Cooperative Research Partners Initiative
Study Fleet Phase II Report
for
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1 Study Fleet Abstract

The National Marine Fisheries Service (NMFS), State, Federal and Constituent Programs Office (SFCP), Cooperative Research Program (CRP) has requested technical assistance in developing, coordinating and implementing their pilot Study Fleet Project. Under the CRP, NMFS has established a program of competitive grants and managed projects designed to increase collaboration between the fishing industry and fisheries scientists. The information collected through this program is aimed at improving fisheries science and fisheries management. The Study Fleets are intended to collect detailed fisheries-dependent information about catch, effort, by-catch, location, and possibly, to collect biological samples. The Study Fleet Project will continue to refine a number of methods for collecting more accurate and timely data from fishing vessels with the goal of improving data, opening new pathways of communication between industry and the scientific community and broadening our understanding of fishing and fisheries science.

The Cooperative Research Partners Initiative (CRPI) is the Northeast Region's cooperative fisheries research program. The Study Fleet Project is one of four major program areas of the CRPI. Three study fleets on Cape Cod, offshore George's Bank and the Gulf of Maine were chosen to work with state-of-the-art electronic data collection and communications systems to provide the CRPI with high resolution data on fisheries dependent catch, effort and biological sampling.

Perot Systems has been tasked by the CRPI to implement the Study Fleet Program. Perot Systems will approach the task with four major work areas; staffing, requirements analysis, information system development and fleet implementation. Task work will include Study Fleet contracting vessels, outreach and education; requirements and development of at-sea data collection and communications systems.

2 Study Fleet Executive Summary

Study Fleet Phase II took place from July 1, 2004 to February 28, 2005. The objective of Study Fleet Phase II was to continue activities started in Phase I to include the further development UNH Logbook and P-Sea Windplot Logbook, test different types of computer hardware, to establish satellite communications to transmit data that and test temperature probes to capture average temperature for an individual haul.

During Phase II the Study Fleet would be expanded by fifteen (15) additional commercial fishing vessels and equip these vessels with electronic devices to capture catch and effort data during their normal fishing operations. This would bring the number of Study Fleet vessels to thirty (30). (See Appendix A: Study Fleet Participating Vessels Phase I & Phase II for a complete list of Study Fleet participating vessels.)

Data was collected over a period of eight (8) months from thirty (30) commercial fishing vessels during Phase II of the Study Fleet project. Study Fleet data came from two sources; the UNH Logbook and P-Sea Windplot Logbook. During the period which the data was being collected, the bulk of the data came from the UNH Logbook because the UNH Logbook was further along in the development life cycle then the P-Sea Windplot Logbook.

2.1 Hardware (Tablet & Laptop Computers)

During Study Fleet Phase I, two (2) different types on computers were used to collect catch and effort data, laptops and tablets. Phase I deployed three (3) different models of tablet computers and two (2) different models of laptop computers. Phase II introduced a third laptop model.

The three (3) models of tablet computers used were; Brite Computers Xplore iX104, Walkabout Hammerhead XRT, and Motion Computer M1300. The three (3) models of laptop computers used were; Dell Inspiron 2600, Dell Latitude C640 and Dell Latitude D505.

The tablets computers used in the Study Fleet project were all deployed during Phase I of the project. The laptops computers used in the Study Fleet project deployed during Phase I were Dell Inspiron 2600, Dell Latitude C640. The Dell Latitude D505 was first deployed in Phase II.

All of the tablet computers have the capacity to run the UNH Logbook and P-Sea Windplot logbook. All but one of the laptop computers can run the P-Sea Windplot Logbook. The less powerful Dell Inspiron 2600 had performance problems running the P-Sea Windplot Logbook. The P-Sea Windplot would run very slow or at times hang. On the more powerful Dell Latitude C640 and Dell Latitude D505 the P-Sea Windplot application ran without any issues.

All types and models of the tablet and laptop computers can accept data feeds from the Garmin 36 Tracpak GPS antenna and ARC Nautilus 85 Temperature Probe. Also all types and models of the tablet and laptops can send trip data via the Boatracs interface, Iridium and SkyMate Satellite modems. (Please see section 5.2.1 Hardware for more details.)

Hardware (Tablet & Laptop Computers) Recommendation

As far as choosing a standard computer for the Study Fleet project it would be a laptop with the same capacity as the Dell Latitude D505. The Dell Latitude D505 has the capability to run both electronic logbooks, transmit data via satellite and accept positional data feeds from a GPS device. The Dell Latitude D505's are compact and can be easy transported. The Dell Latitude D505 is less expensive then the tablet computers and provides the same performance. (Please see sections 5.2.1.3 Dell Latitude D505 and Appendix B: Study Fleet Recommended Hardware (Dell Latitude D505) for more details.)

2.2 Software (Electronic Logbooks)

Study Fleet Phase II continued the development started in Phase I of the UNH Logbook and P-Sea Windplot Logbook. During Phase II the breath and depth of the data capture by both logbooks was expanded. Both logbooks can capture detail catch and effort to include individual species both kept and discard, species sold to individual dealers and time stamping data as data is entered. Also enhancements were made in the rules when entering efforts using fixed and mobile gears, lump sum catches and the code tables for Species, Gear and Port codes.

In Phase II of the Study Fleet, twenty-eight (28) of the thirty (30) fishing vessels submitted catch and effort data using the UNH Logbook. During the course of the project, the UNH Logbook has shown to be simple and easy to use. Another reason for the deployment of UNH Logbook in a greater numbers then the P-Sea Windplot Logbook was the UNH Logbook was further along in the development life cycle then the P-Sea Windplot Logbook.

The P-Sea Windplot Logbook has a total different design then the UNH Logbook and appeals to a different type of audience. In Phase II of the Study Fleet project, two (2) of the thirty (30) fishing vessels was equipped with the P-Sea Windplot Logbook.

The concept for the P-Sea Windplot Logbook came about from interviews and time-and-motion assessment on fishing vessels. In the course of these interviews and time-and-motion assessment most of the vessels had P-Sea Windplot II navigation software and suggestions were made to couple an electronic logbook to the navigation software.

This suggestion was follow-up on and the second Study Fleet electronic logbook was under development. The P-Sea Windplot Logbook saw limited use in Phase II. (Please see section 5.2.2 Software for more details.)

Software (Electronic Logbooks) Recommendation

If a standard logbook was selected it would be the UNH Logbook. The reason for choosing the UNH Logbook is the ease of use, especially during hectic fishing operations and the UNH Logbook is a stand alone application.

In the case of the P-Sea Windplot Logbook, this logbook is not a stand alone application. The users need to have installed on their computer P-Sea Windplot II core navigation software to use the logbook. P-Sea Windplot Logbook should continue to be tested with a limited audience to see if the architecture of this logbook should be pursued. (Please see sections 5.2.2.1 UNH Logbook, 5.2.2.2 P-Sea Windplot Logbook and Appendix C: Study Fleet Recommended Software (UNH & P-Sea Windplot Logbooks) for more details.)

2.3 Marine Communications

In Phase I and Phase II of the Study Fleet, three (3) methods were being tested to transmit trip data via satellite; Iridium A3LA-IG, SkyMate 100 and Boatracs WBUI.

During Phase I and Phase II, fifteen (15) vessels were equipped with Skymate 100 Satellite Modems and eight (8) vessels were equipped with Boatracs WBUI Interface. The reason why Boatracs and Skymate system were so popular, is both systems are vetted by law enforcement for section management.

The Iridium A3LA-IG was tested in Phase I and the tests were successful but this is not a solution going forward because of the monthly cost are higher then Skymate.

All models of the tablet and laptop computers as well as both UNH Logbook and P-Sea Windplot Logbook have the ability to transmit data via satellite using Iridium A3LA-IG, Skymate 100 and Boatracs WBUI. (Please see section 5.2.3 Marine Communication for more details.)

At this stage of the project data is transmitted via satellite communication at the end of a trip no matter which method of transmission is being used. Files transmission via satellite to the Study Fleet mail box is encrypted and compressed.

Marine Communications Recommendation

The recommendation for the Study Fleet project at this point is Skymate 100 for vessels which do not already have a satellite system installed.
The Skymate 100 is easy to install and easy to use. Skymate monthly fees are far lower then Boatracs and Iridium. (Please see sections 5.2.3.3 Skymate 100 Satellite Modem, Appendix D: Study Fleet Recommended Marine Communications (Skymate 100) and Appendix B: Boatracs/WBUI Transmission Cost Calculation for more details.)

2.4 Global Position System Devices

In Study Fleet Phase I and Phase II eleven (11) vessels were outfitted with Garmin 36 Tracpak GPS Antenna. Both UNH Logbook and P-Sea Windplot Logbook will accept data feeds from the Garmin 36 Tracpak GPS Antenna providing positional information to the logbooks at the start and end of each tow automatically. The automatic data feed of positional information to the logbook reduces the time the fishermen needs to enter data and the number of error if the information was manually entered. The Garmin 36 Tracpak GPS Antenna has worked well in the Study Fleet and at this time is the only GPS device being fielded by the project. (Please see section 5.2.1 Global Positioning System for more details.)

Global Position System Devices Recommendation

The Garmin 36 Tracpak GPS Antenna was used in Phase I and Phase II of the project and operated without any failures. The Garmin 36 Treacpak should be continued to be used in the Study Fleet project. Currently it is the only GPS Antenna deployed by the Study Fleet project. (Please see sections 5.2.4.1 Garmin GPS 36 Tracpak and Appendix E: Study Fleet Recommended Global Positioning System (Garmin GPS 36 Tracpak) for more details.)

2.5 Temperature Probes

In the course of our interviews and time-and-motion assessment, fishermen suggested it would aid their fishing operations if they could record sea temperature during individual tows. The ARC Nautilus 85 Temperature Probe was incorporated into the UNH Logbook and P-Sea Windplot Logbook software to accept a data feed from the probes. The temperature probe was a great asset to the project by allowing the capture of "Average Temperature" for each tow. Average temperature for each tow is an important piece of information for both the fishermen and the scientist.

The ACR Nautilus 85 Temperature Probe was deployed on seven (7) vessels during Phase I and Phase II.
On six (6) of the vessels the probe worked well, on one (1) vessel there were three (3) total failures of the ARC Nautilus 85 Temperature probe for the same reason. The failures were caused by what appears to be a design flaw in the probe. Sea water leaks into the probe causing corrosion and destroying all the internal components. There are two (2) theories to explain why sea water leaks into the probe. One is after repeatedly

removing and replacing the cap of the temperature probe, the O-Ring can become damaged allowing sea water to leak inside the probe destroying internal parts and making the probe useless. The second theory is the temperature probe is secured to the fishing net by the cap end and because of the banging and spinning against the net; the cap can become loose allowing sea water to leak in. The last total failure occurred on a 5 day trip.

