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AA Technical Memorandum OMPA-5

INDEX TO OBSERVATIONS OF CURRENTS

IN PUGET SOUND, WASHINGTON,

FROM 1908-1980

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noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / Office of Marine Pollution Assessment

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GEORGETOWN CENTER
MAY 1981
N.O.A.A.
U. S. Dept. of Commerce

81 1477

Submitted to

MESA Puget Sound Project

Office of Marine Pollution Assessment

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ABBREVIATIONS

EQUIPMENT

ACM	--	Aanderaa Current Meter
BCM	--	Braincon Current Meter
ECM	--	Ekman Current Meter
Floats	--	Surface floats
GCM	--	Gemware Current Meter
GeCM	--	Geodyne Current Meter
GOCM	--	General Oceanics Current Meter
HPCM	--	Hydro Products Current Meter
MCM	--	Magnesyn Current Meter
MACM	--	Marine Advisers Current Meter
PCM	--	Price Current Meter
Pole	--	Drift pole
RRCM	--	Roberts Radio Current Meter
VACM	--	Vector Averaging Current Meter

OTHER

C	--	conductivity
cm	--	centimeter
m	--	meter
MESA	--	Marine Ecosystems Analysis
NOAA	--	National Oceanic and Atmospheric Administration
NOS	--	National Ocean Survey
O	--	oxygen
P	--	pressure
PMEL	--	Pacific Marine Environmental Laboratory
PST	--	Pacific Standard Time
s	--	seconds
T	--	temperature
T_R	--	transmissivity
USACE	--	U.S. Army Corps of Engineers
USCGS	--	U.S. Coast and Geodetic Survey
UW	--	University of Washington

ABSTRACT

In order to describe the characteristics of the circulation in two major basins of Puget Sound, Washington, we are undertaking a synthesis of historical current measurements. As a first step towards our goal we have collected nearly all the current observations taken throughout the Sound. This report indexes 48.8 recorded years of Eulerian current observations generally one day or longer taken at nearly 300 sites from 1908-1980. The three major organizations taking measurements during this period were the National Ocean Survey, the University of Washington, and the Pacific Marine Environmental Laboratory. Fourteen different types of equipment were used to take the measurements; each is described herein. Approximately two-thirds of the data were taken in Puget Sound's Main Basin and its seaward sill zone - Admiralty Inlet; the remaining one-third is divided equally among the Sound's three other major basins. Maps showing the locations of the observations and tables listing pertinent information on each are provided.

This report is considered preliminary and includes all data collected by the authors as of December 31, 1980. The synthesis and interpretation of all data in the Main and Southern basins will be presented in a final report and journal articles. Additions and corrections to this report are most welcome and will be included in the final report.

1. INTRODUCTION

Puget Sound is an inland estuarine waterway in northwestern Washington (Fig. 1.1) that receives a variety of man-made wastes. The dilution and distribution of these waters is in part controlled by a complex circulation of water between the major basins of the Sound (Fig. 1.2). As water passes between the basins it is often mixed vertically over shallow sills creating the possibility of surface pollutants being carried to depth and returned landward. In a previous synthesis of hydrographic data, Ebbesmeyer and Barnes (1980) estimated that the majority of water at 100 m depth in the Main Basin may have been vertically mixed downward from the surface. To more precisely describe the circulation, a synthesis of all current observations taken in the major channels of the Main and Southern basins of the Sound is in preparation. Specific objectives of the synthesis are to: 1) compare variations of the current data to variations in freshwater, air temperature, and winds; 2) describe seasonal variations of the circulation; 3) estimate residence times of contaminants for the Main Basin; 4) relate field observations to previous hydraulic tidal model experiments; and 5) estimate the relative contributions of tidal pumping and winds to transport. No synthesis of this nature has ever been done due to the formidable size and complexity of the data, and the fact that the data have been stored in scattered locations.

As a first step towards our goal, we have collected nearly all the current observations taken throughout the Sound by various investigators. The specific objective of this report is to provide an index of the measurements taken between 1908-1980. Criteria applied to the selection of the data presented herein are as follows: 1) the measurements are Eulerian in nature obtained using current meters, drift poles, and floats; and 2) the measurements generally span one day or longer so as to be representative of a tidal cycle. Practically all of the records shorter than a day in length have been listed by Collias (1971).

Within the report are descriptions of the various types of equipment used to take the measurements along with brief histories of the observations taken by three major organizations. The locations at which observations were taken are shown in Appendix A; the observations are indexed in Appendix B; and the sources of the data are listed in Appendix C.

Please note that this report is considered preliminary and lists measurements collected by the authors as of December 31, 1980. A synthesis and interpretation of the data will be presented in a final report and journal articles.

We would appreciate any information concerning additional observations or corrections to the report. The information can be listed on the simple form provided on the last page of this report and should be sent to Ronald P. Kopenski, NOAA-OMPA, 7600 Sand Point Way N.E., Seattle, WA 98115.

Figure 1.1. Inland marine waters of northwestern Washington and Canada.

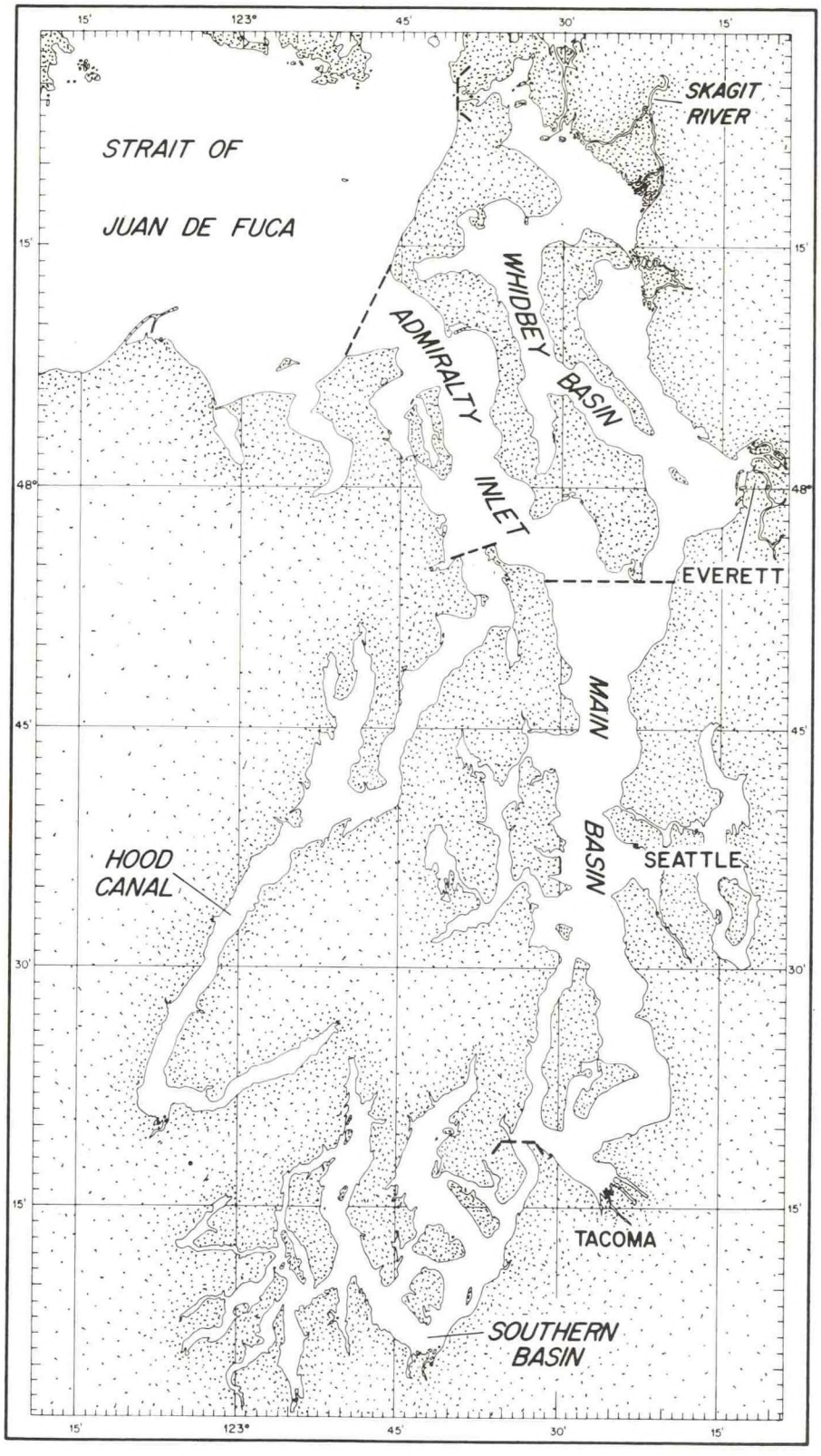

Figure 1.2. The five major subregions of Puget Sound. Dashed lines denote boundaries between subregions.

2. EQUIPMENT

Fourteen types of equipment were used to measure currents in Puget Sound. They consisted of two types of drifting apparatus, six types of current meters suspended over-the-side from anchored platforms, and six types of current meters suspended from moored buoys. Brief descriptions are provided below.

2.1 DRIFTING APPARATUS

The two types of drifting apparatus have been used to make observations at single locations.

2.1.1 Drift Poles

Prior to the introduction of current meters, observations were often made using drift poles. These are wooden poles, approximately 0.08 m in diameter and 4.5 m in length, weighted so as to float upright with approximately 0.3 m protruding above the water level (U.S. Coast and Geodetic Survey-USCGS, 1950a). The current speed is obtained using a line (referred to as a log line) attached to the drift pole and graduated such that the length of line carried away from an anchored vessel in one minute equals the speed expressed in knots. Current direction is determined from the angle of the log line with respect to the vessel's compass.

2.1.2 Floats

In areas where currents precluded anchoring a ship, floats were used in place of drift poles. Floats consist of two horizontal, perpendicular wooden poles approximately 0.05 m in diameter and 0.5 - 1.0 m in length. Often a vertical pole is attached to increase visibility (USCGS, 1950a). Current speed is determined by timing the passage of a float between two ranges set onshore a known distance apart as shown in Figure 2.1. Current direction is noted as in or out channel, or if the channel is sufficiently straight the direction can be given in degrees.

2.2 CURRENT METERS SUSPENDED OVER-THE-SIDE

Described are current meters that are generally suspended from a surface platform or ship. These meters are commonly lowered on electrical or hydrographic cables.

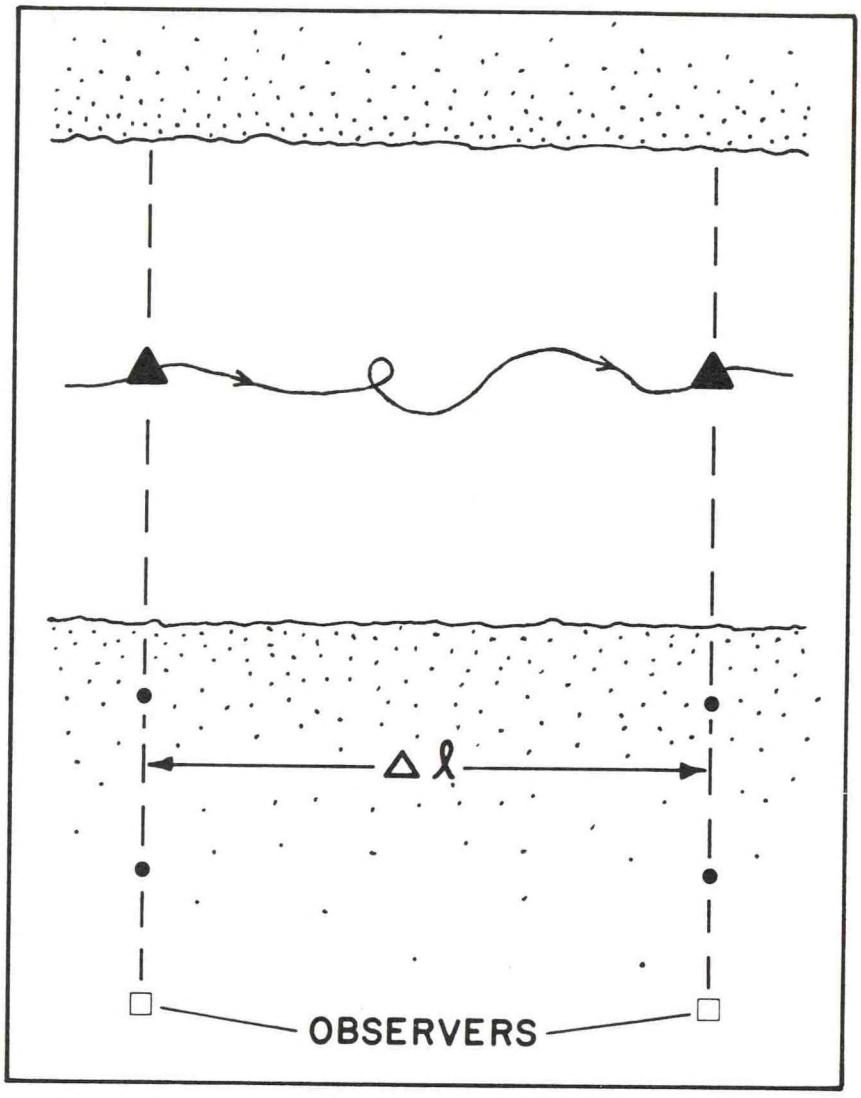

Figure 2.1. Current speed determined by timing the passage of a float (triangle) between two parallel ranges (dashed lines) set a known distance apart ($\Delta\ell$) along a channel. Each range is established by two markers (dots) set onshore perpendicular to the channel along which observers note the passage of the float.

2.2.1 Price Current Meter

The first observations made at depth were taken with Price current meters originally designed by W.G. Price, an engineer with the U.S. Army Corps of Engineers. This meter senses current speed but not direction and is normally suspended from an anchored vessel using a cable held vertically by a heavy weight (USCGS, 1950a; Fig. 2.2). Speed is measured using a set of rotating cups attached to a vane which orients the cups upstream into the current. The cups are rotated by the current similar to the way cups of an anemometer are driven by the wind. The rotation of the cups creates electrical pulses which are carried aboard ship by cables. The pulses are recorded by an observer using earphones or by an automatic device described by Liddy (1932). The speed of the current is calculated by comparing with calibration tables the number of electrical pulses generated during a selected interval.

2.2.2 Ekman Current Meter

The first mechanical current meter was developed by V.W. Ekman (1932), a Swedish scientist. The meter measures both speed and direction but has the disadvantage that it has to be brought to the surface in order to record the measurements. Speed is determined from the number of revolutions a propeller completes during a given interval of time; this number is registered by dials mounted on the instrument. Direction is sensed as the orientation of a vane with respect to an internal compass. For every one hundred revolutions of the propeller a lead shot is released and oriented by the compass towards magnetic north. The shot drops into one of thirty-six compartments, each representing ten degrees of direction, which are oriented by the vane. As the meter is generally suspended on a hydrographic wire, it is designed to use messengers to control the time interval of its measurements. The meter does not work accurately in currents greater than 1 m s^{-1}.

2.2.3 Gemware Current Meter

The Gemware current meter (see Kahl Scientific Instrument Corp., undated) is similar to the Ekman current meter with the advantage that several can be used concurrently on a single hydrographic wire.

2.2.4 Hydro Products Current Meter

Model 451 current meters manufactured by Hydro Products, Inc. was one of the first meters used in the Sound to sense speed with a Savonius rotor (Sternberg and Collias, 1973). The rotor revolutions are counted by magnetically activating reed switch closures. Direction is sensed by a small vane ($\sim$0.1 x 0.1 m) coupled to a potentiometer which is compared to an internal magnetic compass. The measurements are telemetered via cable to voltage meters aboard ship and recorded either manually or automatically on a strip-chart recorder.

