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Ship Operations Report 1976

December 1978

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Survey

SoR1976

Preface

The NOAA Ship Operations Report 1976 was developed to provide a summary of projects undertaken during calendar year 1976. The report was prepared from season, cruise, and special reports submitted by ships of the fleet.

This report is published for in-house dissemination in the National Oceanic and Atmospheric Administration, for collaborating and interested agencies, and for use by members of the scientific community.

Throughout the year, ships routinely collected and transmitted weather data. Similarly, as NOAA participants in the Integrated Global Station System (IGOSS) service program, XBT observations were taken and either radioed or submitted in log form via mail. In addition, observations were made of marine mammals, and a marine pollution watch was maintained.

1976 FIELD SEASON

Ship	Commanding Officer/Master	Projects
Class I		
OCEANOGRAPHER (OSS 01)	Capt. K. E. Taggart	RP-8, SP-PMC-1
DISCOVERER (OSS 02)	Capt. C. D. Upham	RP-3, RP-4, SP-PMC-1
RESEARCHER (OSS 03)	Capt. R. W. Franklin	RP-1, RP-2, RP-9, RP-10, RP-11, RP-12, FRC-11-76
SURVEYOR (OSS 32)	Capt. K. W. Jeffers	RP-4, RP-5
Class II		
FAIRWEATHER (MSS 20)	Capt. R. E. Alderman	OPR 411, OPR 418, OPR 469
RAINIER (MSS 21)	Cdr. C. K. Townsend Capt. J. P. Randall	OPR 411, OPR 419, OPR 509, OPR 524, SP-PMC-2
MT. MITCHELL (MSS 22)	Capt. W. V. Hull	OPR 423, OPR 516, SP-PMC-7, FRC-09, RP-13
MILLER FREEMAN (FRS 21)	Cdr. S. R. Petersen Lt.Cdr. J. T. Atwell	RP-4
Class III		
PEIRCE (CSS 28)	Cdr. J. W. Dropp	OPR 503, OPR 511
WHITING (CSS 29)	Cdr. R. A. Trauschke	OPR 423, OPR 503
McARTHUR (CSS 30)	Cdr. D. W. Crawford	OPR 418, OPR 451, OPR 509, OPR 518, SP-PMC-3, SP-PMC-6
DAVIDSON (CSS 31)	Cdr. C. Andreasen	OPR 418, OPR 448, OPR 451, OPR 511, OPR 999, SP-PMC-5, SP-PMC-8
OREGON II	Mr. R. E. Adams, Master	76-01(64), 76-02(65), 76-03(66), 76-04(67), 76-05(68), 76-06(69), 76-07(70), 76-08(71), 76-09(72), SP-AMC-5

Ship	Commanding Officer/Master	Projects
Class IV		
GEORGE B. KELEZ (CRS 41)	Lt.Cdr. J. D. Stachelhaus Lt.Cdr. J. W. DeCoste	MESA
ALBATROSS IV (FRS 42)	Mr. W. E. Beatteay, Master	76-01, 76-02, 76-03, 76-05, 76-09, 76-10
TOWNSEND CROMWELL (FRS 43)	Cdr. M. N. Walter	76-01, 76-02, 76-03 76-04, 76-05, 76-06
DAVID STARR JORDAN (FRS 44)	Mr. C. W. Forster, Master	76-01(100), 76-02(101), 76-03(102), 76-04(103), 76-05(104), 76-06(105) 76-07(106)
DELAWARE II (FRS 45)	Mr. R. W. Landsvik, Master	76-01, 76-02, 76-05, 76-07, 76-08, 76-09, 76-10, 76-12, 76-13
FERREL (ASV 92)	Lt.Cdr. R. K. Matsushige	OPR 500, OPR 501, SP-AMC-4
Class V		
OREGON (FRV 51)	Mr. W. Schneider, Master	76-01, 76-02, 76-03, 76-04
JOHN N. COBB (FRV 52)	Mr. R. P. Larsen, Master	76-01, 76-02, 76-03a, 76-03b, 76-04
RUDE (ASV 90) and HECK (ASV 91)	Cdr. R. A. Ganse	OPR 479, OPR 515
Class VI		
GEORGE M. BOWERS (FRV 65)	Lt. M. F. Kolesar	2-76(138), 3-76(139), 4-76(140), 5-76(141), 6-76(142), 7-76(144)
MURRE II (FRV 63)	Mr. H. C. Museth, Master	Research Surveys and Field Station Support.

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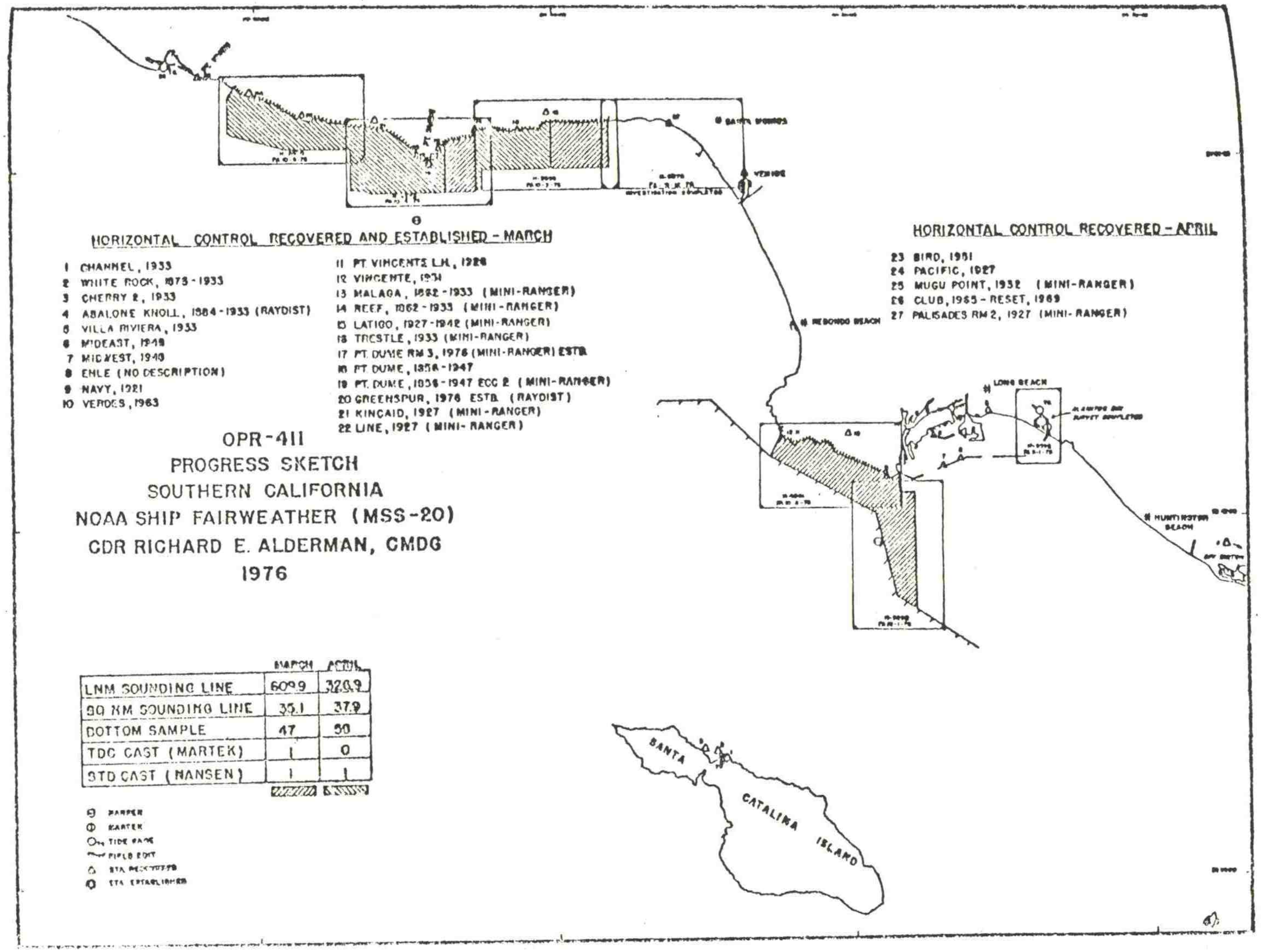
OPR-411-FA-76
Hydrographic Surveys
Southern California Coast

Background

This project is a continuation of work begun some years ago to re-survey the California Coast from the Mexican border to San Francisco. These surveys were begun by DAVIDSON in 1968 and continued by PATHFINDER in 1969, by DAVIDSON and McARTHUR in 1970, by RAINIER in 1971 through 1974, and by FAIRWEATHER in 1975. These surveys will provide a new data base for nautical charts and other tools associated with the prediction and development of the ocean environment of the Continental Shelf and adjacent areas.

1976 Operations

FAIRWEATHER began field work on this project February 22 and ended work April 25. With the Long Beach Naval Station as a base, FAIRWEATHER closed the gap between the 1975 Santa Monica Bay and offshore Long Beach work, sounded Alamitos Bay, and extended surveys northward to near Carrillo Beach. The project was mainly hydrographic surveys but also required extensive photogrammetric and horizontal control support. FAIRWEATHER completed surveys H-9590, H-9591, H-9592, H-9598, H-9599, and H-9600. The offshore project limit was generally the 110 fathom curve except in the delineation of the San Pedro and Dume underwater canyons. FAIRWEATHER launches completed a total of 817 nautical miles of hydrography, covering an area of 71 square miles.



OPR-411
PROGRESS SKETCH
SOUTHERN CALIFORNIA
NOAA SHIP FAIRWEATHER (MSS-20)
CDR RICHARD E. ALDERMAN, CMDG
1976

	MARCH	APRIL
LNM SOUNDING LINE	609.9	320.9
90 KM SOUNDING LINE	35.1	37.9
BOTTOM SAMPLE	47	50
TDC CAST (MARTEK)	1	0
STD CAST (NANSEN)	1	1

- HARPER
- BARTER
- TIDE GAGE
- FIELD EDIT
- STA RECOVERED
- STA ESTABLISHED

OPR-411-RA-76
Hydrographic Survey
Southern California Coast

Background

This project was a continuation of basic hydrographic operations on the Southern California Coast. These surveys will provide a new data base for nautical charts and other tools associated with the prediction and development of the ocean environment of the Continental Shelf and adjacent areas. Previous work on this project was begun by DAVIDSON in 1968 and continued by PATHFINDER in 1969, by DAVIDSON and McARTHUR in 1970, by RAINIER in 1971 through 1974, and by FAIRWEATHER in 1975 and 1976.

1976 Operations

RAINIER began field work on this project on November 11 and completed work on December 5. Two surveys were completed: H-9666, a 1:5,000 scale visual launch survey in Port Heunume/Channel Island and H-9667, a 1:20,000 scale electronic survey at Point Mugu, which required both ship and launch work. RAINIER completed a total of 420.5 linear nautical miles of hydrography covering an area of 3.9 square miles.

PROGRESS SKETCH

OPR - 411 - RA - 76

HYDROGRAPHIC SURVEY

SOUTHERN CALIFORNIA

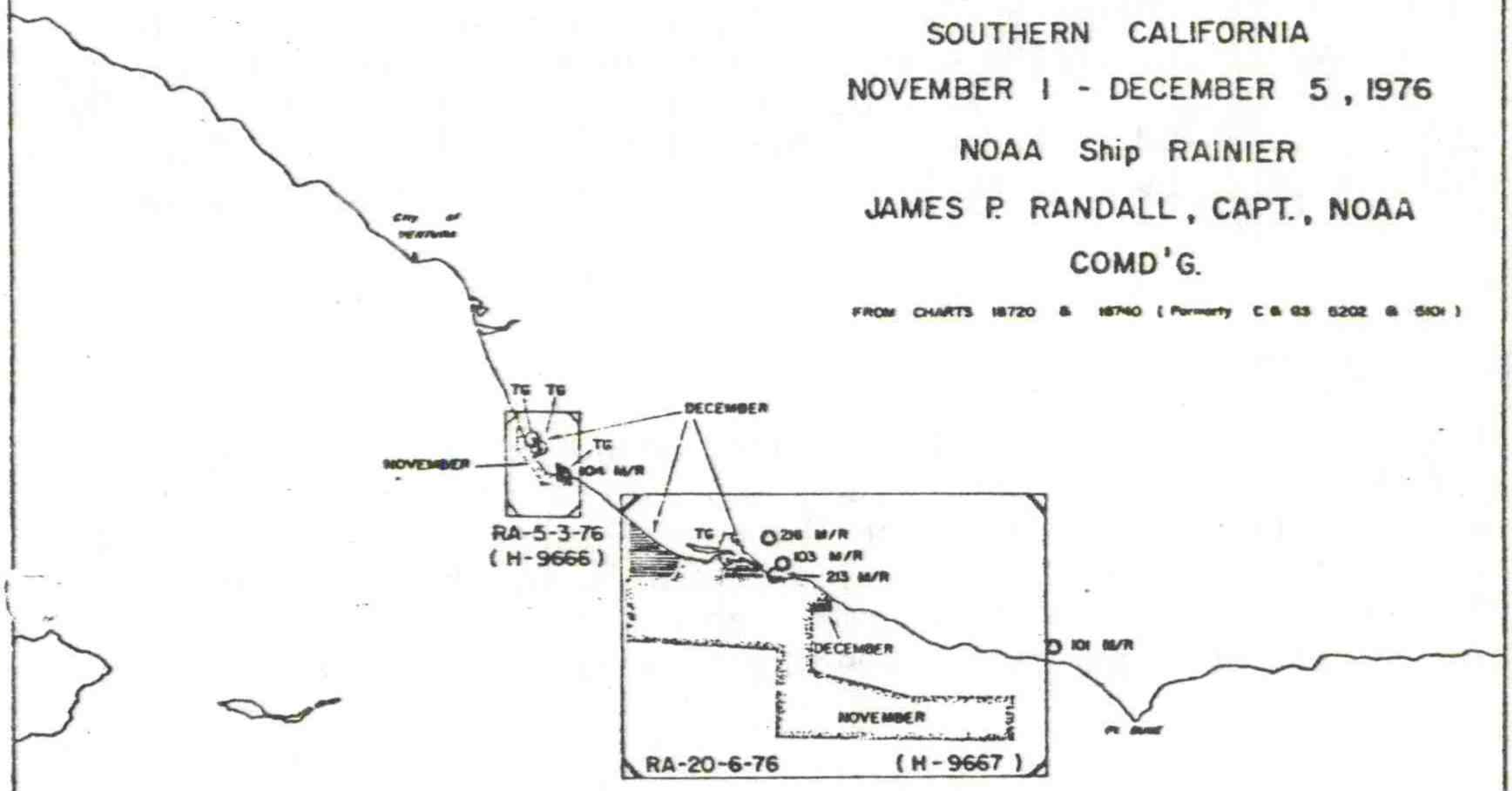
NOVEMBER 1 - DECEMBER 5, 1976

NOAA Ship RAINIER

JAMES P. RANDALL, CAPT., NOAA

COMD'G.

FROM CHARTS 18720 & 18740 (Formerly C & GS 8202 & 5101)



LEGEND

NOV	DEC	
343	52	SQ N M SOUNDING
93	69	L N M MISCELLANEOUS DISTANCE
132	99	L N M DISTANCE TO & FROM
2988	1312	L N M SOUNDING LINE
27	62	BOTTOM SAMPLES (GRAB)
9	0	WATER SAMPLES ANALYZED (SALINITY)
5	0	CONTROL STATIONS (ELECTRONIC)
0	0	TEMPERATURE, DEPTH, CONDUCTIVITY
1	0	NANSEN CAST
4	0	TIDE GAUGE
7	0	STATIONS LOCATED BY TRAVERSE

OPR 418
Inspection and Servicing of Tide Stations

This operation provides for routine inspection and servicing of tide stations in Alaska. DAVIDSON, FAIRWEATHER, and McARTHUR participated in the project during the 1976 field season.

DAVIDSON inspected and serviced tide stations at Seward, Sitka, and Ketchikan.

FAIRWEATHER inspected the control tide gauge at Nikiski and replaced the steel piping used to support the orifice and protect the bubbler pressure tubing. At Seldovia, the electro-tape well and float well were cleaned of marine growth obstructions. Divers cleaned submerged orifices and attached additional securing bands to the deepest end of the wells. At Seward, inspection and leveling was done and divers moved the tide staff to a more visible location.

McARTHUR inspected and serviced the standard tide gauge at Valdez and replaced the existing float well with a new 12-inch diameter float well.

OPR-419-RA-76
Hydrographic Survey
Kaneohe Bay, Hilo, Hawaii

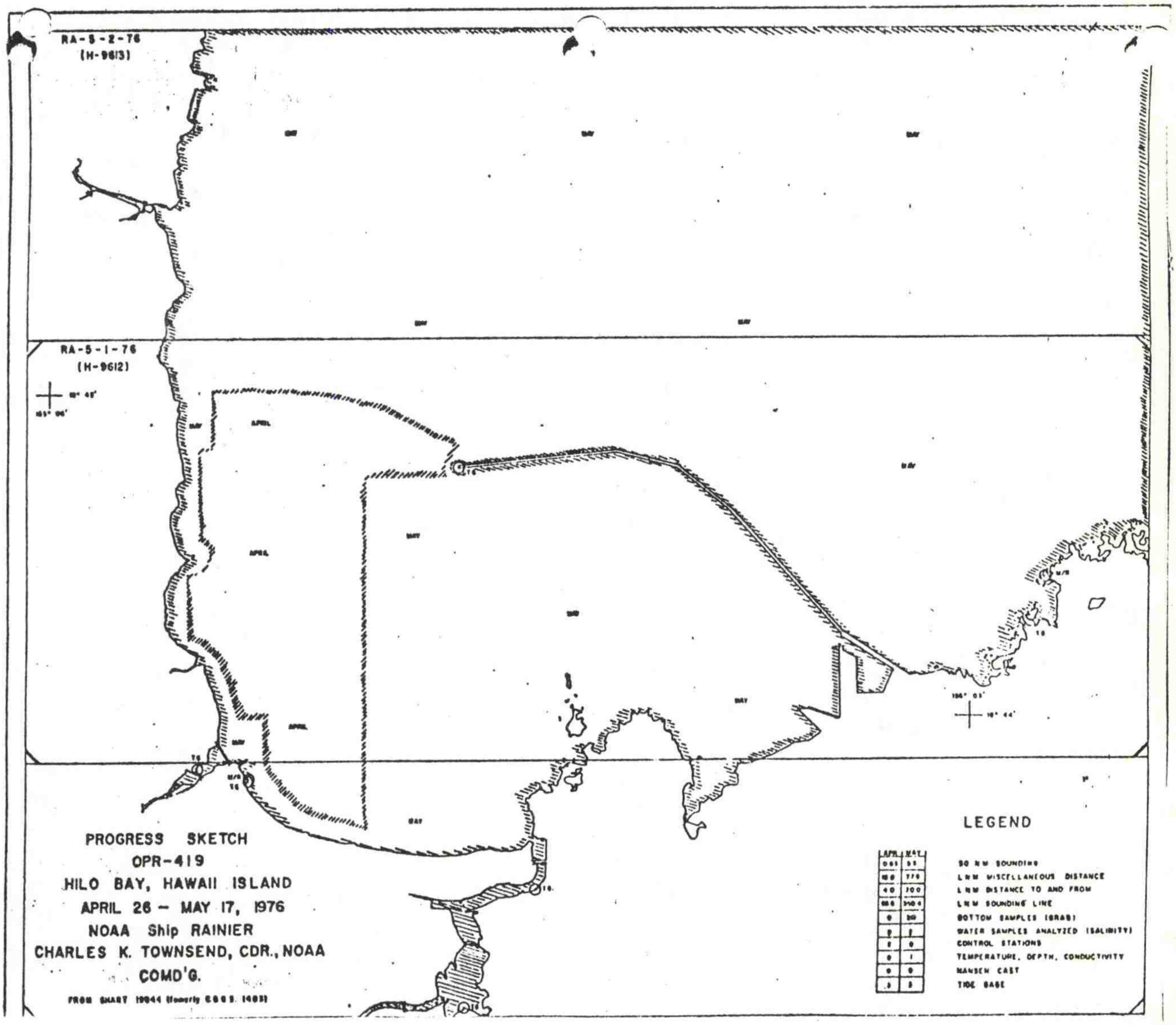
Background

RAINIER'S work on OPR 419 during 1976 was a continuation of a basic hydrographic survey to update existing nautical charts of the Hawaiian Islands. SURVEYOR and PATHFINDER began operations on this project in 1961 and continued during the field seasons 1962 through 1966, 1968, 1970, and 1971. McARTHUR conducted surveys on this project in 1967 and 1969, as did RAINIER in 1972. FAIRWEATHER conducted combined operations off the Kona Coast in 1973.

1976 Operations

RAINIER was engaged on this project from March 3 to May 18. Operations on the Kaneohe Bay survey began on March 3 and ended on April 17. Due to the characteristics of the coral bottom, the survey was conducted at 1:5,000 line spacing with additional development in some areas. The survey was done with Boston Whalers equipped with Raytheon fathometers and mini-ranger navigation for shoal water surveying.

Walking parties were organized to take soundings on coral heads too shoal for the whalers. More than 60 lineal miles of hydrography were performed by these walking parties. RAINIER'S work on the Hilo Bay portion of this project was performed from April 28 through May 18. During this period, hydrography was run on Surveys H-9612 and H-9613. RAINIER completed 1,091.3 lineal nautical miles of hydrography on this project covering an area of 21.3 square nautical miles.



