Part 5—SEBSCC Administration and Management

From the outset, the University of Alaska Fairbanks, the NOAA Alaska Fisheries Science Center, and the NOAA Pacific Marine Environmental Laboratory managed SEBSCC jointly. NOAA Coastal Ocean Program was the funding agency.

The project's management goals were to

- Conduct a first-quality scientific program that supported a specific goal to provide critical knowledge needed for formulating policy and management of resources of the southeastern Bering Sea ecosystem.
- Build partnerships and encourage multidisciplinary cooperative efforts among research scientists within the academic community, NOAA, and other agencies interested in the southeastern Bering Sea.
- Provide an open process in establishing research objectives and proposal selection to ensure quality and diversity.

The project management structure consisted of a Project Management Team, a Technical Advisory Committee, a Research Council, and Office of Coordination. This structure built on successful structures of the Coastal Ocean Program, i.e., NECOP, SABRE, and Bering Sea FOCI. In addition, it provided a coordinated forum for marine ecological research in the southeastern Bering Sea.

5.1 Project Management Team

The Project Management Team (PMT) actively led the scientific conduct of SEBSCC, maintained financial and project accountability, and directed project administration. A primary function of the PMT was to assemble a multidisciplinary research team for multi-year investigations of the southeastern Bering Sea ecosystem during each of the three research phases of SEBSCC. The PMT conducted a workshop early in 1996 to define specific 2-year and 5-year research objectives for investigations into biophysical domains, juvenile pollock productivity, and modeling. The SEBSCC workshop attracted a substantial group of potential PIs. A recently completed National Research Council review of the Bering Sea ecosystem and a PICES Workshop on the Bering Sea helped establish a foundation for discussion. Shortly after the workshop, and at two other intervals in the life of the project, the PMT conducted a competitive, peer-reviewed proposal process. SEBSCC's Technical Advisory Committee (section 5.2) ranked the proposals based on peer-review scores and scientific merit, making a recommendation for subproject funding to the Coastal Ocean Program.

During all research phases of SEBSCC, the PMT assured that balance and integration was maintained among subprojects, and that academic, NOAA, and resource manager viewpoints were included. The PMT, with guidance from the TAC and RC, prioritized research, and adjusted the mix

of investigators during the progress of the study to reflect the evolving needs for observation, modeling, and synthesis. The PMT was responsible for ensuring that integrated results were passed to management organizations such as the North Pacific Fishery Management Council.

The primary way that the PMT achieved the SEBSCC research and management goals was through clear guidelines of accountability. The PMT acted as COTRs (monitors) on the accepted proposals. The expertise within the PMT included integrative approaches to modeling fisheries stock structure; lower-trophic, process-oriented research; and a regional oceanographic approach. The PMT also balanced a research orientation with a NOAA perspective of providing scientific products to the North Pacific Fishery Management Council. The PMT members did not compete for funds from the program. The composition of the team was as follows:

Vera Alexander, University of Alaska Fairbanks: Dr. Alexander is Dean of the School of Fisheries and Ocean Sciences. She has a long career of studying the Bering Sea, specializing in physical influences on lower trophic level processes. She is one of two U.S. delegates to PICES and serves on numerous research and review boards. The North Pacific Marine Science Organization (PICES) was established to promote scientific coordination among Pacific Rim nations. Dr. Alexander is a Fellow of the American Association for the Advancement of Science, the Arctic Institute of North America, and the Explorers Club.

Anne Hollowed, Alaska Fisheries Science Center: Dr. Hollowed provides scientific advice to the North Pacific Fishery Management Council for the Gulf of Alaska fisheries. She works with population models and publishes on the connectivity between strong year classes throughout the North Pacific. She serves on the steering committee for U.S. GLOBEC and is leading PICES-GLOBEC planning to address the issue of carrying capacity and climate change in the North Pacific and Bering Sea.

Jim Overland, Pacific Marine Environmental Laboratory: Dr. Overland has published research on the Bering Sea for 20 years. He was co-director of the Bering Sea FOCI project for the previous 5 years and conducted two proposal solicitations. He served a 5-year term as an editor for the Journal of Geophysical Research-Oceans and served on the National Research Council Committee for the Coastal Ocean and the PICES Bering Sea Working Group. Dr. Overland provided the primary contact with the Coastal Ocean Program office.

All members of the PMT agreed to undertake the following:

- Actively manage the scientific conduct of this research.
- Participate in meetings for planning and coordination of the program.
- Evaluate and report on interim progress and steps required to meet the project objectives.
- Prepare annual implementation plans.
- Ensure that quality-controlled data are made available to other investigators in a timely manner.

