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National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
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PROJECT REPORT

Vessel: NOAA Ship *Hi'ialakai*, Project HA-18-01 (Legs 1, 2, and 3)

Project Period: 31 May–16 August, 2018

Area of Operation: American Samoa and the Pacific Islands Marine National Monument

Type of Operation: Personnel from: the Ecosystem Sciences Division (ESD) and Scientific Operations Division (SOD) of the NOAA Pacific Islands Fisheries Science Center (PIFSC), the Joint Institute for Marine and Atmospheric Research (JIMAR), the NOAA Diving Program (NDP) and NOAA Corps, the American Samoa Department of Marine and Wildlife Resources and National Marine Sanctuary of American Samoa, the University of Hawai'i at Mānoa (UH), the Hawai'i Institute of Marine Biology, the Scripps Institution of Oceanography (SIO), and the San Diego State University (SDSU) conducted interdisciplinary surveys of benthos, fishes, and oceanographic parameters related to climate change in coastal waters of American Samoa and the Pacific Remote Islands Marine National Monument (PRIMNM). In addition, staff from the U.S. Fish and Wildlife Service conducted terrestrial surveys at select Wildlife Refuges. All activities described in this report were covered by the following permits and authorizations: Environmental Assessment (PIFSC-20180003); Endangered Species Act, Section 7 consultation (PIR-2017-10255); U.S. National Parks Service, Scientific Research and Collecting Permit (NPSA-0046); American Samoa Department of Marine and Wildlife Resources, Scientific Collection Permit (001-2018); National Marine Sanctuary of American Samoa Permit (NMSAS-2018-001); and the U.S. Fish and Wildlife Service Refuge System Permit (USFWS-12514-2018-002).

1. Mission

The American Samoa and Pacific Islands Marine National Monument, Reef Assessment and Monitoring Program (ASRAMP) cruise is a component of the integrated coral reef ecosystem assessment led by the ESD of the PIFSC at some 40 U.S.-affiliated Pacific Islands. This comprehensive, multi-agency research and education effort is sponsored by NOAA's Coral Reef Conservation Program (CRCP), a partnership between the National Marine Fisheries Service, National Ocean Service, and other NOAA agencies with the objective of improving understanding and management of coral reef ecosystems.

The CRCP has made the strategic decision to invest a portion of its annual operating budget in perpetuity to support a National Coral Reef Monitoring Program (NCRMP). This Program is designed to assess and report the status and trends of environmental conditions, living reef resources, and the people and processes that interact with coral reef ecosystems. The NCRMP builds upon a decade of CRCP-supported, nationwide coral reef monitoring and reporting efforts, such as the Pacific Reef Assessment and Monitoring Program (Pacific RAMP), and *The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States*, and a NOAA Technical Memorandum compiled by the NOAA Center for Coastal Monitoring and Assessment. Although the scope of NCRMP is broad, it is intended to assess the status of coral reef ecosystems and their conditions throughout U.S. states and territories and provide a steady, consistent, and comprehensive analytical context to gauge changes in conditions at the sub-jurisdictional scale of an island or atoll.

The NCRMP focuses on four priority themes: climate change and ocean acidification; coral populations and benthic communities; reef-associated fish populations and communities; and socioeconomics. Biological monitoring for benthic and fish communities are conducted throughout shallow water (0–30 m), hard-bottom coral reef habitats using a stratified random sampling design. Monitoring of climate change and ocean acidification is achieved by means of sustained, remotely sensed and in situ observations of ocean temperature; autonomous and discrete water sampling for analyses of near-reef and surface-seawater carbonate chemistry; and distinct biological installations designed to provide integrated, ecosystem-wide response data (e.g., biodiversity, calcification, and bioerosion) in the context of climate change. In the Pacific, biological (benthic and fish) and climate monitoring are conducted on a triennial basis. Socioeconomic monitoring is led by the CRCP at headquarters in Silver Spring, MD, and stands outside the scope of the Pacific RAMP expeditions; therefore, it is not addressed in this cruise report.

2. Goals

The operations of HA-18-01 ASRAMP were as follows:

1. Conduct ecosystem monitoring of the species composition, abundance, percent cover, size distribution, and general health of the fishes, corals, other invertebrates, and algae of the shallow water (<30 m) coral reef ecosystems.

2. Deploy, retrieve, and/or service an array of instruments and installations—including Subsurface Temperature Recorders (STRs), Autonomous Reef Monitoring Structures (ARMS), Calcification Accretion Units (CAUs), Bioerosion Monitoring Units (BMUs)—to allow long-term monitoring of oceanographic and environmental conditions affecting the shallow-water (<30 m) coral reef ecosystems.

3. Monitor nearshore physical and ecological factors associated with ocean acidification and general water quality, including analysis of seawater for salinity, temperature, nutrients (PRIMNM only), dissolved oxygen, transmissivity, total alkalinity, and dissolved inorganic carbon.

4. Use photomosaics to collect coral community composition data at select sites and contextualize any physical and/or biological changes recorded at the climate stations over time. Conduct photomosaics at a subset of stratified random sites to test survey methods for future coral demographic surveys.

5. Opportunistically collect shallow water coral cores to examine calcification/extension rates in recent decades and assess potential early impacts of ocean acidification.

6. Conduct shipboard CTD (Conductivity, Temperature, Density) casts at each island 15 km offshore in each cardinal direction along with a concurrent water sample.

7. Conduct shipboard ADCP surveys around reef ecosystems to examine physical and biological linkages supporting island ecosystems.

8. Collect oceanographic data utilizing shipboard measurement systems (ADCP, ThermoSalinoGraph, and TA and pCO2 flow-through system, in the Scientific Computer System) during all transits for the duration of the project.

9. Recover High Frequency Acoustic Recording Packages (HARPs) used for long-term monitoring of cetaceans in the Pacific Islands Region.

10. Determine the existence of threats to the health of these coral reef resources from anthropogenic sources, including marine debris.

11. Support investigations of marine microbial communities, including the collection of specimens via water sampling, coral/algal biopsies, and benthic grab samples.

12. Provide logistical support to U.S. Fish and Wildlife Service to conduct terrestrial surveys at Howland, Baker, Jarvis and Swains islands, and Rose Atoll, and Jarvis Island.

3. Operating Area

The operating area of HA-18-01 ASRAMP was as follows (Figures 1–4).

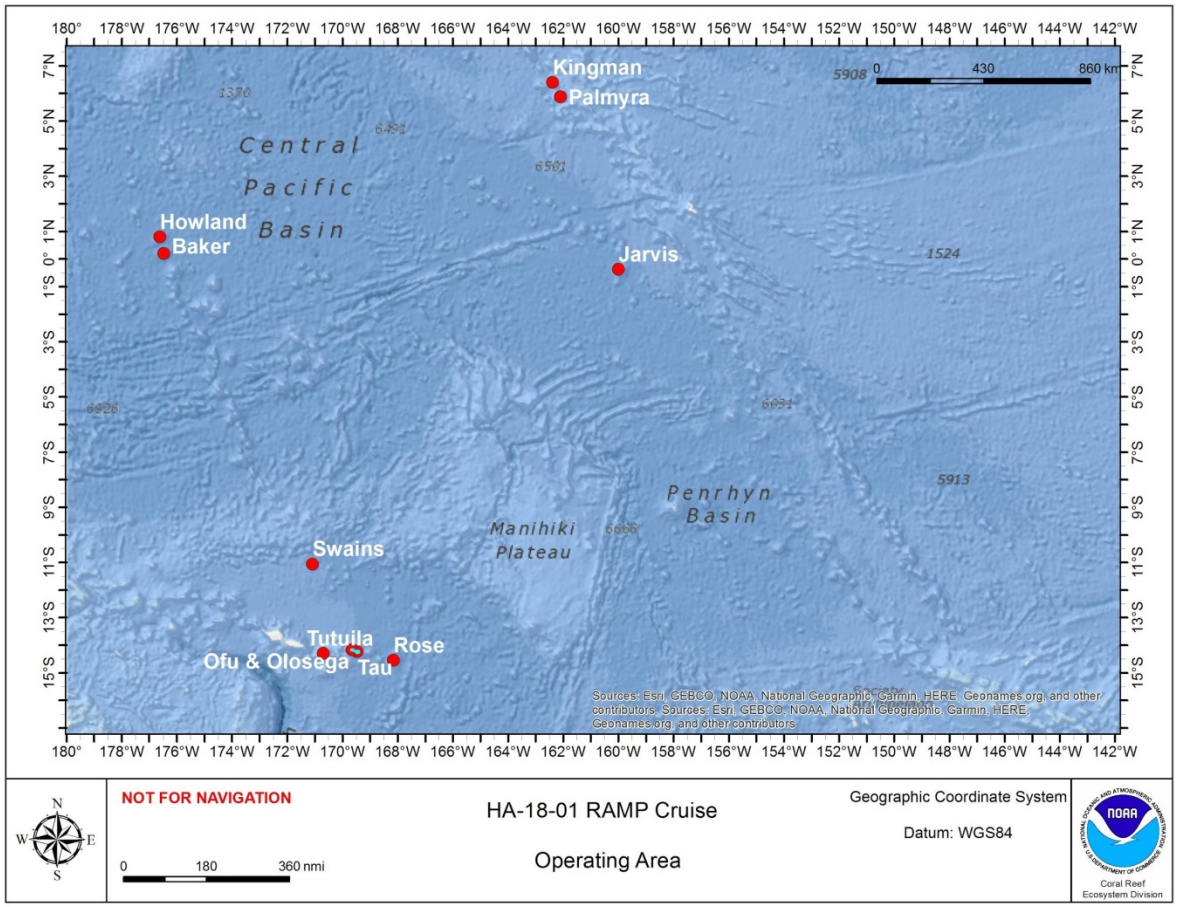

Figure 1. Operating area of the NOA Ship *Hi'ialakai* for the cruise HA-18-01.

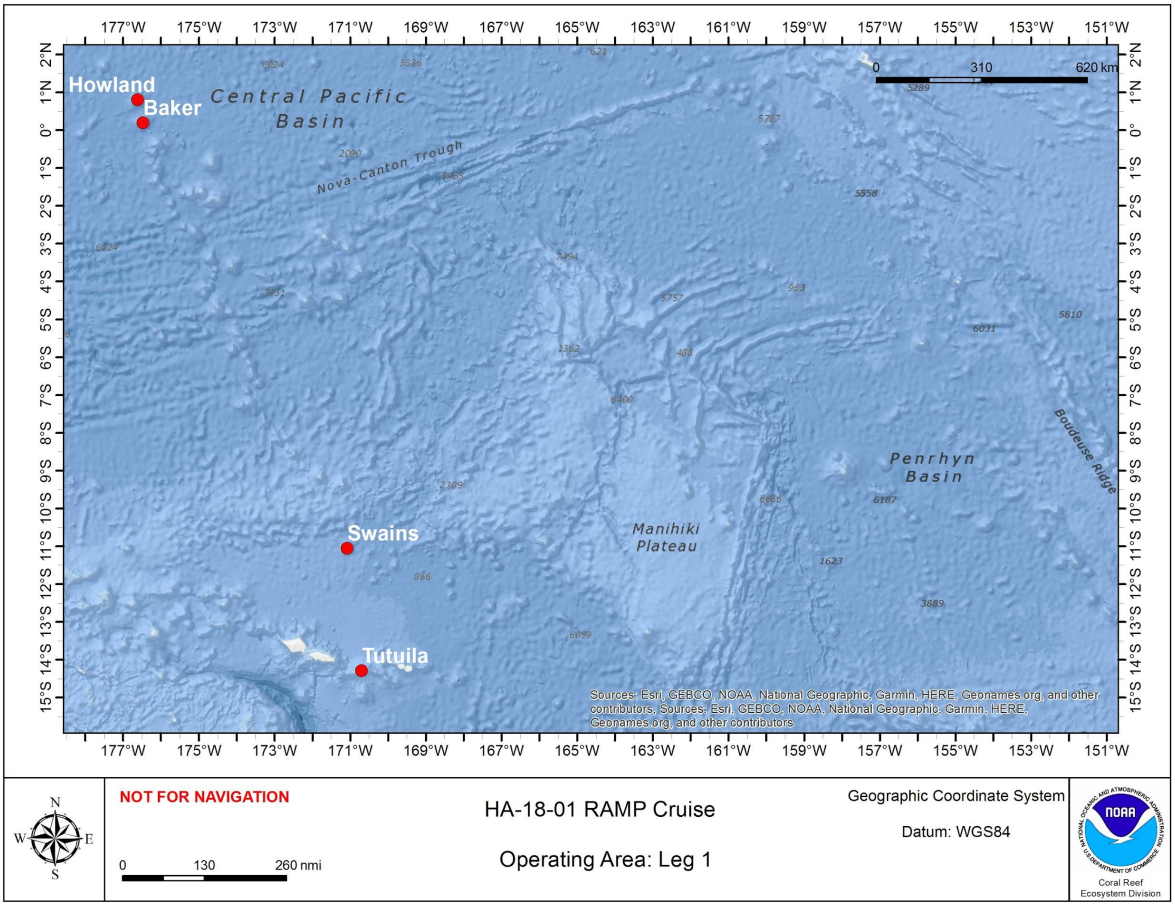

Figure 2. Operating area of the NOAA Ship *Hi'ialakai* for the cruise HA-18-01 Leg 1.

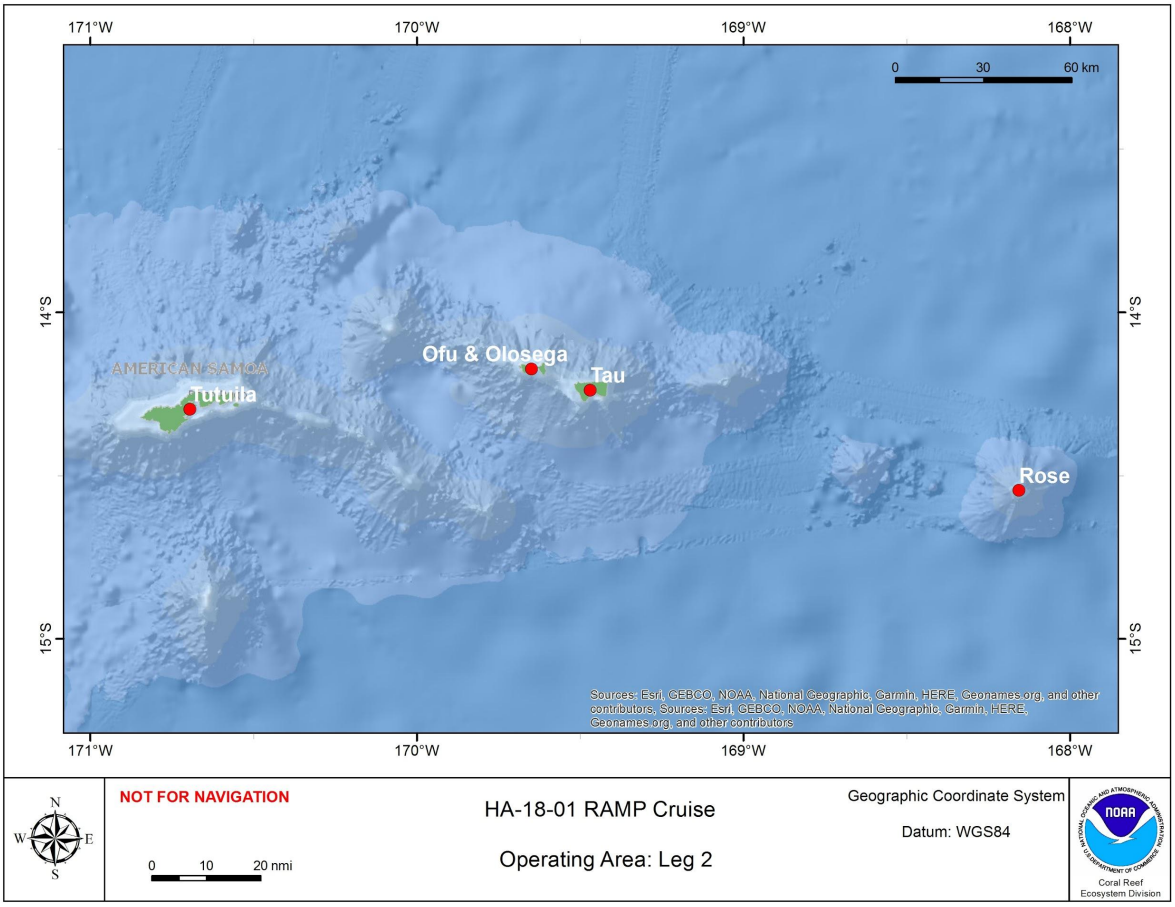

Figure 3. Operating area of the NOAA Ship *Hi'ialakai* for the cruise HA-18-01 Leg 2.

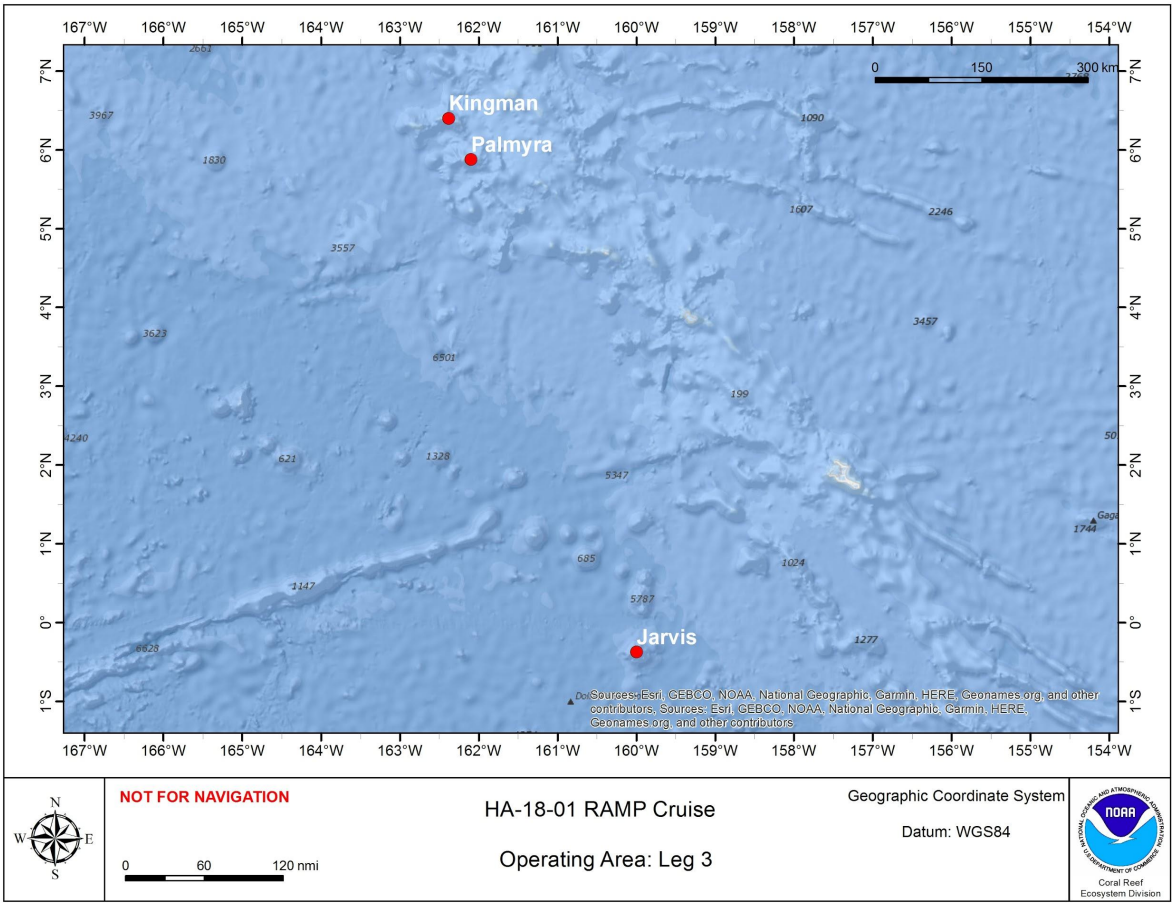

Figure 4. Operating area of the NOAA Ship *Hi'ialakai* for the cruise HA-18-01 Leg 3.

4. Itinerary

Leg 1:

May 31–June 7	Embarked scientific personnel, departed Pearl Harbor in-transit to Howland Island
June 8–11	Conducted operations around Howland Island
June 12–15	Conducted operations around Baker Island
June 16–18	Transited to Swains Island
June 19–21	Conducted operations around Swains Island
June 22	Transited to Tutiula
June 23	Conducted half day of operations around Tutuila. Arrived in Pago Harbor; end of Leg 1

Leg 2:

June 28–July 6	Embarked scientific personnel, departed Pago Harbor and began operations around Tutuila. Conducted operations around Tutuiila; departed Tutuila, transited to Manu'a Islands
July 8	Conducted operations around Ofu and Olosega islands
July 8	Mandatory non-diving day for scientists
July 9–10	Conducted operations around Ofu and Olosega islands
July 11–12	Conducted operations around Ta'u
July 13–15	Conducted operations around Rose Atoll
July 16	Conducted operations around Ta'u

July 17–18 Conducted operations around Tutuila. Arrived in Pago Harbor; end of Leg 2
July 19 Conducted outreach ship tour activity

Leg 3:

July 23–27 Embarked scientific personnel, departed Pago Harbor in-transit to Jarvis Island
July 28–31 Conducted operations around Jarvis Island
August 1 Transited to Palmyra Atoll
August 2–7 Conducted operations at Palmyra Atoll
August 8–11 Conducted operations at Kingman Reef
August 12–16 Transited to Honolulu; arrive in Pearl Harbor; disembarked scientific personnel. End of Leg 3 and end of ASRAMP 2018

5. Results

Background: The coral reef ecosystems of U.S.-affiliated Pacific islands have been surveyed biennially since 2000 and triennially starting in 2010 through Pacific RAMP. Herein, we present qualitative highlights from our observations during this latest expedition for select islands.

This report only highlights work conducted in American Samoa and the Pacific Remote Islands Marine National Monument during legs 1–3 of HA-18-01.

This section also provides operational totals regarding research activities (Tables 1, 2, and 3), specifics regarding data collected during cruise HA-18-01, legs 1, 2, and 3 and a summary of important observations made while at sea. For more information pertaining to the data collected and methodology employed at the islands visited, see Appendices A and B.

Leg 1:

Howland

- **Benthic**: In 2017, divers reported patches of partial and total coral mortality on the west side of the Baker between 0 and 45 ft; however divers noted no comparable observations this year, and that reefs anecdotally appeared to be in good condition, i.e., no signs of any mass bleaching or large disease outbreaks.
- **Fish**: Fish team divers noted a) the anecdotally low number of grey reef sharks (*Charcharhinus amblythynchos*) around the island in comparison to previous survey years, and b) surface sightings of ocean sunfish (*Mola mola*) offshore of the leeward coast of Howland.
- **Climate Change and Ocean Acidification***:* Plating *Montipora* had recruited on to one of the CAU plates following its deployment in 2015, which made it challenging to find prior to retrieval (Figure 5).

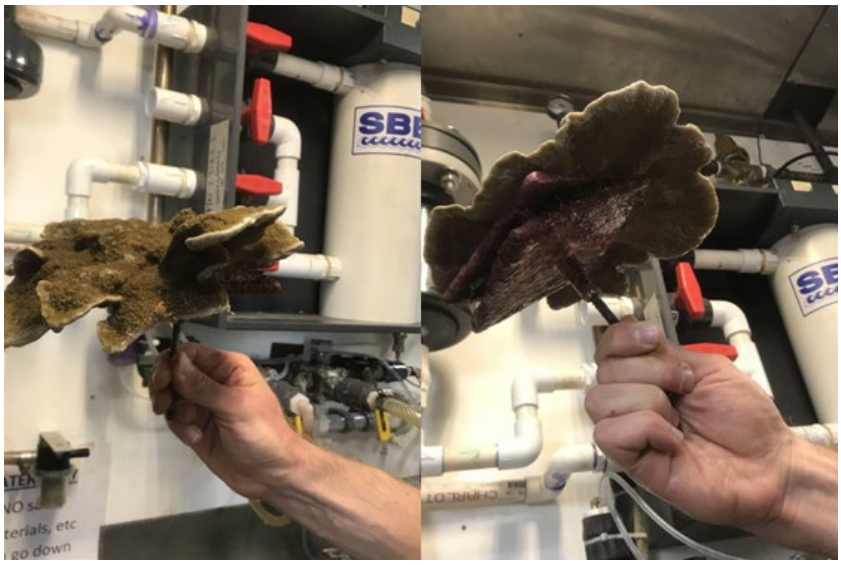

Figure 5. Colony of plating *Montipora* growing on a CAU plate recovered from Howland Island (Photo credit NOAA Fisheries/Ari Halperin).

