NOS Oceanographic Circulatory
Survey Report No. 4

Cook Inlet Circulatory Survey: 1973-75

June 1981
Rockville, Md.

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

NOS Oceanographic Survey Reports

This series of reports presents information on circulatory surveys by the National Ocean Survey. Normal activity includes the measurements of water flow (currents), tides, temperature, salinity, and occasionally other parameters needed for understanding the physical processes. These surveys are made primarily for the Nation's navigational waterways; however, data are also obtained to describe the circulatory patterns of estuaries and harbors.

These reports offer information on sampling locations, measurement techniques, processing and analysis routines, data formats, and general information on the survey area. They do not present technical interpretations of hydrodynamics of the areas.

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No. 2 Tampa Bay Circulatory Survey 1963. Demetrio A. Dinardi, August 1978, (PB 299-163).

No. 3 Puget Sound Approaches Circulatory Survey From 1973 Through 1976. Bruce B. Parker and James T. Bruce, August 1980, (PB81 113375).

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U.S. DEPARTMENT OF COMMERCE
Malcolm Baldrige, Secretary

National Oceanic and Atmospheric Administration
James P. Walsh, Acting Administrator

National Ocean Survey
R. Adm. H. R. Lippold, Jr., Director

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ERRATA

On page 4, Figure 1. Station Locations For Phase 1., shown should be of Cook Inlet, Southern Part which is shown as Figure 4 on page 7.

On page 7, Figure 4. Station Locations For Phase 3., shown should be of Cook Inlet, Fire Island to Goose Creek which is shown as Figure 1 on page 4.

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COOK INLET, ALASKA, CIRCULATORY SURVEY, 1973-75

Richard C. Patchen, James T. Bruce, and
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ABSTRACT

This report presents a full description of the 3-year circulatory survey conducted by the National Ocean Survey in Cook Inlet, Alaska. Station location maps and station information tables for the physical parameters are provided. Results of the Harmonic analysis performed on the current meter records are included. A summary of the historical current meter data collected by NOS is also presented.

1. INTRODUCTION

Cook Inlet, Alaska, is a region of expanding industrial and commercial activities. It is a center for both extensive drilling and shipping of oil to the continental United States. However, it is also a region where important ecological balances exist between the land and the ocean. Cook Inlet is one of the most important estuaries in the United States; and the environmental impact from the expansion of the industrial and commercial communities could be significant, not only in the Cook Inlet region, but also along the entire southern coast of Alaska. Navigation in the waters of Cook Inlet can be extremely hazardous at times for both small recreational crafts and the large supertankers. The fishing community, both commercial and recreational, must be assured that oil-related activities will not affect the numerous fisheries in the estuary. The naturalists and conservationists must also be assured that the wildlife in the region will not be affected.

Therefore, in response to numerous requests from the commercial, recreational, and environmental communities, the National Ocean Survey (NOS), a component of the National Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce, conducted an intensive 3-year circulatory survey of Cook Inlet, Alaska. The major aim of the survey was to update Cook Inlet tide and tidal current information in the traditional products of NOS and to develop new methods; such as, dynamical models which can be used in describing the important oceanographic processes of the estuary. Important items to be determined include: (1) the general circulation pattern, including the major driving mechanisms; (2) the tidal datums which had been modified recently by earthquakes in the region; and (3) the temporal and spatial distribution of the important physical parameters, salinity and temperature.

This survey also obtained the "baseline" information from which any oceanographic changes can be monitored. By using the data base as input into existing oil spill models, trajectories can be predicted. If predictions are inadequate, the results of the data analysis will assist in the development of new oil spill models. A full description of the tidal current regime, the predominant driving mechanism in determining the daily circulation, will be used by NOS to update the existing Tidal Current Predictions Table and compile a new series of Tidal Current Charts for Cook Inlet, Alaska. These products can be used by recreational, industrial, and commercial communities to ensure safe navigation in these often hazardous waters. Using this information, engineers can also compute the effect of water movement on surface and subsurface structures.

2. GENERAL DESCRIPTION AND OBJECTIVE OF THE SURVEY

NOS planned an intensive 3-year circulatory study from 1973 through 1975 to determine the dynamics of Cook Inlet. A circulatory survey plan must assure that a comprehensive data set is collected which will allow for an interrelated and correlated analysis to be performed for all the important physical parameters measured. The circulation patterns result from various driving mechanisms, and the water column responds at various temporal and spatial scales. Vertical and horizontal periodic (tidal) variation in the water column is the response to astronomic forcing, with a time scale of approximately 1 day; however, atmospheric forcing and the density structure of the water column determine both the small scale dispersion processes and the longer time scale (nontidal) circulation. Therefore, the survey planned by NOS included, over the 3-year period, 92 current meter locations, 51 tide gage locations, and 214 locations of salinity and temperature versus depth (STD) measurements.

The survey extended to the south, to a line between Cape Douglas and Chugach Island and, to the north to the upper reaches of Knik and Turnagain Arms. The survey was conducted in three phases: Phase 1 defined a region commonly known as Lower Cook Inlet. The limits were to the southern extent of Cook Inlet and as far north as Anchor Point. Phase 2 defined a region in the southern half of Upper Cook Inlet, from Anchor Point to the Forelands. Phase 3, which completed the survey, extended to the northern limits of Cook Inlet. Figure 1 indicates the station locations for the current meters, tide gages, and STD casts for Phase 1. Figures 2, 3, and 4 indicate the station locations for Phases 2 and 3, respectively.

The data collected during this survey were obtained using the 175-foot NOAA Class III ship the McARTHUR. The McARTHUR was commanded by NOAA Corps Cdr. George Poor and Cdr. J. Austin Yeager for the 1973, and 1974-75 periods, respectively. The McARTHUR's home port is Seattle, Washington, at the NOS Pacific Marine Center.

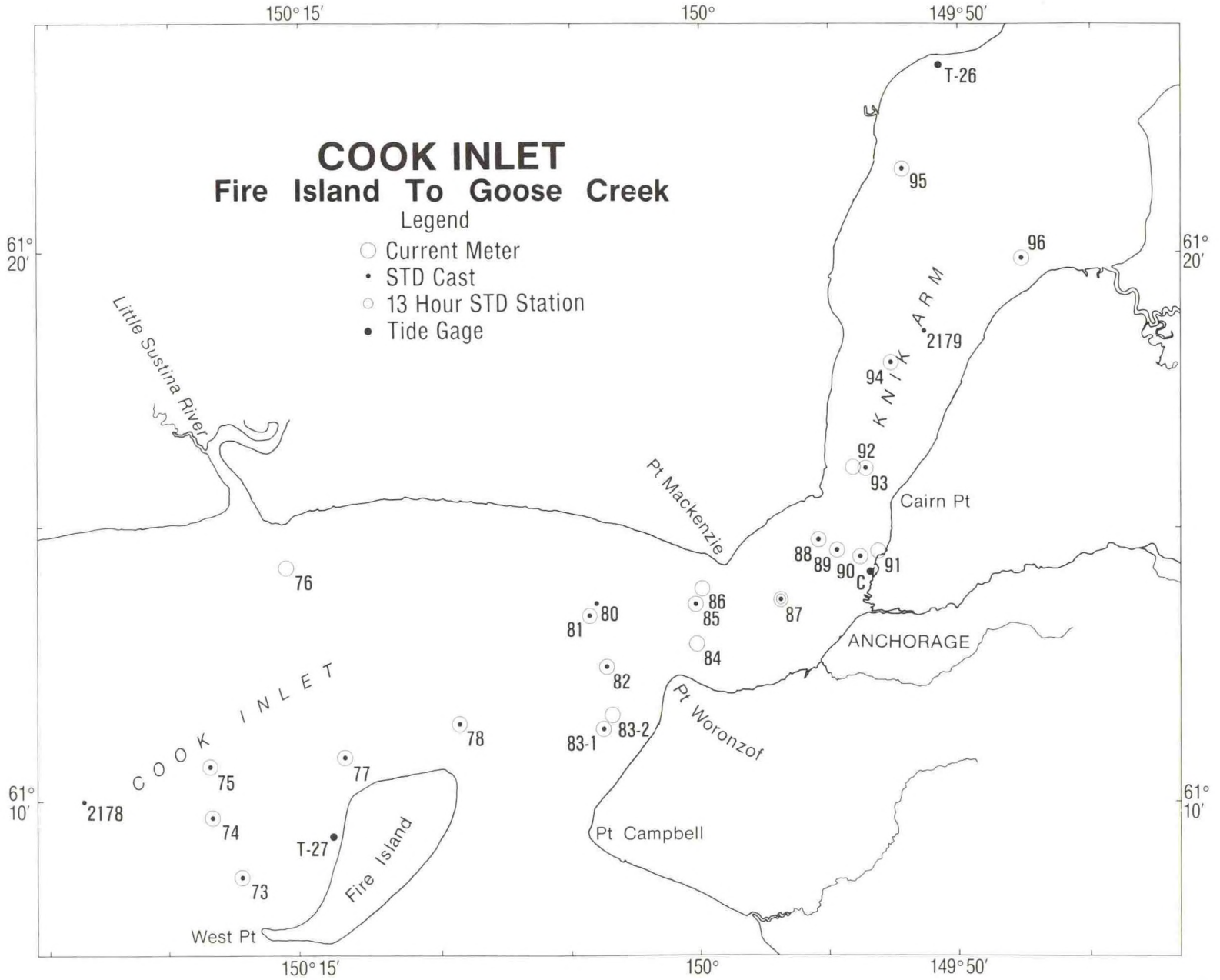

Figure 1. Station Locations For Phase 1.

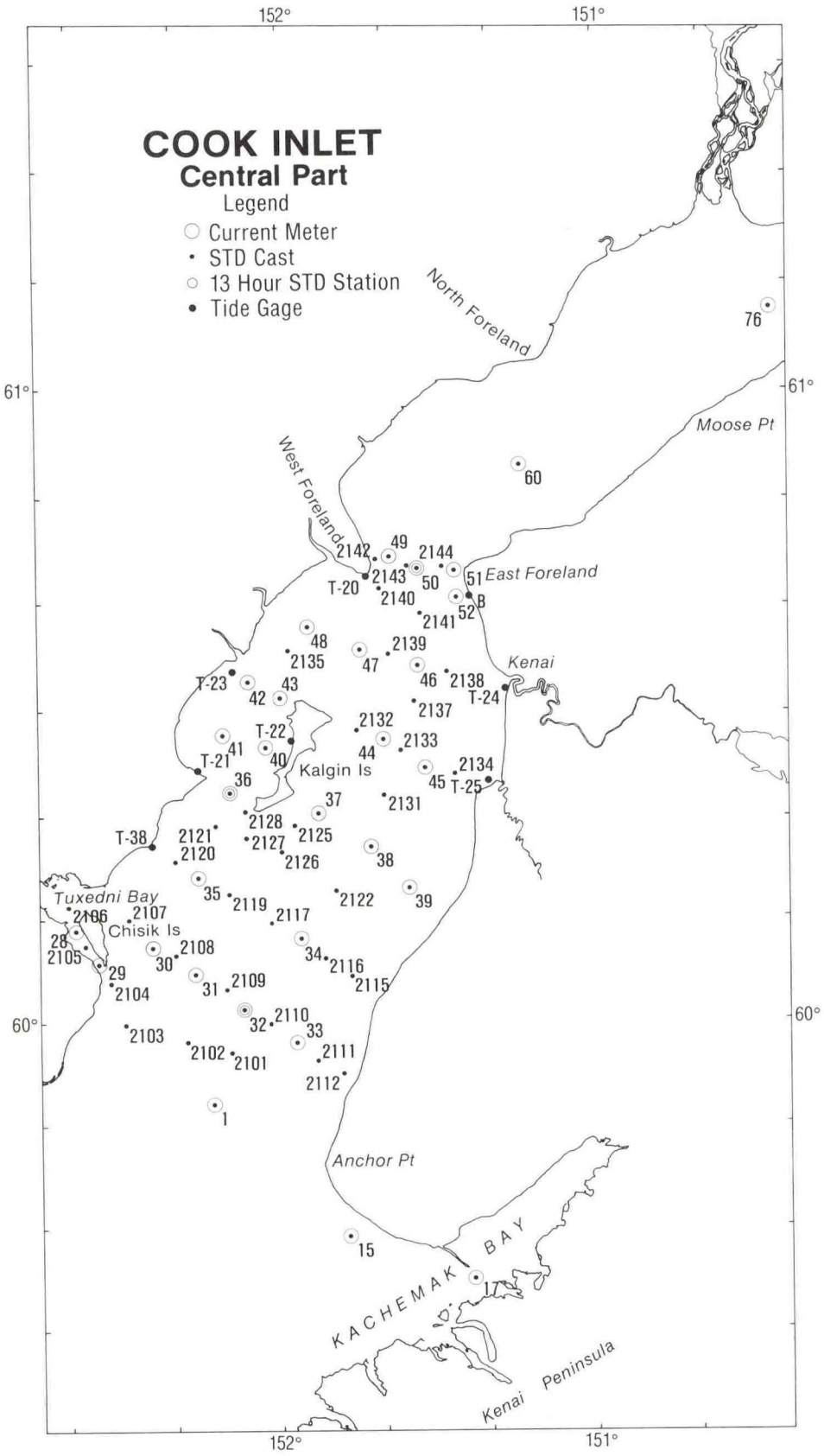

Figure 2. Station Locations For Phase 2.

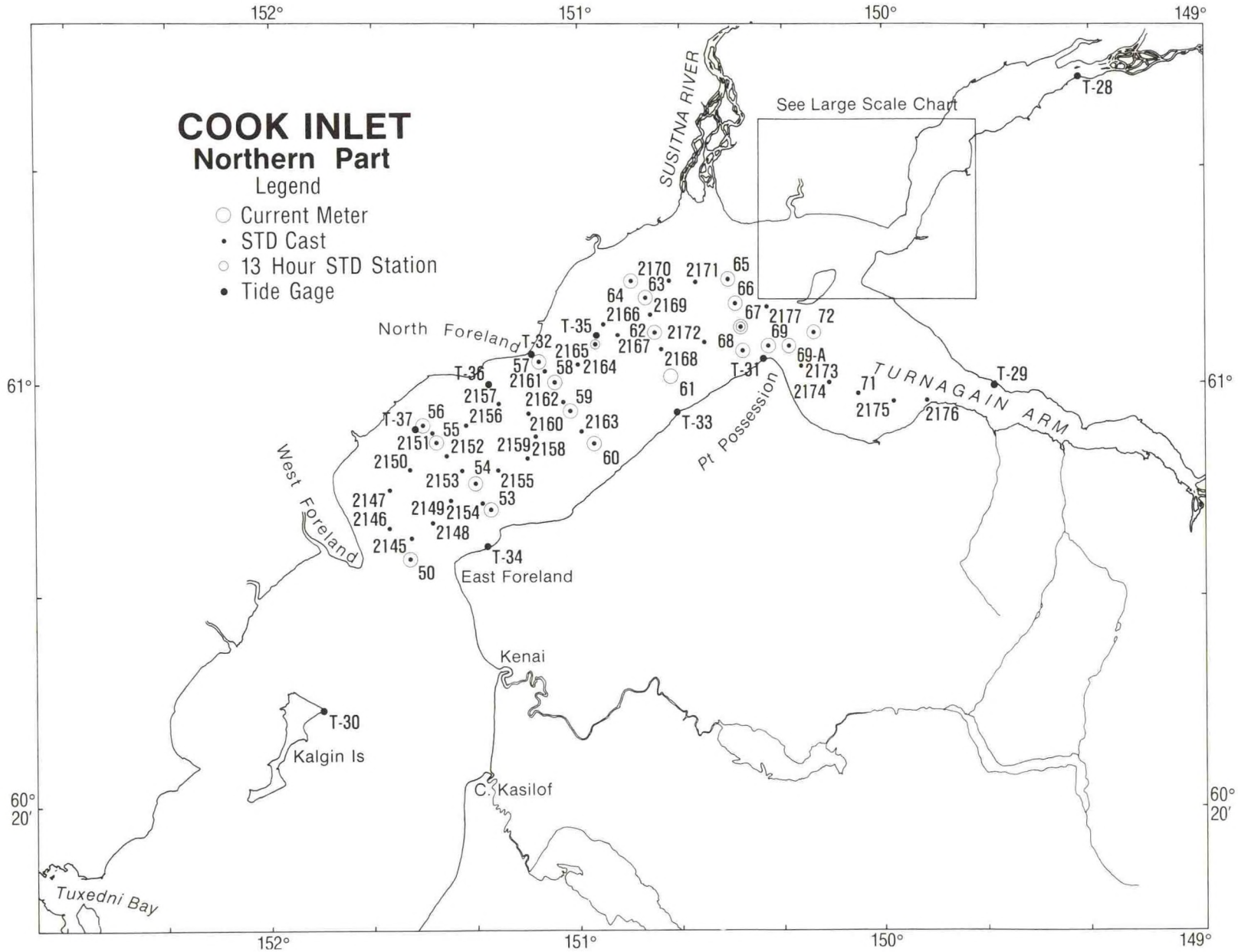

Figure 3. Station Locations For Phase 3.

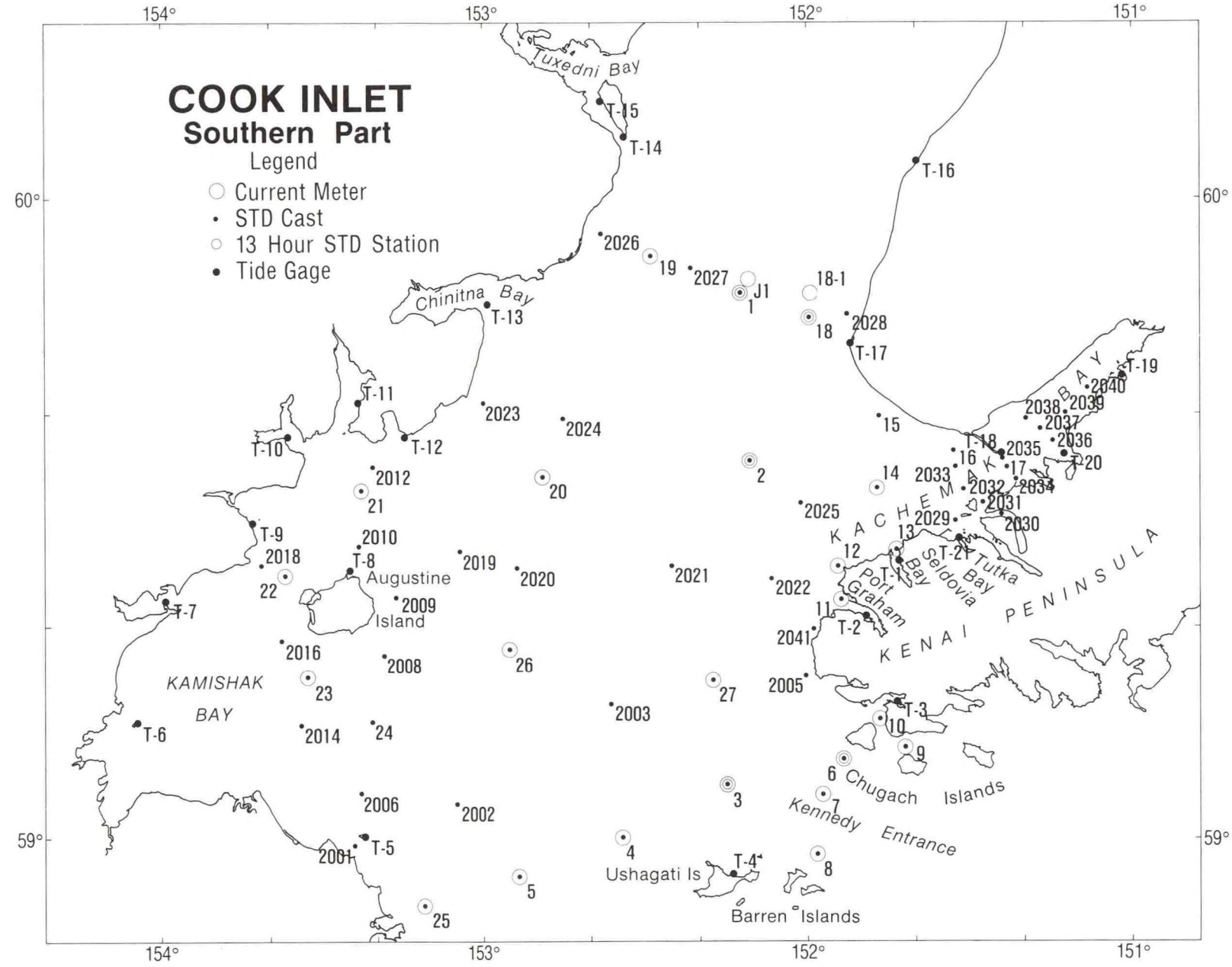

Figure 4. Station Locations For Phase 3.

3. CURRENT METER PROGRAM

Table 1 contains the current meter station information, by year, for the three phases. The table includes for each station: the geographic position, the depth of the water column, the observational levels, the parameters measured, the dates of the observations, and the number of days of recoverable data. The current meter observations were obtained with an Aanderaa current meter at fixed locations. The Aanderaa current meter uses a Savonious-type rotor to measure speed and a compass/vane to measure an instantaneous direction after each integrated rotor count. The vane is large, designed to reduce sensitivity to high frequency environmental noise.

Table 2 gives the specifications for the Aanderaa current meter. A taut-line mooring was developed and tested by the Engineering Development Laboratory. This type of mooring was used because it has the capability to survive in deep water and in regions of extremely strong currents. The mooring is configured with a subsurface buoy approximately 15 feet below the surface and with current meters attached to the wire cable at discrete depths in the water column. An acoustic release is situated between the bottom current meter and an anchor. A witness buoy is attached to the subsurface buoy, linked by line floats.