OPR-423-MI-76
Hydrographic Survey,
Mona Passage and Southeast Coast Puerto Rico

Background

This project is a continuation of the basic nautical chart program begun in 1969 to update surveys and to issue large-scale nautical charts for Puerto Rico and the Virgin Islands. Previous surveys on this project were conducted by EXPLORER in 1964 and 1965, WHITING in 1966, 1968 through 1970, 1973 and 1975. MT. MITCHELL ran surveys on this project in 1971-72 and 1975.

1976 Operations

The 1976 work by MT. MITCHELL on OPR 423 from February 10 through April 17 consisted of two working areas: Mona Passage, on the west coast of Puerto Rico, and the area between Las Mareas and Perto Yabucoa, on the southeast coast. The Mona Passage project provided data to fulfill Defense Mapping Agency requirements, maintenance of existing charts, and future bathymetric mapping. This phase was all ship hydrography. The southeast coast phase consisted of launch and ship hydrography from the shoreline south to latitude 17°15'N. A reconnaissance survey was run at Palmas Del Mar.

Eight boatsheets were completed during the period: MI-125-1-76 (H-9587), MI-10-1-76 (H-9596), MI-10-2-76 (H-9597), MI-10-3-76 (H-9607), MI-10-4-76 (H-9608), MI-20-1-76 (H-9610), MI-100-1-76 (H-9595), and MI-5-1-76 (H-9609).

MT. MITCHELL ran 5,883 lineal nautical miles of hydrography on this project, covering an area of 4,327 square nautical miles.

OPR-423-WH-76
Hydrographic Survey, Virgin Islands

Background

This project is a continuation of the basic nautical chart program began in 1969 to update surveys and to issue large-scale nautical charts for Puerto Rico and the Virgin Islands. Previous surveys on this project were run by EXPLORER in 1964 and 1965, by WHITING in 1966, 1968 through 1970, and in 1973 and 1975. MT. MITCHELL ran surveys on this project in 1971, 1972, and 1975.

1976 Operations

WHITING was engaged on this project from February 13 to April 26. The area of operations was Virgin Passage between Isla de Culebra and St. Thomas Island. WHITING ran 2564 lineal nautical miles of hydrography covering an area of 283 square nautical miles.

OPR-448-DA-76
Navigable Area Survey,
Sumner Strait, Alaska

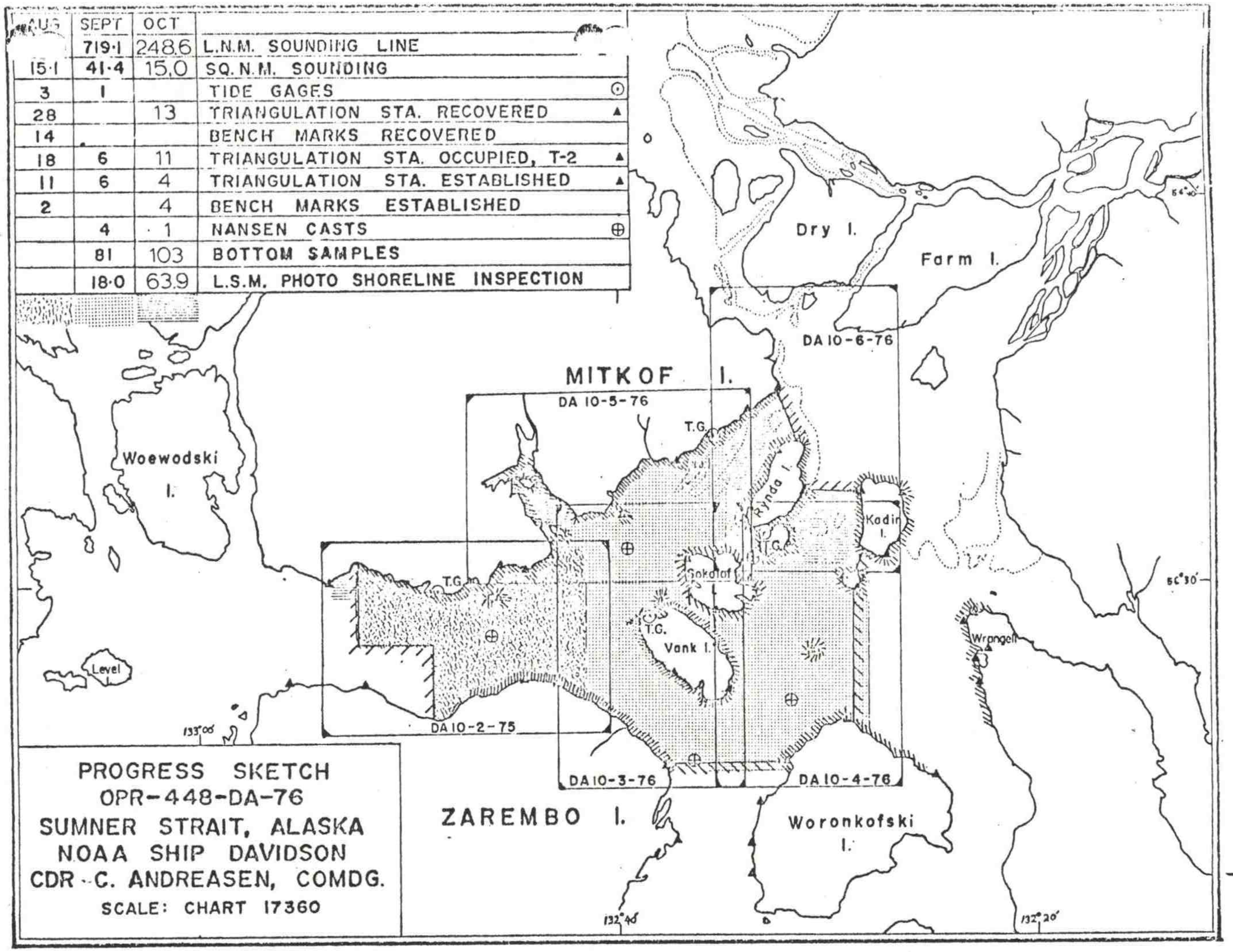
Background

The purpose of a navigable area survey is to provide basic hydrographic coverage for all areas of potential navigation within a water form. This project was a continuation of work begun in Keku Strait with progress to Sumner Strait. The surveys conform to the nautical chart plan for maintenance of existing nautical charts and in planning for the proposed construction of 1:40,000,000 scale coverage. The surveys will also be available as a new data base for ecological, pollution, engineering, coastal zone management, and other scientific studies. Previous hydrographic surveys were made by DAVIDSON in the Sumner Strait area in 1972, as well as 1974 and 1975.

1976 Operations

DAVIDSON began field work on this project August 19 and ended work October 21. Five 1:10,000,000 scale sheets near the junction of Sumner and Stikine Straits (H-9572, H-9650, H-9651, H-9652, and H-9653) and one 1:2,500 scale hydrographic investigation in Clarence Strait were prepared during this project. One sheet (H-9572) represented the completion of work done by DAVIDSON in 1975. Two computer-equipped survey launches ran 1,224.1 nautical miles of hydrography for this project.

AUG	SEPT	OCT	
	719·1	248.6	L.N.M. SOUNDING LINE
15·1	41·4	15.0	SQ. N.M. SOUNDING
3	1		TIDE GAGES ⊙
28		13	TRIANGULATION STA. RECOVERED ▲
14			BENCH MARKS RECOVERED
18	6	11	TRIANGULATION STA. OCCUPIED, T-2 ▲
11	6	4	TRIANGULATION STA. ESTABLISHED ▲
2		4	BENCH MARKS ESTABLISHED
	4	1	NANSEN CASTS ⊕
	81	103	BOTTOM SAMPLES
	18·0	63.9	L.S.M. PHOTO SHORELINE INSPECTION



PROGRESS SKETCH
OPR-448-DA-76
SUMNER STRAIT, ALASKA
NOAA SHIP DAVIDSON
CDR C. ANDREASEN, COMDG.
SCALE: CHART 17360

OPR-451-DA/FA/AR-76
Familiarization and Instruction Visits to
Authorized Nautical Chart Agents in Alaska

Background

Nautical Chart Sales Agents in Alaska provide valuable assistance to the mariner and small boater by having available current up-to-date charts required by the user. These agents of the National Ocean Survey operate independently and their normal contact with NOAA is by mail. Visits by ships' personnel to these agents are in the form of familiarization and assistance, not inspections.

1976 Operations

DAVIDSON visited chart agencies at Sitka, Seward, Cordovia, Glacier Bay National Monument, Ketchikan, Petersburg, and Wrangell during the 1976 field season.

FAIRWEATHER visited six chart agencies located at Homer and Soldotna.

McARTHUR determined that there was a need for an authorized chart agent in Valdez and several possible agents were interviewed. Recommendations were forwarded to Distribution Division by memorandum.

OPR-469-FA-76
Hydrographic Survey.
Upper Cook Inlet, Alaska

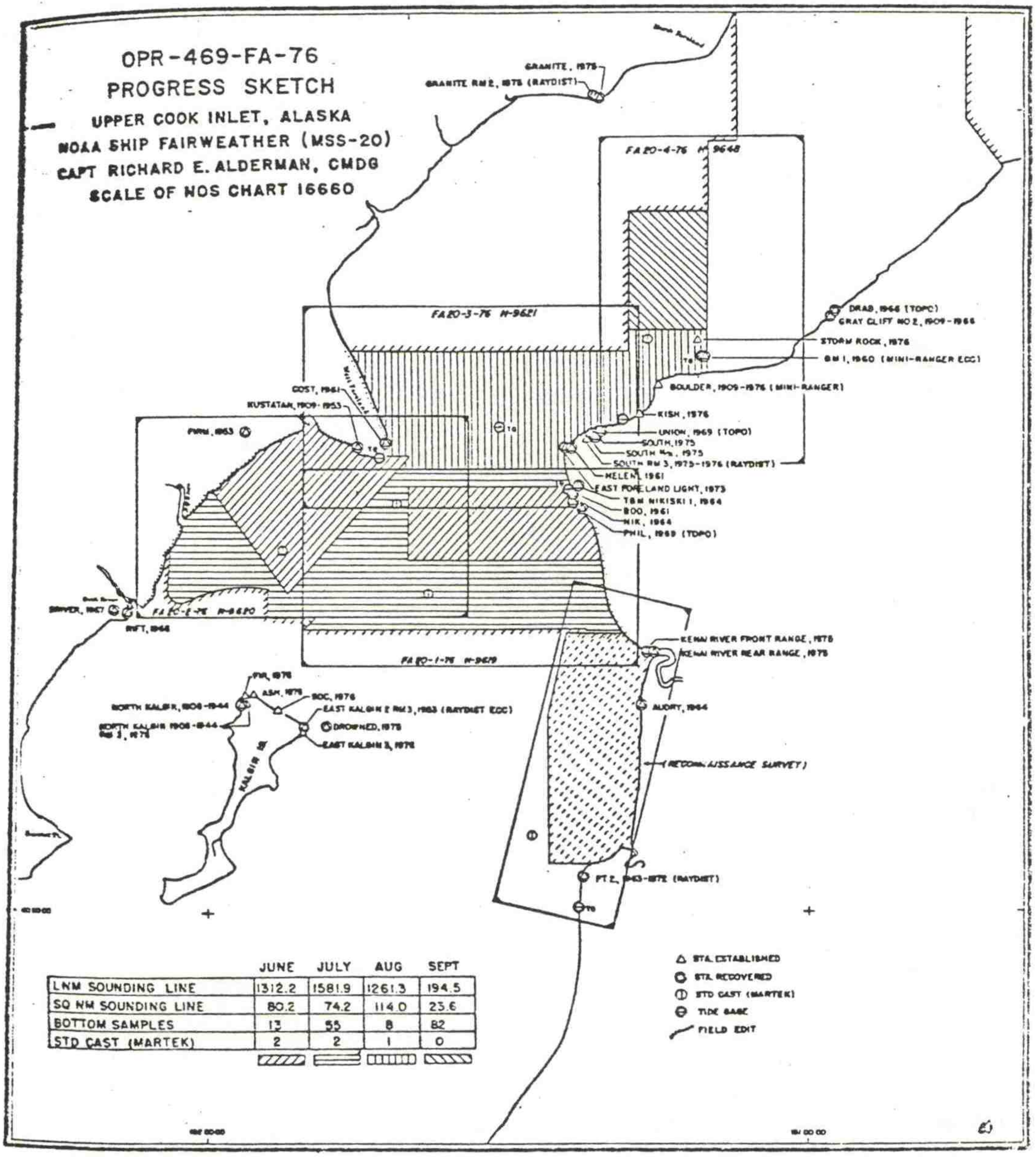
Background

Basic hydrographic surveys are required to support the increased activity in Cook Inlet. New, large-scale coverage for navigation has been requested by various government organizations and private industry. The surveys will also be used to update existing nautical chart coverage and to provide a new data base for use in ecological, pollution, engineering, fisheries, and other scientific studies. Survey work on this project was also done by DAVIDSON in 1975, FAIRWEATHER in 1973 and 1974, RAINIER in 1974 and 1975, and PATHFINDER in 1969 and 1971.

1976 Operations

Field work commenced May 25 and was completed September 14. Survey operations were concentrated between the east and west foreland areas

north of Kalgin Island and south of Boulder Point. A Special Reconnaissance Survey was conducted offshore of Kenai, to evaluate the adequacy of a 1969 PATHFINDER survey. Work was accomplished on surveys H-9619, H-9620, H-9621, and H-9648. FAIRWEATHER launches ran a total of 3,807.9 nautical miles of hydrography, covering an area of 292 square nautical miles.



	JUNE	JULY	AUG	SEPT
LNM SOUNDING LINE	1312.2	1581.9	1261.3	194.5
SQ NM SOUNDING LINE	80.2	74.2	114.0	23.6
BOTTOM SAMPLES	13	55	8	82
STD CAST (MARTEK)	2	2	1	0

OPR-479-RU/HE-76
Wire Drag Operations,
Louisiana Coast-Calcasieu Pass

Background

The objective of this project is to clear the safety fairways along the Gulf Coast. RUDE and HECK began work on this project in 1970 with wire drag surveys off Point Aionas, Texas, and in the Tampa, Florida, area. In 1971 and 1972, operations were conducted in the Southwest Pass areas of Mississippi and in Galveston Harbor. In 1973, RUDE and HECK conducted wire drag operations in the Galveston, Sabine, Orange and Port Aransas, Texas, areas. In 1975, further operations were conducted in the Sabine Pass area.

1976 Operations

RUDE and HECK began field work on June 7 and ended work on July 13. The work for this project started eastward from the Calcasieu Channel and included the anchorage east of the channel. The anchorage was completed, as was the Safety Fairway down to 29°24'N. Four obstructions were located and investigated.

OPR-500-FE-76
Tide and Current Survey,
Beaufort Inlet, North Carolina

Background

The purposes of this survey were to update tide and tidal current prediction data, to develop water circulation data to be used for future ecological studies of the area, and to redefine and update tidal datums for land movement and shoreline boundary determinations. The project was conducted in cooperation with the Atlantic Estuarine Fisheries Center, National Marine Fisheries Service (NMFS), in Beaufort, North Carolina.

1976 Operations

FERREL began operations February 18 and completed work May 5. The project consisted of 22 tidal current stations, including one 60-day station, five 31-day stations, twelve 16-day stations and four 8-day stations. In addition, STD data was collected at all 22 locations. Three 13-hour STD stations were occupied and tide gauges were operated at ten sites.

OPR-500-FE-76
Tide and Current Survey,
Cape Fear, North Carolina

Background

The purposes of this survey were to update tide and tidal current prediction data, to develop water circulation data for shoaling and ecological studies of the area, and to redefine and update tidal datums for land movement and shoreline boundary determination.

1976 Operations

FERREL began field work on this project May 6 and completed work June 21. The project consisted of 22 tidal current stations, including one 30-day station, three 15-day stations, and eighteen 7.5-day stations. In addition, temperature and salinity data were taken at all 22 locations. Three 13-hour time series STD stations were occupied and tide gauges were operated at 19 sites.

OPR-501-FE-76
Tide and Current Survey
Northeast Atlantic Coast Estuaries,
Portsmouth Harbor to Cape Neddick

Background

The purposes of this project were to update tide and tidal current prediction data, to develop water circulation data for future ecological studies of the area, and to redefine and update tidal datum planes for land movement and boundary determination. FERREL also did work on this project in 1975.

1976 Operations

FERREL began work on this project July 15 and ended work November 18. The project consisted of 27 tidal current stations, including one 120-day station, one 45-day station, five 30-day stations, eighteen 15-day stations, and two 7.5-day stations. Salinity and temperature data (STD) were collected at current station locations and at numerous additional stations. Four 13-hour time series STD stations were occupied. Tide stations were operated at 13 sites. Current meters were deployed at the standard depths of 15- and 30-feet from the surface and 20-feet from the bottom at MLW.

OPR-503-PE/WH-76
Hydrographic Survey,
Buzzards Bay, Massachusetts

Background

This project was designed to provide modern survey data for the maintenance of existing charts in view of the increase in vessel traffic and the increase in draft of the vessels transiting the area.

1976 Operations

NOAA Ships PEIRCE and WHITING conducted a basic hydrographic survey in Buzzards Bay during the 1976 field season. Field work for PEIRCE was from May 3 to November 12. WHITING began field work May 10 and ended work November 12. A total of 3,661.6 lineal nautical miles of hydrography was run, covering an area of 147.65 square nautical miles.

OPR-509-AR-76
Tide and Current Survey,
Puget Sound, Washington

Background

This project was a continuation of projected 5-year tide and current survey of Puget Sound and vicinity. Previous surveys were conducted by McARTHUR in 1973, 1974, and 1975. The purposes of this 5-year survey are to update the tidal and tidal prediction data, to provide water and circulation data as a basis for any ecological studies, and to redefine tidal datum planes for shoreline boundary determinations.

1976 Operations

McARTHUR was engaged in field work on this project from February 17 through April 23. The operations consisted of obtaining data from moored current stations, tide gages, STD casts, and a meteorological data logging package in the eastern Strait of Juan de Fuca and Admiralty Inlet. Current station data was recorded by Aanderaa RCM-4 current meters on a taut-wire mooring with a surface marking buoy. Tide information was gathered from Bristol bubbler pressure recording and Fischer-Porter ADR floatwell-type gages. STD data was collected using a Martek TDC, a Plessey Model #9060 and a Plessey Model #9006 system with analog output. Wind and temperature data was recorded with an Aanderaa meteorological data logger, Model DL-1.

Current data was collected from a total of 30 stations. Fourteen temporary tide gages were installed during the project and four long-term gages were maintained.

OPR-509-RA-76
Recovery of Current Meters,
Strait of Juan de Fuca

This short project involved RAINIER recovering current meter arrays deployed in the Strait of Juan de Fuca. Scientists and recovery equipment came aboard RAINIER the morning of December 12 and recovery operations began immediately. RAINIER got underway for Seattle the afternoon of December 13 and arrived at PMC on Tuesday, December 14.

OPR-511-DA-76
Chart Adequacy Survey,
San Francisco Bay

Background

The Chart Adequacy Survey is designed to provide contemporary information to the Office of Marine Surveys and Maps on the adequacy of its major marine products, both from a professional and a technical critical evaluation by National Ocean Survey personnel and from the user point of view. Data collection includes reconnaissance hydrography to evaluate the adequacy of sounding data on existing charts, resolving all reported or discovered discrepancies and deficiencies, and expanding the Coast Pilot inspection program.

1976 Operations

DAVIDSON began field work in San Francisco Bay February 23 and completed work on April 25. Over 140 discrete item investigations were resolved during Chart Adequacy Survey work on Charts 18649, 18650, and 18651. Several hundred landmarks and non-floating and floating aids to navigation were evaluated and checked for chart adequacy. Traditional hydrographic development was used where situations warranted. Reported or submerged hazards were investigated with otter spread wire sweep or wire drag techniques. All sweep hangs were checked by divers, and least depths were confirmed by diver-positioned lead-line or pole soundings.

OPR-511-PE-76
Chart Adequacy Survey
Florida Gulf Coast

Background

The Chart Adequacy Survey is designed to provide contemporary information to the Office of Marine Surveys and Maps on the adequacy of its major marine products. Data collection includes reconnaissance hydrography to evaluate the adequacy of sounding data on existing charts, resolving all reported or discovered discrepancies and deficiencies, and expanding the Coast Pilot inspection program.

1976 Operations

PEIRCE began field work on this project February 17 and ended work on April 15. The area of the survey was from Cape St. George to Mississippi Pass. PEIRCE ran 878 lineal nautical miles of hydrography covering an area of 2546 square nautical miles.

OPR-515-RU/HE-76
Wire Drag Operations,
Atlantic Coast of United States

Background

The objective of this project was to search for dangerous wrecks, obstructions, and other hazards to navigation by using wire drag between two ships.

1976 Operations

RUDE and HECK conducted wire drag operations at the entrance to Chesapeake Bay and in Delaware Bay during the 1976 field season.