USFWS Terrestrial Surveys: All metal hardware originally placed in 2015 was replaced with stainless steel equivalent parts to promote less damage in the future (Figure 6). One new acoustic recorder was deployed and 2 cameras were redeployed in their original locations (aimed at potential trespassers and seabird colonies). Due to heat malfunctions, 4 older acoustic recording devices were removed from the island for maintenance in Honolulu. A total of 2 cameras and 2 acoustic recorders are currently running on the island. Rapid ecological assessments of terrestrial species and seabirds were also conducted.

Figure 6. Camera trap system with new acoustic device and stainless steel deployed at Baker Island (Photo credit USFWS/Dana Schot).

Baker

- **Benthic**: In 2017, divers reported patches of partial and total coral mortality on the west side of the Baker between 0 and 45 ft. Divers noted no comparable observations this year, and reported that reefs appeared to be in good condition, i.e. no signs of any mass coral bleaching or disease outbreaks.
- **Fish***:* Similar to Howland, Fish team divers noted a) the anecdotally low number of grey reef sharks (*Charcharhinus amblythynchos*) around the island in comparison to previous survey years, and b) surface sightings of ocean sunfish (*Mola mola*) offshore of the leeward (western) coast of Baker.
- **Climate Change and Ocean Acidification***:* The diurnal suite, which was deployed on the west side of Baker -the first deployment of its kind at this island, detected episodic upwelling, particularly as indicated through temperature and salinity fluctuations (Figure 7).

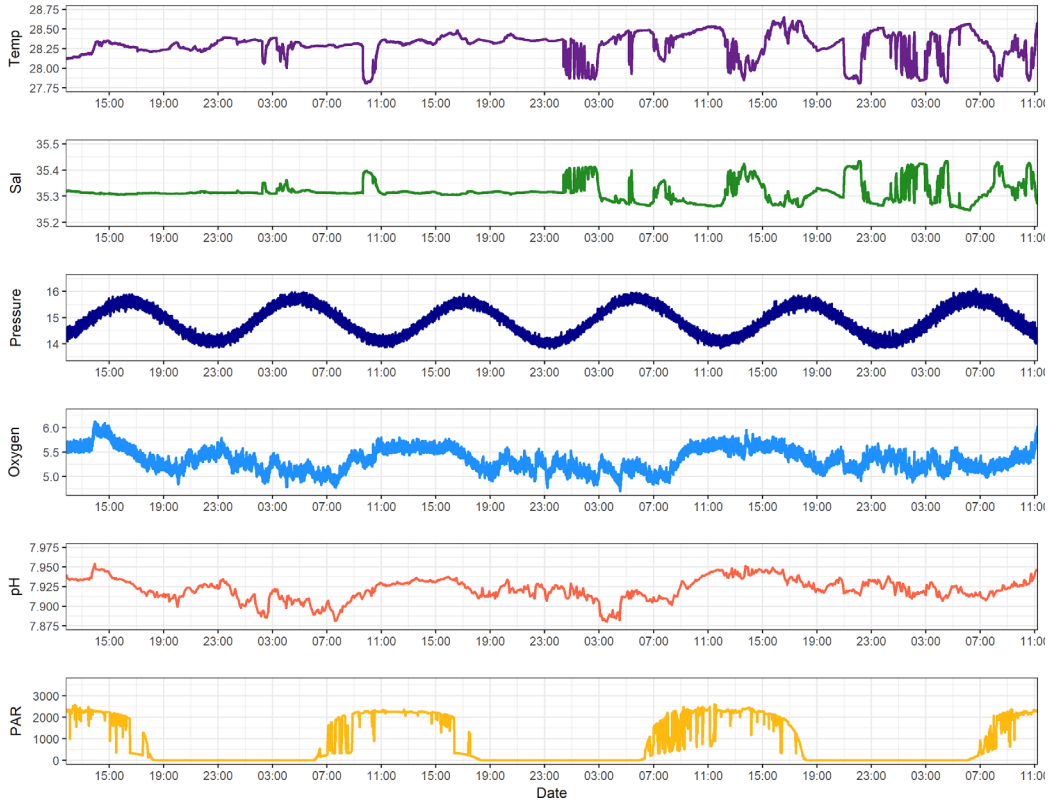

Figure 7. At Baker, the OCC team conducted a special investigation known as a "Diel Suite" that includes autonomous water samples and a variety of instrumentation that collect data over a multi-day period to quantify the diel carbonate chemistry cycle on the reef. These are the various data collected by the instrument package; water samples will be analyzed after the cruise returns.

- **USFWS Terrestrial Surveys**: As with Howland, stainless steel mounting hardware was set up in place of severely damaged metal equipment. Two new acoustic recorders were deployed and 2 cameras were redeployed in their original locations (aimed at potential trespassers and seabird colonies). One of the older acoustic recorders was working properly and redeployed, while 4 others were unresponsive. Those 4 systems remained on the island for Susan Hunter to troubleshoot when she arrived for a USFWS visit unrelated to ASRAMP. Rapid ecological assessments of terrestrial species and seabirds were also conducted during our time on island (Figure 8).

Figure 8. Strawberry hermit crabs (*Coenobita perlatus*) at Howland Island (Photo credit USFWS/Dana Schot).

Swains

- **Benthic**: Divers noted the presence of increased dead *Pocillopora* colonies at Swains. Based on reports by partners from American Samoa, this occurrence is attributed to the 2015–2016 sea warming and associated coral bleaching mortality.
- **Fish***:* A large school consisting of several hundred blackfin barracuda (*Sphyraena genie)* was sighted along the eastern coastline (Figure 9), although the majority remained outside of SPC survey cylinders. Divers also sighted a large group of bigeye trevally (*Caranx sexfasciatus*) during a post-survey safety stop.

Figure 9. Large school of the blackfin barracuda (*Sphyraena genie*) sighted on eastern Swains (Photo credit NOAA Fisheries/Paula Ayotte).

- **Climate Change and Ocean Acidification***:* A spatial map of aragonite saturation state (Ω) along the Leg 1–2 cruise track (calculated the OCC flow-through TA, pCO2, temperature, and salinity data) is provided in Figure 10. Several interesting latitudinal gradients are noted, including a dramatic drop in Ω/pH in the equatorial upwelling zone and much higher values recorded around American Samoa. The pattern displayed here matches the general spatial trends observed in nearshore discrete water samples since 2010, and it is also consistent with expectations based on interpolated/modeled Pacific carbonate chemistry climatology. While data from different seasons remains sparse, the effect of seasonality would not be expected to significantly change these overarching latitudinal patterns.

  Shifts between El Niño and La Niña are predicted to cause fairly dramatic changes near the equator. La Niña will strengthen equatorial upwelling and drive Ω/pH values down at low latitudes, while El Niño will cause weakened upwelling and a less dramatic gradient in carbonate chemistry. For the last 3 months, the oceanic Niño Index fairly neutral.

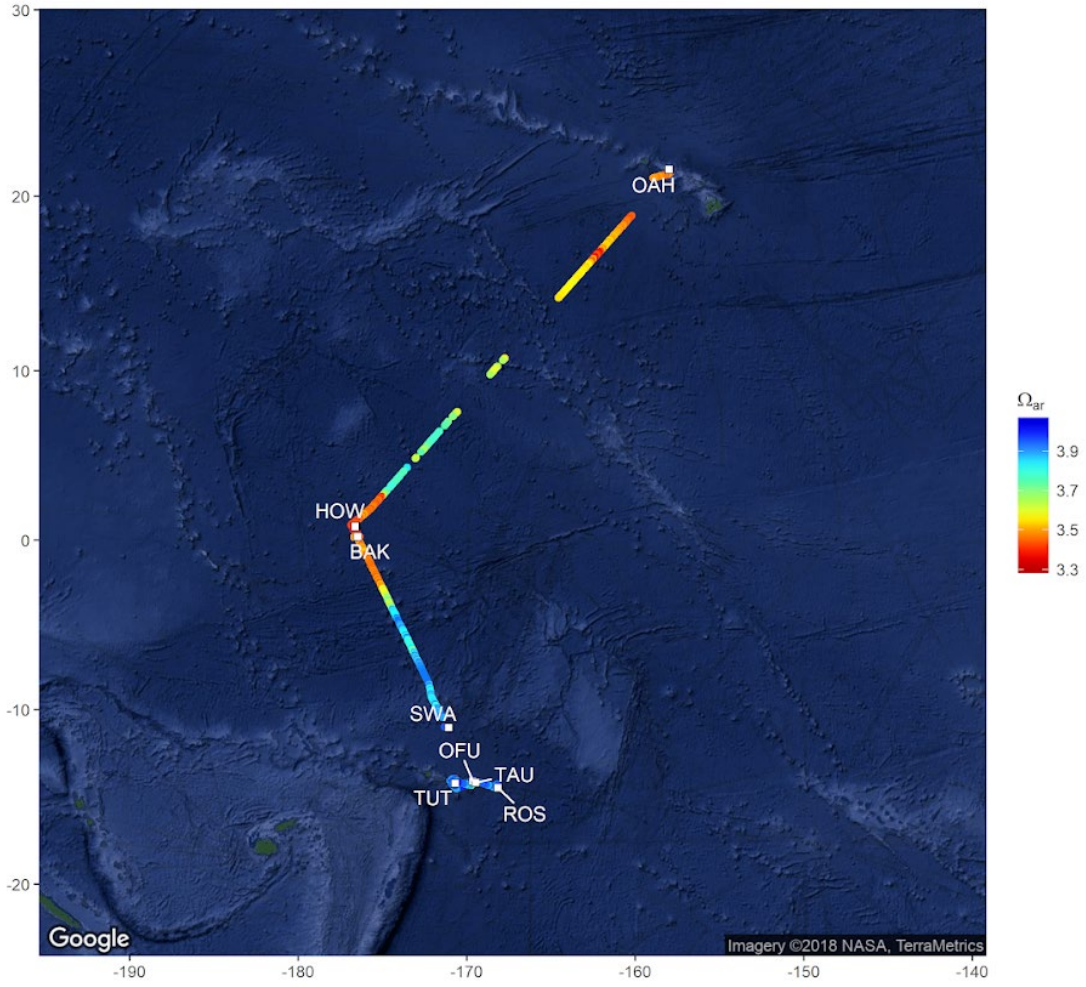

Figure 10. Spatial map of aragonite saturation state along the ASRAMP Leg 1–2 cruise track.

Leg 2:

Tutuila

- **Benthic**: While weather conditions precluded work along the south facing forereef habitats, no bleaching was noted along the north coastline. Also, compared to 2015 lesions of the coralline lethal orange disease (CLOD) were more frequently observed in 2018 particularly along the west and southwest forereef habitats. Eight benthic surveys were conducted in the Fagatele-Fogama'a Sanctuary Management Area. Weather conditions preclude surveys in Aunu'u Management Areas.
- **Fish***:* At Tutuila, a rarely seen giant trevally (*Caranx ignobilis*) was seen in Fagatele Bay. Also seen in Fagatele Bay was the soapfish *Belonoperca chabanaudi*, previously only recorded by ESD divers twice in the CNMI.
- **Climate Change and Ocean Acidification***:* A 24-day diurnal suite instrument package including CTD (temperature, salinity, and pressure), SeaFET (pH), ADCP (current speed and direction), and programmable discrete water samplers (analyzed for total alkalinity and

dissolved inorganic carbon), was deployed at deployment at Fagamalo to capture the temporal variability in nearshore physical and chemical conditions over multiple diel and tidal cycles.

Ofu and Olosega:

- **Benthic**: Like Tutuila, weather conditions limited survey work along the south facing forereef habitat. Overall, divers reported that reefs appeared to be in good condition, i.e. no signs of any mass coral bleaching or disease outbreaks.
- **Fish***:* The halfmoon triggerfish, *Rhinecanthus lunula* seen also at Ta'u, was recorded for the first time at Ofu. Another rare sighting was the giant trevally (*Caranx ignobilis*).
- **Climate Change and Ocean Acidification***:* The shallow back reef environments of Ofu are known to be relatively extreme, and a temperature logger recovered from a back reef site recorded temperatures as high as 32°C within the past 3 years. Despite this, there were abundant *Acropora* and *Pocillopora* colonies and large *Porites* micro-atolls living in these locations.

Ta'u

- **Benthic***:* A large towering colony of massive *Porites*, was sighted along the east facing forereef of Ta'u (Figure 11). This colony is comparable in size to the "big momma" colony on west Ta'u. Sightings of *Acropora globiceps* were also reported along the northwest corner. Overall, weather conditions limited access to the southern facing forereef habitats. As such, a total of five benthic surveys were completed in the Ta'u Sanctuary Management Area.
- **Fish**: The halfmoon triggerfish, *Rhinecanthus lunul*a seen for the first time at Ofu and only once previously at Tau in 2016, was recorded at 2 sites off Ta'u.
- **Climate Change and Ocean Acidification***:* Partners collected a photomosaic of Big Momma, which will be used for outreach efforts in the future.

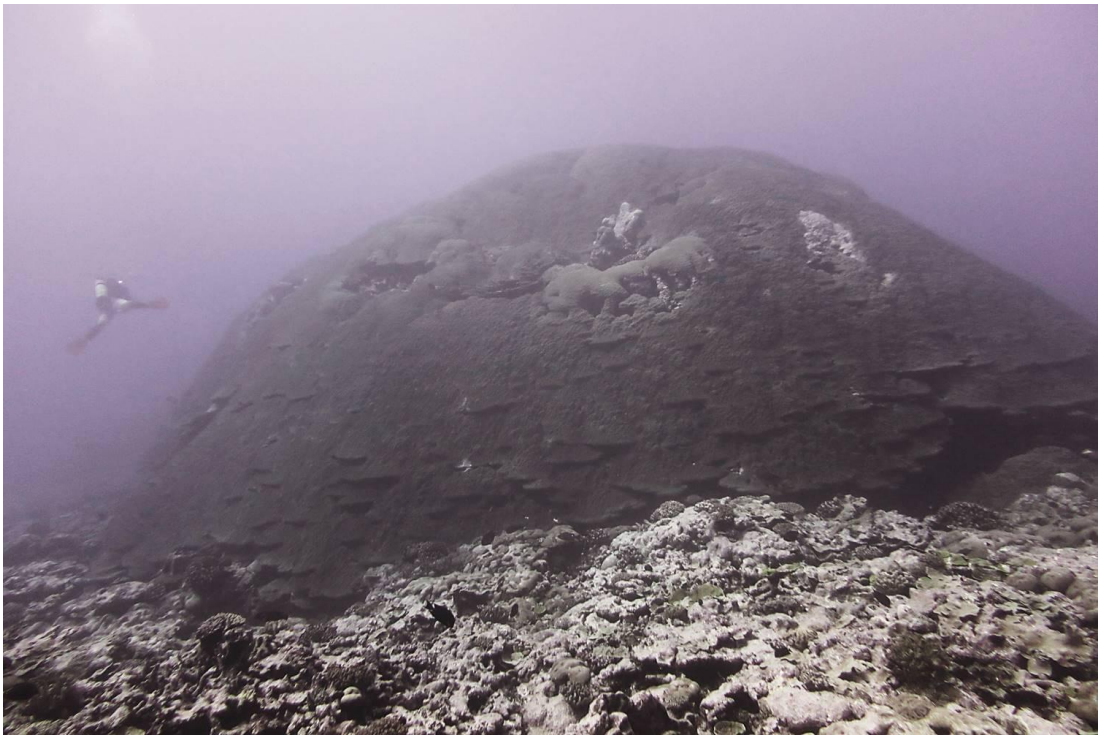

Figure 11. Towering colony of massive *Porites lobata* (Big Papa) sighted on the southeastern coast of Ta'u Island. (Photo credit NOAA NOS/Mareike Sudek).

Rose

- **Benthic**: As documented during previous ASRAMP expeditions, forereef coral communities at Rose are dominated by conspicuous crustose coralline algae (CCA) growth formations (Figure 12). In addition to, during the 2018 visit, a number of colonies of the ESA-threatened coral *Acropora retusa* were sighted. In addition, surveys conducted at the old wreck site (ROS-5001 14.55°S; 168.17°W) revealed the persistence of extremely low coral cover and species diversity, with colonies of branching *Pocillopora* dominating the site community. Also noticeable were the low levels of CCA, the presence of back cyanophytes covering portions of the substrate and coral colonies, as well as the persistence of metallic debris still embedded in the reef framework. It appears that the remaining metallic debris continues to leach resulting in the cyanobacterial proliferation historically observed at this site (Figure 12). A total of 16 benthic surveys were completed within the Muliwa (Rose Atoll) Sanctuary Management Area.

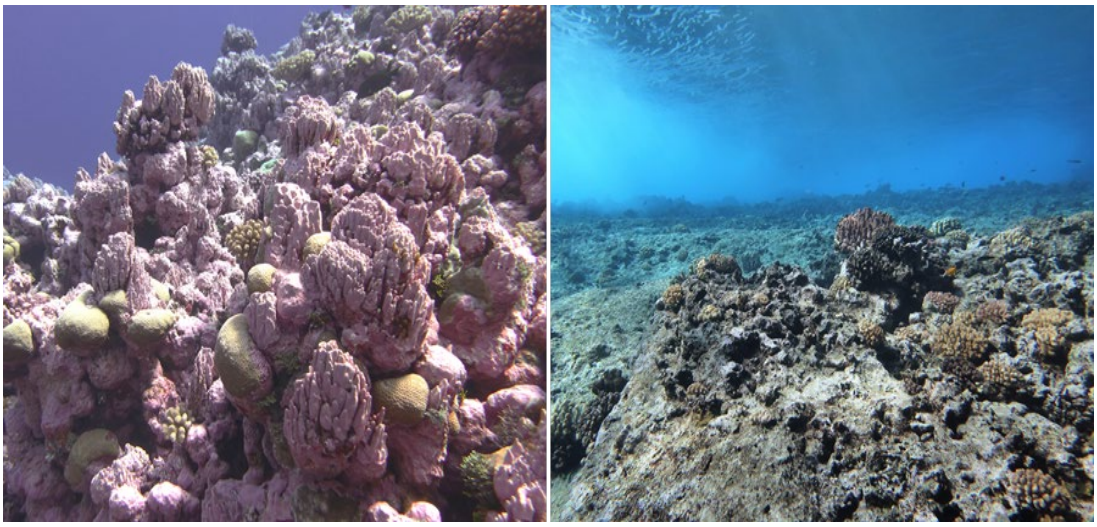

Figure 12. Conspicuous coralline algae (*Porolithon craspedium*) formations at Rose atoll (left panel); and persistent low coral cover, diversity, and cyanophyte proliferation at the 1993 Taiwanese long-liner *Jin Shiang Fa* wreck site (right panel) (Photo credit NOAA NOS/Mareike Sudek).

- **Fish**: A large school of bigeyed trevally (*Caranx sexfasciatus*) (Figure 13), generally not recorded on transect, were observed at the mouth of the channel at Rose.
- **Climate Change and Ocean Acidification**: Aragonite saturation states and calcification rates of CCA at Rose are the highest of all of the islands we monitor in the Pacific. As a result, the CAUs collected at Rose had extremely high levels of CCA accretion; on a few, CCA had formed towers of calcium carbonate that were several inches in height.

Figure 13. A large school of the bigeyed trevally (*Caranx sexfasciatus*) observed at the mouth of the channel at Rose (Photo credit NOAA Fisheries/Paula Ayotte).

Leg 3:

Jarvis

- **Benthic**: Jarvis's benthic communities were severely impacted by the 2015–2016 bleaching event, which resulted in >98% coral mortality. During the 2018 surveys we recorded extremely low densities of both adult and juvenile corals, suggesting that there has been little to no recovery in the last 3 years. There are, however, a few locations on the shallow (<20 ft) eastern terrace that still harbor large fully or partially living massive colonies. Aside from the low coral recovery, the most striking observation was the dramatic increase in crustose coralline algae that covered much of the dead substrate (Figure 14), even overgrowing living corals.
- **Fish**: We recorded three species at Jarvis for the first time: the bluespot mullet (*Moolgarda seheli*), the striated wrasse (*Pseudocheilinus evanidus*), and Klein's butterflyfish (*Chaetodon kleinii*). We saw very few butterflyfish with only 124 individuals recorded. We commonly observed juvenile fusiliers (*Pterocaesio tile* and *Caesio teres*).

Figure 14. Little to no coral reef community recovery has occurred at Jarvis in the aftermath of the 2015–2016 bleaching event. Underwater seascapes are dominated by dead coral and rubble fields covered with crustose coralline algae (Photo credit NOAA Fisheries/Courtney Couch).

- **Climate Change and Ocean Acidification**: In our efforts to continue tracking the impacts of the 2015–2016 El Niño, in which Jarvis corals suffered near-complete mortality, we managed not only to recover and redeploy all instruments at Jarvis, resample 6 photmosaic plots (and add 2 new sites), but we also deployed our diurnal suite, tracking the carbonate environment on the west, upwelling side of Jarvis. These measures will be critical in tracking the recovery of the reef, or the further decline of the habitat.
- **USFWS Terrestrial surveys:** The western third of the island was mapped at 3-cm resolution using an unmanned aerial system (a.k.a. drone). Bird and plant species presence and reproductive status was noted. The island was back to the normal sparse vegetative cover unlike 2016. No rare *Procellariiformes* species were seen this time despite the 2016 addition of a social attraction bird caller. The Lesser Frigate birds had lots of older chicks. Ninety-six red-tailed tropicbird nests were counted in a half mile of shoreline coral rubble which is similar to the 2016 count (Figure 15). Crab and mouse populations were assessed and numbers were similar to previous counts in 2015 with 62 mice per hectare, 41 *Geograpsus,* and 435 *Coenobita perlatus* per hectare. The mouse population count of 2016 appears to be a high count at 200 mice per hectare.

Figure 15. Red-tailed tropic bird and chick at Jarvis Island (photo credit USFWS/Susan Hunter).

Palmyra

- **Benthic:** Surveys recorded moderate to high coral cover and high coral diversity at Palmyra. While there was evidence of some mortality in the table *Acropora* and other thermally sensitive taxa, it was highly variable across the atoll. We also saw high levels of coral juveniles across a range of hardy and thermally sensitive taxa suggesting that Palmyra still has high recovery potential. In general, the corals showed very low levels of disease or compromised signs of health. We did observe COTS predation across the atoll (Figure 16) and conducted a 30 x 1 m belt survey to all benthic and fish sites. COTS density was generally $0/m^2$ and never exceeded $0.1/m^2$. However, qualitatively densities outside the belt transects were abnormally high.

Figure 16. Predation scars of the corallivorous crown-of-thorns sea star at Palmyra Atoll (photo credit NOAA Fisheries/Courtney Couch).

- **Fish**: Humphead wrasse (*Cheilinus undulates*), classified as endangered on the IUCN red list, were common around the island with 46 individuals recorded and a group of six individuals observed on the south side. Blue-bridled parrotfish (*Scarus dimidiatus*) and Mackerel tuna (*Euthynnus affinis*) were observed at the island for the first time. Divers also observed high numbers of juvenile gray reef sharks on the north side of the island.
- **Climate Change and Ocean Acidification**: Palmyra was apparently only lightly impacted by the 2015–2016 El Nino, and continued to show diverse reefs at reasonably high coral cover. Here we managed another diurnal suite deployment, along with 6 photomosaics, and swapping of all instruments that weather and the large south swell would safely allow. The impacts of the rising swell are apparent in the diurnal suite imagery.