The current meter survey was planned using a three-dimensional array of current meters. The observational depths were selected to assure that the vertical current structure could be determined. Also, because of navigational requirements, observations were obtained as near to the surface as allowable by mooring design and data noise considerations. The surface layer is extremely important because of the possible navigational problems resulting from the variability and strength of the surface current. Problems in obtaining surface observations are the possible contamination from surface waves which bias the record and the loss of instrumentation from the passage of surface vessels.

To fully describe the three-dimensional structure both spatially and temporally, the optimum plan would be to occupy a determined array for the duration of the survey. But, since that is not operationally feasible, the planned period for a given observation is determined by the standard analysis techniques that can be performed on the current records. One or more locations are occupied for the duration of the survey, and all other observations are planned for a period of at least 15 days, with a sufficient number for at least 30 days. This strategy allows for comparisons to be made between the shorter-period stations and a long-period station. Long-period stations are called the reference stations, and shorter-period stations are called subordinate stations. For this survey, stations 1 and J1 are the reference stations. Figure 5 shows the period and the actual number of good days of data collected for each station. The figure illustrates the reference station versus subordinate station strategy and for which station simultaneity is available.

3.1 Current Meter Processing

Within the NOS Office of Oceanography, the Circulatory Surveys Branch of the Marine Environmental Services Division has the responsibility for project planning, data processing, data analysis, and final product preparation. The initial stage of processing is transcribing (or translating) the 5-inch copies of the original 3-inch current meter instrument tapes to a computer-compatible format. In Phase 1, the transcribed tape is processed with a large mainframe computer; e.g., CDC 6000, or UNIVAC 1100. Each instrument file is inspected to ensure that the number of data records transcribed and the number of expected records are the same. The number of expected records can be calculated by using the logs that are compiled onboard the McARTHUR, which include deployment and recovery times. During the Phase 2 stage of processing, calibration coefficients for each parameter measured by the instrument are used to convert the Aanderaa instrument numbers to engineering units. Calibration coefficients are assigned to each current meter by the Northwest Regional Calibration Center in Bellevue, Washington. Every Aanderaa current meter is recalibrated prior to each field season. Using the information from the ship's logs, times are assigned to each data record.

Before a given data record can be analyzed, erroneous individual data records resulting from sporadic mechanical or electrical failures must be removed. During Phase 3 of the processing, these bad data values can be removed either by visually determining which values are bad and substituting another reasonable value or (except for long periods of missing or bad values) by using a computer editing program which identifies and corrects erroneous "glich" values. The program edits only these "gliches" and does not filter the data record. This Phase 3 record is the final processed record, and copies are sent to the National Oceanographic Data Center (NODC) within NOAA.

Data can also be obtained directly from NOS by individuals or companies by sending a request to:

Associate Director
Office of Oceanography
National Ocean Survey, NOAA
6001 Executive Boulevard
Rockville, MD 20852

The various forms in which NOS can supply current meter data are:

(1) computer listing,
(2) magnetic tape,
(3) 35-mm microfilm showing a time plot of the data.

The cost of the data depends on the type of data and the size of the request.

STATION NO.	LATITUDE LONGITUDE	OBSERVATION INFORMATION				SENSORS IN OPERATION				
		Dates of Observations	Depth of Station Feet (Meters)	Depth of Meter (+) Above Bottom ( ) Below Surface Feet	Days of Good Data	Current Speed	Current Direction	Temperature	Conductivity	Pressure
1	59°51'42"N 152°12'00"W	6/16- 7/16/73	193 (58.8)	-22 -75 +50	30 30 30	X X X	X X X	X X X		X X
	59°51'16"N 152°12'35"W	7/16- 8/16/73		-22 -75 +50	30 0 30	X X X	X X X	X X X		X X
	59°51'12"N 152°12'36"W	8/16- 8/31/73		-22 -75 +50	15 15 15	X X X	X X X	X X X		X X
	59°51'42"N 152°11'42"W	8/31- 9/6/73		-22 -75 +50	6 6 0	X X X	X X X	X X X		X X
2	59°34'00"N 152°16'00"W	5/14- 6/15/73	229 (69.8)	-22 -75 +50	32 32 32	X X X	X X X	X X X		X X
3	59°05'05"N 152°15'24"W	6/23- 7/25/73	390 (118.9)	-22 -75 +50	32 32 32	X X X	X X X	X X X		X X
4	59°00'22"N 152°33'48"W	7/21- 8/21/73	486 (148.1)	-22 -75 +50	31 31 31	X X X	X X X	X X X		X X
5	58°56'27"N 152°53'24"W	7/9- 8/7/73	558 (170.1)	-22 -75 +50	27 0 27	X X X	X X X	X X X		X X
6	59°07'12"N 151°53'42"W	7/21- 8/21/73	283 (86.3)	-22 -75 +50	31 0 31	X X X	X X X	X X X		X X
7	59°04'00"N 151°57'24"W	8/21- 9/7/73	664 (202.4)	-22 -75 +50	9 16 16	X X X	X X X	X X X		X X
8	58°58'24"N 151°59'12"W	8/10- 8/25/73	498 (151.8)	-22 -75 +50	15 15 0	X X X	X X X	X X X		X X

Table 1. Current Meter Observations, 1973-75

STATION NO	LATITUDE LONGITUDE	OBSERVATION INFORMATION				SENSORS IN OPERATION				
		Dates of Observations	Depth of Station Feet (Meters)	Depth of Meter (+) Above Bottom ( ) Below Surface Feet	Days of Good Data	Current Speed	Current Direction	Temperature	Conductivity	Pressure
9	59°08'25"N 151°42'19"W	6/22 7/19/73	90 (27.4)	-22	17	X	X	X		X
10	59°11'05"N 151°46'31"W	7/2- 7/17/73	316 (96.3)	-22	15	X	X	X		X
11	59°22'42"N 151°53'06"W	6/27- 7/2/73	107 (32.6)	-22	0	X	X	X		X
12	59°25'42"N 151°54'36"W	8/25- 9/11/73	138 (42.1)	-22 +50	17 17	X X	X X	X X		X X
13	59°27'07"N 151°43'20"W	8/25- 9/11/73	36 (11.0)	-22	0	X	X	X		X
14	59°33'03"N 151°47'08"W	6/5- 6/22/73	222 (67.7)	-22 -75 +50	17 0 17	X X X	X X X	X X X	X	X X
18-1	59°51'12"N 152°00'30"W	5/21- 6/16/73	115 (35.1)	-22 +50	25 25	X X	X X	X X		X
18-2	59°49'22"N 151°59'50"W	6/15- 6/22/73	115 (35.1)	-22 +50	6 6	X X	X X	X X		X
19	59°54'45"N 152°28'36"W	5/21- 6/21/73	120 (36.6)	-22 +50	31 31	X X	X X	X X		X X
20	59°34'00"N 152°49'00"W	5/18- 5/26/73 5/18- 6/4/73	136 (41.5)	-22 +50	11 17	X X	X X	X X		X
21	59°32'15"N 153°22'30"W	8/18- 8/22/73	75 (22.9)	-22	4	X	X	X		X
22	59°24'30"N 153°37'13"W	8/23- 9/10/73	62 (18.9)	-22	18	X	X	X		X
	59°15'04"N 153°32'54"W	7/13- 7/19/73	106 (32.3)	-22	6	X	X	X		X
25	58°53'20"N 153°11'16"W	7/25- 8/9/73	537 (163.7)	-22 -75 +50	15 15 0	X X X	X X X	X X X		X X

Table 1. Current Meter Observations, 1973-75 (con.)

STATION NO	LATITUDE LONGITUDE	OBSERVATION INFORMATION				SENSORS IN OPERATION				
		Dates of Observations	Depth of Station Feet (Meters)	Depth of Meter (+) Above Bottom ( ) Below Surface Feet	Days of Good Data	Current Speed	Current Direction	Temperature	Conductivity	Pressure
26	59°17'48"N 152°54'42"W	8/22- 8/10/73	271 (82.6)	-22 -75 +50	18 18 0	X X X	X X X	X X X	X X	X X
27	59°15'12"N 152°16'20"W	6/18- 7/21/73	310 (94.5)	-22 -75 +50	31 32 32	X X X	X X X	X X X	X 	X X
J-1	59°52'42"N 152°10'30"W	5/14- 6/17/73	193 (58.8)	-22 -75 +50	29 29 29	X X X	X X X	X X X	 	X X

Table 1. Current Meter Observations, 1973-75 (con.)

STATION NO	LATITUDE LONGITUDE	OBSERVATION INFORMATION				SENSORS IN OPERATION				
		Dates of Observations	Depth of Station Feet (Meters)	Depth of Meter (+) Above Bottom (-) Below Surface Feet	Days of Good Data	Current Speed	Current Direction	Temperature	Conductivity	Pressure
1	59°52'06"N 152°11'42"W	5/30- 6/14/74	198 (60.35)	-20 -75 +50	15 15 15	X X X	X X X	X X X	 X X	X X
15	59°39'15"N 151°47'24"W	5/10- 5/29/74	96 (29.26)	-20	19	X	X	X		X
17	59°35'03"N 151°23'19"W	5/10- 5/29/74	288 (87.78)	-20 -75 +50	19 19 19	X X X	X X X	X X X	X X	 X
28	60°08'54"N 152°38'45"W	7/24- 8/9/74	144 (43.89)	-20	13	X	X	X		X
29	60°05'43"N 152°34'27"W	7/24- 8/9/74	174 (53.04)	-20	16	X	X	X		X
30	60°07'36"N 152°24'06"W	7/23- 8/8/74 7/23- 8/9/74	120 (36.58)	-20 +50	16 17	X X	X X	X X	X X	X
31	60°04'39"N 152°16'45"W	7/27- 8/12/74	192 (58.52)	-20 -75	16 16	X X	X X	X X		X X
32	60°01'09"N 152°07'00"W	7/11- 7/25/74 7/11- 7/20/74 7/26- 8/9/74	192 (58.52)	-20 -75 +50 -20 -75 +50	14 14 9 14 14 14	X X X X X X	X X X X X X	X X X X X X	 X X	X X X X
33	59°58'03"N 151°57'03"W	7/10- 7/25/74	96 (29.26)	-20	15	X	X	X		X
34	60°08'00"N 151°56'03"W	6/25- 7/11/74	132 (40.23)	-20 +50	16 16	X X	X X	X X		X
35	60°13'54"N 152°15'51"W	7/11- 7/26/74	177 (53.95)	-20 -75 +50	15 15 15	X X X	X X X	X X X	X X	X X

Table 1. Current Meter Observations, 1973-75 (con.)

STATION NO.	LATITUDE LONGITUDE	OBSERVATION INFORMATION				SENSORS IN OPERATION				
		Dates of Observations	Depth of Station Feet (Meters)	Depth of Meter (+) Above Bottom (-) Below Surface Feet	Days of Good Data	Current Speed	Current Direction	Temperature	Conductivity	Pressure
36	60°22'27"N 152°09'57"W	6/25-7/22/74	330 (100.58)	-20	27	X	X	X		X
		6/21-7/22/74		-75	31	X	X	X		X
		6/21-7/23/74		+50	32	X	X	X	X	-
37	60°20'18"N 151°52'36"W	6/25-7/1/74	120 (36.58)	-20	16	X	X	X	X	X
				+50	16	X	X	X	X	
38	60°17'09"N 151°42'42"W	6/25-7/4/74	84 (25.60)	-20	7	X	X	X		X
		6/25-7/7/74		+50	7	X	X	X	X	
	60°16'45"N 151°42'54"W	7/9-8/9/74		-20	31	X	X	X		X
				+50	0	X	X	X		X
39	60°13'15"N 151°35'24"W	6/21-7/5/74	66 (20.12)	-20	14	X	X	X	X	X
40	60°26'36"N 152°02'36"W	6/5-6/20/74	78 (23.77)	-20	15	X	X	X		X
41	60°27'06"N 152°10'48"W	6/7-6/24/74	120 (36.58)	-20	17	X	X	X		X
				+50	17	X	X	X	X	
42	60°32'33"N 152°05'57"W	6/7-6/24/74	222 (67.67)	-20	17	X	X	X		X
				-75	17	X	X	X		X
43	60°31'15"N 151°59'51"W	6/6-6/21/74	156 (47.55)	-20	14	X	X	X		X
44	60°27'12"N 151°40'00"W	5/23-6/6/74	174 (53.04)	-20	14	X	X	X		X
				+50	14	X	X	X	X	
45	60°24'45"N 151°32'00"W	5/22-6/6/74	270 (82.30)	-20	15	X	X	X		X
47	60°35'54"N 151°44'06"W	5/8-5/23/74	54 (16.46)	-20	15	X	X	X	X	X
48	60°37'48"N 151°53'48"W	5/7-5/22/74	60 (18.29)	-20	15	X	X	X		

Table 1. Current Meter Observations, 1973-75 (con.)

STATION NO.	LATITUDE LONGITUDE	OBSERVATION INFORMATION				SENSORS IN OPERATION				
		Dates of Observations	Depth of Station Feet (Meters)	Depth of Meter (+) Above Bottom (-) Below Surface Feet	Days of Good Data	Current Speed	Current Direction	Temperature	Conductivity	Pressure
49	60°44'21'N 151°38'30"W	5/6- 6/5/74	60 (18.29)	-20	30	X	X	X		X
50	60°43'15"N 151°33'36"W	5/7- 5/30/74	72 (21.95)	-20 +50	23 23	X X	X X	X X		X X
	60°43'27"N 151°33'15"W	5/31- 7/9/74		-20 +50	39 39	X X	X X	X X		X X
	60°43'45"N 151°33'12"W	7/26- 8/15/74		-20	20	X	X	X		X
		7/12- 8/15/74		+50	34	X	X	X		
51	60°43'21"N 151°25'54"W	6/14- 6/18/74	36 (10.97)	-20	4	X	X	X		X
	60°43'24"N 151°28'00"W	7/9- 7/23/74		-20	14	X	X	X		X
	60°43'27"N 151°27'57"W	7/24- 8/8/74		-20	15	X	X	X		X
52	60°40'45"N 151°25'47"W	5/8- 5/23/74	102 (31.09)	-20 +50	15 15	X X	X X	X X		X X
60	60°53'00"N 151°13'57"W	7/31- 8/15/74	132 (40.23)	-15 -70	10 10	X X	X X	X X	 X	X
76	61°07'21"N 150°26'48"W	7/30- 8/14/74	78 (23.77)	-20	15	X	X	X	X	X

Table 1. Current Meter Observations, 1973-75 (con.)

STATION NO	LATITUDE LONGITUDE	OBSERVATION INFORMATION				SENSORS IN OPERATION				
		Dates of Observations	Depth of Station Feet (Meters)	Depth of Meter (+) Above Bottom (-) Below Surface Feet	Days of Good Data	Current Speed	Current Direction	Temperature	Conductivity	Pressure
50	60°43'45"N 151°33'00"W	6/21- 7/11/75 7/11- 7/26/75	99 (30.1)	-20 -46 -20 -50	15 15 9 15	X X X X	X X X X	X X X X		X X X X
53	60°48'15"N 151°17'12"W	5/8- 5/28/75 7/26- 8/12/75	79.8 (24.3) 82.8 (25.2)	-20 -50 -20	0 19 13	X X	X X	X X		X X
54	60°50'45"N 151°20'12"W	5/8- 5/27/75 7/11- 7/29/75	140.4 (42.8)	-20 -50 +50 -20 -50 +40	19 19 0 18 18 18	X X X X X	X X X X X	X X X X X		X X X X X
55	60°54'27"N 151°27'30"W	5/7- 5/15/75	239 (72.8)	-20	0					
	60°54'30"N 151°28'00"W	5/7- 5/23/75		-50 +50	16 16	X X	X X	X X		X X
	60°54'30"N 151°28'00"W	5/15- 5/23/75		-20	8	X	X	X		X
	60°54'45"N 151°27'12"W	7/14- 8/1/75		-20 +50	0 17	X	X	X		X
56	60°56'12"N 151°30'15"W	5/7- 5/23/75 5/29- 6/17/75 7/24- 8/5/75	70 (21.3)	-20 -20 -20	0 0 12					
57	61°02'12"N 151°07'48"W	5/23 6/5/75	89.4 (27.2)	-20	13	X	X	X		X
58	61°00'12"N 151°04'42"W	5/23- 6/5/75	90 (27.4)	-20	13	X	X	X		X

Table 1. Current Meter Observations, 1973-75 (con.)

STATION NO	LATITUDE LONGITUDE	OBSERVATION INFORMATION				SENSORS IN OPERATION				
		Dates of Observations	Depth of Station Feet (Meters)	Depth of Meter (+) Above Bottom (-) Below Surface Feet	Days of Good Data	Current Speed	Current Direction	Temperature	Conductivity	Pressure
59	60°57'30"N 151°01'45"W	5/22- 6/5/75	130 (39.6)	-20	0					
				-50	14	X	X	X		X
		7/31- 8/12/75		-20	12	X	X	X		X
60	60°54'24"N 150°57'23"W	5/22- 6/5/75	54 (16.4)	-20	0					
	60°54'20"N 150°42'00"W	7/29- 8/6/75		-20	8	X	X	X		X
61	61°00'57"N 150°45'03"W	5/21- 5/30/75	53.4 (16.2)	-20	8	X	X	X		X
62	61°04'39"N 150°45'03"W	5/21- 5/30/75	73 (22.2)	-20	8	X	X	X		X
				-50	0					
	61°04'32"N 150°44'42"W	6/11- 6/20/75		-50	8	X	X	X		X
63	61°07'54"N 150°47'00"W	5/21- 5/29/75	89.4 (27.2)	-20	0					
				-50	8	X	X	X		X
	61°07'48"N 150°47'48"W	7/29- 8/6/75		-20	8	X	X	X		
64	61°09'33"N 150°49'48"W	5/21- 5/29/75	67 (20.4)	-20	0					
				-50	0					
		6/3- 6/12/75		-20	8	X	X	X		X
		7/31- 8/12/75		-50	11	X	X	X		X
65	61°09'45"N 150°30'45"W	5/30- 6/17/75	87.6 (26.7)	-20	17	X	X	X		X
				-50	4	X	X	X		X
		6/18- 7/7/75		-50	19	X	X	X		X
66	61°07'30"N 150°29'15"W	5/30- 6/18/75	73.8 (22.5)	-20	19	X	X	X		X

Table 1. Current Meter Observations, 1973-75 (con.)

STATION NO	LATITUDE LONGITUDE	OBSERVATION INFORMATION				SENSORS IN OPERATION				
		Dates of Observations	Depth of Station Feet (Meters)	Depth of Meter (+) Above Bottom (-) Below Surface Feet	Days of Good Data	Current Speed	Current Direction	Temperature	Conductivity	Pressure
67	61°05'15"N 150°28'18"W	5/30- 6/17/75 6/17- 6/30/75	90.1 (27.4)	-20 -50 -20 -50	18 18 13 13	X X X X	X X X X	X X X X		X X X X
68	61°03'00"N 150°27'42"W	5/30- 6/16/75	45.5 (13.8)	-20	17	X	X	X		X
69	61°03'33"N 150°23'00"W	5/28- 6/16/75	133.5 (40.7)	-20 -50	19 0	X	X	X		X
69A	61°03'08"N 150°19'15"W	6/16- 7/7/75	184.8 (56.3)	-20 -50	8 20	X X	X X	X X		X X
	61°03'12"N 150°19'00"W	8/1- 8/12/75		-20	10	X	X	X		X
72	61°05'15"N 150°14'06"W	7/17- 7/31/75	66 (20.1)	-20	13	X	X	X		X
73	61°08'36"N 150°17'33"W	6/11- 6/19/75	41.5 (12.6)	-20	8	X	X	X		X
74	61°09'40"N 150°18'45"W	6/11- 6/20/75	51.0 (15.5)	-20	9	X	X	X		X
75	61°10'32"N 150°18'51"W	6/12- 6/20/75	44.9 (13.6)	-20	0					
76	61°14'15"N 150°15'51"W	6/24- 7/3/75	31 (9.4)	-15	8	X	X	X		X
77	61°10'48"N 150°13'45"W	6/12- 6/30/75	80 (24.3)	-20 -50	18 12	X X	X X	X X		X X
78	61°11'24"N 150°09'17"W	7/9- 7/18/75	82 (25.0)	-20 -50	9 9	X X	X X	X X		X X
81	61°13'20"N 150°04'18"W	6/23- 7/9/75	32 (9.75)	-20	16	X	X	X		X

Table 1. Current Meter Observations, 1973-75 (con.)

