

National Marine Sanctuary of American Samoa

Climate Change: Bleaching

Management Issue

Coral bleaching events can have lasting effects on the physical and community structure of a coral reef system. Drivers for these events are well documented, and increased sea surface temperatures can be a significant contributor to bleaching events around the world. The National Marine Sanctuary of American Samoa (NMSAS or Sanctuary) needs to understand the short and long term impacts of coral bleaching as a result of increased sea surface temperatures to plan for and better manage the resources of the NMSAS.

Description

There has been a history of severe coral bleaching events in American Samoa. While coral reefs are dynamic and can be resilient to localized and temporary disturbances; the detailed long term effects of climate change that will raise the temperature of the ocean and in turn may cause coral to bleach and die are now becoming well understood. American Samoa is known for having water temperatures that can peak as high as 34°C at shallow reefs and coral bleaching is an issue. Consistent, seasonally high temperatures can make conditions stressful for marine organisms. Particularly, bleaching is a major stress response to high temperatures. Corals and giant clams are major reef building organisms that are known to bleach in response to high temperatures.



*Bleached coral in Fagatele Bay.
Photo credit: Chuck Birkeland*

Questions and Information Needs

- 1) What characteristics of a specific area confer resistance or susceptibility to bleaching?
- 2) What characteristics of each coral or giant clam species confer resistance, resilience and susceptibility to bleaching?
- 3) How widespread are bleaching events in the sanctuary?
- 4) How far in advance can bleaching events be predicted using currently available tools?
- 5) Can the duration and geographic scope of bleaching events be predicted?
- 6) How do bleaching events affect the ecosystem as a whole?
- 7) What amount of corals and giant clams survive mild/moderate/severe bleaching in the sanctuary?

Scientific Approach and Actions

- Identify areas that are generally more stable during bleaching events to ensure that they receive maximum possible protection through marine spatial planning
- Identify species and habitats within marine ecosystems that are highly vulnerable to bleaching
- Identify transition or alternative habitats that will provide for shifts in distribution and abundance of species and habitats affected by coral bleaching
- Complete a vulnerability assessment of village communities in American Samoa to identify bleaching vulnerable reef dependent human communities
- Make regular measurements of parameters that track basic critical coral bleaching indicators
- Monitor the ecological impacts of coral bleaching
- Identify, develop and test intervention measures to reduce stress from coral bleaching to coral reef ecosystems
- Implement and monitor possible intervention measures which reduce the impacts of coral bleaching
- Monitor the socioeconomic correlation to coral and giant clam bleaching and the associated impacts of the marine ecosystem.

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For More Information -- <http://www.sanctuaries.noaa.gov/science/assessment>

Key Partners and Information Sources

Hawai'i Institute of Marine Biology; NOAA/NMFS/PIFSC/Coral Reef Ecosystems Division; NOAA/NMFS/PIFSC/CRED/Pacific Benthic Habitat Mapping Program; NOAA/NMFS/Pacific Islands Fisheries Center; NOAA/NOS/National Center for Coastal Ocean Science; NOAA/NMFS/PIRO, US Fish and Wildlife Service; US Geological Survey/Biological Resources Division; USGS/BRD/National Biological Information Infrastructure/Pacific Basin Information Node; Territorial Government of American Samoa, American Samoa Department of Marine and Wildlife Resources, The National Park Service of American Samoa

Management Support Products

- Report describing characteristics that may relate to resistance or susceptibility to bleaching
- Produce scientific papers and reports on the extent, impacts and predictability of bleaching events
- Presentations on research results at conferences, symposia, meetings and workshops
- Maps of particularly sensitive areas
- Education and outreach products to inform about the impacts of coral bleaching on sanctuary resources
- Coral bleaching response plan

Planned Use of Products and Actions

- Draft a Bleaching Response Plan with information collected during research and monitoring activities
- An initial assessment of bleaching in giant clams
- Contribute to the data record on long term monitoring of coral bleaching in Fagatele Bay
- Use data collected and analytical results from research to develop or enhance education and outreach products
- Utilize research results to inform management and implementation of the Marine Conservation Science Action Plan
- Restrict activity in sensitive areas
- Facilitating future research
- Mitigation options identified by scientific activities will be considered for action
- Create areas with elevated protection based on identifying "sensitive" areas (e.g. limiting permits)

Program References

NMSAS Management Plan

- Action Plan 4.1 Marine Conservation Science
 - Strategy MCS-5: Continue to enhance research and monitoring programs throughout the life of the plan
- Action Plan 5.1 Climate Change
 - Strategy CC-2: Identify and implement strategies to maximize the resiliency of coastal and marine resources to potential climate change impacts at National Marine Sanctuary sites in American Samoa.
 - Strategy CC-3: Conduct and facilitate targeted research and monitoring efforts to respond to the effects of climate change impacts at National Marine Sanctuary sites in American Samoa.

NMSAS Condition Report

- These activities will support questions 1, 4, 5-9, 11-14

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