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FISHING OBSTRUCTION CHARTS

PREPARED FOR DIRECTOR
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I. EXECUTIVE SUMMARY

NOAA requests 4 positions and \$2,550K to survey and chart natural and man-made obstructions on the Outer Continental Shelf (OCS) which pose potential hazards to commercial fishing.

The new obstruction charts will be used by fishermen to avoid bottom obstructions that have proven costly to their operations. Commercial fishermen annually suffer millions of dollars in damage to their equipment as a result of snagging on bottom obstructions. In the Gulf of Mexico alone, damages, including losses in fishing harvest due to bottom obstructions, amount to \$16-20 million annually. The OCS covers an area of approximately 853,000 square nautical miles and will require a surveying and charting effort estimated to take 7 years.

The requested resources (4/\$2,550K) will be used in FY 1982 to provide funding for contractual services to initiate the search, acquisition, and evaluation of existing data collected by other government agencies and private sources which will be used for charting/identifying additional survey needs. After available data have been evaluated and areas identified where data coverage is of low quality or quantity, initial contractual bottom obstruction survey efforts will commence in OCS areas where oil and gas production has commenced or is expected to commence prior to 1988. Chart design, compilation, printing, and maintenance will be accomplished by contract with suitable staff increases to monitor contracts. Chart distribution will be accomplished by existing in-house facilities.

This program initiative is to be undertaken as directed by Section 407, Title IV of PL 95-372, OCS Lands Act Amendments of 1978, enacted September 18, 1978.

The National Marine Fisheries Service (NMFS) administers a Fishermen's Contingency Fund designed to provide reasonable compensation to the commercial fishermen for damages/losses to fishing gear due to bottom obstructions or activities related to oil and gas exploitation, development, or production on the OCS. The validity of claims made against this fund depend greatly upon obstruction information previously charted or reported in the Notices to Mariners. Bottom obstruction charts will require more detailed data defining the ocean floor and identifying obstructions than have been historically required in the production of nautical charts. At present, a distinct obstruction data deficiency exists which compounds the administering of the Fishermen's Contingency Fund.

Unless funding is provided to produce bottom obstruction charts, this problem will continue to burden the NMFS and more importantly, the extensive commercial fishing fleets.

II. INTRODUCTION

Background

The importance of the sea as a source of food for past, present, and future generations and as a source for industry, has long been recognized. Early settlements in the U.S. relied on the nearshore waters along the Atlantic coast for much of their essential food supply. These early commercial fishing efforts spread to the waters of the Gulf of Mexico and the Pacific Ocean as the migration of settlers moved into these areas. Today, as reflected in Table 1, domestic commercial fishing is a 1.8 billion dollar industry and plays an important role in the standard of living in this country. Using the latest published figures (1978), Figure 1 shows the respective value of fish catch on an area basis for the continental U.S. and Hawaii.

U.S. CATCH OF FISH AND SHELLFISH (1959 - 1978) *

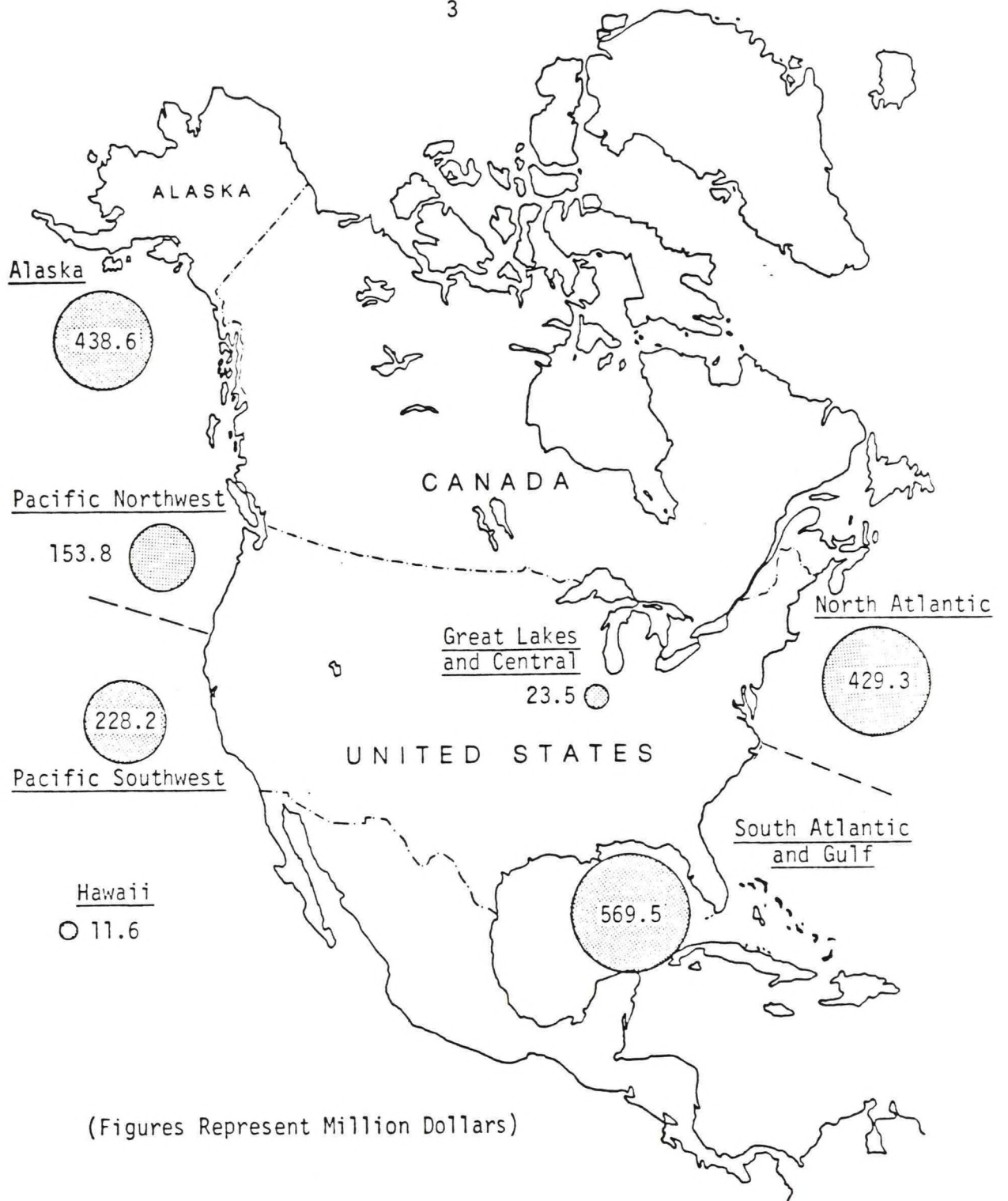
Year	Value (\$ x 10 ⁶)	Catch (lb. x 10 ⁶)	Year	Value (\$ x 10 ⁶)	Catch (lb. x 10 ⁶)
1959	346	5,122	1969	527	4,337
1960	354	4,942	1970	613	4,917
1961	362	5,187	1971	651	5,018
1962	396	5,354	1972	748	4,806
1963	377	4,847	1973	937	4,858
1964	389	4,541	1974	932	4,967
1965	445	4,777	1975	977	4,877
1966	472	4,364	1976	1,353	5,350
1967	438	4,062	1977	1,515	5,198
1968	497	4,160	1978	1,854	6,028

* Fisheries of the United States, 1967, U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries, Current Fishery Statistics No. 4700, P. 4, 1959-1967.

Fisheries of the United States, 1977, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Current Fishery Statistics No. 7500, P. 6, 1967-1977.

Fisheries of the United States, 1978, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Current Fishery Statistics No. 7800, P. 6, 1978.

TABLE 1



Fisheries of the United States, 1978, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Current Fishery Statistics No. 7800, P 6, 1978.

FIGURE 1. U.S. COMMERCIAL LANDINGS BY REGIONS, 1978

The advent of oil and natural gas exploration on the OCS (see Figure 2), and the resulting development of acquisition and transportation systems on the OCS, have created severe operational problems for commercial fishermen, especially those employing bottom trawling gear and equipment. Offshore exploration by the U.S. began as early as 1896 off Summerland, California. Major drilling efforts in the Santa Barbara Channel (California) were begun in the 1920's; in the Gulf of Mexico in 1938; and in Alaska (Cook Inlet) in the early 1960's. It is estimated by the Department of Interior that more than 20,000 oil and natural gas wells have been drilled in the territorial sea and the Federally-controlled OCS (see Figures 2, 3, and 4). At present, there are about 7,000 wells considered active. Many of these wells are located beneath structures, or platforms, which project above the ocean surface. Fishermen conducting bottom trawling operations have little difficulty in avoiding these obstructions. However, they do have trouble avoiding wells and capped heads which are not identified in some manner on the surface, such as with a buoy. There is enough hard evidence to recognize that these active and inactive wells have caused extensive damage to fishing gear and equipment. Although they often project above the sea floor only a short distance, it is sufficient to hang or snag a trawl assembly and cause damage to the trawl or the towing vessel. Wellheads, called "underwater stubs," are difficult to locate using electronic survey equipment because of their relatively small size and the short distance they usually extend above the bottom.