2.2.5 Magnesyn Current Meter

Two types of Magnesyn current meters have been developed at the University of Washington Department of Oceanography. The first version

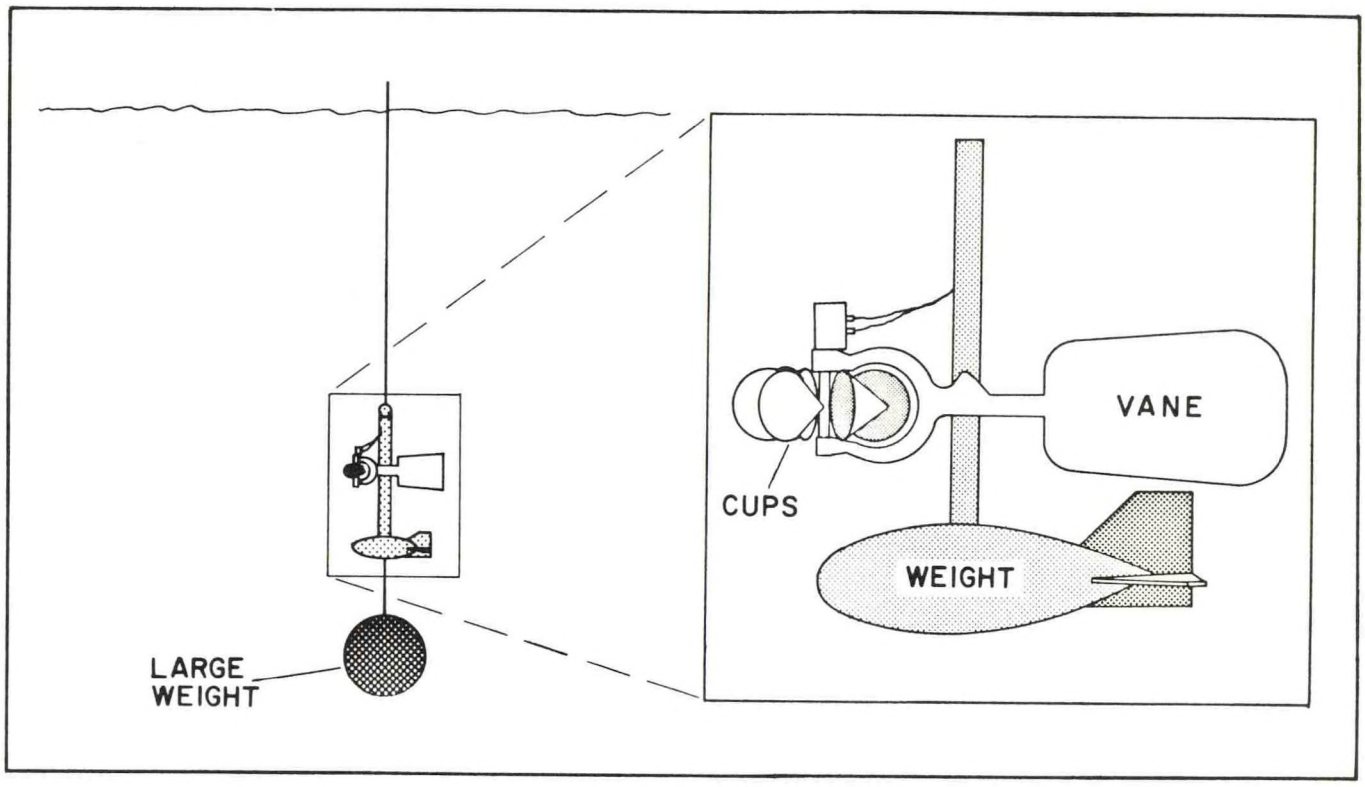

Figure 2.2. Deployment of a Price current meter. Inset shows profile view of meter.

was an experimental model designed by R.G. Paquette in the early 1950's and was used in the Sound prior to 1955. The meter uses an internal Magnesyn compass to sense direction, but little else is known about the meter at this time.

The second type of Magnesyn current meter was developed in 1967 by P.L. Taylor (1968). The meter uses a Hydro Products Savonius rotor to sense speed. Direction is sensed with an internal Magnesyn compass coupled to a potentiometer. The meter is suspended singly and connected to a deck readout with an electrical cable. When suspended, the meter is designed to remain vertical.

2.2.6 Marine Advisers Current Meter

A meter developed by Marine Advisers, Inc. measures speed only using a Savonius rotor. The meter is capable of measuring currents between $2\frac{1}{2}$ - 300 cm s^{-1} with an accuracy of approximately ± 2% (Creeden, 1968). The meters are normally suspended from a stationary platform on hydrographic wires; the measurements are telemetered via cable to automatic recorders.

2.3 CURRENT METERS SUSPENDED FROM MOORED BUOYS

Following is a description of current meters that have generally been suspended on moorings attached to either surface or subsurface buoys. The advantage of the surface buoy is that measurements can be taken very near the surface (i.e., 0-3 m depth), but its disadvantage is that wave 'noise' may contaminate the current measurements. While wave noise is greatly reduced using subsurface buoys, near surface currents cannot be measured.

2.3.1 Roberts Radio Current Meter

The first observations made from moored buoys were taken using Roberts Radio current meters originally developed in 1942 by E.B. Roberts of the USCGS (see Roberts, 1947; and USCGS, 1950a). At the time, the main advantage of these meters was that a single operator could measure currents at several locations simultaneously because the measurements are transmitted to the observer. The original type of meter is normally suspended below a single surface buoy at approximately 5 m depth (Fig. 2.3). A later model was developed (see USCGS, 1950b, 1961) which can be deployed concurrently at three depths (Fig. 2.4). Both models can measure currents as low as 15 cm s^{-1}. Speed is sensed as the time interval between two electrical pulses generated by the rotation of a propeller during a sampling interval. Direction is determined by two sets of electrical contacts whose positions are controlled by a vane. The electrical signals were transmitted via the surface buoy to a nearby recording instrument where they were manually converted into speed and direction.

2.3.2 Braincon Current Meter

The Type 381 histogram current meter manufactured by Braincon, Inc.

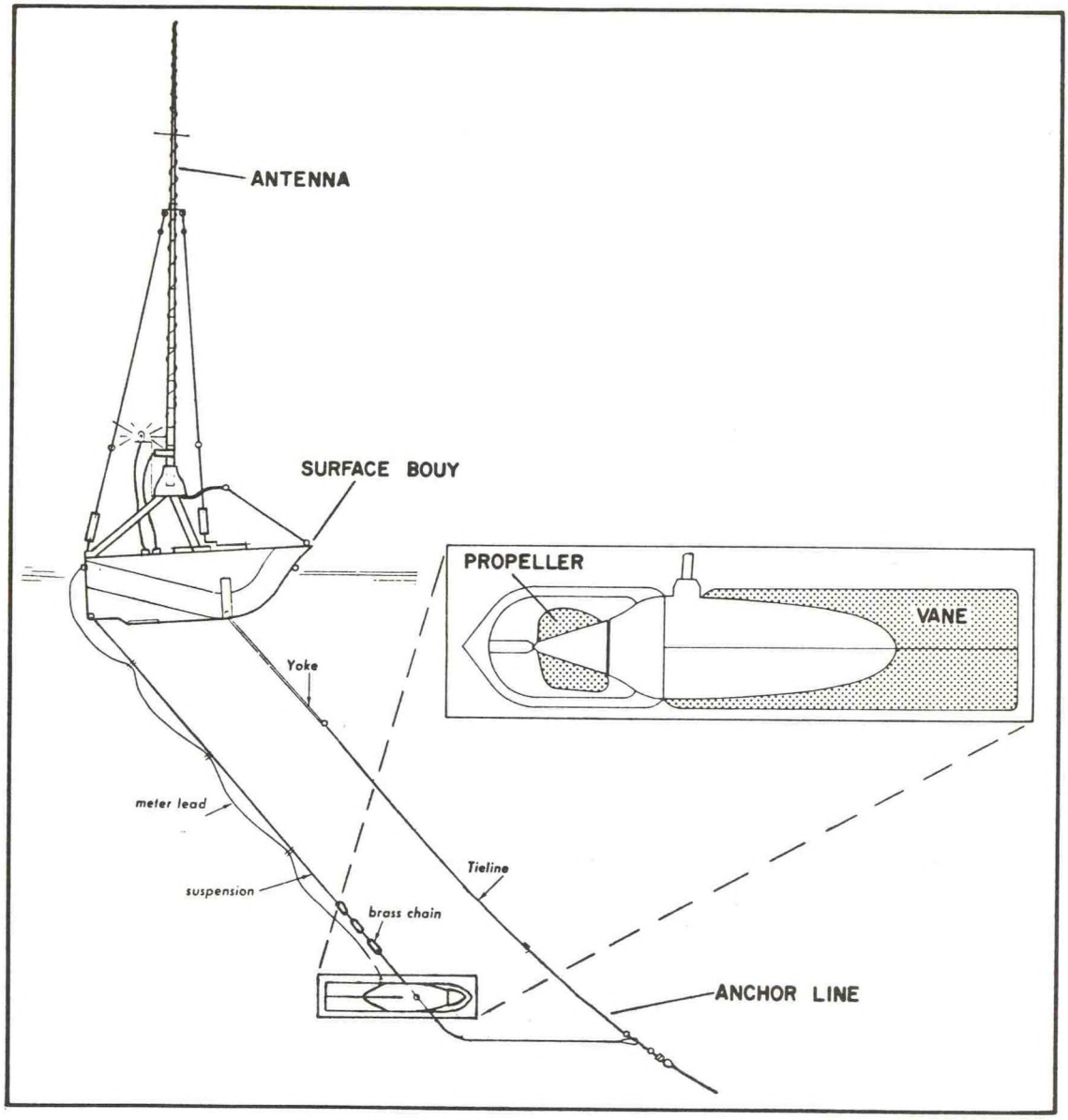

Figure 2.3. Deployment of the original version of the Roberts Radio current meter (adapted from USCGS, 1950a). Only one meter could be moored below each surface buoy. Inset shows profile view of meter.

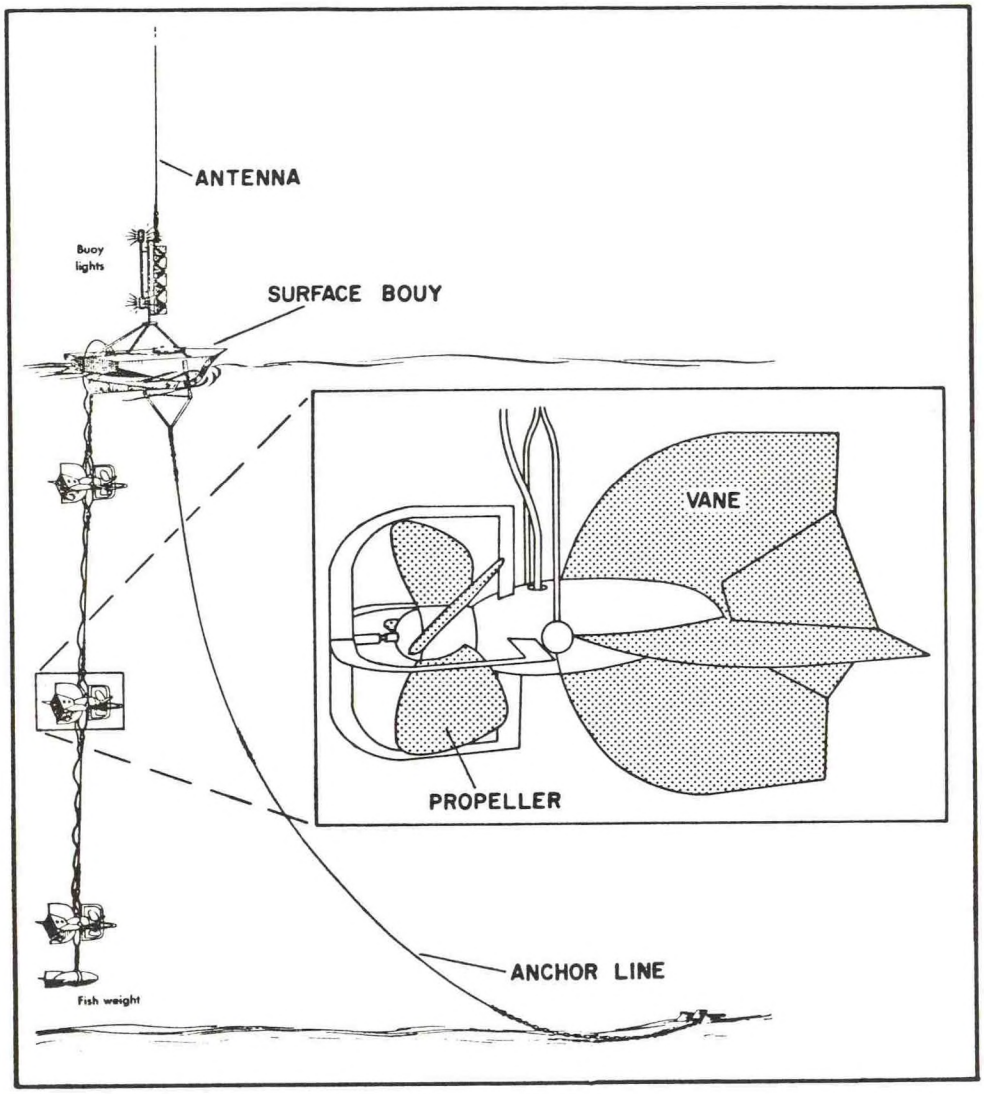

Figure 2.4. Deployment of Roberts Radio current meters modified to measure currents simultaneously at three depths below a single surface buoy (adapted from USCGS, 1961). Inset shows side view of the modified version of the meter.

senses speed, direction, and meter tilt, and records the data internally on 16 mm photographic film (National Oceanographic Instrumentation Center, 1970). The meter can be left unattended on an anchored mooring for periods up to fifty days. Speed within the range of 3 - 250 cm s^{-1} is sensed using a Savonius rotor and recorded on film as an arc whose length is proportional to the number of revolutions made by the rotor during the sampling period. Direction is sensed with a magnetic compass and a large vane and is recorded as the angle between two reference points on the film. Tilt is determined from the orientation of the current meter housing with respect to the plane of the compass card. The sampling interval is adjustable, but commonly 9.5 minutes of film are exposed every half hour.

2.3.3 General Oceanics Current Meter

The Model 2011 current meter manufactured by General Oceanics, Inc. uses the principle of drag on a buoyant object to measure currents. The meter is attached at its base to a mooring and the current deflects the meter from the vertical in the downstream direction. Speed is determined from the tilt angle. The angle and direction of the tilt with respect to a magnetic compass are photographically recorded on Super 8 film at selected intervals. A total of 3500 photographs can be obtained during a deployment. The meter can measure speeds from 2 - 200 cm s^{-1} with an error of $\pm$ 4%; however due to its slow response rate, the meter can only be considered accurate within the error in steady currents.

2.3.4 Geodyne Current Meter

The Model A850-2 current meter manufactured by Geodyne, Inc. measures speed and direction and records these data internally on magnetic tape (National Oceanographic Instrumentation Center, 1971). Speed is sensed using a Savonius rotor and direction is sensed with a large vane and a magnetic compass. The meter is capable of sampling continuously for approximately 8.5 days or at timed intervals for up to 156 days.

2.3.5 Aanderaa Current Meter

The Model RCM-4 current meter manufactured by Aanderaa Instruments measures speed and direction and internally records this information on magnetic tape (National Oceanographic Instrumentation Center, 1974a). The meter is normally attached by gimbals to a mooring held taut with a subsurface buoy. The gimbals allow the current meter to remain vertical when the mooring is tilted up to 23^{o} from vertical by drag from the current. Both the meter and mooring (Fig. 2.5) have been described by Parker and Walker (1978) and Parker and Bruce (1980). Speed is determined by counting the number of revolutions of a Savonius rotor during a selected sampling interval after which an instantaneous reading of the current direction, sensed as the orientation of an internal compass to the meter body and large vane, is sampled. The sampling interval is adjustable, but normally six samples of speed and direction are taken per hour. At this sampling interval the meter can record for up to two months. The meter can be equipped with additional sensors to measure temperature, pressure, and conductivity which are then internally recorded simultaneously with speed and direction.

