

DENSITY OF SEA WATER

AT COAST AND GEODETIC SURVEY TIDE STATIONS

PACIFIC OCEAN

SPECIAL PUBLICATION NO. 281

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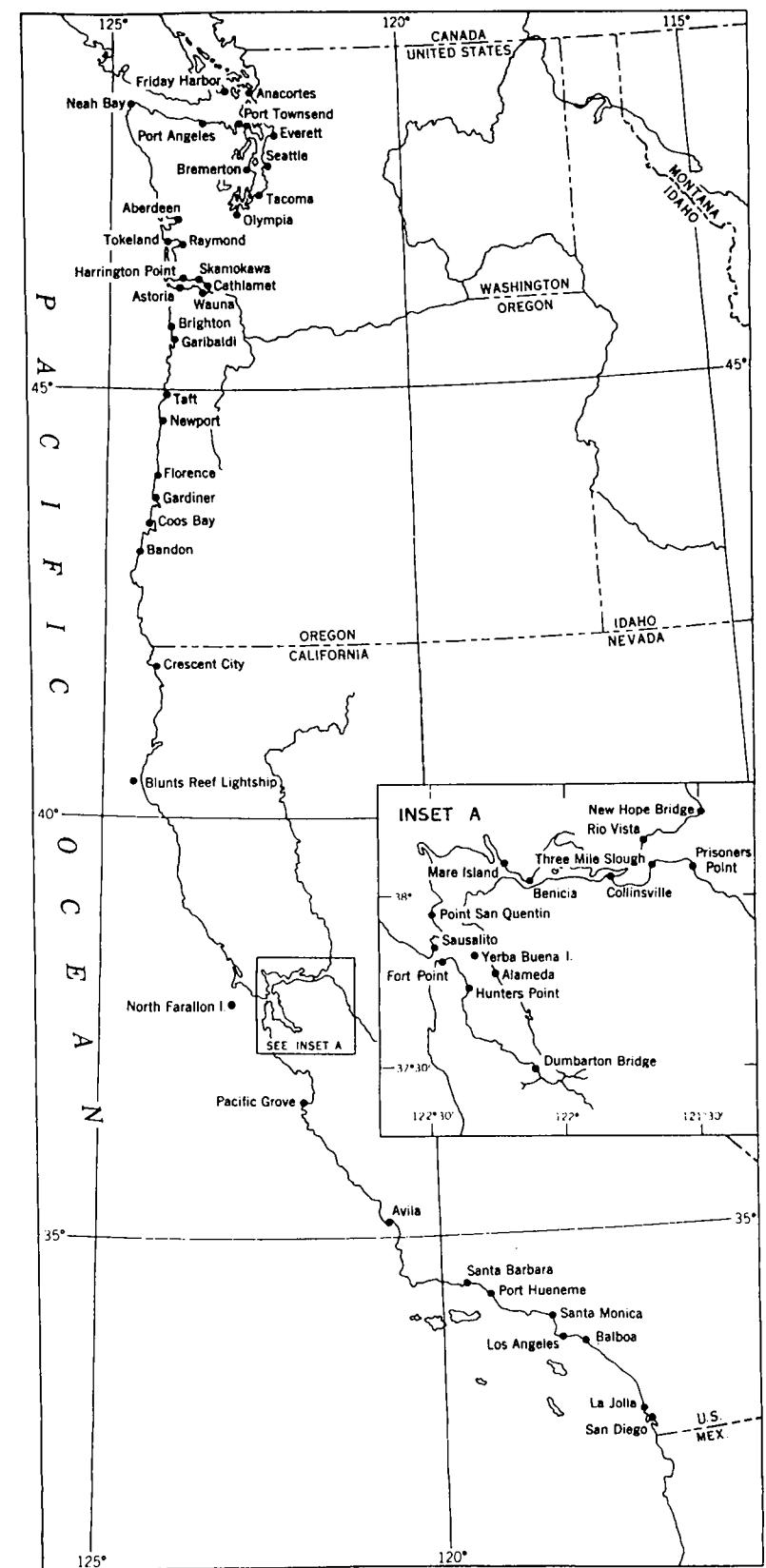
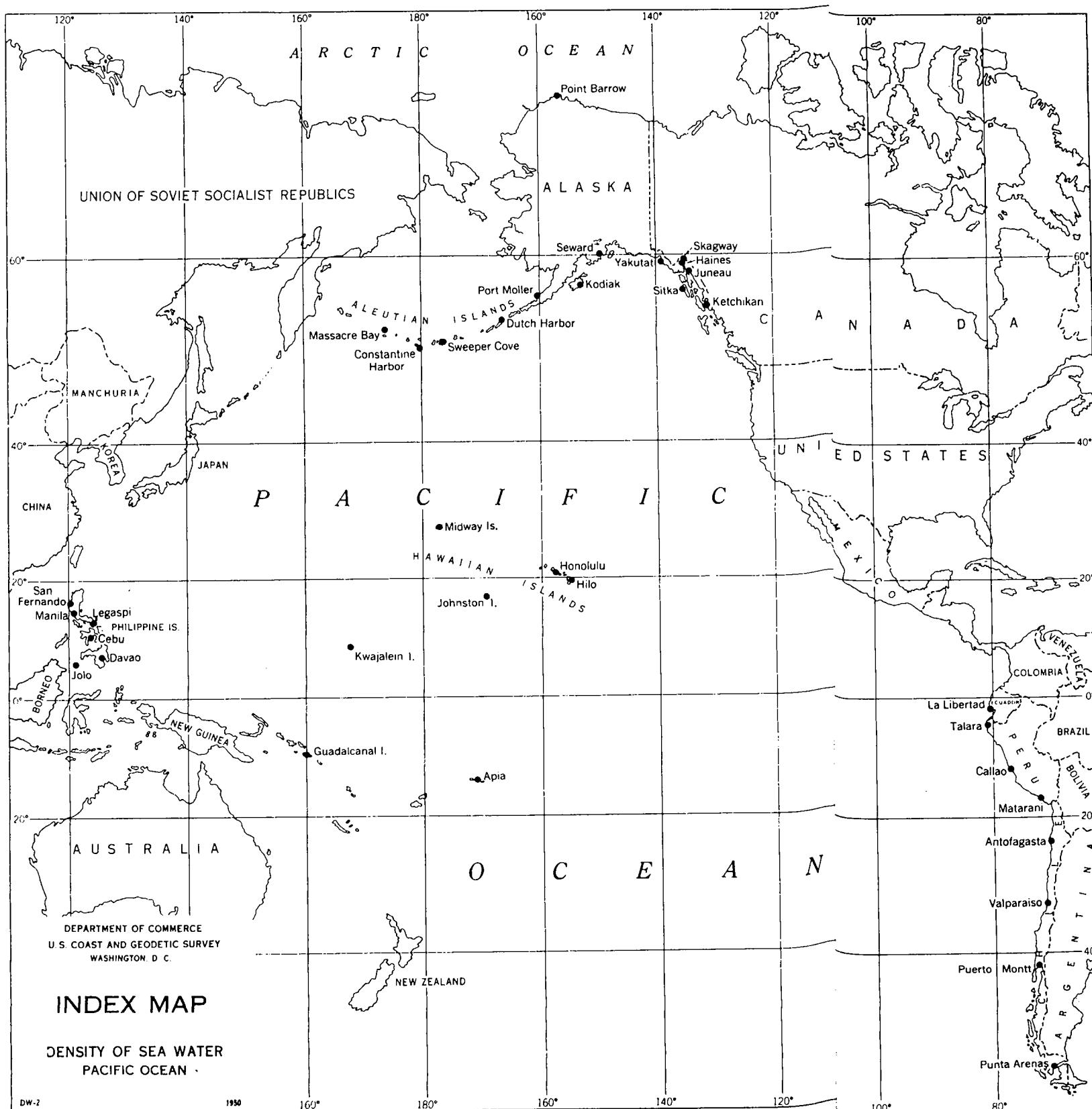
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LIST OF STATIONS

Station	Lat.	Long.	Page
	° '	° '	
CALIFORNIA	North	West	
San Diego -----	32 42	117 14	7
La Jolla -----	32 52	117 15	7
Balboa -----	33 36	117 54	33
Los Angeles (Outer Harbor) -----	33 43	118 16	8
Santa Monica -----	34 00	118 30	9
Port Hueneme -----	34 09	119 12	33
Santa Barbara -----	34 25	119 41	9
Avila -----	35 10	120 44	10
Pacific Grove -----	36 38	121 55	33
North Farallon Island -----	37 46	123 06	33
<i>San Francisco Bay and Tributaries</i>			
San Francisco (Fort Point) -----	37 48	122 28	10
Yerba Buena Island -----	37 49	122 22	11
Alameda (Naval Air Station) -----	37 47	122 18	11
San Francisco (Hunters Point) -----	37 44	122 22	12
Dumbarton Bridge -----	37 30	122 07	12
Sausalito -----	37 51	122 29	12
Point San Quentin -----	37 57	122 29	12
Mare Island (Navy Yard) -----	38 06	122 16	12
Benicia, Carquinez Strait -----	38 03	122 08	12
Three Mile Slough, San Joaquin River -----	38 05	121 41	12
Prisoners Point, San Joaquin River -----	38 04	121 33	12
Collinsville, Sacramento River -----	38 04	121 51	13
Rio Vista, Sacramento River -----	38 09	121 42	13
New Hope Bridge, Mokelumne River -----	38 14	121 29	13
Blunts Reef Lightship -----	40 26	124 30	33
Crescent City -----	41 45	124 12	13
<i>OREGON</i>			
Bandon, Coquille River -----	43 07	124 25	14
Coos Bay entrance -----	43 21	124 19	14
Gardiner, Umpqua River -----	43 44	124 07	14
Florence, Siuslaw River -----	43 58	124 06	14
Newport, Yaquina Bay -----	44 38	124 03	14
Taft, Siletz Bay -----	44 56	124 01	15
Garibaldi, Tillamook Bay -----	45 33	123 54	15
Brighton, Nehalem River -----	45 40	123 56	15
<i>Columbia River</i>			
Astoria (Tongue Point) -----	46 13	123 46	15
Wauna -----	46 10	123 24	16
<i>WASHINGTON</i>			
<i>Columbia River</i>			
Harrington Point -----	46 16	123 39	16
Skamokawa -----	46 16	123 27	16
Cathlamet -----	46 12	123 23	16
Tokeland, Willapa Bay -----	46 42	123 58	17
Raymond, Willapa Bay -----	46 41	123 45	17
Aberdeen, Grays Harbor -----	46 58	123 51	17
<i>Puget Sound and Approaches</i>			
Neah Bay -----	48 22	124 37	18
Port Angeles -----	48 08	123 26	18
Port Townsend (Fort Worden) -----	48 08	122 46	18
Everett -----	47 59	122 13	19

LIST OF STATIONS -- *Continued*

Station	Lat. ° ° North	Long. ° ° West	Page
WASHINGTON - <i>Continued</i>			
Puget Sound and Approaches - <i>Continued</i>			
Bremerton -----	47 34	122 38	19
Seattle (Elliott Bay) -----	47 36	122 20	19
Seattle (Duwamish River) -----	47 32	122 19	20
Tacoma -----	47 17	122 25	20
Olympia -----	47 03	122 54	20
Anacortes -----	48 31	122 37	20
Friday Harbor, San Juan Island -----	48 33	123 00	21
ALASKA			
Ketchikan -----	55 20	131 38	21
Sitka -----	57 03	135 20	22
Juneau -----	58 18	134 25	23
Haines -----	59 14	135 26	23
Skagway -----	59 27	135 19	24
Yakutat -----	59 33	139 44	24
Seward -----	60 06	149 27	24
Kodiak -----	57 47	152 24	25
Dutch Harbor, Unalaska Island -----	53 54	166 32	25
Sweeper Cove, Adak Island -----	51 51	176 39	26
Constantine Harbor, Amchitka Island -----	51 25	180 43	26
Massacre Bay, Attu Island -----	52 50	186 48	26
Port Moller -----	55 59	160 34	27
Point Barrow (Ocean) -----	71 23	156 27	27
Point Barrow (Elson Lagoon) -----	71 23	156 27	27
HAWAIIAN ISLANDS			
Midway Islands -----	28 12	177 22	27
Honolulu -----	21 18	157 52	27
Hilo -----	19 44	155 03	28
Johnston Island -----	16 45	169 31	28
SOUTHWEST PACIFIC ISLANDS			
Apia (observatory), Samoa Islands -----	13 48	171 46	28
South East			
Kukum, Guadalcanal Island, Solomon Islands -----	9 26	160 00	28
North East			
Kwajalein Island, Marshall Islands -----	8 44	167 44	28
PHILIPPINE ISLANDS			
Manila, Luzon Island -----	14 35	120 58	28
San Fernando, Luzon Island -----	16 37	120 18	29
Legaspi, Luzon Island -----	13 09	123 45	29
Cebu, Cebu Island -----	10 18	123 54	29
Davao, Mindanao Island -----	7 05	125 38	29
Jolo, Jolo Island -----	6 04	121 00	30
SOUTH AMERICA			
Punta Arenas, Magellan Strait, Chile -----	53 09	70 54	30
Puerto Montt, Chile -----	41 29	72 58	30
Valparaiso, Chile -----	33 02	71 38	31
Antofagasta, Chile -----	23 39	70 25	31
Matarani, Peru -----	17 00	72 07	31
Callao, Peru -----	12 03	77 09	32
Talara, Peru -----	4 35	81 17	32
La Libertad, Ecuador -----	2 13	80 55	32

INTRODUCTION

The monthly mean and yearly mean and extreme densities of sea water given on the following pages are based on observations made in Pacific harbor and coastal waters through the year 1949. The densities were observed primarily at tide stations maintained by the U. S. Coast and Geodetic Survey in the United States and possessions and at stations maintained cooperatively in other countries.

