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Subject: CONCLUSIONS AND RECOMMENDATIONS

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CONCLUSIONS AND RECOMMENDATIONS

The Science Advisors appreciate again the opportunity to be meaningfully engaged in the GCD AMP. Although we have an ambitious schedule of reviews this year, we are pleased to provide a critique of science directions in the Aquatic Food Base Program. The twelve year monitoring assessment provided in the NAU/GCMRC program has been important in establishing several baselines on how to work in, and understand a very complex system in which it is difficult to conduct effective research and monitoring. The effort provides reference for the proposed new approach.

The Aquatic Food Base Program is clearly at a juncture where it must significantly change approaches and methods to provide the type of support needed by scientists and managers in the GCD-AMP. When making such a profound change in methods, science must evaluate objectively both the strengths and weaknesses of the previous methods, to guide the decision process toward new approaches. The Science Advisors try to utilize the above philosophy in its reviews, especially where changes in protocols or methods are proposed. We offer the following conclusions and recommendations to AMWG and GCMRC regarding this review.

1. Review of the NAU Aquatic Food Base Research.

- a. The past Aquatic Food Base work was a valiant attempt to chart the trends and status of invertebrates and algae by NAU. It is a good beginning, but all reviewers found weaknesses in appropriate use of rigorous and status-of-science design, sampling and analysis, reporting of some science findings, research documentation in science literature, and conclusions drawn from available data.
- b. The state of the science in food base research is currently well beyond the work done by NAU researchers and the past work cannot be used effectively to evaluate persistent management questions and actions. Therefore, an entirely new science effort is recommended, as well as termination of the historical food base program.
- c. The reviewers indicate a number of ways in which the past research and monitoring efforts would need to be modified in order to increase understanding of the food base and provide appropriate information to management.
 - i. Research would have to apply more rigorous and advanced methods of design, sampling and analysis,
 - ii. Develop a more integrated approach to sampling and studies,
 - iii. Base approaches on current scientific literature, and
 - iv. Publish findings in peer reviewed journals.

2. Review of 2001 Program Evaluation Panel (PEP) Report

- a. Unfortunately parts of this document and its recommendations have been dated by new knowledge, and subsequent activities of GCMRC and others. The SAs feel they could have provided more useful information had they been asked to provide input in a timely fashion (the report is now over 2 years old.).
- b. We recommend that reviews of this nature should be accomplished with the intent of utilizing the outcomes adaptively in some manner in a reasonable time frame. It is not clear from review of the NAU/GCMRC program from 2001-2004, that this was accomplished.
- c. GCMRC development of a new proposed Aquatic Food Base Program in 2003 (the Kennedy Proposal, see 3 below) incorporates general tenants of the 2001 PEP panel (i.e., improved ecosystem approaches, need for assessment of factors of production, etc.), but more importantly incorporates new science understanding and a more comprehensive view of the Aquatic Food Base issue. As such, the 2003 proposal was considered as the most current GCMRC food base putative plan..

3. Review of GCMRC 2003 Proposed Aquatic Food Base Program

- a. The program proposal is a critical step forward for GCMRC in that it is based on assessment of

ecosystem processes, pursues issues of food web productivity and energetics in the system, as well as requirements of upper trophic levels, i.e., HBC. All these elements are required in the next steps.

b. The general framework and many elements of the plan are endorsed by the SAs, but significantly greater definition of design and linkages, sampling procedures, interpretive analysis methods, etc must be provided. Importantly, there was full agreement that the techniques proposed are difficult and that at this time GCMRC does not have the staff to undertake this ambitious plan of work. As such we recommend the proposal, considered as a total program, should be placed on hold, and only critical elements implemented in Fy 2005.

c. It is recommended that GCMRC draft an RFP for release for Fy 2005 on Aquatic Food Base Science activity. This open RFP process should identify a specific research effort for immediate startup, that determines most efficient and useful approaches for long term monitoring/trends of the aquatic food base. This effort should involve stable isotope analysis of food web paths from the trophic base (detritus, algae) to invertebrates, to fish, i.e., HBC, that would help identify the energetic base in this system for production at higher trophic levels.

d. It is recommended that the basic elements of the new proposed RFP direction be discussed by the GCMRC Chief, program managers, scientists and SAs during the April science river trip, if agreeable with the GCMRC Chief. This is a proposal for the SAs to provide assistance to GCMRC managers on this critical issue. We may also request that other key scientists be available for the trip if possible.

e. The SAs would also make themselves available to assist with reviews of proposals received in response to this food web RFP, if the GCMRC Chief feels this would be helpful.

f. These new proposed methods (food web analysis using multiple stable isotope signatures) are significantly complex, especially when combined with the vagaries of the research environment. The SAs strongly believe that input from a mid-career to senior level ecosystems ecologist needs to be available to the GCMRC staff through the RFP process or as a staff position. The SAs believe a specialist with a broad perspective of ecosystem processes in aquatic systems and experience in interdisciplinary programs would be most helpful to the Center. Clarification on GCMRC's present and future science staff capability would also be a topic for the river science trip.