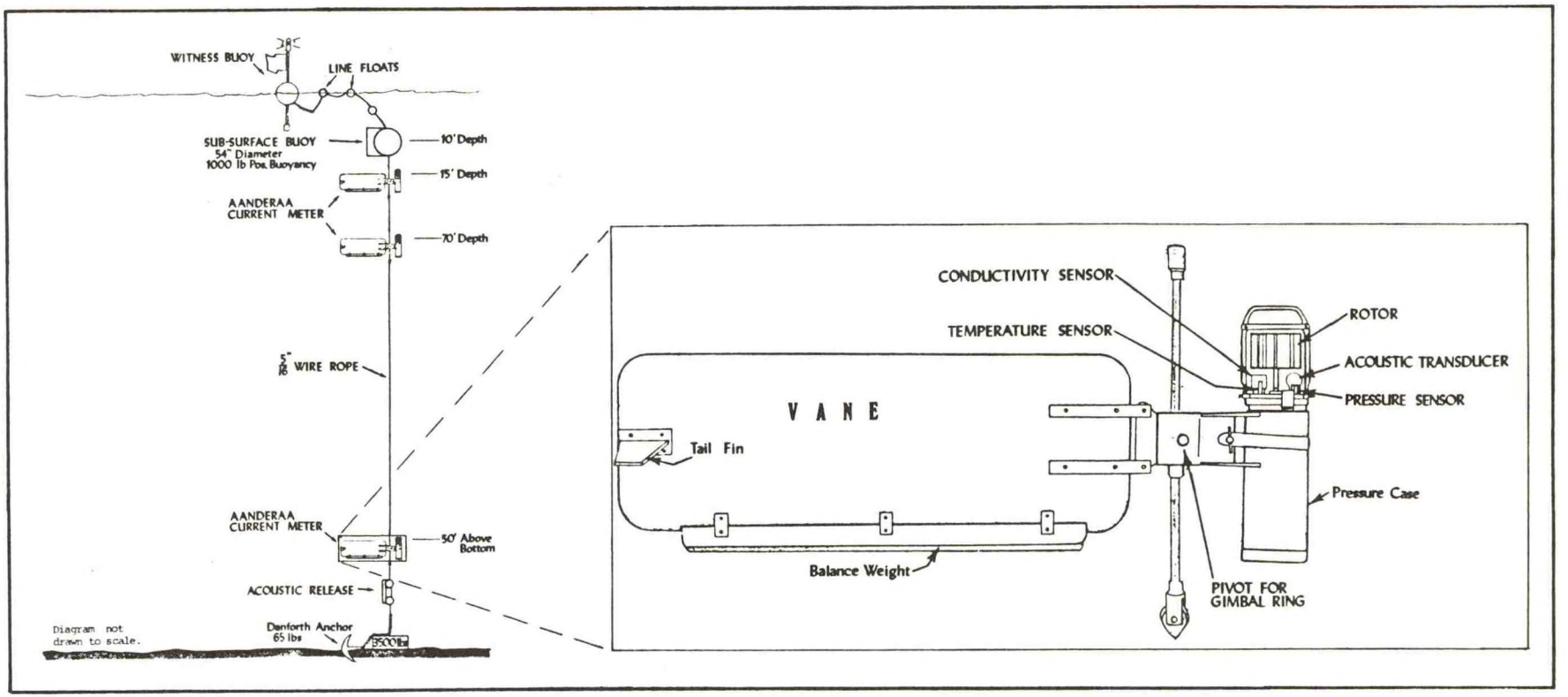

Figure 2.5. Configuration of a National Ocean Survey taut wire mooring using Aanderaa current meters (adapted from Figures 14 and 15 by Parker and Bruce, 1980). Inset shows profile view of Aanderaa Model RCM-4 current meter.

2.3.6 AMF Vector Averaging Current Meter

The vector averaging current meter developed by the Woods Hole Oceanographic Institution is manufactured by AMF, Inc. (National Oceanographic Instrumentation Center, 1974b). Speed is sensed using a Savonius rotor and direction is sensed using a vane and magnetic compass; both are recorded internally on magnetic tape. The meters are commonly attached to moorings using a surface float. Eight samples of speed and direction are taken during each revolution of the rotor, yielding approximately 11 samples per second at a speed of 51 cm s^{-1}. The meter has a range of approximately 3 - 300 cm s^{-1} and an accuracy of near 2 cm s^{-1} (Halpern, 1980) when used near surface in the open ocean. It can operate for approximately six months in areas where current speeds average 154 cm s^{-1}. Its major advantage is that because of its high sampling rate, contamination of the current spectrum by surface wave noise is reduced compared to Aanderaa current meter records taken near the surface (Halpern and Pillsbury, 1976; and Saunders, 1976). The AMF meter is therefore useful on surface moorings.

3. MAJOR CONTRIBUTORS OF MEASUREMENTS

The majority of the observations have been taken by three organizations: 1) the National Ocean Survey (NOS, formerly USCGS); 2) the University of Washington (UW); and 3) the Pacific Marine Environmental Laboratory (PMEL). Following is a chronological summary of the observations taken by each. Additional observations have been taken by some private companies. The total amount of data recorded by these companies however is small in comparison to that taken by the NOS, UW, and PMEL; therefore, it has not been detailed here but is included in the Appendices. The charts in Appendix A show locations, and the tables in Appendix B list the locations, investigators, times, and type of equipment for all observations. Sources of the observations are listed in Appendix C.

3.1 NATIONAL OCEAN SURVEY

The National Ocean Survey has periodically observed currents in Puget Sound since 1908 for the purpose of annually predicting currents in the Tidal Current Tables (e.g., NOS, 1980). Generally measurements were taken at a few primary sites for thirty days or longer and at secondary sites for three to five days. During the most recent measurements (1976-1978) the observational period at secondary sites was extended to fifteen days.

The first observations were taken during 1908-1909 and 1917 at eighteen and eleven sites, respectively. The current was measured every half hour and observations lasted from one to seven days except at sites 87, 138, and 159 (Appendices A.2 and A.3) where currents were observed for 43, 25, and 27 days, respectively.

From 1925 to 1940 the NOS made observations only at secondary sites. In 1925 measurements were made at depth at nine sites using Price current meters in addition to surface observations made using drift poles. The sites were occupied for one to three days with observations made at half-hour intervals. In 1936 and 1940 drift poles were used to measure currents at four and six sites, respectively.

From 1942 to 1947 three types of equipment were used: drift poles and Price and Roberts Radio current meters. The Roberts Radio current meter usually was moored so as to record at 5 m depth. Price current meters and drift poles were used to measure currents at greater and shallower depths, respectively. During this period a total of 741 days of records were obtained at various sites and depths. The majority of these records were obtained with Roberts Radio current meters and are less than five days in length but five records are longer than fifteen days (site Nos. 85,87,234,255).

By 1952 the Roberts Radio current meter system had been adapted to measure currents at three depths per site. The depths sampled were typically 2-3 m, mid-depth, and near bottom. This system was used almost exclusively from 1952-1965. During 1952 currents were measured for five days at 53 sites and for 30 days at one site (No. 240; Appendix A.5). During 1960-1961 six sites were occupied and during 1963-1965 22 sites were each sampled for five days. From 1952-1965 a total of approximately a thousand days of record was obtained.

Finally, during 1976-1978, 63 sites were sampled using Aanderaa current meters. Each measurement lasted a minimum of 15 days with several being 30 days or longer. Currents were typically measured at 5 and 23 m depth and 16 m above the bottom. A total record of approximately 13.4 years in length was obtained.

All totaled, the NOS has obtained approximately 18.7 years of data or 38.4% of all the data listed herein.

3.2 UNIVERSITY OF WASHINGTON

The University of Washington began taking current measurements of Puget Sound in 1932. Until 1948 these measurements were primarily exploratory and lasted less than a day. The data do not appear to have been published. In 1948 the UW began taking longer measurements and continues to do so today.

From 1948-1955 the UW occupied twenty-one sites for a period of one day or longer (see Collias, 1971). Nine sites were located in Admiralty Inlet, three each in the Main Basin and Hood Canal, and six in the Southern Basin. All of the measurements span less than 4½ days and averaged approximately 1.7 days in length. The measurements were taken with a variety of equipment including Price, Ekman, Gemware, Hydro Products, Magnesyn, and Roberts Radio current meters.

During the 1960's currents were measured exclusively in Hood Canal. Approximately two days of data were obtained in the early 1960's using Price and Ekman current meters. In 1966 a total of ten Marine Adviser current meters were suspended from the Hood Canal Floating Bridge at three sites (Nos. 212, 213, 214; Appendix A.4). Twenty-one days of data were collected by each meter.

In 1970-1971 currents were measured in the northern half of Whidbey Basin. Twelve sites were occupied at three or less depths for 2-21 days. A few sites were reoccupied. A total of 47 days of measurements was obtained.

In 1972 one site (No. 271; Appendix A.5) in the Southern Basin was sampled twice using Hydro Products current meters at four depths. Seven additional depths were measured with a Magnesyn current meter. Currents near the bottom were measured by an unknown type of current meter mounted on a tripod which rested on the bottom. A total of 64 days of measurements was collected.

During 1976-1980 currents were measured in the Main Basin using Aanderaa current meters. In 1976 currents were measured at two depths for nearly 14 days. In 1977 four depths were sampled for 28 days. In 1979 forty days of measurements were taken at two depths. In 1980 twenty-seven days were taken at the same site at four depths.

All totaled, the University has obtained 2.6 years of record or 5.3% of all data listed herein.

3.3 PACIFIC MARINE ENVIRONMENTAL LABORATORY

The Pacific Marine Environmental Laboratory came into existence in the early 1970's. Their measurements have been taken primarily in an effort to describe the estuarine circulation of Puget Sound. Often surface or subsurface moorings were deployed for a month or longer; up to eight current meters were attached to a mooring.

In 1970-1971 currents were measured at eight sites in Whidbey Basin. Thirty Braincon current meters were deployed for 15-35 days. Approximately 748 days of observations were collected.

During 1972-1976 measurements were taken exclusively in the central Main Basin. In 1972 measurements were taken at one site (No. 129; Appendix A.3) at five depths lasting a month using three Braincon and two Aanderaa current meters. This site was reoccupied in 1973 using twelve current meters (Aanderaa, Geodyne, and AMF vector averaging meters) deployed on a surface and a subsurface mooring. Most of the records span about a month. This site was again reoccupied in 1975-1976 with an additional five moorings placed nearby. Currents at the reoccupied site were measured for approximately thirteen months, while those at the other sites were measured for approximately seventy days. Currents were measured at two to seven depths on each mooring using Aanderaa current meters. A total of approximately 9.6 years of measurements was taken during 1972-1976.

During 1977-1978 observations were made in Admiralty Inlet (six sites) and the Main (five sites) and Southern (two sites) Basins using Aanderaa current meters. The records spanned 32-61 days; a total of 6.5 years of records was obtained.

During 1979-1980 measurements were made concurrently in Hood Canal, Admiralty Inlet, and the Main Basin. From two to eight Aanderaa current meters were placed on subsurface moorings. The records span 30-60 days and a total of 8.4 years of measurements was obtained.

All totaled, PMEL has obtained approximately 27.4 years of data or 56.2% of the measurements listed herein.

4. DATA SUMMARY

From 1908-1980 currents have been observed for one day or longer (with some exceptions) at 289 locations throughout Puget Sound, Washington. A total of approximately 48.8 years of data has been collected. We have subdivided these data in three ways: by basin, by equipment, and by the organization that obtained the data.

Table 4.1 shows the amount of data taken in five subregions of Puget Sound using each type of equipment. With all types of equipment the largest portion of the data (49%) was taken in the Main Basin. Approximately 10% of the data was taken in each: Hood Canal, and Whidbey and Southern Basins. Twice that amount was taken in Admiralty Inlet. Currents were observed at more sites (90) in the Main Basin than in any other subregion. The number of sites occupied within the other subregions were: Admiralty Inlet, 79 sites; Southern Basin, 57 sites; Whidbey Basin, 33 sites; and Hood Canal, 30 sites.

Aanderaa current meters were used to collect 80% of all the recorded data listed herein, suggesting that a majority of these data are of a high quality. Of the remainder of the data 9% was taken with Roberts Radio current meters, 6% with Braincon current meters, and 5% with all other types of equipment. Within each subregion of Puget Sound, the percentage of data taken with each type of equipment is similar to that listed above with the exception of Whidbey Basin where Braincon current meters were used to take 48% of the data and only 38% was collected with Aanderaa current meters.

Approximately 56% of all data was collected by PMEL at 40 sites, 39% by the NOS at 230 sites, and 5% by the UW at 31 sites. Less than 0.1% of the data was taken by private companies. Please note that some sites were occupied by more than one organization.

Following are maps (Appendix A) showing the locations and tables (Appendix B) listing information for individual observations. Appendix C lists the sources of this data.

TABLE 4.1. QUANTITY OF DATA OBTAINED USING VARIOUS EQUIPMENT

	Basin total	Drift Pole	Floats	Price C.M.	Ekman C.M.	Gemware C.M.	Hydro Products C.M.	Magnesyn C.M.	Marine Advisor C.M.	Roberts Radio C.M.	Braincon C.M.	General Oceanics C.M.	Geodyne C.M.	Aanderaa C.M.	Vector Averaging C.M.	Unknown
Whidbey Basin																
days	1933	21	7	42						188	932			743		
%	11	1.1	0.4	2.2						9.7	48.2			38.4		
Admiralty Inlet																
days	3477	21		38	39	34		6		421	15	14		2870		19
%	20	0.6		1.1	1.1	1.0		0.2		12.1	0.4	0.4		82.6		0.5
Main Basin																
days	8791	109		35	13	3				410	62		79	7932	37	111
%	49	1.2		0.4	0.15	-				4.7	0.7		0.9	90.2	0.4	1.3
Hood Canal																
days	1768	3		12	16	13			210	139				1375		
%	10	0.2		0.7	0.9	0.7			11.9	7.8				77.8		
Southern Basin																
days	1855	22		34	2		8	8		473	2			1302		4
%	10	1.2		1.8	0.1		0.4	0.4		25.5	0.1			70.2		0.2
All Puget Sound																
days	17,824	176	7	161	70	50	8	14	210	1631	1011	14	79	14,222	37	134
%	100	1.0	0.04	0.9	0.4	0.3	0.04	0.1	1.2	9.1	5.7	0.1	0.4	79.8	0.2	0.7

ACKNOWLEDGEMENTS

The authors would like to express their appreciation to many individuals who generously supplied information concerning current measurements. We thank members of the National Ocean Survey circulatory survey team in Rockville, Maryland who provided that agency's data, Eugene E. Collias and Lawrence H. Larsen who provided measurements taken by the University of Washington Department of Oceanography, and Michael W. Grigsby, Richard L. Sillcox, and Sharon L. Wright who helped make available portions of the measurements taken by the Pacific Marine Environmental Laboratory.

We are also grateful to Robert C. Hamilton and Phillip L. Taylor for valuable discussions concerning equipment and field techniques; Ronald P. Kopenski and Debra L. Payton for reviewing the writing; and to Terry L. Storms for graphics.

This work was conducted for the NOAA/MESA Puget Sound Project under Contract No. NA80RAC00074 to Evans-Hamilton, Inc.

