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Introduction

Records of daily surface seawater temperatures and salinities are available from a number of shore stations located on the British Columbia, Alaska and Washington coasts (Fig. 1, Table I). The observation periods for each of the 17 stations whose data are presented in this report are recorded in Table I. Included in this list is one station with 40 years of continuous observations, another with 35 years, 8 with 25 years, and 3 with 20 years. The stations are arranged in this table in a north-to-south order in two groups, one group located on the outer island coast and the second group located along the inshore mainland coast. Temperature records from 3 American shore stations (Sitka, Ketchikan, Neah Bay) have been included in this report because the data observed at these stations are useful in the study of oceanographic conditions in adjacent British Columbia waters.

Table II records the locations of, and periods of observation for, a number of British Columbia stations where the observations have been discontinued, or where they are not of sufficient length to be used in this report. Together with Table I, this provides a complete listing of Canadian shore station records.

The temperature and salinity data from the Canadian stations listed in Tables I and II have been published as tabulations of daily values in a series of annual data record volumes (Fisheries Research Board of Canada, MSS, 1947 to 1959; Hollister, MSS, 1960 to 1963). The temperature data through 1960 from the American stations have been published as monthly mean values in two publications of the U.S. Coast and Geodetic Survey (1956, 1962). Summaries of the 1961 and 1962 data were obtained from the Marine Data Division of the Coast and Geodetic Survey; permission to include these records in this report was granted by the Director of the U.S. Coast and Geodetic Survey, Washington, D.C.

This large group of shore station data is essentially a collection of individual time-series surveys. When the daily temperature and salinity data are grouped by month and the monthly means computed, it is readily apparent that each set of data has its own characteristic annual cycle, featured by a regular seasonal oscillation in the monthly mean values (Tully, 1950). Pickard and McLeod (1953) examined the temperature and salinity data from 12 B.C. shore stations. The studies showed that the annual cycle of temperature is basically similar at all stations, but the ranges between the seasonal maxima and minima are different for each station. It was also indicated that 3 distinct annual cycles were evident in the salinity data, corresponding to variations in the characteristics of the seasonal cycles of coastal precipitation and river discharge. The

annual temperature and salinity cycles serve as indices of the marine climate at the shore stations. The stations can be classified into 9 different climatic groups according to their climatological region and type of geographic location (Tully, 1952), (Pickard and McLeod, 1953). Each group typifies a different combination of range and pattern in the annual cycles of temperature and salinity.

The simplest way to recognize trends and abnormalities in a time series is to determine the anomalies in the data, by subtracting the individual monthly means from a long-term mean for that month. This also eliminates from the anomalies the effect of the seasonal variation in each series. Because the stations are classed in a variety of climatic groups, the anomalies calculated for the data in the same period from different stations will show considerable variation in magnitude. Such differences in the sizes of anomalies can be recognized in the data from several Canadian and American shore stations, as shown in Fig. 2 to 6. These figures were contained in reports by the University of California (1960, fig. 4, 5, 7 and 8) and Roden (1961, fig. 4 and 8) and are reproduced here by kind permission of the authors. These figures illustrate two methods of presenting and emphasizing anomalies.

It would be useful to know what degree of abnormality these variable-sized anomalies represent. This report describes a classification system which codifies the temperature and salinity monthly means on the basis of the amount of their departure from average conditions. This system eliminates the differences of annual range values at the various stations, and so allows direct comparison of all data, either on an inter-station, or on an inter-month basis. It provides an indicator of abnormal conditions, and directs attention to a closer examination of the circumstances causing these conditions.

The classification system

This classification system was developed in 1960, and was designed so that the data could be processed on an electronic digital computer. The reference period for average conditions is a moving 10-year monthly mean, commencing with the first ten years of observation. The standard deviation of the 10 variates in each monthly group of data is determined, to give the limits of average conditions. Each individual monthly mean value of temperature and salinity is given an index, depending upon the number of ½ standard-deviation units contained in its anomaly from the 10-year mean.

Using these indices, the data can be grouped into classes which indicate the degree of differences from average conditions. These classes are defined by:

Indices of 0 to 1 (±): difference from the mean of less than 1 standard deviation. This class is considered indicative of average conditions.

Indices of 2 to 3 ($\pm$): difference from the mean of between 1 and 2 standard deviations. This class represents above or below average conditions.

Indices of 4 and higher ($\pm$): differences from the mean of greater than 2 standard deviations. This class represents conditions which are strongly above or below average.

A classification index of 2 is considered as the lower limit of the "above or below" average conditions because each index number represents a fractionally larger multiple of ½ standard deviation units. (The machine computations method outputs only the integral part of the classifying index, as explained in a following section of this report.)

The classification system described above is an adaption of one devised previously by Tabata (1957). He classified the seawater temperature and salinity data for 5 B.C. coastal stations, using a 15-year (1940-1954) reference period, and multiples of whole standard-deviation units to delineate the classes. These were coded by letter rather than by number. It is interesting to note that Harris (1963) has used a method almost identical to the one described in this report in his search for generalized equations to describe mixed-layer depth and temperature structure in the ocean. His major requirement was the screening of a large amount of oceanographic and meteorological variables for diagnostic analyses, and the use of anomalies of the variables was found to be the easiest method. He describes his classification index as "... a Standardized Anomaly $S(x_i)$ defined by

$$S(x_i) = \frac{x_i - \overline{x}_i}{\sigma(x_i)}$$

where $\sigma(x_i)$ represents the climatic standard deviation of x_i corresponding to mean $\overline{x}_i$. In shorter form, this becomes

$$S(x_i) = \frac{A(x_i)}{\sigma(x_i)}$$

indicating that the Standardized Anomaly is the original anomaly expressed in units of its own standard deviation."

Classifications computation method

The calculations of classifications were carried out with the ALWAC III-E digital computer at the University of British Columbia. A detailed description of the computer program was written by Fofonoff and Froese (MS, 1960) and can be abstracted as follows:

> "The data format is fixed in this program. The monthly means must consist of two decimal digits before and after the decimal point. Each row must contain 12 monthly means, so interpolated data are inserted for missing data. The program inputs data for the nine-year period preceding the year to be classified and stops on an lb command; it then expects the data for the tenth year. After input has been completed, the program computes grand monthly means (m_g) and the standard deviations (σ) from monthly means (m_i) according to the formulae:
>
> $$m_g = \sum_{i=1}^{10} m_i \,/10$$
>
> and $$\sigma^2 = \left(10 \sum_{i=1}^{10} m_i^2 - \left(\sum_{i=1}^{10} m_i\right)^2\right) /100$$
>
> The monthly means of the tenth year are classified according to a number (C) where (C) is the largest integer less than $(m_i - m_g)/\frac{1}{2}\sigma$, and the sign of (C) is the same as the sign of $(m_i - m_g)$. The program prints out (m_g), $(m_i - m_g)$, (σ) and a hexadecimal digit (C)."

Examples of the computer print-out are shown in Appendix I.

Discussion of the classification system

The 10-year reference period: An important use of the shore station data is the comparison of the anomalies in these data with the anomalies in oceanographic data from the adjacent oceanic regions. Ideally, the same reference period should be used for the calculation of both series of anomalies. It was decided at the 1959 Eastern Pacific Oceanic Conference (EPOC) that the 10-year period 1950-1959 would be selected as a common reference period for comparison of North Pacific Ocean data. When the present classification system was designed in 1960, a flexible base reference period such as a moving 10-year monthly mean seemed to be

more suitable to the changing concepts of North Pacific oceanographic research. Keeping the base reference period "up to date" permits the use of data from recently-established shore stations. (One of the features of this classification system is that the first ten years of data are classified retroactively, after the classification parameters for the tenth year are computed.)

Robinson (1960) examined the monthly mean temperature and salinity data for 11 of the stations presented in this report, in order to determine what variations would occur in the anomaly values by using 10-year and longer (20 to 24 years) reference periods. She made comparisons between two 10-year periods, 1949-1958 and 1950-1959, and between these two periods and the longer-term periods.

She concluded that, for the temperature anomalies, "... the change in common reference period principally effects those months and years with small deviations. The spectacularly different years (e.g., 1931, 1933, 1941, 1958) would still stand out regardless of the base of reference." No systematic differences could be found in the salinity anomalies determined for the various reference periods.

The standard deviations: The use of a moving 10-year reference period introduces a series of different standard deviation values throughout the classification computations for each set of monthly mean data. The values of standard deviation used to classify the January and July temperature data from a number of stations in different climatic groups are listed in Table III. These 2 months were chosen because they are at opposite extremes of the annual cycle, and because they generally represent conditions of high and low ranges in standard deviation values. The standard deviation values used to classify 2 sets of monthly mean salinity data from several stations representative of the 3 annual salinity cycle groups (page 1) are listed in Table IV. The year-to-year variation in the temperature and salinity values is regular and only slight, but the considerable extent of the variations in their range and size shows how variable the limits of average conditions can be in the data from different months and different stations. This emphasizes the need for the classification of anomalies to determine their degree of abnormality before making comparisons between sets of data.