OPR-516-MI-76
Hydrographic Survey
Coast of New Jersey, Maryland, Delaware
and Virginia

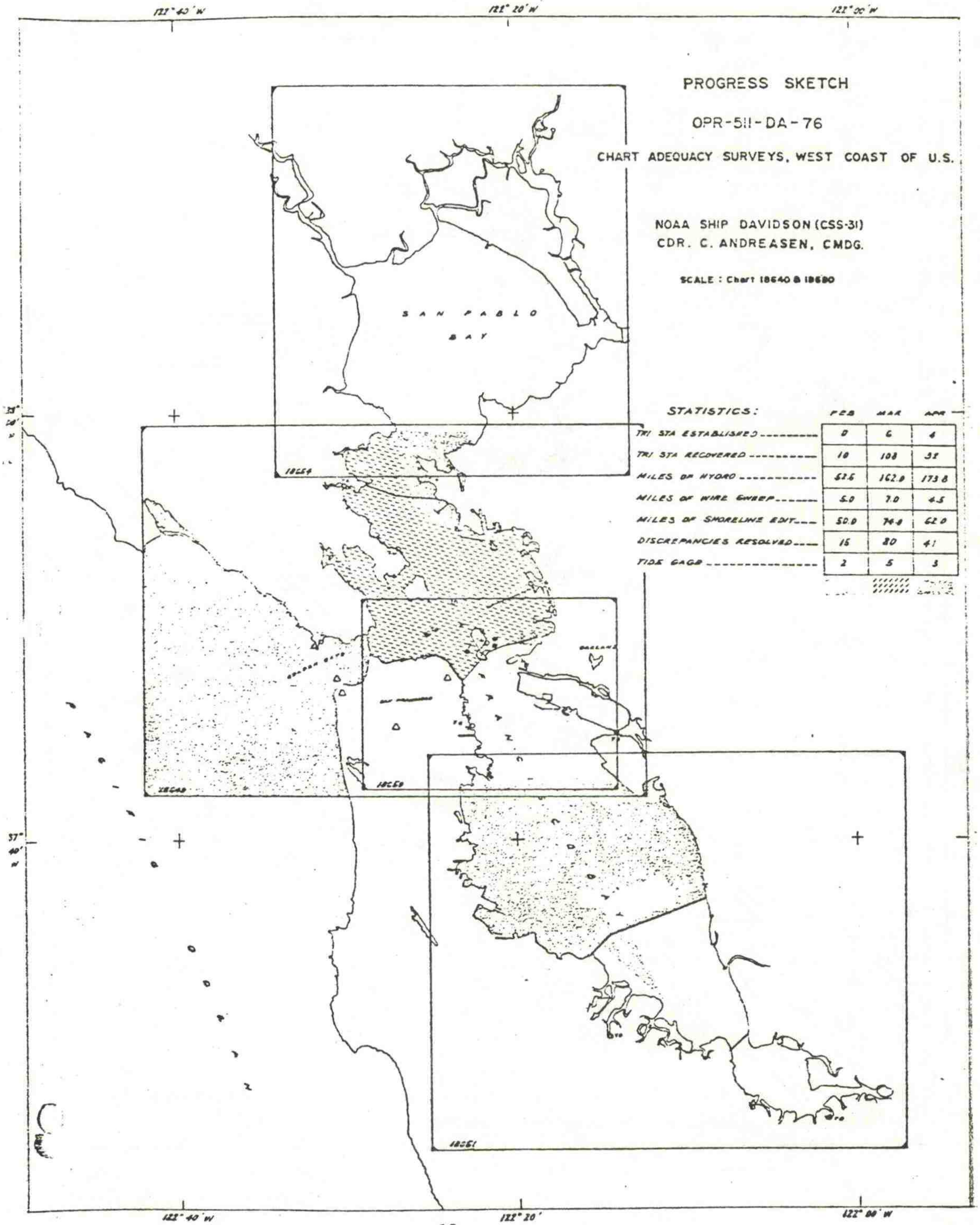
Background

This is a continuing project under the Atlantic Seaboard Area Project (ASAP) on which the WHITING was deployed during October and November of 1975.

1976 Operations

MT. MITCHELL began work on this project May 11 and ended work on November 9. This work consisted of hydrographic and bathymetric surveys offshore from New Jersey, Delaware, Maryland, and Virginia, generally between 10 and 1,400 fathom curves. The area covered was between 39°N and 37°20'N. All work was performed by the ship. Ten survey sheets were completed: H-9622, H-9639, H-9629, H-9640, H-9614, H-9623, H-9631, H-9632, H-9659, and H-9663. In completing these sheets, MT. MITCHELL ran 20,140 linear nautical miles of hydrography, covering an area of 7,554 square nautical miles.

In addition to the hydrographic work completed, MT. MITCHELL carried out the offshore Tide Telemetry System Field Experiments (OTTS). The objective of OTTS is to provide tidal data for analysis of offshore tides. Two OTTS gages were deployed on August 4 and 5 offshore from Ocean City, Maryland, and Assateague, Virginia, and were successfully retrieved on September 8. They were redeployed offshore from Chesapeake Bay and Virginia Beach on September 10 and, again, successfully retrieved on November 4.


122° 40' W
122° 20' W
122° 00' W
37° 40' N
SAN PABLO BAY
18654
18649
18652
18651
PROGRESS SKETCH
OPR-511-DA-76
CHART ADEQUACY SURVEYS, WEST COAST OF U.S.
NOAA SHIP DAVIDSON (CSS-31)
CDR. C. ANDREASEN, CMDG.
SCALE : Chart 18640 & 18680
STATISTICS:
FEB MAR APR
TRI STA ESTABLISHED 0 6 4
TRI STA RECOVERED 10 108 32
MILES OF HYDRO 52.6 162.0 173.8
MILES OF WIRE DRAG 5.0 7.0 4.5
MILES OF SHORELINE EDIT 50.0 74.0 62.0
DISCREPANCIES RESOLVED 15 80 41
TIDE GAGE 2 5 3

19

MONTHLY PROGRESS SKETCH

OPR-518-MA-76
TIDE AND CURRENT SURVEY
PRINCE WILLIAM SOUND, ALASKA

NOAA Ship McARTHUR
D. W. CRAWFORD, CDR., NOAA, Comd'g.

MAY	JUN	JUL	AUG	
13	13	23		CURRENT STATIONS DEPLOYED
7	14	15	13	CURRENT STATIONS RECOVERED
10	7	8		TIDE STATIONS INSTALLED
	3	7	12	TIDE STATIONS REMOVED
48	91	95	55	STD CASTS
9	11	11	2	NANSEN CASTS
83	123	128	61	WATER SAMPLES ANALYZED FOR SALINITY

HINCHINBROOK I.

Scale: 1:200,000

OPR-518-AR-76
Tide and Current Survey
Prince William Sound, Alaska

Background

This is the first year of a projected 4-year study of tides and currents in Prince William Sound. The purposes of this survey are to update tide and tidal current prediction data, to collect and analyze circulation data for future use in ecological studies, and to redefine tidal datums for land movement and shoreline boundary determination.

1976 Operations

McARTHUR began work on this project May 10 and ended work on August 13. The operation concentrated on collecting tide, current and STD data in eastern Prince William Sound between Valdez and Hinchinbrook Entrance. Aanderaa RCM-4 current meters, Bristol Bubbler and Fischer-Porter ADR tide gages, and a Plessey Model 9060 STD instrument were used to collect data.

Current data was collected from a total of 41 stations. A taut-wire mooring system with a surface marking buoy was used. A total of 23 tide gages were installed. A total of 314 STD casts were taken during this project. The water temperature ranged from 3.40^{o}C to 15.5^{o}C, and salinity ranged from 22.60 to 32.80 parts per thousand. A meteorological data logger installed on Reef Island recorded 1,556 hours of weather data.

OPR-524-RA-76
Hydrographic Survey
Icy Bay, Alaska

Background

This basic hydrographic survey of Icy Bay was conducted in response to increased user requirements in the area (logging and oil exploration) and will provide hydrographic and topographic data in a virtually uncharted area.

1976 Operations

RAINIER was engaged on this project from June 25 to September 16. Floating ice in the bay slowed operations, hampering small boat support operations and restricting launch operations. During this project RAINIER ran 2,965.4 linear nautical miles of hydrography, covering an area of 115.5 square nautical miles.

OPR-999-DA-76
Navigable Area Survey
Hinchinbrook Entrance to Middleton Island,
Gulf of Alaska

Background

Valdez is the terminus for deep draft ship traffic in Prince William Sound. In response to the projected increase in deep draft ship traffic, the U. S. Coast Guard proposed a system of traffic separation lanes from the entrance to Port Valdez to Middleton Island in the Gulf of Alaska. In order to provide modern hydrographic data, DAVIDSON conducted Navigable Area Surveys from Hinchinbrook Entrance to Middleton Island and hydrographic surveys in two proposed Vessel Traffic Services Anchorage areas in Prince William Sound. These surveys formed a junction with DAVIDSON'S work in Hinchinbrook Entrance in 1973.

1976 Operations

DAVIDSON began field work on this project June 2 and completed work July 30. The first portion of this project included field work in Port Valdez and Valdez Narrows from June 2-5. Existing Survey H-8900 was developed with 110.4 nautical miles of hydrography. Two aluminum survey launches equipped with PDP 8/e Hydroplot system and Ross 500 fathometers were employed.

Offshore survey work from Hinchinbrook Entrance to Middleton Island was performed from June 6 to July 16. Three 1:40,000 scale sheets (H-9624, H-9625, and H-9626) with a total of 3947.4 nautical miles of hydrography were completed. All data was collected with the PDP 8/e Hydroplot system aboard the DAVIDSON. Field work at the entrance to Port Fidalgo and at Glacier Island in Prince William Sound was conducted between July 20-30. Two 1:10,000 scale sheets (H-9636 and H-9637) were completed with a total of 562.0 nautical miles of hydrography. Two survey launches were used for all hydrographic work.

PMC-SP-2-RA-76
Hydrographic Survey,
Kealaikahiki Channel, Hawaii

RAINIER was engaged on this project from April 17-21, 1976. This was a 1:20,000 survey conducted entirely by the ship. Excellent preparatory and followup support were lent by Kaneohe MCAS by way of helicopter to set up and remove controls on Lanai. RAINIER ran 554.2 lineal nautical miles of hydrography, covering an area of 41.1 square nautical miles.

PMC-SP-3-AR-76
Test of Modified Buoy Mooring System

This test, conducted by EDL personnel in conjunction with McARTHUR'S personnel, consisted of deploying a modified taut-wire moor using 3/16-inch wire. The 24 hours of data collected was analyzed by EDL and, based on this analysis, further tests were scheduled for the fall.

PMC-SP-4-RA-76
Hydrographic Surveys
Point Reyes and Point La Jolla
California

This project consisted of two surveys: A 1:20,000-scale ship survey near Point Reyes and a 1:20,000 ship survey near Point La Jolla. RAINIER was engaged on this project from October 5-31, 1976. In completing this project, RAINIER ran 1,873 lineal nautical miles of hydrography, covering an area of 98 square nautical miles.

AMC-SP-4-FE-76
Current Survey,
Norfolk Harbor Reach Channel

This survey, requested by the U. S. Navy, collected current data at two locations in the Norfolk Harbor Reach Channel. FERRELL began operations January 19 and completed work February 6. Two 7-day stations were occupied

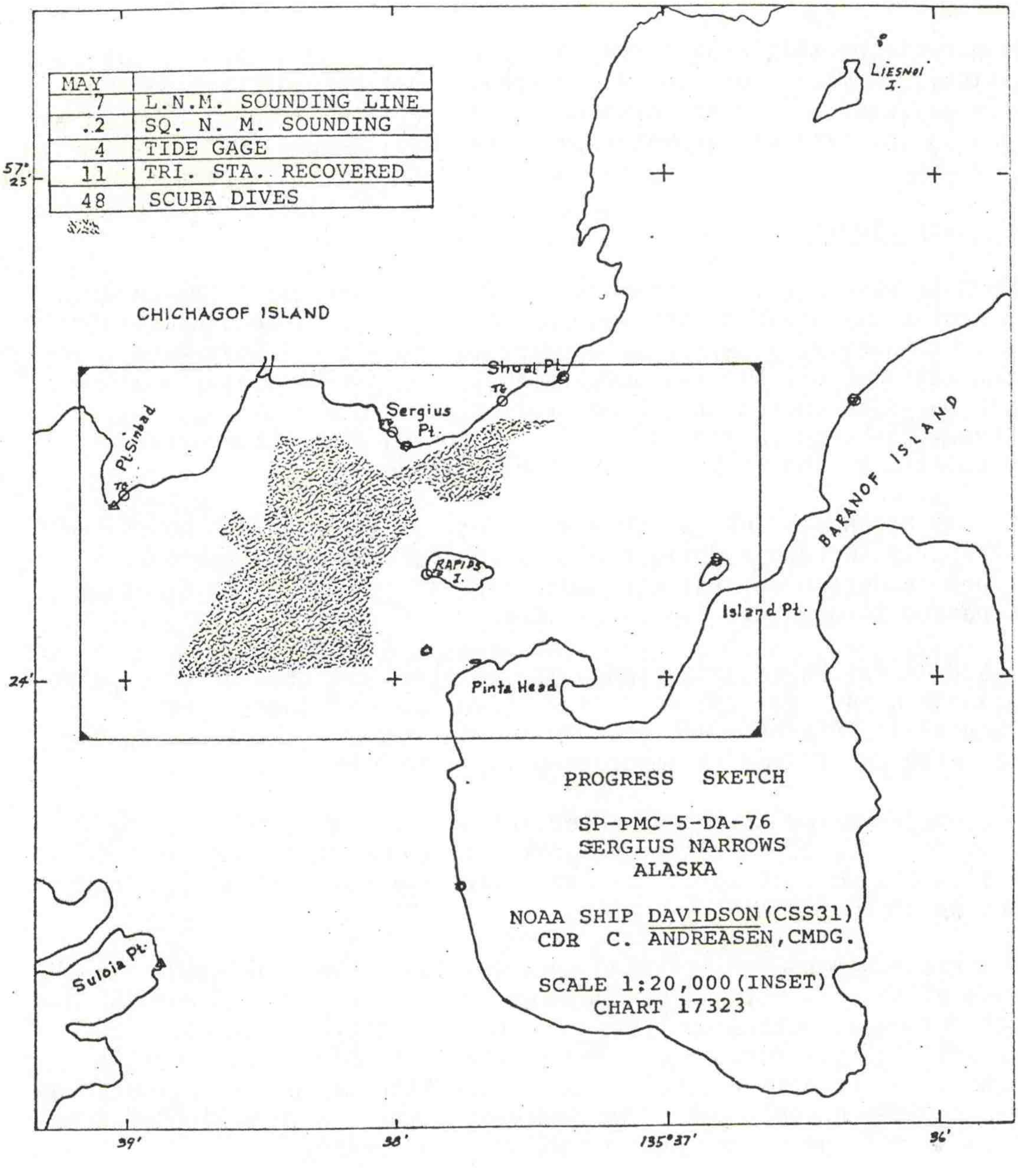
SP-PMC-5-DA-76
Special Investigation,
Sergius Narrows, Peril Strait, Alaska

Background

DAVIDSON conducted a thorough hydrographic survey of Sergius Narrows, Peril Strait, during October 1975 because of pinnacles reported to exist in that area. High currents precluded wire drag operations and rendered lead line investigations inaccurate; consequently, the minimum depth over West Francis Rock was not conclusively established. The purpose of this project was to (1) determine the least depth over West Francis Rock; (2) determine the least depth in the vicinity of the 15-foot sounding along the southern edge of Sergius Channel; (3) determine the least depth over East Francis Rock; (4) run several crosslines through the area of the 1975 hydrography to determine that the 1975 and 1976 position control and tidal datums are in agreement; and (5) develop hydrographically the two shoal areas which lie along the southern edge of the navigation channel.

1976 Operations

DAVIDSON began field work on this project May 21 and ended work on May 27. A total of seven nautical miles of launch hydrograph was run to verify datum against previous work and to develop shoal areas in the immediate vicinity of Sergius Narrows. Divers investigated five rocks and pinnacles to determine least depths.


MAY
7 L.N.M. SOUNDING LINE
.2 SQ. N. M. SOUNDING
4 TIDE GAGE
11 TRI. STA. RECOVERED
48 SCUBA DIVES
57° 25'
24'
CHICHAGOF ISLAND
Shoal Pt.
Sergius Pt.
Pt. Sinbad
RAPIDS I.
Pinta Head
Island Pt.
BARANOF ISLAND
LIESNOI I.
Suloia Pt.
PROGRESS SKETCH
SP-PMC-5-DA-76
SERGIUS NARROWS
ALASKA
NOAA SHIP DAVIDSON (CSS31)
CDR C. ANDREASEN, CMDG.
SCALE 1:20,000 (INSET)
CHART 17323
39'
38'
135°37'
36'

AMC-SP-5-OT-76-02
Deepwater Dumpsite 106 Cruise

Background

The purpose of this cruise was to determine and describe the basic physical, chemical, biological and geological characteristics and their patterns of variation which characterize environmental conditions in the area of Deepwater Dumpsite (DWD) 106.

1976 Operations

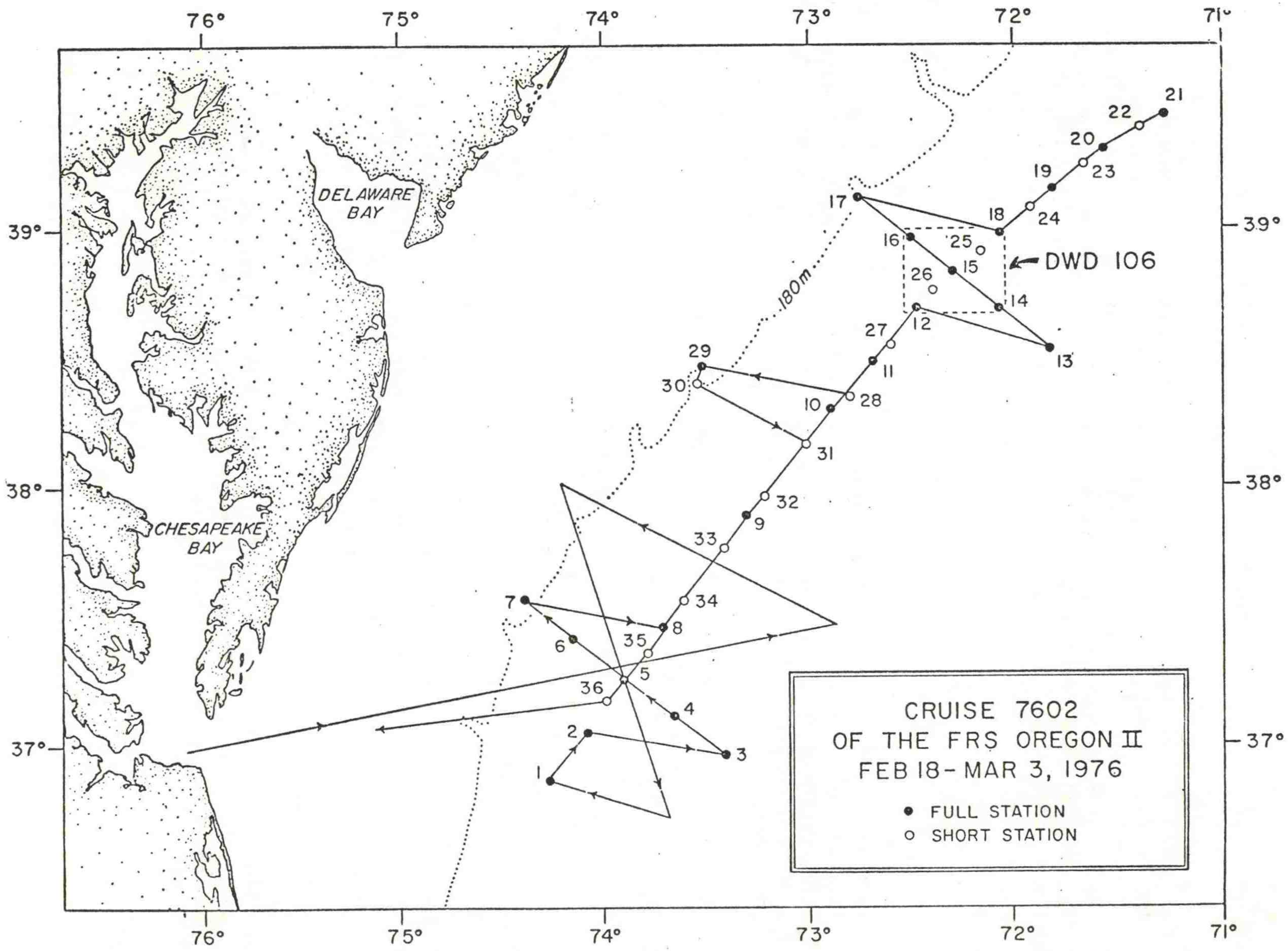
OREGON II was engaged on this cruise from February 18 to March 3. The cruise was divided into four phases: (1) Eddy Reconnaissance (XBT, CPR Survey, underway), February 18 and 19; (2) Eddy Area Characterization (full station occupations), February 20-24; (3) Slope Water/Dumpsite Characterization (full station occupations), February 25-March 1; and (4) Surface Layer Chemistry Survey and Reoccupations (short special stations), March 1-3.

The Eddy Reconnaissance phase was conducted underway with hourly or half-hourly XBT drops while towing a CPR (continuous plankton recorder) to define an old, warm core eddy off the Virginia Capes which had passed through DWD 106 in December.

The Eddy Area Characterization phase involved the occupation of nine stations in and near the warm core eddy. Each of these stations involved XBT's, plankton net tows, mid-water trawling, water sampling casts with an STD and sediment sampling with a grab sampler.

