tamil Chanel Entrance (West)	ECW01	Reef Crest	Chlorurus sordidus	4
4/29/2023	Tamil Chanel Entrance (West)	ECW01	Reef Crest	Scarus ghobban	14
4/29/2023	Tamil Chanel Entrance (West)	ECW01	Reef Crest	Scarus oviceps	4
4/29/2023	Tamil Chanel Entrance (West)	ECW01	Reef Crest	Thalassoma lunare	6
4/29/2023	Tamil Chanel Entrance (West)	ECW01	Reef Crest	Thalassoma lutescens	18
4/29/2023	Tamil Chanel Entrance (West)	ECW01	Reef Crest	Gnathodentex aureolineatus	30
4/29/2023	Tamil Chanel Entrance (West)	ECW01	Reef Crest	Pygoplites diacanthus	1
4/29/2023	Tamil Chanel Entrance (West)	ECW01	Reef Crest	Pomacentrus spp.	3
4/29/2023	Tamil Chanel Entrance (West)	ECW01	Reef Crest	Siganus doliatus	2
4/29/2023	Tamil Chanel Entrance (West)	ECW01	Reef Crest	Siganus lineatus	24
4/29/2023	Tamil Chanel Entrance (West)	ECW02	Reef Crest	Acanthurus blochii	4
4/29/2023	Tamil Chanel Entrance (West)	ECW02	Reef Crest	Ctenochaetus striatus	20
4/29/2023	Tamil Chanel Entrance (West)	ECW02	Reef Crest	Caranx melampygus	2
4/29/2023	Tamil Chanel Entrance (West)	ECW02	Reef Crest	Caranx sp.	1
4/29/2023	Tamil Chanel Entrance (West)	ECW02	Reef Crest	Plectorhinchus lineatus	2
4/29/2023	Tamil Chanel Entrance (West)	ECW02	Reef Crest	Myripristis kuntee	20
4/29/2023	Tamil Chanel Entrance (West)	ECW02	Reef Crest	Neoniphon argenteus	10
4/29/2023	Tamil Chanel Entrance (West)	ECW02	Reef Crest	Cheilinus undulatus	1
4/29/2023	Tamil Chanel Entrance (West)	ECW02	Reef Crest	Scarus ghobban	4
4/29/2023	Tamil Chanel Entrance (West)	ECW02	Reef Crest	Thalassoma lutescens	11
4/29/2023	Tamil Chanel Entrance (West)	ECW02	Reef Crest	Lutjanus bohar	2
4/29/2023	Tamil Chanel Entrance (West)	ECW02	Reef Crest	Pomacentrus spp.	6
4/29/2023	Tamil Chanel Entrance (West)	ECW02	Reef Crest	Cephalopholis miniata	1
4/29/2023	Tamil Chanel Entrance (West)	ECW02	Reef Crest	Siganus lineatus	17
4/29/2023	Tamil Chanel Entrance (West)	ECW03	Reef Crest	Acanthurus blochii	9
4/29/2023	Tamil Chanel Entrance (West)	ECW03	Reef Crest	Ctenochaetus striatus	31

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Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
4/29/2023	Tamil Chanel Entrance (West)	ECW03	Reef Crest	Caranx melampygus	1
4/29/2023	Tamil Chanel Entrance (West)	ECW03	Reef Crest	Chaetodon sp.1	3
4/29/2023	Tamil Chanel Entrance (West)	ECW03	Reef Crest	Plectorhinchus lineatus	1
4/29/2023	Tamil Chanel Entrance (West)	ECW03	Reef Crest	Myripristis kuntze	7
4/29/2023	Tamil Chanel Entrance (West)	ECW03	Reef Crest	Scarus ghobban	3
4/29/2023	Tamil Chanel Entrance (West)	ECW03	Reef Crest	Thalassoma lunare	3
4/29/2023	Tamil Chanel Entrance (West)	ECW03	Reef Crest	Thalassoma lutescens	6
4/29/2023	Tamil Chanel Entrance (West)	ECW03	Reef Crest	Parupeneus multifasciatus	1
4/29/2023	Tamil Chanel Entrance (West)	ECW03	Reef Crest	Pomacanthus sp.	3
4/29/2023	Tamil Chanel Entrance (West)	ECW03	Reef Crest	Pomacentrus coelestis	12
4/29/2023	Tamil Chanel Entrance (West)	ECW03	Reef Crest	Pomacentrus spp.	10
5/2/2023	Tamil Chanel Entrance (West)	ECW04	Reef Flat	Acanthurus triostegus	3
5/2/2023	Tamil Chanel Entrance (West)	ECW04	Reef Flat	Ctenochaetus striatus	40
5/2/2023	Tamil Chanel Entrance (West)	ECW04	Reef Flat	Rhinecanthus rectangulus	2
5/2/2023	Tamil Chanel Entrance (West)	ECW04	Reef Flat	Thalassoma lunare	6
5/2/2023	Tamil Chanel Entrance (West)	ECW04	Reef Flat	Abudefduf spp.	2
5/2/2023	Tamil Chanel Entrance (West)	ECW05	Reef Flat	Ctenochaetus striatus	7
5/2/2023	Tamil Chanel Entrance (West)	ECW05	Reef Flat	Chromis spp.	30
5/2/2023	Tamil Chanel Entrance (West)	ECW05	Reef Flat	Zanclus cornutus	1
5/2/2023	Tamil Chanel Entrance (West)	ECW06	Forereef	Acanthurus triostegus	4
5/2/2023	Tamil Chanel Entrance (West)	ECW06	Forereef	Ctenochaetus striatus	38
5/2/2023	Tamil Chanel Entrance (West)	ECW06	Forereef	Rhinecanthus rectangulus	3