The observations were made by drawing a sample of water from near the surface and observing its density by means of a hydrometer. They are usually made once each weekday at whatever time the observer attends the tide gage. It may be assumed that in the course of a month or a year the distribution of observations is fairly uniform over all phases of the tide. At some stations situated within or near the entrance of an estuary, the density changes with the rise and fall of the tide or the flood and ebb of the tidal current.

The densities are given with respect to the density of pure water at a temperature of 4°C (39.2°F) as unity. The actual density of the water may vary from a little less than unity for fresh water at a temperature other than 4°C to approximately 1.0310 for the heaviest sea water. Since the density of sea water, as observed, depends not only upon the amount of soluble matter contained in a unit volume but also upon the temperature of the water at the time the reading was made, it is necessary to reduce the observed densities to some standard temperature in order that they may be comparable. In this publication the observed densities have been reduced to a standard temperature of 15°C (59°F). The density of pure water free from air at a temperature of 15°C is 0.9991.

The salinity of sea water is defined as the number of grams of salts contained in 1000 grams of sea water. Salinity can be determined by several different methods, one of the simplest being based upon the density of the water as obtained from the use of the hydrometer. The table on the inside back cover gives the salinity corresponding to different values of density at the standard temperature of 15°C to which all densities in this publication are referred.

The principal table contains monthly mean densities and means for each year for which there are twelve monthly means. Maximum and minimum densities are shown for each year in which observations were made whether or not the observations covered the whole year. In all cases the extremes are from the months of the year for which means are given. If they are from an incomplete year, they are followed by an asterisk. Below each series that covers two or more years, mean and extreme densities for the series are given on the line labeled "Mean Density". The next line gives the corresponding salinities.

A supplemental table shows mean salinities for some additional places along the California coast. It was furnished by The Scripps Institution of Oceanography.

Following the tables are graphs of monthly mean salinities which show at a glance the seasonal variation for many of the places listed in the principal table.

The following publications complete this series:

Special Pub. 278. Surface Water Temperatures, Atlantic Coast, North and South America.

Special Pub. 279. Density of Sea Water, Atlantic Coast.

Special Pub. 280. Surface Water Temperatures, Pacific Ocean.

Density of Sea Water
Means and Extremes

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.
SAN DIEGO, CALIF.															
1922	1.0240	1.0240	1.0241	1.0244	1.0247	1.0249	1.0251	1.0252	1.0251	1.0248	1.0248	1.0246	1.0246	1.0258	1.0228
1923	246	246	248	249	251	251	255	256	253	250	250	248	250	261	240
1924	248	249	249	249	251	251	253	251	252	250	250	247	250	261	237
1925	248	249	251	251	253	253	254	251	249	246	247	246	250	258	240
Mean Density	1.0246	1.0246	1.0247	1.0248	1.0250	1.0251	1.0253	1.0252	1.0251	1.0248	1.0249	1.0247	1.0249	1.0261	1.0228
Salinity	33.2	33.2	33.3	33.4	33.7	33.8	34.1	34.0	33.8	33.4	33.6	33.3	33.6	35.1	30.8
LA JOLLA, CALIF.															
1925	1.0250	1.0249	1.0249	1.0249	1.0250	1.0251	1.0251	1.0252	1.0248	1.0246	1.0248	1.0248	1.0249	1.0256	1.0240
1926	249	249	249	247	249	250	250	249	248	249	249	248	249	251	243
1927	248	243	245	248	248	249	249	250	250	249	249	248	248	250	224
1928	248	248	248	249	249	249	250	250	249	249	249	248	249	251	247
1929	249	249	249	249	250	250	251	250	249	249	250	250	250	252	248
1930	249	249	249	249	249	250	250	250	250	250	250	251	250	252	248
1931	251	250	251	251	250	251	252	251	250	250	250	250	251	252	249
1932	249	246	247	249	250	250	250	249	249	248	249	248	249	250	240
1933	248	248	248	249	250	251	250	250	250	250	250	249	249	251	245
1934	249	248	248	249	250	250	250	249	249	248	248	248	249	251	246
1935	248	247	248	248	249	249	249	249	248	248	248	249	248	250	241
1936	248	247	248	249	249	250	250	250	250	248	249	248	249	251	244
1937	248	246	245	247	249	250	250	250	250	250	250	249	249	251	237
1938	250	249	246	249	250	250	250	250	249	249	249	248	249	251	234
1939	248	248	249	249	250	251	251	251	249	250	250	250	250	252	243
1940	250	249	249	249	250	250	249	250	249	248	248	247	249	251	244
1941	247	247	244	243	246	248	249	248	248	247	247	247	247	250	239
1942	247	247	247	248	249	249	249	249	249	249	249	248	248	250	242
1943	248	247	246	248	250	250	250	250	249	249	249	248	249	250	244
1944	248	247	246	248	249	250	250	250	250	250	249	249	249	250	244

Density of Sea Water - *Continued*
Means and Extremes

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Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.
LA JOLLA, CALIF. - Continued															
1945	1.0249	1.0248	1.0248	1.0249	1.0250	1.0250	1.0250	1.0250	1.0249	1.0249	1.0249	1.0248	1.0249	1.0251	1.0245
1946	249	249	249	249	250	250	250	249	249	249	249	249	249	251	247
1947	249	249	249	249	250	249	249	249	249	249	249	248	249	250	247
1948	249	249	249	249	249	249	249	249	249	249	249	249	249	250	247
1949	248	248	249	249	249	249	250	250	249	249	249	249	249	250	246
Mean Density	1.0249	1.0248	1.0248	1.0248	1.0249	1.0250	1.0250	1.0249	1.0249	1.0249	1.0249	1.0249	1.0249	1.0256	1.0224
Salinity	33.6	33.4	33.4	33.4	33.6	33.7	33.7	33.7	33.6	33.6	33.6	33.6	33.6	34.5	30.3
LOS ANGELES (Outer Harbor), CALIF.															
1924	1.0248	1.0249	1.0248	1.0247	1.0249	1.0247	1.0248	1.0249	1.0247	1.0246	1.0247	1.0248	1.0248	1.0254	1.0244
1925	247	247	246	246	247	246	245	245	244	243	243	244	245	250	242
1926	245	243	244	240	244	245	246	247	246	245	245	245	245	250	208
1927	246	233	244	247	250	251	248	250	249	250	247	248	247	258	191
1928	248	248	248	251	250	250	249	250	248	248	249	249	249	254	241
1929	250	249	249	250	251	252	252	252	251	251	251	250	251	256	247
1930	247	249	249	251	251	251	252	252	252	251	251	252	251	255	241
1931	252	250	253	252	252	252	252	252	250	251	250	248	251	257	240
1932	247	244	249	251	251	250	250	249	249	248	---	248	---	255*	228*
1933	247	247	249	249	250	251	251	251	250	250	251	250	250	256	239
1934	243	247	248	249	249	249	250	250	248	249	248	247	248	253	201
1935	245	246	246	247	248	249	249	250	248	248	248	248	248	254	242
1936	248	247	247	249	250	251	251	251	249	249	250	248	249	255	242
1937	246	241	246	248	250	249	251	250	251	249	251	250	248	257	223
1938	249	246	238	248	251	252	252	252	250	249	249	244	248	256	186
1939	247	248	249	251	251	252	252	252	252	251	251	252	251	257	242

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.
SANTA MONICA, CALIF.															
1946	1.0249	1.0250	1.0251	1.0252	1.0251	1.0252	1.0253	1.0251	1.0252	1.0249	1.0249	1.0248	1.0251	1.0263	1.0230
1947	248	248	251	252	250	250	251	248	249	250	249	248	250	273	240
1948	247	247	247	249	251	250	250	251	248	248	247	247	248	256	239
1949	247	246	247	249	251	253	253	249	251	251	251	250	250	260	227
Mean Density	1.0247	1.0246	1.0247	1.0249	1.0250	1.0250	1.0250	1.0250	1.0249	1.0249	1.0248	1.0249	1.0259	1.0168	
Salinity	33.3	33.2	33.3	33.6	33.7	33.7	33.7	33.7	33.7	33.6	33.6	33.4	33.6	34.9	23.0
SANTA BARBARA, CALIF.															
1930	---	---	1.0251	1.0253	1.0253	1.0254	1.0254	1.0254	1.0254	1.0251	1.0252	1.0252	---	1.0262*	1.0244*
1931	1.0251	1.0253	253	254	253	254	255	255	253	253	252	249	1.0253	260	221
1932	250	247	251	252	254	255	---	---	---	---	---	---	---	260*	216*
Mean Density	1.0250	1.0250	1.0252	1.0253	1.0253	1.0254	1.0254	1.0254	1.0254	1.0252	1.0252	1.0251	1.0252	1.0262	1.0216
Salinity	33.7	33.7	34.0	34.1	34.1	34.2	34.2	34.2	34.1	34.0	34.0	33.8	34.0	35.3	29.3

*Observations for the year are incomplete; extremes are for the months shown.

Density of Sea Water - *Continued*

Means and Extremes

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Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.
AVILA, CALIF.															
1945	---	---	---	---	---	1.0257	1.0256	1.0258	1.0256	1.0253	1.0253	1.0251	---	1.0263*	1.0248*
1946	1.0251	1.0250	1.0252	1.0253	1.0253	254	254	253	252	250	249	247	1.0252	259	240
1947	248	249	250	251	253	250	252	255	252	252	250	252	251	266	244
1948	251	251	252	250	254	254	252	251	250	250	249	249	251	260	246
1949	248	249	249	252	251	252	251	250	252	250	250	250	250	259	239
Mean Density	1.0250	1.0250	1.0251	1.0252	1.0253	1.0253	1.0253	1.0253	1.0252	1.0251	1.0250	1.0250	1.0252	1.0266	1.0239
Salinity	33.7	33.7	33.8	34.0	34.1	34.1	34.1	34.1	34.0	33.8	33.7	33.7	34.0	35.8	32.3
SAN FRANCISCO (Fort Point), CALIF.															
1922	1.0218	1.0204	1.0180	1.0189	1.0173	1.0170	1.0207	1.0224	1.0231	1.0231	1.0227	1.0214	1.0206	1.0236	1.0124
1923	208	204	210	198	201	204	219	232	238	234	232	231	218	240	158
1924	231	225	223	229	232	238	245	247	249	249	241	230	237	251	210
1925	225	195	196	186	187	200	226	234	237	236	229	228	215	241	149
1926	228	196	200	183	203	223	232	243	242	242	239	213	220	246	132
1927	219	178	168	179	187	196	214	230	238	238	229	225	208	240	110
1928	220	208	206	180	211	222	233	240	241	239	235	228	222	244	125
1929	224	217	218	222	221	224	236	241	241	242	240	231	230	246	194
1930	215	217	191	201	213	227	237	242	241	242	240	234	225	245	164
1931	229	228	224	229	235	241	247	251	250	252	251	241	240	257	214
1932	209	199	210	210	202	203	216	232	237	237	238	235	219	243	148
1933	231	222	220	210	218	218	232	239	242	244	240	237	229	246	180
1934	213	222	212	217	227	235	241	246	251	246	240	229	232	256	178
1935	211	211	201	174	174	185	217	232	237	239	233	231	212	242	124
1936	211	197	170	187	187	200	224	235	238	236	234	232	213	241	114
1937	227	201	173	159	181	196	222	234	239	236	230	198	208	243	98
1938	200	150	131	147	157	167	203	224	230	231	228	224	191	243	50
1939	223	223	222	213	225	234	242	245	248	244	242	236	233	255	200

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.
YERBA BUENA ISLAND, SAN FRANCISCO BAY, CALIF.															
1937	1.0215	1.0187	1.0143	1.0139	---	---	1.0214	1.0227	1.0235	1.0235	---	---	---	1.0239*	1.0079*
ALAMEDA (Naval Air Station), CALIF.															
1940	1.0174	1.0146	1.0100	1.0098	1.0142	1.0173	1.0196	1.0217	1.0226	1.0228	1.0219	1.0208	1.0177	1.0232	1.0012
1941	128	103	92	108	126	151	180	197	212	219	223	188	161	229	074
1942	148	093	128	133	140	152	176	200	214	216	210	198	167	220	071
1943	164	121	113	122	146	168	193	209	219	226	217	214	176	231	086
1944	206	181	170	184	187	196	210	222	232	232	212	202	203	238	116
1945	194	154	163	171	170	187	202	216	222	217	205	186	190	228	120
1946	137	163	174	176	176	189	208	220	224	221	215	198	192	239	118
1947	200	195	180	185	203	212	224	234	245	230	217	218	212	250	151
1948	216	201	206	178	160	169	191	209	220	218	211	209	199	227	146
1949	204	196	171	175	184	198	212	224	227	224	217	216	204	232	125
Mean Density	1.0177	1.0155	1.0150	1.0153	1.0163	1.0180	1.0199	1.0215	1.0224	1.0223	1.0215	1.0204	1.0188	1.0250	1.0012
Salinity	24.2	21.3	20.6	21.0	22.4	24.6	27.1	29.1	30.3	30.2	29.1	27.7	25.6	33.7	2.6

*Observations for the year are incomplete; extremes are for the months shown.

