



Davis College of Agriculture, Natural Resources and Design

21 February 2010

Gerald W. Bowes, Ph.D.  
Manager, Cal/EPA Scientific Peer Review Program  
Office of Research, Planning and Performance  
State Water Resources Control Board  
1001 I Street  
Sacramento, CA 95814

Dear Dr. Bowes:

I have addressed each of the 32 identified “issues” regarding the California Rapid Assessment Method (CRAM) that I received on 21 January 2010. However, I was not sure what is being asked of me as a reviewer on some of these issues as there are no real questions presented. Nonetheless, I did the best I could in addressing the concerns and any other issues in the documents. I reviewed all 3 of the volumes and the webpage per your request.

Sincerely,

A handwritten signature in black ink that reads 'James T. Anderson'.

James T. Anderson, Ph.D.  
Professor, Wildlife Ecology and Management  
Director, Environmental Research Center

West Virginia University  
Division of Forestry and Natural Resources  
PO Box 6125; 322 Percival Hall  
Morgantown, WV 26506-6125

[jim.anderson@mail.wvu.edu](mailto:jim.anderson@mail.wvu.edu)

(304) 293-3825 Phone

(304) 293-2441 Fax

**Division of Forestry and Natural Resources**

Phone: 304-293-2941  
Fax: 304-293-2441  
[www.caf.wvu.edu](http://www.caf.wvu.edu)

322 Percival Hall  
P.O. Box 6125  
Morgantown, WV 26506-6125

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## **Group 1 Issues**

1. CRAM like most wetland rapid assessment procedures has multiple functions and uses. The 8 recommended appropriate uses are all expected and typical of other rapid assessment procedures. I believe the documentation throughout the manual is supportive of these uses. I also believe the inappropriate use section is useful for acknowledging the limitations of the CRAM. I do not have any issues with item 1.
2. The Level 1-3 USEPA wetland assessment approach has been widely adopted by state and federal agencies. I am well versed with this 3-tiered approach and believe that CRAM is well suited for Level 2 assessments.
3. CRAM is designed for use throughout California. I was pleased to see the perceived limitations in assessing structurally simple wetlands, such as headwater riparian areas with simplistic vegetation structures, as mentioned in the document. CRAM is designed as a dynamic system to capture the various wetland classification regimes (HGM, NWI, and unique CA wetlands) so it should have enduring value. While I do not find these limitations overly troublesome I encourage the development of additional models suitable for these important but under represented wetlands.

## **Group 2 Issues**

4. There is a solid foundation of literature stressing the use and value of adaptive management and Pressure-State-Response modeling. CRAM reportedly uses this Pressure-State-Response approach and best sums it up in the last sentence of 2.2.1 (although there appears to be a typo) "For the purposes of CRAM the PSR model is simply used to clarify that CRAM is mainly intended to "described" state conditions of wetlands". I assume the author's are trying to put CRAM in a theoretical framework but I don't truly see the need for this.
5. Agreed; these assumptions are common to most rapid assessment methods. Ecological conditions are evaluated based on a fixed set of observable indicators, and that conditions respond to variation in natural and anthropogenic stress in a predictable manner. This is common in CRAM and other methods. I have looked extensively at the metrics for developing our own rapid assessment metrics and find them to be grounded in good (albeit sometimes incomplete data). However this should not be viewed negatively as obtaining all of these data would take additional substantial time and money.
6. The definition of wetland condition is suitable and appropriate because it includes reference to healthy wetlands and includes the concept of self-organization as it relates to biotic and abiotic characteristics.
7. This is a reasonable assumption. There are multiple scientific papers stressing the importance and impacts of many of these stressors. Similar stressors and ratings are used in numerous other rapid assessment methodologies including Ohio, Pennsylvania, and West Virginia.