All models of the tablet and laptop computers as well as both UNH Logbook and P-Sea Windplot Logbook will accept data download from the ACR Nautilus 85 Temperature Probe. (Please see section 5.2.5 Temperature Probes for more details.)

Temperature Probes Recommendation

Testing should continue with the ACR Nautilus 85 Temperature to solve the leaking problem. Both theories for the leaking problem should be pursued. The damaged O-Ring could be solved by lubricating the O-Ring to prevent damage. The second theory of the probes cap coming loose because of the banging and spinning against the fishing net could be solved by installing a bracket to place the temperature probe in.

If the leaking problem can not be solved then it is recommended another vendor of temperature probes should be investigated. The reason is this is an important function and should not be abandoned because of one vendor. (Please see sections 5.2.5.1 ACR Nautilus 85 Temperature Probe and Appendix F: Study Fleet Recommended Temperature Probe (ACR Nautilus) for more details.)

2.6 Configuration & Cost of Recommended Vessel Side Equipment

If the recommended equipment became the standard issue for Study Fleet vessels the following table shows the equipment configuration and estimated cost per vessel:

Study Fleet Equipment Configuration & Cost Summary	
Equipment Description	**Cost**
Dell Latitude D505 & Supporting Equipment	$ 1,986.55
Garmin 36 Trackpak with 9 Pin Serial Connector	$ 264.00
Skymate 100 with VMS and Reserve	$ 1,188.00
ACR Nautilus 85 Temperature with PC Interface Cable	$ 398.00
Total	$ 3,836.55

* The cost reflects the prices at the time of purchase and does not include M & H and G & A costs.

Please see Appendix B: Study Fleet Recommended Hardware (Dell Latitude D505) for more details.

The table shows the cost per vessel, but there are several factors that have to be taken into account which could increase or decrease the cost to equip each vessel.

The follow factors could increase or decrease the cost to equip each vessel:

- If the UNH Logbook is used then there is no increase or decrease.
- If the P-Sea Windplot Logbook is used then there will be an increase because this is not a stand alone logbook and needs to interface with the P-Sea Windplot core navigation software to use the logbook. The cost per license is $ 1,650.00.
- Depending on the vessel, some vessels already have a GPS System which the laptop computer can be connected to. In this case a decrease of $ 264.00.
- Depending on the vessel, some vessels already have satellite communication which the laptop computer can be connected to. In this case a decrease of $ 1,188.00. This does not include activation fee or monthly cost for transmitting data.

2.7 Study Fleet Data Collection and Error Summary

UNH Logbook Summary

The following table is the data collection summary for the UNH Logbook from July 2004 to February 2005.

Summary for UNH Logbook Trip Data July 2004 through February 2005		
Month	**Number of Trips**	**UNH Logbook Version**
July 2004	56	3.0
August 2004	64	3.0
September 2004	71	3.0
October 2004	85	3.0
November 2004	62	3.0
November 2004	18	4.0
December 2004	89	4.0
January 2005	63	4.0
February 2005	12	4.0
Totals	**520**	

The following table is an error summary for the UNH Logbook. The table will break down each data error by the version of the UNH Logbook in which it occurred and the frequency:

Summary for UNH Logbook Data Errors July 2004 through February 2005			
UNH Logbook Version	**Number of Trips**	**Number of Errors**	**Average Errors Per Trip**
3.0	337	252	1.34
4.0	183	817	4.46
	520	**1069**	

The Summary for UNH Logbook Data Errors July 2004 through February 2005 tables shows in some cases a rise in the error rate version 3.0 to version 4.0 of the UNH Logbook.

There were two (2) reasons for the increased error rate from UNH Logbook version 3.0 to 4.0. There was an increase error in the Species and Port Codes. In the case of Species Codes there was a error in the UNH Logbook export routine and the export routine was exporting incorrect species even though correct species codes was selected in the application. The species code in question was the NMFS code for Lobster. Instead of exporting the value "LOB" for the lobster which the UNH Logbook had done in previous versions, the UNH Logbook starting exporting "LOBC" or "LOBN" depending on which unit of measure was chosen. The species code "LOBC" for lobster "Count" and "LOBN" for lobster "Number". The error was corrected in UNH Logbook 4.1.

In the case of Port Code, Port Code was added to UNH Logbook Version 4.0 and the code could not be validated at the point of entry, but could only be validated when the trip was loaded by the Study Fleet Information System. In previous versions of the UNH Logbook, version 3.0 or lower, Port Name was the only required entry. The error was corrected by PSGS field staff visiting the vessels and correcting the UNH Logbook setup with the correct Port Code. (Please see section 5.2.6.1 UNH Logbook Data Collection & Data Errors for more details on data collection and data errors.)

P-Sea Windplot Logbook Summary

The following table is the data collection summary for the P-Sea Windplot Logbook for July 2004 to February 2005:

Summary for P-Sea Windplot Logbook Trip Data July 2004 through February 2005		
Month	**Number of Trips**	**P-Sea Windplot Logbook Version**
July 2004	N/A	P-Sea Windplot Logbook was not available.
August 2004	N/A	P-Sea Windplot Logbook was not available.
September 2004	N/A	P-Sea Windplot Logbook was not available.
October 2004	N/A	P-Sea Windplot Logbook was not available.
November 2004	6	7.08
December 2004	6	7.08
January 2005	7	7.08
February 2005	1	7.09
Totals	**20**	

The following table is an error summary for the P-Sea Windplot Logbook. The table will break down each data error by the version of the P-Sea Windplot Logbook in which it occurred and the frequency.

Summary for P-Sea Windplot Logbook Data Errors July 2004 through February 2005			
UNH Logbook Version	**Number of Trips**	**Number of Errors**	**Average Errors Per Trip**
7.08	18	341	18.94
7.09	2	2	4.50
Totals	**20**	**343**	

(Please see section 5.2.6.2 P-Sea Windplot Logbook Data Collection & Data Errors for more details on data collection and data errors.)

2.8 Study Fleet Information System

In Phase I and Phase II of the Study Fleet project a Study Fleet Information System was successfully designed and built for loading data submitted by the fishing vessels into a structured database design, performing data editing, providing data security and the ability to disseminate data submitted by study fleet participants.

The Study Fleet Information System (**SFLEET**) encompasses the database, security context management, and access sub-systems (administration, data editing, and reporting). The general structure of the SFLEET, with its tiered data structures (RAW-WORK-BASE) are subject to varying levels of modification and auditing,

offers a highly manageable solution to meet numerous requirements regarding system security, enforceability and traceability of data, and constituent access to confidential data sources.

The Study Fleet Information System also has procedures to uncompress and unencrypted files submitted via satellite communication prior to loading into the Study Fleet database.

The Study Fleet Information System between September 2003 and February 2005 loaded and stored over 800 trips submitted from the UNH Logbook and P-Sea Windplot Logbook.

The full objective for the Study Fleet Information System was not completed. The missing piece even though designed and built but never implemented was the Study Fleet Web Site. The web site would have allowed the fishermen to view their data, edit their data and sign off on it.

The reason the Study Fleet Web Site was never implemented is because as NMFS was very much an Oracle facility and had Oracle licensing in place, the selection of Oracle Application Server (OAS) was a natural selection as the planned architecture for the Study Fleet website. This allowed the leveraging of previous work for the Data Query System as well. The plans were put in place for using a combination of Oracle Portal and Discoverer as the user interface to the Study Fleet database.

Unfortunately several issues were discovered during the process of implementing the web site pilot:

1) The version of Oracle Portal in place was riddled with bugs acknowledged by Oracle as developers tried to make use of documented capabilities. The only fix for this would have been to upgrade all of NMFS OAS application to the latest version of 10G along with all the testing required for applications outside of Study Fleet.

2) The customization of Oracle Portal is very limited. The Study Fleet application was to be a web based application and not a Portal for which this system was designed. The layout possibilities made the web site less intuitive for the prospective user than was possible by other application server technology.

3) The use of other components of OAS such as Oracle Forms and Report Servers, would have allowed for the form customization desired, but this introduces another complication. The use of Forms and Reports services make use of a java applet that has to be installed on every computer using the application. In many cases the installation is very straight forward, but all too often, it requires IT expertise to get systems operational. This process would not scale at all for the future plans of Study Fleet.

Since the beginning of the Study Fleet project, Oracle has released another product called HTML DB. This product is much more suited for the type of application desired for Study Fleet. This is also a component of oracle 10G, so it does involve the potential of upgrading other NMFS applications should they decide to integrate onto a single server, but HTML DB is not part of OAS, so it can be run separately. This produce uses more standard technologies such as J2EE support in the development of web applications.

As there are now better platforms for developing the final version of the web application, it was decided that the pilot web site would not be finalized using the Oracle Portal technology. Instead, NMFS will make that a future project. (Please see section 5.2.7 Study Fleet Information System for more details.)

3 Study Fleet Purpose

The purpose of the Study Fleet Project is to investigate, design and implement data collection systems that improve the timeliness and accuracy of fisheries-dependent data collected from fishing vessels.

Vessels will be outfitted with electronic data collection devices which will facilitate the transfer of catch and effort data directly into an information system.

The goal of the Study Fleet project will be to test automated data processing solutions that may be applied to the collection, transmittal, quality assurance and analysis to enhance data collected by fishing vessels. This goal will be to collect more detailed data that will allow sophisticated fisheries evaluations to be performed. The goal of this project is to improve the way commercial fisheries data are collected and processed. Also, the data that will be collected through the Study Fleet project would be made available to fishermen in the form of reports and visual aids.

Additionally, fishermen and scientists alike would also be interested in recording data that can indicate the relationships between catch and effort observations and environmental factors such as weather, surface temperature, bottom temperature and salinity. The current purpose Study Fleet Project lays the groundwork for collecting those data.

4 Study Fleet Approach

The approach taken to engage commercial fishing fishermen to collect catch and effort data during normal fishing operations and process the data was as follows:

1. Select three (3) professional fishing organizations to provide and coordinator commercial fishing vessels for the Study Fleet project. In Phase I the following organizations were selected by submitting a completive proposal; Gulf of Maine Research Institute, Cape Cod Commercial Hook Fishermen's Association and Manomet Center for Conservation Sciences.

   During Phase I each of the organizations were required to provide five (5) fishing vessels each. The vessels provided by these organizations were diverse enough to allow choosing from a broad range of vessel characteristics and gear configurations. The same organizations were used in Phase II.

   In Phase II each of the organizations were required to provide and additional five (5) vessels each bring the total vessel count for each organization to ten (10) vessels. This expanded the fleet size to thirty (30) vessels.

2. In both phases of the Study Fleet project an outreach program was maintained. Perot field staff maintained daily contact with the fishermen to provide dockside support for hardware, software, and electronic logbook training.