An additional impact on commercial fishing operations is the snagging of other man-made bottom obstructions which are the result of offshore oil and natural gas exploration and development. Again, valid evidence shows that debris and waste materials, such as tools, tower structures, and similar appurtenances from oil and gas production activities, have been discarded into the OCS waters. The industry has seemed to view these waters as an unlimited and readily available disposal area. This type of obstruction results in additional gear and equipment damage for the commercial fishermen.

Generally more significant as a cost to the fishermen is the associated loss of harvest (fish catch) at the time of the hang and during the period of downtime while repairs are being made. While these damages and operational losses are difficult enough for the larger, more prosperous fishing companies to endure, they sometimes mean bankruptcy for the smaller individually-owned fishing companies.

Other natural and man-made obstructions exist in the OCS area which are unrelated to oil and natural gas exploitation activities. These obstructions also produce operational problems for the commercial fishermen and result in equipment damage and lost catches similar to those caused by the aforementioned obstructions.

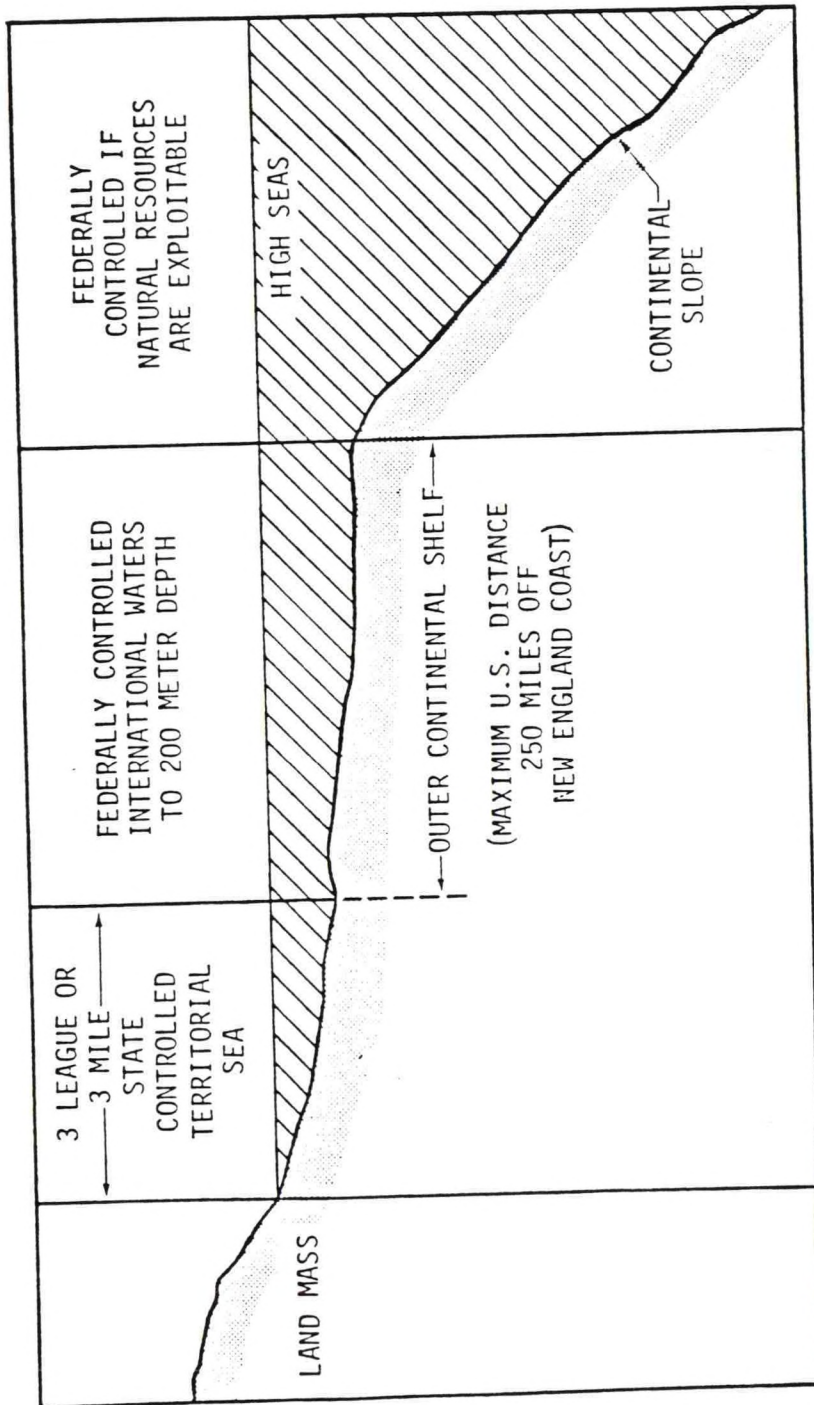
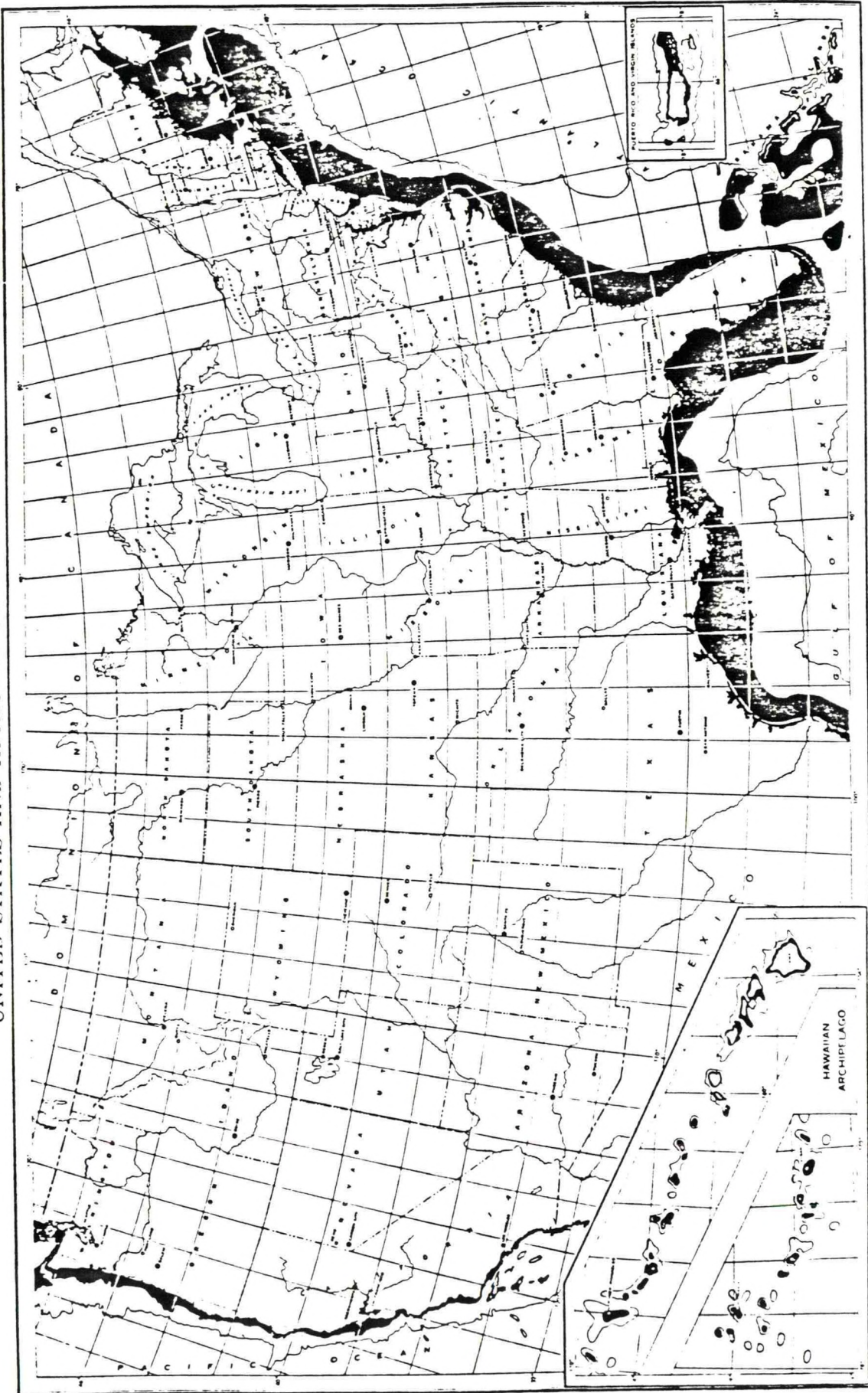