- Participate in synthesis and interpretation of research results and the development of products of value to environmental and scientific communities.
- Participate in selected fora to encourage communication between the resource management and scientific communities.
- Encourage the publication of research results in the peer-reviewed literature for the benefit of the marine scientific community.
- Prepare a data management plan and schedule.

5.2 Technical Advisory Committee

The Technical Advisory Committee (TAC) provided independent oversight to the PMT. Members reviewed the science implementation plan and suggested how to better coordinate the program to meet its goal and objectives. They provided peer-review of proposals and recommended subprojects for funding. TAC members participated in annual meetings, helping to guide the project to meet changing research challenges during the life of the project. The following members served:

Dr. Michael J. Dagg is Professor, Louisiana Universities Marine Consortium, Chauvin, Louisiana. He was Interim Director during 1990–1991. Dr. Dagg was a participant in PROBES and NECOP. His specialty is secondary production.

Mr. D. Bart Eaton is Vice President of Alaska Operations with Trident Seafoods Corporation. He has been active in the commercial fishing industry for 30 years and is currently partner in two state-of-the-art catcher/processors operating in the Bering Sea and Gulf of Alaska. Mr. Eaton is a past member of the North Pacific Fishery Management Council and was a Technical Advisor to Bering Sea FOCI. Mr. Eaton resigned from the TAC during phase II.

Dr. Eileen E. Hofmann is Associate Professor at the Center for Coastal Physical Oceanography, Old Dominion University, in Norfolk, Virginia. Her primary interest is marine ecosystem models.

Dr. Thomas C. Royer was Professor of Marine Science at the University of Alaska Fairbanks before moving to Old Dominion University. His specialties are coastal boundary currents and mesoscale ocean circulation with emphasis on the sub-polar gyre. He is a member of the National Academy of Science Ocean Studies Board and Committee on the Bering Sea Ecosystem. Dr. Royer has served as an Associate Editor of the Journal of Geophysical Research.

Dr. Albert V. Tyler, now retired, was Associate Dean and Professor of Fisheries at the School of Fisheries and Ocean Sciences, University of Alaska Fairbanks. Dr. Tyler has served as a Research Scientist with the Fisheries Research Board of Canada, Professor at Oregon State University, and Research Scientist with the Canada Department of Fisheries and Oceans. Dr. Tyler is active in developing models of stock assessment in multi-species

fisheries and at-sea surveys of groundfish assemblages. Dr. Tyler was chair of the PICES Bering Sea Working Group.

Dr. Warren S. Wooster is Professor Emeritus of the School of Marine Affairs, University of Washington, Seattle, Washington. He has held positions as Research Oceanographer and Professor at the Scripps Institution of Oceanography, Director of UNESCO's Office of Oceanography, and Dean of the Rosenstiel School of Marine and Atmospheric Sciences at the University of Miami. A Technical Advisor to the Bering Sea FOCI, Dr. Wooster also was Chairman of PICES and a member of the National Research Council Committee on the Bering Sea Ecosystem. He is a Fellow of the American Geophysical Union and a Fellow of the American Meteorological Society. His main area of scientific interest is the relationship between climate and large marine ecosystems.

Dr. Jerald S. Ault is Associate Professor of Marine Biology and Fisheries at the Rosenstiel School of Marine and Atmospheric Science, University of Miami. He replaced Dr. Wooster on the TAC during phase II. Dr. Ault's expertise is in ecosystem dynamics synthesis, specifically theoretical and applied population and community dynamics for fishery assessment and management in marine ecosystems.

5.3 Research Council

The Research Council was a loosely knit, informal collective of project-funded principal investigators and associate PIs from other projects, notably the NSF Inner Front Study and the NMFS resource survey team. The Council provided a forum for exchange of information on the multidisciplinary aspects of the southeastern Bering Sea. Several smaller interdisciplinary scientific working groups evolved from the Research Council, as needed. The continuity of the Council promoted extensive cross-disciplinary cooperation.

5.4 Project Coordination and Communication

SEBSCC supported a small office to coordinate communication among project investigators, other agencies, and researchers studying the SE Bering Sea ecosystem, and NOAA's Coastal Ocean Program and National Marine Fisheries Service. The Project Coordinator was Mr. Allen Macklin, Pacific Marine Environmental Laboratory, Seattle, Washington. Products provided were data management, personnel directories, seminar series and announcements, publication and presentation lists, reports and documents, minutes of meetings, production of conferences and workshops, a graphic archive, and cruise plans and schedules. The primary method was by a World Wide Web SEBSCC home page at `http://www.pmel.noaa.gov/sebscc`. This office maintained a catalog of investigators and encouraged interdisciplinary contact among investigators.