3. Off-the-shelf (COTS) hardware options were used in both phases of the Study Fleet project to collect catch and effort data. In both phases two type of off the shelf computers were used, Laptop and Tables Computers along with GPS and satellite devices.

4. Two (2) custom electronic logbooks were developed, UNH Logbook and P-Sea Windplot Logbook to capture catch and effort data using either a Laptop or Tablet computer in conjunction with GPS and satellite devices. The development of these logbooks was started in Phase I of the project.

5. A Study Fleet Information System was developed to collect, manage and disseminate data from the field data collection devices. The Study Fleet Information System was design and built to store and to perform data quality check on the data collecting from the participating fishing vessels.

5 Study Fleet Findings

5.1 Vessel Wheelhouse Configurations

Before placing equipment on the fishing vessels, Perot Systems field staff performed initial requirements analysis of each vessel. Perot Systems field staff took photographs of the participating fishing vessel's wheelhouses to illustrate the notes being collected during the requirements analysis phase for each vessel. (See Appendix A: Study Fleet Participating Vessels Phase I & Phase II for a complete list of Study Fleet participating vessels.)

The wheelhouse photographs clearly show the different environments hardware will have to be installed and operate in. The major disparities between small wet-wheelhouses and large dry-wheelhouses became evident. It was clear there would be a need to try different types of hardware based on wheelhouse characteristics and this gave a basis for hardware requirements for each vessel.

The following photographs show the wide range of wheelhouses of the vessels participating in the Study Fleet Pilot Project:

F/V Capt Bligh

F/V Decisive

F/V Iron Horse

F/V Isabella Rose

F/V Linda Marie

F/V Sea Holly

F/V Synergisgic

F/V Tenacious

F/V Trident

F/V Wendy Jean

5.2 Study Fleet Hardware & Software Evaluation

5.2.1 Hardware

5.2.1.1 Dell Inspiron 2600

Dell Inspiron 2600 Overview

The Dell Inspiron 2600 is a low-cost, portable hardware solution that has performed well running the UNH Logbook.

Dell Inspiron 2600 Evaluation

The Dell Inspiron 2600 was first deployed in Phase I of the project in June of 2003. At that time six (6) were deployed and at the writing of this report they are still in service. The Dell Inspiron 2600 was placed in a wide range of wheel houses from dry in-closed to open wet wheel houses.

The Celeron processor in the Dell Inspiron 2600 did not perform well when running P-Sea Windplot and the UNH Logbook simultaneously. It has, however, performed well when running the UNH Logbook and ACR Temperature Logger software. Other issues with the Dell Inspiron 2600 are weather related mostly with extreme cold, which causes battery failure and the keyboard to freeze up.

Over the winter one (1) battery had to be replaced in a wheelhouse that was subjected to sub-freezing temperatures frequently. The only other problem noted is the screen is subject to serious glare, making it problematic to entry data.

An issue with long term exposure to vibration has not been evaluated and therefore should be considered a future issue. This issue will vary depending on the vessel and the length of exposure to vibration, even if the vibration is very slight.

Captain Bill Lee had been experiencing periodic blue screen/fatal errors on his Dell Inspiron, while connected to his boat's GPS. He was using a Belkin serial to USB adapter cable to make the GPS connection. PSGS field staff took a trip on the F/V Ocean Reporter on November 30, 2004, to try using the field staff's Dell Latitude laptop, which does not require a serial to USB cable because it has a serial port. No blue screen/fatal errors were encountered. It was decided to try swapping out the Belkin cable with an Iogear serial to USB adapter cable before swapping out the actual Dell Inspiron laptop.

Captain Lee has used the Dell Inspiron with the new Iogear cable on three trips since December 3, 2004 and has not had any blue screen/fatal errors. The new cable solved the problem.

Possible future issues is the Dell Inspiron 2600 and its peripherals have been in the field longer then any other device we have and could start to experience failures.

Dell Inspiron 2600 Recommendation

The Dell Inspiron 2600 is limited in its computing ability and is a moderate solution for vessel electronic reporting. Current the Dell Inspiron 2600 is installed on five (5) fishing vessels and it is suggested that if the project continues with future phases, vessels with these computers be upgraded with newer laptops such as the Dell Latitude D505. Another note Dell Computer has discontinued the Dell Inspiron 2600 model line.

5.2.1.2 Dell Latitude C640

Dell Latitude C640 Overview

The Dell Latitude C640 is a portable, expandable, high-powered laptop. The Pentium 4 processor allows it to run P-Sea Windplot and the UNH Logbook simultaneously.

Dell Latitude C640 Evaluation

The Dell Latitude C640 was first deployed in Phase I of the project in October of 2003. At that time two (2) were deployed and at the writing of this report they are still in service. The Dell Latitude C640 were placed in a wide range of wheel houses from dry in-closed to open wet wheel house

The Dell Latitude C640 experienced some problem with screen glare. Other problems dealt with were the number of USB and Serial Ports available on the Dell Latitude C640. In order to connect all the peripherals such as the ACR Temperature Probe, Skymate or Boatracs satellite communication and GPS devices, multiple port USB and DB9 Serial Port hubs had to be installed on the Dell Latitude C640. When the hubs are installed and the other peripherals are connected, close attention has to be paid to the Device Manager to insure the ports are correctly assigned to the peripherals.

An issue with long term exposure to vibration has not been evaluated and therefore should be considered a future issue. This issue will vary depending on the vessel and the length of exposure to vibration, even if the vibration is very slight.

On February 7, 2005, Captain Cameron McLellan, F/V Adventurer, reported that his Dell Latitude C640 laptop was having problems with its GPS connection. On February 9, 2005, PSGS Field Staff checked on the

problem in Portland, Maine. The GPS problem was fixed by reassigning the Com Port. Captain McLellan had redone some of the wiring behind the computer and accidentally plugged the GPS cable into the wrong serial port.

While rebooting the computer, PSGS Field Staff noticed that on repeated attempts the computer locked up while loading Windows. After four (4) or five (5) tries it did load. This happened on three (3) occasions. The computer would then operate normally. Captain McLellan will watch for this and any other erratic behavior, on his next trip.

This computer is just over two (2) years old. It may be necessary to swap out this computer in the near future.

Dell Latitude C640 Recommendation

The Dell Latitude C640 is in use on two (2) fishing vessels and is a solid solution both in operational ability and price for all size vessels. One plus is that the Dell latitude C640 has one serial port, which can at least accommodate the GPS without a serial to USB adapter cable. The Dell Latitude C640 has the capacity to run Unh Logbook and P-Sea Windplot Logbook. But going forward as a solution for laptop type computers it is not recommended because Dell Computer has discontinued the "C" series line and it was more expensive the Dell Latitude D505.

5.2.1.3 Dell Latitude D505

Dell Latitude C505 Overview

The Dell Latitude C505 is a portable, expandable, high-powered laptop. The Pentium M 725 processor allows it to run the UNH Logbook or P-Sea Windplot Logbook.

Dell Latitude D505 Evaluation

The Dell Latitude D505 was first deployed in Phase II of the project in August 2004. At that time fifteen (15) were deployed and at the time of this writing they are still in service. The Dell Latitude D505 were placed in a wide range of wheel houses from dry in-closed to open wet wheel houses.

The Dell Latitude D505 experienced some problem with screen glare. The Dell Latitude D505 is fitted with USB and DB9 Serial Ports Hubs to accommodate peripherals such as the ACR Temperature Probe, Skymate or Boatracs satellite communication and GPS devices

An issue with long term exposure to vibration has not been evaluated and therefore should be considered a future issue. This issue will vary depending on the vessel and the length of exposure to vibration, even if the vibration is very slight.

Dell Latitude D505 Recommendation

The Dell Latitude D505 is in use on fifteen (15) fishing vessels and is a solid solution both in operational ability and price for all size vessels. One plus is that the Dell latitude D505 has one serial port, which can at least accommodate the GPS without a Serial to USB adapter cable. Dell Computer "D" series is the new wave of laptop computer and is recommended for use in Study Fleet. The Dell Latitude D505 in the current configuration used by Study Fleet provides the performance to run both the UNH Logbook and P-Sea Windplot Logbook.

The cost for the Dell Latitude D505 is lower then the Dell Latitude C640 at about $ 1,700.00 a unit.

5.2.1.4 Motion Computing M1300

Motion Computing M1300 Overview

The M1300 is a portable, compact, powerful hardware solution. The View Anywhere screen significantly reduces glare issues associated with wheelhouses across all gear types and vessel sizes. The M1300 is capable of running P-Sea Windplot and the UNH Logbook.

Motion Computing M1300 Evaluation

The Motion Computing M1300 was first deployed in Phase I of the project in November 2003. At that time four (4) were deployed and at the time of this writing they are still in service. The Motion Computing M1300 was placed in warm dry wheel houses.

One of the Motion Computing M1300 started in a wet wheel house and was removed because of an unreliable performance. The Motion Computing M1300 would blue screen on a regular basis. This issue was solved by changing the basic setting on the Motion Computing M1300. Also the docking station for the Motion Computing M1300 is possibly susceptible to vibration. Although this has yet to be proven, on some vessels, the Motion Computing M1300 vibrated heavily and does not lock into docking station well. The other units have been installed on dry wheel house and have had only a minor amount of blue screen issues which were corrected with changing the basic settings.

Other issues were there are no serial ports on the M1300 or docking station and relied on a 2 or 4-port serial to USB hub, depending on the number of peripherals that are connected to the Motion Computing M1300.

Preliminary fishermen feedback has been all positive. The positive comments have mentioned the View Anywhere screen, light-up keyboard, small size, and portability for storage. All of the fishermen using this device have commented on the clear visibility of the View Anywhere screen. Glare has not been an issue with this device.

The crew of the F/V Ellen Diane experienced several random freeze-up and shutdowns of their M1300. The hardware was taken off the boat and run through by PSGS field staff and Scott Tibbetts. It was determined not to be a software issue but perhaps a mouse issue. The computer was reinstalled with a new trackball mouse. The mouse and keyboard USB y-splitter cable was also moved to a USB port in the back of the M1300 dock that might be more protected from being bent or wiggled loose inadvertently. The M1300 was reinstalled on February 20, 2005 and functioned correctly.

Motion Computing M1300 Recommendation

The Motion Computing M1300 is recommended with reservations. The Motion Computing M1300 is on the expensive side for use on smaller and day fishing boats. However it maybe a solution for the larger offshore trawlers. The one factor for continuing with the Motion Computing M1300 is the View Anywhere screen coupled with the light up keyboard make this computer versatile in direct sun light and total darkness.

5.2.1.5 Walkabout Hammerhead XRT

Walkabout Hammerhead XRT Overview

The Walkabout Hammerhead XRT is still in the field-testing phase of this project. This is a high-cost, ruggedized Tablet PC capable of running both P-Sea Windplot and the UNH Logbook.