FIGURE 2. OUTER CONTINENTAL SHELF LEGAL CONTROL AND OWNERSHIP

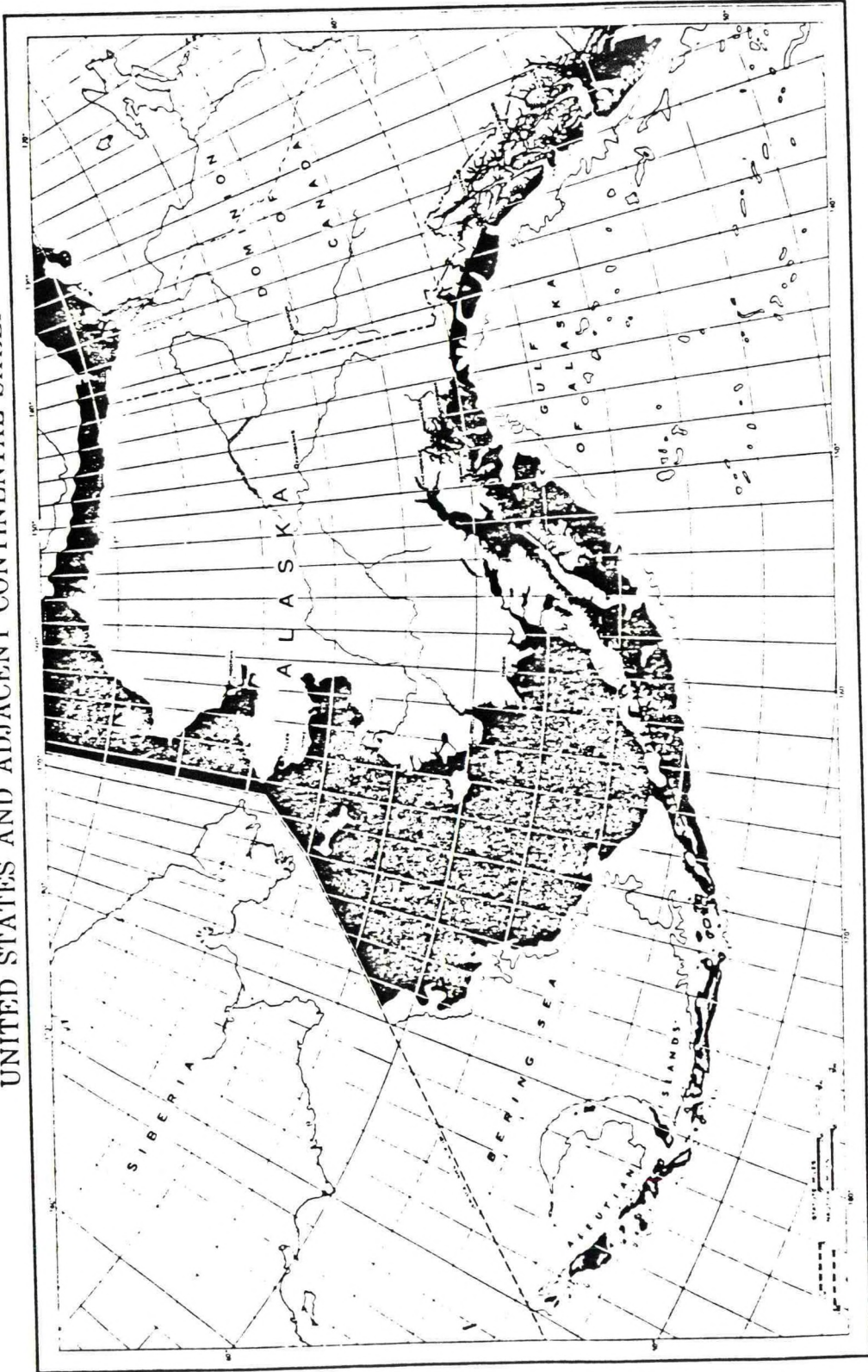
UNITED STATES AND ADJACENT CONTINENTAL SHELF



■ CONTINENTAL SHELF

FIGURE 3.

UNITED STATES AND ADJACENT CONTINENTAL SHELF



CONTINENTAL SHELF

FIGURE 4.

Purpose

The purpose of this paper is to describe the need, justification, and a program for production of fishing obstruction charts. This issue has been introduced as a result of the OCS Lands Act Amendments of 1978 (see Section III, Program Authority).

Technical Areas

The production of fishing obstruction charts involves data collection and analysis, automated data processing, automated and manual chart compilation, automated and manual chart negative engraving, chart printing, and chart distribution.

III. USER NEEDS and PROGRAM AUTHORITY

User Needs

The number of registered U.S. vessels (≥ 5 ton) and other smaller craft involved in commercial fishing within the territorial waters of the U.S. has increased in recent years (Table 2).

The number of people employed by the fishing industry in the fishing, processing, and wholesaling areas has also increased.

These increases have been necessary for the fishing industry to keep pace with trends started in 1970 when the annual human consumption and export of U.S. fishing products began steadily increasing.

FISHING CRAFT and PERSONS EMPLOYED

(1960 - 1975) *

	1960	1965	1970	1975
<u>Craft Used</u>				
Vessels (≥ 5 ton)	12,018	12,311	13,591	16,211
Small-Craft (< 5 ton)	<u>65,039</u>	<u>67,221</u>	<u>73,570</u>	<u>86,983</u>
TOTAL	77,057	79,532	87,161	103,194
<u>Persons Employed</u>				
Fishermen	130,431	128,565	140,358	168,013
Processing & Wholesaling	<u>93,625</u>	<u>86,864</u>	<u>86,813</u>	<u>92,310</u>
TOTAL	224,056	215,429	227,351	260,323

* Fisheries of the United States, 1978, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Current Fishery Statistics No. 7800, P 6, 1978.

TABLE 2

The annual production of the fishing industry is adversely affected by the expensive operational losses resulting from bottom trawls snagging on unknown obstructions. As oil and natural gas exploitation of the OCS continues in the Gulf of Mexico and off the California coast, and expands

to the Atlantic coast and unexploited areas off Alaska, there will be an increasing amount of downtime due to bottom obstructions snagged and gear damage. The magnitude of these snags can be assessed by considering shrimping operations in the Gulf of Mexico where it is estimated that fishermen annually incur \$16-20 million in trawling gear and vessel equipment damage and in associated catch or harvest losses. It is estimated also that in the Gulf of Mexico, 15 percent of all hangs/snags result in the total loss of the trawl, with 74 percent of all hangs resulting in measurable damage requiring repairs to restore the trawl to an operating condition. Recognizing that the gulf area has experienced the most pronounced offshore development by the oil industry, other fishing areas would be proportionately less affected by oil-related obstructions. However, the fishing industry is additionally affected by natural obstructions in these other OCS areas which are not characteristic to the gulf; these are also causing measurable catch and equipment damage losses. For example, the southeastern region of the Atlantic has experienced 8 percent total trawl failure and 63 percent measurable damage from all hangs reported.

Considering the annual cost to the fishermen of obstruction damage repairs, the reduction in annual catch as a result of lost fishing time, and the need to increase the annual domestic catch of fish to meet demands, it is certain that economic benefits will result if fishermen can be assisted in avoiding bottom obstructions during trawling operations.

U.S. fishermen working the waters of the OCS have long recognized the need for a chart which will effectively alert them to subsurface obstructions. Today's increased use of sophisticated instrumentation which provides accurate bottom profile delineation combined with easy to acquire vessel positioning data, makes the use of large-scale obstruction charts the most logical means for fishermen to improve their operational efficiency and effectiveness. This improvement in commercial fishing operations can be achieved only through the production of charts specifically designed to identify the location and type of bottom obstructions now required on standard nautical charts. In addition, the charting of offshore detail may have to be at a scale normally selected for charts of the nearshore waters if the obstruction charts are to be effective in normal trawling operations.

Program Authority

Recognizing a distinct area of need, the U.S. Congress enacted legislation to assist the U.S. commercial fishermen in the conduct of their operations.

First, Congress acknowledged that commercial fishermen had been annually incurring millions of dollars in damage to their vessel equipment and trawling gear, and in lost production as a result of hanging

or snagging bottom obstructions during routine trawling operations. Congress recognized that the majority of these hangs and snags were occurring on obstructions which were the result of oil and natural gas exploration and production activities on the OCS.

Second, they recognized that existing charts of the State territorial and Federally-controlled OCS waters do not provide definitive information on the existence of natural and/or man-made obstructions which are not considered hazardous to surface navigation. Congress recognized the need for charts specifically designed to delineate all of these natural and man-made obstructions considered hazardous to commercial bottom fishing operations conducted on the OCS.

Congressional response to these recognized needs resulted in the OCS Lands Act Amendments of 1978. This legislation was signed into law by President Carter on September 18, 1978, as Public Law 95-372. Basic to the needs identified above, Title IV (Sec. 402) of the Law, created a Fishermen's Contingency Fund for purposes of providing reasonable compensation for damages to, or loss of, fishing gear and any resulting economic loss to commercial fishermen due to activities related to oil and gas exploration, development, and production in such areas.

Title IV (Sec. 407) also provided authorization for a 2-year survey of obstructions on the OCS. It was specified that the survey will be conducted for purposes of identifying natural and man-made obstructions on the OCS which pose as potential hazards to commercial fishing or fishing gear. On the basis of this survey, charts will be published to identify all natural and man-made obstructions on the OCS which are potential hazards to fishing operations.

