American Samoa Bleaching Monitoring Report 2015 – 2017

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This document is an initial attempt at collating information of qualitative coral bleaching observations around the American Samoa archipelago between 2015 and 2017. Observations were collated by Alice Lawrence from local scientists based at the American Samoa Dept. Marine & Wildlife Resources (DMWR) - Coral Reef Advisory Group (CRAG), National Park Service of American Samoa (NPSA), National Marine Sanctuary of American Samoa (NMSAS) around the American Samoa archipelago between 2015 – 2017.

Observations detailed in this document are summarized below:

Island	Depth (ft)	2015	2016	2017
		Oct 2014 – June 2015	**Oct 2015 – June 2016**	**Oct 2016 – June 2017**
Tutuila	3 - 5 Reef Flat & Crest	Relatively high percentage of table Acropora in certain shallow reef areas were lost during the bleaching event	Very little observation of bleaching	Extensive bleaching at all sites. Significant bleaching of Acropora species was observed, with records of high impact of bleaching to the Porites massive species at Utulei.
	3 - 10 Backreef pools	The Acropora staghorn thickets in the Airport pools showed up to 100% bleaching whereas *Porites cylindrical* only bleached very lightly towards the end of the bleaching episode. Over the span of 3 - 4 months an estimated 80% of the staghorns in the pools died.	Very little observation of bleaching	Extensive bleaching at all sites. Staghorn corals bleached intensively with significant mortality, in particular at Alofau pools where 90% were bleached.
	20 - 50 Reef Slope	**Feb-Mar 2015** – NOAA ASRAMP cruise surveys recorded 8.2% bleaching (highest % at 20-60ft depth). The highest occurrence of bleaching was in the Fagasa and Fagatele Bay (shallow (0-20ft) and mid depth (20-60ft), with average bleaching ~25%. Local managers estimated that 1-10% of corals were bleached with differences in bleaching prevalence and severity depending on site. Branching and table Acropora were affected the most. Other sensitive species were *Montastrea curta* and *Isopora crateriformis*.	Very little observation of bleaching	**Jan – April 2017** – Interesting observations included corals bleaching in the deeper areas (20-60ft) compared to the shallow areas (3-10ft), and Porites massive colonies were one of the first genera to partially bleaching observations of Porites massive colonies. Other genera affected included Acropora, Pocillopora, Astreopora, Leptrastrea, Favia, Favites, Fungia, Goniastrea, Isopora, Montipora, Montastrea. NPS bleaching surveys indicated bleaching up to 130ft at sites surveyed on north Tutuila.
Manu'a	3 - 10 Backreef pools	**Feb 2015 -** Low to intermediate levels of bleaching observed (mostly affecting Millepora and Acropora, some massive Porites).	Feb 2016 - No evidence of bleaching in the backreef pools	Widespread bleaching of different coral genera including Acropora tables, Encrusting Isopora species and Montipora species, branching Acropora and Pocillopora species, Massive Porites, Favia and Favites

Island	Depth (ft)	2015	2016	2017
		Oct 2014 – June 2015	Oct 2015 – June 2016	Oct 2016 – June 2017
	20 - 50 Reef Slope	**NOAA ASRAMP surveys 13-26 March: Ofu-Olosega**: Average 5.9% bleached (0-20ft = 9.4%; 20-60ft = 5.9%; 60-100ft = 2.8%). **Ta'u**: Average 5.9% bleached (0-20ft = 9.4%; 20-60ft = 5.9%; 60-100ft = 2.8%). It is possible that further bleaching occurred following the surveys.	Very little observation of bleaching	No surveys conducted
Rose	Lagoon 3 - 10	No surveys conducted	**March 2016:** very little bleaching observed **Sept 2016:** Light bleaching observed	Some bleaching evident on the shallow coral blocks inside the lagoon.
	20 - 50 Reef Slope	**NOAA ASRAMP surveys 16-19 March 2015:** Average 2.3% bleached (0-20ft = 3%; 20-60ft = 2.3%; 60-100ft = 0.8%). It is possible that further bleaching occurred following the surveys.	Very little observation of bleaching	No surveys conducted
Swains	3 Reef Flat	No surveys conducted	No surveys conducted	**May 2017** – no bleaching observed (very low coral cover naturally).
	20 - 50 Reef Slope	**NOAA ASRAMP surveys 15-20 February 2015:** Average 10.6% bleached (0-20ft = 9.9%; 20-60ft = 9.9%; 60-100ft = 16.3%). It is estimated that following initial observations by NOAA of light bleaching in February 2015, 70% mortality affected the dominant Pocillopora coral colonies.	No surveys conducted	**May 2017** - DMWR survey recorded 70% of Pocillopora coral colonies were dead and were colonized by CCA, possibly due to the 2015 bleaching event

For quick reference to years and islands use the following table:

Year	Island	Page #
2015	Tutuila	3
	Manu'a	6
	Rose	7
	Swains	7
2016	All islands	8

2017	Tutuila	10
	Manu'a	17
	Rose	20
	Swains	21

Bleaching Observations 2015 – Tutuila Island

No bleaching monitoring programs were in place in for the 2015 bleaching event, however prolonged above average air temperatures were recorded from February to May, and peaking in April (fig 5).

Reef flats, reef crest and shallow reef area (around 5ft): No surveys were carried out in these areas before and during the bleaching episode in 2015 but anecdotal information of opportunistic observations by CRAG staff and Doug Fenner (the formal benthic ecologist for DMWR) suggest that a relatively high percentage of table Acropora in shallow reef areas experienced mortality (figure 1).

Figure 1: Shallow reef (5ft) at Fagamalo. Note most table Acropora have recently died.

Reef slope (30 ft): No quantitative surveys were carried out by local monitoring programs during the bleaching episode in 2015 but photos were taken of bleached coral and general, subjective observations of bleaching prevalence were made. It was estimated that around 1-10% of corals were bleached with differences in bleaching prevalence and severity depending on site. It appears that branching and table Acropora were affected the most. Other sensitive species are *Montastrea curta* and *Isopora crateriformis*.

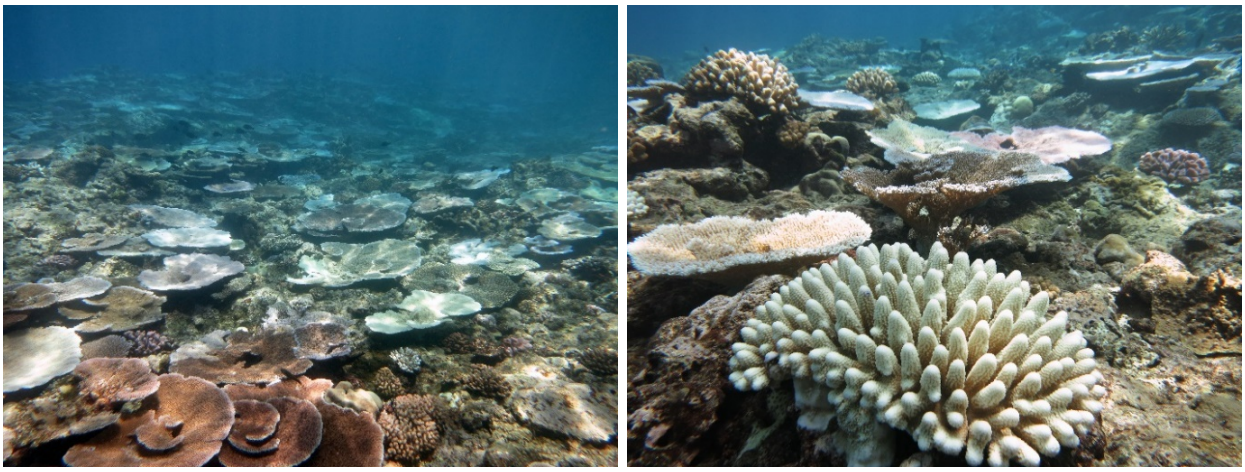


Figure 2: Bleached table and branching Acropora on the reef slope. Photo credit NOAA (ASRAMP cruise 2015)

Backreef pools: The airport pools are dominated by extensive staghorn (Acropora) beds and a branching Porites species (*Porites cylindrica*). The staghorns in the pools showed very high bleaching (up to 100%) whereas *P. cylindrical* did not bleach or only very lightly towards the end of the bleaching episode. Over the span of 3-4 months the staghorns in the pool showed very high mortality; an estimated 80% of the staghorns in the pools died (see Figure 3)