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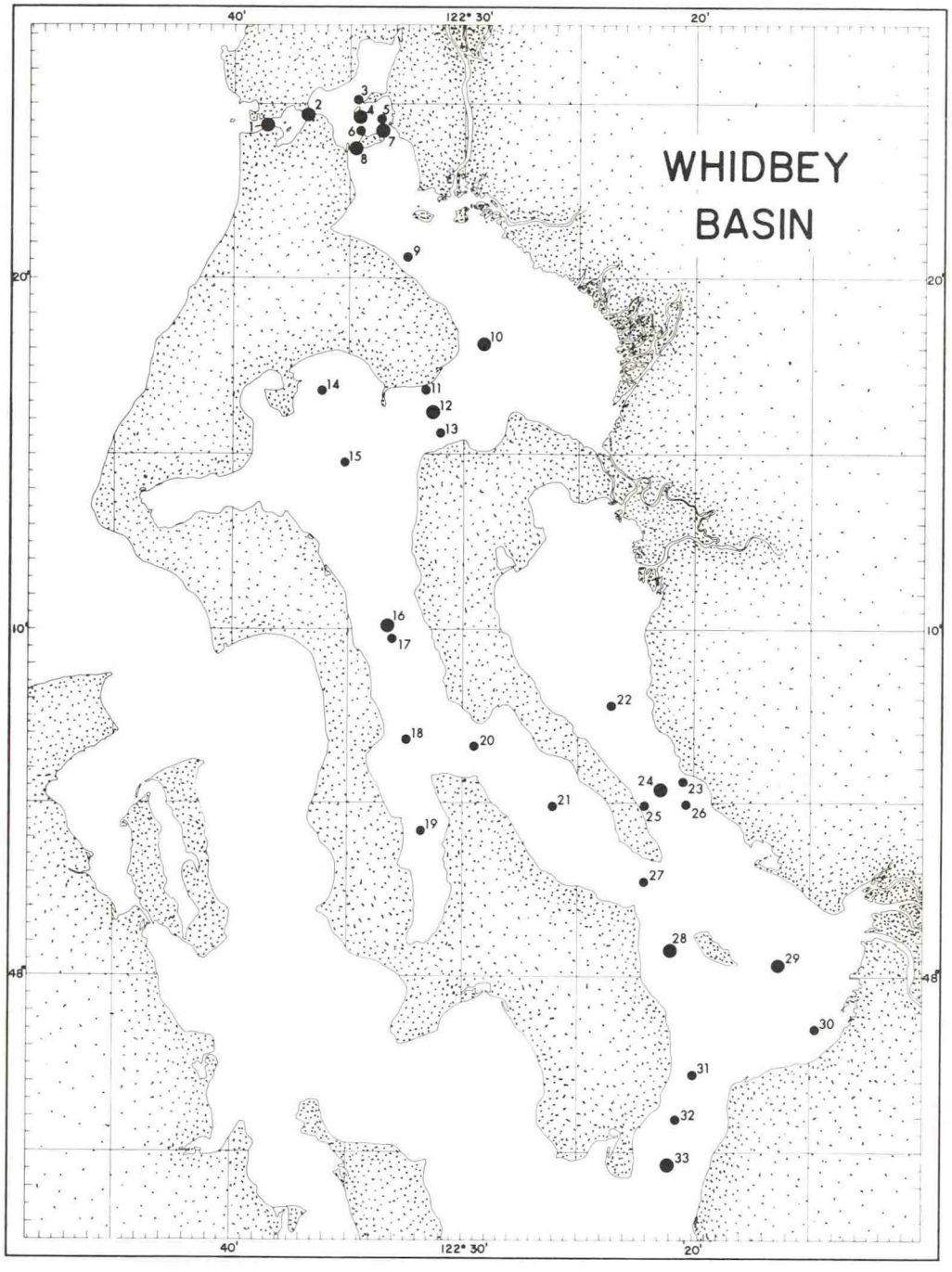
APPENDIX A

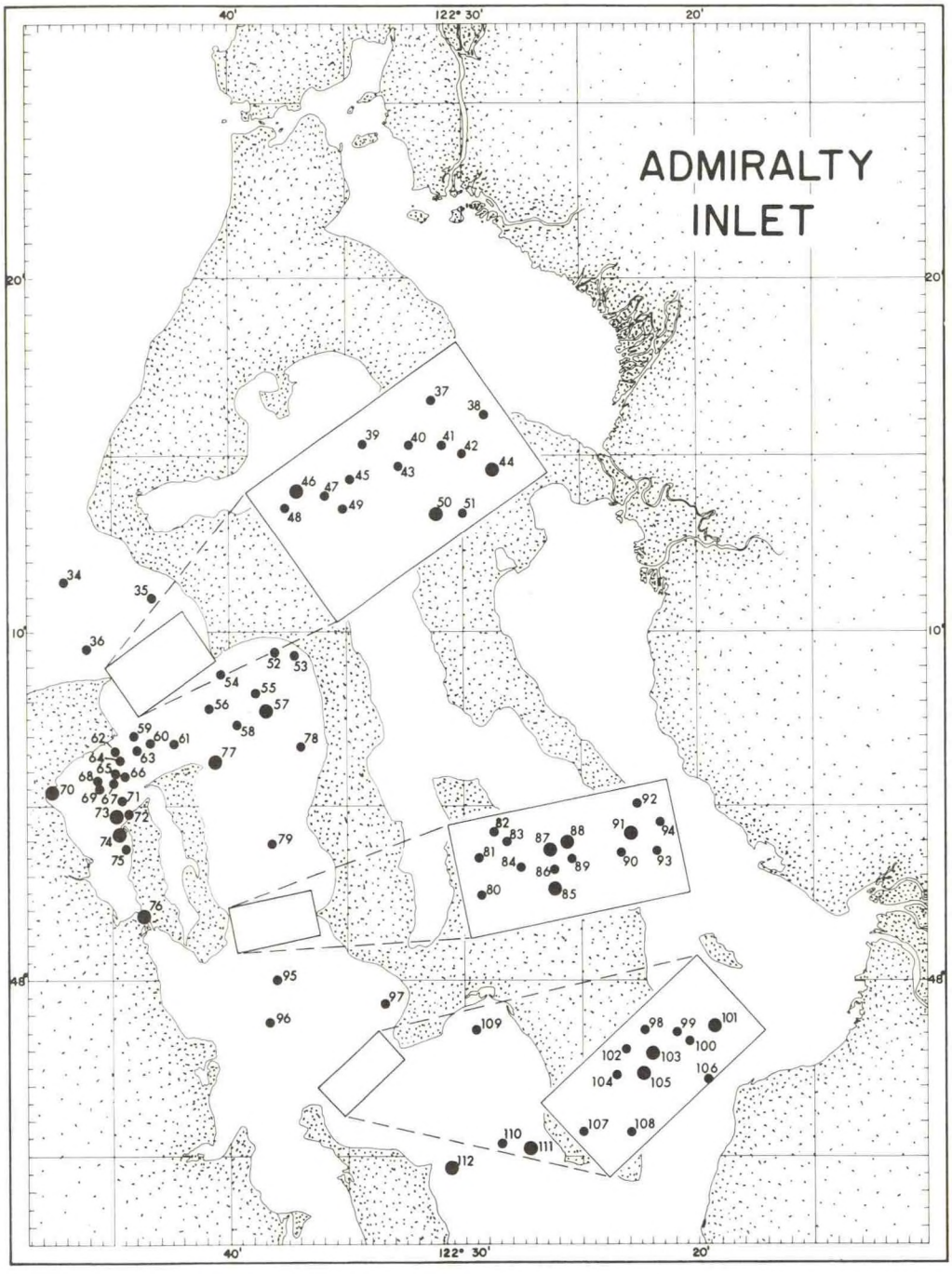
LOCATIONS OF CURRENT OBSERVATIONS

IN PUGET SOUND, WASHINGTON

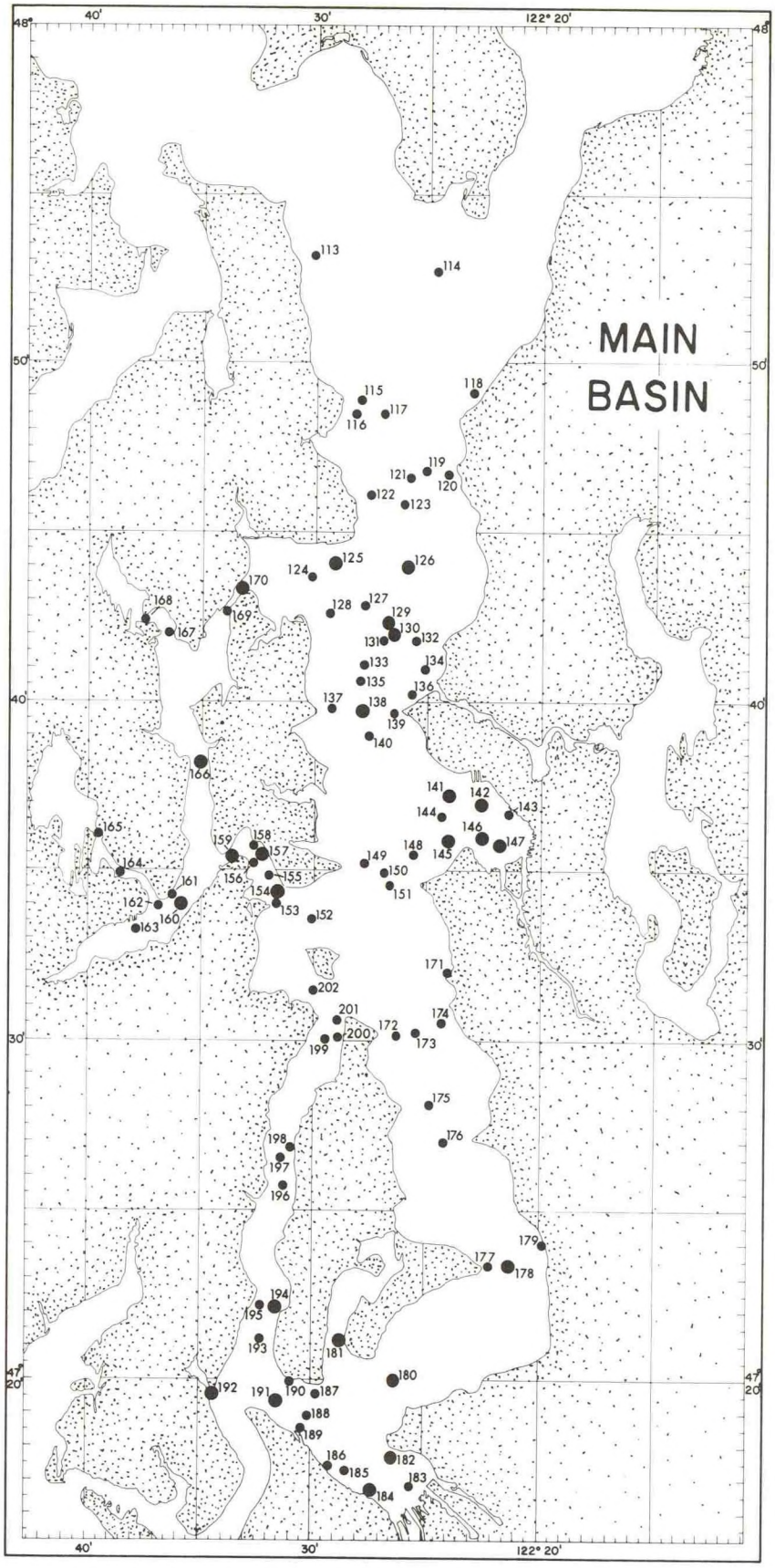
The observations of currents in Puget Sound have been divided into five subregions: Whidbey Basin, Appendix A.1; Admiralty Inlet, Appendix A.2; Main Basin, Appendix A.3; Hood Canal, Appendix A.4; and the Southern Basin, Appendix A.5. A total of 289 individual sites is indicated where small and large dots denote whether a site was visited one or more times, respectively. Within each of Appendices A.1 - A.5 the sites are numbered from north to south, except in complex configurations (e.g., Appendix A.5 in the Southern Basin).



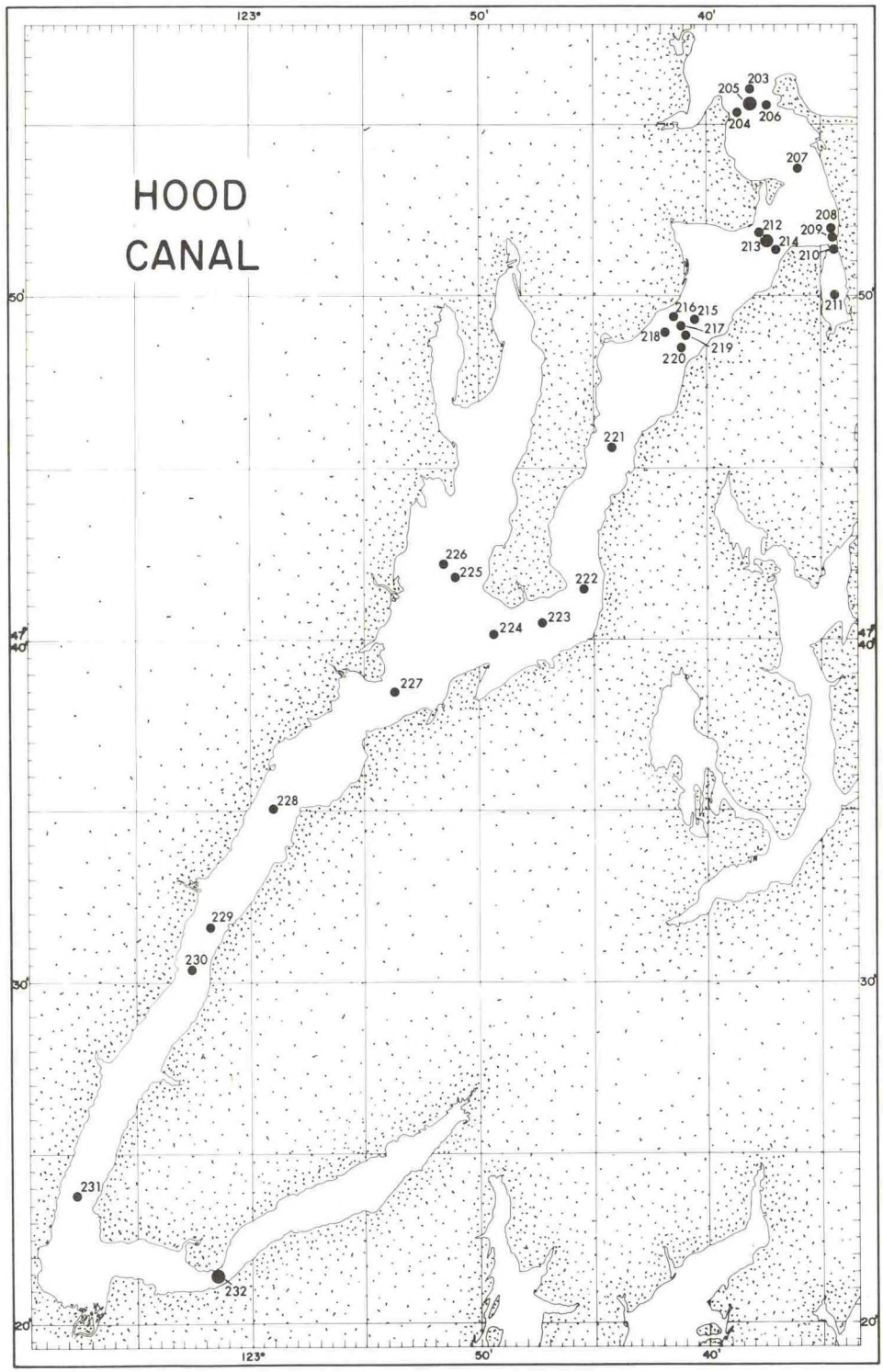
Appendix A.1. Sites of current observations in Whidbey Basin.



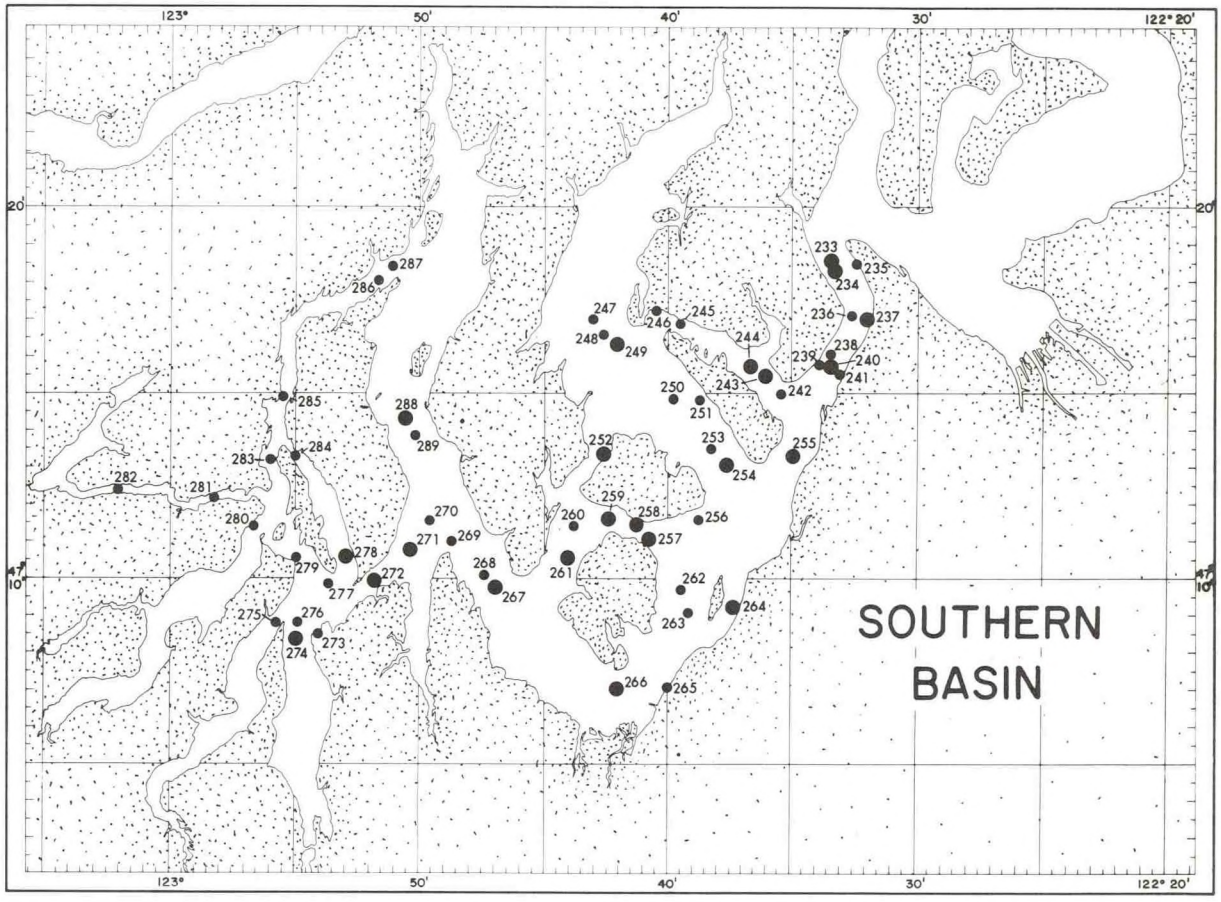
Appendix A.2. Sites of current observations in Admiralty Inlet. Three heavily observed areas have been expanded for clarity.