5/2/2023	Tamil Chanel Entrance (West)	ECW06	Forereef	Platax teira	2
5/2/2023	Tamil Chanel Entrance (West)	ECW06	Forereef	Chromis spp.	4
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Acanthurus blochii	5
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Ctenochaetus striatus	50
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Zebrasoma flavescens	2
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Rhinecanthus rectangulus	3
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Chlorurus microrhinos	2
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Coris batuensis	6
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Hipposcarus sp.	2
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Scarus ghobban	8
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Thalassoma lunare	10
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Gnathodentex aureolineatus	1
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Lutjanus gibbus	1
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Centropyge bicolor	1
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Chromis spp.	26
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Pycnochromis margaritifer	12
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Cephalopholis miniata	1
5/2/2023	Tamil Chanel Entrance (West)	ECW07	Forereef	Siganus lineatus	9
5/2/2023	Tamil Chanel Entrance (West)	ECW08	Reef Crest	Acanthurus blochii	10
5/2/2023	Tamil Chanel Entrance (West)	ECW08	Reef Crest	Acanthurus lineatus	6
5/2/2023	Tamil Chanel Entrance (West)	ECW08	Reef Crest	Ctenochaetus striatus	52
5/2/2023	Tamil Chanel Entrance (West)	ECW08	Reef Crest	Rhinecanthus rectangulus	2
5/2/2023	Tamil Chanel Entrance (West)	ECW08	Reef Crest	Heniochus sp.	2
5/2/2023	Tamil Chanel Entrance (West)	ECW08	Reef Crest	Scarus ghobban	9
5/2/2023	Tamil Chanel Entrance (West)	ECW08	Reef Crest	Centropyge bicolor	2
5/2/2023	Tamil Chanel Entrance (West)	ECW08	Reef Crest	Pomacanthus sp.	1



## Appendix B. Benthic/Biotic Data. Belt Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
5/2/2023	Tamil Chanel Entrance (West)	ECW08	Reef Crest	Cephalopholis miniata	2
5/2/2023	Tamil Chanel Entrance (West)	ECW08	Reef Crest	Siganus lineatus	2
5/2/2023	Tamil Chanel Entrance (West)	ECW09	Forereef	Acanthurus blochii	37
5/2/2023	Tamil Chanel Entrance (West)	ECW09	Forereef	Acanthurus lineatus	12
5/2/2023	Tamil Chanel Entrance (West)	ECW09	Forereef	Ctenochaetus striatus	87
5/2/2023	Tamil Chanel Entrance (West)	ECW09	Forereef	Bolbometopon muricatum	1
5/2/2023	Tamil Chanel Entrance (West)	ECW09	Forereef	Hipposcarus sp.	2
5/2/2023	Tamil Chanel Entrance (West)	ECW09	Forereef	Scarus ghobban	4
5/2/2023	Tamil Chanel Entrance (West)	ECW09	Forereef	Scarus oviceps	1
5/2/2023	Tamil Chanel Entrance (West)	ECW09	Forereef	Thalassoma lunare	9
5/2/2023	Tamil Chanel Entrance (West)	ECW09	Forereef	Gnathodentex aureolineatus	7
5/2/2023	Tamil Chanel Entrance (West)	ECW09	Forereef	Lethrinus harak	2
5/2/2023	Tamil Chanel Entrance (West)	ECW09	Forereef	Lutjanus gibbus	3
5/2/2023	Tamil Chanel Entrance (West)	ECW09	Forereef	Pomacanthus sp.	3
5/2/2023	Tamil Chanel Entrance (West)	ECW09	Forereef	Siganus lineatus	1
5/2/2023	Tamil Chanel Entrance (West)	ECW09	Forereef	Zanclus cornutus	1
5/3/2023	Tamil Chanel Entrance (West)	ECW10	Forereef	Acanthurus blochii	20
5/3/2023	Tamil Chanel Entrance (West)	ECW10	Forereef	Acanthurus lineatus	11
5/3/2023	Tamil Chanel Entrance (West)	ECW10	Forereef	Acanthurus nigricans	2
5/3/2023	Tamil Chanel Entrance (West)	ECW10	Forereef	Ctenochaetus striatus	15
5/3/2023	Tamil Chanel Entrance (West)	ECW10	Forereef	Rhinecanthus rectangulus	1
5/3/2023	Tamil Chanel Entrance (West)	ECW10	Forereef	Sufflamen chrysoptera	6
5/3/2023	Tamil Chanel Entrance (West)	ECW10	Forereef	Chaetodon auriga	1
5/3/2023	Tamil Chanel Entrance (West)	ECW10	Forereef	Paracirrhites arcatus	2