December 2014: No bleaching

February 2015: mass bleaching of staghorns in the pool

April 2015: mass bleaching and mortality of staghorns in the pool

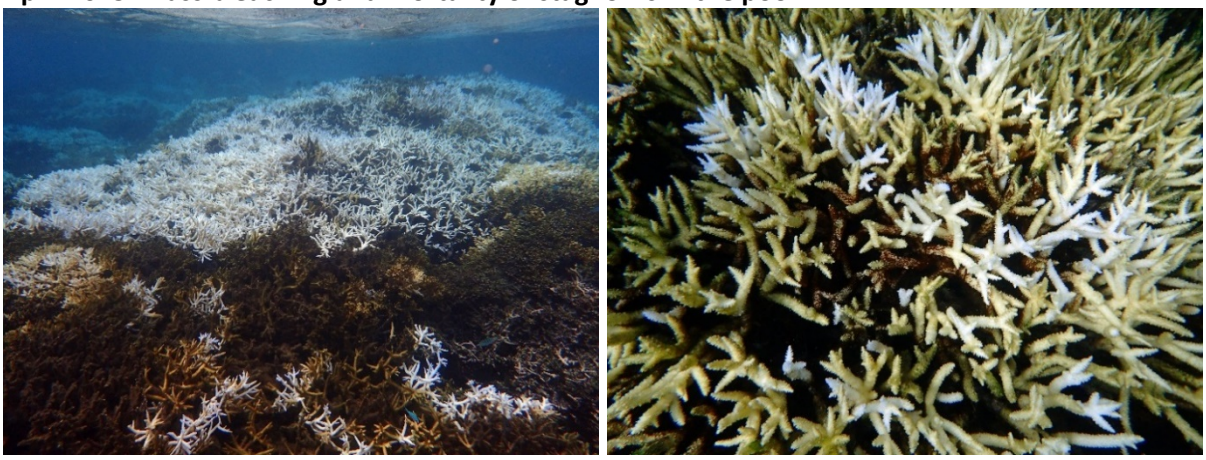


Figure 3: Bleached corals in the Airport Pools in 2015

NOAA CREP conducted their American Samoa Reef Assessment and Monitoring Cruise (ASCRMP) between 15 February 2015 – 30 March 2015. Tutuila Island was surveyed between 26 Feb – 7 March 2015. General observations from benthic surveys in Tutuila showed higher occurrence of bleaching in Fagasa and Fagatele areas (shallow (0-20ft) and mid depth (20-60ft) reef surveys). The benthic team conducted a survey at a shallow locale at the head of Fagatele Bay (see Figure 4) and reported widespread bleaching averaging ~25% colonies, and within colonies the severity of bleaching ranging from 2 to 4 (1 = pale; 5 = stark white). At this particular location the bleached taxa included mainly encrusting colonies of Isopora, as well as some Acropora, Hydnophora, Leptoria, Platygyra, and Porites. Of the 89 sites surveyed an average 8.2% of the live coral was recorded as bleached. The % bleaching at different depth strata were as follows: 0-20ft = 4.5%; 20-60ft = 8%; 60-100ft = 4.5%.

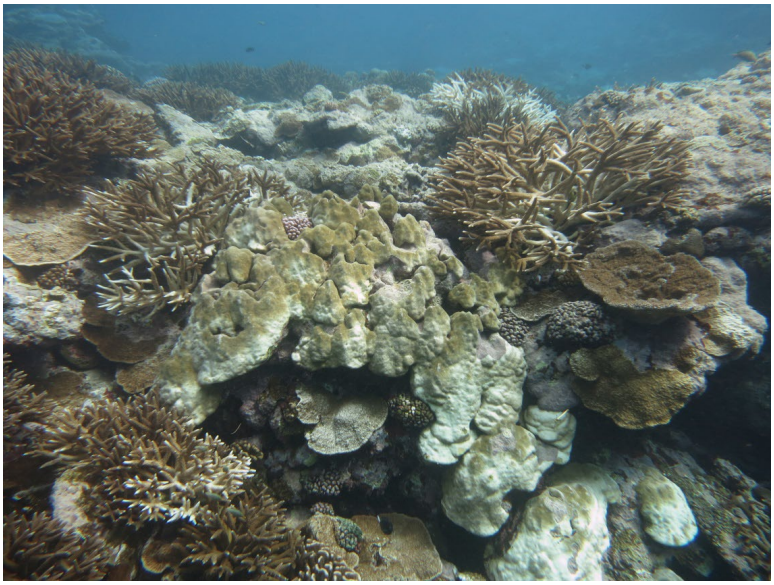


Figure 4: Widespread bleaching conditions averaging 25% colonies observed at a shallow site in Fagatele Bay. NOAA photo by Bernardo Vargas-Ángel.

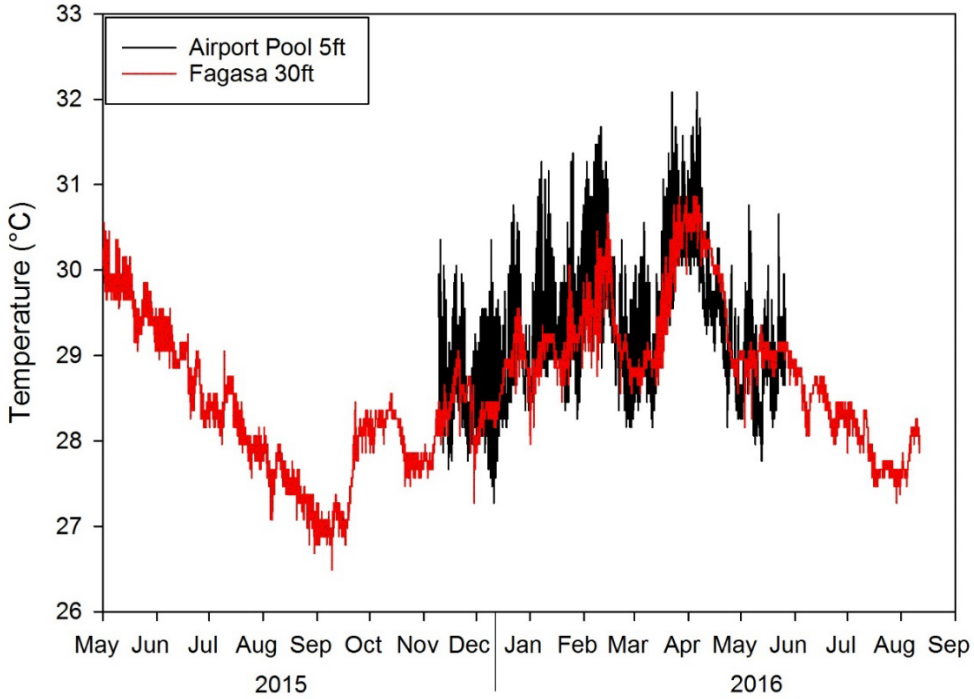


Figure 5: Temperature data from 2 Hobo Loggers showing thermal pattern from May 2015 to September 2016.

Bleaching Observations 2015 – Manu'a Islands

The CRAG-DMWR American Samoa Territorial Monitoring Program conducted baseline coral reef monitoring surveys of 12 shallow reef flat and backreef lagoon sites in Ofu and Olosega between 14th – 18th February 2015 by Dr. Mareike Sudek (benthic ecologist) and Alice Lawrence (reef fish ecologist). Low to intermediate levels of bleaching were observed (genera mostly affected were Millepora and Acropora, some massive Porites) and low levels of disease was observed. These surveys were conducted at the beginning of the 2015 bleaching event therefore it is possible that further bleaching occurred in the shallow pools, however no other surveys were conducted there.