Walkabout Hammerhead XRT Evaluation

The Walkabout Hammerhead XRT were first deployed in Phase I of the project in August 2003. At that time one (1) was deployed and at the writing of this report they are still in service. The Walkabout Hammerhead XRT was placed in a wet open wheel houses.

There were some problems with the Walkabout Hammerhead XRT with screen glare and extreme cold. In cold weather condensation froze in the power button, the unit had to be taken off the vessel. When the Walkabout Hammerhead XRT was warmed up and allowed to dry for a few days, the power button preformed without any issues.

This Walkabout Hammerhead XRT did experience a fall from the bulkhead to the deck in high seas. The fall was about five (5) feet and the Walkabout Hammerhead XRT sustained no damage and continued working.

Walkabout Hammerhead XRT Recommendation

The Walkabout Hammerhead XRT is not a solution for the smaller boat fleet, where they could do the most good, because of the cost of the unit and the docking station need to mount it. The Walkabout Hammerhead XRT is not recommended beside other limitations the cost is about $ 7,000.00 per unit.

5.2.1.6 Brite Computers Xplore iX104

Brite Computers Xplore iX104 Overview

The Brite Computers Xplore iX104 is a high-priced, durable and rugged Tablet PC. It has been placed in a very wet wheelhouse environment. This device has a glare issue that makes operation difficult at best.

Brite Computers Xplore iX104 Evaluation

The Brite Computers Xplore iX104 first deployed in Phase I of the project in August 2003. At that time one (1) was deployed and at this time is not in service The Brite Computers Xplore iX104 was placed in a wet open wheel houses.

The Brite Computers Xplore iX104 was taken off the vessel because of recurring glare issues that could not be solved by screen light and angling the unit within the boat's wheel house. The fisherman using the Brite Computers Xplore iX104 was unable to regularly collect data because of the screen glare issues. A number of solutions to cut down on glare were attempted with little or no success. The Brite Computers Xplore iX104 was then re-deployed on a vessel where it could be mounted down below in the cabin out of direct sunlight. The screen is much easier to read in this environment.

This device was capable of running the P-Sea Windplot program along with the UNH logbook program.

A positive of the Xplore iX104 is that it is durable enough to standup to the wet wheelhouse environment aboard the small Cape Cod hook and gillnet vessels. It remains to be seen how this device will perform in long term exposure to cold weather.

Brite Computers Xplore iX104 Recommendation

The Brite Computers Xplore iX104 tablet is not recommended for use in the Study Fleet project because of the glare issues this device is not a solution for the smaller vessels, were they would do the most good. The Brite Computers Xplore iX104 is not recommended beside other limitations the cost is about $ 6,000.00 per unit.

5.2.2 Software

5.2.2.1 UNH Logbook

The UNH Logbook software has gone through various changes since it was first field-tested in August 2003. Both fishermen and the needs of NOAA Fisheries have driven these changes. The user interface has been made much simpler by combining screens, interfacing with various GPS devices, and adding more defaults. All of these changes have decreased the number of keystrokes made by fishermen during the data-entry phase.

UNH Logbook Version 4.2 contains many error checks to make sure the fishermen are entering information in the required data fields, as specified by NOAA Fisheries. Version 3.0 interfaces with the ACR Temperature Probes to create a graph of bottom temperature versus time for each tow. Version 3.0 has the capability to interface with marine communications systems to allow real-time data reporting.

The UNH Logbook has proven to be an effective data collection program across a number of fishing gear types. It is recommended that the UNH Logbook continue to be utilized and improved based upon fishermen's comments and suggestions.

This software has been deployed on 97% of the vessels in this project. This program is a solid solution for the day boat and large offshore dragger fleets.

The biggest issue with this program was the interaction with various GPS units found throughout the New England Commercial Fleet. These issues were solved over time as we adjusted for the various GPS units we en-counted.

According to the fishermen interviews we conducted they feel that this software allows the user to navigate the program with ease. It is at this time the work horse of the project.

5.2.2.2 Sea Windplot Logbook

This software combines a very popular pc-based chart-plotting program with a logbook designed based on Study Fleet project requirements. It is deployed on four vessels in the Study Fleet. The logbook was designed to work within the chart-plotting software, allowing the user to use both features simultaneously. The logbook portion of the software has been through many changes, based on suggestions from the fishermen and NOAA Fisheries.

Project fishermen like the idea of the P-Sea Windplot Logbook because it will be part of the navigation software that most of them, who have onboard-PCs, use. Fishermen see value-added features that could come out of this logbook, such as associating catch quantities with saved track lines on their electronic charts.

During Phase II there was a failure with the P-Sea Windplot Logbook that was not software related directly. P-Sea Windplot Logbook or more to the point P-Sea Windplot navigation software requires a hardware key to be connected to the computer in order to use the software. During a fishing trip the hardware key was damaged during fishing operations.

The following is the Study Fleet Damage and Lost Equipment describing what happen:

"Captain Bill Lee, F/V Ocean Reporter, reported to PSGS Field Staff on August 24, 2004 that his P-Sea Windplot USB Key (#3115) had been damaged when his computer slid across the shelf due to rough seas. The Captain reported that the key was cracked and not functioning properly at all times, resulting in his P-Sea Windplot II software not working at certain times. It was determined that the Captain would try to super-glue the key back together to fix it. This worked for a time but the super-glued key did not stand up to the rigors of being taken in and out of the USB port on his Dell Inspiron 2600 and the key became totally cracked and inoperative. It was determined that the key would need to be replaced by P-Sea Windplot. Captain Lee's key (#3115) was sent back to P-Sea on October 5, 2004. In order to allow Captain Lee to continue testing the P-Sea Windplot Logbook for us, he was issued a spare P-Sea Windplot License and key (#3075) while we await his new key."

5.2.3 Marine Communication

5.2.3.1 Boatracs WBUI Interface

Boatracs WBUI interface has been installed on eight (8) of the Study Fleet vessels and ready to transmit data via the Boatracs system. At the time of this writing two (2) of the vessels started transmitting data to the Study Fleet Mail Box at the regional office.

Early on in this phase of the project, data could not been transmitted in the file naming convention adopted by the Study Fleet project. The Boatracs naming convention was an eight (8) character file name with a three (3) character file extension. The Study Fleet name convention required a thirty-five (35) character file name with a three (3) character file extension. The Study Fleet naming convention is Source of data (PSW or UNH), Vessel Name and Trip Date. In December 2004 Boatracs introduced an upgrade to their software to accommodate a thirty-five (35) character file name.

Both logbooks can send data via the Boatracs system, to date there have been no notable problems with transmitting data have bee reported.

The Boatracs WBUI interface cost $ 495.00 per license.

5.2.3.2 Iridium A3LA-IG Satellite Modem

One Iridium modem has been installed successfully and test messages of dummy P-Sea Windplot Logbook data were sent and received. Currently the plan is to install four (4) Iridium A3LA-IG Satellite Modems on the remaining Study Fleet vessels without satellite communications.

Iridium A3LA-IG is currently under fielding testing. But the monthly service code for the Iridium is much higher then the service cost for the Skymate 100 Satellite Modem.

5.2.3.3 SkyMate 100 Satellite Modem

Skymate 100 Satellite Modem is installed on fifteen (15) Study Fleet vessels with an anticipated seven (3) more in the near future. At the time of this writing one (1) of the vessels transmitting data to the Study Fleet Mail Box at the regional office.

Some problems sending data with Skymate 100 system have been reported. On February 9, 2005, PSGS Field Staff met with Captain Cameron McLellan on the F/V Adventurer to troubleshoot an issue with his Skymate unit. Since installing the Skymate in the third week of January, Captain McLellan has not been getting nearly the satellite availability that he should be. 99% of the time he has no satellite availability. Most vessels have satellite availability around 80% of the time. After talking with Skymate and Marine Computer Systems it was determined that the antenna is in the correct position and all the cables should be to spec. On February 9th we tried swapping out coaxial cables and antennas, only to find that none of the changes gave us a satellite signal. PSGS Field Staff called Skymate again and they said that after all of the tests we had done, they would like to test the unit itself. Captain McLellan will be shipping the unit back to Skymate to have them look at it. The problem should be resolved at that point.

> "On February 14, 2005 Captain Bill Lee finished installing his Skymate unit on the F/V Ocean Reporter. A good satellite signal was received, dockside. While Captain Lee was out fishing the following day, he noticed that his satellite signal was much more intermittent than it had been at the dock. PSGS field staff and Captain Lee decided to do some testing involving the other electronics in the pilothouse to determine if something was interfering with the Skymate satellite signal. It was determined, after turning on all electronics separately and together, that two pieces of electronics interfered with the satellite signal. The depth sounder cause the satellite signal to be lost when it was turned on, but once in normal operations the satellite signal returned. This was determined not to be an issue because the depth sounder is only turned on once in the morning. It was also discovered that the VHF radio caused the satellite signal to be lost when Captain Lee transmitted through it. Captain Lee is going to move his VHF antenna and antenna cable away from the Skymate unit, cable, and antenna. This should ensure a more reliable satellite signal. "

> "On February 18, 2005 PSGS field staff met with Lendall Alexander, F/V Julie D, tested UNH Version 4.1 data transmission via Skymate. Captain Alexander has had the Skymate installed since May 2004 and has not had any problems with it. A trip with seven tows was send around 9:30 AM. The transmission did not appear in the studyfleet@noaa.gov inbox until around 3:00 PM. The file appeared to be somewhat garbled like there was noise in the transmission. The problem could not be pinpointed from the test circumstances. It was decided to have the captain re-send the same trip, as well as another trip at the soonest possible time to see if the problem occurs again."

Satellite Communications Recommendation

The recommendation for the Study Fleet project at this point is Skymate 100 for vessels which do not already have a satellite system installed.

The Skymate 100 is easy to install and easy to use. Skymate monthly fees are far lower then Boatracs and Iridium A3LA-IG.

5.2.4 Global Positioning System

5.2.4.1 Garmin GPS 36 Tracpak

The Garmin is installed on eleven (11) of the Study Fleet vessels. The Garmin GPS 36 Tracpak has performed well when used to provide position information to either the UNH Logbook or P-Sea Windplot Logbook.

5.2.4.2 Other GPS Units

Throughout the course of the project existing GPS units have been utilized when possible. Some of the utilized brands include Northstar, Furuno, JRC, and Raytheon.

5.2.5 Temperature Probes

5.2.5.1 ACR Nautilus 85 Temperature Probe

The ACR Nautilus 85 Temperature Probes were used on three (3) of the Study Fleet vessels. The data provided by the temperature probes is valuable to the fishermen but there seem to be a few design flaws in the probe itself.