5/3/2023	Tamil Chanel Entrance (West)	ECW10	Forereef	Eviota pellucida	X
5/3/2023	Tamil Chanel Entrance (West)	ECW10	Forereef	Eviota sigillata	X
5/3/2023	Tamil Chanel Entrance (West)	ECW10	Forereef	Coris sp.	26
5/3/2023	Tamil Chanel Entrance (West)	ECW10	Forereef	Thalassoma sp.	29
5/3/2023	Tamil Chanel Entrance (West)	ECW10	Forereef	Chromis spp.	2
5/3/2023	Tamil Chanel Entrance (West)	ECW10	Forereef	Chrysiptera brownriggii	11
5/3/2023	Tamil Chanel Entrance (West)	ECW10	Forereef	Sebastapistes cyanostigma	3
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Acanthurus blochii	3
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Acanthurus lineatus	17
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Ctenochaetus striatus	9
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Zebrasoma flavescens	2
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Rhinecanthus rectangulus	2
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Sufflamen chrysoptera	4
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Cirripectes sp.	X
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Plagiotremus rhinorhynchus	1
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Cirrhitichthys oxycephalus	1
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Paracirrhites arcatus	1
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Eviota sp.	X
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Coris sp.	17
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Thalassoma lunare	3
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Thalassoma sp.	41
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Pomacentrus spp.	3
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Pycnochromis margaritifer	3
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Ptereleotris monoptera	3

## Appendix B. Benthic/Biotic Data. Belt Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Sebastapistes cyanostigma	1
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Cephalopholis argus	1
5/3/2023	Tamil Chanel Entrance (West)	ECW11	Forereef	Cephalopholis miniata	1
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Acanthurus blochii	2
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Acanthurus lineatus	55
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Ctenochaetus striatus	6
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Zebrasoma flavescens	2
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Rhinecanthus rectangulus	5
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Sufflamen chrysoptera	2
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Cirripectes sp.	X
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Eviota pellucida	X
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Cheilinus undulatus	1
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Coris sp.	18
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Labrichthys unilineatus	1
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Thalassoma lunare	9
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Thalassoma sp.	91
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Lutjanus gibbus	1
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Parupeneus multifasciatus	1
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Chrysiptera brownriggii	13
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Ptereleotris monoptera	1
5/3/2023	Tamil Chanel Entrance (West)	ECW12	Forereef	Sebastapistes cyanostigma	1
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Acanthurus blochii	3
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Acanthurus olivaceus	2
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Acanthurus triostegus	33
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Ctenochaetus striatus	76