Appendix A.3. Sites of current observations in the Main Basin.



Appendix A.4. Sites of current observations in Hood Canal.



Appendix A.5. Sites of current observations in Southern Basin.

APPENDIX B

INDEX OF CURRENT OBSERVATIONS

IN PUGET SOUND, WASHINGTON

Appendices B.1 - B.5 give the following information for observations at each site: site numbers as shown in Appendices A.1 - A.5; date based on Pacific Standard Time (PST); approximate duration; the principal investigator and the station number that he originally assigned to the site; latitude and longitude; depth; method of measurement; other parameters measured (temperature, conductivity, pressure); and the data source. Each line represents one visit to a site. The abbreviations are listed at the beginning of this report. Data sources are listed in Appendix C.

APPENDIX B.1. OBSERVATIONS OF CURRENTS IN WHIDBEY BASIN.

Site No.	Dates (PST)	~ Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
1	9/13-17/1925	3	Zeskind	20	48° 24.4'	122° 38.4'	Surface	Floats		18
	7/28-8/1/1960	4	Taylor	2	48° 24.4'	122° 38.4'	Surface	Floats		18
	3/23-3/2/1976	8	NOS	75	48° 24.4'	122° 38.6'	?	ACM	T	18
2	9/13-15/1925	2	Zeskind	20a	48° 24.8'	122° 36.8'	2,5,12,18	Pole,PCM		18
	12/8-13/1952	5	Conerly	42	48° 24.6'	122° 36.8'	2,4	RRCM		18
	12/8-13/1952	5	Conerly	43	48° 24.7'	122° 36.8'	2,8,15	RRCM		18
	12/8-13/1952	5	Conerly	44	48° 24.8'	122° 36.8'	2,7,14	RRCM		18
	7/7-30/1970	22.9	Cannon	Y	48° 24.7'	122° 36.7'	5,10,20	BCM		3,17
	3/19-29/1971	10	Collias	YKNo	48° 24.8'	122° 36.8'	5	BCM		8
	3/19-29/1971	10	Collias	YKM	48° 24.7'	122° 36.8'	1	BCM		8
	3/19-29/1971	10	Collias	YKC	48° 24.7'	122° 36.7'	5,10	BCM		8
	3/19-4/9/1971	21	Collias	YKS	48° 24.7'	122° 36.6'	5	BCM		8
3	2/20-3/6/1970	14	Collias	1-4	48° 25.1'	122° 34.7'	3	BCM		8,10
4	2/20-24/1970	4.5	Collias	1-1	48° 24.6'	122° 34.6'	9	BCM		8,10
	3/21-26/1970	5	Collias	2-2	48° 24.7'	122° 34.7'	11,18	BCM		8,10
5	2/20-3/6/1970	14	Collias	1-3	48° 24.6'	122° 33.6'	3,18	BCM		8,10
6	2/20-3/6/1970	14	Collias	1-2	48° 24.2'	122° 34.6'	9	BCM		8,10
7	3/21-26/1970	5	Collias	2-1	48° 24.3'	122° 33.6'	2.5	BCM		8,10
	3/18-28/1971	10	Collias	Tosi Ch.	48° 24.2'	122° 33.4'	3	BCM		8
8	6/7-12/1952	4.5	Conerly	40	48° 23.7'	122° 34.8'	2,4	RRCM		18
	6/6-10/1952	3	Conerly	41	48° 23.7'	122° 34.7'	2,5,11	RRCM		18
	3/21-26/1970	5	Collias	2-3	48° 23.7'	122° 34.7'	3,5	BCM		8,10
	10/31-11/6/1970	6	Collias	HP-E	48° 23.8'	122° 34.7'	5,8	BCM		8
	10/31-11/2/1970	2	Collias	HP-C	48° 23.8'	122° 34.8'	7,10,16	BCM		8
	10/31-11/2/1970	2	Collias	HP-W	48° 23.7'	122° 34.9'	8,10	BCM		8
	3/18-28/1971	10	Collias	HP	48° 23.7'	122° 34.7'	5,19	BCM		8
9	6/26-28/1939	2	Knox	5	48° 20.6'	122° 32.5'	2,5,12,18	Pole,PCM		8

APPENDIX B.1 (continued).

Site No.	Dates (PST)	Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
10	3/18-28/1971	9.5	Cannon	St Pt.	48° 18.2'	122° 29.2'	19	BCM		2
	4/2-4/1971	12	Cannon	St Pt.	48° 18.2'	122° 29.2'	7	BCM		2
	4/2-8/1971	6	Cannon	St Pt.	48° 18.2'	122° 29.2'	24	BCM		2
	4/14-5/5/1971	21	Cannon	St Pt.	48° 18.2'	122° 29.2'	7	BCM		2
	4/14-22/1971	8.1	Cannon	St Pt.	48° 18.2'	122° 29.2'	12	BCM		2
	4/14-28/1971	13.5	Cannon	St Pt.	48° 18.2'	122° 29.2'	24	BCM		2
	7/7-27/1970	20.1	Cannon	St	48° 18.0'	122° 29.2'	5,10,22	BCM		3,17
	11/6-15/1970	8.5	Cannon	St Pt.	48° 18.0'	122° 29.2'	19	BCM		2
	12/11/70-1/16/71	37	Cannon	St Pt.	48° 18.0'	122° 29.2'	5	BCM		2
	1/23-29/1971	16.5	Cannon	St Pt.	48° 18.0'	122° 29.2'	13	BCM		2
	2/16-19/1971	2.5	Cannon	St Pt.	48° 18.0'	122° 29.2'	8	BCM		2
	2/16-3/4/1971	16	Cannon	St Pt.	48° 18.0'	122° 29.2'	16,24	BCM		2
11	12/2-8/1952	5.5	Conerly	39	48° 16.8'	122° 31.7'	2,9,17	RRCM		18
12	6/20-22/1939	2	Knox	6	48° 16.1'	122° 31.7'	2,6,16,25	Pole,PCM		18
	12/1-6/1952	4.5	Conerly	37	48° 16.0'	122° 31.1'	2,9,18	RRCM		18
	12/1-5/1952	4	Conerly	38	48° 16.4'	122° 31.3'	2,10,19	RRCM		18
	7/16-20/1960	4	Taylor	1	48° 16.1'	122° 31.4'	2,6,15,24	Pole,PCM		18
13	12/2-8/1952	4.5	Conerly	36	48° 15.6'	122° 31.0'	2,7,14	RRCM		18
14	10/15-19/1964	4	Keith	90	48° 16.8'	122° 36.2'	4,10,19	RRCM		18
15	10/16-20/1964	3.5	Keith	90a	48° 14.7'	122° 35.2'	5,17,29	RRCM		18
16	7/7-27/1970	20	Cannon	SA	48° 10.0'	122° 33.2'	1,5,10,15,25,35,50,80	BCM		3,17
	2/17-3/22/1977	33	NOS	150	48° 10.2'	122° 33.4'	5,22,69	ACM	T	18
17	2/16-24/1943	8.5	Roberts	2	48° 09.8'	122° 33.1'	5	RRCM		18
18	10/15-19/1964	4	Keith	91	48° 06.8'	122° 32.5'	5,14,23	RRCM		18
19	10/15-16/1964	1	Keith	92	48° 04.2'	122° 31.8'	5,25,41	RRCM		18
20	2/13-26/1943	12	Roberts	3	48° 06.6'	122° 29.5'	5	RRCM		18
21	2/17-3/22/1977	33	NOS	149	48° 04.9'	122° 26.1'	4,21,94	ACM	T	18
22	6/16-7/1/1970	15.7	Cannon	N	48° 07.8'	122° 23.6'	3,10	BCM		3

APPENDIX B.1 (continued).

Site No.	Dates (PST)	~ Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
23	6/16-7/1/1970	15.6	Cannon	E	48° 05.6'	122° 20.5'	3,10	BCM		3
24	2/26-3/4/1943	6	Roberts	4	48° 05.5'	122° 21.5'	5	RRCM		18
	6/16-7/1/1970	15.6	Cannon	M	48° 05.2'	122° 21.3'	1,3,6,10,20, 30,50,75,100	BCM		3
25	6/16-7/1/1970	15.6	Cannon	W	48° 04.9'	122° 22.1'	10	BCM		3
26	3/23-3/10/1977	15	NOS	148	48° 04.9'	122° 20.3'	5,21,106	ACM	T	18
27	2/14-26/1943	10	Roberts	5	48° 02.7'	122° 22.2'	5	RRCM		18
	2/23-27/1960	4	Taylor	2	48° 02.7'	122° 22.1'	2,37,91,146	Pole,PCM		18
28	2/17-3/2/1977	13	NOS	147	48° 00.7'	122° 20.8'	4,20,141	ACM	T	18
	3/2-23/1977	21	NOS	147	48° 00.8'	122° 21.1'	4,21,142	ACM	T	18
	3/29-4/20/1977	22	NOS	147	48° 00.9'	122° 21.0'	6,23,143	ACM	T	18
29	7/27-8/31/1970	35.4	Cannon	PSS1	48° 00.3'	122° 16.3'	100	BCM		3
	9/1-25/1970	24.1	Cannon	PSS2	48° 00.3'	122° 16.3'	100	BCM		3
30	3/16-31/1977	15	NOS	146	47° 58.5'	122° 14.7'	8,24,84	ACM	T	18
31	3/16-4/15/1977	30	NOS	145	47° 57.2'	122° 20.0'	4,21,163	ACM	T	18
32	?	7	Denson	2	47° 55.9'	122° 20.7'	?	?		18
33	3/15-4/14/1977	30	NOS	144	47° 54.6'	122° 20.9'	5,22,173	ACM	T	18
	9/8-10/11/1977	33	NOS	144	47° 54.4'	122° 21.2'	5,22,172	ACM	T	18

APPENDIX B.2. OBSERVATIONS OF CURRENTS IN ADMIRALTY INLET

Site No.	Dates (PST)	~ Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
34	3/16-4/1/1976	16.3	NOS	126	48° 11.4'	122° 47.1'	40,46,213	ACM	T	18
35	3/17-25/1976	8	NOS	127	48° 11.0'	122° 43.3'	21,27	ACM	T	18
36	3/10-14/1965	4	Munson	87	48° 09.5'	122° 46.1'	4,10,19	RRCM		18
37	2/11-16/1946	5	Finnegan	1	48° 10.0'	122° 42.5'	5	RRCM		18
38	7/8-10/1952	2	Conerly	35	48° 09.8'	122° 41.6'	2,9,19	RRCM		18
	7/11-19/1952	8.5	Conerly	35	48° 09.8'	122° 41.6'	2,9,19	RRCM		18
39	2/11-15/1946	4	Finnegan	2	48° 09.5'	122° 43.6'	5	RRCM		18
40	8/15-16/1952	1	Conerly	49	48° 09.5'	122° 42.8'	3,+63,+57,+51 +44,+38,+32, +26,+20,+14, +8,+2,+1,+0.6	RRCM		18
41	7/21-22/1952	1	Conerly	34	48° 09.5'	122° 42.3'	2,23,46	RRCM		18
	8/10-11/1952	-	Conerly	34	48° 09.5'	122° 42.3'	2,23,42	RRCM		18
42	3/10-14/1965	4.5	Munson	89	48° 09.4'	122° 41.9'	5,26,42	RRCM		18
43	7/21-23/1952	2	Conerly	33	48° 09.2'	122° 43.0'	2,18,37	RRCM		18
	8/9-13/1952	4	Conerly	33	48° 09.2'	122° 43.0'	2,18,37	RRCM		18
44	9/20-10/10/1975	20.5	NOS	79	48° 09.2'	122° 41.4'	21	ACM	T	18
	3/16-28/1976	12.2	NOS	79	48° 09.3'	122° 41.4'	5,21	ACM	T	18
45	7/7-11/1952	4	Conerly	32	48° 09.1'	122° 43.8'	2,19,37	RRCM		18
46	?		Derickson	4						18
	2/11-15/1946	4	Finnegan	3	48° 09.0'	122° 44.6'	5	RRCM		18
	3/5-25/1976	20.5	NOS	78	48° 08.9'	122° 44.6'	47.5	ACM	T	18
	3/19-28/1976	8	NOS	78	48° 08.9'	122° 44.6'	4,21,32	ACM	T	18
	3/26-4/23/1976	28.5	NOS	78	48° 09.0'	122° 44.7'	4,21,32	ACM	T	18
	9/1-21/1975	20.5'	NOS	78	48° 08.9'	122° 44.2'	4,21,32	ACM	T	18
47	7/7-20/1952	13	Conerly	31	48° 08.8'	122° 44.8'	2,19,37	RRCM		18
48	3/10-15/1965	5	Munson	88	48° 08.8'	122° 43.9'	5,30,48	RRCM		18
49	3/16-4/1/1976	16.3	NOS	128	48° 08.7'	122° 42.4'	21,33,62	ACM	T	18
50	12/17/1977-3/27/1978	100	Holbrook	JDF43	48° 08.7'	122° 42.4'	28,43	ACM	T,C	12
	12/17/1977-2/18/1978	63	Holbrook	JDF43	48° 08.7'	122° 42.4'	68	ACM	T,C	12
	7/11-10/1/1978	82	Holbrook	JDF53	48° 08.7'	122° 42.3'	45	ACM	T,C	12
	7/11-9/21/1978	72	Holbrook	JDF53	48° 08.7'	122° 42.3'	60	ACM	T,C	12

APPENDIX B.2 (continued).

