

UNCLASSIFIED

AD. 296 402

*Reproduced
by the*

**ARMED SERVICES TECHNICAL INFORMATION AGENCY
ARLINGTON HALL STATION
ARLINGTON 12, VIRGINIA**



UNCLASSIFIED

NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U. S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

DEPARTMENT OF OCEANOGRAPHY

SCHOOL OF SCIENCE

OREGON STATE UNIVERSITY

Corvallis, Oregon

SURFACE TEMPERATURE AND SALINITY
OBSERVATIONS AT SHORE STATIONS
ON THE OREGON COAST FOR 1961

by

Malcolm Oliphant, Bruce Wyatt

and

Norman F. Kujala

Data Report No. 8

Office of Naval Research
Contract Nonr 1286(02)
Project NR 083-102

Edited by Elizabeth Strong

Reference 62-11
September 1962

Wayne V. Burt
Chairman

INTRODUCTION

During 1961, a program of shore station sampling of ocean temperatures and salinities was carried out by the Oceanography Department of Oregon State University. This is a continuation of the work reported by Kujala and Wyatt (1961). Sampling was conducted at 11 locations along the Oregon coast and at one location in northern California. Temperature and salinity samples were taken by interested persons living along the coast. Without the participation of these individuals this program could not be successfully carried out. Table I lists the sampling stations by name, the location where the collection was made, and the observers. Figure 1 shows the location of each station.

METHODS AND PROCEDURES

Wherever possible, sampling sites were selected at points where the influence of fresh water runoff was a minimum. Observations were made as close as possible to the time of high tide. Temperatures were read to 0.1°C using a calibrated thermometer contained in a brass bucket with a plastic liner. Water for salinity analysis was stored in pressure-stoppered citrate bottles; titration was completed three to four months after the samples were collected. The method used was that described by Strickland and Parsons (1960) (estimated accuracy $\pm 0.04\%$). Salinities at Seaside Aquarium and Crescent City were computed from salinity hydro-meter reading, using tables from Zerbe and Taylor (1953).

RESULTS

Table II lists each temperature and salinity observation taken during 1961. Table III presents summaries of these data in the form of monthly means, maxima, minima, range, and number of observations. Monthly mean values of temperature and salinity at four stations are plotted in Figure 2. Seasonal temperature ranges along the coast for the latitude were small, particularly off central and southern Oregon (Otter Rock and Humbug Mountain). This is attributed, at least in part, to summer upwelling.

Salinity ranges were large and the variations show dependence both on runoff and on upwelling. To the north (Seaside Aquarium and Arch Cape), salinity minima occurred from April to June, showing the effects of local precipitation and of the Columbia river runoff, which was a maximum in June. In central and southern Oregon, the local runoff led to the development of a sharp surface salinity minimum in February. Upwelling in the southern region maintained the salinity at high levels from June to November.

The means for the Columbia River Lightship are plotted in Figure 3. The striking feature here is the exceptionally large salinity range, from an ocean-like high of 32‰ in January to only 17‰ in June, when the Columbia outflow was a maximum.

REFERENCES

- Kujala, Norman and Bruce Wyatt, 1961. Surface Temperatures and Salinity Observations at Shore Stations on the Oregon Coast, Data Report No. 6. Department of Oceanography, Oregon State University, Ref. 61-4.
- Strickland and Parsons, 1960. A Manual of Seawater Analysis. Fish. Res. Bd. Canada Bul. No. 125, pp. 11-17.
- Zerbe, W. B. and C. B. Taylor, 1953. Sea Water Temperature and Density Reduction Tables, U. S. Dept. Comm., Coast and Geod. Surv. Spec. Pub. No. 298, 21 pp. 1953.

TABLES

I. List of Shore Stations	4
II. Temperature and Salinity Observations	8
III. Monthly Mean Temperature and Salinity	14

FIGURES

1. Location of Shore Stations	5
2. Mean Temperature and Salinity, Four Stations	6
3. Mean Temperature and Salinity, Columbia River Lightship	7

TABLE I. LIST OF SHORE STATIONS

<u>Station Name</u>	<u>Location of Collection</u>	<u>Observer</u>
Columbia River Lightship 46°11.2'N 124°11.0'W	Five miles southwest of the Columbia River south jetty	U. S. Coast Guard
Seaside Aquarium 45°59.7'N 123°55.6'W	At pump outlet into aquarium settling tank which is filled during the highest tide each day from a surf inlet pipe	Mr. Lawrence Smith
Arch Cape 45°48.0'N 123°58.0'W	In the surf on a sand beach	Mrs. Berkeley Snow Mr. John Markham
Netarts 45°26.1'N 123°58.0'W	Boat ramp at the entrance of Netarts Bay.	Mrs. Virginia Cornette
Otter Rock 44°44.6'N 124°58.0'W	Off the rocks	Mr. Robert Troxel
Yachats 44°18.5'N 124° 4.0'W	Off the rocks	Mr. Eugene Hanson
Heceta Beach 44° 3.0'N 124° 7.5'W	Sand beach 1-3/4 miles north of the Suislaw River	Mr. C. H. Grow Mr. H. Dale Harp
Hauser 43°28.0'N 124°17.0'W	Sand beach 12 miles north of Coos Bay	Mr. Leroy Hanson
Bandon 43° 7.0'N 124°25.5'W	Off the rocks at Bandon Wayside	Miss Lura Morgan Mr. George Anthony
Humbug Mountain 42°36.6'N 124°24.0'W	Off the rocks 4 miles south of Humbug Mountain	Mr. E. V. Nelson
Brookings 42° 4.1'N 124°18.8'W	Off the rocks at Harris Beach State Park	Mr. Morton W. Phillips
Crescent City, California 41°44.6'N 124°11.7'W	Off the end of the Crescent City municipal wharf	Mr. Darold Richcreek