Classifications based on a long-period mean: In view of this progressive variation in standard deviation values, a comparison was made between the classifications determined using the moving 10-year reference period and those using a 20-year (1943-1962) period and a 25-year (1938-1962) period. The monthly mean temperature data from Kains Island during the period 1935 to 1962 were used for this comparison. The number of instances in which there was a difference of 2 classification units between indices based on the 10-year reference periods and those based on the 20- and 25-year periods were recorded. In the 336 comparisons obtained in 28 years of data, the classifications based on the moving 10-year periods differed 30 times (9%) from those based on the

20-year period, and 11 times (3%) from those based on the 25-year period. There were never any changes in sign between the various sets of indices. The effect of 26 of the 30 changes in the "10- vs 20-year" comparison was to increase the value of the classification index when the 20-year period was used. In the "10- vs 25-year" comparison, 5 of the 11 changes indicated an increase in the value of the index, and 6 effected a decrease in the value. So there was no significant change in the pattern of temperature classification indices for this 28-year period (1935-1962) at Kains Island, when using different reference periods. Of course, these good results might have occurred because of fortuitous choice of Kains Island data, and because of the particular position of the 28-year period in a longer-term cycle of temperature change. But, concurrent with the conclusions of Robinson (1960), it could be considered that using a fixed longer reference period rather than a moving 10-year base would not change the trend of classification indices, but it might change the classification value of some significant anomalies.

Arrangement of the tabulations in the report

The original publication of the classifications computations for 13 of the B.C. stations catalogued in Table I was made in the report "Classifications of daily observations of seawater temperature and salinity on the Pacific Coast of Canada, 1915-1959" (Hollister, MS, 1960). The tables of monthly mean values and classification indices presented in this report are summaries of the detailed tabulations published in the 1960 report and in subsequent volumes of annual data records for the years 1960, 1961 and 1962. Any errata in previous publications have been corrected in this report.

The monthly mean temperatures and salinities and their classification indices are arranged in two groups of pages for each station, in the same order as shown in Table I. In the first group, the tabulations of the monthly mean temperatures are presented on the even-numbered left-hand page and their classification indices are tabulated on the facing odd-numbered right-hand page. The second group of pages presents in the same manner the monthly mean salinities and the corresponding classification indices. Interpolated monthly-mean values are underlined, and no classification indices are listed for these values. These interpolated data should not be considered as representing conditions for those months, as they were determined only for computational purposes. Twenty-year (1943-1962) and 25-year (1938-1962) grand monthly means of temperature and salinity are tabulated on the pages of monthly mean values for those stations where observations are continuing through 1962. A 35-year (1928-1962) grand monthly mean temperature is also tabulated for Ketchikan and Fraser River. Means for the full period of observations are listed for those stations where observations have been discontinued. The range of the different standard deviation values used to compute the classification indices is included at the foot of each month's column on the page of tabulated indices. They are given in the same units as the corresponding monthly means, F° and ‰. This could be considered as a summarized listing of Tables III and IV for all stations.

The monthly mean temperatures and salinities and their classification indices for 1963 and subsequent years will be published in the annual data record volumes of the daily observations.

Special notes concerning tabulations for some stations:

1. Langara Island: Classification indices have been computed for data for the years 1936, 1937, and 1940, using the computation parameters determined for the period 1941-1949.

2. Cape St. James: Classification indices have been computed for the monthly mean temperatures for the years 1934 to 1937, 1941, and 1942, using data from the period 1934-1948 to determine the computation parameters. Machine computations commenced with the data for 1943.

3. Pine Island: The upper range of the standard deviations for the November and December salinity classifications is 1.12 and 1.13 ‰ respectively, during the years 1937-1948. These standard deviations (large in comparison to those for the other months) are due to the inclusion in the 10-year reference group of unusually low monthly mean salinities for November and December 1939. These low mean values were caused by the occurrence in each month's group of data of 6 low daily salinity values. The low 1939 values are deleted when the reference based group is 1940-1949, and the standard deviation values then fall within a more usual range of 0.25 to 0.40 ‰.

Graphical plots of the classification indices

The classification indices are presented graphically in Fig. 7 to 16 in three 15-year units, 1920-1934, 1935-1949, and 1950-1964. The temperature indices for the period 1915-1919 for Departure Bay are also shown in Fig. 7. The temperature indices for the 2 Alaskan stations of Sitka and Ketchikan are grouped for the period 1935-1962 in Fig. 8. In Fig. 9 to 16, the graphical plots of the temperature and salinity indices are arranged in the figures in the same order of stations as listed in the two regional groupings in Table I.

On the graphical plots, the areas enclosed by the classification indices greater than 2 are darkened to emphasize the abnormal conditions they represent.

Bibliography and Appendix

A large number of reports concerning various studies of the Canadian and American shore station data have been published. A bibliography of these reports, together with an abstract for each, is presented. There are also a number of reports in which shore station data are used in conjunction with studies of oceanographic and fisheries conditions in B.C. coastal regions. These reports are listed in the bibliography, along with an abstract describing how the data are used in the studies. Most of the reports used as references are listed in the bibliography also.

An appendix is attached, which tabulates the full detail of the machine print-out of the temperature data classifications from 4 shore stations (1 Canadian, and 3 American). These detailed computations have not been reported previously.

References

Fisheries Research Board of Canada. MSS, 1947-1951. Observations of seawater temperature, salinity, and density on the Pacific coast of Canada, Vol. I, 1914-1934, to Vol. X, 1950. Pacific Oceanographic Group, Nanaimo, B.C.

MSS, 1952 to 1957. Observations of seawater temperature and salinity on the Pacific coast of Canada, Vol. XI, 1951, to Vol. XVI, 1956. Pacific Oceanographic Group, Nanaimo, B. C.

MSS, 1958 and 1959. Observations of seawater temperature and salinity on the Pacific coast of Canada, Vol. XVII, 1957, and Vol. XVIII, 1958. Fish. Res. Bd. Canada, MS Rept. Series (Oceanogr. and Limnol.), Nos. 23 and 48.

Fofonoff, N.P., and C. Froese. MS, 1960. Programs for oceanographic computations and data processing on the electronic digital computer ALWAC III-E. M-1 miscellaneous programs. Fish. Res. Bd. Canada, MS Rept. Series (Oceanogr. and Limnol.), No. 72, 35 pp.

Harris, R.G. 1963. Studies of techniques for the analysis and prediction of temperature in the ocean. Part II: Diagnosis of mixed-layer depth and sea temperature by statistical methods. Interim report 7046-93, The Travelers Research Centre, Inc., Hartford, Conn. 49 pp.

Hollister, H.J. MS, 1960. Classifications of daily observations of seawater temperature and salinity on the Pacific coast of Canada, 1915-1959. Fish. Res. Bd. Canada, MS Rept. Series (Oceanogr. and Limnol.), No. 68, 139 pp.

MSS, 1960 to 1963. Observations of seawater temperature and salinity on the Pacific coast of Canada, Vol. XIX, 1959 to Vol. XXII, 1962. Ibid., Nos. 67, 104, 131, 161.

Pickard, G.L., and D.C. McLeod. 1953. Seasonal variation of temperature and salinity of surface waters of the British Columbia coast. J. Fish. Res. Bd. Canada, 10(3): 125-145.

Robinson, M.K. 1960. The use of a common reference period for evaluating climatic coherence in temperature and salinity records from Alaska to California. Calif. Coop. Oceanic Fish. Invest. Rept. Vol. VIII, 1 July 1959 to 30 June 1960: 121-130.

Roden, G.I. 1960. On nonseasonal temperature and salinity variations along the west coast of the United States and Canada. Calif. Coop. Oceanic Fish. Invest. Rept. Vol. VIII, 1 July 1959 to 30 June 1960: 95-119.

Tabata, S. 1957. Classification of daily sea-water data. Trans. Amer. Geophys. Union, Vol. 38, No. 2: 191-197.

Tully, J.P. 1952. Climate in the coastal seas of British Columbia. Fish. Res. Bd. Canada, Prog. Rept. Pac. Coast Sta., No. 90: 16-20.

University of California, Scripps Institution of Oceanography. 1960. Temperature and salinity anomaly charts for 24 Canadian and American shore stations based on a common reference period. S.I.O. Ref. 60-30. 9 pp., 33 fig.

U.S. Coast and Geodetic Survey. 1956. Surface water temperatures at tide stations, Pacific coast. Spec. Pub. No. 280, Fifth Ed. 74 pp.

