

An Executive Summary and Table of Contents for  
**GULF ECOSYSTEM MONITORING**

A sentinel monitoring program  
for the conservation of the natural resources of the northern Gulf of Alaska

**Review Draft**

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## **EXECUTIVE SUMMARY**

This document is the foundation for a research and monitoring plan that has yet to be written. The Trustee Council is one-third of the way through a three-year process of developing, reviewing and adopting a research and monitoring plan. Individual research projects to implement the future research and monitoring plan are not to be received by the Trustee Council until April of 2002, and the first implementation projects are to be funded by the Council no earlier than October of 2002.

The document is composed of four main sections plus supporting materials. Section I describes the Gulf of Alaska region and the regional needs for the program. Section II contains the Trustee Council's vision for meeting regional needs, and Section III is the framework of an institution and process for realizing that vision. Section IV presents and organizes the scientific information available to guide the Trustee Council as it develops and implements the GEM program. As such, Section IV attempts to be inclusive of all the biological and physical components of the Gulf of Alaska ecosystem.

Within the northern Gulf of Alaska, including Prince William Sound, Cook Inlet, Kodiak and the Alaska Peninsula, offshore and nearshore marine, estuarine, freshwater and terrestrial environments interact with geologic, climatic, oceanographic, and biologic processes to produce highly valued natural bounty and exceptional beauty. The Gulf of Alaska is a major source of seafood for the entire nation, as well as for Alaska Natives, who rely on it for subsistence and cultural purposes. It is also part of the "lungs" of the planet for recycling of oxygen and carbon to and from the atmosphere; habitat for diverse populations of fish and shellfish, marine mammals and seabirds; and a source of beauty and inspiration for those who love nature. As a result of both human influences and natural processes, these important attributes are continually experiencing significant change.

Fifty-four percent of the state's 621,000 permanent residents live within the geographic area of the northern Gulf of Alaska and the nearby population centers of Anchorage and Wasilla. Most of the more than one million tourists that travel to the state visit this region each year. The private sector economy of Alaska depends heavily on extraction of natural resources from this region, primarily petroleum, followed in descending order by fish and shellfish, minerals, and agricultural products, including timber. Crude oil and fuel tanker traffic, increasing tourism and recreational use, expanded road building, and increased commercial and sport fishing pressure are all human activities that could affect the marine resources and ecosystem of the northern Gulf of Alaska. In addition, recent evidence of persistent organic pollutants and heavy metals in fish and wildlife tissues in the gulf indicate that this region is not immune from worldwide concerns about potential

effects of contaminants on marine organisms and on human consumers, particularly Alaska Native subsistence users.

Populations of important marine resources in the northern Gulf of Alaska have undergone major changes, especially since the late 1970s. Salmon catches of all species, and especially sockeye, have remained near record levels for two decades, with annual catches significantly greater than those in the three decades ending in 1979. Shrimp and red king crab have fallen to extremely low levels in the gulf since 1980, in sharp contrast to the very high levels in the two prior decades. Kodiak's red king crab fishery, once among the world's richest, has been completely closed since 1984. As shrimp and crab declined, cod, pollock and flatfish such as arrowtooth flounder have rapidly increased. Some marine mammals associated with the gulf, such as sea lions, harbor seals and over-wintering fur seals have steadily declined since 1980. Other species such as sea otters and elephant seals have been on the rise for more than a decade. Colonies of seabirds such as kittiwakes, common murre and cormorants have shown declines since about 1980 in some coastal localities such as Prince William Sound and central Cook Inlet, but not in others. Overall, many species and populations associated with nearshore habitats in the Gulf of Alaska have declined since about 1977, whereas species and populations having access to offshore gulf habitats have generally increased.