Density of Sea Water - *Continued*

Means and Extremes

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.
SAN FRANCISCO (Hunters Point), CALIF.															
1945	---	1.0156	1.0183	1.0186	1.0162	1.0198	1.0210	1.0222	1.0226	1.0224	1.0212	1.0185	---	1.0240*	1.0119*
1946	1.0144	185	191	189	186	199	222	230	229	229	---	---	---	237*	110*
DUMBARTON BRIDGE, SAN FRANCISCO BAY, CALIF.															
1937	1.0236	1.0195	1.0146	1.0114	1.0144	1.0164	1.0183	1.0204	1.0218	1.0222	---	---	---	1.0261*	1.0091*
SAUSALITO, CALIF.															
1937	1.0224	1.0224	1.0224	1.0208	1.0161	1.0157	1.0194	1.0198	1.0200	1.0200	---	---	---	1.0238*	1.0122*
POINT SAN QUENTIN, SAN FRANCISCO BAY, CALIF.															
1937	1.0174	1.0102	1.0078	1.0069	1.0084	1.0113	1.0167	1.0203	1.0201	1.0198	1.0194	---	---	1.0220*	1.0004*
MARE ISLAND (Navy Yard), CALIF.															
1937	1.0108	1.0028	1.0023	1.0012	1.0017	1.0029	1.0092	1.0140	1.0159	1.0147	---	---	---	1.0165*	0.9993*
BENICIA, CARQUINEZ STRAIT, CALIF.															
1937	1.0074	1.0012	1.0001	1.0003	1.0005	1.0010	1.0025	1.0084	1.0125	1.0104	1.0101	---	---	1.0135*	0.9995*
THREE MILE SLOUGH, SAN JOAQUIN RIVER, CALIF.															
1938	---	---	---	---	---	---	---	---	---	0.9996	0.9995	0.9996	---	0.9998*	0.9992*
1939	0.9996	0.9995	0.9999	0.9999	0.9999	1.0000	1.0012	1.0043	1.0037	1.0011	1.0002	0.9995	1.0007	1.0068	0.9993
1940	0.9993	0.9994	0.9995	0.9994	0.9999	0.9999	---	---	---	---	---	---	---	1.0002*	0.9990*
PRISONERS POINT, SAN JOAQUIN RIVER, CALIF.															
1939	---	---	---	---	---	---	---	1.0059	1.0014	1.0005	1.0000	0.9997	---	1.0117*	0.9995*
1940	0.9993	0.9992	0.9991	0.9994	0.9999	0.9994	---	---	---	---	---	---	---	1.0009*	0.9989*

COLLINSVILLE, SACRAMENTO RIVER, CALIF.															
1937	0.9999	0.9995	0.9997	0.9999	1.0001	0.9998	1.0005	1.0033	1.0050	1.0021	1.0000	0.9994	1.0008	1.0070	0.9992
RIO VISTA, SACRAMENTO RIVER, CALIF.															
1938	---	---	0.9995	0.9995	0.9995	0.9995	0.9995	0.9994	0.9995	0.9993	0.9992	0.9991	---	1.0000*	0.9988*
1939	0.9991	0.9990	0.9991	0.9992	0.9991	0.9991	1.0000	1.0030	1.0020	0.9998	0.9992	0.9990	0.9998	1.0049	0.9986
1940	0.9990	0.9991	0.9993	0.9992	0.9992	0.9991	---	---	---	---	---	---	---	0.9998*	0.9988*
Mean Density	0.9990	0.9990	0.9993	0.9993	0.9993	0.9992	0.9998	1.0012	1.0008	0.9996	0.9992	0.9990	0.9996	1.0049	0.9986
Salinity	0.0	0.0	0.1	0.1	0.1	0.0	0.8	2.6	2.1	0.5	0.0	0.0	0.5	7.5	0.0
NEW HOPE BRIDGE, MOKELEMNE RIVER, CALIF.															
1938	---	---	---	0.9995	0.9996	1.0006	0.9995	0.9994	0.9992	0.9994	0.9994	0.9993	---	1.0012*	0.9985*
1939	0.9993	0.9994	0.9995	0.9997	0.9996	0.9998	1.0003	1.0004	0.9996	0.9994	0.9992	0.9993	0.9996	1.0009	0.9984
1940	0.9993	0.9992	0.9994	0.9995	0.9996	1.0001	---	---	---	---	---	---	---	1.0010*	0.9990*
Mean Density	0.9993	0.9993	0.9994	0.9996	0.9996	1.0002	0.9999	0.9999	0.9994	0.9994	0.9993	0.9993	0.9996	1.0012	0.9984
Salinity	0.1	0.1	0.3	0.5	0.5	1.3	0.9	0.9	0.3	0.3	0.1	0.1	0.5	2.6	0.0
CRESCENT CITY, CALIF.															
1934	1.0195	1.0222	1.0217	1.0230	1.0229	1.0243	1.0239	1.0239	1.0240	1.0238	1.0210	1.0209	1.0226	1.0283	1.0127
1935	198	200	191	199	223	234	239	236	236	222	232	224	220	270	094
1936	189	195	218	214	219	224	231	233	244	246	245	238	225	251	113
1937	226	227	215	175	231	208	235	243	243	240	194	211	221	251	097
1938	212	168	175	218	230	221	239	244	247	243	234	228	222	261	102
1939	237	224	201	226	238	241	243	243	243	240	243	226	234	252	096
1940	203	183	193	225	225	245	238	242	239	239	229	229	224	269	117
1941	189	201	203	199	201	214	215	227	232	240	230	194	212	252	105
1942	210	211	232	230	217	220	233	240	236	242	212	184	222	254	097
1943	189	192	199	211	236	229	238	236	242	246	233	239	224	258	104
1944	231	227	235	227	232	235	244	242	243	245	223	224	234	256	169

*Observations for the year are incomplete; extremes are for the months shown.

Density of Sea Water - Continued

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Means and Extremes

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.	
CRESCENT CITY, CALIF. - Continued																
1945	1.0219	1.0221	1.0227	1.0239	1.0211	1.0244	1.0240	1.0243	1.0247	---	1.0211	1.0205	---	1.0256*	1.0147*	
1946	206	220	223	224	221	234	244	240	240	242	230	228	229	257	154	
1947	238	223	224	231	243	242	241	---	240	---	---	---	---	254*	176*	
Mean Density	1.0210	1.0208	1.0211	1.0218	1.0225	1.0231	1.0237	1.0239	1.0241	1.0240	1.0225	1.0218	1.0225	1.0283	1.0094	
Salinity	28.5	28.2	28.6	29.5	30.4	31.2	32.0	32.3	32.5	32.4	30.4	29.5	30.4	38.0	13.3	
BANDON, COQUILLE RIVER, ORE.																
1933	---	---	---	---	---	---	---	1.0229	1.0228	1.0227	1.0216	1.0096	---	1.0254*	0.9994*	
1934	1.0046	1.0083	1.0106	---	---	---	---	---	---	---	---	---	---	1.0242*	0.9987*	
COOS BAY ENTRANCE, ORE.																
1933	---	---	---	1.0220	1.0160	1.0235	1.0262	1.0262	1.0257	---	---	1.0175	---	1.0271*	1.0075*	
1934	1.0163	1.0205	1.0201	---	---	---	---	---	---	---	---	---	---	1.0230*	1.0037*	
GARDINER, UMPQUA RIVER, ORE.																
1933	---	---	---	---	---	---	---	1.0009	1.0091	1.0134	1.0110	1.0117	1.0082	1.0004	1.0180*	0.9989*
1934	0.9995	1.0016	1.0015	---	---	---	---	---	---	---	---	---	---	1.0103*	0.9988*	
FLORENCE, SIUSLAW RIVER, ORE.																
1933	---	---	---	---	---	---	---	---	1.0163	1.0128	1.0104	1.0024	---	1.0209*	0.9995*	
1934	1.0023	1.0092	1.0061	---	---	---	---	---	---	---	---	---	---	1.0237*	0.9994*	
NEWPORT, YAQUINA BAY, ORE.																
1933	---	---	---	1.0159	1.0172	1.0212	1.0243	1.0248	1.0244	1.0240	1.0226	---	---	1.0258*	0.9998*	
1934	1.0172	1.0213	1.0214	---	---	---	---	---	---	---	---	---	---	1.0239*	1.0039*	

TAFT, SILETZ BAY, ORE.															
1933	---	---	---	---	---	1.0104	1.0221	1.0219	1.0213	1.0177	1.0149	1.0031	---	1.0252*	0.9989*
1934	1.0034	1.0151	1.0087	1.0143	---	---	---	---	---	---	---	---	---	1.0245*	0.9989*
GARIBALDI, TILLAMOOK BAY, ORE.															
1933	---	---	---	---	1.0119	1.0168	1.0224	1.0229	1.0173	1.0123	1.0113	---	---	1.0253*	1.0006*
1934	---	1.0147	1.0131	1.0121	---	---	---	---	---	---	---	---	---	1.0248*	1.0001*
BRIGHTON, NEHALEM RIVER, ORE.															
1933	---	---	---	---	1.0089	1.0099	1.0191	1.0202	1.0200	1.0171	1.0155	1.0043	---	1.0282*	0.9991*
1934	1.0041	1.0139	1.0106	1.0117	---	---	---	---	---	---	---	---	---	1.0240*	0.9985*
ASTORIA (Tongue Point), ORE.															
1925	0.9991	0.9987	0.9991	0.9993	0.9996	0.9997	0.9999	0.9995	0.9999	1.0008	1.0018	1.0007	0.9998	1.0073	0.9984
1926	1.0021	1.0005	1.0000	1.0005	0.9999	0.9999	0.9999	1.0005	1.0006	1.0008	1.0002	0.9996	1.0004	1.0062	0.9991
1927	1.0004	0.9997	0.9998	0.9998	0.9995	0.9997	0.9995	0.3993	0.9995	0.9996	0.9993	0.9991	0.9996	1.0044	0.9984
1928	0.9996	0.9996	0.9996	0.9994	0.9997	0.9996	0.9996	0.9993	0.9999	1.0001	1.0014	1.0022	0.9999	1.0072	0.9986
1929	1.0007	1.0017	0.9995	0.9995	0.9994	0.9996	0.9998	1.0003	1.0000	1.0016	1.0027	1.0016	1.0005	1.0088	0.9998
1930	1.0047	0.9992	1.0004	0.9998	0.9996	0.9997	0.9996	1.0001	1.0007	1.0018	1.0033	1.0042	1.0011	1.0095	0.9987
1931	1.0026	1.0020	1.0001	0.9998	0.9996	0.9995	0.9997	1.0005	1.0009	1.0021	1.0007	1.0022	1.0008	1.0102	0.9987
1932	0.9998	1.0008	0.9993	0.9993	0.9995	0.9998	0.9996	1.0000	1.0003	1.0011	0.9995	1.0003	0.9999	1.0062	0.9982
1933	0.9994	0.9996	0.9994	0.9993	0.9994	0.9995	0.9999	0.9995	0.9996	0.9999	0.9991	0.9990	0.9995	1.0035	0.9984
1934	0.9989	0.9994	0.9992	0.9991	0.9993	0.9992	0.9995	1.0001	1.0012	1.0006	0.9997	0.9996	1.0067	0.9986	
1935	1.0001	0.9999	0.9999	0.9999	0.9997	0.9999	0.9999	0.9998	1.0007	1.0020	1.0036	1.0051	1.0009	1.0095	0.9990
1936	0.9993	1.0025	0.9996	0.9998	0.9997	0.9998	1.0005	1.0013	1.0037	1.0050	1.0037	1.0012	1.0097	0.9984	
1937	1.0039	1.0008	1.0004	0.9997	0.9996	0.9993	0.9992	0.9999	1.0010	1.0028	1.0003	0.9996	1.0005	1.0095	0.9988
1938	0.9994	1.0004	0.9998	0.9995	0.9996	0.9997	0.9999	1.0000	1.0013	1.0021	1.0021	1.0009	1.0004	1.0059	0.9988
1939	1.0000	1.0000	0.9996	0.9989	0.9991	0.9991	0.9991	0.9995	1.0007	1.0021	1.0036	1.0011	1.0002	1.0080	0.9986
1940	1.0024	0.9998	0.9994	0.9991	0.9991	0.9992	0.9992	1.0001	1.0009	1.0023	1.0009	1.0021	1.0004	1.0096	0.9988
1941	1.0017	1.0022	1.0004	0.9994	0.9993	0.9990	0.9996	1.0000	1.0000	1.0002	1.0005	0.9994	1.0002	1.0071	0.9982
1942	1.0010	1.0000	0.9994	0.9991	0.9991	0.9992	0.9991	0.9997	1.0002	1.0014	0.9994	0.9991	0.9997	1.0050	0.9986
1943	0.9992	0.9993	0.9999	0.9993	0.9991	0.9994	0.9994	0.9992	1.0010	1.0018	1.0014	1.0008	1.0000	1.0082	0.9986
1944	1.0006	1.0002	1.0000	1.0001	0.9992	0.9992	0.9995	1.0000	1.0010	1.0028	1.0033	1.0041	1.0008	1.0099	0.9988

*Observations for the year are incomplete; extremes are for the months shown.