The SEBSCC Office of Coordination also managed a Bering Sea and North Pacific Ocean theme page on the World Wide Web (`http://www.pmel.noaa.gov/bering`). This site exploits existing home page developments to create a single, hyper-linked resource that enables any user to browse the

most recent observational data, scientific analyses, model animations, management and proposal information, and historical perspectives. The site continues to provide a virtual network for the SE Bering Sea, with participation based on common interest and easy access to information.

5.5 Data Management

SEBSCC followed the lead of the U.S. GLOBEC data policy (U.S. Global Ocean Ecosystems Dynamics Report Number 10, February 1994). SEBSCC maintained that the intellectual investment and time committed to the collection and processing of a data set entitles an investigator to the fundamental benefits of the data set. Initial publication of descriptive or interpretive results derived immediately and directly from the data is the privilege and responsibility of the investigators responsible for each collection. Accordingly, SEBSCC generally allowed exclusive use of data for 1 year from the completion of data processing. Data were released for collaboration among scientists to promote interdisciplinary and comparative interpretation, development of collaborative approaches, and development and testing of new theories. Any scientist making substantial use of a data set was obligated to communicate with the investigators who acquired the data and anticipated that these scientists would be co-authors of published results.

In its request for proposals, SEBSCC's PMT required a data management plan from each investigator. This plan included documentation of adequate methods and equipment to meet the quality standards established for SEBSCC. As part of an interdisciplinary study, each plan was required to show coordination with other elements. Investigators submitted a schedule for collecting, processing, analyzing, archiving, and sharing data with other investigators consistent with SEBSCC standards. The investigators were responsible for archiving data with appropriate agencies and maintaining data for project sharing, preferably by on-line electronic means; SEBSCC facilitated data sharing. Applicants for research funds agreed to the following conditions: At least 3 months prior to execution of field sampling or scientific cruises, investigators will submit a plan to the SEBSCC data management office which documents the procedure to be used to collect, process, and analyze samples and data. SEBSCC will then derive a single plan for each cruise. From the collection of cruise summaries, SEBSCC will publish an annual data report describing its field operations.

The project developed data quality and timeliness standards following the GLOBEC model. SEBSCC's data management plan ensured that all data were processed, validated, and made available to other investigators. Metadata (descriptions of how data were collected, processed and analyzed) are part of the record. Retrospective data sets, numerical experiments, and field data are included in the database. Data information may be located through the SEBSCC web site and in the North Pacific Ecosystem Metadatabase (`http://www.pmel.noaa.gov/bering/mdb`).

5.6 Research Structure and Methodology

SEBSCC was designed as a three-phase research project. The emphasis of Phase I was initialization of ecosystem monitoring and modeling, retrospective analysis, and beginning process studies. Phase II continued the monitoring and modeling effort. It also promoted more process studies to address specific objectives and began the important synthesis stage. Phase III was devoted to synthesis of results with limited monitoring to support synthesis activity. Research requirements were based on the following assertions:

- The southeastern Bering Sea shelf is a major region for groundfish, other commercial species, and marine mammals, containing as much as 50–85% of the pollock biomass in the Bering Sea.
- Walleye pollock is a nodal species in the Bering Sea ecosystem, i.e., it dominates the pelagic guild, and, in its juvenile stage, it serves as a major forage fish. Adult pollock are a major commercial asset for the United States.
- Because population dynamics processes that determine abundance appear to be chaotic, they are especially sensitive to initial conditions. The success of age-structured models for pollock in the Bering Sea shows that much variability in year class abundance is established by age two. There appears to be top-down predation control of pollock recruitment, spatial and temporal variability in food supply, and variability in transport processes affecting larval and juvenile pollock. The sequence of survival processes is non-linear.
- SEBSCC will test the hypothesis that interannual ocean variability influences the availability of prey, growth rate, predation, and distribution of juvenile pollock and higher trophic level species. Although we already know that ocean variability can influence fisheries, what is not known is how these factors specifically co-occur in the Bering Sea. We use the phrase "carrying capacity" in a general context as to what limits the potential size of the pelagic guild. From the results of testing these hypotheses, we will develop annual recruitment indices for pre-recruit pollock.