1962. Surface water temperature and salinity, Pacific coast. C & GS Pub. 31-3, First Ed. 71 pp.

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Acara, A. 1962. On warm and cold years in the North Pacific Ocean. Fish. Res. Bd. Canada, MS Rept. Series (Oceanogr. and Limnol.), No. 134, 18 pp.

The yearly maximum monthly mean surface temperature data from several B.C. coastal stations indicate that a cyclic change occurs in summer conditions on the eastern Pacific coast, which is opposite in phase to that shown by Japanese coastal station data.

Eber, L.E., and O.E. Sette. 1959. Indices of mean monthly geostrophic wind over the North Pacific Ocean. U.S. Fish and Wildlife Serv. Spec. Sci. Repts. - Fish. No. 323. 108 pp.

"Geostrophic wind components computed from monthly mean atmospheric sea level pressure charts are employed as indices of wind intensity over principal current systems in the North Pacific Ocean ... Application of the wind index data is illustrated by a simple comparison with sea temperature. A correlation was found between paired values of wind indices and sea temperatures off British Columbia (Triple I.), for January, which is consistent with the concept of wind-induced advection."

Wind indices were compared with temperature data from Langara I., Kains I., and Amphitrite Pt. also, and correlations of slightly lower significance were found.

Harris, R.G. 1963. Studies of techniques for the analysis and prediction of temperature in the ocean. Part II: Diagnosis of mixed-layer depth and sea temperature by statistical methods. Interim Report 7046-93, The Travelers Research Centre, Inc., Hartford, Conn. 49 pp.

"Techniques were developed to estimate the mixed-layer depth and vertical profile of sea temperatures to 440 ft at 4 ocean-station vessels in the North Atlantic. The estimations were based on climatological parameters and concurrent observations of routinely reported surface variables ... Statistical methods were used to develop the techniques ... Climatological parameters were compiled for each surface variable and for sea temperatures at depth. Equations were derived by harmonic analysis to express the mean and standard deviation of each variable as a function of the day of the year. The estimations were computed from significant statistical relationships expressed in the form of regression equations ..."

It is desirable that the regression equations be generalized as much as possible in space and time, so the seasonal and geographical characteristics of the climatological parameters must be suppressed. This is accomplished by first deriving the anomalies of these parameters from their climatic means, thus eliminating the seasonal variation. The geographical distribution of the parameters is generalized by expressing the anomalies in a standardized form so that they are expressed in units of their own climatic standard deviation.

Herlinveaux, R.H. 1957. On tidal currents and properties of the sea water along the British Columbia coast. Fish. Res. Bd. Canada, Prog. Rept. Pac. Coast Sta., No. 108: 7-9.

In calm weather, periods of maximum and minimum sea-surface temperatures and salinities at some shore stations can be related to the variations in tidal currents in nearby coastal passes.

Hollister, H.J. 1949. Daily seawater observations in Georgia Strait. Fish. Res. Bd. Canada, Prog. Rept. Pac. Coast Sta., No. 81: 75-79.

The geographic location of, and observed oceanographic conditions at, Entrance I. and Race Rocks shore stations are described.

1951. Daily seawater observations along the west coast of Vancouver Island. Ibid., No. 86: 6-11.

The geographic location of, and observed oceanographic conditions at, Amphitrite Pt., Nootka, and Kains I. stations are described.

1952. Daily seawater observations in northern British Columbia waters. Ibid., No. 91: 3-9.

The geographic location of, and observed oceanographic conditions at, Cape St. James, Langara I., and Triple I. stations are described.

1953. Daily seawater observations along the central British Columbia coast. Ibid., No. 94: 8-15.
The geographic location of, and observed oceanographic conditions at, Ivory I., Pine I., and Cape Mudge stations are described.

1954. What was the water temperature of the sea water on the British Columbia coast in 1952? Ibid., No. 98: 6-9.
The coastal shore stations can be classified into 4 oceanic region types using as a criterion their geographic location. The anomalies of the 1952 monthly mean temperatures from a 10-year mean are presented.

1956. Daily seawater observations on the Pacific coast of Canada. Proc. Eighth Pac. Sci. Cong., Vol. III: 705-720.
The uses of the daily sea-surface data in relation to fisheries research are discussed generally.

MS, 1956. The program of bathythermograph observations at the Canadian Ocean Weather Station "PAPA" (59°00'N, 145°00'W). Joint Committee on Oceanography, Pacific Oceanographic Group, 32 pp.
Significantly anomalous conditions are recognized simultaneously in the sea surface temperature data from Station "P" and Amphitrite Pt.

Hubbs, C.L. 1948. Changes in the fish fauna of western North America correlated with changes in ocean temperature. J. Mar. Res., 7: 459-482.
There are numerous records of the occurrence of southern forms of fishes in B.C. waters, especially when warmer-than-average conditions prevail in the ocean. The sea-surface temperature data from Nootka are used to indicate ocean temperature conditions.

Johnson, J.H. 1961. Sea surface temperature monthly average and anomaly charts, Northeastern Pacific Ocean, 1947-58. U.S. Fish and Wildlife Service, Spec. Sci. Rept. - Fish. No. 385. 56 pp.
"Sea temperature data in the area bounded by the west coast of North America and longitude 150°W and latitude 20° to 54°N, and temperature data at four coastal stations along the west coast of North America are presented in two parts. Part I consists of 12 monthly average charts based on data from 1947 to 1958, and Part II consists of 144 monthly anomaly charts derived from the average charts."

The coastal station data tabulated on the charts include that from Cape St. James and Kains I.

Ketchen, K.S. 1956. Climatic trends and fluctuations in yield of marine fisheries of the northeast Pacific. J. Fish. Res. Bd. Canada, 13(3): 357-374.

"Winter" (February-April) ocean temperatures are thought to best represent (ocean) conditions at the time eggs and larvae of most commercial bottom fishes are in the water. Suggestive short-term correlations have been observed between "winter" temperatures and the abundance of brill, rock sole, and lemon sole. Departure Bay and Triple I. sea surface temperature data are used to describe the history of mean annual and mean "winter" temperature changes in B.C. waters. Tables of mean annual and mean February-April sea surface temperatures at Departure Bay and Triple I. are presented.

1956. Factors influencing the survival of the lemon sole (Parophrys vetulus) in Hecate Strait, British Columbia. Ibid., 13(5): 647-694.

Fluctuations in the strengths of lemon sole year-classes are correlated inversely with sea surface temperatures, occurring at the time in the life-cycle when the young are in the pelagic stage. Small annual differences in sea temperature could produce marked differences in the duration of the pelagic stage. Winter and spring temperature data from Triple I. are used to represent ocean temperature conditions.

Lane, R.K. 1962. A review of the temperature and salinity structures in the approaches to Vancouver Island, British Columbia. J. Fish. Res. Bd. Canada, 19(1): 45-91.

The temperature and salinity structures and distributions in the ocean off the coast of southwestern Vancouver Island are revealed as, basically, being functions of fresh water input (estuarine influence), insolation, wind, and the oceanic influence. There is sufficient data from an area off Amphitrite Pt. so that seasonal cycles can be noted in the ocean conditions. The surface salinity data from the shore station are used to indicate when the estuarine influence is dominant in the coastal region. Surface salinity data from other shore stations are used to indicate when other sources of fresh water input may enter the region, and how effective these estuarine influences may be on the salinity distribution in the coastal ocean.

Pickard, G.L., and D.C. McLeod. 1953. Seasonal variation of temperature and salinity of surface waters of the British Columbia coast. J. Fish. Res. Bd. Canada, 10(3): 125-145.

Monthly mean surface seawater temperature and salinity data for the 13 years 1935 to 1948 from 12 B.C. shore stations have been analysed. The temperatures reach a minimum in January and February, and a maximum in August. Temperature data from the various stations show different annual ranges, which are due largely to differences in the physical characteristics of

the geographic locations of the stations. The character of the annual temperature cycle for each station is typical for that station throughout the individual years, because the annual range is a statistically significant property of the cycle. During any year, the seawater temperatures at all the stations tend to differ from the long-period mean in the same manner.

The salinity data give evidence that the stations can be classified into 3 distinct groups, according to the characteristics of the annual cycle. There is one group where the salinity increases to a maximum in the summer, a second where it decreases to a minimum in the summer, and a third where it is substantially constant throughout the year. These cycles are explained as depending on variations in precipitation, river discharge, tidal currents, and wind.

The temperature and salinity cycles can be regarded as climatic indices of conditions at the shore stations. There are 3 major climatic regions, defined by the 3 salinity cycles, because the temperature cycles are similar at all stations. The stations are classified into 9 groups according to the climatological region and the geographic-type location.

Robinson, M.K. 1957. Sea temperature in the Gulf of Alaska and in the northeast Pacific Ocean, 1941-1952. Bull. Scripps Inst. Oceanogr., 7(1): 1-98.

