Part 1—Introduction

As a society, we recognize that the bounty of our planet is not endless. Accordingly, we develop and apply techniques that enable us to better manage resources. With the establishment of the exclusive economic zone (EEZ) of U.S. coastal waters in 1976, our society realized that many valuable resources are maritime in nature. Legislation was adopted to provide for their protection, and the ensuing decades brought into existence systematic research and managerial programs to optimize the balance between resource utilization and conservation. The principles to effect such balance are called stewardship. Some coastal stewardship programs have been less than effective, however, as demonstrated by the collapse of the Georges Bank fishery off New England. Although it is difficult to discern who or what is to blame for fishery collapses, i.e., whether they are the result of natural processes, anthropological influence, or a mixture of both, the outcome is certain. The penalties for failure to maintain rich, viable fisheries are billions of dollars of lost revenue and loss of livelihood to all dependent on the industry for an unknown period of time.

Of all U.S. coastal waters, the Gulf of Alaska and Bering Sea ecosystems are among the most productive, supporting vast populations of fishes, birds, and marine mammals. The Alaskan EEZ is crucial to the U.S. economy. Fish and shellfish from these waters constitute nearly 50% of the U.S. and 5% of the world harvest. Alaskan pollock, salmon, halibut, and crab generate over $2 billion in revenue each year and provide an important source of high protein food. Pollock also provide food for numerous fish, marine birds and mammals and as such are a keystone or node of Alaskan ecosystems. Until recently, these most productive waters haven't seen the same commercial pressure as other U.S. fisheries, and the opportunity to manage them successfully is still with us.

Southeast Bering Sea Carrying Capacity (SEBSCC) was a NOAA Coastal Ocean Program project designed to conduct basic research on the Bering Sea ecosystem and transfer information to applied management of fish stocks. SEBSCC began in the final months of fiscal year 1996 and closed at the end of fiscal year 2002. The project contributed to resource management by examining ecosystem dynamics and survival of walleye pollock in the southeastern Bering Sea. The goals of SEBSCC were to understand the overall workings of the ecosystem (the changing physical environment and its relationship to the biota of the region), to relate that understanding to natural variations in year-class strength of walleye pollock (*Theragra chalcogramma*), and transfer this information to fishery managers. Incorporating scientific understanding of survival processes represents an advance from the classical fishery management technique of survey and projection.

The model for SEBSCC's information transfer came from the Fisheries-Oceanography Coordinated Investigations (FOCI) in the Gulf of Alaska. FOCI provides information from research directly to NOAA's National Marine Fisheries Service advisory team whose mission is to advise the North Pacific Fisheries Management Council on the status of pollock stocks in the Gulf of Alaska and Bering Sea. In this way, researchers play a unique role

of directly transferring results to applied management. Moreover, the investment in research is a small fraction (less than 0.04%) of the commercial value of the Alaskan stocks. Beginning in 1992, FOCI scientists have analyzed biological and physical time series to estimate survival qualitatively. This scientific application significantly simplifies the stock projection analysis used by NMFS to recommend fishing quotas to the management council. As our understanding of how ecosystem processes interact to limit or encourage survival of young pollock, our ability to provide more accurate and quantitative forecasts will increase. With SEBSCC, research has begun to address the more complex questions of survival in the Bering Sea. SEBSCC scientists coordinated their research efforts with several international scientific organizations to address the effect of climate fluctuations on the Bering Sea ecosystem. As we understand how these systems function, we will become more able to forecast changes. These include not only large changes in abundance of pollock, but also changes in the ecosystem that favor other species. Such knowledge will permit commercial interests to reallocate and focus their efforts. With time, this ongoing fisheries oceanographic research will provide expanded social and economic benefits. As our knowledge of natural variations in the population of commercially valuable stocks increases, the application of scientific techniques will occupy a growing niche in the management process. Our ability to understand ecosystem interactions will amplify our ability to maintain and allocate coastal resources effectively.