IV. USER REQUIREMENTS and PROGRAM DEFICIENCIES

Objectives, Assumptions, and Problems

The requirements of commercial fishermen for bottom obstruction charts vary depending on the physiography of the area, the cultural changes, and the type of fishing conducted. A basic set of co-related natural obstruction chart and fishing information needs will become apparent as the regional requirements of the fishermen are identified. Basic assumptions are made throughout this plan because it has been developed without full cognizance of user needs. The final design of the obstruction chart may be significantly different, cartographically, from the traditional nautical charts. In every instance, adherence to national mapping and charting accuracy standards will be an essential consideration in developing the chart specifications. Chart parameters such as chart coverage, chart scale, electronic positioning lattices, aids to navigation, bathymetry, bottom characteristics, symbolization, etc., are all factors in the design of fishing obstruction charts. The identification and classification of "what is an obstruction?" is a more difficult matter. The primary objective of this plan is to produce charts which will accurately portray the location of objects considered hazardous to the operation of fishermen employing bottom trawls. Natural and man-made objects which project short distances above the bottom (underwater stubs) must be located and delineated to provide much more bottom information than would be expected or required for traditional navigation charts. This plan also assumes that these obstruction data can be obtained, providing the necessary resources are made available. The acceptability of obstruction data for charting will be determined by critical evaluation on a case-by-case basis, since it is anticipated that major data sources reside outside the present National Ocean Survey (NOS) data files. Therefore, the data collecting techniques are not specified by the NOS and may not be consistent with standards established for NOS hydrographic (bathymetric) data acquisition.

A. Obstruction Data - What Information is Required?

What are the obstruction information requirements of the commercial fishermen? The answer (on a regional basis) will be a prime factor in deciding on the best format for presenting obstruction information to the user. It is assumed that the fishermen must know the location of obstructions for two basic reasons -- to avoid those which cause damage to trawling gear and vessel equipment, and to be alerted to hazards -- so that with due care, the hazards can be avoided, and the annual catch of the fishermen will increase because of less damage-caused downtime.

B. Obstruction Data - What are the Sources?

There are several considerations to be addressed regarding obstruction data:

1. What obstruction data currently exist?
2. Where are existing obstruction data located?
3. Are existing bottom obstruction data adequate for charting?
4. What are the sources for future obstruction data?

These questions dealing with identification, acquisition, and evaluation of present and future bottom obstruction information must be addressed before a definitive fishing obstruction chart program can be developed.

1. What obstruction data current exist? Historically, the NOS has been concerned with natural and man-made obstructions only as they would affect surface and subsurface navigation. Hydrographic surveys are designed and accomplished to provide bathymetry essential in the production of these navigation charts. The development of bottom anomalies or irregularities were accomplished during these surveys only to the extent that sufficient data were acquired to assure that any potential hazard to surface and subsurface navigation had been located, and that the least depth of water over the obstruction had been determined. Survey specifications were (and still are) structured to the scale of the chart and the general depth of water within the project area. Unless special considerations were identified, surveys in deeper water have been designed with much wider line spacing requirements, less stringent accuracy standards for vessel positioning, and relaxed requirements for correcting depth observations than would be in effect for shoaler water or nearshore surveys. It can be concluded that existing NOS records may not have bottom obstruction information to support the proposed fishing obstruction chart program.

The fishing companies, large and small, are believed to have the most data on bottom obstructions in their respective operating areas. However, there are two critical factors which must be addressed regarding these data. The first is whether these data are acceptable for charting, and the second is whether or not the fishermen would be willing to share it with NOS for charting purposes. Some fishermen have in the past considered their knowledge of bottom obstructions as being proprietary information and have refused to share it with others.

The factors affecting data acceptability will be the scale of the obstruction chart and the amount of the positional error associated

with the fishermen's data. Most of the obstruction data available from the fishing industry are expected to be referenced to LORAN-A readings. Due to the electronic limitations of the LORAN-A system, only a relative position is provided to the user. This relative position often differs from an absolute or true position by $\pm 1/2$ mile to ± 1 mile. Therefore, obstruction position data referenced solely to LORAN-A readings are considered inadequate for charting for they do not satisfy chart accuracy standards. Cartographic alternatives exist by which these data could be used to provide "reported obstruction" or "position approximate" information on the charts, or until independent survey investigations could be scheduled for verifying such data at an accuracy level considered acceptable for charting.

The oil industry could be a principal source of obstruction data relating to permanent structures or distribution system appurtenances. Whether they would be willing to open their files for use by NOS in this charting program will depend, perhaps, on whether they receive a benefit from this program as well.

The above are considered to be major sources of existing data. Other less significant sources will be investigated.

2. Where are existing obstruction data located? Extensive hydrographic survey records exist within the archive storage of the NOS. Although the NOS maintains a file of more than 12,000 surveys, it is expected that an extensive review of raw sounding records would be required to identify any natural and man-made obstructions of concern to the fishermen. Small underwater obstructions resulting from oil and natural gas exploration operations are extremely difficult to locate by conventional sounding methods. Considering normal spacing of sounding lines, there is no assurance that an in-depth review of every analog sounding record would result in a sufficient number of bottom obstructions of concern to the fishermen to make this major effort worthwhile.

It is believed that extensive bottom obstruction data exist with each commercial fisherman. Data from commercial fishermen would have to be retrieved from each vessel's log or wreck book, or from a graphic record which the fisherman might maintain. The availability of these data, however, will depend on the individual attitude of each fisherman. It is not expected that a large percentage of the fishermen would be willing to share their information for the purpose of compiling an obstruction chart, thus aiding their competitors by identifying preferred fishing areas.

It is also believed that extensive bottom obstruction data are contained in the records of each oil company involved in offshore oil and natural gas exploration. These records can run the gamut from initial site investigation surveys to actual development drawings. Again,

a question exists as to the availability of these data. An oil company may guard that information which it considers proprietary or strategic to future exploration efforts.

3. Are existing bottom obstruction data adequate for charting? It is very doubtful that more than 20 percent of available data will meet the desired standards of accuracy for these charts. If true, this means the program plan will require extensive hydrographic survey efforts in areas of reported obstructions to qualify these data for accurate and useful charting. The plan will be designed to include these surveys with provisions for both governmental and private contract efforts.

4. What are the sources for future obstruction data? Future sources of obstruction data are expected to be from:

- Hydrographic surveys by private contractors.
- Reports to the NMFS by commercial fishermen making claims against the Fishermen's Contingency Fund.
- Reports on hangs and snags or other obstructions encountered in trawling operations which do not qualify for claims against the Fishermen's Contingency Fund.
- Records of the oil industry engaged in offshore exploration and development.
- Hydrographic surveys by NOS. (The NOS Nautical Charting Program will suffer if ship time, presently allocated for this purpose, is diverted to the investigation of fishing obstructions. The impact will be significantly less if obstruction data are routinely flagged during planned hydrographic surveys in support of the NOS Nautical Charting Program.)
- Other authoritative bodies.

C. Obstruction Data - What Presentation Format is Required?

One of the initial activities of this program plan will be directed toward the identification of regional charting requirements of the commercial fishermen. This information will assist in determining which of the methods discussed previously, or others, would be most appropriate for satisfying these charting requirements.

To respond to this critical need for information on "user requirements," an in-depth questionnaire will be prepared for distribution to all potential users for the purpose of soliciting their comments and

recommendations of their charting needs. This questionnaire will be disseminated to the user through Federal (Sea Grant, NMFS, etc.) and non-Federal (private firms under contract) channels. A draft users' questionnaire is included as Attachment 1 to this program plan. An evaluation of the information received from polling potential users will enable NOS to determine what information format and design will best suit the commercial fishermen.

D. Obstruction Data - What are the Verification Requirements?

The obstruction chart will be compiled and published to prescribed charting standards, or as close thereto that available data will permit. This assumption is presumed valid when considering the navigation needs of the fishermen in controlling the trawl to avoid charted obstructions while at the same time permitting the fishermen to pass as "close to" the obstruction as is possible. The need of "close to" operations is recognized industry-wide as essential for maximizing the trawl's catch, as it is usually near natural and man-made obstructions where marine life congregates. As the capability of the fishermen to position their vessels will increase in relative accuracy through the expansion of the LORAN-C positioning network, it is necessary for obstruction data to be acquired and charted at an order of accuracy at least one level above the LORAN-C accuracy capability.

Verification of obstruction data will be accomplished mainly by private surveyors utilizing a combination of electronic instrumentation methods and conventional wire-drag techniques. The methods or techniques employed will be determined after an evaluation is made of the type or characteristics of the obstruction. Generally, man-made obstructions attributed to oil and natural gas exploration cannot be located by electronic instrumentation survey techniques because of either their small size and shape, or the short distance they project above the bottom. Such items must usually be surveyed using wire-drag techniques, which also have their limitations. There does not appear to be any clear-cut, positive answer to this problem. Again, a case-by-case evaluation of all known facts will be made before an appropriate verification method can be recommended.

Only those private hydrographers having the survey capability dictated by charting requirements will be tasked with the verification of reported obstructions, or in acquiring obstruction data as part of routine hydrographic, bathymetric, or oceanographic operations.

E. Obstruction Data - New Data Requirements

A principal assumption upon which this charting plan has been developed is that new data requirements will include the verification of reported obstructions and in densification of hydrography where a

deficiency of data currently exists. Whether the obstruction report is in support of a claim against the Fishermen's Contingency Fund or as an attempt to keep NOS posted on new obstructions, it will have to be evaluated for conformance with data requirements for charting. Hydrographic verification surveys will be scheduled as required following an evaluation of these reports. Other basic surveys will be scheduled for an evaluation of existing data.

Considering the desire of the oil industry to expand exploration efforts in new areas (see Figure 5), it is anticipated that new man-made obstructions will continue to occur as well. As a result, new data requirements will also continue to occur.