Kingman

- **Benthic**: The 2018 surveys suggest that coral communities at Kingman were impacted by the recent coral bleaching event, but that these impacts were variable across the atoll. We observed notable *Acropora* mortality on the forereef and backreef, especially at depths less than 50 ft. Corals, including the more thermally sensitive *Acropora*, fared better on portions of the western protected reef slope. However, similar to Palmyra, we saw diverse and high densities of coral juveniles (Figure 17), suggesting that Kingman also has high recovery potential. Overall, Kingman's corals were also very healthy, with the exception of COTS predation that was observed at most fore reef sites. Similar to Palmyra, COTS densities were qualitatively abnormally high outside the belt transects.

Figure 17. Diverse and high densities of juvenile corals at Kingman Reef are suggestive of high resilience potential (photo credit NOAA Fisheries/Courtney Couch).

- **Fish**: Divers recorded Blue surgeonfish (*Paracanthurus hepatus*) for the first time at Kingman. Gray reef sharks continue to be exceptionally curious at Kingman reef in comparison to other islands we survey.
- **Climate Change and Ocean Acidification**: As a middle ground between Jarvis' major mortality and Palmyra's light impacts, Kingman showed a mix of impacts, with many sites showing persistence of a limited taxonomic set (*Porites* dominated), but other sites, particularly on the protected slope, showed a diverse, high cover assemblage. Here, we again managed to replace all instruments, except for 2 very shallow loggers that inaccessible due to swell conditions.

Table 1. Summary statistics for HA-18-01 Leg 1 to the American Samoa and the Pacific Remote Islands Marine National Monument. Totals for scuba dives include all dives carried out for all activities at each island.

RESEARCH ACTIVITY	HOWLAND	BAKER	SWAINS	TOTALS
Scuba Dives	128	157	128	413
BIOLOGICAL SURVEYS				
REA Sites: Benthic	9	11	30	50
REA Sites: Fish	29	32	10	71
Photo Mosaics—ESD	1	1	1	3
Photo Mosaics—Partners	5	4	7	16
BIOLOGICAL SAMPLE COLLECTIONS				
Microbial Sample Sites	4	3	3	10
Microbial Coral/Algal Biopsies	3	4	2	9
BIOLOGICAL MONITORING				
ARMS Retrieved	0	0	0	0
ARMS Deployed	0	0	0	0
CAUs Retrieved	12	13	24	49
CAUs Deployed	15	20	20	55
BMUs Deployed	0	0	0	0
BMUs Retrieved	0	0	0	0
OCEANOGRAPHIC MOORED				
STRs Retrieved	6	7	6	19
STRs Deployed	6	5	6	17
Diurnal Suite Deployed/ Retrieved (~ 24 hr)	0	1	0	1
HARPs Retrieved	1	0	0	1
HYDROGRAPHIC SURVEYS				
Shallow-water CTD Casts	7	4	13	24
Shallow-water DIC Water Samples	7	17	15	39
Underway PCO2(km)				~5500
Underway ADCP (km)				~4700

Table 2. Summary statistics for HA-18-01 Leg 2 to the American Samoa and the Pacific Remote Islands Marine National Monument. Totals for scuba dives include all dives carried out for all activities at each island.

RESEARCH ACTIVITY	TUTUILA	OFU-OLOSEGA	TA'U	ROSE	TOTALS
Scuba Dives	383	139	133	91	746
BIOLOGICAL SURVEYS					
REA Sites: Benthic	41	20	16	16	93
REA Sites: Fish	81	25	28	21	155
Photo Mosaics—ESD	7	2	2	1	12
Photo Mosaics—Partners	9	4	5	2	20
BIOLOGICAL SAMPLE COLLECTIONS					
Microbial Sample Sites	7	4	2	2	16
Microbial Coral/Algal Biopsies	3	3	1	1	8
BIOLOGICAL MONITORING					
ARMS Retrieved	12	6	6	0	24
ARMS Deployed	12	6	6	0	24
CAUs Retrieved	42	19	22	19	102
CAUs Deployed	35	20	25	20	100
BMUs Deployed	20	10	10	0	40
BMUs Retrieved	20	9	10	0	39
OCEANOGRAPHIC MOORED					
STRs Retrieved	15	8	9	5	37
STRs Deployed	19	10	11	6	46
Diurnal Suite Deployed/ Retrieved (~ 24 hr)	1	0	0	0	1
HYDROGRAPHIC SURVEYS					
Shallow-water CTD Casts	30	16	5	9	60
Shallow-water DIC Water Samples	42	18	11	14	85
Underway PCO2(km)					~1000
Underway ADCP (km)					~3000

Table 3. Summary statistics for HA-18-01 Leg 3 to the American Samoa and the Pacific Remote Islands Marine National Monument. Totals for scuba dives include all dives carried out for all activities at each island.

RESEARCH ACTIVITY	JARVIS	PALMYRA	KINGMAN	TOTALS
Scuba Dives	242	272	185	**699**
BIOLOGICAL SURVEYS				
REA Sites: Benthic	28	39	28	95
REA Sites: Fish	39	50	40	129
Photo Mosaics—ESD	3	5	3	11
Photo Mosaics—Partners	8	6	6	20
BIOLOGICAL SAMPLE COLLECTIONS				
Microbial Sample Sites	5	7	3	15
Microbial Coral/Algal Biopsies	1	1	0	2
BIOLOGICAL MONITORING				
ARMS Retrieved	9	9	0	18
ARMS Deployed	9	9	0	18
CAUs Retrieved	10	29	23	62
CAUs Deployed	25	20	25	70
BMUs Deployed	15	15	0	30
BMUs Retrieved	11	14	0	25
OCEANOGRAPHIC MOORED				
STRs Retrieved	12	0	6	18
STRs Deployed	15	0	6	21
Diurnal Suite Deployed/ Retrieved (~ 24 hr)	0	1	0	1
HYDROGRAPHIC SURVEYS				
Shallow-water CTD Casts	25	24	13	62
Shallow-water DIC Water Samples	25	24	13	62
Underway PCO2(km)				~5000
Underway ADCP (km)				~5800

6. Data streams

The following data and samples were collected during this expedition:

Climate Change and Ocean Acidification

Oceanographic Instrumentation and Biological Installations:

- Seawater temperature
- Assessment of taxonomic diversity of coral reef species by collection of invertebrate specimens from retrieved ARMS
- $CaCO_3$ deposition rates by collection of calcifying organisms from retrieved CAUs
- Bioerosion rates from retrieved BMUs
- HARPs

Nearshore Oceanography from Small Boats:

- Shallow-water CTD profiles to depths ≤ 30 m
- Water samples for salinity, dissolved inorganic carbon (DIC), total alkalinity (TA), and nutrients collected in concert with shallow-water CTD casts
- *In-situ* salinity, temperature, pressure, pH, current direction and magnitude, and samples for analyses of DIC and TA collected in concert for quantification of 24-hour variability in seawater carbonate chemistry.

Shipboard Oceanography:

- Transects of profiles of ocean current velocity and direction collected using a shipboard ADCP
- Solar radiation, photosynthetic active radiation (PAR), air temperature, barometric pressure, and wind speed and direction
- Surface seawater temperature and salinity and carbonate chemistry measurements from real-time flow through shipboard instrumentation

Corals and Thermal Stress:

- Samples of *Porites c.f.* coral colonies were collected at Kingman reef from a NCRMP site and were subjected to different temperature treatments: Controlled temperature ramps occurred over 19 hours under the following conditions: a three hour ramp to maximum temperature, a three hour hold, followed by a ramp down to 29°C, the control temperature. Three maximum temperatures: 32°C, 35°C, and 38°C, were selected as possible bleaching temperatures to compare bleaching responses.

Biological Monitoring

Benthic REA surveys:

- Digital still photographs of overall site character and typical benthos
- Digital still photographs of the benthos along transect lines
- Digital still photographs of the benthos covering a 18 m x 2 m plot at select sites
- Number, species or genus, size, and condition (% mortality, disease, bleaching) of all coral colonies observed within belt transects of known area
- Digital still photographs of diseased corals and coralline algae

Fish REA surveys:

- Number, species, and estimated sizes of all fishes observed within visually estimated 7.5 m radius, stationary-point-count surveys

- Visual estimates of benthic cover, habitat type, and habitat complexity
- Digital still photographs of the benthos along transect lines
- Digital still photographs of rare or interesting fish species
- Species presence checklists for estimates of fish community diversity

Microbial studies:

- Water and benthic samples at select sites for microbial studies

Photomosaics:

- Digital photographs of the benthos covering a 10 m x 10 m, 1 m x 18 m, 5 m x 5 m, and 1 m x 2.5 m plots at select sites

7. Scientific Personnel

Table 4. List of HA-18-01 cruise participants: JIMAR: Joint Institute for Marine and Atmospheric Science; ESD: Ecosystem Sciences Division; SOD: Science Operations Division, RCUH,: Research Corporation of the University of Hawaii; HIMB: Hawaii Institute of Marine Biology; DMWR: American Samoa Department of Marine and Wildlife Resources; NMSAS: National Marine Sanctuary of American Samoa; UH: University of Hawaii; SIO: Scripps Institute of Oceanography; SDSU: San Diego State University; NDC: NOAA Dive Program; USFWS: U.S. Fish and Wildlife Service.

Name (Last, First)	Primary Team	Role(s)	Leg	Affiliation
Ayotte, Paula	Fish	Team Lead, Fish Diver	I	JIMAR/ESD
Giuseffi, Louise	Fish	Fish Diver	I,2,3	NOAA, SOD
Asher, Jacob	Fish	Chief Scientist (Leg 1), Fish Diver	1	JIMAR/ESD
McCoy, Kaylyn	Fish	Chief Scientist (leg 3), Team Lead, Fish Diver	2,3	JIMAR/ESD
Rock, Laura	Fish	Fish Dive, Instrumentation Diver	1,2,3	(NOAA Corps)
Wester, Tate	Fish/Ops	Fish Diver, Operations Lead (Leg 3)	1,2,3	JIMAR/ESD
Milisen, Jeff	Fish	Fish Diver	1,3	RCUH/HCRI
Alice Lawrence	Fish	Fish Diver	2	DMWR
Council, Chelsea	Fish	Fish Diver	1,2,3	RCUH/HIMB
Gray, Andrew	Fish	Team Lead, Fish Diver	3	JIMAR/ESD
Weible, Rebecca	Fish	Fish Diver	3	JIMAR/ESD

Name (Last, First)	Primary Team	Role(s)	Leg	Affiliation
Vargas Angel, Bernardo	Benthic	Chief Scientist (Leg 2), Benthic Diver	2	JIMAR/ESD
Winston, Morgan	Benthic	Team Lead, Benthic Diver	1,2,3	JIMAR/ESD
Mareike Sudek	Benthic	Benthic Diver	2	NMSAS
Brittany Huntington	Benthic	Benthic Diver	2,3	JIMAR/ESD
Garriques, Joao	Benthic/Ops	Operations Lead (Leg 1,2), Benthic Diver	1,2,3	JIMAR/ESD
Pomeroy, Noah	Oceanography	Team Lead, Instrumentation Diver	1	JIMAR/ESD
Courtney Couch	Benthic	Team Lead, Benthic Diver	3	JIMAR/ESD
Austin Green	Benthic	Benthic Dive	3	HIMB
Barkley, Hannah	Oceanography	Team Lead, Instrumentation Diver	1,2	JIMAR/ESD
Oliver, Thomas	Oceanography	Team Lead, Instrumentation Diver	3	JIMAR/ESD
Halperin, Ari	Oceanography	Instrumentation Diver	1,2,3	JIMAR/ESD
Klepac, Courtney	Oceanography	Instrumentation Diver	2,3	JIMAR/ESD
Vicente, Jan	Oceanography	Instrumentation Diver	1	HIMB
Barba, Evan	Oceanography	Instrumentation Diver	2,3	HIMB
Hoban, Mykle	Oceanography	Instrumentation Diver, ARMS		HIMB
Sullivan, Chris	Oceanography	Photomosaics, Instrumentation Diver	1	SIO
Clements, Samantha	Oceanography	Photomosaics, Instrumentation Diver	1	SIO
Pederson, Nicole	Oceanography	Photomosaics, Instrumentation Diver	1	SIO
Barkman, Alexandria	Oceanography	Microbial Biologist, Instrumentation Diver	1	UH
Calhoun, Sandi	Oceanography	Microbiologist	2	SDSU
Green, Kevin	Oceanography	Microbiologist	3	SDSU

Akridge, Michael	Data Management	Team Lead, Data Manager	1,2,3	JIMAR/ESD
Hileman, Zach		Divemaster, Chamber Operator	1,2	NOAA, NDC
Mangiafico, Joseph		Divemaster, Chamber Operator	2	NOAA, NDC
Mahaffey, Katie		Divemaster, Chamber Operator	3	NOAA, NDC
Schot, Dana		Terrestrial biologist	1	USFWS
Hathaway, Stacie		Terrestrial biologist	1,2	USFWS
Hunter, Susan		Terrestrial biologist	3	USFWS

Submitted by:

Bernardo Vargas-Ángel
~~ASRAMP POC~~

Approved by:

Michael P. Seki, Ph.D.
Science Director
Pacific Islands Fisheries Science Center

Appendices

Appendix A. Methods

This appendix describes the methods and procedures used by the ESD during its Pacific RAMP cruise HA-18-01 (Legs 1–3) on the NOAA Ship *Hi'ialakai* during the May 31–August 16, 2018, period.

A.1. Biological Monitoring surveys

A.1.1. Benthic composition and coral demographics

A one-stage stratified random sampling design was employed to survey Rapid Ecological Assessment (REA) sites. The survey domain encompassed reef and hard bottom habitat, and was divided into strata based upon depth. Depth categories of shallow (0–6 m), mid (>6–18 m) and deep (> 18–30 m) were also incorporated into the stratification scheme. Allocation of sampling effort was proportional to strata area. Sites were randomly selected within each stratum

Surveys at each site were conducted within two, 18-m belt transects. Adult coral colonies (≥ 5 cm) were surveyed within four segments that were 1.0-m wide by 2.5-m long. Along the transect tape the segments were located at 0–2.5 m, 5.0–7.5m, 10–12.5 m, and 15–17.5 m. All colonies whose center fell within 0.5 m on either side of each transect line were identified to lowest taxonomic level possible (species or genus), measured for size (maximum diameter to nearest cm), and morphology was noted. In addition, partial mortality and condition of each colony was assessed. Partial mortality was estimated as percent of the colony in terms of 'old dead' and 'recent dead' and the cause of recent mortality was identified if possible. The condition of each colony, including disease and bleaching, was noted along with the extent (percent of colony affected) and severity (semi-quantitative scale from mild to acute).

Juvenile coral colonies (< 5 cm) were surveyed within three segments along the same two transects. Juvenile segments were 1.0-m wide by 1.0-m long, and were located within the segments used for adults at 0–1.0 m, 5.0–6.0 m, and 10.0–11.0 m (covering 3 m^2 per transect). Juvenile colonies were distinguished in the field by a distinct tissue and skeletal boundary (not a fragment of larger colony). Each juvenile colony was identified to lowest taxonomic level (genus or species) and measured for size by recording both the maximum and perpendicular diameter to the nearest 2 mm.

Still photographs were collected to record the benthic community composition at predetermined points along the same 2 transect lines with a high-resolution digital camera mounted on a pole. Photographs were taken every 1 m from the 1 m to the 15-m mark. This work generated 30 photographs per site, which are later analyzed by ESD staff and partners using the computer program CoralNet. This analysis is the basis for estimating benthic cover and composition at each site (benthic habitat photographs at sites surveyed by the fish team are also analyzed using CoralNet).

A.1.2. Surveys of Reef Fishes

Divers conducted Fish REA surveys using the stationary-point-count (SPC) method at preselected REA sites. All fish REA sites visited were selected using a stratified random sampling design in shallow (0–6 m), mid (6–18 m), or deep (18–30 m) depth strata, in the forereef habitat strata. Surveys were performed using a 30-m transect line set along a single depth contour. The REA sites

selected for fish surveys typically differ in location from the REA sites where benthic surveys were conducted.

Each fish REA site consists of a team of two divers conducting two adjacent and simultaneous SPC surveys. Once a transect line was deployed, the 2 divers moved to the 7.5-m and 22.5-m marks on this transect line to start their SPC surveys. Each of these marks or points, with 1 diver at each, served as the center of a visually estimated cylindrical survey area with a radius of 7.5 m. During the first 5 min, divers created a list of all fish species found within their cylinder. Afterwards, divers went down their respective species lists, which were created from their work during the initial 5 min of a survey, sizing and counting all individuals within their cylinder, one species at a time. Cryptic species missed during the initial 5 min of a survey could still be counted, sized, and added to the original species list. Fish species observed at a REA site but not recorded during the SPCs were recorded for presence data.

After a survey was completed, divers recorded benthic habitat information within their respective cylindrical survey areas. Divers visually estimated habitat complexity, habitat type, and percentage of cover for hard corals, macroalgae, crustose coralline red algae, turf algae, and sand. Urchin densities were also estimated. Every meter along the transect line still photographs were taken of the benthos to the right side of the line. This work generates 30 photographs per site, which are analyzed later using CoralNet to estimate the benthic cover and composition at each site.

A.1.3. Benthic photomosiaics

Photomosaics are used to collect coral community composition data at select stations and contextualize any physical and/or biological changes recorded at the climate stations over time. The collection of photomosaics is straightforward and requires little special equipment or dive operations. The mosaic camera system consists of two SLR Nikon D7000 cameras and a single GoPro video camera mounted to a custom frame. To obtain continuous coverage of the reef floor within a 10 m x 10 m plot, the diver operating the camera system swims a gridded pattern approximately 1.5 m above the average depth of the plot at speeds sufficient to maintain maximum overlap between adjacent images. Depending on local conditions a single site mosaic will take 45–60 min to collect. To calibrate mosaic images, a second diver collects a series of detailed measurements between a set of temporary and/or permanent reference markers deployed during surveys. Additional benthic photomosaics covering 1 m x 18 m, 5 m x 5 m and, 1 m x 2.5 m plots were also completed at select sites.

A.2 Biological Collections

A.2.1. Microbial Surveys

The data collected by the microbial partner will provide added value to the assessment and monitoring of coral reefs by combining the microbial taxonomic and functional composition and the fluxes of matter and energy they facilitate with the data on benthic and pelagic macro-biota. This will allow for characterization of coral reef ecosystems from a molecular to an ecosystem scale across the entire US Pacific.

- *Collection of water chemistry using Minidon Niskin bottles*: This provides most of the long term monitoring samples (water chemistry: organic carbon, inorganic nutrients; microbial activity and composition: abundances and biomass, autotroph:heterotroph, and diversity). At every reef site, samples will be collected from 1) the reef benthos, 2) the reef matrix, and 3) the reef water column. Offshore samples will be collected opportunistically

whenever the OCC team samples there. Water samples are processed according to the procedures outlined in Haas et al, 2014.

- *Molecular characterization of dissolved organic matter (DOM metabolomics)*: isolation of DOM from seawater with low salt contamination for downstream analysis by LCMS. These analyses will yield information concerning both the quality and quantity of DOM in benthic-associated seawater providing deeper characterization of the organic matter pool on reefs.

- *Collection of benthic viral and microbial metagenomes:* As part of the long-term monitoring efforts of microbial community structure on reefs, this protocol replaces the 80-l water collections in cubies and TFF concentration methods completed from 2009 to 2015. These samples characterize benthic associated bacterial and viral composition for estimates of community diversity and function on reef of varying condition.

- *Collection of coral:algal interaction tissue biopsies (Microbial Coral Biopsy):* Microbiologist will collect 1 coral:algal biopsy transects across coral-algal interaction interfaces per site (goal: 2-4 punch transects per island depending on island size. Biopsies will be processed to yield coral and algal metagenomes, metatranscriptomes, viromes, and metabolomes. These samples are to be collected at reef sites, but do not need to be at NCRMP sites. These collections (A) replace the collections of rubble and algae (i.e., smashed reef) that we have collected on previous cruises and (B) provide a spatial data set for investigating mechanisms of coral resistance to algal competition at coral:algal interaction interfaces.

A.2.2. Cores of Massive Colonies

Coring of massive coral colonies is used to determine historical coral growth and accretion rates to provide paleoceanographic time series of calcification and growth rates to hindcast the carbonate chemistry climate of coral reefs from hundreds of years past. To quantify the size and density of annual growth bands in coral skeletons, opportunistic sampling of coral cores are requested to be preserved for analysis by nondestructive CAT scan and image analysis techniques to visualize growth bands that cannot otherwise be observed

A.3. Biological Installations

A.3.1. Autonomous Reef Monitoring Structures (ARMS)

These are small, long-term collecting devices designed to mimic the structural complexity of a coral reef. This device attracts colonizing invertebrates over the period during which they are left in the field. Each of the ARMS measures 36 cm × 46 cm × 20 cm and contains nine 23 cm × 23 cm layers for colonization. Layers alternate between open surfaces and semi-closed surfaces containing triangular-shaped caves. ARMS are placed on pavement or rubble, in proximity to coral reef structures, specifically to avoid coral damage and are deployed by ESD divers using stainless steel stakes and weights to insure that they remain in place for the duration of 1–3 years.

A.3.2. Calcification Accretion Units (CAUs)

These are paired 10 cm x 10 cm PVC plates mounted on stainless steel stakes installed into the reef substrate, which allow for spatial and temporal evaluation of coral reef net calcification and productivity. These analyses are made by measuring the settlement of sessile organisms including stony corals, crustose coralline algae, and macroalgae.

A.3.2. Bioerosion Monitoring Units (BMU)

These are calcium carbonate blocks (5 cm x 2 cm x 1 cm) attached to each installed CAU that measure bioerosion rates. The total number of blocks at each island will not exceed 25. These blocks act as settling substrate for bioeroding organisms.

A.4. Oceanographic Surveys

Water samples are collected at reef study sites to assess total alkalinity (TA) and dissolved inorganic carbon (DIC). Conductivity, temperature and depth (CTD) casts are completed concurrently with water sample collection. At select locations, a special investigation known as a "Diurnal Suite" is conducted, and includes autonomous water samples and a variety of instruments that collect samples over a multi-day period to quantify the diel carbonate chemistry cycle on the reef.
Water sample collection and CTD casts are also conducted at offshore sites (about 15 km offshore of islands) for comparison with onshore observations.

A.4.1. Moored Instruments for Time-series Observations

- Subsurface Temperature Recorder (STR): Provide in situ, high resolution, long term water temperature.
- Acoustic Doppler Current Profiler (ADCP): Measures water velocity in the water column
- Programmable Underwater Collector (PUC; aka Diurnal Suite): Collect water samples at pre-programmed times
- SeaFet pH Sensor

A.4.2. Hydrographic Surveys

- Shallow-water (nearshore) Conductivity, Temperature, and Depth Casts: Provide salinity, temperature, pressure, beam transmission, and dissolved oxygen data in the water column
- Water Chemistry: Water samples for analyses of dissolved inorganic carbon (DIC), nutrients (N and P), salinity (S‰), and Total Alkalinity (TA) were collected at select locales concurrently with CTD casts.
- Shipboard Acoustic Doppler Current Profiler (ADCP): A ship-based sensor to provide directional ocean current data.
- Shipboard CTD casts: Conduct shipboard CTD casts at each island 15 km offshore in each cardinal direction along with a concurrent water samples.

A. 5. Data Management

Data Management operations are conducted using laptops connecting to a Microsoft Server running an Oracle database which also provides file management and backup services. Once data is collected in the field, photos and videos are copied to the file server, while Fish and Benthic observations and partner field data is entered nightly into an in-house Mission Application built with Application Express (APEX) which interfaces with the Oracle database. Oceanography data is tracked currently using a Microsoft Access database.

Appendix B. Data streams

Table 5. Summary of sites where benthic StRS belt transect surveys were conducted. *Asterisk denotes images collected during REA fish surveys.

