NOAA FORM 77-65 (REV 3-84) **U.S DEPARTMENT OF COMMERCE** NOAA

REQUEST FOR THE SHIP TIME (FY 03)

1. ORIGINATING OFFICE	2. DATE
Pacific Marine Environmental Laboratory, Seattle, Washington	12/7/01

3. PROJECT/CRUISE TITLE	4. ORIGINAL REQUEST ☐ CHANGE NUMBER ☑ *(If update complete item 5)*	5. DATE OF ORIGINAL REQUEST
Fisheries-Oceanography Coordinated Investigations (FOCI)		1/8/01

6. SHIP PREFERENCES(*In Order of Preference*)	7.PROGRAM MANAGER (*Name, Routing Code, Telephone*)
NOAA Ship RONALD H. BROWN or Class I	Dr. Phyllis J. Stabeno, R/PMEL, (206) 526-6453
8. CHIEF SCIENTIST (*Name, Routing Code, Telephone*)	9. ADDITIONAL CONTACTS
Dr. Edward D. Cokelet, R/PMEL, (206) 526-6820	James A. Bunn, LT/NOAA, R/PMEL, (206) 526-6809

10. PROJECT/CRUISE OBJECTIVE AND DESCRIPTION

Spring FOCI:
Mooring operations, collect CTD, ADCP, and water/net tow samples for annual ichthyoplankton survey and zooplankton studies. Supports: U.S. GLOBEC, NEP/BS, FOCI, and Steller Sea Lion research.

POSSIBLE FOREIGN RESEARCH OR PORT CLEARANCES:

11. PROJECT AREA (*Include Chartlet*)	12. SEATIME REQUIRED (Including Transit Time) IN DAYS:	
North Pacific Ocean	DESIRED 45	MINIMUM ACCEPTABLE 43
13. CRUISE PERIOD (*Months*)	14. THIS PROJECT WILL BE PRIMARY ☑ PIGGYBACK ☐	
Late April - early June		

15a. **NOAA PROGRAM PERSONNEL** ☐ **SHIP'S COMPANY ONLY**

	MAX/MIN	OFFICE	BERTHING REQUIRED	
SCIENTISITS	4		YES	
TECHINICANS	10		YES	
TOTAL	14			

15b. **NON-NOAA PARTICIPANTS AND THEIR AFFLIATION**

PERSONNEL (*Names*)	AFFLIATIONS

15c. NON-NOAA BERTHS REQUIRED: 2	15d. TOTAL BERTHS REQUIRED: 14

16. SUGGESTED PIGGYBACK PROJECTS AND TIME REQUIREMENTS (*or Restrictions*) WHICH CAN BE ACCOMMODATED

- Tsunami mooring deployments/recoveries during transits in the North Pacific Ocean.
- VENTS Acoustic Monitoring Project hydrophone mooring recoveries/servicing/deployments during transit, requiring an additional 2 days for operations.

17. **SHIP CAPABILITIES REQUIREMENTS**

ENDURANCE (Days)	LAB SPACE (Sq. feet)	WET	DRY
MINIMUM POSITION ACCURACY REQUIRED±		ON STATION TIME:	Speed *(Knots):* 12

18. **SHIP CAPABILITIES REQUIREMENTS**

ELECTRONICS	OCEANOGRAPHIC	GEAR HANDLING
- GPS - Real-time data acquisition processing system. - Meteorological observing system - Fathometer	- CTD/rosette with 3,800 meters of wire - Niskin water bottles - ADCP calibrated for backscatter - Thermosalinograph - Fluorometer	- A-frame, crane, and winches for mooring deployments and ADCP cages - Ability to tow and recover standard ichthyloplankton nets, including MOCHNESS. - CTD winch with 3,800 meters of wire
SHIP SUPPORT REQUIRED: Yes ☑ No ☐	SHIP SUPPORT REQUIRED: Yes ☑ No ☐	SHIP SUPPORT REQUIRED: Yes ☑ No ☐

19. ON BOARD PROCESSING REQUIREMENTS:	OUTPUT REQUIRED MAG. TAPE ☐ PAPER TAPE ☐ PRINTOUT ☐ ANALOG ☐ OTHER ☐ *(Specify)* _____

