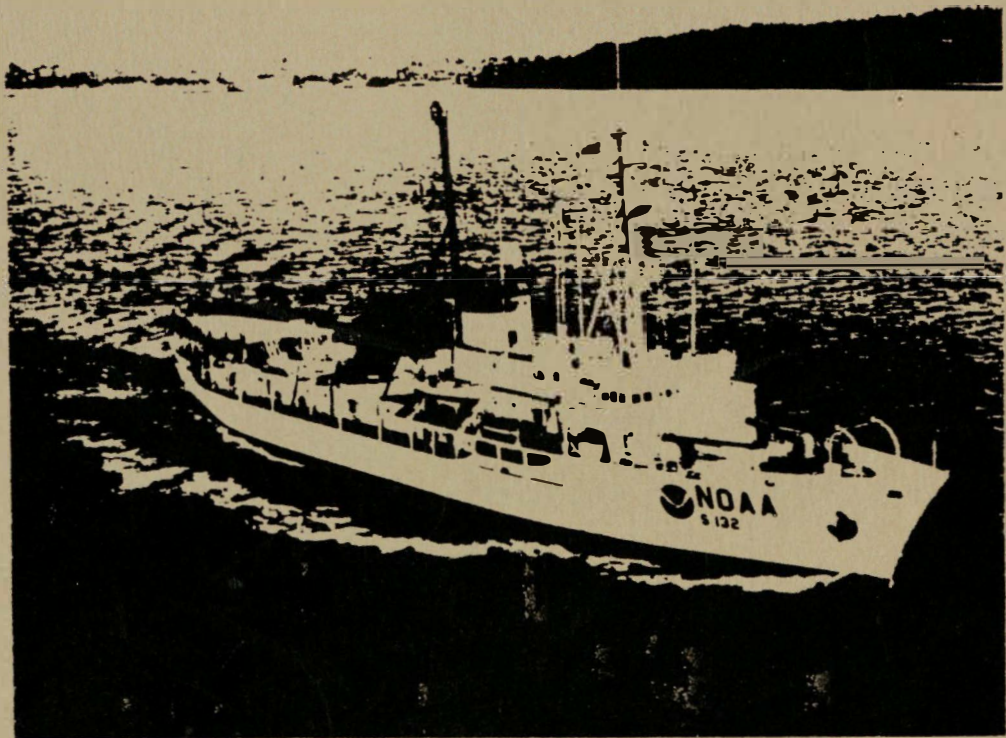


GC
87
.P426
1987



Plan for Mapping the Seafloor of the United States Exclusive Economic Zone 1988-92

August 1987



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Charting and Geodetic Services

PREFACE

The purpose of this plan is to identify the goals, products, and operational capabilities of the National Oceanic and Atmospheric Administration's (NOAA) Exclusive Economic Zone (EEZ) bathymetric mapping program. This document provides an overview of the present program and the anticipated progress over the next 5 years. The plan describes the history and need for the program, users of the program products, the technological approaches to producing the products, and program resources.

The plan is oriented toward National Oceanic and Atmospheric Administration (NOAA) and Department of Commerce programmatic goals, with the primary objective of determining the seafloor characteristics of the U.S. EEZ. This is accomplished by conducting swath surveys over selective areas of the EEZ to produce digital data sets and bathymetric maps. These maps and data sets are essential components of a national EEZ characterization program.

Responding to the 1983 Presidential Proclamation on the U.S. EEZ, the plan reflects program reviews by a group of scientific advisors convened by the Assistant Administrator of the National Ocean Service (NOS), the National Advisory Committee on Oceans and Atmosphere (NACOA), workshops and symposia held by the U.S. Department of the Interior and NOAA and the National Academy of Engineering's Marine Board. It outlines program objectives and identifies relevant issues, strategies, or tasks supporting the objectives. In addition it defines the relationship between the NOS EEZ mapping program and other elements of a National EEZ research and mapping effort, including activities carried out under other elements of NOAA, the U.S. Geological Survey (USGS), and other Federal, State and private organizations.

This plan will be updated annually to include new requirements and geographical priorities, resource conditions, ship allocation plans, new technological developments, and relationships with users, other agencies, and organizations.

Cover: NOAA Ship SURVEYOR currently surveying the Exclusive Economic Zone off the west coast of the United States.

SUMMARY

In 1983, the President proclaimed the establishment of an Exclusive Economic Zone (EEZ), extending 200 nautical miles seaward of the United States coastline. This proclamation extended the Nation's sovereign rights for the purposes of exploring, exploiting, conserving, and managing natural resources in the coastal ocean. This new area is approximately 3.4 million square nautical miles, approximately equivalent to 1.5 times the Nation's total land area. Information is needed to determine the resources within it. The Department of Commerce has established a major program to meet the goal of determining the characteristics and resources of the EEZ.

The National Ocean Service, Office of Charting and Geodetic Service's responsibility includes the acquisition of marine geographic information for the production of nautical charts, bathymetric maps, and associated data of the seabed. To meet this responsibility, NOAA, in conjunction with the U.S. Geological Survey (USGS), is undertaking a systematic mapping program of the EEZ. A companion environmental assessment program is currently underway in the NOS Office of Oceanography and Marine Assessments to develop data atlases and data bases for other categories of data and information needed to characterize and understand the EEZ.

Bathymetric maps and data bases with the accuracy and quality being produced by NOAA from new multibeam surveys of the EEZ are essential for planning and carrying out resource exploration, exploitation and management activities. Existing maps do not provide adequate feature definition to meet academic, industrial, and government user needs. The mapping program is essential to any future commercial development and is needed by the Nation's scientific community to understand the processes that form continental margins and the mineral deposits in and on the seafloor. Advances in computer technology, the development of multibeam sonar systems, and improved methods of obtaining accurate marine positions make it possible for NOAA to respond to these needs.

In FY 1984, NOAA signed a Memorandum of Understanding with the USGS to map the important areas of the EEZ. These areas were identified by the USGS on the basis of scientific interest and resource potential -- hard mineral as well as oil and gas. Priorities for mapping specific sites are being set to complement the broad reconnaissance scale USGS Geological Long Range Inclined Asdic (GLORIA) surveys. Two NOAA ships commenced bathymetric surveys along the west coast of the contiguous United States in FY 1984. In FY 1986-87 three NOAA ships, DAVIDSON, SURVEYOR and DISCOVERER surveyed the EEZ off the West Coast, Alaska, and the Hawaiian Islands. Over 30,000 square nautical miles of seafloor have been mapped during this period.

East Coast and Gulf of Mexico surveying will begin in FY 1988 when additional multibeam sounding systems will expand NOAA's surveying capabilities. In FY 1989-92 approximately 1,050 days at sea are projected for the EEZ survey program, which may be adjusted through NOAA's fleet allocation process. With this amount of ship support most of the high priority areas can be surveyed in the next 5-years.

Release of the accurate bathymetric data acquired by the NOAA survey systems is viewed by the Department of the Defense (DoD) as a potential threat to the Nation's security. The program is presently operating in a classified mode. Data at full resolution are only being disseminated to users with a "need to know" who have secure facilities. Unclassified data is publicly available in the form of improved nautical charts.

The products of the program include: a digital data base of survey soundings on a fixed grid, survey sheets at 1:50,000 scale, base maps at 1:100,000 scale and 3.5 kHz high resolution sub-bottom profiles. From the digital data base, bathymetric contours and individual soundings are being applied to update NOS offshore nautical charts. Information for bathymetric fishing maps, selected surveys for navigational safety, or specialized small scale surveys for specific research users are also available within the guidelines of national security. At the present time all raw data and products will be stored in secure facilities in Rockville, MD.

Future program enhancements include conversion to new computer facilities, preparation of a data management plan for the long term storage of data, computer routines to improve quality assurance and preparation of products, and improvements in data acquisition and shipboard processing systems.

For additional reading, Section 3 contains a list of citations relevant to the development of NOAA's EEZ mapping program and technical papers describing various aspects of the mapping program. Appendices include a copy of the EEZ Proclamation, the Memorandum of Understanding between NOAA and the USGS, and a summary of the mapping and research activities to be undertaken by the newly established NOAA/USGS coordinating office.

CONTENTS

	Page
PREFACE	i
SUMMARY	ii
1. INTRODUCTION AND PROGRAM BACKGROUND	
1.1 NOAA's Role in Bathymetric Mapping	1
1.2 Bathymetric Map Users	2
1.3 Bathymetric Mapping Technology Improvements	3
1.4 Multibeam Technology	5
1.5 Formation of NOAA's EEZ Mapping Project	10
1.6 Classification of Survey Data.....	12
2. PROGRAM OPERATION	
2.1 Technical Approach	14
2.2 Survey Priorities	16
2.3 Data Acquisition and Shipboard Processing	23
2.4 Final Processing	24
2.5 Data Management, Products, and Archiving	24
2.6 Future Survey and Processing Systems	30
2.7 Coordination with Other Agencies and Users	31
2.8 Long-range Plans - 1993-2020	31
3. CITATIONS AND REFERENCES	33
Appendix A. Exclusive Economic Zone Proclamation	37
Appendix B. NOAA/USGS Memorandum of Understanding	42
Appendix C. Description of NOAA/USGS Coordination Office ..	46

TABLES

1. Uses of bathymetric maps	4
2. Multibeam survey systems	9
3. Ships and days at sea assigned to EEZ surveys 1987-92 ..	14
4. Characteristics of NOAA's swath survey systems	23
5. Data archived by the EEZ project office	29

FIGURES

1. Conventional NOAA/USGS bathymetric/topographic Map	3
2. NOS SEAMAP - North Pacific Ocean	6
3. Real Time contour plot from Sea Beam system	7
4. Configuration of beams on Sea Beam	8
5. The U.S. Exclusive Economic Zone	11
6. Areas Surveyed by the EEZ survey program 1984-87	13

FIGURES (Cont.)

	Page
7. Overview structure and data flow of EEZ mapping project	15 ..
8. Survey priorities - East Coast and Gulf of Mexico	17 ..
9. Survey priorities - Alaska	18
10. Survey priorities - West Coast and Hawaii	19
11. Anticipated survey coverage 1988-92 - East Coast and Gulf of Mexico	20 ..
12. Anticipated survey coverage 1988-92 - Alaska	21
13. Anticipated survey coverage 1988-92 - West Coast and Hawaii	22
14. Sample 1:50,000-scale survey sheet	26
15. Bathymetric contours to be applied to NOS nautical charts	27 ..
16. Three-dimensional portrayal of seafloor relief from EEZ survey data	28 ..

Mention of a commercial company or product does not constitute an endorsement by the National Oceanic and Atmospheric Administration

1. INTRODUCTION AND PROGRAM BACKGROUND

Bathymetric mapping is the science of determining seafloor relief through the measurement of ocean depths at known geographical positions. It involves taking sufficient depth observations in order to describe, map, or contour variations in bottom topography. This process has evolved from a manual, labor intensive effort to one which is automated and analytical. The maps from these efforts are extremely accurate reproductions of seafloor geomorphology. The following discussion highlights the major evolutionary steps in the science of bathymetric mapping, as well as the survey philosophy and technology involved.

1.1 NOAA's role in Bathymetric Mapping

The development of sonar technology during World War I resulted in an increased capability to measure ocean depths. In addition to improving the ability to survey for navigational purposes, bathymetric maps were being used by geologists to interpret sea floor related phenomena. The mapping of the continental shelf off the east coast of the United States, including the first comprehensive picture of the submarine canyons, resulted from the work of A.C. Veatch and Paul Smith of the U.S. Coast and Geodetic Survey in the 1930's and 1940's. Bruce Heezen and Marie Tharp of the Lamont-Doherty Geological Observatory produced the well-known three-dimensional physiographical maps in the 1960's and 1970's, which were published by the Geological Society of America and the National Geographic Society. Much of the data used for these maps were collected for military purposes during or immediately after the Second World War and has subsequently been declassified. Throughout this period, the General Bathymetric Map of the Oceans (GEBCO) series, published as an international cooperative effort since 1903, was updated by incorporating the increasing volume of data.

These maps have contributed to new theories regarding the formation of continents, plate tectonics, seafloor spreading, mid-ocean ridges, continental margins, and sedimentary basins. Not only were the maps useful for scientific investigations but, when combined with other geophysical measurements (gravity, magnetic, and seismic profiles), they were key elements which contributed to the discovery of offshore oil and gas formations and areas of mineral potential.

The maps produced during this era lacked detail due to the wide distance between survey lines. These lines were typically greater than 5 miles apart in offshore regions. The drawing of contours between data points was accomplished by the subjective generalization and interpretations by marine geologists and cartographers. By utilizing all available data small-scale maps

showing reasonable renditions of the seafloor relief were produced.

NOAA's role in bathymetric mapping stems from its historical mission to assist and encourage the Nation's commercial development by surveying the coastal waters of the United States. Initially these surveys were related to navigational safety. In subsequent years the mission has been gradually broadened to include surveys and maps of the ocean floor for a variety of purposes. This authority was enacted into law through the Act of August 6, 1947. In 1960 NOAA's authority was expanded to include responsibility for surveying international waters, in addition to the territorial sea previously covered. These duties and responsibilities have been codified in 33 U.S.C. 883(a) et seq.

In 1966 NOAA initiated a program of producing a series of bathymetric maps using available data from a variety of sources, i.e. government agencies, private industry and academic institutions. These have resulted in a series of bathymetric maps ranging in scale from 1:24,000 to 1:1,000,000. This program was subsequently expanded in the 1970's, through an interagency agreement with the Department of Interior (Bureau of Land Management (BLM), Minerals Management Service (MMS), and USGS) to include maps associated with oil and gas development, as well as serving to meet environmental planning needs and increased interest in coastal zone matters. The first integrated topographic (land) and bathymetric (seafloor) maps were published in 1972. In most cases sufficient data exist to produce accurate 1:100,000 scale maps within the 150 meter isobath. An example of a typical NOAA/USGS map is shown in Figure 1.

Systematic ocean geophysical (bathymetric, magnetic and gravity) surveys were conducted by NOAA in the 1960's in the areas off Hawaii to the Aleutian Islands and the West Coast. These resulted in a series of "SEAMAPS" which also included gravity and magnetic measurements in addition to the bathymetric base maps. Maps published are found in NOAA Bathymetric Map Catalog Number 5.