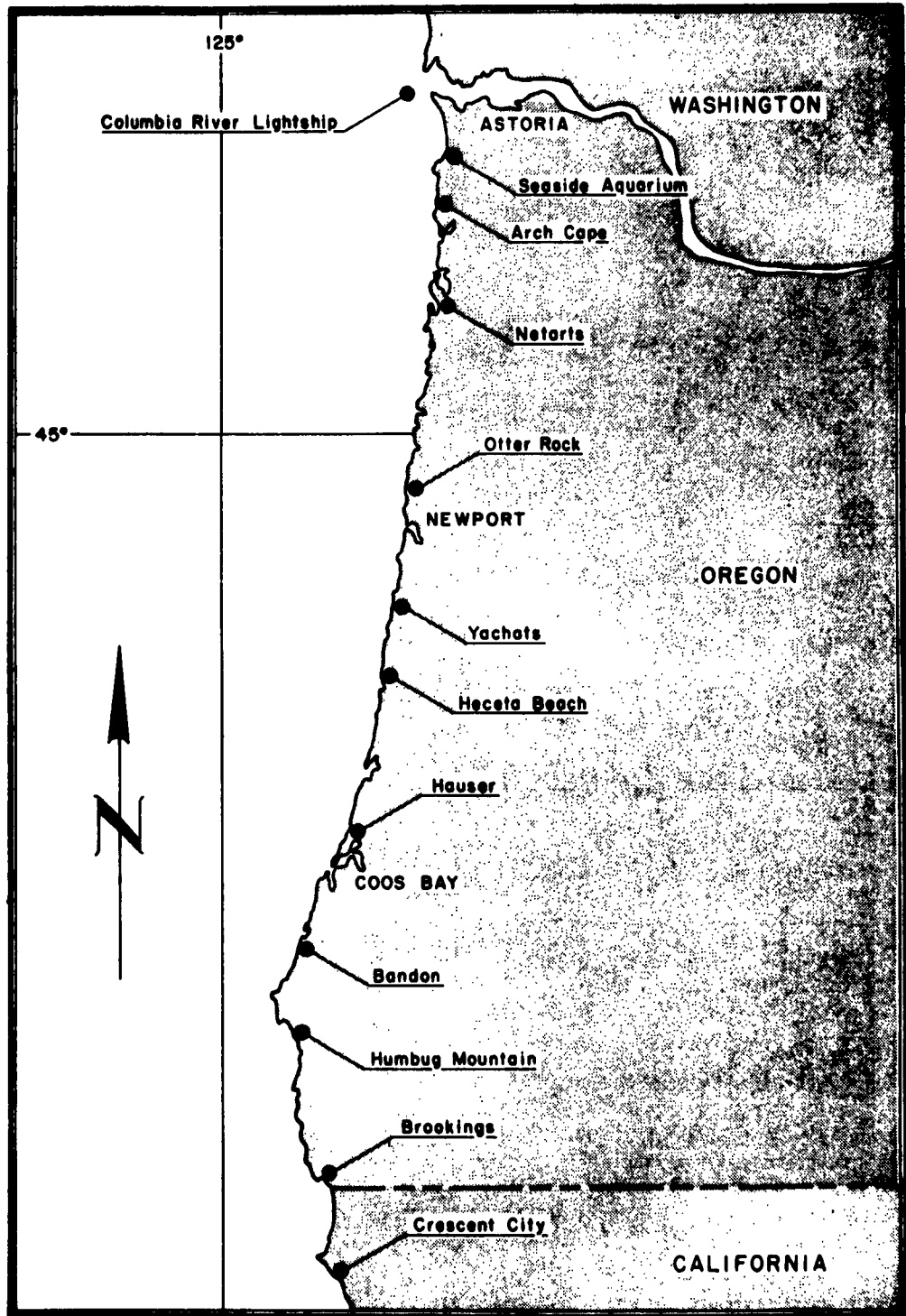


FIGURE 1. LOCATION OF SHORE STATIONS

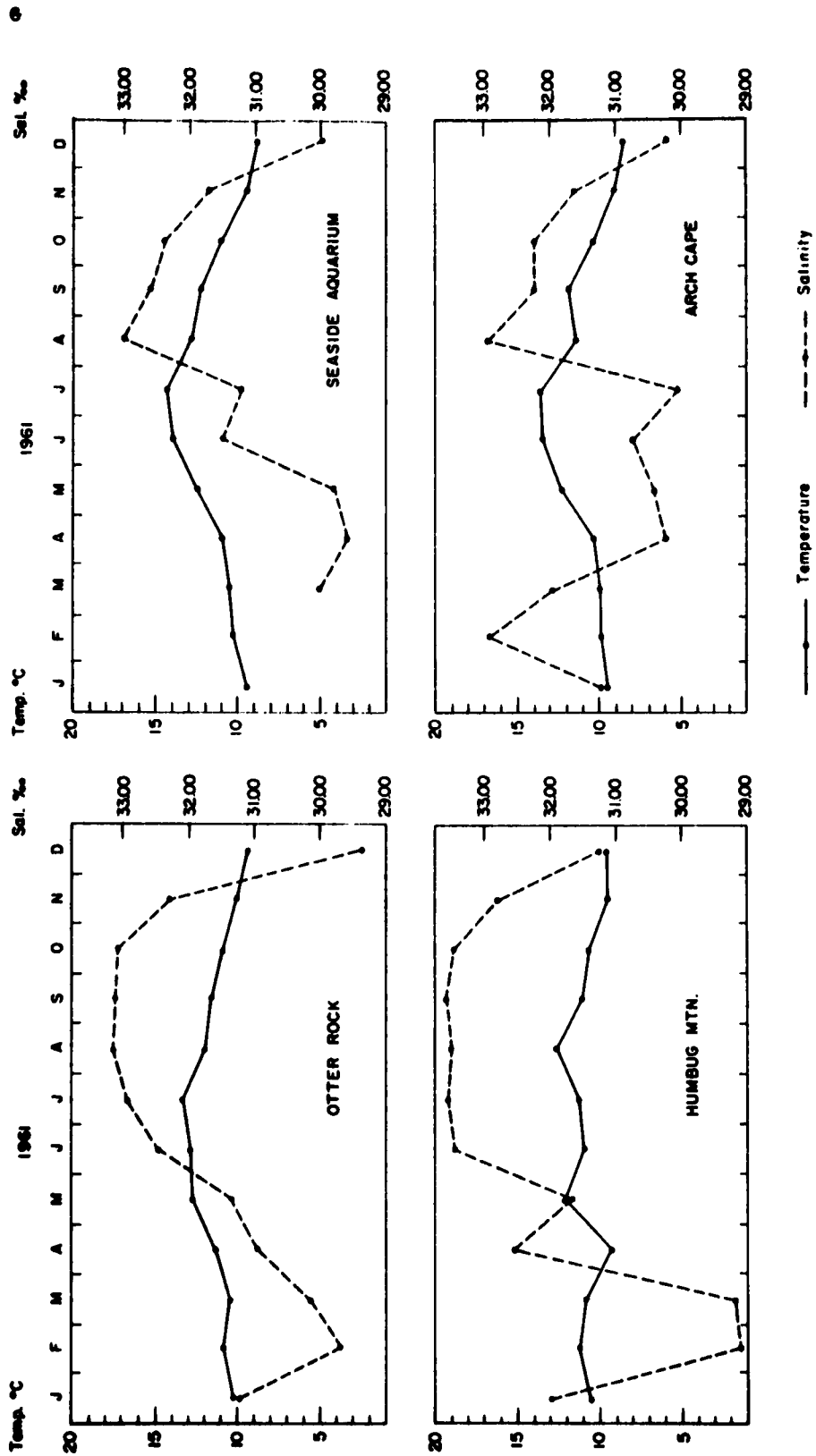


FIGURE 2. MEAN TEMPERATURE AND SALINITY

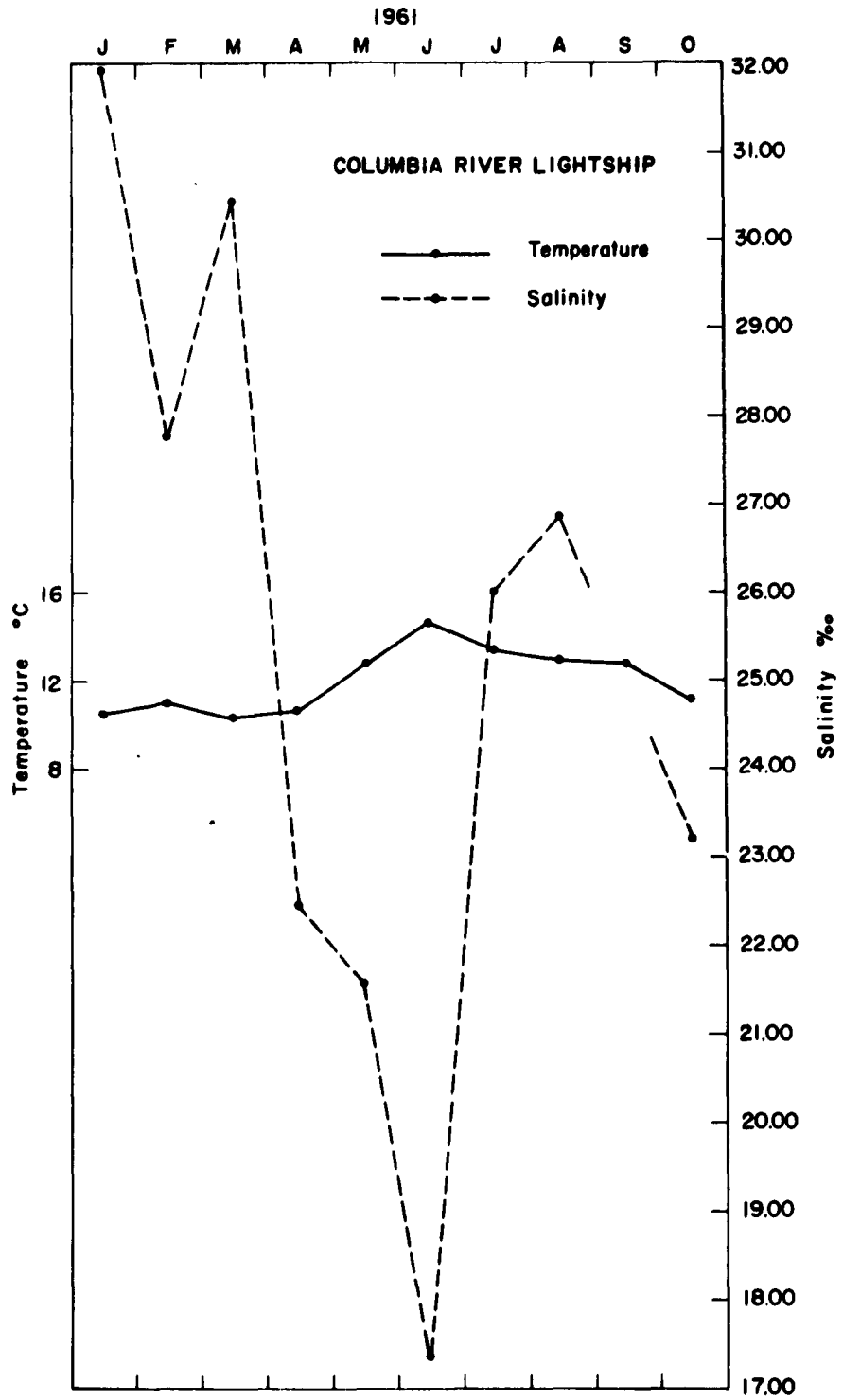


FIGURE 3. MEAN TEMPERATURE AND SALINITY

SEASIDE AQUARIUM

Date 1961	T °C	S ‰	Time PST	Date 1961	T °C	S ‰	Time PST	Date 1961	T °C	S ‰	Time PST
June 5	14.1		0705	Aug. 10	12.4	31.5	1205	Oct. 16	12.1	32.8	1600
6	14.8		2010	11	12.4	34.1	1230	17	11.7	33.1	1650
7	14.4		0900	12	12.8	31.8	1300	18	10.2	32.9	0650
8	14.8		0915	13	12.4	33.5	1335	19	10.7	33.2	0700
9	14.8		0940	14	13.1	31.9	1500	20	10.2	32.7	0745
10	14.9		1040	15	13.9	31.6	1600	21	10.4	32.5	0825
11	14.7		1155	16	15.1	32.1	1640	22	10.2	32.1	0915
12	14.6	27.6	1245	17	16.0	32.4	1645	21	10.7	31.0	0950
13	15.8		1315	18	12.4	32.8	1700	24	10.6	31.8	1020
14	17.5		1430	19	12.5	33.7	1700	25	11.6	32.0	1145
15	13.7	30.1	1240	20	13.9	34.0	1800	26	10.9	30.8	1315
16	12.2	29.7	1345	21	12.8	33.5	1900	27	10.7	31.0	1305
17	13.6	34.1	1455	23	11.9	33.3	1015	28	11.2	32.7	1320
18	13.8	30.1	1545	24	12.4	33.2	1115				
19	16.0	29.3	1715	25	12.7	32.8	1130	Nov. 9	10.4	29.8	1045
20	12.8	31.0	1645	26	12.3	32.9	1205	10	10.6	32.0	1115
21	13.3	30.3	0600	27	13.7	32.9	1215	11	10.7	32.5	1225
22	11.4	33.1	0720	28	12.7	32.9	1400	12	10.8	32.5	1300
23	12.5	32.8	0815	29	12.6	32.9	1430	13	10.4	32.5	1335
24	12.2	32.8	0925	30	13.1	33.5	1510	14	10.1	32.4	1430
25	12.4	32.8	1000	31	12.9	32.8	1820	15	9.6	33.2	0645
26	12.4	33.1	1100					16	8.7	32.7	0630
27	13.6	33.3	1200	Sept. 1	13.4	31.9	0630	17	9.0	32.3	0640
28	13.8	32.8	1215	2	14.3	31.9	1800	18	9.0	30.2	0715
29	15.7		1445	3	14.5	31.6	1830	19	8.7	30.8	0730
30	16.4		1440	4	13.9	32.3	2100	20	8.6	30.6	0900
				5	12.5	32.7	0930	21	8.9	30.4	0930
July 1	16.4		1320	6	11.9	33.1	1030	22	9.4	30.3	1000
2	16.1		1440	7	11.8	33.1	1030	23	9.5	31.1	1100
3	14.6	29.9	1700	8	11.2	33.1	1100	24	8.5	31.9	1130
4	14.4	29.7	0450	9	10.6	33.7	1130	25	8.9	31.9	1130
