NOAA Form 77-65 (Rev 5-04) U.S. DEPARTMENT OF COMMERCE National Oceanic and Atmospheric Administration **REQUEST FOR SHIP TIME (FY 2006)**	1. Originating Office NOAA/OAR/PMEL, Seattle, Washington	2. Date December 15, 2004

Mail or fax completed form to: NOAA Marine and Aviation Operations, Program Services and Outsourcing Division, SSMC#3, Room 12872, 1315 East-West Highway, Silver Spring, MD 20910. Fax: 301-713-1541, Phone 301-713-1045

Use Continuation page if more space is needed

3. Project/Cruise Title, Mission/Purpose
Summer FOCI: Collect CTD, ADCP, water/net tow samples for annual ichthyoplankton survey and zooplankton studies, and Underwater Towed Vehicle operations. Supports North Pacific Marine Research (NPMR), Endangered Species Act (ESA) – Steller Sea Lion, and North Pacific Climate Research and Ecosystem Production (NPCREP).

4. Ship Preferences (In order of preference)
NOAAS RONALD H. BROWN or Global Class I Vessel

5. Possible foreign research or Port Clearances:
None

6. Project Area: (Include Chartlet)
Northern Gulf of Alaska

7. NOAA Mission goals supported by the Project (Check all that apply and show percentages if more than one) ☐ Unknown
☑ Climate 40 % ☐ Weather / Water ___ % ☑ Ecosystem 60 % ☐ Commerce / Transportation ___ %

8. PPBES Program(s) supported by the project/mission:
Ecological Observations and Climate & Ecosystems

9. Impact Statement (Impact of project not being funded)
FOCI and its partner programs depend on research vessels for annual research, assessment, and monitoring cruises during critical environmental stages. Loss of these cruises would seriously compromise management of the world's most valuable fishery.

10. Sea time required (including transit time): Desired: 20 Days Minimum: 15 Days

11. Cruise Period (Months) July

12. This project will be ☑ Primary ☐ Piggyback

13. Field of Science Category (See Form Instructions)
(2) Applied Research

14. NSF R&D Category (See Form Instructions)
(31) Atmospheric Science, (33) Oceanography, (39) Environmental Science

15a. **NOAA Program Personnel** ☐ Ship's company only

	Max/Min	Office	Berthing Required	
Scientists	8/6		Yes	
Technicians	3/3		Yes	
Total	11/9			

15b. **Non-NOAA Participants and their Affiliation**

Personnel (Names)	Affiliations
TBD	University of Alaska - Fairbanks (UAF) Joint Institute for the Study of the Atmosphere and Ocean (JISAO) Applied Physics Laboratory (APL)

15c. Non-NOAA Berths Required TBD

15d. Total Berths Required TBD

16. Suggested piggyback projects and time requirements (or restrictions) which can be accommodated:
(1) Deep-Ocean Assessment and Reporting of Tsunami (DART) and (2) National Marine Mammal Laboratory (NMML)

17. **Ship Capabilities Requirements**

Endurance: 30 Days | Lab Space: sq.ft. | Wet: sq.ft. | Dry: sq.ft.

Minimum position accuracy required ± | On station time: | Speed: Knots

Electronics Requirements	Oceanographic Requirements	Gear Handling Requirements
(1) GPS (2) Real-time data acquisition processing system (3) Meteorological observation system (4) Fathometer	(1) CTD/Rosette with 5,000 meters of electro-mechanical wire. (2) Niskin water bottles (12) (3) ADCP - calibrated for back scatter. (4) Thermosalinograph	(1) Ability to tow/recover standard ichthyoplankton nets, including Bongo and MOCNESS, and TUV. (2) CTD winch with 5,000 meters of electro-mechanical wire.
Ship Support Required: ☑ Yes ☐ No	Ship Support Required: ☑ Yes ☐ No	Ship Support Required: ☑ Yes ☐ No

18. **Program Furnished Equipment**

Item	Description	Wt (lbs).	Power Req'd.	Space Req	Location Preference
1	Sea-Bird (SBE) CTD	450	Yes	18-sqft	
2	Ichthyoplankton sampling gear	Varies	Varies	Large open deck	
3	Towed Underwater Vehicle w/winch	6000	Yes	Varies	Fantail
4					