1.2 Bathymetric Map Users

As an example of the interest in bathymetric maps, in 1985 approximately 250,000 copies were sold through NOAA and USGS map distribution centers. These include NOAA/USGS "Topo-Bathy" maps as well as conventional bathymetric maps. More than 2,000 requests for bathymetric information were received and over 700 digital bathymetric data sets or graphical products portraying bathymetry were distributed by NOAA's National Geophysical Data Center (NGDC) between 1984-86. Maps which show outer continental shelf lease blocks are routinely produced in

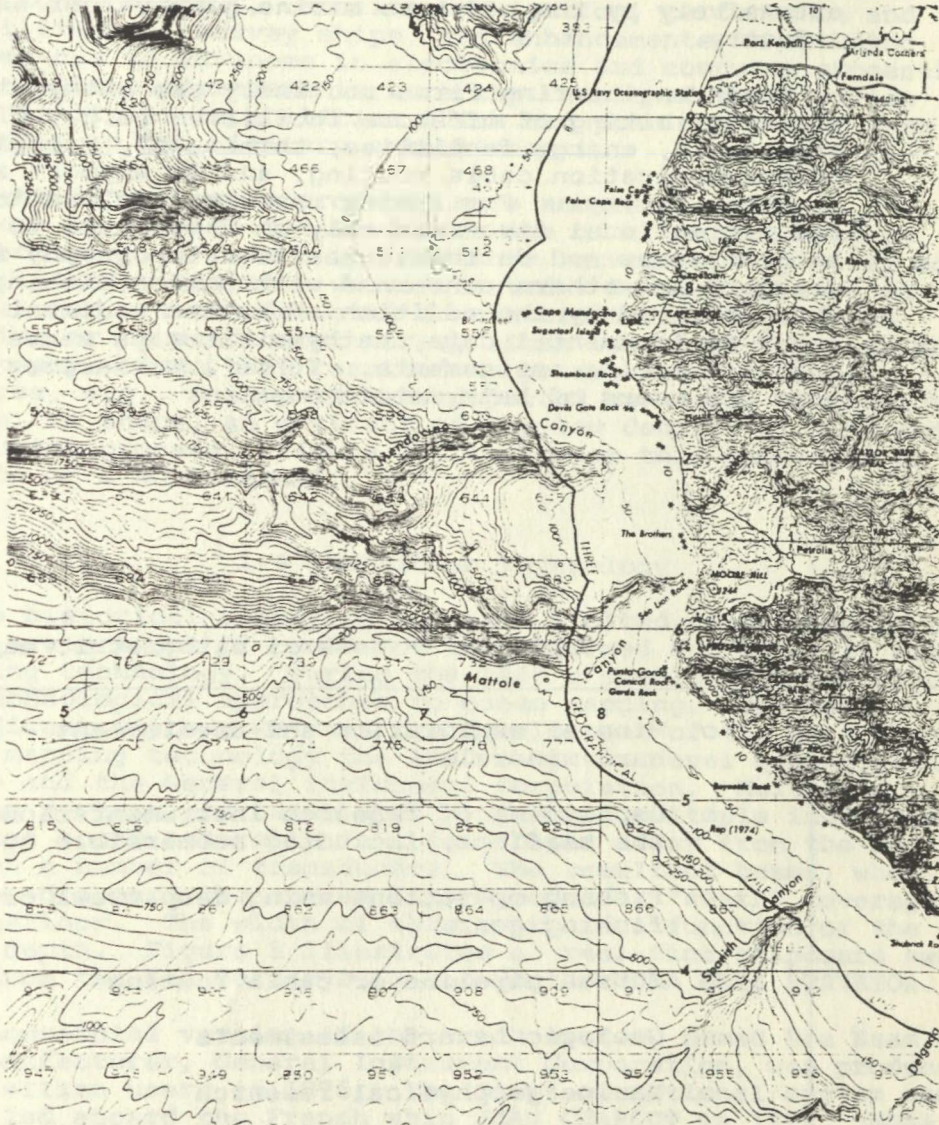


FIGURE 1. -- NOAA/USGS coastal map combining topographic (land) and bathymetric (seafloor) information. Maps of this type have been produced for many years and are useful for coastal development, engineering studies and scientific research.

cooperation with the Department of the Interior's MMS to aid in the determination of areas with oil and gas potential and the assessment of geological hazards. These maps are an important element of marine environmental impact studies and are used extensively by the offshore marine geophysical exploration industry.

Ocean engineering firms routinely use bathymetric maps for planning, siting of offshore facilities (e.g., offshore structures, energy facilities, terminals), pipeline and telecommunication cable routing, and to support submersible and deep tow surveys. For living resource applications, commercial and recreational fishermen rely on these maps to locate fish habitat areas and delineate seafloor topography for deep draggers and others concerned with bottom fishing and trawling. When enhanced by the addition of bottom sediment information and other environmental data, bathymetric maps serve as a valuable tool for marine assessments. Table 1 summarizes the most common uses and users of bathymetric maps.

Table 1. -- Uses of bathymetric maps

- Mineral exploration and development - oil and gas, hard minerals
- Deployment of research instrumentation on or near the seafloor, including submersible operations
- Fishing operations using deep trawl or bottom fishing gear
- Subsea pipeline or cable routing
- Geologic hazard assessments
- Marine geophysical research
- Surveys of ocean waste disposal sites
- Fish habitat research investigations

1.3 Bathymetric Mapping Technology Improvements

In the 1950's and 1960's, the technology for seafloor mapping was upgraded through improvements in navigational positioning, i.e., LORAN A and C, satellite navigation, performance and capabilities of survey ships, and enhancements in sounding systems due to advances in electronics and computer processing. Many of these improvements were the result of the civilian availability of capabilities which had previously only been available to the military establishment.

These improvements produced more accurate soundings. However, to provide detailed coverage of a particular area, it was necessary to reduce the distance between survey lines so that all major features were detected. Generally, once an unusual feature was detected or anticipated, the ship ran crossing or perpendicular survey lines to further develop the topography. Even this resulted in generalized seafloor features, e.g., seamounts were depicted as nearly symmetrical or conical in shape, an artifact of the low density of data and the contouring process. Figure 2 illustrates this phenomena on a portion of a NOAA SEAMAP.

1.4 Multibeam Technology

The historical surveying approach limited ocean mapping of large areas since it could not be performed economically with existing technology. During the 1960's development was begun on new technological approaches to ocean mapping. The most significant improvement was the development of the multibeam or swath mapping technology the 1960's by the Naval Oceanographic Office and the General Instrument Corporation. Multibeam mapping systems are capable of projecting multiple individual beams of sound laterally in a fan-shaped array from the ship through a number of transducers. The resultant beams, when processed aboard the survey ship, produce a "swath" coverage of the seafloor. The width of this swath is a function of the water depth. Figure 3 illustrates a real-time shipboard swath plot from the Sea Beam system aboard the NOAA Ship SURVEYOR.

A commercial version of the swath system, named Sea Beam by its manufacturer, General Instrument Corporation, was produced for civilian users in 1976. The first operational system was installed aboard the French ship JEAN CHARCOT in 1978. NOAA installed a system aboard the SURVEYOR in 1979. It is capable of operating in depths of nearly 12,000 meters, and has a swath width of approximately .8 times the water depth. (See figure 4 and table 4.) In water depths of 2,000 meters the system is capable of mapping a swath nearly 1,600 meters wide containing 16 individual survey lines each approximately 100 meters apart, thus achieving virtually complete bottom coverage in one swath.

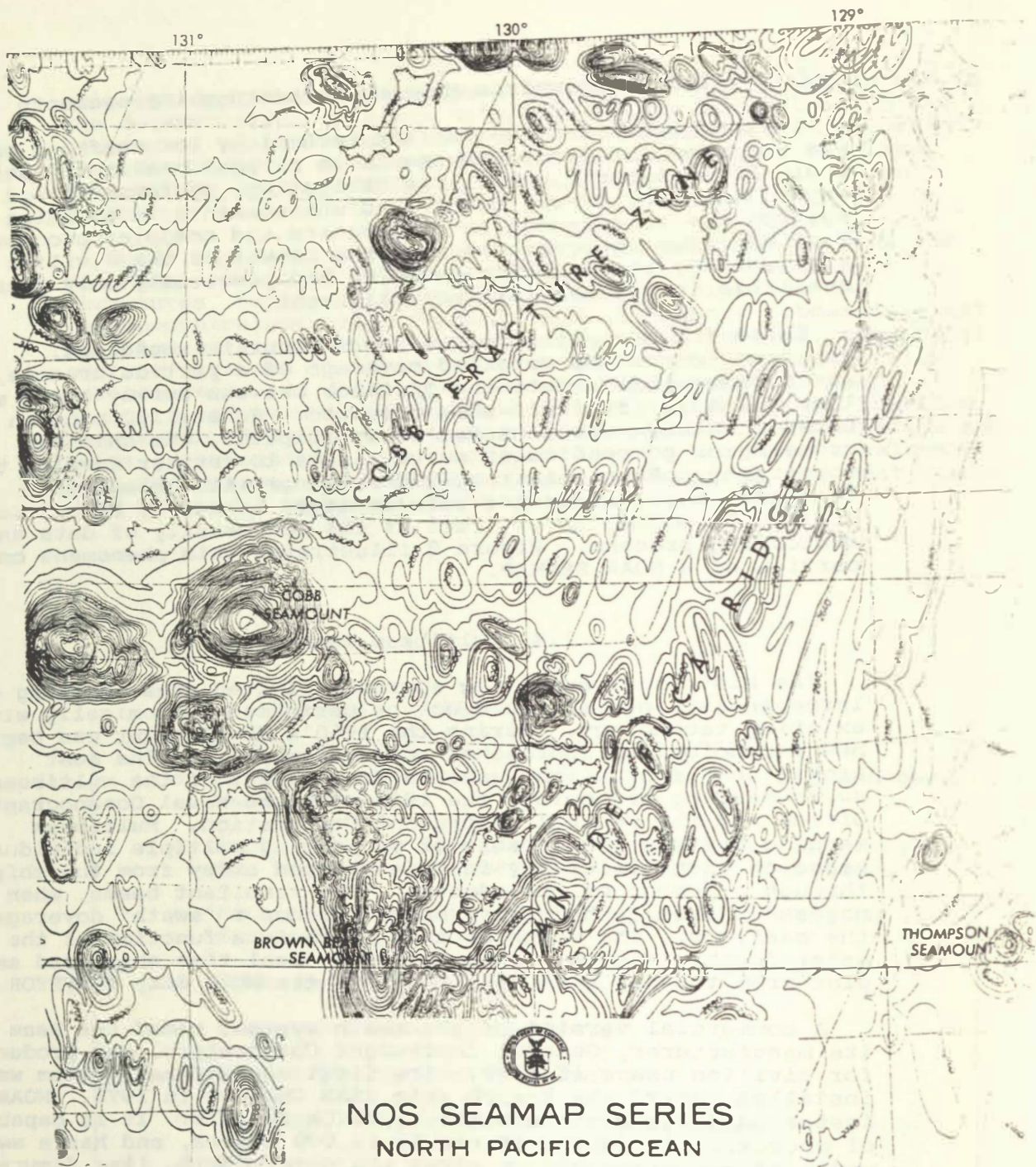


Figure 2. -- NOAA "SEAMAP" illustrating the uniformity of the contours associated with widely spaced survey lines. Map scale is 1:1,000,000.

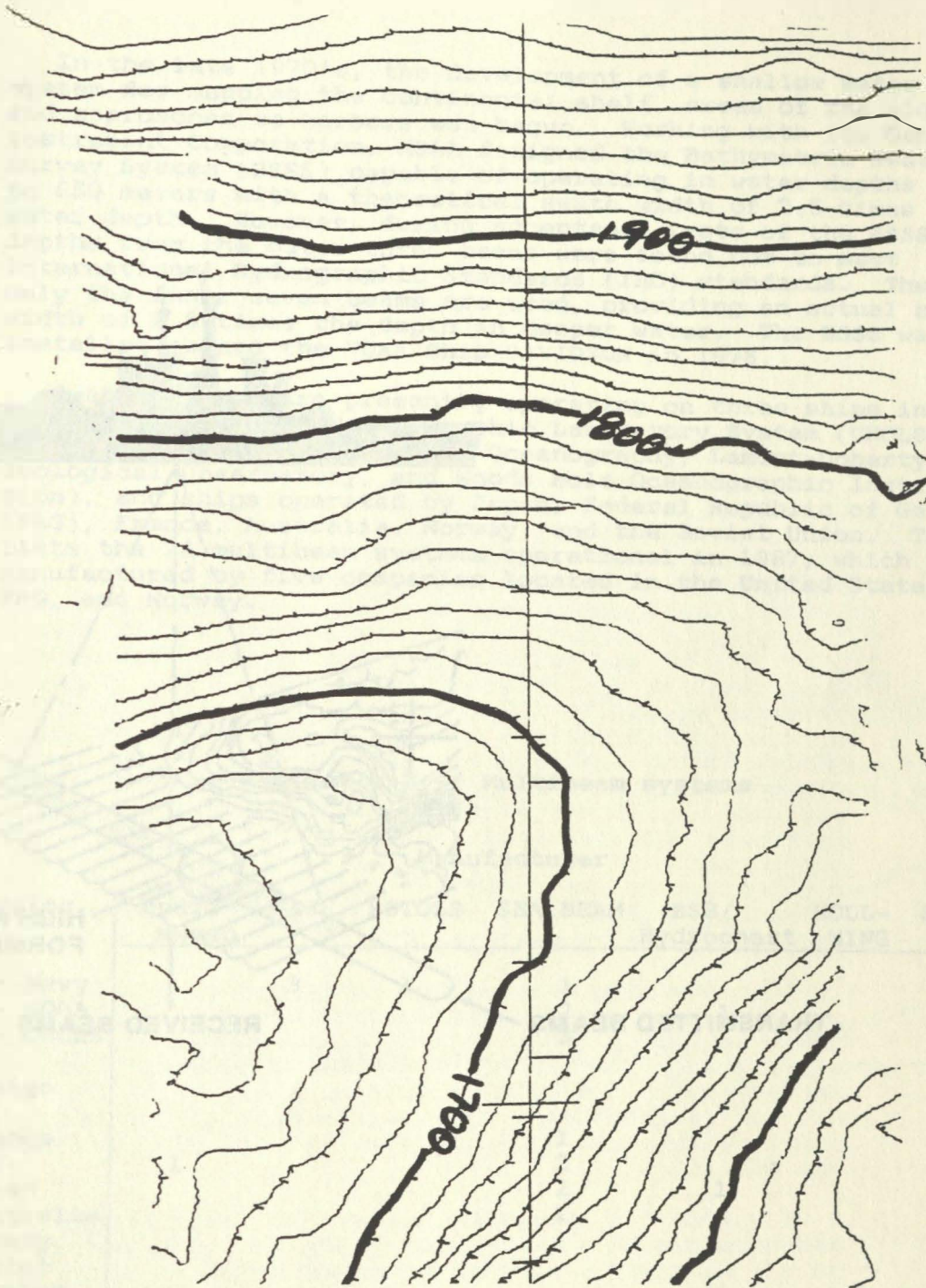


Figure 3. -- Example of real-time shipboard contour plot. Swath width is approximately 1.4 km.

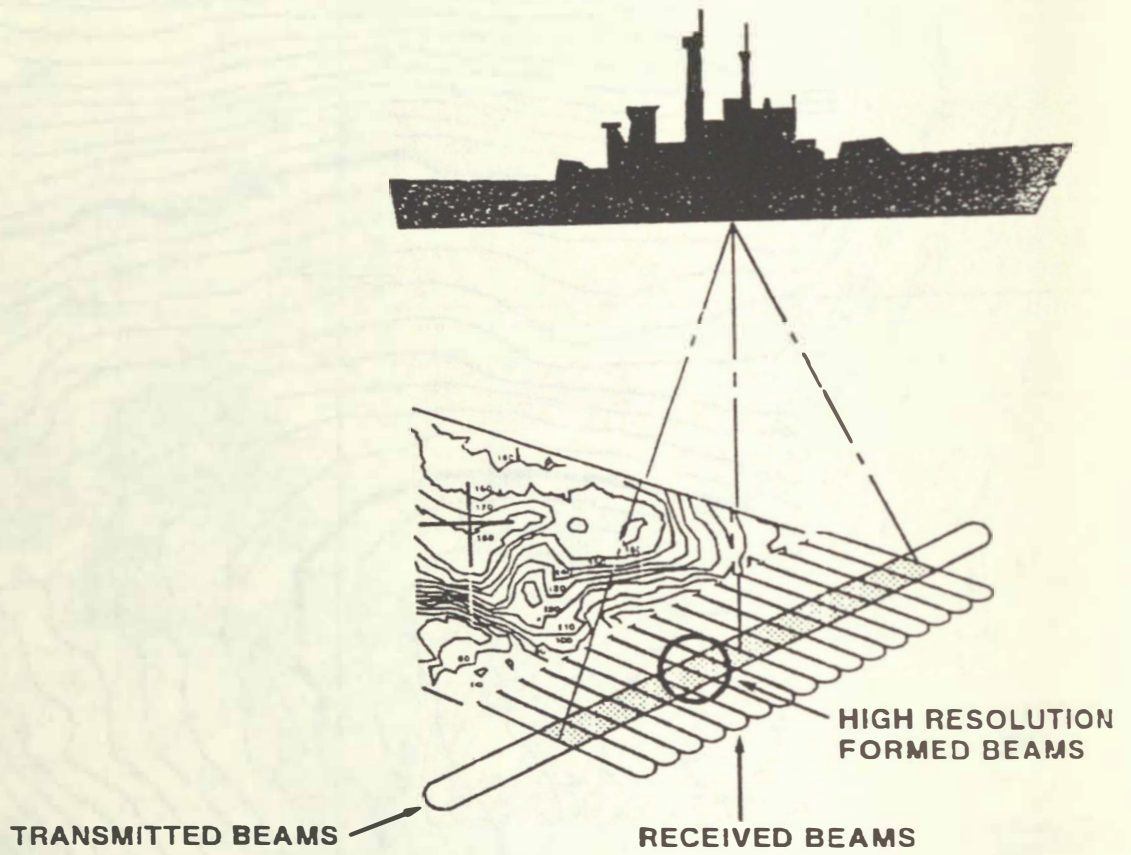


Figure 4. -- Beam configuration of Sea Beam system.

