

2007 FAGATELE BAY NATIONAL MARINE SANCTUARY CONDITION REPORT

REVIEWERS AND AFFILIATIONS

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REVIEWER COMMENTS (IN NO PARTICULAR ORDER)

Reviewer 1 of 3:

Comments on the Condition Report for the Fagatele Bay National Marine Sanctuary

This report is right on target and interprets the available data very reasonably. I agree with their assessments of the state of the resources and conditions of the habitats, the influences of past events, and their judgments of the factors that are most threatening. They have included all the pertinent information from reports. I believe most researchers are impressed with the resilience of American Samoan coral communities in face of the multiple destructive events. In contrast, the fish populations have not been recovering. The common response of visiting scientists is that with the recovery of corals but not fishes, the coral reefs of American Samoa are like “a beautiful mansion, but nobody’s home”. It may be that the disturbance events to the corals have been acute, allowing for intermediate periods for recovery, while the fishing pressure has been chronic. I don’t have any recommendations for changes in the report. I hope this report is updated periodically for future happenings.

There are only two statements with which I am not confident. These statements do not need to be changed because I do not have conflicting evidence. But I feel that since I have no substantive criticism, I might as well state my doubts to show I did read the report. The report states (page 13) that there were “millions” of crown-of-thorns starfish (COTS) in the 1978 outbreak. My feeling is that there was more like only one million, and maybe even less. The bounty system removed 486,933 COTS which were buried on the beaches when the funds for the bounty ran

out. This did not have a clear impact on the population of COTS, there seemed to be as many as before the half million were removed. Considering the size of Tutuila and the densities at various locations in 1979, I would think one million is the best guess and “millions” is too high an estimate.

In the second paragraph of the Abstract, it is said that “Although Fagatele Bay and its fringing reef have experienced severe disruptions from...and more recently from coral bleaching and diseases...” I am not convinced at this time that the diseases of corals or crustose coralline algae have been severe or have recently appeared or increased. As with the previous paragraph, these statements do not need to be changed because I do not have conflicting evidence, but feel I should express my doubt and urge future surveys to pay particular attention to the increase or decrease in the prevalence of disease. When I first heard of the Coralline Lethal Orange Disease (CLOD), I looked for it. It was easy to see because it is a bright orange band leaving a white patch behind. But despite it being colorful, I only see it when I look for it. If I am focused on surveying corals, I seem to go right by it. The same is the case on Guam where I see CLOD when I look for it, but not if I am focused on other things. Like COTS, CLOD seems to ordinarily be relatively rare but conspicuous. Unlike COTS, I have not seen CLOD in major outbreaks. It is important to explicitly add CLOD and coral diseases to the list of items for focus in future surveys.

In the second paragraph on page 7, 120 m is equated with 300 ft. I believe 120 m is closer to 400 ft.

In the first paragraph of page 7, FBNMS is said to serve “...as an extraordinary example of a pristine tropical marine environment...” With global changes in the environment, “pristine” (in original untouched state) might be platitudinous. The description of COTS as a “benign” member of the reef community when rare also seems unnecessary. The sentence might be made more accurate by simply removing “and benign” from the sentence.

In contrast, I believe the use of the word “alleged” in the caption for the photo at the top of page 17 might be too cautious. I believe I remembered Alison Green actually found some physical evidence of explosives. It would be best to check with Alison Green. I will do so myself right now. I will pass on to you what I learn from her.

Page 17, Diseases: The crusty black crustose coralline disease might be as common as CLOD but less conspicuous because of the dull color. The abundance of CLOD might be positively correlated with the abundance of crustose coralline algae (CCA), indicating a positive relationship. Of course, I suspect the relationship is negative, and as for COTS, I would not call CLOD “benign”, but I also feel there is no evidence of CLOD gaining in abundance over CCA. However, I may be wrong and so I agree that it is important to keep a record over time on the relative prevalence of CCA and CLOD.

In the bulleted trends of conditions of marine resources on page 28, it is stated that disease has “impacted” the condition of some corals and coralline algae. An impact is an abrupt collision, something brought about by an acute event. Perhaps one could consider a hurricane, earthquake

or outbreak of COTS having an impact, but I feel another word such as “weakened, degraded, deteriorated” or something other than impacted should be used for a disease which is more chronic than acute. It is often said that humans impact the reef, which implies they are falling on the reef from the sky like meteors. Or, perhaps more realistically, if a fast moving boat impacts a reef when a passenger is standing on the bow, the human might then impact the reef himself. We have such a beautiful language; we should use it more respectfully.