Monthly charts of average temperature for 100-foot levels between the surface and 400 feet, and charts of average annual temperature cycles are presented. On these charts, the 12-year monthly average sea surface temperatures, the average annual sea surface temperature, the average minimum and maximum and the annual range of surface temperature for 19 American and Canadian shore stations (including all those in this report) are tabulated. Data from Amphitrite Pt. station were compared with the data from two other locations that are at the same latitude — the weather station at 49°N, 148°W, and the coastal oceanic region in the 1-degree square 48°-49°N, 129°-130°W — to show that sea temperatures in the coastal area are more variable than at either the shore station or the weather station. The correlation between the monthly mean temperatures at the 3 locations was high and indicates a good correlation in seasonal phase. The correlation between the deviation of the means was significant for the coastal location and shore station comparison only. This would allow the use of the shore station data in the study of year-to-year temperature fluctuations in coastal waters.

Robinson, M.K. 1960. The use of a common reference period for evaluating climatic coherence in temperature and salinity records from Alaska to California. Calif. Coop. Oceanic Fish. Invest. Rept. Vol. VIII, 1 July 1959 to 30 June 1960: 121-130.

The temperature and salinity data from 24 American and Canadian shore stations are studied. Individual monthly mean anomalies using a 1949-1958 mean, a 1950-1959 mean, and a variable longer-period mean as reference bases are analysed to show that the change in the reference period principally effects the magnitude of the anomalies in those years and months with small deviations. Station-to-station coherence is defined as the agreement in sign of temperature and salinity anomalies when computed from the same reference base. There is evidence that significant coastwise coherence in temperature anomalies occurred during 57% of the months for the 25 years 1935-1959, and that coherence was highest in December and January and lowest in August and September. Coastwise coherence for salinity anomalies is generally poor, but it is somewhat better in summer than winter. Predictions of coastwise climatic events would have only a low probability of success at present, if based on statistics from past records of shore station temperature and salinity data. A better understanding of the interaction between the atmosphere and the ocean is required.

Roden, G.I. 1960. On nonseasonal temperature and salinity variations along the west coast of the United States and Canada. Calif. Coop. Oceanic Fish. Invest. Rept. Vol. VIII, 1 July 1959 to 30 June 1960: 95-119.

Power spectra of the anomalies of the sea surface temperature and salinity data from 20 shore stations are investigated for the frequency range between 0 and 6 cycles per year. It is found that the power of these anomalies is concentrated at low frequencies. As a result of the analyses of coherence between the anomalies of sea temperature, air temperature, precipitation, river discharge, and salinity, the following conclusions are made: (1) At most well-exposed stations, air temperature anomalies can be used as an indicator of sea temperature anomalies. (2) At most stations not affected by river discharge, local precipitation anomalies can be used as indicators of salinity anomalies. (3) The relation between river discharge and salinity anomalies is good at stations located at the boundary between oceanic and river water. (4) Temperature and salinity anomalies at most stations are not related to each other. (5) Sea surface and air temperature anomalies occur more or less simultaneously over large areas. Salinity and precipitation anomalies are very local phenomena.

Roden, G.I., and G.W. Groves. 1960. On the statistical prediction of ocean temperatures. J. Geophys. Res., 65(1): 249-263.

An investigation is made into the prediction of sea surface temperatures from past records of wind, temperature, and radiation. "... There is practically no relation between radiation and sea-surface temperature, but there is a noticeable but small relation between wind and temperature. The best estimate

of future values of temperature can be made from past values of temperature, and the use of past wind values slightly improves the prediction." The prediction method was applied to the monthly mean sea temperature data from Amphitrite Pt. The observed and predicted time series gave the same anomaly sign, but the magnitude of the predicted anomaly was smaller than the observed. The computed error of the analysis indicated that only 41% of the variance had been accounted for, but this was better than the theoretical capability of the method.

Stewart, Jr., H.B., B.D. Zetler, and C.B. Taylor. 1958. Recent increases in coastal water temperature and sea level - California to Alaska. U.S. Dept. of Commerce, Tech. Bull. No. 3, 11 pp.
The monthly anomalies in sea surface temperature and sea level from 5 American shore stations (including Sitka, Ketchikan, and Neah Bay) during 1957-1958 are compared. There is a general parallelism in the variations of the two anomalies. It appears that a change in the atmospheric circulation is the predominant cause of these increases in both water temperature and sea level along the west coast.

Tabata, S. 1957. Heat exchange between sea and atmosphere along the northern British Columbia coast. Fish. Res. Bd. Canada, Prog. Rept. Pac. Coast Sta., No. 108: 18-20.
A graph showing the total heat transfer across the air-sea boundary at Triple I. is presented.

1957. Classification of daily sea-water data. Trans. Amer. Geophys. Union, Vol. 38, No. 2: 191-197.
A method is presented for classifying monthly mean seawater temperature and salinity data from 5 B.C. shore stations for the 15 years 1940-1954. The monthly means are compared to the grand monthly means by passing them through a step filter whose jumps are chosen from integral multiples of the standard deviations. The data are graded according to the classifications "average", "above average", and "much above average". There appears to be coherence in the temperature data for each station; that is, warmer months are followed by warmer months, and colder by colder. Some coherence is also noted in the salinity data. Synoptic oceanographic surveys are made to determine the seasonal variation in the conditions in a coastal region. Classification of data from a shore station located in the same region would indicate whether conditions at the time of a survey were normal or abnormal.

1958. Heat budget of the water in the vicinity of Triple Island, British Columbia. J. Fish. Res. Bd. Canada, 15(3): 429-451.
The annual cycles of the total heat transfer across the air-sea boundary at Triple I. for the 8 years in the period 1947-1954 are computed and graphically presented. The total heat transfer is compared to the rate of exchange of heat content of the

ocean in the vicinity of Triple I. during the period May 1954 to June 1955. It is concluded there had been transports of warm and cold water masses into the region at various intervals during this period.

Tully, J.P. 1935. Weather and the ocean. Fish. Res. Bd. Canada, Prog. Rept. Pac. Coast Sta., No. 26: 5-10.
The relationship between weather and its effects on the B.C. coastal oceanic regions is discussed in general terms. Daily seawater records from several west coast shore stations illustrate these relationships.

1937. A warmer summer. Ibid., No. 31: 16-18.
The records from several west coast shore stations show that surface seawater temperatures in the summer of 1936 were warmer than in 1935; and also that summer conditions appeared later in the northern waters than in the southern waters.

1937. Seasons in the sea. Ibid., No. 33: 11-12.
Seasons comparable to those occurring in the atmosphere can be recognized in the sea surface water temperature data at shore stations.

1937. Report on dynamic studies off the Canadian Pacific coast, 1936. Trans. Amer. Geophys. Union, Vol. 18, Pt. 1: 228-231.
The sea surface temperature data from Kains I. is used to delineate the conditions which identify the four seasons in the ocean. An oceanic-current survey should be made within the period when seasonal conditions measured at the shore station are constant. Daily oceanographic and meteorological observations could be used to define seasonal cycles in coastal waters, their limits and periodicity.

1938. Some relations between meteorology and coast gradient-currents off the Pacific coast of North America. Ibid., 19th meeting: 176-183.
Data from Amphitrite Pt. shore station show that variations in the temperature and salinity conditions in the coastal ocean are seasonal, and can be related directly to local meteorology. Continuous observations at a shore station would provide direct observations of the major forces controlling the coastal gradient-current system and a record of its variations.

1950. Seasonal cycles in the sea. Fish. Res. Bd. Canada, Prog. Rept. Pac. Coast Sta., No. 85: 88-90.
Some of the external processes that affect the annual temperature and salinity cycles at Entrance I., are described. During the 4 years 1937 to 1941, there were significant changes in the ocean "climate" in this region of the Strait of Georgia.

1952. Climate in the coastal seas of British Columbia. Fish. Res. Bd. Canada, Prog. Rept. Pac. Coast Sta., No. 90: 16-20.

Climate in the coastal seas can be recognized just as in the atmosphere. The annual cycles in the daily observations of seawater temperature and salinity are used to define the different types of coastal marine climate. The B.C. shore stations can be classified into 9 different groups according to their marine climatological region and geographic location. The complex inter-relationships of solar heating, wind mixing, fresh water influences, and geographic location in the determination of the marine climate types are discussed in detail.

Tully, J.P., and E.B. Bennett. 1952. Project "Offshore", coastal temperatures, and Tuna. Fish. Res. Bd. Canada, Prog. Rept. Pac. Coast Sta., No. 92: 6-9.