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Rhinecanthus rectangulus	1
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Salarias sp.	X
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Eviota pellucida	X
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Eviota sp.	X
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Neoniphon argenteus	1
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Cheilinus undulatus	X
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Chlorurus microrhinos	1
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Coris sp.	14
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Halichoeres hortulanus	3
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Labroides dimidiatus	1
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Thalassoma lunare	15
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Thalassoma sp.	20
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Parupeneus multifasciatus	1
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Chromis viridis	4
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Chrysiptera brownriggii	3
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Pomacentrus coelestis	2
5/6/2023	Tamil Chanel Entrance (West)	ECW13	Reef Flat	Zanclus cornutus	2
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Acanthurus blochii	1
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Acanthurus lineatus	3
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Acanthurus triostegus	11
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Ctenochaetus striatus	20
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Rhinecanthus rectangulus	1
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Paracirrhites arcatus	1

## Appendix B. Benthic/Biotic Data. Belt Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Asterropteryx semipunctata	X
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Eviota pellucida	X
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Eviota sp.	X
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Neoniphon argenteus	1
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Coris batuensis	10
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Coris gaimard	1
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Coris sp.	2
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Novaculichthys taeniourus	1
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Thalassoma lunare	3
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Thalassoma lutescens	7
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Thalassoma sp.	2
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Lethrinus harak	7
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Parupeneus multifasciatus	1
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Chromis viridis	5
5/6/2023	Tamil Chanel Entrance (West)	ECW14	Reef Flat	Pomacentrus coelestis	6
5/6/2023	Tamil Chanel Entrance (West)	ECW15	Reef Flat	Acanthurus blochii	8
5/6/2023	Tamil Chanel Entrance (West)	ECW15	Reef Flat	Acanthurus triostegus	45
5/6/2023	Tamil Chanel Entrance (West)	ECW15	Reef Flat	Ctenochaetus striatus	69
5/6/2023	Tamil Chanel Entrance (West)	ECW15	Reef Flat	Rhinecanthus rectangulus	1
5/6/2023	Tamil Chanel Entrance (West)	ECW15	Reef Flat	Coris batuensis	3
5/6/2023	Tamil Chanel Entrance (West)	ECW15	Reef Flat	Coris sp.	7
5/6/2023	Tamil Chanel Entrance (West)	ECW15	Reef Flat	Thalassoma lunare	5
5/6/2023	Tamil Chanel Entrance (West)	ECW15	Reef Flat	Thalassoma sp.	11
5/6/2023	Tamil Chanel Entrance (West)	ECW15	Reef Flat	Lethrinus harak	1
5/6/2023	Tamil Chanel Entrance (West)	ECW15	Reef Flat	Chrysiptera brownriggii	9
5/6/2023	Tamil Chanel Entrance (West)	ECW15	Reef Flat	Pomacentrus coelestis	1
5/7/2023	Tamil Chanel Entrance (West)	ECW16	Reef Flat	Acanthurus triostegus	9
5/7/2023	Tamil Chanel Entrance (West)	ECW16	Reef Flat	Rhinecanthus rectangulus	1