The scientific approach that SEBSCC pursued was interdisciplinary research balancing time-series measurements, process studies, models, and syntheses that were phased over the life of the project. Basic time series comprised a spring larval survey and autumn juvenile survey over the shelf and shelf break, moored biophysical platforms in several habitats over a 6-year period, and periodic hydrographic and water property surveys. The time series measurements tracked important climate changes, the ecosystem response to these changes, and provided data for model studies. Process and retrospective studies examined horizontal and vertical physical dynamics influencing the separation and overlap of aggregations of predators and prey, the feeding and switching behavior of juvenile pollock and their predators, nutrient transport onto the shelf, and the establishment

Table 5.1: Annual funds received by SEBSCC from NOAA Coastal Ocean Program.

1996	1997	1998	1999	2000	2001	2002
$500,000	$1,070,500	$941,800	$946,700	$964,700	$672,700	$361,800

of pollock as the dominant species. Model-based research implemented a three-dimensional physical model, an individual-based model (IBM) for larval/juvenile processes, a trophic dynamics model, and a spatially dependent model of pollock, their predators, and alternate food sources. Synthesis efforts documented a contemporary understanding of the southeastern Bering Sea ecosystem and produced indices for predicting the abundance of age-1 pollock.

5.7 Resources

The project was awarded $5,458,200 over its lifetime. Annual increments (Table 5.1) indicate the ramp-up, level-funding, and ramp-down character of the funding. Annual resources also included ∼30 days aboard NOAA Ship *Miller Freeman*, ∼30 days aboard a Class I research vessel, and a cooperative summer cruise aboard *Oshoro Maru*.

5.8 Leverage and Collaboration

Southeast Bering Sea Carrying Capacity was a highly leveraged program. It worked collaboratively with ongoing research by other National Marine Fisheries Service (NMFS) programs examining pollock resources and ecology of the Bering Sea (fishery acoustics group, stock assessment group, and Marine Mammal Protection Act studies), programs at the University and State of Alaska, Environmental Protection Agency, Shelikof Strait FOCI, Japan Far Seas Fisheries Laboratory, Ocean Research Institute of Tokyo University, Faculty of Fisheries of Hokkaido University, the Japanese Marine Science and Technology Center, Tokai University in Sapporo, Tohoku National Fisheries Institute, Korean Ocean Research and Development Institute and the Institute of Marine Biology, Far East Branch of the Russian Academy of Sciences. SEBSCC also coordinated with the inhabitants of St. Paul Island. The project promoted collaborative research with the Office of Naval Research, the National Science Foundation, and the National Aeronautics and Space Administration. Southeast Bering Sea Carrying Capacity was considered a component in the PICES-GLOBEC Climate Change and Carrying Capacity (CCCC) Program.

5.9 Research Components and Principal Investigators

SEBSCC advertised for research applicants to address the following scientific issues:

- How does climate variability influence the Bering Sea ecosystem? Is there historical evidence for a biophysical regime shift on the Bering Sea shelf? How is this reflected in ecological relationships and species mix? Are there "top-down" ecosystem effects associated with climate variations as well as "bottom-up" effects?

- What limits population growth on the Bering Sea shelf? Is there evidence of a single species carrying capacity, e.g., for pollock, or a more complex structure? What is the ecological role of pollock on the Bering Sea shelf, i.e., how are pollock, forage fish, and apex species linked through energetics and life history? How important is cannibalism?

- How do oceanographic conditions on the shelf influence biological distributions? How do the separate mixing domains, sea ice, and the cold pool influence the overlap or separation between predators and prey?

- What influences primary and secondary production regimes? What are the sources of nutrients to the southeastern Bering Sea shelf, and what processes affect their availability? Is the variability in sea ice extent and timing the primary factor influencing productivity? What determines the relative allocation of organic carbon going to benthos versus that remaining in the pelagic system? What are the lower trophic level structure and energetics on the shelf in summer and winter, especially regarding euphausiids? What is the role of gelatinous organisms?

Applicants were selected for the three research phases by the competitive process described in section 5.2 and according to the specific phase's research requirements (section 5.6). Funded subprojects are listed by title, investigator, and institution for phases I, II, and III in Tables 5.2, 5.3, and 5.4, respectively.

Table 5.2: Research components and principal investigators for Phase I, 1996–1998.

