

data report

PHYSICAL AND CHEMICAL DATA

CCOFI Cruise 5607
6-25 July 1956

CCOFI Cruise 5608
7-19 August 1956

CCOFI Cruise 5609
5-17 September 1956

CCOFI Cruise 5610
27 September - 5 October 1956

CCOFI Cruise 5611
30 October - 5 November 1956

SIO Reference 60-35
27 April 1960

UNIVERSITY OF CALIFORNIA
SCRIPPS INSTITUTION OF OCEANOGRAPHY

PHYSICAL AND CHEMICAL DATA

CCOFI CRUISE 5607

6-25 July 1956

CCOFI CRUISE 5608

7-19 August 1956

CCOFI CRUISE 5609

5-17 September 1956

CCOFI CRUISE 5610

27 September - 5 October 1956

CCOFI CRUISE 5611

30 October - 5 November 1956

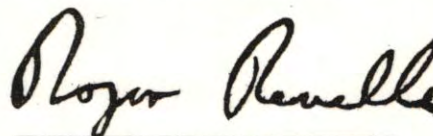
Sponsored by

Marine Research Committee

SIO Reference 60-35

27 April 1960

Approved for distribution:



Roger Revelle, Director

CONTENTS

INTRODUCTION	iii
CRUISE 5607	
List of Figures.	v
Personnel	vi
Tabulated Data	193
Observations at 10 Meters (Net-Tow Stations)	193
CRUISE 5608	
List of Figures.	viii
Personnel	ix
Tabulated Data	204
Hydrographic Casts.	204
Observations at 10 Meters (Net-Tow Stations)	207
CRUISE 5609	
List of Figures.	xi
Personnel	xii
Tabulated Data	209
Hydrographic Casts.	209
Observations at 10 Meters (Net-Tow Stations)	212
CRUISE 5610	
List of Figures.	xiv
Personnel	xv
Tabulated Data	214
Observations at 10 Meters (Net-Tow Stations)	214
CRUISE 5611	
List of Figures.	xvii
Personnel	xviii
Tabulated Data	217
Observations at 10 Meters (Net-Tow Stations)	217
DISTRIBUTION LIST	221

INTRODUCTION

The data presented in this report were collected on the eighty-sixth, eighty-seventh, eighty-eighth, eighty-ninth and ninetieth consecutive cruises of the California Co-operative Oceanic Fisheries Investigations program. The R/V Black Douglas of the U. S. Fish and Wildlife Service participated in all five cruises; the R/V Paolina-T of the Scripps Institution participated in Cruise 5607; the R/V Orca of the Scripps Institution participated in Cruises 5607, 5610 and 5611.

The data are tabulated at observed depths; the interpolated and computed values tabulated at standard depths and are accompanied by charts of horizontal distribution. The presentation of data in this report does not constitute publication; however, the data contained in this report have been carefully edited and no modifications should be necessary before final publication.

STANDARD PROCEDURES

To indicate degree of accuracy, temperatures are recorded in tenths of a degree when obtained by bucket thermometer, thermograph, or bathythermograph, while temperatures from reversing thermometers are recorded in hundredths of a degree. Extrapolated values and values interpolated between remote observations are entered within parentheses. A hyphen is used to indicate a missing observed value. The time is the time of messenger release. When more than one cast was made on a station, messenger times and wire angles are given in the order of increasing depth. A line is left blank between the observed data of each cast.

FOOTNOTES

Footnotes which appear frequently are "loose bottle cap" and "possible evaporation." To avoid any confusion as to their meaning the following explanation is included.

Laboratory personnel, before titrating the salinity samples, note any possible imperfections in the sealing of the bottles as follows:

Loose bottle cap:

The cap is definitely loose so that it could be moved with very little applied pressure. The salinity values obtained from these samples may be usable depending on time and/or conditions of storage.

Possible evaporation: Either the cap was sealed with less than usual pressure, the bottle edge chipped, the rubber washer cracked, or the bale broke on opening, etc.

Use of the above values in interpolation depends upon consistency with other values of salinity and other properties, and these footnotes are supplemented with "falls on property curve" or "does not fall on property curve," depending upon whether the property curve was drawn through the value or not.

In addition to footnotes, three special notations are used without footnotes because their meaning is always the same.