The Slope Water/Dumpsite Characterization phase was conducted by occupying a series of stations similar to those of the previous phase. Two stations were occupied in shelf water for comparison with the slope water environment.

The Surface Layer Chemistry and Reoccupation phase consisted of a series of short stations to obtain water samples from 50- and 55m depth for heavy metals analyses and quality control studies. Four previous stations were reoccupied to obtain samples missed earlier due to adverse weather conditions. In addition, another full station was occupied in shelf water and sediment samples were collected from the shelf and the nearby head of Wilmington Canyon.


76°
75°
74°
73°
72°
71°
39°
38°
37°
DELAWARE BAY
CHESAPEAKE BAY
180m
DWD 106
CRUISE 7602
OF THE FRS OREGON II
FEB 18 - MAR 3, 1976
FULL STATION
SHORT STATION

PMC-SP-6-AR-76
Test of Mooring System for
Prince William Sound, Alaska

This test, conducted by EDL personnel in conjunction with McARTHUR personnel, consisted of a new spherical subsurface buoy and a new spherical steel float for the backup module. The station was deployed "anchor first" and then released by a triphook on the subsurface buoy lifting bail, rather than with a deployment wire. This test mooring was successful and will be used during the 1977 field season.

AMC-SP-7-MI-76
Deep Sea Tide Gage Deployment

This project consisted of the deployment of a deep sea tide gage at latitude 37°24'24"N. and longitude 73°05'29"W. in 2847 meters of water. Primary control consisted of Loran C and Loran A and Sea Fix as secondary control. Sea Fix was used to run a development prior to deployment to ensure the bottom area did not have excessive relief.

MT. MITCHELL deployed this tide gage on June 9 and successfully retrieved the gage on November 5, 1976.

SP-PMC-8-DA-76
Hydrographic Survey,
Icy Strait, Alaska

Background

The cruise ship RENAISSANCE reported striking a rock in Icy Strait south of Port Gustavus in the vicinity of the charted nine fathoms of shoal. The primary purpose of this project was to determine the least depths and the extent of the shoal areas in Icy Strait.

1976 Operations

DAVIDSON began field work on this project August 9 and ended work August 17. For this project, 210.2 nautical miles of hydrography were completed on one 1:5,000-scale sheet (H-9638). Four shoal areas were investigated.

PMC-SP-10-RA-76
Hydrographic Survey
San Nicolas Island, California

This project is a continuation of basic hydrographic operations on the Southern California Coast. These surveys provide a new data base for nautical charts, bathymetric map revisions, and other tools associated with the prediction and development of the ocean environment of the Continental Shelf and adjacent areas.

RAINIER was engaged on this project from November 5 to 8, 1976. A 1:10,000 scale survey was run at San Nicolas Island, California. Problems encountered during the operations included interference with Mini-Ranger signals from Navy "C" band radar, very heavy kelp beds, and dangerous surf conditions. During this project RAINIER launches ran 72.7 lineal nautical miles of hydrography covering an area of 2.4 square nautical miles.

RP-1-RE-76
POLYMODE Subtropical Front Studies

Background

The POLYMODE project is designed to better understand the relationship between oceanic surface features and those at depth. Measurements taken during the project are compared to satellite infra-red data taken at the same time, so as to better assess the usefulness of infra-red data in the investigation of mesoscale eddies in the oceanic waters.

In addition, the POLYMODE project attempts to establish the distribution and time evaluation of the sea surface temperature and how this is influenced by the atmosphere and oceanic mesoscale eddies.

1976 Operations

RESEARCHER'S 1976 operations on this project were divided into two legs. During Leg I, from March 9 to 31, the project area was defined as a one-degree square in the vicinity of 29.0^{o}N, 70.0^{o}W. The specific objective was to delineate the oceanic frontal region. This was accomplished by a detailed survey of hourly XBT's accompanied by half-hourly sea surface salinity/temperature samples. Additional XBT surveys were occasionally run to relocate the temperature gradient as it moved with time.

Leg II, from April 12 to May 2, was a continuation of the investigations undertaken in Leg I and in the same project area. In addition to XBT and sea surface temperature/salinity measurements, two satellite tracking buoys were deployed.

Instrumentation used by the RESEARCHER during this project included STD, CSTD, XBT, surface temperature and salinity measurements, satellite tracking buoys, a LODAR unit, and a towed instrument package developed by Dr. E. Katz, of Woods Hole Oceanographic Institute (WHOI). The LODAR is an acoustical, directional instrument package which is towed midship approximately four meters beneath the surface. This low frequency device measures density discontinuities in the water column and is able to detect such phenomena as internal waves, turbulence and temperature gradients. The WHOI instrument package is a dual array which is depth controlable and measures current velocity, temperature, depth, and salinity. The data from the WHOI instrument package is processed in real time by a dedicated onboard computer system.

RP-2-RE-76
Mississippi Delta Sediment Stability Project

Background

The Mississippi Delta Project was designed to study the bottom and subbottom sedimentary processes taking place in an area of active deposition. The principal objective was the investigation of sediment stability and related mechanisms and processes responsible for the sea floor stability-instability. The specific area of study was the mouth of the Mississippi River where large amounts of deposition is presently occurring.

1976 Operations

RESEARCHER was engaged on this project from May 24 to June 2. Two sites were chosen as main priority for the cruise. Site Number One was at 28°51'38"N and 89°27'18"W. The second site was located at 28°53'42"N and 89°29'pp"W. Both sites were just west of the Southwest Passage of the Mississippi River.

Principle operations included taking Ewing cores and obtaining data from a 56-foot Piezometer probe inserted in the substrate. In addition, a geophysical grid survey was run in the area. During this operation, RESEARCHER took nine core samples plus five pilot cores, recorded 37 hours of Piezometer Station data, ran 63 nautical miles of sounding line and recorded 63 nautical miles of Seismic Reflection Profiles. XBT's were taken to and from the work site at 1-hour intervals.

RP-3-DI-76
Puget Sound Energy Research Project

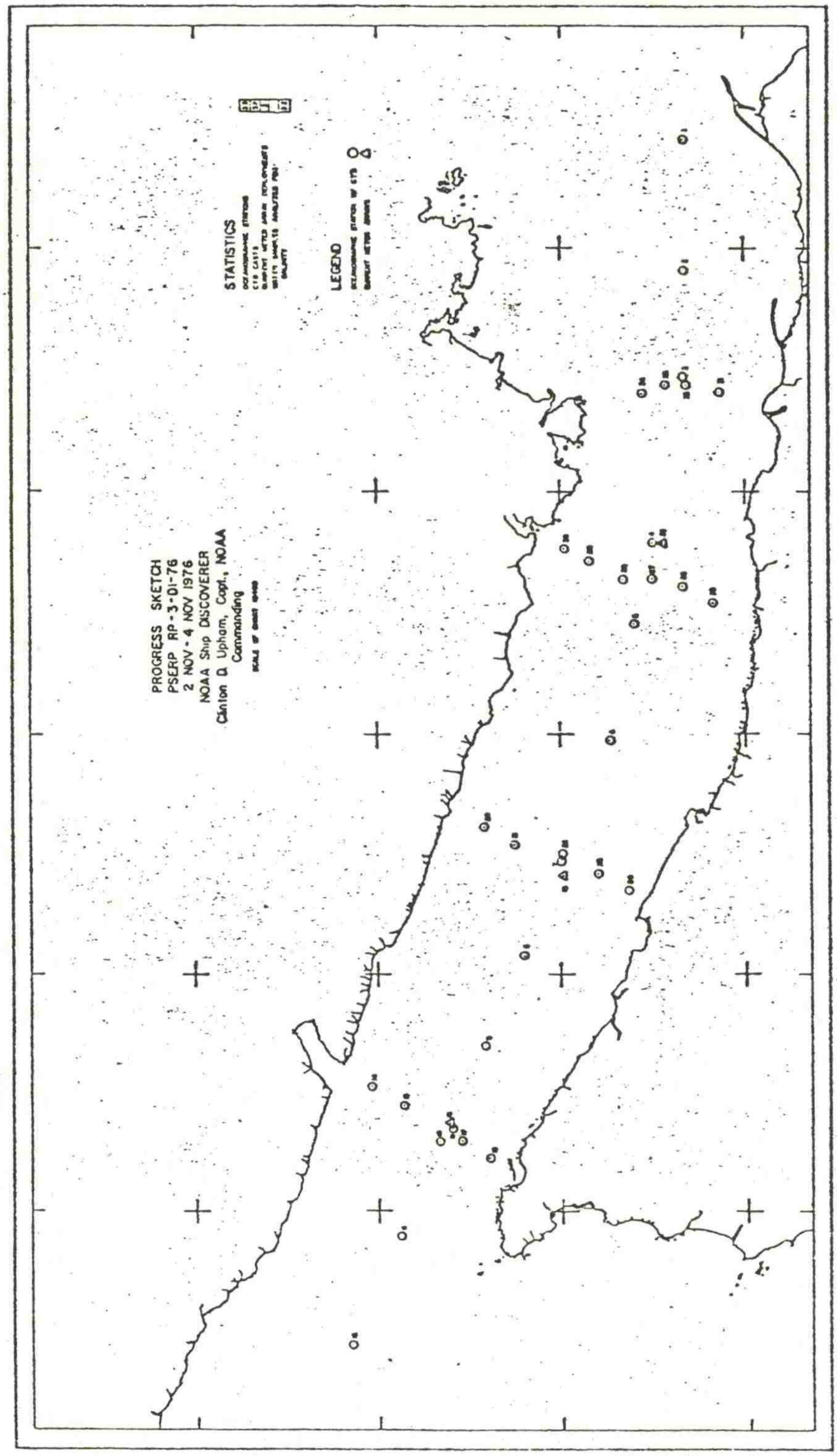
Background

This cruise was conducted by the Ocean/Atmosphere Response Studies (OARS) Group of NOAA's Pacific Marine Environmental Laboratory (PMEL), at Seattle, Washington, as part of the Puget Sound Energy Research Project (PSERP). PSERP is an enterprise initiated by the Environmental Protection Agency (EPA) and NOAA to obtain data that will allow assessment of the environmental impact of a significantly increased volume of crude oil anticipated to begin entering Washington State by tanker during the 1977-1978 time frame.

OARS has been tasked to conduct a 4-year study of the near surface circulation in the Strait of Juan de Fuca system. Winter and summer observations will be made. The winter measurements are being made when the surface layer is well mixed and the mean wind stress is large and directed westward, and the summer measurements will coincide with a well-stratified surface layer and an eastward wind stress.

1976 Operations

DISCOVERER was engaged on this cruise from November 2 through 5. During this cruise, three surface moorings -- STRAIT-2, STRAIT-3, and STRAIT-4 -- were deployed along the center line of the Strait in the traffic separation zone to measure winds and near-surface currents. STRAIT-2 and STRAIT-3 were each equipped with a wind recorder and three vector averaging current meters set at 4, 10, and 15 meters below the water surface. STRAIT-4 contained a wind recorder and one vector averaging current meter set at a depth of 4 meters. In addition, CTD measurements were made at a 32-station grid in the Strait. Data from the moorings and CTD grid will be used to describe (1) temporal and longitudinal variations of the near-surface wind field; (2) the temporal, longitudinal and vertical scales of the near-surface (upper 15m.) currents; (3) the response of near-surface currents to local storms; (4) the longitudinal accelerations experienced by near-surface currents under a variety of wind stress and river runoff conditions; (5) the across-strait and along-strait density field; and (6) the along-strait geostrophic currents.


STATISTICS
LEGEND
PROGRESS SKETCH
PSERP RP-3-01-76
2 NOV - 4 NOV 1976
NOAA Ship DISCOVERER
Clinton D. Upham, Capt., NOAA
Commanding

RP-4-DI-76
Outer Continental Shelf Environmental Assessment Program
Gulf of Alaska and Bering Sea

Background

The Outer Continental Shelf Environmental Assessment Program (OCSEAP) has four primary objectives: (1) To provide comprehensive environmental data and information within the Alaskan Continental Shelf mineral base areas; (2) to define the probable impact of oil exploration, storage, and transshipment on these areas; (3) to refine present understanding of the area's key ecological dynamic processes; and (4) to provide a basis for the development of predictive and diagnostic models of the area's eco-system response to loading by petroleum and petroleum by-products. DISCOVERER, SURVEYOR, and MILLER FREEMAN participated in work on this program in the Bering Sea, Gulf of Alaska, and Prince William Sound during the 1975 field season.

1976 Operations

DISCOVERER'S participation in OCSEAP during the 1976 field season consisted of two major cruises, RP-4-DI-76A, Gulf of Alaska and Bering Sea, for February 23 to June 5, 1976, and RP-4-DI-76B, Gulf of Alaska, Bering Sea, Norton Sound, Chukchi Sea and Arctic Ocean, from July 15 to October 27, 1976.

These cruises were conducted by NOAA's Pacific Marine Environmental Laboratory (PMEL) and the Institute of Marine Sciences (IMS), University of Alaska, and coordinated by NOAA's OCSEAP Project Office in Juneau, Alaska. Other participants included the U.S. Fish and Wildlife Service, the University of Louisville, Oregon State University, the University of Washington, NOAA's National Marine Fisheries Service (NMFS), and NOAA's Atlantic Oceanographic and Meteorological Laboratories (AOML).

Cruise RP-4-DI-76A was divided into seven legs. The objective of Leg I (February 23 to March 11) was to collect data relevant to the study of ocean currents, sea surface slope, sediment transport, coastal meteorology and marine bird and mammal populations in the northern Gulf of Alaska between Cape Hinchinbrook and Yakutat. Operations undertaken included the recovery of one current meter array, the deployment of six current meter arrays, the recovery of two pressure/temperature gage arrays, the deployment of one internal recording nephalometer, the deployment of six pressure/temperature gage arrays, the acquisition of radiosonde and surface meteorological data at 35 locations, the acquisition of tethered balloon meteorological data at five locations, the conduct of marine bird and mammal observations, the acquisition of CTD data at all mooring sites, and the acquisition of CTD data along two transects normal to the coastline between Kayak Island and Icy Bay.

RP-4-DI-76 (continued)

The purpose of Leg II (March 16 to March 30) was to continue the benthic biology and microbiology survey of the northeastern Gulf of Alaska. Forty-three stations were occupied for collection of benthic fauna and microbiology water and sediment samples. Marine bird and mammal observations were carried on concurrently and two expeditions were made by small boat to collect near-shore water samples and beach sediments for analysis of the microbiota and for shore surveys of marine birds.

The objective of Leg III (April 6 to 13) was threefold: (1) To investigate the phytoplankton, microzooplankton, icthyoplankton, neuston, and nekton in terms of their ecological dynamics and the parameters affecting the dynamics; (2) to determine the dissolved hydrocarbon concentrations and the abundance and distribution of suspended particulate matter in the water column; and (3) to investigate the marine birds and mammals in terms of species and abundance and to determine the trophic relationships of birds within the marine food chain. Data collection involved the following operations: (1) Rosette/Niskin bottle casts for chlorophyll content, primary productivity and nutrients; (2) continuous near-surface water samples for chlorophyll content; (3) vertical and horizontal ring net tows; (4) standard bongo net tows; (5) pyranometer incident light measurements; (6) underwater Quanta meter for light penetration values in the euphatic zone; (7) marine mammal observations; (8) bird observations and collections; and (9) high frequency echo sounding profiles for plankton with an over-the-side transducer. In addition, CTD profiles were taken at all stations. The area investigated included a portion of lower Cook Inlet, the Continental Shelf and Slope east and southeast of the Hinchinbrook Entrance to Cook Inlet, and Prince William Sound.

Leg IV (April 13 to 30) was designed to provide data related to the seasonal distribution, concentrations and compositions of suspended particulate matter, low molecular weight (C_1 - C_4) hydrocarbons, marine mammals, and marine birds. A predetermined grid of 50 stations distributed over the Alaskan Continental Shelf between Resurrection Bay and Yakutat was occupied. CTD profiles were taken with each set of water samples. Approximately 1-1/2 days were devoted solely to marine mammal observations along the 1,000-fathom curve between Yakutat Bay and Fairweather Ground, on Fairweather Ground, and in the near-shore area between Fairweather Ground and Cape Spencer. Data collection involved Rosette/Niskin bottle casts, and over-the-side water pumping mechanisms for light hydrocarbons.

The purpose of Leg V (May 3 to 9) was precisely the same as that of Leg III but included fewer stations, because of the shorter time period. The area investigated again covered Lower Cook Inlet, Kachemak Bay, and a portion of the Continental shelf and slope south and southeast of the Hinchinbrook Entrance to Cook Inlet. No *in situ* productivity was accomplished and no observations made in Prince William Sound. CTD profiles were taken at all stations.

RP-4-DI-76 (continued)

The objective of Leg VI (May 11 to 20) was essentially the same as that for Leg I, with the exception that the meteorological observations were omitted and the deployment of satellite buoys was added. Six moored subsurface tide and current arrays were recovered and seven were deployed.

Two NIMBUS-6 Satellite Tracked Drift Buoys were deployed. CTD profiles were taken at each of the moored array sites and along predetermined lines in the vicinity of the moored array sites.

The purpose of Leg VII (May 24 to June 5) was the same as that for Legs III and IV. The area covered included Lower Cook Inlet, Kachemak Bay, a portion of the Continental Shelf and Slope south and southeast of the Hinchinbrook Entrance to Cook Inlet, and Prince William Sound.

Cruise RP-4-DI-76B was divided into six legs. The objectives of Leg I (July 15 to 31) were to sample 50 pre-selected locations in the northern Gulf of Alaska for suspended matter and light hydrocarbons, to conduct marine bird observations and collections, and to conduct marine mammal observations. Operations included Rosette/Niskin bottle casts, CTD profiles, and nephelometer measurements. On five occasions, a small boat was deployed for the purpose of marine mammal and bird observations and collections. The area covered was bounded on the east by Yakutat Bay entrance and on the west by Resurrection Bay entrance.

The objectives of Leg II (August 3 to 17) were to (1) conduct a population analysis of the near-shore zooplankton communities in Norton Sound and the eastern Chukchi Sea, (2) collect distributional and feeding data on larval pollock in the southeast Bering Sea, (3) conduct marine bird observations and collections throughout the area visited for population assessment, stomach analysis, hydrocarbon analysis and the acquisition of study skins, (4) marine mammal observations for the determination of species and populations encountered along the ship's track, and (5) bathymetric measurements along tracks between oceanographic stations in Norton Sound and the Chukchi Sea.

The objectives of Leg III (August 18 to September 25) were (1) the deployment of current meters and pressure gages at 19 locations in Norton Sound, the Bering Strait, the Chukchi Sea, and in the vicinity of St. Lawrence Island, (2) conducting CTD observations throughout the above-mentioned areas and along the ice edge in the Arctic Ocean, (3) the observation and collection of marine mammals, and (4) bathymetric measurements between deployment sites and oceanographic stations. The physical oceanography portion of the program aimed at verifying fluctuations in the northward water movement, acquiring a temporal and spatial description of the bifurcation of the north flow that occurs off Point Hope, obtaining data on temporal/spatial scales of eddies ubiquitous to the current system, and defining the water circulation in Norton Sound and Katzebue Sound. The marine mammals portion of the

program aimed at the assessment of standing stocks of all species, as well as investigating the trophic relationships of ice inhabiting phocid seals and the natural history of ringed and bearded seals in the Norton Sound and the Chukchi Sea.

The objective of Leg IV (September 8 to 24) was to continue baseline surveys of the chemical physical and biological parameters in Norton Sound and the Chukchi Sea. The scientific program consisted of areal distribution studies of dissolved low molecular weight hydrocarbons and tar balls in the surface water, trace meters in the water and sediments, water column temperature and conductivity, and marine mammals and birds.

The objective of the physical oceanographic portion of Leg V (September 26 to October 9) was the same as that for Leg III but was focused on the St. Lawrence Island area and Norton Sound and included time series current measurements made from the anchored ship. The meteorological portion was aimed at measuring the modification of an Arctic air mass as it moved from the land area south over the warmer surface of Norton Sound. Marine mammal observations were conducted as an ancillary activity.

The objectives of Leg VI (October 13 to 27) were to measure the current circulation around Kodiak Island, to measure the general circulation on the Continental Shelf in the Gulf of Alaska from Kodiak Island to Icy Bay, and to determine fluctuations in sea surface slope on the Continental Shelf in the vicinity of Icy Bay. Operations included the recovery and deployment of moored current meters and pressure gage arrays, the deployment of NIMBUS-6 Satellite-Tracked drift buoys, the conduct of CTC casts, and marine mammal observations.

RP-4-MF-76
Outer Continental Shelf
Environmental Assessment Program (OCSEAP)

Background

The Outer Continental Shelf Environmental Assessment Program (OCSEAP) is designed to (1) provide comprehensive environmental and biological data on the Alaska Outer Continental Shelf (OCS) area, (2) define the probable ecological impact of oil exploration, production, storage, and transshipment on the OCS, (3) refine our understanding of key ecological dynamic processes, and (4) provide a basis for a priori predictive or diagnostic models of the ecosystem response to loading by petroleum and petroleum by-products. DISCOVERER, SURVEYOR, and MILLER FREEMAN participated in work on this program in the Bering Sea, Gulf of Alaska and Prince William Sound during the 1975 field season.

1976 Operations

MILLER FREEMAN'S participation in OCSEAP during the 1976 field season consisted of two major cruises: RP-4-MF-76A, Bering Sea, from March 15 through June 23, and RP-4-MF-76B, Norton Sound, Chukchi Sea, Lower Cook Inlet and Northern Gulf of Alaska, from August 19 through November 23.