STATION NO.	LATITUDE LONGITUDE	OBSERVATION INFORMATION				SENSORS IN OPERATION				
		Dates of Observations	Depth of Station Feet (Meters)	Depth of Meter (+) Above Bottom (-) Below Surface Feet	Days of Good Data	Current Speed	Current Direction	Temperature	Conductivity	Pressure
82	61°12'25"N 150°03'40"W	6/23- 7/9/75	48 (14.6)	-20	16	X	X	X		X
83	61°11'14"N 150°03'45"W	6/24- 7/11/75	37 (11.2)	-20	15	X	X	X		X
		7/10- 7/17/75		-20	7	X	X	X		X
84	61°12'51"N 150°00'09"W	7/2- 7/18/75	42.7 (13.0)	+20	16	X	X	X		X
85	61°13'31"N 150°00'09"W	6/23- 7/10/75	95 (28.9)	-20	16	X	X	X		X
				-50	16	X	X	X		X
		7/10- 7/22/75		-20	12	X	X	X		X
				-50	12	X	X	X		X
		7/21- 8/4/75		-20	13	X	X	X		X
				-50	13	X	X	X		X
86	61°13'52"N 149°59'57"W	7/1- 7/17;75	67.6 (20.6)	-26	19	X	X	X		X
87	61°13'41"N 149°56'48"W	5/9- 6/3/75	74 (22.5)	-20	19	X	X	X		X
		5/9- 6/12/75		-50	34	X	X	X		X
		6/13- 6/26/75		-20	13	X	X	X		X
				-50	13	X	X	X		X
		6/26- 7/10/75		-20	13	X	X	X		X
				-50	13	X	X	X		X
		7/10- 7/22/75		-20	10	X	X	X		X
				-50	12	X	X	X		X
		7/23- 8/1/75		-20	2	X	X	X		X
				-50	8	X	X	X		X
		8/4- 8/11/75		-20	6	X	X	X		X
88	61°14'45"N 149°55'28"W	7/7- 7/21/75	81 (24.6)	-20	4	X	X	X		X
				-50	6	X	X	X		X
		7/21- 8/7/75		-20	2	X	X	X		X
				-50	17	X	X	X		X

Table 1. Current Meter Observations, 1973-75, (con.)

STATION NO	LATITUDE LONGITUDE	OBSERVATION INFORMATION				SENSORS IN OPERATION				
		Dates of Observations	Depth of Station Feet (Meters)	Depth of Meter (+) Above Bottom (-) Below Surface Feet	Days of Good Data	Current Speed	Current Direction	Temperature	Conductivity	Pressure
89	61°14'35"N 149°54'45"W	7/7-7/18/75	64 (19.5)	-20	5	X	X	X		X
		7/18-8/4/75		-20	17	X	X	X		X
90	61°14'27"N 149°53'50"W	7/7-7/24/75	74 (22.5)	-20	16	X	X	X		X
		7/30-8/9/75		-50	8	X	X	X		X
91	61°14'33"N 149°53'07"W	5/9-5/13/75	36 (10.9)	-20	3					
		5/16-5/19/75		-20	2					
		5/23-5/27/75		-20	3					
		5/30-6/2/75		-20	2					
		6/26-6/30/75		-20	3					
92	61°16'02"N 149°54'03"W	7/1-7/17/75	94.6 (28.8)	-20	10	X	X	X		X
				-50	13	X	X	X		X
93	61°16'02"N 149°53'36"W	6/23-7/9/75	116 (35.3)	-20	16	X	X	X		X
				-50	16	X	X	X		X
		7/9-7/23/75		-20	11	X	X	X		X
				-50	0					
		7/23-8/4/75		-20	11	X	X	X		X
				-50	12	X	X	X		X
94	61°18'05"N 149°52'33"W	7/30-8/7/75	50 (15.2)	-20	8	X	X	X		X
95	61°21'30"N 149°52'12"W	7/21-8/2/75	25 (7.6)	-14	5	X	X	X		X
96	61°19'54"N 149°47'37"W	7/22-7/30/75	22 (6.7)	-10	8	X	X	X		X

Table 1. Current Meter Observations, 1973-75, (con.)

Ocean Current Measuring System

Manufacturer: Aanderaa
Parameters Measured: Current Speed, Current Direction, Temperature, Pressure, and Conductivity

Parameter	Range	Accuracy
Current Speed	1.5-250 cm/sec	± 10% of value
Current Direction	0-360°magnetic	±5° magnetic
Temperature	-2.46°C to 21.40°C -0.34°C to 32.17°C	±0.2°
Pressure	0-200 PSI 0-500 PSI 0-1000 PSI	±1% of range
Conductivity	0-60 mmho	±0.05 mmhos

Recorder: 1/4-inch magnetic tape
Record Format: 10-bit binary words'
Sampling Rate" 10 minutes
Duration: 60,000 words of information
Processing: tape to tape transcriber
Mode of Operation: part of an ocean mooring system

Table 2. Current Meter Specifications

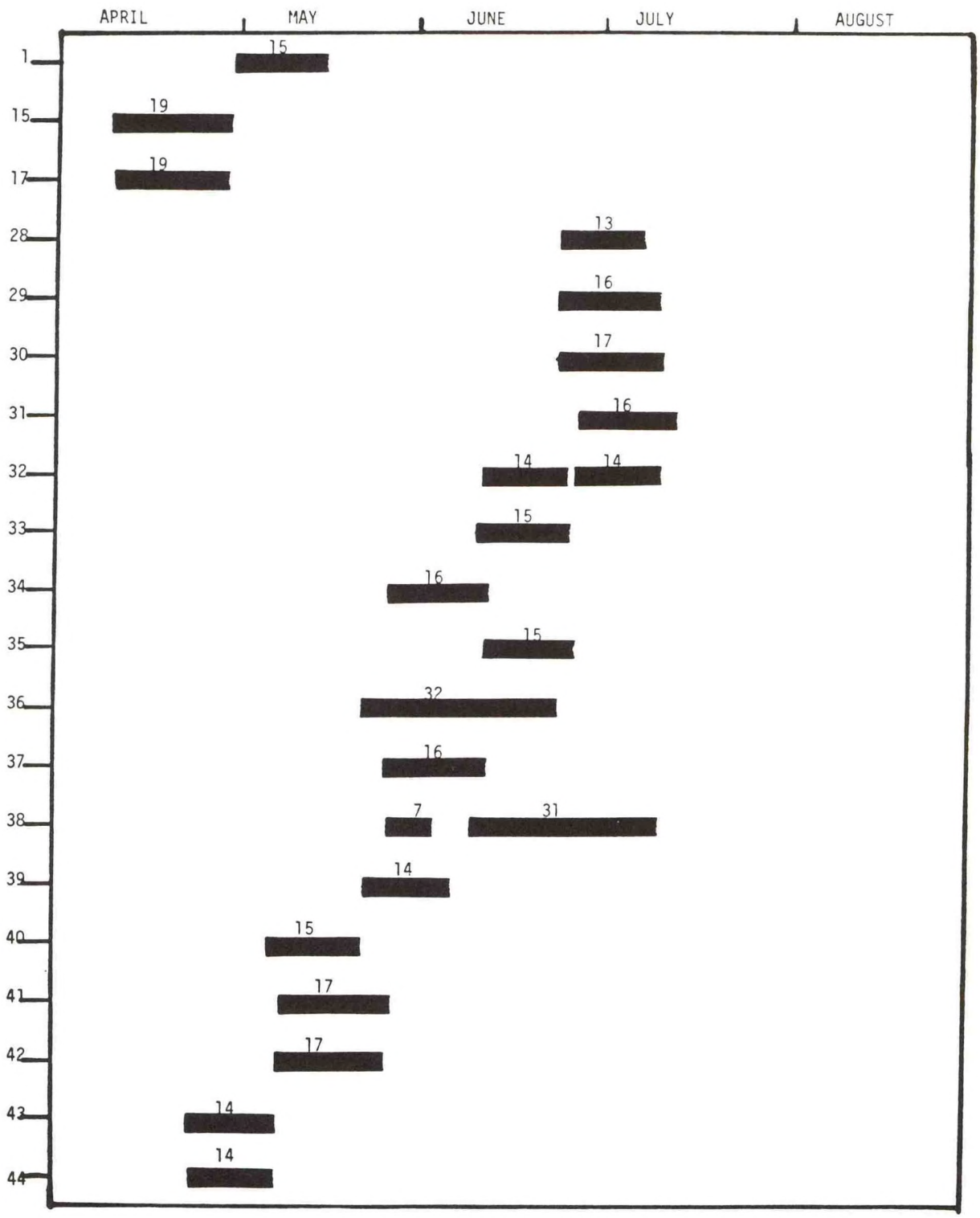

Figure 5. Current Meter Periods

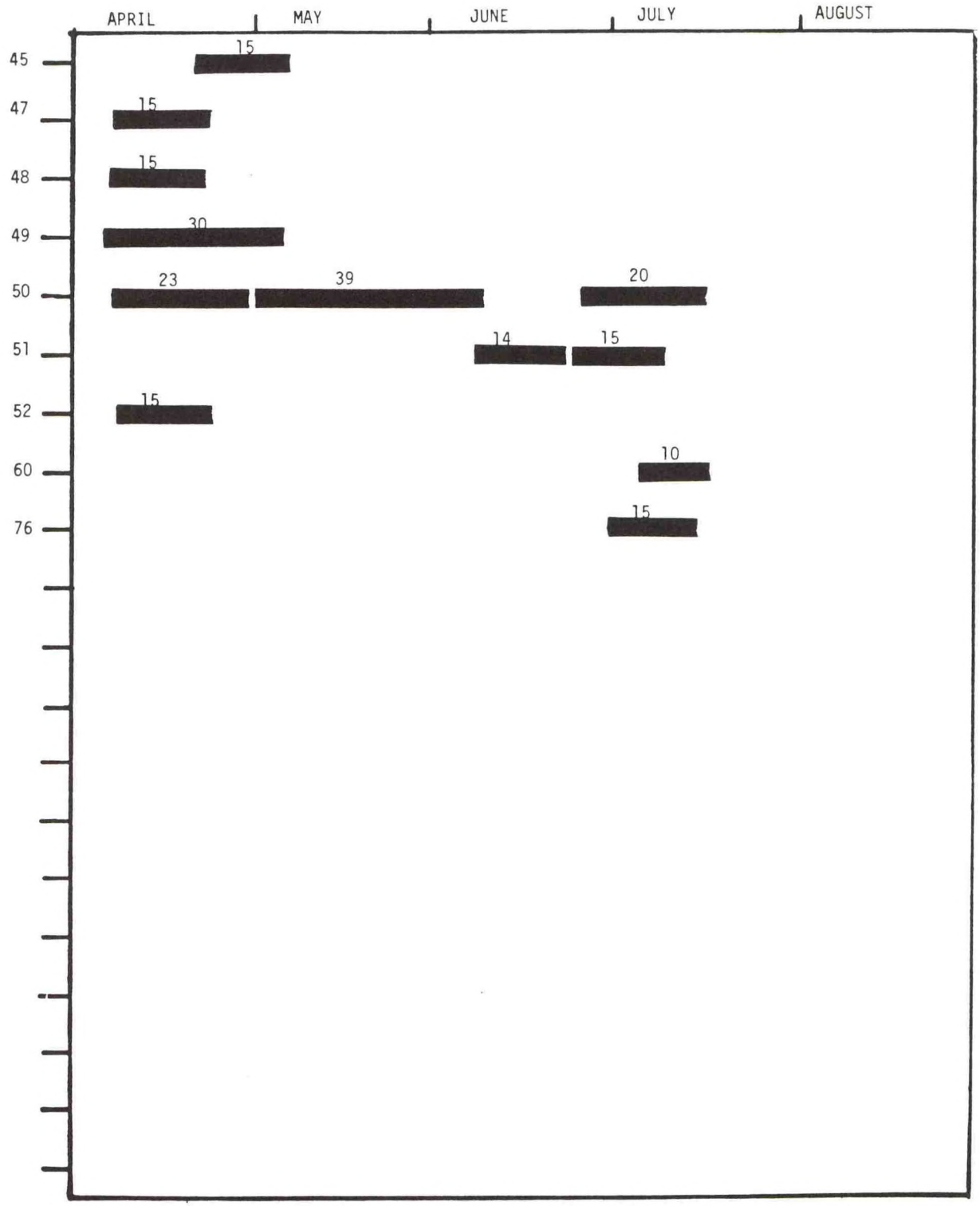

Figure 5. Current Meter Periods (con.)

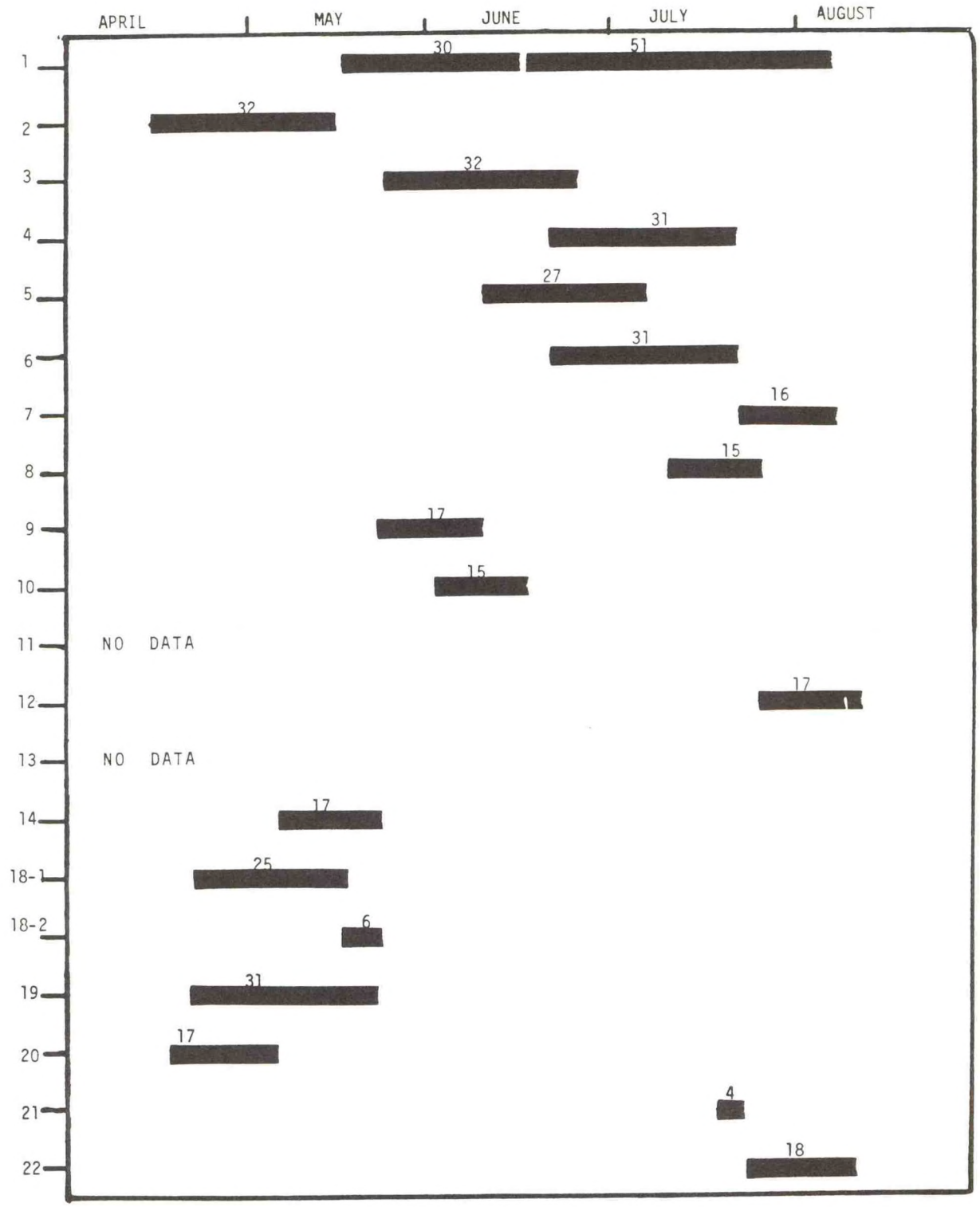

Figure 5. Current Meter Periods (con.)

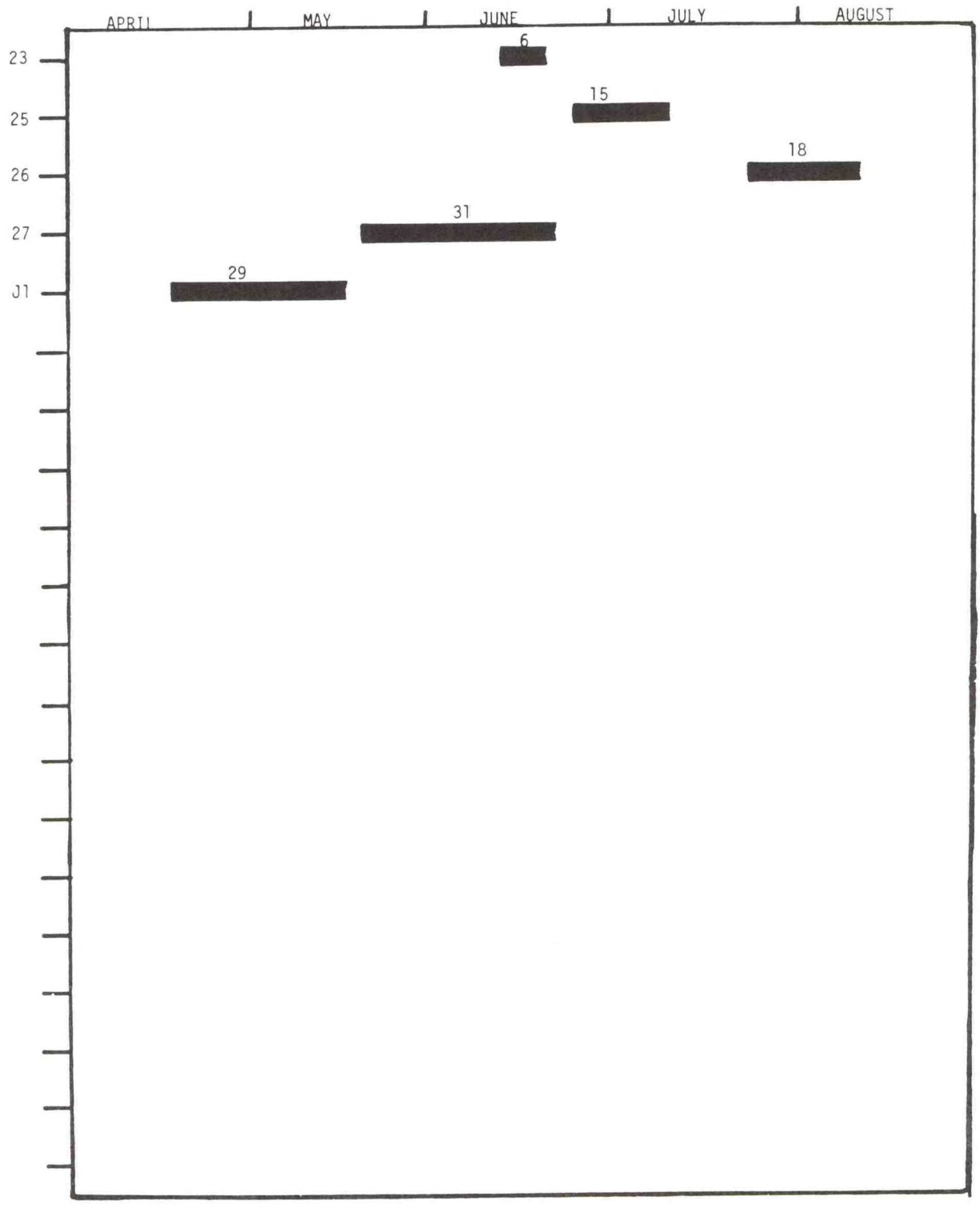

Figure 5. Current Meter Periods (con.)

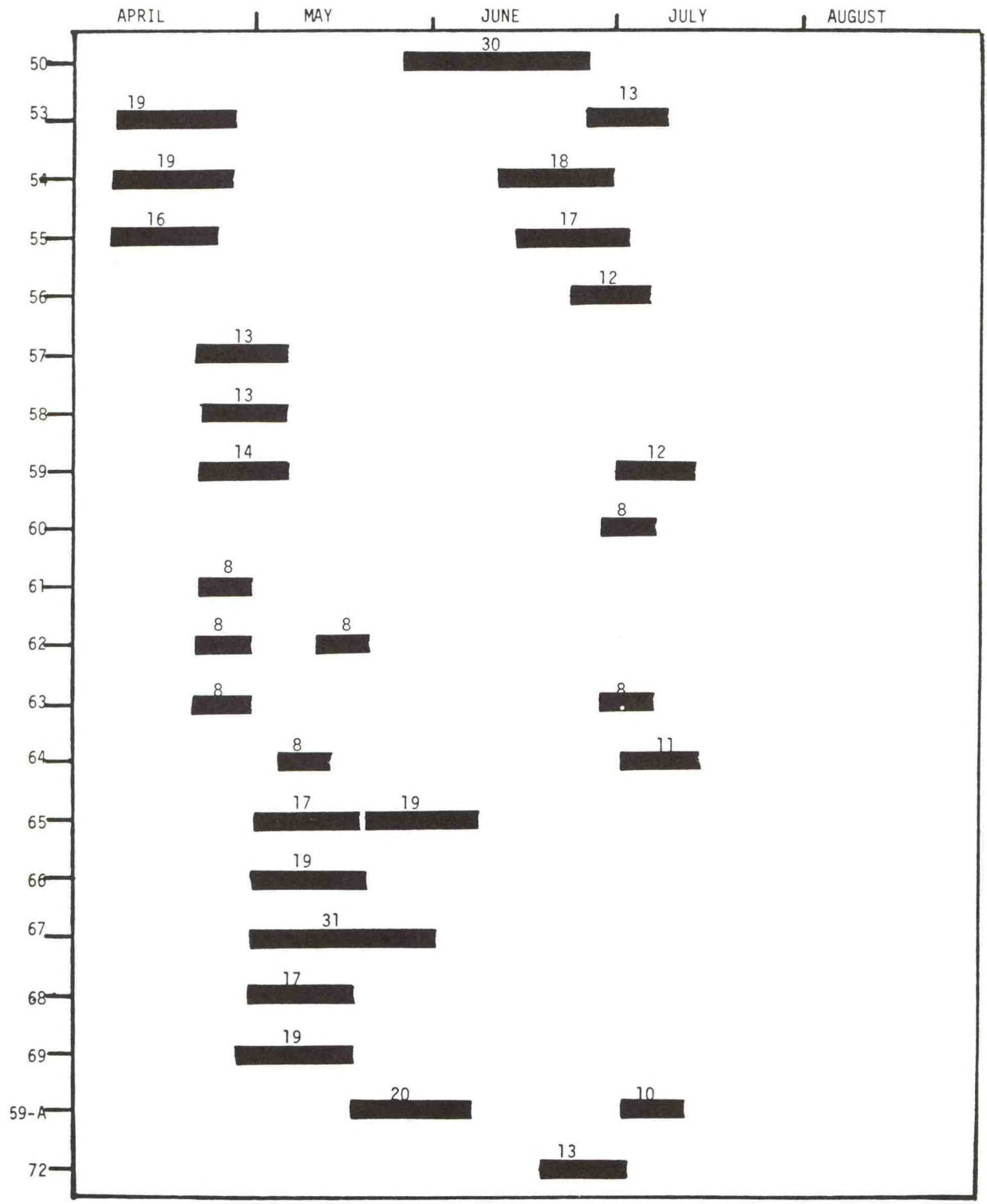

Figure 5. Current Meter Periods (con.)