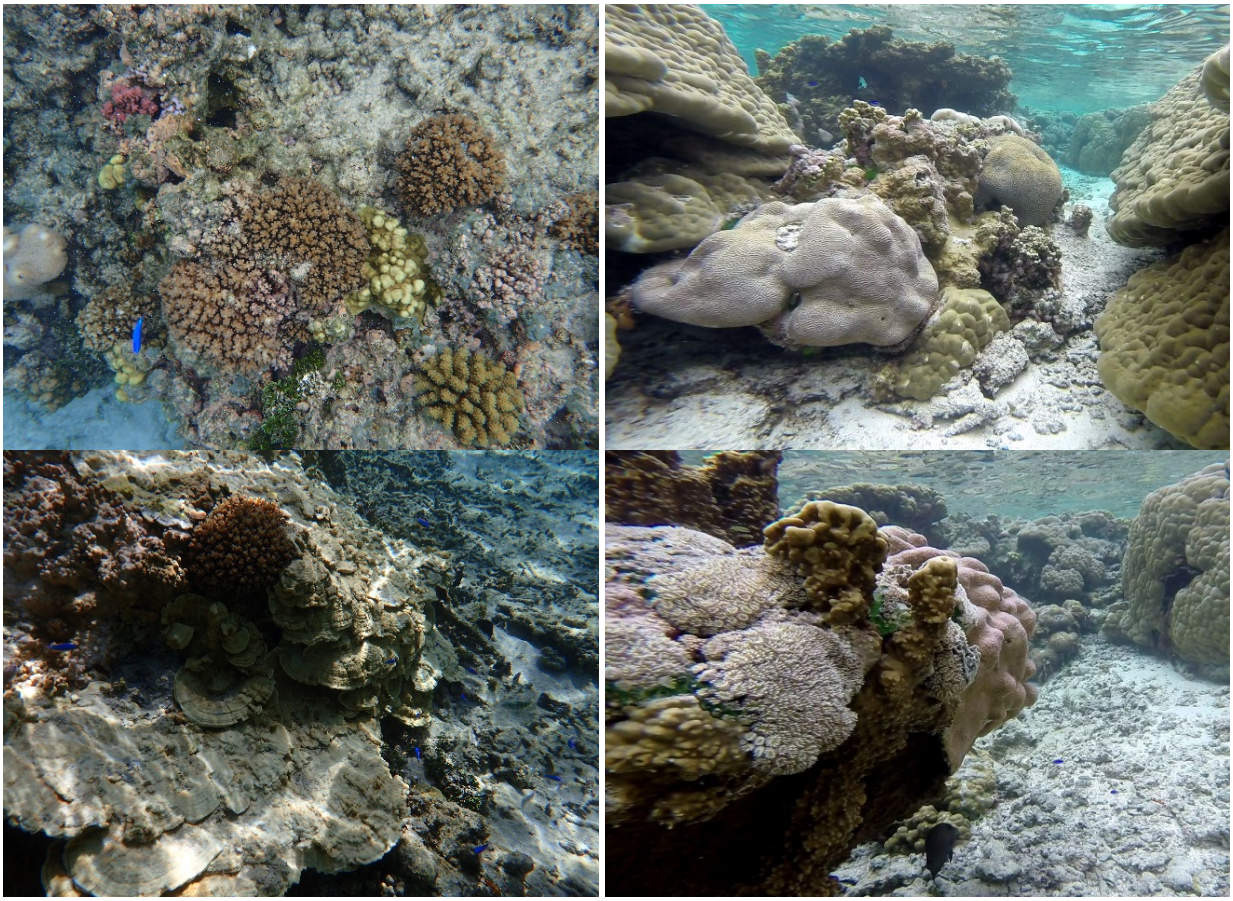


Figure 5: Lightly bleached coral colonies in the Ofu backreef Pools in February 2015. Photo credit: CRAG.

NOAA CREP conducted their American Samoa Reef Assessment and Monitoring Cruise (ASCRMP) between 15 February 2015 – 30 March 2015. The Manu'a Islands were surveyed between 13 March – 24th March 2015 and no major bleaching was reported, however these reefs were surveyed before the main bleaching event. The **Ofu-Olosega Islands** were surveyed 13 - 14, 22 - 23, 25 - 26 March 2015 and the majority of benthic surveys revealed reef conditions similar to those found during surveys in previous years. Belt-transect surveys did not report any major bleaching conditions or increases in coral disease prevalence at the benthic REA sites visited. Of the 31 sites surveyed an average 5.9% of the live coral was recorded as bleached. The % bleaching at different depth strata were as follows: 0-20ft = 9.4%; 20-60ft = 5.9%; 60-100ft = 2.8%. **Tau Island** was surveyed 15, 20, 23-24 March 2015 and the majority of benthic surveys revealed reef conditions similar to those found during surveys in previous years. Belt-transect surveys did not report any major bleaching conditions or increases in coral disease prevalence at the benthic REA sites visited. Of the 31 sites surveyed an average 5.9% of the live coral was recorded as bleached. The % bleaching at different depth strata were as follows: 0-20ft = 9.4%; 20-60ft = 5.9%; 60-100ft = 2.8%.

Bleaching Observations 2015 – Rose Island

No surveys were conducted in the conducted in shallow reef flat and lagoon areas.

NOAA CREP conducted their American Samoa Reef Assessment and Monitoring Cruise (ASCRMP) between 15 February 2015 – 30 March 2015. Rose Atoll was surveyed between 16 – 19 March 2015 and the majority of benthic surveys revealed reef conditions similar to those found during surveys in previous years. Belt-transect surveys did not report any major bleaching conditions or increases in coral disease prevalence at the benthic REA sites visited, however this was before the main bleaching event. Of the 29 sites surveyed an average 2.3%

of the live coral was recorded as bleached. The % bleaching at different depth strata were as follows: 0-20ft = 3%; 20-60ft = 2.3%; 60-100ft = 0.8%.

Bleaching Observations 2015 – Swains Island

NOAA CREP conducted their American Samoa Reef Assessment and Monitoring Cruise (ASCRMP) between 15 February 2015 – 30 March 2015 with Swains Island being surveyed between 15 - 20 February 2015. The majority of benthic surveys revealed reef conditions similar to those found during surveys in previous years. Belt-transect surveys did observe the presence of widespread coral bleaching averaging nearly 10%, with over 15% recorded at the deeper sites (60-100ft). Of the 31 sites surveyed an average 5.9% of the live coral was recorded as bleached. The % bleaching at different depth strata were as follows: 0-20ft = 9.4%; 20-60ft = 5.9%; 60-100ft = 2.8%. These surveys coincided with the start of the 2015 bleaching event observed in American Samoa. Following observations in 2017 by NMSAS and CRAG staff who estimated 70% mortality of the Pocillopora colonies between 20-40ft depth, it is assumed that the 2015 bleaching event continued to affect the coral colonies on the reef slope at Swains island, causing extensive mortality. Of the 18 sites surveyed, an average 10.6% of the live coral was recorded as bleached. The % bleaching at different depth strata were as follows: 0-20ft = 9.9%; 20-60ft = 9.9%; 60-100ft = 16.3%.

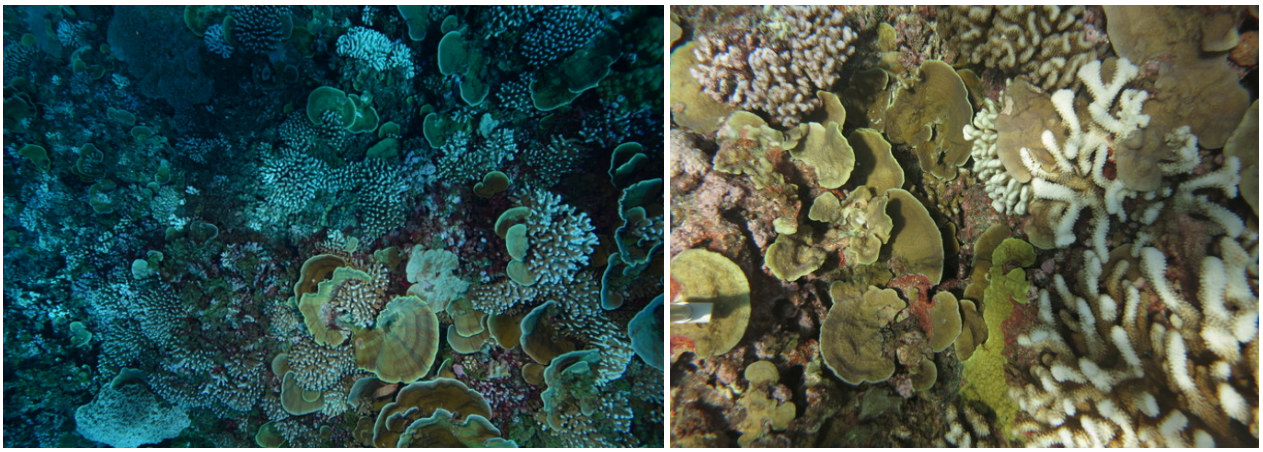
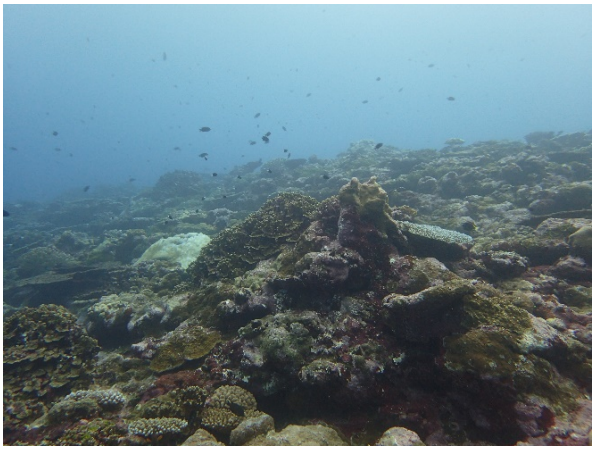
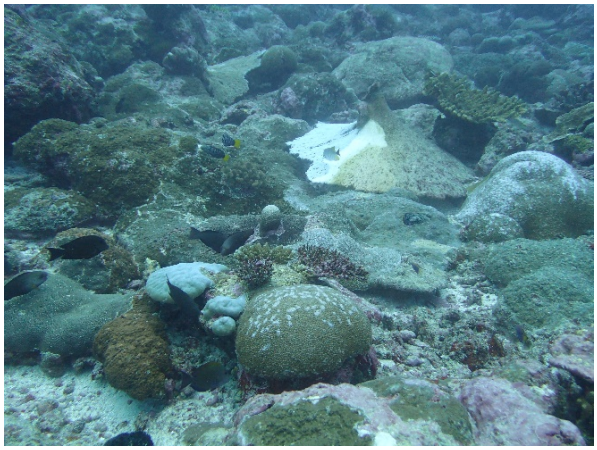