Cruise RP-4-MF-76A was composed of four legs. The specific objectives of Leg I, II, and III were (1) to examine, as a coordinated effort with two chartered fishing vessels, the distribution and abundance of groundfish, shellfish, and epibenthic invertebrate resources occurring in the survey area during the spring months; (2) to grab sample infaunal benthos at selected grid stations; (3) to obtain samples of selected demersal fish and/or benthic invertebrates for hydrocarbon and trace metal analysis; (4) to provide salinity and temperature data to augment demersal fish studies and oceanographic modeling; (5) to conduct marine bird and mammal observations and to obtain marine bird samples; and (6) to collect various species of fish for physiological studies and pathological analysis.

The specific objective of Leg IV was to conduct a physical oceanographic survey of the southeast Bering Sea which involved the recovery of two moored arrays and the deployment of three moored arrays, CTD casts at each moored array and at 69 selected stations, marine bird observations and collections, and marine mammal observations.

Cruise RP-4-MF-76B was also divided into four legs. Legs I and II, Norton Sound and the Chukchi Sea, August 24 to October 13, had six objectives: (1) Examine the distribution and abundance of pelagic and groundfish, shellfish, and epibenthic invertebrates; (2) obtain samples of selected pelagic and groundfish, and/or benthic invertebrates for biological studies; (3) collect salinity and temperature data to augment fish and oceanographic modeling studies; (4) make marine bird and mammal observations and collect specimens; (5) sample various species from net hauls for physiological and pathological analysis; and, (6) perform replicate gillnet sets at selected stations, in order to determine temporal changes in species composition and density.

The objectives of Leg III, Lower Cook Inlet, October 14 to 30, were to: (1) Determine the abundance and distributions of menoplankton and benthic organisms; (2) obtain water and sediment samples for bacteriological analysis; (3) make marine bird observations and collection; and (4) make marine mammal observations.

The objectives of Leg IV, Gulf of Alaska and Lower Cook Inlet, October 31 to November 23 were to (1) conduct physical oceanographic studies in the Northern Gulf of Alaska and Lower Cook Inlet, (2) recover

RP-4-MF-76 (continued)

and deploy IMS 9 current meter array, (3) conduct XBT studies in transit to Cape Spencer, (4) make marine bird observations and collections over project area and enroute to Seattle, and (5) make marine mammal observations.

RP-4-SU-76
Outer Continental Shelf Environmental Assessment Program (OCSEAP)

Background

The Outer Continental Shelf Environmental Assessment Program (OCSEAP) is designed to (1) provide comprehensive environmental and biological data on the Alaska Outer Continental Shelf (OCS) lease area; (2) define the probable ecological impact of oil exploration production, storage, and transshipment on the OCS; (3) refine our understanding of key ecological dynamic processes; and (4) provide a basis for a priori predictive or diagnostic models of the ecosystem response to loading by petroleum and petroleum by-products. DISCOVERER, SURVEYOR, and MILLER FREEMAN participated in work on this program in the Bering Sea, Gulf of Alaska, and Prince William Sound during the 1975 field season.

1976 Operations

SURVEYOR'S participation of OCSEAP during the 1976 field season consisted of two major cruises, RP-4-SU-76A, Bering Sea and Gulf of Alaska, from March 14 to June 20, and RP-4-SU-76B, Gulf of Alaska, Bering Sea, and Norton Sound, from August 5 to October 29.

Cruise RP-4-SU-76A was divided into six legs. Leg I, Bering Sea, from March 14 to April 2, had the following objectives: (1) Determine the initiation of and study the plankton bloom which occurs in a narrow band parallel to the ice edge in early spring; (2) determine the distribution and abundance of phytoplankton, zooplankton, and neuston; (3) determine the distribution and abundance of demersal fish and benthic organisms; (4) determine the distribution, abundance, behavior, and parasitology of marine mammals, specifically, sea lions, and seals; (5) observe bird abundances and distributions as related to ice coverage; and (6) occupy a standard grid of physical-chemical oceanographic stations to determine temperature, salinity, oxygen, chlorophyll, nutrients, PH, and alkalinity of the water column.

The sampling operations included vertical plankton tows, mid-water trawls, neuston trawls, other trawls, CTD and rosette hydrocasts, ice coring, bird observations and collection from ship, boat and helicopter, and collection of algae samples from the underside of the ice floes by ship's divers.

The objectives for Leg II, Kodiak-Bering Sea-Kodiak, from April 12 to 30, were the same as those for Leg I.

Leg III was a plankton and primary productivity survey of Lower Cook Inlet across the Continental Shelf and back into Prince William Sound and involved Rosette/Niskin bottle casts for chlorophyll content, primary productivity, and nutrients; continuous near-surface water samples for chlorophyll content; CTD casts; vertical and horizontal ring net tows; standard bongo net tows; pyranometer incident light measurements; underwater Quanta meter for light penetration values in the euphatic zone; marine mammal observations; bird observations and collections; and, echo sounding profiles of plankton with the ship's 100kHz Ross Fineline depth recorder and a University of Washington high frequency echo sounding system.

The objectives of Leg IV, Gulf of Alaska-Kodiak Island, from May 10 to 20, were to (1) provide launch and helicopter support for intertidal and sublittoral surveys at sites along the southeastern and southern coast of Kodiak Island; (2) collect samples from the intertidal zone to establish composition, distribution, and abundance of biota from several habitats in the Kodiak lease area; (3) collect sublittoral samples of benthic algae, in order to determine species composition, distribution, and abundance; (4) conduct marine bird observations and collections; and (5) observe marine mammals.

The specific purpose of Leg V, May 25 to June 3, was to make marine mammal and bird observations and collections at Portlock Bank, Middleton Island, Kayak Island, Icy Bay, Yakutat Bay and the stretch of coast between Kayak Island and Cape Spencer.

Specific objectives for SURVEYOR on Leg VI, Bering Sea, June 5 through 20, were to (1) provide launch and helicopter support for intertidal and sublittoral surveys at sites in the Bering Sea; (2) collect samples from the intertidal zone to establish composition, distribution, and abundance of biota from several habitats in the vicinity of the St. George Basin which has potential for oil deposits; (3) collect sublittoral samples of benthic algae in order to determine species composition, distribution, and abundance; (4) conduct marine bird observations and collections; (5) observe marine mammals; (6) provide helicopter support for the servicing of seismic stations in the vicinity of Unalaska Island; and (7) provide ship transport and helicopter support for a Bureau of Land Management geodetic field party on Chinikof Island.

RP-4-SU-76 (continued)

Cruise RP-4-SU-76B, OCSEAP Gulf of Alaska, Bering Sea, and Norton Sound, was also divided into six legs.

Leg I, Norton Sound, from August 8 to 16, was an intertidal and sea bird survey involving (1) launch and helicopter support for intertidal surveys at nine sites; (2) collecting samples from the intertidal zone to determine composition, distribution, and abundance of biota at selected location; (3) investigation of sea bird rookeries at five sites with the use of small boats; (4) marine mammal observations; and (5) seismic station servicing at two stations in the western Gulf of Alaska enroute to Kodiak at the end of the leg.

Leg II, Lower Cook Inlet, Gulf of Alaska, Prince William Sound, from August 24 to September 3, was a plankton and primary productivity survey involving (1) Rosette/Niskin bottle casts for chlorophyll content, primary productivity, and nutrients; (2) continuous near-surface water samples for chlorophyll content; (3) CTD profiles; (4) vertical and horizontal ring net tows; (5) standard bongo net tows; (6) pyranometer incident light measurements; (7) underwater Quanta meter for light penetration values in the euphatic zone; and (8) marine bird observations and collections.

Leg III, northern Gulf of Alaska, September 7 through 16, was a physical oceanography study designed to provide data on salinity and temperature versus depth from 60 standard hydrographic Gulf of Alaska Shelf Study stations. Marine mammal observations were also accomplished.

Operations included CTD-Rosette casts, CTD casts with Nansen bottles and CTD fish in water depths greater than 200 meters, CTD casts with CTD fish only in waters less than 200 meters, marine mammal observations underway and on station, and helicopter flights for marine mammal observations.

Leg IV, Gulf of Alaska, Shelikof Strait and Lower Cook Inlet, September 20 to October 2, had the following objectives: (1) To obtain data on conductivity and temperature versus depth from casts taken at 89 hydrographic stations on the Kodiak Island-Shelikof Strait grid; (2) to provide helicopter support for servicing seismic stations at Chirikof Island, Chowiet Island, Bruin Bay and McNeil River; (3) to obtain core and grab samples in the vicinity of Augustine Island; (4) to provide helicopter support for Augustine Island investigations of gas samples, geologic pyroclastic ash mapping, gravity and thermal resurveys; (5) to provide ship's divers for investigating submarine ash deposits; and (6) to take marine mammal and bird observations.

Leg V, October 4 to 14, consisted of marine mammal observations and collections from the ship by small boat and helicopter and a field party pickup. Field studies were concentrated in the vicinity of Kodiak Island.

RP-4-SU-76 (continued)

The goals of Leg VI, October 18 to 29, were to provide data on the abundance and distribution of marine mammals (seals, sea lions, and whales) in the Bering Sea and the Gulf of Alaska, including the eastern Aleutians and the Alaska Peninsula. In addition, zooplankton and micronekton studies were conducted to determine the ecological relationship between daily migrating bathypelagic fishes and zooplankton communities in the Bering Sea.

RP-5-SU-76
Eastern Pacific Porpoise Distribution
and School Characteristics Study

SURVEYOR was engaged on this cruise from November 16 to December 9, 1976. Principal working grounds were the eastern Tropical Pacific off the Coast of Mexico.

The objectives of this cruise were (1) to study the relationships (by comparison) of porpoise school sightings recorded concurrently by observers on board ship, on board helicopter, and captured on film from helicopter. Sighting parameters included counts and species identification of individuals and the distance of the school to the vessel; (2) to study in porpoise schools the relationship between numbers visible and numbers counted, and total school size as a function of school behavior; (3) to study the distribution of porpoise, bird, and tuna associations in the Equatorial Counter Current and its boundaries and to the Intertropical Convergence Zone; (4) to study the factors involved in the differences between high and low density areas of porpoise abundance; (5) to obtain observations on the behavior of individual, minimally disturbed porpoise schools over a 24-hour period.

RP-8-OC-76
Deep Ocean Mining Environmental Studies (DOMES)

DOMES is an environmental assessment study designed to judge the impact of dredge mining of manganese nodules from the surface of the ocean floor in the North Tropical Pacific Ocean. This effort was the fourth of a series of voyages by OCEANOGRAPHER seeking baseline information, centering on three sites within an area of present economic interest: Site A at $8^{o}27'N$, $150^{o}47'W$; Site B at $11^{o}42'N$, $138^{o}24'$; and Site C at $15^{o}00'N$, $126^{o}00'W$.

The cruise was divided into three legs of 35, 25, and 21 days' length. The first of the three from February 11 to March 16, 1976, was devoted to near-surface chemistry, biology and solar radiation measurements at all three sites. Continuous surface samples from the sea chest, hydrocasts with Niskin bottles and a 9006-CTD were used to measure chemical parameters of the water column. In situ, primary productivity measurements, phytoplankton enrichment experiments, bongo and neuston net tows, and direct water samples were taken to obtain biological baseline measurements.

On the second leg, March 23 to April 15, the operations were devoted primarily to near-bottom studies. Deep CTD/nephelometer/Niskin casts and deep bongo net tows were used along with bathymetry, magnetics, solar radiation, and neuston tows.

RP-8-OC-76 (continued)

The third leg, April 22 to May 13, was dedicated to CTD casts and nephelometry and trace metal sampling, as well as deployment of two Equatorial Bottom Water arrays at Sites A and B. Bow radiation, bathymetry, and magnetic data were taken as usual.

RP-9-RE-6
Rational Use of the Sea Floor (RUSEF)

The RUSEF Project within the Atlantic Oceanographic and Meteorological Laboratory's (AOML) Continental Margin Sedimentation (COMSED) Program is designed to study sedimentary processes, both past and present on the continental margin. Investigations in this program include deposition and erosion on the slope, submarine canyons possibly serving as conduits for offshore transport of sediment, and mass movement of material down the continental slope and rise. Specifically examined during RUSEF are the bottom processes along selected areas of the continental margin south of Baltimore Canyon to West Palm Beach, Florida. RUSEF 1976 is a continuation of the COMSED studies pursued in 1974 and 1975 aboard the RESEARCHER.

RESEARCHER was engaged on this project during June 14 to July 2 and July 7 to July 23, 1976. These cruises were devoted to a series of geological observations along the continental margin which include the Outer Continental Shelf, continental slope and rise. The investigations consisted of magnetic, seismic reflection, and bathymetric surveys, sediment coring, current meter deployment, and bottom photography. Ship's and AOML equipment used included magnetometer, 3.5 kHz, 120- and 40-inch air guns, 200 feet of Teledyne hydrophones, narrow beam echo sounder, 40-20-10-foot piston cores, 8-foot hydroplastic cores, bottom-bounce camera, and Geodyne current meter array.

Principle areas of investigation during these June and July cruises were the continental slope and rise south of Baltimore Canyon and at the seward end of Washington Canyon. Also, the sedimentary framework and sediment distribution on the Florida-Hatteras slope between Cape Hatteras and West Palm Beach, Florida, were determined.

RP-10-RE-76
Metallogenesis at Dynamic Plate Boundaries

The Atlantic Oceanographic and Meteorological Laboratory (AOML) Plate Boundary Project is a study of ongoing geological processes within the Mid-Atlantic Ridge as they pertain to mineral concentration and deposition. Results of the study will hopefully contribute to the evaluation of mineral potential of oceanic crusts and aid in establishing guidelines necessary in future mineral exploration.

RP-10-RE-76 (continued)

RESEARCHER was engaged on this cruise from August 10 to August 31, 1976. The cruise was largely devoted to geologic observations in and around the Mid-Atlantic rift valley near latitude 26°N and longitude 45°W. Also included in the observations were bottom photography, heat sensing, coring, and water sampling. In addition to core samples, water samples, and bottom photographs, RESEARCHER ran 4,444 lineal nautical miles of bathymetry, 4,441 lineal nautical miles of magnetics, and 4,444 lineal nautical miles of gravity.

RP-11-RE-76
Circulation and Chemistry Studies
Gulf of Mexico

RESEARCHER was engaged on this cruise from October 5 to November 5, 1976. The cruise was designed to provide synoptic observations of the entire Gulf during the fall of one year. The aim was to advance understanding of the large-scale circulation and of the distribution of O_2 nutrients and trace metals. Particular emphasis was placed on locating the position of the Loop Current at the beginning and end of the cruise, measuring the geostrophic transport of the anti-cyclonic western gyre, and measuring the concentration of trace metals in the outflows of the major rivers emptying into the Gulf. The observations of temperature and salinity were also expected to be ideal for use in a diagnostic model of Gulf circulation. During this cruise RESEARCHER occupied 118 CTD stations, made 193 XBT casts, and collected 1,072 water samples for salinity, 984 samples for dissolved oxygen, 984 samples for nutrients, 388 samples for pH, 372 samples for trace metals, and 10 samples for ammonia analysis.

RP-12-RE-76
MESA XWCC II Cruise

The Marine Ecosystems Analysis (MESA) project is designed to supply oceanographic data from the New York Bight to be used in evaluation of processes of material redistribution in and around existing and proposed marine waste disposal sites. The data collected on this cruise will expand the effectiveness of data previously collected in the apex of the Bight and, in some cases, represent the reoccupation of some stations to examine temporal variation in the environment. Previous investigations in support of this project were conducted by PEIRCE, FERREL, and ALBATROSS IV in 1973, by RESEARCHER, ALBATROSS IV, and DELAWARE II in 1974, and by RESEARCHER in 1975.

RP-12-RE-76 (continued)

The 1976 MESA cruise was planned to collect physical, chemical, and biological data from the water column, take surface samples by means of neuston net tows and, retrieve two current meters. RESEARCHER was engaged on this cruise from September 8 to 27, 1975.

RP-13-MI-76
Continental Shelf Sedimentation Cruise
(CONSED)

This project consisted of observing current velocities and sea floor response to currents 10-25 kilometers offshore of Assateague Island.

MT. MITCHELL was engaged on this project from November 17 to 22, 1976. Operations included the retrieval of two current meters, 26 miles of side scan sonar profiling, 178 sea-bottom photographs, and 536 bottom samples. A grid of bottom samples and hydrography was also run. Sea Fix was used for control with excellent results.

Marine Ecosystems Analysis (MESA)
New York Bight

Background

The MESA project is essentially a regional assessment of the living marine resources in relation to pollution loading. The New York Bight area supports the most heavily populated and industrialized complex in the United States. It also supports some of the most heavily utilized and valuable recreation areas in addition to sport and commercial fishery resources. The intensive utilization and development of this coastal habitat has hastened the degradation of the marine environment.

Previous investigations in support of this project were conducted by NOAA Ships PEIRCE, FERREL and ALBATROSS IV in 1973 and by RESEARCHER, ALBATROSS IV and DELAWARE II in 1974. GEORGE B. KELEZ was engaged on this project during March to December 1975.

1976 Operations

GEORGE B. KELEZ was engaged on this project from January through December 1976. Investigations included studies of internal wave generation and energy transfer between barotropic tidal flow over the Continental Shelf and the commonly observed high frequency wave pockets which propagate shoreward and become dissipated, collecting grab and bar core samples and seismic reflection data in support of the Inner Shelf Sediment Transport Experiment, collecting water circulation and chemical data to evaluate the use of remote sensing for monitoring water mass characteristics of the New York Bight, studying

the short term transformation in chemical composition, size distribution, concentration and dispersion of particulates and nutrients in sewage sludge dumped in coastal waters, collecting data from deep sea tide gages for further qualification of Outer Continental Shelf tides, studies of nutrient supply, light attenuation with depth and grazing by zooplankton during the spring bloom period on a cross-shelf transect.

MI-FRC-9-76
Current Meter Deployment
Georges Bank

This project involved the deployment of three current meters in the Northeast Channel off Georges Bank at the following locations: 42°19.7'N, 65°54.4'W; 42°16.8'N, 65°57.0'W; 42°10.7'N, 66°02.3'W. In addition, XBT's were taken hourly to and from the deployment sites. Thirteen hydrographic data stations were taken in the vicinity of the current meters. MT. MITCHELL was engaged on this project from September 22 through 25, 1976.

RE-FRC-11-76
Larval Herring Survey
Georges Bank and Nantucket Shoals

RESEARCHER conducted this cruise from November 26 to December 12, 1976.

The primary objective of this cruise was to monitor the distribution and relative abundance of larval Atlantic herring and their food organisms in the Georges Bank-Nantucket Shoals area for estimates of production, growth, mortality, and dispersal. Hydrographic work was conducted to describe water mass distribution in the study area. Water samples also were taken for chlorophyll and nutrient analysis for estimates of primary productivity.

One hundred ten stations were sampled along the cruise track, including 22 special stations. Herring larvae were observed on stations in the Nantucket Shoals area, the Great South Channel, and scattered about on Georges Bank. Atlantic herring larvae were collected at 48 stations with three stations having 11-100 individuals in the catch.

An oblique haul was made at each station using a 61 cm bongo sampler in conjunction with a 20 cm bongo sampler to a maximum gear depth of 100 meters or to within 5 meters of the bottom in shallower areas. A neuston net was hauled at the surface for 10 minutes simultaneously

RE-FRC-11-76 (continued)

with the bongo tows. An XBT drop, surface bucket temperature and salinity, and meteorological conditions were taken routinely at every station. At all standard stations, a complete temperature, salinity, and oxygen profile were made using a Plessy STD unit. Water samples were collected for analysis of dissolved oxygen, salinity, nutrients, and chlorophyll.

AL-76-01
ICNAF Larval Herring Survey

ALBATROSS IV was engaged on this cruise from February 9 to 25, 1976. The area of investigation was from eastern Georges Bank, westward through the Nantucket Shoals and Southern New England areas.

Objectives of this cruise were to (1) determine distribution and abundance of larval herring and their food organisms for estimates of production, growth, dispersal, and mortality, (2) collect chlorophyll and nutrient samples for estimates of primary productivity, and (3) conduct hydrographic sampling to monitor larval herring environment and general hydrographic conditions in the cruise area.

At each standard station, an ICNAF oblique haul was made to maximum gear depth of 100 meters, or to within 5 meters of the bottom at more shallow stations, utilizing a 61 cm bongo sampler and a 20 cm bongo sampler one meter above. In order to more clearly delineate larval herring distribution, the gear was also set at extra stations occupied at midpoints between standard stations where larval herring were sampled. XBT casts were made at each standard and extra station. Surface salinity samples and water temperatures were taken from bucket samples at each station and complete meteorological conditions were also recorded. Salinity, temperature, and dissolved oxygen determinations were made at each standard and special hydrographic station, where feasible, utilizing a Plessey STD-DO fitted with a rosette sampler and associated Niskin bottles. Chlorophyll and nutrient samples were taken at selected stations and a fluorometer was operated to monitor primary productivity for the duration of the cruise.

AL-76-02
Part I
Spring Bottom Trawl Survey

ALBATROSS IV conducted this cruise during the period between March 25 and April 9, 1976. The area of investigation was Georges Bank and the southwest Gulf of Maine. Several stations on two transects extending 80 miles southeast of Lydonia Canyon were sampled to study a Gulf stream eddy.