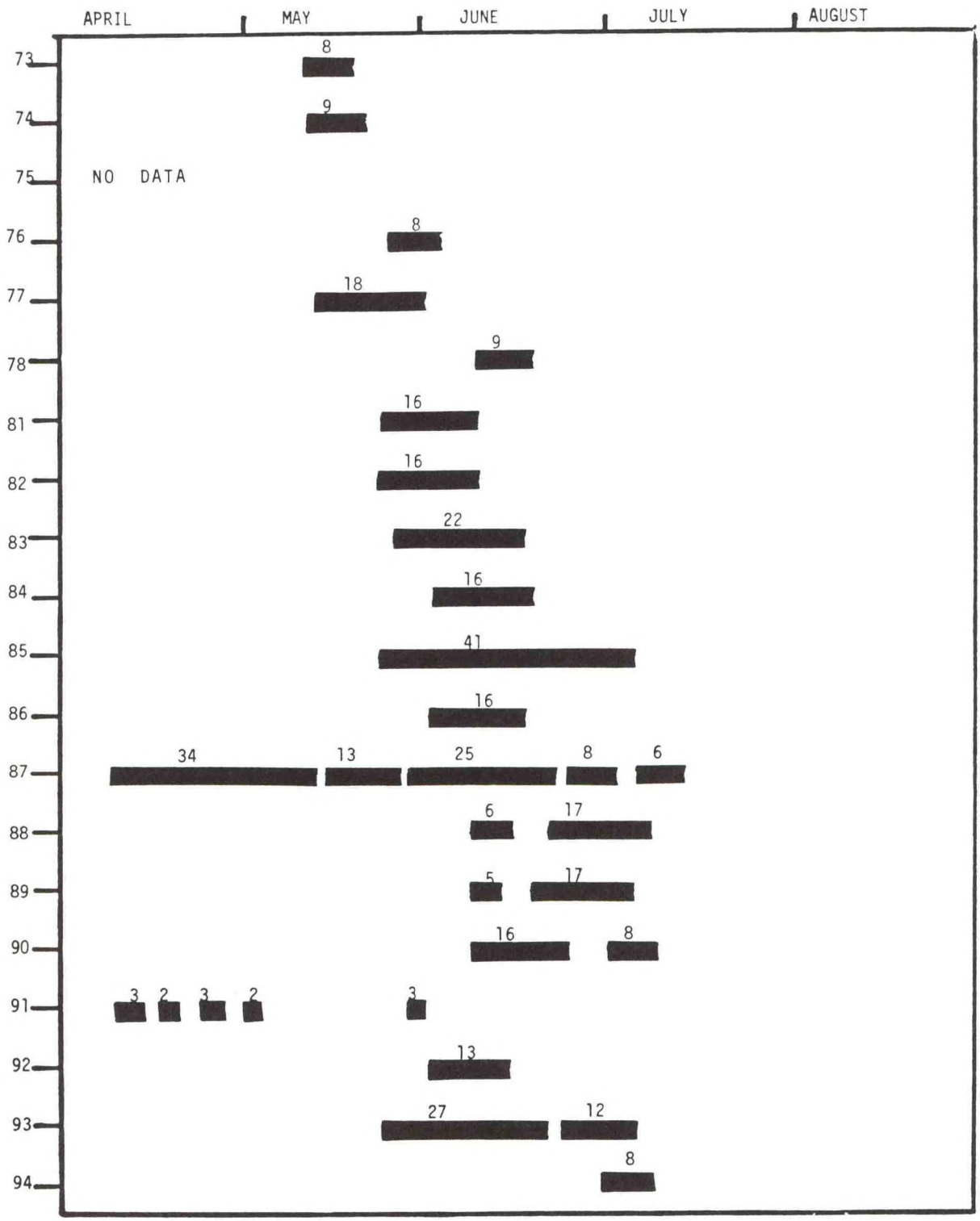

Figure 5. Current Meter Periods (con.)

3.2 Current Meter Analysis

The traditional NOS analysis methods can be used to define the tidal frequency band within the observed record. In estuaries, the energy in the tidal band is often as high as 90 to 95 percent of the total signal. Therefore, if the tidal band can be properly resolved, the tidal current circulation will approximate the total circulation for a specified time period. However, the nontidal component, resulting from wind currents, river runoff, and other effects, can have a significant effect on the circulation, especially during periods of strong fresh water inputs or storms. Also, the seasonal net circulation results from the nontidal current.

The tidal regime can be derived by the calculation of the harmonic constants which are directly related to astronomic conditions. In many locations the predominant astronomic force is the rotation of the Earth with respect to the Moon, with a cyclical period of 12.42 hours, resulting in semidiurnal tidal currents. The accompanying horizontal movement of the water flowing up the estuary is called flooding, and the movement away from the estuary toward the open ocean is called ebbing. The harmonic constituents which generally describe the semidiurnal tidal currents are: M_2, the principal lunar semidiurnal constituent; N_2, the larger lunar elliptic semidiurnal constituent; and S_2, the principal solar semidiurnal constituent. In many locations, especially along the Pacific Coast, the asymmetrical effect of the Moon's tide-producing forces, with respect to the equator, is important. This "declination effect" accounts for diurnal inequalities. The harmonic constituents which generally describe this diurnal effect are: K_1, the lunisolar diurnal constituent, and O_1, the lunar diurnal constituent.

Using either a 15-day or 29-day harmonic analysis, the harmonic constants are calculated for all processed records. A 29-day record allows more constituents to be resolved within the tidal band. The standard Fourier harmonic analysis method of Darwin has been automated by NOS and is further described by Schureman (1958). This technique resolves the components along any set of orthogonal axes. For longer records, usually 6 months to 1 year, a least squares harmonic analysis is performed. Using these harmonic constants, predictions of the tidal current can be predicted at the location where the data were collected.

The results of a harmonic analysis of current data can also be used to construct constituent ellipses. In confined narrow regions, such as river channels and narrow passages, ellipses are long and narrow, illustrating the reversing nature of the tidal current at such locations. For unconfined or partially confined regions, ellipses are more round, and the flow of the tidal current, associated with that constituent rotates continuously through 360° over the period of that constituent; e.g., M_2 is 12.42 hours. The parameters of the calculated elipse are:

(1) W(1) and W(2): The magnitude of the major and minor axis in cm/sec, respectively. W(1) is the maximum velocity of a given constituent. The ratio of W(2)/W(1) is a measure of the ellipticity. If W(1) = W(2), the ellipse is a circle.

(2) Theta(1): The orientation of the major axis, relative to east in a counterclockwise direction. Theta(1) is the direction of progress, either flood or ebb, of a given constituent.

(3) Phase Lag (AN): The difference in degrees (or hours) between the time, at the local time meridians, an astronomic force occurs and the actual current response (e.g., for M_2, the difference between the time of lunar passage over the local time meridian and the time of maximum current response). The phase is relative to the direction indicated by Theta(1).

(4) Rotation (ROT): The rotation of the constituent ellipse, either clockwise or counterclockwise.

The results of the harmonic analysis of the primary constituents, either 15 or 29 days, are given in table 3. These individual results can be used to describe the spatial variability of the predominant tidal constituents in Cook Inlet. By contouring the values of W(1) throughout Cook Inlet for the principal semidiurnal constituent, M_2, and for the principal diurnal constituent, K_1, the coamplitude contours can be constructed. Similarly, using the values of AN, cophase contours can also be constructed. Together with the direction of progress for the constituents at various stages of the tide, these illustrations will describe the spatial picture of the tidal current regime for each constituent.

A prediction of the tidal current regime can be obtained for any time at any of the locations specified in table 3. This method is also described by Schureman (1958). Predictions can be calculated by either using the calculated harmonic constants for each orthogonal axis, then combining the results and determining the predictions for speed and direction, or by using the values of W(1) and AN presented in table 3 for each constituent and assuming the current is reversing. (They usually are in estuaries, and the ellipticity will indicate if this assumption is correct for a given station.) For the second method, predictions are along the Theta(1) axis of the principal constituent (M_2 in Cook Inlet, Alaska).

Predictions can also be determined (especially from data records of less than 15 days) by using a nonharmonic reduction method. For each record, the time, speed, and direction of maximum flood and maximum ebb current are determined, as well as the times of minimum flow or slack period. Using a reference station where a harmonic analysis has been performed and a prediction made, ratios and time differences can be calculated

between the reference and subordinate stations. By applying these ratio and time difference factors to the reference station, a tidal current prediction can be made at a subordinate location. These factors are given in table 2 of the Tidal Current Prediction Tables. Also using these factors, Tidal Current Charts for a given region can also be constructed. Table 4 is a summary of the time differences and velocity ratios for all historical current meter data collected prior to this survey. Factors are referenced to Wrangell Narrows, located at 56°49'N, 132°58'W (at Petersburg in the inner waterways of the Alexander Archipelago). A final product from this survey will be an updating of the Tidal Current Prediction Tables, including the designation of a new reference station, and the publication of a new Tidal Current Chart series for Cook Inlet, Alaska.

The variation and causes of the nontidal component are studied by performing spectral and statistical analyses of the current record, including cross-spectra and coherence between current data at different depths or geographic locations, and between current and meteorological data, if available. The residual series (observed series minus predicted series) is calculated for each station; then additional statistical analyses are performed. Finally, current meter records are compared with the extensive STD and tide observations obtained as an integral part of the circulatory survey. The results of the nontidal analysis and further results of the tidal analysis will be published as part of a future NOAA Technical Report.

Table 3. Results Of The Harmonic Analysis In Ellipse Parameters For The M_2, S_2, N_2, K_1, And O_1 Constituents For All Current Meter Stations, 1973-75.

STATION NO.	DEPTH OF METER IN FEET (-) BELOW SURFACE (+) ABOVE BOTTOM	TYPE OF HARMONIC ANALYSIS 15 DAY OR 29 DAY	DATE ANALYSIS BEGINS	M_2						S_2					
				W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW
1	-22	29	7-17-73	123.7	95.5	13.7	32.7	1.1	CW	40.1	94.1	2.8	46.6	1.6	CW
1	-75	29	6-16-73	104.7	72.9	0.6	30.2	1.0	CCW	37.9	74.5	1.0	50.8	1.7	CCW
1	+50	29	7-17-73	80.0	96.0	14.6	31.1	1.1	CCW	30.9	98.3	3.5	52.9	1.8	CCW
1	+50	29	6-16-73	83.5	73.2	12.5	26.6	0.9	CCW	32.3	71.9	2.0	46.3	1.5	CCW
J-1	-22	29	5-18-73	120.5	70.2	10.0	38.8	1.3	CW	39.9	70.5	0.1	53.6	1.8	CW
J-1	-75	29	5-18-73	104.2	68.3	1.4	29.7	1.0	CCW	35.3	67.3	1.2	49.5	1.7	CCW
J-1	+50	29	5-18-73	83.8	72.4	10.9	25.6	0.9	CCW	29.6	72.1	2.6	47.8	1.6	CCW
2	-75	29	5-14-73	82.7	77.2	4.1	6.9	0.2	CW	29.6	77.2	0.7	26.9	0.9	CW
2	+50	29	5-14-73	67.6	83.3	0.9	4.4	0.2	CW	24.2	84.2	0.5	25.6	0.9	CW
3	-22	29	6-23-73	60.4	332.7	12.3	173.7	6.0	CW	26.0	156.0	0.6	19.7	0.7	CCW
3	-75	29	6-23-73	57.5	327.4	11.2	171.3	5.9	CW	23.5	150.3	0.0	14.7	0.5	CCW
3	+50	29	6-23-73	34.1	308.3	12.0	142.1	4.9	CCW	16.3	311.0	3.3	161.9	5.4	CCW
4	-22	29	7-21-73	24.1	341.9	0.0	170.9	5.9	CCW	12.0	167.5	2.4	14.5	0.5	CW
4	-75	29	7-21-73	26.0	309.4	0.3	163.9	5.7	CCW	12.1	148.9	2.4	12.1	0.4	CW
4	+50	29	7-21-73	25.1	300.5	3.4	159.2	5.5	CW	9.4	291.0	0.6	173.9	5.8	CCW
5	-22	15	7-10-73	17.1	293.2	1.4	157.9	5.4	CCW	6.7	285.1	0.8	175.2	5.8	CCW
5	+50	15	7-10-73	19.4	302.3	2.9	163.4	5.6	CW	9.7	287.6	2.0	164.5	5.5	CW
6	-22	29	7-21-73	99.5	319.0	3.5	155.8	5.4	CCW	42.5	317.2	3.9	170.0	5.7	CCW
6	+50	29	7-21-73	70.8	317.7	3.1	132.7	4.6	CCW	24.0	313.9	0.4	149.4	5.0	CCW
7	-75	15	8-22-73	82.6	324.5	3.1	158.1	5.5	CW	33.9	327.6	2.4	179.3	6.0	CCW
7	+50	15	8-22-73	53.5	316.4	23.8	145.9	5.0	CCW	19.0	308.5	7.6	163.0	5.4	CCW

Table 3. Results Of The Harmonic Analysis In Ellipse Parameters For The M_2, S_2, N_2, K_1, And O_1 Constituents For All Current Meter Stations, 1973-75 (con.)

N_2						K_1						O_1						STATION NO.
W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT. CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT. CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW	
25.9	270.3	3.2	178.6	6.3	CW	21.2	90.7	.2	70.6	4.7	CW	13.1	95.5	.5	62.9	4.5	CCW	1
20.4	70.5	.9	1.2	0.0	CW	18.3	74.9	1.9	72.0	4.8	CCW	12.2	78.2	1.2	68.2	4.9	CCW	1
17.7	100.2	3.0	5.3	.2	CCW	16.3	100.8	1.5	74.9	5.0	CCW	9.1	95.1	.9	69.1	5.0	CCW	1
16.8	254.6	1.2	177.7	6.2	CCW	15.2	79.3	2.5	74.5	5.0	CCW	10.6	75.5	.4	70.0	5.0	CCW	1
24.6	67.0	1.4	2.6	0.1	CW	20.6	71.4	0.2	73.5	4.9	CCW	11.6	74.1	1.7	62.0	4.4	CCW	J-1
20.9	66.6	0.4	1.8	0.1	CCW	18.3	69.4	1.0	72.1	4.8	CCW	10.0	71.8	1.7	60.2	4.3	CCW	J-1
16.2	74.3	2.3	0.2	0.0	CCW	14.9	76.4	1.5	71.8	4.8	CCW	8.0	78.9	1.4	64.1	4.6	CCW	J-1
15.1	258.9	0.6	159.1	5.6	CW	13.7	75.6	1.7	64.1	4.3	CW	7.8	70.9	0.5	61.3	4.4	CW	2
12.6	263.3	0.3	154.4	5.4	CW	11.2	80.7	1.3	61.2	4.1	CW	6.2	82.9	0.9	59.9	4.3	CW	2
16.7	345.4	5.6	165.3	5.8	CW	11.3	145.6	1.2	69.7	4.6	CW	4.6	143.8	1.8	38.7	2.8	CCW	3
13.4	338.8	3.7	163.3	5.7	CW	9.9	143.7	0.4	63.1	4.2	CW	5.7	146.6	0.4	44.1	3.2	CCW	3
9.3	301.4	0.2	107.1	3.8	CCW	10.7	161.9	0.5	75.1	5.0	CW	5.6	158.2	0.3	65.6	4.7	CCW	3
7.0	294.4	1.2	119.2	4.2	CW	5.4	164.7	1.7	62.6	4.2	CCW	4.5	172.7	0.8	73.3	5.3	CCW	4
5.3	273.2	0.5	127.8	4.5	CW	6.6	142.0	2.3	75.0	5.0	CCW	4.7	146.1	1.3	69.5	5.0	CCW	4
8.0	308.5	1.4	145.3	5.1	CW	5.5	132.9	1.0	63.2	4.2	CCW	3.2	128.6	0.7	65.0	4.7	CCW	4
3.3	295.5	0.1	147.2	5.2	CCW	4.6	113.1	0.5	74.4	4.9	CW	3.3	228.6	0.5	150.9	10.8	CCW	5
3.8	302.8	0.3	166.4	5.9	CW	3.9	136.9	0.2	85.3	5.7	CCW	2.9	141.2	0.6	82.7	5.9	CCW	5
20.6	313.4	2.1	128.5	4.5	CCW	19.4	140.2	1.3	41.8	2.8	CW	9.1	126.9	3.5	59.2	4.2	CCW	6
15.1	320.2	0.7	126.8	4.5	CCW	12.3	144.0	3.6	22.8	1.5	CCW	6.2	158.7	3.4	46.8	3.4	CCW	6
16.0	324.7	1.6	147.0	5.2	CW	19.4	137.0	1.9	42.0	2.8	CCW	9.0	147.5	0.1	47.1	3.4	CW	7
10.3	316.5	4.8	133.9	4.7	CCW	11.3	153.7	5.1	50.0	3.3	CCW	6.8	156.1	2.4	40.9	2.9	CCW	7

Table 3. Results Of The Harmonic Analysis In Ellipse Parameters For The M_2, S_2, N_2, K_1, And O_1 Constituents For All Current Meter Stations, 1973-75 (con.)

STATION NO.	DEPTH OF METER IN FEET (-) BELOW SURFACE (+) ABOVE BOTTOM	TYPE OF HARMONIC ANALYSIS 15 DAY OR 29 DAY	DATE ANALYSIS BEGINS	M_2						S_2					
				W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW
8	-22	15	8-10-73	84.6	321.3	3.5	102.0	3.5	CW	32.0	316.4	0.5	121.1	4.0	CW
9	-22	15	6-22-73	146.2	357.3	3.2	122.5	4.2	CCW	45.7	355.0	2.5	139.4	4.6	CCW
12	-22	15	8-25-73	116.9	227.9	6.1	144.5	5.0	CW	45.0	223.8	1.5	147.2	4.9	CW
12	+50	15	8-25-73	97.7	230.9	0.2	142.5	4.9	CW	40.1	234.0	1.5	150.4	5.0	CW
14	-22	15	6-5-73	33.2	238.8	11.3	156.7	5.4	CCW	14.4	71.0	1.2	13.6	0.5	CCW
14	+50	15	6-5-73	36.8	225.9	8.1	138.8	4.8	CCW	14.3	215.5	3.2	158.4	5.3	CCW
18	-22	15	5-22-73	119.2	71.1	0.2	20.8	0.7	CCW	38.5	69.4	1.1	30.4	1.0	CCW
18	+50	15	5-22-73	107.0	71.0	2.1	20.1	0.7	CCW	34.6	69.7	0.8	30.5	1.0	CW
19	-22	29	5-21-73	104.6	68.4	5.6	12.8	0.4	CCW	33.9	70.4	2.3	29.2	1.0	CCW
19	+50	29	5-21-73	94.5	68.8	8.3	15.1	0.5	CCW	31.6	68.2	2.3	25.5	0.9	CCW
20	+50	15	5-18-73	56.4	69.3	20.5	15.3	0.5	CW	17.9	69.7	7.4	28.7	1.0	CW
22	-22	15	8-23-73	36.1	40.5	10.9	59.7	2.1	CW	10.5	41.2	4.4	76.2	2.5	CW
25	-22	15	7-25-73	19.9	117.1	10.3	36.5	1.3	CW	10.2	119.8	4.7	62.0	2.1	CW
26	-22	15	8-23-73	4.5	110.8	2.1	125.3	4.3	CW	6.7	307.6	4.8	18.4	0.6	CW
27	-22	29	6-19-73	72.9	289.8	16.4	106.9	3.7	CW	20.6	285.9	0.0	90.8	3.0	CW
27	-75	29	6-19-73	73.5	286.1	16.8	164.2	5.7	CW	29.5	105.2	1.7	8.8	0.3	CW
27	+50	29	6-19-73	56.0	284.7	0.5	145.8	5.0	CCW	22.6	285.2	1.1	166.2	5.5	CCW

Table 3. Results Of The Harmonic Analysis In Ellipse Parameters For The M_2, S_2, N_2, K_1, And O_1 Constituents For All Current Meter Stations, 1973-75 (con.)