Research Title	Investigators	Institution
Individual-based modeling of walleye pollock in the southeast Bering Sea	Hinckley, Sarah Megrey, Bern Hermann, Al	NOAA/NMFS/AFSC NOAA/NMFS/AFSC U. Washington/JISAO
A spatial model of upper-trophic level interactions in the eastern Bering Sea	Livingston, Pat Hinckley, Sarah	NOAA/NMFS/AFSC NOAA/NMFS/AFSC
Circulation modeling for the S.E. Bering Sea	Hermann, Al Stabeno, Phyllis Haidvogel, Dale Musgrave, David	U. of Washington/JISAO NOAA/OAR/PMEL Rutgers University U. Alaska Fairbanks
Monitoring and development of biophysical indices of the southeastern Bering Sea	Schumacher, Jim Stabeno, Phyllis Brodeur, Ric Napp, Jeff Hunt, George	NOAA/OAR/PMEL NOAA/OAR/PMEL NOAA/NMFS/AFSC NOAA/NMFS/AFSC U. California Irvine
An altimetric census of mesoscale eddy-like features in the Bering Sea	Okkonen, Steve	U. Alaska Fairbanks
Investigation of the origin and dynamics of nutrients on the southeast Bering Sea shelf in relation to dominant physical and biological processes	Whitledge, Terry	U. Texas at Austin
Isotopic and biomarker composition of sinking organic matter in the southeast Bering Sea: indicators of food web structure	Henrichs, Susan	U. Alaska Fairbanks
Using optical measurements to explore the influence of mesoscale eddies on the interaction of lower and higher trophic levels in the southeast Bering Sea	Stabeno, Phyllis	NOAA/OAR/PMEL
High-resolution acoustic and juvenile pollock retrospective data analysis	Swartzman, Gordie Brodeur, Ric	U. Washington NOAA/NMFS/AFSC
Habitat differences in frontal regions around the Pribilof Islands and their importance to juvenile pollock growth and survival in the Bering Sea	Brodeur, Ric Napp, Jeff Doyle, Miriam	NOAA/NMFS/AFSC NOAA/NMFS/AFSC U. Washington/JISAO
Low-temperature incubation of walleye pollock eggs (*Theragra chalcogramma*) from the southeast Bering Sea region	Blood, Debbie	NOAA/NMFS/AFSC
Natural scales of variability in coastal marine ecosystems of the eastern Bering Sea	Francis, Bob	U. Washington
Historical trends in the number of foraging trips made by lactating northern fur seals	Loughlin, Tom	NOAA/NMFS/AFSC
The role of atmospheric forcing on the cold pool and ecosystem dynamics of the Bering Sea shelf: A retrospective study	Niebauer, Joe Wyllie-Echeverria, Tina Bond, Nick Schumacher, Jim Stabeno, Phyllis	U. Alaska Fairbanks U. Washington/JISAO U. Washington/JISAO NOAA/OAR/PMEL NOAA/OAR/PMEL
A retrospective investigation into relationships between southeast Bering Sea pollock recruitment and biophysical correlates	Megrey, Bern Wespestad, Vidar	NOAA/NMFS/AFSC NOAA/NMFS/AFSC

Table 5.3: Research components and principal investigators for Phase II, 1999–2000.

Research Title	Investigators	Institution
Circulation modeling for the S.E. Bering Sea	Hermann, Al	U. Washington/JISAO
	Haidvogel, Dale	Rutgers University
	Stabeno, Phyllis	NOAA/OAR/PMEL
	Musgrave, David	U. Alaska Fairbanks
Measures of ecosystem trends: an approach for synthesis and understanding	Schumacher, Jim	Two Crow Environ. Consult.
The regime shift of the 1970s: air-sea interactions crucial to walleye pollock	Bond, Nick	U. Washington/JISAO
	Kachel, Nancy	U. Washington/JISAO
Environmental influences on the early life stages of walleye pollock, *Theragra chalcogramma*, in the southeastern Bering Sea during the late 1970s climate regime shift	Kendall, Art	NOAA/NMFS/AFSC
Monitoring and use of biophysical indices of the southeastern Bering Sea: phase II	Schumacher, Jim	Two Crow Environ. Consult.
	Stabeno, Phyllis	NOAA/OAR/PMEL
	Brodeur, Ric	NOAA/NMFS/AFSC
	Napp, Jeff	NOAA/NMFS/AFSC
	Hunt, George	U. California Irvine
Currents and transfer processes between shelf and slope waters: a Lagrangian perspective	Stabeno, Phyllis	NOAA/OAR/PMEL
In situ monitoring of nitrate concentrations on the Southeast Bering Sea shelf	Whitledge, Terry	U. Alaska Fairbanks
	Stabeno, Phyllis	NOAA/OAR/PMEL
Sinking organic matter and pelagic food webs	Henrichs, Susan	U. Alaska Fairbanks
Investigation of origin of nutrients on the Southeast Bering Sea shelf in relation to physical processes and biological uptake	Whitledge, Terry	U. Alaska Fairbanks
Proximity of age-0 pollock, jellyfish, predators and prey	Swartzman, Gordie	U. Washington
	Coyle, Ken	U. Alaska Fairbanks
	Brodeur, Ric	NOAA/NMFS/AFSC
	Napp, Jeff	NOAA/NMFS/AFSC
Habitat differences in frontal regions around the Pribilof Islands and their importance to juvenile pollock survival in the Bering Sea: Phase II	Brodeur, Ric	NOAA/NMFS/AFSC
	Napp, Jeff	NOAA/NMFS/AFSC
	Paul, A.J.	U. Alaska Fairbanks

Table 5.4: Research components and principal investigators for Phase III, 2001–2002.