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Density of Sea Water - Continued

Means and Extremes

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.
ASTORIA (Tongue Point), ORE. - Continued															
1945	1.0006	0.9997	0.9999	0.9991	0.9988	0.9991	0.9991	0.9994	1.0002	1.0024	1.0015	1.0015	1.0001	1.0082	0.9985
1946	1.0014	1.0000	---	---	---	---	---	---	1.0016	1.0017	1.0008	0.9999	---	1.0047*	0.9989*
1947	1.0006	0.9994	0.9998	0.9995	0.9998	0.9998	1.0000	1.0004	1.0010	1.0004	0.9994	0.9996	1.0000	1.0050	0.9986
1948	0.9998	0.9999	0.9994	0.9995	0.9994	0.9997	0.9999	0.9999	1.0006	1.0006	1.0000	1.0003	0.9999	1.0072	0.9989
1949	1.0010	0.9997	0.9994	0.9994	0.9992	0.9994	0.9995	0.9999	1.0009	1.0008	1.0017	1.0001	1.0001	1.0046	0.9989
Mean Density	1.0007	1.0002	0.9997	0.9995	0.9994	0.9995	0.9996	0.9999	1.0006	1.0014	1.0013	1.0010	1.0002	1.0102	0.9982
Salinity	2.0	1.3	0.7	0.4	0.3	0.4	0.5	0.9	1.8	2.9	2.8	2.4	1.3	14.4	0.0
WAUNA, COLUMBIA RIVER, ORE.															
1940	---	---	---	---	---	---	---	---	---	---	0.9990	0.9990	---	0.9995*	0.9988*
1941	0.9989	0.9990	0.9990	0.9993	0.9992	0.9994	0.9992	0.9995	0.9995	0.9992	0.9990	0.9990	0.9992	0.9999	0.9988
1942	0.9991	0.9990	0.9990	0.9992	0.9994	0.9997	0.9997	---	---	---	---	---	---	1.0000*	0.9988*
HARRINGTON POINT, COLUMBIA RIVER, WASH.															
1940	---	---	---	---	---	---	---	---	0.9994	0.9993	0.9990	0.9991	---	0.9996*	0.9989*
1941	0.9991	0.9992	0.9993	0.9995	0.9997	0.9998	0.9995	0.9995	0.9993	0.9991	0.9990	0.9991	0.9993	1.0001	0.9987
1942	0.9991	0.9990	0.9989	0.9992	0.9994	0.9997	1.0001	---	---	---	---	---	---	1.0005*	0.9988*
SKAMOKAWA COLUMBIA RIVER, WASH.															
1940	---	---	---	---	---	---	---	---	---	0.9989	0.9989	---	---	0.9992*	0.9985*
1941	0.9989	0.9989	0.9990	0.9991	0.9993	0.9990	0.9992	0.9989	0.9989	0.9990	0.9987	0.9987	0.9990	0.9999	0.9984
1942	0.9988	0.9987	0.9988	0.9988	0.9990	0.9992	0.9991	---	---	---	---	---	---	1.0000*	0.9984*
CATHLAMET, COLUMBIA RIVER, WASH.															
1940	---	---	---	---	---	---	---	---	0.9992	0.9991	0.9991	0.9991	---	0.9995*	0.9989*
1941	0.9990	0.9993	0.9995	0.9996	0.9995	0.9996	0.9997	0.9994	0.9995	0.9993	0.9994	0.9992	0.9994	1.0000	0.9989
1942	0.9992	0.9996	0.9995	0.9995	0.9995	0.9996	0.9999	---	---	---	---	---	---	1.0002*	0.9991*

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TOKELAND, WILLAPA BAY, WASH.															
1935	1.0131	1.0163	1.0146	1.0166	1.0193	1.0181	1.0203	1.0216	1.0216	1.0213	1.0200	1.0190	1.0185	1.0237	1.0040
1936	126	166	157	160	148	135	175	208	217	218	221	167	175	236	043
1937	189	167	158	153	166	173	201	204	213	201	146	157	177	231	056
1938	136	157	153	131	177	199	205	217	212	210	179	178	180	234	007
1939	150	136	154	174	183	182	183	219	213	216	208	---	---	233*	060*
Mean Density	1.0146	1.0158	1.0154	1.0157	1.0173	1.0174	1.0193	1.0213	1.0214	1.0212	1.0191	1.0173	1.0180	1.0237	1.0007
Salinity	20.1	21.7	21.2	21.6	23.7	23.9	26.3	28.9	29.0	28.8	26.0	23.7	24.6	32.0	2.0
RAYMOND, WILLAPA RIVER, WASH.															
1935	---	---	1.0010	1.0045	1.0051	1.0070	1.0110	1.0143	1.0143	1.0148	1.0117	1.0091	---	1.0183*	0.9994*
1936	1.0008	1.0080	024	059	051	040	068	---	---	---	105	064	---	196*	0.9994*
1937	052	029	041	017	045	---	---	---	---	---	048	020	---	092*	0.9994*
1938	024	035	036	026	053	101	129	159	166	144	043	050	1.0080	179	1.0002
1939	036	028	030	069	098	071	097	155	163	150	115	057	089	184	004
1940	054	020	025	027	039	112	152	147	148	107	064	053	079	181	004
1941	054	072	085	088	080	084	124	152	084	095	064	039	085	178	005
1942	058	047	048	059	054	---	---	---	---	---	---	---	---	109*	006*
Mean Density	1.0041	1.0044	1.0037	1.0049	1.0059	1.0080	1.0113	1.0151	1.0141	1.0129	1.0079	1.0053	1.0081	1.0196	0.9994
Salinity	6.4	6.8	5.9	7.5	8.8	11.5	15.8	20.8	19.5	17.9	11.4	8.0	11.6	26.7	0.3
ABERDEEN, GRAYS HARBOR, WASH.															
1934	---	---	---	---	---	1.0031	1.0075	1.0097	1.0107	1.0082	1.0002	1.0004	---	1.0156*	0.9990*
1935	1.0001	1.0007	0.9998	1.0013	1.0024	049	065	---	---	---	---	---	---	1.0103*	0.9989*

*Observations for the year are incomplete; extremes are for the months shown.

Density of Sea Water - Continued

Means and Extremes

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.
NEAH BAY, WASH.															
1936	1.0227	1.0238	1.0236	1.0241	1.0232	1.0215	1.0236	1.0244	1.0246	1.0246	1.0242	1.0239	1.0237	1.0251	1.0173
1937	243	240	233	233	236	234	243	246	248	238	231	233	238	253	204
1938	230	229	232	228	242	246	247	250	249	239	241	238	239	255	205
1939	232	236	236	246	236	240	246	245	244	243	236	235	240	254	188
1940	235	227	224	232	228	238	241	245	243	235	238	233	235	252	197
1941	233	233	235	235	234	238	239	243	242	235	232	226	235	259	199
1942	229	233	230	228	233	235	235	242	247	238	234	216	233	253	161
1943	227	224	235	216	233	240	240	244	245	240	242	235	235	255	177
1944	229	237	239	234	241	243	245	245	235	242	234	242	239	255	167
1945	231	236	230	234	230	245	244	241	239	234	221	220	234	255	106
1946	213	214	217	216	231	211	224	237	237	238	232	219	224	247	161
1947	224	216	224	231	232	212	234	238	240	226	224	221	227	246	158
1948	219	229	223	221	217	220	232	236	225	233	231	220	226	246	153
1949	232	218	217	232	229	236	239	239	242	239	227	222	231	254	106
Mean Density	1.0229	1.0229	1.0229	1.0230	1.0232	1.0232	1.0239	1.0242	1.0242	1.0238	1.0233	1.0228	1.0234	1.0259	1.0106
Salinity	31.0	31.0	31.0	31.1	31.4	31.4	32.3	32.7	32.7	32.1	31.5	30.8	31.6	34.9	14.9
PORT ANGELES, WASH.															
1934	---	---	---	---	---	---	---	1.0226	1.0229	1.0228	1.0221	1.0222	---	1.0239*	1.0199*
1935	1.0200	1.0215	1.0217	1.0220	1.0228	1.0230	1.0229	231	231	---	---	---	---	238*	147*
PORT TOWNSEND (Fort Worden), WASH.															
1935	---	---	---	1.0225	1.0226	1.0227	1.0230	1.0232	1.0234	1.0234	1.0235	1.0234	---	1.0241*	1.0217*
1936	1.0230	1.0229	---	---	---	---	---	---	---	---	---	---	---	237*	224*

EVERETT, WASH.															
1934	---	---	---	---	---	---	---	1.0176	1.0189	1.0183	1.0146	1.0156	---	1.0221*	0.9985*
1935	1.0153	1.0131	1.0158	1.0140	1.0101	1.0104	1.0113	1.0170	---	---	---	---	---	218*	1.0014*
BREMERTON, WASH.															
1934	---	---	---	---	---	---	1.0218	1.0221	1.0222	1.0221	1.0218	1.0213	---	1.0228*	1.0147*
1935	1.0198	1.0199	1.0204	1.0208	1.0213	1.0215	216	219	222	222	223	216	1.0213	236	097
1936	217	217	---	---	---	209	219	218	---	223	224	---	---	257*	193*
SEATTLE (Elliott Bay), WASH.															
1922	1.0189	1.0186	1.0174	1.0146	1.0140	1.0171	1.0199	1.0208	1.0213	---	1.0211	1.0206	---	1.0224*	1.0068*
1923	172	193	188	168	177	180	201	208	213	1.0212	216	200	1.0194	223	117
1924	198	164	185	184	190	205	216	219	223	221	198	189	200	232	099
1925	193	181	190	175	182	195	206	210	214	218	218	212	200	225	110
1926	201	199	185	197	202	206	216	220	218	212	211	203	206	224	149
1927	198	183	177	176	160	164	205	211	210	204	194	189	189	220	101
1928	183	196	182	167	173	187	203	211	216	211	213	216	197	222	138
1929	215	211	203	194	183	176	205	215	218	220	220	214	207	228	111
1930	214	190	193	183	189	194	203	210	212	212	216	214	202	221	136
1931	201	200	191	175	176	190	198	207	210	207	203	206	197	220	137
1932	194	195	166	166	171	177	191	202	208	210	183	187	188	221	123
1933	183	199	184	179	179	171	187	201	203	198	190	168	187	217	126
1934	169	182	177	180	186	196	204	206	210	211	199	199	193	217	127
1935	188	185	185	188	182	190	200	207	210	212	214	215	198	220	145
1936	194	202	190	188	177	174	195	205	211	217	216	209	198	222	143
1937	215	206	194	190	189	184	196	206	211	215	200	192	200	222	150
1938	192	198	190	176	177	186	205	209	216	225	228	226	202	241	132
1939	221	220	218	217	220	215	217	221	224	227	229	226	221	238	206
1940	221	217	216	210	212	216	217	220	223	226	224	222	219	238	196
1941	222	220	220	217	202	210	222	224	227	227	224	223	220	231	167
1942	221	221	220	221	224	221	225	225	226	229	230	228	224	235	216
1943	223	221	221	218	220	222	220	229	232	231	232	230	225	252	206
1944	229	226	227	226	226	224	225	230	232	231	233	226	228	244	215

*Observations for the year are incomplete; extremes are for the months shown.

Density of Sea Water - Continued

Means and Extremes

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Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.
SEATTLE (Elliott Bay), WASH. - Continued															
1945	1.0223	1.0228	1.0222	1.0222	1.0223	1.0220	1.0222	1.0223	1.0228	1.0230	1.0229	1.0223	1.0224	1.0263	1.0212
1946	215	216	215	213	212	210	211	217	223	225	225	219	217	231	201
1947	218	214	212	214	211	212	216	220	223	225	218	---	---	229*	198*
1948	215	216	214	214	214	203	209	214	218	219	221	220	215	228	181
1949	220	218	214	213	205	208	216	220	223	225	227	220	217	231	189
Mean Density	1.0205	1.0203	1.0198	1.0193	1.0193	1.0197	1.0208	1.0214	1.0218	1.0219	1.0215	1.0210	1.0206	1.0263	1.0068
Salinity	27.8	27.6	26.9	26.3	26.3	26.8	28.2	29.0	29.5	29.7	29.1	28.5	28.0	35.4	9.9
SEATTLE (Duwamish River), WASH.															
1924	---	---	---	---	---	---	---	1.0088	1.0185	1.0188	1.0199	1.0120	1.0105	---	1.0240*1.0038*
1925	1.0096	1.0099	1.0106	1.0103	---	---	---	---	---	---	---	---	---	134*	091*
TACOMA, WASH.															
1934	---	---	---	---	---	---	---	1.0154	1.0160	1.0194	1.0192	1.0161	1.0175	---	1.0230*1.0062*
1935	1.0160	1.0172	1.0187	1.0172	1.0153	1.0145	140	---	---	---	---	---	---	213*	059*
OLYMPIA, WASH.															
1923	---	---	---	---	---	---	---	---	---	---	1.0199	1.0171	---	1.0214*1.0088*	
1924	1.0174	1.0135	1.0171	---	---	---	---	---	---	---	---	---	---	194*	014*
--	---	---	---	---	---	---	---	1.0184	1.0190	1.0198	1.0192	143	159	---	216* 075*
1934	121	131	141	1.0135	1.0166	1.0169	191	---	---	---	---	---	---	211* 0.9986*	
ANACORTES, WASH.															
1922	1.0220	1.0220	1.0223	1.0224	1.0226	1.0221	1.0217	1.0224	1.0220	1.0224	1.0223	1.0226	1.0222	1.0240	1.0192
1923	220	222	223	225	224	224	222	225	221	224	226	224	223	233	194
1924	222	219	220	224	226	---	---	---	---	---	---	---	---	233*	200*
--	---	---	---	---	---	---	---	---	---	---	---	---	---	---	

1934	---	---	---	---	---	---	---	---	---	222	219	---	---	225*	212*
1935	217	210	215	215	217	219	210	215	218	---	---	---	---	230*	190*
Mean Density	1.0220	1.0218	1.0220	1.0222	1.0223	1.0221	1.0216	1.0221	1.0220	1.0224	1.0224	1.0223	1.0221	1.0240	1.0190
Salinity	29.8	29.5	29.8	30.0	30.2	29.9	29.3	29.9	29.8	30.3	30.3	30.2	29.9	32.4	25.9
FRIDAY HARBOR, SAN JUAN I., WASH.															
1935	1.0222	1.0219	1.0221	1.0220	1.0222	1.0222	1.0216	1.0216	1.0225	1.0228	1.0228	1.0229	1.0222	1.0232	1.0185
1936	228	232	227	229	226	223	219	220	222	227	229	231	226	234	195
1937	229	231	230	229	227	226	219	222	214	228	227	214	225	236	195
1938	212	215	224	223	223	221	218	225	228	229	229	228	223	231	176
1939	226	226	228	228	221	225	218	220	226	228	226	224	225	232	190
1940	219	221	220	222	218	218	220	222	225	228	226	226	222	229	195
1941	225	222	224	224	219	224	221	225	226	226	225	224	224	234	189
1942	222	222	224	226	226	---	---	---	---	---	228	226	---	233*	223*
1943	---	---	---	---	---	---	---	---	---	228	226	---	227	247	200
1944	226	225	227	228	228	227	227	228	228	225	226	224	227	228*	199*
1945	222	220	223	220	221	214	---	---	---	---	---	---	---	239*	197*
1946	---	---	---	---	224	224	223	223	223	226	226	225	226	236*	186*
1947	---	---	---	---	227	222	225	221	228	230	226	228	227	235	141
1948	223	224	224	225	224	212	210	222	221	221	226	223	221	235	206
1949	224	228	227	229	226	221	225	229	229	229	230	226	227	235	206
Mean Density	1.0223	1.0224	1.0225	1.0225	1.0224	1.0222	1.0220	1.0223	1.0225	1.0227	1.0227	1.0225	1.0224	1.0247	1.0141
Salinity	30.2	30.3	30.4	30.4	30.3	30.0	29.8	30.2	30.4	30.7	30.7	30.4	30.3	33.3	19.5
KETCHIKAN, ALASKA															
1922	---	---	1.0229	1.0226	1.0205	1.0190	1.0210	1.0201	1.0183	1.0182	1.0170	1.0202	---	1.0233*1.0080*	
1923	1.0222	1.0227	214	206	197	185	184	185	183	189	170	---	---	233*	117*
1924	208	205	213	225	200	178	177	192	167	177	191	207	1.0195	238	119
1925	230	231	229	221	200	181	177	183	192	212	197	202	239	131	
1926	170	197	190	204	201	194	197	192	209	198	201	213	197	228	128
1927	220	227	224	224	216	197	182	191	197	182	206	222	207	242	160
1928	202	208	208	189	175	178	185	208	195	197	204	196	196	229	115
1929	203	227	220	224	218	199	181	177	198	187	170	193	200	236	101

*Observations for the year are incomplete; extremes are for the months shown.