N_2						K_1						O_1						STATION NO.
W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT. CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT. CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW	
16.4	321.3	0.9	91.8	3.2	CW	14.9	138.7	3.0	30.9	2.1	CCW	9.6	152.7	0.2	32.7	2.3	CCW	8
28.4	357.3	0.5	113.4	4.0	CCW	15.6	1.5	0.7	174.2	11.6	CW	4.9	13.9	0.7	167.7	12.0	CW	9
22.7	227.9	1.4	143.2	5.0	CW	13.3	33.4	1.4	29.1	1.9	CW	7.7	37.3	2.2	41.0	2.9	CW	12
19.0	230.9	0.3	138.1	4.9	CCW	12.3	49.7	2.0	27.4	1.8	CW	7.7	37.4	0.1	38.4	2.8	CCW	12
6.2	242.3	2.8	140.4	4.9	CCW	4.3	55.6	0.3	27.6	1.8	CW	2.0	75.0	0.2	52.3	3.8	CCW	14
7.2	225.9	1.5	125.8	4.4	CCW	4.0	56.5	1.0	17.3	1.1	CCW	3.9	55.9	0.1	23.4	1.7	CCW	14
23.1	71.1	0.3	15.5	0.5	CW	17.3	71.9	0.1	61.0	4.1	CCW	9.7	72.5	0.1	48.5	3.5	CCW	18
20.8	71.1	0.9	14.5	0.5	CCW	15.4	71.1	0.2	62.1	4.1	CW	8.7	74.1	0.1	46.8	3.4	CW	18
19.7	250.8	1.2	160.1	5.6	CCW	12.7	68.5	3.1	50.8	3.4	CCW	6.9	53.9	1.2	24.7	1.8	CCW	19
18.5	250.9	0.9	148.2	5.2	CCW	13.0	71.6	3.1	47.0	3.1	CCW	7.9	52.9	1.1	35.6	2.6	CCW	19
11.0	68.4	3.8	8.5	0.3	CW	12.0	63.2	4.8	82.5	5.5	CW	8.0	72.8	5.1	64.4	4.6	CW	20
7.1	40.1	1.7	50.4	1.8	CW	4.1	44.4	1.4	118.0	7.8	CW	5.2	54.0	1.1	87.5	6.3	CW	22
3.8	115.7	2.1	22.9	0.8	CW	5.8	106.2	2.0	152.3	10.1	CCW	5.2	107.0	0.4	130.7	9.4	CW	25
0.9	113.2	0.4	75.8	2.7	CW	5.9	183.6	1.5	18.5	1.2	CW	5.6	63.3	1.6	86.3	6.2	CCW	26
11.1	292.1	2.4	29.5	1.0	CW	15.4	100.6	5.7	10.2	0.7	CW	9.9	95.1	4.9	0.7	0.1	CW	27
17.6	285.5	3.7	142.5	5.0	CW	15.1	99.1	3.4	40.7	2.7	CW	8.8	93.9	2.7	38.4	2.8	CW	27
10.7	285.9	0.6	129.9	4.7	CW	12.1	118.9	0.8	43.2	2.9	CW	6.2	124.0	1.1	48.6	3.5	CW	27

Table 3. Results Of The Harmonic Analysis In Ellipse Parameters For The M_2, S_2, N_2, K_1, And O_1 Constituents For All Current Meter Stations, 1973-75 (con.)

STATION NO.	DEPTH OF METER IN FEET (-) BELOW SURFACE (+) ABOVE BOTTOM	TYPE OF HARMONIC ANALYSIS 15 DAY OR 29 DAY	DATE ANALYSIS BEGINS	M_2						S_2					
				W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW
1	-75	15	5-30-74	107.1	69.5	3.3	33.0	1.1	CCW	40.3	72.9	.55	54.7	1.8	CW
1	+50	15	5-30-74	87.7	72.0	16.0	28.8	1.0	CCW	29.8	65.1	4.5	42.1	1.4	CCW
15	-20	15	5-10-74	40.2	315.2	4.4	161.8	5.6	CCW	14.7	320.2	1.4	164.7	5.5	CW
17	-20	15	5-10-74	18.0	230.4	2.1	139.7	4.8	CCW	7.2	244.4	.041	175.4	5.9	CCW
17	-75	15	5-10-74	23.8	215.4	.58	135.6	4.7	CW	9.5	200.7	.15	156.8	5.2	CCW
17	+50	15	5-10-74	13.1	211.8	.03	154.2	5.3	CW	4.5	206.7	1.0	165.3	5.5	CCW
29	-20	15	7-24-74	78.0	118.9	3.0	5.7	.19	CCW	29.2	121.7	1.6	31.3	1.0	CCW
29	+50	15	7-25-74	63.5	122.9	.18	4.8	.16	CCW	23.3	124.3	.85	20.1	.67	CCW
30	+50	15	7-23-74	82.5	72.0	3.4	27.6	.95	CCW	29.9	72.9	3.5	47.3	1.6	CCW
31	-75	15	7-27-74	99.9	80.6	1.6	37.2	1.3	CW	32.3	81.2	1.3	45.1	1.5	CCW
33	-20	15	7-10-74	121.6	70.8	1.4	22.2	.76	CCW	43.0	68.7	.54	34.4	1.1	CCW
34	-20	15	6-25-74	158.7	60.2	27.9	50.3	1.7	CW	47.8	57.7	8.3	72.6	2.4	CW
34	+50	15	6-25-74	114.9	57.0	9.3	46.2	1.6	CCW	37.0	56.0	.85	68.0	2.3	CCW
36	-75	29	6-21-74	174.0	76.6	4.3	44.0	1.5	CW	56.1	83.8	2.4	64.8	2.1	CW
37	-20	15	6-25-74	147.5	58.5	10.0	54.4	1.9	CW	45.8	54.8	2.9	73.2	2.4	CW
38	-20	29	7-9-74	140.4	62.4	4.4	50.7	1.7	CCW	42.5	56.5	5.1	61.3	2.0	CCW
38	+50	29	7-9-74	112.1	66.7	11.5	47.7	1.6	CCW	37.5	68.0	4.0	59.9	2.0	CCW
41	-20	15	6-7-74	102.2	91.4	2.8	55.5	1.9	CCW	28.7	99.4	1.9	80.5	2.7	CCW
41	+50	15	6-7-74	91.2	92.0	7.5	55.0	1.9	CCW	25.5	96.3	2.3	75.4	2.5	CCW
42	-20	15	6-7-74	126.8	44.8	.57	62.1	2.1	CW	34.3	47.5	1.2	84.7	2.8	CCW
42	-75	15	6-7-74	122.2	51.5	.70	63.2	2.2	CW	31.1	56.1	.005	80.9	2.7	CCW

Table 3. Results Of The Harmonic Analysis In Ellipse Parameters For The M_2, S_2, N_2, K_1, And O_1 Constituents For All Current Meter Stations, 1973-75 (con.).

N_2						K_1						O_1						STATION NO.
W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT. CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT. CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW	
20.8	69.6	1.1	21.3	.75	CCW	19.3	72.2	1.0	73.0	4.9	CCW	12.1	69.2	1.0	61.9	4.4	CCW	1
16.9	72.9	3.6	20.9	.74	CCW	17.5	79.7	2.5	77.3	5.1	CCW	10.4	82.8	1.9	72.6	5.2	CCW	1
7.7	315.2	1.7	159.7	5.6	CCW	5.7	323.5	.60	163.6	10.9	CW	4.5	326.3	1.2	159.4	11.4	CW	15
3.5	230.6	.63	120.7	4.2	CCW	2.0	45.6	.64	81.3	5.4	CW	1.7	61.7	.291	59.9	4.3	CW	17
4.6	215.4	.23	123.8	4.3	CW	4.0	44.7	.20	58.2	3.9	CCW	1.3	66.4	.20	89.1	6.4	CCW	17
2.5	211.4	.32	147.2	5.2	CW	4.7	59.3	1.8	63.7	4.2	CW	4.8	36.3	2.7	29.0	2.1	CW	17
15.1	299.0	.48	172.1	5.2	CCW	10.2	122.0	1.2	63.7	4.2	CCW	4.6	105.4	.44	56.3	4.0	CCW	29
12.3	302.9	.18	176.6	6.2	CW	10.7	123.3	.56	53.1	3.5	CW	4.8	121.2	.52	47.2	3.4	CW	29
16.0	71.8	.01	17.0	.60	CW	12.3	81.4	1.7	67.2	4.5	CCW	9.3	78.8	.56	67.6	4.8	CCW	30
19.3	81.0	.91	33.0	1.2	CW	15.9	79.6	3.6	61.0	4.0	CCW	12.1	65.2	2.2	26.5	1.1	CCW	31
23.6	70.8	.28	15.6	.54	CCW	15.2	69.5	.71	63.8	4.2	CW	11.0	67.0	.75	71.3	5.1	CW	33
30.7	60.2	5.6	38.8	1.4	CW	23.9	56.5	1.5	79.8	5.3	CW	14.7	66.6	.21	64.2	4.6	CCW	34
22.1	57.4	3.0	34.6	1.2	CCW	19.7	61.5	1.2	84.4	5.6	CCW	10.8	47.2	3.2	74.1	5.3	CCW	34
31.1	78.0	2.1	12.6	.44	CW	22.7	85.4	.05	71.5	4.8	CW	16.1	86.4	2.4	69.9	5.0	CW	36
28.6	58.5	2.0	44.5	1.6	CW	19.6	64.4	1.2	82.4	5.5	CW	16.0	64.3	4.0	72.8	5.2	CW	37
26.9	63.9	.43	19.9	.70	CCW	20.3	62.1	1.6	79.0	5.2	CCW	14.2	65.5	1.9	93.9	6.7	CCW	38
19.5	74.6	1.1	30.0	1.0	CCW	17.9	66.4	.75	87.0	5.8	CCW	14.2	70.7	.87	81.1	5.8	CW	38
19.8	91.0	.65	42.4	1.5	CCW	15.3	99.3	2.4	90.5	6.0	CW	10.0	75.4	4.1	114.7	8.2	CW	41
17.7	90.8	1.6	44.2	1.5	CCW	13.5	100.6	1.2	80.4	5.3	CW	8.4	82.6	5.2	103.8	7.4	CW	41
24.6	44.8	.65	50.2	1.8	CW	18.9	50.4	.35	89.9	6.0	CW	13.2	51.3	.94	78.3	5.6	CCW	42
23.7	51.5	.21	53.7	1.9	CW	16.3	55.8	.27	84.8	5.6	CCW	10.6	49.5	.62	84.9	6.1	CW	42

Table 3. Results Of The Harmonic Analysis In Ellipse Parameters For The M_2, S_2, N_2, K_1, And O_1 Constituents For All Current Meter Stations, 1973-75 (con.)

STATION NO.	DEPTH OF METER IN FEET (-) BELOW SURFACE (+) ABOVE BOTTOM	TYPE OF HARMONIC ANALYSIS 15 DAY OR 29 DAY	DATE ANALYSIS BEGINS	M_2						S_2					
				W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW
47	-20	15	5-8-74	166.9	36.7	20.7	56.4	1.9	CW	44.7	37.7	3.4	82.7	2.7	CW
48	-20	15	5-7-74	137.2	35.0	7.8	54.9	1.9	CW	34.3	36.7	.25	76.5	2.5	CW
49	-20	29	5-6-74	194.1	99.9	1.5	65.3	2.2	CCW	51.7	96.0	2.1	85.3	2.8	CW
50	-20	29	5-31-74	193.3	75.1	15.3	56.7	1.9	CCW	54.4	77.0	.26	89.6	3.0	CCW
50	-20	15	5-7-74	204.2	77.5	16.6	63.7	2.2	CCW	52.7	80.2	1.1	88.0	2.9	CCW
50	-20	15	7-26-74	202.1	71.5	20.7	66.4	2.3	CCW	61.8	71.8	4.1	81.0	2.7	CCW
50	+50	15	5-7-74	179.0	70.3	17.4	63.1	2.2	CCW	43.6	61.7	1.9	89.1	3.0	CCW
50	+50	29	5-31-74	175.9	75.8	13.6	61.5	2.1	CCW	51.4	74.9	.49	94.6	3.1	CCW
50	+50	29	7-12-74	167.5	71.1	18.6	61.9	2.1	CCW	43.2	67.7	1.5	86.3	2.9	CCW
51A	-20	15	7-24-74	187.8	82.1	10.7	64.2	2.2	CCW	53.5	83.9	2.8	87.5	2.9	CCW
51A	-20	15	7-24-74	188.4	82.0	9.9	64.1	2.2	CCW	53.8	84.3	2.8	87.5	2.9	CCW
52	-20	15	5-8-74	196.9	96.7	2.8	58.8	2.0	CCW	49.6	95.7	1.9	86.6	2.9	CCW
52	+50	15	5-8-74	183.9	98.1	4.6	58.0	2.0	CCW	48.1	96.2	1.4	85.5	2.8	CCW

Table 3. Results Of The Harmonic Analysis In Ellipse Parameters For The M_2, S_2, N_2. K_1, And O_1 Constituents For All Current Meter Stations, 1973-75 (con.)

N_2						K_1						O_1						STATION NO.
W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT. CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT. CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW	
32.3	36.5	4.8	42.3	1.5	CW	17.4	36.3	.116	81.1	5.4	CW	6.5	37.4	3.4	88.7	6.4	CCW	47
26.6	34.9	2.2	43.3	1.5	CW	16.6	36.8	.30	81.2	5.4	CCW	8.9	38.3	.41	73.3	5.2	CCW	48
27.3	97.5	.01	33.8	1.9	CW	18.9	91.0	.33	92.4	6.1	CW	10.1	77.4	1.1	105.3	7.5	CW	49
30.6	72.6	.37	37.7	1.3	CW	20.7	76.6	.29	85.4	5.7	CCW	11.4	75.4	.76	85.4	6.1	CW	50
39.5	78.2	4.3	50.9	1.8	CCW	22.1	80.3	.07	85.7	5.7	CCW	10.1	82.1	2.3	71.4	5.1	CW	50
39.1	71.8	4.7	58.6	2.0	CCW	21.5	80.0	.28	82.4	5.5	CCW	12.1	64.8	1.5	94.5	6.7	CCW	50
34.6	70.8	4.5	48.9	1.7	CCW	19.0	63.0	2.9	85.9	5.7	CW	8.3	95.3	6.8	38.4	2.7	CW	50
28.4	72.9	1.9	40.5	1.4	CCW	18.9	76.3	1.2	88.1	5.9	CW	10.8	71.5	2.0	87.7	6.3	CW	50
28.6	64.2	3.2	36.5	1.3	CCW	16.8	67.8	2.1	81.9	5.4	CW	11.8	53.4	.59	85.0	6.1	CCW	50
36.4	82.0	1.9	51.7	1.8	CCW	18.7	86.2	.66	84.7	5.6	CCW	11.3	89.7	.53	76.0	5.4	CW	51A
36.6	81.8	1.6	51.7	1.8	CCW	19.0	84.7	1.6	84.7	5.6	CCW	11.5	95.9	1.2	75.5	5.4	CW	51A
38.2	96.7	.03	43.9	1.5	CCW	20.8	96.4	.68	84.6	5.6	CW	9.6	90.2	1.6	76.5	5.5	CW	52
35.7	98.2	.63	43.2	1.5	CCW	19.8	.10	6.0	84.0	5.6	CW	9.4	87.9	.11	76.5	5.5	CW	52

Table 3. Results Of The Harmonic Analysis In Ellipse Parameters For The M_2, S_2, N_2, K_1, And O_1 Constituents For All Current Meter Stations, 1973-75 (con.)

STATION NO.	DEPTH OF METER IN FEET (-) BELOW SURFACE (+) ABOVE BOTTOM	TYPE OF HARMONIC ANALYSIS 15 DAY OR 29 DAY	DATE ANALYSIS BEGINS	M_2						S_2					
				W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW
50	-46	15	6-26-75	182.8	70.3	22.3	61.6	2.1	CCW	53.4	67.1	1.3	91.2	3.0	CCW
53	-50	15	5-8-75	156.2	36.8	0.1	59.7	2.1	CCW	46.9	37.2	0.5	90.9	3.0	CCW
54	-20	15	7-11-75	198.2	37.2	9.7	70.7	2.4	CW	62.0	36.3	0.5	96.4	3.2	CW
54	-20	15	5-8-75	200.0	35.0	6.8	62.9	2.2	CW	59.6	33.1	1.7	93.2	3.1	CW
54	-20	15	5-8-75	200.0	35.0	6.8	72.3	2.5	CW	59.6	33.1	1.7	103.2	3.4	CW
54	-50	15	7-11-75	187.8	37.2	1.3	70.8	2.4	CW	59.1	37.2	0.1	97.0	3.2	CW
54	-50	15	5-8-75	183.0	29.6	4.6	74.2	2.6	CW	58.1	31.4	0.7	97.3	3.2	CW
54	+40	15	7-11-75	164.7	39.4	4.1	70.5	2.4	CCW	53.3	37.7	0.3	96.4	3.2	CCW
55	-50	15	5-7-75	195.2	32.8	0.6	85.9	3.0	CCW	58.1	39.6	2.9	121.6	4.1	CCW
55	+50	15	7-15-75	146.6	38.2	0.8	84.3	2.9	CW	45.3	37.4	1.2	118.6	4.0	CCW
55-2	+50	15	5-7-75	128.2	44.4	4.0	114.9	4.0	CW	10.6	47.5	3.1	92.8	3.1	CW
67	-20	15	5-30-75	147.6	7.0	6.0	84.9	2.9	CW	36.6	4.4	2.9	113.5	3.8	CW
67	-50	15	5-30-75	114.2	14.4	1.1	75.1	2.6	CCW	37.2	13.0	2.1	64.4	2.1	CW
68	-20	15	5-30-75	167.3	18.4	5.9	77.6	2.7	CW	38.7	16.7	0.7	110.3	3.7	CW
69	-20	15	5-28-75	218.5	349.9	2.1	85.1	2.9	CW	52.8	350.0	0.8	117.1	3.9	CCW
69A	-50	15	6-16-75	199.0	341.3	1.0	80.7	2.8	CCW	57.6	340.2	0.4	118.2	3.9	CCW
77	-20	15	6-12-75	182.5	24.1	0.0	94.0	3.2	CW	58.9	25.0	1.4	132.3	4.4	CW
77	-20	15	6-12-75	182.5	24.1	0.1	98.9	3.4	CW	59.0	25.0	1.3	137.3	4.6	CW
81	-20	15	6-23-75	9.0	290.4	5.4	9.2	0.3	CCW	17.2	300.4	9.3	8.0	0.3	CCW
82	-20	15	6-23-75	155.1	37.4	7.2	100.2	3.5	CCW	47.4	35.5	1.9	142.9	4.8	CW

Table 3. Results Of The Harmonic Analysis In Ellipse Parameters For The M_2, S_2, N_2, K_1, And O_1 Constituents For All Current Meter Stations, 1973-75 (con.)

N_2						K_1						O_1						STATION NO.
W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT. CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT. CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW	
35.2	71.4	6.1	45.9	1.6	CCW	20.3	70.5	0.6	80.7	5.4	CW	12.5	61.3	3.5	76.7	5.5	CW	50
30.3	36.8	0.2	42.9	1.5	CW	15.3	38.6	0.8	97.8	6.5	CCW	8.4	45.5	1.3	102.2	7.3	CCW	53
38.4	37.2	2.7	57.0	2.0	CW	22.5	37.4	2.2	100.4	6.7	CCW	14.6	39.6	1.3	105.8	7.6	CCW	54
38.8	35.0	1.4	46.7	1.6	CW	21.3	23.3	2.5	97.8	6.6	CW	12.7	12.1	0.8	103.3	7.4	CW	54
38.8	35.0	1.4	56.2	2.0	CW	21.3	23.3	2.5	103.7	6.9	CW	12.7	12.1	0.8	108.0	7.7	CW	54
36.4	37.2	0.4	56.8	2.0	CW	19.5	37.3	1.4	99.7	6.6	CCW	13.8	41.3	1.0	99.2	7.1	CCW	54
35.5	29.5	1.2	61.8	2.2	CW	20.0	28.9	0.6	102.5	6.8	CCW	10.3	30.1	0.7	109.5	7.9	CCW	54
31.9	39.4	1.1	56.6	2.0	CCW	16.6	34.0	0.5	98.8	6.6	CCW	13.5	43.4	0.3	96.0	6.9	CCW	54
37.9	32.8	0.8	67.1	2.4	CW	24.4	31.6	2.5	105.1	7.0	CCW	12.9	33.2	2.1	105.0	7.5	CCW	55
28.4	38.1	0.7	66.0	2.3	CW	18.8	35.8	0.2	98.3	6.5	CW	11.6	39.7	2.1	94.9	6.8	CCW	55
24.8	44.4	2.6	125.8	4.4	CCW	17.7	31.9	0.6	120.1	8.0	CW	13.1	34.2	3.3	154.7	11.1	CCW	55-2
28.7	7.3	0.3	69.7	2.5	CW	13.8	1.9	0.6	103.3	6.9	CW	7.6	2.3	0.6	112.4	8.1	CCW	67
22.1	14.1	1.1	80.9	2.8	CCW	12.8	9.7	0.2	99.7	6.6	CW	5.9	4.7	1.5	95.6	6.9	CCW	67
32.4	18.3	1.4	60.1	2.1	CW	13.8	16.9	0.1	94.4	6.3	CCW	8.2	16.9	1.6	124.7	8.9	CCW	68
42.4	350.0	1.0	68.0	2.4	CW	20.1	349.6	1.5	108.4	7.2	CCW	11.5	354.4	2.8	114.4	8.2	CCW	69
38.6	341.3	0.2	60.6	2.1	CCW	17.7	343.0	1.7	105.0	7.0	CCW	9.3	340.3	1.0	94.5	6.8	CCW	69A
35.4	24.1	0.4	73.5	2.6	CCW	16.8	24.7	0.4	109.0	7.2	CCW	9.4	31.5	1.1	112.6	8.1	CCW	77
35.4	24.1	0.4	78.2	2.8	CCW	16.8	24.9	0.4	111.7	7.4	CCW	9.4	31.5	1.1	115.2	8.3	CCW	77
1.7	286.1	1.1	10.5	0.4	CCW	7.1	321.8	5.0	38.9	2.6	CCW	2.5	41.3	2.1	82.8	5.9	CW	81
30.1	37.4	1.5	77.2	2.7	CCW	15.6	36.4	0.6	104.8	7.0	CCW	11.3	42.7	1.5	118.6	8.5	CCW	82

Table 3. Results Of The Harmonic Analysis In Ellipse Parameters For The M_2, S_2, N_2, K_1, And O_1 Constituents For All Current Meter Stations, 1973-75 (con.)