5/7/2023	Tamil Chanel Entrance (West)	ECW16	Reef Flat	Plectorhinchus lineatus	X
5/7/2023	Tamil Chanel Entrance (West)	ECW16	Reef Flat	Coris sp.	46
5/7/2023	Tamil Chanel Entrance (West)	ECW16	Reef Flat	Novaculichthys taeniourus	1
5/7/2023	Tamil Chanel Entrance (West)	ECW16	Reef Flat	Thalassoma lunare	2
5/7/2023	Tamil Chanel Entrance (West)	ECW16	Reef Flat	Thalassoma sp.	3
5/7/2023	Tamil Chanel Entrance (West)	ECW16	Reef Flat	Lethrinus harak	1
5/7/2023	Tamil Chanel Entrance (West)	ECW16	Reef Flat	Abudefduf spp.	3
5/7/2023	Tamil Chanel Entrance (West)	ECW16	Reef Flat	Chrysiptera brownriggii	3
5/7/2023	Tamil Chanel Entrance (West)	ECW16	Reef Flat	Sebastapistes cyanostigma	1
5/7/2023	Tamil Chanel Entrance (West)	ECW17	Reef Flat	Acanthurus triostegus	6
5/7/2023	Tamil Chanel Entrance (West)	ECW17	Reef Flat	Naso lituratus	1
5/7/2023	Tamil Chanel Entrance (West)	ECW17	Reef Flat	Rhinecanthus rectangulus	2
5/7/2023	Tamil Chanel Entrance (West)	ECW17	Reef Flat	Chaetodon lunulatus	2
5/7/2023	Tamil Chanel Entrance (West)	ECW17	Reef Flat	Coris sp.	44
5/7/2023	Tamil Chanel Entrance (West)	ECW17	Reef Flat	Thalassoma lunare	2
5/7/2023	Tamil Chanel Entrance (West)	ECW17	Reef Flat	Thalassoma sp.	3
5/7/2023	Tamil Chanel Entrance (West)	ECW17	Reef Flat	Abudefduf spp.	2
5/7/2023	Tamil Chanel Entrance (West)	ECW17	Reef Flat	Chrysiptera brownriggii	5
5/7/2023	Tamil Chanel Entrance (West)	ECW18	Reef Flat	Acanthurus triostegus	7
5/7/2023	Tamil Chanel Entrance (West)	ECW18	Reef Flat	Ctenochaetus striatus	1

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Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
5/7/2023	Tamil Chanel Entrance (West)	ECW18	Reef Flat	Rhinecanthus rectangulus	3
5/7/2023	Tamil Chanel Entrance (West)	ECW18	Reef Flat	Carcharhinus melanopterus	1
5/7/2023	Tamil Chanel Entrance (West)	ECW18	Reef Flat	Chaetodon auriga	1
5/7/2023	Tamil Chanel Entrance (West)	ECW18	Reef Flat	Coris sp.	21
5/7/2023	Tamil Chanel Entrance (West)	ECW18	Reef Flat	Thalassoma lunare	3
5/7/2023	Tamil Chanel Entrance (West)	ECW18	Reef Flat	Thalassoma sp.	4
5/7/2023	Tamil Chanel Entrance (West)	ECW18	Reef Flat	Lethrinus harak	4
5/7/2023	Tamil Chanel Entrance (West)	ECW18	Reef Flat	Chrysiptera brownriggii	3
4/30/2023	Yap Port	YP01	Inner Reef	Acanthurus blochii	15
4/30/2023	Yap Port	YP01	Inner Reef	Ctenochaetus striatus	15
4/30/2023	Yap Port	YP01	Inner Reef	Cheilodipterus quinquelineatus	X
4/30/2023	Yap Port	YP01	Inner Reef	Caranx melampygus	1
4/30/2023	Yap Port	YP01	Inner Reef	Chaetodon ephippium	6
4/30/2023	Yap Port	YP01	Inner Reef	Heniochus sp.	4
4/30/2023	Yap Port	YP01	Inner Reef	Neoniphon argenteus	2
4/30/2023	Yap Port	YP01	Inner Reef	Thalassoma sp.	2
4/30/2023	Yap Port	YP01	Inner Reef	Lethrinus harak	1
4/30/2023	Yap Port	YP01	Inner Reef	Scolopsis lineata	1
4/30/2023	Yap Port	YP01	Inner Reef	Centropyge bicolor	3
4/30/2023	Yap Port	YP01	Inner Reef	Abudefduf spp.	20
4/30/2023	Yap Port	YP02	Inner Reef	Ctenochaetus striatus	60
4/30/2023	Yap Port	YP02	Inner Reef	Apogon spp.	X
4/30/2023	Yap Port	YP02	Inner Reef	Caranx melampygus	3
4/30/2023	Yap Port	YP02	Inner Reef	Chaetodon ephippium	15
4/30/2023	Yap Port	YP02	Inner Reef	Chaetodon lunulatus	20
4/30/2023	Yap Port	YP02	Inner Reef	Thalassoma sp.	8
4/30/2023	Yap Port	YP02	Inner Reef	Monotaxis heterodon	1
4/30/2023	Yap Port	YP02	Inner Reef	Parupeneus barberinus	13
4/30/2023	Yap Port	YP02	Inner Reef	Pomacanthus imperator	3
4/30/2023	Yap Port	YP02	Inner Reef	Abudefduf spp.	17
4/30/2023	Yap Port	YP02	Inner Reef	Chromis viridis	200
4/30/2023	Yap Port	YP02	Inner Reef	Dascyllus aruanus	12
4/30/2023	Yap Port	YP03	Inner Reef	Ctenochaetus striatus	11
4/30/2023	Yap Port	YP03	Inner Reef	Sufflamen chrysoptera	6
4/30/2023	Yap Port	YP03	Inner Reef	Myripristis kuntee	2
4/30/2023	Yap Port	YP03	Inner Reef	Chlorurus microrhinos	1