To indicate a premature or a delayed reversal of the water-sampling device which results in certain depth and property errors, the following notation is used.

p: pretrip or posttrip

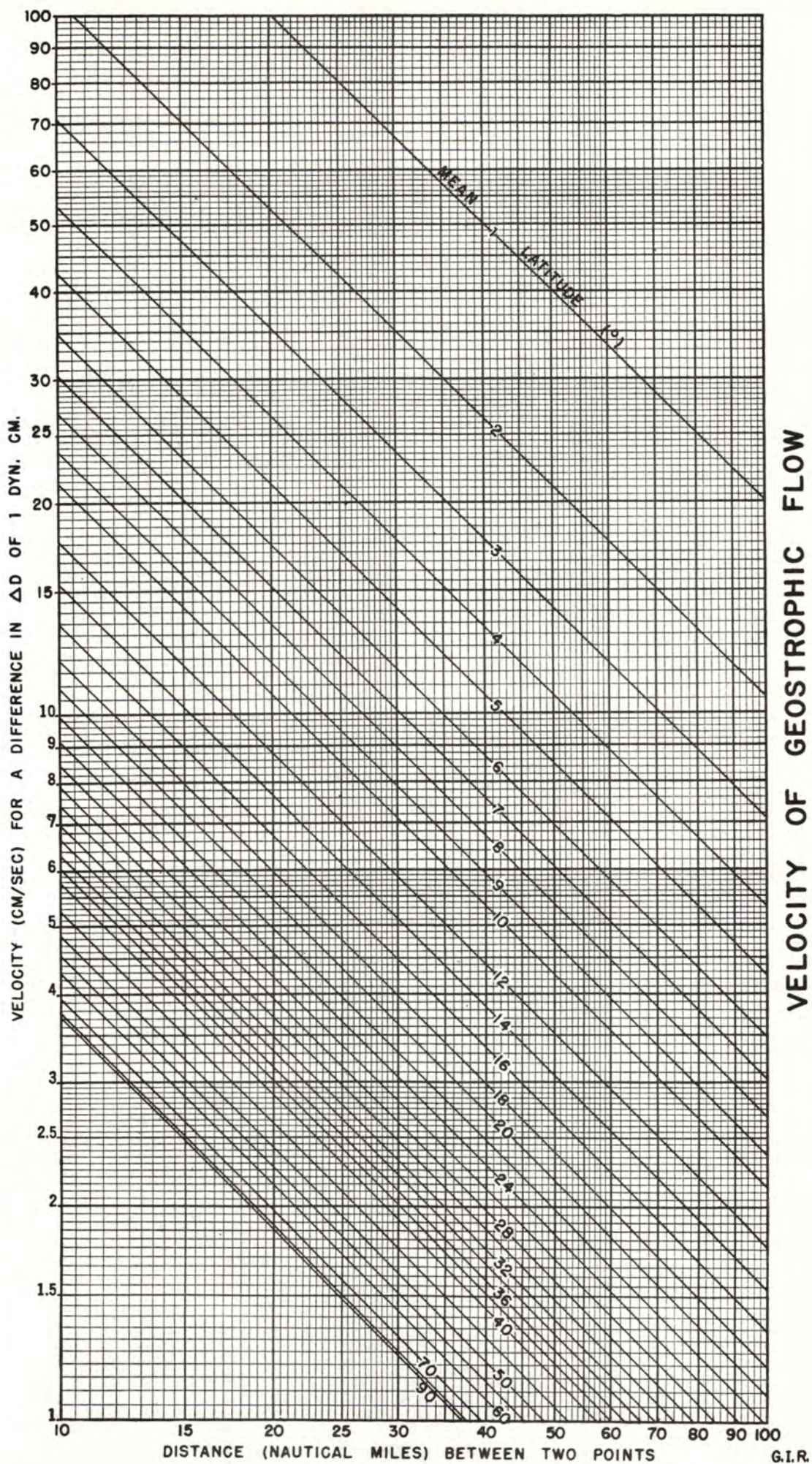
Values which are not drawn through because they seem to be in error without apparent reason are indicated by one of the following notations.

r: rejected value (value seems to be definitely wrong),

u: uncertain value (value may be correct; occasionally it can influence the drawing of the property curve).

FORMAT

These data are typed in the format of the University of California Press publication, Oceanic Observations of the Pacific. So that these pages can be used as copy for the 1956 volume, the first page of the Cruise 5607 data is numbered 193; 5608, 204; 5609, 209; 5610, 214; 5611, 217.



FIGURES

1. CCOFI Cruise 5610, station positions
2. Horizontal distribution of temperature at 10 meters
3. Horizontal distribution of salinity at 10 meters