19. If a NOAA Ship is unavailable or not economical, do you want to charter a ship to support your project? ☑ Yes ☐ No

Continuation page used? ☑ Yes ☐ No

20. Has your lab or science center director approved this request? ☑ Yes ☐ No

21. Principal Investigator/Chief Scientist (Include complete address, phone, fax, Email)

Dr. Phyllis J. Stabeno, NOAA/PMEL
Pacific Marine Environmental Laboratory
7600 Sand Point Way, NE
Seattle, Washington 98112
Tel: (206) 526-6453, Fax: (206) 526-6485, E-mail: Phyllis.Stabeno@noaa.gov

Signature/Date Phyllis J. Stabeno 1/5/05

22. NOAA PPBES Program Manager approval of ship time request

Dr. Steven A. Murawski, NOAA/NFSC
Northeast Fisheries Science Center
166 Water Street
Woods Hole, Massachusetts 02543-1026
Tel: (508) 495-2000 x2303, Fax: (508) 495-2393, E-mail: Steve.Murawski@noaa.gov

Signature/Date

PACIFIC MARINE ENVIRONMENTAL LABORATORY
OCEAN ENVIRONMENT RESEARCH DIVISION
FISHERIES-OCEANOGRAPHY COORDINATED INVESTIGATIONS (FOCI)

Again, we're interested in finding something between 9 and 11 DAS on board NOAA Ship FAIRWEATHER between late June and early August, ideally in July, out of either Kodiak, Homer, or Seward, listed by order of preference.

REQUEST FOR FY 2006 SHIP TIME

CLASS I OR CLASS II VESSEL

FOCI's preference for conducting the following operations would be to utilize the capabilities aboard **NOAA Ship *RONALD H. BROWN*** or **NOAA Ship *FAIRWEATHER***. National Oceanic and Atmospheric Administration's (NOAA) ships are flexible, multipurpose platforms that support a wide range of activities related to natural resource management and environmental protection. Few ships in the United States can conduct joint operations of fishery stock assessment and oceanography, as do NOAA's research vessels. NOAA's ships are the only such platforms in the United States with the capability of meeting NOAA's program requirements. Under NOAA's management, NOAA ships are cost effective, have demonstrated a tremendous safety record, and successful mission accomplishment while operating in frequently hazardous environments.

ABSTRACT OF PROJECT PROPOSAL:

NOAA, under congressional mandate, established the Fisheries-Oceanography Coordinated Investigations (FOCI) in 1984 to examine the physical and biological factors that affect commercially valuable finfish and shellfish in the North Pacific Ocean and Bering Sea ecosystems. These regions provide about half of the United States tonnage of commercial fish, and the catch is presently valued at more than a billion dollars annually. Studies focus on the relationships between fish populations and the marine environment. Long-term monitoring and process studies are at the core of FOCI's observational strategy. FOCI has established some of the longest time series of physical oceanographic and biological observations in the region. Analyses of these observations have produced more than 300 peer-reviewed scientific articles. FOCI provides predictions of fish abundance and other information to the National Marine Fisheries Service (NMFS) to guide the North Pacific Fishery Management Council, the body mandated to establish quotas for commercial fishing in the region.

FOCI collaborates with multiple other funding agencies to accomplish FOCI's research goals and meet its obligations to fisheries management. These agencies currently include the North Pacific Research Board (NPRB) and Steller Sea Lion Program. FOCI scientists collaborate with scientists from other United States and foreign universities, including Canada, Great Britain, Japan, Korea, and Russia. In particular, FOCI scientists are involved with the Alaska Ocean Observing System (AOOS) to improve NOAA's ability to rapidly detect changes in marine ecosystems and living resources, and predict future changes and their consequences for the public good. These collaborations have provided a rich blend of academic and government scientists who have addressed many of the important issues of ecosystem understanding and marine resource management. FOCI receives $737-thousand annually from the Office of Oceanic and Atmospheric Research (OAR) and over $1-million annually from other programs as listed above.