Research Title	Investigators	Institution
Synthesis of pinniped and seabird ecology	Sinclair, Beth	NOAA/NMFS/NMML
	Hunt, George	U. California Irvine
	Byrd, Vernon	USFandWS
Ecosystem trends of the southeastern Bering Sea	Schumacher, Jim	Two Crow Environ. Consult.
	Springer, Alan	U. Alaska Fairbanks
	Ianelli, Jim	NOAA/NMFS/AFSC
	Napp, Jeff	NOAA/NMFS/AFSC
	Stabeno, Phyllis	NOAA/OAR/PMEL
Synthesis of sediment trap, zooplankton, and biophysical data	Henrichs, Susan	U. Alaska Fairbanks
Habitat differences around the Pribilof Islands	Brodeur, Ric	NOAA/NMFS/NWFSC
	Napp, Jeff	NOAA/NMFS/AFSC
	Francis, Robert	U. Washington
Synthesis of acoustic and net data	Swartzman, Gordie	U. Washington
	Napp, Jeff	NOAA/NMFS/AFSC
	Coyle, Ken	U. Alaska Fairbanks
Biophysical monitoring of the southeastern Bering Sea	Stabeno, Phyllis	NOAA/OAR/PMEL
	Whitledge, Terry	U. Alaska Fairbanks