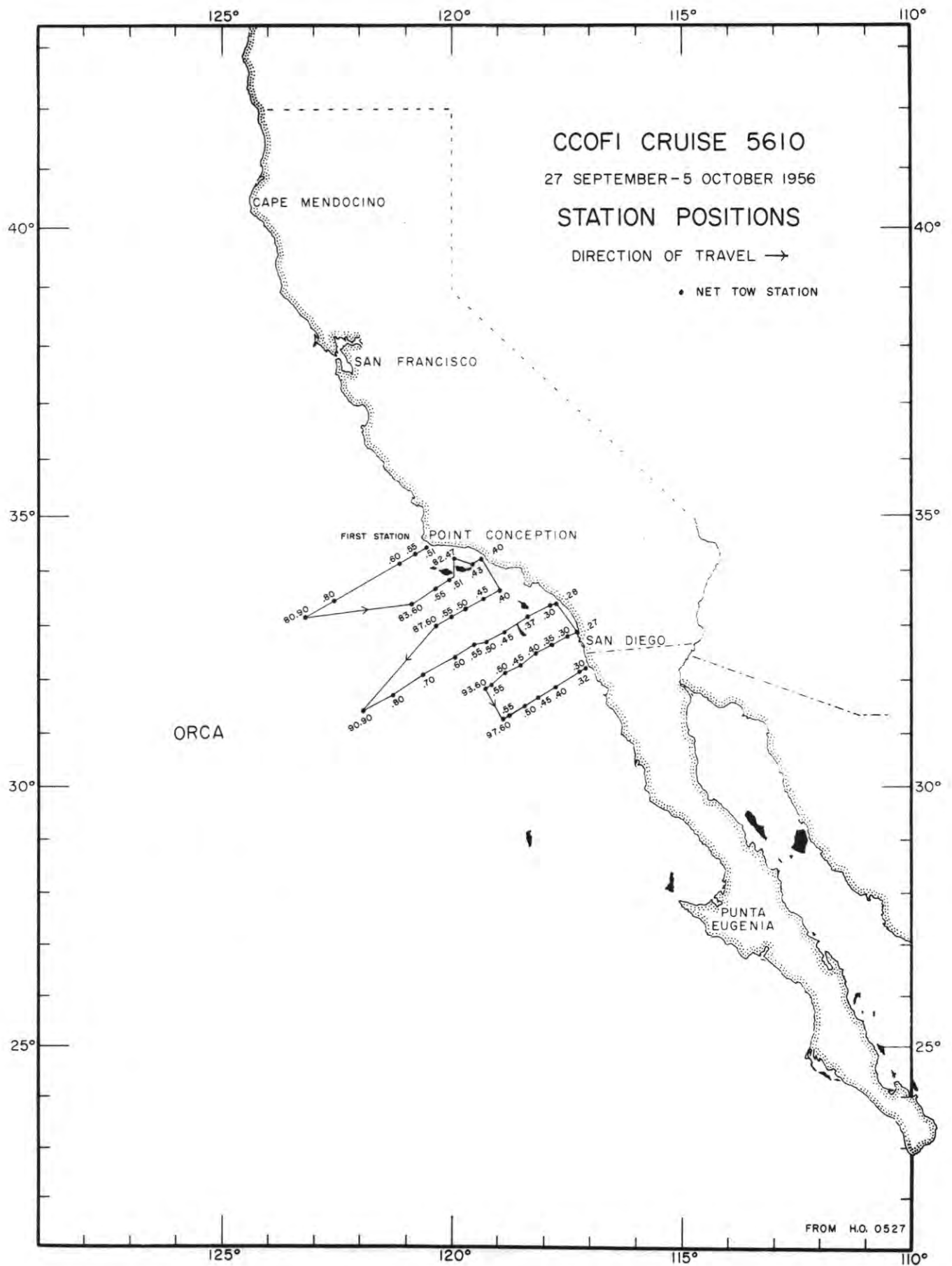


FIGURE 1

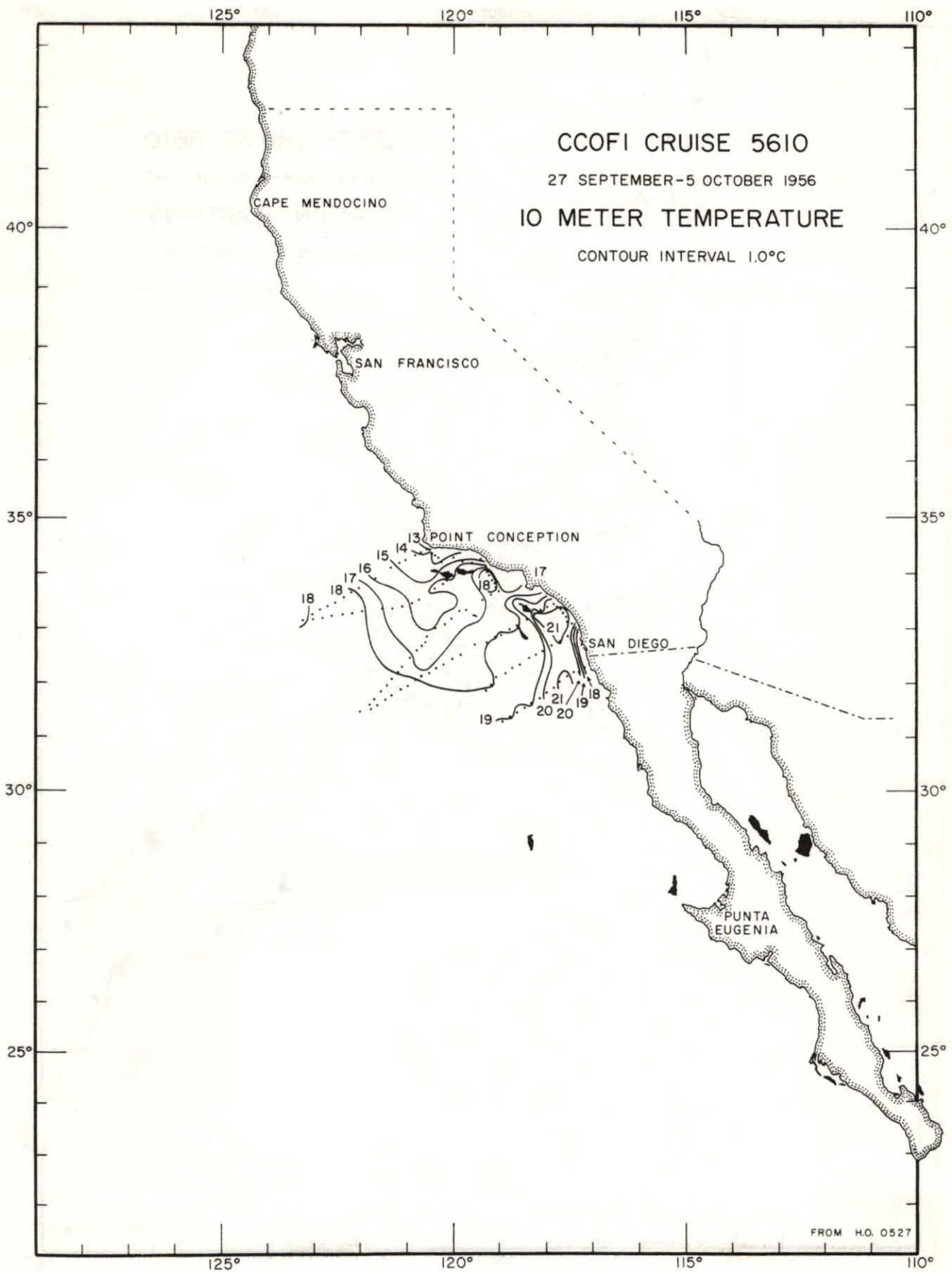


FIGURE 2

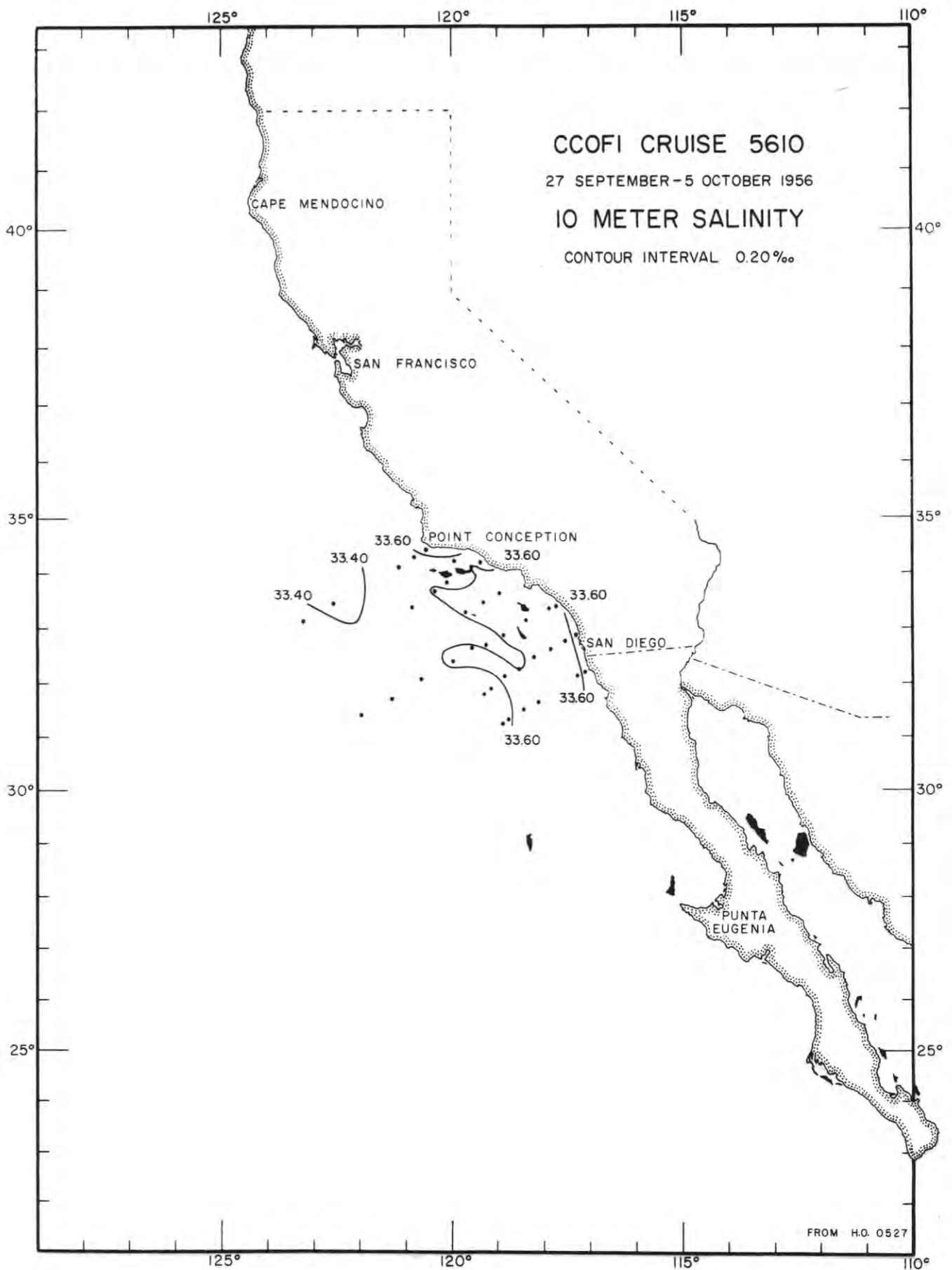


FIGURE 3

PERSONNEL
Cruise 5610

SHIPS' CAPTAINS

Forster, Charles W., R/V Black Douglas
Colbeth, Clifford W., R/V Orca

PERSONNEL PARTICIPATING IN THE COLLECTION OF DATA

R/V Black Douglas

O'Connell, Charles P., Fishery Research Biologist, U. S. Fish and Wildlife
Service

Wolf, Robert S., Fishery Research Biologist, U. S. Fish and Wildlife Service

R/V Orca

Bryer, Bruce A., Senior Marine Technician
Reid, Charles F., Fishery Aid, U. S. Fish and Wildlife Service

Station	Date	Time GCT	Latitude North	Longitude West	Sounding (fm)	Wind		Weather	Sea	10 Meters	
						Dir	Force			T	S