Site	Date	Depth bin	Reef zone	Depth (ft)	Latitude	Longitude	Photos taken
HOW-866	6/8/2018	Mid	Forereef	52	0.48972	-176.375	No**
HOW-861	6/9/2018	Mid	Forereef	53	0.8052	-176.61	No*
HOW-865	6/9/2018	Mid	Forereef	55	0.82356	-176.624	No*
HOW-910	6/9/2018	Shallow	Forereef	22	0.82122	-176.625	No*
HOW-890	6/10/2018	Shallow	Forereef	23	0.81195	-176.612	No*
HOW-860	6/10/2018	Deep	Forereef	75	0.81195	-176.612	No*
HOW-891	6/10/2018	Shallow	Forereef	21	0.8084	-176.611	No*
HOW-862	6/11/2018	Deep	Forereef	70	0.8054	-176.621	No*
HOW-1031	6/11/2018	Mid	Forereef	38	0.79788	-176.62	No*
BAK-761	6/12/2018	Mid	Forereef	50	0.18851	-176.482	No*
BAK-776	6/12/2018	Shallow	Forereef	24	0.18798	-176.47	No*
BAK-725	6/13/2018	Deep	Forereef	72	0.20183	-176.465	No*
BAK-745	6/13/2018	Mid	Forereef	54	0.20494	-176.474	No*
BAK-813	6/13/2018	Shallow	Forereef	20	0.20132	-176.469	No*
BAK-752	6/14/2018	Mid	Forereef	49	0.20007	-176.484	No*
BAK-724	6/14/2018	Deep	Forereef	70	0.18673	-176.47	No*
BAK-804	6/14/2018	Shallow	Forereef	20	0.20376	-176.478	No*
BAK-770	6/15/2018	Shallow	Forereef	22	0.19557	-176.486	No*
BAK-763	6/15/2018	Mid	Forereef	37	0.19374	-176.461	No*
SWA-793	6/19/2018	Deep	Forereef	62	-11.0566	-171.092	Yes
SWA-795	6/19/2018	Mid	Forereef	42	-11.0659	-171.085	Yes
SWA-800	6/19/2018	Shallow	Forereef	19	-11.0634	-171.087	Yes

Site	Date	Depth bin	Reef zone	Depth (ft)	Latitude	Longitude	Photos taken
SWA-788	6/20/2018	Shallow	Forereef	10	-11.0467	-171.081	Yes
SWA-780	6/20/2018	Mid	Forereef	34	-11.0459	-171.078	Yes
SWA-775	6/20/2018	Deep	Forereef	67	-11.0453	-171.072	Yes
SWA-789	6/20/2018	Shallow	Forereef	17	-11.0485	-171.089	Yes
SWA-766	6/21/2018	Mid	Forereef	42	-11.0515	-171.065	Yes
SWA-774	6/21/2018	Shallow	Forereef	17	-11.0639	-171.072	Yes
SWA-802	6/21/2018	Shallow	Forereef	8	-11.0586	-171.091	Yes
TUT-2897	6/29/2018	Deep	Forereef	73	-14.2371	-170.673	Yes
TUT-2927	6/29/2018	Mid	Forereef	44	-14.2469	-170.664	Yes
TUT-2929	6/29/2018	Mid	Forereef	46	-14.2386	-170.669	Yes
TUT-2935	6/30/2018	Deep	Forereef	65	-14.2634	-170.713	Yes
TUT-2949	6/30/2018	Mid	Forereef	11	-14.2779	-170.723	Yes
TUT-2954	7/1/2018	Shallow	Forereef	18	-14.2908	-170.789	Yes
TUT-2948	7/1/2018	Shallow	Forereef	19	-14.2931	-170.809	Yes
TUT-2938	7/1/2018	Mid	Forereef	44	-14.2995	-170.815	Yes
TUT-2933	7/1/2018	Mid	Forereef	42	-14.2884	-170.769	Yes
TUT-2932	7/1/2018	Deep	Forereef	70	-14.3107	-170.836	Yes
TUT-5000	7/1/2018	Deep	Forereef	64	-14.2877	-170.782	Yes
TUT-2937	7/2/2018	Deep	Forereef	66	-14.2884	-170.759	Yes
TUT-2942	7/2/2018	Deep	Forereef	74	-14.2823	-170.734	Yes
TUT-2944	7/2/2018	Deep	Forereef	65	-14.2908	-170.747	Yes
TUT-2952	7/2/2018	Shallow	Forereef	16	-14.292	-170.792	Yes
TUT-5001	7/2/2018	Mid	Forereef	50	-14.2921	-170.78	Yes
TUT-2903	7/3/2018	Mid	Forereef	33	-14.256	-170.651	Yes

Site	Date	Depth bin	Reef zone	Depth (ft)	Latitude	Longitude	Photos taken
TUT-2909	7/3/2018	Shallow	Forereef	34	-14.2504	-170.621	Yes
TUT-3043	7/3/2018	Deep	Forereef	80	-14.2508	-170.642	Yes
TUT-2916	7/3/2018	Shallow	Forereef	12	-14.2483	-170.67	Yes
TUT-2871	7/4/2018	Mid	Forereef	51	-14.3651	-170.764	Yes
TUT-2874	7/4/2018	Mid	Forereef	46	-14.3619	-170.765	Yes
TUT-2883	7/4/2018	Shallow	Forereef	12	-14.3631	-170.762	Yes
TUT-2889	7/4/2018	Shallow	Forereef	13	-14.3642	-170.76	Yes
TUT-5003	7/5/2018	Deep	Forereef	80	-14.2837	-170.563	Yes
TUT-5004	7/5/2018	Mid	Forereef	48	-14.281	-170.562	Yes
TUT-5005	7/5/2018	Mid	Forereef	45	-14.2768	-170.558	Yes
TUT-2850	7/6/2018	Deep	Forereef	75	-14.3643	-170.752	Yes
TUT-2854	7/6/2018	Mid	Forereef	46	-14.3653	-170.753	Yes
TUT-2852	7/6/2018	Deep	Forereef	63	-14.3608	-170.75	Yes
TUT-2855	7/6/2018	Mid	Forereef	45	-14.3601	-170.749	Yes
OFU-1014	7/7/2018	Mid	Forereef	27	-14.1781	-169.65	Yes
OFU-1010	7/7/2018	Mid	Forereef	36	-14.1884	-169.621	Yes
OFU-1004	7/7/2018	Mid	Forereef	38	-14.1726	-169.642	Yes
OFU-988	7/7/2018	Deep	Forereef	80	-14.1752	-169.646	Yes
OFU-987	7/7/2018	Deep	Forereef	76	-14.1867	-169.664	Yes
OFU-1024	7/7/2018	Mid	Forereef	50	-14.1767	-169.628	Yes
OFU-1049	7/7/2018	Deep	Forereef	73	-14.1761	-169.648	Yes
OFU-1045	7/7/2018	Mid	Forereef	54	-14.1741	-169.644	Yes
OFU-995	7/9/2018	Deep	Forereef	66	-14.1644	-169.656	Yes
OFU-985	7/9/2018	Deep	Forereef	65	-14.161	-169.638	Yes

Site	Date	Depth bin	Reef zone	Depth (ft)	Latitude	Longitude	Photos taken
OFU-1000	7/9/2018	Deep	Forereef	65	-14.1607	-169.62	Yes
OFU-1012	7/9/2018	Mid	Forereef	30	-14.1651	-169.649	Yes
OFU-1031	7/9/2018	Shallow	Forereef	14	-14.1662	-169.628	Yes
OFU-1033	7/9/2018	Shallow	Forereef	12	-14.1622	-169.621	Yes
OFU-1047	7/9/2018	Deep	Forereef	64	-14.1607	-169.668	Yes
OFU-1034	7/9/2018	Shallow	Forereef	20	-14.164	-169.66	Yes
OFU-982	7/10/2018	Shallow	Forereef	16	-14.1612	-169.683	Yes
OFU-1051	7/10/2018	Mid	Forereef	45	-14.1635	-169.687	Yes
OFU-1013	7/10/2018	Mid	Forereef	25	-14.1631	-169.685	Yes
OFU-1054	7/10/2018	Mid	Forereef	35	-14.1736	-169.685	Yes
TAU-1065	7/11/2018	Mid	Forereef	52	-14.2634	-169.5	Yes
TAU-1056	7/11/2018	Deep	Forereef	66	-14.2651	-169.499	Yes
TAU-1071	7/11/2018	Shallow	Forereef	14	-14.2633	-169.499	Yes
TAU-1000	7/12/2018	Deep	Forereef	72	-14.2196	-169.518	Yes
TAU-1080	7/12/2018	Mid	Forereef	49	-14.2282	-169.519	Yes
TAU-1034	7/12/2018	Mid	Forereef	51	-14.2148	-169.502	Yes
TAU-1032	7/12/2018	Mid	Forereef	37	-14.2144	-169.488	Yes
TAU-1016	7/12/2018	Shallow	Forereef	23	-14.2244	-169.52	Yes
TAU-1006	7/12/2018	Deep	Forereef	70	-14.213	-169.481	Yes
ROS-1071	7/14/2018	Mid	Forereef	36	-14.5437	-168.172	Yes
ROS-1101	7/14/2018	Mid	Forereef	40	-14.5362	-168.164	Yes
ROS-1070	7/14/2018	Deep	Forereef	65	-14.5461	-168.171	Yes
ROS-1067	7/14/2018	Mid	Forereef	44	-14.537	-168.147	Yes
ROS-1056	7/14/2018	Mid	Forereef	38	-14.555	-168.147	Yes

Site	Date	Depth bin	Reef zone	Depth (ft)	Latitude	Longitude	Photos taken
ROS-1048	7/14/2018	Deep	Forereef	67	-14.5417	-168.144	Yes
ROS-5001	7/14/2018	Shallow	Forereef	22	-14.5507	-168.167	Yes
ROS-1047	7/14/2018	Deep	Forereef	80	-14.537	-168.168	Yes
ROS-1053	7/15/2018	Shallow	Forereef	44	-14.5323	-168.158	Yes
ROS-1062	7/15/2018	Mid	Forereef	50	-14.5418	-168.173	Yes
ROS-1076	7/15/2018	Shallow	Forereef	56	-14.5391	-168.146	Yes
ROS-1077	7/15/2018	Shallow	Forereef	16	-14.534	-168.159	Yes
ROS-1080	7/15/2018	Shallow	Forereef	17	-14.5378	-168.171	Yes
ROS-1105	7/15/2018	Mid	Forereef	32	-14.5373	-168.169	Yes
ROS-1108	7/15/2018	Mid	Forereef	23	-14.5442	-168.171	Yes
ROS-1045	7/15/2018	Deep	Forereef	70	-14.5353	-168.162	Yes
TAU-1009	7/16/2018	Deep	Forereef	76	-14.2116	-169.442	Yes
TAU-1011	7/16/2018	Deep	Forereef	66	-14.2099	-169.43	Yes
TAU-1021	7/16/2018	Mid	Forereef	54	-14.2558	-169.42	Yes
TAU-1036	7/16/2018	Mid	Forereef	46	-14.2487	-169.419	Yes
TAU-1062	7/16/2018	Mid	Forereef	53	-14.2755	-169.492	Yes
TAU-1074	7/16/2018	Shallow	Forereef	21	-14.2677	-169.496	Yes
TAU-1077	7/16/2018	Mid	Forereef	39	-14.2346	-169.419	Yes
TUT-3020	7/17/2018	Mid	Forereef	45	-14.3366	-170.804	Yes
TUT-3021	7/17/2018	Mid	Forereef	53	-14.3437	-170.789	Yes
TUT-3006	7/17/2018	Deep	Forereef	82	-14.3603	-170.786	Yes
TUT-3023	7/17/2018	Shallow	Forereef	18	-14.3269	-170.834	Yes
TUT-3026	7/17/2018	Shallow	Forereef	17	-14.3307	-170.814	Yes
TUT-2806	7/18/2018	Deep	Forereef	65	-14.293	-170.553	Yes

Site	Date	Depth bin	Reef zone	Depth (ft)	Latitude	Longitude	Photos taken
TUT-2803	7/18/2018	Deep	Forereef	72	-14.2929	-170.55	Yes
TUT-2808	7/18/2018	Mid	Forereef	46	-14.2965	-170.566	Yes
TUT-2812	7/18/2018	Mid	Forereef	48	-14.295	-170.558	Yes
JAR-1916	7/28/2018	Deep	Forereef	73	-0.36268	-160.004	Yes
JAR-1948	7/28/2018	Mid	Forereef	35	-0.36165	-159.998	Yes
JAR-1980	7/28/2018	Mid	Forereef	55	-0.36251	-159.993	Yes
JAR-1995	7/28/2018	Shallow	Forereef	22	-0.36275	-160.002	Yes
JAR-2019	7/28/2018	Shallow	Forereef	11	-0.36982	-160.008	Yes
JAR-2021	7/28/2018	Shallow	Forereef	13	-0.36538	-160.006	Yes
JAR-1935	7/29/2018	Mid	Forereef	55	-0.36835	-159.978	Yes
JAR-1919	7/29/2018	Deep	Forereef	70	-0.37342	-159.973	Yes
JAR-1918	7/29/2018	Deep	Forereef	67	-0.36612	-159.981	Yes
JAR-1950	7/29/2018	Mid	Forereef	35	-0.37083	-159.976	Yes
JAR-2046	7/29/2018	Shallow	Forereef	18	-0.36623	-159.985	Yes
JAR-2031	7/29/2018	Shallow	Forereef	20	-0.37672	-159.979	Yes
JAR-1997	7/29/2018	Shallow	Forereef	23	-0.36837	-159.981	Yes
JAR-1984	7/29/2018	Mid	Forereef	25	-0.37425	-159.982	Yes
JAR-1974	7/29/2018	Mid	Forereef	35	-0.37568	-159.976	Yes
JAR-2040	7/30/2018	Shallow	Forereef	21	-0.37228	-159.982	Yes
JAR-2016	7/30/2018	Shallow	Forereef	20	-0.37735	-159.983	Yes
JAR-1981	7/30/2018	Mid	Forereef	30	-0.37893	-159.972	Yes
JAR-1967	7/30/2018	Mid	Forereef	39	-0.38195	-159.989	Yes
JAR-1965	7/30/2018	Mid	Forereef	39	-0.38254	-159.976	Yes
JAR-1945	7/30/2018	Mid	Forereef	29	-0.38043	-159.978	Yes

Site	Date	Depth bin	Reef zone	Depth (ft)	Latitude	Longitude	Photos taken
JAR-1915	7/31/2018	Deep	Forereef	63	-0.38199	-159.996	Yes
JAR-1923	7/31/2018	Mid	Forereef	32	-0.38168	-159.999	Yes
JAR-1931	7/31/2018	Shallow	Forereef	16	-0.37545	-160.013	Yes
JAR-1939	7/31/2018	Mid	Forereef	45	-0.38176	-160.007	Yes
JAR-1977	7/31/2018	Mid	Forereef	58	-0.38149	-160.012	Yes
JAR-2039	7/31/2018	Shallow	Forereef	21	-0.38189	-160.004	Yes
JAR-1900	7/31/2018	Deep	Forereef	79	-0.37962	-160.016	Yes
PAL-1125	8/2/2018	Mid	Forereef	35	5.88169	-162.13	Yes
PAL-1182	8/2/2018	Shallow	Forereef	16	5.877228	-162.119	Yes
PAL-1186	8/2/2018	Shallow	Forereef	15	5.895223	-162.114	Yes
PAL-5000	8/2/2018	Mid	Forereef	20	5.8927	-162.13	Yes
PAL-1111	8/2/2018	Mid	Forereef	51	5.897517	-162.095	Yes
PAL-1101	8/2/2018	Mid	Forereef	23	5.893973	-162.13	Yes
PAL-1075	8/2/2018	Deep	Forereef	76	5.87569	-162.146	Yes
PAL-1107	8/3/2018	Mid	Forereef	29	5.886772	-162.13	Yes
PAL-1106	8/3/2018	Mid	Forereef	37	5.873518	-162.127	Yes
PAL-1093	8/3/2018	Mid	Forereef	35	5.866929	-162.123	Yes
PAL-1052	8/3/2018	Deep	Forereef	70	5.884333	-162.141	Yes
PAL-1114	8/3/2018	Mid	Forereef	32	5.895702	-162.123	Yes
PAL-1176	8/3/2018	Shallow	Forereef	12	5.87388	-162.112	Yes
PAL-1170	8/3/2018	Shallow	Forereef	15	5.889177	-162.122	Yes
PAL-1142	8/3/2018	Shallow	Forereef	13	5.886696	-162.116	Yes
PAL-1065	8/4/2018	Deep	Forereef	66	5.863276	-162.029	Yes
PAL-1095	8/4/2018	Mid	Forereef	26	5.869347	-162.034	Yes

Site	Date	Depth bin	Reef zone	Depth (ft)	Latitude	Longitude	Photos taken
PAL-1102	8/4/2018	Mid	Forereef	38	5.867425	-162.017	Yes
PAL-1134	8/4/2018	Mid	Forereef	24	5.873855	-162.036	Yes
PAL-1187	8/4/2018	Shallow	Forereef	16	5.873456	-162.043	Yes
PAL-1139	8/4/2018	Shallow	Forereef	18	5.879394	-162.03	Yes
PAL-1138	8/4/2018	Shallow	Forereef	15	5.867444	-162.041	Yes
PAL-1196	8/4/2018	Shallow	Forereef	12	5.87507	-162.043	Yes
PAL-1153	8/5/2018	Shallow	Forereef	13	5.895465	-162.09	Yes
PAL-1152	8/5/2018	Shallow	Forereef	17	5.896258	-162.105	Yes
PAL-1143	8/5/2018	Shallow	Forereef	16	5.894722	-162.084	Yes
PAL-1100	8/5/2018	Mid	Forereef	45	5.898678	-162.066	Yes
PAL-1077	8/5/2018	Mid	Forereef	52	5.895581	-162.084	Yes
PAL-1059	8/5/2018	Deep	Forereef	65	5.897446	-162.1	Yes
PAL-1057	8/5/2018	Deep	Forereef	65	5.896885	-162.089	Yes
PAL-1162	8/5/2018	Shallow	Forereef	16	5.895975	-162.079	Yes
PAL-1185	8/6/2018	Deep	Forereef	75	5.869049	-162.089	Yes
PAL-1120	8/6/2018	Mid	Forereef	37	5.868771	-162.072	Yes
PAL-1104	8/6/2018	Mid	Forereef	50	5.875905	-162.131	Yes
PAL-1099	8/6/2018	Mid	Forereef	20	5.87144	-162.118	Yes
PAL-1087	8/6/2018	Mid	Forereef	25	5.866966	-162.11	Yes
PAL-1066	8/6/2018	Deep	Forereef	63	5.868817	-162.13	Yes
PAL-1190	8/6/2018	Shallow	Forereef	19	5.881436	-162.121	Yes
PAL-1193	8/6/2018	Shallow	Forereef	12	5.883424	-162.114	Yes
KIN-850	8/8/2018	Mid	Forereef	25	6.420936	-162.363	Yes
KIN-843	8/8/2018	Mid	Forereef	29	6.424462	-162.367	Yes

Site	Date	Depth bin	Reef zone	Depth (ft)	Latitude	Longitude	Photos taken
KIN-841	8/8/2018	Mid	Forereef	51	6.435843	-162.382	Yes
KIN-835	8/8/2018	Mid	Forereef	27	6.427592	-162.372	Yes
KIN-832	8/8/2018	Deep	Forereef	78	6.433351	-162.378	Yes
KIN-829	8/8/2018	Deep	Forereef	72	6.415949	-162.354	Yes
KIN-861	8/8/2018	Shallow	Forereef	12	6.417963	-162.362	Yes
KIN-868	8/8/2018	Shallow	Forereef	21	6.424615	-162.369	Yes
KIN-838	8/9/2018	Mid	Forereef	54	6.39717	-162.336	Yes
KIN-837	8/9/2018	Mid	Forereef	25	6.429722	-162.375	Yes
KIN-815	8/9/2018	Deep	Backreef	65	6.435566	-162.392	Yes
KIN-899	8/9/2018	Deep	Protected Slope	74	6.421698	-162.429	Yes
KIN-860	8/9/2018	Shallow	Forereef	14	6.404042	-162.345	Yes
KIN-871	8/10/2018	Deep	Protected Slope	80	6.417319	-162.399	Yes
KIN-872	8/10/2018	Deep	Lagoon	70	6.400254	-162.435	Yes
KIN-886	8/10/2018	Mid	Lagoon	44	6.407084	-162.367	Yes
KIN-865	8/10/2018	Shallow	Forereef	16	6.38196	-162.35	Yes
KIN-863	8/10/2018	Shallow	Forereef	18	6.393916	-162.336	Yes
KIN-862	8/10/2018	Shallow	Forereef	22	6.385349	-162.336	Yes
KIN-905	8/10/2018	Mid	Protected Slope	38	6.380195	-162.439	Yes
KIN-820	8/10/2018	Mid	Lagoon	42	6.401337	-162.35	Yes
KIN-855	8/10/2018	Mid	Lagoon	52	6.387454	-162.426	Yes
KIN-915	8/11/2018	Mid	Protected Slope	39	6.405676	-162.458	Yes
KIN-918	8/11/2018	Mid	Lagoon	46	6.405131	-162.46	Yes
KIN-5001	8/11/2018	Deep	Forereef	66	6.397649	-162.336	Yes
KIN-892	8/11/2018	Deep	Protected Slope	62	6.392212	-162.463	Yes

Site	Date	Depth bin	Reef zone	Depth (ft)	Latitude	Longitude	Photos taken
KIN-901	8/11/2018	Mid	Lagoon	48	6.401165	-162.467	Yes
KIN-908	8/11/2018	Mid	Protected Slope	52	6.398091	-162.461	Yes

Table 6. Summary of sites where Fish REA surveys were conducted.