As previously noted, a real question exists as to whether state-of-the-art electronic hydrographic survey instrumentation can feasibly acquire the data necessary to produce charts specifically for bottom trawling operations. For example, side scan sonar would require a return resolution capable of distinguishing a small object projecting 2 feet or so above the bottom and distinguishing it from other spurious traces attributed to electronic signal noise or fish. A NOAA vessel wire-drag operation would be equally difficult and extremely time-consuming. The plan developed has addressed these special data requirements. The size of the OCS, the expected difficulty in acquiring data, and the corresponding magnitude of this charting program will require that extensive contract surveys be undertaken to assure the success of NOS production of obstruction charts.

Program Deficiencies

At the beginning of this section, it was stated the plan would be prepared on the basic assumption that the final design of an obstruction chart may be significantly different, cartographically, from the traditional nautical chart. Whether this proves to be true will depend on the results of the yet-to-be-performed regional users surveys and on specification constraints which might be imposed by NOS on the designing of these charts. However, it should be stressed that fishing obstructions hindering bottom trawling operations, historically, have not been considered important by NOS in the production of nautical charts. Because of their nature, these obstructions have little impact on the safe navigation of either surface vessels, submarines, or other sub-surface tows. To show these non-critical features on present nautical charts would probably degrade the chart clarity and reduce the intended effectiveness and purpose for which they were designed. In general, obstructions to bottom trawling operations are not hazardous to most of the users of the standard nautical chart and are not justified for inclusion thereon. Therefore, the present conventional charting program is, by design, deficient with respect to portrayal of fishing obstructions.

SALE AREA	1980		1981		1982		1983		1984		1985	
	J	F	J	F	J	F	J	F	J	F	J	F
Gulf of Mexico												
55 Gulf of Alaska												
62 Gulf of Mexico												
46 Kodiak												
53 Central & Northern Cal												
Gulf of Mexico I												
56 South Atlantic												
60 Cook Inlet												
66 Gulf of Mexico												
59 Mid-Atlantic												
Gulf of Mexico												
Santa Barbara Channel												
52 North Atlantic												
Gulf of Mexico												
57 Norton Basin												
Beaufort												
Gulf of Mexico												
Southern California												
Gulf of Mexico												
Mid-Atlantic												
Gulf of Mexico I												
Blake Plateau												
Gulf of Mexico												
Cook Inlet												
Central & Northern Cal												
Gulf of Mexico												
North Atlantic												
Chukchi Sea I												
Navarin Basin												
St. George Basin I												

U.S. Department of the Interior March 1979

1 These sales have been included in this schedule in order that planning may be commenced. Subsequent events (e.g., deletion of another sale from this schedule) will determine whether these sales will be held as indicated, deleted or postponed until after February 1985.

F - Final Environmental Statement
 P - Proposed Notice of Sale
 SC - State Comments Due
 D - Draft Environmental Statement
 T - Draft Selection
 E - Draft Environmental Statement
 H - Public Hearing

S - Sale

FIGURE 5. PROPOSED 5-YEAR OCS OIL & GAS LEASING PROGRAM

As early as 1947, NOS, then the U.S. Coast and Geodetic Survey, began the production of the first fishing obstruction chart. This chart (No. 13009), covering the area of Georges Bank off the coast of New England at a scale of 1:500,000, was developed specifically for the fishing industry at their request. Recommendations and considerable input were provided by the Fish and Wildlife Commission. Since that time, NOS has received numerous other requests for fishing-oriented charts. Late 1977 saw the development of two experimental fishing obstruction charts of Alaskan waters, developed in cooperation with the Northwest and Alaska Fisheries Center, NMFS. These efforts were no more than incidental to the charting program, and to undertake a major effort to produce fishing obstruction charts while maintaining the present Nautical Chart Program would be impossible with present resources and staff.

V. IMPACT of NOT MEETING REQUIREMENTS

The proposed fishing obstruction charts will enable fishermen to avoid many obstructions. Therefore, an evident impact of not meeting the requirements of the fishing industry for these charts would be the continuation or increase of the present level of losses due to damage to vessels and fishing gear and lost fishing time. A second impact would be the continuation and probable increase of claims for compensation for damages. A third impact would be the failure to fulfill the pertinent part of the intent of the OCS Lands Act Amendments of 1978.

VI. STRATEGY and ALTERNATIVES

General Concepts of Product and Product Development

The justification of need of obstruction charts is based on the annual operating damages to trawling gear and vessel equipment the commercial fishermen are incurring due to uncharted natural and man-made bottom obstructions; and on the economic losses annually incurred as a result of lost catches and/or fishing time due to hanging or snagging bottom obstructions. It is considered essential that an obstruction chart be provided that will permit the user to avoid bottom obstructions while providing information necessary to conduct surface navigation in a safe manner.

The development or design of a fishing obstruction chart can be accomplished effectively only after fully determining and analyzing the requirements of the user -- the commercial fishermen. Specific regional requirements may require somewhat different chart designs for different regions in order to most closely satisfy individual area needs. The plan for producing obstruction charts will include, but not be limited to, the following areas:

1. Determine user requirements for charts.
2. Develop regional charting specifications.
3. Identify priorities for area or regional charting.
4. Identify sources of existing obstruction data.
5. Assess and evaluate existing obstruction data for charting.
6. Initiate mechanism for verifying reported or questionable obstruction data.
7. Design and produce prototype charts.
8. Distribute prototype charts for user evaluation.
9. Evaluate user comments on prototype charts.
10. Begin production of finalized obstruction charts.
11. Initiate mechanism for updating obstruction charts between new printings.
12. Initiate program support for acquisition and/or verification of new obstruction data.

All phases of obstruction chart development will be closely monitored to assure maximum interfacing with the currently developing automation of the NOS Nautical Charting Program. Eventual interfacing with existing and future in-house automation capabilities and systems will include all cartographic operations from basic data acquisition through the compilation and production of the charts.

Relationship to Base Nautical Charting Program

Information required for updating existing NOS nautical charts and producing new nautical charts is assembled and the charts compiled by the Marine Chart Division of the Office of Marine Surveys and Maps. This information comes from over 70 major data sources including other elements of NOS, U.S. Coast Guard, U.S. Coast Guard Auxiliary, U.S. Army Corps of Engineers, U.S. Power Squadrons, and Canadian Hydrographic Service. To perform the cartographic functions for the 972 charts now produced and a few new charts in process, the Nautical Chart Branch of the Marine Chart Division employs about 100 cartographers. These cartographers are divided into seven Geographic Area Teams of 12 or 13 people each, with each team responsible for compiling and maintaining charts of a particular geographic area.

Finished compilations are sent to the Reproduction Division of the Office of Aeronautical Charting and Cartography where chart revisions are transferred to negatives, press plates produced, and the charts printed. The charts are then distributed to the users by the Distribution Division.

The collection of data, compilation, and engraving of present nautical charts are financed by appropriated funds. Only the printing and distribution of the charts are financed by sales receipts (P.L. 91-412), the price of the charts being set to recover these costs. The proposed program assumes the same financing policy will be used for the fishing obstruction charts.

Development of computer-assisted methods for the production of nautical charts is well underway, and eventually chart production will be largely automated. The methods developed for nautical charts will be applied to the fishing obstruction charts. Particularly significant will be the automated production of chart negatives in place of hand engraving.

Alternatives

Following are possible alternatives to the proposed Federally-funded program of development (including necessary surveys) and production of fishing obstruction charts:

1. Do nothing beyond the base nautical charting program to help fishermen avoid bottom obstructions.

2. Publish readily available bottom obstruction data in Notices to Mariners and/or elsewhere in narrative, tabular, and chartlet form.

3. Add to Alternative 2 a comprehensive search for bottom obstruction data now in the hands of the fishing industry, the oil and gas industries, and other agencies.

4. Add to Alternative 3 field surveys for locating bottom obstructions.

5. Overprint existing nautical charts with obstruction data.

6. Conduct the proposed program by reducing the base nautical charting program so that both programs can be accomplished in a marginal and dangerous manner with present resources.

The fishing obstruction chart program described herein is being proposed as being preferable to any of the above alternatives because it is responsive to the OCS Lands Act Amendments of 1978 and because any substantial reduction in the base nautical charting program would be unacceptably contrary to the vital interests of general navigation.

Alternative 5 is possibly feasible as an addition to the proposed program for areas least intensely fished. In most cases, overprinting would probably produce too much clutter for the chart to be interpreted safely. Alternative 2, 3, or 4 could be adopted as an interim measure before the proposed plan is fully implemented.

VII. PROGRAM PLAN

Introduction

Data now available to the NOS on the nature and location of bottom obstructions potentially damaging to the various gear used in commercial fishing were reviewed and found to be far from adequate for producing the charts required by the OCS Lands Act Amendments of 1978. Therefore, it is necessary in planning the development and production of fishing obstruction charts to provide for an extensive search, early in the program, for additional data and to provide for subsequent field surveys to acquire needed data not available from any existing source. Specific requirements of the fishing industry for depiction of bottom obstructions on charts as well as other special information which would assist the harvesting of fish are not now known. It is first necessary to determine the user requirements for fishing obstruction chart content. With these uncertainties of data and requirements, this charting plan was devised based on broad concepts of what the final product may be.