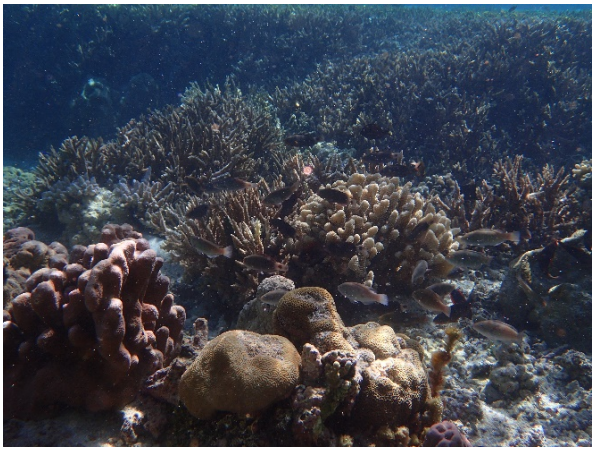
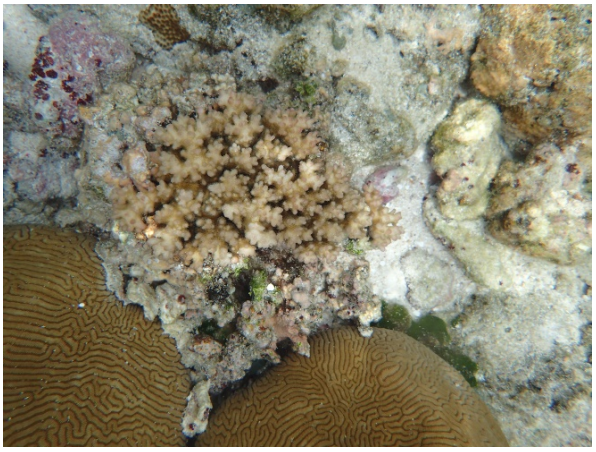
Figure 6: Bleached coral colonies on the reef slope at Swains island during February 2015. Photo credit NOAA.

Bleaching Observations (September 2015 – October 2016)

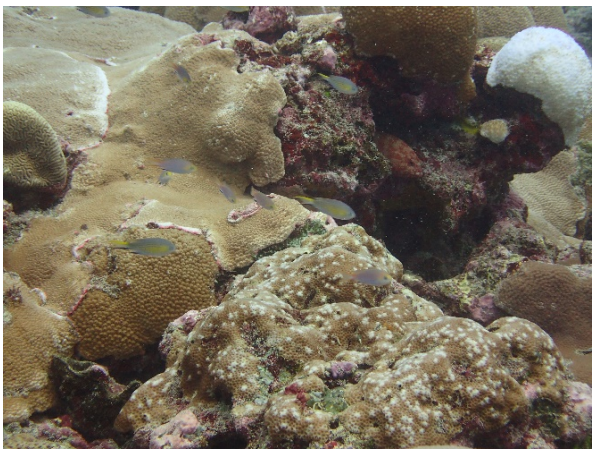
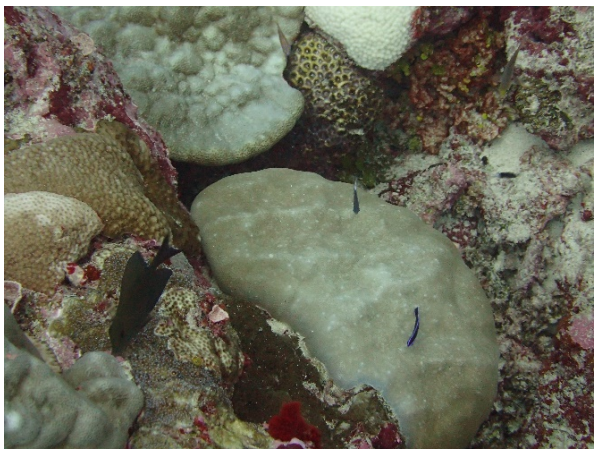
Tutuila Island - Very little observation of bleaching in 2016 was recorded by local scientists. A NOAA fish cruise conducted fish surveys around Tutuila in March 2016, low occurrence of light bleaching was recorded.

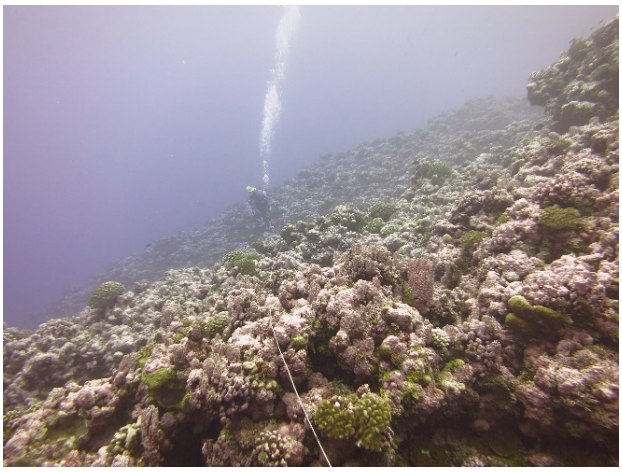
Manu'a Islands (February - March 2016): No evidence of bleaching in the shallow lagoon pools on Ofu Island in February 2016 during CRAG annual surveys.

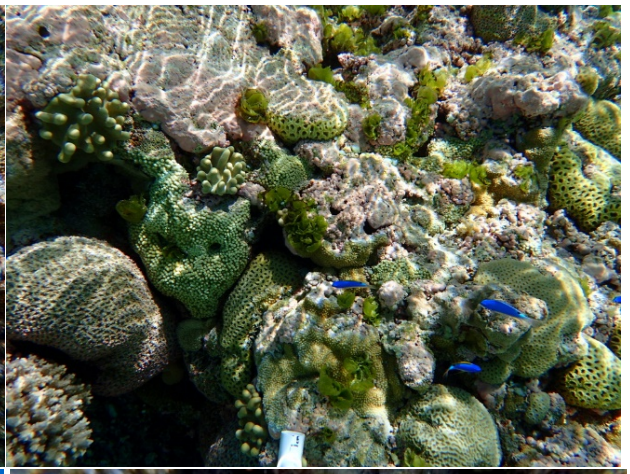
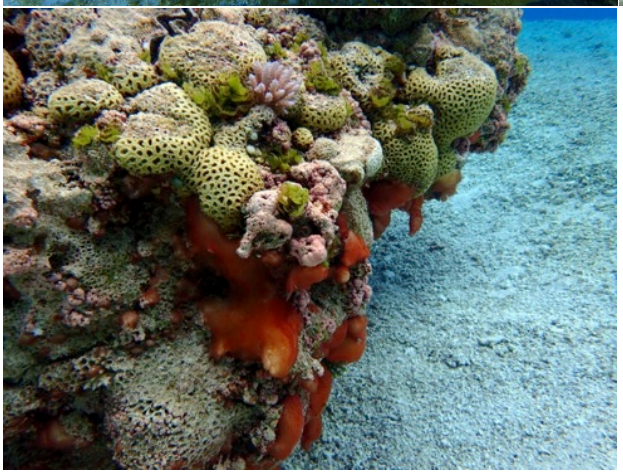
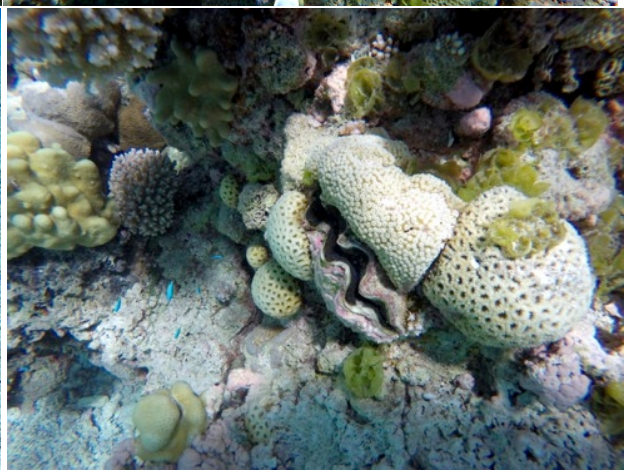
A NOAA fish cruise conducted fish surveys around Manu'a in March 2016, where low occurrence of light bleaching was observed during the surveys

Rose Atoll – (March 2016 & September 2016): A NOAA fish cruise conducted fish surveys around Rose Atoll in March 2016, where low occurrence of light bleaching was observed during the surveys.