The purpose of the cruise was to determine the spring distribution and relative abundance of fish species and to collect biological and hydrographical samples for the center.

A 30-minute tow at 3.5 knots was made at each randomly preselected station with the modified No. 41 otter trawl. Standard ground fish survey techniques were used to process the catch of each station. Special weight and distribution tallies were maintained for 31 commercially important species. A bottom trace was made with the fathometer during each trawl haul.

The standard MARMAP plankton tows were made during trawl hauls. Sampling was done with a 61 cm Bongo array using a 4-foot Braincon V-fin depressor. Port and starboard net meshes were 0.333 and 0.505 mm respectively.

An XBT cast was made, a surface water bucket sample collected, and weather conditions recorded at each station.

AL-76-02
Parts II and III
Spring Bottom Trawl Survey

ALBATROSS IV conducted the second part of the Spring Bottom Trawl Survey in the Gulf of Maine and Nova Scotia areas from April 13 through 30, 1976. Work in the Gulf of Maine and Massachusetts Bay area was performed during the period from May 3 to 8, 1976. Trawl stations within Strata 26-27 and 40-49 were completed, as well as the pre-selected stations in the New England Biome Study area. In addition, special "Lipo" stations were included during each leg of the cruise. The purpose of the cruise was to determine the spring distribution and relative abundance of fish species and to collect biological and hydrographical samples. Interest in the Massachusetts Bay area included special work to establish a defined area for the "Lipo" phenomenon and continued surveillance of the nursery grounds for the New England Biome Program.

A 30-minute tow at 3.5 knots was made at each preselected random station with the modified No. 41 otter trawl. The techniques of the standard groundfish survey were used to process the catch at each station. Special weight and distribution tallies were made of 26 commercially important species. Plankton sampling was by standard ICNAF oblique tows at each station. Sampling was accomplished with a 60 cm bongo array with net meshes of 0.333 and 0.505 mm port and starboard, respectively. An XBT was dropped and a standard ICNAF oblique tow was made at each "Lipo" station. In addition, various combinations of Smith-MacIntyre, Ponar, and Dietz-Laford grabs were lowered during Part II of the cruise. A Naturalist Dredge was towed at two knots for 5-10 minutes during each part of the cruise. At each station, an XBT station cast was made, a surface water bucket sample collected, and weather conditions monitored.

AL-76-03
Hydrographic Studies Cruise

ALBATROSS IV was engaged on this cruise from May 11 to May 21, 1976. The area of investigation was the Gulf of Maine.

The objectives of the cruise were to (1) characterize the deep waters (> 100 fathoms) of the Gulf of Maine and Northeast Channel; (2) investigate the distribution of Age I herring and other species in the Gulf of Maine and Georges Bank; (3) obtain an estimate of the particulate and dissolved primary production in the Gulf of Maine and Georges Bank; (4) train various staff members of NEFC in the at-sea operation of the STD and interpretations of data for finality control.

AL-76-05
Oceanographic Studies Cruise

ALBATROSS IV was engaged on this cruise from July 28 to August 16, 1976. The area of investigation was from south of Cape Cod to Northeast Channel, Georges Basin, and Georges Bank.

The principal objectives of the cruise were to (1) test equipment and procedures for deploying a current meter in Northeast Channel to be used in a 2-year experiment; (2) define the position of the shelf-slope waterfront from south of Cape Cod to Northeast Channel; (3) characterize the waters of Northeast Channel and Georges Basin to examine slope water intrusions into the Gulf of Maine; (4) investigate the possible causes for the appearance of relatively cool water in northern Great South Channel and on eastern Georges Bank; (5) engage in a cooperative phytoplankton experiment with Woods Hole Oceanographic Institute; and, (6) obtain an estimate of the primary production of particulate and dissolved organic carbon in the Georges Bank area at not less than 20 stations.

At each of 133 stations, a Plessey STD/DO with rosette sampler was lowered to obtain continuous profiles of temperature, salinity, and dissolved oxygen. At each station, water samples for salinity, oxygen, chlorophyll, and nutrients were obtained. A total of 87 XBT stations were occupied during the cruise and, in addition, surface salinity samples and weather data were collected.

At 22 selected stations, a special cast with Niskin bottles was made and primary production of particulate carbon was measured at each depth for every station and as dissolved carbon at a subset of stations.

Four different types of plankton nets were used during portions of the cruise: A surface phytoplankton net, paired bongo nets, surface neuston net, and a Clark-Bumpas net. The phytoplankton net, with 35 u. mesh, was deployed at about 5 m. on each of the 133 hydrographic stations to sample microplankton. At 28 positions selected as stations across the shelf-slope waterfront, a Clark-Bumpas net with 35 n. mesh designed to open and close at a selected depth was towed beneath the thermocline. Paired 51 cm bongo nets, with 333 u. mesh and a time-depth recorder, were towed at the same stations according to standard MARMAP procedures.

AL-76-09
Part I
Fall Groundfish Survey

Cruise AL-76-09, Part I, a fall ground survey, was conducted by ALBATROSS IV from September 28 to October 18, 1976. Principal areas investigated were Southern New England and mid-Atlantic Bight waters.

Cruise objectives were to (1) investigate the distribution, weights and abundance of finfish and invertebrates collected in a standard otter trawl from Martha's Vineyard to Cape Hatteras, (2) investigate the distribution and abundance of larval and juvenile fishes collected by 60 cm bongo nets and neuston nets at selected stations in the survey areas, (3) make extensive sample collections for life history studies, including age and growth, food habits, maturation and fecundity, and (4) make hydrographic collections for temperatures, salinity, and oxygen determinations.

A roller-rigged #36 Yankee trawl with 544 Kg BMV oval doors was used for trawl stations. A standard trawl station consisted of a 1/2-hour tow at 3.5 knots. During the tow a fathometer trace was kept for subsequent analysis of bottom contours and fish echoes. Plankton tows were made at selected stations using 60 cm bongo nets and standard MARMAP sampling procedures. A one-meter Haedrich net was towed for 15 minutes at 3.5 knots to sample the neuston. In addition, neuston samples were taken with the newly designed MARMAP neuston net at 1.5 to 2 knots for 10 minutes. On trawl stations surface and bottom salinity samples were collected, bottom oxygen determinations made, and an XBT profile taken. The ALBATROSS IV completed 179 stations from Martha's Vineyard to Cape Hatteras.

AL-76-09
Part II
Fall Bottom Trawl Survey

ALBATROSS IV conducted this part of Cruise AL-76-09 from October 20 to November 5, 1976, in the Georges Bank area.

The purpose of the cruise was to determine the fall distribution and relative abundance of fish species and to collect biological and hydrographical samples.

A 30-minute tow at 3.5 knots was made at each randomly preselected station with the standard Yankee #36 trawl. Standard bottom trawl survey techniques were used to process the catch at each station. Data on each species, including weight and length frequencies, were recorded on trawl logs. Special weight and distribution frequencies were recorded for 32 commercially important species. A standard MARMAP bongo tow was completed at preselected stations. At each station, an XBT was made, a surface water bucket sample collected, and weather conditions monitored. A total of 103 casts were made, including six additional stations in a special XBT transect south of Martha's Vineyard.

AL-76-09
Part III
Fall Bottom Trawl Survey

ALBATROSS IV conducted this part of Cruise AL-76-09 from November 9 to 23, 1976, in the Gulf of Maine and on the Scotian Shelf. Nine stations along the southern edge of Georges Bank were also completed. In addition, an XBT transect from south of Martha's Vineyard out to the 366 m line was completed.

The purpose of the cruise was to determine the fall distribution and relative abundance of fish species and to collect biological and hydrographical samples.

A 30-minute trawl was made at each station with a Standard #36 Yankee otter trawl. Standard groundfish survey techniques were used to process each catch. The location and weight of catches were maintained for 22 commercially important species. Standard MARMAP plankton tows were made at selected trawl stations at two knots. An XBT cast was made, a surface water bucket sample collected, and weather conditions recorded at each station. ALBATROSS IV completed 74 standard trawl and nine COMAP stations.

AL-76-10
Ecosystems Biological Oceanography

ALBATROSS IV was engaged on this cruise from August 24 to September 9, 1976. The cruise was divided into two parts. The principal areas of investigation were Lower New York Bay and New York Bight Apex and the Continental Shelf between New York and Delaware.

The objectives of Part I, Lower New York Bay and New York Bight Apex, from August 24 to 29, were to (1) determine the effects of heavy metals on the transfer rates of energy and carbon for organisms at or near the base of the food web for demersal fish, (2) determine the interrelationships between the rates at which organic material is taken up and decomposed by these organisms, and the number and kinds of organisms responsible for these activities, and (3) monitor the distribution and magnitude of oxidation of organic matter by the seabed in the apex and to compare the rates found with those of previous summers.

The objectives of Part II, Lower New York Bay and the Continental Shelf between New York and Delaware, from August 29 to September 9, were to examine integrated water columns for primary productivity, heavy metal concentrations, total bacterial counts, oxygen consumption by the seabed and the water above, and nutrient regeneration from the benthos along a series of transects from the Lower Hudson Estuary to the Outer New York Bight to determine the extent and magnitude of influence of the New York Metropolitan Area on biological components and activities of the affected estuary and adjacent Continental Shelf, particularly, with reference to recent fish kills.

GB-2-76 (138)
Scallop Survey

GEORGE M. BOWERS was engaged on this cruise from March 9 to 26, 1976. The survey area extended from Vero Beach, Florida, to Daytona Beach, Florida, between the 10 and 40 fathom curves.

The primary objective of the survey was to obtain a photographic record of the distribution and abundance of calico scallops (argopecten gibbus) and other epibenthic invertebrates. A secondary objective was to delineate "live bottom" (sponge, coral, and rocky reef) areas providing habitat for fish, such as sea bass, grouper, and snapper.

An unmanned, towed submersible, the Remote Underwater Fisheries Assessment System (RUFAS), was utilized to photograph the sea floor and epibenthic invertebrates. The submersible was "flown" five feet above the sea floor in a series of west-east transects across the survey area. A closed-circuit television camera mounted on RUFAS provided a picture of the sea floor during each transect. A 35mm color film sequence camera on RUFAS was activated at periodic intervals along each transect or whenever objects or organisms of interest were viewed.

Fifteen RUFAS transects viewing over 200 miles of sea floor were completed during the survey. Approximately, 6,400 feet of 35mm color film was exposed during 28 hours of the submersible's 66 hours of underwater survey time.

Calico scallops were not observed in large beds or in dense concentrations during this survey, as they have been in the past. Small patches of scallops of possible commercial significance were observed in 18-to-29 fathoms along the 3L1-1700, 1850, 1900, and 1950 loran lines. The largest patches of scallops were viewed in 23 and 24 fathoms along the 3L1-1900 loran line and in 20.5, 26 and 27.5 fathoms along the 3L1-1700 loran lines.

GB-3-76 (139)
Croaker Tagging Cruise
Northern Gulf of Mexico

GEORGE M. BOWERS was engaged on this cruise from April 20 to May 6, 1976. The objectives of this cruise were to determine the abundance of "bull" croaker populations associated with offshore platforms, assess the abilities of platforms to hold and attract bull croaker by observing the movements of tagged croaker and to obtain environmental data around the fishing stations in order to relate it with the density of croaker.

GB-4-76 (140)
Harvesting Technology Cruise

GEORGE M. BOWERS conducted this cruise from May 10 to June 1, 1976, in the Northern Gulf of Mexico.

Objectives of the cruise were to (1) conduct SCUBA diver evaluations of the performance characteristics of a 60-foot prototype shrimp separator trawl; (2) conduct SCUBA diver evaluations of four-mouth barrier designs for use on the 60-foot prototype separator trawl; (3) conduct SCUBA diver evaluations of an off-bottom electrode array design; (4) make field measurements of an off-bottom electrode array design; and, (5) conduct shrimp behavior studies relating to the development of the off-bottom shrimp trawl concept.

GB-5-76 (141)
Groundfish Assessment Survey

GEORGE M. BOWERS conducted this cruise from June 7 to June 29, 1976, in the northern Gulf of Mexico. The first leg of the survey was between Galveston, Texas, and Isles Dernienes, Louisiana, and the second leg, from Isles Dernienes to Pensacola Bay, Florida.

Cruise objectives were to (1) assess finfish stocks west of 91°31' longitude in a 2-to-20 fathoms and (2) assess juvenile croaker on the primary fishing grounds (88°00' to 91°30' longitude) in 2-to-5 fathoms.

Sample site selection was random west of Mobile Bay, Alabama; however, east of Mobile Bay to Pensacola Bay, all sites within 5 fathoms were sampled. Sampling was conducted with a 40-foot semi-balloon shrimp trawl with 8' x 40" chain doons. Environmental data collected included surface and bottom temperatures and salinities.

GB-5-76 (continued)

One hundred ten trawling stations were sampled in the primary area (88°00' to 91°30' longitude) in a 2-to-5 fathoms. One hundred fifty-nine stations were sampled in the secondary area (west of 91°30' longitude) between 2 and 20 fathoms.

GB-6-76 (142)
Fishtrap Buoy Test

GEORGE M. BOWERS conducted this cruise from July 19 to August 3, 1976. Buoys with different length and diameter lines were tested to find a practical economical method of fishing traps in deep water off southeastern Florida. Also, drags were made to assess the epibenthic fauna and bottomtype between 25 and 100 fathoms.

GB-7-76 (144)
Groundfish Assessment Cruise

GEORGE M. BOWERS conducted this trawl mensuration and groundfish assessment cruise in the northern Gulf of Mexico from September 17 to October 8, 1976.

Objectives of the cruise were to (1) mensurate and adjust "v" doors on a 40-foot semi-balloon trawl for optimum performance; (2) survey groundfish stocks from 2-to-5 fathoms between 90° and 94°W longitude and between 2 and 5 fathoms from Ship Shoal, Louisiana (91°20'W longitude), to Mobile Bay, Alabama (88°00'W longitude); evaluate shrimp fleet discard rate within the survey area; (3) evaluate catch rates of a 40-foot semi-balloon trawl rigged with steel doors as compared to the sampling trawl; and (4) collect environmental data in the survey area.

Fifty-five stations were completed in the primary study area and 78 stations were completed in the secondary study area. Tow time was either 30 or 10 minutes at each station. Surface temperature and salinity, water samples for bottom salinities and turbidity measurements were made at each station.

GB-9-76 (146)
Harvesting Technology Evaluation

GEORGE M. BOWERS was engaged on this cruise in the northern Gulf of Mexico from October 12 to 19, 1976.

GB-9-76 (continued)

Objectives of the cruise were to (1) conduct SCUBA diver evaluation of a 60-foot shrimp separator and standard shrimp trawl; (2) conduct SCUBA diver evaluations of a trailer electrode-array design; and (3) conduct field measurements of the trailer electrode array electrical output voltage.

JC-76-01
Southeast Alaska Herring Survey

NOAA Ship JOHN N. COBB was engaged on this cruise from January 14 to February 11, 1976. The areas of investigation were Gastineau Channel, Lynn Canal, Upper Chatham Strait and the west coast of Prince of Wales Island.

The objectives of this cruise were to (1) locate, sample, and assess wintering concentrations of Pacific herring which are suspected to contribute to the spring Lynn Canal fishery; (2) locate, sample, and assess wintering concentrations of Pacific herring which are suspected to occur in the Heceta Island-Sea Otter Sound region off the west coast of Prince of Wales Island, and, (3) measure temperature and salinity with depth in the areas surveyed.

JC-76-02
Southeast Alaska Groundfish Survey

JOHN N. COBB was engaged on this cruise from April 10 to May 27, 1976. This survey covered the eastern-most Gulf of Alaska area between Yakutat Bay and Cross Sound and the inside waters of southeastern Alaska between Cross Sound and Dixon Entrance. This was the sixth in a series of cruises designed to assess the status of pollock stocks and the fishery potential of groundfish resources in the northeastern Pacific area of Alaska.

Prior to fishing, the vessel traversed the area using an echo sounder to locate satisfactory trawling bottom. All trawl hauls were for a duration of one-half hour. An XBT cast was made during each tow of the survey. A total of 87 trawl hauls were made in the survey area. Of these, 31 were made in outside waters and 56, in inside waters.

Biological data collected for pollock included 2,510-length measurements and approximately 790 otoliths. In addition, approximately 12,600-length measurements were obtained from other principal groundfish species. A total of 142 sablefish were tagged and released in inside waters.

JC-76-03A
Shrimp Net Research

JOHN N. COBB was engaged on this cruise from July 9 to 21, 1976. Principal area of investigation was Puget Sound, off Seattle, Washington.

The principal objective was to determine the size distributions of pink shrimp, Pandalus Jondari, passing through or retained by several different panels of commercial shrimp netting. A secondary objective was to conduct initial fishing tests with an experimental semi-balloon trawl modified to provide more uniform shrimp size selectivity.

JC-76-03B
Rockfish Survey

This cruise was an experimental rockfish survey off Monterey, California, and in Queen Charlotte Sound, British Columbia, conducted by JOHN N. COBB and NOAA Charter Vessels PAT SAN MARIE and PACIFIC RAIDER from August 2 to October 1, 1976. The M/V WESTNESS, under charter to the Washington State Department of Fisheries, and the Canadian R/V G. B. REED also participated in the Queen Charlotte Sound part of the survey.

Specific objectives of the cruise were to collect data necessary to (1) estimate the mean biomass density per unit area for each fish species taken in bottom trawl hauls; (2) estimate the mean pelagic fish biomass density per unit area; (3) determine species composition of pelagic fish aggregation; (4) determine size composition of all rockfish species and the abundant non-rockfish species in bottom and midwater trawl catches; (5) determine the age composition, in the catches of both types of trawls, for selected "target" species (chili-pepper, Sebastes Goodei, and bocaccio, S. Paucispinis, in the Monterey area; Pacific Ocean perch, S. Alutus, and yellowtail rockfish, S. Flavidus, in Queen Charlotte Sound); (6) obtain data on the acoustic target strength of selected rockfish species; (7) estimate the proportion of untrawlable bottom in each survey area; and (8) estimate the relative efficiency of three types of bottom trawls used by JOHN N. COBB, WESTNESS, and G. B. REED.

JC-74-04
Southeast Alaska Pacific Cod Survey

This cruise was conducted by JOHN N. COBB in October-November 1976. The area of investigation was inside southeast Alaskan waters, Lynn Canal-Dixon Entrance.

JC-74-04 (continued)

The objectives of the cruise were to conduct long line fish trap surveys to assess the bathymetric and geological distribution, relative abundance and biological condition of Pacific cod, Gadus Macrocephalus.

TC-76-01
Eastern Tropical Pacific Porpoise Distribution Survey

TOWNSEND CROMWELL was engaged on this cruise from January 5 to March 3, 1976. This cruise was divided into two legs: Leg I began on January 5, at Honolulu, Hawaii, and proceeded to the Galapagos Islands, where a port call was made on January 30 and, then, to Puntarenas, Costa Rica, via Cocos Island, arriving at Puntarenas on February 6. Leg II began at Puntarenas on February 11 via latitude 13°00'N, longitude 134°30'W, and then to San Diego, California, arriving on March 3.

The primary objective of the cruise was to ascertain the boundaries of offshore porpoise distribution in the eastern tropical Pacific, particularly, those of spotted and spinner porpoise species. The survey was designed to investigate the distribution in regions of presently understood boundaries along divergence and convergence regions of the equatorial currents and near oceanic islands. Concurrently, bird sightings and other marine mammal sightings were to be recorded.

Midwater "COBB Trawls" were made just after dark to collect species for taxonomic studies. During daylingt hours, one or more jigs were trolled to collect fish for heavy metal studies. XBT's, surface water samples, thermosalinograph recordings and meteorological data for correlation with sightings and catches were also taken.

TC-76-02
Microstratification Survey
California Coast

TOWNSEND CROMWELL was engaged on this project from March 8 to April 2, 1976. The cruise was divided into three legs, all departing from and terminating at San Diego, California.

Leg I was devoted to testing and modifying as necessary all equipment to be used during subsequent legs.

TC-76-02 (continued)

Leg II consisted of occupying stations along the 10-fathom curve seaward to approximately seven miles out along the California coast from Point La Jolla to Dana Point. The objective was to sample various particles at various depths to defind micro distribution of the particles and organisms in the chlorophyll maximum layer. All sampling was done by pumping, either through a lowered base and deck pump, a submersible pump with hose to the deck, or a self-contained pump with filter entrapment.

Leg III consisted of station work but with only one pumping operation, a net tow and an STD cast at each station. Standard CalCoFi stations were occupied from San Diego to Los Angeles and offshore approximately 60 nmi.

Data collected on this cruise included eight bongo net tows, 16 plankton net tows, 74 STD casts, 220 pump samples and 110 free-fall particle counts.

TC-76-03
PTDF Transit to Hawaii

TOWNSEND CROMWELL conducted this cruise, a PTDF Transit, from San Diego, California, to Honolulu, Hawaii, from April 2 to 12, 1976.

The scientific objective of this cruise was to test transportation procedures for transporting live anchovies in the vessel bait tanks from commercial bait receivers in San Diego to Kewalo Basin, Honolulu, Hawaii. During transit, XBT's were taken at 4-hour intervals and continuous surface thermosalinograph readings recorded.

TC-76-04
Resource Assessment
Northwest Hawaiian Islands

TOWNSEND CROMWELL was engaged on this project from May 3 to June 9, 1976. The cruise was divided into three legs, each dealing with a separate, unrelated scientific objective.