RELEVANCE TO NOAA'S MISSION AND STRATEGIC PLAN:

Program Planning and Budget System Information:

Goal	Program	Program Manager
Ecosystem Goal	Ecological Observations	Dr. Steven A. Murawski

FOCI's goal of advancing the understanding of Alaska's marine ecosystem processes supports NOAA's mission to build sustainable fisheries. FOCI's research is interdisciplinary, blending the talents of atmospheric, oceanographic, and fisheries scientists from various academic and government institutions. The FOCI approach focuses on elucidating how changes in the physical environment, from individual storm to decadal climate change time scales, directly or indirectly influence biota, hence, the eventual recruitment of economically valuable marine resources.

Starting in 2004, the North Pacific Climate Research and Ecosystem Production (NPCREP), a newly funded program in Climate Goal, is tasked to study the impact of climate on the ecosystem of the North Pacific Ocean and Bering Sea. Ship time is needed to support the goals and mission of NPCREP focusing studies in the Gulf of Alaska and Bering Sea. While recruitment is a vital part of FOCI, other important factors need to be understood for management of the ecosystem. For example, the influence of biophysical variability on marine mammal and bird populations also evolves from FOCI's research and coordinated studies. Such information is critical since these populations can affect fisheries, and they are monitored through the Endangered Species Act and the Marine Mammal Protection Act. Since its inception in 1984, FOCI has grown beyond its initial focus on fishery recruitment to encompass a broader ecosystem view.

Alaskan waters are the primary United States fishing grounds with the potential for remaining a rich vital resource. Some stocks in the Bering Sea are still undergoing changes in abundance due to natural variations, independent of harvesting; however, other major fisheries already have been depleted, perhaps irreversibly. Global-scale climatic changes, pollution, ongoing and future development, habitat destruction, and fishing pressures all exert an influence on marine resources. Effective management of the marine resource extant in Alaskan waters requires a better understanding of air-ocean-biota linked processes.

CONDENSED DAILY SCHEDULE OF SCIENCE TO BE CONDUCTED:

A typical FOCI field operations day consists of Conductivity, Temperature, and Depth (CTD) profiler casts, acoustic Doppler current profiler (ADCP) transects, and Towed Underwater Vehicle (TUV) operations.

The objectives are to:

1. Conduct a CTD survey of the Seward and Gore Point Lines and of submarine canyons and banks off Kodiak Island where deep water may be transported shoreward and mixed up by strong tidal currents. A basin eddy that interacts with the continental shelf may also be studied if one is active in the research area at cruise time.
2. Conduct underway thermosalinograph, fluorometer, nutrient meter, and ADCP transects in the above regions.

3. Conduct zooplankton surveys in the above regions to estimate the abundance of zooplankton prey for fish and to relate prey availability to nutrients and phytoplankton standing stock.
4. Conduct TUV operations to provide fine-scale measurements across fronts and regions where deep water is mixed into surface waters.

CTD casts up to 4,500 meters depths are conducted along historical transects. The CTD instrument package contains dual temperature and salinity sensors, light meter, fluorometer, spectrophotometer, pinger, and altimeter. CTD profiler casts are spaced 10-20 kilometers apart on transects. Ten-liter Niskin water bottles are tripped to provide nutrient and phytoplankton samples.

Acoustic Doppler Current Profiler (ADCP) data are recorded continuously during FOCI cruises, and a Global Positioning System-based (GPS) Attitude Determination Unit (ADU) is critical to accurately measure the ship's heading needed to meet ADCP accuracy requirements.

The TUV will measure temperature, salinity, fluorescence, nutrient, and plankton concentrations. TUV undulations at five knots will typically range from near-surface to 200 meters or less. Data will be telemetered in real time via a 10-conductor cable to a data acquisition system on board the ship. The TUV, cable, winch, and data acquisition system will be provided by FOCI.

OTHER NOAA, INTERAGENCY, OR INTERNATIONAL INVOLVEMENT:

A single FOCI cruise will support the mooring requirements of a number of research programs in the Bering Sea with combined budgets of over $2-million, which includes:

1. FOCI,
2. North Pacific Marine Research (NPMR),
3. Endangered Species Act (ESA) – Steller Sea Lion, and
4. North Pacific Climate Research and Ecosystem Production (NPCREP).