STATION NO.	DEPTH OF METER IN FEET (-) BELOW SURFACE (+) ABOVE BOTTOM	TYPE OF HARMONIC ANALYSIS 15 DAY OR 29 DAY	DATE ANALYSIS BEGINS	M_2						S_2					
				W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW
83	-20	15	6-25-75	116.3	39.2	4.7	102.2	3.5	CCW	36.0	43.0	10.2	140.7	4.7	CW
84	-20	15	7-2-75	163.7	16.9	7.2	105.3	3.6	CCW	36.7	19.6	2.8	136.5	4.5	CCW
85	-20	15	6-23-75	167.1	5.3	3.0	98.3	3.4	CW	50.1	6.9	0.7	143.7	4.8	CCW
85	-50	15	6-23-75	139.2	1.6	1.0	86.3	3.0	CW	52.7	1.2	2.5	138.0	4.6	CW
86	-20	15	7-1-75	147.8	5.9	6.1	93.7	3.2	CW	41.2	5.4	1.8	135.7	4.5	CW
87	-50	15	5-9-75	136.4	17.4	3.9	104.3	3.6	CW	35.5	17.2	1.2	146.3	4.9	CW
87	-50	15	5-9-75	135.7	17.4	3.9	107.0	3.7	CW	36.2	17.2	1.2	148.7	5.0	CW
88	-50	15	7-21-75	165.5	49.3	4.0	96.8	3.3	CW	56.1	48.3	0.3	134.1	4.5	CCW
89	-20	15	7-18-75	197.7	69.9	7.9	110.0	3.8	CCW	62.3	70.1	2.6	144.1	4.8	CCW
90	-20	15	7-8-75	99.1	65.8	3.8	100.5	3.5	CW	25.5	68.0	0.2	130.2	4.3	CW
93	-20	15	6-23-75	183.3	72.2	9.0	106.3	3.7	CCW	53.7	69.2	2.6	146.0	4.9	CW
93	-50	15	6-23-75	179.7	74.1	1.6	103.2	3.6	CCW	58.9	75.6	1.4	145.9	4.9	CCW

Table 3. Results Of The Harmonic Analysis In Ellipse Parameters For The M_2, S_2, N_2, K_1, And O_1 Constituents For All Current Meter Stations, 1973-75 (con.)

N_2						K_1						O_1						STATION NO.
W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT. CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT. CW OR CCW	W(1) CM/SEC	THETA(1) DEGREES	W(2) CM/SEC	AN DEGREES	AN HOURS	ROT CW OR CCW	
22.1	38.6	4.6	80.2	2.8	CCW	13.2	35.9	0.9	124.7	8.3	CW	10.1	37.4	0.8	128.6	9.2	CCW	83
31.8	17.0	1.0	88.8	3.1	CCW	13.5	17.2	0.0	117.2	7.8	CCW	11.8	14.0	0.1	131.9	9.5	CCW	84
32.4	5.1	1.1	74.0	2.6	CW	14.3	8.0	0.3	99.7	6.6	CCW	7.6	9.7	0.3	107.4	7.7	CCW	85
27.0	1.6	0.2	58.5	2.1	CCW	12.7	0.1	1.4	97.9	6.5	CW	7.0	3.2	1.7	97.4	7.0	CW	85
28.7	5.9	1.1	71.2	2.5	CW	11.3	4.6	0.3	99.4	6.6	CW	6.3	9.0	0.8	100.5	7.2	CCW	86
17.8	17.7	0.5	98.0	3.4	CCW	11.5	16.9	0.5	118.1	7.9	CCW	6.6	20.2	1.1	131.3	9.4	CCW	87
20.7	17.1	0.4	94.6	3.3	CCW	11.4	16.7	0.5	119.7	8.0	CCW	6.5	19.7	1.1	131.5	9.4	CCW	87
32.1	49.3	1.3	76.9	2.7	CW	15.2	52.7	0.8	94.7	6.3	CCW	9.4	49.8	1.0	103.0	7.4	CCW	88
38.4	69.8	1.5	91.8	3.2	CCW	17.2	72.1	0.5	100.2	6.7	CCW	13.3	65.1	0.8	108.4	7.8	CCW	89
19.2	65.9	1.1	84.5	3.0	CW	7.9	68.7	0.2	120.2	8.0	CW	7.3	70.1	0.2	127.0	9.1	CW	90
35.4	72.7	3.5	85.3	3.0	CCW	16.7	70.7	0.2	111.6	7.4	CW	10.4	86.2	0.6	124.0	8.9	CCW	93
34.9	74.1	0.0	80.3	2.8	CW	15.8	75.1	0.9	100.9	6.7	CW	6.7	69.2	0.2	116.7	8.4	CW	93

STATION NUMBER	LOCATION	OBSERVATIONS				SLACK	FLOOD STAGE				SLACK	EBB STAGE				MEAN CUR. HOUR	VELOCITY RATIO	
		DATE	PERIOD	METHOD	DEPTH		TIME	DIR. TRUE	SPEED	FLOOD DUR.		TIME	DIR. TRUE	SPEED	EBB DUR.		FLOOD	EBB
			Days		*Feet*	*Hours After*	*Hours After*	*o*	*Knots*	*Hours*	*Hours After*	*Hours After*	*o*	*Knots*	*Hours*	*Hours*		
1	59°10.2'N 151°47.2'W	9/29-10/1/31	2.0	Pole	7	1.71	1.73	355	3.1	7.21	-0.43	-2.00	170	1.8	5.20	7.95	0.8	0.5
B-3	60°59.01'N 150°47.01'W	1910	0.5	Pole	7	2.90	1.85	63	2.9	7.66	3.63	3.33	243	2.8	4.75	12.35	0.80	0.80
B-5	61°20.01'N 149°55.25'W	9/19-9/23/10	2.0	Pole	7	4.96	3.63	15	3.6	5.85	4.88	5.08	18	3.9	6.56	14.06	--	--
C-1	61°13.8'N 149°55.25'W	8/06-8/12/60	6.0	RCM	6	5.13	4.80	51	2.9	7.65	5.01	2.96	220	2.9	4.76	1.48	0.78	0.85
C-2	61°13.5'N 149°54.38'W	8/07-8/12/60	4.5	RCM	15	1.61	2.81	28	1.5	7.65	3.33	2.56	207	2.5	4.76	12.00	0.41	0.74
C-3	60°45.1'N 151°31.6'W	8/24-8/28/60	4.0	RCM	18	2.91	2.73	25	3.8	6.05	3.03	2.80	206	3.8	6.36	12.30	1.03	1.12
P-4	59°44.0'N 151°57.01'W	1910	0.75	Pole	7	-0.10	0.18	358	2.4	6.91	0.88	-0,33	195	1.9	5.50	9.58	0.6	0.6
P-11	60°01.03'N 151°45.01'W	1910	1.0	Pole	7	0.28	-0.48	22	2.2	6.70	1.05	-0.20	205	1.4	5.71	9.58	0.6	-0.4
Q-1	60°29.5'N 151°26.01'W	1910	2.25	Pole	7	2.31	1.58	21	2.4	5.91	2.71	1.75	193	2.6	6.50	11.50	0.6	0.8
QN A	60°08.7'N 152°38.7'W	1911	3.5	Pole	7	1.00	0.53	332	1.1	5.08	0.15	-0.38	162	1.9	7.33	9.75	0.3	0.6
QN I	59°51.01'N 153°04.5'W	1911	0.50	Pole	7	-1.26	-0.30	260	1.0	7.18	-0.01	-0.45	79	1.1	5.23	8.91	0.3	0.3
QN J	60°22.5'N 151°28.5'W	1911	0.32	Pole	7	1.28	0.85	22	3.0	7.16	2.93	1.71	206	2.3	5.25	11.11	0.8	0.7

Table 4. Historical Current Meter Data

STATION NUMBER	LOCATION	OBSERVATIONS				SLACK	FLOOD STAGE				SLACK	EBB STAGE				MEAN CUR. HOUR	VELOCITY RATIO	
		DATE	PERIOD	METHOD	DEPTH		TIME	DIR. TRUE	SPEED	FLOOD DUR.		TIME	DIR. TRUE	SPEED	EBB DUR.		FLOOD	EBB
			Days		*Feet*	*Hours After*	*Hours After*	*o*	*Knots*	*Hours*	*Hours After*	*Hours After*	*o*	*Knots*	*Hours*	*Hours*		
W-1	60°41.1'N 151°23.9'W	6/10-6/14/61	4	Price	17	2.25	2.08	0	3.8	6.03	2.76	0.86	180	2.6	6.38	11.40	1.03	0.76
W-2	60°41.2'N 151°25.2'W	6/10-6/16/61	6	Pole	15	2.85	2.23	345	3.8	6.06	2.98	2.00	175	3.6	6.35	11.93	1.03	1.06
Wo-1	60°33.2'N 151°14.3'W	9/15-9/17/65	2	Pole	2	1.43	0.88	130	0.48	5.20	.70	1.46	300	1.44	7.21	10.53	0.13	0.42
Wo-2	60°33.1'N 151°13.7'W	9/13-9/15/65	2	Pole	2	1.48	0.86	115	0.66	4.41	-0.03	-0.35	285	1.44	8.00	9.91	0.18	0.42

Table 4. Historical Current Meter Data (con.)

4. SALINITY/TEMPERATURE PROGRAM

Salinity/Temperature vs. Depth (STD) observation are important in understanding the effect of density structure on circulation, especially on nontidal circulation. In Cook Inlet the fresh water runoff from melting glacers can have a dominant seasonal effect on the circulation. Therefore, a comprehensive STD program was planned. The two primary instruments deployed to gather the required STD data were the Bissett-Berman Model 9060 profiling system and the Martek Model TDC instrument. The Bissett-Berman (presently Grundy) system specifications are given in table 5a, and the specifications for the Martek Instrument are given in table 5b. At locations of the STD casts, Nansen bottles were used for supplementary data and for the in situ calibration of the STD system. Also, the Aanderaa current meter recorded conductivity (a measure of salinity) and temperature at some locations. This information described the temporal variability of temperature and conductivity at a fixed location at a single specified depth. Table 1 indicates the current station locations of meters that had temperature and conductivity sensors.

A comprehensive STD program will define temporal and spatial variations in the density field. Variations over large spatial scales, transverse and longitudinal, must be determined. Temporal variations over a tidal cycle and seasonal variations must also be defined; therefore, the STD station locations are classified into three categories:

(1) S-type station: 13- or 25-hour stations. Observations are obtained at fixed locations, taking a surface-to-bottom cast at approximately half-hour intervals for 13 or 25 hours. These observations describe the variability of the density field over a tidal cycle versus depth. The results are also used in the evaluation of the synopticity of the ST-type stations.

(2) ST-type primary station: At approximately one stage of the tide (i.e., slack before flood or slack before ebb), STD casts are made along either a transverse or longitudinal line. This information indicates the density structure at one "synoptic" stage for a specified cross section.

(3) SP-type auxiliary station: Observations are obtained at various other locations throughout the region to complete the spatial picture and to investigate whether local anomalies might exist in the density regime.

Figures 1, 2, 3, and 4 indicate the station locations of all the STD casts taken in Cook Inlet for the three phases of the project. Table 6 gives the station observation information, including the dates of the cast and the station classification.

Using programs developed by the NOS Circulatory Survey Branch, cross section contours and time series contours for the measured parameters are produced on 35-mm microfilm. These contours, together with supplemental data from the current meters and other outside sources, can give a complete picture of the density structure both in time and space. Comparisons of results between various phases of the survey will indicate any seasonal or yearly fluctuations in the density regime.

The various forms in which NOS can supply STD data are:

(1) photocopies of the raw station data,
(2) computer listings of the raw data,
(3) photocopies of a cross section contour (if available),
(4) photocopies of a time contour (if available).

The cost of the data depends on the type of data and the size of the request.

STD Profiling System

Manufacturer: Bissett-Berman, Model 9060
Parameters Measured: Salinity, Temperature, and Depth
Manufacturer Specifications:

Parameter	Range	Resolution	Accuracy
Salinity	30-40 ppt 0-40 ppt	0.2% of full scale	±0.05 ppt
Temperature	-2°C to +35°C	0.2% of range	±0.1°C
Depth	0-500 m	±0.1% of range	±0.25% of range

Recorder: Drum plotter, 6-1/2 x 9-1/2 inches (one frame) x 100 feet long
Record Format: Analog
Sampling Rate: Continuous
Duration: 100 frames
Processing: Visual
Mode of Operation: STD is lowered near the bottom with a non-electrical cable.

Table 5a. STD Specification for Profiling System

In Situ Metering System

Manufacturer: Martek, Model TDC
Parameters Measured: Conductivity, Temperature, and Depth
Manufacturer Specifications:

Parameter	Range	Accuracy
Conductivity	Variable 0-100, 50, 25, 10, 5 2.5 mmhos/cm	+1-2% full scale +0.5°C
Temperature	0°C to 40°C	+2% full scale on 0-100 m
Depth	0-100, 30 m	+4% full scale on 0-30 m

Recorder: Read-out module
Record Format: Digitized
Sampling Interval: 0-50 feet @ 10-foot increments
50-300 feet @ 25-foot increments
Processing: Visual
Mode of Operation: Probe is lowered to a discrete depth, then module is read and value is recorded for each parameter.

Table 5b. STD In Situ Metering System

Table 6. STD Observations, 1973-75

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1973 Hours JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
1	59°52.5'N 152°14.0'W	0415 135 TO 1427 135 @ approximately half hour intervals	BB		S
		0337 159 TO 1629 159 @ approximate half-hour intervals	BB	272	S
		0029 164 TO 1558 164 @ approximately half hour intervals	BB	(83)	S
		2359 164	BB		ST
		0258 170 TO 2058 170 @ approximately half hour intervals	BB		S
		0355 187	BB		ST
		1952 207	BB		ST
		0121 223	BB		ST
		0130 229	BB		ST
		0310 240	BB		ST
		0315 240	M		ST
		2228 242	BB		ST
		0132 243 TO 1429 243 @ approximately half hour intervals	BB		S
		1015 248	BB		S
2	59°33.7'N 152°15.7'W	0743 136 TO 2057 136 @ approximately half hour intervals	BB		S

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1973 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
2	59°33.7'N 152°15.7'W	0521	160	BB		ST
		1801	164	BB		ST
		0810	187	BB		ST
		0959	208	BB		ST
		0702	221	BB	167	ST
		1828	243	BB		S
		0200 TO	244			
		@ approximately half hour intervals			(51)	
		1411	250			
		0715	156	BB		S
		1930	156			
		@ approximately half hour intervals				
		0605	157	BB		S
		TO				
		1757	157			
		@ approximately half hour intervals				
3	59°04.7'N 152°14.8'W	0002	137	BB	354	S
		TO				
		0355	137		(108)	
		@ approximately half hour intervals				
		1129	143	BB		ST
		0444	165	BB		ST
		0550	174	BB		ST
		0815	170	BB		S
		TO				
		2103	170			
		@ approximately half hour intervals				
		2208	184	BB		ST
		0017	189	BB		ST
		0037	213	BB		ST
		0427	213	BB		S
		TO				
		1728	213			
		@ approximately half hour intervals				

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1973 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
3	59°04.7'N	0130	227	BB		ST
	152°14.8'W	0600	242	BB		S
		TO				
		1852	242			
		@ approximately half hour intervals				
		0409	250	BB		ST
4	59°00.4'N	1016	143	BB		ST
	152°34.4'W	0050	163	BB	462	ST
		2103	184	BB		ST
		1920	202	BB		ST
		2130	212	BB	(141)	ST
		2327	221	BB		ST
		0538	251	BB		ST
		0557	251	M		ST
5	58°56.4'N	0858	143	BB		ST
	152°53.6'W	1924	145	BB		ST
		2008	145	BB		ST
		0159	163	BB	531	ST
		1959	184	BB		ST
		2015	212	BB	(162)	ST
		2220	221	BB		ST
		0717	251	BB		ST
6	58°08.9'N	0632	151	BB		SP
	151°54.0'W	2227	164	BB		ST
		0200	189	BB	148	ST
		0425	213	BB		S
		TO			(45)	
		1725	213			
		@ approximately half hour intervals				
		0519	250	BB		ST
		0748	254	BB		ST
7	59°03.8'N	1615	151	BB	626	SP
	151°57.8'W	0145	250	BB	(191)	SP

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1973 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
8	58°59.0'N	1510	151	BB	243	SP
	152°00.2'W	0313	250	BB	(74)	SP
9	59°08.4'N	0136	151	BB	108	SP
	151°41.7'W	0620	250	BB	(33)	SP
		0902	254	BB		SP
10	59°11.0'N	2338	150	BB	295	SP
	151°46.4'W	0655	250	BB	(90)	SP
		0702	250	M		SP
11	59°22.4'N	0903	151	BB	177	SP
	151°54.1'W	1055	250	M	(54)	SP
12	59°24.9'N	1153	137	BB		ST
	151°56.0'W	0350	160	BB	118	ST
		0355	189	BB		ST
		1049	214	BB	(36)	ST
		0515	248	M		ST
		1130	250	M		ST
13	59°27.5'N	1555	151	BB	30	SP
	151°44.0'W	1908	237	BB	(9)	SP
		2118	251	BB		SP
14	59°33.5'N	1338	137	BB	220	SP
	151°47.1'W	1954	237	BB	(67)	SP
		1935	251	BB		SP
15	59°40.0'N	1426	137	BB		SP
	151°46.2'W	2039	237	BB	82	SP
		1945	251	BB	(25)	SP
		1955	251	BB		SP
16	59°36.1'N	1511	137	BB	66	SP
	151°33.5'W	1213	144	BB	(20)	SP
		2140	237	BB		SP
		0032	252	BB		SP

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1973 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
17	59°35.1'N	0958	144	BB		SP
	151°22.9'W	0333	238	BB	285	SP
		0425	238	M	(87)	SP
		0140	250	BB		SP
18	59°50.2'N	0123	138	BB		ST
	152°00.0'W	0328	159	BB		S
		TO				
		1630	159			
		@ approximately half hour intervals				
		2240	159	BB	118	ST
		0445	187	BB		ST
		2034	207	BB	(36)	ST
		0247	229	BB		ST
		1107	240	BB		ST
		1113	248	BB		ST
19	59°55.4'N	0607	138	BB		ST
	152°30.2'W	2024	159	BB		ST
		0025	164			
		TO				
		1259	164			
		@ approximately half hour intervals			86	
		2357	164	BB	(27)	ST
		1630	187	BB		ST
		1839	207	BB		ST
		0430	229	BB		ST
		0920	240	BB		ST
		0845	248	M		ST
20	59°34.4'N	0945	138	BB		ST
	153°49.6'W	0714	160	BB	138	ST
		0941	187	BB		ST
		1212	208	BB		ST
		1147	221	BB	(42)	ST
		1550	253	BB		ST

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1973 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
21	59°31.8'N	0321	145	BB		ST
	153°23.3'W	1120	160	BB	88	ST
		1145	187	BB		ST
		1519	208	BB	(27)	ST
		0212	221	BB		ST
		0450	248	M		ST
22	59°24.4'N	0423	145	BB	78	ST
	153°38.1'W	1229	221	BB		SP
		0000	248	M	(24)	SP
23	59°16.3'N	0128	143	BB	89	SP
	153°43.9'W	1823	208	BB		SP
		2211	247	BB	(27)	SP
		0840	253	BB		SP
23A	59°16.7'N	2301	145	BB	115	ST
	153°43.9'W				(35)	
24	59°11.1'N	1409	138	BB	124	ST
	153°20.8'W	2210	145	BB		ST
		0807	163	BB	(38)	ST
		1201	188	BB		ST
		1045	212	BB		ST
		1521	221	BB		ST
		1231	253	BB		ST
25	58°52.5'N	0640	143	BB	534	ST
	153°12.0'W	0304	163	BB		ST
		1820	184	BB	(163)	ST
		1910	212	BB		ST
		1926	221	BB		ST
		0815	251	BB		ST
26	59°16.5'N	1530	138	BB	282	ST
	152°55.1'W	1250	145	BB		ST
		1128	165	BB	(86)	ST
		0649	187	BB		ST
		1415	212	BB		ST
		1237	251	BB		ST

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1973 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
27	59°14.6'N	0146	143	BB	324	ST
	152°14.4'W	0330	166	BB		ST
		2322	194	BB	(99)	ST
		0850	219	BB		ST
		0900	250	BB		ST
		0910	250	M		ST
2001	58°59.2'N	2114	142	BB	266	ST
	153°24.4'W	0442	163	BB		ST
		1026	188	BB	(81)	ST
		1732	212	BB		ST
		1014	253	BB		ST
2002	59°03.1'N	0756	143	BB	436	ST
	153°05.0'	1433	145	BB		ST
		0628	163	BB	(133)	ST
		0805	187	BB		ST
		1540	212	BB		ST
		1552	212	BB		ST
		1733	221	BB		ST
		1733	221	BB		ST
		1019	251	BB		ST
2003	59°12.3'N	1240	143	BB	295	ST
	152°35.6'W	0438	166	BB		ST
		0110	185	BB	(90)	ST
		1022	219	BB		ST
		0408	251	BB		ST
		0420	251	M		ST
2005	59°15.4'N	0722	151	BB	131	SP
	152°00.0'W	0755	250	BB	(40)	SP
		0802	250	M		SP
2006	59°04.2'N	0353	143	BB	161	ST
	153°22.5'W	1541	145	BB		ST
		0725	163	BB	(49)	ST
		1115	188	BB		ST
		1000	212	BB		ST
		1601	221	BB		ST
		1147	253	BB		ST
2008	59°17.1'N	1230	138	BB	89	SP
	153°18.8'W	2355	146	BB		ST
		0848	163	BB	(27)	ST
		1241	188	BB		ST
		1122	212	BB		ST
		1445	221	BB		ST
		1310	253			