80.51-O	IX-28	2045	34°26.5'	120°32.0'	50	300°	4	partly cloudy	moderate	12.52	33.62
80.55-O	28	2300	34°18.5'	120°48.0'	414	240°	2	cloudy	rough	14.42	33.57
80.60-O	29	0145	34°09.0'	121°09.0'	1200	240°	2	partly cloudy	rough	14.50	33.58
80.80-O	29	1135	33°28.5'	122°32.0'	2000+	260°	3	clear	moderate	18.34	33.30
80.90-O	29	1645	33°09.0'	123°12.5'	2000+	300°	3	partly cloudy	rough	17.88	33.53
82.47-O	30	1600	34°14.5'	119°58.0'	315	260°	1	clear	moderate	14.20	33.58
83.40-O	30	2040	34°13.5'	119°22.0'	12	090°	1	fog	slight	14.56	33.47
83.43-O	30	1900	34°07.5'	119°34.0'	130	300°	1	fog	slight	15.99	33.60
83.51-O	30	1125	33°51.0'	120°07.0'	72	260°	3	partly cloudy	moderate	16.32	33.57
83.55-O	30	0900	33°42.0'	120°22.0'	530	320°	4	partly cloudy	moderate	16.34	33.62
83.60-O	30	0445	33°25.0'	120°52.0'	1000	320°	3	partly cloudy	moderate	15.89	33.57
87.40-O	X-1	0130	33°40.0'	118°59.0'	470	290°	3	overcast	moderate	17.15	33.66
87.45-O	1	0420	33°30.0'	119°19.5'	900	260°	3	clear	moderate	16.64	33.64
87.50-O	1	0745	33°19.5'	119°42.5'	44	320°	4	clear	rough	16.22	33.65
87.55-O	1	1030	33°10.0'	120°00.0'	1000	270°	4	missing	rough	16.40	-
87.60-O	1	1300	33°00.0'	120°22.0'	2000+	300°	3	missing	moderate	16.00	-
90.28-O	3	1300	33°28.5'	117°45.5'	50	calm		partly cloudy	calm	20.34	33.66
90.30-O	3	1100	33°24.0'	117°54.5'	340	calm		partly cloudy	calm	20.60	33.73
90.37-O	3	0745	33°10.0'	118°23.0'	647	calm		partly cloudy	calm	18.56	33.63

TEMPERATURE AND SALINITY AT 10 METERS (NET-TOW STATIONS)