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
HOW-876	6/8/2018	Mid	Forereef	15.85	0.812697	-176.623
HOW-866	6/8/2018	Mid	Forereef	13.55	0.816194	-176.624
HOW-904	6/8/2018	Shallow	Forereef	5.05	0.802199	-176.621
HOW-893	6/8/2018	Mid	Forereef	13	0.811144	-176.623
HOW-888	6/8/2018	Shallow	Forereef	4	0.798243	-176.62
HOW-887	6/9/2018	Shallow	Forereef	5.95	0.81622	-176.614
HOW-902	6/9/2018	Shallow	Forereef	8.05	0.81377	-176.613
HOW-868	6/9/2018	Mid	Forereef	14.75	0.820825	-176.617
HOW-865	6/9/2018	Mid	Forereef	15.65	0.823563	-176.624
HOW-861	6/9/2018	Mid	Forereef	14.15	0.805199	-176.61
HOW-910	6/9/2018	Shallow	Forereef	5.1	0.821225	-176.625
HOW-848	6/9/2018	Deep	Forereef	20.85	0.822895	-176.619
HOW-858	6/9/2018	Mid	Forereef	14.15	0.816459	-176.614
HOW-855	6/10/2018	Deep	Forereef	21.3	0.79044	-176.617
HOW-856	6/10/2018	Deep	Forereef	21.8	0.80128	-176.61
HOW-914	6/10/2018	Shallow	Forereef	5.5	0.795672	-176.611
HOW-912	6/10/2018	Shallow	Forereef	7.75	0.79429	-176.618
HOW-909	6/10/2018	Shallow	Forereef	4.45	0.820446	-176.62
HOW-891	6/10/2018	Shallow	Forereef	3.35	0.808395	-176.611
HOW-890	6/10/2018	Shallow	Forereef	5.7	0.81151	-176.612

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
HOW-860	6/10/2018	Deep	Forereef	22.65	0.81195	-176.612
HOW-869	6/10/2018	Mid	Forereef	17.75	0.790974	-176.613
HOW-879	6/10/2018	Mid	Forereef	8.3	0.798394	-176.611
HOW-852	6/11/2018	Deep	Forereef	24.5	0.819176	-176.626
HOW-851	6/11/2018	Mid	Forereef	10.6	0.803913	-176.621
HOW-908	6/11/2018	Shallow	Forereef	5.45	0.820565	-176.619
HOW-896	6/11/2018	Shallow	Forereef	5.4	0.812959	-176.623
HOW-862	6/11/2018	Deep	Forereef	20.7	0.8054	-176.621
HOW-1031	6/11/2018	Mid	Forereef	9.75	0.797881	-176.62
BAK-719	6/12/2018	Deep	Forereef	25.3	0.189066	-176.488
BAK-740	6/12/2018	Mid	Forereef	9.15	0.189294	-176.464
BAK-791	6/12/2018	Shallow	Forereef	4.35	0.187271	-176.472
BAK-781	6/12/2018	Shallow	Forereef	5.3	0.188178	-176.478
BAK-776	6/12/2018	Shallow	Forereef	5.5	0.187985	-176.47
BAK-761	6/12/2018	Mid	Forereef	14	0.188508	-176.482
BAK-760	6/12/2018	Mid	Forereef	11.1	0.187948	-176.476
BAK-742	6/13/2018	Mid	Forereef	15.925	0.198113	-176.461
BAK-725	6/13/2018	Deep	Forereef	20.9	0.201831	-176.465
BAK-712	6/13/2018	Deep	Forereef	20.3	0.205276	-176.472
BAK-695	6/13/2018	Deep	Forereef	21.95	0.206295	-176.48
BAK-745	6/13/2018	Mid	Forereef	15.9	0.204936	-176.474
BAK-747	6/13/2018	Mid	Forereef	10.15	0.20314	-176.469
BAK-777	6/13/2018	Shallow	Forereef	4.75	0.199568	-176.468
BAK-813	6/13/2018	Shallow	Forereef	5.3	0.201357	-176.469

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
BAK-748	6/14/2018	Mid	Forereef	10	0.2046	-176.477
BAK-724	6/14/2018	Deep	Forereef	21	0.186727	-176.47
BAK-710	6/14/2018	Deep	Forereef	22.9	0.197151	-176.459
BAK-705	6/14/2018	Deep	Forereef	20.7	0.18688	-176.462
BAK-752	6/14/2018	Mid	Forereef	14.95	0.200068	-176.484
BAK-804	6/14/2018	Shallow	Forereef	4.2	0.203762	-176.478
BAK-794	6/14/2018	Shallow	Forereef	4.6	0.20402	-176.481
BAK-793	6/14/2018	Shallow	Forereef	5.05	0.20305	-176.472
BAK-792	6/14/2018	Shallow	Forereef	3.6	0.193887	-176.487
BAK-759	6/14/2018	Mid	Forereef	14.3	0.196545	-176.486
BAK-731	6/15/2018	Mid	Forereef	20.25	0.188202	-176.478
BAK-732	6/15/2018	Deep	Forereef	26.9	0.198932	-176.485
BAK-749	6/15/2018	Mid	Forereef	13.1	0.18902	-176.487
BAK-750	6/15/2018	Mid	Forereef	6.85	0.198742	-176.464
BAK-763	6/15/2018	Mid	Forereef	12.4	0.193742	-176.461
BAK-765	6/15/2018	Mid	Forereef	17.35	0.186192	-176.466
BAK-770	6/15/2018	Shallow	Forereef	4.45	0.195568	-176.486
SWA-706	6/19/2018	Shallow	Forereef	10.25	-11.0548	-171.092
SWA-711	6/19/2018	Deep	Forereef	26.2	-11.0638	-171.087
SWA-722	6/19/2018	Mid	Forereef	10.1	-11.0676	-171.083
SWA-724	6/19/2018	Mid	Forereef	12.3	-11.0611	-171.089
SWA-740	6/19/2018	Shallow	Forereef	4.15	-11.0648	-171.086
SWA-750	6/19/2018	Shallow	Forereef	4.25	-11.0667	-171.075
SWA-753	6/19/2018	Shallow	Forereef	2.25	-11.0599	-171.09

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
SWA-676	6/19/2018	Deep	Forereef	25.8	-11.0507	-171.092
SWA-677	6/19/2018	Deep	Forereef	23.5	-11.0663	-171.074
SWA-687	6/19/2018	Mid	Forereef	15.05	-11.0561	-171.092
SWA-717	6/20/2018	Deep	Forereef	23.15	-11.0453	-171.074
SWA-713	6/20/2018	Deep	Forereef	22.25	-11.0519	-171.065
SWA-712	6/20/2018	Deep	Forereef	27.15	-11.0462	-171.082
SWA-703	6/20/2018	Shallow	Forereef	4.65	-11.0614	-171.068
SWA-684	6/20/2018	Mid	Forereef	7.7	-11.0632	-171.071
SWA-757	6/20/2018	Shallow	Forereef	5.85	-11.0583	-171.065
SWA-728	6/20/2018	Mid	Forereef	15.75	-11.0467	-171.083
SWA-731	6/20/2018	Mid	Forereef	10.85	-11.0467	-171.069
SWA-741	6/20/2018	Shallow	Forereef	5.4	-11.0637	-171.087
SWA-747	6/20/2018	Shallow	Forereef	3.4	-11.0481	-171.088
SWA-751	6/20/2018	Shallow	Forereef	6.15	-11.0463	-171.079
SWA-723	6/20/2018	Mid	Forereef	10.35	-11.0547	-171.064
SWA-721	6/21/2018	Shallow	Forereef	3.7	-11.05	-171.067
SWA-700	6/21/2018	Shallow	Forereef	2	-11.0573	-171.091
SWA-689	6/21/2018	Mid	Forereef	11.3	-11.0532	-171.093
SWA-683	6/21/2018	Deep	Forereef	24.9	-11.0616	-171.068
SWA-678	6/21/2018	Deep	Forereef	25.6	-11.0549	-171.092
SWA-732	6/21/2018	Mid	Forereef	17.2	-11.0485	-171.09
SWA-739	6/21/2018	Shallow	Forereef	3.7	-11.0457	-171.074
SWA-733	6/21/2018	Mid	Forereef	14	-11.0684	-171.08
TUT-3182	6/28/2018	Mid	Forereef	10.95	-14.2936	-170.654

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
TUT-3163	6/28/2018	Deep	Forereef	21	-14.2882	-170.677
TUT-3193	6/28/2018	Mid	Forereef	15.2	-14.302	-170.679
TUT-3210	6/28/2018	Mid	Forereef	14.55	-14.2924	-170.664
TUT-3262	6/28/2018	Mid	Forereef	13.55	-14.2854	-170.665
TUT-2926	6/29/2018	Deep	Forereef	18	-14.2429	-170.681
TUT-2909	6/29/2018	Shallow	Forereef	4.45	-14.2457	-170.684
TUT-2932	6/29/2018	Deep	Forereef	29.35	-14.2304	-170.696
TUT-3022	6/29/2018	Shallow	Forereef	5.25	-14.2538	-170.702
TUT-3017	6/29/2018	Mid	Forereef	9.25	-14.2407	-170.677
TUT-2949	6/29/2018	Mid	Forereef	14.75	-14.2611	-170.706
TUT-2945	6/29/2018	Mid	Forereef	15.1	-14.2529	-170.69
TUT-3050	6/30/2018	Deep	Forereef	25.6	-14.2801	-170.737
TUT-2960	6/30/2018	Mid	Forereef	15.9	-14.2473	-170.689
TUT-2965	6/30/2018	Mid	Forereef	16	-14.2626	-170.714
TUT-3118	6/30/2018	Mid	Forereef	6.7	-14.2826	-170.734
TUT-3070	7/1/2018	Deep	Forereef	22.15	-14.2959	-170.812
TUT-3071	7/1/2018	Deep	Forereef	28.65	-14.318	-170.846
TUT-3063	7/1/2018	Deep	Forereef	24.4	-14.2993	-170.822
TUT-3072	7/1/2018	Mid	Forereef	10.1	-14.3029	-170.826
TUT-3144	7/1/2018	Shallow	Forereef	4.35	-14.3084	-170.831
TUT-3086	7/1/2018	Mid	Forereef	10.75	-14.2939	-170.809
TUT-3114	7/1/2018	Mid	Forereef	9.8	-14.2949	-170.811
TUT-3135	7/1/2018	Shallow	Forereef	4.2	-14.3002	-170.814
TUT-3080	7/1/2018	Mid	Forereef	15.1	-14.3092	-170.834

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
TUT-3040	7/2/2018	Deep	Forereef	18.85	-14.2893	-170.745
TUT-3038	7/2/2018	Deep	Forereef	22.45	-14.2887	-170.757
TUT-3049	7/2/2018	Mid	Forereef	15.4	-14.2812	-170.724
TUT-3129	7/2/2018	Shallow	Forereef	4.45	-14.2722	-170.721
TUT-3125	7/2/2018	Shallow	Forereef	3.85	-14.2915	-170.776
TUT-3119	7/2/2018	Mid	Forereef	12.05	-14.2898	-170.8
TUT-3113	7/2/2018	Mid	Forereef	9.05	-14.2918	-170.805
TUT-3074	7/2/2018	Mid	Forereef	7.25	-14.292	-170.795
TUT-3087	7/2/2018	Mid	Forereef	17.25	-14.2871	-170.768
TUT-3108	7/2/2018	Shallow	Forereef	5.05	-14.2872	-170.784
TUT-2903	7/3/2018	Mid	Forereef	20.3	-14.2501	-170.657
TUT-2977	7/3/2018	Mid	Forereef	12.1	-14.2483	-170.639
TUT-2959	7/3/2018	Mid	Forereef	9.75	-14.2481	-170.627
TUT-2934	7/3/2018	Deep	Forereef	24.45	-14.2485	-170.646
TUT-3007	7/3/2018	Shallow	Forereef	3.65	-14.247	-170.673
TUT-2581	7/4/2018	Mid	Forereef	15.7	-14.3553	-170.788
TUT-2564	7/4/2018	Deep	Forereef	25.7	-14.3398	-170.792
TUT-2553	7/4/2018	Deep	Forereef	23.7	-14.3364	-170.801
TUT-2591	7/4/2018	Mid	Forereef	10.15	-14.3328	-170.82
TUT-3143	7/4/2018	Mid	Forereef	6.8	-14.3214	-170.846
TUT-2662	7/4/2018	Shallow	Forereef	5.6	-14.3268	-170.836
TUT-2639	7/4/2018	Shallow	Forereef	3.25	-14.3351	-170.795
TUT-2636	7/4/2018	Shallow	Forereef	1.5	-14.3276	-170.808
TUT-2630	7/4/2018	Mid	Forereef	17.05	-14.3479	-170.789

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
TUT-2606	7/4/2018	Mid	Forereef	13.45	-14.3349	-170.807
TUT-2943	7/5/2018	Mid	Forereef	16.1	-14.2456	-170.564
TUT-2933	7/5/2018	Mid	Forereef	12.8	-14.2459	-170.581
TUT-2924	7/5/2018	Deep	Forereef	23.15	-14.252	-170.594
TUT-2957	7/5/2018	Mid	Forereef	9.8	-14.25	-170.582
TUT-2962	7/5/2018	Mid	Forereef	16.75	-14.2455	-170.575
TUT-2979	7/5/2018	Mid	Forereef	10.05	-14.247	-170.571
TUT-2985	7/5/2018	Mid	Forereef	7.5	-14.2496	-170.586
TUT-2794	7/6/2018	Deep	Forereef	20.35	-14.3638	-170.752
TUT-2791	7/6/2018	Shallow	Forereef	3.8	-14.3641	-170.762
TUT-2771	7/6/2018	Mid	Forereef	14.4	-14.3608	-170.748
TUT-2796	7/6/2018	Mid	Forereef	11.1	-14.361	-170.751
TUT-2871	7/6/2018	Mid	Forereef	3.95	-14.3659	-170.762
TUT-2872	7/6/2018	Shallow	Forereef	5.25	-14.3643	-170.761
TUT-2860	7/6/2018	Mid	Forereef	17.05	-14.3628	-170.767
TUT-2846	7/6/2018	Mid	Forereef	11.95	-14.3642	-170.763
TUT-2838	7/6/2018	Deep	Forereef	26.55	-14.3633	-170.767
TUT-2843	7/6/2018	Deep	Forereef	22.05	-14.3645	-170.768
OFU-883	7/7/2018	Deep	Forereef	22.7	-14.1814	-169.652
OFU-902	7/7/2018	Deep	Forereef	28.35	-14.1904	-169.619
OFU-935	7/7/2018	Mid	Forereef	7.85	-14.1793	-169.628
OFU-944	7/7/2018	Mid	Forereef	15.15	-14.1847	-169.624
OFU-973	7/7/2018	Shallow	Forereef	4	-14.1725	-169.642
OFU-977	7/9/2018	Mid	Forereef	12.65	-14.1612	-169.638

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
OFU-981	7/9/2018	Shallow	Forereef	4.25	-14.1643	-169.633
OFU-891	7/9/2018	Deep	Forereef	24.65	-14.183	-169.603
OFU-893	7/9/2018	Deep	Forereef	22.35	-14.165	-169.646
OFU-896	7/9/2018	Deep	Forereef	21.8	-14.1581	-169.62
OFU-904	7/9/2018	Deep	Forereef	17.85	-14.1519	-169.61
OFU-912	7/9/2018	Mid	Forereef	14.15	-14.1616	-169.608
OFU-931	7/9/2018	Mid	Forereef	10.05	-14.165	-169.626
OFU-955	7/9/2018	Mid	Forereef	9.35	-14.1643	-169.651
OFU-974	7/9/2018	Shallow	Forereef	5.9	-14.1628	-169.665
OFU-886	7/10/2018	Mid	Forereef	25	-14.1852	-169.676
OFU-892	7/10/2018	Deep	Forereef	25.2	-14.1518	-169.68
OFU-895	7/10/2018	Deep	Forereef	25.7	-14.1553	-169.686
OFU-919	7/10/2018	Mid	Forereef	8.15	-14.1589	-169.672
OFU-985	7/10/2018	Deep	Forereef	2.7	-14.1758	-169.681
OFU-937	7/10/2018	Mid	Forereef	12.05	-14.159	-169.682
OFU-943	7/10/2018	Mid	Forereef	12.4	-14.1833	-169.678
OFU-951	7/10/2018	Mid	Forereef	9.75	-14.158	-169.68
OFU-957	7/10/2018	Mid	Forereef	14.15	-14.187	-169.674
OFU-929	7/10/2018	Mid	Forereef	9.3	-14.169	-169.686
TAU-900	7/11/2018	Shallow	Forereef	3.95	-14.2497	-169.504
TAU-906	7/11/2018	Deep	Forereef	25	-14.2139	-169.511
TAU-910	7/11/2018	Deep	Forereef	26.6	-14.2233	-169.52
TAU-923	7/11/2018	Deep	Forereef	20.5	-14.2584	-169.501
TAU-945	7/11/2018	Mid	Forereef	15.7	-14.2756	-169.493

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
TAU-947	7/11/2018	Mid	Forereef	15.8	-14.2599	-169.5
TAU-958	7/11/2018	Mid	Forereef	17.2	-14.2437	-169.509
TAU-983	7/11/2018	Mid	Forereef	9.4	-14.2305	-169.519
TAU-1003	7/11/2018	Shallow	Forereef	5.4	-14.2376	-169.516
TAU-1007	7/11/2018	Shallow	Forereef	4.75	-14.2656	-169.498
TAU-943	7/12/2018	Mid	Forereef	14.2	-14.214	-169.47
TAU-919	7/12/2018	Deep	Forereef	25.95	-14.2131	-169.504
TAU-894	7/12/2018	Deep	Forereef	21.5	-14.2127	-169.466
TAU-951	7/12/2018	Mid	Forereef	12.7	-14.2123	-169.443
TAU-987	7/12/2018	Mid	Forereef	9.05	-14.2115	-169.461
TAU-992	7/12/2018	Mid	Forereef	9.4	-14.2149	-169.484
TAU-1022	7/12/2018	Shallow	Forereef	5.45	-14.2165	-169.5
TAU-993	7/12/2018	Mid	Forereef	13.6	-14.2093	-169.452
TAU-1019	7/12/2018	Shallow	Forereef	3.6	-14.2147	-169.478
ROS-936	7/13/2018	Deep	Forereef	22.55	-14.5348	-168.161
ROS-967	7/13/2018	Mid	Forereef	17.85	-14.5362	-168.164
ROS-933	7/14/2018	Deep	Forereef	20.55	-14.5361	-168.147
ROS-931	7/14/2018	Shallow	Backreef	1.2	-14.5512	-168.15
ROS-924	7/14/2018	Mid	Backreef	11.2	-14.5424	-168.163
ROS-944	7/14/2018	Deep	Forereef	23.9	-14.547	-168.17
ROS-1005	7/14/2018	Mid	Lagoon	14.75	-14.5447	-168.15
ROS-995	7/14/2018	Shallow	Forereef	4.1	-14.558	-168.161
ROS-979	7/14/2018	Mid	Forereef	12.1	-14.5338	-168.159
ROS-974	7/14/2018	Mid	Forereef	12	-14.5505	-168.167

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
ROS-952	7/14/2018	Mid	Forereef	10.7	-14.5379	-168.172
ROS-929	7/15/2018	Shallow	Backreef	2.55	-14.5412	-168.161
ROS-932	7/15/2018	Shallow	Backreef	2.2	-14.5466	-168.164
ROS-948	7/15/2018	Mid	Forereef	16.95	-14.5406	-168.173
ROS-955	7/15/2018	Mid	Forereef	17	-14.5431	-168.143
ROS-999	7/15/2018	Shallow	Forereef	4.6	-14.553	-168.166
ROS-993	7/15/2018	Shallow	Forereef	5.2	-14.5367	-168.166
ROS-977	7/15/2018	Mid	Forereef	17.1	-14.5446	-168.141
ROS-972	7/15/2018	Mid	Forereef	16.65	-14.5458	-168.171
ROS-968	7/15/2018	Mid	Forereef	11.45	-14.5306	-168.155
ROS-998	7/15/2018	Shallow	Forereef	5.35	-14.5445	-168.171
TAU-890	7/16/2018	Deep	Forereef	19.4	-14.2493	-169.419
TAU-979	7/16/2018	Mid	Forereef	16.3	-14.2424	-169.419
TAU-975	7/16/2018	Mid	Forereef	11.65	-14.2498	-169.457
TAU-961	7/16/2018	Deep	Forereef	23.65	-14.2182	-169.417
TAU-952	7/16/2018	Mid	Forereef	11.3	-14.2515	-169.446
TAU-950	7/16/2018	Mid	Forereef	14.1	-14.2621	-169.426
TAU-941	7/16/2018	Mid	Forereef	12.8	-14.2567	-169.433
TAU-938	7/16/2018	Mid	Forereef	7.75	-14.2504	-169.447
TAU-897	7/16/2018	Deep	Forereef	21.15	-14.2318	-169.417
TUT-2589	7/17/2018	Mid	Forereef	10.3	-14.329	-170.812
TUT-2558	7/17/2018	Deep	Forereef	19.7	-14.3322	-170.828
TUT-2552	7/17/2018	Deep	Forereef	20.85	-14.367	-170.776
TUT-2607	7/17/2018	Mid	Forereef	11.5	-14.3436	-170.789

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
TUT-2628	7/17/2018	Mid	Forereef	11.15	-14.3588	-170.786
TUT-2652	7/17/2018	Shallow	Forereef	3.35	-14.3421	-170.788
TUT-2870	7/17/2018	Mid	Forereef	16.75	-14.3708	-170.762
TUT-3201	7/17/2018	Mid	Forereef	9.6	-14.3475	-170.722
TUT-3187	7/18/2018	Mid	Forereef	14.15	-14.2985	-170.617
TUT-3171	7/18/2018	Deep	Forereef	26.3	-14.2775	-170.578
TUT-3168	7/18/2018	Deep	Forereef	22.25	-14.2818	-170.595
TUT-3238	7/18/2018	Shallow	Forereef	1.05	-14.2777	-170.607
TUT-3276	7/18/2018	Shallow	Forereef	2.85	-14.2815	-170.636
TUT-3256	7/18/2018	Shallow	Forereef	4.15	-14.274	-170.617
JAR-1853	7/28/2018	Shallow	Forereef	3.95	-0.37563	-159.983
JAR-1835	7/28/2018	Mid	Forereef	7.85	-0.37906	-159.978
JAR-1827	7/28/2018	Mid	Forereef	8.9	-0.36694	-160.007
JAR-1817	7/28/2018	Mid	Forereef	17.1	-0.36472	-160.006
JAR-1855	7/28/2018	Shallow	Forereef	4.7	-0.38133	-160
JAR-1807	7/28/2018	Mid	Forereef	7.45	-0.3815	-160.007
JAR-1801	7/28/2018	Deep	Forereef	21.6	-0.37405	-160.013
JAR-1805	7/28/2018	Deep	Forereef	20.65	-0.38101	-160.014
JAR-1813	7/28/2018	Mid	Forereef	11.7	-0.38189	-159.988
JAR-1809	7/29/2018	Mid	Forereef	9.7	-0.37375	-159.978
JAR-1810	7/29/2018	Mid	Forereef	11	-0.36216	-159.997
JAR-1821	7/29/2018	Mid	Forereef	7.45	-0.37016	-159.978
JAR-1823	7/29/2018	Mid	Forereef	8.8	-0.37782	-159.973
JAR-1830	7/29/2018	Mid	Forereef	9.5	-0.3675	-159.98

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
JAR-1841	7/29/2018	Mid	Forereef	10.45	-0.3646	-159.985
JAR-1852	7/29/2018	Shallow	Forereef	5.6	-0.37102	-159.984
JAR-1865	7/29/2018	Shallow	Forereef	5.9	-0.37998	-159.981
JAR-1866	7/29/2018	Shallow	Forereef	5.25	-0.36586	-159.984
JAR-1793	7/29/2018	Deep	Forereef	19.7	-0.36289	-160.005
JAR-1803	7/29/2018	Deep	Forereef	25.3	-0.36261	-159.993
JAR-1802	7/30/2018	Deep	Forereef	26.75	-0.38261	-159.981
JAR-1806	7/30/2018	Mid	Forereef	8.8	-0.38206	-160.002
JAR-1867	7/30/2018	Shallow	Forereef	5.05	-0.38103	-160.011
JAR-1862	7/30/2018	Shallow	Forereef	1.5	-0.37186	-160.011
JAR-1859	7/30/2018	Shallow	Forereef	5.75	-0.37438	-159.982
JAR-1857	7/30/2018	Shallow	Forereef	5.05	-0.36788	-159.983
JAR-1845	7/30/2018	Shallow	Forereef	5.05	-0.36415	-159.988
JAR-1842	7/30/2018	Mid	Forereef	7.85	-0.37714	-160.015
JAR-1826	7/30/2018	Mid	Forereef	10.25	-0.38038	-159.973
JAR-1815	7/30/2018	Mid	Forereef	10.65	-0.37201	-159.975
JAR-1820	7/30/2018	Mid	Forereef	8.05	-0.3799	-159.977
JAR-1843	7/31/2018	Shallow	Forereef	3.35	-0.37239	-159.984
JAR-1816	7/31/2018	Mid	Forereef	12.5	-0.37198	-160.012
JAR-1814	7/31/2018	Mid	Forereef	8.3	-0.3757	-159.976
JAR-1797	7/31/2018	Deep	Forereef	19.4	-0.38029	-160.015
JAR-1794	7/31/2018	Deep	Forereef	23.7	-0.37677	-159.972
JAR-1850	7/31/2018	Shallow	Forereef	5.45	-0.37679	-159.982
JAR-1846	7/31/2018	Shallow	Forereef	5.4	-0.36889	-160.007

