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HOUSE SUBCOMMITTEE ON INSULAR AFFAIRS, OCEANS AND WILDLIFE

OVERSIGHT HEARING “MANAGING OCEAN AND WILDLIFE RESOURCES IN A DYNAMIC ENVIRONMENT: PRIORITIES FOR THE NEW ADMINISTRATION AND THE 111<sup>th</sup> CONGRESS”

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THE CONSERVATION IMPERATIVE

The Subcommittee recognizing...“that the conservation of our ocean and wildlife resources will be “... impacted by a host of challenges, including climate change, energy development, the economic downturn, and federal budget deficits...”, has asked my views “regarding: 1) the information, product, and service needs necessary to address conservation in a dynamic era; and 2) new tools, which Congress may consider...to protect and conserve...ecologically healthy oceans.”

In the global and national context, the substantial environmental challenges that we face are intertwined with the ever-increasing human population and consequent food and water shortages; growing limitations in waste-management options; and declining societal welfare. The concentration of population into cities located on coasts or large waterways continues unabated. The differences in priorities between the rich and the poor are significant challenges to any comprehensive approach to coastal and ocean conservation.

In addressing these issues, we have sometimes arrived at simplistic definitions and approaches that are potentially ineffective in solving the problem. These simplistic approaches are evident in terms of both what we know and what we do not know and in terms of the conceptual underpinnings for policy.

For example, while everyone knows that climate change is affecting the ocean, many think that the effect is limited to sea-level rise and increased ocean temperatures. However, the increased heat has significant influence on ocean stability and hence on nutrient cycling and ocean productivity, affecting at the fundamental productivity and organization of the ocean ecosystem.

With regard to conceptual underpinnings, when we think of the challenges facing our ocean resources, we naturally think of “conservation.” In the early 1900s, society became aware of the need to conserve our natural resources. At that time, “conservation” was an important *concept*. While, at that time, some had the prescience to understand its importance, others perceived resources to be virtually limitless and suppressed actions

that would have prevented the irreversible effects of human activity that we observe today.

But, conservation is no longer a concept, it is an *imperative*. Taking into account the involvement of a burgeoning global population, a growing scarcity of many resources, and the complex character of global environmental change requires establishing the *conservation imperative*. An imperative requires action! And it is obvious that plans for action need to be constructed in the context of shrinking budgets and the need to preserve and even create employment.

How do we address the conservation imperative in time of scarce possibly shrinking budget resources?

In a time of shrinking budgets, we have to ask the right questions to ensure that we focus our resources on the most important problems. As an approach, we might start by listing all of the perceived conservation issues that concern us. We would find some issues would be relatively easy to identify. Other issues would be extremely complicated. Some of the complicated issues would be oversimplified to the extent that their supposed solutions would not result in the intended effect and, in fact, some of the unintended consequences might be negative.

In addition, we would almost certainly find that the magnitude of the total perceived required effort would far exceed resources needed to address the issues. (Let us not forget that some environmental issues are global in scope.)

The actions implied by the conservation imperative require us to select the most important conservation programs given a fixed budget. What are the smart choices? Are some remedies simplistic? Can we make everything pristine? How do we factor in sustainability and balance the political realities of resource use?

At the end of the day, we need a concrete quantitative analysis to assure us that we are asking the right questions. Without such analysis, how can we be sure that the budget and personnel are appropriately allocated? As important, are we organized to maximize our capability to address the right questions in a cost effective way?

Let's examine the specific case of the conservation and management of fish stocks. The conservation of fish stocks is governed by the Magnuson-Stevens Act. This legislation requires that management strike a balance among competing goals: 1) eliminating overfishing, 2) fully utilizing optimum yield, 3) taking into account the economic and social fabric of fishing communities, and 4) utilizing the best available science in the process.

In the context of the conservation imperative in this particular application, we do not have the tools to address the balance among controlling fishing, obtaining the optimum or maximum yield, and balancing the needs of society.