Monthly mean sea surface temperature at the four ocean coast stations, Langara I., Cape St. James, Kains I., and Amphitrite Pt., show a north to south cold-warm-cold-warm sequence in July 1950 and a regular cold-warm sequence in 1951. The irregular sequence corresponded to similar sequences of clouds of warm water separated by bands of cold water, noted in the surface temperature distribution in contiguous ocean waters. August 1950 and 1951 temperature conditions at the shore stations were similar to July's, and it is suggested that July shore station data could be used to predict August conditions in the ocean. The warm ocean temperature conditions in the summer of 1950 might have some bearing on the good tuna fishery that occurred during that time.

Tully, J.P., and A.J. Dodimead. 1957. Properties of the water in the Strait of Georgia, British Columbia, and influencing factors. J. Fish. Res. Bd. Canada, 14(3): 241-319.

The temperature data from Entrance I. and Departure Bay are used to indicate seasonal cycles in the thermal conditions in central Strait of Georgia, and the salinity data from Entrance I. measures seasonal and annual variations in the freshwater content of the upper zone in this same region. Daily salinity records at Entrance I. indicate the irregularity in surface salinity distribution in the central Strait caused by the pulsating discharge from the Fraser River. Monthly mean salinity data from Cape Mudge and East Pt. illustrate the annual variations in the lateral distribution of surface salinity in the Strait.

Waldichuk, M. 1952. Oceanography of the Strait of Georgia. I. Salinity distribution. Fish. Res. Bd. Canada, Prog. Rept. Pac. Coast Sta., No. 93: 26-29.

Daily salinity observations at Entrance I. illustrate the occurrence of cells of high and low salinity surface water in this region of the Strait.

1953. Oceanography of the Strait of Georgia. II. Temperature distribution. Ibid., No. 94: 19-23.

"Sunshine dominates the seasonal variation of surface temperature in the Strait of Georgia." The annual cycle of seawater temperature at Entrance I. follows the same trend as the insolation at Vancouver. Seasonal variation in surface seawater temperature in the southern Strait is similar to that at Race Rocks shore station.

Table I. List of stations for which temperature and salinity classifications are presented in this report

Station	Location		Period of Observation
	Latitude N	Longitude W	
(a) Outer island coast group			
Sitka, Alaska	57°03'	135°30'	November 1924 to December 1925, May 1943 to present
Ketchikan, Alaska	55°20'	131°38'	January 1922 to present
Langara Island, B.C.	54°15'	133°03'	November 1936 to August 1937, March 1940 to present
Cape St. James, B.C.	51°56'	131°01'	July 1934 to present
Kains Island, B.C.	50°27'	128°02'	January 1935 to present
Nootka, B.C.	49°36'	126°37'	August 1934 to June 1953
Amphitrite Point, B.C.	48°55'	125°32'	August 1934 to present
William Head, B.C.	48°20'	123°32'	March 1921 to June 1940
Race Rocks, B.C.	48°18'	123°32'	May 1941 to present
Neah Bay, Wash.	48°22'	124°37'	January 1936 to present
(b) Inshore mainland coast group			
Triple Island, B.C.	54°18'	130°53'	January 1940 to present
Ivory Island, B.C.	52°16'	128°24'	July 1937 to December 1955
Pine Island, B.C.	50°58'	127°43'	January 1937 to present
Cape Mudge, B.C.	50°00'	125°12'	January 1937 to present
Entrance Island, B.C.	49°13'	123°48'	June 1936 to present
Departure Bay, B.C.	49°13'	123°57'	September 1914 to July 1932, June 1934 to present
Fraser River, B.C.	49°12'	122°57'	March 1927 to present

Table II. List of stations, (a) where daily surface seawater observations have been terminated, and (b) where observations were commenced after 1953.

Station	Location		Period of Observation
	Latitude N	Longitude W	
(a) Short-period, terminated stations			
Green Island, B.C.	54°34'	130°42'	February 1935 to September 1936
Prince Rupert, B.C.	54°19'	130°20'	February 1934 to October 1935, January 1940 to May 1942
Stephens Island, B.C.	54°07'	130°40'	March 1934 to December 1936, intermittently
Masset, B.C.	54°00'	132°04'	December 1939 to October 1942
Shannon Bay, B.C.	53°38'	132°30'	December 1939 to August 1942
Sandspit, B.C.	53°15'	131°49'	August 1953 to December 1956, June to August 1952
Pulteney Point, B.C.	50°38'	127°09'	August 1954 to December 1957
Stuart Island, B.C.	50°24'	125°09'	September 1950 to August 1951
Texada Island, B.C.	49°42'	124°33'	May 1953 to October 1956
Lasqueti Island, B.C.	49°29'	124°21'	July 1946 to September 1948
Ladysmith Harbour, B.C.	49°00'	123°49'	July 1936 to June 1942, August 1949 to March 1957, intermittently
Beaver Point, B.C.	48°47'	123°22'	November 1953 to December 1957
White Rock, B.C.	49°01'	122°48'	June 1954 to June 1956
Port Alberni, B.C.	49°14'	124°49'	May 1941 to September 1942
Swiftsure Bank Lightship, Wash.	48°32'	125°00'	July 1954 to June 1961
Umatilla Reef Lightship, Wash.	48°10'	124°50'	July 1955 to April 1960
(b) Continuing observations, after 1953			
Bonilla Island, B.C.	53°30'	130°38'	April 1960 to present
McInnes Island, B.C.	52°16'	128°43'	August 1954 to present
Chrome Island, B.C.	49°28'	124°41'	April 1961 to present
East Point, Saturna Island, B.C.	48°47'	123°03'	July 1953 to September 1960, April 1961 to present

Table III. Standard deviation values (F°) used to compute classification indices of monthly mean temperatures for January and July at several shore stations

10-year period	Ketchikan		Langara I.		Kains I.		Race Rocks		Triple I.		Entrance I.		Fraser R.	
	Jan.	Jul.	Jan.	Jul.	Jan.	Jul.	Jan.	Jul.	Jan.	Jul.	Jan.	Jul.	Jan.	Jul.
1934-43	1.7	2.0											2.8	1.6
1935-44	1.6	1.9			1.8	1.7							2.8	1.5
1936-45	1.7	1.9			2.0	1.8							2.6	1.5
1937-46	1.6	1.9			2.0	1.2					0.8	1.6	2.3	1.7
1938-47	1.5	1.9			2.2	1.2					0.8	1.7	1.3	1.8
1939-48	1.5	1.8			2.2	1.2					0.8	1.7	1.2	1.8
1940-49	1.5	1.9			2.4	1.2			2.2	1.3	1.0	1.5	2.2	1.8
1941-50	1.5	1.8	2.5	1.1	2.2	1.3			2.6	1.2	1.6	1.5	2.4	1.8
1942-51	1.3	1.9	2.3	0.9	2.1	1.0	1.2	0.5	2.3	1.0	1.5	1.5	2.2	1.8
1943-52	1.3	1.1	2.1	0.9	2.0	1.2	1.1	0.5	2.2	0.5	1.4	1.0	2.3	1.2
1944-53	1.2	0.9	2.2	0.9	1.9	1.2	1.1	0.5	2.2	0.5	1.4	1.0	2.5	1.2
1945-54	1.3	1.0	1.9	1.0	1.9	1.3	1.1	0.5	2.0	0.6	1.4	1.1	2.5	1.5
1946-55	1.3	1.0	1.9	1.2	1.5	1.3	1.0	0.6	1.7	0.6	1.3	1.2	2.4	1.6
1947-56	1.2	1.0	1.8	1.2	1.6	1.2	1.0	0.6	1.6	0.6	1.2	1.0	2.3	1.6
1948-57	1.1	1.0	1.8	1.2	1.4	1.0	1.0	0.5	1.8	0.7	1.2	1.1	2.2	1.6
1949-58	1.1	1.3	2.0	1.2	1.6	1.1	1.2	0.8	2.2	0.8	1.3	1.8	2.8	2.6
1950-59	1.1	1.3	2.0	1.3	1.5	1.1	1.1	1.0	2.1	0.8	1.3	1.8	2.5	2.6
1951-60	0.9	1.3	1.5	1.2	1.3	1.2	0.9	1.0	1.7	0.8	0.8	1.8	2.4	2.6
1952-61	0.7	1.3	1.6	1.2	1.4	1.4	1.0	1.1	1.7	0.9	0.8	1.8	2.6	2.6
1953-62	0.8	1.3	1.5	1.2	1.4	1.2	0.9	1.1	1.8	1.0	0.9	1.8	2.1	2.6
Range of Std. Devn.	0.7 to 1.7	0.9 to 2.0	1.5 to 2.5	0.9 to 1.3	1.3 to 2.4	1.0 to 1.8	0.9 to 1.2	0.5 to 1.1	1.6 to 2.6	0.5 to 1.3	0.8 to 1.6	1.0 to 1.8	1.2 to 2.8	1.2 to 2.6