Site No.	Dates (PST)	~ Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
51	9/14-11/10/1977	57	Cannon	12	48° 08.7'	122° 41.9'	89	ACM	T,C,P	6
52	4/1-21/1976	20.5	NOS	135	48° 09.2'	122° 38.0'	5,21	ACM	T	18
	4/1-21/1976	20.5	NOS	135	48° 09.2'	122° 38.0'	5	ACM	T	18
53	?	1	Derickson	6	48° 09.3'	122° 37.2'	?	Pole		18
54	2/5-12/1947	4.5	Crosby	1	48° 08.8'	122° 40.3'	5	RRCM		18
55	?	2	Derickson	5	48° 08.2'	122° 38.8'	?	Pole		18
56	2/7-4/9/1980	62	Cannon	8A	47° 07.8'	122° 40.8'	30,104,105	ACM	T,C,P	2
57	2/11-20/1946	7.5	Finnegan	5	48° 07.8'	122° 38.4'	5	RRCM		18
	2/18-20/1946	2.5	Finnegan	5a	48° 07.7'	122° 38.4'	5	RRCM		18
58	6/16-18/1908	2	Derickson	1	48° 07.4'	122° 39.7'	?	Pole		18
59	5/29-6/3/1963	4	Keith	10	48° 07.0'	122° 44.1'	5,18,30	RRCM		18
60	?	2	Derickson	3	48° 06.8'	122° 43.4'	?	Pole		18
61	5/30-6/3/1963	4	Keith	11	48° 06.8'	122° 42.4'	2,5,9	RRCM		18
62	2/11-15/1946	4	Finnegan	4	48° 06.6'	122° 44.9'	2,4,10,16	Pole,PCM		18
63	4/1-17/1976	16.3	NOS	134	48° 06.6'	122° 44.0'	5,21	ACM	T	18
64	11/5-6/1940	0.8	Knox	1	48° 06.3'	122° 44.7'	2	Pole		18
65	11/6-7/1940	1.3	Knox	2	48° 06.0'	122° 44.9'	2	Pole		18
66	11/6/1940	0.2	Knox	5	48° 05.9'	122° 44.5'	2	Pole		18
67	11/7/1940	0.3	Knox	5a	48° 05.7'	122° 45.0'	2	Pole		18
68	11/6-7/1940	0.5	Knox	3	48° 05.8'	122° 45.7'	2	Pole		18
69	11/6-7/1940	0.5	Knox	4	48° 05.5'	122° 45.6'	2	Pole		18
70	6/16-19/1976	2.6	Young	-	48° 05.5'	122° 47.7'	0.5	MCM		21
	1/23-24/1969	1	Amberg/ Aspitarte	-	48° 05.3'	122° 47.6'	3,6,9	MCM		1
71	5/7-18/1975	1	URS	B-6	48° 05.1'	122° 44.7'	12	GOCM		22
72	5/16-17/1975	1	URS	B-5	48° 04.8'	122° 44.4'	6	GOCM		22
73	2/21-22/1975	1	URS	A-2	48° 04.9'	122° 44.9'	15	GOCM		22
	2/22-23/1975	1	URS	A-3	48° 04.5'	122° 44.8'	9	GOCM		22
	5/16-17/1975	1	URS	B-4	48° 04.7'	122° 44.8'	21	GOCM		22

APPENDIX B.2 (continued).

Site No.	Dates (PST)	~ Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
74	5/15-16/1975	0.8	URS	B-2	48° 04.2'	122° 44.7'	14	GOCM		22
	5/17-18/1975	1	URS	B-3	48° 04.3'	122° 44.9'	18	GOCM		22
75	5/15-16/1975	0.8	URS	B-1	48° 03.8'	122° 44.5'	14	GOCM		22
76	6/8-12/1963	4	Keith	18	48° 01.9'	122° 43.8'	1.5,3	PCM		18
	2/27-3/3/1943	4	Roberts	7	48° 01.8'	122° 43.7'	2	RRCM		18
77	5/30-6/4/1963	4.5	Keith	12	48° 06.3'	122° 40.8'	5,18,30	RRCM		18
	2/14-16/1946	2.5	Finnegan	6	48° 06.3'	122° 40.6'	5	RRCM		18
	?	2	Derickson	2	48° 06.2'	122° 40.5'	?	Pole		18
	4/1-25/1976	24.2	NOS	129 in	48° 06.2'	122° 40.4'	5,19,22	ACM	T	18
			NOS	129 out					T	18
78	4/1-21/1976	20.5	NOS	130	48° 06.7'	122° 36.9'	5,22,52	ACM	T	18
	4/1-21/1976	20.5	NOS	130	48° 06.7'	122° 36.9'	S,22,58	ACM	T	18
79	6/4-5/1954	1	Collias	45	48° 03.9'	122° 38.2'	S,10,20, 40,70	ECM,GCM,S		7
80	3/30-4/15/1976	16.3	NOS	131	48° 01.3'	122° 39.5'	5,41	ACM	T	18
81	2/16-20/1946	4	Finnegan	8	48° 01.7'	122° 39.5'	5	RRCM		18
82	9/23-30/1975	6	Kinney	D	48° 02.1'	122° 39.3'	37	ACM	T,C,P	13
83	11/30-12/3/1953	3.1	Collias	39	48° 01.9'	122° 39.1'	S,10,20,40	BCM,ECM,GCM,S		7
84	9/14-11/10/1977	57	Cannon	11	48° 01.6'	122° 38.9'	18,52	ACM	T,C,P	6
85	1/27-3/16/1942	37.5	Roberts	1	48° 01.4'	122° 38.3'	5	RRCM		18
	2/14-3/25/1943	36	Roberts	1	48° 01.3'	122° 38.2'	5	RRCM		18
86	3/23-4/25/1976	33	NOS	132	48° 01.6'	122° 38.3'	4,54		T	18
87	?	43	Derickson	Bush Pt.						18
	2/13-3/20/1943	26	Roberts	1a	48° 01.9'	122° 38.3'	5	RRCM		18
	6/7-11/1963	4	Keith	13	48° 01.7'	122° 38.5'	5	RRCM		18
88	11/30-12/3/1953	3.1	Collias	38	48° 01.9'	122° 38.1'	S,10,20, 40,80	BCM,ECM,GCM,S		7
	6/1-5/1954	4.2	Collias	43	48° 01.9'	122° 38.1'	S,10,20,30, 40,70,100, 110	ECM,GCM,S		7

APPENDIX B.2 (continued).

Site No.	Dates (PST)	Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
89	9/14-11/10/1977	57	Cannon	10	48° 01.7'	122° 38.0'	2,16,32,55, 72,103	ACM	T,C,P	6
90	9/14-11/10/1977	57	Cannon	9	48° 01.8'	122° 37.2'	23,107	ACM	T,C,P	6
91	11/30-12/3/1953	3.1	Collias	37	48° 01.9'	122° 36.9'	S,10,20, 40,80	BCM,ECM,GCM,		7
	6/1-4/1954	3.1	Collias	42	48° 01.9'	122° 36.9'	S,10,20,30, 40,70,100	ECM,GCM,		7
	9/23-30/1975	6	Kinney	B	48° 02.0'	122° 37.1'	124	ACM	C,T,P	13
92	2/16-20/1946	4	Finnegan	7	48° 02.3'	122° 36.9'	5	RRCM		18
93	3/17-4/2/1976	16.3	NOS	133	48° 01.8'	122° 36.7'	21,76	ACM	T	18
94	9/23-30/1975	6	Kinney	A	48° 02.1'	122° 36.5'	73	GOCM	C,T,P	13
95	6/4-5/1954	1	Collias	46	48° 00.0'	122° 38.0'	S,10,20,40	ECM,GCM,		7
96	2/6-11/1947		Crosby	2	47° 58.8'	122° 38.3'	5	RRCM		18
97	2/16-20/1946	4	Finnegan	9	47° 59.3'	122° 33.4'	2,5,11,18	Pole,PCM		18
98	2/13-21/1978	8	NOS	139	47° 57.8'	122° 34.7'	5,22,95	ACM	T	18
99	5/2-3/1951	1	Collias	26	47° 57.7'	122° 34.1'	5,50,60	PCM		7
100	11/15-19/1952	4	Conerly	29a	47° 57.6'	122° 33.9'	2,37,74	RRCM		18
101	6/23-27/1952	4	Conerly	30	47° 57.8'	122° 33.4'	2,13,27	RRCM		18
	3/2-18/1977	16	NOS	140	47° 57.8'	122° 33.5'	6,23,87	ACM	T	18
102	6/18-25/1952	5.5	Conerly	28	47° 57.5'	122° 34.9'	2,45,89	RRCM		18
103	6/22-23/1952	1	Conerly	29	47° 57.4'	122° 34.5'	2,45,89	RRCM		18
	2/16-3/18/1977	30	NOS	139	47° 57.5'	122° 34.5'	5,22,94	ACM	T	18
	2/3-13/1978	10	NOS	139	47° 57.5'	122° 34.6'	5,22,95	ACM	T	18
	9/15-10/23/1977	38	Cannon	8	47° 57.5'	122° 34.5'	104	ACM	C,T,P	6
	9/15-11/5/1977	51	Cannon	8	47° 57.5'	122° 34.5'	30	ACM	C,T,P	6
	9/15-11/9/1977	55	Cannon	8	47° 57.5'	122° 34.5'	18,70	ACM	C,T,P	6
104	4/30-5/2/1951	1.6	Collias	25	47° 57.2'	122° 35.1'	5,50	PCM		7
105	1/27-2/1/1942	5	Roberts	8	47° 57.2'	122° 34.6'	5	RRCM		18
	6/17-21/1963	4	Keith	15	47° 57.3'	122° 34.7'	5	RRCM		18

APPENDIX B.2 (continued).

Site No.	Dates (PST)	~ Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
106	8/6-9/11/1979	36	Cannon	7A	47° 57.2'	122° 33.6'	30,97	ACM	T,C,P	2
107	6/18-22/1952	4	Conerly	27	47° 56.6'	122° 35.6'	2,5,11	RRCM		18
108	2/16-3/3/1977	15	NOS	138	47° 56.8'	122° 34.8'	4,21,98	ACM		18
109	2/16-20/1946	4	Finnegan	10	47° 58.6'	122° 29.5'	5	RRCM		18
110	3/24-4/13/1977	20	NOS	142	47° 55.3'	122° 28.5'	7,23,126	ACM	T	18
111	3/15-4/14/1977	30	NOS	143	47° 55.3'	122° 27.3'	4,21,49	ACM	T	18
	9/8-10/11/1977	33	NOS	143	47° 55.1'	122° 27.2'	8,25,53	ACM	T	18
112	3/15-21/1977	6	NOS	141	47° 54.5'	122° 30.4'	6,23,73	ACM	T	18
	3/22-4/16/1977	23	NOS	141	47° 54.8'	122° 30.7'	6,21,73	ACM	T	18

APPENDIX B.3. OBSERVATIONS OF CURRENTS IN THE MAIN BASIN

Site No.	Dates (PST)	~ Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
113	3/12-16/1942	4.5	Roberts	8a	47° 53.2'	122° 30.1'	5	RRCM		18
114	9/8-10/11/1977	33	NOS	151	47° 52.7'	122° 24.7'	6,21	ACM	T	18
115	3/12-16/1942	4.5	Roberts	8b	47° 49.0'	122° 28.1'	5	RRCM		18
116	6/17-21/1963	4	Keith	16	47° 48.5'	122° 26.7'	5	RRCM		18
117	9/9-10/13/1977	38	NOS	152	47° 48.5'	122° 27.0'	7,23,168	ACM	T	18
118	2/5-12/1947	5.5	Crosby	4	47° 49.1'	122° 23.1'	5	RRCM		18
119	10/1-2/1952	1	Collias	34	47° 46.8'	122° 25.0'	5,20,50,100, 150,B	ECM		7
120	8/1-7/1952	5.5	Conerly	48	47° 46.7'	122° 24.5'	2,41,82	RRCM		18
121	6/26-27/1953	1	Collias	35	47° 46.6'	122° 25.8'	5,20,50,100, 150,B	PCM,ECM		7
122	8/1-7/1952	5.5	Conerly	47	47° 46.1'	122° 27.6'	2,18,37	RRCM		18
123	2/10-19/1942	9	Roberts	14	47° 45.8'	122° 26.1'	5	RRCM		18
124		3	Denson	6	47° 43.7'	122° 30.2'	?	Pole		18
125	3/4-12/1942	7.5	Roberts	14a	47° 44.0'	122° 29.3'	5	RRCM		18
	3/7-12/1942	5	Roberts	14b	47° 44.2'	122° 29.2'	5	RRCM		18
126	3/12-26/1976	13.8	Aagaard	2	47° 44.0'	122° 25.9'	138,213	ACM	C,T,P	5
	7/21-10/29/1976	69	Cannon	2b	47° 44.0'	122° 25.9'	15,55,106, 195	ACM	C,T,P	5
127	7/20-10/30/1976	69.8	Cannon	5	47° 42.8'	122° 27.8'	15,49,102	ACM	C,T,P	5
128	7/20-10/30/1976	69.7	Cannon	4	47° 42.6'	122° 29.4'	20	ACM	C,T,P	5
	7/20-10/27/1976	67.3	Cannon	4	47° 42.6'	122° 29.4'	50	ACM	C,T,P	5
129	1/31-3/2/1972	31	Cannon	-	47° 42.3'	122° 26.9'	16,41,67, 90,127	ACM,BCM	T	4
	1/8-2/14/1973	37.1	Laird	Surface	47° 42.4'	122° 26.7'	2	VACM	T	14
	1/15-2/15/1973	30.6	Laird	Surface	47° 42.4'	122° 26.7'	2,5	ACM	T,C	14
	2/7-14/1973	6.9	Laird	Surface	47° 42.4'	122° 26.7'	20	ACM	T,C	14
	1/8-2/12/1973	34.7	Laird	Subsurface	47° 42.3'	122° 26.9'	17,36.5, 111.5, 192.5	ACM	T,C	14

APPENDIX B.3 (continued).

Site No.	Dates (PST)	~Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
129	1/8-2/8/1973	30.2	Laird	Subsurface	47° 42.3'	122° 26.9'	36,85	GeCM	-	14
	1/8-27/1973	18.7	Laird	Subsurface	47° 42.3'	122° 26.9'	192	GeCM	-	14
	1/8-23/1973	15.3	Laird	Subsurface	47° 42.3'	122° 26.9'	56	ACM	T,P,C	14
	9/16-11/10/1975	54.8	Cannon	1a	47° 42.2'	122° 26.7'	21,36,55,76, 110,153,193	ACM	T,C,P	5
	11/10/1975-2/24/1976	105.8	Cannon	1b	47° 42.2'	122° 26.7'	22,36,59,78, 113,190	ACM	T,C,P	5
	2/24-4/15/1976	50.9	Cannon	1c	47° 42.2'	122° 26.7'	17,31,50,71, 103,137,188	ACM	T,C,P	5
	4/15-6/21/1976	66.9	Cannon	1d	47° 42.2'	122° 26.7'	16,32,51,71, 107,152	ACM	T,C,P	5
	6/21-10/5/1976	105.9	Cannon	1e	47° 42.2'	122° 26.7'	70,105,149, 192	ACM	T,C,P	5
	2/24- /1977	32+	Cannon	6	47° 42.3'	122° 26.6'	19,34,47,72, 113,198	ACM	C,T,P	6
	10/12-11/9/1977	28	NOS	154	47° 42.3'	122° 26.6'	15,92,191	ACM	T	18
	2/4-4/9/1980	64	Cannon	6B	47° 42.3'	122° 26.4'	15,35,60,90, 125,150,175, 194	ACM	T,C,P	2
130	9/9-10/12/1977	33	NOS	154	47° 42.0'	122° 26.5'	15,91,191	ACM	T	18
	8/2-9/12/1979	41	Cannon	6A	47° 42.0'	122° 26.8'	15,35,60,90, 125,150, 175,194	ACM	T,C,P	2
131	9/15-10/30/1977	45	Cannon	6	47° 41.8'	122° 26.9'	18,54,110	ACM	C,T,P	6
132	7/20-9/28/1976	69.9	Cannon	6	47° 41.8'	122° 25.5'	30,60	ACM	T,C,P	5
133	12/26-29/1908	4	Denson	3a	47° 41.1'	122° 27.8'	?	Pole		18
134	3/11-14/1946	3.5	Finnegan	15	47° 41.0'	122° 25.1'	5	RRCM		18
135	7/21-9/28/1976	68.8	Cannon	3	47° 40.6'	122° 28.0'	17,51,108, 198	ACM	T,C,P	5
136	3/11-15/1946	4	Finnegan	16	47° 40.2'	122° 25.7'	2,4,11,18	Pole,PCM		18
137	4/2-7/1963	4	Keith	9	47° 39.8'	122° 29.3'	5,38,62	RRCM		18
138	12/1-25/1908	25	Denson	3	47° 39.6'	122° 27.8'	?	Pole		18
	4/2-7/1963	4	Keith	8	47° 39.8'	122° 28.0'	5,114,191	RRCM		18

APPENDIX B.3 (continued).