In the late 1970's, the development of a shallow water swath system for mapping the continental shelf, areas of the slope, and approaches to harbors was begun. Working with the General Instrument Corporation, NOAA designed the Bathymetric Swath Survey System (BSSS) capable of operating in water depths of up to 650 meters with a theoretical swath width of 2.5 times the water depth. However, during acceptance tests of the BSSS, depths from the outer three beams were found not to meet International Hydrographic Standards (IHO) standards. Thus, only the inner seven beams are used, providing an actual swath width of 1.5 times the depth in deeper water. The BSSS was installed aboard the NOAA Ship DAVIDSON in 1978.

Swath systems are presently operating on three ships in the University National Oceanographic Laboratory System (UNOLS) fleet (Scripps Institution of Oceanography, Lamont-Doherty Geological Observatory, and Woods Hole Oceanographic Institution), and ships operated by Japan, Federal Republic of Germany (FRG), France, Australia, Norway, and the Soviet Union. Table 2 lists the 24 multibeam systems operational in 1987, which were manufactured by five companies located in the United States, FRG, and Norway.

Table 2 -- Multibeam systems

Operator	Manufacturer						
	Hydro-sweep	SASS	BOTOSS	SEA BEAM	BS3/ Hydrochart	HOLL-MING	SIMRAD
US							
- Navy		3	1	1			
- NOAA				2	1		
- UNOLS				3			
Foreign							
France				1			
FRG	1			2			
Japan				2	1		
Australia				1			
Norway							
Soviet Union						3	
TOTAL	1	3	1	12	2	3	2

To provide the necessary high degree of positioning accuracy required for detailed mapping with the multibeam mapping systems, and to meet IHO standards, the NOS is utilizing shore-based medium range electronic systems such as ARGO and Raydist. A significant improvement in positioning capability will occur when the Global Positioning System (GPS) becomes operational in late 1990. In the meantime, during the 4-6 hours of coverage each day, GPS is being used for calibration of medium range systems. The fully operational GPS constellation will greatly expand the capabilities to survey the outer continental shelf, continental slope, and the remote areas of the EEZ off Alaska and the Pacific Trust Territories.

1.5 Formation of NOAA's EEZ Mapping Project

With the signing of the EEZ Proclamation in March of 1983, the Nation's attention was drawn to the need to assess the resources, especially hard minerals, of the territory within the 200-mile zone of the United States and its territorial possessions. (See appendix A.) This proclamation added nearly 3.4 million square nautical miles of "sovereign" territory to the Nation's jurisdiction. (See figure 5.) To determine the direction of the national program, a symposium was held by the Department of the Interior in November 1983. This meeting was attended by nearly 250 representatives from various governmental agencies, universities and the offshore exploration industry (ocean mining and energy development). At this meeting it was recommended that a major effort by NOAA and the USGS should be put into improving the maps of the seafloor by the use of multibeam and side scan technology. It was concluded by the participants at the symposium that these maps were necessary, vital steps to improving our basic knowledge of the seafloor topography and as essential information for subsequent investigations by private industry.

This position was further confirmed by a group of national oceanographic experts convened by the Assistant Administrator of NOS. Following these initial recommendations, a special EEZ mapping workshop was held by NOAA in December 1984 and a second EEZ Symposium was held in October 1985. A NACOA report on the EEZ identified NOAA's bathymetric mapping function as one of the critical elements in a 10-year national plan for exploration of the EEZ.

The NOAA and the USGS, because of their complementary roles and missions to map and assess the Nation's resources, entered into a Memorandum of Understanding (MOU) in April 1984 to map the seafloor. (See appendix B.) This MOU has resulted in a permanent working relationship between NOAA's Office of Charting and Geodetic Services and the USGS Office of Energy and Marine Geology, and has led to the formation of a Joint Mapping and Research Office between the two agencies. (See appendix C.)

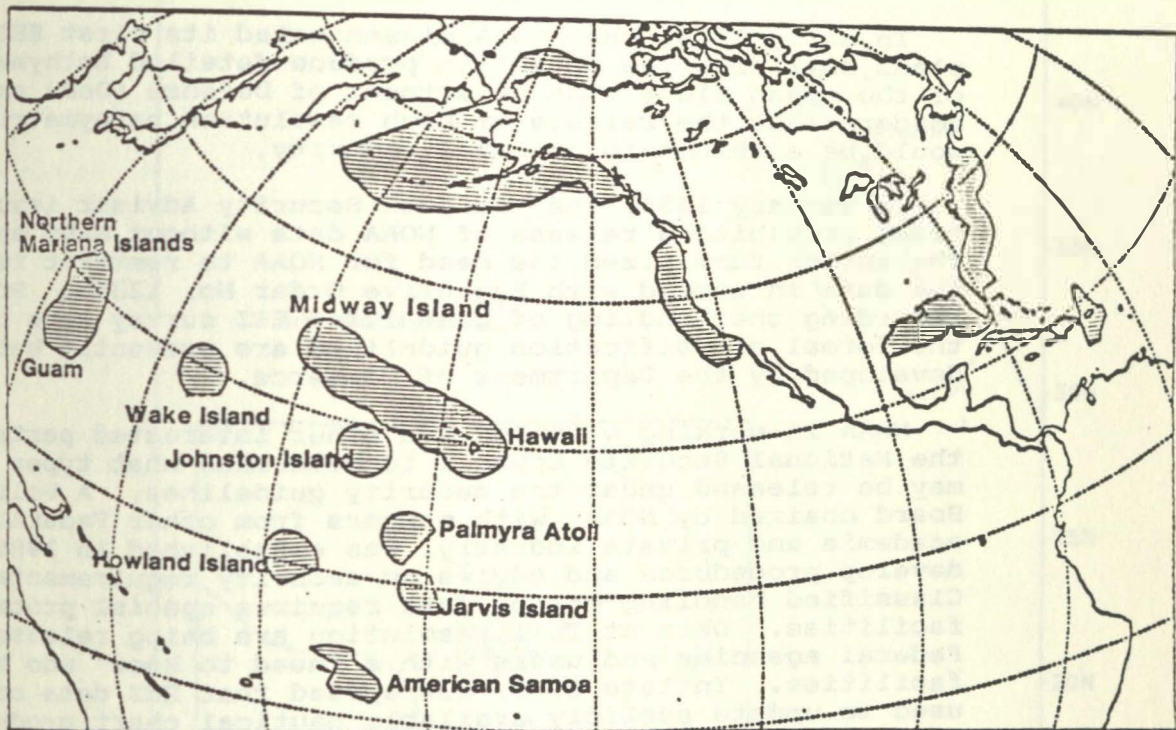


Figure 5. -- Areal extent of the U.S. Exclusive Economic Zone

Since the NOAA EEZ Mapping Project began in 1984, two NOAA ships, SURVEYOR and DAVIDSON, have surveyed over 30,000 square nautical miles (sq. n.mi.) of the Pacific ocean floor off California, Oregon, and Hawaii. This has resulted in 105 1:50,000 survey sheets and 13 1:100,000 base maps as of May 1987. Figure 6 shows the extent of survey coverage for the first 3 years of the program. The two ships surveyed about 1,500 sq. n.mi./month. An additional Sea Beam was installed aboard the NOAA ship DISCOVERER in 1986. This has increased production capability to more than 2,500 sq. n.mi./month.

1.6 Classification of Survey Data

In early 1984, when NOAA disseminated its first EEZ survey plans outlining the intent to produce detailed bathymetric maps of the ocean floor, the Department of Defense (DoD) expressed concern that the release of high resolution bathymetric data would be a threat to national security.

In January 1985, the National Security Advisor issued an order prohibiting release of NOAA data without Navy approval. The action formalized the need for NOAA to restrict release of the data in accord with Executive Order No. 12356. Procedures regarding the handling of classified EEZ survey data including the formal classification guidelines are presently being developed by the Department of Commerce.

NOAA is working with DoD and other interested parties through the National Security Council to determine what types of data may be released under the security guidelines. A Policy Review Board chaired by NOAA, with members from other Federal Agencies, academia and private industry, was established in 1985 to develop procedures and advise on security requirements. Classified handling of the data requires special procedures and facilities. Data at full resolution are being released to other Federal agencies and users with a "need to know" who have secure facilities. In late 1986, DoD agreed that EEZ data could be used to update publicly available nautical chart products. Work is continuing to find additional means for publicly releasing the EEZ data.

Procedures are being developed through the interagency Policy Review Board to expedite the clearance process for release of specific small area surveys to the general public. In the interim all requests for release of classified data are being forwarded to the Office of the Oceanographer of the Navy, who is serving as the focal point for review within the Department of Defense.

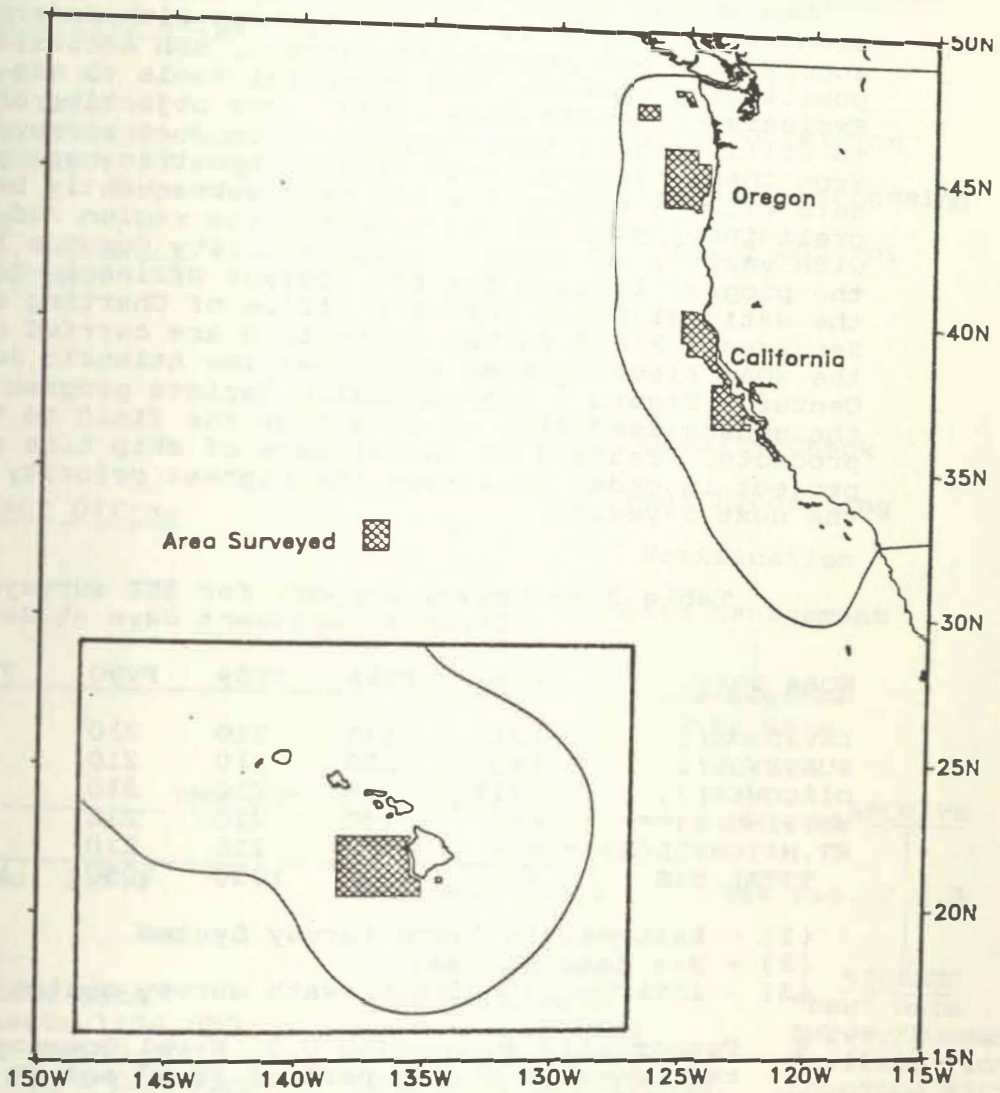


Figure 6. -- Areas surveyed by the EEZ survey program, 1984-87.

2. PROGRAM OPERATION

2.1 Technical Approach

New marine survey technologies, including long-range side scan sonar, multibeam survey systems with modern digital acquisition and processing systems, and accurate satellite positioning systems, are essential tools to map the U.S. Exclusive Economic Zone (EEZ). The objective of the program is to utilize these technologies to conduct surveys of the EEZ. From these surveys, base line bathymetric maps and digital data sets will be produced which will subsequently be used as a preliminary step to characterize the region and to support a wide variety of needs. Responsibility for the implementation of the program is with the EEZ Project Office in Rockville, MD in the National Ocean Survey's Office of Charting and Geodetic Services. Field survey operations are carried out by ships of the NOAA fleet located at either the Atlantic or Pacific Marine Center. Figure 7 schematically depicts program operations and the generalized flow of data from the field to the final products. Table 3 is an estimate of ship time required by the project in order to survey the highest priority areas during the next 5-years.

Table 3 -- Vessel support for EEZ surveys
(Figures represent Days at Sea)

<u>NOAA Ship</u>	<u>FY87</u>	<u>FY88</u>	<u>FY89</u>	<u>FY90</u>	<u>FY91</u>	<u>FY92</u>
DAVIDSON(1)	171	145	210	210	210	210
SURVEYOR(2)	140	158	210	210	210	210
DISCOVER(2)	71*	*	210	210	210	210
WHITING(3)**	---	140	210	210	210	210
MT.MITCHELL(2)**	---	135	210	210	210	210
TOTAL DAS	372	588	1050	1050	1050	1050

(1) - Bathymetric Swath Survey System

(2) - Sea Beam System

(3) - Intermediate depth swath survey system system

* Temporarily supporting U.S. Naval Oceanographic Office requirements during part of FY 87 and FY 88.

** Planned to be in operation during FY 88

NOTE: Although the EEZ Project Office has requirements for full utilization (210 days at sea) for all ships capable of multibeam surveys, the figures for FY's 87 and 88 represent allocations reduced to support other NOAA and national programs and funding reductions. Allocations of ship support for years beyond FY-88 will be determined through the NOAA fleet allocation process.