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Density of Sea Water - Continued

Means and Extremes

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.
KETCHIKAN, ALASKA - Continued															
1930	1.0221	1.0224	1.0222	1.0221	1.0212	1.0180	1.0185	1.0188	1.0204	1.0183	1.0173	1.0165	1.0198	1.0237	1.0102
1931	177	197	209	216	197	190	188	183	189	188	187	214	195	254	139
1932	214	225	211	216	203	196	180	177	175	176	181	209	197	233	128
1933	214	220	224	217	203	182	171	162	173	179	171	192	192	250	132
1934	202	189	205	208	196	188	183	190	193	191	186	203	194	227	129
1935	225	206	212	215	216	219	223	222	221	212	210	207	216	230	168
1936	210	207	212	215	212	203	190	212	192	165	111	122	188	231	101
1937	199	202	193	202	192	204	166	121	138	175	170	169	178	226	107
1938	189	195	202	191	207	197	194	196	201	180	198	200	196	223	106
1939	200	216	227	218	195	186	179	170	175	177	173	175	191	267	112
1940	207	217	216	208	213	211	196	171	187	198	193	187	201	231	149
1941	211	215	226	218	214	214	206	205	204	---	174	186	---	238*	139*
1942	---	216	213	225	215	209	205	208	199	183	179	202	---	253*	152*
1943	204	218	221	225	224	224	217	201	---	188	184	192	---	242*	124*
1944	187	202	223	224	224	225	204	178	186	186	189	197	202	244	132
1945	219	230	234	233	222	194	193	198	198	193	198	216	211	246	167
1946	219	225	217	218	207	188	---	---	196	182	192	216	---	230*	112*
1947	214	217	208	208	198	180	173	191	176	169	184	198	193	227	137
1948	202	215	221	228	214	165	175	192	171	185	185	210	197	233	149
1949	218	224	221	204	182	171	167	152	179	171	168	196	188	231	127
Mean Density	1.0207	1.0214	1.0216	1.0216	1.0206	1.0194	1.0168	1.0186	1.0189	1.0185	1.0182	1.0195	1.0198	1.0267	1.0080
Salinity	28.1	29.0	29.3	29.3	28.0	26.4	25.6	25.4	25.8	25.2	24.8	26.5	26.9	35.9	11.5
SITKA, ALASKA															
1924	---	---	---	---	---	---	---	---	---	---	1.0195	1.0192	---	1.0217*	1.0135*
1925	1.0211	1.0228	1.0213	1.0211	1.0159	1.0164	1.0136	1.0151	1.0157	1.0172	179	179	1.0180	233	082
--															

1943	---	---	---	---	190	177	174	172	166	189	211	200	---	240*	114*
1944	218	221	220	216	197	172	181	184	181	193	206	209	200	234	102
1945	220	221	211	212	177	166	165	181	178	185	221	222	196	235	109
1946	223	228	227	---	195	171	178	178	186	194	210	227	---	236*	105*
1947	217	231	202	212	195	195	197	206	161	205	208	219	204	237	124
1948	212	230	232	234	205	188	192	194	186	209	201	227	209	239	136
1949	218	235	227	221	205	200	183	198	203	200	206	226	210	239	122
Mean Density	1.0217	1.0228	1.0219	1.0218	1.0190	1.0179	1.0176	1.0183	1.0177	1.0193	1.0204	1.0211	1.0200	1.0240	1.0082
Salinity	29.4	30.8	29.7	29.5	25.9	24.4	24.0	25.0	24.2	26.3	27.7	28.6	27.2	32.4	11.8
JUNEAU, ALASKA															
1937	1.0206	1.0218	1.0218	1.0214	1.0120	1.0094	1.0097	1.0098	1.0116	1.0130	1.0191	1.0206	1.0159	1.0243	1.0012
1938	212	213	211	206	150	124	099	104	120	133	182	192	162	237	032
1939	216	214	224	214	176	110	085	079	093	144	185	196	161	233	005
1940	211	219	224	214	150	129	088	105	---	---	---	---	---	235*	008*
1941	---	---	---	---	---	---	---	---	167	187	220	---	---	225*	061*
1942	192	211	---	208	141	101	090	098	115	132	199	218	---	229*	040*
1943	212	210	214	161	135	090	058	072	104	122	154	---	---	230*	012*
1944	199	205	208	168	128	082	081	095	111	108	158	181	144	228	032
1945	204	217	218	219	140	101	096	091	104	109	202	225	160	244	0.9986
1946	219	226	217	206	132	093	090	083	128	143	159	216	159	249	0.9999
1947	204	216	178	175	135	078	078	114	084	127	151	177	143	259	1.0023
1948	188	212	226	225	112	074	077	086	103	137	152	210	150	245	026
1949	194	228	219	189	148	111	101	117	130	139	129	204	159	275	024
Mean Density	1.0205	1.0216	1.0214	1.0200	1.0139	1.0099	1.0087	1.0095	1.0110	1.0133	1.0171	1.0204	1.0156	1.0275	0.9986
Salinity	27.8	29.3	29.0	27.2	19.2	14.0	12.4	13.5	15.4	18.4	23.4	27.7	21.4	37.0	0.0
HAINES, ALASKA															
1949	1.0227	---	1.0233	1.0219	1.0181	1.0150	1.0064	1.0039	1.0067	1.0166	1.0184	1.0209	---	1.0247*	1.0009*

*Observations for the year are incomplete; extremes are for the months shown.

Density of Sea Water - *Continued*
Means and Extremes

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.
SKAGWAY, ALASKA															
1944	---	---	---	---	---	---	---	---	1.0036	1.0071	1.0102	1.0214	1.0205	---	1.0259*0.9997*
1945	1.0230	1.0232	1.0230	1.0228	1.0127	1.0046	1.0027	010	077	095	223	232	1.0146	244	0.9995
1946	234	233	---	---	129	033	010	012	081	153	196	237	---	242*	0.9997*
1947	235	242	216	222	164	050	034	077	057	136	197	200	152	248	1.0001
1948	219	232	238	241	---	---	---	---	---	---	---	---	---	246*	1.0210*
1949	---	---	---	---	167	095	075	023	---	165	158	218	---	235*	0.9999*
Mean Density	1.0231	1.0235	1.0228	1.0230	1.0147	1.0056	1.0036	1.0032	1.0072	1.0130	1.0198	1.0218	1.0151	1.0259	0.9995
Salinity	31.2	31.8	30.8	31.1	20.3	8.4	5.8	5.2	10.5	18.0	26.9	29.5	20.8	34.9	0.4
YAKUTAT, ALASKA															
1941	1.0228	1.0226	1.0219	1.0216	---	---	---	1.0172	1.0204	---	1.0218	1.0225	---	1.0234*	1.0138*
1942	220	216	218	218	1.0205	1.0189	1.0155	169	---	1.0203	218	228	---	265*	105*
1943	221	227	---	217	213	201	192	---	188	200	208	201	---	236*	174*
1944	212	216	215	213	---	179	164	166	184	138	---	---	---	229*	120*
1945	224	224	221	224	204	201	190	177	182	200	222	225	1.0208	237	146
1946	226	227	226	225	210	186	167	169	199	216	221	230	208	235	127
1947	---	234	219	222	217	203	194	192	192	207	219	218	---	242*	126*
1948	221	228	228	230	---	---	---	---	---	---	224	---	---	241*	189*
1949	213	217	215	204	188	182	167	176	184	201	205	216	197	235	103
Mean Density	1.0231	1.0224	1.0220	1.0219	1.0206	1.0192	1.0176	1.0174	1.0190	1.0202	1.0216	1.0221	1.0205	1.0265	1.0103
Salinity	29.9	30.3	29.8	29.7	28.0	26.1	24.0	23.8	25.9	27.4	29.3	29.9	27.8	35.6	14.5
SEWARD, ALASKA															
1926	1.0181	1.0200	1.0180	1.0176	1.0128	1.0121	1.0037	1.0049	1.0120	1.0162	1.0141	1.0209	1.0142	1.0251	1.0001
1927	216	215	225	220	205	064	019	048	---	194	209	---	---	274*	0.9998*
1928	---	---	218	209	153	135	059	093	137	186	195	208	---	269*	1.0005*
1929	227	227	233	207	175	056	060	086	065	---	158	231	---	274*	1.0009*
1930	250	---	175	216	168	109	064	051	133	204	214	210	---	292*	1.0005*
1931	218	215	224	210	177	082	058	068	145	183	193	220	166	234	1.0000
1932	228	236	222	212	196	139	095	091	158	146	218	218	180	251	1.0005
1933	228	223	235	230	182	133	083	081	158	207	205	237	184	249	1.0001
1934	228	204	211	189	115	087	097	072	108	142	187	187	152	266	0.9998
1935	215	205	223	216	179	097	052	127	138	166	206	217	170	264	1.0000
1936	208	214	223	210	173	084	092	069	145	129	156	193	158	233	0.9999
1937	214	225	218	222	166	080	073	119	108	131	---	---	---	237*	1.0000*
1938	---	---	---	---	175	085	060	090	100	137	190	182	---	265*	1.0001*
1939	215	222	233	229	---	078	052	059	162	184	186	210	---	249*	0.9996*
1944	---	---	---	---	---	---	---	---	---	156	198	200	---	233*	1.0081*
1945	197	204	215	212	149	061	066	042	127	128	210	207	152	231	1.0002
1946	---	225	227	221	155	071	046	062	083	148	205	230	---	236*	1.0000*
1947	228	208	183	210	139	063	065	092	104	145	---	---	---	236*	0.9996*
1948	---	---	---	---	---	---	---	129	136	153	---	---	---	232*	1.0037*
1949	---	---	---	---	177	116	057	113	078	180	170	215	---	235*	0.9995*
Mean Density	1.0218	1.0216	1.0215	1.0212	1.0165	1.0092	1.0063	1.0081	1.0122	1.0162	1.0191	1.0211	1.0162	1.0292	0.9995
Salinity	29.5	29.3	29.1	28.8	22.6	13.1	9.3	11.6	17.0	22.2	26.0	28.6	22.2	39.2	0.4
KODIAK, ALASKA															
1935	---	---	---	---	1.0225	1.0228	1.0232	1.0238	1.0226	1.0228	1.0231	1.0231	---	1.0251*	1.0162*
1936	1.0227	1.0232	1.0237	1.0241	221	229	---	---	---	---	---	---	---	245*	168*
DUTCH HARBOR, UNALASKA ISLAND, ALASKA															
1945	---	---	---	---	---	---	---	---	1.0233	1.0236	---	---	---	1.0250*	1.0209*
1946	---	---	---	---	---	---	1.0230	1.0237	1.0232	240	231	1.0237	---	243*	191*
1947	1.0238	1.0235	1.0236	1.0232	1.0233	1.0220	238	239	239	235	233	1.0235	254	165	
1948	234	234	234	234	241	238	235	239	236	238	239	243	237	262	220
1949	242	240	241	242	242	232	239	242	237	239	237	239	239	275	210
Mean Density	1.0238	1.0236	1.0237	1.0236	1.0239	1.0230	1.0236	1.0239	1.0236	1.0238	1.0236	1.0238	1.0237	1.0275	1.0165
Salinity	32.1	31.9	32.0	31.9	32.3	31.1	31.9	32.3	31.9	32.1	31.9	32.1	32.0	37.0	22.6

*Observations for the year are incomplete; extremes are for the months shown.