Table IV. Standard deviation values (‰) used to compute classification indices of monthly mean salinities for various months at several shore stations

10-year period	Langara I.		Kains I.		Amphitrite Pt.		Race Rocks		Triple I.		Cape Mudge		Entrance I.	
	May	Oct.	Jun.	Nov.	Mar.	Aug.	Jan.	May	Jul.	Nov.	Apr.	Jul.	Jun.	Oct.
1935-44			0.47	0.93	0.68	0.40								
1936-45			0.47	0.82	0.67	0.42								
1937-46			0.41	0.88	0.73	0.44					0.36	1.05	1.45	0.67
1938-47			0.40	0.87	0.73	0.39					0.37	1.07	1.44	0.71
1939-48			0.38	0.87	0.74	0.47					0.30	1.07	1.96	0.71
1940-49			0.35	0.65	0.74	0.58			0.91	0.16	0.27	0.97	1.97	0.71
1941-50	0.11	0.12	0.38	0.78	0.99	0.75			0.80	0.16	0.27	1.06	1.91	0.68
1942-51	0.11	0.12	0.40	0.84	1.00	0.75	0.39	0.16	0.86	0.23	0.28	0.99	1.94	0.64
1943-52	0.11	0.10	0.43	0.86	1.04	0.74	0.39	0.17	0.78	0.24	0.28	1.01	1.91	0.57
1944-53	0.12	0.11	0.43	1.11	1.10	0.77	0.41	0.17	0.74	0.23	0.28	0.99	1.82	0.56
1945-54	0.12	0.11	0.28	1.13	1.07	0.70	0.43	0.14	0.87	0.24	0.27	0.92	1.56	0.62
1946-55	0.14	0.11	0.30	1.14	1.24	0.60	0.43	0.11	1.05	0.25	0.25	0.85	1.77	0.58
1947-56	0.12	0.12	0.29	1.06	1.20	0.69	0.46	0.13	1.12	0.25	0.23	0.79	1.73	0.51
1948-57	0.13	0.13	0.29	1.06	1.27	0.60	0.40	0.11	1.12	0.26	0.23	0.76	1.83	0.41
1949-58	0.38	0.16	0.35	1.06	1.32	0.62	0.40	0.17	1.21	0.26	0.26	0.77	1.58	0.41
1950-59	0.37	0.13	0.38	1.08	1.32	0.63	0.36	0.18	1.18	0.26	0.21	0.73	1.56	0.66
1951-60	0.37	0.13	0.49	1.03	1.09	0.50	0.34	0.20	1.48	0.26	0.25	0.77	1.55	0.68
1952-61	0.37	0.12	0.45	0.95	1.16	0.44	0.29	0.21	1.39	0.12	0.38	0.75	1.35	0.68
1953-62	0.38	0.12	0.45	0.95	1.21	0.48	0.26	0.19	1.45	0.13	0.41	0.71	1.46	0.66
Range of Std. Devn.	0.11 to 0.38	0.10 to 0.16	0.28 to 0.49	0.65 to 1.14	0.67 to 1.32	0.39 to 0.75	0.26 to 0.46	0.11 to 0.21	0.74 to 1.48	0.12 to 0.26	0.21 to 0.41	0.71 to 1.07	1.35 to 1.97	0.41 to 0.71

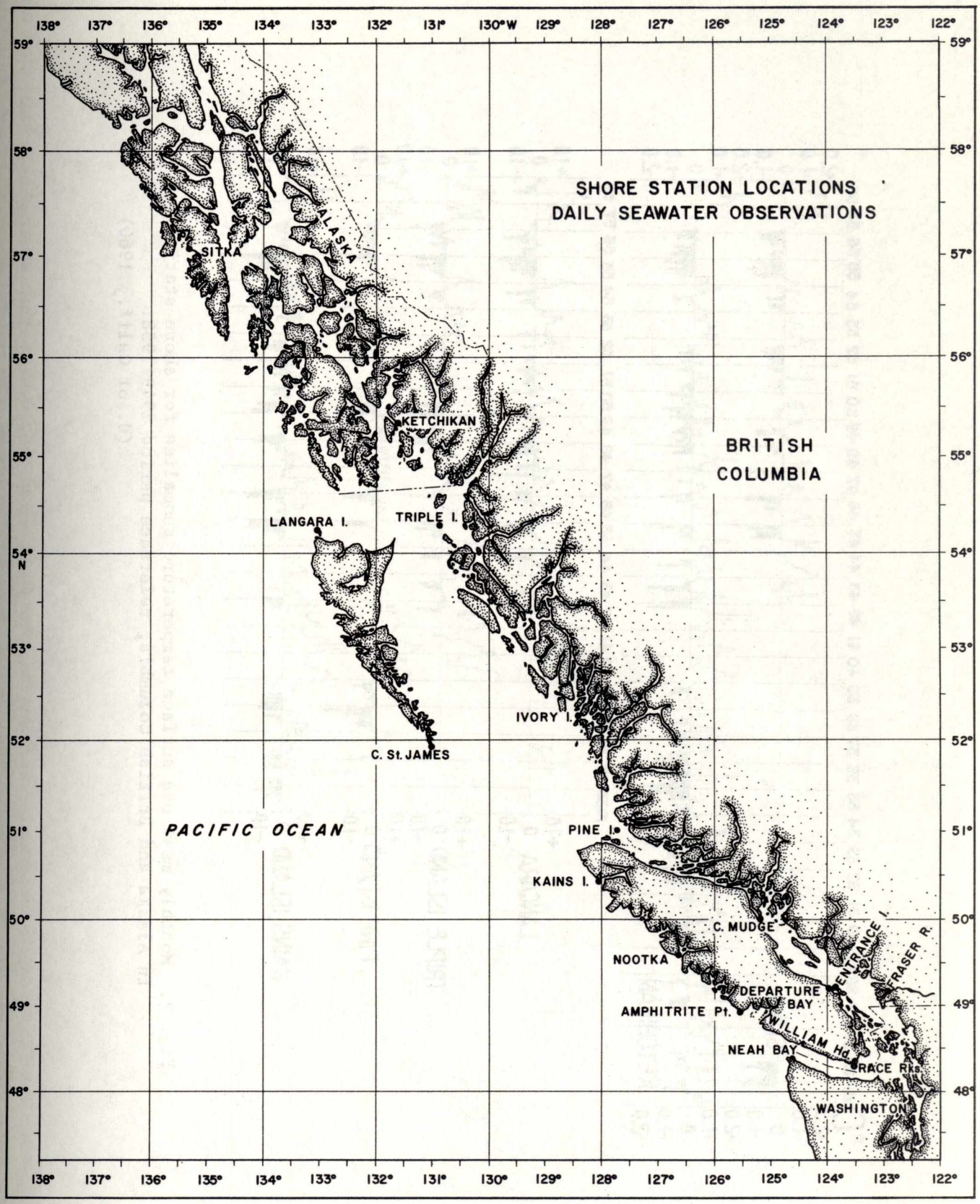

Fig. 1. Locations of shore stations listed in Table I.