CRAG staff participated in a 2-day research trip in collaboration with USFWS to Rose Atoll 1-2 September 2016. Some bleaching was observed on the shallow coral blocks inside the lagoon between 0-5ft depth.

Bleaching Observations October 2016 – June 2017

Tutuila – October 2016 to January 2017

A period of prolonged hot weather with very little wind occurred between October 2016 and January 2017, which caused a peak in surface water temperatures in December 2016 (see figure below). In January, surveyors observed that deeper corals between 20 to 50 feet seemed to be bleaching more than the shallow corals which continued to be the case in March and April 2017 (potentially due to less circulation and water movement in the deeper areas). Interestingly Porites massive colonies were observed to be partially bleached in January at around 20 to 40 feet deep and continued to show signs of bleaching in March and April 2017, during extensive coral reef monitoring surveys around Tutuila.

National Park of American Samoa (NPS) divers, observed bleaching up to 130 ft on the north side of the island in NPS waters. NPS divers discontinued COTs tow-board surveys during that time due to observations of severe bleaching, which made it difficult to distinguish between a COT scar and a bleached coral or colony. The NPSA Inventory and Monitoring (I&M) surveys were conducted in March and April 2017, and benthic photo data (see page 15) show that bleaching occurred in the majority of survey transects (30 total - 15 permanent and 15 random – ranging between 30 – 60 ft depth on the north side of Tutuila in NPSA waters). NPSA divers also witnessed bleaching occurring at depths up to 120 ft when deploying their HOBO temperature loggers at 90 ft, 115 ft, and 130 ft at two of their bleaching sites (Muliulu Point and Tafeu cove). The majority of the observed bleached colonies were Acropora sp. with some Pocillopora sp.

In the shallower reef flat areas and pools, staghorn corals bleached intensively with significant mortality, in particular at Alofau pools where they were observed to be completely white and well over 90% were bleached. Additionally, on the shallower reef flat areas significant bleaching of Acropora sp. was observed around Tutuila, with records of high impact of bleaching to the Porites massive species at Utulei. The NPS deployed loggers at shallow sites at 1 m, 5 m, and 10 m, at Vatia Bay, Muliulu Point, and Tafeu Cove where bleaching was also observed.

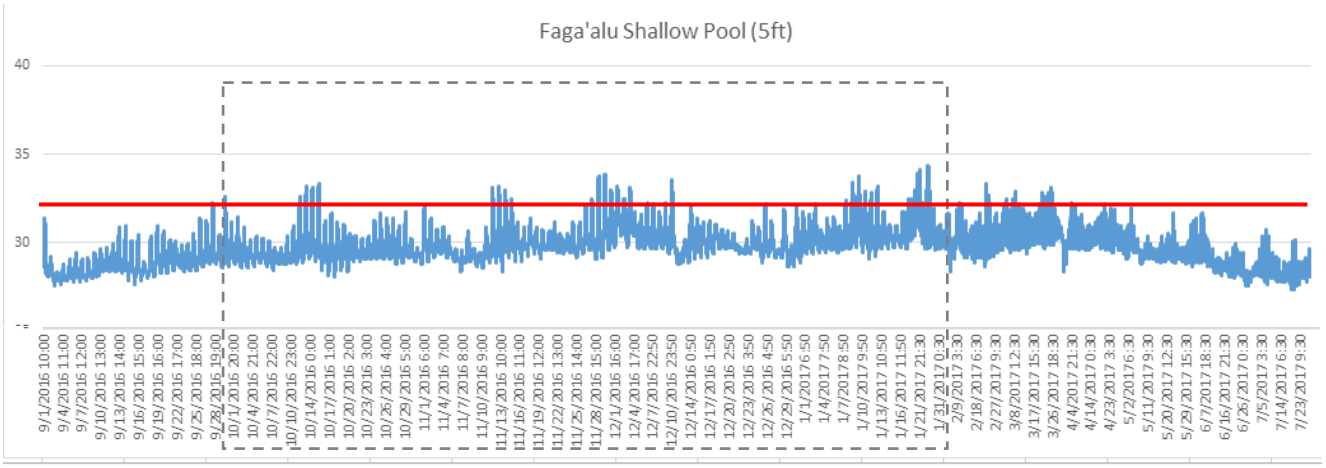


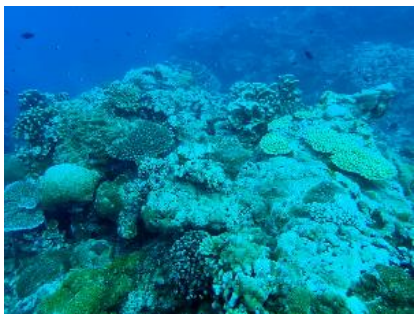
Figure: Temperature data from 1 Hobo Logger showing thermal pattern from September 2016 to July 2017. Red line indicates 31 degree C threshold and the dashed box shows the peak temperature time period between 1 October 2016 and 31 January 2017

Tutuila – January 2017 (HOBO logger exchange dives)

The following CRAG bleaching monitoring sites were photographed in January 2017 during logger retrieval and deployment, and bleaching observations are described for the shallow reef flat areas and the deeper reef slope areas between 20 – 50 feet.

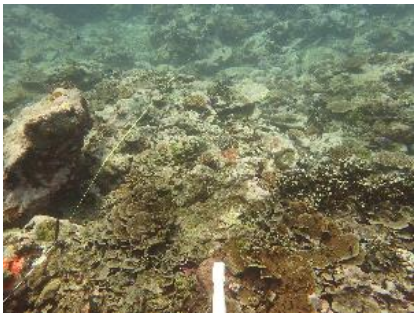
Amalau – North (30-40ft) – light bleaching of Astreopora, Acropora branching / digitate, Acropora tables, and Pocillopora



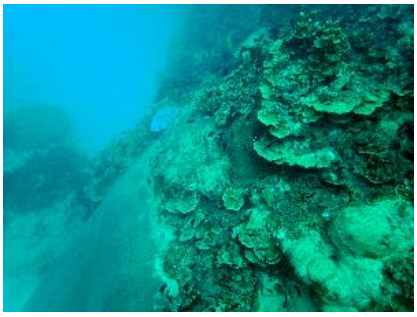


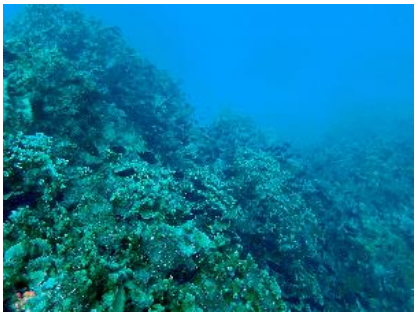
Amanave – North West (30-40ft) – very little bleaching, although some pale Acropora and Leptastrea purpurea



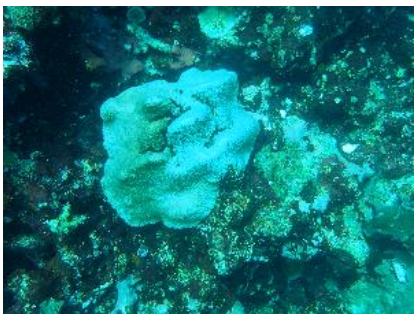
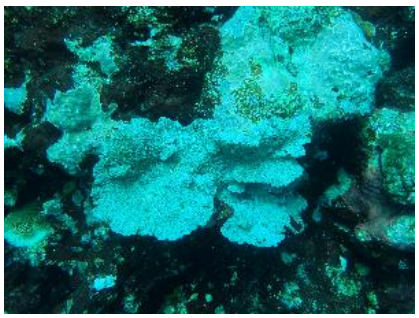


Aoa – North East (30-40ft) – very light bleaching on some Acropora and Pocillopora branching coral colonies