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
JAR-1854	7/31/2018	Shallow	Forereef	5.15	-0.3627	-159.999
PAL-961	8/2/2018	Shallow	Forereef	4.2	5.869253	-162.111
PAL-945	8/2/2018	Mid	Forereef	16.85	5.860914	-162.127
PAL-933	8/2/2018	Mid	Forereef	12.5	5.880153	-162.129
PAL-929	8/2/2018	Mid	Forereef	13.65	5.866502	-162.118
PAL-915	8/2/2018	Deep	Forereef	26.3	5.878593	-162.145
PAL-902	8/2/2018	Deep	Forereef	23.75	5.86838	-162.132
PAL-973	8/2/2018	Shallow	Forereef	4.35	5.894515	-162.121
PAL-975	8/2/2018	Shallow	Forereef	3.7	5.881869	-162.12
PAL-960	8/3/2018	Shallow	Forereef	4	5.880944	-162.114
PAL-957	8/3/2018	Shallow	Forereef	4.4	5.882416	-162.115
PAL-936	8/3/2018	Mid	Forereef	7.1	5.885253	-162.13
PAL-934	8/3/2018	Mid	Forereef	15.8	5.871459	-162.128
PAL-925	8/3/2018	Mid	Forereef	10.65	5.892233	-162.138
PAL-898	8/3/2018	Deep	Forereef	24.65	5.872362	-162.14
PAL-964	8/3/2018	Deep	Forereef	5	5.895169	-162.087
PAL-992	8/3/2018	Mid	Forereef	13.4	5.897259	-162.101
PAL-990	8/3/2018	Mid	Forereef	11	5.896689	-162.112
PAL-976	8/3/2018	Shallow	Forereef	3.7	5.887005	-162.124
PAL-917	8/4/2018	Deep	Forereef	24.9	5.869144	-162.001
PAL-931	8/4/2018	Mid	Forereef	8.1	5.868163	-162.032
PAL-943	8/4/2018	Shallow	Forereef	6.1	5.866152	-162.042
PAL-944	8/4/2018	Mid	Forereef	9.05	5.865515	-162.03
PAL-946	8/4/2018	Mid	Forereef	10.15	5.87534	-162.008

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
PAL-981	8/4/2018	Mid	Forereef	11.25	5.86619	-162.057
PAL-951	8/4/2018	Mid	Forereef	9.25	5.873823	-162.014
PAL-962	8/4/2018	Mid	Forereef	6.55	5.872814	-162.022
PAL-980	8/4/2018	Shallow	Forereef	2.15	5.872554	-162.045
PAL-977	8/4/2018	Shallow	Forereef	4.45	5.868946	-162.041
PAL-974	8/4/2018	Shallow	Forereef	5.6	5.879553	-162.03
PAL-947	8/4/2018	Mid	Forereef	10.6	5.870771	-162.016
PAL-904	8/5/2018	Deep	Forereef	18.9	5.878941	-162.017
PAL-994	8/5/2018	Mid	Forereef	12.4	5.898475	-162.075
PAL-991	8/5/2018	Deep	Forereef	20.45	5.897346	-162.108
PAL-989	8/5/2018	Deep	Forereef	22.05	5.89307	-162.052
PAL-970	8/5/2018	Shallow	Forereef	3.85	5.896167	-162.098
PAL-963	8/5/2018	Shallow	Forereef	3.8	5.879854	-162.037
PAL-950	8/5/2018	Mid	Forereef	15.3	5.879904	-162.023
PAL-939	8/5/2018	Mid	Forereef	7	5.888854	-162.048
PAL-932	8/5/2018	Mid	Forereef	11.75	5.886157	-162.042
PAL-914	8/6/2018	Deep	Forereef	18.85	5.886258	-162.155
PAL-903	8/6/2018	Deep	Forereef	19	5.875153	-162.166
PAL-900	8/6/2018	Deep	Forereef	21.3	5.886582	-162.138
PAL-918	8/6/2018	Deep	Forereef	20.55	5.89374	-162.156
PAL-955	8/6/2018	Shallow	Forereef	5.2	5.883777	-162.122
PAL-956	8/6/2018	Shallow	Forereef	4.75	5.869417	-162.115
PAL-988	8/6/2018	Shallow	Forereef	3.6	5.890405	-162.116
PAL-979	8/7/2018	Shallow	Forereef	4.15	5.869032	-162.092

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
PAL-921	8/7/2018	Mid	Forereef	15.5	5.880826	-162.136
PAL-912	8/7/2018	Deep	Forereef	19.6	5.870417	-162.15
PAL-984	8/7/2018	Mid	Forereef	13.15	5.869774	-162.081
KIN-710	8/8/2018	Deep	Forereef	21.6	6.424135	-162.365
KIN-712	8/8/2018	Deep	Forereef	20.65	6.379251	-162.363
KIN-761	8/8/2018	Deep	Forereef	27.5	6.411732	-162.418
KIN-740	8/8/2018	Shallow	Forereef	5.35	6.391676	-162.335
KIN-736	8/8/2018	Shallow	Forereef	5.8	6.383111	-162.406
KIN-769	8/8/2018	Deep	Forereef	26.35	6.413176	-162.399
KIN-730	8/8/2018	Mid	Forereef	11	6.400606	-162.34
KIN-727	8/8/2018	Mid	Forereef	14.05	6.438567	-162.387
KIN-720	8/8/2018	Mid	Forereef	7.6	6.421036	-162.363
KIN-719	8/8/2018	Mid	Forereef	9.1	6.382704	-162.342
KIN-735	8/8/2018	Shallow	Forereef	4.45	6.433376	-162.385
KIN-687	8/9/2018	Mid	Backreef	7.9	6.385823	-162.357
KIN-689	8/9/2018	Mid	Backreef	7.15	6.392223	-162.342
KIN-692	8/9/2018	Shallow	Backreef	3.65	6.386033	-162.379
KIN-695	8/9/2018	Shallow	Backreef	1.65	6.405876	-162.354
KIN-696	8/9/2018	Shallow	Backreef	5.25	6.381108	-162.425
KIN-704	8/9/2018	Shallow	Backreef	5.95	6.437743	-162.394
KIN-745	8/9/2018	Shallow	Backreef	5.2	6.422887	-162.373
KIN-675	8/9/2018	Deep	Backreef	25.3	6.389996	-162.35
KIN-677	8/9/2018	Deep	Backreef	24.8	6.411191	-162.359
KIN-686	8/9/2018	Mid	Backreef	7.95	6.386456	-162.395

Site	Date	Depth bin	Reef zone	Avg depth (m)	Latitude	Longitude
KIN-816	8/10/2018	Mid	Protected Slope	10.7	6.427529	-162.428
KIN-805	8/10/2018	Mid	Protected Slope	11.3	6.410828	-162.443
KIN-802	8/10/2018	Mid	Protected Slope	17.55	6.391701	-162.478
KIN-793	8/10/2018	Deep	Protected Slope	22.9	6.379776	-162.453
KIN-766	8/10/2018	Deep	Lagoon	23.1	6.396551	-162.456
KIN-774	8/10/2018	Mid	Lagoon	17.75	6.38787	-162.442
KIN-771	8/10/2018	Mid	Lagoon	15.4	6.400781	-162.419
KIN-768	8/10/2018	Deep	Lagoon	19.6	6.400351	-162.398
KIN-785	8/10/2018	Deep	Protected Slope	21.15	6.397067	-162.46
KIN-817	8/11/2018	Mid	Protected Slope	10.95	6.384268	-162.465
KIN-809	8/11/2018	Mid	Protected Slope	8.75	6.44193	-162.393
KIN-807	8/11/2018	Mid	Protected Slope	10.5	6.436813	-162.417
KIN-804	8/11/2018	Mid	Protected Slope	11.9	6.401446	-162.463
KIN-789	8/11/2018	Deep	Protected Slope	20.95	6.451465	-162.412
KIN-764	8/11/2018	Deep	Lagoon	22.05	6.420983	-162.412
KIN-762	8/11/2018	Deep	Lagoon	23.75	6.399285	-162.441
KIN-760	8/11/2018	Deep	Lagoon	25.25	6.412538	-162.427
KIN-820	8/11/2018	Mid	Lagoon	12.15	6.416475	-162.434
KIN-750	8/11/2018	Deep	Lagoon	20.05	6.385093	-162.441

Table 7. Summary of sites where climate photo-quad surveys were conducted.

Site	Date	Latitude	Longitude
BAK-02	6/15/2018	0.18842	-176.47997
BAK-11	6/12/2018	0.19864	-176.48489
BAK-14	6/14/2018	0.20502	-176.4744473

Site	Date	Latitude	Longitude
BAK-50	6/13/2018	0.18702	-176.4705
HOW-11	6/8/2018	0.79877	176.62025
HOW-12	6/9/2018	0.80934	-176.61057
HOW-13	6/10/2018	0.81971	-176.61609
HOW-14	6/10/2018	0.81492	-176.623989
SWA-01	6/19/2018	-11.06829	-171.08122
SWA-08	6/20/2018	-11.0456887	-171.0770818
SWA-16	6/21/2018	-11.0507421	-171.092233
SWA-40	6/20/2018	-11.05261	-171.06471
SWA41	6/19/2018	-11.0467315	-171.0840072
TUT-01	6/28/2018	-14.28443	-170.63793
TUT-05	7/3/2018	-14.25184	-170.62355
TUT-06	7/6/2018	-14.32808	-170.8319
TUT-13	7/2/2018	-14.26046	-170.71187
TUT-17	7/3/2018	-14.24606	-170.57182
TUT-19	7/2/2018	-14.28323	-170.72801
TUT-72	6/29/2018	-14.24479	-170.65237
TUT-73	7/5/2018	-14.28537	-170.56395
TUT-74	7/1/2018	-14.152125	-170.81192
TUT-75	7/4/2018	-14.36351	-170.7632
OFU-01	7/10/2018	-14.16463	-169.65568
OFU-06	7/10/2018	-14.1738	-169.68182
OFU-09	7/9/2018	-14.15785	-169.67442
OFU-54	7/7/2018	-14.1733008	-169.6419043
OFU-05	7/10/2018	-14.16373	-169.62435

Site	Date	Latitude	Longitude
TAU-02	7/16/2018	-14.25116	-169.44694
TAU-04	7/12/2018	-14.2124	-169.44067
TAU-07	7/16/2018	-14.22728	-169.41792
TAU-11	7/12/2018	-14.21738	-169.51308
TAU-12	7/11/2018	-14.25755	-169.50068
ROS-01	7/15/2018	-14.5395	-168.1457
ROS-03	7/15/2018	-14.55563	-168.1469
ROS-06	7/14/2018	-14.53644	-168.16515
ROS-07	7/14/2018	-14.549417	-168.168467
ROS-23	7/14/2018	-14.542217	-168.1727
JAR-11	7/28/2018	-0.36896	-160.00826
JAR-08	7/29/2018	-0.36307	-159.99115
JAR-07	7/29/2018	-0.37605	-160.01393
JAR-01	7/30/2018	-0.36776	-159.97881
JAR-04	7/31/2018	-0.38241	-160.00293
PAL-66	8/2/2018	5.88323	-162.13318
PAL-19	8/3/2018	5.86636	-162.1096
PAL-25	8/4/2018	5.8683	-162.03061
PAL-64	8/5/2018	5.89733	-162.07817
PAL-12	8/5/2018	5.897	-162.10785
PAL-65	8/6/2018	5.87	-162.07628
KIN-62	8/8/2018	6.40219	-162.38564
KIN-04	8/9/2018	6.43883	-162.38795
KIN-11	8/10/2018	6.38183	-162.34641
KIN-13	8/10/2018	6.38221	-162.38397

Table 8. Summary of sites where diurnal suites were deployed and recovered.

Site	Date	Latitude	Longitude	Deployment	Retrieval
BAK-12	6/12/2018	0.19181	-176.48866	x	
BAK-12	6/15/2018	0.19174	-176.48872		x
TUT-74	6/23/2018	-14.152125	-170.81192	x	
TUT-74	7/15/2018	-14.152125	-170.81192		x
JAR-11	7/28/2018	-0.36896	-160.00826	x	
JAR-11	7/30/2018	-0.36896	-160.00826		x
PAL-19	8/3/2018	5.86636	-162.1096	x	
PAL-19	8/6/2018	5.86636	-162.1096		x

Table 9. Geographic coordinates and depths where ARMS were deployed and recovered.

Site	Date	Depth bin	Latitude	Longitude	ARMS retrieved	ARMS deployed
TUT-72	29-Jun-18	-	-14.2448	-170.652	3	3
TUT-74	1-Jul-18	-	-14.1521	-170.812	3	3
TUT-75	4-Jul-18	-	-14.3635	-170.763	3	3
TUT-73	5-Jul-18	-	-14.2854	-170.564	3	3
OFU-54	7-Jul-18	-	-14.1733	-169.642	3	3
OFU-09	9-Jul-18	Mid	-14.1579	-169.674	3	3
TAU-12	11-Jul-18	Mid	-14.2576	-169.501	3	3
TAU-04	12-Jul-18	Mid	-14.2124	-169.441	3	3
JAR-11	28-Jul-18	Mid	-0.36896	-160.008	3	3
JAR-01	30-Jul-18	Mid	-0.36776	-159.979	3	3
JAR-04	31-Jul-18	Mid	-0.38241	-160.003	3	3
PAL-66	2-Aug-18	-	5.88323	-162.133	3	3
PAL-25	4-Aug-18	Mid	5.8683	-162.031	3	3
PAL-64	5-Aug-18	-	5.89733	-162.078	3	3

Table 10. Geographic coordinates and depths where CAUs were deployed and recovered.

Site	Date	Latitude	Longitude	Depth (ft)	CAUs deployed	CAUs recovered
HOW-11	6/8/2018	0.79877	176.6203	45	5	2
HOW-12	6/9/2018	0.80934	-176.611	-	-	3
HOW-13	6/10/2018	0.81971	-176.616	42	5	3
HOW-14	6/10/2018	0.81492	-176.624	48	5	4
BAK-11	6/12/2018	0.19864	-176.485	50	5	3
BAK-50	6/13/2018	0.18702	-176.471	49	5	3

Site	Date	Latitude	Longitude	Depth (ft)	CAUs deployed	CAUs recovered
BAK-14	6/14/2018	0.20503	-176.474	50	5	3
BAK-02	6/15/2018	0.18842	-176.48	48	5	4
SWA-01	6/19/2018	-11.0683	-171.081	43	5	5
SWA-41	6/19/2018	-11.0467	-171.084	46	5	5
SWA-08	6/20/2018	-11.0457	-171.077	40	5	4
SWA-40	6/20/2018	-11.0526	-171.065	45	5	5
SWA-16	6/21/2018	-11.0507	-171.092	-	-	5
TUT-01	6/28/2018	-14.2844	-170.638	43	5	3
TUT-72	6/29/2018	-14.2448	-170.652	48	5	4
TUT-74	7/1/2018	-14.1521	-170.812	50	5	4
TUT-13	7/2/2018	-14.2605	-170.712	-	-	2
TUT-19	7/2/2018	-14.2832	-170.728	51	5	4
TUT-05	7/3/2018	-14.2518	-170.624	-	-	5
TUT-17	7/3/2018	-14.2461	-170.572	42	5	5
TUT-75	7/4/2018	-14.3635	-170.763	48	5	5
TUT-73	7/5/2018	-14.2854	-170.564	48	5	5
TUT-06	7/6/2018	-14.3281	-170.832	-	-	5
OFU-54	7/7/2018	-14.1733	-169.642	50	5	5
OFU-09	7/9/2018	-14.1579	-169.674	48	5	4
OFU-01	7/10/2018	-14.1646	-169.656	48	5	5
OFU-06	7/10/2018	-14.1738	-169.682	49	5	5
OLO-05	7/10/2018	-14.1637	-169.624	47	5	5
TAU-12	7/11/2018	-14.2576	-169.501	50	5	5
TAU-04	7/12/2018	-14.2124	-169.441	49	5	5

Site	Date	Latitude	Longitude	Depth (ft)	CAUs deployed	CAUs recovered
TAU-11	7/12/2018	-14.2174	-169.513	40	5	5
ROS-06	7/14/2018	-14.5364	-168.165	47	5	3
ROS-07	7/14/2018	-14.5494	-168.168	50	5	5
ROS-23	7/14/2018	-14.5422	-168.173	49	5	5
ROS-01	7/15/2018	-14.5395	-168.146	51	5	5
ROS-03	7/15/2018	-14.5556	-168.147	-	-	1
TAU-02	7/16/2018	-14.2512	-169.447	42	5	2
TAU-07	7/16/2018	-14.2273	-169.418	48	5	5
JAR-11	7/28/2018	-0.36896	-160.008	49	5	5
JAR-07	7/29/2018	-0.37605	-160.014	48	5	3
JAR-08	7/29/2018	-0.36307	-159.991	48	5	-
JAR-01	7/30/2018	-0.36776	-159.979	49	5	-
JAR-04	7/31/2018	-0.38241	-160.003	48	5	2
PAL-66	8/2/2018	5.88323	-162.133	47	5	3
PAL-05	8/3/2018	5.89578	-162.138	-	-	4
PAL-19	8/3/2018	5.86636	-162.11	-	-	5
PAL-25	8/4/2018	5.8683	-162.031	50	5	4
PAL-12	8/5/2018	5.897	-162.108	-	-	3
PAL-64	8/5/2018	5.89733	-162.078	48	5	5
PAL-65	8/6/2018	5.87	-162.076	47	5	5
KIN-16	8/8/2018	6.39252	-162.342	25	5	5
KIN-62	8/8/2018	6.40219	-162.386	48	5	5
KIN-04	8/9/2018	6.43883	-162.388	48	5	5
KIN-11	8/10/2018	6.38183	-162.346	48	5	5

Site	Date	Latitude	Longitude	Depth (ft)	CAUs deployed	CAUs recovered
KIN-13	8/10/2018	6.38221	-162.384	47	5	3

Table 11. Geographic coordinates and depths where BMUs were deployed and recovered.

Site	Date	Latitude	Longitude	Depth (ft)	BMUs deployed	BMUs recovered
TUT-72	6/29/2018	-14.2448	-170.652	48	5	5
TUT-74	7/1/2018	-14.1521	-170.812	50	5	5
TUT-75	7/4/2018	-14.3635	-170.763	48	5	5
TUT-73	7/5/2018	-14.2854	-170.564	48	5	5
OFU-54	7/7/2018	-14.1733	-169.642	50	5	5
OFU-09	7/9/2018	-14.1579	-169.674	48	5	4
TAU-12	7/11/2018	-14.2576	-169.501	50	5	5
TAU-04	7/12/2018	-14.2124	-169.441	49	5	5
JAR-11	7/28/2018	-0.36896	-160.008	49	5	5
JAR-01	7/30/2018	-0.36776	-159.979	49	5	3
JAR-04	7/31/2018	-0.38241	-160.003	48	5	5
PAL-66	8/2/2018	5.88323	-162.133	47	5	4
PAL-25	8/4/2018	5.8683	-162.031	50	5	5
PAL-64	8/5/2018	5.89733	-162.078	48	5	5

Table 12. Geographic coordinates and depths of where STRs were retrieved or deployed.

Mooring Site	Date	Instrument	Lat	Long	Depth (m)	REA Site	Retrieve	Deploy
HOW_OCEAN_012	6/8/2018	STR	0.81	-176.62	24.9936		–	1
HOW_OCEAN_013	6/8/2018	STR	0.81	-176.62	14.3256		1	1
HOW_OCEAN_014	6/8/2018	STR	0.81	-176.62	5.1816		–	1

Mooring Site	Date	Instrument	Lat	Long	Depth (m)	REA Site	Retrieve	Deploy
HOW_OCEAN_012	6/8/2018	STR	0.81	-176.62	24.9936	HOW-70	1	–
HOW_OCEAN_014	6/8/2018	STR	0.81	-176.62	5.1816	HOW-70	1	–
HOW_OCEAN_010	6/9/2018	STR	0.81	-176.61	24.9936		–	1
HOW_OCEAN_011	6/9/2018	STR	0.81	-176.61	14.6304		–	1
HOW_OCEAN_010	6/9/2018	STR	0.81	-176.61	24.9936	HOW-12	1	–
HOW_OCEAN_011	6/9/2018	STR	0.81	-176.61	14.6304	HOW-12	1	–
HOW_OCEAN_015	6/11/2018	STR	0.81	-176.61	5.1816		–	1
HOW_OCEAN_015	6/11/2018	STR	0.81	-176.61	5.1816	HOW-12	1	–
BAK_OCEAN_017	6/12/2018	STR	0.19	-176.49	14.3256		1	–
BAK_OCEAN_016	6/12/2018	STR	0.19	-176.49	25.6032	BAK-70	1	–
BAK_OCEAN_010	6/13/2018	STR	0.19	-176.46	23.4696		–	1
BAK_OCEAN_011	6/13/2018	STR	0.19	-176.46	14.0208		–	1
BAK_OCEAN_012	6/13/2018	STR	0.19	-176.47	4.2672		–	1
BAK_OCEAN_010	6/13/2018	STR	0.19	-176.46	23.4696	BAK-71	1	–
BAK_OCEAN_011	6/13/2018	STR	0.19	-176.46	14.0208	BAK-71	1	–
BAK_OCEAN_012	6/13/2018	STR	0.19	-176.47	4.2672	BAK-71	1	–
BAK_OCEAN_013	6/14/2018	STR	0.21	-176.48	25.6032		–	1
BAK_OCEAN_015	6/14/2018	STR	0.20	-176.48	13.716		–	1
BAK_OCEAN_013	6/14/2018	STR	0.21	-176.48	25.6032	BAK-72	1	–
BAK_OCEAN_015	6/14/2018	STR	0.20	-176.48	13.716	BAK-72	1	–
SWA_OCEAN_006	6/19/2018	STR	-11.06	-171.09	24.6888		–	1
SWA_OCEAN_009	6/19/2018	STR	-11.06	-171.09	0.9144		–	1
SWA_OCEAN_001	6/19/2018	STR	-11.06	-171.09	14.3256	SWA-041	–	1
SWA_OCEAN_001	6/19/2018	STR	-11.06	-171.09	14.3256	SWA-71	1	–

Mooring Site	Date	Instrument	Lat	Long	Depth (m)	REA Site	Retrieve	Deploy
SWA_OCEAN_002	6/19/2018	STR	-11.06	-171.09	6.096	SWA-71	1	–
SWA_OCEAN_006	6/19/2018	STR	-11.06	-171.09	24.6888	SWA-71	1	–
SWA_OCEAN_009	6/19/2018	STR	-11.06	-171.09	0.9144	SWA-71	1	–
SWA_OCEAN_007	6/20/2018	STR	-11.05	-171.06	25.908		–	1
SWA_OCEAN_008	6/20/2018	STR	-11.05	-171.06	4.8768		–	1
SWA_OCEAN_004	6/20/2018	STR	-11.05	-171.06	15.24	SWA-40	–	1
SWA_OCEAN_004	6/20/2018	STR	-11.05	-171.06	15.24	SWA-70	1	–
SWA_OCEAN_007	6/20/2018	STR	-11.05	-171.06	24.9936	SWA-70	1	–
SWA_OCEAN_008	6/20/2018	STR	-11.05	-171.06	4.8768	SWA-70	1	–
TUT_OCEAN_025	6/28/2018	STR	-14.29	-170.63	24.6888		–	1
TUT_OCEAN_015	6/28/2018	STR	-14.29	-170.63	15.24	TUT-01	1	1
TUT_OCEAN_025	6/28/2018	STR	-14.29	-170.63	24.6888	TUT-01	1	–
TUT_OCEAN_031	6/29/2018	STR	-14.25	-170.66	6.096	TUT-72	1	1
TUT_OCEAN_032	6/29/2018	STR	-14.24	-170.66	14.6304	TUT-72	–	2
TUT_OCEAN_033	6/29/2018	STR	-14.24	-170.66	24.0792	TUT-72	1	1
TUT_OCEAN_045	7/1/2018	STR	-14.29	-170.81	13.716	TUT-74	1	2
TUT_OCEAN_046	7/1/2018	STR	-14.29	-170.81	25.146	TUT-74	1	1
TUT_OCEAN_047	7/1/2018	STR	-14.29	-170.81	5.6388	TUT-74	1	1
TUT_OCEAN_027	7/2/2018	STR	-14.28	-170.72	15.5448	TUT-77	1	1
TUT_OCEAN_039	7/2/2018	STR	-14.28	-170.72	24.0792	TUT-77	1	1
TUT_OCEAN_023	7/4/2018	STR	-14.36	-170.76	5.7912	TUT-75	1	1
TUT_OCEAN_026	7/4/2018	STR	-14.36	-170.76	14.3256	TUT-75	1	2
TUT_OCEAN_029	7/4/2018	STR	-14.36	-170.76	0.9144	TUT-75	1	–
TUT_OCEAN_030	7/4/2018	STR	-14.36	-170.76	24.9936	TUT-75	1	1