4/30/2023	Yap Port	YP03	Inner Reef	Chlorurus sordidus	2
4/30/2023	Yap Port	YP03	Inner Reef	Thalassoma sp.	5
4/30/2023	Yap Port	YP03	Inner Reef	Lethrinus harak	1
4/30/2023	Yap Port	YP03	Inner Reef	Lutjanus gibbus	80
4/30/2023	Yap Port	YP03	Inner Reef	Parupeneus barberinus	6
4/30/2023	Yap Port	YP03	Inner Reef	Centropyge bicolor	3
4/30/2023	Yap Port	YP03	Inner Reef	Abudefduf spp.	3
4/30/2023	Yap Port	YP03	Inner Reef	Dischistodus perspicillatus	10
4/30/2023	Yap Port	YP03	Inner Reef	Pomacentrus spp.	8
4/30/2023	Yap Port	YP04	Inner Reef	Ctenochaetus striatus	1
4/30/2023	Yap Port	YP04	Inner Reef	Zebrasoma flavescens	1
4/30/2023	Yap Port	YP04	Inner Reef	Apogon spp.	X

## Appendix B. Benthic/Biotic Data. Belt Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
4/30/2023	Yap Port	YP04	Inner Reef	Rhinecanthus aculeatus	1
4/30/2023	Yap Port	YP04	Inner Reef	Sufflamen chrysopteram	1
4/30/2023	Yap Port	YP04	Inner Reef	Plagiotremus laudandus	X
4/30/2023	Yap Port	YP04	Inner Reef	Salarias sp.	X
4/30/2023	Yap Port	YP04	Inner Reef	Chaetodon kleinii	1
4/30/2023	Yap Port	YP04	Inner Reef	Amblygobius sp.	X
4/30/2023	Yap Port	YP04	Inner Reef	Asterropteryx semipunctata	X
4/30/2023	Yap Port	YP04	Inner Reef	Ctenogobius sp.	X
4/30/2023	Yap Port	YP04	Inner Reef	Eviota bifasciata	X
4/30/2023	Yap Port	YP04	Inner Reef	Eviota sigillata	X
4/30/2023	Yap Port	YP04	Inner Reef	Fusigobius signipinnis	X
4/30/2023	Yap Port	YP04	Inner Reef	Coris sp.	3
4/30/2023	Yap Port	YP04	Inner Reef	Lethrinus harak	9
4/30/2023	Yap Port	YP04	Inner Reef	Lutjanus gibbus	22
4/30/2023	Yap Port	YP04	Inner Reef	Lutjanus viridis	1
4/30/2023	Yap Port	YP04	Inner Reef	Parupeneus multifasciatus	1
4/30/2023	Yap Port	YP04	Inner Reef	Dascyllus aruanus	27
4/30/2023	Yap Port	YP04	Inner Reef	Dischistodus perspicillatus	12
4/30/2023	Yap Port	YP04	Inner Reef	Plectroglyphidodon leucozonus	15
4/30/2023	Yap Port	YP04	Inner Reef	Pomacentrus spp.	1
4/30/2023	Yap Port	YP05	Inner Reef	Ctenochaetus striatus	3
4/30/2023	Yap Port	YP05	Inner Reef	Apogon spp.	X
4/30/2023	Yap Port	YP05	Inner Reef	Cheilodipterus quinquelineatus	X
4/30/2023	Yap Port	YP05	Inner Reef	Sphaeramia sp.	X
4/30/2023	Yap Port	YP05	Inner Reef	Sufflamen chrysopteram	1
4/30/2023	Yap Port	YP05	Inner Reef	Ecsenius sp.	X
4/30/2023	Yap Port	YP05	Inner Reef	Amblygobius sp.	X
4/30/2023	Yap Port	YP05	Inner Reef	Asterropteryx semipunctata	X
4/30/2023	Yap Port	YP05	Inner Reef	Ctenogobius sp.	X
4/30/2023	Yap Port	YP05	Inner Reef	Eviota sigillata	X
4/30/2023	Yap Port	YP05	Inner Reef	Istigobius sp.	X
4/30/2023	Yap Port	YP05	Inner Reef	Chlorurus sordidus	2
4/30/2023	Yap Port	YP05	Inner Reef	Coris sp.	1
4/30/2023	Yap Port	YP05	Inner Reef	Halichoeres hortulanus	3
4/30/2023	Yap Port	YP05	Inner Reef	Hipposcarus sp.	1
4/30/2023	Yap Port	YP05	Inner Reef	Thalassoma sp.	1
4/30/2023	Yap Port	YP05	Inner Reef	Parupeneus barberinus	1
4/30/2023	Yap Port	YP05	Inner Reef	Chromis viridis	54
4/30/2023	Yap Port	YP05	Inner Reef	Dascyllus aruanus	12
4/30/2023	Yap Port	YP05	Inner Reef	Dischistodus perspicillatus	5
4/30/2023	Yap Port	YP05	Inner Reef	Pomacentrus spp.	1
4/30/2023	Yap Port	YP06	Inner Reef	Ctenochaetus striatus	12
4/30/2023	Yap Port	YP06	Inner Reef	Zebrasoma flavescens	7
4/30/2023	Yap Port	YP06	Inner Reef	Apogon spp.	X
4/30/2023	Yap Port	YP06	Inner Reef	Cheilodipterus quinquelineatus	X
4/30/2023	Yap Port	YP06	Inner Reef	Ecsenius sp.	X
4/30/2023	Yap Port	YP06	Inner Reef	Salarias sp.	X
4/30/2023	Yap Port	YP06	Inner Reef	Chaetodon auriga	4



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Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
4/30/2023	Yap Port	YP06	Inner Reef	Chaetodon ephippium	4
4/30/2023	Yap Port	YP06	Inner Reef	Chaetodon kleinii	4
4/30/2023	Yap Port	YP06	Inner Reef	Chaetodon lunulatus	12
4/30/2023	Yap Port	YP06	Inner Reef	Forcipiger flavissimus	4