5	14.4	29.9	0610	10	10.5	32.8	1115	26	8.6	31.9	1205
6	15.2		0640	11	11.1	33.3	1215	27	9.3	31.6	1330
7	16.3		0830	12	11.3	33.1	1230	28	9.7	32.1	1400
8	15.4	27.7	0930	13	11.9	33.3	1240	29	9.6	31.9	0625
9	13.5	31.5	1030	14	12.5	32.5	1315	30	9.6	32.0	0630
10	12.0	33.6	1110	15	13.7	32.1	1335				
11	12.5	33.1	1140	16	14.0	31.6	1430	Dec. 1	9.7	31.8	0630
12	12.1	33.3	1205	17	15.0	31.9	1530	2	9.6	31.8	0630
13	14.0	30.8	1230	18	14.5	32.7	1700	3	9.0	30.4	0700
14	15.2	29.7	1345	19	12.4	32.5	0630	4	9.6	31.4	0745
15	16.6	29.1	1445	20	13.0	32.1	0730	5	9.3	30.6	0805
16	16.6	29.1	1515	21	11.4	32.5	0810	6	8.9	30.4	0850
17	18.0	29.4	1630	22	11.7	32.7	0900	7	9.1	31.0	0950
18	15.5	30.2	0330	23	11.7	32.9	0945	8	8.8	31.1	1020
19	14.5	31.2	0415	24	11.3	32.5	1000	9	8.8	31.4	1115
20	14.5	31.2	0610	25	11.5	33.5	1110	10	8.6	31.1	1145
21	15.1	30.4	0640	26	11.4	33.3	1135	11	8.0	31.2	1210
22	13.3	32.7	1945	27	11.7	33.3	1155	12	8.0	31.2	1310
23	13.6	32.4	2030	28	12.7	31.6	1245	13	7.7	26.1	1505
24	14.0	32.1	2100	29	12.4	32.0	1400	14	8.1	26.7	1545
25	12.2	32.4	1115	30	11.9	32.0	1500	15	8.3	26.9	0630
26	11.0	32.9	1145					16	8.4	26.7	0630
27	12.6	32.8	1230	Oct. 1	11.9	31.8	0630	17	8.4	29.8	0700
28	14.1	32.4	1255	2	11.0	32.5	0630	18	8.6	29.7	0715
29	14.2	31.6	1400	3	11.1	32.5	0710	19	8.8	29.7	0800
30	14.5	31.9	1430	4	10.8	33.2	0715	20	9.4	30.7	0900
31	13.8	32.0	1530	5	10.3	33.3	0755	21	9.4	30.8	0940
				6	10.7	32.1	0830	22	9.4	31.0	0955
Aug. 1	14.1	31.9	1600	7	10.5	32.8	0900	23	9.3	30.2	1050
2	13.9	31.8	1615	8	10.3	33.5	1115	24	9.7	30.8	1145
3	13.5	33.5	1715	9	11.3	32.5	1020	25	9.0	29.7	1210
4	12.3	32.8	1400	10	11.4	32.0	1050	26	8.7	28.9	1305
5	13.3	32.8	1930	11	11.6	31.8	1145	27	8.9	29.1	1420
6	11.9	32.8	2045	12	11.3	32.1	1145	28	9.5	29.5	1430
7	11.5	33.6	2100	13	11.9	32.8	1220	29	9.3	29.4	0630
8	11.4	33.8	2140	14	12.5	32.5	1330	30	9.3	29.1	0620
9	11.8	33.6	1015	15	12.9	32.4	1430	31	9.2	30.6	0630