Density of Sea Water - Continued

Means and Extremes

Year	Jan	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.
SWEEPER COVE, ADAK ISLAND, ALASKA															
1944	1.0238	1.0225	1.0210	1.0203	1.0223	1.0237	---	---	---	1.0183	1.0182	1.0185	---	1.0258*	1.0066*
1945	197	204	173	167	186	208	1.0228	1.0227	1.0214	---	---	188	---	251*	077*
1946	178	194	171	110	102	165	188	186	202	182	211	236	1.0177	276	005
1947	215	227	211	196	229	229	239	230	225	231	204	229	222	250	038
1948	233	228	234	228	227	211	217	214	207	192	208	208	217	251	092
1949	---	184	194	169	151	214	165	193	168	---	---	---	---	264*	027*
Mean Density	1.0212	1.0210	1.0199	1.0179	1.0186	1.0211	1.0207	1.0210	1.0203	1.0197	1.0201	1.0209	1.0202	1.0276	1.0005
Salinity	28.8	28.5	27.1	24.4	25.4	28.6	28.1	28.5	27.6	26.8	27.3	28.4	27.4	37.1	1.7
CONSTANTINE HARBOR, AMCHITKA ISLAND, ALASKA															
1944	---	---	---	---	---	1.0248	1.0247	1.0243	1.0243	1.0243	1.0243	1.0243	---	1.0267*	1.0235*
1945	1.0245	---	---	---	---	---	244	245	238	241	242	240	---	251*	210*
1946	243	---	---	---	---	245	243	243	239	244	244	239	---	251*	202*
1947	240	1.0244	---	---	---	245	246	245	245	245	244	244	---	252*	197*
1948	249	255	1.0248	1.0245	---	249	251	252	251	252	---	---	---	278*	229*
Mean Density	1.0244	1.0250	1.0248	1.0245	---	1.0247	1.0246	1.0246	1.0243	1.0245	1.0243	1.0242	---	1.0278	1.0197
Salinity	32.9	33.7	33.4	33.0	---	33.3	33.2	33.2	32.8	33.0	32.8	32.7	---	37.3	26.8
MASSACRE BAY, ATTU ISLAND, ALASKA															
1946	"	---	---	---	---	1.0233	1.0224	1.0233	1.0237	1.0239	1.0245	1.0242	---	1.0255*	1.0179*
1947	---	---	---	---	---	---	---	---	---	244	238	1.0243	---	247*	219*
1948	1.0244	1.0242	1.0244	1.0234	237	224	241	---	---	---	---	---	---	252*	188*
1949	---	---	250	249	243	243	239	243	243	244	247	245	---	261*	224*
Mean Density	1.0244	1.0242	1.0247	1.0242	1.0238	1.0230	1.0238	1.0240	1.0241	1.0244	1.0242	1.0244	1.0241	1.0261	1.0179
Salinity	32.9	32.7	33.3	32.7	32.1	31.1	32.1	32.4	32.5	32.9	32.7	32.9	32.5	35.1	24.4

PORT MOLLER, ALASKA															
1948	---	---	---	---	---	---	---	---	1.0223	1.0222	1.0223	---	---	1.0228*	1.0214*
1949	---	---	1.0222	1.0225	1.0227	1.0227	1.0230	1.0228	228	219	218	1.0216	---	236*	211*
POINT BARROW (ocean), ALASKA															
1945	---	---	---	---	---	---	---	---	1.0198	---	---	---	---	1.0217*	1.0153*
POINT BARROW (Elson Lagoon), ALASKA															
1945	---	---	---	---	---	---	---	---	1.0170	---	---	---	---	1.0205*	1.0111*
MIDWAY ISLANDS, HAWAIIAN ISLANDS															
1944	---	---	1.0262	1.0261	---	1.0262	1.0263	1.0260	1.0256	1.0257	1.0256	1.0256	---	1.0274*	1.0246*
1945	1.0258	1.0256	259	265	1.0265	272	---	---	---	---	---	---	---	281*	251*
1946	---	---	---	---	---	268	268	268	269	268	268	267	---	275*	257*
1947	257	---	263	265	266	265	267	264	267	267	266	262	---	273*	246*
1948	---	---	267	265	265	266	264	267	---	261	264	261	---	279*	244*
1949	264	263	264	268	---	---	---	---	272	---	270	272	---	286*	259*
Mean Density	1.0260	1.0260	1.0263	1.0265	1.0265	1.0266	1.0266	1.0265	1.0265	1.0264	1.0264	1.0264	1.0264	1.0286	1.0244
Salinity	35.0	35.0	35.4	35.6	35.6	35.8	35.8	35.6	35.6	35.5	35.6	35.5	35.5	38.4	32.9
HONOLULU, HAWAIIAN ISLANDS															
1944	---	1.0249	---	1.0248	1.0249	1.0249	1.0255	1.0255	1.0255	1.0256	1.0258	1.0254	---	1.0269*	1.0231*
1945	1.0255	258	1.0260	258	262	261	260	260	260	261	259	256	1.0259	270	226
1946	256	252	254	253	256	258	259	261	261	261	259	256	257	265	231
1947	257	259	258	257	256	259	260	260	257	259	256	258	258	268	234
1948	253	254	256	253	256	259	258	259	261	261	261	260	258	266	217
1949	250	259	259	262	262	260	263	263	261	262	266	266	261	269	218
Mean Density	1.0254	1.0255	1.0257	1.0255	1.0257	1.0258	1.0259	1.0260	1.0259	1.0260	1.0260	1.0258	1.0258	1.0270	1.0217
Salinity	34.2	34.4	34.6	34.4	34.6	34.7	34.9	35.0	34.9	35.0	35.0	34.7	34.7	36.3	29.4

*Observations for the year are incomplete; extremes are for the months shown.

Density of Sea Water - *Continued*

Means and Extremes

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Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.
HILO, HAWAIIAN ISLANDS															
1947	1.0207	1.0194	1.0175	1.0176	1.0150	1.0161	1.0145	1.0154	1.0167	1.0159	1.0159	1.0162	1.0167	1.0265	1.0103
1948	176	---	178	167	162	190	176	189	191	198	185	159	---	254*	069*
1949	163	207	180	122	149	155	149	137	148	163	172	138	157	254	028
Mean Density	1.0182	1.0200	1.0178	1.0155	1.0154	1.0169	1.0157	1.0160	1.0169	1.0173	1.0172	1.0153	1.0168	1.0265	1.0028
Salinity	24.8	27.2	24.3	21.3	21.2	23.1	21.6	22.0	23.1	23.7	23.5	21.0	23.0	35.6	4.7
JOHNSTON ISLAND, HAWAIIAN ISLANDS															
1947	---	---	---	---	1.0262	1.0260	1.0262	1.0261	1.0261	---	---	---	---	1.0267*	1.0256*
1948	---	1.0262	1.0263	1.0264	263	---	---	---	---	---	---	---	---	268*	259*
1949	---	259	258	263	261	259	261	---	---	---	---	---	---	275*	251*
APIA (Observatory), SAMOA ISLANDS															
1948	---	---	---	1.0258	1.0255	1.0260	1.0262	1.0284	1.0267	1.0266	1.0263	1.0262	---	1.0274*	1.0243*
1949	1.0259	1.0262	1.0259	259	257	260	262	264	265	266	267	263	1.0262	272	192
KUKUM, GUADALCANAL ISLAND, SOLOMON ISLANDS															
1948	---	---	---	1.0254	---	1.0253	1.0253	1.0255	1.0256	1.0255	1.0254	1.0253	---	1.0262*	1.0238*
1949	1.0254	1.0255	1.0255	252	1.0252	251	255	255	255	256	256	---	---	261*	204*
KWAJALEIN ISLAND, MARSHALL ISLANDS															
1949	---	1.0259	1.0258	1.0258	1.0256	1.0253	1.0256	1.0253	1.0254	1.0254	1.0253	1.0250	---	1.0263*	1.0234*
MANILA, LUZON ISLAND, PHILIPPINE ISLANDS															
1947	---	---	---	---	---	---	1.0185	1.0181	1.0150	1.0194	1.0200	1.0206	---	1.0251*	1.0008*
1948	1.0212	1.0215	1.0232	1.0238	1.0244	1.0246	234	229	132	155	225	214	1.0215	258	100
1949	229	229	234	245	251	254	253	22	197	204	236	242	233	260	161

Mean Density	1.0220	1.0222	1.0233	1.0242	1.0248	1.0250	1.0224	1.0211	1.0160	1.0184	1.0220	1.0221	1.0220	1.0260	1.0008
Salinity	29.8	30.0	31.5	32.7	33.4	33.7	30.3	28.6	22.0	25.1	29.8	29.9	29.8	35.0	2.1
SAN FERNANDO, LUZON ISLAND, PHILIPPINE ISLANDS															
1948	---	1.0250	1.0251	1.0248	1.0256	1.0243	1.0238	1.0228	1.0212	1.0226	1.0242	1.0246	---	1.0264*	1.0149*
1949	1.0247	247	247	246	254	252	247	224	216	230	240	250	1.0242	260	195
LEGASPI, LUZON ISLAND, PHILIPPINE ISLANDS															
1947	---	---	---	---	1.0206	1.0228	1.0239	1.0227	1.0240	1.0235	1.0230	1.0198	---	1.0261*	1.0126*
1948	1.0211	1.0203	1.0214	1.0222	223	244	235	252	246	245	208	203	1.0226	277	113
1949	199	215	211	214	213	245	239	253	256	236	188	183	221	264	122
Mean Density	1.0205	1.0209	1.0212	1.0218	1.0214	1.0239	1.0238	1.0244	1.0247	1.0239	1.0209	1.0195	1.0222	1.0277	1.0113
Salinity	27.8	28.4	28.8	29.5	29.0	32.3	32.1	32.9	33.3	32.3	28.4	26.5	30.0	37.2	15.8
CEBU, CEBU ISLAND, PHILIPPINE ISLANDS															
1947	---	---	---	---	1.0250	1.0237	1.0246	1.0248	1.0244	1.0248	1.0247	---	1.0259*	1.0143*	
1948	1.0246	1.0254	1.0253	1.0255	255	249	243	249	249	248	237	238	1.0248	263	138
1949	247	250	254	257	254	252	243	247	243	241	235	239	247	260	127
Mean Density	1.0246	1.0252	1.0254	1.0256	1.0253	1.0246	1.0244	1.0248	1.0245	1.0244	1.0240	1.0241	1.0247	1.0263	1.0127
Salinity	33.2	34.0	34.2	34.5	34.1	33.2	32.9	33.4	33.0	32.9	32.4	32.5	33.3	35.4	17.6
DAVAO, MINDANAO ISLAND, PHILIPPINE ISLANDS															
1947	---	---	---	---	1.0240	1.0224	1.0216	1.0228	1.0211	1.0225	1.0235	1.0253	---	1.0264*	1.0129*
1948	1.0253	1.0254	1.0258	1.0252	251	237	214	215	214	210	235	252	1.0237	267	130
1949	259	258	256	248	232	195	182	---	174	174	199	214	---	286	040
Mean Density	1.0256	1.0256	1.0257	1.0250	1.0241	1.0219	1.0205	1.0222	1.0200	1.0203	1.0223	1.0240	1.0231	1.0286	1.0040
Salinity	34.5	34.5	34.6	33.7	32.5	29.7	27.8	30.0	27.2	27.6	30.2	32.4	31.2	38.4	6.3

*Observations for the year are incomplete; extremes are for the months shown.

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Density of Sea Water - *Continued*
Means and Extremes

30

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.
JOLO, JOLO ISLAND, PHILIPPINE ISLANDS															
1947	---	---	---	---	---	---	---	---	---	1.0257	1.0244	1.0243	---	1.0265*1.0229*	
1948	1.0247	1.0249	1.0249	1.0251	1.0261	1.0251	1.0250	1.0250	1.0250	249	246	245	1.0249	257	232
1949	249	249	244	249	252	254	252	256	252	250	240	239	249	266	171
Mean Density	1.0248	1.0249	1.0246	1.0250	1.0252	1.0252	1.0251	1.0253	1.0251	1.0252	1.0243	1.0242	1.0249	1.0266	1.0171
Salinity	33.4	33.6	33.2	33.7	34.0	34.0	33.8	34.1	33.8	34.0	32.8	32.7	33.6	35.8	23.4
PUNTA ARENAS, MAGELLAN STRAIT, CHILE															
1944	---	---	---	---	1.0226	1.0222	1.0225	1.0224	1.0227	1.0229	1.0229	1.0230	---	1.0231*1.0209*	
--	---	---	---	---	214	217	221	224	224	223	223	223	---	233*	193*
1947	---	---	---	---	218	220	220	221	221	223	224	225	1.0222	229	203
1948	1.0223	1.0223	1.0222	1.0219	218	220	220	221	221	223	224	225	1.0222	232*	198*
1949	228	226	222	220	217	213	214	---	---	226	---	---	---	---	---
Mean Density	1.0226	1.0224	1.0222	1.0220	1.0220	1.0217	1.0219	1.0222	1.0224	1.0226	1.0225	1.0226	1.0223	1.0233	1.0193
Salinity	30.6	30.3	30.0	29.6	29.8	29.4	29.7	30.0	30.3	30.6	30.4	30.6	30.2	31.5	26.3
PUERTO MONTT, CHILE															
1944	---	---	---	---	1.0238	1.0225	1.0228	1.0235	1.0232	1.0229	1.0199	---	---	1.0251*1.0176*	
1945	---	1.0202	1.0220	1.0226	221	210	230	230	213	---	207	1.0185	---	250*	150*
1946	1.0189	206	213	225	233	233	229	230	228	218	223	183	1.0218	245	152
1947	204	196	223	221	236	230	---	233	229	224	224	203	---	284*	151*
1948	198	221	226	233	234	238	233	227	221	---	241	212	---	278*	167*
1949	194	209	---	232	222	---	231	227	223	---	220	---	---	251*	153*
Mean Density	1.0196	1.0207	1.0220	1.0227	1.0231	1.0227	1.0230	1.0230	1.0224	1.0224	1.0219	1.0196	1.0219	1.0284	1.0150
Salinity	26.7	28.1	29.8	30.7	31.2	30.7	31.1	31.1	30.3	30.3	29.7	26.7	29.7	38.1	20.6