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1973 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
2009	59°22.5'N	1128	138	BB	118	ST
	153°16.6'W	0635	146	BB		ST
		0947	163	BB	(36)	ST
		1335	188	BB		ST
		1200	212	BB		ST
		1412	221	BB		ST
		1344	253	BB		ST
2010	59°27.0'N	0552	146	BB	89	ST
	153°22.9'W	1055	163	BB		ST
		1114	187	BB	(27)	ST
		1555	208	BB		ST
		1619	221	BB		ST
2012	59°34.7'N	0247	146	BB	66	ST
	153°21.0'W	1049	160	BB		ST
		1111	187	BB		ST
		1438	208	BB	(20)	ST
		0316	221	BB		ST
2014	59°10.8'N	0008	235	BB	79	SP
	153°34.2'W	2116	247	BB	(24)	ST
2016	59°18.5'N	0209	143	BB	72	SP
	153°37.7'W	2237	247	BB	(22)	SP
2018	59°25.6'N	0450	145	BB	30	SP
	153°41.4'W	2322	247	BB	(9)	SP
		2300	248	M		SP
2019	59°26.8'N	1021	138	BB		ST
	153°06.3'W	0725	145	BB	134	ST
		1146	163	BB		ST
		1424	188	BB		ST
		1242	212	BB	(41)	ST
		1329	221	BB		ST
		1440	251	BB		ST
		1510	251	BB		ST
		1427	253	BB		ST

Table 6. STD Observations 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1973 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
2020	59°25.5'N	1057	142	BB	171	ST
	152°53.2'W	0811	145	BB		ST
		1226	163	BB		ST
		1507	188	BB		ST
		1326	212	BB	(52)	ST
		1242	221	BB		ST
		1351	251	BB		ST
2021	59°25.8'N	0922	137	BB	187	ST
	152°24.1'W	0936	145	BB		ST
		1313	165	BB	(57)	ST
		1632	188	BB		ST
		1301	214	BB		ST
		0102	221	BB		ST
		1310	250	BB		ST
2022	59°24.6'N	1102	137	BB	177	ST
	152°07.4'W	1036	145	BB		ST
		1411	165	BB		ST
		0318	189	BB	(54)	ST
		1141	214	BB		ST
		1201	214	BB		ST
		0090	221	BB		ST
		1213	250	BB		ST
2023	59°41.4'N	0930	142	BB	82	ST
	152°59.5'W	0944	160	BB		ST
		1325	187	BB		ST
		1326	208	BB	(25)	ST
		0438	221	BB		ST
		0630	248	M		ST
2024	59°39.3'N	0805	138	BB	148	ST
	152°44.0'W	0751	160	BB		ST
		1418	187	BB	(45)	ST
		1140	208	BB		ST
		0532	221	BB		ST
		0630	229	BB		ST
		1629	251	BB		ST
2025	59°31.8'N	1245	137	BB	118	ST
	152°01.4'W	0437	160	BB		ST
		0702	166	BB	(36)	ST
		0720	187	BB		ST
		0907	208	BB		ST
		0808	221	BB		ST
		1500	250	BB		ST

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1973 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
2026	59°56.7'N	0705	142	BB	43	ST
	152°37.8'W	1512	164	BB		ST
		1805	187	BB		ST
		1800	207	BB	(13)	ST
		0505	229	BB		ST
		0826	240	BB		ST
		1817	253	BB		ST
2027	59°53.7'N	0640	138	BB	213	ST
	152°21.3'W	2132	159	BB		ST
		1548	187	BB		ST
		1914	207	BB	(69)	ST
		0351	229	BB		ST
		0959	240	BB		ST
		0925	248	BB		ST
2028	59°49.4'N	0052	138	BB	59	ST
	151°52.6'W	1832	159	BB		ST
		0535	187	BB		ST
		2107	207	BB	(18)	ST
		0223	229	BB		ST
		1137	240	BB		ST
		1145	248	M		ST
2029	59°29.8'N	1648	151	BB	207	SP
	151°32.7'W	0850	152	BB		SP
		0930	152	BB	(63)	SP
		2323	237	BB		SP
		2210	251	BB		SP
2030	59°30.3'N	0743	152	BB	200	SP
	151°26.1'W	2302	251	BB	(61)	SP
2031	59°31.6'N	0743	152	BB	177	SP
	151°27.9'W	2326	251	BB	(54)	SP
2032	59°32.5'N	1559	137	BB	154	SP
	151°31.5'W	1119	144	BB		SP
		2248	237	BB	(47)	SP
		0610	238	BB		SP
		1535	238	M		SP
		2349	251	BB		SP

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1973 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
2033	59°34.2'N 151°31.8'W	1532 1146 2210 0014	137 144 237 252	BB BB BB BB	236 (72)	SP SP SP SP
2034	59°34.2'N 151°21.6'W	1036 0040 0445 0212	144 238 238 252	BB BB M BB	177 (54)	SP SP SP SP
2035	59°35.7'N 151°23.8'W	0935 0015 0119	144 238 252	BB BB BB	141 (43)	SP SP SP
2036	59°37.4'N 151°14.8'W	0755 0311 0247	144 238 252	BB M BB	213 (65)	ST SP SP
2037	59°38.4'N 151°17.0'W	0818 0331 0311	144 238 252	BB M BB	200 (61)	ST SP SP
2038	59°39.3'N 151°19.5'W	0044 0354 0326	144 238 252	BB M BB	79 (24)	ST SP SP
2039	59°40.0'N 151°12.1'W	0723 0228 0351	144 238 252	BB M BB	197 (60)	ST SP SP
2040	59°42.6'N 151°08.3'W	0651 0145 0200 0420	144 238 238 252	BB BB M BB	236 (72)	ST SP SP SP
2041	59°19.8'N 151°59.0'W	0805 1015	151 250	BB M	72 (22)	SP SP

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1974 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
1	59°52.0'N	2308	149	BB	167	SP
	152°12.5'W	0010	164	BB		SP
		0121	134	BB	(51)	ST
		0339	137	BB		ST
		0529	219	BB		ST
		0317	221	BB		ST
15	59°40.0'N	2321	133	BB	95	SP
	151°46.2'W	2050	149	BB	(29)	SP
17	59°34.7'N	2157	133	BB	318	SP
	151°23.7'W	1902	149	BB	(97)	SP
28	60°09.0'N	0705	221	BB	89	SP
	152°38.5'W	1844	205	BB	(27)	ST
29	60°05.7'N	0505	221	BB	138	SP
	152°34.0'W	2240	205	BB	(42)	ST
30	60°07.8'N	0403	204	BB	105	SP
	152°24.7'W	0105	221	BB		SP
		1420	135	BB	(32)	ST
		1700	197	BB		ST
		0827	214	BB		ST
31	60°04.6'N	2355	207	BB	157	SP
	152°15.6'W	2305	224	BB		SP
		1340	135	BB	(48)	ST
		1605	197	BB		ST
		0714	214	BB		ST
32	60°01.3'N	@ approximately half hour intervals				
	152°06.9'W	1902	135		197	
		TO				
		2000	136	BB		S
		2030	192	BB	(60)	SP
		0238	134	BB		ST
		1237	135	BB		ST
		0215	183	BB		ST
		1457	197	BB		ST
		0625	214	BB		ST
		0714	219	BB		ST

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1974 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
33	59°58.0'N	0352	191	BB	95	SP
	151°57.8'W	1850	207	BB		SP
		1141	135	BB		ST
		1401	197	BB	(29)	ST
		0535	214	BB		ST
34	60°08.0'N	2218	175	BB	128	SP
	151°57.0'W	0355	182	BB		SP
		1539	134	BB	(39)	ST
		0114	137	BB		ST
		0328	183	BB		ST
		2235	198	BB		ST
		0232	214	BB		ST
		0905	219	BB		ST
35	60°14.7'N	2305	192	BB	144	SP
	152°15.0'W	2120	207	BB		SP
		2220	136	BB	(44)	ST
		0627	137	BB		ST
		2200	182	BB		ST
		1912	198	BB		ST
		2335	213	BB		ST
		2335	220	BB		ST
36	60°23.0'N	@ approximately half hour intervals				
	152°09.0'W	0915	141			
		TO				
		1000	142	BB	361	S
		2030	212			
		TO				
		2130	213	BB	(110)	S
		1610	172	BB		SP
		0208	204	BB		SP
		0723	137	BB		ST
		2008	182	BB		ST
		2050	220	BB		ST
37	60°20.3'N	2000	175	BB	105	SP
	151°53.0'W	0635	192	BB		SP
		0730	135	BB	(32)	ST
		0836	184	BB		ST
		1100	219	BB		ST

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1974 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
38	60°16.8'N	1715	176	BB	88	SP
	151°43.6'W	0825	135	BB		ST
		1307	183	BB	(27)	ST
		0750	184	BB		ST
		1155	219	BB		ST
		1307	219	BB		ST
		2045	221	BB		ST
39	60°13.8'N	0710	172	BB	72	SP
	151°34.7'W	0040	191	BB		SP
		0909	135	BB	(22)	ST
		0654	184	BB		ST
		1230	219	BB		ST
40	60°26.9'N	1845	156	BB	52	SP
	152°02.5'W	1720	171	BB		SP
		2053	182	BB	(16)	SP
		1845	212	BB		SP
41	60°26.9'N	0540	158	BB	243	SP
	152°10.1'W	0750	137	BB		ST
		1922	182	BB	(74)	ST
		2031	220	BB		ST
42	60°32.2'N	1730	159	BB	187	SP
	152°06.0'W	1820	175	BB		SP
		1451	134	BB	(57)	ST
		0827	137	BB		ST
		1825	182	BB		ST
		0202	184	BB		ST
		1745	212	BB		ST
		1950	220	BB		ST
43	60°31.1'N	0305	157	BB	108	SP
	152°00.4'W	1918	171	BB		SP
		1522	134	BB	(33)	ST
		0235	184	BB		ST
		1715	212	BB		ST

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1974 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
44	60°27.4'N	2243	157	BB	210	SP
	151°41.5'W	1702	134	BB		ST
		0420	184	BB	(64)	ST
		1450	212	BB		ST
45	60°27.4'N	1744	134	BB	89	ST
	151°31.5'W	2101	157	BB		SP
		0520	184	BB	(27)	ST
		1401	212	BB		ST
46	60°34.7'N	2325	175	BB	131	SP
	151°33.6'W	0624	134	BB		ST
		1141	134	BB	(40)	ST
		1542	183	BB		ST
		2247	183	BB		ST
		1210	212	BB		ST
		1513	219	BB		ST
47	60°36.3'N	1245	134	BB	79	ST
	151°43.8'W	0442	135	BB		ST
		2338	183	BB	(24)	ST
		1057	212	BB		ST
48	60°37.9'N	0312	134	BB	72	SP
	151°53.5'W	1349	134	BB		ST
		0920	137	BB		ST
		1723	182	BB	(22)	ST
		0051	184	BB		ST
		0953	212	BB		ST
		1849	220	BB		ST
49	60°43.6'N	1956	134	BB	174	SP
	151°38.0'W	2130	156	BB		SP
		0824	134	BB		ST
		1836	183	BB	(53)	ST
		0756	212	BB		ST
50	60°43.4'N	1054	137	BB	98	S
		@ approximately half hour intervals				
		1607	219			
		TO				
		1731	220	BB		S

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1974 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
50	60°43.4'N 151°32.9'W	2046	134	BB	98	SP
		0505	227	BB		SP
		0719	134	BB		ST
		0912	134	BB	(30)	ST
		1615	182	BB		ST
		1712	183	BB		ST
		0655	212	BB		ST
51	60°43.1'N 151°25.9'W	2137	134	BB	95	SP
		1655	165	BB		SP
		1630	175	BB		SP
		0112	220	BB		SP
		0950	134	BB	(29)	ST
		2040	183	BB		ST
		0625	212	BB		ST
52	60°40.7'N 151°25.0'W	2257	134	BB	108	SP
		2116	183	BB		SP
		0043	220	BB	(33)	SP
60	60°54.3'N 151°10.8'W	2345	226	BB	138 (42)	SP
76	61°07.4'N 150°26.8'W	@ approximately half hour intervals				
		1930 TO 2030	210 TO 211	BB	85	S
		1918	226	BB	(26)	SP
2101	59°56.9'N 152°09.6'W	0155	134	BB	216	ST
		0122	183	BB		ST
		0631	219	BB	(66)	ST
2102	59°58.1'N 152°18.0'W	0440	137	BB	308	ST
		0042	183	BB		ST
		0226	221	BB	(94)	ST
2103	59°59.8'N 152°29.6	1556	135	BB	148	SP
		0015	206	BB	(45)	SP

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1974 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
2104	60°03.8'N 152°36.9'W	2314	205	BB	209 (64)	ST
2105	60°07.3'N 152°36.9'W	1905	305	BB	88 (27)	ST
2107	60°09.6'N 152°29.0'W	1502 1737 0900	135 197 214	BB BB BB	108 (33)	ST ST ST
2108	60°06.2'N 152°20.0'W	1502 0529 2322 1631 0810 2335	135 137 182 197 214 220	BB BB BB BB BB BB	157 (48)	ST ST ST ST ST ST
2109	60°03.0'N 152°11.4'W	1316 1535 0647	135 197 214	BB BB BB	157 (48)	ST ST ST
2110	59°59.8'N 152°02.5'W	1207 1430 0600	135 197 214	BB BB BB	131 (40)	ST ST ST
2111	59°56.2'N 151°53.5'W	1120 1327 0505	135 197 214	BB BB BB	49 (15)	ST ST ST
2112	59°54.5'N 151°48.5'W	1057 1250 0430	135 197 214	BB BB BB	66 (20)	ST ST ST
2113	60°10.5'N 152°17.5'W	0558 2241 2302	137 182 220	BB BB BB	161 (49)	ST ST ST
2114	60°04.8'N 152°01.8'W	0313 0255 0808	134 183 219	BB BB BB	174 (53)	ST ST ST

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1974 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
2115	60°04.4'N 151°46.8'W	0204 0002	137 199	BB BB	92 (28)	ST ST
2116	60°06.0'N 151°51.9'W	0141 2323 0300	137 198 214	BB BB BB	125 (38)	ST ST ST
2117	60°09.6'N 152°01.4'W	0053 2208 0148	137 198 214	BB BB BB	223 (68)	ST ST ST
2119	60°12.6'N 152°09.8'W	2045 1944 0005 0330	136 198 214 214	BB BB BB BB	131 (40) 75 (23)	ST ST ST ST
2120	60°16.1'N 152°19.5'W	2140 1833 2312	136 198 213	BB BB BB	114 (35)	ST ST ST
2121	60°19.0'N 152°12.3'W	0656 2115 2115	137 182 220	BB BB BB	298 (91)	ST ST ST
2122	60°12.8'N 151°49.6'W	0413 0425 1000	134 183 219	BB BB BB	154 (47)	ST ST ST
2123	60°15.2'N 151°38.9'W	0850 0718 1215	135 184 219	BB BB BB	88 (27)	ST ST ST
2124	60°18.5'N 151°48.0'W	0800 0814 1123	135 184 219	BB BB BB	121 (37)	ST ST ST
2125	60°19.0'N 151°57.1'W	0920	184	BB	75 (23)	ST

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1974 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
2126	60°16.5'N 151°59.1'W	0956	184	BB	82 (25)	ST
2127	60°18.0'N 151°59.1'W	0155	183	BB	79 (24)	ST
2128	60°20.7'N 152°07.0'W	0050	183	BB	56 (18)	ST
2129	60°23.2'N 152°06.0'W	2320 1915	182 212	BB BB	59 (18)	ST ST
2130	60°29.9'N 152°08.0'W	0811 1858 2009	137 182 220	BB BB BB	187 (57)	ST ST ST
2131	60°22.0'N 151°39.9'W	0442 0512 1348	134 134 183	BB BB BB	134 (41)	ST ST ST
2132	60°28.1'N 151°45.1'W	1644 0405 1533	134 184 212	BB BB BB	49 (15)	ST ST ST
2133	60°26.5'N 151°36.6'W	0540 1723 1428 0454 1424 1408	134 134 183 184 212 219	BB BB BB BB BB BB	134 (41)	ST ST ST ST ST ST
2134	60°24.6'N 151°27.1'W	1803 0545 1840	134 184 212	BB BB BB	59 (18)	ST ST ST
2135	60°35.4'N 151°59.0'W	0851 1753 1924	137 182 220	BB BB BB	134 (41)	ST ST ST

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1974 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
2136	60°33.6'N 151°50.5'W	1553 0316 1643	134 184 212	BB BB BB	56 (17)	SP SP SP
2137	60°30.9'N 151°35.0'W	0603 1504 1443	134 183 219	BB BB BB	164 (50)	ST ST ST
2138	60°33.5'N 151°27.1'W	1106 2217 1238	134 183 212	BB BB BB	85 (26)	ST ST ST
2139	60°35.4'N 151°38.2'W	1211 2312 1127	134 183 212	BB BB BB	266 (81)	ST ST ST
2140	60°41.1'N 151°41.0'W	1001 1643 1813	137 182 220	BB BB BB	62 (19)	ST ST ST
2141	60°39.1'N 151°33.1'W	0648 1625 1539	134 183 219	BB BB BB	115 (35)	ST ST ST
2142	60°43.7'N 151°41.0'W	0800 1751 0834	134 183 212	BB BB BB	49 (15)	ST ST ST
2143	60°43.5'N 151°35.4'W	0912 1903 0714	134 183 212	BB BB BB	239 (73)	ST ST ST
2144	60°43.1'N 151°28.5'W	0934 1955 0637	134 183 212	BB BB BB	46 (14)	ST ST ST

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1975 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
50	60°43.4'N 151°33.8'W	0738	134	BB	186	ST
		2335	160			
		TO				
		0029	162			S
		@ approximately half hour intervals				
		0029	177	BB	(56)	SP
		1920	189	BB		ST
		0053	206			
		TO				
		0203	207	BB		S
		@ approximately half hour intervals				
53	60°48.25'N 151°17.5'W	1936	128	BB	84	SP
		1710	134	BB		ST
		2310	147	BB	(25)	SP
		0914	196	BB		ST
54	60°50.5'N 151°20.5'W	2004	128	BB	139	SP
		0440	134	BB		ST
		2133	147	BB	(42)	SP
		1821	189	BB		ST
		1800	192	BB		SP
		0845	196	BB		ST
55	60°54.14'N 151°27.00'W	2322	128	BB	240	SP
		1120	134	BB		ST
		2020	134	BB	(73)	ST
		1930	143	BB		SP
		2128	189	BB		ST
		0600	196	BB		ST
		0020	213	BB		SP
56	60°56.12'N 151°29.5'W	0001	129	BB	96	SP
		2103	134	BB		ST
		2040	143	BB	(29)	SP
		2300	168	BB		SP
		0417	196	BB		ST
		1742	205	BB		SP
		0444	217	BB		SP

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1975 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
57	61°02.25'N	1322	134	BB	96	ST
	151°07.5'W	2232	143	BB		SP
		1845	156	BB	(29)	SP
		1235	196	BB		ST
58	61°00.2'N	1412	134	BB	102	ST
	151°04.7'W	2310	143	BB		SP
		1957	156	BB	(31)	SP
		1208	196	BB		ST
59	60°57.5'N	1444	134	BB	138	ST
	151°01.4'W	2049	156	BB		SP
		1136	196	BB	(42)	ST
		2215	212	BB		SP
60	60°54.6'N	1520	134	BB	66	ST
	150°57.3'W	1950	142	BB		SP
		2157	156	BB	(20)	SP
		1057	196	BB		ST
61	61°01.7'N	2309	141	BB	66	SP
	150°41.5'W	2205	148	BB		ST
		0050	150	BB	(20)	SP
		1608	196	BB		ST
62	61°04.5'N	2239	139	BB	81	ST
	150°44.5'W	2239	141	BB		SP
		2300	148	BB	(25)	ST
		2335	149	BB		SP
		2223	162	BB		SP
		1530	196	BB		ST
		2355	196	BB		ST
63	61°07.9'N	0005	134	BB	96	ST
	150°47.4'W	2015	141	BB		SP
		2345	148	BB	(29)	ST
		2250	162	BB		SP
		0050	171	BB		SP
		1025	189	BB		ST
		1434	196	BB		ST

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1975 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
64	61°09.4'N	2000	141	BB	75	SP
	150°50.0'W	0005	149	BB		ST
		2105	149	BB	(23)	SP
		0210	163	BB		SP
		1415	196	BB		ST
65	61°09.6'N	2250	133	BB	87	ST
	150°30.5'W	0105	149	BB		ST
		2205	150	BB	(26)	SP
		0106	168	BB		SP
		1835	188	BB		SP
		1826	196	BB		ST
66	61°07.5'N	0135	149	BB	78	ST
	150°29.2'W	2006	150	BB		SP
		1813	169	BB	(24)	SP
		1758	196	BB		ST
67	61°05.2'N	2128	139	BB	104	ST
	150°28.0'W	0900	140			
		TO				
		1000	141	BB		S
		@ approximately half hour intervals			(31)	
		0205	149	BB		ST
		1900	150	BB		SP
		2103	181	BB		SP
		1717	196	BB		ST
		2055	196	BB		ST
		0915	217			
		TO				
		1015	218	BB		S
		@ approximately half hour intervals				
68	61°03.00'N	0230	149	BB	72	ST
	150°27.7'W	1744	150	BB		ST
		2055	167	BB		SP
		1649	196	BB	(22)	ST