4/30/2023	Yap Port	YP06	Inner Reef	Amblygobius sp.	X
4/30/2023	Yap Port	YP06	Inner Reef	Asterropteryx semipunctata	X
4/30/2023	Yap Port	YP06	Inner Reef	Ctenogobius sp.	X
4/30/2023	Yap Port	YP06	Inner Reef	Eviota pellucida	X
4/30/2023	Yap Port	YP06	Inner Reef	Eviota sigillata	X
4/30/2023	Yap Port	YP06	Inner Reef	Koumansetta rainfordi	X
4/30/2023	Yap Port	YP06	Inner Reef	Chlorurus sordidus	8
4/30/2023	Yap Port	YP06	Inner Reef	Coris sp.	6
4/30/2023	Yap Port	YP06	Inner Reef	Halichoeres melanurus	4
4/30/2023	Yap Port	YP06	Inner Reef	Hipposcarus sp.	2
4/30/2023	Yap Port	YP06	Inner Reef	Lethrinus harak	3
4/30/2023	Yap Port	YP06	Inner Reef	Lutjanus gibbus	29
4/30/2023	Yap Port	YP06	Inner Reef	Parupeneus barberinus	1
4/30/2023	Yap Port	YP06	Inner Reef	Parupeneus multifasciatus	4
4/30/2023	Yap Port	YP06	Inner Reef	Chrysiptera brownriggii	12
4/30/2023	Yap Port	YP06	Inner Reef	Dischistodus perspicillatus	27
4/30/2023	Yap Port	YP06	Inner Reef	Pomacentrus coelestis	10
4/30/2023	Yap Port	YP06	Inner Reef	Pomacentrus spp.	12
4/30/2023	Yap Port	YP06	Inner Reef	Segastes spp.	6
4/30/2023	Yap Port	YP06	Inner Reef	Pseudochromis sp.	1
4/30/2023	Yap Port	YP06	Inner Reef	Corythoichthys sp.	X
4/30/2023	Yap Port	YP07	Inner Reef	Acanthurus blochii	10
4/30/2023	Yap Port	YP07	Inner Reef	Ctenochaetus striatus	21
4/30/2023	Yap Port	YP07	Inner Reef	Zebrasoma flavescens	3
4/30/2023	Yap Port	YP07	Inner Reef	Apogon spp.	X
4/30/2023	Yap Port	YP07	Inner Reef	Sufflamen chrysoptera	4
4/30/2023	Yap Port	YP07	Inner Reef	Chaetodon mertensii	2
4/30/2023	Yap Port	YP07	Inner Reef	Chlorurus sordidus	2
4/30/2023	Yap Port	YP07	Inner Reef	Hipposcarus sp.	1
4/30/2023	Yap Port	YP07	Inner Reef	Thalassoma sp.	8
4/30/2023	Yap Port	YP07	Inner Reef	Lethrinus harak	2
4/30/2023	Yap Port	YP07	Inner Reef	Lutjanus gibbus	7
4/30/2023	Yap Port	YP07	Inner Reef	Centropyge bicolor	3
4/30/2023	Yap Port	YP07	Inner Reef	Dascyllus reticulatus	4
4/30/2023	Yap Port	YP07	Inner Reef	Dischistodus perspicillatus	18
4/30/2023	Yap Port	YP07	Inner Reef	Pomacentrus spp.	3
4/30/2023	Yap Port	YP07	Inner Reef	Pseudochromis sp.	1
4/30/2023	Yap Port	YP07	Inner Reef	Cephalopholis miniata	2
4/30/2023	Yap Port	YP07	Inner Reef	Zanclus cornutus	1
5/1/2023	Yap Port	YP08	Inner Reef	Acanthurus blochii	5
5/1/2023	Yap Port	YP08	Inner Reef	Cheilodipterus quinquelineatus	X
5/1/2023	Yap Port	YP08	Inner Reef	Chaetodon ephippium	1
5/1/2023	Yap Port	YP08	Inner Reef	Amblygobius sp.	X
5/1/2023	Yap Port	YP08	Inner Reef	Ctenogobius sp.	X

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Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
5/1/2023	Yap Port	YP08	Inner Reef	Istigobius sp.	X
5/1/2023	Yap Port	YP08	Inner Reef	Chlorurus sordidus	13
5/1/2023	Yap Port	YP08	Inner Reef	Halichoeres melanurus	6
5/1/2023	Yap Port	YP08	Inner Reef	Hipposcarus sp.	1
5/1/2023	Yap Port	YP08	Inner Reef	Thalassoma lunare	4
5/1/2023	Yap Port	YP08	Inner Reef	Lethrinus harak	2
5/1/2023	Yap Port	YP08	Inner Reef	Lutjanus gibbus	8
5/1/2023	Yap Port	YP08	Inner Reef	Centropyge bicolor	6
5/1/2023	Yap Port	YP08	Inner Reef	Dascyllus reticulatus	1
5/1/2023	Yap Port	YP08	Inner Reef	Dischistodus chrysopoecilus	1
5/1/2023	Yap Port	YP08	Inner Reef	Dischistodus perspicillatus	27
5/1/2023	Yap Port	YP08	Inner Reef	Plectroglyphidodon leucozonus	12
5/1/2023	Yap Port	YP08	Inner Reef	Pomacentrus spp.	10
5/1/2023	Yap Port	YP09	Inner Reef	Acanthurus blochii	10
5/1/2023	Yap Port	YP09	Inner Reef	Ctenochaetus striatus	32
5/1/2023	Yap Port	YP09	Inner Reef	Apogon spp.	X
5/1/2023	Yap Port	YP09	Inner Reef	Cheilodipterus quinquelineatus	X
5/1/2023	Yap Port	YP09	Inner Reef	Hipposcarus sp.	4
5/1/2023	Yap Port	YP09	Inner Reef	Lutjanus gibbus	6
5/1/2023	Yap Port	YP09	Inner Reef	Pomacanthus sp.	8
5/1/2023	Yap Port	YP09	Inner Reef	Dascyllus reticulatus	2