The failures were caused by what appears to be a design flaw in the probe, sea water leaks into the probe causing corrosion and destroying all the internal components. There are two (2) theories to explain why sea water leaks into the probe. One is after repeatedly removing and replacing the cap of the temperature probe, the O-Ring can become damaged allowing sea water to leak inside the probe destroying internal parts and

making the probe useless. The second theory is the temperature probe is secured to the fishing net by the cap end and because of the banging and spinning against the net the cap can become loose allowing sea water to leak in.

One design flaw is having a single ring to connect the probe to the fishing nets as noted in the following field reports:

> "On September 23, 2004 the Captain of the F/V Ellen Diane reported to PSGS Field Staff that they had lost their ACR Temperature Logger, S/N 8149, over the side and were not able to recover it. The logger had been fastened to the head rope of their net with twine and was attached to floats. At the time of the loss, they were hauling in an extremely large catch of spiny dogfish. As best the crew can figure, the logger got caught between the boat and the heavy net full of fish. The resulting strain broke the twine and the logger shot off the net and into the water. The whole assembly of twine, floats, and temperature logger was broken apart.
>
> The crew believes that this was just a freak occurrence, largely resulting from the over-sized bag of fish and the logger catching on the boat. Their suggestion was to try to find temperature loggers that can be tied on from both ends. This would keep the logger from swinging free and getting caught on things. They do try to lash the free end of the probe onto the net, but it can slip off easily. They will try to be more careful in the future.
>
> The F/V Ellen Diane was issued a replacement ACR Temperature Logger, S/N 7277."
>
> "On January 8, 2005 the Captain and crew of the F/V Jocka lost their ACR temperature probe (S/N: 8138), at sea. They had their ACR probe attached to one of the doors because they felt it could be secured better there than on the net. It also allowed for easier access when downloading data. Captain Stephen York believes he “buried the door in the mud,” causing the temperature probe to be ripped off.
>
> Captain York has found the data from the probe very useful. If he is given another probe, he is going to have a welder secure a protective steel cylinder on one of his doors to better secure the probe. The probe would be completely enclosed in the cylinder."

Another design flaw is the O-Ring used on the probe cap to keep it watertight. Is seems after repeatedly removing and replacing the cap the O-Ring can become damaged allowing sea water to penetrate inside the probe causing damaged and making the probe useless as reported in the following field report :

> "On January 19, 2005, the Captain and crew of the F/V Ellen Diane reported that their ACR Temperature Probe (S/N: 7277) had suffered water damage and was no longer working. The interior of the probe, around and inside the data cable plug is extremely corroded. The Captain and crew stated that they have been very careful when downloading data from the probe, so as not to get any

seawater or moisture inside. This, however, is a difficult task on a fishing boat. They feel that the problem could be dirt getting on the o-ring, with water subsequently getting inside the probe when it is at depths up to 100 fathoms. The captain stated that they first noticed the problem on a day when they were fishing in 95 fathoms. Another possible cause of the leaking water could be that the cap loosened slightly, while attached to the net. Although they tighten the cap as much as they can, it does seem to loosen easily in your hand. Banging around in the net could loosen the cap. This probe had been used on 5 day trips."

Temperature Probes Recommendation

Testing should continue with the ACR Nautilus 85 Temperature to solve the leaking problem. Both theories for the leaking problem should be pursued. The damaged O-Ring could be solved by lubricating the O-Ring to prevent damage. The second theory of the probes cap coming loose because of the banging and spinning against the fishing net could be solved by installing a bracket to place the temperature probe in.

If the leaking problem can not be solved then it is recommended another vendor of temperature probes should be investigated. The reason is this is an important function and should not be abandoned because of one vendor.

5.2.6 Study Fleet Data Collection for Phase II

During the course of Phase II, the project collected data from one main source. The main source was PC based application called UNH Logbook. A second software application was under development but not fully fielded by the end of Phase II called P-Sea Windplot Logbook produced by P-Sea Software.

For the purpose of the Phase II this summary will focus on the data collected by the UNH Logbook installed on the Dell Insprion 2600, Dell Latitude C640, Dell Latitude D505 and Motion Computing M1300.

5.2.6.1 UNH Logbook Data Collection & Data Errors

In Study Fleet Phase II the UHH Logbook started collecting data in July 2004 and is still collecting data at the time of this writing. The UNH Logbook continued to be developed as data was being collected.

During phase II, two (2) versions of the UNH Logbook was deployed version 3.0 and 4.0.

In Phase II, UNH Logbook data was collected from the fishermen on a weekly basis. During phase II development continued with the UNH Logbook and the data set began to expand on the breath and depth of the data elements being collected and the quality of the data began to show improvements. The improvements in the data quality can be traced to two areas. The first was through data analysis, feed back was given to the

fishermen on their weekly data submission and second developing tighter editing rules as data errors were uncovered.

In July 2005, UNH Logbook Version 3.0 was the version installed on all participating Study Fleet vessels.

The following tables are a break out of data submitted by each participating vessels on trips taken between July 2004 and February 2005.

UNH Logbook Data July 2004

UNH Logbook Trip Data for July 2004		
Vessel Name	**Number of Trips**	**UNH Logbook Version**
F/V Ellen Diane	27	3.0
F/V Gulf Venture	15	3.0
F/V Julie D	2	3.0
F/V Mary Elena	7	3.0
F/V Mora K	3	3.0
F/V Sea Win	2	3.0
Totals	**56**	

UNH Logbook Data August 2004

UNH Logbook Trip Data for August 2004		
Vessel Name	**Number of Trips**	**UNH Logbook Version**
F/V Angela & Rose	10	3.0
F/V Ellen Diane	27	3.0
F/V Gulf Venture	8	3.0
F/V Julie D	1	3.0
F/V Linda Marie	1	3.0
F/V Mary Elena	9	3.0
F/V Never Enough	1	3.0
F/V Sea Breeze	3	3.0
F/V Sea Win	4	3.0
Totals	**64**	

UNH Logbook Data September 2004

UNH Logbook Trip Data for September 2004		
Vessel Name	**Number of Trips**	**UNH Logbook Version**
F/V Capt. Bligh	3	3.0
F/V Decisive	3	3.0
F/V Ellen Diane	22	3.0
F/V Glenna & Jacob	1	3.0
F/V Iron Horse	1	3.0
F/V Isabella Rose	6	3.0
F/V Jocka	2	3.0
F/V Julie D	2	3.0
F/V Linda Marie	1	3.0
F/V Mary Elena	1	3.0
F/V Mora K	1	3.0
F/V Never Enough	5	3.0
F/V Padre Pio	7	3.0
F/V Sea Breeze	5	3.0
F/V Sea Holly	1	3.0
F/V Sea Win	6	3.0
F/V Susan Lee	3	3.0
F/V T. Luis	1	3.0
Totals	**71**	

UNH Logbook Data October 2004

UNH Logbook Trip Data for October 2004		
Vessel Name	**Number of Trips**	**UNH Logbook Version**
F/V Angela & Rose	7	3.0
F/V Ellen Diane	16	3.0
F/V Glenna & Jacob	3	3.0
F/V Iron Horse	3	3.0
F/V Isabella Rose	6	3.0
F/V Jacka	2	3.0
F/V Julie D	3	3.0
F/V Linda Marie	11	3.0
F/V Mora K	1	3.0

UNH Logbook Trip Data for October 2004		
Vessel Name	**Number of Trips**	**UNH Logbook Version**
F/V Never Enough	4	3.0
F/V Padre Pio	3	3.0
F/V Sea Breeze	2	3.0
F/V Sea Holly	3	3.0
F/V Sea Win	6	3.0
F/V T. Luis	2	3.0
F/V Tenacious	9	3.0
F/V Trident	1	3.0
F/V Wendy Jean	3	3.0
Totals	**85**	

UNH Logbook Data November 2004

In November 2004 a new version of the UNH Logbook was being deployed. UNH Logbook Version 4.0 was replacing Version 3.0. The table listing the data submitted by the Study Fleet vessels for trips taken in November shows the transition between the versions.

The reason for the data transition period between one version of the UNH Logbook and another is PSGS field staff had to meet with each vessel to install the new UNH Logbook version. This process could take up to thirty (30) days before all vessels are upgraded.

UNH Logbook Trip Data for November 2004		
Vessel Name	**Number of Trips**	**UNH Logbook Version**
F/V Angela & Rose	5	3.0
F/V Capt. Bligh	2	3.0
F/V Ellen Diane	11	4.0
F/V Erika Lynn	3	3.0
F/V Glenna & Jacob	1	3.0
F/V Iron Horse	1	4.0
F/V Isabella Rose	7	3.0
F/V Isabella Rose	2	4.0
F/V Jocka	2	3.0
F/V Linda Marie	18	3.0
F/V Mary Elena	3	3.0

UNH Logbook Trip Data for November 2004		
Vessel Name	**Number of Trips**	**UNH Logbook Version**
F/V Mora K	1	3.0
F/V Never Enough	5	3.0
F/V Padre Pio	3	3.0
F/V Padre Pio	3	4.0
F/V Sea Breeze	2	3.0
F/V Susan Lee	1	4.0
F/V Synergisgic	2	3.0
F/V T. Luis	2	3.0
F/V Tenacious	3	3.0
F/V Trident	1	3.0
F/V Wendy Jean	2	3.0
Totals	**80**	

UNH Logbook Data December 2004

In December 2005 all vessels were converted over to the UNH Logbook Version 4.0 and were sending data in that format.

UNH Logbook Trip Data for December 2004		
Vessel Name	**Number of Trips**	**UNH Logbook Version**
F/V Angela & Rose	5	4.0
F/V Capt. Bligh	3	4.0
F/V Ellen Diane	14	4.0
F/V Iron Horse	3	4.0
F/V Isabella Rose	5	4.0
F/V Jocka	1	4.0
F/V Julie D	2	4.0
F/V Mary Elena	2	4.0
F/V Mora K	1	4.0
F/V Never Enough	5	4.0
F/V Padre Pio	6	4.0
F/V Sea Breeze	6	4.0
F/V Sea Win	8	4.0
F/V Susan Lee	7	4.0
F/V T. Luis	2	4.0
F/V Tempest Toss'd	3	4.0

UNH Logbook Trip Data for December 2004		
Vessel Name	**Number of Trips**	**UNH Logbook Version**
F/V Tenacious	9	4.0
F/V Trident	2	4.0
F/V Yellowbird	5	4.0
Totals	**89**	

UNH Logbook Data January 2005

UNH Logbook Trip Data for January 2005		
Vessel Name	**Number of Trips**	**UNH Logbook Version**
F/V Angela & Rose	13	4.0
F/V Capt. Bligh	2	4.0
F/V Ellen Diane	12	4.0
F/V Glenna & Jacob	3	4.0
F/V Growing Old	1	4.0
F/V Iron Horse	2	4.0
F/V Isabella Rose	2	4.0
F/V Jocka	1	4.0
F/V Julie D	2	4.0
F/V Linda Marie	6	4.0
F/V Mary Elena	2	4.0
F/V Never Enough	1	4.0
F/V Padre Pio	8	4.0
F/V Rug Rats	1	4.0
F/V Sea Breeze	4	4.0
F/V Sea Win	1	4.0
F/V Synergisgic	1	4.0
F/V T. Luis	1	4.0
F/V Tenacious	1	4.0
Totals	**63**	

UNH Logbook Data February 2005

The table for February 2005 data submissions is not complete. The tables show files received on or before February 25, 2005.