20. **PROGRAM FURNISHED EQUIPMENT**

ITEM	DESCRIPTION	WT. (lbs.)	POWER REQD.	SPACE REQUIRED	LOCATION PREFERENCE
1	Sea-Bird (SBE) CTD	450	YES	18 sft	
2	Ichthyloplankton sampling gear			Large, open deck	
3	FOCI biophysical platforms and anchors	20000	NO	400 sft	
4					

21. STAGING TIME REQUIRED *(Days/Location):* 1/ Seattle	DESTAGING TIME REQUIRED *(Days/Location):* 1/ Seattle

22. APPROVED	DATE	TITLE	*Remarks Continue On Reverse* ☑

ATTACHMENT TO NOAA FORM 77-65 **DECEMBER 6, 2001**

FISHERIES-OCEANOGRAPHY COORDINATED INVESTIGATIONS (FOCI)
PMEL/OERD

REQUEST FOR FY 03/04 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**. 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.

This cruise will accomplish work in the Gulf of Alaska region while MILLER FREEMAN completes work in the Bering Sea and Aleutian Islands area during the same time period.

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 that are 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 oceanography 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 funding agencies to accomplish its research goals and meets its obligations to fisheries management. These agencies currently include NOAA's Center for Sponsored Coastal Ocean Research (CSCOR)/Coastal Ocean Program (COP), North Pacific Marine Research Program (NPMRP), Arctic Research Initiative (ARI), Environmental Protection Agency (EPA), United States Global Ocean Ecosystems (GLOBEC), Office of Naval Research (ONR), and National Science Foundation (NSF). FOCI scientists collaborate with scientists from other United States and foreign universities, including Canada, Great Britain, and Japan. 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:

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. 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, mooring recoveries and deployments, MOCNESS, CalVET and Bongo net tows, bottom trawls, and various bio-optical instrument deployments.

This cruise will accomplish work in the Gulf of Alaska while MILLER FREEMAN works in the Bering Sea and Aleutian Islands area during the same time period.

The objectives are to:

1. Monitor the water properties and circulation along an oft-repeated oceanographic section in Shelikof Strait and the Northern Gulf of Alaska. In support of this we will be deploying moorings in Unimak Pass, Shelikof Strait, south of Kodiak Island, near Gore Point, and on a line extending southeast from Seward. Satellite drifter buoys will also be deployed along our transect route.
2. Detect movements of nutrient-rich slope water onto the Gulf of Alaska shelf and relate them to temporal and spatial variations in biological distributions and processes
3. Assess the role of Amatouli Trough in replenishing nutrients to the Gulf of Alaska shelf.
4. Conduct an ichthyoplankton survey and process-oriented study in the region between Kennedy Entrance to Shelikof Strait and the Semidi Islands to estimate the abundance of young walleye pollock larvae, their transport, and factors influencing their survival.
5. Occupy stations on 'Line 8' to continue our 15 yr. time series of environmental and biological conditions in Shelikof Strait.

Large 'North Pacific-class' surface moorings will be deployed off the fantail through the A-frame. The deck crane is used to maneuver the buoy, subsurface floats, and anchor into position. The buoy is set out through the A-frame and lowered into the water. Up to 4,000 meters of mooring line is paid out via the ship's capstan, while the ship slowly maneuvers forward through the water. The anchor is deployed last through the A-frame. The ship must have good sea-handling characteristics and station-keeping capabilities ensures that the mooring deployments are conducted safely even when the sea state increases during operations.

CTD casts up to 6,000-meter depths will be conducted at all mooring sites and other areas of interest. The 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. Mooring deployments and CTD profiler casts are linked because the mooring sites are important sampling nodes in CTD transects, and mooring time series are calibrated by CTD profiler cast data.

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.

Ecosystem-oriented FOCI sampling stations include Marine Assessment Monitoring and Prediction (MARMAP) Bongo net tows and a variety of bio-optical measurements. Bio-optical instruments are fragile and often hand-lowered, requiring precise ship position-keeping capabilities. They include, but are not limited to, a Tethered Spectral Radiometer Buoy, a free-falling multi-channel profiling radiometer, and a Bio-Optical Profiling package consisting of spectrophotometer, Fast Repetition Rate (FRR) fluorometer, scatterometer, and silhouette floc camera.