Mooring Site	Date	Instrument	Lat	Long	Depth (m)	REA Site	Retrieve	Deploy
TUT_OCEAN_042	7/5/2018	STR	-14.29	-170.56	15.8496	TUT-73	1	2
TUT_OCEAN_043	7/5/2018	STR	-14.29	-170.56	24.384	TUT-73	1	1
OFU_OCEAN_006	7/7/2018	STR	-14.18	-169.65	0.9144	OFU-54	1	1
OFU_OCEAN_009	7/7/2018	STR	-14.18	-169.65	24.0792	OFU-54	1	1
OFU_OCEAN_010	7/7/2018	STR	-14.18	-169.65	14.6304	OFU-54	1	2
OFU_OCEAN_015	7/9/2018	STR	-14.16	-169.67	14.6304	OFU-09	1	2
OFU_OCEAN_016	7/9/2018	STR	-14.16	-169.67	24.6888	OFU-09	1	1
OFU_OCEAN_017	7/9/2018	STR	-14.16	-169.67	6.096	OFU-09	1	1
OFU_OCEAN_011	7/10/2018	STR	-14.18	-169.68	24.384	OFU-006	–	1
OFU_OCEAN_012	7/10/2018	STR	-14.17	-169.68	13.716	OFU-006	–	1
OFU_OCEAN_011	7/10/2018	STR	-14.18	-169.68	24.384	OFU-06	1	–
OFU_OCEAN_012	7/10/2018	STR	-14.17	-169.68	13.716	OFU-06	1	–
TAU_OCEAN_014	7/11/2018	STR	-14.26	-169.50	24.0792	TAU-012	–	1
TAU_OCEAN_015	7/11/2018	STR	-14.26	-169.50	6.096	TAU-012	–	1
TAU_OCEAN_016	7/11/2018	STR	-14.26	-169.50	14.3256	TAU-012	–	2
TAU_OCEAN_014	7/11/2018	STR	-14.26	-169.50	24.0792	TAU-12	1	–
TAU_OCEAN_015	7/11/2018	STR	-14.26	-169.50	6.096	TAU-12	1	–
TAU_OCEAN_016	7/11/2018	STR	-14.26	-169.50	14.3256	TAU-12	1	–
TAU_OCEAN_011	7/12/2018	STR	-14.21	-169.44	6.096	TAU-004	–	1
TAU_OCEAN_012	7/12/2018	STR	-14.21	-169.44	14.9352	TAU-004	–	2
TAU_OCEAN_013	7/12/2018	STR	-14.21	-169.44	25.6032	TAU-004	–	1
TAU_OCEAN_011	7/12/2018	STR	-14.21	-169.44	6.096	TAU-04	1	–
TAU_OCEAN_012	7/12/2018	STR	-14.21	-169.44	14.9352	TAU-04	1	–
TAU_OCEAN_013	7/12/2018	STR	-14.21	-169.44	25.2984	TAU-04	1	–

Mooring Site	Date	Instrument	Lat	Long	Depth (m)	REA Site	Retrieve	Deploy
ROS_OCEAN_014	7/14/2018	STR	-14.55	-168.17	25.6032	ROS-007	–	1
ROS_OCEAN_015	7/14/2018	STR	-14.55	-168.17	14.9352	ROS-007	–	1
ROS_OCEAN_016	7/14/2018	STR	-14.55	-168.17	5.7912	ROS-007	–	1
ROS_OCEAN_014	7/14/2018	STR	-14.55	-168.17	25.6032	ROS-07	1	–
ROS_OCEAN_015	7/14/2018	STR	-14.55	-168.17	14.9352	ROS-07	1	–
ROS_OCEAN_016	7/14/2018	STR	-14.55	-168.17	5.7912	ROS-07	1	–
ROS_OCEAN_019	7/15/2018	STR	-14.54	-168.15	5.7912	ROS-001	–	1
ROS_OCEAN_020	7/15/2018	STR	-14.54	-168.15	15.5448	ROS-001	–	1
ROS_OCEAN_021	7/15/2018	STR	-14.54	-168.15	24.6888	ROS-001	–	1
ROS_OCEAN_020	7/15/2018	STR	-14.54	-168.15	15.5448	ROS-01	1	–
ROS_OCEAN_021	7/15/2018	STR	-14.54	-168.15	24.6888	ROS-01	1	–
TAU_OCEAN_008	7/16/2018	STR	-14.23	-169.42	5.7912	TAU-007	–	1
TAU_OCEAN_009	7/16/2018	STR	-14.23	-169.42	24.384	TAU-007	–	1
TAU_OCEAN_010	7/16/2018	STR	-14.23	-169.42	14.0208	TAU-007	–	1
TAU_OCEAN_008	7/16/2018	STR	-14.23	-169.42	5.7912	TAU-07	1	–
TAU_OCEAN_009	7/16/2018	STR	-14.23	-169.42	24.384	TAU-07	1	–
TAU_OCEAN_010	7/16/2018	STR	-14.23	-169.42	14.0208	TAU-07	1	–
JAR_OCEAN_015	7/28/2018	STR	-0.37	-160.01	14.9352	JAR-011	–	2
JAR_OCEAN_021	7/28/2018	STR	-0.37	-160.01	23.7744	JAR-011	–	1
JAR_OCEAN_022	7/28/2018	STR	-0.37	-160.01	5.7912	JAR-011	–	1
JAR_OCEAN_015	7/28/2018	STR	-0.37	-160.01	14.9352	JAR-11	1	–
JAR_OCEAN_021	7/28/2018	STR	-0.37	-160.01	23.7744	JAR-11	1	–
JAR_OCEAN_022	7/28/2018	STR	-0.37	-160.01	5.7912	JAR-11	1	–
JAR_OCEAN_001	7/29/2018	STR	-0.38	-160.02	14.478		1	1

Mooring Site	Date	Instrument	Lat	Long	Depth (m)	REA Site	Retrieve	Deploy
JAR_OCEAN_023	7/29/2018	STR	-0.38	-159.97	24.0792		1	1
JAR_OCEAN_024	7/29/2018	STR	-0.38	-159.97	12.8016		1	1
JAR_OCEAN_025	7/29/2018	STR	-0.37	-159.98	4.8768		–	1
JAR_OCEAN_025	7/29/2018	STR	-0.37	-159.98	4.8768	JAR-01	1	–
JAR_OCEAN_028	7/30/2018	STR	-0.37	-159.98	24.0792	JAR-001	–	1
JAR_OCEAN_029	7/30/2018	STR	-0.37	-159.98	15.5448	JAR-001	–	2
JAR_OCEAN_028	7/30/2018	STR	-0.37	-159.98	24.0792	JAR-01	1	–
JAR_OCEAN_029	7/30/2018	STR	-0.37	-159.98	15.5448	JAR-01	1	–
JAR_OCEAN_026	7/31/2018	STR	-0.38	-160.00	14.6304	JAR-004	–	2
JAR_OCEAN_027	7/31/2018	STR	-0.38	-160.00	5.1816	JAR-004	–	1
JAR_OCEAN_030	7/31/2018	STR	-0.38	-160.00	24.0792	JAR-004	–	1
JAR_OCEAN_026	7/31/2018	STR	-0.38	-160.00	14.6304	JAR-04	1	–
JAR_OCEAN_027	7/31/2018	STR	-0.38	-160.00	5.1816	JAR-04	1	–
JAR_OCEAN_030	7/31/2018	STR	-0.38	-160.00	24.0792	JAR-04	1	–
-	8/2/2018	STR	5.89	-162.17	24.6888	PAL-066	–	1
PAL_OCEAN_042	8/2/2018	STR	5.88	-162.12	4.572	PAL-066	–	1
PAL_OCEAN_050	8/2/2018	STR	5.88	-162.13	14.9352	PAL-066	–	2
PAL_OCEAN_042	8/2/2018	STR	5.88	-162.12	4.572	PAL-66	1	–
PAL_OCEAN_049	8/2/2018	STR	5.89	-162.17	24.6888	PAL-66	1	–
PAL_OCEAN_050	8/2/2018	STR	5.88	-162.13	14.9352	PAL-66	1	–
PAL_OCEAN_004	8/3/2018	STR	5.86	-162.13	15.24		1	–
PAL_OCEAN_004	8/3/2018	STR	5.86	-162.13	15.24		–	1
PAL_OCEAN_052	8/3/2018	STR	5.89	-162.12	0.6096		–	1
PAL_OCEAN_052	8/3/2018	STR	5.89	-162.12	0.6096	PAL-66	1	–

Mooring Site	Date	Instrument	Lat	Long	Depth (m)	REA Site	Retrieve	Deploy
PAL_OCEAN_053	8/4/2018	STR	5.88	-162.00	15.24		1	–
PAL_OCEAN_054	8/4/2018	STR	5.88	-162.00	25.908		1	–
PAL_OCEAN_016	8/4/2018	STR	5.87	-162.04	4.8768	PAL-25	1	1
PAL_OCEAN_029	8/4/2018	STR	5.86	-162.03	13.4112	PAL-25	1	2
PAL_OCEAN_036	8/4/2018	STR	5.87	-162.05	1.524	PAL-25	–	1
PAL_OCEAN_053	8/4/2018	STR	5.88	-162.00	15.24	PAL-25	–	1
PAL_OCEAN_054	8/4/2018	STR	5.88	-162.00	25.908	PAL-25	–	1
PAL_OCEAN_055	8/4/2018	STR	5.86	-162.03	24.384	PAL-25	1	1
PAL_OCEAN_043	8/5/2018	STR	5.90	-162.08	25.6032	PAL-064	–	1
PAL_OCEAN_046	8/5/2018	STR	5.90	-162.08	14.6304	PAL-064	–	2
PAL_OCEAN_048	8/5/2018	STR	5.90	-162.08	7.0104	PAL-064	–	1
PAL_OCEAN_043	8/5/2018	STR	5.90	-162.08	26.5176	PAL-64	1	–
PAL_OCEAN_046	8/5/2018	STR	5.90	-162.08	14.6304	PAL-64	1	–
PAL_OCEAN_048	8/5/2018	STR	5.90	-162.08	7.0104	PAL-64	1	–
-	8/6/2018	STR	5.87	-162.08	14.6304	PAL-065	–	1
PAL_OCEAN_037	8/6/2018	STR	5.87	-162.08	24.384	PAL-065	–	1
PAL_OCEAN_037	8/6/2018	STR	5.87	-162.08	24.384	PAL-65	2	–
PAL_OCEAN_039	8/6/2018	STR	5.87	-162.08	14.6304	PAL-65	1	–
PAL_OCEAN_005	8/7/2018	STR	5.89	-162.09	3.3528		1	1
KIN_OCEAN_020	8/9/2018	STR	6.44	-162.39	14.3256	KIN-004	–	1
KIN_OCEAN_021	8/9/2018	STR	6.44	-162.39	6.096	KIN-004	–	1
KIN_OCEAN_022	8/9/2018	STR	6.44	-162.39	25.2984	KIN-004	–	1
KIN_OCEAN_020	8/9/2018	STR	6.44	-162.39	14.3256	KIN-04	1	–
KIN_OCEAN_021	8/9/2018	STR	6.44	-162.39	6.096	KIN-04	1	–

Mooring Site	Date	Instrument	Lat	Long	Depth (m)	REA Site	Retrieve	Deploy
KIN_OCEAN_022	8/9/2018	STR	6.44	-162.39	25.2984	KIN-04	1	–
KIN_OCEAN_024	8/10/2018	STR	6.42	-162.44	14.3256		1	–
KIN_OCEAN_025	8/10/2018	STR	6.42	-162.44	25.6032		1	–
KIN_OCEAN_015	8/10/2018	STR	6.42	-162.44	25.6032		–	1
KIN_OCEAN_016	8/10/2018	STR	6.42	-162.44	14.3256		–	1
KIN_OCEAN_019	8/10/2018	STR	6.38	-162.38	23.7744	KIN-013	–	1
KIN_OCEAN_019	8/10/2018	STR	6.38	-162.38	23.7744	KIN-13	1	–

Table 13. Summary of sites where Photomosaic surveys were conducted during cruise.

Site	Date	Latitude	Longitude	Depth (ft)	ESD	Partner
HOW-11	6/8/18	0.79877	-176.62025	13.8		x
HOW-13	6/10/18	0.81967	-176.61613	13.0		x
HOW-14	6/10/18	0.81485	-176.62393	11.6		x
HOW-SIO1	6/11/18	0.81064	-176.62251	9.3		x
HOW-SIO2	6/11/18	0.80395	-176.62103	10.0		x
BAK-11	6/12/18	0.19864	-176.48489	14.5		x
BAK-50	6/13/18	0.18702	-176.47050	12.4		x
BAK-14	6/14/18	0.20500	-176.47444	14.8		x
BAK-02	6/15/18	0.18842	-176.47997	11.3		x
SWA-41	6/19/18	-11.05859	-171.09102	14.7		x
SWA-01	6/19/18	-11.06829	-171.08122	13.9		x
SWA-40	6/20/18	-11.05261	-171.06471	12.6		x
SWA-08	6/20/18	-11.04570	-171.07698	10.6		x
SWA-16	6/21/18	-11.05079	-171.09222	13.4		x
SWA-SIO1	6/21/18	-11.04764	-171.08731	9.0		x

Site	Date	Latitude	Longitude	Depth (ft)	ESD	Partner
SWA-SIO2	6/21/18	-11.06445	-171.08623	7.9		x
TUT-01	6/28/18	-14.28356	-170.63790	11.1		x
TUT-72	6/29/18	-14.24479	-170.66006	14.2		x
TUT-74	7/1/18	-14.29461	-170.81192	14.0		x
TUT-19	7/2/18	-14.28320	-170.72832	15.8		x
TUT-13	7/2/18	-14.26055	-170.71208	10.4		x
TUT-05	7/3/18	-14.25164	-170.62318	14.5		x
TUT-17	7/3/18	-14.24608	-170.57202	11.2		x
TUT-75	7/6/18	-14.36351	-170.76300	14.6		x
TUT-06	7/6/18	-14.32797	-170.83183	14.6		x
OFU-54	7/7/18	-14.18059	-169.65211	14.9		x
OFU-09	7/9/18	-14.15760	-169.67400	14.5		x
OFU-06	7/10/18	-14.17421	-169.68195	10.9		x
OLO-05	7/10/18	-14.16335	-169.62453	11.5		x
TAU-12	7/11/18	-14.25758	-169.50096	14.1		x
TAU-BM	7/11/18	-14.25943	-169.50045	13.9		x
TAU-04	7/12/18	-14.21179	-169.44093	14.6		x
TAU-11	7/12/18	-14.21714	-169.51271	12.2		x
ROS-07	7/14/18	-14.54868	-168.16875	15.1		x
ROS-23	7/14/18	-14.54220	-168.17241	12.6		x
TAU-07	7/16/18	-14.22741	-169.41826	14.0		x
JAR-11	7/28/18	-0.36896	-160.00813	17.5		x
JAR-SIO2	7/28/18	-0.36227	-160.00192	11.3		x
JAR-08	7/29/18	-0.36307	-159.99115	15.9		x

Site	Date	Latitude	Longitude	Depth (ft)	ESD	Partner
JAR-07	7/29/18	-0.37605	-160.01393	18.1		x
JAR-01	7/30/18	-0.36776	-159.97881	17.7		x
JAR-SIO1	7/30/18	-0.38173	-159.99905	12.1		x
JAR-SIO3	7/30/18	-0.38057	-159.97935	9.2		x
JAR-04	7/31/18	-0.38234	-160.00305	17.9		x
PAL-66	8/2/18	5.88322	-162.13322	14.8		x
PAL-05	8/3/18	5.89578	-162.13783	-		x
PAL-25	8/4/18	5.86379	-162.03062	-		x
PAL-64	8/5/18	5.89733	-162.07817	-		x
PAL-12	8/5/18	5.89700	-162.10785	-		x
PAL-65	8/6/18	5.86961	-162.07510	-		x
KIN-62	8/8/18	6.40213	-162.38570	-		x
KIN-16	8/8/18	6.39252	-162.34210	-		x
KIN-04	8/9/18	6.43878	-162.38803	-		x
KIN-13	8/10/18	6.38224	-162.38397	-		x
KIN-11	8/10/18	6.38180	-162.34641	-		x
KIN-901	8/11/18	6.40117	-162.46690	-		x
HOW-1031	6/11/2018	0.79788	-176.6198	38	x	
BAK-745	6/13/2018	0.20494	-176.47351	54	x	
SWA-780	6/20/2018	-11.045855	-171.077936	34	x	
TUT-2927	6/29/2018	-14.246887	-170.664336	36	x	
TUT-2954	7/1/2018	-14.290842	-170.788769	17	x	
TUT-2871	7/4/2018	-14.365118	-170.7635	50	x	
TUT-5001	7/2/2018	-14.292134	-170.779835	50	x	

Site	Date	Latitude	Longitude	Depth (ft)	ESD	Partner
TUT-2854	7/6/2018	-14.365348	-170.75252	48	x	
TUT-3021	7/7/2018	-14.343739	-170.789134	50	x	
OFU-1024	7/7/2018	-14.176668	-169.628432	50	x	
OFU-1012	7/9/2018	-14.165058	-169.649097	29	x	
TAU-1032	7/12/2018	-14.214405	-169.488093	35	x	
ROS-1062	7/15/2018	-14.541813	-168.17255	50	x	
TAU-1077	7/16/2018	-14.234642	-169.41888	28	x	
TUT-2812	7/18/2018	-14.295019	-170.558202	47	x	
JAR-1935	7/29/2018	-0.368347	-159.978151	55	x	
JAR-1981	7/30/2018	-0.378925	-159.972386	31	x	
JAR-1931	7/31/2018	-0.375452	-160.013453	31	x	
PAL-1162	8/5/2018	5.895975	-162.07913	16	x	
PAL-1143	8/5/2018	5.894722	-162.084479	16	x	
PAL-1190	8/6/2018	5.881436	-162.120753	20	x	
PAL-1190	8/6/2018	5.881436	-162.120753	20	x	
PAL-1190	8/6/2018	5.881436	-162.120753	20	x	
KIN-835	8/8/2018	6.427592	-162.371615	20	x	
KIN-835	8/8/2018	6.427592	-162.371615	20	x	
KIN-835	8/8/2018	6.427592	-162.371615	20	x	

Table 14. Summary of sites where Microbial surveys were conducted during cruise.

Site	Date	Latitude	Longitude	Collection type	Collection number	Sample Depth (ft)
HOW-11	6/8/2018	0.79877	176.6203	VIROME Sample	1	58
HOW-11	6/8/2018	0.79877	176.6203	Chemistry Sample	3	58
HOW-11	6/8/2018	0.79877	176.6203	2 L	2.5	58

Site	Date	Latitude	Longitude	Collection type	Collection number	Sample Depth (ft)
HOW-12	6/9/2018	0.80934	-176.611	VIROME Sample	1	40
HOW-12	6/9/2018	0.80934	-176.611	SPEDOM Sample	1	40
HOW-12	6/9/2018	0.80934	-176.611	Chemistry Sample	3	40
HOW-12	6/9/2018	0.80934	-176.611	2 L	3.5	40
HOW-13	6/10/2018	0.81971	-176.616	2 L	3.5	40
HOW-13	6/10/2018	0.81971	-176.616	Chemistry Sample	3	40
HOW-13	6/10/2018	0.81971	-176.616	SPEDOM Sample	1	40
HOW-13	6/10/2018	0.81971	-176.616	VIROME Sample	1	40
HOW-14	6/10/2018	0.81492	-176.624	2 L	1	-
HOW-14	6/10/2018	0.81492	-176.624	Chemistry Sample	1	-
BAK-11	6/12/2018	0.19864	-176.485	Chemistry Sample	1	45
BAK-11	6/12/2018	0.19864	-176.485	2 L	1	45
BAK-11	6/12/2018	0.19864	-176.485	SPEDOM Sample	1	45
BAK-11	6/12/2018	0.19864	-176.485	2 L	1	45
BAK-50	6/13/2018	0.18702	-176.471	Chemistry Sample	1	45
BAK-50	6/13/2018	0.18702	-176.471	2 L	1	45
BAK-50	6/13/2018	0.18702	-176.471	SPEDOM Sample	1	45
BAK-50	6/13/2018	0.18702	-176.471	2 L	1	45
BAK-02	6/15/2018	0.18842	-176.48	Chemistry Sample	3	50
BAK-02	6/15/2018	0.18842	-176.48	2 L	1.5	50
BAK-02	6/15/2018	0.18842	-176.48	-	-	50
SWA-41	6/19/2018	-11.0467	-171.084	Chemistry Sample	1	-
SWA-41	6/19/2018	-11.0467	-171.084	2 L	1	-
SWA-41	6/19/2018	-11.0467	-171.084	SPEDOM Sample	1	-

Site	Date	Latitude	Longitude	Collection type	Collection number	Sample Depth (ft)
SWA-41	6/19/2018	-11.0467	-171.084	2 L	1	-
SWA-40	6/20/2018	-11.0526	-171.065	2 L	1	47
SWA-40	6/20/2018	-11.0526	-171.065	Chemistry Sample	1	47
SWA-40	6/20/2018	-11.0526	-171.065	2 L	1	47
SWA-40	6/20/2018	-11.0526	-171.065	SPEDOM Sample	1	47
SWA-16	6/21/2018	-11.0507	-171.092	2 L	1	45
SWA-16	6/21/2018	-11.0507	-171.092	Chemistry Sample	2	45
SWA-16	6/21/2018	-11.0507	-171.092	2 L	1	45
SWA-16	6/21/2018	-11.0507	-171.092	SPEDOM Sample	1	45
TUT-01	6/28/2018	-14.2844	-170.638	Chemistry Sample	3	40
TUT-72	6/29/2018	-14.2448	-170.652	SPEDOM Sample	1	40
TUT-72	6/29/2018	-14.2448	-170.652	Chemistry Sample	3	40
TUT-72	6/29/2018	-14.2448	-170.652	VIROME Sample	1	40
TUT-74	7/1/2018	-14.1521	-170.812	VIROME Sample	1	50
TUT-74	7/1/2018	-14.1521	-170.812	SPEDOM Sample	1	45
TUT-74	7/1/2018	-14.1521	-170.812	Chemistry Sample	3	45
TUT-13	7/2/2018	-14.2605	-170.712	VIROME Sample	-	50
TUT-19	7/2/2018	-14.2832	-170.728	SPEDOM Sample	1	45
TUT-19	7/2/2018	-14.2832	-170.728	Chemistry Sample	3	45
TUT-05	7/3/2018	-14.2518	-170.624	Chemistry Sample	3	50
TUT-06	7/6/2018	-14.3281	-170.832	Chemistry Sample	3	45
TUT-06	7/6/2018	-14.3281	-170.832	VIROME Sample	1	45
TUT-06	7/6/2018	-14.3281	-170.832	SPEDOM Sample	1	45
OFU-54	7/7/2018	-14.1733	-169.642	VIROME Sample	1	50