UNH Logbook Trip Data for February 2005		
Vessel Name	**Number of Trips**	**UNH Logbook Version**
F/V Capt. Bligh	1	4.0
F/V Iron Horse	2	4.0
F/V Jocka	1	4.0
F/V Julie D	1	4.0
F/V Linda Marie	2	4.0
F/V Mora K	1	4.0
F/V Padre Pio	1	4.0
F/V Rug Rats	1	4.0
F/V Tempest Toss'd	1	4.0
F/V Trident	1	4.0
Totals	**12**	

UNH Logbook Data Summary for July 2004 through February 2005

The following table is a summary of the data submitted using the UNH Logbook. The UNH Logbook was deployed in August 2003 during Phase I of the Study Fleet project and data was received using the UNH Logbook version 2.0 in September 2003.

Phase II vessels started submitting data in September 2004 using version 3.0 of the UNH Logbook. During Phase II vessels were upgraded to UNH Logbook version 4.0.

UNH Logbook Summary of Data Collected

Summary for UNH Logbook Trip Data July 2004 through February 2005		
Month	**Number of Trips**	**UNH Logbook Version**
July 2004	56	3.0
August 2004	64	3.0
September 2004	71	3.0
October 2004	85	3.0
November 2004	62	3.0

Summary for UNH Logbook Trip Data July 2004 through February 2005		
Month	**Number of Trips**	**UNH Logbook Version**
November 2004	18	4.0
December 2004	89	4.0
January 2005	63	4.0
February 2005	12	4.0
Totals	**520**	

UNH Logbook Summary of Data Errors

Summary for UNH Logbook Data Errors July 2004 through February 2005				
Error	**UNH Logbook Version**	**Number of Trips**	**Number of Errors**	**Average Errors Per Trip**
Species Code	3.0	337	2	0.0059
Species Code	4.0	183	365	1.9945
Port Code	3.0	337	239	0.7091
Port Code	4.0	183	354	1.9344
Dealer Code	3.0	337	144	0.4272
Dealer Code	4.0	183	69	0.3770
Operator ID	3.0	337	8	0.0213
Operator ID	4.0	183	1	0.0005
Date/Datetime	4.0	183	12	0.0655
Hull Number	3.0	337	9	0.0267
Hull Number	4.0	183	6	0.0327
		520	**1069**	

The Summary for UNH Logbook Data Errors July 2004 through February 2005 table shows in some cases an increase in the error rate from version 3.0 to version 4.0 of the UNH Logbook.

In the case of Species Codes there was a error in the UNH Logbook export routine and the export routine was exporting incorrect single species code even though correct species code was selected in the application. The species code in question was the NMFS code for Lobster. Instead of exporting the value “LOB” for the lobster which the UNH Logbook had done in previous versions, the UNH Logbook starting exporting “LOBC” or “LOBN” depending on which unit of measure was chosen. The species code “LOBC” for lobster “Count” and “LOBN” for lobster “Number”. The error was corrected in UNH Logbook 4.1.

In the case of Port Code, Port Code was added to UNH Logbook Version 4.0 and the code could not be validated at the point of entry, but could only be validated when the trip was loaded by the Study Fleet Information System. In previous versions of the UNH Logbook, version 3.0 or lower, Port Name was the only required entry. The error was corrected by PSGS field staff visiting the vessels and correcting the UNH Logbook setup with the correct Port Code.

5.2.6.2 P-Sea Windplot Logbook Data Collection & Data Errors

In Study Fleet Phase II the P-Sea Windplot Logbook started collected data in November 2004 and is still collecting data at the time of this writing. The P-Sea Windplot Logbook continued to be developed as data was being collected during Phase II.

During phase II, three (3) versions of the P-Sea Windplot Logbook was deployed version 7.08, 7.09 and 7.10.

In Phase II, P-Sea Windplot Logbook data was collected from the fishermen on a weekly basis. During phase II development continued with the P-Sea Windplot Logbook and the data set began to expand on the breath and depth of the data elements being collected and the quality of the data began to show improvements. The improvements in the data quality can be traced to two areas. The first was through data analysis, feed back was given to the fishermen on their weekly data submission and second developing tighter editing rules as data errors were uncovered.

The following tables are a break out of data submitted by the participating vessels on trips taken between July 2004 and February 2005.

P-Sea Windplot Logbook Data November 2004

P-Sea Windplot Logbook Trip Data for November 2004		
Vessel Name	**Number of Trips**	**P-Sea Windplot Logbook Version**
F/V Adventurer	1	7.08
F/V Dory I	5	7.08
Totals	**6**	

P-Sea Windplot Logbook Data December 2004

P-Sea Windplot Logbook Trip Data for December 2004		
Vessel Name	**Number of Trips**	**P-Sea Windplot Logbook Version**
F/V Adventurer	2	7.08
F/V Dory I	4	7.08
Totals	**6**	

P-Sea Windplot Logbook Data January 2005

P-Sea Windplot Logbook Trip Data for January 2005		
Vessel Name	**Number of Trips**	**P-Sea Windplot Logbook Version**
F/V Adventurer	1	7.09
F/V Dory I	6	7.08
Totals	**7**	

P-Sea Windplot Logbook Data February 2005

P-Sea Windplot Logbook Trip Data for January 2005		
Vessel Name	**Number of Trips**	**P-Sea Windplot Logbook Version**
F/V Dory I	1	7.08
Totals	**1**	

P-Sea Windplot Logbook Data Summary for July 2004 through February 2005

The following tables is a summary of the data submitted using the P-Sea Windplot Logbook. The P-Sea Windplot was deployed in the fleet until September 2004 and data was received using the P-Sea Windplot Logbook version 7.08 in November 2004.

P-Sea Windplot Logbook Summary of Data Collected

Summary for P-Sea Windplot Logbook Trip Data July 2004 through February 2005		
Month	**Number of Trips**	**P-Sea Windplot Logbook Version**
July 2004	N/A	P-Sea Windplot Logbook was not available.
August 2004	N/A	P-Sea Windplot Logbook was not available.
September 2004	N/A	P-Sea Windplot Logbook was not available.
October 2004	N/A	P-Sea Windplot Logbook was not available.
November 2004	6	7.08

Summary for P-Sea Windplot Logbook Trip Data July 2004 through February 2005		
Month	**Number of Trips**	**P-Sea Windplot Logbook Version**
December 2004	6	7.08
January 2005	7	7.08
February 2005	1	7.09
Totals	**20**	

P-Sea Windplot Logbook Summary of Data Errors

Summary for P-Sea Windplot Logbook Data Errors July 2004 through February 2005				
Error	**P-Sea Windplot Logbook Version**	**Number of Trips**	**Number of Errors**	**Average Errors Per Trip**
Date/Datetime	7.08	18	331	18.388
Species Code	7.09	2	8	4
		20	**339**	

5.2.7 Study Fleet Information System

In Phase I and Phase II of the Study Fleet project a Study Fleet Information System was successfully designed and built for loading data submitted by the fishing vessels into a structured database design, performing data editing, providing data security and the ability to disseminate data submitted by study fleet participants.

The Study Fleet Information System (**SFLEET**) encompasses the database, security context management, and access sub-systems (administration, data editing, and reporting). The SFLEET application satisfies the requirement to utilize and improve the existing efforts to develop the Illex Squid Study Fleet Application (CSFLEET) already being piloted by the Northeast Fisheries Science Center (NEFSC). The general structure of the CSFLEET, with its tiered data structures (RAW-WORK-BASE) are subject to varying levels of modification and auditing, offers a highly manageable solution to meet numerous requirements regarding system security, enforceability and traceability of data, and constituent access to confidential data sources.

Study Fleet Database Design

The SFLEET database utilizes the RAW-WORK-BASE structure, with MASTER tables that apply to all three of these tiers. The nomenclature for all tables includes the term RAW, WORK, BASE, and MASTER as appropriate. This three-tiered system allows for filling in information in a progressively more complete manner.

RAW TABLES: The data in the form actually received. For the Study Fleet Project, the RAW data consist of the text files as transmitted from the on-board devices and the parsed versions of the transmitted files. The RAW database is not editable, since it records data in the form that they are received.

WORK TABLES: The raw data merged and processed into a consolidated database structure. The WORK database is where editing and quality control take place – there are sets of programs to Edit the database. For the SFLEET system, the WORK database is the output of the incoming data processing system, which reads the RAW text files and inserts appropriate rows into the WORK database tables.

BASE TABLES: The final data after editing and QA/QC has been performed. This database is not editable, except under special circumstances where the database administrator edits directly in the database. The BASE materialized views are in structure identical to the corresponding WORK database tables, but content is filtered to only show quality level "A" or "B".

MASTER TABLES: Master tables, such as ACCSP codes are maintained outside of the SFLEET system and are therefore not editable as part of the SFLEET system.

Study Fleet File Submission

In Phase II there were two (2) methods for submitted a trip file from the vessel to the Study Fleet Information System for loading. The first was to manually download the file from either the UNH Logbook or the P-Sea Windplot Logbook and attach the trip file to an e-mail. Then send the e-mail to a center source for loading into the Study Fleet Information System. The second method was more automated by the using of satellite communication to transmit the trip file to a center source for loading into the Study Fleet Information System.

The Study Fleet Information System also has procedures to uncompress and unencrypted files submitted via satellite communication prior to loading into the Study Fleet database.

The Study Fleet Information System between September 2003 and February 2005 loaded and stored over 800 trips submitted from the UNH Logbook and P-Sea Windplot Logbook.

Study Fleet Information System Web Site

The full objective for the Study Fleet Information System was not completed. The missing piece even though designed and built but never implemented was the Study Fleet Web Site. The web site would have allowed the fishermen to view their data, edit their data and sign off on it.

The reason the Study Fleet Web Site was never implemented is because as NMFS was very much an Oracle facility and had Oracle licensing in place, the selection of Oracle Application Server (OAS) was a natural selection as the planned architecture for the Study Fleet website. This allowed the leveraging of previous work for the Data Query System as well. The plans were put in place for using a combination of Oracle Portal and Discoverer as the user interface to the Study Fleet database.

Unfortunately several issues were discovered during the process of implementing the web site pilot:

1) The version of Oracle Portal in place was riddled with bugs acknowledged by Oracle as developers tried to make use of documented capabilities. The only fix for this would have been to upgrade all of NMFS OAS application to the latest version of 10G along with all the testing required for applications outside of Study Fleet.