Station	Date	Time GCT	Latitude North	Longitude West	Sounding (fm)	Wind		Weather	Sea	10 Meters	
						Dir	Force			T	S
90.45-O	X-3	0315	32°54.5'	118°55.5'	900	300°	2	overcast	slight	18.01	33.62
90.50-O	2	2315	32°44.5'	119°16.0'	116	-	1	drizzle	slight	17.98	33.58
90.55-O	2	2045	32°41.0'	119°32.0'	250	-	1	overcast	slight	17.97	33.62
90.60-O	2	1700	32°26.5'	119°59.0'	2000+	-	1	overcast	slight	18.10	33.64
90.70-O	2	1200	32°06.0'	120°39.5'	2000+	-	1	missing	slight	17.12	33.56
90.80-O	2	0730	31°45.0'	121°18.5'	2000	040°	1	missing	moderate	18.76	33.46
90.90-O	2	0300	31°25.0'	121°58.5'	2000+	320°	1	cloudy	rough	18.24	33.49
93.27-O	3	2105	32°55.0'	117°19.5'	200	240°	3	partly cloudy	slight	17.86	33.50
93.30-O	3	2300	32°49.5'	117°31.5'	450	240°	2	partly cloudy	slight	20.31	33.68
93.35-O	4	0200	32°40.0'	117°51.5'	325	240°	2	cloudy	slight	20.56	33.66
93.40-O	4	0430	32°30.0'	118°12.5'	940	220°	2	partly cloudy	slight	18.40	33.62
93.45-O	4	0715	32°18.0'	118°31.5'	2000+	200°	2	partly cloudy	slight	18.30	33.60
93.50-O	4	1000	32°09.5'	118°53.0'	2000+	240°	2	missing	slight	18.68	33.63
93.55-O	4	1245	31°55.5'	119°10.0'	2000+	320°	2	missing	slight	17.98	33.56
93.60-O	4	1530	31°51.0'	119°18.0'	2000+	320°	2	overcast	moderate	18.13	33.55
97.30-O	5	1300	32°15.5'	117°08.5'	33	320°	1	partly cloudy	slight	17.90	33.50
97.32-O	5	1130	32°11.5'	117°16.5'	600	260°	1	clear	slight	20.21	33.68
97.40-O	5	0600	31.53.0'	117°48.5'	2000+	320°	2	clear	slight	20.38	-
97.45-O	5	0315	31°42.5'	118°08.0'	2000+	270°	2	clear	slight	19.25	33.62

TEMPERATURE AND SALINITY AT 10 METERS (NET-TOW STATIONS)

Station	Date	Time GCT	Latitude North	Longitude West	Sounding (fm)	Wind		Weather	Sea	10 Meters	
						Dir	Force			T	S
97.50-O	X-5	0045	31°31.5'	118°27.0'	2000+	320°	3	partly cloudy	moderate	19.72	33.64
97.55-O	4	2200	31°21.0'	118°47.0'	2000+	290°	2	partly cloudy	slight	18.86	33.58
97.60-O	4	2030	31°17.0'	118°55.0'	2000+	310°	2	cloudy	slight	19.06	33.58

TEMPERATURE AND SALINITY AT 10 METERS (NET-TOW STATIONS)

DISTRIBUTION LIST

Mr. D. L. Alverson, Chief
North Pacific Fisheries Exploration and
Gear Research
Bureau of Commercial Fisheries
2725 Montlake Boulevard
Seattle 2, Washington

Mr. William Anderson
Bureau of Commercial Fisheries
Brunswick, Georgia

Mr. William E. Batzler
Code 2232
U. S. Navy Electronics Laboratory
San Diego 52, California

British Joint Services
(Navy Staff)
1910 K Street N. W.
Washington, D. C.

Mr. J. G. Burnette, Chairman
Marine Research Committee
P. O. Box 807
Los Altos, California

Librarian (4)
Department of Fish and Game
California State Fisheries Laboratory
Terminal Island, California

Library
Oceanographic Group
Central Fisheries Experiment Station
Pusan, Korea

Dr. Ernest R. Anderson
Code 2233
U. S. Navy Electronics Laboratory
San Diego 52, California

Mr. Thomas S. Austin
Bureau of Commercial Fisheries
Biological Laboratory
P. O. Box 3830
Honolulu 12, Hawaii

Dr. Rolf Bolin
Hopkins Marine Station
Pacific Grove, California

Librarian
Bureau of Commercial Fisheries
Biological Laboratory
P. O. Box 3830
Honolulu 12, Hawaii

Dr. Wayne V. Burt
Assoc. Prof. of Oceanography
School of Science
Oregon State College
Corvallis, Oregon

Mr. Luis R. A. Capurro
Associate Director
IGY World Data Center
Oceanographic Archive
A. and M. College of Texas
College Station, Texas

Mr. Harold B. Clemens, Jr.
Marine Resources Operations
California State Fisheries Laboratory
Terminal Island, California

Chief, Division of Fisheries
Commonwealth Scientific and Industrial
Research Organization
P. O. Box 21
Crunulla, N. S. W., Australia

Mr. R. S. Croker, Director
California Department of Fish and Game
Marine Fisheries Laboratory Branch
772 Capitol Avenue
Sacramento 14, California

Deutsches Hydrographisches Institut
Bernhard-Nocht-Str. 78
Hamburg 4, Germany

Chief
Division of Biological Research
Bureau of Commercial Fisheries
U. S. Department of the Interior
Washington 25, D. C.