5/1/2023	Yap Port	YP10	Inner Reef	Apogon spp.	X
5/1/2023	Yap Port	YP10	Inner Reef	Cheilodipterus quinquelineatus	X
5/1/2023	Yap Port	YP10	Inner Reef	Lutjanus gibbus	50
5/3/2023	Yap Port	YP12	Inner Reef	Acanthurus blochii	1
5/3/2023	Yap Port	YP12	Inner Reef	Ctenochaetus striatus	8
5/3/2023	Yap Port	YP12	Inner Reef	Zebrasoma flavescens	2
5/3/2023	Yap Port	YP12	Inner Reef	Apogon spp.	X
5/3/2023	Yap Port	YP12	Inner Reef	Cheilodipterus quinquelineatus	X
5/3/2023	Yap Port	YP12	Inner Reef	Sufflamen chrysoptera	2
5/3/2023	Yap Port	YP12	Inner Reef	Coris sp.	4
5/3/2023	Yap Port	YP12	Inner Reef	Chromis viridis	25
5/3/2023	Yap Port	YP12	Inner Reef	Dischistodus perspicillatus	45
5/6/2023	Yap Port	YP14	Inner Reef	Ctenochaetus striatus	20
5/6/2023	Yap Port	YP14	Inner Reef	Chaetodon lunulatus	11
5/6/2023	Yap Port	YP14	Inner Reef	Hipposcarus sp.	13
5/6/2023	Yap Port	YP14	Inner Reef	Labroides dimidiatus	1
5/6/2023	Yap Port	YP14	Inner Reef	Thalassoma lunare	23
5/6/2023	Yap Port	YP14	Inner Reef	Lethrinus harak	2
5/6/2023	Yap Port	YP14	Inner Reef	Abudefduf spp.	1
5/6/2023	Yap Port	YP14	Inner Reef	Dischistodus perspicillatus	1
5/6/2023	Yap Port	YP14	Inner Reef	Pomacentrus spp.	5
5/6/2023	Yap Port	YP14	Inner Reef	Siganus sp.	1
5/3/2023	Yap Port-Southwest	YPSW01	Inner Reef	Ctenochaetus striatus	7
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Ctenochaetus striatus	14
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Chaetodon ephippium	4
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Chaetodon lunulatus	4
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Neoniphon argenteus	1

## Appendix B. Benthic/Biotic Data. Belt Transect Surveys

Date	Survey Area	Transect ID	Reef Zone	Reef Fish Species	Number of Individuals*
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Chlorurus sordidus	2
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Coris sp.	2
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Scolopsis sp.	2
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Centropyge bicolor	1
5/3/2023	Yap Port-Southwest	YPSW02	Inner Reef	Plectroglyphidodon leucozonus	13
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Ctenochaetus striatus	4
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Sufflamen chrysoptera	1
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Chaetodon auriga	1
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Chaetodon lunulatus	2
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Coris sp.	1
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Halichoeres hortulanus	1
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Thalassoma lunare	1
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Scolopsis sp.	1
5/3/2023	Yap Port-Southwest	YPSW04	Inner Reef	Chromis viridis	13
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Ctenochaetus striatus	7
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Chaetodon lunulatus	1
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Neoniphon argenteus	1
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Chlorurus sordidus	2
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Coris sp.	5
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Gymnothorax flavimarginatus	1
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Centropyge bicolor	8
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Pomacanthus sp.	2
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Chromis viridis	120
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Cephalopholis argus	3
5/3/2023	Yap Port-Southwest	YPSW05	Inner Reef	Cephalopholis miniata	1
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Eviota sp.	X
5/5/2023	Yap Port-Southwest	YPSW06	Inner Reef	Dischistodus perspicillatus	2

\* X denotes non-targeted species (i.e., cryptic) observed but not counted during belt transect reef fish surveys