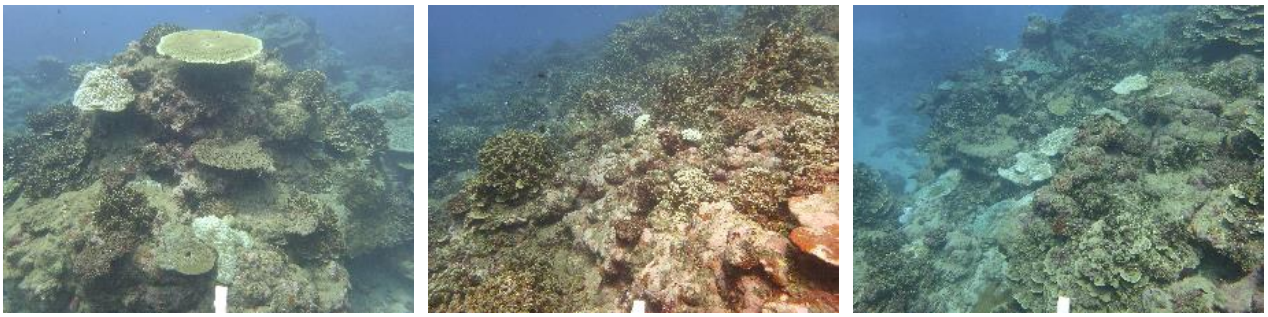




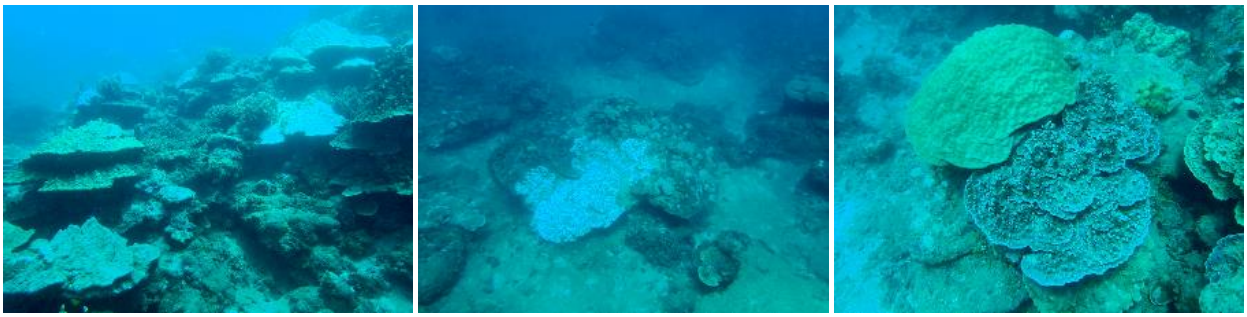
Faga'alu – South East (30-40ft) – some light bleaching observed on Favia stellegria, Hydnophora, Fungia, Pocillopora and Montastrea curta.


Fagamalo – North West (30-40ft) – some light bleaching of Acropora tables, branching / digitate, Massive Porites, Montipora, Goniastrea, Astreopora, Favia, Pocillopora, Favites and soft coral. Quite a few Porites massive colonies were fully bleached

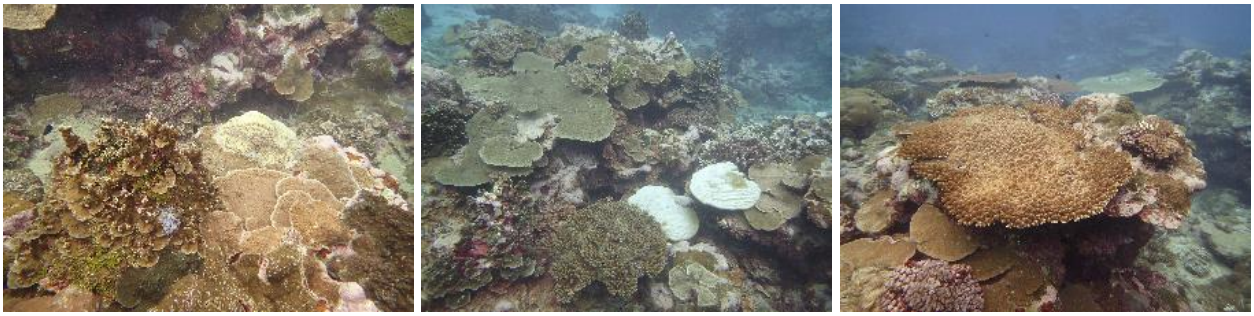


Fagasa – North Central (20-50ft) – Noticeably more bleaching was observed on the deeper reef slope areas between 10-40 ft than the shallow reef flat, in particularly Porites massive colonies, of which 50-60% were bleached. Acropora tables and an identified encrusting sp. were partially to completely bleached and total bleaching was estimated at around 10% due to the large number of Porties massive colonies.



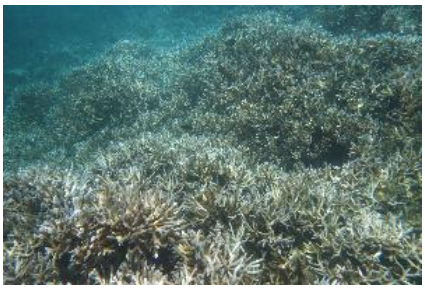
Fagasa – North Central (3-10ft) – On the shallow reef flat at 3 ft only minor bleaching was observed, mainly of Acropora branching, Acropora tables, Pocillopora. On the reef crest around 6 ft a few Porites massive colonies were partially bleached, and some Acropora tables, whereas similar colonies in the shallower areas were not observed to be bleached.

Leone – South West (30-40ft) – some light bleaching observed on Pocillopora, Isopora, Coscinaria, and Montipora colonies, with severe bleaching observed on a Porites massive colonies.



Airport Pools – South (3-10ft) – light bleaching on branching tips were observed in the Airport pools in January 2017, with complete bleaching of some Fungia corals.





Nu'uuli Pools - no photos were taken at this site

Alofau – no photos were taken at this site

The following is a summary table of bleaching observations at bleaching monitoring sites in January 2017, using the Assessment Scales as shown in Appendix 1

Site	Date	Depth (ft)	Coral Cover	Bleach Extent	Bleach Severity	Table	Branching	Massive	Encrusting	Fungia	Soft Coral	Notes
Amalau	1/19/17	30-40	2	1	1 to 2	1	1	1				Light bleaching
Amanave	1/23/17	30-40	2	1	1		1		1			No bleaching, some pale
Aoa	1/19/17	30-40	2	1	1		1					Light bleaching
Fagaalu	1/19/17	30-40	1	1	1 to 2		1		1	1		Some bleaching
Fagamalo	1/23/17	30-40	1	2	1 to 2	1	1	1	1		1	Quite a few bleached porites severity = 2
Fagasa	1/18/17	30-40	1	2	2	1		1	1			10 % bleaching due to large number of Porites
Fagasa	1/18/17	3--5	1	1	1	1		1				Less bleaching on the shallower areas
Leone	1/23/17	30-40	2	1	1 to 2		1	1	1			Severe bleaching on some Porites massive
Airport Pools	1/6/17	3--10	2	1	1		1			1		Light bleaching of Acropora branching tips

Tutuila Island – March – April 2017 (NPSA)

The following bleaching images were photographed during the NPSA Inventory &Monitoring season in 2016 and 2017, capturing a before and after image of the bleaching event.

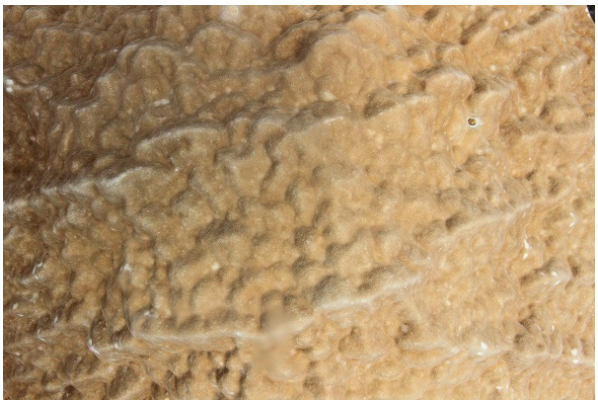
NOTE: The location of the bleaching site is labelled at the top of each set of images, with depth, and date each image was taken at the bottom.