Understanding the sources of these changes, whether natural or influenced by human activities, requires a solid historical context. This has certainly been the lesson of the 1989 *Exxon Valdez* oil spill, a large-scale ecological disaster, with hundreds of millions of dollars invested in studies and restoration projects in the past decade. Based on the knowledge and experience gained through this program, the *Exxon Valdez* Oil Spill Trustee Council has dedicated approximately \$120 million to complete work on lingering oil-spill injury and to endow long-term monitoring and research in the world-renowned ecosystem of the northern Gulf of Alaska.

For planning purposes, the program is referred to as the Gulf Ecosystem Monitoring – GEM – program. The mission of the program is “to sustain a healthy and biologically diverse marine ecosystem in the northern Gulf of Alaska and the human use of the marine resources in that ecosystem through greater understanding of how its productivity is influenced by natural changes and human activities.”

GEM has five major programmatic goals. These are to:

**DETECT:** Serve as a sentinel (early warning) system by detecting annual and long-term changes in the marine ecosystem, from coastal watersheds to the central gulf;

**UNDERSTAND:** Identify causes of change in the marine ecosystem, including natural variation, human influences, and their interaction;

**PREDICT:** Develop the capacity to predict the status and trends of natural resources for use by resource managers and consumers;

**INFORM:** Provide integrated and synthesized information to the public, resource managers, industry and policy makers in order for them to respond to changes in natural

resources; and

**SOLVE:** Develop tools, technologies, and information that can help resource managers and regulators improve management of marine resources and address problems that may arise from human activities.

Obviously the annual earnings from a \$120 million endowment will not be able to fund all that needs to be done to achieve the above goals. Instead, the Trustee Council will focus a large part of its efforts in providing leadership in identifying monitoring and research gaps and priorities; encouraging efficiency and integration through leveraging of funds, coordination, and partnerships; and involving stakeholders in local stewardship by having them help guide and carry out the program.

Recognizing that the gulf ecosystem under consideration is extremely complex, consisting of thousands of species, it also will not be possible for GEM to answer all, or even most, of the questions that could be posed about the Gulf of Alaska. GEM instead, will be focused to a large extent, on key species and ecological processes in the system. These would be picked on the basis of ecological importance, human relevance, and their ability to indicate ecosystem disturbance, as well as their importance for understanding the physical and biological basis for production. In the end, GEM must be justified on what it can teach policy makers, resource managers and the public about options for directing human behavior toward achieving sustainable resource management goals. The GEM program will continue to work with resource managers, stakeholders, the scientific community and the public to refine a common set of priorities for research, monitoring and protection in the northern Gulf. In order to do that, we must share an understanding of which marine resources of the northern Gulf are valued and what stressors, or potential threats, could affect their overall health. The GEM program will then build a matrix of who is monitoring what, where, and when and identify gaps in monitoring these things that are important to us. GEM will fill in the important gaps. The long-term monitoring element of GEM will be complemented by strategically chosen research projects. These projects will follow up on lingering effects of the *Exxon Valdez* oil spill; explore questions and concerns that arise out of interpretation of the monitoring data especially in trying to understand the causes of change; and provide key information and tools for management and conservation purposes.

The Trustee Council believes that encouraging local awareness and participation in research and monitoring enhances long-term stewardship of living marine resources. Traditional and local knowledge can provide important observations and insights about changes in the status and health of marine resources and should be incorporated into the GEM program. Citizen monitoring efforts are already underway in several communities in the GEM region and should be looked to for future collaboration.

Independent peer review of the GEM program is essential for a high caliber scientific program. Participation in research and monitoring is expected to be completely open to competition. All data must be archived, maintained, and readily accessible to other

scientific users and the public. In order for GEM to be successful, it will be necessary to integrate, synthesize, and interpret monitoring and research results to form and present a “big picture” of the status of and trends in the northern Gulf of Alaska ecosystem. One approach is through the use of models, as well as periodic “State of the Gulf” and “State of the North Pacific” workshops, reports and a GEM website. The Trustee Council is committed to public input and outreach as vital components of the long-term GEM program.