ARCH CAPE

Date 1961	T °C	S °/oo	Time PST	Date 1961	T °C	S °/oo	Time PST	Date 1961	T °C	S °/oo	Time PST
Jan. 1	9.5		1210	Mar 19	10.2		1355	June 3	11.8	32.05	1605
2	8.8		0830	20	10.3		1615	4	14.8		1710
3	9.0		1615	21	10.4		1615	5	14.6		1610
4	8.3		1615	22	10.3		1620	6	14.4		0645
5	9.1		1610	23	10.4		1700	7	14.9		0805
6	9.5		1620	24	10.5		1800	8	14.8		1055
7	9.1	30.99	1520	25	10.3	30.44	0825	9	14.1		0925
8	9.2		1610	26	9.8		0855	10	14.9	24.58	1040
9	9.6		1730	27	10.0		0600	11	15.0		1155
10	9.7		0605	28	9.8		0605	12	14.8		1425
11	9.8		0555	29	9.7		0555	13	15.2		1315
12	9.6		0620	30	10.1		0555	17	13.0	33.28	1530
13	9.6		0600	31	11.4		1615	21	12.4		1855
14	10.2	29.23	0940	April 1	11.0	30.03	1250	22	11.9		1825
15	10.3		1045	2	11.2		1105	23	11.2		1940
16	9.8		0605	3	11.2		1635	24	10.0		0755
17	9.6		0605	4	10.6		1620	25	10.9	33.01	0950
18	9.4		0600	5	10.8		1615	26	10.7		1045
19	10.1		1650	6	11.0		1620	27	11.5		1230
20	10.0		1730	7	10.7		1730	28	13.7		1145
21	10.1	31.53	1530	8	10.1	32.03	1840	29	15.9		1335
22	10.00		1630	9	9.6		0750	30	16.5		1930
23	10.0		1715	10	9.5		0635	July 1	16.5	23.44	1450
24	9.6		0610	11	9.6		0625	2	15.1		1550
25	9.2		0645	12	9.6		0600	3	13.8		1630
26	9.0		0640	13	9.8		1910	4	17.2		1740
27	9.2		0650	14	9.5		0650	5	15.4		0625
28	9.3	32.95	0945	15	10.2		0840	6	15.7		0705
29	9.5		1100	16	10.4	31.46	1235	7	16.2		0635
30	9.7		0555	17	10.8		1620	8	14.3		1050
31	9.5		0600	18	10.3		1615	9	10.6	32.47	1020
Feb. 1	10.0		1615	19	10.0		1710	10	9.9		1140
2	10.2		1615	20	10.2		1620	11	11.8		1235
3	10.0		1610	21	9.8		1720	12	12.0		1250
4	10.3	33.03	1420	22	9.4	30.19	1825	13	15.1		1700
5	10.7		1535	23	9.2		0600	14	15.6		1415
6	10.3		1705	24	9.3		0550	15	17.4		1615
7	10.0		1620	25	9.7		0610	16	16.5	28.86	1500
8	10.3		0540	26	9.6		0515	17	18.0		1600
9	10.3		0540	27	10.9		1815	18	16.5		1730
10	10.2		0630	28	11.0		1750	19	13.6		1750
11	10.3	33.17	0830	29	11.6	27.52	1145	20	12.9		1705
12	9.3		0920	30	11.5		1220	21	11.2		0555
13	9.2		0635	May 1	10.8		1620	22	10.0	32.59	0715
14	9.3		0610	2	11.2		1620	23	10.3		0830
15	9.0		0610	3	11.3		1630	24	10.8		0645
16	9.6		0555	4	10.6		0605	25	11.5		2005
17	10.1		1615	7	11.5	31.24	0630	26	9.5		1125
18	9.7	33.17	1445	8	11.4		1655	27	11.8		1215
19	10.2		1520	9	11.2		0620	28	11.9		1625
20	9.8		1635	10	10.9		0600	29	11.9	32.95	1435
21	9.8		1715	11	10.6		0645	30	13.0		1420
22	10.2		1720	12	11.5		0645	31	14.0		1625
23	10.2		0610	13	11.8	31.06	1135	Aug. 1	13.9		1615
24	10.0		0550	14	12.7		1230	2	12.2		1740
25	9.7	32.34	0825	15	13.8		1515	3	11.9		1740
26	10.0		0920	16	13.5		1530	4	9.2		1845
27	9.8		1655	17	12.8		1515	5	10.5	33.03	0800
28	9.7		1625	18	11.7		1515	6	12.4		0900
March 1	10.0		1655	19	12.3		1525	7	10.0		0740
2	10.1		1630	20	12.5	30.32	1645	8	8.5		0755
3	9.6		1755	21	12.9		1755	9	9.5		1125
5	8.5	32.30	1405	22	12.5		1655	10	10.4		1200
6	9.6		1645	23	12.0		1700	11	10.7		1700
7	9.6		1705	24	12.0		1700	12	11.2	33.17	1320
8	9.4		1655	25	14.1		1740	13	12.0		1400
9	9.3		1715	26	13.3		1855	14	10.9		1410
10	9.3		1735	27	13.3	29.09	1035	15	11.3		1645
11	8.5	33.19	0650	28	12.4		1120	16	13.8		1730
12	9.0		0820	29	14.3		1415	17	13.6		1655
13	9.5		0800	30	14.1		1240	18	11.7		1645
16	10.1		1150	31	13.9		1435	19	10.7	33.17	1730
17	10.4		1240	June 1	13.5		1630	20	9.5		0725
18	10.7		1300	2	12.2		1530	21	9.2		0715

ARCH CAPE

Date 1961	T °C	S ‰	Time PST
Aug. 22	8.4		0805
23	10.3		0815
24	12.2		1005
25	14.9		1415
26	13.8	32.34	1225
27	13.7		1315
28	12.2		1350
29	11.6		1445
30	11.1		1545
31	13.6		1615
Sept. 1	14.5		1635
2	12.3	32.30	0620
4	13.2		0720
5	13.6		0730
6	11.2		0900
7	11.6		1600
8	11.5		1530
9	9.5		1530

Date 1961	T °C	S ‰	Time PST
Sept. 10	10.3	33.19	1215
11	10.9		1300
12	11.3		1335
13	10.0		1535
16	14.5	31.04	1535
17	12.9		1715
18	12.2		1870
21	10.0		0930
23	11.2	32.88	1100
27	11.5		1415
30	12.0	31.67	1530
Oct. 7	9.5	33.01	1100
14	12.4	32.12	1400
21	9.1	32.75	1000
28	10.3	31.02	0900
Nov. 5	9.3	31.47	1000
11	10.0	32.10	1230
18	8.5	31.55	1500
30	12.0	31.67	1530

Date 1961	T °C	S ‰	Time PST
Nov. 25	8.0	31.38	1135
Dec. 2	9.2	30.84	1600
10	8.2	32.21	1300
17	7.8		1105
18	8.2		1305
19	8.5	29.69	1010
20	8.5		1625
21	8.3		1300
22	8.3		1330
23	8.6		1250
24	8.5	28.12	1315
25	8.0		1400
26	8.1		1515
27	8.1		1545
28	8.6		1620
29	8.8		1650
30	8.8		1815
31	8.5	30.12	0755

NETARTS

Jan. 7	10.2	30.95	1630
14	10.3	30.97	1130
24	8.0	30.95	0800
Feb. 5	11.1	30.01	1530
13	10.3	28.57	1130
20	10.2	29.42	1730
March 2	10.5	29.42	1300
7	9.2	24.38	1000
14	10.2	29.14	1130
20	10.7	29.16	1600

Mar. 28	10.6	31.58	1030
April 7	10.5	31.64	1030
26	11.0	29.07	1000
May 9	11.3	30.48	0830
10	14.8	30.32	1000
31	16.2	29.99	0930
June 16	15.0	32.29	1515
26	14.7	31.64	0700
Sept. 14	13.8	31.94	0930
28	12.3	32.47	1530

Oct. 5	12.8	31.96	1000
13	13.3	31.85	1500
21	12.0	31.92	1200
30	11.4	31.89	1700
Nov. 7	11.0	32.09	1200
12	10.7	32.05	1500
27	9.9	31.22	1600
Dec. 11	8.4	31.31	1500
22	8.8		1300