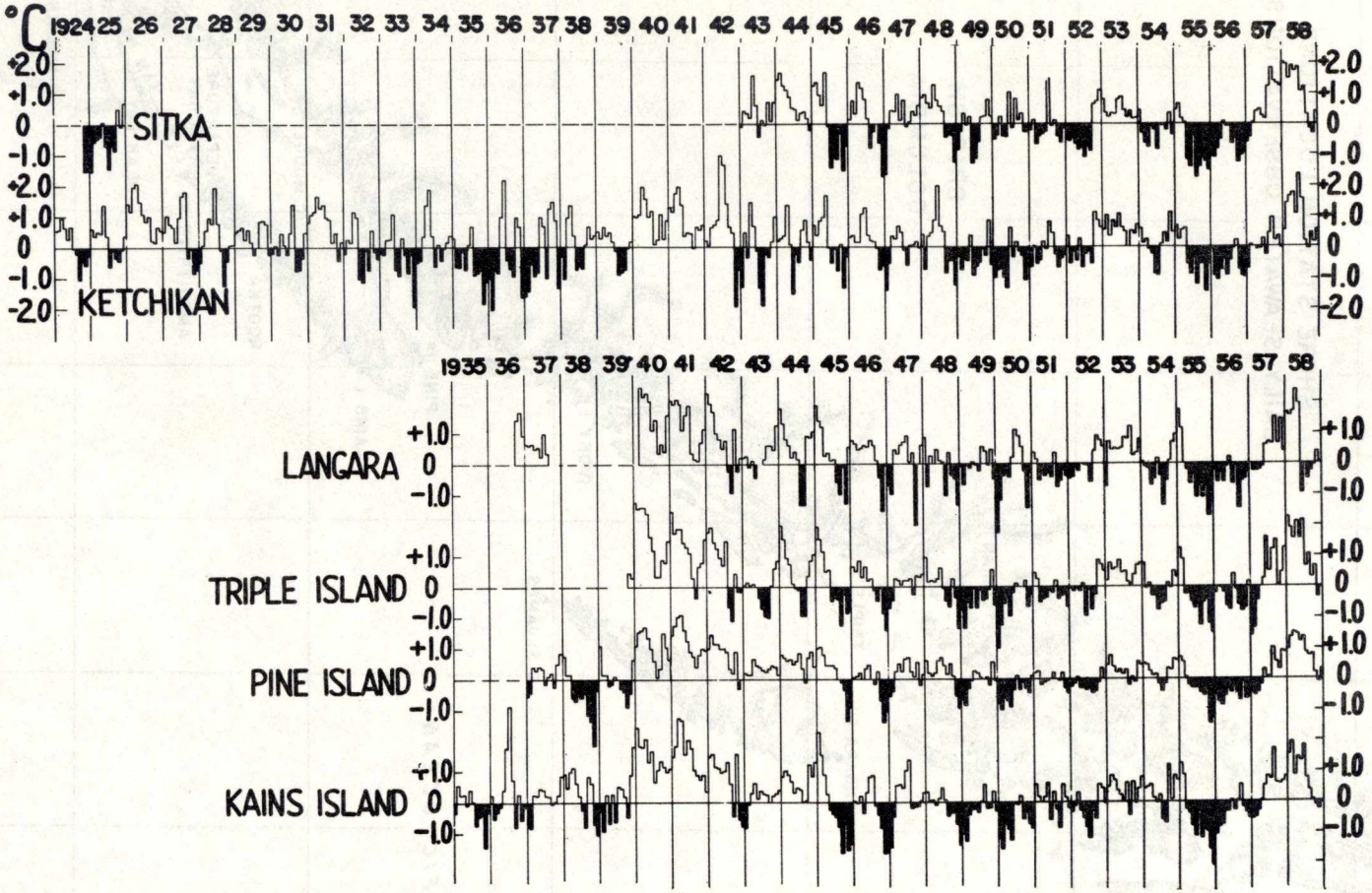

Fig. 2. Monthly mean sea surface temperature anomalies for shore stations in Alaska and British Columbia, reference period 1949-1958.
(U. of Calif., 1960)

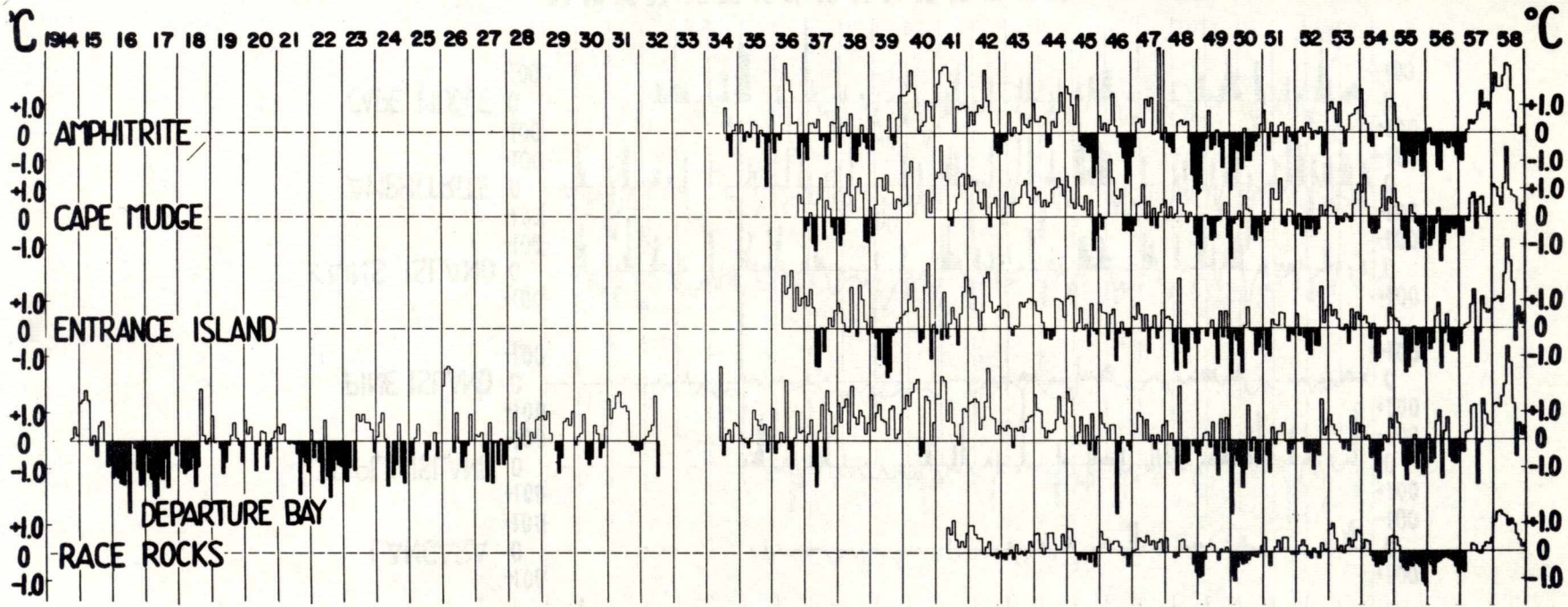

Fig. 3. Monthly mean sea surface temperature anomalies for shore stations in British Columbia, reference period 1949-1958.
(U. of Calif., 1960)

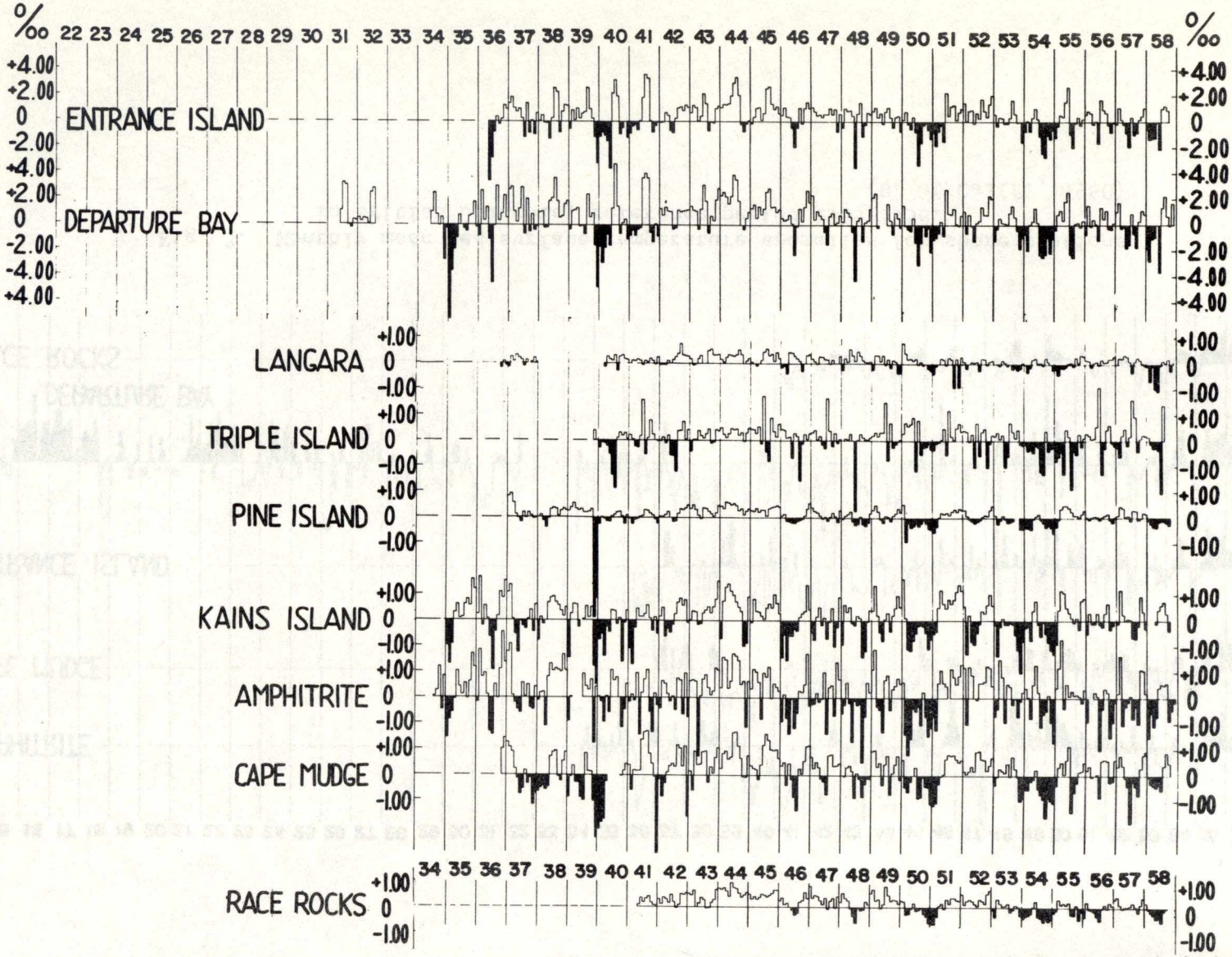

Fig. 4. Monthly mean sea surface salinity anomalies for shore stations in British Columbia, reference period 1949-1958.
N.B. The scale for Entrance I. and Departure Bay is 1/2 that for the other stations.