After review of the resources of the NOS available for the purpose and alternative means of accomplishing the work necessary for the production of fishing obstruction charts, it was concluded that the most efficient method would be through coordinated in-house and contract efforts. Data search and evaluation, determination of user requirements, design of the chart, and surveys to acquire new data or to verify reported obstructions would be accomplished by contract. Monitoring of contracts would be carried out by the Marine Chart Division with a suitable expansion of staff. Chart compilation and chart maintenance could either be accomplished by contract with Marine Chart Division monitoring or in-house with a significant increase of staff and resources. Chart printing will probably be accomplished by contract with distribution accomplished by existing in-house facilities.

Area Priorities

The OCS Lands Act Amendments of 1978 specifies that charting priority will be given areas where offshore oil exploration has begun or is expected to begin soon. The first of the new charts will cover certain areas of the Gulf of Mexico off Louisiana and Texas because of an estimate by the NMFS that approximately 90 percent of the underwater obstructions to trawling are located offshore of these states; the large commercial fishing industry in the gulf; and the large offshore development by the oil and natural gas industry. Following this, area priorities were judged to be the Alaskan coast, the Pacific coast, and then the Atlantic coast where oil and natural gas development is either ongoing or is expected in the near future. Remaining areas of the OCS

will be charted in a priority order based on demonstrated need of the commercial fishermen.

Determination of User Requirements

The first step in the determination of user requirements for fishing obstruction charts was the attendance by staff of the Marine Chart Division, NOS, at meetings of various fishing groups, and contacts with other agencies having appropriate information. These activities provided an insight into probable requirements that formed the basis for development of this plan. However, because of the limited manpower and funding, detailed information needed to design and begin construction of the fishing obstruction charts could not be provided.

The second step will be the dissemination throughout the fishing industry of a questionnaire on user requirements. A copy of the proposed questionnaire is included with this Issue Paper as Attachment 1. It was developed by the Marine Chart Division, in coordination with the NMFS and the Office of Sea Grant.

The third and final step of awarding a contract to define user requirements for chart design and content is presently being accomplished. The contractor will analyze the results of the proposed questionnaire, make a comprehensive series of contacts with the fishing industry, oil industry, and other sources of pertinent information, and provide a definitive evaluation of requirements. The scope of the contract will be limited to coastal (OCS) waters of the Gulf States. A similar contract will be awarded to include the remainder of the coastal waters of the contiguous 48 states and Alaska when funding is available. Since obstruction chart requirements are expected to be somewhat different from region to region, the contractor's evaluation will be required on an area basis. The estimated cost and desired progress of the contract are given under "Program Budget and Milestones."

Evaluation of Existing Data

A considerable volume of data pertinent to the production of the fishing obstruction charts is in the possession of other agencies, individuals, fishermen, oil companies, and others. Mainly, these data would document the existence of bottom obstructions. A contract will be awarded for a comprehensive survey to acquire existing pertinent data, evaluate the usability of the data, and transform the selected data to an appropriate format as required.

The search for and evaluation of existing data can be conducted concurrently with the determination of user requirements (described above), with the final selection of data for application being made after user requirements have been detailed carefully. This program

plan also provides for additional contract support by onsite hydrographic survey verification of these data. This verification is considered essential to assure that the accuracy of these existing data satisfies NOS charting standards and requirements for chart credibility. The estimated cost and desired progress of these contracts are presently under "Program Budget and Milestones."

New Data Acquisition

It is expected that the determination of user requirements and evaluation of existing data will reveal the need to search and locate additional information believed to exist. These data will mainly involve the locations of man-made and artificial bottom obstructions which can only be obtained by field surveys. The majority of necessary field surveys are to be made by contract.

It was previously noted that present hydrographic surveying techniques may be inadequate for locating small obstructions over wide areas. Further, even large debris can be, and probably is, often moved considerable distances by the trawls and currents. Therefore, both the technical feasibility and practicality of surveys need to be established. For this purpose, it is proposed to conduct a contract pilot survey in the Gulf of Mexico of not more than 6-month duration. Assuming the pilot survey would show that bottom obstruction surveys are generally feasible and would provide usable information, a plan for full surveys of all areas has been developed. The priorities, estimated cost, and desired progress of the surveys are given under "Program Budget and Milestones."

Monitoring Mechanism

The importance of contract support to the success of this charting program cannot be overemphasized. The need for extensive contractual support in determining user requirements, locating and evaluating existing obstruction data, acquiring new data, verification of reported data, and in assisting the development of specifications for the regional design of these obstruction charts has been recognized or identified in earlier sections of this program plan. As important as the contract support is, this support must still be at a level of competence commensurate with National Ocean Survey hydrographic survey standards and the associated chart data requirements which comply with national mapping and charting standards. To assure that these standards are adhered to, the National Ocean Survey will provide technical hydrographic and cartographic monitoring services to each contract. This monitoring will include onsite inspection of all aspects of each contract to assure that contract specifications are being interpreted correctly and are conformed to in full. Resources estimated for this monitoring are identified under "Program Budget and Milestones."

Chart Design

The intent of the charting program is to satisfy the operational requirements of the majority of commercial bottom-trawling fishermen. Total coverage of the OCS with new medium-scale (1:100,000) charts could require as many as 230 charts, a formidable and lengthy task if total new coverage is needed. However, charts covering only the primary fishing banks would number considerably fewer. It is estimated that the OCS area in the Gulf of Mexico, the first area designated to be charted under this program, would require at least 61 charts if the charts are produced at the scale of 1:100,000.

Based on previous experiences with prototype fishing charts and on current conditions and considerations, the proposed fishing obstruction charts will be designed to meet requirements in the areas of greatest need. In addition to prominently displaying the bottom obstructions, they will include bathymetry and complete surface navigational information in a way that will not detract from the obstructions, and in a flat format to include the navigational references that are needed to assist the fishermen in improving their operations. A definitive fishing obstruction chart, properly used, should result in a significant decrease in damage to vessel equipment and trawling gear.

It is expected these fishing obstruction charts will be designed to meet several primary parameters:

1. Scale - The scale needed to clearly portray the fishing grounds will be carefully selected after examining user requirements and evaluating the obstruction and other chart data available and fishing methods used. The initial charts will probably be constructed to 1:100,000 scale to provide effective trawl route planning and plotting information, and to display the obstruction detail necessary for hang avoidance.
2. Fishing obstructions, which will consist of presently charted bottom hazards and additional obstruction data acquired from other authoritative sources. Features will be identified for type, positional accuracy, and other factors as appropriate. These features will be emphasized on the charts.
3. LORAN-C lines to provide a primary means of vessel positioning in offshore waters. LORAN-C may be combined initially with a subdued display of LORAN-A. This would provide a direct method for the fishermen to graphically convert any of their obstructions still in LORAN-A values to the new LORAN-C system. LORAN-A is being phased out, and will be deleted from later versions of these charts.

The LORAN-C display may be emphasized by bold index lines and labels, with closely spaced intermediate lines -- subdued and unlabeled.

4. Supporting navigational information will include all necessary visible aids to navigation such as sea buoys, passing buoys, and entrance aids to ports and harbors. All fixed lights visible over long distances will be shown, as well as marine and aero radiobeacons, and radio broadcast stations for radio direction finding.

5. Oil platform structures are to be identified on the chart by their company name, geographic area, lease block number, and structure number, letter, or name. This same information is listed on a sign appearing on the structure and should provide basic orientation information to the chart user.

6. Bathymetry (sea bottom configuration) will be portrayed by closely-spaced and subdued contours, by limited depth zone background color tinting, and a judicious selection of soundings and bottom compositions affecting trawling, anchoring, and marine life attraction. Soundings considered critical may be emphasized in relation to support soundings which would be subdued.

7. Zones of pipeline movement may be shown if these zones can be determined. Active and inactive wells, pipeline valving, and related hardware, which pose as hazards to bottom trawling, will also be shown if the information can be obtained.

8. Safety fairways and other marine limits including the territorial sea, contiguous zone, and fishing limits may be shown.

Chart Construction

The fishing obstruction charts should be produced by automated methods. This would assure the greatest accuracy of the presented information in the shortest overall time.

As previously mentioned, chart construction will be accomplished under contract, or possibly in-house with a significant increase of staff and resources. Program cartographers must be familiar with the evaluation and utilization of all types of charting data. Cartographers should also be familiar with the use of existing automated software and hardware in the compilation of nautical charts and should be qualified to assist in the determination of any new cartographic equipment which may be needed. The proper use of automated chart producing techniques assures minimum manual manipulation of data through the various compilation steps required, greatly reducing the change of positional errors which may otherwise be introduced between initial application of the data and the final printing of the chart.

Further errors can be reduced if the critical data are shown in the same color and on the same construction plate as the controlling

geographic projection. This would reduce the number of registrations of construction plates involved between screens (half-tones) of the same color, and between registrations of different printing plate colors on the press. Position errors of critical data, as a result of production methods, would be virtually non-existent, thus improving the U.S. National Map Accuracy Standards which specifies that not more than 10 percent of the points tested shall have a plotting error in excess of 1/50 of an inch.

Bathymetry will also be carried in greater detail and with less displacement of depth contours, if the contours are charted directly from automated input, and they will be screened to obviate the necessity to displace them for legibility reasons.

It is assumed that the charts will be constructed on the rectangular Mercator projection, facilitating both course plotting and new data plotting. This conforms to standard nautical practices.

The tabulations will be generated by simple automated CRT/TSO text editing and automated print-producing techniques now in use.