OTTER ROCK

Jan. 7	9.9	30.68	1500
14	10.9	30.93	1200
21	10.9	31.38	1500
28	9.3	31.82	0930
Feb. 4	11.1	30.16	1400
10	11.1	29.09	0715
18	10.7	29.58	1400
26	10.1	29.94	0930
March 4	10.3	31.02	1330
11	9.4	29.65	0700
18	11.5	30.16	1400
25	10.4	29.74	0700
April 1	12.4	31.13	1200
8	10.0		1830
15	12.0		1230
22	10.3	30.48	1800
29	11.9	31.18	1130

May 6	13.2	30.81	1700
13	12.4	30.88	1130
19	11.9	32.01	1630
28	13.4	31.65	1130
June 4	12.3	32.72	1800
11	14.1	31.40	1200
18	13.0	32.81	1600
24	11.6	32.92	0930
July 1	14.0	33.40	1500
9	13.8	33.13	1030
14	15.1	30.90	1400
22	10.2	33.71	0700
29	13.3	33.48	1330
Aug. 5	12.1	32.70	0900
12	11.4	32.90	1300
19	12.7	33.40	1730
26	11.5	33.51	1230

Sept. 1	12.2	33.21	1630
10	10.4		1230
17	12.5	32.70	1700
27	11.1	33.35	1200
Oct. 2	9.7	33.51	0800
8	10.1	33.60	1200
14	12.8	32.56	1530
21	10.2	33.06	1000
28	11.9	32.50	1400
Nov. 5	9.8	32.66	0930
12	11.7	32.00	1400
19	9.1	32.81	0930
27	9.2	31.62	1500
Dec. 2	9.1	30.57	0730
9	8.9	32.00	1300
17	8.7	30.93	1300
22	9.4	28.91	1130
31	10.4	24.27	1630

YACHATS

Jan. 8	10.3	30.39	1445
21	10.2	31.09	1440
29	10.7	30.86	1440
Feb. 5	11.3	28.83	1545
13	10.5		1615
19	10.4		1500
Mar. 14	9.8		1545
21	10.8	29.16	1745
28	11.4	31.04	1545
April 5	10.4	32.45	1815
12	10.1	32.05	1720

Apr. 20	10.2		1600
26	11.4	31.08	1550
May 2	11.7	28.08	1540
9	12.2	28.08	1730
17	10.9	31.89	1745
24	12.9	31.02	1730
31	13.4	31.47	1815
Aug. 12	10.1	33.60	1850
20	9.2	33.78	1245
27	12.0	33.42	1615
Sept. 3	12.4	33.30	1435

Sept. 9	10.1	33.55	1430
14	11.9		0930
Oct. 6	9.4	33.51	0945
14	12.8	32.38	1015
22	10.5		1600
29	10.6		0910
Nov. 5	10.5	31.73	1600
12	10.4	32.29	0930
18	9.4	32.50	1530
Dec. 8	8.9	31.29	1600
25	9.4	28.62	1630

BROOKINGS

Date 1961	T °C	S ‰	Time PST
Jan. 8	10.4	32.70	1530
16	10.7	31.49	1630
24	10.8	31.94	0930
31	11.1	31.62	1000
Feb. 7	11.6	29.48	1530
14	11.3	24.02	1400
21	11.3	28.42	0830
28	10.8	30.53	1030
March 9	10.9	31.15	0930
15	10.6	29.99	1000
21	11.6	24.36	1530
28	11.9	29.52	1530

Date 1961	T °C	S ‰	Time PST
April 5	10.4	33.13	1545
15	10.0	31.82	1500
23	9.8	31.00	1900
May 2	12.0	30.79	1530
8	11.8	30.08	1330
16	11.6	31.87	1300
21	13.0	29.79	1230
28	10.1	33.22	1500
June 15	12.4	32.30	1500
19	15.2	31.00	1430
28	13.2	32.74	1530

Date 1961	T °C	S ‰	Time PST
July 15	14.0	33.17	1600
23	14.6	33.24	1545
29	13.6	32.81	1530
Aug. 7	15.6	33.01	1445
16	14.2	33.30	1530
25	14.5	33.30	1700
31	14.0	33.12	1530
Sept. 18	11.5	33.19	0830
26	12.2	33.46	1100
Oct. 2	11.9	33.66	1630
9	10.5	33.87	1030
Dec. 22	9.8	29.74	1430

CRESCENT CITY

Date 1961	T °C	S ‰	Time PST
Sept. 1	17.2	31.9	1400
3	11.9	33.2	0920
5	12.8	32.9	0705
7	11.1	33.7	1210
9	10.6	33.3	0850
11	11.1	32.5	1230
13	12.5	31.9	1200
15	13.1	32.1	1400
16	12.2	31.5	1435
18	12.8	32.9	1455
21	10.0	33.5	0810
24	11.1	32.7	1010
26	11.7	33.1	1605
27	11.4	33.1	1225
29	10.0	33.8	1425
30	9.7	34.0	1300
Oct. 1	10.3	33.3	1340
2	12.5	32.0	1300
5	12.8	32.0	1535
7	9.4	33.8	1225
9	10.0	33.7	1245
11	10.6	32.0	1100
12	10.8	31.8	1425

Date 1961	T °C	S ‰	Time PST
Oct. 14	11.7	32.8	0955
15	12.5	32.7	1025
17	12.8	33.2	1420
19	12.5	32.8	1550
22	10.8	32.5	0905
24	10.8	33.3	0915
26	11.1	32.0	0835
27	11.4	31.0	1525
28	11.4	32.4	1355
30	10.8	33.6	1120
Nov. 1	10.8	32.9	1125
2	11.1	32.1	1540
4	11.9	31.0	1440
5	10.8	32.1	1100
6	11.1	31.4	1250
8	10.8	33.1	1405
10	11.1	31.9	1230
11	11.1	32.4	1105
14	10.8	32.8	0815
15	10.3	34.1	1606
18	9.4	33.2	1020
19	9.4	33.2	1000
20	9.2	33.8	1025

Date 1961	T °C	S ‰	Time PST
Nov. 24	9.7	25.6	0910
25	9.4	30.4	1530
27	9.4	25.0	1330
29	10.0	29.3	1445
30	10.3	31.0	1650
Dec. 1	10.3	28.5	1255
3	10.3	32.7	0930
4	9.7	29.9	1015
6	10.3	33.2	1200
8	9.4	32.4	0940
9	10.0	33.7	0940
10	9.7	33.7	1130
12	9.2	33.6	1015
14	8.3	30.8	1505
17	8.9	31.1	0845
20	10.0	27.8	1215
21	10.0	28.1	1155
22	9.4	28.0	1450
23	9.4	26.3	1310
26	9.2	30.4	1210
27	9.7	29.3	1310
29	9.4	29.0	1255
30	9.2	31.4	0915