Dr. S. A. El Wardani
Sciences
San Jose State College
San Jose, California

Dr. Richard H. Fleming
University of Washington
Oceanographic Laboratories
Seattle 5, Washington

Prof. James A. Gast
Division of Natural Resources
Humboldt State College
Arcata, California

Mr. Rafael Soto Gil
Secretario General
Universidad de Baja California
Mexicali, B. C.
México

Dr. G. M. Cresswell
Department of Earth Sciences
Stanford Research Institute
Menlo Park, California

Herrn Professor Dr. A. Defant
Sternwartestrasse 38
Innsbruck
Austria

Dirección General de Pesca é
Industrias Conexas
Estación de Biología Marina
Casa del Marina
Mazatlán, Sinaloa, México

Mr. Robert L. Eberhardt
Technology - ASW and Ocean Systems
Lockheed Aircraft Corporation
California Division
Burbank, California

Director of Research
Fish Commission of Oregon
Route 1, Box 31A
Clackamas, Oregon

Dr. Paul M. Fye
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts

Dr. Robert H. Gibbs, Jr.
Department of Biology
Boston University
Boston 15, Massachusetts

Mr. C. G. Gunnerson
Department of Water Resources
Division of Resources Planning
P. O. Box 388
Sacramento 2, California

Hancock Library of Biology and
Oceanography
Allan Hancock Foundation
University of Southern California
Los Angeles 7, California

Mr. John Hawk
c/o Seafarers' International Union of
North America
450 Harrison Street
San Francisco 5, California

Mr. T. Hirano
Tokai Regional Fisheries Research
Laboratory
Tsukishima
Tokyo, Japan

Ichthyological Laboratory
U. S. Fish and Wildlife Service
U. S. National Museum
Washington 25, D. C.

Director
Instituto de Geofísica
Torre de Ciencias, 3er piso
Universidad Nacional Autónoma de México
Villa Obregón, D. F., México

Mr. Alphonse Kemmerich
Executive Director
Pacific Marine Fisheries Commission
741 State Office Building
1400 S. W. Fifth Avenue
Portland 1, Oregon

Dr. E. Koto
Institute of Fisheries
Hokkaido University
Hakodate, Japan

Dr. John Lyman
National Science Foundation
Washington 25, D. C.

Dr. William J. Hargis, Jr., Director
Virginia Fisheries Laboratory
Gloucester Point, Virginia

Dr. Robert W. Hiatt
University of Hawaii
Honolulu 12, Hawaii

Mr. Charles J. Hoeppe
U. S. Department of Commerce
Coast and Geodetic Survey
417 South Hill Street, Room 535
Los Angeles 13, California

Director (2)
IGY, WDC-A, Oceanography
Texas A. and M. College
College Station, Texas

Japan Meteorological Agency
Oceanographical Section
Tokyo, Japan

Dr. H. Kitamura
Oceanographic Section
Kobe Marine Observatory
Kobe, Japan

Dr. E. C. LaFond
Code 2250
U. S. Navy Electronics Laboratory
San Diego 52, California

Mr. Joseph Mardesich
1513 West Fifteenth Street
San Pedro, California

Mr. John C. Marr
Bureau of Commercial Fisheries
Biological Laboratory
P. O. Box 3830
Honolulu 12, Hawaii

Dr. Hugh J. McLellan
Department of Oceanography
Texas A. and M. College
College Station, Texas

Dr. R. C. Miller, Director
California Academy of Science
Golden Gate Park
San Francisco 18, California

Mr. John V. Morris
French Sardine Company
582 Tuna Street
Terminal Island, California

Mr. A. W. H. Needler, Director
Pacific Biological Station
Nanaimo, B. C.
Canada

Dr. Robert M. Norris
Department of Physical Sciences
University of California
Santa Barbara Campus
Goleta, California

Chief of Naval Research
Office of Naval Research
Geophysics Branch, Code 416
Washington 25, D. C.

Dr. E. L. Pickard
Institute of Oceanography
University of British Columbia
Vancouver, B. C.
Canada

Mr. Jotaro Masuzuwa
Japan Meteorological Agency
Oceanographical Section
Tokyo, Japan

Mr. Arthur H. Mendonca
c/o R. E. Booth Company, Inc.
280 Battery Street
San Francisco 11, California

Librarian
Ministry of Agriculture, Fisheries
and Food
Fisheries Laboratory
Lowestoft, Suffolk, England

National Marine Consultants, Inc.
1500 Chapala Street
Santa Barbara, California
Attn: Dr. Richard Kent

Mr. Kenneth S. Norris
University of California
Department of Zoology
Los Angeles 24, California

Director
Norwegian Polar Institute
Observatoriegte 1
Oslo, Norway

Dr. Yngve H. Olsen
Journal of Marine Research
Yale University
New Haven, Connecticut

Dr. G. Pogade, Librarian
Deutscher Wetterdienst Seewetteramt
Hamburg, Germany

Dr. D. W. Pritchard, Director
Chesapeake Bay Institute
The Johns Hopkins University
121 Maryland Hall
Baltimore 18, Maryland