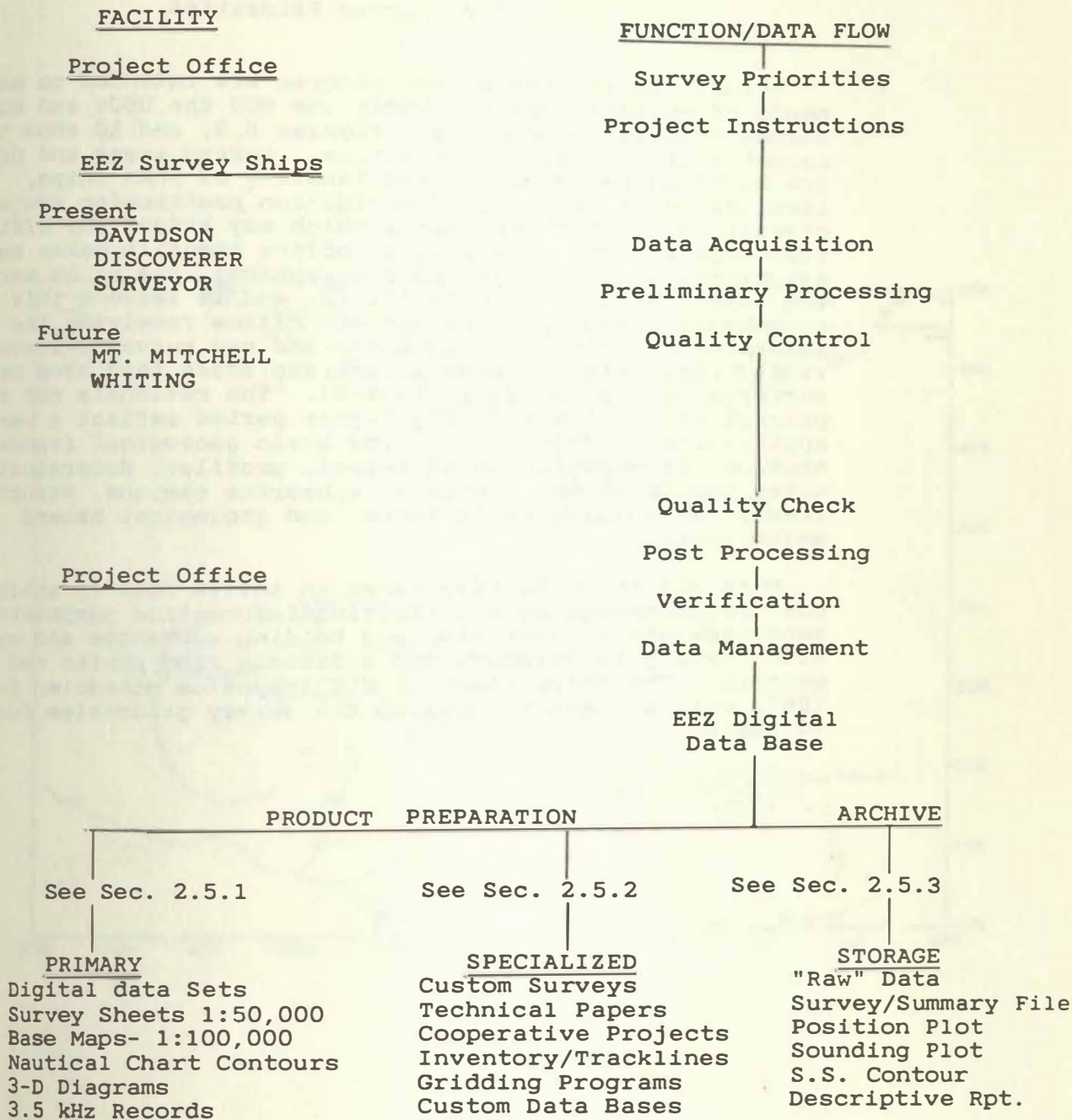


Figure 7. -- Overview structure and data flow for the EEZ Mapping Program.

2.2 Survey Priorities

Priorities for the survey program are intended to satisfy the needs of multiple users. Under the MOU the USGS and NOAA review survey priorities annually. Figures 8,9, and 10 show the most recent regional survey priorities. Survey areas and priorities are modified based on the availability of NOAA ships, limitations of shore based navigation positioning systems, and prevailing weather conditions which may affect the efficiency of field operations. The project office annually makes an assessment of the projected geographical area to be surveyed in the next 5 years. Figures 11, 12, and 13 reflect this assessment based upon the project office receiving the full allotment of ship time requested and new survey systems being on line. These figures also illustrate areas that have been surveyed during the years 1984-87. The rationale for the priorities for the upcoming 5-year period reflect a variety of applications. These range from basic geological framework studies, interpretation of seismic profiles, determination of sites for dredging, limits of submarine canyons, structural trends, earthquake fault lines, and geological hazard assessments.

NOAA and the USGS have taken an active role in soliciting user requirements by distributing information pamphlets, placing announcements in journals, and holding workshops and symposiums with leading researchers and officials from public and private sectors. The third biennial EEZ symposium scheduled for November 1987, will be used to develop the survey priorities for the next 10 years.

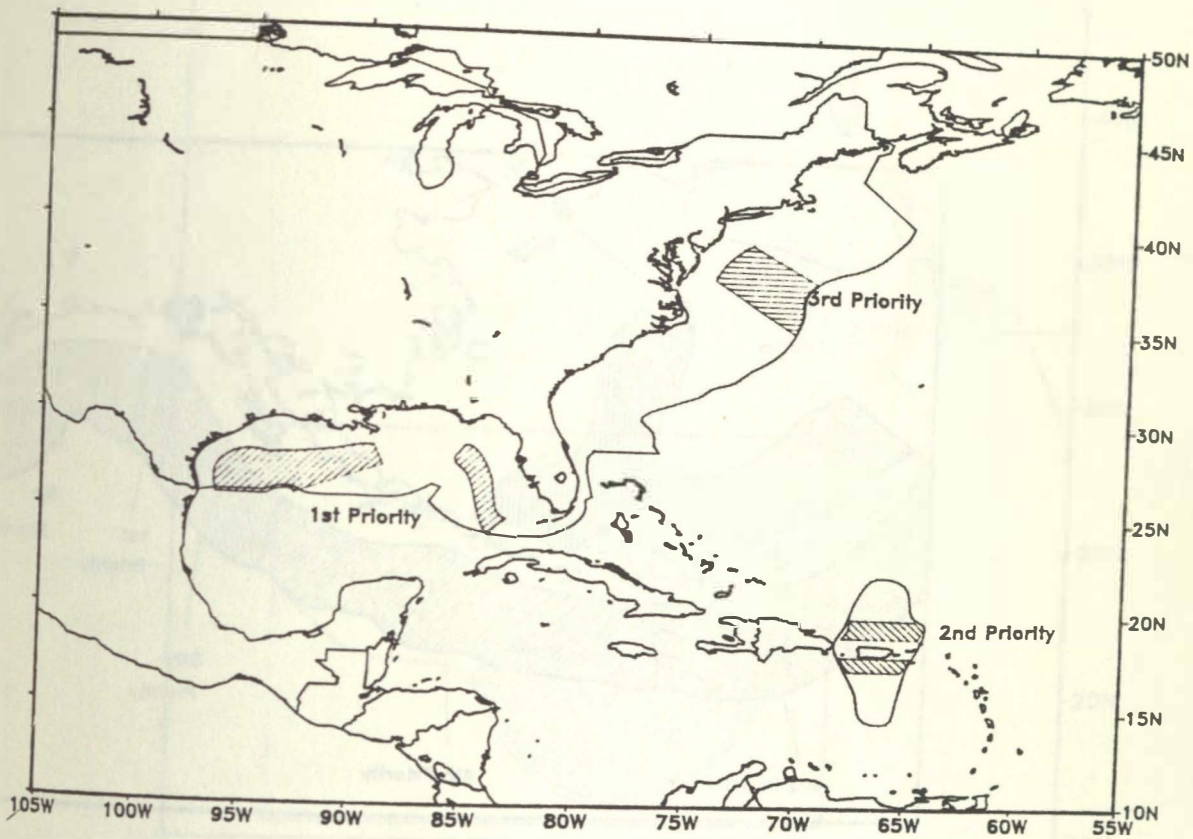


Figure 8. -- East Coast and Gulf of Mexico Survey Priority areas.

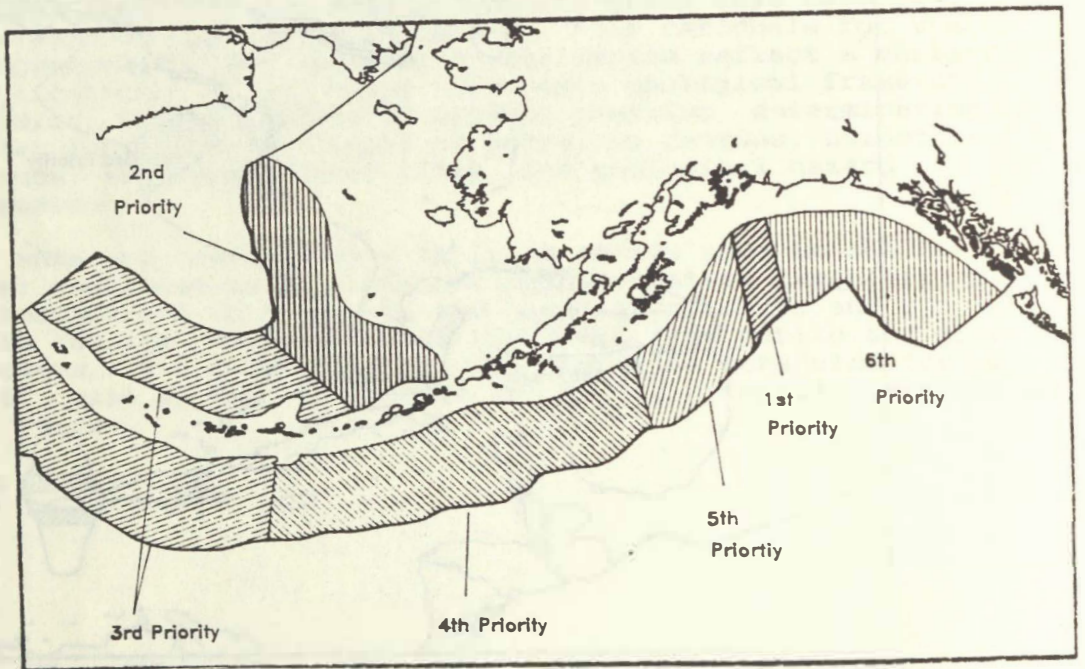


Figure 9. -- Alaskan survey priority areas.

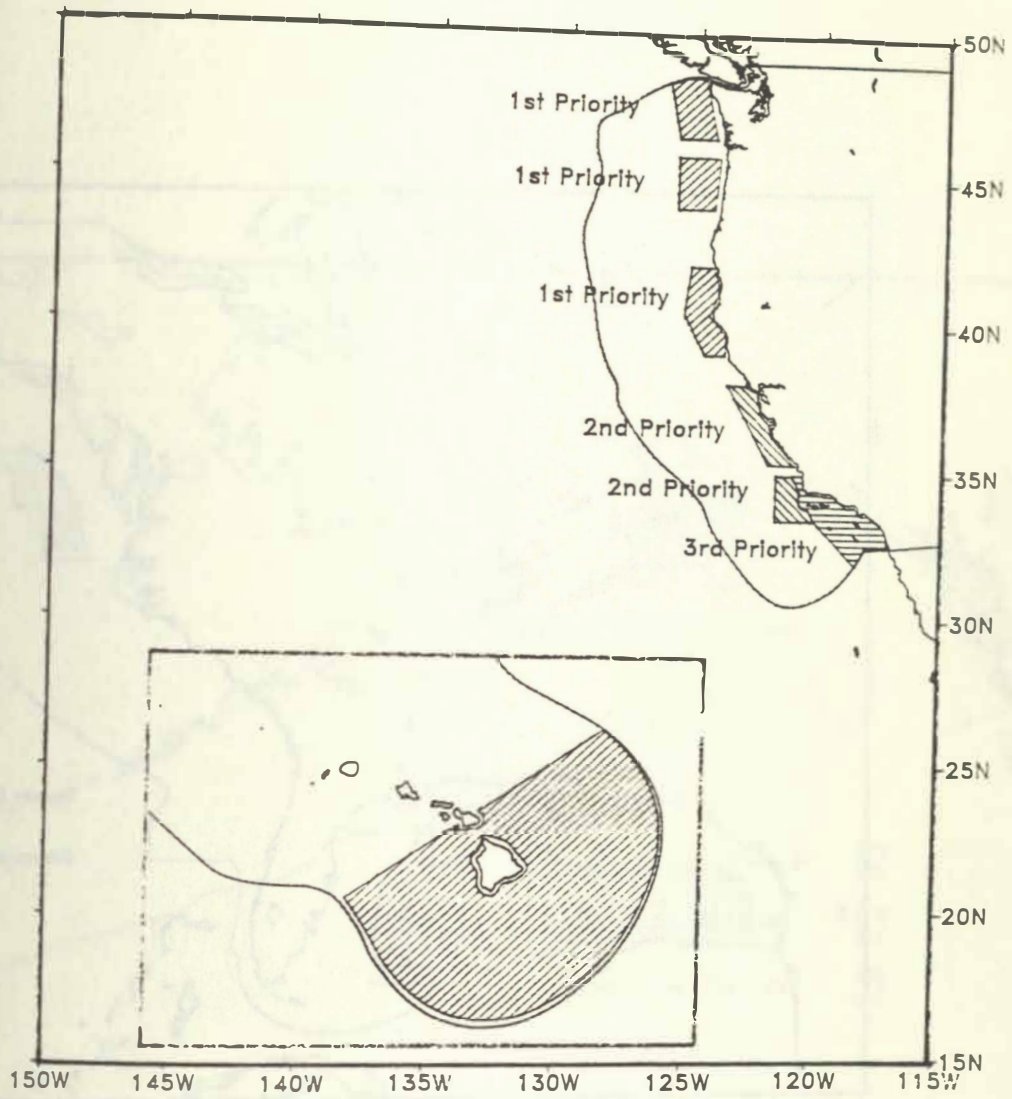


Figure 10. -- West Coast and Hawaiian Priority areas.

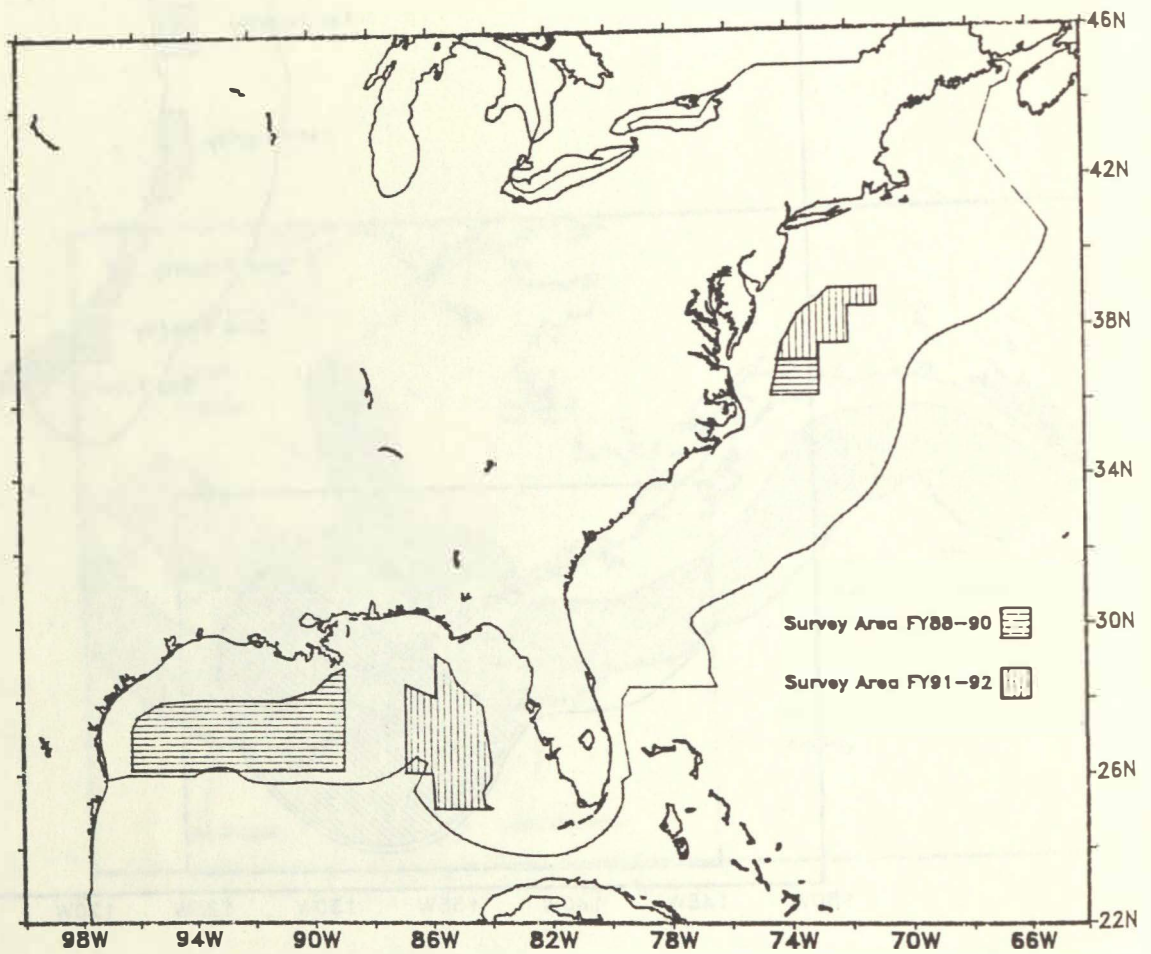


Figure 11. -- Anticipated East and Gulf Coast Survey Coverage 1988-92.