Fixed site 4 (West pt. of Agapie cove). Lat: -14.26106 Long: -170.70708 Depth: 19-20m

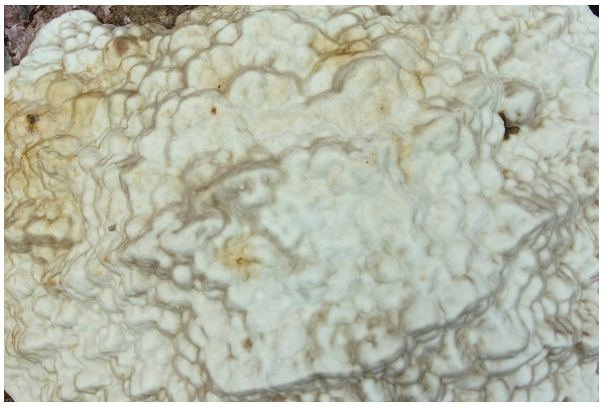
Fixed site 4 – 2016 (03/15/2016)

Fixed site 4- 2017 (04/11/2017)

Fixed site 5 (East pt. of Agapie cove) Lat: -14.25991 **Long**: -170.70433 **Depth**: 11-12m **Species** : *Porites sp.*



Fixed site 5- 2016 (03/16/2016)



Fixed site 5- 2017 (04/10/2017)

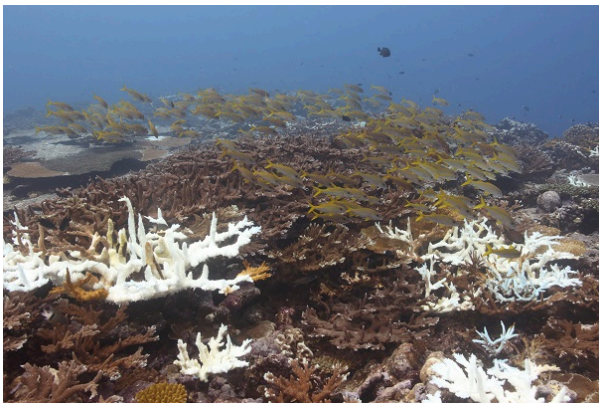
Below are some bleaching images as evidence showing the emphasis was not on few coral species (such as *Acropora sp*. and *Porites sp*.) but almost all including free leaving corals and some sea anemones. Also to show that bleaching occurred in in the park, from Fagasa bay to the west pt. of Afono.

Temporary site 3 (West pt. of Amalau) Lat: -14.27443 Long: -170.72366 Depth: 11-12m Date: 04/13/2017

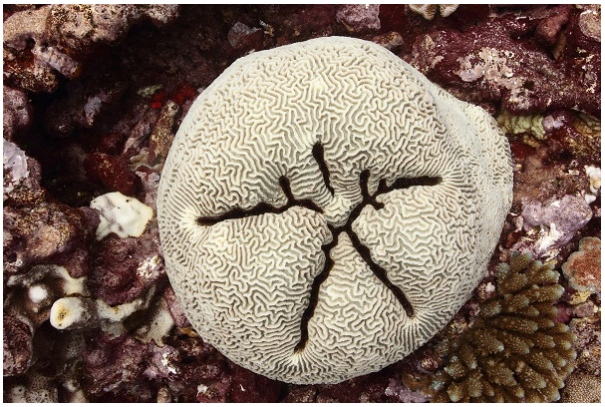
Hydnophora exesa

Acropora abrotanoides

Fixed site 13 (East side of Pola island) Lat: -14.23598 Long: -170.66879 Depth: 17-18m Date: 04/12/2017

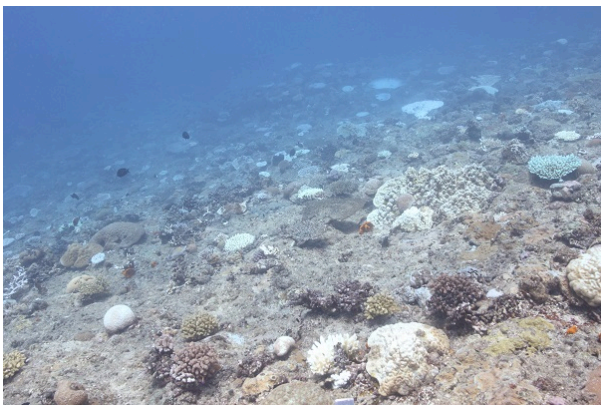


Acropora abrotanoides



Platygyra sp.

Fixed site 7 (Vaiasa pt.) Lat: -14.25011 Long: -170.69496 Depth: 11-12m Date: 4/10/2017



Astreopora sp.

Astreopora sp.

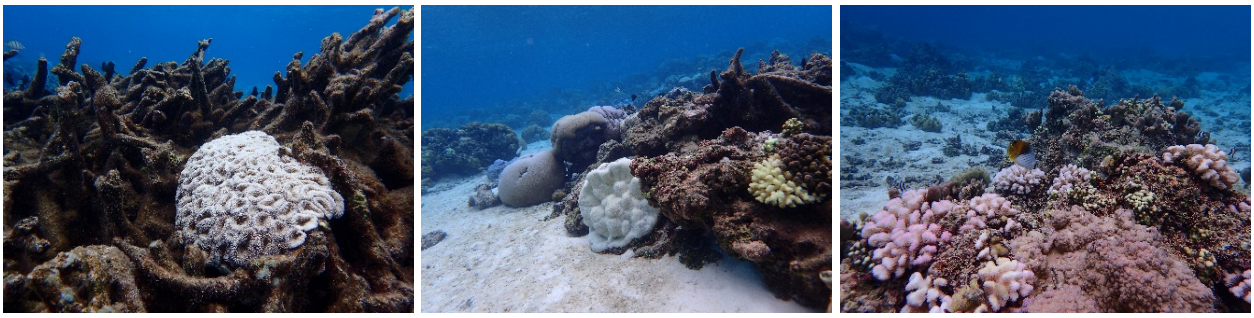
Manu'a Islands (Ofu – Olosega Islands) – February 2017 (CRAG)

Annual surveys are conducted by CRAG monitoring staff in the shallow pools around Ofu and Olosega islands. Transects are located by GPS coordinates for 8 different sites. Photos of bleached corals observed are shown for each of the survey sites.

- **Summary of what was observed** – widespread bleaching of different coral genera including Acropora tables, Encrusting Isopora species and Montipora species, branching Acropora and Pocillopora species, Massive Porites, Favia and Favites

Pool 300

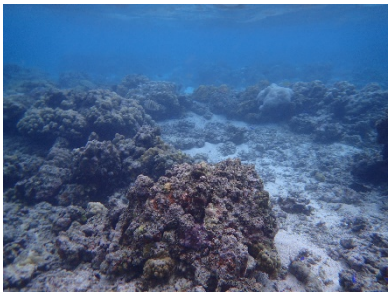
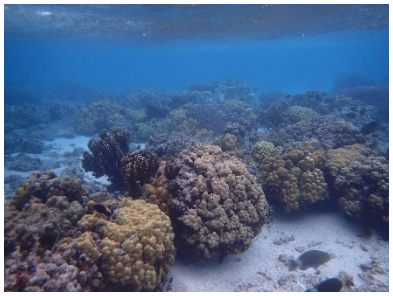
Pool 400-A



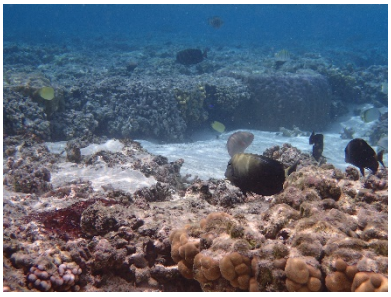
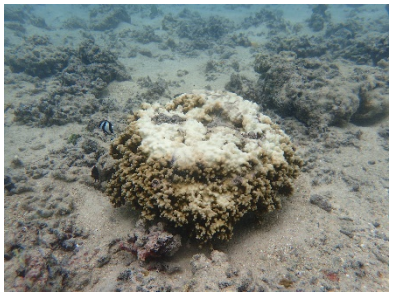
Pool 400-B

Pool 600

Olosega village

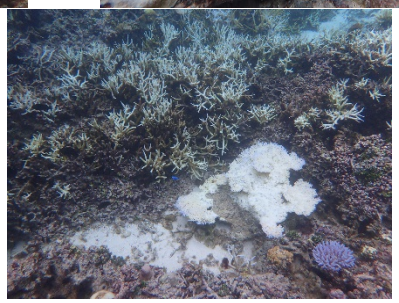
Ofu village


Sili village (nr. Stanford nursery





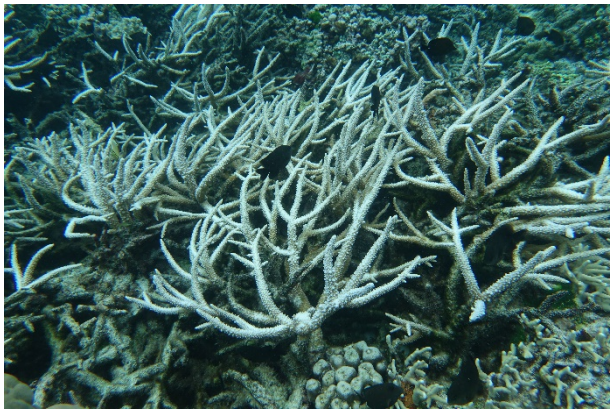



Manu'a Islands (Ofu Island) – September & November 2017 (NPSA)

NPSA divers observed bleaching in the Ofu backreef pools (3-5 ft) when conducting their bleaching monitoring surveys in September 2017 and November 2017. Most of the bleaching was observed on colonies of Acropora and some Montipora, but also observed on some colonies of Goniastria, Pocillopora. The Acropora colonies were by far the most bleached, some nearing complete bleaching.