TABLE III. MONTHLY MEAN TEMPERATURE AND SALINITY

	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	MEAN
<u>COLUMBIA RIVER LIGHTSHIP</u>													
<u>TEMPERATURE °C</u>													
Mean	10.5	11.0	10.3	10.7	12.6	14.6	13.4	13.0	12.7	11.2			12.0
Max.	11.0	11.0	10.9	11.0	13.0	16.2	13.5	14.2	14.2	11.5			
Min.	10.0	11.0	9.9	10.4	11.9	14.1	13.2	11.9	12.2	11.2			
Range	1.0	0.0	1.0	0.6	1.1	2.1	0.3	2.3	2.0	0.3			
No. of Obs.	2	3	4	3	5	6	2	4	5	2			
<u>SALINITY ‰</u>													
Mean	31.94	27.78	30.44	22.46	21.56	17.35	25.99	26.85		23.21			25.29
Max.	32.00	32.36	32.27	25.44	31.76	28.82	28.77	27.57		23.21			
Min.	31.89	23.21	26.35	17.05	16.94	10.61	23.21	26.09		23.21			
Range	0.11	9.15	5.92	8.39	4.82	18.21	5.56	1.48		0.00			
No. of Obs.	2	2	4	3	4	6	2	3		1			
<u>SEASIDE AQUARIUM</u>													
<u>TEMPERATURE °C</u>													
Mean	9.4	10.3	10.6	11.0	12.6	14.0	14.4	12.9	12.4	11.1	9.5	8.9	11.4
Max.	10.0	11.1	11.7	11.9	14.3	17.5	18.0	16.0	15.0	12.9	10.8	9.7	
Min.	8.2	9.5	9.8	10.0	11.7	11.4	11.0	11.4	10.5	10.2	8.5	7.7	
Range	1.8	1.6	1.9	1.9	2.6	6.1	7.0	4.6	4.5	2.7	2.3	2.0	
No. of Obs.	31	28	32	30	33	30	31	30	30	28	22	31	
<u>SALINITY ‰</u>													
Mean			30.0	29.6	29.8	31.5	31.2	33.0	32.6	32.4	31.7	30.0	31.2
Max.			31.4	32.9	31.8	34.1	33.6	34.1	33.5	33.5	33.2	31.8	
Min.			26.9	26.8	26.0	27.6	27.7	31.6	31.6	30.8	29.8	26.1	
Range			4.5	6.1	5.8	6.5	5.9	2.5	1.9	2.7	2.9	5.7	
No. of Obs.			16	30	33	19	27	30	30	28	22	31	
<u>ARCH CAPE, OREGON</u>													
<u>TEMPERATURE °C</u>													
Mean	9.5	9.9	9.9	10.3	12.3	13.4	13.5	11.4	11.8	10.3	9.0	8.4	10.8
Max.	10.3	10.3	11.4	11.6	14.3	16.5	18.0	14.9	14.5	12.4	10.0	9.2	
Min.	8.3	9.0	8.5	9.2	10.6	10.0	9.5	8.4	9.5	9.1	8.0	7.8	
Range	2.0	1.3	2.9	2.4	3.7	6.5	8.5	6.5	5.0	3.3	2.0	1.4	
No. of Obs.	31	28	28	30	29	24	31	31	19	4	4	17	
<u>SALINITY ‰</u>													
Mean	31.18	32.93	31.98	30.25	30.43	30.73	30.06	32.93	32.22	32.23	31.62	30.20	31.40
Max.	32.95	33.17	33.19	32.03	31.24	33.28	32.95	33.17	33.19	33.01	32.10	32.21	
Min.	29.23	32.34	30.44	27.52	29.09	24.58	23.44	32.34	31.04	31.02	31.38	28.12	
Range	3.72	0.83	2.75	4.51	2.15	8.70	9.51	0.83	2.15	1.99	0.72	4.09	
No. of Obs.	4	4	3	5	4	4	5	4	5	4	4	5	
<u>NETARTS, OREGON</u>													
<u>TEMPERATURE °C</u>													
Mean	9.5	10.5	10.2	10.8	14.1	14.8			13.0	12.4	10.5	8.6	11.4
Max.	10.3	11.1	10.7	11.0	16.2	15.0			13.8	13.3	11.0	8.8	
Min.	8.0	10.2	9.2	10.5	11.3	14.7			12.3	11.4	9.9	8.4	
Range	2.3	0.9	1.5	0.5	4.9	0.3			1.5	1.9	1.1	0.2	
No. of Obs.	3	3	5	2	3	2			2	4	3	2	
<u>SALINITY ‰</u>													
Mean	30.96	29.33	28.74	30.36	30.26	31.96			32.20	31.90	31.79	31.31	30.88
Max.	30.97	30.01	31.58	31.64	30.48	32.29			32.47	31.96	32.09	31.31	
Min.	30.95	28.57	24.34	29.07	29.99	31.64			31.94	31.85	31.22	31.31	
Range	0.02	1.44	7.20	2.57	0.49	0.65			0.53	0.11	0.87	0.00	
No. of Obs.	3	3	5	2	3	2			2	4	3	1	

	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	MEAN
<u>GITER ROCK</u>													
TEMPERATURE °C													
Mean	10.2	10.8	10.4	11.3	12.7	12.8	13.3	11.9	11.6	10.9	10.0	9.3	11.3
Max.	10.9	11.1	11.5	12.4	13.4	14.1	15.1	12.7	12.5	12.8	11.7	10.4	
Min.	9.3	10.1	9.4	10.0	11.9	11.6	10.2	11.4	10.4	9.7	9.1	8.7	
Range	1.6	1.0	2.1	2.4	1.5	2.5	4.9	1.3	2.1	3.1	2.6	1.7	
No. of Obs.	4	4	4	5	4	4	5	4	4	5	4	5	
SALINITY ‰													
Mean	31.20	29.69	30.14	30.93	31.34	32.46	32.92	33.13	33.09	33.05	32.27	29.34	31.63
Max.	31.82	30.16	31.02	31.18	32.01	32.92	33.71	33.51	33.35	33.60	32.81	32.00	
Min.	30.68	29.09	29.74	30.48	30.81	31.40	30.90	32.70	32.70	32.50	31.62	24.27	
Range	1.14	1.07	1.28	0.70	1.20	1.52	2.81	0.81	0.65	1.10	1.19	7.73	
No. of Obs.	4	4	4	3	4	4	5	4	3	5	4	5	
<u>YACHATS</u>													
TEMPERATURE °C													
Mean	10.4	10.7	10.7	10.5	12.2			10.4	11.5	10.8	10.1	9.2	10.6
Max.	10.7	11.3	11.4	11.4	13.4			12.0	12.4	12.8	10.5	9.4	
Min.	10.2	10.4	9.8	10.1	10.9			9.2	10.1	9.4	9.4	8.9	
Range	0.5	0.9	1.6	1.3	2.5			2.8	2.3	3.4	1.1	0.5	
No. of Obs.	3	3	3	4	5			3	3	4	3	2	
SALINITY ‰													
Mean	30.78	29.83	30.10	31.86	30.11			33.60	33.42	32.94	32.17	29.95	31.48
Max.	31.09	29.83	31.04	32.45	31.89			33.78	33.55	33.51	32.50	31.29	
Min.	30.39	29.83	29.16	31.08	28.08			33.42	33.30	32.38	31.73	28.62	
Range	0.70	0.00	1.88	1.37	3.81			0.36	0.25	1.13	0.77	2.67	
No. of Obs.	3	1	2	3	5			3	2	2	3	2	
<u>HECATA BEACH</u>													
TEMPERATURE °C													
Mean		11.4		11.8	12.2	12.8	9.3						11.51
Max.		11.4		11.8	12.6	13.6	10.2						
Min.		11.4		11.8	12.0	12.1	8.8						
Range		0.0		0.0	0.6	1.5	1.4						
No. of Obs.		1		1	3	3	3						
SALINITY ‰													
Mean		25.34		30.06	29.21	31.53	33.26						29.88
Max.		25.34		30.59	30.99	31.92	33.44						
Min.		25.34		29.54	28.22	30.90	32.92						
Range		0.00		1.05	2.77	1.02	0.52						
No. of Obs.		1		2	3	3	3						
<u>HAUSER</u>													
TEMPERATURE °C													
Mean	8.2	8.7	8.3	8.9	9.7	9.3	9.0	8.3					8.8
Max.	8.9	9.3	8.6	9.7	10.4	11.9	11.7	8.9					
Min.	7.7	8.1	8.1	7.7	9.0	7.9	7.8	7.3					
Range	1.2	1.2	0.5	2.0	1.4	4.0	3.9	1.6					
No. of Obs.	5	3	3	5	2	4	5	3					
SALINITY ‰													
Mean				31.12	31.38	32.21	32.35	33.30					32.07
Max.				31.38	31.82	33.03	33.48	33.46					
Min.				30.86	30.93	31.06	29.45	33.10					
Range				0.52	0.89	1.97	3.03	0.36					
No. of Obs.				2	2	4	5	3					