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1975 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
69	61°03.0'N 150°20.5'W	2022	148	BB	210	SP
		2219	167	BB		SP
		2147	196	BB	(64)	ST
69A	61°03.2'N 151°19.2'W	2330	167	BB	180	SP
		2124	188	BB		SP
		2253	213	BB	(55)	SP
72	61°05.0'N 150°13.9'W	1735	212	BB	60 (18)	SP
73	61°08.5'N 150°18.0'W	2010	139	BB	58	ST
		0455	149	BB		ST
		1945	162	BB	(17)	SP
		2010	177	BB		ST
		1954	196	BB		ST
74	61°09.6'N 150°18.6'W	0455	149	BB	62	ST
		2005	162	BB		SP
		2105	171	BB	(19)	SP
		2040	177	BB		ST
75	61°10.5'N 150°18.7'W	2203	133	BB	80	ST
		0515	149	BB		ST
		1918	163	BB	(24)	SP
		2201	171	BB		SP
		2058	177	BB		ST
		1314	189	BB		ST
76	61°14.3'N 150°15.8'W	2356	175	M	10	S
		TO				
		2200	183		(3)	
		@ approximately half hour intervals				
77	61°10.9'N 150°13.5'W	2142	133	BB	90	ST
		1940	139	BB		ST
		1829	163	BB	(27)	SP
		1250	189	BB		ST
		1922	196	BB		ST

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1975 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
78	61°11.5'N	2122	133	BB	63	ST
	150°08.7'W	1215	189	BB		ST
		2338	190	BB	(19)	SP
		1840	199	BB		SP
80	61°13.5'N				26	ST
	150°03.9'W	2215	129	BB	(8)	
81	61°13.2'N	2240	129	BB	47	ST
	150°04.4'W	2056	133	BB		ST
		1814	174	BB		SP
		2022	183	BB	(14)	ST
		1142	189	BB		ST
		2214	190	BB		SP
82	61°12.3'N	2317	129	BB	54	ST
	150°03.5'W	1906	174	BB		SP
		2011	183	BB	(16)	ST
		2103	190	BB		SP
83	61°11.2'N	1820	176	BB	72	ST
	150°03.8'W	1915	183	BB	(22)	SP
84	61°12.5'N	1902	183	BB	48	SP
	149°59.4'W	1922	199	BB	(15)	SP
85	61°13.5'N	2041	133	BB	88	ST
	150°00.01'W	1956	174	BB		SP
		1142	189	BB	(27)	ST
		1900	191	BB		SP
		1854	216	BB		SP
86	61°15.1'N	1820	198	BB	90	ST
	149°53.8'W				(27)	
87	61°13.4'N	2343	129	BB	83	SP
	149°56.8'W	2014	133	BB		ST
		1830	153			
		TO				
		1930	154	BB	(25)	S
		@ approximately half hour intervals				

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1975 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
87	61°13.4'N 149°56.8'W	2145	163	BB	83	SP
		1836	164	BB		SP
		2230	177	BB		SP
		1046	189	BB	(25)	ST
		0900	191			S
		TO				
		1000	192	BB		
		@ approximately half hour intervals				
88	61.14.6'N 149°55.4'W	1937	133	BB	78	ST
		1810	183	BB		ST
		0020	189	BB	(24)	ST
		2206	219	BB		SP
89	61°14.6'N 149°53.7'W	1912	133	BB	75	ST
		1952	133	BB		ST
		1810	183	BB	(23)	ST
		1025	189	BB		ST
		2007	216	BB		SP
90	61°14.5'N 149°53.8'W	1841	133	BB	80	ST
		1825	183	BB		ST
		0144	189	BB	(24)	SP
		2347	211	BB		SP
		0007	220	BB		SP
91	61°14.6'N 149°53.0'W	0050	138	BB	25 (8)	SP
92	61°16.0'N 149°53.6'W	2002	198	BB	54 (16)	SP
93	61°16.6'N 149°53.6'W	1730	133	BB	158	ST
		0947	189	BB		ST
		2030	216	BB	(48)	SP
94	61°18.0'N 149°52.4'W	1753	133	BB	60	ST
		0908	189	BB		ST
		2308	211	BB	(18)	SP
		2303	219	BB		SP

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1975 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
95	61°21.3'N	1845	133	BB	30	ST
	149°52.0'W	2330	202	M		SP
		1900	214	BB	(9)	SP
96	61°19.8'N	1825	133	BB	45	ST
	149°47.6'W	2345	203	M	(14)	SP
2145	60°44.9'N	0608	134	BB	95	ST
	151°31.7'W	0718	134	BB		ST
		1906	189	BB	(29)	ST
2146	60°46.0'N	0855	134	BB	234	ST
	151°37.12'W	0912	134	BB		ST
		1952	189	BB	(71)	ST
2147	60°49.6'N	0957	134	BB	174	ST
	151°36.0'W	2031	189	BB	(53)	ST
2148	60°46.8'N	0544	134	BB	96	ST
	151°30.1'W	1852	189	BB	(29)	ST
2149	60°48.9'N	0512	134	BB	96	ST
	151°28.0'W	1837	189	BB	(29)	ST
2150	60°51.7'N	1040	134	BB	258	ST
	151°31.9'W	2056	189	BB	(79)	ST
2151	60°55.5'N	2049	134	BB	58	ST
	151°28.6'W	0430	196	BB	(17)	ST
2152	60°53.6'N	2005	134	BB	78	ST
	151°25.1'W	0629	196	BB	(24)	ST
2153	60°51.9'N	2020	134	BB	117	ST
	151°23.0'W	0820	196	BB	(35)	ST

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1975 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
2154	60°48.9'N 151°19.1'W	1745 0900	134 196	BB BB	93 (28)	ST ST
2155	60°52.1'N 151°15.6'W	0420 1806	134 189	BB BB	108 (33)	ST ST
2156	60°56.25'N 151°20.9'W	1145 2158	134 189	BB BB	138 (42)	ST ST
2157	60°58.20'N 151°15.0'W	1210 2223	134 189	BB BB	130 (40)	ST ST
2158	60°53.8'N 151°10.5'W	0350 1746	134 189	BB BB	96 (29)	ST ST
2159	60°55.5'N 151°08.5'W	0323 1728	134 189	BB BB	90 (27)	ST ST
2160	60°58.25'N 151°09.25'W	1235 2241	134 189	BB BB	78 (24)	ST ST
2161	61°01.3'N 151°06.5'W	1350 1223	134 196	BB BB	102 (31)	ST ST
2162	60°58.6'N 151°03.1'W	0240 1430 1650 1153	134 134 189 196	BB BB BB BB	102 (31)	ST ST ST ST
2163	60°55.7'N 150°59.0'W	1503 1110	134 196	BB BB	84 (26)	ST ST
2164	61°01.7'N 151°00.2'W	0207 1630	134 189	BB BB	96 (29)	ST ST
2165	61°03.3'N 150°57.0'W	0100 2338 0200 TO 0300 @ approximately half hour intervals 1616 0029 0640 TO 0730 @ approximately half hour intervals	134 139 155 156 189 197 197 198 	BB BB BB	96 (29)	ST ST S ST ST S

Table 6. STD Observations, 1973-75 (con.)

STATION NUMBER	LATITUDE LONGITUDE	DATES OF OBSERVATIONS 1975 Hours	JD	TYPE OF METER BB: BISSET-BERMAN M: MARTEK	DEPTH OF STATION FEET (M) AT MLLW	CLASSIFICATION S: 13-HOUR STA. ST: PRIMARY SP: AUXILIARY
2166	61°05.8'N 150°50.8'W	0027 1554	134 189	BB BB	84 (26)	ST ST
2167	60°04.3'N 150°50.5'W	2307 0015	139 197	BB BB	78 (24)	ST ST
2168	61°03.0'N 150°43.5'W	2300 1547	148 196	BB BB	72 (22)	ST ST
2169	61°06.4'N 150°46.3'W	2327 1513	148 196	BB BB	75 (23)	ST ST
2170	61°08.9'N 150°42.25'W	2343 1518	133 189	BB BB	78 (24)	ST ST
2171	61°09.3'N 150°36.3'W	2324 1440	133 189	BB BB	72 (22)	ST ST
2172	61°05.00'N 150°35.9'W	2212 2335	139 196	BB BB	90 (27)	ST ST
2173	61°01.75'N 150°16.3'W	2230	196	M	42 (13)	ST
2176	60°57.75'N 151°01.0'W	2345	139	BB	130 (39)	ST
2177	61°07.2'N 150°22.9'W	2035 2025	139 196	BB BB	93 (28)	ST ST
2178	61°10.0'N 150°24.0'W	2226 1347	133 189	BB BB	80 (24)	ST ST
2179	61°18.5'N 149°51.4'W	1807	133	BB	30 (9)	ST

5. TIDE OBSERVATION PROGRAM

The purpose of the tide program is to characterize water level fluctuations. Using the results of the tide, current, and STD observational programs, the dynamics of a given region can be described. The astronomic tide, including the propagation rate and its deformation by the basin as it progresses up the estuary, can be determined. Also, any local response of the sea surface to astronomic forcing can be resolved.

Especially in Cook Inlet, where recent changes have occurred as a result of earthquakes, hydrographic features must be well defined. By comparing the new tidal datum planes (which can be calculated from the tidal height records) with those calculated from previous surveys, land subsidence or emergence can be measured. The need for these datums is well documented, including their use in negotiating boundary disputes and in determining shoreline control procedures. Because of the draft of large oil tankers, they may only be able to depart harbors at times of high tide. Safe navigation, therefore, requires not only accurate depth soundings on charts, but also the corrections necessitated by the tidal height variations.

The scope of the tide program in Cook Inlet is shown in figures 2 and 3 for the three phases of the project. Table 7 describes the observational information for each tide station. Three types of gages were used during the survey. A standard tide gage was used at Seldovia for the duration of the survey; analog-to-digital recorder (ADR) gages were used for three stations; and for the remaining stations, bubbler gages were installed. Table 8 gives the specifications for the three gage types.

Pressure was also measured using the Aanderaa current meter. Table 1 indicates which stations obtained pressure information. This information can be used to describe generally the water level fluctuation at a specified location.

The ADR gages record instantaneous water level values on a foil-backed paper. Using a mechanical translator, the individual data values are translated onto a computer-compatible tape. Both the bubbler and standard tide gages record on an analog strip chart. Hourly values are coded from the marigram by using either a slow manual-visual inspection or a specially developed bubbler marigram scanner.

The processing system includes: (1) calculating the daily high and low waters; (2) digitizing the hourly values for stations designated for further analyses; (3) calculating datums; and (4) calculating the monthly and yearly means. The important datums are: mean higher high water, mean high water, mean low water, mean lower low water, mean tide level, and mean sea level. Also, the times of high and low water referenced to a primary station (Seldovia, in Cook Inlet) are important. For each station, datums

are corrected according to the staff/marigram relationship. Monthly means can be equivalenced to a 19-year mean by performing a simultaneous comparison with a control or reference station. Tidal benchmark elevations are established by referencing the results to the observed tidal datums. These benchmarks can be compared with historical information to determine if subsidence or emergence has occurred. Finally, using the information at the benchmarks, the elevations are connected to the National Geodetic Vertical Network.

For any tide station where further information is required, the data record is analyzed by using a variety of techniques. These include: (1) 29-day Fourier harmonic analysis; (2) least squares harmonic analysis for stations of longer than one-half year duration; (3) response harmonic analysis; (4) nonharmonic reduction between the reference station and short-period stations; and (5) filtering and spectral analysis. The results from the harmonic analyses are used to make predictions at the reference station, and the factors at secondary stations are published in the yearly Tide Tables. These tables will be updated using the extensive data set collected in Cook Inlet.

The various forms in which NOS can supply data are:

(1) copies of the original marigram,
(2) high-and low-water tabulations,
(3) hourly heights (if available),
(4) summary table of monthly means,
(5) derived harmonic constants, and
(6) tidal benchmark descriptions and elevations.

The cost of the data depends on the type of data and the size of the request.

6. SUMMARY

This report describes the extensive 3-year circulatory survey conducted in Cook Inlet, Alaska, from 1973-75. The major users of the data obtained in the survey will be: (1) the commercial and industrial communities; (2) the environmentalists and legislators who will use the data to evaluate the impact of oil-related activities on the wildlife; (3) pilots of the small craft, who will use the updated Tide and Tidal Current Tables in navigating the sometimes hazardous waters of Cook Inlet; and (4) the scientific community, which will use this extensive data base in further describing and explaining the dynamics of Cook Inlet. New NOS products will include: (1) a supplement to the Tide and Tidal Current Tables; (2) a special publication giving hourly heights at selected locations throughout Cook Inlet; (3) a new Tidal Current Chart series for Cook Inlet, Alaska; and (4) a scientific technical report describing the tide and tidal current hydrodynamics, including a total description of the dynamics of Cook Inlet, Alaska.

STATION NUMBER	STATION NAME	LATITUDE LONGITUDE	DATES OF OBSERVATIONS	TYPE OF GAGE
T-1	Seldovia	59°26'24"N 151"43'00"W	Continuous	Standard
T-2	Port Graham	59°21'05"N 151°49'26"W	6/16-8/24/73	ADR
T-3	Port Chatham	59°12'42"N 151°43'38"W	5/31-7/17/73	Bubbler
T-4	Ushagat Is.	58°56'30"N 152°14'36"W	6/25-8/18/73	Bubbler
T-5	Shaw Island	59°00'06"N 153°22'54"W	5/25-9/04/73	ADR
T-6	Nordyke Island	59°10'36"N 154°05'18"W	7/24-7/29/73	Bubbler
T-7	Bruin Bay	59°22'18"N 154°00'30"W	7/13-8/17/73	Bubbler
T-8	Burr Point	59°25'06"N 153°25'12"W	6/5-8/16/73	Bubbler
T-9	Ursus Cove	59°30'10"N 153°43'17"W	7/16-9/09/73	Bubbler
T-10	Iliamna Bay	59°37'42"N 153°36'48"W	5/25-7/03/73	Bubbler

Table 7. Tide Observations 1973-75

STATION NUMBER	STATION NAME	LATITUDE LONGITUDE	DATES OF OBSERVATIONS	TYPE OF GAGE
T-11	Iniskin Bay	59°41'00"N 153°23'00"W	6/17-7/31/73	Bubbler
T-12	Oil Bay	59°38'00"N 153°14'50"W	6/4-8/11/73	Bubbler
T-13	Chinitna Bay	59°50'30"N 152°59'18"W	6/21-9/06/73	Bubbler
T-14	Snug Harbor	60°06'12"N 152°34'18"W	5/21-8/30/73	Bubbler
T-15	Tuxedni Harbor	60°09'12"N 152°38'06"W	7/06-8/29/73	Bubbler
T-16	Ninilchik	60°03'16"N 151°40'11"W	6/05-8/27/73	Bubbler
T-17	Anchor Point	59°46'12"N 151°52'06"W	7/01-9/09/73	Bubbler
T-18	Homer	59°36'13"N 151°25'11"W	6/09-9/09/73	ADR
T-19	Bear Cove	59°43'30"N 151°01'24"W	6/08-8/29/73	Bubbler
T-20	Halibut Cove	59°35'48"N 151°13'06"W	6/03-8/26/73	Bubbler

Table 7. Tide Observations 1973-75 (con.)

STATION NUMBER	STATION NAME	LATITUDE LONGITUDE	DATES OF OBSERVATIONS	TYPE OF GAGE
T-21	Kasitsna Bay	59°28'18"N 151°32'36"W	5/31-8/11/73	Bubbler
T-28	Eklutna	61°28'12"N 149°21'18"W	6/24-9/30/73	Bubbler

Table 7. Tide Observations 1973-75 (con.)

STATION NUMBER	STATION NAME	LATITUDE LONGITUDE	DATES OF OBSERVATIONS	TYPE OF GAGE
T-1	Seldovia	59°26'24"N 151°43'00"W	Continuous During Survey 1973-1975	Standard
T-B	Nikiski	60°41'00"N 151°23'48"W	Continuous 1974-75	Bubbler
T-8	Burr Point	59°25'06"N 153°25'12"W	5/17- 6/01/74	Bubbler
T-14	Snug Harbor	60°06'12"N 152°34'18"W	5/21- 8/30/74	Bubbler
T-16	Ninilchick	60°03'16"N 151°40'11"W	6/24- 8/19/74	Bubbler
T-20	West Foreland	60°42'47"N 151°42'36"W	5/07- 8/02/74	Bubbler
T-21	Harriet Point	60°24'24"N 152°30'25"W	6/06- 8/22/74	Bubbler
T-22	West Kalgin Island	60°27'09"N 151°57'24"W	6/11- 8/19/74	Bubbler
T-23	Drift River	60°33'17"N 152°08'04"W	7/01- 8/19/74	Bubbler
T-24	Chinula	60°30'12"N 151°17'00"W	5/22- 8/22/74	Bubbler
T-25	Cape Kasilof	60°20'15"N 151°22'05"W	6/20- 8/22/74	Bubbler

Table 7. Tide Observations 1973-75 (con.)

STATION NUMBER	STATION NAME	LATITUDE LONGITUDE	DATES OF OBSERVATIONS	TYPE OF GAGE
T-31	Point Possession	61°02'18"N 150°24'00"W	6/21-8/21/74	Bubbler
T-32	North Foreland	61°02'48"N 151°10'12"W	7/19-8/20/74	Bubbler
T-26	Goose Creek	61°23'36"N 149°50'48"W	5/21-6/24/74	Bubbler
T-27	Fire Island	61°09'24"N 150°14'24"W	5/22-8/22/74	Bubbler
T-28	Eklutna	61°28'12"N 149°22'12"W	6/02-6/26/74	Bubbler

Table 7. Tide Observations 1973-75 (con.)

STATION NUMBER	STATION NAME	LATITUDE LONGITUDE	DATES OF OBSERVATIONS	TYPE OF GAGE
T-1	Seldovia	59°26'36"N 151°43'00"W	Continuous	Bubbler
T-B	Nikiski	60°41'12"N 151°23'48"W	Continuous	Bubbler
T-C	Anchorage	61°14'30"N 149°53'12"W	Continuous	Bubbler
T-20	West Foreland	60°42'45"N 151°42'36"W	5/15-8/21/75	Bubbler
T-25	Cape Kasilof	60°20'18"N 151°23'00"W	6/12-8/28/75	Bubbler
T-26	Goose Creek	61°23'36"N 149°50'48"W	6/23-8/08/75	Bubbler
T-29	Rainbow	61°00'00"N 149°38'24"W	6/03-8/04/75	Bubbler
T-30	Kalgin Island (East Side)	60°27'12"N 151°57'24"W	6/09 8/12/75	Bubbler
T-31	Point Possession	61°02'12"N 150°24'48"W	5/21-8/05/75	Bubbler
T-32	North Foreland	61°02'48"N 151°10'12"W	5/29-8/20/75	Bubbler
T-33	Moose Point	60°57'24"N 150°41'00"W	6/12-8/20/75	Bubbler
T-34	Nikishka Point	60°45'00"N 151°19'00"W	5/10-8/22/75	Bubbler

Table 7. Tide Observations 1973-75 (con.)

STATION NUMBER	STATION NAME	LATITUDE LONGITUDE	DATES OF OBSERVATIONS	TYPE OF GAGE
T-35	Phillips Oil Platform	61°04'30"N 150°56'54"W	7/02-8/15/75	Bubbler
T-36	Amoco Oil Platform	61°00'00"N 151°17'48"W	5/30-8/10/75	Bubbler
T-37	Arco Oil Platform	60°55'42"N 151°31'48"W	6/25-8/09/75	Bubbler
T-38	Redoubt Point	60°17'00"N 152°24'30"W	6/27-8/07/75	Bubbler

Table 7. Tide Observations 1973-75 (con.)

Bubbler (Gas Purged)

Manufacturer: Bristol
Range: 0-10 feet to 0-50 feet
Resolution: 1% of full scale
Recorder: 6-inch strip chart
Record Format: Analog, curvilinear
Sampling Rate: Continuous
Duration: Chart - 1 month
Chart drive, spring wound - 8 days
Processing: Visual
Mode of Operation: Compressed nitrogen is purged through the system actuating a pressure-sensitive element which measures water level fluctuations.

Analog-to-Digital Recorder (ADR)

Manufacturer: Fischer & Porter
Range: 0-99.99 feet
Resolution: Foil-backed paper tape (punch)
Record Format: Binary - decimal code
Sampling Rate: 6-minute intervals
Duration: Chart - 3 months
Chart drive, battery - 3 months
Processing: Mechanical translator
Mode of Operation: Float movement is translated into binary code and recorded on paper tape.

Standard Tide Gage

Manufacturer: D. Ballauf Manufacturing Company
Range: 0-48 feet
Resolution: 0.1-foot
Recorder: 13-inch strip chart
Record Format: Analog, rectilinear
Sampling Rate: Continuous
Duration: Chart - 1 month
Chart drive, spring wound - 8 days
Processing: Visual or mechanical scanner
Mode of Operation: A float-operated, gravity counter-poised system is employed in a stilling well which measures water level fluctuations.

Table 8. Tide Gage Specifications

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