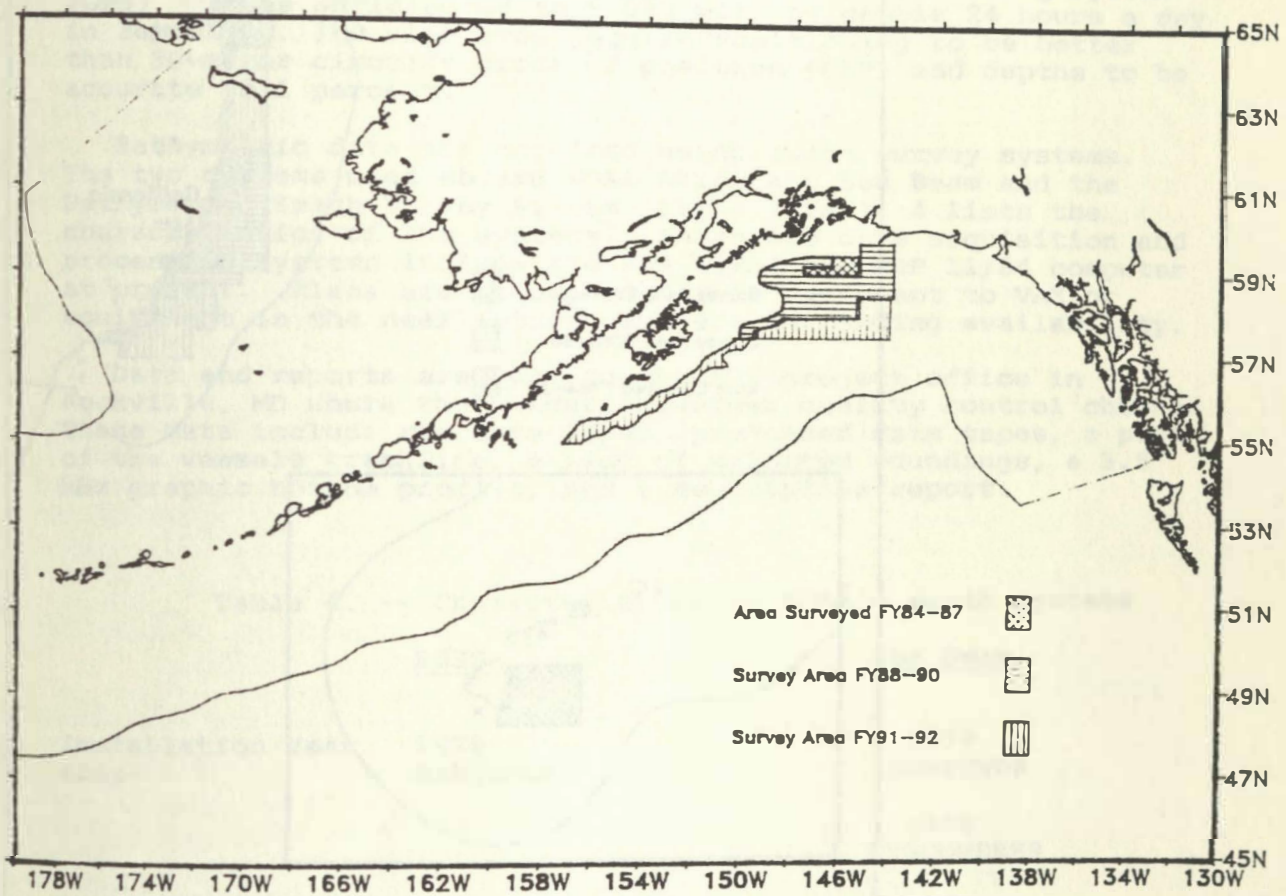


Figure 12. -- Anticipated survey coverage of Alaska 1988-92

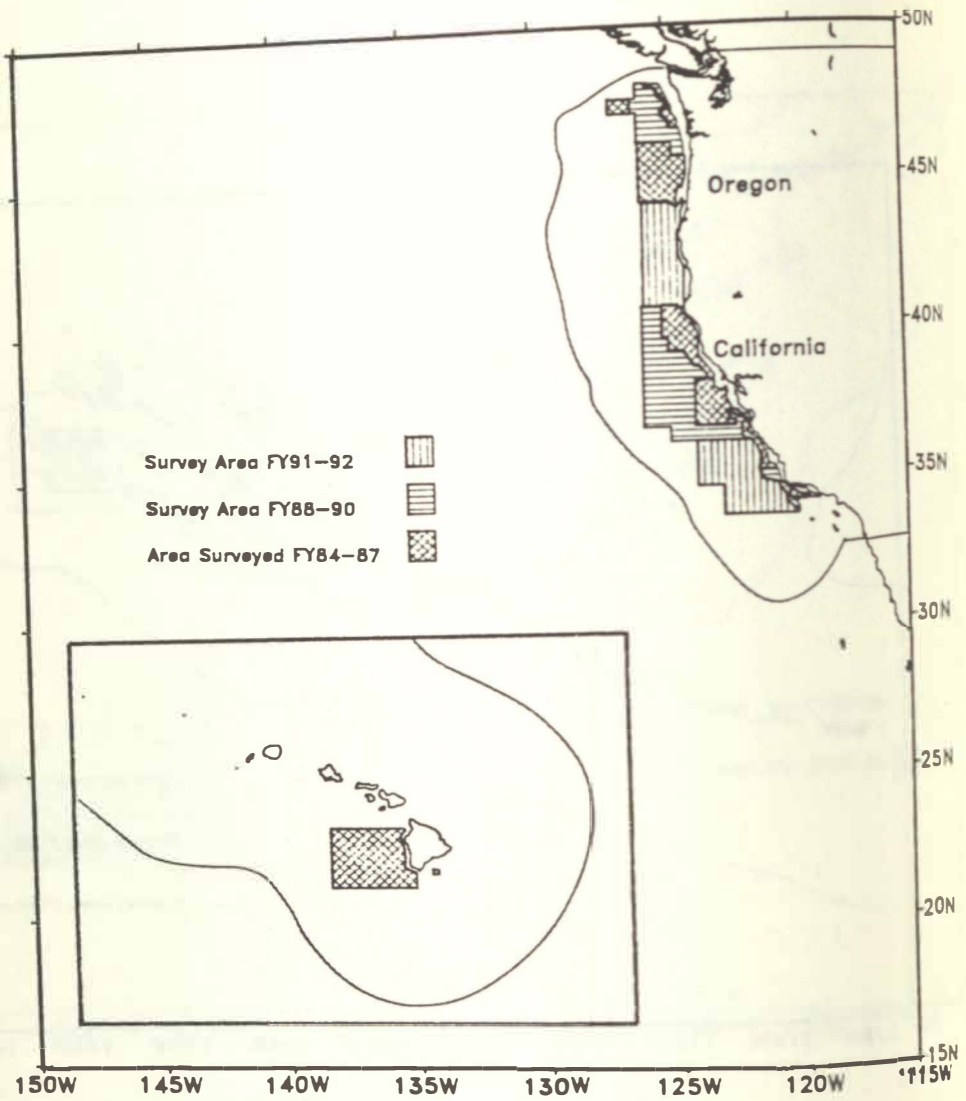


Figure 13. -- Anticipated survey coverage of West Coast and Hawaii 1988-92.

2.3 Data Acquisition and Shipboard Processing

All bathymetric data are acquired and initially processed as 1:50,000 scale field surveys on board the vessel. The multibeam surveys are run with overlapping coverage and data are gathered parallel to the depth contours to maintain uniform swath widths for ease in obtaining complete bottom coverage. Plans are to acquire bathymetric data between the 150-meter depth contour and the 200 nautical mile limit of the Exclusive Economic Zone. Medium-range radio positioning systems such as Raydist or ARGO are used with the integration of the Global Positioning System (GPS). It is anticipated that GPS will be usable 24 hours a day in late 1990. IHO standards require positioning to be better than 50-meter circular error of position (CEP) and depths to be accurate to 1 percent.

Bathymetric data are acquired using swath survey systems. The two systems used aboard NOAA Ships are Sea Beam and the Bathymetric Swath Survey System (BSSS). Table 4 lists the characteristics of the systems. Shipboard data acquisition and processing systems include the PDP 11/34 and PDP 11/84 computer at present. Plans are to upgrade this equipment to VAX or equivalent in the near future, subject to funding availability.

Data and reports are sent to the EEZ project office in Rockville, MD where they undergo further quality control checks. These data include raw data tapes, processed data tapes, a plot of the vessels trackline, a plot of selected soundings, a 3.5 kHz graphic bottom profile, and a descriptive report.

Table 4. -- Characteristics of NOAA's swath systems

	<u>BSSS</u>	<u>Sea Beam</u>
Installation Year	1978	1979
Ship	DAVIDSON	SURVEYOR
		1986
		DISCOVERER
		1987
		MT. MITCHELL
Frequency	36 kHz	12 kHz
Practical Depth Range	150-600 m	600-11000 m
Beams (# x Width)	22x5 Deg.	16x2 2/3 Deg.
Effective Coverage	105 Deg.	42 1/3 Deg.
Swath Width	2.5xdepth	.75xdepth

2.4 Final Processing

Contour plots at a scale of 1:50,000 are generated from a fixed x-y grid using the Universal Transverse Mercator (UTM) projection. Data are processed on a CYBER 170-815 super mini-computer. The peripherals consist of two mass storage units which are capable of handling 474 million bytes, five terminals and one 4125 Tektronix graphic terminal with plotter. Development of a DEC Micro VAX II computer system continues to complement and if feasible replace the CYBER 170-815.

Contours which are suspected to be anomalies are inspected and compared to the associated real time graphic profiles for authenticity. Data anomalies are identified and removed. As more powerful computers become available aboard ship, 1:50,000 scale contouring will be done aboard ship and resolution of anomalies will occur in the field. A processing report is submitted along with the contour plots for review and acceptance. Several (typically 3-6) 1:50,000 sheets are merged into one 1:100,000 base map produced as both a digital and hard copy product. This base map may eventually be used to generate a public bathymetric map complete with symbols, color enhancement, other bottom features, LORAN lattice, shore line and geographic names. Selected contours of the digital data set are being used to prepare depth curves for nautical charts.

Development of a color filled bathymetric contour map and preparation of other specialized products rests upon repair of a VERSATEC ECP42 color plotter and procurement of additional hardware and software to provide rasterization of Micro VAX II bathymetric contour vectors.

2.5 Data Management, Product Preparation, Dissemination, and Archiving

Upon completion of each survey sheet a variety of tasks are performed under the broad definition of data management, product preparation, dissemination, and archiving. These include preliminary distribution of survey data to Federal agencies having a "need to know". This includes Department of Interior agencies (MMS and USGS) interpreting GLORIA data and making geological assessments; preparation of a limited number of EEZ products; and the final archiving of the data. In addition, a number of quality assurance and research tasks are performed on the data within the project office. These include analysis of special areas of interest utilizing a variety of scales, projections or perspectives, i.e., 3-dimensional, mesh, or color enhancements.

The EEZ data set is being structured to support the growing needs of digital marine data. This will be an essential element in support of digital graphic systems, such as the electronic chart, under development within the private sector.

2.5.1 Primary Data Products

The following products will be produced from the digital data base of soundings on a referenced geographical grid:

- o Survey sheets at 1:50,000 and bathymetric base maps at 1:100,000 scales
- o High-resolution analog 3.5 kHz records
- o Digital data sets on fixed geographic grid
- o Selected contours for nautical charts, or bathymetric fishing maps and selected spot soundings
- o Limited geographical area large scale maps and 3-dimensional views of the seafloor

Figures 14,15, and 16 are examples of data products from the digital data sets.

2.5.2 Specialized Products and Services

- o Customized surveys and maps of specific sites and bottom features, generally surveyed and prepared in response to specific requests, i.e., Cordell Bank, Loihi Seamount, and Escanaba Trough

- o Special surveys for navigational safety. These may include searches for reported shoals or surveys along corridors leading in and out of ports, e.g., approaches to San Francisco and Seattle

- o Technical papers and talks describing the EEZ program, surveying and processing methods and instrumentation, and data interpretation, participation in technical workshops and symposia.

- o Cooperative investigations and research projects with other organizations, (i.e. USGS, Environmental Protection Agency (EPA), National Science Foundation (NSF), Office of Naval Research (ONR)), possibly including other geophysical measurements taken in conjunction with bathymetric surveys, e.g., gravity, magnetic, seismic reflection profiles.

- o Maps, reports and indexes showing survey coverage and plans

- o Gridding and contouring programs

- o Customized data bases containing selected data registered to geographic coordinates. In some cases these will be for specific categories such as marine geographic names. In other