	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	MEAN
BANDON													
TEMPERATURE °C													
Mean	10.6	11.2	9.7	11.0	12.8	12.2	11.2	11.3	11.4	10.2	10.2	9.6	11.0
Max.	11.2	12.4	9.7	12.1	13.8	13.2	11.5	12.3	12.5	12.3	10.6	10.5	
Min.	9.2	10.4	9.7	9.9	12.1	11.6	10.6	10.4	10.0	9.0	9.8	8.7	
Range	2.0	2.0	0	2.2	1.7	1.6	0.9	1.9	2.5	3.3	0.8	1.8	
No. of Obs.	23	4	1	3	3	4	4	4	5	4	2	4	
SALINITY ‰													
Mean	31.99	25.89	29.30	31.43	30.43	32.27	33.50	28.74	33.69	33.20	32.48	31.28	31.18
Max.	32.09	30.77	30.17	33.12	32.16	33.21	33.60	33.71	33.78	33.80	33.33	33.10	
Min.	31.78	21.17	28.80	30.17	28.64	31.69	33.42	20.16	33.60	32.61	30.18	28.39	
Range	0.31	9.60	1.37	2.95	3.52	1.52	0.18	13.55	0.18	1.19	3.15	4.71	
No. of Obs.	4	4	4	5	3	4	4	4	5	4	4	4	
HUMBURG MOUNTAIN													
TEMPERATURE °C													
Mean	10.5	11.2	10.8	9.2	12.0	10.9	11.2	12.6	11.0	10.6	9.4	9.5	10.7
Max.	11.1	11.3	11.8	11.2	13.7	11.7	13.1	14.0	12.5	12.7	9.8	9.8	
Min.	9.9	11.1	10.2	7.8	11.2	9.7	9.7	10.0	9.5	9.6	8.6	9.1	
Range	1.2	0.2	1.6	3.4	2.5	2.0	3.4	4.0	3.0	3.1	1.2	0.7	
No. of Obs.	5	2	5	4	5	3	3	4	4	4	4	3	
SALINITY ‰													
Mean	31.96	29.09	29.19	32.56	31.67	33.45	33.54	33.50	33.58	33.46	32.80	31.24	32.17
Max.	32.94	29.25	29.76	33.55	32.74	33.96	33.75	33.75	33.82	33.82	33.57	32.84	
Min.	31.29	28.93	28.64	30.64	31.27	32.84	33.22	33.30	33.33	32.90	30.73	29.31	
Range	1.65	0.32	1.12	2.91	1.47	1.12	0.53	0.45	0.49	0.90	2.84	3.53	
No. of Obs.	5	2	4	4	5	3	3	4	2	4	4	3	
BROOKINGS													
TEMPERATURE °C													
Mean	10.8	11.2	11.2	10.1	11.7	13.6	14.1	14.6	11.8	11.2		9.8	11.8
Max.	11.1	11.6	11.9	10.4	13.0	15.2	14.6	15.6	12.2	11.9		9.8	
Min.	10.4	10.8	10.6	9.8	10.1	12.4	13.6	14.0	11.5	10.5		9.8	
Range	0.7	0.8	1.3	0.6	2.9	2.8	1.0	1.6	0.7	1.4		0	
No. of Obs.	4	4	4	3	5	3	3	4	2	2		1	
SALINITY ‰													
Mean	31.94	28.09	28.76	31.98	31.15	32.01	33.07	33.18	33.32	33.76		29.74	31.54
Max.	32.70	30.53	31.15	33.13	33.22	32.74	33.24	33.30	33.46	33.87		29.74	
Min.	31.49	24.02	24.36	31.00	29.79	31.00	32.81	33.01	33.19	33.66		29.74	
Range	1.21	6.51	6.79	2.13	3.43	1.74	0.43	0.29	0.27	0.21		0.00	
No. of Obs.	4	4	4	3	5	3	3	4	2	2		1	
CRESCENT CITY													
TEMPERATURE °C													
Mean									11.8	11.3	10.4	9.6	10.8
Max.									17.2	12.8	11.9	10.3	
Min.									9.7	9.4	9.2	8.3	
Range									7.5	3.4	2.7	2.0	
No. of Obs.									16	17	18	18	
SALINITY ‰													
Mean									32.9	32.6	31.4	30.6	31.9
Max.									34.0	33.8	33.8	33.7	
Min.									31.5	31.0	25.0	26.3	
Range									2.5	2.8	8.8	7.4	
No. of Obs.									16	17	18	18	

DEPARTMENT OF DEFENSE

1 Director of Defense Research and Engineering
Attn: Coordinating Committee on Sciences
Pentagon
Washington 25, D. C.

Navy

2 Office of Naval Research
Geophysics Branch (Code 416)
Washington 25, D. C.

Office of Naval Research
Washington 25, D. C.
1 Attn: Biology Branch (Code 446)
1 Surface Branch (Code 463)
1 Undersea Warfare (Code 466)
1 Special Projects (Code 418)

1 Commanding Officer
Office of Naval Research Branch
495 Summer Street
Boston 10, Massachusetts

1 Commanding Officer
Office of Naval Research Branch
207 West 24th Street
New York 11, New York

1 Commanding Officer
Office of Naval Research Branch
The John Crerar Library Building
86 East Randolph Street
Chicago 1, Illinois

1 Commanding Officer
Office of Naval Research Branch
1000 Geary Street
San Francisco 9, California

1 Commanding Officer
Office of Naval Research Branch
1030 East Green Street
Pasadena 1, California

10 Commanding Officer
Office of Naval Research Branch
Navy #100, Fleet Post Office
New York, New York

1 Contract Administrator Southeast Area
Office of Naval Research
2110 G Street, N. W.
Washington 7, D. C.

1 Resident Representative
Office of Naval Research
University of Washington
Seattle 5, Washington

1 U. S. Navy Branch
Hydrographic Office
Navy 3923, Box 77
P.F.O., San Francisco, Calif.

6 Director
Naval Research Laboratory
Attn: Technical Services Information Officer
Washington 25, D. C.

8 Hydrographer
U. S. Navy Hydrographic Office
Washington 25, D. C.
Attn: Library (Code 1640)

Chief, Bureau of Ships
Department of the Navy
Washington 25, D. C.

1 Attn: Code 312
1 Code 341C
1 Code 631
1 Code 688

Chief, Bureau of Naval Weapons
Department of the Navy
Washington 25, D. C.
1 Attn: FASS
1 Attn: RU-222

1 Office of the U. S. Naval Weather Service
U. S. Naval Station
Washington 25, D. C.

1 Chief, Bureau of Yards and Docks
Office of Research
Department of the Navy
Washington 25, D. C.
Attn: Code 70

1 Commanding Officer and Director
U. S. Navy Electronics Laboratory
San Diego 52, California
1 Attn: Code 2201
1 Attn: Code 2420