5.10 Field Operations: SEBSCC Cruise Schedule

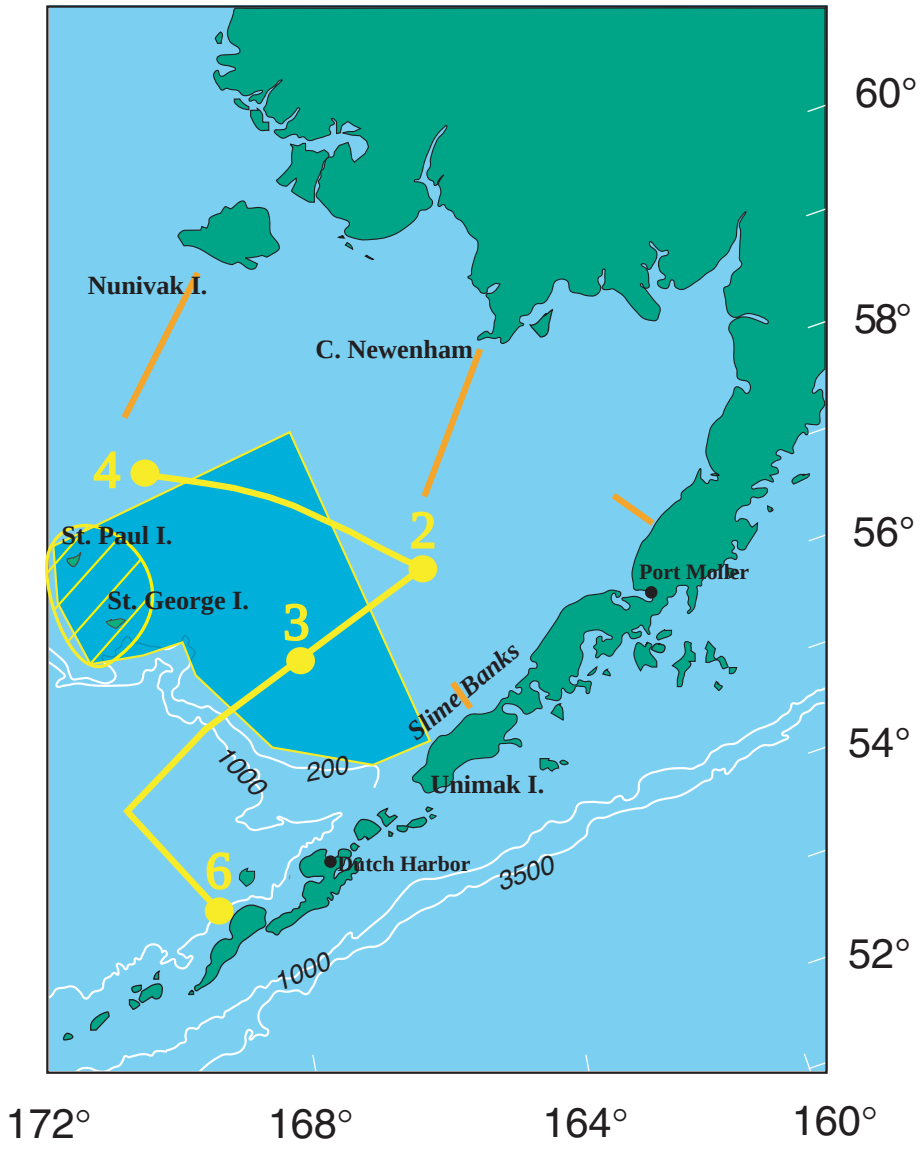

Figure 5.1: Field operations area for SEBSCC. Yellow numbers indicate mooring sites. Yellow lines connecting the moorings are transects for hydrographic, nutrient, phytoplankton, and zooplankton sampling. The crosshatched circular region on the left indicates the Pribilof Islands study area. The juvenile pollock sampling area of cooperative cruises aboard *Oshoro Maru* is shaded dark blue. Transects occupied by the Inner Front program are shown as orange lines.

Table 5.5: SEBSCC cruises.