It is good that on page 24 the small size of fishes is emphasized. Recent research by Bruggemann (1996, MEPS 134: 59-71) and research towards her PhD dissertation by Ling Ong at the University of Hawaii are showing that some scarids greater than 20 cm in length have major effects on bioerosion while those less than 20 cm length have no effect. More attention should be given to changes in sizes of fishes.

I think it is commendable that the writers of this report have recognized the importance of human population growth and human culture traditions on the systems of resources.

Reviewer 2 of 3:

10/18/06

Review: Condition Report for Fagatele Bay National Marine Sanctuary

I find the NMS Rating Scheme for monitoring questions to be well designed and I concur with the ratings for Fagatele Bay NMS. The status and trends are reasonable summaries of current conditions in the bay, however the section on “responses” to “pressures” is weak. My specific comments follow:

1. page 2, abstract, paragraph 3, last sentence.

“Continuation of the long-term monitoring program in the bay is considered a top priority for FBNMS...” FBNMS has sponsored an extraordinary 25-year monitoring program, but it seems that effort has been under-utilized by both sanctuary managers and scientists. While there have been several reports, I am aware of only one article in the peer-reviewed scientific literature, and I am not aware of any management decisions that have been based on the findings. Nonetheless, the potential biological value of this long-term dataset remains high, as noted below.

2. page 5-6, abstract, Summary table.

Good summary and supporting comments.

3. page 7, Site History and Resources, Overview, para. 1.

FBNMS cannot be pristine and overfished at the same time (“severe declines for some species”).

4. page 8, Site History and Resources, Geology, para. 2.

While I am not a geologist, I think the following statement is incorrect: “The island formed as the plate traveled over a ‘hot spot’ of volcanic activity that is believed to result from geological stresses created in the Pacific Plate by its descent into the Tongan Trench.” The Samoan hotspot is probably not related to the plate’s descent down the Tongan Trench. Instead, volcanism more typically occurs on the stationary plate as the other plate descends beneath it, causing stress and volcanic eruptions along the edge of the stationary plate.

5. page 15, Pressures, Coral Bleaching.

This section is mis-named. Coral bleaching is a symptom. The pressure is global warming.

6. page 16, Pressures, Fishing.

The graph of fish catches in the territory does not seem relevant to this section. It does not describe fishing in FBNMS and it provides no context for why the graph is included.

7. page 17, Pressures, Diseases, para. 2.

Because CLOD is of “particular concern” to FBNMS managers, I would think that there would be mention of the equally abundant second disease of crustose coralline algae, the black lichen-like fungus, that occurs in FBNMS and is described by Littler & Littler.

8. page 18, Pressures, Agriculture.

It is appropriate that FBNMS pay attention to the watershed around the bay, but much of this section, as written, is not particularly relevant to FBNMS. Also, I find the information on taro to be a bit too romantic a view. In general, the taro farmer clears an area on the steep hillside, removes virtually all vegetation down to bare earth, and plants his taro. Bare earth on steep slopes is a good recipe for erosion. After harvest, the plot is left fallow for about 2 years, during which time alien invasive weeds (particularly mile-a-minute vine) carpet the exposed ground and may drape nearby trees, as occurs in Fagatele Bay. The photo on page 20 shows this clearly, and the caption statement that “The reason for this proliferation of invasive vegetation is unclear” is not really correct. The photo shows a taro farmer’s field lying fallow and covered by invasive vines (probably *Mikania micrantha*). Agriculture is not a new activity in Fagatele Bay – it has probably occurred intermittently over the years.

9. page 21, State of Sanctuary Resources, Water, para.. 1-3.

These paragraphs are not particularly relevant to FBNMS. Also, probably the biggest water quality issue is hardly mentioned at all: increased water temperatures due to global warming.

10. page 21, State of Sanctuary Resources, Water, para.. 4, bullets.

The format of these sections, with general text followed by somewhat unrelated bullets causes some confusion for the reader.

11. page 21, State of Sanctuary Resources, Water, fourth bullet.