1 Commanding Officer and Director
U. S. Naval Civil Engineering Laboratory
Port Hueneme, California
Attn: Code L54

1 Commander, Naval Ordnance Laboratory
White Oak, Silver Spring, Maryland
Attn: E. Liberman, Librarian

1 Commanding Officer
Naval Ordnance Test Station
China Lake, California
1 Attn: Code 753
1 Code 508

1 Commanding Officer
Naval Radiological Defense Laboratory
San Francisco, California

1 Commanding Officer
U. S. Naval Underwater Sound Laboratory
New London, Connecticut

1 Commanding Officer
U. S. Navy Air Development Center
Johnsville, Pennsylvania
Attn: NADC Library

1 Commanding Officer
U. S. Navy Mine Defense Laboratory
Panama City, Florida

1 Officer in Charge
U. S. Navy Weather Research Facility
Naval Air Station
Building R-48
Norfolk, Virginia

1 Superintendent
U. S. Naval Academy
Annapolis, Maryland

1 Code 3145, Box 7
Pt. Mugu Missile Range
Pt. Mugu, California

1 Department of Meteorology and Oceanography
U. S. Naval Postgraduate School
Monterey, California

Air Force

1 Hdqtrs., Air Weather Service (AWSSS/TIPD)
U. S. Air Force
Scott Air Force Base, Illinois

1 AFGR (GRZF)
L. G. Hanscom Field
Bedford, Massachusetts

Army

1 Army Research Office
Office of the Chief of R and D
Department of the Army
Washington 25, D. C.

1 U. S. Army Beach Erosion Board
5201 Little Falls Road, N. W.
Washington 16, D. C.

1 Director
U. S. Army Engineers Waterways Experiment Station
Vicksburg, Mississippi
Attn: Research Center Library

OTHER U. S. GOVERNMENT AGENCIES

1 Office of Technical Service
Department of Commerce
Washington 25, D. C.

1 U. S. Geological Survey
Washington 25, D. C.
Attn: James Trumbull

1 Director
National Oceanographic Data Center
Washington 25, D. C.

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

- 1 Laboratory Director
Bureau of Commercial Fisheries
Biological Laboratory
450-B Jordan Hall
Stanford, California
- 1 U. S. Bureau of Commercial Fisheries
Fish and Wildlife Service
P. O. Box 271
La Jolla, California
- 2 Library, U. S. Weather Bureau
Washington 25, D. C.
- 1 Commandant (OPU)
U. S. Coast Guard
Washington 25, D. C.
- 2 National Research Council
2101 Constitution Avenue
Washington 25, D. C.
Attn: Committee on Undersea Warfare
Committee on Oceanography
- 1 Commanding Officer
U. S. Coast Guard Oceanographic Unit
c/o Woods Hole Oceanographic Institution
Woods Hole, Massachusetts
- 1 Director
Coast and Geodetic Survey
U. S. Department of Commerce
Washington 25, D. C.
Attn: Office of Oceanography
- 1 Director of Meteorological Research
U. S. Weather Bureau
Washington 25, D. C.
- 2 Director, Bureau of Commercial Fisheries
U. S. Fish and Wildlife Service
Department of Interior
Washington 25, D. C.
- Bureau of Commercial Fisheries
U. S. Fish and Wildlife Service
Post Office Box 3830
Honolulu 12, Hawaii
- 1 Attn: Librarian
- 10 Armed Services Technical Information Agency
Arlington Hall Station
Arlington 12, Virginia
- RESEARCH LABORATORIES**
- 1 University of Pittsburgh
Environmental Sanitation
Department of Public Health Practice
Graduate School of Public Health
Pittsburgh 13, Pennsylvania
- 1 Stanford Research Institute
Department of Earth Sciences
Menlo Park, California
- 1 Oceanographic Institute
Florida State University
Tallahassee, Florida
- 1 Dr. F. B. Berger
General Precision Laboratory
Pleasantville, New York
- 2 Director
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts
- 1 Director, Marine Laboratory
University of Miami
#1 Rickenbacker Causeway
Virginia Key
Miami 49, Florida
- 1 Mr. Henry D. Simmons, Chief
Estuaries Section
Waterways Experiment Station
Corps of Engineers
Vicksburg, Mississippi
- 2 Head, Department of Oceanography and Meteorology
Texas A and M College
College Station, Texas
- 1 Director
Scripps Institution of Oceanography
La Jolla, California
- 1 Allan Hancock Foundation
University Park
Los Angeles 7, California
- 1 Department of Engineering
University of California
Berkeley, California
- 1 Head, Department of Oceanography
University of Washington
Seattle 5, Washington
- 1 Director, Hawaiian Marine Laboratory
University of Hawaii
Honolulu, Hawaii
- 1 Director
Arctic Research Laboratory
Barrow, Alaska
- 1 Geophysical Institute of the University of Alaska
College, Alaska
- 1 Director
Bermuda Biological Station for Research
St. Georges, Bermuda
- 1 Department of Meteorology and Oceanography
University of Hawaii
Honolulu 14, Hawaii
Attn: Dr. H. M. Johnson
- 1 Mail No. J-3009
The Martin Company
Baltimore 3, Maryland
Attn: J. D. Pierson
- 1 Applied Physics Laboratory
The Johns Hopkins University
8621 Georgia Avenue
Silver Spring, Maryland
Attn: Mr. George L. Selalstad
- 1 Dr. Harold Maslins
Rutgers University
New Brunswick, New Jersey
- 1 Director
Hudson Laboratories
145 Palisades Street
Dobbs Ferry, New York
- 1 Director
Chesapeake Bay Institute
Johns Hopkins University
121 Maryland Hall
Baltimore 18, Maryland
- 3 Project Officer
Laboratory of Oceanography
Woods Hole, Massachusetts
- 1 Department of Geodesy and Geophysics
Cambridge University
Cambridge, England
- 1 Bingham Oceanographic Laboratories
Yale University
New Haven, Connecticut
- 1 Head, Department of Oceanography
Oregon State University
Corvallis, Oregon
- 1 Chairman
Department of Meteorology and Oceanography
New York University
New York 53, New York
- 1 Gulf Coast Research Laboratory
Post Office Box
Ocean Springs, Mississippi
Attn: Librarian
- 1 Director
Lamont Geological Observatory
Torrey Cliff
Palisades, New York
- 1 Documents Division - ml
University of Illinois Library
Urbana, Illinois
- 1 Advanced Undersea Warfare Engineering
Advanced Electronics Center
General Electric Company
Ithaca, New York
- 1 Servicio de Hidrografia Naval
Sarmiento 2544-50 C.
Buenos Aires, Argentina
Attn: Nestor C. L. Granelli
Teniente de Navio
- 1 Director
Narragansett Marine Laboratory
University of Rhode Island
Kingston, Rhode Island
- 1 Great Lakes Research Division
Institute of Science & Technology
University of Michigan
Ann Arbor, Michigan
1 Attn: Dr. John C. Ayers
- 1 Dr. C. I. Beard
Sylvania Electric Defense Laboratory
P. O. Box 205
Mt. View, California
- 1 Technical Information Center,
CU-201
Lockheed Missile and Space Division
3251 Hanover Street
Palo Alto, California
- 1 James A. Gast
Wildlife Building
Humboldt State College
Arcata, California

July 1962

ADDITIONAL DISTRIBUTION

U. S. Army Engineer, District
Library
Corps of Engineers
628 Pittock Block
Portland 5, Oregon

Department of Conservation
Cornell University
Ithaca, New York
Attn: Dr. J. Ayers

University of North Carolina
Institute of Fisheries Research
Morehead City, N. C.

Director of Fisheries
Beach Road, Sea Point
Capetown, South Africa

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

Dr. John Lyman
Associate Program Director for
Earth Sciences (Oceanography)
National Science Foundation
Washington 25, D. C.

Dr. Richard Bader
Earth Sciences
National Science Foundation
Washington 25, D. C.

Director
Pacific Oceanographic Group
Nanaimo, B. C.
Canada

Fisheries Research Board of
Canada
Atlantic Oceanographic Group
5 Terminal Road
Halifax, N. S., Canada

U. S. Navy Electronics Laboratory
Code 2252
San Diego 52, California

Fisheries-Oceanography Library
203 Fisheries Center
c/o Mrs. Helen D. Strickland,
Librarian
University of Washington
Seattle 5, Washington

Exchange Service of the Station de
Biologie Marine
Grande-Riviere, Caspe Sud
P. Q., Canada

Mrs. Winona Richey
Library, Research Laboratory
Route 1, Box 31-A
Clackamas, Oregon

Dr. E. M. Baldwin
Department of Geology
University of Oregon
Eugene, Oregon

State of California Water Pollution
Control Board
Fisheries Project Leader
Humboldt State College
Arcata, California

American Geological Institute
2101 Constitution Ave., N. W.
Washington 25, D. C.
Attn: Martin Russell

U. S. Department of Commerce
Coast and Geodetic Survey
Washington 25, D. C.
Attn: Geodetic Branch
Mr. Hyman Orlin

Mr. Ray Morgan
Oregon Fish Commission
859 Olney Avenue
Astoria, Oregon

Mr. Douglas Manske
2274 Wyda Way
Sacramento 25, California

Bureau of Sports Fisheries & Wildlife
U. S. Fish & Wildlife Service
Sandy Hook Marine Laboratory
P. O. Box 428
Highlands, New Jersey
Attn: Librarian

Air Force Office of Scientific
Research
Washington 25, D. C.

U. S. Geological Survey
Crustals Studies Branch
Denver, Colorado
Attn: Low Pikiser

U. S. Geological Survey
Menlo Park, California
Attn: Mr. Snavely
Mr. Childs

U. S. Atomic Energy Commission
Richland, Washington
Attn: K. L. Englund, Chief
Radiation Sciences Branch

Environmental Sciences Branch
Division of Biology and Medicine,
E-201

U. S. Atomic Energy Commission
Washington 25, D. C.
Attn: Dr. I. E. Wallen

National Science Foundation
Environmental Biology Division
Washington 25, D. C.

National Science Foundation
Systematic Biology
Washington 25, D. C.

Senator Warren Magnuson
Attn: Mr. Daniel Markel
Senate Office Building
Washington 25, D. C.