Leg I consisted of two 1-day trips on May 3 and 4 to demonstrate oceanographic and fisheries data collection techniques to students of the University of Hawaii and NMFS Laboratory personnel.

Leg II began on May 5 and ended on May 19, 1976. The islands of Mihoa, Lajsan, Necker, and the French Frigate Shoals were visited. The objective was to make a preliminary survey of inshore marine and bird fauna for an integrated assessment design.

TC-76-04 (continued)

Leg III, tracking skipjack tuna in local waters off Oahu, bagan on May 24 and ended on June 9, 1976. Sonic tags were implanted in medium-size skipjack tuna and the signal received by ship's sonar enabled the tracking of an individual fish for habit studies.

TC-76-05
Western Pacific PTDF Expedition

TOWNSEND CROMWELL was engaged on this cruise in the waters of the U.S. Trust Territory of the Pacific Islands from June 21 to September 16, 1976.

The primary objectives of this cruise were to (1) scout for tuna schools and drift logs in the areas north and south of Guam; (2) observe fish aggregations around fabricated floating objects; (3) collect environmental and biological data; and (4) conduct bottom trawling near Saipan using the shrimp trawl.

Eighteen STD casts, one at each latitude from 20^{o} to 4^{o}N were made between $145^{o}$and 148^{o}E. XBT casts were made twice daily except during STD runs, at which time, additional casts were made every half degree of latitude traversed.

TC-76-06
Resource Assessment
Northwest Hawaiian Islands
Tracking of Skipjack Tuna

TOWNSEND CROMWELL was engaged on this cruise from October 5 to November 30, 1976. The area of investigation was the Northwestern Hawaiian Islands from Middle Bank to Hancock Seamount. The objectives of this cruise were to:

(1) Conduct bottom fish trawling, fish and lobster trapping, handlining, and oceanographic surveys, as well as to collect forage organism at selected insular sites, in order to assess the fishery resources of the Northwestern Hawaiian Islands.

(2) Continuously monitor the swimming of several large skipjack tuna for data on swimming depth and activity, by tagging individual tuna with ultrasonic transmitters.

DE-76-01
Trawl Mensuration Cruise

DELAWARE II conducted a trawl mensuration cruise in the waters south of Martha's Vineyard from January 29 to February 6, 1976. The objective of this cruise was to acoustically measure the headrope height and wingspread of four newly constructed two-seam, modified No. 41 high-opening bottom trawls.

Each of the new trawls were fished for a 30-minute period at a vessel speed of 3.5 knots preceding mensuration. Following this procedure, each trawl was outfitted with 50 kHz wing and headrope transducers and connected electrically to a shipboard recorder to produce a graphic record of both headrope height and wingspread. Each trawl was towed through a sequence of towing parameters which included variations of vessel speed and directions "with," "across," and "against" prevailing tidal currents. Operations were conducted on a 24-hours-per-day basis with variations in the velocity of tidal currents throughout the period. Tables of the results of measurements of headrope height and wingspread with indicated vessel speed, scopes, water depths, and directions of tow were made.

DE-76-02
Placement of Fish Traps

This was a one-day cruise by DELAWARE II to place live fish traps in the New York Bight area, which was accomplished on February 11, 1976. This cruise had as its only objective the placement of fish traps. No data was collected.

DE-76-05
1976 Spring Groundfish Survey

DELAWARE II completed this Spring Groundfish Survey from Martha's Vineyard to Cape Hatteras between March 4 and 25, 1976.

The objectives of this cruise were to (1) investigate the distribution, weights, and abundance of finfish and invertebrates collected in a standard otter trawl; (2) investigate the distribution and abundance of larval and juvenile fishes collected by 60 cm bongo nets and neuston nets at selected stations; (3) make extensive sample collections for life history studies, including age and growth, food habits, maturation, and fecundity; and (4) obtain surface and bottom salinity and temperature profiles at all stations.

DE-76-05 (continued)

A modified No. 41 high-opening otter trawl with rollers, 10 fathom legs and 1,500 lbs. BMV doors was towed at each station. The cod end and upper belly were lined with 1/2-inch mesh netting to retain smaller fish. Surface and bottom salinities and an XBT profile were taken at each station. In tows occurring in depths of 185 meters or greater, a fathometer trace was taken and saved for future reference. Catch processing was based on standard groundfish survey techniques, essentially, sorting to species, weighing and measuring the entire catch.

Plankton tows were made at selected trawl stations, using 60 cm bongo nets and standard MARMAP sampling procedures. In conjunction with trawling operations, a 1-meter Haedrich net was towed for 15 minutes at 35 knots to sample the neuston. In addition, neuston samples were taken with the newly-designed MARMAP neuston net at 1.5-to-2 knots for 10 minutes during bongo tows.

The DELAWARE II completed 174 stations from Martha's Vineyard to Cape Hatteras. Included in the total, either as combined or separate stations, are 174 trawl stations, 174 Haldrich stations, 76 MARMAP neuston stations and 76 bongo stations.

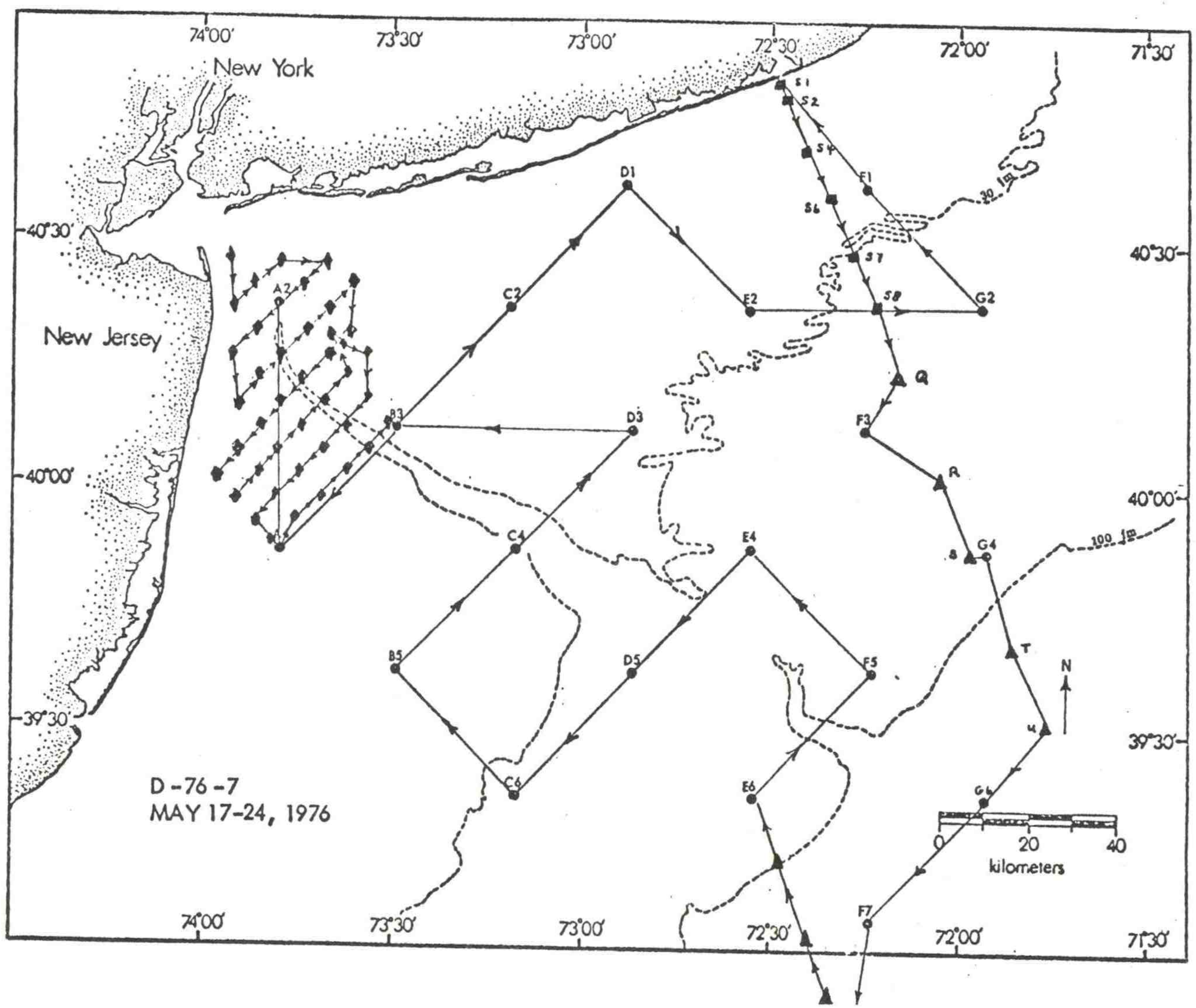
DE-76-06
Shellfish Resource Assessment Survey

DELAWARE II was engaged on this cruise from April 6 to May 13, 1976. The area of investigation was from Block Island, Rhode Island, to Cape Fear, North Carolina. The objective of this cruise was to collect biological data to be used in studies of life history and population dynamics of the surf clam and ocean quahog. Collections of clams and quahogs were made to study size and age structure, reproductive characteristics, and comparative morphology.

DE-76-07
New York Bight Icthyoplankton Survey

This was the 14th in a series of cruises to investigate the distribution of icthyoplankton in the New York Bight with special emphasis on vertical processes in the near shore area.

In addition to icthyoplankton samples, information was collected on the hydrography, 300 plankton, phytoplankton and nutrients in the area. Also, surface tows were taken in the apex of the New York Bight to investigate mutagenesis of fish eggs.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DE-76-08
Shellfish Resource Assessment Survey

This Shellfish Resource Assessment Survey was conducted by DELAWARE II from Sandy Hook, New Jersey, to Woods Hole, Massachusetts, during the period from May 25 to 28, 1976.

The objectives of this cruise were to (1) collect shellfish samples from the vicinity of a hydroxide-pesticide spill in the New York Bight apex for tissue analysis and (2) collect shellfish from the New London, Connecticut, dumping ground and control areas for determination of spoiling impacts on tissue heavy metals concentrations.

DE-76-09
Fisheries Technology Training Cruise

The objective of this cruise was to give NOAA personnel involved in the University of Rhode Island Fisheries Technology Course "hands-on" experience in conducting all phases of Repetitive Trawl Studies aboard the NOAA Ship DELAWARE II. This cruise was conducted by DELAWARE II on June 7 and 8, 1976, from offshore Barnegat Light to the apex of the New York Bight.

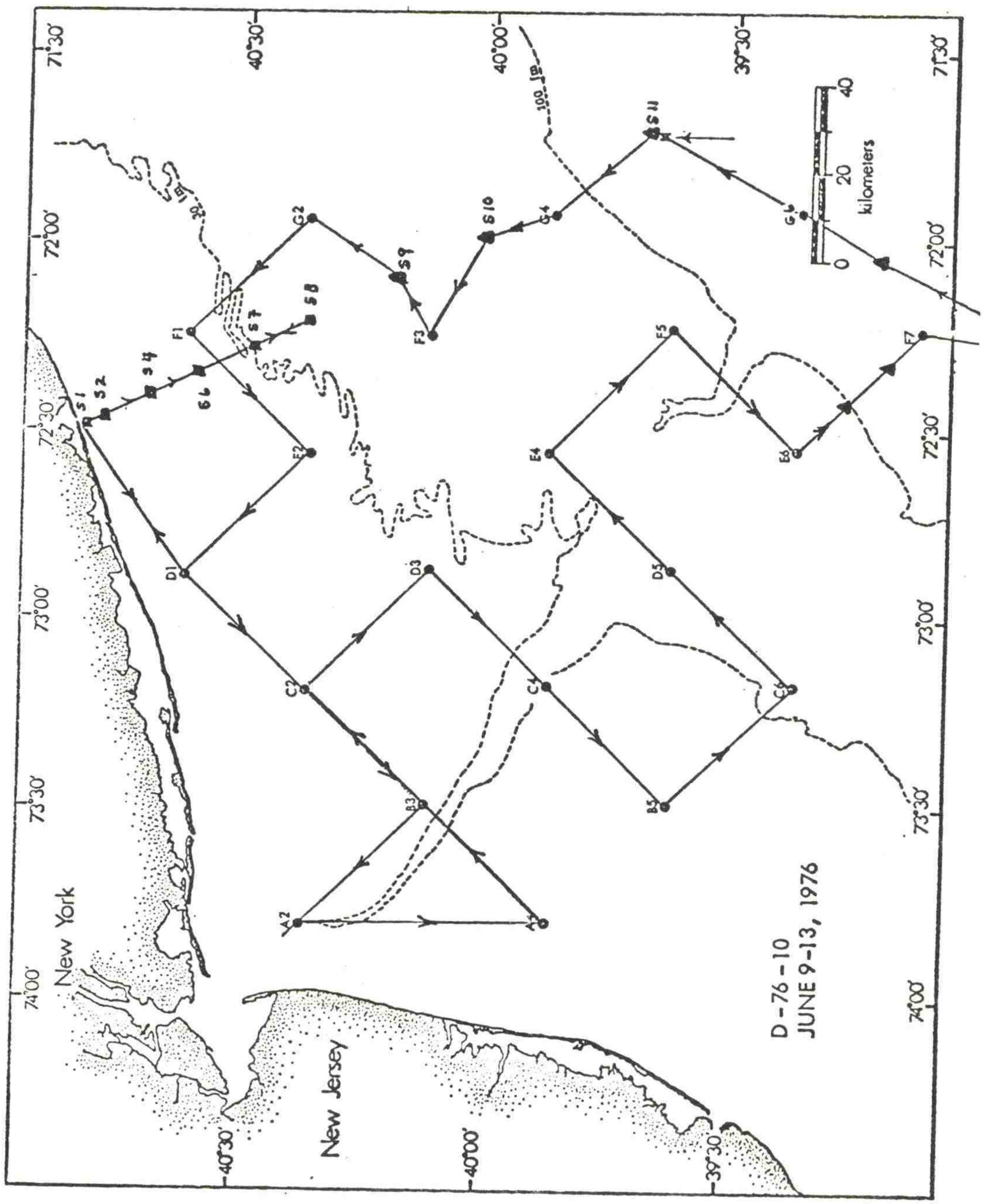
DE-76-10
Ichthyoplankton Survey
New York Bight

This cruise by DELAWARE II was the 15th in a series of cruises to investigate the distribution of ichthyoplankton in the New York Bight area with special emphasis on vertical processes in the near-shore-area. In addition to ichthyoplankton samples, information was collected on the hydrography, zooplankton, phytoplankton, and nutrients in the area.

This cruise began June 9 and ended June 13, 1976.

DE-76-12
Groundfish Survey

This groundfish survey aboard DELAWARE II began on December 5 and ended on December 21, 1976, during which 114 stations from Martha's Vineyard, Massachusetts, to Assateague Island, Maryland were completed in waters from 9 to 365 meters.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DE-76-12 (continued)

Objectives of this cruise were to (1) investigate the distribution, weights, and abundance of finfish and invertebrates collected in a standard otter trawl; (2) investigate the distribution and abundance of larval and juvenile fishes collected by 60 cm bongo nets and neuston nets at selected stations; (3) make extensive sample collection for life history studies, including age and growth, maturation, and fecundity; and (4) obtain temperature profiles and dissolved oxygen concentrations at selected depths and stations.

The DELAWARE II towed a No. 36 Yankee otter trawl with chain sweep, 9.1 m legs and 544 kg BMV oval doors. The cod end and upper belly were lined with 13 mm mesh netting to retain smaller fish. The trawl was towed for 30 minutes at 3.5 knots. An XBT profile was made at each station and a fathometer trace was made and retained at each station depth of 185 m or greater. The entire catch was sorted to species, weighed and measured. Plankton tows were made with a 60 cm bongo net and standard MARMAP sampling procedures. Neuston samples were taken with the newly designed MARMAP neuston net at 1.5 to 2 knots for 10 minutes during bongo tows. The water column was sampled at standard depths with Niskin water bottles.

DE-76-13
Oil Spill Research Cruise

DELAWARE II conducted this cruise from December 22 to 24, 1976, in the vicinity of the oil spill from the tanker ARGO MERCHANT, aground on Fishing Rip.

The purpose of the cruise was to sample the fish and associated populations of invertebrates and plankton in the vicinity of the oil spill, as well as from outside the area contaminated by the oil slick, for use as controls. Additional objectives were to obtain oil, water and sediment samples and to observe the effect of oil on birds and mammals in the area.

Work was conducted at 11 stations, of which six were sampled with miscellaneous gear and four with only bathythermographs and surface water buckets.

Plankton, hydrographic, SBT, and sediment samples were obtained from both clean and contaminated areas.

DS-76-01 (100)
Porpoise Cruise
Eastern Tropical Pacific

DAVID STARR JORDAN was engaged on this cruise from January 5 to March 2, 1976. The area of investigation was the eastern tropical Pacific Ocean from 8°S to 20°N latitude and 85°W to 130°W latitude. The objectives of the cruise were to:

1. Use search methods similar to those employed in the commercial tuna fishery to survey the suspected boundaries of offshore porpoise populations in the eastern tropical Pacific.

2. In particular, investigate porpoise distribution along regions of divergence and convergence of the equatorial currents and near-oceanic islands.

3. Identify to species, to the degree possible, all marine mammal sightings and estimate their numbers.

4. Note associations of birds and fishes with these populations.

5. Measure the thermal and salinity regime by:

   a. A series of XBT probes;
   b. surface salinity samples;
   c. continuous temperature-salinity records.

6. Identify, to the degree possible, and record the distribution of all marine birds and collect bird specimens.

7. Make nightly neuston hauls and Isaacs-Kidd midwater trawls for collection of epipelagic and meso-pelagic specimens.

8. Make nighttime stations for fish and squid samples and hook-and-line fish samples.

9. Record the nature of deep scattering layers and individual acoustic targets and measure their volume, reverberation, and target strength levels.

DAVID STARR JORDAN covered about 11,400 nautical miles along a pre-determined track. Eight species of dolphins were observed and identified. In addition, several dolphin sightings were identified to species. Four small-to-medium size whale species were noted plus one grouping of un-identified beaked whales. One species of large whales was identified and two additional groupings were observed and enumerated. A total of 60 bird species was identified and a total of about 26,000 to 27,000 individuals counted. Twenty-four bird specimens were collected.

DS-76-02 (101)
Microstratification Survey
Southern California Bight

This cruise by DAVID STARR JORDAN was part of a three-ship experiment to define spatial and temporal micro-distribution of planktonic food organisms upon which larval anchovy feed. The other vessels were NOAA's TOWNSEND CROMWELL and Scripps Institution of Oceanography Vessel ALEXANDER AGASSIZ. DAVID STARR JORDAN participated in two legs of this project, from March 15 to April 2, 1976. The objectives were to investigate the relation on small scales of zooplankton to phytoplankton, define microdistribution of particles and organisms in the chlorophyll maximum layer, investigate the relation of fish larvae to plankton microdistribution, investigate mechanisms for establishing and maintaining the chlorophyll maximum layer, investigate anchovy cannibalism, vertical distribution of larvae with gas bladders, and invertebrate predation on larvae.

A variety of measurements was made to determine vertical and horizontal microdistribution of dinoflagellates, diatoms and zooplankton and to determine micro- and microdistribution of associated environmental determinates (nutrients, oxygen, salinity, temperature, and particle concentrations).

In order to study the effects of predation by adult anchovy on their eggs and larvae, areas where anchovy schools were concentrated were identified by aerial search and radio contact with the fishermen. These areas were sampled intensively with the midwater trawl to collect adult anchovy and with plankton nets to collect eggs and larvae. Shipboard examination of the catch indicated that eggs and larvae were abundant in shoal areas and that some of the adult fishes had preyed upon their own eggs.

DS-76-03 (103)
Hydroacoustical Studies
Southern California Coast

DAVID STARR JORDAN was engaged on this cruise from May 4 to 15, 1976, in the vicinity of Point Dume, Anacapa Island, Catalina Island, Point Loma, and San Clemente Island. The objectives of the cruise were to: (1) Make routine doppler analysis of school fish targets; (2) sample adult anchovy for evaluation of cannibalism on eggs; (3) sample anchovy larvae before, during, and after sundown to study the process of air bladder filling in anchovy larvae; (4) make vertical profiles of multiple high frequency volume reverberation; (5) test and demonstrate fish school mapping precision model; (6) check feasibility of direct measurement of sound attenuation within fish schools and comparison to actual within school echo-level slope; (7) assess changes in the water column effected by the passage of an anchovy school; (8) test a continuous particle counter and obtain profiles of particles; (9) locate and collect jack mackerel eggs.

Approximately 15 hours of school fish doppler measurements were recorded for later analysis ashore. Anchovy adults were quick-frozen in liquid nitrogen for later analysis of cannibalism. One hourly and 5 half-hourly manta neuston tows were taken before, during, and after sundown, and about 30 hours of multiple high frequency volume reverberation measurements were taken. A continuous particle counter was successfully tested and a profile of particles (70 um to 500 um) was taken off Point Loma.

DS-76-04 (103)
Oceanographic Studies Cruise
Eastern North Pacific

DAVID STARR JORDAN was engaged on this cruise from June 1 to July 2, 1976. The cruise covered 4,000 nautical miles in the eastern North Pacific with the survey centered about the subtropical frontal region near 32°N, 137°30'W.