JUSTIFICATION FOR TIME FRAME, OPTIONS FOR REDUCED SUPPORT:

1. The continental shelf in the Gulf of Alaska sustains a productive ecosystem even though it is in a downwelling region, on average, for which nutrients are not continually supplied to the surface waters.
2. Spring FOCI cruises have measured the onset of productivity and placed moorings. Autumn cruises primarily have recovered and replaced moorings with some incidental ecosystem measurements.
3. Satellite-borne measurements indicate that the productivity on the continental shelf is prolonged past the initial spring bloom and over most of the summer.
4. FOCI wishes to initiate summertime measurements to ascertain how nutrients are provided to this ecosystem.
5. FOCI also want to begin using our new TUV in benign summer conditions.
6. FOCI's spring cruise is tied directly to the North Pacific and Bering Sea spring phytoplankton bloom, corresponding fish spawn, larval drift period, and increased avian and marine mammal activity, including pupping.
7. Large, 'North Pacific-class', mooring recoveries and deployments are timed to coincide with the Bering Sea sea-ice retreat in April and increased storminess in late September, which represents the outer working limits for successful mooring operations in this region.

8. Biophysical moorings must be turned around at least twice a year to insure quality data. The earliest opportunity that this can reliably be accomplished is May, and the latest is mid to late September.
9. In sixteen years of fieldwork, FOCI has never failed to meet a primary cruise mission due to weather. FOCI's cruise successes are due in large part to a combination of large ship capabilities and flexibility in the order of cruise objectives. In addition, examining processes during stormy conditions is critical to understanding the ecosystem.
10. Piggybacking Tsunami's Deep-Ocean Assessment and Reporting of Tsunami (DART) and National Marine Mammal Laboratory (NMML) projects following the FOCI cruise reduces overall transit times required for the projects and maximizes regional efficiencies of Class I vessel work.

WHAT FOLLOW-ON PROJECTS WILL ARISE FROM THIS?

FOCI is a leading interdisciplinary research program in the North Pacific and Bering Sea, and as such will continue to be involved in numerous and diverse regional ecosystem studies.

ECONOMIC BENEFIT:

With the establishment of the Exclusive Economic Zone (EEZ) of United States coastal waters in 1976, legislation was adopted to provide for the protection of marine resources. The collapse of the Georges Bank fishery off New England demonstrates how some coastal conservation programs have been less than effective. The penalties of this failure to maintain a rich, viable fishery are billions of dollars of lost revenue and loss of livelihood to all dependent on that industry.

Of all the United States 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 United States economy. Finfish and shellfish from these waters constitute nearly five-percent of the world and fifty-percent of the United States harvest. Pollock, salmon, halibut, and crab generate over two billion dollars each year in revenue and provide an important source of high protein food. Pollock also provides food for numerous fish, birds, and marine mammals and as such is a keystone of Alaskan ecosystems. Until the final decades of the last century, these most productive waters had not seen the same commercial pressures as other United States fisheries. For EEZ resource management to be effective in the new millennium we must seriously investigate and understand man's impact on these ecosystems.

FOCI contributes to resource management partly by examining the dynamics of survival of pollock in Alaskan ecosystems. The goal is to understand natural variations in year-class strength and to provide this information to those who manage these fertile waters. Incorporating scientific understanding of survival processes represents advancement from the classical fishery management technique of survey and estimation. In the Gulf of Alaska since 1992, FOCI has been providing information from research directly to NOAA's NMFS advisory team whose mission is to advise the North Pacific Fisheries Management Council on the status of pollock and other stocks in the Gulf of Alaska and Bering Sea. In this manner, FOCI has a unique role of directly transferring research results to applied management. Moreover, the investment in FOCI research is a small fraction, less than 0.04%, of the commercial value of the Alaskan stocks.

FOCI research began in the Shelikof Strait region of the Gulf of Alaska. Owing to the consistent spawning behavior of pollock, studying the complex environmental interactions that occur while the fish is growing from the egg to juvenile stages is most tractable in Shelikof Strait. 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. To date, actual fish returns have verified the FOCI forecasts. As our understanding of how biological and physical processes interact to limit or encourage survival of young pollock, our ability to provide more accurate and quantitative forecasts will increase. Recently, FOCI research has begun to address the more complex questions of survival in the Bering Sea and provide similar assistance to stock management there.

FOCI scientists are coordinating their research efforts with several international scientific organizations to address the effect of climatic fluctuations on the Gulf of Alaska and Bering Sea ecosystems. 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 favors other species. Such knowledge will permit commercial interests to reallocate and refocus 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.