Pusan Fisheries College
Pusan
Korea

Dr. Gordon A. Riley
Bingham Oceanographic Foundation
Yale University
New Haven, Connecticut

Dr. O. E. Sette, Chief
Bureau of Commercial Fisheries
Biological Laboratory
450-B Jordan Hall
Stanford, California

Mr. D. Shoji
Japanese Hydrographic Office
Tsukiji
Tokyo, Japan

Mr. W. E. Stewart
c/o California State Chamber of Commerce
350 Bush Street
San Francisco 4, California

Miss Margaret Storey, Librarian
Natural History Museum
Stanford, California

Mr. Norman Tebble
Annelida Section
British Museum (Natural History)
Cromwell Road
London SW7, England

Mr. D. W. Privett, Librarian
National Institute of Oceanography
Wormley
Near Godalming
Surrey, England

Mr. John Radovich
California Department of Fish and Game
California State Fisheries Laboratory
Terminal Island, California

Mr. Don T. Saxby
California Division
California Packing Corporation
2600 Seventh Street
Berkeley 10, California

Mr. W. T. Shannon, Director
California Department of Fish and Game
926 J Street
Sacramento 14, California

Dr. Reimer Simonsen
Institut für Meereskunde
Hohenbergstrasse 2
Kiel, Germany

Prof. Henry M. Stommel
Harvard University
Pierce Hall
Cambridge 38, Massachusetts

Dr. Y. Takenouti
Oceanographical Section
Japan Meteorological Agency
Chuo-ku
Tokyo, Japan

Department of Oceanography
Texas A. and M. College
College Station, Texas

Mr. A. J. Thomson, Official Secretary
New South Wales Government Offices
56, Strand
London, W. C. 2, England

Dr. M. Uda
Tokyo University of Fisheries
Minato-ku
Tokyo, Japan

U. S. Hydrographic Office (2)
Navy Department
Washington 25, D. C.
Attn: Dr. Boyd E. Olson
Division of Oceanography

University of California, Berkeley
Department of Zoology
Berkeley 4, California

University of California, Berkeley (2)
Serials Department
General Library
Berkeley 4, California

Librarian
University of Washington
Oceanographic Laboratories
Friday Harbor, Washington

Director
University of Washington
School of Fisheries
Seattle 4, Washington

Mr. Richard C. Vetter
Secretary to the Committee on
Oceanography
National Academy of Sciences
2101 Constitution Avenue
Washington 25, D. C.

Dr. R. B. Tibby
Hancock Foundation
University of Southern California
University Park
Los Angeles 7, California

U. S. Fish and Wildlife Service
Marine Game Fish Research
c/o University of California
Department of Zoology
Los Angeles 24, California

Library, Code 2420 (2)
U. S. Navy Electronics Laboratory
San Diego 52, California

University of California, Berkeley
Publications Office
101 University Hall
2200 University Avenue
Berkeley 4, California

Director
University of Miami
Marine Laboratory
Coral Gables, Florida

Librarian (2)
University of Washington
Oceanographic Laboratories
Seattle 5, Washington

Mr. Gilbert C. Van Camp, Sr.
772 Tuna Street
Terminal Island, California

Dr. Boyd W. Walker
University of California
Department of Zoology
Los Angeles 24, California

Director
Washington Biological Laboratory
Bureau of Commercial Fisheries
U. S. Fish and Wildlife Service
Washington 25, D. C.

Dr. Warren S. Wooster
Office of Oceanography
UNESCO
Place de Fontenoy
Paris 7^e, France

Inter-American Tropical Tuna Commission
(c/o Scripps Institution of Oceanography)

Mr. Edward B. Bennett
Mr. T. J. Chow
Dr. M. B. Schaefer

Scripps Institution of Oceanography

Mrs. A. Alvaríño de Leira
Dr. Leo D. Berner
Dr. Maurice Blackburn
Dr. Edward Brinton
Dr. Abraham Fleminger
Mr. Jeffery D. Frautschy
Mr. John D. Isaacs
Dr. Martin W. Johnson
Mr. Hans T. Klein
Mr. Garth I. Murphy

Dr. M. Pat Wennekens
Oceanic Research Division
(Code 508)
Naval Ordnance Test Station
China Lake, California

Dr. Kozo Yoshida
Geophysical Institute
Tokyo University
Bunkyo-ku
Tokyo, Japan

U. S. Bureau of Commercial Fisheries
(c/o Scripps Institution of Oceanography)

Dr. E. H. Ahlstrom
Mr. Frederick H. Berry
Mr. Gerald V. Howard

Mr. Joseph L. Reid, Jr.
Dr. Roger Revelle
Mrs. Margaret K. Riedel
Mrs. Margaret K. Robinson
Mr. Gunnar I. Roden
Dr. Richard H. Rosenblatt
Mr. Richard A. Schwartzlose
Mr. Charles G. Worrall (20)
Library (4)
Library, SFA