The objectives of this cruise were (1) improve our understanding of the physical processes involved in the frontal boundaries of the transition zone in the eastern North Pacific and, through this understanding, provide a basis for relating these processes to the distribution and relative abundance of albacore during the early season on shore migration; (2) examine the feasibility of using satellite observations to monitor the changes in the ocean characteristics that influence the spatial and temporal distribution and relative abundance of albacore tuna.

A broad scale search pattern was conducted using STD and XBT casts and a continuous thermosalinograph trace. After several crossings, a tighter pattern was employed to follow the front and determine local orientation. A 90-nautical mile transect was conducted normal to the front. STD stations were spaced at 5- and 10-nautical miles. Water samples were taken by command sampler and/or Nansen casts for analysis of dissolved oxygen and chlorophyll. Throughout the cruise, surface chlorophyll was monitored continuously while underway. After completing the study of the subtropic front, meridional transects were conducted to locate the subarctic front. A current meter station was conducted on each side of the front and five levels were observed. Radiosonde soundings were made to measure vertical profiles of temperature and moisture. These data will be used to determine their effect upon satellite-derived surface temperature observations. The oceanographic station data and continuous thermosalinograph and chlorophyll data will be used for "ground truth" studies of satellite remote-sensed data.

DS-76-05 (104)
Anchovy/Sportfish Interaction

This cruise was conducted by DAVID STARR JORDAN from July 12 to September 17, 1976. The area of investigation was the Los Angeles Bight from San Mateo Point to Point Dume. The purpose of this cruise was to assess the degree of co-occurrence of northern anchovies and important recreational species in a section of the Los Angeles Bight; to correlate the movement of centers of anchovy abundance to the catch of predator species; to set the above studies in the context of the biological and physical ocean environment prevailing at the time.

Anchovy abundance was determined by acoustically mapping fish schools along a series of close spaced transects in the San Pedro Channel and along the 30-fathom contour from San Mateo Point to Point Dume. A side-looking sonar was directed 90^{o} to the ships' heading and interrogated over a 250 m observation band. Approximately, 8 kw of 30kHz sound was used for 10 msec pulses repeated at 1 second intervals. The return signal was digitized and analyzed by shipboard computer. The number of detected targets was calculated every 10 minutes and tabulated as the smallest sample unit. An 18 kHz echo sounder was operative continuously throughout the cruise period. A series of XBT's were launched during each occupation of the transect pattern. Profiles of salinity and temperature, using the STDO instrument, were made at dawn and dusk of each day devoted to acoustical work on the survey pattern. Biological sampling was conducted each night on a random basis weighted toward those areas where high target densities were encountered.

DS-76-06 (105)
Porpoise Behavior Cruise
Eastern Tropical Pacific

DAVID STARR JORDAN was engaged on this cruise from October 5 to November 8, 1976. The area of operation was in the eastern tropical Pacific in the vicinity of Clipperton Island and Mexico. The purpose of this cruise was to identify and define basic parameters of tuna and porpoise behavior and elements of the bond between them. Specific objectives of this cruise were to (1) track three radio-tagged schools of porpoise, in order to study a variety of behavioral aspects over extended periods; (2) identify and photograph all marine mammal sightings and estimate their numbers; (3) collect oceanographic and weather data on a regular basis including surface temperatures, salinities, and XBT's; (4) collect sonar data on the abundance of food organisms available for tuna and porpoise and make oblique tows with an Isaacs-Kidd trawl, in order to gain information on the composition of the food resources; (5) act as a laboratory for dissections of fish and porpoise kill incidental to the commercial fishing operations; and (6) collect birds associated with tuna schools for stomach analysis.

DS-76-07 (106)
Hydroacoustic Survey
Los Angeles Bight

As the development of acoustic stock assessment tachniques approaches the level of practical application, it becomes desirable to compare similar data obtained by independently developed systems. Since one of the target species, Northern Anchovy, is under international exploitation, the fishery management agencies of the Federal Government, the State of California and the Mexican Government have a direct interest in the development of hydroacoustic assessment schemes and their optimum application. The primary purpose of this cruise was to obtain the data necessary for an intercalibration of acoustic systems aboard Federal, State, and Mexican vessels.

A second purpose for the cruise was the field testing of an instrumentation suite designed to collect the data necessary to detect the presence of swim bladders in an acoustic target and, if present, to determine the size distribution of the bladders. The technique utilizes the phenomena of low frequency resonance of acoustic energy by fish swim bladders and a broad band sound source is employed.

In addition to the above work, microstructure of zooplankton distributions were studied using high frequency sound sources and direct sampling gear.

DAVID STARR JORDAN was engaged on this cruise from December 6 to 21, 1976. The area of operation was in the Los Angeles Bight from Point Conception to the United States-Mexico Border.

OR-76-1
Shrimp Resource Assessment Cruise

This shrimp resource assessment survey cruise around Kodiak Island and the Alaskan Peninsula was accomplished by OREGON from April 1 to May 19, 1976. The objectives were to: Define possible areas of trawlable bottom; define the distribution of pandalid shrimp populations; determine the abundance of pandalid species within the trawlable areas; collect length/weight, size/sex, percent sex, percent mortality of shrimp catches returned to the ocean and ancillary data; determine the abundance of pre-recruit shrimp in selected areas; test for persistent percent differences between the currently used volumetric method of estimating catch weights and by use of the new electronic load cell.

OR-76-2
Groundfish Survey
Eastern Bering Sea

This trawl survey, in the general area of the eastern Bering Sea extending from Unimak Pass north to 58°40'N and from 176°40'W east to 158°20'W, was accomplished by OREGON during May 23 to August 13, 1976. The objectives of the cruise were to: Monitor, assess, and predict the status of king crab, tanner crab, and gastropod stocks in the eastern Bering Sea; assess distribution and abundance of groundfish species and to collect data on size composition and age structure; monitor the distribution and abundance of larval king crab, paralithodes camtschatica, along the north side of the Alaska Peninsula; conduct vessel comparison tows with the Charter Vessel PAT SAN MARIE in an area just north of Unimak Island; assess the distribution and abundance of all trawl catch components including snails, other invertebrates, and fishes; collect materials for electrophonetic assay of proteins found in selected gastropods; collect information on marine environmental conditions which affect the distribution and abundance of the species of interest; collect fish and invertebrates for a reference collection of animals of eastern Bering Sea.

OR-76-3
Shrimp Resource Assessment Survey
Alaskan Continental Shelf

OREGON conducted a shrimp resource assessment cruise along the Alaskan Continental Shelf from 157° to 163°W longitude during August 30 to October 29, 1976. The objectives of this cruise were to: Delineate the distribution and estimate the relative abundance of the pandalid shrimp population within the survey strata; establish a year/class index; identify separate stocks within the survey areas; collect length/weight, growth, mortality and ancillary data; collect samples of pardalus goniurus in Pavlof, Beaver, and Kujulik Bays for general life history studies.

OR-76-04
Long Line Fish Trap Survey

A long line fish trap survey in the vicinity of Kodiak Island was accomplished by OREGON during October 18 to November 19, 1976. The objective of this cruise was to assess the bathymetric and geographic distribution, relative abundance, and biological condition of Pacific cod.

OT-76-01 (64)
Groundfish Resource Assessment Survey

OREGON II was engaged on this cruise from January 13 to February 5, 1976. The objectives were (1) collect biological data including species composition, abundance and distribution, and length frequency data on the demersal finfish stocks; (2) collect hydrographic data to determine correlation between distribution and density of finfish and environmental factors; and (3) collect icthyoplankton for larval drift and phytoplankton for productivity studies.

Sample sites were preselected with three 10-minute tows made in each sampling area. Ninety-five sample sites were surveyed east of the Delta between Mobile Bay, Alabama, and the Mississippi River Delta. West of the Delta, 130 sites were surveyed between the Mississippi River and Atchafalaya Bay. All tows were made using a standard 40-foot semi-balloon trawl with 8' x 40" chain doors. Ten surface phytoplankton and 39 oblique zooplankton tows using a bongo array were completed. Surface and bottom water samples and STD data were collected for analysis.

OT-76-02 (65)
Calico Scallop Assessment and Equipment Test

A Calico Scallop Assessment Cruise was conducted by OREGON II off Cape Canaveral, Florida, and the northeast Gulf of Mexico from March 19 to April 8, 1976.

The objectives of this cruise were to (1) confirm visual observations of calico scallop distribution and abundance with ground truth substantiation; (2) make a faunal survey of the benthic organisms of the Cape Canaveral scallop grounds for yearly comparisons; (3) make a photographic survey of the calico scallop grounds in the northeast Gulf of Mexico and substantiate visual observations with ground truth samples; and (4) test the durability and accuracy of a trawl-door-mounted STD.

The cruise was divided into three phases. Phase I, from May 19 to 27, was conducted off Cape Canaveral in 10-40 fathoms of water. A series of half-hour drags were made with 6 or 8-foot tumbler dredges along predetermined transects. Seventy-two samples were taken. Ground truth samples verified observations of calico scallop distribution and abundance made during an earlier photographic survey of the area.

Phase 2 was conducted from March 28 to April 4. Two areas in the northeastern Gulf of Mexico off the Florida panhandle were surveyed to determine distribution and abundance of calico scallops and associated benthic fauna. An unmanned submersible, the Remote Underwater Fisheries Assessment System (RUFAS), and a 6-foot tumbler dredge were used. A photographic record of benthic fauna was made with a 35 mm color movie camera in a series of transects across the area. Approximately 4,250 feet of 35 mm film were exposed and 165 miles of sea floor viewed during the survey.

Phase 3, on April 5 and 6, was spent testing a prototype, self-contained STD sensor attached to trawl doors. A series of drags, in depths of 10 to 400 fathoms near DeSota Canyon were made with the STD attached to the inboard trawl door. The accuracy and durability of the STD appeared to be acceptable; however, tests indicated that minor modifications were needed. The STD instrument package did not affect trawl door performance.

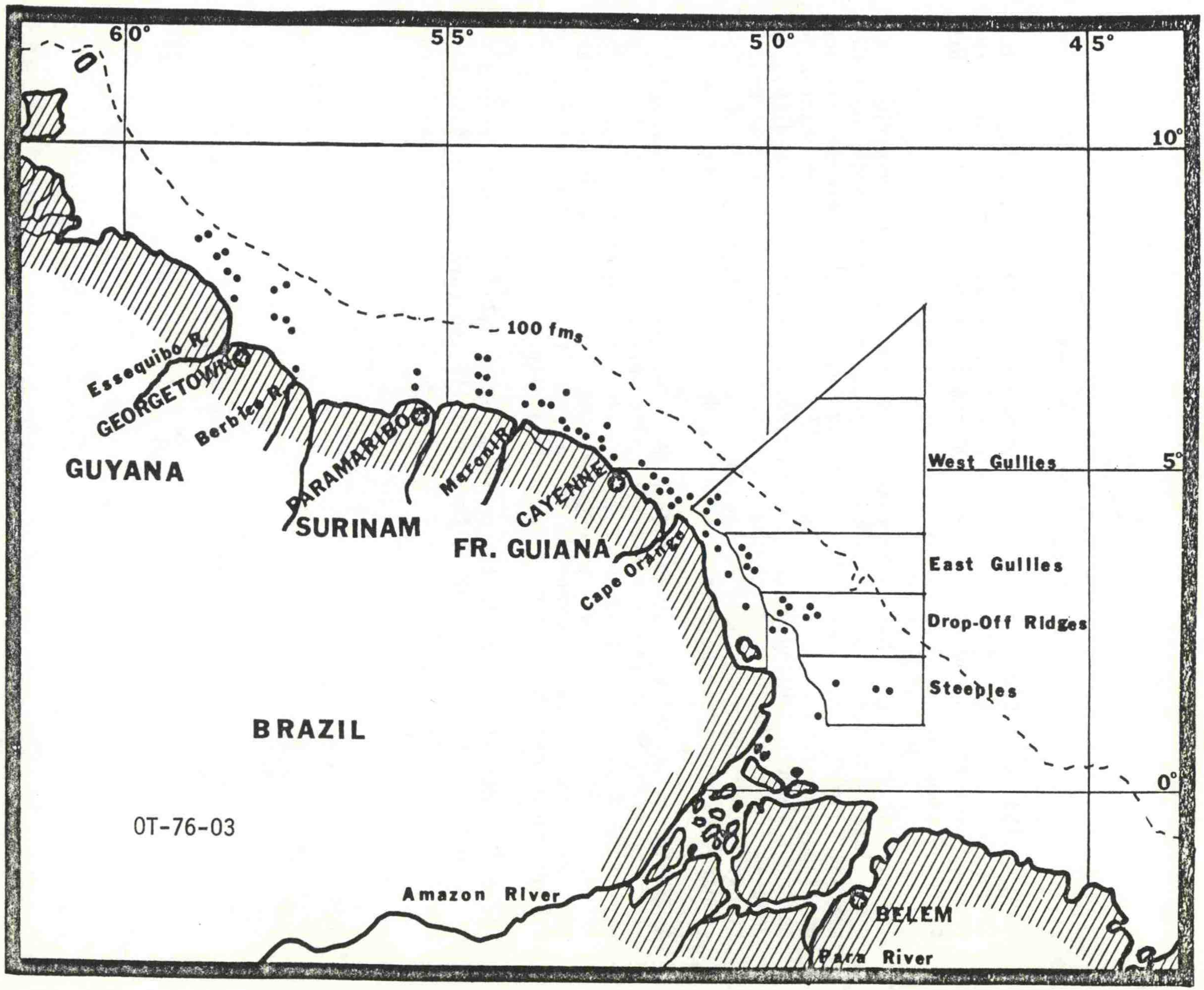
OT-76-03 (66)
Shrimp Assessment Survey
Northeast Coast of South America

This cruise, conducted by OREGON II from May 14 to June 14, 1976, was to investigate an area off Guyana, Surinam, French Guiana, and northeastern Brazil. The area surveyed extended from the Essequibo River to the mouth of the Amazon.

The objectives of this survey were to (1) study the species distribution, size distribution, and some ecological aspects of penaeid shrimp on commercial fishing grounds of the Guianas and Brazil; (2) obtain information on associated fauna, primarily fish; and (3) record concurrent observations on physical oceanography (water temperature, salinity, and turbidity), general composition of the substrate and prevailing meteorological conditions. Information was also collected on maturity stages of shrimp. For comparative purposes, observations were made both day and night.

As part of a cooperative study with RSMAS, University of Miami, Miami, Florida, seven thousand surface drift cards were released along the entire coast from the Essequibo River, Guyana, to the mouth of Para River, Brazil. Observations on aggregations of marine mammals and tunas and tuna-like fishes were recorded in an area from the mouth of the Amazon throughout the Caribbean Sea and to Miami, Florida.

The environmental data collected on this cruise will be used as ground truth for comparison with satellite data collected during the cruise from the Brazilian receiving station.


60°
55°
50°
45°
10°
5°
0°
100 fms
Essequibo R.
GEORGETOWN
Berbice R.
GUYANA
PARAMARIBO
SURINAM
Maroni R.
CAYENNE
FR. GUIANA
Cape Orange
West Gullies
East Gullies
Drop-Off Ridges
Steeples
BRAZIL
OT-76-03
Amazon River
BELEM
Para River

OT-76-04 (67)
Demersal Finfish Assessment Survey

OREGON II completed a summer demersal finfish assessment survey in the northern Gulf of Mexico from July 7 to 16, 1976. This survey included the area from Mobile Bay, Alabama, to Point auFer, Louisiana, and from 5-to-50 fathoms. Two hundred ninety-three 10-minute tows were made using a standard 40-foot semi-balloon shrimp trawl.

The objectives of this cruise were to obtain age composition, relative abundance and distribution of croaker; obtain species composition of the groundfish stock in the survey area; obtain environmental data associated with the groundfish stock; and collect plankton samples with a bongo array.

Temperature profiles were obtained using XBT probes. Salinity data were collected with a refractometer. Water color and secchi disc readings were taken during daylight hours. In addition, water samples were taken from the surface and the bottom to determine dissolved oxygen, chlorophyll, nitrate, phosphate, and ammonia. Plankton samples were obtained by personnel of Louisiana State University Sea Grant Program's Coastal Studies Institute and Marine Science Department.

Catch rates and percent of croaker present were tabulated for the survey area. Length frequency measurements and sexual maturity determinations for croker, spot and sea trout were also carried out during this survey.

OT-76-05 (68)
Shrimp Separator Trawl Evaluation

OREGON II, engaged on this cruise from July 19 to 30, 1976, evaluated a 60-foot prototype shrimp separator trawl on commercial fishing grounds in the northern Gulf of Mexico.

This cruise represented the first evaluation of the 60-foot prototype trawl. Several improvements in trawl operation have been made with the new design. The knotless separator panel performed exceptionally well, requiring no repairs in torn meshes. The escape chute design allowed for smooth flow of fish out of the trawl with no clogging, as was experienced in previous designs. The mouth barrier design performed well mechanically; however, a smaller mesh was required to reduce the number of fish entering the trawl.

OT-76-06 (69)
Tilefish and Shrimp Stock Survey

The objectives of this cruise, conducted by OREGON II from August 2 to 19, 1976, in the northwestern Gulf of Mexico, were to survey tilefish stock, monitor status of royal-red shrimp stock on traditional "Northeastern Gulf" grounds, test an experimental squid fishing machine, and field test an experimental trawl door mounted STD. Three of the four objectives were achieved. Delivery of the experimental door-mounted STD was delayed and field-testing of the unit cancelled.

Twenty-three bottom longline sets for tilefish were made in an area between Southwest Pass and Galveston, Texas. Longline gear was fished in depths of 80-to-300 fathoms, using a total of 7,600 hooks. Three hundred tilefish, weighing approximately 1,800 lbs., and 83 grouper, weighing 1,600 lbs., were landed. Best catches of tilefish were made in water deeper than 125 fathoms. Length, weight and sexual maturation stages were determined for 274 tilefish and scales were taken for age/growth studies.

Thirty trawl stations of two-hours' duration each were made on the traditional "Northeast Gulf" grounds. The first 10 stations were made at 50 fathom intervals between the 100- and 300-fathom contours. Catches indicated a more narrow depth range of distribution and the remaining tows were made at 25-fathom intervals between 175- and 250-fathoms. Catch rates of royal-red shrimp were light throughout their range.

Mechanical operations of the squid-jigging machine worked well. After a one-time adjustment of the depth settings and proper placement of the outboard guide rollers, the machine operated automatically and without failure for hours at a time during three nights of testing.

OT-76-07 (70)
Shrimp Separator Trawl Evaluation

OREGON II was engaged on this cruise from August 31 to September 10, 1976, in the northern Gulf of Mexico. The cruise objective was to evaluate a 60-foot prototype shrimp separator trawl on commercial shrimping grounds.

Forty-seven comparative tows were made between a standard 60-foot semi-balloon shrimp trawl and a 60-foot separator trawl employing several different design modifications.

OT-76-08 (71)
Groundfish Survey
Northern Gulf of Mexico

OREGON II was engaged on this cruise from November 2 to December 1, 1976. This was the thirteenth groundfish survey in the northern Gulf of Mexico. The objectives of this cruise were to (1) obtain data on the croaker population, age structure, abundance and distribution; (2) obtain environmental data to explain distributional patterns; (3) collect plankton samples with a bongo array; and (4) test prototype door-mounted STD unit.

A preselected cruise track was followed with one-to-three 10-minute tows made in each sample site, depending on density of finfish. All sites were sampled using the standard 40-foot semi-balloon shrimp trawl with 8' x 40" chain doors. A prototype STD unit mounted on the trawl doors was evaluated during the first segment of the cruise. A total of 706 stations were occupied during this cruise. All stations were between 5 and 50 fathoms.

Surface-to-bottom temperature profiles were obtained using XBT probes. Surface and bottom salinities were measured by refractometer. Forel-Ule water color and secchi-disk visibility were recorded during daylight hours.

OT-76-09 (72)
Shrimp Separator Trawl Test

OREGON II returned to Pascagoula, Mississippi, on December 17, 1976, after completing a 12-day cruise to the Dry Tortugas shrimping grounds.

Objectives of the cruise were to evaluate prototype 60-foot shrimp separator trawl designs on the pink shrimp fishery in the southeastern Gulf of Mexico and to test the performance and reliability of a prototype off-bottom shrimp trawl electrode array design.

Two 60-foot (headrope) separator trawl designs were evaluated on the pink shrimp grounds. One employed a 1.5-inch square #504 knotless mesh separator panel (S4) and the other, a 1.25 x 2.50-inch rectangular #24 knotless mesh panel (R5). The results of 24 comparative drags with a standard 60-foot semi-balloon trawl were tabulated. The separator trawls significantly reduced the bycatch with separation rates averaging 46% for the S4 design and 91% for the R5 design.

The off-bottom electrode array was evaluated on a 43-foot electric trawl employing 8' x 40" chain doors. A total of 29 tows were made with the system. The electric trawl captured 20% more shrimp than the larger standard trawl and reduced the fish catch by 41% at night. During the day, the electric trawl caught 81% fewer fish but did not significantly increase the shrimp catch.

MURRE II

Resources Assessment and Ecology Surveys
Southeast Alaska

MURRE II was employed conducting herring and log raft surveys in the vicinity of Juneau, Alaska, from January to April and August to December 1976. The herring surveys were accomplished using sonar transects, STD casts, and sampling by net. The log raft ecology surveys were accomplished by divers doing biological investigations around log rafts, using the log rafts as a base.

MURRE II also acted as a supply ship for the NMFS hatchery/laboratory/counting station at Little Port Walter, Alaska.