Ofu shallow lagoon pools in National Park - September 2017

Ofu shallow lagoon pools in National Park - November 2017



Rose Island – September 2017 (USFWS & NPSA)

A USFWS coordinated research trip to Rose Atoll was conducted in September 2017 to undertake giant clam sampling and assessments in the shallow lagoon area. Benthic photographs were taken of the shallow lagoon coral bommies which suggested light bleaching of most coral colonies (see Figure 7).

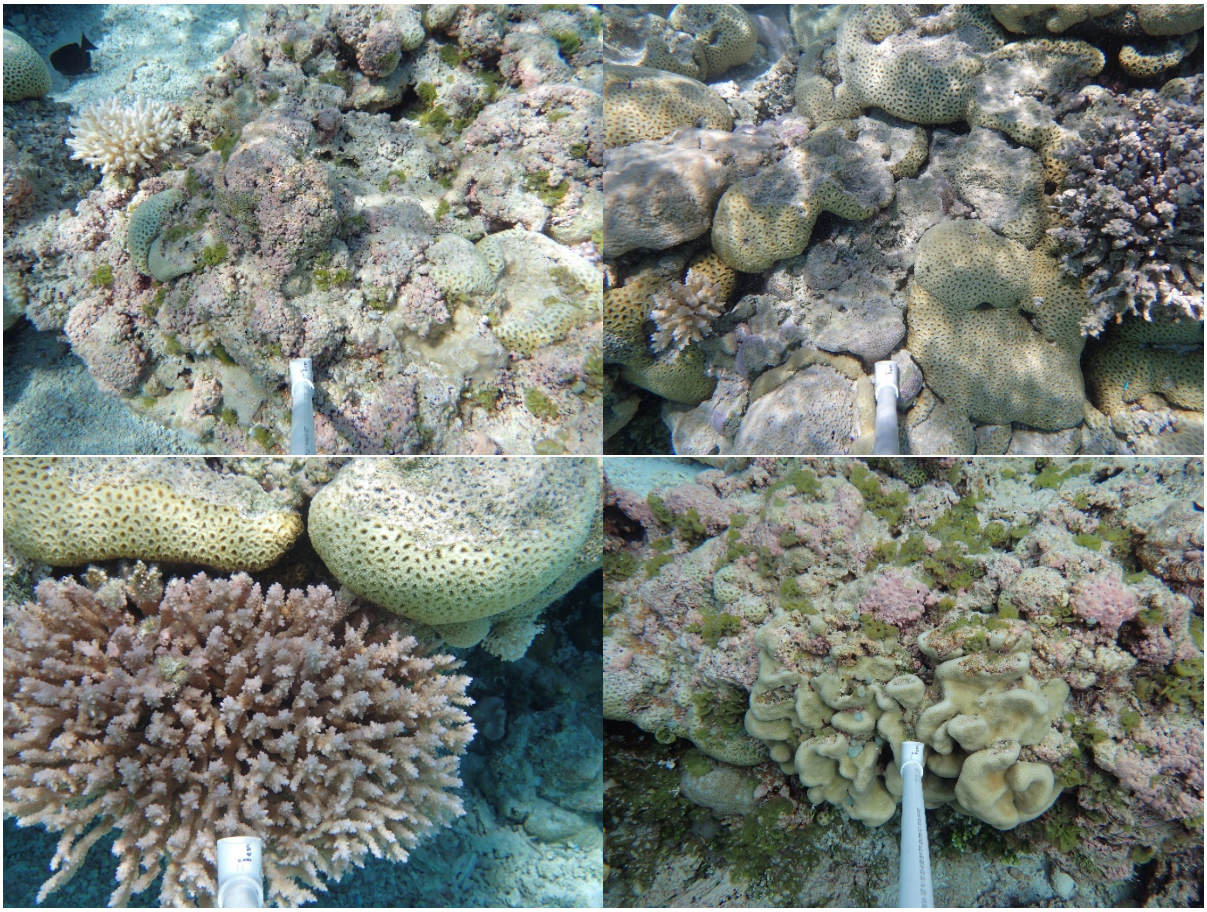


Figure 7: Lightly bleached coral colonies on shallow lagoon coral bommies at Rose Atoll September 2017.

Swains Island – May 2017 (CRAG)

A DMWR Wildlife Division reconnaissance trip to Swains Island in May 2017 provided an opportunity for CRAG staff to conduct a rapid assessment of coral health using snorkel. Photos in figure 7 show an estimated 70% of Pocillopora coral colonies dead and covered in crustose coralline algae, suggesting that the bleaching event in 2015 may have caused the mortality (also discussed on page 4). Figure 8 shows a photograph of the coral reef at Swains taken during the 2010 ASRAMP cruise shows the live Pocillopora coral colonies.

Figure 8: Dead Pocillopora colonies observed at Swains Island in May 2017.

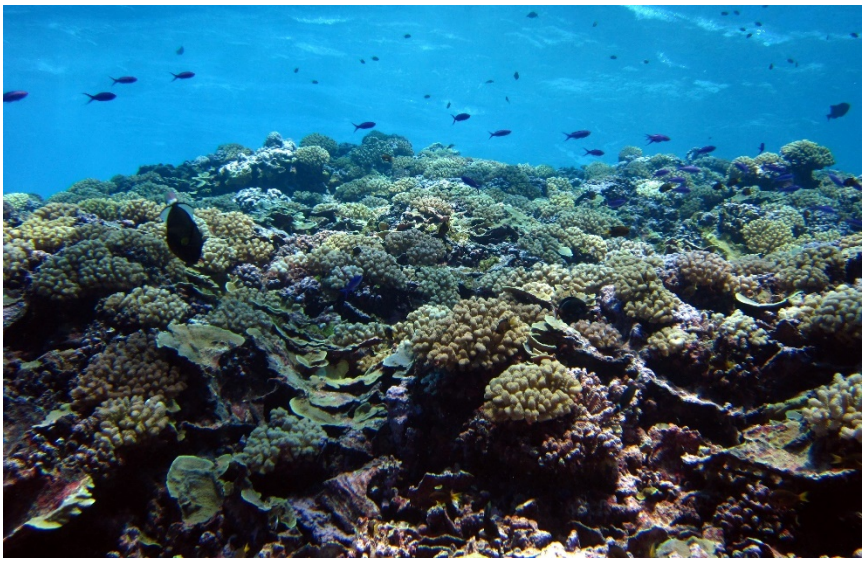


Figure 9: Live Pocillopora coral colonies at Swains Island during the 2010 ASRAMP cruise. Photo credit: NOAA

Appendix 1: Assessment Scales

Coral Cover

Category	% Visual assessment
0	< 1
1	1 – 10
2	10 – 50
3	50 – 90
4	> 90

Bleaching Extent (adapted from Oliver *et al.* 2004)

Category	%	Visual assessment
0	< 1	No bleaching observed or occasional scattered bleached colonies (< 2 per dive).
1	1 – 10	Only a few corals are bleached. Bleached colonies seen occasionally but vast majority of colonies not bleached.
2	10 – 50	Bleached colonies frequent but less than half the corals are bleached.
3	50 – 90	Bleaching very frequent and most corals bleached all colonies.
4	> 90	Almost all corals are bleached, unbleached colonies not common. Whole reef looks white.

Bleaching Severity (adapted from Oliver *et al.* 2004)

Category	Visual assessment
0	No bleaching
1	Partially bleached (surface / tips pale but not white)
2	Completely bleached (bright white)
3	Completely bleached + partly dead
4	Recently dead

Functional group categories (also growth forms)

Functional groups
Acropora table
Acropora branching
Acropora arborescent (need to define)
Acropora staghorn
Porites massive / mounding
Montipora encrusting
Other encrusting
Other massive / mounding
Other branching
Plating / foliose
Free-living
Mix –> Porites rus