	VALPARAISO, CHILE														
1944	---	---	---	1.0261	1.0262	1.0260	1.0261	1.0256	1.0263	1.0262	1.0263	1.0259	---	1.0277*1.0240*	
1945	1.0263	1.0264	1.0267	261	258	261	259	259	258	260	263	266	1.0262	291	249
1946	264	265	264	259	260	---	---	259	258	262	262	263	---	270*	247*
1947	261	260	260	259	256	255	253	254	255	256	257	259	257	267	247
1948	260	259	260	259	257	255	253	259	263	263	262	258	259	271	246
1949	263	265	263	263	260	256	255	258	263	264	267	263	262	289	237
Mean Density	1.0262	1.0263	1.0263	1.0260	1.0259	1.0257	1.0256	1.0258	1.0260	1.0261	1.0262	1.0261	1.0260	1.0291	1.0237
Salinity	35.3	35.4	35.4	35.0	34.9	34.6	34.5	34.7	35.0	35.1	35.3	35.1	35.0	39.0	32.0
	ANTOFAGASTA, CHILE														
1946	1.0263	1.0259	1.0259	1.0257	1.0256	1.0256	1.0257	1.0258	1.0258	1.0258	1.0258	1.0258	---	1.0267*1.0253*	
1947	259	257	260	261	263	261	262	263	260	264	261	1.0259	1.0261	270	243
1948	263	264	---	---	---	---	---	---	---	---	---	---	---	273*	256*
1949	263	264	263	266	264	261	263	266	263	264	268	267	264	275	258
Mean Density	1.0262	1.0261	1.0261	1.0261	1.0259	1.0261	1.0262	1.0260	1.0262	1.0262	1.0263	1.0261	1.0261	1.0275	1.0243
Salinity	35.3	35.1	35.1	35.1	35.1	34.9	35.1	35.3	35.0	35.3	35.3	35.4	35.1	37.0	32.8
	MATARANI, PERU														
1944	---	---	---	1.0262	1.0262	1.0262	1.0260	1.0264	1.0263	1.0264	1.0262	---	---	1.0280*1.0247*	
1945	1.0262	---	---	265	264	263	264	261	264	265	264	1.0264	---	276*	249*
1946	263	1.0264	264	263	263	260	261	264	271	272	267	265	1.0265	281	250
1947	262	262	262	261	261	260	---	---	---	262	266	---	---	274*	251*
1948	267	265	264	264	264	266	266	263	260	261	262	264	264	285	244
1949	260	---	---	---	---	---	---	---	259	261	261	261	---	266*	256*
Mean Density	1.0263	1.0264	1.0263	1.0263	1.0263	1.0262	1.0264	1.0263	1.0264	1.0264	1.0263	1.0264	1.0263	1.0285	1.0244
Salinity	35.4	35.5	35.4	35.4	35.4	35.3	35.5	35.4	35.5	35.5	35.4	35.5	35.4	38.2	32.9

*Observations for the year are incomplete; extremes are for the months shown.

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Density of Sea Water - *Continued*

Means and Extremes

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means	Max.	Min.	
CALLAO, PERU																
1944	---	1.0239	1.0234	1.0235	1.0242	1.0244	---	1.0247	1.0248	1.0250	1.0251	1.0254	---	1.0275*	1.0214*	
1945	1.0257	253	248	245	252	245	1.0248	254	256	250	253	252	1.0252	269	227	
1946	244	235	247	224	240	---	232	239	244	247	246	236	---	296*	213*	
1947	---	249	244	242	239	242	---	253	247	251	257	257	---	269*	220*	
1948	256	244	249	248	250	243	243	247	247	254	248	256	249	274	224	
1949	251	248	248	248	249	250	251	252	252	254	257	254	251	277	198	
Mean Density		1.0252	1.0245	1.0245	1.0240	1.0245	1.0245	1.0244	1.0249	1.0249	1.0251	1.0252	1.0252	1.0247	1.0296	1.0198
Salinity	34.0	33.0	33.0	32.4	33.0	33.0	32.9	33.6	33.6	33.6	34.0	34.0	33.3	39.7	26.9	
TALAR, PERU																
1944	---	---	---	---	---	---	1.0268	1.0266	1.0268	1.0268	1.0266	1.0266	1.0269	---	1.0275*	1.0259*
1945	1.0260	1.0259	1.0264	1.0270	1.0272	271	273	---	---	---	---	---	267	---	279*	249*
1946	271	266	270	266	264	263	265	264	262	263	263	265	265	---	281*	257*
1947	270	270	271	274	268	264	264	---	272	267	267	263	264	---	295*	256*
1948	259	261	265	264	264	264	265	263	263	262	266	266	1.0264	272	253	
1949	265	266	265	267	267	267	265	264	263	264	264	264	265	274	253	
Mean Density		1.0265	1.0264	1.0267	1.0268	1.0267	1.0266	1.0267	1.0266	1.0265	1.0264	1.0265	1.0266	1.0266	1.0295	1.0249
Salinity	35.6	35.5	35.9	36.0	35.9	35.8	35.9	35.8	35.6	35.5	35.6	35.8	35.8	35.8	39.6	33.6
LA LIBERTAD, ECUADOR																
1948	---	---	---	---	---	---	---	---	---	---	1.0253	1.0252	---	1.0256*	1.0247*	
1949	1.0254	1.0256	1.0257	---	---	1.0265	---	---	1.0256	1.0256	253	252	---	275*	241*	

*Observations for the year are incomplete; extremes are for the months shown.

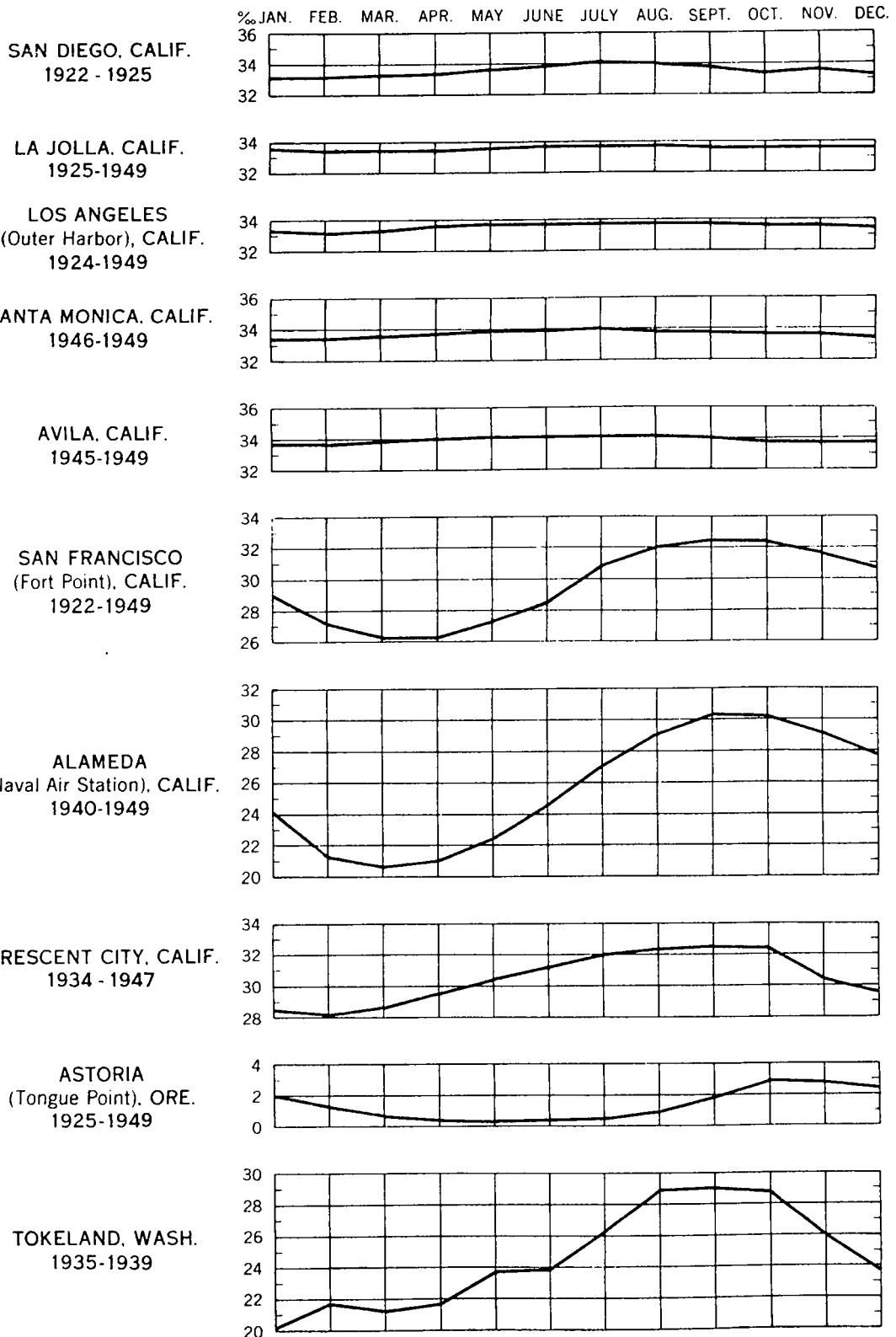
Salinity of Sea Water

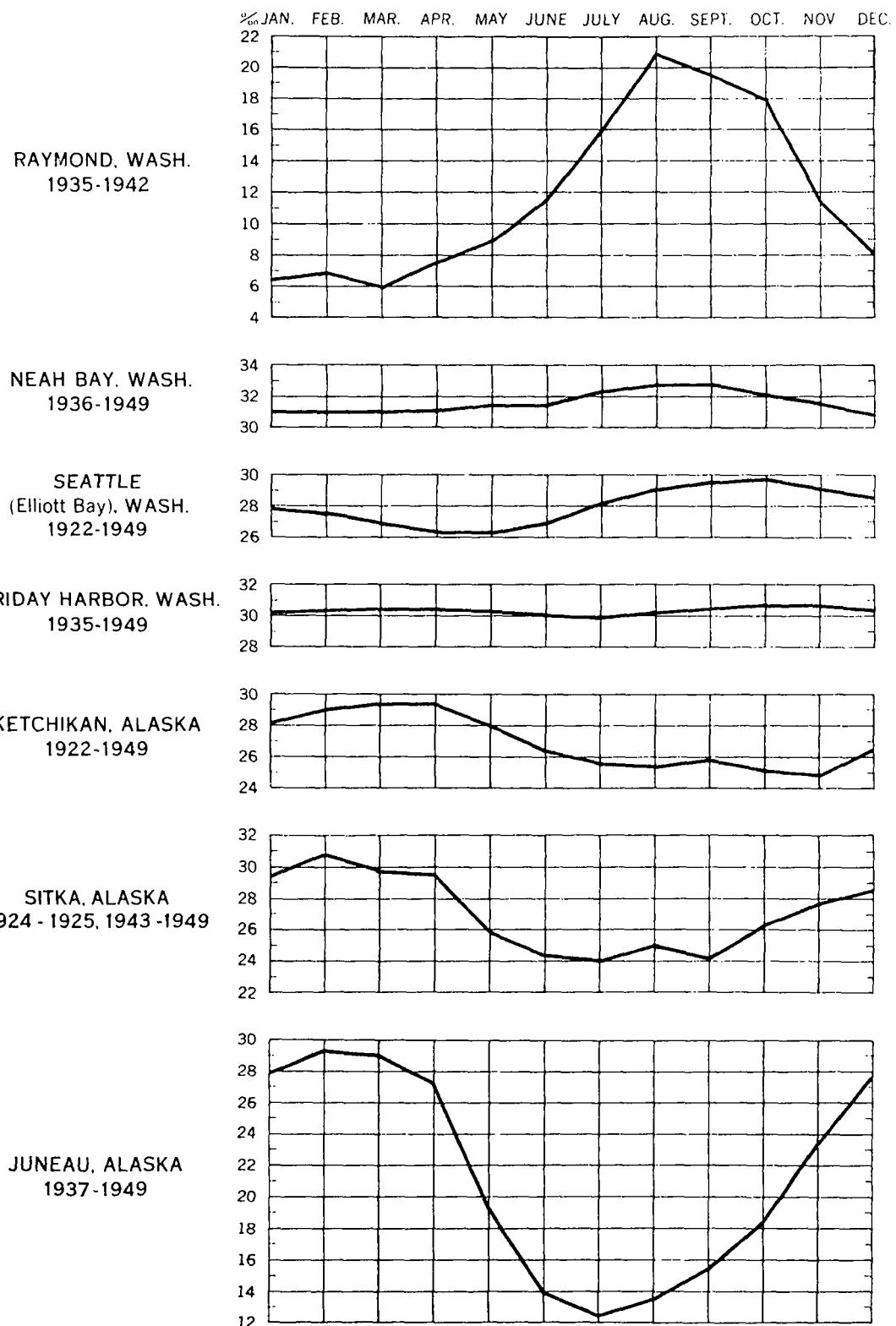
Average monthly surface salinities, in parts per thousand, furnished by the Scripps Institution, La Jolla, Calif.