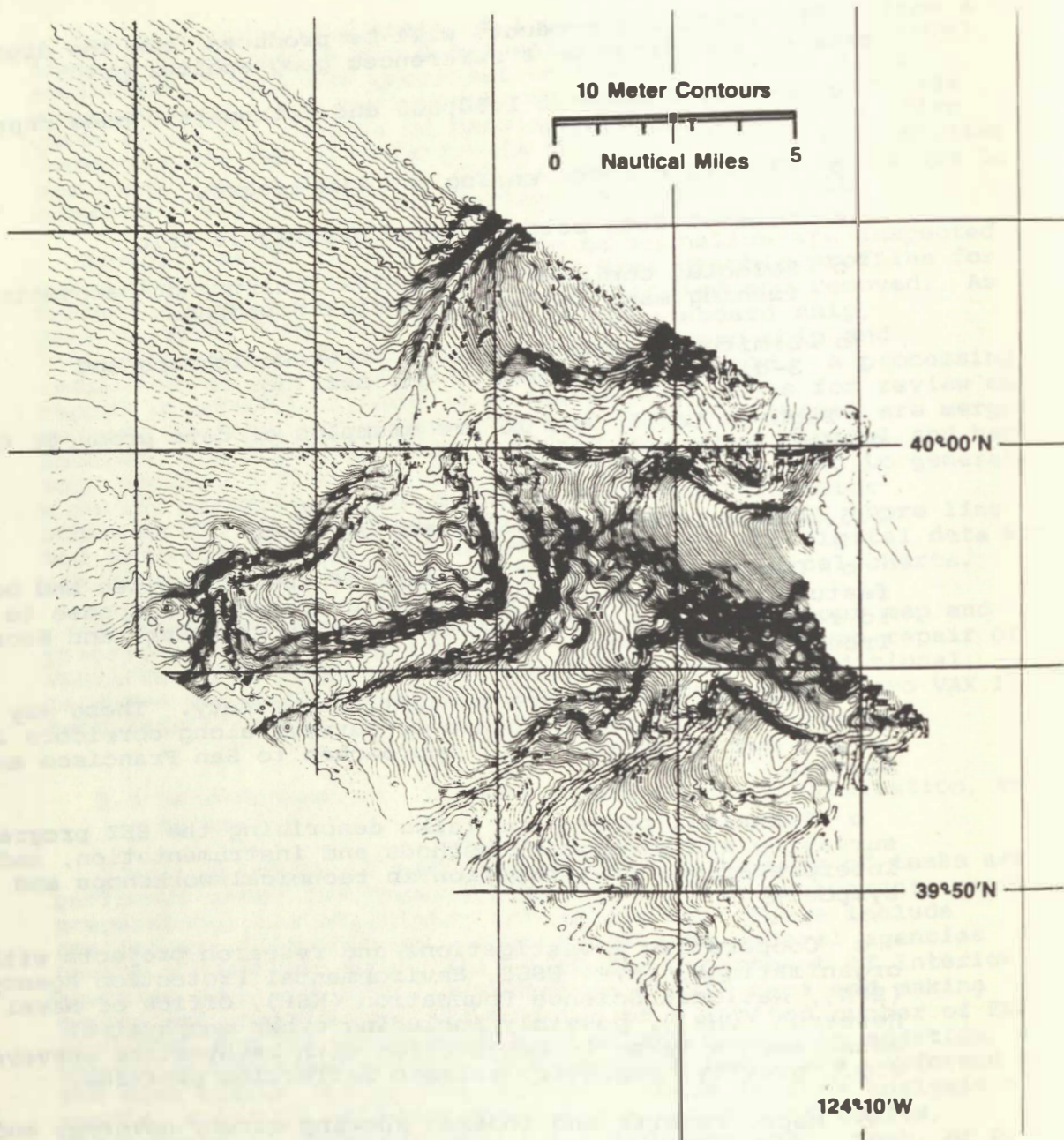
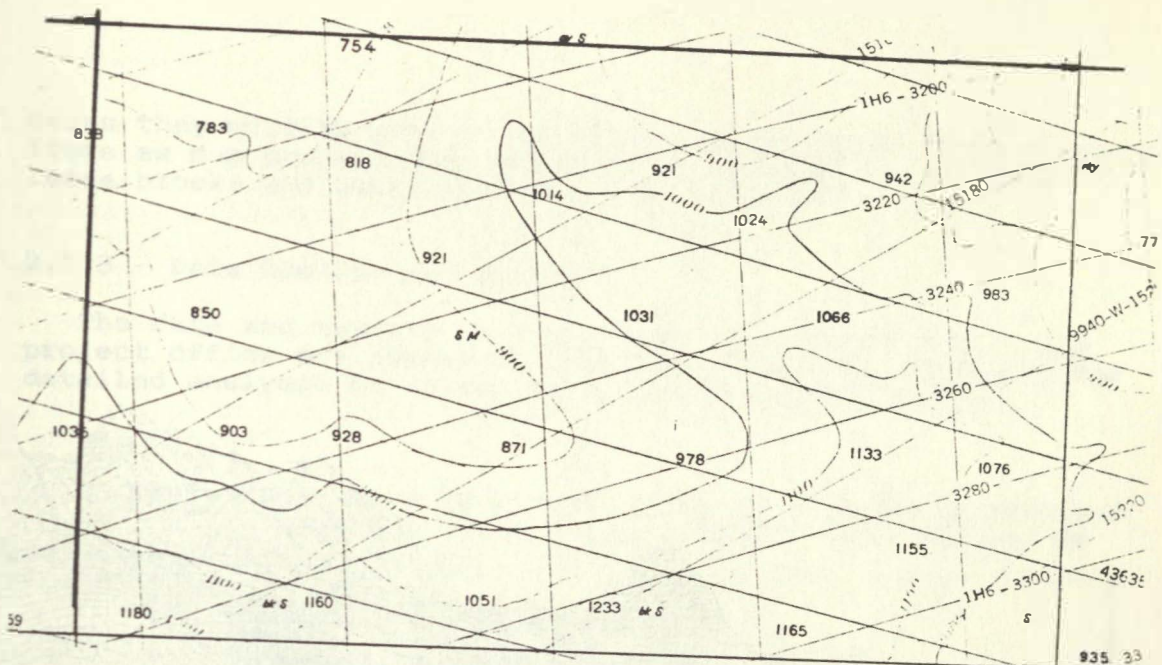
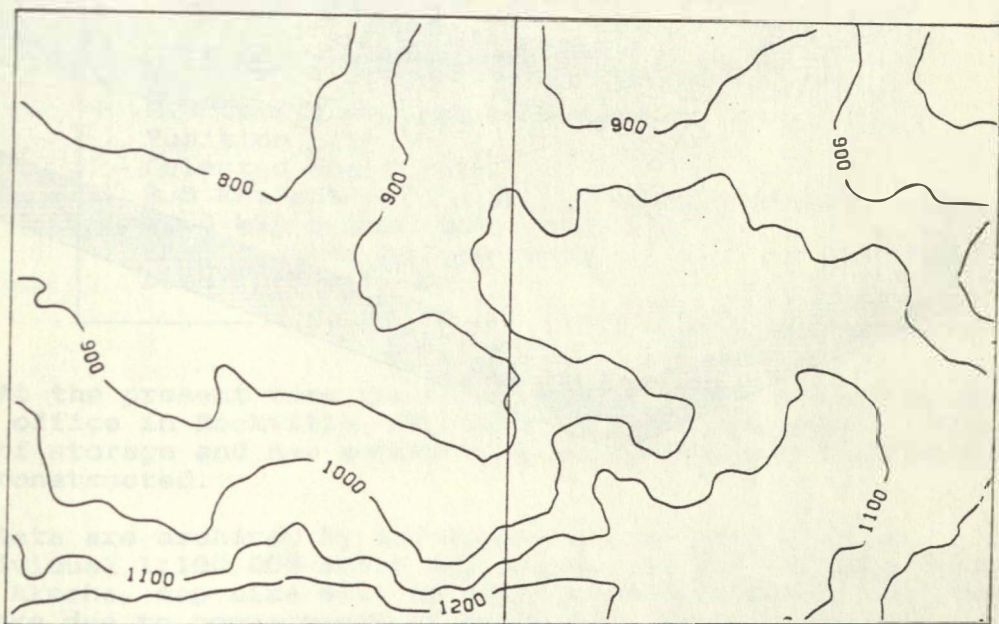


Figure 14. -- 1:50,000 scale survey sheet prepared from the digital data base gridded at 250-meter intervals.



-124° 40' 00"

-124° 20' 00"



39° 40' 00"

-124° 40' 00"

39° 40' 00"

-124° 20' 00"

Figure 15. -- Bathymetric contours at 100 fathom intervals (lower figure), derived from the 250-meter gridded EEZ data base. These contours will be applied to the new editions of NOAA nautical charts (upper figure).

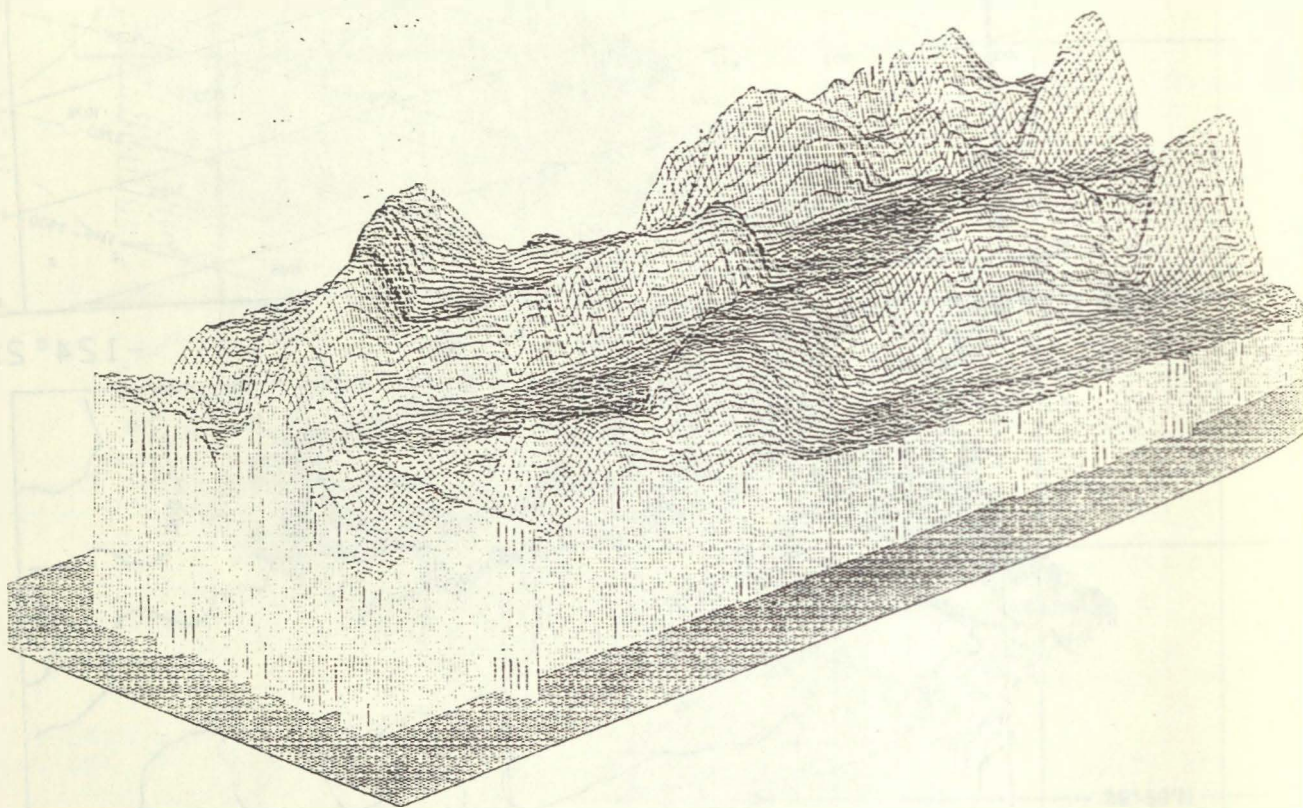


Figure 16. -- Three-dimensional projection of the seafloor from the 250-meter gridded EEZ data set. Products of this type are useful in depicting the complex geomorphology of seafloor relief.

cases they will be part of a set at a given scale covering such items as map projections, shorelines, bathymetric contours, lease blocks and other bottom characteristics.

2.5.3 - Data Archive and Storage

The data and reports to be archived and maintained by the project office are listed in table 5. These are available for detailed analysis or future study in the project office.

Table 5. -- Data to be archived and permanently retained by the EEZ project office in Rockville, MD

Digital archive and storage

"Original" raw data tapes
"Modified" parameter table and
survey summary file

Hard copy paper archive and storage

Electronic control Calibration
Position plot
Selected sounding plot
3.5 kHz sub-bottom profile analog record
12.0 kHz center beam record
Single swath contour plot
Descriptive report

At the present time the data archive is maintained by the EEZ office in Rockville, MD, in a secure environment. Fire proof storage and new secure computer processing facilities will be constructed.

Data are archived by 1/2 degree blocks constituting individual 1:100,000 scale map areas. In the northern latitudes off Alaska, map size will be adjusted to encompass 1-1/2 degree blocks due to convergence of meridians, but digital data will be archived by 1/2 degree blocks. Selected data will also be incorporated in the Navigation Information Data Base (NIDB) of the new Automated Nautical Charting System II.

The UTM projection is used for bathymetric maps because the projection provides less distortion, which is necessary for scientific uses, whereas the Mercator projection is used for the navigation data base because ship tracklines plot as straight lines. Line data (feet, fathoms, and meters) and selected

soundings will be incorporated into the NIDB. The project office will archive all raw data, gridded data, and line data associated with bathymetric maps. The data held will be continually upgraded with time such that the Government's evaluation of the most probable representation of the seafloor topography is available through this office, i.e. digital and hard copy bathymetric maps.

Eventually, as classification is removed, all raw data will be archived at NOAA's National Geophysical Data Center (NGDC) in Boulder, CO so that the research community, private industry, and the general public will have access to unprocessed data. In the interim, plans are underway to microfilm original hard copy records, convert digital data to a denser and more compact media, and develop procedures for optical storage either utilizing the WORM (write once read many) or CD-ROM (compact disc-read only memory) technology. Procedures are being developed to extract the trackline and centerbeam data to be forwarded to the NGDC and for subsequent utilization in future editions of the GEBCO bathymetric map series.

The final aspect of the data management process will be to adopt an international digital exchange format either the MGD77, GF3, CEDD, or DATGEN format as appropriate. Survey area locations are being incorporated into the NGDC GEODAS data base so the locations of existing multibeam survey coverage will be known.

2.6 Future Survey and Processing Systems

In 1988 an intermediate depth system (to survey between 100-1,000 meters) and a deep water system are planned to begin surveying the East Coast and the Gulf of Mexico. The shallow water system on the DAVIDSON will be replaced in late 1988 or 1989. Eventually, NOAA Ships FAIRWEATHER and RAINIER will be equipped with multibeam systems for nautical charting purposes and to augment surveys in the U.S. Pacific island areas during winter months.

The long range goal of the program is to acquire all data between the 150 meter depth curve and the 200 nautical mile EEZ limit. The new intermediate depth systems are designed to survey in depths between 150 meters to 1,000 meters. This will greatly increase the operating efficiency for shallow water surveying.

Current computer configurations aboard the NOAA vessels will not be sufficient to handle all shipboard data processing of bathymetric data. Plans include an upgrade of shipboard computer systems which will utilize virtual memory and will be comparable to the systems used aboard university ships. The upgrade will fulfill three objectives. One, the universities,

the U.S. Navy, and NOAA will be able to establish an exchange program of software. Second, NOAA will be able to charter university ships for data acquisition using NOAA's swath software. Third, processing and depiction of data will be enhanced with new program editors and graphic packages which currently cannot be developed because of hardware limitations.

Computer programs which produce contour maps of bathymetric data on board the vessels will be adopted. Contours shall be generated from the same x-y parameters currently used by the project office. Producing contour plots in the field will allow shipboard personnel to check the integrity of the data. This quality assurance step will ensure that ship personnel are aware of problems while on the working grounds, and will allow them to take corrective action. This will avoid the possibility of having to resurvey an area, or accept data of lower quality later when it is reviewed by the staff in Rockville.

2.7 Coordination with other Agencies

NOAA and the USGS have established a Joint Office for Mapping and Research in the EEZ. This office will provide direction and coordination of efforts for scientific exploration, research and investigations, including oceanic and geological research, environmental and marine mineral resource investigations, bathymetric and geological mapping and data base management.

Functions of the new office include:

- Establishing goals for future mapping and research to provide the data needed to characterize the seafloor of the EEZ

- Identifying mapping and research objectives and priorities as part of a national EEZ plan

- Promoting more effective utilization of agency mapping and research resources

- Providing a product-oriented information transfer system for public dissemination of the results of mapping and research efforts in the form of maps, reports, and base line data of importance to multiple users

The new office, located at the USGS headquarters in Reston, VA, will be responsible for conducting a national EEZ symposium every 2 years, issuing a bimonthly EEZ newsletter, coordination through monthly meetings of a NOAA/USGS coordination committee, and interactions with professional societies and other user groups.

2.8 Long-range Plans, 1993-2020

This plan has primarily concentrated on the near term ocean mapping requirements to meet the most urgent, priority needs of users. It is based upon using technology available to NOAA. However, it is recognized that the vastness of the EEZ region, combined with the limitations of the current technology, will require a sustained continuing effort, including the introduction of new technology, in order to properly characterize and map the seafloor of the EEZ.

While it is difficult to forecast future events, there are indications that the seafloor will be increasingly utilized by the Nation for a variety of civilian and military purposes. Long-range leasing plans from the Minerals Management Service indicate that the deeper waters of the continental shelf and slope, i.e., water depths of 2,000 meters, will be developed. Alaska, Pacific island territories, and other frontier regions will continue to be explored for energy resources.

In the hard mineral arena, cobalt crust, polymetallic sulfides, manganese nodules, and near shore placer deposits will be seriously considered as sources of strategic materials. Among potential mineral-rich regions are the Juan de Fuca Ridge, Blanco Fracture Zone, and Gorda Ridge regions off the coast of Oregon and Washington, the Cobalt enriched crusts on the flanks of seamounts off the Hawaiian Archipelago and the Blake Plateau off the east coast.

Other uses such as waste disposal, seafloor habitats, ocean thermal energy, bio-technology, deep water pipelines, and cable routes will need high quality seafloor maps. Bathymetric maps are essential to improve efficiency of bottom fishing.