2) The customization of Oracle Portal is very limited. The Study Fleet application was to be a web based application and not a Portal for which this system was designed. The layout possibilities made the web site less intuitive for the prospective user than was possible by other application server technology.

3) The use of other components of OAS such as Oracle Forms and Report Servers, would have allowed for the form customization desired, but this introduces another complication. The use of Forms and Reports services make use of a java applet that has to be installed on every computer using the application. In many cases the installation is very straight forward, but all too often, it requires IT expertise to get systems operational. This process would not scale at all for the future plans of Study Fleet.

Since the beginning of the Study Fleet project, Oracle has released another product called HTML DB. This product is much more suited for the type of application desired for Study Fleet. This is also a component of oracle 10G, so it does involve the potential of upgrading other NMFS applications should they decide to integrate onto a single server, but HTML DB is not part of OAS, so it can be run separately. This produce uses more standard technologies such as J2EE support in the development of web applications.

As there are now better platforms for developing the final version of the web application, it was decided that the pilot web site would not be finalized using the Oracle Portal technology. Instead, NMFS will make that a future project.

6 Study Fleet Evaluation

In Phase II of the Study Fleet project there were five (5) major objectives to be achieved. The following are the major objective for Study Fleet Phase II:

1. **Study Fleet Size**: Equip an additional fifteen (15) fishing vessels to capture catch and effort fishing dependant data during normal fishing operations. Also to maintain the Study Fleet of thirty (30) with hardware and software support. Also maintain a Study Fleet size of thirty (30) vessels equipped with data logging and transmission systems that provide properly formatted data to the NMFS-designated recipients.

2. **Study Fleet Data Feed**: Maintain a steady stream of data from the fishing vessels from July 1, 2004 to February 28, 2005 and transmit the data via satellite or send the data manually via electronic mail.

3. **Study Fleet Outreach Program:** Maintain lines of communication through an outreach program with the Study Fleet Coordinating Organizations and the participating fishing vessels which was established in Phase I.

4. **Study Fleet Information System**: Design and build a Study Fleet Information System to load, manage and disseminate data submitted by Study Fleet participants.

5. **Study Fleet Electronic Logbooks**: Continue the development of the UNH Logbook and P-Sea Windplot Logbook electronic logbooks to capture catch and effort data

6.1 Study Fleet Objectives Summary

All of the major objectives were met during Phase II, but there were parts of some of the objectives that were still in the process of being completed. The statuses of each of the five (5) objectives are documented individually in the following section of this document.

The objectives that were still in progress of bring competed at the end of the project were; having all vessels transmit data via satellite and completion of the Study Fleet Web application. Detail of why these tasks were still in progress or not competed is documented in sections 6.3 Study Fleet Data Feed and 6.5 Study Fleet Information System.

But overall, all objective were achieved during this phase.

6.2 Study Fleet Size

The objective of equipping fifteen (15) additional vessels to collect catch and effort data to bring the Study Fleet size up to thirty (30) vessels was achieved. All thirty (30) vessels were equipped and each of the Study Fleet coordinating organizations provided ten (10) vessels each for the duration of Phase II. The Study Fleet maintained a size of thirty (30) vessels through out the entire time period of Phase II. (Please see Appendix A: Study Fleet Participating Vessels Phase I & Phase II for listing of participating vessels.)

All participating vessels that started in Phase II remained so through out the phase. There was no down time for any vessel or did the complement of thirty (30) active vessels ever drop below thirty (30).

All vessels were equipped with tablet or laptop computers with electronic logbook installed on them to collect and submit catch and effort data. At the time of this writing all thirty (30) vessels are still collecting and submitting data.

6.3 Study Fleet Data Feed

Study Fleet data was collected steadily from July 2004 through February 28, 2005, and is still being collected at the time of this writing.

In July 2004 the source of the data came from the Study Fleet Phase I vessels. Phase II vessels started submitting data in September 2004 timeframe. Because vessels were being equipped five (5) at a time, data submission was a phased in approach. During September 2004, eight (8) of the new fifteen (15) vessels were submitting data. By November 2004, twelve (12) of the new fifteen (15) vessels were submitting data and by December 2004 all fifteen (15) had submitted data. Also part of the time difference is not when the vessel was equipped and the vessel captains trained, but after being equipped and trained when the vessel next made a fishing trip which could be a month later.

The following table is a summary of the data submitted using the UNH Logbook during July 2004 through February 2005.

Summary for UNH Logbook Trip Data July 2004 through February 2005		
Month	**Number of Trips**	**UNH Logbook Version**
July 2004	56	3.0
August 2004	64	3.0
September 2004	71	3.0
October 2004	85	3.0
November 2004	62	3.0
November 2004	18	4.0
December 2004	89	4.0
January 2005	63	4.0
February 2005	12	4.0
Totals	**520**	

The following tables is a summary of the data submitted using the P-Sea Windplot Logbook. The P-Sea Windplot was deployed in the fleet until September 2004 and data was received using the P-Sea Windplot Logbook version 7.08 in November 2004.

Summary for P-Sea Windplot Logbook Trip Data July 2004 through February 2005		
Month	**Number of Trips**	**P-Sea Windplot Logbook Version**
July 2004	N/A	P-Sea Windplot Logbook was not available.
August 2004	N/A	P-Sea Windplot Logbook was not available.
September 2004	N/A	P-Sea Windplot Logbook was not available.
October 2004	N/A	P-Sea Windplot Logbook was not available.
November 2004	6	7.08
December 2004	6	7.08
January 2005	7	7.08
February 2005	1	7.09
Totals	**20**	

The full objective was to have all thirty (30) vessels transmitting data via satellite communication in this phase. By the end of Phase II twenty-five (25) of the thirty (30) vessels were equipped to transmit data via satellite communication and four (4) actual has started transmitted. But this in no way impaired the amount of data collected during Phase II. In Phase I procedures were implemented to download data from the tablet or laptop computers a floppy disk and e-mailed to a central source for loading into the Study Fleet Information System. This procedure was used at the start of Phase II and data submission continued without interrupting.

Also it should be noted this procedure is the backup procedure if for whatever reason satellite communication fails and data cannot be transmitted.

There were two (2) reasons why all thirty (30) vessels were not transmitting data via satellite communications by the end of this phase.. The first was it was decided early in Phase II to delay in implementing satellite to give priority to the development of the UNH Logbook and P-Sea Windplot Logbooks, expanding the Study Fleet data model to capture finer detail data and review code tables for Species, Ports, and Gear. The second was five (5) vessels captains requested that satellite communications not be installed on their vessels until they could be reassured on the future direction of the Study Fleet project beyond February 28, 2005.

6.4 Study Fleet Outreach Program

In Phase I an outreach program was established early on in the Study Fleet project to maintain lines of communication between the captains of the participating vessels and their coordinating organization.

The outreach program was a complete success in Phase and Phase II. It was the PSGS staff maintaining daily contact with the captains and coordinating organizations keeping the lines of communication open.

The outreach program had two (2) parts to it, the first the field staff maintaining lines of communications directly with the vessels captains and crew by visiting each vessels, participating in fishing trips to observe fishing operations, dockside hardware and software training and providing hardware and software support on an on going basis. The second part of the program was a formal monthly meeting with the coordinating organizations o review progress to date in the Study Fleet project and silicate input from the coordinating organizations themselves on what they would like to see in the Study Fleet project.

6.5 Study Fleet Information System

In Phase I and Phase II of the Study Fleet project a Study Fleet Information System was successfully designed and built for loading data submitted by the fishing vessels into a structured database design, performing data editing, providing data security and the ability to disseminate data submitted by study fleet participants.

The Study Fleet Information System (**SFLEET**) encompasses the database, security context management, and access sub-systems (administration, data editing, and reporting). The general structure of the SFLEET database is its tiered data structures (RAW-WORK-BASE) that are subject to varying levels of modification and auditing, offers a highly manageable solution to meet numerous requirements regarding system security, enforceability and traceability of data, and constituent access to confidential data sources.

The full objective for the Study Fleet Information System was not completed. The missing piece even though designed and built but never implemented was the Study Fleet Web Site. The web site would have allowed the fishermen to view their data, edit their data and sign off on it.

The reason the Study Fleet Web Site was never implemented is because as NMFS was very much an Oracle facility and had Oracle licensing in place, the selection of Oracle Application Server (OAS) was a natural selection as the planned architecture for the Study Fleet website. This allowed the leveraging of previous work for the Data Query System as well. The plans were put in place for using a combination of Oracle Portal and Discoverer as the user interface to the Study Fleet database.

Unfortunately several issues were discovered during the process of implementing the web site pilot:

1) The version of Oracle Portal in place was riddled with bugs acknowledged by Oracle as developers tried to make use of documented capabilities. The only fix for this would have been to upgrade all of NMFS OAS application to the latest version of 10G along with all the testing required for applications outside of Study Fleet.

2) The customization of Oracle Portal is very limited. The Study Fleet application was to be a web based application and not a Portal for which this system was designed. The layout possibilities made the web site less intuitive for the prospective user than was possible by other application server technology.

3) The use of other components of OAS such as Oracle Forms and Report Servers, would have allowed for the form customization desired, but this introduces another complication. The use of Forms and Reports services make use of a java applet that has to be installed on every computer using the application. In many cases the installation is very straight forward, but all too often, it requires IT expertise to get systems operational. This process would not scale at all for the future plans of Study Fleet.

Since the beginning of the Study Fleet project, Oracle has released another product called HTML DB. This product is much more suited for the type of application desired for Study Fleet. This is also a component of oracle 10G, so it does involve the potential of upgrading other NMFS applications should they decide to integrate onto a single server, but HTML DB is not part of OAS, so it can be run separately. This produce uses more standard technologies such as J2EE support in the development of web applications.

As there are now better platforms for developing the final version of the web application, it was decided that the pilot web site would not be finalized using the Oracle Portal technology. Instead, NMFS will make that a future project.

6.6 Study Fleet Electronic Logbooks

Study Fleet Phase II continued the development started in Phase I of the UNH Logbook and P-Sea Windplot Logbook. During Phase II the breath and depth of the data capture by both logbooks was expanded.

In Phase II of the Study Fleet, twenty-eight (28) of the thirty (30) fishing vessels submitted catch and effort data using the UNH Logbook. During the course of the project, the UNH Logbook has shown to be simple and easy to use. Another reason for the deployment of UNH Logbook in a greater numbers then the P-Sea Windplot Logbook was the UNH Logbook was further along in the development life cycle then the P-Sea Windplot Logbook.

The P-Sea Windplot Logbook has a total different design then the UNH Logbook and appeals to a different type of audience. In Phase II of the Study Fleet project, two (2) of the thirty (30) fishing vessels was equipped with the P-Sea Windplot Logbook.

