

June 15, 2010

Review: Coral Reef Biological Criteria: Using the Clean Water Act to Protect a National Treasure

Summary Comments:

Although I agree that coral reef management and conservation could benefit from identifying the appropriate biological criteria, I found this document to be of little use in providing a coherent argument for it or helpful guidance to managers in developing criteria. I found this document overly generalized, with little substantive information.

Specific comments:

1. Chapter 1
 - a. Introduction: This is somewhat superficial, lacking in facts and references related to the description of coral reefs, their significance and value.
 - b. Table 1-1: Why are the FL Keys and Caribbean omitted? This is where the most significant number of reefs are located vs the Gulf of Mexico. Similarly Hawaii is probably the least representative of the Pacific reefs as they have low diversity.
 - c. Table 1-1: The entry for Cnidaria: there is a duplication of anemones in the first column.
 - d. As each one of the steps outlined in Table P2 is addressed and its application to coral reef ecosystems identified, the authors should provide linkage back to the step in this table their points address. This will provide some measure of continuity and reference back to the larger picture and actual goal the authors are trying to achieve.
 - e. Overall I think this chapter could be improved by setting out a clear premise that is tightly tied to coral reefs. The chapter comes across more as a jargon that reiterates generalities about water quality standards and associated components and then tries to make a case for a biocriteria program. Because the information is so generalized the case the authors build is weak. I agree that biocriteria for reefs are important but as a scientist I would like to see more substance to the material presented.
2. Chapter 2
 - a. The treatment of this topic is very superficial and overly simplified. The authors need to strengthen their argument for why reefs are important and substantiate their points with adequate peer-reviewed references.
 - b. The lack of references is problematic. Ex. Why use the Federal Register as a reference to describe ecosystem services?
 - c. There seems to be a general lack of scholarship throughout this document.
3. Chapter 3
 - a. This chapter seems to lack a real thesis, and does not really fully answer the question the authors pose. There is no real rationale for their selection of 'what should be protected' and again seems to be more conjecture than substance relevant to their declared audience of 'managers'.
4. Chapter 4

- a. The authors' treatment of this subject matter is so general and somewhat superficial, that I question the real value of this information to a coral reef resource manager.
- b. pg 4-2; para 2 line 6 zooplankton is misspelled
- c. pg 4-3; para 1 – I disagree that an indicator needs no specific information about the source or type or degree of indicating. I believe going blindly to develop indicators is not a scientifically sound approach.
- d. I would suggest the authors consider another criterion for developing an indicator is the time-scale needed or expected by a manager to be able to detect change, either for detecting impacts or restoration.
- e. pg 4-5 – Table 4-1 the legend is incomplete.
- f. pg 4-5 Table 4-1 – the authors do not address the time scale within which these metrics are able to report. These metrics seem rather gross in nature. Though the authors may have found correlations along a gradient, there is no evidence that these are related to causation.
- g. Table 4-2 – I would suggest avoiding the generality of stress genes and proteins. Though not clear in the legend, it seems that these are supposed to represent metrics of injury or damage. The use of stress genes and proteins should be avoided in this context as it is too general and imprecise. Often stress proteins or transcripts are only indicative of a response and do not alone indicate injury or damage. Measure of physiological parameters that indicate a pathology would be more appropriate consideration in the context of damage.

5. Chapter 5

- a. Again the subject matter is treated so superficially for this chapter the real message could be condensed into a page or less. There is a lot of superfluous rhetoric that dilutes the point.
- b. Figure 5-1 is incorrect there are two maps of St Croix instead of the upper one being St John as described in the legend.
- c. The information presented seems to be developed around Caribbean reefs, particularly the USVI. Pacific reefs in structure, diversity and density is quite different than the Caribbean. It is well know that survey methods appropriate for the Caribbean are inappropriate for the Pacific, yet the authors do not seem to address these differences.
- d. I am not sure how valuable this discussion will be for managers.

6. Chapter 6

- a. Pg 6-2 last sentence of last paragraph: UAA should be defined and 're' is unclear to its meaning.
- b. Pg 6-3, first sentence: "In heavily disturbed landscapes," a ',' needs to be placed in the sentence after landscapes.
- c. The entire discussion of biological condition gradient is supposition from the freshwater work and though it may be appropriate for coral reefs, the authors have not provide a reasonable technical argument that it is indeed appropriate. Again this document is frustrating because there seems to be a lack of substance, a lot of generality that I cannot see the value, especially to support the publication of a document this long. It seems as though the authors had some data from the USVI that

was not publishable in a peer-reviewed journal and so is being used as an example embedded in an attempt to make an argument that biological criteria are needed for coral reefs. This would be fine if there were sustentative arguments, theory and logic provided in the document along with some concrete guidance for developing the biological criteria, discussion of how to select criteria appropriate for the questions being asked etc.

7. Chapter 7
 - a. Pg 7-2; line 5. 'Indicators' should be 'Indicator'

8. Chapter 8
 - a. Though again a superficial treatment of the subject, this is one of the better chapters. There are no references or real discussion of the numerous papers by Dr. Glen Suter and his colleagues. Consulting this group could greatly improve this chapter and likely the entire document, particularly Dr. Cormier who has past experience in marine and reef environments.
 - b. Table 8-1 is not mentioned in the text.
 - c. Table 8-1 needs to be qualified as only examples. The responses should be referenced back to their original papers and also given critical evaluation by the authors. As written it gives a very inappropriate message with many major responses overlooked, e.g., there are many more genetic expression alterations than just to heavy metals, in that regard there are specific protein expression profiles indicative of damage related to pollution, for boating and shipping – antifoulants were omitted; for invasive species – algae, one of the major problems in Hawaii was overlooked; tourism – sunscreens; nutrients.

9. Chapter 9
 - a. Page 9-10 has no page number or footer.

10. Chapter 10
 - a. Style in page numbering has changed from the rest of the document in the footer
 - b. Add a period at the end of paragraph 2.

11. Appendix A1
Add: TNC, AUU

12. Appendix A2 Glossary – many of these have no reference as to the source of the definition. The addition of references would add more credibility to the entries in the glossary and correct some that are either incomplete or incorrect.
 - a. *Acropora cervicornis* and *Acropora palmata* - these are listed as THREATENED status on the ESA. The definition suggests they are ENDANGERED status.
 - b. Contaminant – format of colored font has changed
 - c. Disease – This definition is incomplete and inaccurate. I suggest the authors get an authoritative definition for this word. Disease is not caused by just infectious agents. Disease can occur from nutritional problems, genetic, toxicants etc.
 - d. The authors included fauna but not flora. Flora should be added.

- e. Health – this definition needs to be better defined. The authors may consider reading David J. Schaeffer’s papers on ecosystem health and measuring it.
 - f. pathogens – The authors should use a medical reference for appropriate definitions. They would discover that pathogens in the strict sense can also be noninfectious agents.
 - g. PLEASE check a chemistry book for the distinction between pH and alkalinity! This is a gross error.
 - h. soft corals – this definition is poor and should at least show some scholarship when selecting these definitions.
 - i. stressors – the authors should include ‘chemical’ in addition to physical and biological factors
13. Appendix A3 – did not review
14. Appendix A4 – this was a helpful section and really is the message of this lengthy document.
14. Appendix A5 – not sure this adds much to what was already said earlier in the document.
15. Appendix A6 – this reads more like an EPA solicitation. It is not clear what value this adds.
16. Appendix A7 – no comments.