Series	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Means
	BALBOA, CALIF.												
1925-1949	33.51	33.41	33.49	33.59	33.66	33.68	33.72	33.68	33.62	33.61	33.60	33.56	33.59
	PORT HUENEME, CALIF.												
1919-1949	33.46	33.38	33.31	33.60	33.60	33.62	33.65	33.59	33.57	33.58	33.58	33.50	33.54
	PACIFIC GROVE, CALIF.												
1919-1949	33.34	33.20	33.20	33.37	33.60	33.70	33.72	33.70	33.62	33.53	33.44	33.37	33.48
	NORTH FARALLON ISLAND, CALIF.												
1925-1942	33.12	32.94	33.02	33.20	33.45	33.68	33.76	33.76	33.66	33.62	33.49	33.40	33.43
	BLUNTS REEF LIGHTSHIP												
1922-1941	33.07	32.99	33.03	33.11	33.49	33.69	33.84	33.77	33.64	33.54	33.28	33.19	33.39

Mean Salinity Curves

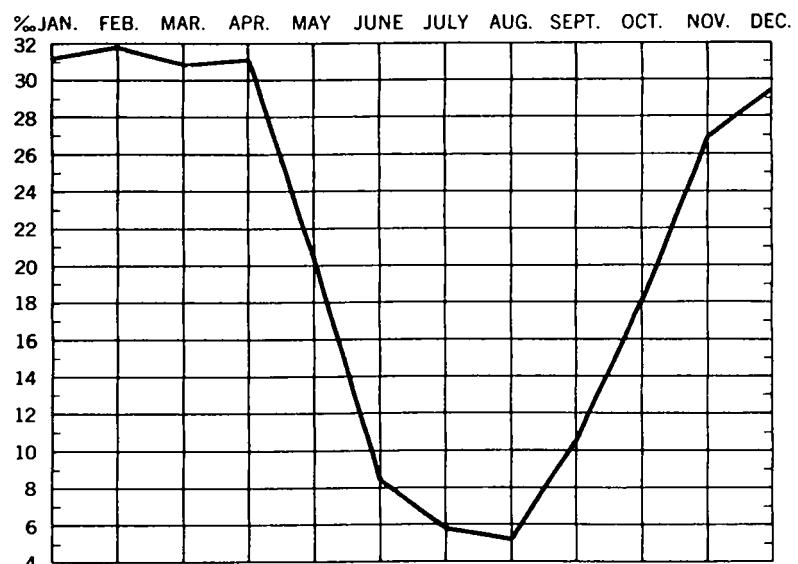
Monthly mean salinities in parts per thousand are presented graphically to show the seasonal variation.



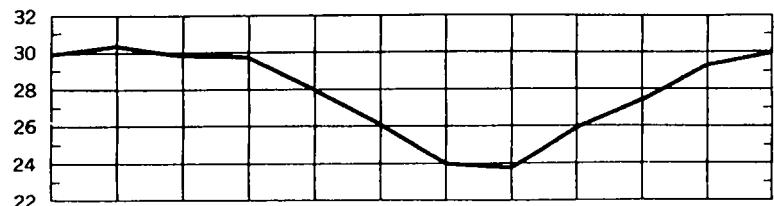
Mean Salinity Curves - *Continued*

Mean Salinity Curves - *Continued*

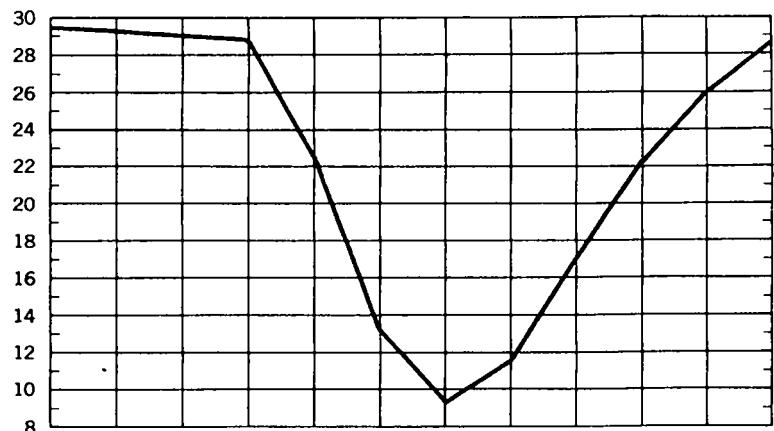
SKAGWAY, ALASKA
1944 - 1949



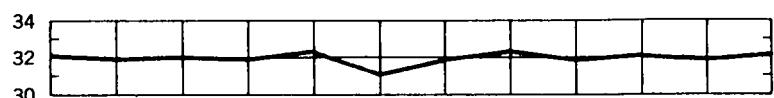
YAKUTAT, ALASKA
1941 - 1949



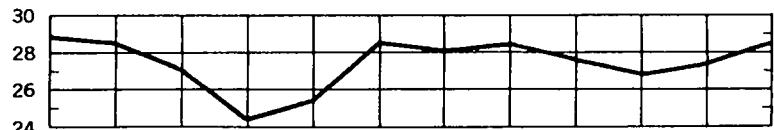
SEWARD, ALASKA
1926-1939, 1944-1949



DUTCH HARBOR,
UNALASKA I., ALASKA
1945-1949

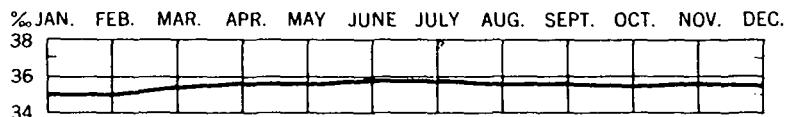


SWEETER COVE,
ADAK I., ALASKA
1944 - 1949

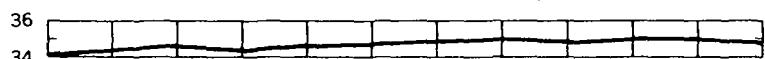


Mean Salinity Curves - *Continued*

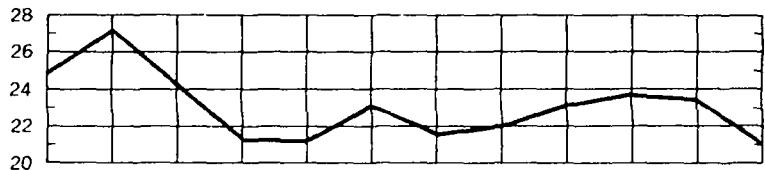
MIDWAY IS.,
HAWAIIAN ISLANDS
1944-1949



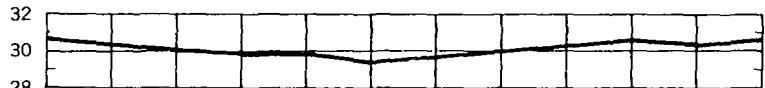
HONOLULU,
HAWAIIAN ISLANDS
1944-1949



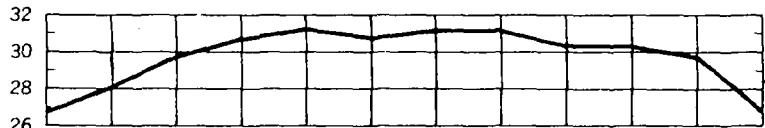
HILO,
HAWAIIAN ISLANDS
1947-1949



PUNTA ARENAS, CHILE
1944, 1947-1949



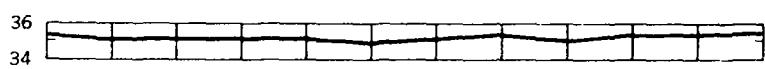
PUERTO MONTT, CHILE
1944-1949



VALPARAISO, CHILE
1944 - 1949



ANTOFAGASTA, CHILE
1946-1949



MATARANI, PERU
1944-1949



CALLAO, PERU
1944-1949



TALARA, PERU
1944-1949



CORRESPONDING DENSITIES AND SALINITIES

[Density at 15° C.—Salinity in parts per 1,000]

Density	Salinity										
0.9991	0.0	1.0046	7.1	1.0101	14.2	1.0156	21.4	1.0211	28.6	1.0266	35.8
.9992	.0	1.0047	7.2	1.0102	14.4	1.0157	21.6	1.0212	28.8	1.0267	35.9
.9993	.1	1.0048	7.3	1.0103	14.5	1.0158	21.7	1.0213	28.9	1.0268	36.0
.9994	.3	1.0049	7.5	1.0104	14.6	1.0159	21.8	1.0214	29.0	1.0269	36.2
.9995	.4	1.0050	7.6	1.0105	14.8	1.0160	22.0	1.0215	29.1	1.0270	36.3
.9996	.5	1.0051	7.7	1.0106	14.9	1.0161	22.1	1.0216	29.3	1.0271	36.4
.9997	.7	1.0052	7.9	1.0107	15.0	1.0162	22.2	1.0217	29.4	1.0272	36.6
.9998	.8	1.0053	8.0	1.0108	15.2	1.0163	22.4	1.0218	29.5	1.0273	36.7
.9999	.9	1.0054	8.1	1.0109	15.3	1.0164	22.5	1.0219	29.7	1.0274	36.8
1.0000	1.1	1.0055	8.2	1.0110	15.4	1.0165	22.6	1.0220	29.8	1.0275	37.0
1.0001	1.2	1.0056	8.4	1.0111	15.6	1.0166	22.7	1.0221	29.9	1.0276	37.1
1.0002	1.3	1.0057	8.5	1.0112	15.7	1.0167	22.9	1.0222	30.0	1.0277	37.2
1.0003	1.4	1.0058	8.6	1.0113	15.8	1.0168	23.0	1.0223	30.2	1.0278	37.3
1.0004	1.6	1.0059	8.8	1.0114	16.0	1.0169	23.1	1.0224	30.3	1.0279	37.5
1.0005	1.7	1.0060	8.9	1.0115	16.1	1.0170	23.3	1.0225	30.4	1.0280	37.6
1.0006	1.8	1.0061	9.0	1.0116	16.2	1.0171	23.4	1.0226	30.6	1.0281	37.7
1.0007	2.0	1.0062	9.2	1.0117	16.3	1.0172	23.5	1.0227	30.7	1.0282	37.9
1.0008	2.1	1.0063	9.3	1.0118	16.5	1.0173	23.7	1.0228	30.8	1.0283	38.0
1.0009	2.2	1.0064	9.4	1.0119	16.6	1.0174	23.8	1.0229	31.0	1.0284	38.1
1.0010	2.4	1.0065	9.6	1.0120	16.7	1.0175	23.9	1.0230	31.1	1.0285	38.2
1.0011	2.5	1.0066	9.7	1.0121	16.9	1.0176	24.0	1.0231	31.2	1.0286	38.4
1.0012	2.6	1.0067	9.8	1.0122	17.0	1.0177	24.2	1.0232	31.4	1.0287	38.5
1.0013	2.8	1.0068	9.9	1.0123	17.1	1.0178	24.3	1.0233	31.5	1.0288	38.6
1.0014	2.9	1.0069	10.1	1.0124	17.3	1.0179	24.4	1.0234	31.6	1.0289	38.8
1.0015	3.0	1.0070	10.2	1.0125	17.4	1.0180	24.6	1.0235	31.8	1.0290	38.9
1.0016	3.2	1.0071	10.3	1.0126	17.5	1.0181	24.7	1.0236	31.9	1.0291	39.0
1.0017	3.3	1.0072	10.5	1.0127	17.6	1.0182	24.8	1.0237	32.0	1.0292	39.2
1.0018	3.4	1.0073	10.6	1.0128	17.8	1.0183	25.0	1.0238	32.1	1.0293	39.3
1.0019	3.5	1.0074	10.7	1.0129	17.9	1.0184	25.1	1.0239	32.3	1.0294	39.4
1.0020	3.7	1.0075	10.8	1.0130	18.0	1.0185	25.2	1.0240	32.4	1.0295	39.6
1.0021	3.8	1.0076	11.0	1.0131	18.2	1.0186	25.4	1.0241	32.5	1.0296	39.7
1.0022	3.9	1.0077	11.1	1.0132	18.3	1.0187	25.5	1.0242	32.7	1.0297	39.8
1.0023	4.1	1.0078	11.2	1.0133	18.4	1.0188	25.6	1.0243	32.8	1.0298	39.9
1.0024	4.2	1.0079	11.4	1.0134	18.6	1.0189	25.8	1.0244	32.9	1.0299	40.1
1.0025	4.3	1.0080	11.5	1.0135	18.7	1.0190	25.9	1.0245	33.0	1.0300	40.2
1.0026	4.5	1.0081	11.6	1.0136	18.8	1.0191	26.0	1.0246	33.2	1.0301	40.3
1.0027	4.6	1.0082	11.8	1.0137	19.0	1.0192	26.1	1.0247	33.3	1.0302	40.4
1.0028	4.7	1.0083	11.9	1.0138	19.1	1.0193	26.3	1.0248	33.4	1.0303	40.6
1.0029	4.8	1.0084	12.0	1.0139	19.2	1.0194	26.4	1.0249	33.6	1.0304	40.7
1.0030	5.0	1.0085	12.2	1.0140	19.4	1.0195	26.5	1.0250	33.7	1.0305	40.8
1.0031	5.1	1.0086	12.3	1.0141	19.5	1.0196	26.7	1.0251	33.8	1.0306	41.0
1.0032	5.2	1.0087	12.4	1.0142	19.6	1.0197	26.8	1.0252	34.0	1.0307	41.1
1.0033	5.4	1.0088	12.6	1.0143	19.7	1.0198	26.9	1.0253	34.1	1.0308	41.2
1.0034	5.5	1.0089	12.7	1.0144	19.9	1.0199	27.1	1.0254	34.2	1.0309	41.4
1.0035	5.6	1.0090	12.8	1.0145	20.0	1.0200	27.2	1.0255	34.4	1.0310	41.5
1.0036	5.8	1.0091	12.9	1.0146	20.1	1.0201	27.3	1.0256	34.5	1.0311	41.6
1.0037	5.9	1.0092	13.1	1.0147	20.3	1.0202	27.4	1.0257	34.6	1.0312	41.8
1.0038	6.0	1.0093	13.2	1.0148	20.4	1.0203	27.6	1.0258	34.7	1.0313	41.9
1.0039	6.2	1.0094	13.3	1.0149	20.5	1.0204	27.7	1.0259	34.9	1.0314	42.0
1.0040	6.3	1.0095	13.5	1.0150	20.6	1.0205	27.8	1.0260	35.0	1.0315	42.1
1.0041	6.4	1.0096	13.6	1.0151	20.8	1.0206	28.0	1.0261	35.1	1.0316	42.3
1.0042	6.6	1.0097	13.7	1.0152	20.9	1.0207	28.1	1.0262	35.3	1.0317	42.4
1.0043	6.7	1.0098	13.9	1.0153	21.0	1.0208	28.2	1.0263	35.4	1.0318	42.5
1.0044	6.8	1.0099	14.0	1.0154	21.2	1.0209	28.4	1.0264	35.5	1.0319	42.7
1.0045	7.0	1.0100	14.1	1.0155	21.3	1.0210	28.5	1.0265	35.6	1.0320	42.8