The P-Sea Windplot Logbook came about from interviews and time-and-motion on fishing vessels. In the course of these interviews and time-and-motion assessment most of the vessels had P-Sea Windplot navigation software and suggestions were made to couple an electronic logbook to the navigation software.

If a standard logbook was selected it would be the UNH Logbook. The reason for choosing the UNH Logbook is the ease of use, especially during hectic fishing operations and the UNH Logbook is a stand alone application. The UNH Logbook has worked well with few failures due to conditions at sea and has provided a steady stream of data through out Phase I and Phase II. As the UNH Logbook developed, the data quality was improved

In the case of the P-Sea Windplot Logbook, this logbook is not a stand alone application. The users need to have installed on their computer P-Sea Windplot core navigation software to use the logbook. P-Sea Windplot should continue to be tested with a limited audience to see if the architecture of this logbook should be pursued.

Appendix B: Boatracs/WBUI Transmission Cost Calculation

Eight (8) vessels participating in the Study Fleet project are equipped with Boatracs devices, but Boatracs devices were not provided by the Study Fleet project. The Study Fleet project did provide the Boatracs/WBUI software which allows the UNH Logbook and P-Sea Windplot Logbook to transmit trip data through the Boatracs satellite system.

Boatracs charges $ 0.50 per Message (Segment) plus $ 0.004 per Character. A Message (Segment) is 1280 bytes of which 1250 bytes is for the message (in the case of Study Fleet a trip data file) and 30 bytes is Boatracs Message (Segment) overhead.

The following is an example of the cost for transmitting for a single trip with a 1,000 byte trip file.

Message Cost = ((Data File Size/Message (Segment) * $ 0.50) + (Data File Size * $ 0.004)

1. Message (Segment) = 1,280 bytes
2. Data File Size = 1,000
3. Message Cost = ((1,000/1,280) * $ 0.50) + (1,000 * $ 0.004)
4. Message Cost = (0.78125 * $ 0.50) + $ 4.00

   Message (Segment) should be rounded up, in this case round up to 1.
5. Message Cost = (1 * $ 0.50) + $ 4.00
6. Message Cost = $ 4.50

The following costs are Boatracs charges for transmitting a data from the vessel to NERO.

Message (Data file) Size	Message (Segments)	Cost
1000 bytes	1 Message (Segment)	$ 0.50
	1,000 byte Data File	$ 4.00
	Total	$ 4.50
2000 bytes	2 Message (Segment)	$ 1.00
	2, 000 bytes Data File	$ 8.00
	Total	$ 9.00

Message (Data file) Size	Message (Segments)	Cost
3000 bytes	3 Message (Segment)	$ 1.50
	3,000 byte Data File	$ 12.00
	Total	$ 13.50
4000 bytes	4 Message (Segment)	$ 2.00
	4, 000 bytes Data File	$ 16.00
	Total	$ 18.00

This does include monthly fees services charged by Boatracs. There are no monthly fees for the Boatracs WBUI software; there is a one time charge of $495.00 for each license.

Appendix C: Study Fleet Recommended Hardware (Dell Latitude D505)

Dell Latitude D505

Dell Latitude D505 Overview

The Dell Latitude D505 is a portable, expandable, high-powered laptop. The Dell Latitude D505 can run UNH Logbook or P-Sea Windplot Logbook.

Dell Latitude D505 Specification

The Dell Latitude D505 used in the Study Fleet Project had the following configuration:

Feature	Specification
Processor	Pentium M 725 (1.6 GHz)
Memory	512 MB Double Data Rate SDRAM
Storage	30 GB Hard Drive
	24X CD-ROM Drive
	Floppy Drive
Display	14.1 in TFT active matrix
Operating System	Windows XP Pro
Battery	6 Cell/53-WHr Primary Battery
Modem	Internal 56K
Power	Ac Adapter 90 Watts
Carrying Case	Nylon Deluxe Carrying Case

Dell Latitude D505 Supporting Equipment

- Logitech TrackMan Wheel (Mouse)
- Keyspan USB 4-Port Serial Adapter
- Belkin PC Mouse/Key "Y" Splitter DB9
- Auravision Elumin X Illuminated Keyboard

Dell Latitude D505 Cost

The following table is a cost brake down for Dell Latitude D505 and supporting equipment per unit:

Part Description	Cost
Latitude D505	$ 1,701.46
Logitech TrackMan Wheel (Mouse)	$ 29.95
Keyspan USB 4-Port Serial Adapter	$ 135.17
Belkin PC Mouse/Key "Y" Splitter DB9	$ 40.33
Auravision Elumin X Illuminated Keyboard	$ 79.95
Total	$ 1,986.55

* The cost reflects the prices at the time of purchase and does not include G & A costs.

Appendix D: Study Fleet Recommended Software (UNH & P-Sea Windplot Logbooks)

UNH Logbook

The UNH Logbook software has gone through various changes since it was first field-tested in August 2003. Both fishermen and the needs of NOAA Fisheries have driven these changes. The user interface has been made much simpler by combining screens, interfacing with various GPS devices, and adding more defaults. All of these changes have decreased the number of keystrokes made by fishermen during the data-entry phase.

UNH Logbook Version 4.1 contains many error checks to make sure the fishermen are entering information in the required data fields, as specified by NOAA Fisheries. Version 4.1 interfaces with the ACR Temperature Probes to create a graph of bottom temperature versus time for each tow. Version 4.1 has the capability to interface with marine communications systems to allow real-time data reporting.

The UNH Logbook has proven to be an effective data collection program across a number of fishing gear types. It is recommended that the UNH Logbook continue to be utilized and improved based upon fishermen's comments and suggestions.

Since the UNH Logbook was developed under a government grant the government owns the software and there are additional no costs associated with licensing.

Sea Windplot

P-Sea Windplot Logbook version 7.10 has been installed on two (2) vessels and it being field tested. At the time of this writing neither vessel has submitted data using P-Sea Windplot Logbook version 7.10

Project fishermen like the idea of the P-Sea Windplot Logbook because it will be part of the navigation software that most of them, who have onboard-PCs, use. Fishermen see value-added features that could come out of this logbook, such as associating catch quantities with saved track lines on their electronic charts.

The P-Sea Windplot is not a stand along logbook and is not a stand alone logbook and needs interface with the P-Sea Windplot core navigation software to use the logbook. The cost per license is $ 1,650.00.

Appendix E: Study Fleet Recommended Marine Communications (Skymate 100)

SkyMate 100 Satellite Modem

Skymate Installation

The installation and setup of the SkyMate modem, antennas, and software is easy to do. The power requirement is 12V. Roughly thirty feet of cable is included for both the GPS and satellite antennas.

The standard 12V-power requirement makes the installation of the SkyMate modem simpler than the Iridium modem, which requires a 4.4V power source. The LCD lights on the modem, indicating there are power and a GPS signal, are an improvement over the Iridium as well.

Skymate Ease of Use

The SkyMate software is easy to navigate. The email and weather forecast features are easy to use. There is an easily accessible "statistics" window that tells the user whether there is a satellite in view, how many characters have been sent and received since the program was turned on, amongst other information.

Skymate Added Value

The SkyMate system contains value-added features for the fishermen. It has email and the ability to request location-specific weather information.

Skymate Additional Equipment

When installing the Skymat 100 two (2) standard 1 ¼" threaded screws will be needed to mount the antenna.

Skymate Costs

The cost of a Skymate 100 w/VMS modem is listed in the table below:

Part Description	Cost
Skymate 100 w/VMS	$ 1,188.00
Skymate Activations Fee (One time)	$ 149.00
Skymate Monthly Service Fee (Basic Plan)	$ 19.99
Skymate Transmission Fee (per 1000 characters)	$ 2.00

Skymate Average Monthly Costs

The average cost per Study Fleet Vessel was calculated by looking at the number of trips per month reported in Phase II, from July 2004 to February 2005.

Then taking the busiest month, which was December 2004 with eighty-nine (89) trips being reported by nineteen (19) different vessels, gives an average of five (5) trips per month per vessel.

The average file size submitted by the UNH Logbook is 1000 characters (1KB) after file compression.

Taken all these factors into account the average monthly cost per Study Fleet is listed in the table below:

Part Description	Cost	
Skymate Monthly Fee (Basic Plan)	$	19.99
Skymate Transmission Fee ($ 2.00 per 1000 characters)	$	10.00
Total	$	29.99

Appendix F: Study Fleet Recommended Global Positioning System (Garmin GPS 36 Tracpak)

Garmin GPS 36 Tracpak

The Garmin GPS 36 Tracpak has performed well when used to provide position information to either the UNH Logbook or P-Sea Windplot.

Installation is simple with the 30 feet of provided cable. A 12-Volt power source is needed. The Garmin GPS 36 Tracpak connects to the PC hardware through a DB9 serial port. The DB9 serial port connector has to be attached to the Garmin GPS 36 cable as a custom option. On PC hardware with no serial ports, it is necessary to use a Belkin Serial to USB converter to connect.

Other GPS Units

Throughout the course of the project existing GPS units have been utilized when possible. Some of the utilized brands include Northstar, Furuno, JRC, and Raytheon.

Garmin GPS 36 Trackpak Cost

The following table is a cost brake down for Garmin GPS 36 Trackpak and supporting equipment per unit:

Part Description	Cost
Garmin GPS 36 Trackpak	$ 209.00
Attaching 9-pin Serial Connector	$ 45.00
Total	$ 254.00

* The cost reflects the prices at the time of purchase and does not include M & H and G & A costs.

Appendix G: Study Fleet Recommended Temperature Probe (ACR Nautilus 85)

ACR Nautilus 85 Temperature Probe

The ACR Nautilus 85 Temperature Probes are still in the process of being field-tested. UNH Logbook Version 3.0 integrates temperature probe data into the logbook.

The limited field-testing of the ACR Nautilus 85 Temperature Probes has shown them to be durable and simple to use. Fishermen have tested the temperature probes using the included ACR software. The ACR software graphs temperature versus date and time. They have found this information to be helpful.

The ACR Nautilus 85 Temperature Probes require a DB9 serial connection on the PC hardware.

It is important to note that the ACR Nautilus Temperature Probe software has a conflict with P-Sea Winplot Version 6.77. The conflict is over the same DLL. This conflict does not happen with P-Sea Windplot Version 7.0 and higher.

ACR Nautilus 85 Temperature Probe

The following table is a cost brake down for ACR Nautilus 85 Temperature Probe:

Part Description	Cost
ACR Nautilus 85 Temperature Probe	$ 299.00
Trend Reader/Nautilus with Interface Package**	$ 129.00
PC Interface Cable (IC-101)	$ 99.00
Total	$ 527.00

* The cost reflects the prices at the time of purchase and does not include G & A costs.
** A copy of the Trend Reader does not have to be purchased with each temperature probe.