Site	Date	Latitude	Longitude	Collection type	Collection number	Sample Depth (ft)
OFU-09	7/9/2018	-14.1579	-169.674	SPEDOM Sample	1	45
OFU-09	7/9/2018	-14.1579	-169.674	Chemistry Sample	3	45
OFU-06	7/10/2018	-14.1738	-169.682	SPEDOM Sample	1	51
OFU-06	7/10/2018	-14.1738	-169.682	Chemistry Sample	3	51
OLO-05	7/10/2018	-14.1637	-169.624	VIROME Sample	1	45
TAU-12	7/11/2018	-14.2576	-169.501	Chemistry Sample	3	45
TAU-12	7/11/2018	-14.2576	-169.501	SPEDOM Sample	1	45
TAU-04	7/12/2018	-14.2124	-169.441	SPEDOM Sample	1	45
TAU-04	7/12/2018	-14.2124	-169.441	Chemistry Sample	3	45
ROS-07	7/14/2018	-14.5494	-168.168	Chemistry Sample	3	45
ROS-23	7/14/2018	-14.5422	-168.173	VIROME Sample	1	50
ROS-07	7/14/2018	-14.5494	-168.168	SPEDOM Sample	1	45
JAR-11	7/28/2018	-0.36896	-160.008	Chemistry Sample	3	46
JAR-11	7/28/2018	-0.36896	-160.008	SPEDOM Sample	1	46
JAR-11	7/28/2018	-0.36896	-160.008	VIROME Sample	1	46
JAR-08	7/29/2018	-0.36307	-159.991	Chemistry Sample	1	45
JAR-08	7/29/2018	-0.36307	-159.991	SPEDOM Sample	3	45
JAR-08	7/29/2018	-0.36307	-159.991	VIROME Sample	1	45
JAR-07	7/29/2018	-0.37605	-160.014	-	-	45
JAR-01	7/30/2018	-0.36776	-159.979	SPEDOM Sample	1	55
JAR-01	7/30/2018	-0.36776	-159.979	VIROME Sample	1	55
JAR-01	7/30/2018	-0.36776	-159.979	Chemistry Sample	3	55
JAR-04	7/31/2018	-0.38241	-160.003	Chemistry Sample	3	55
JAR-04	7/31/2018	-0.38241	-160.003	SPEDOM Sample	1	55

Site	Date	Latitude	Longitude	Collection type	Collection number	Sample Depth (ft)
JAR-04	7/31/2018	-0.38241	-160.003	VIROME Sample	1	55
PAL-66	8/2/2018	5.88323	-162.133	Chemistry Sample	3	42
PAL-66	8/2/2018	5.88323	-162.133	SPEDOM Sample	1	42
PAL-66	8/2/2018	5.88323	-162.133	VIROME Sample	1	42
PAL-19	8/3/2018	5.86636	-162.11	Chemistry Sample	3	45
PAL-05	8/3/2018	5.89578	-162.138	VIROME Sample	1	40
PAL-05	8/3/2018	5.89578	-162.138	Chemistry Sample	3	40
PAL-19	8/3/2018	5.86636	-162.11	SPEDOM Sample	1	45
PAL-05	8/3/2018	5.89578	-162.138	SPEDOM Sample	1	40
PAL-19	8/3/2018	5.86636	-162.11	VIROME Sample	1	45
PAL-25	8/4/2018	5.8683	-162.031	SPEDOM Sample	1	41
PAL-25	8/4/2018	5.8683	-162.031	Chemistry Sample	3	41
PAL-25	8/4/2018	5.8683	-162.031	VIROME Sample	1	41
PAL-64	8/5/2018	5.89733	-162.078	Chemistry Sample	3	44
PAL-64	8/5/2018	5.89733	-162.078	SPEDOM Sample	1	44
PAL-64	8/5/2018	5.89733	-162.078	VIROME Sample	1	44
PAL-12	8/5/2018	5.897	-162.108	Chemistry Sample	3	44
PAL-12	8/5/2018	5.897	-162.108	SPEDOM Sample	1	44
PAL-12	8/5/2018	5.897	-162.108	VIROME Sample	1	44
PAL-65	8/6/2018	5.87	-162.076	SPEDOM Sample	1	44
PAL-65	8/6/2018	5.87	-162.076	Chemistry Sample	3	44
PAL-65	8/6/2018	5.87	-162.076	VIROME Sample	1	44
KIN-16	8/8/2018	6.39252	-162.342	Chemistry Sample	3	26
KIN-16	8/8/2018	6.39252	-162.342	SPEDOM Sample	1	26

Site	Date	Latitude	Longitude	Collection type	Collection number	Sample Depth (ft)
KIN-16	8/8/2018	6.39252	-162.342	VIROME Sample	1	26
KIN-04	8/9/2018	6.43883	-162.388	Chemistry Sample	3	41
KIN-04	8/9/2018	6.43883	-162.388	VIROME Sample	1	41
KIN-04	8/9/2018	6.43883	-162.388	SPEDOM Sample	1	41
KIN-13	8/10/2018	6.38221	-162.384	SPEDOM Sample	1	42
KIN-13	8/10/2018	6.38221	-162.384	VIROME Sample	1	42
KIN-13	8/10/2018	6.38221	-162.384	Chemistry Sample	3	42

Table 15. Summary of sites where coral biopsies/benthic grabs/ were collected for microbial studies during cruise.

Site	Date	Latitude	Longitude	Specimen Collected	Depth (ft)
PAL-12	8/5/2018	5.897	-162.108	Coral - Cubic Centimeter	44
JAR-08	7/29/2018	-0.36307	-159.991	Coral - Cubic Centimeter	46
TAU-02	7/16/2018	-14.2512	-169.447	Coral - Cubic Centimeter	45
ROS-23	7/14/2018	-14.5422	-168.173	Coral - Cubic Centimeter	50
OLO-05	7/10/2018	-14.1637	-169.624	Coral - Cubic Centimeter	45
OFU-54	7/7/2018	-14.1733	-169.642	Coral - Cubic Centimeter	50
OFU-54	7/7/2018	-14.1733	-169.642	Coral - Cubic Centimeter	50
TUT-06	7/6/2018	-14.3281	-170.832	Coral - Cubic Centimeter	50
TUT-13	7/2/2018	-14.2605	-170.712	Coral - Cubic Centimeter	50
TUT-74	7/1/2018	-14.1521	-170.812	Coral - Cubic Centimeter	45
SWA-08	6/20/2018	-11.0457	-171.077	Coral - Cubic Centimeter	45
SWA-01	6/19/2018	-11.0683	-171.081	Coral - Cubic Centimeter	50
BAK-02	6/15/2018	0.18842	-176.48	Coral - Cubic Centimeter	46
BAK-14	6/14/2018	0.20503	-176.474	Coral - Cubic Centimeter	45

Site	Date	Latitude	Longitude	Specimen Collected	Depth (ft)
BAK-11	6/12/2018	0.19864	-176.485	Coral - Cubic Centimeter	40
HOW-14	6/10/2018	0.81492	-176.624	Coral - Cubic Centimeter	40
HOW-12	6/9/2018	0.80934	-176.611	Coral - Cubic Centimeter	40
HOW-11	6/8/2018	0.79877	176.6203	Coral - Cubic Centimeter	40
BAK-50	2/12/2015	0.18702	-176.471	Coral - Cubic Centimeter	45

Table 16. Summary of sites where CTD casts and water samples were conducted.

Shallow CTD ID	Water Sample	Date	Latitude	Longitude	Sounding (ft)
HA1801_Phoenix_BAK_SN3029_003	YES	6/12/2018	0.1926964	-176.608	12288
HA1801_Phoenix_BAK_SN3029_004	YES	6/14/2018			12456
HA1801_Phoenix_BAK_SN4818_001	YES	6/12/2018	0.1985514	-176.485	40
HA1801_Phoenix_BAK_SN4818_002	YES	6/13/2018	0.1870276	-176.471	50
HA1801_Phoenix_BAK_SN4818_003	YES	6/14/2018	0.2052045	-176.475	46
HA1801_Phoenix_BAK_SN4818_004	YES	6/15/2018	0.18839	-176.48	48
HA1801_Phoenix_BAK_SN7744_DS001	YES	6/12/2018	0.1918125	-176.489	47
HA1801_Phoenix_HOW_SN3029_001	YES	6/8/2018	0.6746838	-176.62	12060
HA1801_Phoenix_HOW_SN3029_002	YES	6/10/2018	0.9367418	-176.619	12558
HA1801_Phoenix_HOW_SN4818_001	YES	6/8/2018	0.79877	-176.62	32
HA1801_Phoenix_HOW_SN4818_002	YES	6/8/2018	0.8070214	-176.622	47
HA1801_Phoenix_HOW_SN4818_003	YES	6/9/2018	0.8148624	-176.624	132
HA1801_Phoenix_HOW_SN4818_004	YES	6/10/2018	0.8197093	-176.616	40
HA1801_Phoenix_HOW_SN4818_005	YES	6/11/2018	0.8094629	-176.611	30
HA1801_AmSamoa_OFU_SN4818_002	YES	7/9/2018			55
HA1801_AmSamoa_OFU_SN4818_003	YES	7/10/2018	-14.17417	-169.682	68
HA1801_AmSamoa_OFU_SN4818_004	YES	7/10/2018	-14.16355	-169.624	83

Shallow CTD ID	Water Sample	Date	Latitude	Longitude	Sounding (ft)
HA1801_AmSamoa_OFU_SN4818_005	YES	7/10/2018	-14.1641	-169.657	48
HA1801_AmSamoa_ROS	NO	7/14/2018			
HA1801_AmSamoa_ROS_SN3029_002	YES	7/14/2018	-14.39459	-168.152	14190
HA1801_AmSamoa_ROS_SN4282_001	YES	7/14/2018	-14.54122	-168.144	50
HA1801_AmSamoa_ROS_SN4282_002	YES	7/14/2018	-14.53706	-168.147	50
HA1801_AmSamoa_ROS_SN4282_003	YES	7/14/2018	-14.55524	-168.148	50
HA1801_AmSamoa_ROS_SN4282_004	YES	7/14/2018	-14.55096	-168.167	40
HA1801_AmSamoa_ROS_SN4818_001	YES	7/14/2018	-14.54874	-168.169	73
HA1801_AmSamoa_ROS_SN4818_002	YES	7/14/2018	-14.54226	-168.173	138
HA1801_AmSamoa_ROS_SN4818_003	YES	7/14/2018	-14.53607	-168.166	121
HA1801_AmSamoa_ROS_SN4818_004	YES	7/14/2018	-14.54381	-168.156	69
HA1801_AmSamoa_ROS_SN4818_005	YES	7/15/2018			50
HA1801_AmSamoa_ROS_SN4818_006	YES	7/15/2018			78
HA1801_AmSamoa_ROS_SN4818_007	YES	7/15/2018			200
HA1801_AmSamoa_ROS_SN4818_008	YES	7/15/2018			52
HA1801_AmSamoa_SWA_SN3029_001	YES	6/21/2018	-11.05611	-170.943	14754
HA1801_AmSamoa_SWA_SN3029_002	YES	6/21/2018	-11.06112	-171.216	13506
HA1801_AmSamoa_SWA_SN4282_001	YES	6/19/2018	-11.06329	-171.088	65
HA1801_AmSamoa_SWA_SN4282_002	YES	6/19/2018	-11.05972	-171.092	40
HA1801_AmSamoa_SWA_SN4282_003	YES	6/20/2018	-11.04541	-171.072	45
HA1801_AmSamoa_SWA_SN4282_004	YES	6/20/2018	-11.04805	-171.089	40
HA1801_AmSamoa_SWA_SN4282_005	YES	6/21/2018	-11.05098	-171.066	45
HA1801_AmSamoa_SWA_SN4282_006	YES	6/21/2018	-11.05012	-171.065	42
HA1801_AmSamoa_SWA_SN4818_001	YES	6/19/2018	-11.05864	-171.091	54

Shallow CTD ID	Water Sample	Date	Latitude	Longitude	Sounding (ft)
HA1801_AmSamoa_SWA_SN4818_002	YES	6/20/2018	-11.05257	-171.065	60
HA1801_AmSamoa_SWA_SN4818_003	YES	6/20/2018	-11.0458	-171.077	45
HA1801_AmSamoa_SWA_SN4818_004	YES	6/21/2018	-11.05125	-171.093	
HA1801_AmSamoa_SWA_SN4818_005	YES	6/21/2018	-11.06854	-171.081	100
HA1801_AmSamoa_TAU	NO	7/10/2018			
HA1801_AmSamoa_TAU_FLOWTHRU_001	YES	7/12/2018	-14.26266	-169.582	4296
HA1801_AmSamoa_TAU_SN3029_001	YES	7/12/2018	-14.21246	-169.28	9818
HA1801_AmSamoa_TAU_SN4282_005	YES	7/16/2018			40
HA1801_AmSamoa_TAU_SN4282_006	YES	7/16/2018			90
HA1801_AmSamoa_TAU_SN4282_013	YES	7/12/2018	-14.21341	-169.482	50
HA1801_AmSamoa_TAU_SN4818_006	YES	7/11/2018	-14.25757	-169.501	44
HA1801_AmSamoa_TAU_SN4818_007	YES	7/13/2018			43
HA1801_AmSamoa_TAU_SN4818_008	YES	7/13/2018			48
HA1801_AmSamoa_TAU_SN4818_009	YES	7/16/2018	-14.22753	-169.418	98
HA1801_AmSamoa_TAU_SN4818_010	YES	7/16/2018	-14.25125	-169.447	50
HA1801_AmSamoa_TUT	NO	7/2/2018			
HA1801_AmSamoa_TUT_FLOWTHRU_001	YES	6/30/2018			16200
HA1801_AmSamoa_TUT_FLOWTHRU_002	YES	7/3/2018			2693
HA1801_AmSamoa_TUT_FLOWTHRU_003	YES	7/7/2018	-14.1371	-170.708	5787
HA1801_AmSamoa_TUT_FLOWTHRU_004	YES	7/7/2018	-14.52981	-170.464	12315
HA1801_AmSamoa_TUT_SN3029_003	YES	7/17/2018			10454
HA1801_AmSamoa_TUT_SN4282_001	YES	6/29/2018	-14.23702	-170.673	85
HA1801_AmSamoa_TUT_SN4282_002	YES	6/29/2018	-14.2474	-170.664	35
HA1801_AmSamoa_TUT_SN4282_003	YES	6/30/2018	-14.26371	-170.713	65

Shallow CTD ID	Water Sample	Date	Latitude	Longitude	Sounding (ft)
HA1801_AmSamoa_TUT_SN4282_004	YES	6/30/2018	-14.27767	-170.724	70
HA1801_AmSamoa_TUT_SN4282_005	YES	7/1/2018	-14.29988	-170.815	40
HA1801_AmSamoa_TUT_SN4282_006	YES	7/1/2018	-14.29427	-170.81	50
HA1801_AmSamoa_TUT_SN4282_007	YES	7/2/2018	-14.28245	-170.734	21
HA1801_AmSamoa_TUT_SN4282_008	YES	7/2/2018	-14.28795	-170.759	30
HA1801_AmSamoa_TUT_SN4282_009	YES	7/2/2018	-14.29223	-170.78	25
HA1801_AmSamoa_TUT_SN4282_010	YES	7/3/2018	-14.25065	-170.642	80
HA1801_AmSamoa_TUT_SN4282_011	YES	7/4/2018	-14.36509	-170.764	40
HA1801_AmSamoa_TUT_SN4282_012	YES	7/6/2018	-14.3647	-170.752	50
HA1801_AmSamoa_TUT_SN4282_013	YES	7/6/2018	-14.36038	-170.75	50
HA1801_AmSamoa_TUT_SN4282_014	YES	7/6/2018	-14.36099	-170.751	70
HA1801_AmSamoa_TUT_SN4282_015	YES	7/17/2018	-14.36218	-170.787	80
HA1801_AmSamoa_TUT_SN4282_016	YES	7/17/2018	-14.34357	-170.79	40
HA1801_AmSamoa_TUT_SN4282_017	YES	7/17/2018	-14.33644	-170.804	45
HA1801_AmSamoa_TUT_SN4282_018	YES	7/17/2018	-14.33115	-170.814	50
HA1801_AmSamoa_TUT_SN4282_019	YES	7/18/2018	-14.29472	-170.557	40
HA1801_AmSamoa_TUT_SN4282_020	YES	7/18/2018	-14.29278	-170.55	70
HA1801_AmSamoa_TUT_SN4282_021	YES	7/18/2018	-14.29512	-170.558	40
HA1801_AmSamoa_TUT_SN4282_022	YES	7/18/2018	-14.29603	-170.567	47
HA1801_AmSamoa_TUT_SN4818_001	YES	6/28/2018	-14.28313	-170.638	120
HA1801_AmSamoa_TUT_SN4818_002	YES	6/29/2018	-14.24478	-170.66	95
HA1801_AmSamoa_TUT_SN4818_003	YES	7/1/2018	-14.29482	-170.812	59
HA1801_AmSamoa_TUT_SN4818_004	YES	7/2/2018	-14.28306	-170.729	25
HA1801_AmSamoa_TUT_SN4818_005	YES	7/3/2018	-14.2516	-170.623	30

Shallow CTD ID	Water Sample	Date	Latitude	Longitude	Sounding (ft)
HA1801_AmSamoa_TUT_SN4818_006	YES	7/3/2018	-14.24524	-170.572	29
HA1801_AmSamoa_TUT_SN4818_007	YES	7/6/2018	-14.36351	-170.763	40
HA1801_AmSamoa_TUT_SN4818_008	YES	7/6/2018	-14.32778	-170.832	33
HA1801_AmSamoa_TUT_SN7744_DS001	YES	6/23/2018	-14.29458	-170.812	50
HA1801_Line_JAR	NO	8/31/2018			
HA1801_Line_JAR_FLOWTHRU_002	YES	7/31/2018	-0.387393	-159.768	15186
HA1801_Line_JAR_FLOWTHRU_003	YES	7/31/2018	-0.387616	-159.73	14298
HA1801_Line_JAR_FLOWTHRU_004	YES	7/31/2018	-0.145555	-160.006	15930
HA1801_Line_JAR_SN3029_001	YES	7/31/2018	-0.367544	-160.233	16381
HA1801_Line_JAR_SN4282_001	YES	7/28/2018	-0.362437	-159.993	60
HA1801_Line_JAR_SN4282_002	YES	7/28/2018	-0.362115	-160.004	60
HA1801_Line_JAR_SN4282_003	YES	7/28/2018	-0.361442	-159.999	50
HA1801_Line_JAR_SN4282_004	YES	7/28/2018	-0.362511	-160.002	25
HA1801_Line_JAR_SN4282_005	YES	7/28/2018	-0.365358	-160.006	40
HA1801_Line_JAR_SN4282_006	YES	7/29/2018	-0.365368	-160.007	60
HA1801_Line_JAR_SN4282_007	YES	7/29/2018	-0.368697	-159.977	60
HA1801_Line_JAR_SN4282_008	YES	7/29/2018	-0.370766	-159.976	40
HA1801_Line_JAR_SN4282_009	YES	7/29/2018	-0.368622	-159.981	20
HA1801_Line_JAR_SN4818_001	YES	7/28/2018	-0.368576	-160.008	224
HA1801_Line_JAR_SN4818_002	YES	7/28/2018	-0.362166	-160.002	38
HA1801_Line_JAR_SN4818_003	YES	7/29/2018	-0.362854	-159.991	45
HA1801_Line_JAR_SN4818_004	YES	7/29/2018	-0.375931	-160.014	80
HA1801_Line_JAR_SN4818_005	YES	7/30/2018	-0.367509	-159.979	87
HA1801_Line_JAR_SN4818_006 4818_006	YES	7/30/2018	-0.381767	-160	38

Shallow CTD ID	Water Sample	Date	Latitude	Longitude	Sounding (ft)
HA1801_Line_JAR_SN4818_007	YES	7/30/2018	-0.380356	-159.979	26
HA1801_Line_JAR_SN4818_008	YES	7/30/2018	-0.379475	-159.971	123
HA1801_Line_JAR_SN4818_009	YES	7/31/2018	-0.382202	-160.003	29
HA1801_Line_JAR_SN4818_010	YES	7/31/2018	-0.381969	-159.989	35
HA1801_Line_JAR_SN4818_011	YES	7/31/2018	-0.379584	-160.016	76
HA1801_Line_JAR_SN4818_012	YES	7/31/2018	-0.371772	-160.011	29
HA1801_Line_JAR_SN7744_DS001	YES	7/31/2018	-0.36892	-160.008	56
HA1801_Line_KIN_FLOWTHRU_001	YES	8/11/2018			9774
HA1801_Line_KIN_FLOWTHRU_002	YES	8/11/2018			12450
HA1801_Line_KIN_SN3029_001	YES	8/11/2018			11586
HA1801_Line_KIN_SN4282_001	YES	8/8/2018	6.4332824	-162.378	120
HA1801_Line_KIN_SN4282_002	YES	8/8/2018	6.4356161	-162.382	40
HA1801_Line_KIN_SN4282_003	YES	8/8/2018	6.4281937	-162.371	50
HA1801_Line_KIN_SN4282_004	YES	8/8/2018	6.424739	-162.368	18
HA1801_Line_KIN_SN4282_005	YES	8/9/2018	6.4360627	-162.394	100
HA1801_Line_KIN_SN4282_006	YES	8/10/2018	6.3994491	-162.434	50
HA1801_Line_KIN_SN4282_007	YES	8/10/2018	6.3868452	-162.425	40
HA1801_Line_KIN_SN4282_008	YES	8/10/2018	6.3808384	-162.439	40
HA1801_Line_KIN_SN4282_009	YES	8/10/2018	6.3853258	-162.336	20
HA1801_Line_KIN_SN4818_001	YES	8/8/2018			45
HA1801_Line_KIN_SN4818_002	YES	8/8/2018			26
HA1801_Line_KIN_SN4818_003	YES	8/9/2018	6.4388416	-162.388	49
HA1801_Line_KIN_SN4818_004	YES	8/11/2018			30
HA1801_Line_KIN_SN4818_005	YES	8/11/2018			75

Shallow CTD ID	Water Sample	Date	Latitude	Longitude	Sounding (ft)
HA1801_Line_KIN_SN4818_006	YES	8/11/2018	6.3977282	-162.336	83
HA1801_Line_KIN_SN4818_007	YES	8/11/2018	6.4011694	-162.467	44
HA1801_Line_KIN_SN4818_008	YES	8/11/2018	6.4051971	-162.46	38
HA1801_Line_PAL_FLOWTHRU_001	YES	8/7/2018	5.8858673	-162.329	7788
HA1801_Line_PAL_FLOWTHRU_002	YES	8/7/2018	5.8874937	-161.817	8454
HA1801_Line_PAL_FLOWTHRU_004	YES	8/7/2018	6.1401514	-162.043	8868
HA1801_Line_PAL_FLOWTHRU_005	YES	8/7/2018	5.8648974	-162.11	9210
HA1801_Line_PAL_SN3029_001	YES	8/7/2018	5.731733	-162.078	10980
HA1801_Line_PAL_SN4282_001	YES	8/3/2018	5.8847189	-162.141	73
HA1801_Line_PAL_SN4282_002	YES	8/3/2018	5.8666911	-162.123	37
HA1801_Line_PAL_SN4282_003	YES	8/3/2018	5.8735191	-162.127	31
HA1801_Line_PAL_SN4282_004	YES	8/3/2018	5.8739067	-162.112	12
HA1801_Line_PAL_SN4282_005	YES	8/5/2018	5.8971285	-162.089	60
HA1801_Line_PAL_SN4282_006	YES	8/5/2018	5.8987693	-162.066	40
HA1801_Line_PAL_SN4282_007	YES	8/5/2018	5.8959856	-162.079	10
HA1801_Line_PAL_SN4282_008	YES	8/5/2018	5.8950485	-162.084	20
HA1801_Line_PAL_SN4282_009	YES	8/6/2018	5.8952637	-162.084	60
HA1801_Line_PAL_SN4282_010	YES	8/6/2018	5.868986	-162.115	18
HA1801_Line_PAL_SN4282_011	YES	8/6/2018	5.8756906	-162.166	52
HA1801_Line_PAL_SN4818_001	YES	8/2/2018	5.883437	-162.133	42
HA1801_Line_PAL_SN4818_002	YES	8/3/2018	5.8662039	-162.11	54
HA1801_Line_PAL_SN4818_003	YES	8/3/2018	5.896004	-162.138	39
HA1801_Line_PAL_SN4818_004	YES	8/4/2018	5.8756472	-162.004	48
HA1801_Line_PAL_SN4818_005	YES	8/4/2018	5.8642398	-162.03	30

Shallow CTD ID	Water Sample	Date	Latitude	Longitude	Sounding (ft)
HA1801_Line_PAL_SN4818_006	YES	8/5/2018	5.8976972	-162.078	83
HA1801_Line_PAL_SN4818_007	YES	8/5/2018	5.8970473	-162.108	40
HA1801_Line_PAL_SN4818_008	YES	8/6/2018	5.8699531	-162.075	50
HA1801_Line_PAL_SN7744_DS001	YES	8/6/2018	5.8663838	-162.11	42