In-house compilation of the new charts is considered to be more efficient than contract compilation because (a) better quality control for the same amount of effort can be exercised in-house, (b) in-house compilation will make use of the computer-assisted system now being developed, and (c) the computer-assisted system will release some experienced cartographers from nautical chart production who can then be assigned to the new charts. However, considering the restrictive staff increases proposed (4 positions), in-house compilation of new charts would be impossible without significant impact on the NOS nautical charting program.

Chart Production and Distribution

Chart edition intervals will be determined by the frequency of receipt, amount, and type of new data to be applied, as well as the "criticalness" of the data. As in the traditional system, there is a limit on the quantity of data that the user can reasonably apply from announcements in the Notices to Mariners and still preserve the legibility of the chart. Anticipated changes in important depths and records on the historical rate of change to other features, all affect the planned life of a particular edition. The first charts will probably be scheduled for a 1-year edition life, and adjustments made as experience is gained.

The quantity of fishing obstruction charts will require additional negative and photo work time not now available. However, the computer-assisted cartographic system will increasingly provide automated

production of chart negatives and can be expected to eliminate the need for either hiring additional engravers or contracting for engraving in order to produce the fishing obstruction charts. Press time needs will also be increased. Contract printing (not including engraving will probably be mandatory as it is not expected that this additional time and manpower can be provided in-house. This contract work will place requirements on Marine Chart Division personnel beyond that required to monitor chart compilation; careful contract monitoring will be required to assure strict adherence to quality control specifications throughout the compilation/reproduction process.

Distribution will be by presently established methods -- a sales agent network of 2,000 authorized agents, including the NOS. It is expected that the NOS Distribution Division will have to expand their present capabilities to handle the full suite of 200+ obstruction charts. This potential expansion would not be required for several years and is not considered a critical issue in this plan.

Chart Maintenance and Evaluation

The fishing obstruction charts will be maintained in part by announcements in the weekly and local Notice to Mariners (Federal Register, Vol. 44, No. 102, dated May 24, 1979). The details of this service will be developed through interagency coordination with the cognizant Notice to Mariners agencies; the Defense Mapping Agency Hydrographic/Topographic Center and the U.S. Coast Guard. These announcements will be brief, covering only newly reported items, and refined or verified positions of previously shown items.

The need to maintain the basic chart construction plates in a state of "printing readiness" is essential to the continued success of this program. This continual maintenance procedure is now in use in certain limited areas of the NOS nautical chart production system. This means simply that personnel evaluate and enter new data into the graphics or tabulating base as it is received, as opposed to the alternative method of evaluating and applying all new data at the "last minute" prior to reproduction.

Program Budget and Milestones

In FY 1982, \$2,390,000 will provide contractual services for (1) a user requirement study and analysis to identify the fishermen's charting needs in each OCS area (\$200,000); (2) search, acquisition, and evaluation of existing obstruction data collected by other Federal, State, and local agencies and private sources which will be used for charting and identifying additional survey needs (\$1,900,000); (3) hydrographic survey verification of obstructions reported in formal claims filed with the NMFS against the Fishermen's Contingency Fund (\$190,000);

and (4) preparation of obstruction chart specifications in conformance with user requirements study analysis and for basic design of these charts to satisfy regional requirements of the commercial fishermen (\$100,000). In-house resources of 4 positions and \$160,000 are required to (1) fund contract monitoring and travel associated with the above contracts; i.e., user requirements study (1 position and \$60,000); (2) locate, acquire, and evaluate existing obstruction data (1 position and \$40,000); (3) verify reported obstructions (1 position and \$30,000); and (4) begin preparation of specifications and design of obstruction chart (1 position and \$30,000). (See Table 3.)

In FY 1983, \$2,380,000 will provide contractual services for (1) acquisition of available data from other sources and evaluation of data to identify where data coverage is of low quality and quantity in areas where oil and natural gas production has commenced or is expected to commence prior to 1989, the date by which the initial chart services will be completed (\$350,000); (2) acquisition and processing of additional data required in the Gulf of Mexico will be started (\$1,700,000 (\$1,400,000 for vessel charters and \$300,000 for data-processing services)); (3) contract for hydrographic survey verification of obstructions reported in official claims to the NMFS will be continued (\$270,000); and (4) contract for basic chart design including preparation of chart specifications will also be continued (\$60,000). In-house resources of 4 positions and \$170,000 will provide contract monitoring and travel associated with the above contracts.

In FY 1984, \$2,370,000 will provide for contractual services to (1) acquire and evaluate data from other sources (\$300,000); (2) continue hydrographic surveys in the Gulf of Mexico (\$470,000); (3) begin surveys in the waters off Alaska (\$1,300,000); (4) acquire data for verification of obstruction claims (\$250,000); and (5) complete the design of new obstruction charts (\$50,000). In-house resources of 4 positions and \$180,000 will provide contract monitoring services and travel associated with the above contracts.

In FY 1985, \$2,360,000 will provide contractual services to (1) complete the acquisition and evaluation of obstruction data (\$250,000); (2) continue new data surveys in the Gulf of Mexico (\$250,000) and Alaska (\$1,000,000); and initiate similar surveys in the waters along the Pacific coast (\$400,000); (3) continue surveys to verify reported obstructions in claims to the NMFS and in maintenance support of published obstruction charts (\$260,000); and (4) begin chart construction and distribution (\$200,000). In-house resources of 4 positions and \$190,000 will provide monitoring services for ongoing contracts.

FY 1986 and FY 1987 will require levels of funding for contractual data acquisition surveys similar to previous years (FY 1986, \$2,350,000

and FY 1987, \$2,300,000). FY 1988 will require \$1,150,000 for the termination of contractual surveys (\$370,000) for basic data acquisition, continue contractual surveys (\$600,000) to support the maintenance of previously published obstruction charts or to verify obstruction reports in claims made against the Fishermen's Contingency Fund, and complete contracted chart construction (\$180,000). Subsequent years will continue to require \$600,000 to support similar chart maintenance surveys. With the winding down of contracted surveys, associated in-house monitoring services will also be decreased. A stable base (5 positions and \$330,000) is estimated to be required to support the chart construction, production, distribution, maintenance, and evaluation activities of this program. A total base funding level of 9 positions and \$980,000 will be required to support in-house and contractual efforts comprising the program of fishing obstruction charts in the years following this program plan.

VIII. RESOURCES SUMMARY

Compilation of the new charts will start in FY 1983 and continue through FY 1988. This first portion, estimated to be 10 to 20 prototype charts, will be produced in FY 1984. These first charts will be distributed widely to the fishing industry for critique. Initial production of all of the charts are scheduled to be completed in FY 1988. However, timely completion is dependent on the chart complexity to fill user's needs. To cover the entire OCS with 1:100,000 scale charts would require a total of 230 charts. A considerably fewer number of charts would be needed to only cover primary fishing banks. In FY 1989 and subsequent years, the program will consist of maintaining (updating) the charts and printing new editions (reprinting, as required), and in continuing to verify obstructions in claims filed against the Fishermen's Contingency Fund. It is anticipated that chart maintenance will require acquisition of new data not only from the fishing industry and oil companies, but also from contractual surveys.

Personnel recruitment will be started in FY 1982 and completed in FY 1983. Position and object class detail for FY 1982 are summarized in Table 3.

A summary of resource requirements for the entire period FY 1982 through FY 1988 is given in Table 4.

It should be noted that identification of effort needed for the development of the fishing obstruction charts depends to a large extent on the results of a user requirements study, presently being conducted, and the acquisition and evaluation of available data to be accomplished in FY 1983 through FY 1985. While this proposed plan represents a "most likely" program, the results of these investigations could modify it greatly. The results of the user requirements study,

especially, could cause an early and significant modification of the proposed program. Amount of field surveying required, number of charts, compilation effort, and other aspects of the program are all subject to change, and the total program now envisioned could be found to be substantially less or substantially more than adequate.

POSITION and OBJECT CLASS DETAIL, FY 1982

	<u>GS Grade</u>	<u>Number</u>	<u>Annual Cost</u>	<u>Location</u>
Supervisory Cartographer	13	1	\$ 33,291	Rockville, Maryland
Marine Information Specialist	12	1	27,995	Rockville, Maryland
Cartographer	11	1	23,359	Rockville, Maryland
Cartographer	9	1	<u>19,307</u>	Rockville, Maryland
Total Salaries			\$ 103,952	
Total Compensation			\$ 103,952	
Personnel Benefits			\$ 3,800	
Travel and Transportation of Persons			20,000	
Transportation of Materials, Equipment and Supplies			11,000	
Rent, Communications, and Utilities			13,000	
Printing and Reproduction			2,000	
Other Services			2,383,248	
Materials, Equipment and Supplies			<u>13,000</u>	
TOTAL			\$ 2,550,000	

TABLE 3

RESOURCES SUMMARY

(Fiscal Year, Positions/\$K)

TASK	1982		1983		1984		1985		1986		1987		1988	
	In-house	Contract	In-house	Contract	In-house	Contract	In-house	Contract	In-house	Contract	In-house	Contract	In-house	Contract
<u>User Requirements Study</u>	1/60	200												
<u>Existing Data</u>														
Locate & Acquire	1/40	{ 1,500	1/50	{ 250	1/50	{ 250	1/50	{ 200						
Evaluate		400		50		50		50						
<u>New Data</u>														
<u>Acquisition & Processing</u>														
1. Gulf of Mexico			1/40	1,700	1/50	{ 470	1/50	{ 250	2/100	200				
2. Alaska						1,300		1,000		500				
3. Pacific	1/30	190	1/40	270	1/40	250	1/40	50		350				
4. Atlantic	1/30	100	1/40	60	1/40	50	1/50	150		750				
<u>Maintenance & Verification</u>														
Chart Design														
Chart Construction														
Chart Construction & Distribution														
Chart Maintenance & Evaluation														
<u>Subtotal - In-house</u>	4/160	2,390	4/170	2,380	4/180	2,370	4/190	2,360	4/200	2,350	5/250	2,300	5/250	1,150
<u>Contract</u>														
<u>Total Resource Requirements</u>		4/2,550		4/2,550		4/2,550		4/2,550		4/2,550		5/2,550		5/1,400

TABLE 4

FISHING OBSTRUCTION CHARTS

I. Introduction

In recent years, damage to and loss of trawling gear and vessel equipment due to natural and man-made bottom obstructions on the Outer Continental Shelf have become growing problems for the commercial fishing industry. At present, nautical charts specifically designed to assist the fishing vessel operators in avoiding these bottom hazards are not available.