A unique capability possessed by **NOAA Ship RONALD H. BROWN** is the TeraScan satellite-receiving station that allows FOCI scientists to download Sea-viewing Wide Field-of-view Sensor (SeaWiFS) images in real-time at maximum resolution from satellite passes directly over the ship. The real-time SeaWiFS images are used to vector the ship to sampling locations, and FOCI's bio-optical measurements are used to calibrate SeaWiFS chlorophyll-concentration algorithms. This maximum-resolution SeaWiFS data is not available from land-based stations after the fact due to excessive data-storage requirements.

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.

1) North Pacific Marine Research (NPMR)
2) Endangered Species Act (ESA) – Steller Sea Lion
3) National Science Foundation (NSF)
4) Study of Environmental Arctic Change (SEARCH) – Arctic Bering Sea
5) United States Global Ocean Ecosystems (GLOBEC) – Northeast Pacific Study

Justification for time frame, options for reduced support:

1) FOCI's spring cruise timing is tied directly to the North Pacific and Bering Sea spring phytoplankton bloom, corresponding fish spawn, and increased avian and marine mammal activity, including pupping.
2) The '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 mooring operations in this region.
3) Biophysical moorings must be turned around at least twice a year to insure quality data. The earliest opportunity that this can be reliably accomplished is May, and the latest is mid to late September.
4) 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.
5) Having a Tsunami mooring cruise and the piggyback Vents- Acoustic Monitoring Project, NE Pacific, follow 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.

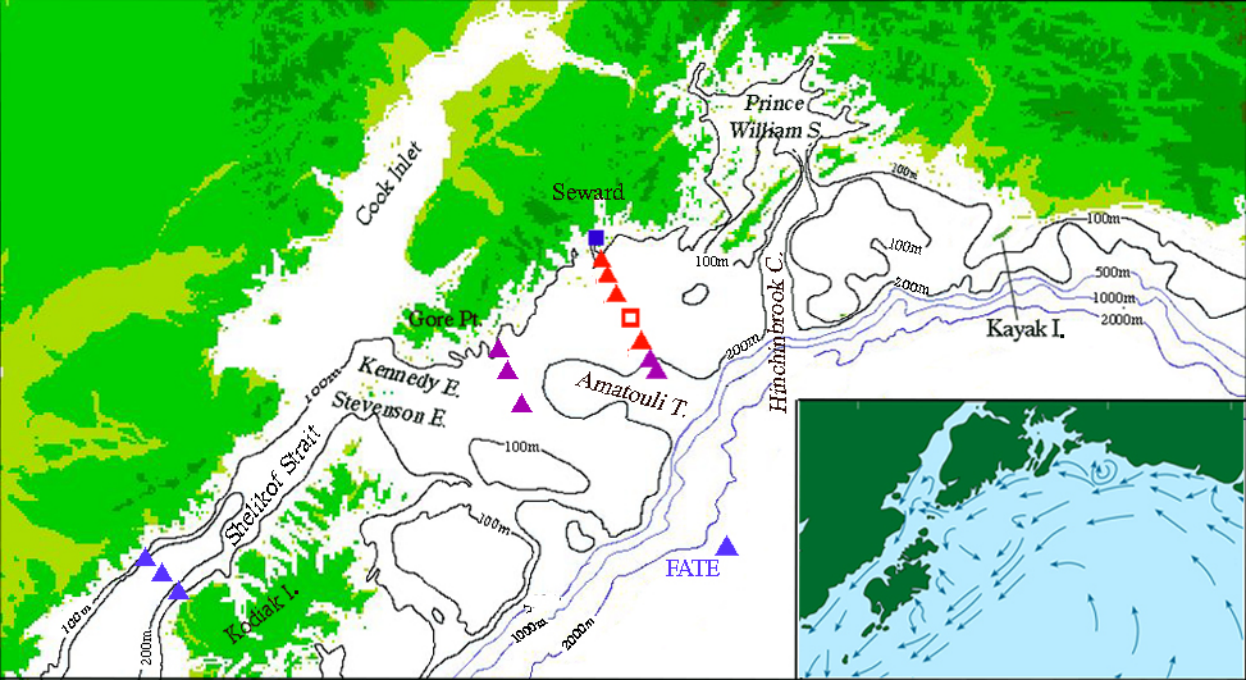
FOCI contributes to resource management partly by examining the dynamics of survival of pollock in Alaskan ecosystems. The goal is to understand natural variations in year-class strength and to provide this information to those who manage these fertile waters. Incorporating scientific understanding of survival processes represents an 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 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 effective.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