Site No.	Dates (PST)	~Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
139	4/2-5/1963	3	Keith	7	47° 39.7'	122° 26.5'	5,24,46	RRCM		18
140	10/13-11/16/1977	34	NOS	166	47° 39.0'	122° 27.7'	4,20,205	ACM	T	18
141	8/1-9/10/1979	40	Cannon	3A	47° 37.2'	122° 24.1'	30,132	ACM	T,C,P	2
	2/5-3/7/1980	30	Cannon	3B	47° 37.3'	122° 24.2'	30,132	ACM	T,C,P	2
142	8/1-9/10/1979	40	Cannon	1A	47° 37.0'	122° 22.6'	30,50,101	ACM	T,C,P	2
	2/5-3/7/1980	30	Cannon	1B	47° 37.0'	122° 22.6'	30,50,101	ACM	T,C,P	2
143	3/25-29/1946	4	Finnegan	17	47° 36.7'	122° 21.4'	2,5,11,18	Pole,PCM		18
144		3	Denson	1	47° 36.6'	122° 24.4'	?	Pole		18
145	8/3-9/12/1979	40	Cannon	4A	47° 35.9'	122° 24.2'	30,132	ACM	T,C,T_R	2
	2/6-3/8/1980	30	Cannon	4B	47° 35.8'	122° 24.0'	30,130	ACM	T,C,T_R	2
146	8/3-9/12/1979	40	Cannon	2A	47° 36.0'	122° 22.6'	30,50,92	ACM	T,C,T_R	2
	2/6-3/8/1980	30	Cannon	2B	47° 35.9'	122° 22.6'	30,50,90	ACM	T,C,T_R	2
147	5/17-6/26/1979	40	Larsen	-	47° 35.7'	122° 21.8'	28,58	ACM	T,C	15,11
	8/8-9/4/1980	27	Larsen	-	47° 35.7'	122° 21.8'	26,31,46,53	ACM	T,C	15,11
148	10/16-22/1952	5.5	Conerly	46	47° 34.6'	122° 25.6'	2,40,77	RRCM		18
149	10/22-27/1952	5	Conerly	45	47° 34.8'	122° 27.8'	2,15,31	RRCM		18
150	9/12-10/12/1977	30	NOS	156	47° 34.9'	122° 26.9'	4,20,224	ACM	T	18
151	3/11-14/1946	4	Finnegan	18	47° 34.6'	122° 26.7'	5	RRCM		18
152	12/19-22/1908	3	Denson	3	47° 33.5'	122° 30.2'	?	Pole		18
153	2/14-18/1947	4	Crosby	7	47° 34.1'	122° 31.7'	5	RRCM		18
154	2/14-18/1947	4	Crosby	5	47° 34.4'	122° 31.4'	5	RRCM		18
	2/14-18/1947	4	Crosby	6	47° 34.4'	122° 31.8'	5	RRCM		18
	9/12-29/1977	17	NOS	155	47° 34.3'	122° 31.8'	7	ACM	T	18
155		3	Maher	D	47° 34.8'	122° 32.1'	3	Pole		18
156	10/21-26/1952	4.5	Conerly	18	47° 35.2'	122° 32.7'	2,6,12	RRCM		18
157	4/4-7/1917	6.25	Maher	A	47° 35.4'	122° 32.4'	3	Pole		18
	3/17-18,21-23/1917		Maher	A	47° 35.4'	122° 32.4'		Pole		18
	10/17-21/1952	4	Conerly	19	47° 35.5'	122° 32.4'	2,6,12	RRCM		18

APPENDIX B.3 (continued).

Site No.	Dates (PST)	~ Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
157	10/17-22/1952	5	Conerly	20	47° 35.5'	122° 32.2'	2,4,7	RRCM		18
158		5	Maher	B	47° 35.7'	122° 32.7'	3	Pole		18
159		3	Denson	2	47° 35.2'	122° 33.4'	?	Pole		18
	3/17-4/13/1917	27	Maher	C	47° 35.4'	122° 33.7'	3	Pole		18
160	2/14-18/1947	4	Crosby	8	47° 34.1'	122° 35.8'	5	RRCM		18
	2/15-16/1947	1	Crosby	8a	47° 34.0'	122° 35.9'	2,6	Pole,PCM		18
161	12/16-17/1936	1	Morris	4	47° 34.2'	122° 36.3'	2	Pole		18
162	12/13-17/1936	3.5	Morris	1	47° 34.0'	122° 36.9'	2	Pole		18
163	2/14-18/1947	4	Crosby	9	47° 33.2'	122° 37.9'	5	RRCM		18
164	12/14-15/1936	1	Morris	2	47° 34.9'	122° 38.6'	2	Pole		18
165	12/15-16/1936	1	Morris	3	47° 36.1'	122° 39.6'	2	Pole		18
166	3/2-4/1942	2	Roberts	13	47° 38.2'	122° 35.1'	5	RRCM		18
	3/10-15/1943	3	Roberts	13	47° 38.2'	122° 35.0'	5	RRCM		18
167	3/12-15/1946	2.5	Finnegan	14	47° 42.0'	122° 36.5'	5	RRCM		18
168	3/11-15/1946	4	Finnegan	13	47° 42.4'	122° 37.5'	5	RRCM		18
169	1/5-8/1909	3	Denson	5	47° 42.7'	122° 33.8'	?	Pole		18
170	11/3-7/1952	4	Conerly	21	47° 43.3'	122° 33.2'	2,4	RRCM		18
	11/3-7/1952	4	Conerly	22	47° 43.4'	122° 33.2'	2,5	RRCM		18
	11/3-7/1952	4	Conerly	23	47° 43.4'	122° 33.3'	2,5	RRCM		18
	10/11-27/1977	16	NOS	162	47° 43.2'	122° 33.3'	5	ACM	T	18
171	3/12-15/1946	3	Finnegan	19	47° 32.0'	122° 24.1'	5	RRCM		18
172	10/18-11/2/1977	15	NOS	159	47° 30.1'	122° 26.3'	6,23,155	ACM	T	18
173	8/2-9/12/1979	41	Cannon	5A	47° 30.2'	122° 25.4'	15,35,60,90, 125,150,178	ACM	T,C,P	2
174	10/18-11/17/1977	30	NOS	160	47° 30.4'	122° 24.3'	5,22,177	ACM	T	18
175	3/16-23/1943	7.5	Roberts	19	47° 28.1'	122° 24.8'	5	RRCM		18
176			NOS	167				ACM	T	18
177		2	Trueblood	3	47° 23.3'	122° 22.2'	1	Pole		18
178	3/15-23/1943	6	Roberts	20	47° 23.3'	122° 21.2'	5	RRCM		18
	9/12-10/12/1977	30	NOS	161	47° 23.4'	122° 21.4'	5,21,195	ACM	T	18
179		4	Trueblood	2	47° 23.9'	122° 19.8'	1	Pole		18

APPENDIX B.3 (continued).

Site No.	Dates (PST)	~ Days of Data	Investigator	Sta. No.	Latitude (^{o}N)	Longitude (^{o}W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
180	2/1-7/1944	5.5	Roberts	23	47° 19.9'	122° 26.5'	5	RRCM		18
	3/10-15/1947	4.5	Crosby	11	47° 19.9'	122° 26.4'	5	RRCM		18
	2/23- /1977	32+	Cannon	5	47° 20.0'	122° 26.1'	29,57,71, 111,176	ACM	C,T,P	6
	9/15-11/15/1977	61	Cannon	5	47° 20.0'	122° 26.2'	16,55,176	ACM	C,T,P	6
	9/8-11/12/1980	34	Cannon	CB-5	47° 19.9'	122° 26.6'	15,40,74, 125,170	ACM	T,C,T_R	2
181	1/25-2/2/1944	4	Roberts	22	47° 21.2'	122° 28.7'	5	RRCM		18
	2/12-16/1945	4	Roberts	22	47° 21.2'	122° 28.8'	5	RRCM		18
182	2/7-10/1944	2.5	Roberts	B	47° 17.7'	122° 26.4'	5	RRCM		18
	9/9-11/12/1980	33	Cannon	CB-4	47° 17.6'	122° 26.5'	25,75,125	ACM	C,T,T_R	2
183	2/7-10/1944	3	Roberts	C	47° 16.8'	122° 25.6'	5	RRCM		18
184	2/8-10/1944	1	Roberts	A	47° 16.7'	122° 27.4'	5	RRCM		18
	9/9-11/12/1980	33	Cannon	CB-3	47° 16.7'	122° 27.5'	25,75,125	ACM	C,T,T_R	2
185	2/24-27/1944	4	Roberts	27a	47° 17.3'	122° 28.5'	5	RRCM		18
186	2/7-10/1944	2	Roberts	27	47° 17.4'	122° 29.2'	5	RRCM		18
187	3/10-15/1947	4.5	Crosby	12	47° 19.6'	122° 29.8'	5	RRCM	C,T,P	18
188	2/23- /1977	31+	Cannon	4	47° 18.9'	122° 30.2'	15,43,92,147	ACM	C,T,P	6
189	3/10-15/1947	4.5	Crosby	13	47° 18.6'	122° 30.4'	5	RRCM		18
190	10/11-15/1952	4	Conerly	14	47° 19.9'	122° 31.0'	2,15,30	RRCM		18
191	1/20-2/2/1944	11	Roberts	25	47° 19.5'	122° 31.3'	5	RRCM		18
	10/6-10/1952	4	Conerly	12	47° 19.2'	122° 31.8'	2,15,30	RRCM		18
	10/9-14/1952	4.5	Conerly	13	47° 19.5'	122° 31.5'	2,25,51	RRCM		18
	2/24- /1977	32+	Cannon	3	47° 19.4'	122° 31.8'	19,39,72,97	ACM	C,T,P	6
	10/17-11/16/1977	30	NOS	163	47° 19.3'	122° 31.2'	5,21,68	ACM	T	18
192	2/11-12/1944	1	Roberts	24	47° 19.6'	122° 34.5'	3	RRCM		18
	2/12-16/1945	4	Roberts	24	47° 19.6'	122° 34.4'	3	RRCM		18
193	10/17-11/2/1977	16	NOS	164	47° 21.2'	122° 32.3'	4,21,79	ACM	T	18

APPENDIX B.3 (continued).

Site No.	Dates (PST)	~ Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
194	1/25-2/7/1944	7.5	Roberts	21	47° 22.2'	122° 31.8'	5	RRCM		18
	10/6-10/1952	4	Conerly	15	47° 22.1'	122° 31.9'	2,36,73	RRCM		18
	9/24-29/1952	4.5	Conerly	16	47° 22.2'	122° 32.3'	2,10,19	RRCM		18
	2/25-3/25/1977	27.8	Larsen	-	47° 22.3'	122° 31.7'	27,59,74,88	?		15,16
195	9/24-29/1952	4.5	Conerly	17	47° 22.2'	122° 32.3'	2,10,19	RRCM		18
196	3/10-15/1947	4.5	Crosby	10	47° 25.7'	122° 31.3'	5	RRCM		18
197	2/24- /1977	32+	Cannon	7	47° 26.5'	122° 31.4'	15,43,92	ACM	C,T,P	6
198	3/13-15/1947	1.5	Crosby	10a	47° 26.8'	122° 31.0'	2,12,29,47	Pole,PCM		18
199	2/28-31/1908	3	Denson	4	47° 30.0'	122° 29.4'	?	Pole		18
200		1	Trueblood	1	47° 30.1'	122° 29.0'	1	Pole		18
201	4/29-30/1955	1.1	Collias	56	47° 30.6'	122° 29.0'	2,5,10,20, 30,60,90	ECM,GCM		7
202	2/19-28/1942	9	Roberts	18	47° 31.5'	122° 30.0'	5	RRCM		18

APPENDIX B.4. OBSERVATIONS OF CURRENTS IN HOOD CANAL

Site No.	Dates (PST)	~Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
203	3/28-29/1950	1	Collias	9	47° 56.0'	122° 38.1'	2,5,30,45, 60,90	PCM,ECM		7
204	11/16-21/1952	4.5	Conerly	24	47° 55.3'	122° 38.7'	2,16,31	RRCM		18
205	1/27-2/1/1942	5	Roberts	9	47° 55.6'	122° 38.0'	5	RRCM		18
	11/15-20/1952	4.5	Conerly	25	47° 55.4'	122° 37.9'	2,36,72	RRCM		18
	6/7-11/1963	4	Keith	14	47° 55.7'	122° 38.3'	5	RRCM		18
	2/2-3/21/1977	47	NOS	136	47° 55.6'	122° 38.0'	5,21,89	ACM	T	18
206	11/15-20/1952	5	Conerly	26	47° 55.5'	122° 37.5'	2,19,38	RRCM		18
207	3/14-4/14/1977	30.5	NOS	137	47° 53.7'	122° 36.1'	5,21,114	ACM	T	18
208	5/1-5/1963	4	Keith	4	47° 51.9'	122° 34.6'	1.5,5,8	RRCM		18
209	2/6-12/1947	6.5	Crosby	3	47° 51.7'	122° 34.6'	3	RRCM		18
210	5/1-5/1963	4	Keith	5	47° 51.3'	122° 34.6'	2,5,9	RRCM		18
211	5/1-5/1963	4	Keith	6	47° 50.0'	122° 34.5'	1.5,5,8	RRCM		18
212	7/25-8/15/1966	21	Creeden	F	47° 51.8'	122° 37.7'	15,45		T,C,O	9
213	7/25-8/15/1966	21	Creeden	J	47° 51.6'	122° 37.4'	15,45,75	MACM	T,C,O	9
	7/25-8/15/1966	21	Creeden	R	47° 51.5'	122° 37.3'	15,35	MACM	T,C,O	9
214	7/25-8/15/1966	21	Creeden	N	47° 51.3'	122° 36.9'	15,45,75	MACM	T,C,O	9
215	2/20-3/1/1942	9	Roberts	11	47° 49.3'	122° 40.6'	5	RRCM		18
216	2/25-3/2/1961	5.5	Clark	3	47° 49.4'	122° 41.5'	5	RRCM		18
217	2/25-3/2/1961	5.5	Clark	2	47° 49.1'	122° 41.2'	5	RRCM		18
218	12/6-8/1954	2.2	Collias	50	47° 48.9'	122° 41.9'	2,5,10,20, 30,50	ECM,GCM		7
219	2/25-3/2/1961	4.4	Clark	1	47° 48.8'	122° 40.9'	5.5,30,49	RRCM,PCM		18
220	12/8-10/1954	2.1	Collias	51	47° 48.5'	122° 41.2'	2,5,10,20, 30,50	ECM,GCM		18
221	2/2-3/8/1978	34	NOS	182	47° 45.6'	122° 44.3'	4,21,80	ACM	T	18
222	3/1-6/1942	5	Roberts	12	47° 41.5'	122° 45.5'	5	RRCM		18
223	2/2-3/7/1978	33	NOS	183	47° 40.4'	122° 47.3'	5,21,41	ACM	T	18

APPENDIX B.4 (continued).