Given that “extensive land clearing for agriculture” has already occurred, change the wording “may impact” to “already has impacted”. For the same reason, the “integrity of the forest” (jargon) has already been affected.

12. page 24, State of Sanctuary Resources, Living Resources, fish, para. 3.

While I agree that the abundance and size of some large coral reef fish is low (as shown in the lower graph on page 26), I do not recall seeing data that document this decline, and the top figure on page 26 does not support this idea very well.

13. page 26, State of Sanctuary Resources, Living Resources, fish para. 4.

The statement is made that it is critical to assess fishing pressure, but then the problem seems to be left for someone else to figure it out.

14. page 27, State of Sanctuary Resources, Living Resources, turtles, para. 2.

Turtles “are often seen in the waters of the bay”. While that may be technically true, it is not my experience. Also, Fagatele Bay is very small and it is probably the same turtle that is seen “often”. An n=1 would not be a lot of turtles.

15. page 28, State of Sanctuary Resources, Living Resources, turtles, last bullet.

“...but awareness of the need for stewardship may influence future harvests”. Meaning unclear.

16. page 30, Response to Pressures.

The ‘Condition Report’ seems rather disoriented in how to respond to the identified “pressures” affecting FBNMS. The seven “pressures” listed earlier in the report seem to get lost in the shuffle because they are not dealt with individually here.

(a) Water. Delete the first 3 sentences in this section because they are not really relevant to FBNMS. Incidentally, in 2004 ASEPA measured nutrients around Tutuila Island (probably including FBNMS) but their EMAP report is not yet available.

(b) Living resources. This section side-steps the issue of resource protection by simply listing regulations that are difficult to enforce. There are indications that resources are overfished and they are likely to remain so. I will be the first to agree that these are difficult issues for a small MPA, but it is not appropriate to sweep them under the rug.

(c) Elephant in closet. Perhaps there is no mention of global warming in the Response section because there is little FBNMS can do about it. However, this hear-no-evil, see-no-evil approach was unexpected.

(d) Database. A thorough analysis of FBNMS’s extraordinary 25 years of monitoring might provide some key insights to changes projected to occur due to increasing water temperatures. I recognize that it is difficult to track down decades-old data, but this dataset may be worth the effort. Brian McArdle made some significant headway in statistically analyzing and reconstructing FBNMS’s database in about 2004, but I suspect his report is sitting on a dusty shelf. Perhaps more progress could be made by hiring a person to work directly with the Principal Investigators in their offices in Hawaii. It is not often that we are sitting on top of a 25-year database, and given the dire projections for coral reefs due to global warming, an attempt to reconstruct the database may be one of the most important things FBNMS can do.

Reviewer 3 of 3:

This condition report accurately reflects the status and trends at Fagatele Bay National Marine Sanctuary. I found the review provided very good coverage of the situation at Fagatele Bay and the threats faced by the reef there.

I recommend just a few small changes. On page 7, it says that the visibility is about 20 m. The water is very clear there, most of the time I would think it is closer to 30 m visibility in the deeper water, though it may be more like 20 m in the shallow waters. I would suggest saying 20-30 m.

On page 7 it says that the steep slopes around the Sanctuary keep introduced vegetation away. Then on page 20 there is a picture of the slopes with many vines on it and it talks about invasive plant species on the slopes. Perhaps the difference is between introduced species and invasive species (which need not be introduced?). But normally we would think of invasive species as being those introduced species that spread rapidly.

On page 8 it says that the “hot spot” of volcanic activity is believed produced by stresses from the splitting of the plate as plate south of Samoa descends into the Tongan Trench. I believe that the hotspot is east of that area, and is thought to be caused like other hotspots by a mantle plume of hot magma. The stress and splitting has been suggested to contribute to the relatively recent (1911) eruptions on Savai’i in (independent) Samoa, to the west of American Samoa, and directly north of the Tongan Trench and the closest spot in the archipelago to the trench.

On page 21 it says it is unknown whether pollution reaches offshore waters. The American Samoa EPA has done a study of waters on the reef slopes. They found that outside the bays, the water was very similar to open ocean water, low in nutrients and very clear. It appears that sediment, nutrients and other chemicals from land are rapidly diluted when they reach the open water on reef slopes. So although there may be small amounts of pollutants in the offshore waters, levels appear to be low.

The views expressed above are those of the author alone, and do not reflect that of any institution.