Major scientific discoveries in the field of marine geology in the last 10 years have been the result of increased seafloor mapping, combined with operation of deep submersible and remotely operated vehicles. These include new theories regarding ocean thermal venting, cold water seeps, active spreading centers, development of undersea volcanoes, and chemosynthetic communities. The GLORIA surveys by the USGS have discovered nearly 200 previously unknown seamounts off the West Coast. Improved seafloor mapping systems were utilized in the initial discovery of the Titanic shipwreck and surveys of the ironclad, Monitor, off Cape Hatteras. Multibeam surveys have discovered small seafloor features and distributary systems associated with major submarine canyons. We can expect discoveries of this type to occur as the "unmapped" territory is explored.

The full potential of the ocean will only be realized if a characterization program continues. Seafloor maps, like topographic maps on land, are essential for the development of

ocean space. They guide the identification, assessment, and eventual production of resource on or beneath the seabed. The national program of systematic mapping of the ocean floor has been underway by NOAA and USGS since 1984. The program is continuing and will eventually develop a base of information and maps that will be used for the development of ocean space. New technology is continually being evaluated and will be integrated into the program as it becomes operational.

3.0. References

The following literature and supporting documentation relates to the formation and scope of NOAA's EEZ Mapping Program, or are technical papers describing in detail various aspects of the program. Copies of the reports and papers are available from the NOS Ocean Mapping Section.

Andreasen, Christian, 1986: National Oceanic and Atmospheric Administration Exclusive Economic Zone bathymetric mapping program. Marine Geodesy, V.10,(3/4), 365-368.

Bossler, John D., Lockwood, M., 1986: The Exclusive Economic Zone: A kaleidoscope of issues facing ocean development. Proceedings of Coastal Zone '85 Conference, July 1985.

Broadus, James M., 1987: Seabed materials. Science, V.235, 853-860.

Champ, Michael A. (Chairman), 1984: Exclusive Economic Zone Papers. Special symposium at the OCEANS '84 Conference Washington, DC September 1984. Marine Technology Society and the Institute of Electrical and Electronics Engineers, 189 p.

Chavez, P.S. Jr., 1986: Processing techniques for digital sonar images from GLORIA. Photogrammetric Engineering and Remote Sensing, V.52, 1133-1145.

Coastal States Organization, 1987: Coastal States and the U.S. Exclusive Economic Zone. Coastal States Organization, Washington, DC, 26 pp.

Compass Publications, 1987: Special Report - Ocean engineering and resource development in the Exclusive Economic Zone. Sea Technology 28(6) June, 77 pp.

Cohen, Philip M., 1981: Observations on a SEAMAP. International Hydrographic Review, Monaco, LVIII (I), 127-133.

Cohen, Philip M., 1986: The coming age of bathymetric maps. ACSM Bulletin, 101, April, 25-27.

Darsten, Jill, Hammond, S.P., Davis, E., Currie, R. G., 1986: Detailed geomorphology and neotectonics of the Endeavor Seamount - Juan de Fuca Ridge: New results from Sea Beam swath mapping. Geological Society of America, V.97, February, 213-221.

- Fefe, Carl X., 1982: The Bathymetric Mapping Program of the National Ocean Survey. Ocean 82 Conference Proceedings. Marine Technology Society, Washington, DC, 778-780.
- Hatem, M. B. (Editor), 1983: Marine polymetallic sulfides: a national overview and future needs. Workshop Proceedings, Maryland Sea Grant Pub. No. UM-SG-TS-83-04.
- Hill, Gary, Lockwood, M., (In Press): Seafloor exploration and characterization: Prerequisite to ocean space utilization. Oceans 87 Conference Proceedings, Halifax, Nova Scotia, September 28-October 1, 1987.
- Holser, A. F. et al, 1984: U.S. Government initiatives in the assessment and development of the mineral resources of the Exclusive Economic Zone of the United States. USGS Open File Report 84-110, 20 pp.
- Krueger, Robert B., Reisenfeld, S.A. (Editors), 1985: The developing order of the oceans. Proceedings Law of the Sea Institute Eighteenth Annual Conference, October 24-27, 1984. University of Hawaii, Sea Grant Pub. No. UHINI - SEAGRANT-CR-85-03, 749 pp.
- Lockwood, Millington, Wheaton, G., 1986: Meso-scale mapping of seafloor topography utilizing swath mapping technology - A description of NOAA's EEZ mapping project. In: Current Practices and New Technology in Ocean Engineering. OED-Vol. 11 American Society of Mechanical Engineers, New York, NY, 161-168.
- Manheim, F. T., 1986: Marine cobalt resources. Science 232,600-608.
- Marine Technology Society, 1985: Marine mineral resources, MTS Journal Special Issue, V.19(4), Washington, DC, 72 pp.
- Marine Technology Society, 1986: Sonar technology for science and commerce, (7 Individual Papers). MTS Journal Special Issue. V.20(4) Washington, DC. 72 pp.
- McGregor, Bonnie A, Offield, T., 1983: The Exclusive Economic Zone: An exciting new frontier. U.S. Geological Survey, Washington, DC, 20 pp.
- McGregor, B.A., Lockwood, M., 1985: Mapping and research in the Exclusive Economic Zone. Jointly published by the U.S. Geological Survey and the National Oceanic and Atmospheric Administration, Washington DC, 40 pp.

- McKelvey, V.E., 1986: Subsea mineral resources, Chapter A. Mineral and petroleum resources of the ocean. U.S. Geological Survey Bulletin, 1989. USGS. Denver, CO, 106 pp.
- Mielke, James E., 1986: Hard minerals in the U.S. Exclusive Economic Zone: Resource assessments and expectations. Part I - Sand and gravel, placers, and phosphorite. Congressional Research Service, The Library of Congress, Washington, DC, 43 pp.
- Matula, Stephen P., 1986: Using Exclusive Economic Zone digital swath data to select effective bathymetry. Oceans '86 Conference Proceedings. Marine Technology Society/IEEE, Washington, DC, 136-140.
- National Advisory Committee on Oceans and Atmosphere, 1984: The Exclusive Economic Zone of the United States: Some immediate policy issues. NOAA, Washington, DC, 109 pp.
- National Advisory Committee on Oceans and Atmosphere, 1986: The need for a national plan of scientific exploration for the Exclusive Economic Zone. Final Panel Report. NOAA, Washington, DC, 62 pp.
- National Oceanic and Atmospheric Administration, 1984: Plan for the National Ocean Service Exclusive Economic Zone Bathymetric and Geophysical Survey Program. NOAA, NOS, Charting and Geodetic Services, Rockville, MD 51, pp.
- National Oceanic and Atmospheric Administration, 1985: Report on the NOAA Exclusive Economic Zone bathymetric and geophysical workshop, December 11-12, 1985. NOAA, NOS, Charting and Geodetic Services, Rockville, MD, 21 pp.
- National Oceanic and Atmospheric Administration, 1986: Proceedings: The Exclusive Economic Zone Symposium, Exploring the New Ocean Frontier. October 2-3, 1985. NOAA, NOS, Charting and Geodetic Services, Rockville, MD, 270 pp.
- National Oceanic and Atmospheric Administration, 1986: Gulf of Mexico coastal Zones Strategic Assessment Data Atlas. NOAA, NOS, Office of Oceanography and Marine Assessments. Washington, DC, 107 pp.
- Perry, Richard, 1982: Scientific and hydrographic use of the bathymetric swath survey System. Oceans '82 Conference Proceedings. Marine Technology Society, Washington, DC, 396-401.
- Perry, R.P., 1985: Mapping the Exclusive Economic Zone, Oceans '85 Conference Proceedings. Marine Technology Society, Washington, DC. 1193-1197.

- Pryor, D.E., 1985: Overview of NOAA's Exclusive Economic Zone survey program. Oceans '85 Conference Proceedings. Marine Technology Society, Washington, DC, 1186-1189.
- Pryor, D.E., 1986: NOAA's Exclusive Economic Zone survey program. In: PACON '86 Proceedings. Marine Technology Society, Honolulu, HI.
- Rowland, Robert W., Gould, M., McGregor, B., 1983: The U.S. Exclusive Economic Zone - A summary of its geology, exploration, and resource potential. U.S. Geological Survey, Circular 912. 24 pp.
- U.S. Congress, Office of Technology Assessment, 1987: Marine minerals: Exploring our new ocean frontier. OTA-O-342, Washington, DC, 347 pp.
- U.S. Department of the Interior, 1984: Symposium Proceedings: A national program for the assessment and development of the mineral resources of the United States Exclusive Economic Zone. USGS Circular 929, Washington, DC, 308 pp.
- U.S. Geological Survey, 1986: GLORIA Atlas of the Exclusive Economic Zone of the western conterminous United States. 1984 EEZ SCAN Scientific Staff. USGS Miscellaneous Investigation Series 1-1792, Department of the Interior/USGS Reston, VA 153 pp.
- University of Hawaii/National Science Foundation, 1987: Ocean Engineering Technology in the Exclusive Economic Zone. Results of a workshop on "Engineering Solutions for the Utilization of the Exclusive Economic Zone Resources" October 19-23, 1986. University of Hawaii, College of Engineering, 18 pp.
- Wheaton, Gerald, E., 1987: Map Compilation of Bathymetric Data gathered within the U.S. Exclusive Economic Zone. Proceedings: 1987 ASPRS-ACSM Annual Convention. Baltimore, MD, 144-153.
- Woods Hole Oceanographic Institution, 1984: Theme issue on the Exclusive Economic Zone. Oceanus V.27,(4), Winter 1984/85. Woods Hole, MA, 96 pp.

APPENDIX A

THE WHITE HOUSE
Office of the Press Secretary

Embargoed for release at 4:00 pm EST

March 10, 1983

EXCLUSIVE ECONOMIC ZONE OF THE UNITED STATES OF AMERICA

A PROCLAMATION BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

WHEREAS the Government of the United States of America desires to facilitate the wise development and use of the oceans consistent with international law;

WHEREAS international law recognizes that, in a zone beyond its territory and adjacent to its territorial sea, known as the Exclusive Economic Zone, a coastal State may assert certain sovereign rights over natural resources and related jurisdiction; and

WHEREAS the establishment of an Exclusive Economic Zone by the United States will advance the development of ocean resources and promote the protection of the marine environment, while not affecting other lawful uses of the zone, including the freedoms of navigation and overflight, by other States;

NOW, THEREFORE, I, RONALD REAGAN, by the authority vested in me as President of the Constitution and laws of the United States of America, do hereby proclaim the sovereign rights and jurisdiction of the United States of America and confirm also the rights and freedoms of all States within an Exclusive Economic Zone, as described herein.

The Exclusive Economic Zone of the United States is a zone contiguous to the territorial sea, including zones contiguous to the territorial sea of the United States, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands (to the extent consistent with the Covenant and the United Nations Trusteeship Agreement), and United States overseas territories and possessions. The Exclusive Economic Zone extends to a distance 200 nautical miles from the baseline from which the breadth of the territorial sea is measured. In cases where the maritime boundary with a neighboring State remains to be determined, the boundary of the Exclusive Economic Zone shall be determined by the United States and other State concerned in accordance with equitable principles.

Within the Exclusive Economic Zone, the United States has, to the extent permitted by international law, (a) sovereign rights for the purpose of exploring, exploiting, conserving and managing natural resources, both living and non-living, of the seabed and subsoil and the superjacent waters and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds; and (b) jurisdiction with regard to the establishment and use of artificial islands, and installations and structures having economic purposes, and the protection and preservation of the marine environment.

The Proclamation does not change existing United States policies concerning the continental shelf, marine mammals and fisheries, including highly migratory species of tuna which are not subject to United States jurisdiction and require international agreements for effective management.

The United States will exercise these sovereign rights and jurisdiction in accordance with the rules of international law.

Without prejudice to the sovereign rights and jurisdiction of the United States, the Exclusive Economic Zone remains an area beyond the territory and territorial sea of the United States in which all States enjoy the high seas freedoms of navigation, overflight, and laying of submarine cables and pipelines, and other internationally lawful uses of the sea.

IN WITNESS WHEREOF, I have hereunto set my hand this tenth day of March, in the third year of our Lord nineteen hundred and eighty-three, and of the Independence of the United States of America the two hundred and seventh

RONALD REAGAN

THE WHITE HOUSE
Office of the Press Secretary

Embargoed for release at 4:00 pm est

March 10, 1983

STATEMENT BY THE PRESIDENT

The United States has long been a leader in developing customary and conventional law of the sea. Our objectives have consistently been to provide a legal order that will, among other things, facilitate peaceful, international uses of the oceans and provide for equitable and effective management and conservation of marine resources. The United States also recognizes that all nations have an interest in these issues.

Last July I announced that the United States will not sign the United Nations Law of the Sea Convention that was opened for signature on December 10. We have taken this step because several major problems in the Convention's deep seabed mining provisions are contrary to the interests and principles of industrialized nations and would not help attain the aspirations of developing countries.

The United States does not stand alone in those concerns. Some important allies and friends have not signed the Convention. Even some signatory States have raised concerns about these problems.

However, the Convention also contains provisions with respect to traditional uses of the oceans which generally confirm existing maritime law and practice and fairly balance the interests of all States.

Today I am announcing three decisions to promote and protect the oceans interests of the United States in a manner consistent with those fair and balanced results in the Convention and international law.

First, the United States is prepared to accept and act in accordance with the balance of interests relating to traditional uses of the oceans—such as navigation and overflight. In this respect, the United States will recognize the rights of other States in the waters off their coasts, as reflected in the Convention, so long as the rights and freedoms of the United States and others under international law are recognized by such coastal States.

Second, the United States will exercise and assert its navigation and overflight rights and freedoms on a worldwide basis in a manner that is consistent with the balance of interests reflected in the Convention. The United States will not, however, acquiesce in unilateral acts of other States designed to restrict the rights and freedoms of the international community in navigation and overflight and other related high seas uses.

Third, I am proclaiming today an Exclusive Economic Zone in which the United States will exercise sovereign rights in living and non-living resources within 200 nautical miles of its coast. This will provide United States jurisdiction for mineral resources out to 200 nautical miles that are not on the continental shelf. Recently discovered deposits there could be an important future source of strategic minerals.

Within this Zone all nations will continue to enjoy the high seas rights and freedoms that are not resource-related, including the freedoms of navigation and overflight. My Proclamation does not change existing United States policies concerning the continental shelf, marine mammals and fisheries, including highly migratory species of tuna which are not subject to United States jurisdiction. The United States will continue efforts to achieve international agreements for the effective management of these species. The Proclamation also reinforces this government's policy of promoting the United States fishing industry.

While international law provides for a right of jurisdiction over marine scientific research within such a zone, the Proclamation does not assert this right. I have elected not to do so because of the United States interest in encouraging marine scientific research and avoiding any unnecessary burdens. The United States will nevertheless recognize the right of other coastal States to exercise jurisdiction over marine scientific research within 200 nautical miles of their coasts, if that jurisdiction is exercised reasonably in a manner consistent with international law.

The Exclusive Economic Zone established today will also enable the United States to take limited additional steps to protect the marine environment. In this connection, the United States will continue to work through the International Maritime Organization and other appropriate international organizations to develop uniform international measures for the protection of the marine environment while imposing no unreasonable burdens on commercial shipping.

The policy decisions I am announcing today will not affect the application of existing United States law concerning the high seas or existing authorities or any United States government agency.

In addition to the above policy steps, the United States will continue to work with other countries to develop a regime, free of unnecessary political and economic restraints, for mining deep seabed minerals beyond national jurisdiction. Deep seabed mining remains a lawful exercise of the freedom of the high seas open to all nations. The United States will continue to allow its firms to explore for and, when the market permits, exploit these resources.

The Administration looks forward to working with the Congress on legislation to implement these new policies.

THE WHITE HOUSE
Office of the Press Secretary

Embargoed for release at 4:00 pm est

March 10, 1983

UNITED STATES OCEANS POLICY FACT SHEET

Today the President announced new guidelines for U.S. oceans policy and proclaimed an Exclusive Economic Zone (EEZ) for the United States. This follows his consideration of a senior interagency review of these matters.