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8. Six assumptions are made regarding CRAM. Like in previous statements these are all mostly items that are based on common scientific knowledge and principles. There is adequate literature evidence to support all 6 of these assumptions. I see no issue here.
9. I do not believe that the metrics are completely independent from natural variation but I agree with the statement that the variation in stress can be distinguished from natural variation. Wetlands are subject to tremendous natural variation that prevents simple classification and categorization of all natural variation. However the rating scale and simple checklist of stressors does allow for the natural and anthropogenic forces to be separated.
10. The CRAM development methodology is well-developed and well-respected. Several additional states have developed similar methodologies but with different metrics. Nonetheless, these other states used a similar methodology of design, calibration, and validation. Moreover, as pointed out in the question, the CRAM was partially based on other wetland rapid assessment literature that has been through the peer-review process.
11. CRAM has undergone extensive calibration of metrics and will continue to undergo calibration. This is a sensible approach and is consistent with an adaptive resource management framework, where additional information is used to inform management decisions. These changes in metrics and methodology have declined and will continue to decline, but as mentioned this is a good approach to follow. Repeatability among observers is critical for a useful rapid assessment technique.
12. True. That's one of the reasons for doing a rapid wetland assessment technique. Small differences in condition class are very difficult to detect but a moderate target is suitable.
13. CRAM has undergone extensive calibration of metrics and will continue to undergo calibration. This is a sensible approach and is consistent with an adaptive resource management framework, where additional information is used to inform management decisions. These changes in metrics and methodology have declined and will continue to decline, but as mentioned this is a good approach to follow.
14. I think that almost all natural resources related field studies would be sufficiently happy with 10% precision. As long as training continues to be mandated for use of CRAM than these target numbers should be able to be met.
15. The concept of best achievable condition can be derived two ways: based on an idealized wetland taking into consideration all wetlands across types, location, etc. or the way CRAM was done which is by looking at the data and finding the best wetland based on the pool of surveyed wetlands. I agree with the CRAM approach but one must realize that the "best" achievable score could change over time.
16. Agreed. This is an appropriate way to conduct these analyses. After reading the background and referenced papers I believe their approach was suitable.
17. Again agreed. Most rapid assessment techniques follow this same procedure. One would assume that a CRAM score on one day would be similar to scores on subsequent days under most natural circumstances with a few minor exceptions (i.e., major flooding, fire, etc.). Anthropogenic impacts would be more likely to cause short term changes in CRAM scores,

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which are expected. The “good professional “judgment” statement reinforces the need for good training standards on use of the protocol.

18. CRAM is an ecological integrity/ecological services assessment method. Other considerations may include things such as endangered/threatened species habitat or aesthetics. Additional criteria need to be considered separate from CRAM for human value and importance considerations. This is certainly appropriate for CRAM and similar methods.

### **Group 3 Issues**

19. I think it is important to recognize the limitations of the method so by stating this up front that is good. Future adjustments should continue to be made to the method as new biases are discovered and ways to account and compensate for these biases are created. The addition of updates is not problematic and should continue.
20. Agreed. However it must be recognized that the conditions in and around a wetland will change over time, so condition at one time may not be representative at another time. Calibration and validation studies must take these changing conditions into effect.
21. That is true as it is for other rapid assessment techniques. Many are developed on a statewide, geographic province, or other category. Statewide is generally best since it simplified the entire system. The only issue is it may reduce the number of responsive metrics in some cases. However most methods take this into account based on explanatory power of the models. I assume that is what was done in this circumstance.
22. Yes that is the assumption and I think in this case it is accurate. The same scores should provide a similar measure of condition and functional capacity.
23. At this time it may not be possible to use CRAM to track and gage future conditions and trajectories. The time may come when this is possible if additional research, monitoring, and analysis is completed.
24. Agreed. I think the CRAM QA/QC is a model document that others should follow. I have recently worked on a similar document and appreciate all the thought and effort that has gone into it.

### **Group 4 Issues**

25. Agreed. Like the other methods the classification and resulting assessment scores will (and should) change over time.
26. Determining assessment areas are one of the most difficult parts of the process, but it is obviously central to the entire assessment procedure. The AA procedure for CRAM is well documented and although takes some professional judgment; most of the subjectivity has been eliminated.
27. Appendix I does a great job of describing the assessment protocols. Again it comes down to assessing and determining the AA. As long as training is required and protocols are followed than results should be repeatable.

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28. Variation in metrics and narratives among wetland types is to be expected and does not limit or reduce the value of CRAM.

### **Group 5 Issues**

29. I was extremely impressed with these stand-alone field books. I think they are well-done with adequate explanation of use and limitations with the exception of a few minor issues. I think these additions are important contributions to the entire CRAM method.

30. I do not have an issue with the method although it may be somewhat arbitrary but I think it is reasonable and easily repeatable if a few details are clarified. The example indicates that for the Site Potential Vegetation Height (SPVH) if the vegetation (alders) is 5 m tall than the AA would extend 10 m from the backshore. I do not see a definition for SPVH. In particular the word potential throws me off. If the alder in this case was only 2 m tall would the AA still be 10 m? How is the backshore defined?

31. The protocol to date seems to be based on solid information. As additional data are obtained than I would expect the protocol to change. There is nothing wrong with this but users must realize the limitations of the current protocol.

32. I wish them well with completing this task and recommend they stay on the same course they have been on.

Overall I see very few issues with the scientific merit of CRAM. Where possible they have used the best available scientific data. Best professional judgment is required in places but is kept to a minimum. I found that the CRAM methodology is provided in great enough detail to be repeatable and consistent. I believe it will improve California's wetland management capabilities.

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