Site No.	Dates (PST)	~ Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
224		1	Derickson	8	47° 40.1'	122° 49.6'	?	Pole		18
225		2	Derickson	7	47° 41.8'	122° 51.1'	?	Pole		18
226	2/2-3/7/1978	33	NOS	184	47° 42.2'	122° 51.6'	3,20,137	ACM	T	18
227	2/1-3/7/1978	34	NOS	185	47° 38.4'	122° 53.7'	5,22,147	ACM	T	18
228	2/8-4/10/1980	62	Cannon	1A	47° 35.0'	122° 59.0'	7,15,35,60, 90,125,160	ACM	T,C,P	2
229	3/5-6/1943	2	Roberts	51	47° 31.6'	123° 01.8'	1-4	RRCM		18
230	2/1-3/7/1978	34	NOS	186	47° 30.3'	123° 02.6'	6,22,143	ACM	T	18
231	2/1-3/7/1978	34	NOS	187	47° 23.7'	123° 07.7'	5,21,94	ACM	T	18
232	3/4-9/1943	5.5	Roberts	50	47° 21.3'	123° 01.6'	5	RRCM		18
	2/1-3/1978	34	NOS	188	47° 21.5'	123° 01.4'	5,22,41	ACM	T	18

APPENDIX B.5. OBSERVATIONS OF CURRENTS IN THE SOUTHERN BASIN

Site No.	Dates (PST)	Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
233	10/17-11/17/1977	31	NOS	165	47° 18.6'	122° 33.4'	6,23,62	ACM	T	18
	9/9-11/13/1980	63	Cannon	CB-2	47° 18.7'	122° 33.5'	15,40,63,65	ACM	C,T,TR	2
234	3/18-24/1943	6	Roberts	26	47° 18.3'	122° 33.0'	5	RRCM		18
	1/19-2/18/1944	27	Roberts	26	47° 18.3'	122° 33.0'	5	RRCM		18
	2/28-3/4/1946	4	Finnegan	27	47° 18.2'	122° 33.4'	5	RRCM		18
	2/24- /1977	32+	Cannon	2	47° 18.4'	122° 33.4'	43,67,68	ACM	C,T,P	6
	3/8-4/10/1978	33	NOS	165	47° 18.4'	122° 33.4'	4,21,61	ACM	T	18
235	2/27-3/4/1946	5	Finnegan	26	47° 18.5'	122° 32.5'	5	RRCM		18
236	2/27-3/4/1946	4.5	Finnegan	29	47° 17.1'	122° 32.6'	5	RRCM		18
237	9/19-21/1925	1	Zeskind	21	47° 16.9'	122° 32.0'	1	Pole		18
	2/28-3/4/1946	4	Finnegan	28	47° 17.1'	122° 32.0'	5	RRCM		18
238	4/13-14/1917	0.75	Trueblood	4	47° 61.1'	122° 33.4'	1	Pole		18
239	2/28-3/4/1946	4	Finnegan	31	47° 15.7'	122° 33.8'	5	RRCM		18
240	9/19-21/1925	1.5	Zeskind	21a	47° 15.8'	122° 33.4'	2,6,15,24	Pole,PCM		18
	2/10-17/1944	2.5	Roberts	28	47° 15.7'	122° 33.2'	5	RRCM		18
	8/29-9/28/1952	30	Conerly	9	47° 15.7'	122° 33.1'	2,12,23	RRCM		18
	9/17-21/1952	4	Conerly	11	47° 15.7'	122° 33.6'	2,12,23	RRCM		18
	2/24- /1977	32+	Cannon	1	47° 15.6'	122° 33.5'	45	ACM	C,T,P	6
	3/9-30/1978	20	NOS	168	47° 15.7'	122° 33.4'	5,22,34	ACM	T	18
241	2/27-3/4/1946	4.5	Finnegan	30	47° 15.5'	122° 33.1'	2.5	Pole,PCM		18
242	2/2-7/1944	5	Roberts	29	47° 15.0'	122° 35.4'	5	RRCM		18
243	3/10-15/1947	4.5	Crosby	14	47° 15.4'	122° 36.1'	5	RRCM		18
	3/9-28/1978	19	NOS	170	47° 15.4'	122° 36.1'	5,21,47	ACM	T	18
244	3/11-13/1947	1.5	Crosby	14a	47° 15.7'	122° 36.7'	2,6,14,23	Pole,PCM		18
245	2/15-23/1944	8.5	Roberts	32	47° 16.8'	122° 39.5'	5	?		18
246		3	Trueblood	5	47° 17.3'	122° 40.5'	1	Pole		18
247	2/15-18/1944	4	Roberts	33	47° 17.0'	122° 43.1'	?	RRCM		18
248	3/9-24/1978	15	NOS	172	47° 16.6'	122° 42.7'	5,21,69	ACM	T	18
249	6/22-23/1954	1	Collias	49	47° 16.4'	122° 42.1'	3-5,30	BCM,ECM,PCM		7,19
	2/3-4/1955	1.1	Collias	54	47° 16.3'	122° 42.2'	7.5,30	MCM,PCM		7,19

APPENDIX B.5 (continued)

Site No.	Dates (PST)	~ Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
250	7/19-20/1954	1.1	Collias	47	47° 14.8'	122° 39.8'	3-5,30	BCM,ECM,PCM		7,19
251	1/31-2/1/1955	1.1	Collias	52	47° 14.8'	122° 38.7'	7.5,30	MCM,PCM		7,19
252	2/18-24/1944	5.5	Roberts	34	47° 13.4'	122° 42.6'	5	?		18
	5/12-17/1952	4	Conerly	8	47° 13.3'	122° 42.7'	2,4	RRCM		18
253	3/11-18/1947	6	Crosby	15	47° 13.5'	122° 38.3'	5	RRCM		18
254	2/10-14/1944	4	Roberts	31	47° 12.9'	122° 37.7'	5	?		18
	2/1-3/1955	1.1	Collias	53	47° 13.2'	122° 37.6'	3,7.5,30	MCM,PCM		7,19
	3/9-24/1978	15	NOS	171	47° 13.1'	122° 37.3'	5,22,127	ACM	T	18
255	2/10-14/1944	4	Roberts	30	47° 13.3'	122° 35.0'	5	?		18
	2/23-3/4/1944	10	Roberts	30	47° 13.3'	122° 35.0'	5	?		18
	1/30-2/16/1945	17	Roberts	30	47° 13.3'	122° 34.9'	5	RRCM		18
	11/6-8/1950		Collias	21	47° 13.2'	122° 34.9'	5,25,50	RRCM,PCM		7
	3/9-24/1978	15	NOS	169	47° 13.4'	122° 35.0'	5,22,62	ACM	T	18
256	3/15-20/1947	5	Crosby	16	47° 11.6'	122° 38.8'	5	RRCM		18
257	5/21-26/1952	4.5	Conerly	6	47° 11.1'	122° 40.9'	2,9,18	RRCM		18
	3/27-4/4/1978	8	NOS	175	47° 11.2'	122° 40.7'	5,29	ACM	T	18
258	2/10-14/1945	4	Roberts	35	47° 11.4'	122° 41.4'	5	RRCM		18
	5/21-25/1952	4	Conerly	7	47° 11.5'	122° 41.2'	2,9,18	RRCM		18
259	3/15-20/1947	5	Crosby	17	47° 11.6'	122° 42.4'	5	RRCM		18
	3/18-19/1947	1	Crosby	17a	47° 11.7'	122° 42.6'	2,6,15,23	Pole,PCM		18
260	3/27-4/12/1978	16	NOS	177	47° 11.4'	122° 43.8'	5,22,42	ACM	T	18
261	1/24-29/1944	5	Roberts	36	47° 10.5'	122° 44.1'	5	RRCM		18
	3/15-20/1947	5	Crosby	18	47° 10.6'	122° 44.1'	5	RRCM		18
262	3/27-4/12/1978	16	NOS	174	47° 09.7'	122° 39.4'	5,21,119	ACM	T	18
263	2/9-14/1945	5	Roberts	30a	47° 09.1'	122° 39.2'	5	RRCM		18
264	2/9-14/1945	5	Roberts	30b	47° 09.4'	122° 37.3'	5	RRCM		18
	3/9-24/1978	15	NOS	173	47° 09.1'	122° 37.4'	4,21,39	ACM	T	18
265		1	Trueblood	6	47° 07.0'	122° 40.0'	1	Pole		18
266	2/18-23/1944	5	Roberts	37	47° 06.9'	122° 42.0'	5	RRCM		18
	8/29-9/3/1952	4.5	Conerly	3	47° 06.9'	122° 42.0'	2,12,23	RRCM		18
	9/11-15/1952	3.5	Conerly	4	47° 07.1'	122° 42.1'	2,21,46	RRCM		18
	9/3-7/1952	4	Conerly	5	47° 07.2'	122° 42.0'	2,12,23	RRCM		18
	3/8-4/10/1978	33	NOS	176	47° 07.1'	122° 42.3'	5,21,45	ACM	T	18

APPENDIX B.5 (continued).

Site No.	Dates (PST)	~ Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
267	2/24-3/4/1944	3.5	Roberts	38	47° 09.8'	122° 47.0'	5	RRCM		18
	1/30-2/4/1945	4.5	Roberts	38	47° 09.7'	122° 47.0'	5	RRCM		18
268	3/27-4/12/1978	16	NOS	178	47° 10.1'	122° 47.4'	4,21,70	ACM	T	18
269	3/15-20/1947	5	Crosby	19	47° 11.0'	122° 48.7'	5	RRCM		18
270	3/19-20/1947	1	Crosby	19a	47° 11.6'	122° 49.6'	2,9,22-23, 35	Pole,PCM		18
271	10/4-6/1972	2	Collias	HOH-701	47° 10.8'	122° 50.4'	+ 1			20
	10/5-6/1972	1	Collias	HOH-701	47° 10.8'	122° 50.4'	0.3,9,18,25	HPCM		20
	10/11-13/1972	2	Collias	HOH-703	47° 10.7'	122° 50.3'	+ 1			20
	10/12-13/1972	1	Collias	HOH-703	47° 10.7'	122° 50.3'	0.3,9,18,25	HPCM		20
	10/12/1972	0.5	Collias	HOH-703	47° 10.7'	122° 50.3'	5.5,10,15, 20,25,30	MCM		20
272	9/23-25/1925	1.5	Zeskind	23	47° 09.9'	122° 51.8'	?,5-6	Pole,PCM		18
	1/30-2/3/1945	4	Roberts	50	47° 09.9'	122° 51.8'	5	RRCM		18
	5/25-31/1952	6	Conerly	1	47° 10.0'	122° 52.1'	2,9,18	RRCM		18
	5/26-31/1952	5	Conerly	2	47° 10.0'	122° 51.6'	2,9,18	RRCM		18
	3/8-4/10/1978	33	NOS	179	47° 09.9'	122° 51.7'	5,22,26	ACM	T	18
273		3	Trueblood	7	47° 08.5'	122° 54.1'	1	Pole		18
274	2/2-10/1945	5	Roberts	49	47° 08.5'	122° 55.0'	5	RRCM		18
	3/15-17/1947	1.5	Crosby	20a	47° 08.3'	122° 54.9'	2,5,7	Pole,PCM		18
275	2/2-6/1945	4	Roberts	48	47° 08.8'	122° 55.8'	5	RRCM		18
276	3/15-20/1947	5	Crosby	20	47° 08.5'	122° 54.9'	5	RRCM		18
277	2/7-11/1945	4	Roberts	47a	47° 09.8'	122° 53.7'	5	RRCM		18
278	2/29-3/4/1944	4	Roberts	47	47° 10.6'	122° 53.1'	?	RRCM		18
	1/30-2/4/1945	5	Roberts	47	47° 10.6'	122° 53.0'	5	RRCM		18
279	2/2-7/1945	4.5	Roberts	46	47° 10.6'	122° 55.0'	5	RRCM		18
280	2/2-6/1945	4	Roberts	45	47° 11.4'	122° 56.7'	5	RRCM		18

APPENDIX B.5 (continued).

Site No.	Dates (PST)	~Days of Data	Investigator	Sta. No.	Latitude (°N)	Longitude (°W)	Depth (m)	Method of Measurement	Other Parameters	Data Source
281	2/7-11/1945	4	Roberts	44	47° 12.2'	122° 58.2'	2	RRCM		18
282	9/22-23/1925		Zeskind	22	47° 12.4'	123° 02.1'	?,2,5-6, 7-10	Pole,PCM		18
283	2/4-9/1945	4.5	Roberts	43	47° 13.2'	122° 56.0'		RRCM		18
284	2/6-10/1945	4.5	Roberts	42	47° 13.3'	122° 55.0'	5	RRCM		18
285	2/4-9/1945	4.5	Roberts	41	47° 14.9'	122° 55.5'	5	RRCM		18
286	3/28-4/12/1978	15	NOS	181	47° 18.1'	122° 51.7'	5,22	ACM	T	18
287	2/11-15/1945	4	Roberts	40	47° 18.4'	122° 51.1'	5	RRCM		18
288	2/24-3/6/1944	10	Roberts	39	47° 14.3'	122° 50.6'	?	RRCM		18
	2/24-25/1945	1	Roberts	39	47° 14.3'	122° 50.6'	?	RRCM		18
289	3/28-4/12/1978	15	NOS	180	47° 13.8'	122° 50.1'	5,22,45	ACM	T	18

APPENDIX C

DATA SOURCES OF CURRENT OBSERVATIONS

IN PUGET SOUND, WASHINGTON

Listed are publications in which original data, or summaries of original data, are presented. Publications which interpret original data (i.e., journal articles, books) are not included. Numbers at left correspond to those given under Data Source in Appendices B.1 - B.5.

APPENDIX C. DATA SOURCES OF CURRENT OBSERVATIONS IN PUGET SOUND, WASHINGTON.

1. Amberg, H.R., and T.R. Aspitarte. 1969. A positive water quality management program for the Port Townsend division of Crown Zellerbach Corporation. Central Research Division, Camas, Washington.

2. Cannon, G.A. Data on file at Pacific Marine Environmental Laboratory RF 28, 3711-15th Ave. N.E., Seattle, Washington 98105.

3. Cannon, G.A. 1973. Observations of currents in Puget Sound, 1970. NOAA Technical Report ERL 260-POL 17. 77 pp.

4. Cannon, G.A., and N.P. Laird. 1972. Observations of currents and water properties in Puget Sound, 1972. NOAA Technical Report ERL 247-POL 13. 42 pp.

5. Cannon, G.A., and N.P. Laird. 1976. General circulation pattern (Subtask 1a). In: Physical oceanography in Puget Sound Main Basin project report: Fiscal year 1976 and 1976T (R.L. Charnell, ed.). NOAA Technical Memorandum ERL MESA-18. pp. 8-38.

6. Cannon, G.A., N.P. Laird, and T.L. Keefer. 1979. Puget Sound circulation: final report for Fy77-78. NOAA Technical Memorandum ERL MESA-40. 55 pp.

7. Collias, E.E. 1971. Current measurements in Puget Sound and adjacent waters July 1948-November 1955. University of Washington Department of Oceanography Technical Report No. 271, reference M71-64.

8. Collias, E.E., C.A. Barnes, and J.H. Lincoln. 1973. Skagit Bay study dynamical oceanography final report. University of Washington Department of Oceanography. 197 pp.

9. Creeden, J.J. 1968. Preliminary analysis currents of Hood Canal obtained from Hood Canal floating bridge. University of Washington Department of Oceanography. 64 pp.

10. Hammond, R.E., and A.D. Rosebrook. 1970. The physical oceanography of northern Skagit Bay. University of Washington Department of Oceanography. 129 pp. plus Appendices.

11. Hinchey, L.H., C.C. Ebbesmeyer, J.M. Helseth, and J.M. Cox. 1980. Dynamics of Elliott Bay and approaches, Washington. Report for URS Corporation, Seattle, Washington. 58 pp.

12. Holbrook, J.R., R.D. Muench, D.G. Kachel, and C. Wright. 1980. Circulation in the Strait of Juan de Fuca: Recent oceanographic observations in the eastern basin. NOAA Technical Report ERL 412-PMEL 33. 42 pp.

13. Kinney, P.J., P.D. Carpenter, and K. Aagaard. 1975. Bottom currents in Admiralty Inlet off Bush Point. Report for Russell Associates, San Francisco, California and Oceanographic Commission of Washington, Seattle, Washington.

14. Laird, N.P., and G.A. Galt. 1975. Observations of currents and water properties in Puget Sound, 1973. NOAA Technical Report ERL 327-PMEL 23. 141 pp.

15. Larsen, L.H. Data on file with the University of Washington Department of Oceanography, Seattle, Washington 98195.

16. Larsen, L.H., N. Shi, and J.G. Dworski. 1977. Current meter observations in Colvos Passage: Puget Sound, March 1977. University of Washington Department of Oceanography Special Report No. 82. Reference M77-119.

17. Littekin, A.H., Jr. 1971. Some aspects of the circulation in Deception Pass and Saratoga Passage. M.S. nonthesis report. University of Washington Department of Oceanography. 54 pp.

18. National Ocean Survey. Data on file with the Chief of Circulatory Surveys, 6001 Executive Blvd., Rockville, Maryland 20852. Attn. OA/C-211.

19 Paquette, R.G., and C.A. Barnes. 1955. Oceanographic Survey of Carr Inlet. Part XVI, current measurements. Special report No. 18. University of Washington, Reference 55-9.

20. Sternberg, R.W., and E.E. Collias. 1973. Deposition of dredge spoils in Dana Passage, Washington. Final report to the Washington State Department of Fisheries. University of Washington Department of Oceanography. 11 pp + Appendices.

21. Young, S.R. 1976. A receiving water survey of Port Townsend Bay - June 1976. Crown Zellerbach Environmental Services Research Memorandum No. 239-9. 20 pp.

22. URS Research Company. 1975. Final Report, Environmental Assessment: Ammunition pier and outfall, Indian Island, Washington. URS Report No. 0912 for Moffat, Nichol, and Bonney, Inc., Portland, Oregon.

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TEAR OUT AND SEND

CURRENT OBSERVATIONS IN PUGET SOUND, WASHINGTON

Name of Principal Investigator:

Address:

Phone Number:

Affiliation:

Mooring Name:

Dates of Observation:

Length of Observation:

Latitude:

Longitude:

Depth of Observations:

Bottom Depth:

Method of Measurement: (include type and model of equipment)

Other Parameters Measured: (examples - temperature, conductivity, pressure)

Publications Listing or Describing the Data:

Data Available?

Form of Data Storage:

Remarks:

Please return to: Ronald P. Kopenski
NOAA-OMPA
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Seattle, WA 98115
(206) 442-5590 FTS 399-5590