The EEZ Proclamation confirms U.S. sovereign rights and control over the living and non-living natural resources of the seabed, subsoil and superjacent waters beyond the territorial sea but within 200 nautical miles of the United States coasts. This will include, in particular, new rights over all minerals (such as nodules and sulphide deposits) in the zone that are not on the continental shelf but are within 200 nautical miles. Deposits of polymetallic sulphides and cobalt/manganese crusts in these areas have only been recently discovered and are years away from being commercially recoverable. But they could be a major future source of strategic and other minerals important to the U.S. economy and security.

The EEZ applies to waters adjacent to the United States, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands (consistent with the Covenant and UN Trusteeship Agreement), and United States overseas territories and possessions. The total area encompassed by the EEZ has been estimated to exceed two million square nautical miles.

The President's statement makes clear that the proclamation does not change existing policies with respect to the outer continental shelf and fisheries within the U.S. zone.

Since President Truman proclaimed U.S. jurisdiction and control over the adjacent continental shelf in 1945, the U.S. has asserted sovereign rights for the purpose of exploration and exploitation of the resources of the continental shelf. Fundamental supplementary legislation, the Outer Continental Shelf Lands Act, was passed by Congress in 1953. The President's proclamation today incorporates existing jurisdiction over the continental shelf.

Since 1976 the United States has exercised management and conservation authority over fisheries resources (with the exception of highly migratory species of tuna) within 200 nautical miles of the coasts, under the Magnuson Fishery Conservation and Management Act. The U.S. neither recognizes nor asserts jurisdiction over highly migratory species of tuna. Such species are best managed by international agreements with concerned countries. In addition to confirming the United States sovereign rights over mineral deposits beyond the continental shelf but within 200 nautical miles, the Proclamation bolsters U.S. authority over the living resources of the zone.

The United States has also exercised certain other types of jurisdiction beyond the territorial sea in accordance with international law. This includes, for example, jurisdiction relating to pollution control under the Clean Water Act of 1977 and other laws.

The President has decided not to assert jurisdiction over marine scientific research in the U.S. EEZ. This is consistent with the U.S. interest in promoting maximum freedom for such research. The Department of State will take steps to facilitate access by U.S. scientists to foreign EEZ's under reasonable conditions.

The concept of the EEZ is already recognized in international law and the President's Proclamation is consistent with existing international law. Over 50 countries have proclaimed some form of EEZ; some of these are consistent with international law and others are not.

The concept of an EEZ was developed further in the recently concluded Law of the Sea negotiations and is reflected in that Convention. The EEZ is a maritime area in which the coastal state may exercise limited powers as recognized under international law. The EEZ is not the same as the concept of the territorial sea, and is beyond the territorial jurisdiction of any coastal state.

The President's proclamation confirms that, without prejudice to the rights and jurisdiction of the United States in its EEZ, all nations will continue to enjoy non-resource related freedoms of the high seas beyond the U.S. territorial sea and within the U.S. EEZ. This means that the freedom of navigation and overflight and other internationally lawful uses of the sea will remain the same within the zone as they are beyond it.

The President has also established clear guidelines for United States oceans policy by stating that the United States is prepared to accept and act in accordance with international law as reflected in the results of the Law of the Sea Convention that relate to traditional uses of the oceans, such as navigation and overflight. The United States is willing to respect the maritime claims of others, including economic zones, that are consistent with international law as reflected in the Convention, if U.S. rights and freedoms in such areas under international law are respected by the coastal state.

The President has not changed the breadth of the United States territorial sea. It remains at 3 nautical miles. The United States will respect only those territorial sea claims of others in excess of 3 nautical miles, to a maximum of 12 nautical miles, which accord to the U.S. its full rights under international law in the territorial sea.

Unimpeded commercial and military navigation and overflight are critical to the national interest of the United States. The United States will continue to act to ensure the retention of the necessary rights and freedoms.

By proclaiming today a U.S. EEZ and announcing other oceans policy guidelines, the President has demonstrated his commitment to the protection and promotion of U.S. maritime interests in a manner consistent with international law.

APPENDIX B

MEMORANDUM OF UNDERSTANDING

Cooperative Program for
Bathymetric Surveying of the U.S. Exclusive Economic Zone

Between the

National Oceanic and Atmospheric Administration (NOAA)
and the

U. S. Geological Survey (USGS)

Starting Date _____

I. INTRODUCTION

Whereas the President of the United States on March 10, 1983, proclaimed on behalf of the United States a zone contiguous to the territorial sea for a distance of 200 nautical miles known as the Exclusive Economic Zone (EEZ) within which the United States would have sovereign rights for the purpose of exploring, exploiting, conserving, and managing living and nonliving resources:

Whereas in order to understand the geography and resources of the EEZ, the United States needs to conduct bathymetric surveying and mapping of the EEZ;

Whereas the EEZ encompasses such a large expanse of ocean area that surveying and mapping should be conducted on a cooperative basis by the agencies in the Federal Government responsible for such activities, and through the identification of priority areas in the EEZ for surveying and mapping;

Whereas the National Oceanic and Atmospheric Administration (NOAA) and the United States Geological Survey (USGS) have complementary responsibilities for bathymetric surveying and mapping and each agency requires high quality depth data in order to produce bathymetric maps of the EEZ;

Whereas USGS primary responsibilities include definition of sea floor geology and geological processes, as well as qualification and quantification of resources within the EEZ;

Whereas NOAA primary responsibilities include surveying, mapping oceanographic analysis, fisheries management, and analysis of resources within the EEZ;

Therefore, NOAA and USGS agree to participate in a cooperative program for bathymetric surveying and mapping of the EEZ.

II. REFERENCES AND AUTHORITIES

NOAA is authorized by 33 U.S.C. 883a et seq. to conduct bathymetric surveys, to process and publish nautical data and information and to enter into cooperative agreements with public and private organizations.

USGS is authorized by 43 U.S.C. 31 to examine the geological structure and mineral resources of the United States and to enter into cooperative agreements with other Federal departments and agencies.

III. PURPOSES AND POLICIES

The purpose of this agreement is to establish a joint NOAA-USGS program for bathymetric surveying and data analysis of areas within the EEZ.

Specifically, the cooperative program will include the following stages: (1) a joint review of EEZ bathymetric data requirements, (2) identification of priority areas, (3) development of an annual survey plan, (4) execution of that plan, (5) processing of the data collected, (6) construction of regional bathymetric data bases, and (7) compilation of bathymetric maps.

Joint research involving scientists from both agencies is encouraged.

IV. ESTABLISHMENT OF PRIORITY REGIONS FOR ASSESSMENT

The agencies recognize that in order to use their resources efficiently, they must establish priority regions in the EEZ for surveying and data analysis. The following regions have been identified as areas in which surveying and analysis are to occur.

A. Pacific Coast

The first EEZ region to be surveyed as part of this cooperative program lies offshore of California, Oregon, and Washington. This area was selected in part because of the interest in hard mineral resources in this region, particularly in the area of the Gorda Ridge.

Within the Pacific coast region, the USGS intends to conduct a survey using the GLORIA wide-swath side-scan sonar system. To complement the GLORIA survey and to provide a bathymetric data base, NOAA intends to deploy its ships using the SeaBeam survey system and Bathymetric Swath Survey System (BS³). Initially, these survey activities will focus on the outermost continental shelf, the continental slope, and the upper rise.

A schedule of activities for FY 1984 and FY 1985 within the Pacific coast region is attached.

B. Atlantic Coast

The agencies will cooperate, consistent with their respective funding and other responsibilities, to survey the Atlantic coast region of the EEZ. Emphasis will be placed on the area known as the Baltimore Canyon Trough.

The agencies will develop a joint approach to conducting a bathymetric survey of the Atlantic coast region and to support the addition of new surveying systems, such as SeaBeam and SeaMARC, on NOAA vessels.

C. Alaska

The agencies undertake, consistent with their respective funding and other responsibilities, to begin a bathymetric survey of the Alaska region in FY 1986. The USGS already has plans to do a survey using the GLORIA system at this time in the Alaska region.

D. Remainder of the EEZ

The agencies agree to develop a schedule for conducting surveys in the Hawaii, Caribbean, and Pacific Trust Territories regions of the EEZ, consistent with optimum ship utilization.

V. RESPONSIBILITIES OF AGENCIES

A. Joint

In addition to the joint program responsibilities identified in Part III above, the agencies will jointly design and specify all products produced as a result of this cooperative program.

B. NOAA

NOAA has the lead role in the collection and dissemination of bathymetric data and products. Collection of data will be done aboard NOAA vessels using the SeaBeam, BS³, and other surveying systems.

NOAA will produce and provide to the USGS a magnetic tape file of bathymetry in standard NOAA format, with merged and corrected bathymetry and navigation, within approximately one month of the completion of a cruise dedicated to this program.

NOAA will produce and provide to the USGS, within approximately six months from the delivery of the magnetic tape file, bathymetric maps, derived from the survey data, at a scale commensurate with the resolution of the data, as well as a digital magnetic tape of the contours in geographic coordinates.

C. USGS

USGS will transfer, consistent with its funding and responsibilities, funds to NOAA for the processing, analysis, and preparation of maps of EEZ regions carried out by NOAA surveys as part of this cooperative program.

USGS will make data acquired by the GLORIA survey system available to NOAA for review and use as required in support of NOAA's bathymetric surveying, mapping, and data processing within the EEZ.

VI. FUNDING

The agencies agree to cooperate in funding this cooperative program in the following manner, subject to the availability of appropriations and consistent with other program responsibilities.

NOAA will fund the operation of NOAA vessels and survey equipment to the extent they are dedicated to the conduct of surveys in support of this cooperative program. USGS will provide and transfer to NOAA under this cooperative program, funds required by NOAA to analyze and process survey data obtained, including the preparation of bathymetric maps.

The financing of this cooperative program will be reviewed on an annual basis and specified either in an addendum to this agreement or in a letter(s) signed by responsible agency officials.

VII. MANAGEMENT

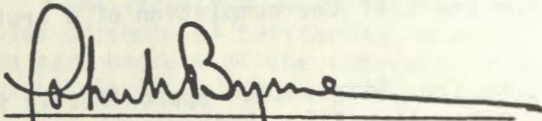
Within NOAA, this agreement will be implemented by the National Ocean Service.

Within USGS, this agreement will be implemented by the Office of Energy and Marine Geology.

VIII. DURATION

This agreement will become effective upon the signature of both the approving officials of the respective agencies entering into this agreement.

This agreement shall remain in effect until terminated by (1) mutual agreement, (2) advance written notice by either agency, or (3) the operation of the terms of this agreement, whichever shall occur first.



John V. Byrne, Administrator
National Oceanic and Atmospheric
Administration

Date 18 April 1984



Dallas L. Peck, Director
U.S. Geological Survey

Date April 24, 1984

DRAFT

CHARTER FOR
COORDINATION OF FEDERAL EXCLUSIVE ECONOMIC ZONE MAPPING AND
RESEARCH PROGRAMS

Purpose

The Exclusive Economic Zone (EEZ) of the United States has a vast potential for resource development. In order to develop these resources in an efficient and environmentally sound manner, it is necessary for a coordinated mapping and research endeavor to be formed, involving the Federal Government, State governments, private industry, and academic interests.

The purpose of this charter is to provide a formal mechanism for the coordination of the Federal mapping and research activities in the EEZ of the United States. Coordination will avoid duplication of activities, assure adequate response to needs of users and provide for timely delivery of products and services and exchange of data. Coordination will also facilitate private sector involvement in the direction and use of EEZ-related data products.

To Meet this Purpose, We Hereby Establish the U.S. Geological Survey (USGS)-National Oceanic and Atmospheric Administration (NOAA) Joint Office for Mapping and Research in the EEZ

Mapping and research activities involved in the EEZ range from long-term ocean surveying programs, preparation of atlases and maps from new and existing data, and site specific research to determine the nature of the seafloor geology.

Much of this research and mapping activity is conducted by the USGS in the Department of the Interior and by NOAA in the Department of Commerce. The joint USGS-NOAA office will provide natural leadership for the design, implementation, and coordination of a national EEZ program of mapping and research and investigation of the nonliving resources of the EEZ seafloor. The Joint Office will also ensure participation by all interested groups in the formulation of goals, objectives, and priorities for a national EEZ mapping and research program.

DRAFT

Donald Paul Hodel
Secretary of the Interior

Secretary of Commerce

USGS - NOAA
JOINT OFFICE
FOR RESEARCH AND MAPPING IN THE
EXCLUSIVE ECONOMIC ZONE

USGS - NOAA
JOINT OFFICE FOR RESEARCH AND MAPPING IN THE EXCLUSIVE ECONOMIC ZONE

*NEED FOR THE JOINT OFFICE:

- Establish formal coordination between the joint USGS-NOAA EEZ effort and other Federal agencies, industry, academia and the Congress.
- Expand USGS-NOAA coordination of EEZ related matters.
- Identify a group responsible for the creation and coordination of a national EEZ program.

*FUNCTION OF THE JOINT OFFICE:

To design, implement, and coordinate the National EEZ plan through:

1. National Coordination Activities:

- foster communication and coordination between government, academia, and industry;
- examine status of current activities;
- identify future research and data requirements;
- identify research gaps and potential impediments to future EEZ related efforts;
- establish goals and priorities for a 10 year National EEZ plan.

2. Expanded USGS-NOAA Coordination Activities:

- develop a 10 year National EEZ plan to include goals, priorities, resources, and short/long term strategies;
- resolve "turf" issues;
- solve problems of mutual concern - examples include information transfer, printing of maps, and creation of digital data bases;
- explore more effective utilization of resources (e.g., facilities, ships, equipment, and/or personnel);
- coordinated/joint budget initiatives.

3. Publication Activities:

- Reports
 - OMB circular - outline policies and procedures to coordinate EEZ activities;
 - 10 year National EEZ plan to include annual updates;
 - annual report to Congress - inventory of yearly activities, significant results, and recommendations.
- Maps/Atlases
 - GLORIA - image presentations;
 - CONMAP - GIS-type stacked data presentations;
 - NOAA bathymetry maps and atlases;
 - Creation of "standardized" National Marine Map Series;
 - Other joint products (e.g., NOAA bathymetric fishing maps with GLORIA images on reverse side).
- Biannual National EEZ Symposium
- Technical Workshops

*OPERATIONAL CHARACTERISTICS OF THE JOINT OFFICE:

- problem-solving orientation;
- product oriented;
- requirement based;
- minimum disruption to current line authority;
- minimum staff requirements;
- maximizes visibility of USGS and NOAA programs and coordination efforts;
- provides opportunity for coordinated funding initiatives;
- provides starting point for national program;
- provides for participation by industry, academia, states, and other federal agencies on a continuous basis in the formulation and execution of a national EEZ program at the technical, management, and policy levels.

JOINT OFFICE NATIONAL COORDINATION ACTIVITIES

- Foster communication and coordination between:
Government
Academia
Industry
 - Examine status of current activities
 - Identify future research data requirements
 - Identify research gaps and potential impediments
to future EEZ related efforts
 - Establish goals and priorities for a 10 year
National EEZ plan
-
-

JOINT OFFICE EXPANDED USGS - NOAA COORDINATION

- Develop 10 year National EEZ plan to include:
 - goals
 - priorities
 - resources
 - Solve "turf" issues
 - Solve problems of mutual concern - examples:
 - information transfer
 - printing of maps
 - creation of digital data bases
 - Explore more effective utilization of resources (e.g., facilities, ships, equipment and/or personnel)
 - Coordinated/joint budget initiatives
-
-

JOINT OFFICE PUBLICATION ACTIVITIES

- REPORTS
 - OMB circular - outline policies & procedures to coordinate EEZ activities
 - 10 year National EEZ plan - annual update
 - Annual report to Congress - inventory of yearly activities; significant results; recommendations
 - MAPS/ATLASES
 - GLORIA - image presentations
 - CONMAP - GIS-type stacked data presentations
 - NOAA atlases - expanded to include geology
 - Creation of "standardized" National Marine Map Series
 - Other joint products (e.g., NOAA bathymetric fishing maps with GLORIA images on reverse)
 - BIENNIAL NATIONAL EEZ SYMPOSIUM
-