Vessel	Cruise Designator	Departure and Return Dates	Departure and Return Ports	Sea Days	Activities
1996					
Miller Freeman	MF96-13	Sep 4 to Sep 16	Dutch Harbor to St. Paul	13	Age-0 monitoring, N. Pribilof mooring recovery
Miller Freeman	MF96-14a	Sep 16 to Sep 30	St. Paul to Larsen Bay	15	Bering Sea shelf and Shelikof mooring recoveries
1997					
Miller Freeman	MF97-01	Feb 10 to Feb 18 to Feb 26	Seattle to Dutch Harbor to Dutch Harbor	(8) 9	Test systems, deploy Bering Sea shelf subsurface moorings; NPZ samples, transect, Unimak stations
Miller Freeman	MF97-04	Mar 28 to Apr 13	Homer to Dutch Harbor	17	Drifters, line 8, egg collections, slope current
Miller Freeman	MF97-05A	Apr 15 to May 1	Dutch Harbor to Dutch Harbor	17	Recover/deploy moorings, NPZ samples, transect, Unimak stations, egg incubation
Miller Freeman	MF97-05B	May 3 to May 13	Dutch Harbor to Dutch Harbor	11	NPZ samples, larval feeding, egg incubation
Miller Freeman	MF97-06	May 14 to May 21	Dutch Harbor to Kodiak	8	Tsunami moorings, line 8, ADCP, drifters, egg incubation
Miller Freeman	MF97-07	May 23 to May 31 to Jun 6	Kodiak to Kodiak to Seattle	15	Larval index survey, drifters
Alpha Helix	HX196	May 29 to Jun 30	Seward to Seward	33	Inner front
Wecoma	W9706A	Jun 4 to Jun 9	Dutch Harbor to Dutch Harbor	6	Deploy/recover moorings, test MPS gear
Wecoma	W9706B	Jun 10 to Jun 27	Dutch Harbor to Dutch Harbor	18	Eddy studies, NPZ samples
Wecoma	W9706C	Jun 30 to Jul 14	Dutch Harbor to Dutch Harbor	15	Habitat survey, ground truth, transect
Oshoro Maru	OM97	Jul 18 to Aug 2	Seward to Dutch Harbor	16	EBS shelf and St. Lawrence shelf survey: CTD, bottom trawl, NORPAC net, larval net, juvenile beam trawl
Alpha Helix	HX200	Aug 12 to Aug 28	Dutch Harbor to Dutch Harbor	17	Inner front
Miller Freeman	MF97-09A	Sep 8 to Sep 18	Dutch Harbor to St. Paul	10	Age-0 survey
Miller Freeman	MF97-09B	Sep 18 to Sep 27	St. Paul to Dutch Harbor	10	Mooring recovery, NPZ samples, transect
1998					
Miller Freeman	MF98-01	Feb 11 to Feb 16; Feb 17 to Feb 27	Seattle to Kodiak; Kodiak to Dutch Harbor	(6) 11	Moorings; NPZ samples, transect, Unimak stations
Miller Freeman	MF98-05B	Apr 14 to Apr 29	Dutch Harbor to Dutch Harbor	16	Moorings, NPZ samples, transect, Unimak stations
Wecoma	(W9804C) and W9804D	Apr 24 to Apr 30 to May 5	Newport to Dutch Harbor to Dutch Harbor	(6) 5	Mooring or CTD / Unimak / nutrients
Wecoma	W9805A	May 6 to May 22	Dutch Harbor to Dutch Harbor	17	NPZ samples and transects
Alpha Helix	HX209	May 22 to Jun 24	Seward to Seward	34	Inner front
Sir Wilfrid Laurier	LA-98-00	Jul 10 to Jul 15	Kodiak to Nome	6	Mooring Deployment, CTD
Oshoro Maru	OM98	Jul 18 to Aug 1	Seattle to Dutch Harbor	15	Ecology, biophysical control
Alpha Helix	HX213	Aug 15 to Sep 12	Seward to Dutch Harbor	29	Inner front
Professor Kaganovsky	PK-98-01	Sep 6 to Sep 18	Dutch Harbor to Dutch Harbor	13	Habitat survey, indices
Sir Wilfrid Laurier	LA-98-02	Sep 28 to Oct 9	Nome to Kodiak	11	Moorings, transects
1999					
Thomas G. Thompson	TGT99-01	Feb 4 to Feb 13	Dutch Harbor to Dutch Harbor	10	Moorings; NPZ samples, transects
Miller Freeman	MF99-04	Apr 10 to Apr 19	Kodiak to Dutch Harbor	10	Pollock eggs
Miller Freeman	MF99-05	Apr 21 to May 1	Dutch Harbor to Dutch Harbor	11	Moorings, NPZ samples, transects
Miller Freeman	MF99-06	May 1 to May 10	Dutch Harbor to Dutch Harbor	9	Hydrographic and NPZ transects
Miller Freeman	MF99-07	May 12 to May 20	Dutch Harbor to Dutch Harbor	9	Greenbelt water properties, drifters, midwater trawls
Alpha Helix	HX220	May 17 to Jun 18	Seward to Seward	33	CTDs, water samples
Alpha Helix	HX222	Jul 18 to Aug 22	Seward to Seward	36	CTDs, water samples
Oshoro Maru	OM99	Jul 20 to Aug 1	Juneau to Dutch Harbor	13	Ecology, biophysical control
Miller Freeman	MF99-11	Sep 2 to Sep 19	Kodiak to Dutch Harbor	18	Habitat survey
Miller Freeman	MF99-12	Sep 19 to Sep 29	Dutch Harbor to Dutch Harbor	11	Moorings, transects
2000					
Miller Freeman	MF00-01 Leg 3	Feb 17 to Feb 25	Dutch Harbor to Dutch Harbor	9	Transit; moorings; NPZ samples, transects; drifters
Miller Freeman	MF00-05	Apr 18 to Apr 30	Kodiak to Dutch Harbor	13	Moorings, NPZ samples, transects, drifters
Miller Freeman	MF00-06	May 1 to May 12	Dutch Harbor to Dutch Harbor	12	Hydrographic and NPZ transects, drifters
Oshoro Maru	OM00	Jul 21 to Aug 3	Victoria to Dutch Harbor	14	Ecology, biophysical control
Ron Brown	RB00-07 Leg 2	Sep 16 to Sep 23	Dutch Harbor to Dutch Harbor	8	Moorings, transects
2001					
Miller Freeman	MF-01-01, Leg 2	Feb 5 to Feb 10	Dutch Harbor to Dutch Harbor	5	Bering Sea moorings
Miller Freeman	MF-01-06	May 12 to May 14 to May 22	Dutch Harbor to Dutch Harbor to Dutch Harbor	11	Moorings and ecosystem monitoring
Ron Brown	RB-01-03, Leg 3	May 25 to Jun 8	Kodiak to Dutch Harbor	15	Mesoscale eddies, shelf-slope exchange
Oshoro Maru	OM01	Jul 14 to Jul 28	Seattle to Dutch Harbor	15	Age-0 pollock survey
Sir Wilfrid Laurier	LA-01-01	Oct 5 to Oct 9 to Oct 14	Nome to Dutch Harbor to Dutch Harbor	10	Moorings

Acknowledgments

The editors appreciate the artistic and word processing skills of Karen Birchfield, Ryan L. Whitney and Tracey Nakamura in producing this report. James E. Overland and Beth Turner contributed valuable comments to an early version of the manuscript. NOAA Coastal Ocean Program provided additional funds for this publication. We extend special thanks to the scientists, engineers, technicians and other personnel of the Southeast Bering Sea Carrying Capacity project and the NSF Inner Front study, and to the men and women of the many research vessels that supported this research.