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February 22, 1999

Barbara E. Curry, Ph.D.
Southwest Fisheries Science Center
P.O. Box 271
La Jolla, CA 92038

RE: Review of manuscript

Dear Barbara:

I appreciate the opportunity to review the manuscript entitled, "Stress in Mammals: The potential influence fisheries-induced stress on dolphins in the ETP." I want to congratulate you on a well-written review of the topic. I made a few minor comments on the manuscript, but I thought that you did a superb job in pulling together the diverse field of stress biology. Your application of this information on the potential impact of fisheries-induced stress on dolphins raises many interesting questions that need to be addressed before sound policy concerning the fishery can be developed.

Having some experience with studying stress in animals, I do not underestimate the problems involved with studying stress in this wild population. However, I believe that the limited information available does point to a potential problem, and I believe that strategies can be developed to provide information about the potential impact of stress on the well-being of these animals. Hopefully, the data you and your colleagues are obtaining this year will provide the foundation for an experimental analysis of the problem. I agree with you that the two most important areas needing to be addressed are susceptibility to disease and the future reproductive success of dolphins exposed to the fishery.

I would also suggest that consideration might be given to the possibility that exposure to the fishing might be a subclinical stressor that would place the animals at greater risk to other stressors. As you know, I have suggested that such subclinical stressors; i.e., stressors that do not cause any clinical signs of stress, may deplete biological resources that would normally be available to cope with other stressors. As a result, animals experiencing a subclinical stress are vulnerable to other stressors that would, under other circumstances, not affect the animals' well-being. Even when successfully released from the netting, the entire process must cost the animals considerable energy resources. These same resources are needed to cope with the other stressors of their lives. If such stressors should occur before the dolphins have had the opportunity to replenish their

reserves, then we would anticipate that other biological functions, such as immune function or reproduction, would be compromised. At this time we have no idea how long it takes dolphins to recover from an event such as netting during the fishing. I do believe that this question could be answered experimentally.

The issues that you raise are both interesting and important. Not only will this work contribute to developing policy concerning the tuna fishery and dolphins, but also I believe that some of your findings will contribute to our fundamental understanding of the stress biology of animals. I am willing to provide you with assistance as you see appropriate.

Sincerely yours,

Gary P. Moberg, Ph.D.
Professor and
Associate Dean for Animal Biology

GM:sk