The core science equations used in fishery management are not realistic. The ocean environment drives variations in fish stock abundance, yet it is not included in the core science equations. Many fisheries catch many species at the same time, yet the core equations are only capable of dealing with a single species at a time (not two species and certainly not entire ecosystems). The population dynamics of fish populations are dependent upon the ecosystem within which they live, yet ecosystems are poorly understood. In particular, the component of the ecosystem that drives fish recruitment—the dynamics of the plankton and their interaction with physical forcing—is in particular even less understood. Despite the fact that there is considerable information on fishery economics, that information and associated body of theory is almost never used in fishery management.

Existing data on fisheries is dependent to a significant degree on results from research survey vessels. Because these vessels are very expensive to operate, it is difficult to assemble frequent relatively real time data. The reliance on survey vessels meets some needs but suppresses obtaining data from fishing vessels. Data from fishing vessels satisfies the need to know how effective each fishing vessel is, a critical need in management, and provides basic data.

The nature of the core science equations, the data necessary to fuel the core equations, and the flow of information comprise a system. This system has neither been specified nor analyzed in the context of a systems engineering problem. Experience shows that managing without using a systems context is very expensive. Adopting a systems approach would improve the quality of management without increasing costs.

At stake is the fact that the legal requirement of the MSA, to balance the competing goals of suppressing overfishing, attaining optimum yield, and taking into account the economic and social needs of fishing communities are poorly addressed.

So how do we develop the *capability* to address the conservation imperative in fisheries? We need to develop a critical-mass effort in three essential areas. To do this we need to develop a sending-a-man-to-the-moon approach. We need to focus many existing efforts in three national research centers.

There needs to be a National Center for Ocean Ecosystems Research (NCOER). Virtually every fundamental problem that relates to our resources—fisheries and the waste-sink capacity of the ocean—can be found in the structure and functioning of the ocean ecosystem. The NCOER would focus on critical problems in our understanding of ecosystems, particularly the role of the plankton as it affects fish population dynamics. It is important to recognize that understanding ecosystems is also critically important to understanding the very important role plankton play in driving the ocean and atmospheric component of global change. A particular issue of concern is the interaction among species of fish, recruitment dynamics, and scenarios that result from a changing climate—the linkages we need to forecast our nation's fisheries resources, and other species of concern. This would address critical components of the identification of conservation imperatives.

There needs to be a National Center for Fishery Management Systems (NCFMS) applying a systems engineering approach to the technical requirements of fishery management. This center needs to focus on the requirements for fishery management and the alternative approaches to meet these requirements. NCFMS would develop the procedures for development of end-to-end fishery management systems facilitating sampling theoretic data collection; efficient and focused use of simple fishery control rules; and rapid information reports to managers and various user groups. The focus would be on developing simpler, more cost-effective techniques that effectively sample the catch and provide advice on optimum yield—a critical aspect of the conservation imperative.

There needs to be a National Center for Fisheries Engineering (NCFE). NCFE would focus on the improvement of fishing gear and fishing strategies to reduce by-catch and fuel consumption. New net systems and ways of sensing fish from fishing boats would be a priority with the thought-in-mind that these would do a better job in saving fuel and separating wanted fish from unwanted fish—both conservation imperatives. Much of the work in this Center would be undertaken in collaborative programs with the fishing industry—a possible target for stimulus funding.

To respond to the second question posed by the subcommittee concerning new conservation tools, I think that the most productive effort is to take an end-to-end systems approach to fisheries management. This has essentially not been done, and because of this, we are not sure whether we are asking the right questions or being cost-effective in our approach to management.

A priority focus establishing the three Centers would involve a refocusing and retargeting of *existing* personnel and budget resources. In the short term, we could continue to manage fish under the existing system. I envision after a three-year carefully phased effort, the three Centers would arrive at an innovative approach to fishery management, effectively providing new and more cost-effective conservation tools. This approach would not only enable a much clearer public perception of our nation's fishery resource management process, but also achieve solid definable results in balancing overfishing, optimum yield, and the economic needs of communities.