The National Ocean Survey is planning to produce a series of charts that will identify potentially hazardous bottom obstructions. A further purpose of these charts will be to provide other useful information to the commercial fishing industry in a form that will be most helpful to fishing vessel operations.

The purpose of this questionnaire is to learn from you what information will be useful and how the charts should be designed to meet your needs. Please take time to answer each question. Most of the questions can be answered by checking the appropriate response. Also, please include any other comments necessary to explain your charting needs.

II. General Questions

1. Do you need a chart that shows natural or man-made bottom fishing obstructions in more detail than a standard navigation chart?

() Yes () No () Undecided

2. What commercial fishing areas would you like covered by an obstruction chart?

3. How far offshore should obstruction charts extend?

4. Would a listing of bottom obstructions, to be used with standard navigation charts instead of a special chart, be adequate for you to avoid these obstructions? This listing would give the location and other information, such as nature or type of obstruction.

Yes No Undecided

If you do not consider a listing adequate, please explain briefly why.

5. Would you be willing to provide the National Ocean Survey with position and depth information on any bottom obstruction encountered?

Yes No Undecided

6. What chart scale would you prefer? (n.m. = nautical mile)

Between 1:25,000 and 1:100,000 (3" = 1 n.m. to 3/4" = 1 n.m.)

1:100,000 (3/4" = 1 n.m.)

Between 1:100,000 and 1:250,000 (3/4" = 1 n.m. to 7/8" = 3 n.m.)

1:250,000 (7/8" = 3 n.m.)

Other than those listed above (please indicate the scale desired)

7. Would charts at different scales be required of the same fishing grounds?

Yes No Undecided

8. Would LORAN lines be required?

Yes No Undecided

9. Are the following types of navigation aids necessary on an obstruction chart?

a. Fixed aids to navigation (light towers, radio transmitters, etc.)

Yes No Undecided

b. Floating aids to navigation (buoys, etc.)

Yes No Undecided

c. Landmarks or prominent features (oil platforms, stacks, buildings, etc.)

Yes No Undecided

10. What other information would you want the obstruction chart to include to assist in determining the location of your vessel?

III. Special Charting Features

All features on a chart should be shown clearly so that the user is not confused when reading the chart. A chart should be both easy to read and easy to understand. Certain charted features are considered to be more critical to the user than other charted features. Obstructions, LORAN lines, soundings, etc., are examples of features considered critical on an obstruction chart. To assure that the obstruction chart is designed to show these features properly and to satisfy the needs of the majority of chart users, it is requested that you answer the following questions.

A. Soundings

1. Would you prefer the obstruction chart to show soundings in:

a. Feet Yes No Undecided

b. Fathoms Yes No Undecided

c. Meters Yes No Undecided

2. Should soundings be shown in:

Dark print

Light print

Same as (another charted feature)

3. Should the fishing obstruction chart contain more, less, or the same number of soundings as the standard navigation chart?

More Less Same

4. Should the shoalest, or the deepest, soundings in an area be printed in a lighter, darker, or the same color and shade as all other soundings?

Shoalest: Lighter Darker Same as other soundings

Deepest: Lighter Darker Same as other soundings

5. What other comments or recommendations would you like to make regarding the charting of soundings?

B. Depth Curves

1. What interval of depth curve would you prefer? For example, if soundings are to be shown in feet, would curves at 6-foot intervals be acceptable?

Yes No Undecided

If soundings are in fathoms or meters, would a similar spacing of depth curves be acceptable?

Yes No Undecided

Other preference?

2. Should depth curves be printed in a lighter, darker, or the same color and shade as the soundings?

Lighter Darker Same as the soundings

C. Depth Zones

The standard nautical chart uses two shades of blue to identify shoal water depth zones.

1. Is the coloring of any depth zone on an obstruction chart considered necessary?

Yes No Undecided

2. Perhaps the use of several colors or patterns could be used on a fishing obstruction chart to identify hazardous areas or different depth zones. Would the use of different colors or patterns be helpful in identifying hazards and shoal and deep water areas?

Colors: Yes No Undecided

Patterns: Yes No Undecided

D. Bottom Characteristics

1. Should bottom characteristics (clay, rock, mud, etc.) be shown on the obstruction chart?

Yes No Undecided

2. If bottom characteristic information is desired on the obstruction chart, would the same abbreviations used on the standard navigation chart be acceptable?

Yes No Undecided

3. If required, should bottom characteristics be printed in a lighter, darker, or same color and shade as the soundings?

Lighter Darker Same as the soundings

E. Electronic Positioning Lattice

If LORAN lines are considered essential features on an obstruction chart, how should they be shown with respect to other charted features, such as soundings, depth curves, etc.?

Lighter than _____
(feature)

Darker than _____
(feature)

Same as _____
(feature)

F. Natural and Man-Made Obstructions

1. In addition to charting the location of all obstructions, will additional information be required, such as:

- a. Type of obstruction () Yes () No () Undecided
- b. Description of obstruction () Yes () No () Undecided
- c. Stability of obstruction () Yes () No () Undecided
- d. Height of obstruction
 above the bottom () Yes () No () Undecided

2. If required, how shall this additional information be provided, such as in Notice to Mariners, separate listing, listed in border of chart, etc.?

G. Symbolization

The need to alert the commercial fisherman to natural and man-made obstructions existing in the area where fishing operations are conducted is important if equipment and gear damages are to be reduced. By providing information on obstructions, it is hoped that the fishermen can avoid damaging or losing their trawls with a resulting increase in their annual catch. However, a question exists as to the best way of providing obstruction information. A separate listing of obstruction information which would supplement a chart has been one suggestion proposed earlier in this questionnaire.

This section proposes the use of special symbols on the chart to identify obstructions. These symbols would be selected to have special meaning to represent obstructions listed below. What recommendations can you make regarding the use of symbols for charting?

- 1. Hangs and snags (obstruction material or item is unknown).

2. Natural obstruction (item known, such as rock, coral, etc.)

3. Man-made obstruction (item known and is the result of oil and gas operations).

4. Man-made obstruction (item known and is not the result of oil and gas operations).

5. Symbols for other items or features?

H. Foul Areas

Should the following areas be charted?

1. Dump Sites (Active) () Yes () No () Undecided

2. Dumping and Disposal
Areas (Inactive) () Yes () No () Undecided

I. Legal Boundaries

Should the following legal boundary limits be charted?

1. Legal State Limits (water boundary between states)

() Yes () No () Undecided

2. Territorial Sea Limit (State 3-mile or 3-league line)
 Yes No Undecided
 3. Contiguous Zone Limit (12-mile line)
 Yes No Undecided
 4. Fishing Conservation Zone Limit (200-mile line)
 Yes No Undecided
 - a. U.S.-Bahamas Boundary Yes No Undecided
 - b. U.S.-Canada Boundary Yes No Undecided
 - c. U.S.-Cuba Boundary Yes No Undecided
 - d. U.S.-Mexico Boundary Yes No Undecided
 - e. U.S.-Russia Boundary Yes No Undecided
 5. Lease Block Limits
 Yes No Undecided
 6. Other restricted or regulated areas.
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-
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J. Ship Navigation Information

Should the following marine navigation information be charted?

1. Approved surface traffic lanes
 Yes No Undecided
2. Other known shipping routes
 Yes No Undecided

K. Night Operations

1. Should the fishing obstruction chart be designed for use under poor daylight operations?

Yes No Undecided

2. Should the fishing obstruction chart be designed for use under "red light" nighttime operations?

Yes No Undecided

L. Chart Size and Style

1. What style of obstruction chart would you prefer?

a. Flat Chart (standard navigation chart about 3' by 4' in size).

Yes No Undecided

b. Folded Chart (similar to the small-craft charts published by National Ocean Survey).

Yes No Undecided

c. Book Chart (a series of small chart sections bound together to form a book)

Yes No Undecided

2. The National Ocean Survey produces their standard navigation charts on paper sizes selected to match world charting standards. It would be desirable to produce obstruction charts to satisfy these same paper size standards. For the style of chart you prefer, please indicate the size of chart paper you feel would be most appropriate.

Paper Size (inches)

a. Flat Chart _____

b. Folded Chart _____

c. Book Chart _____