(U. of Calif., 1960)

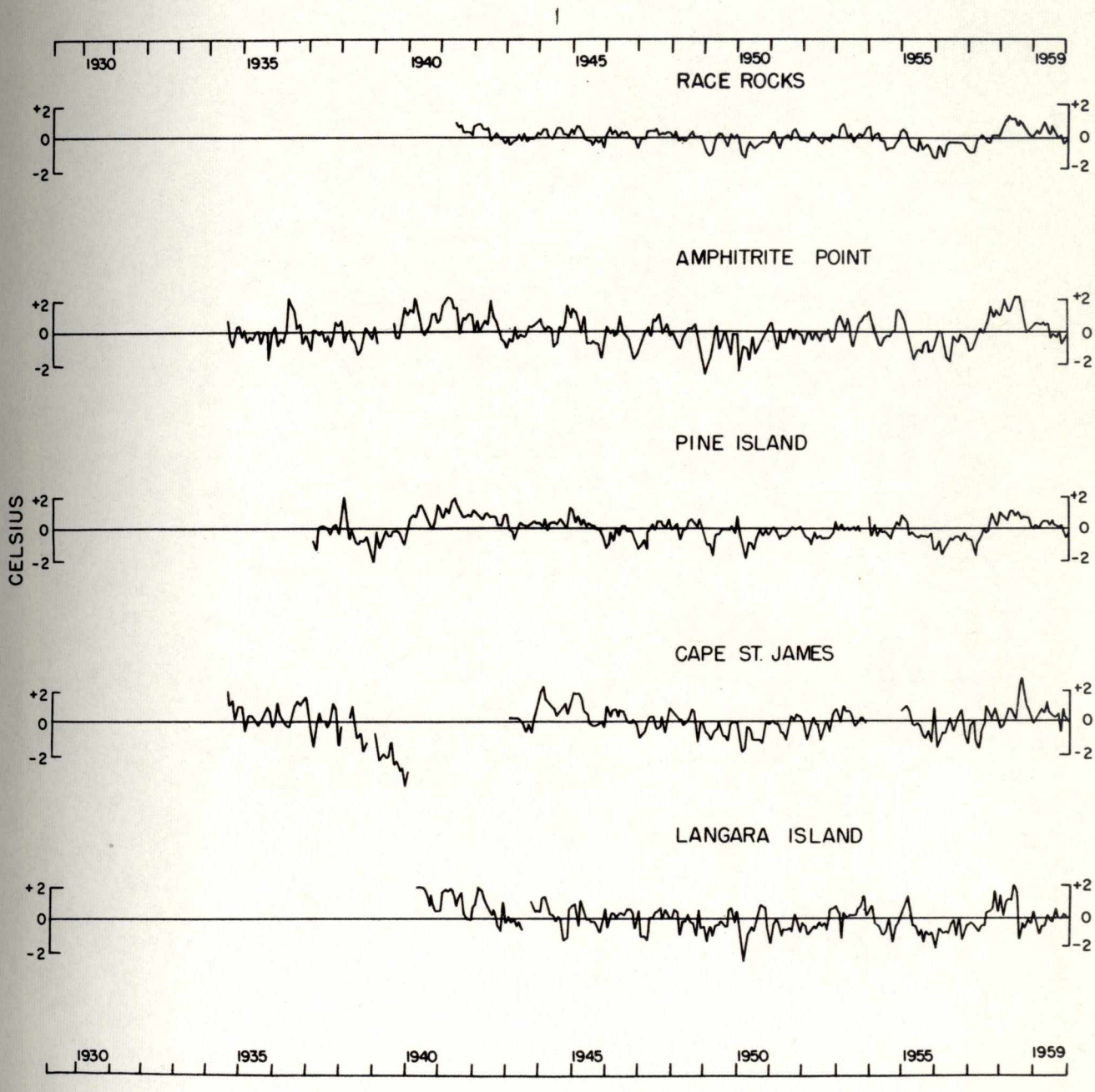

Fig. 5. Monthly mean sea surface temperature anomalies for shore stations in British Columbia, variable length reference periods.
(Roden, 1960)

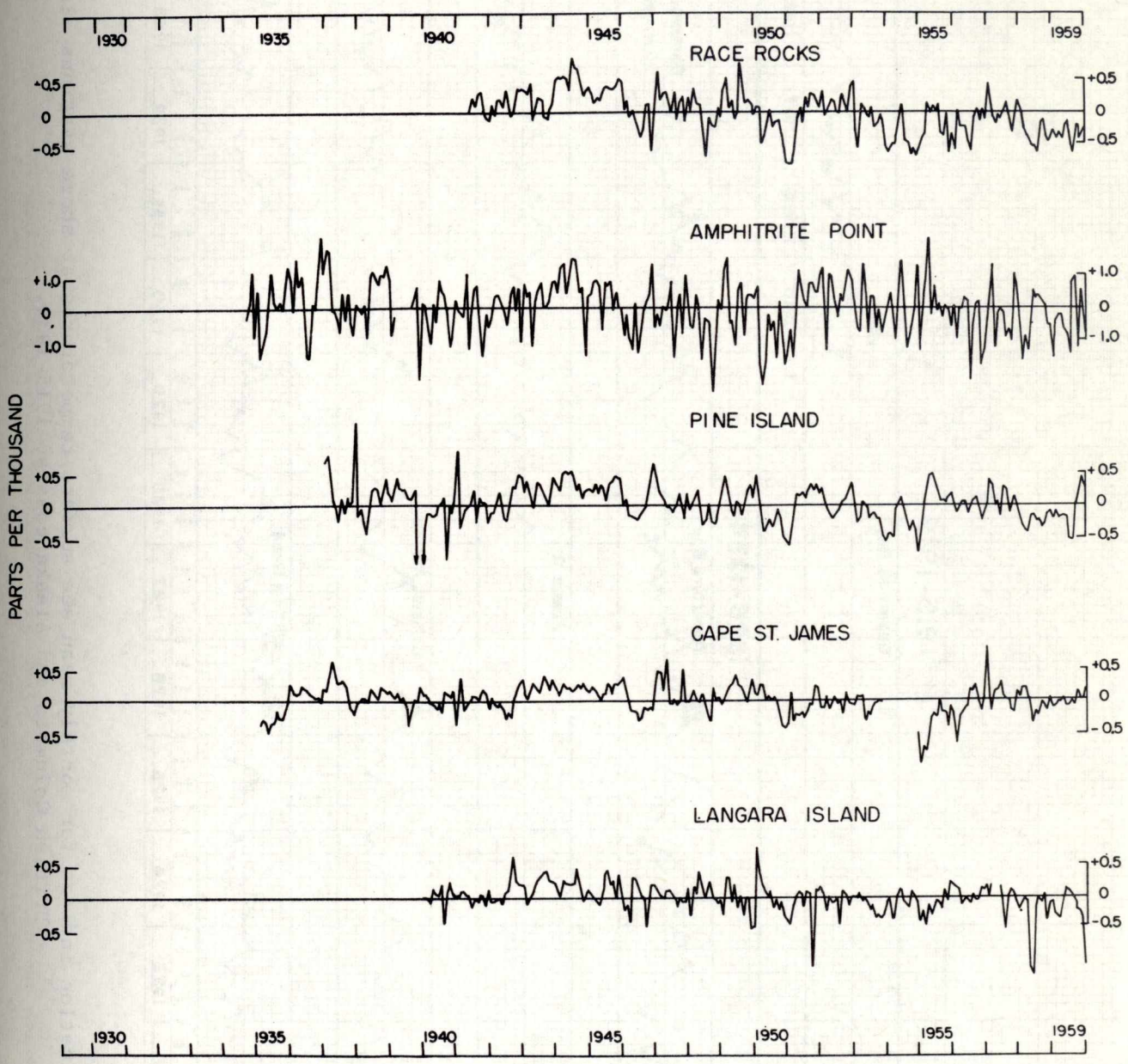

Fig. 6. Monthly mean sea surface salinity anomalies for shore stations in British Columbia, variable length reference periods. (Roden, 1960)

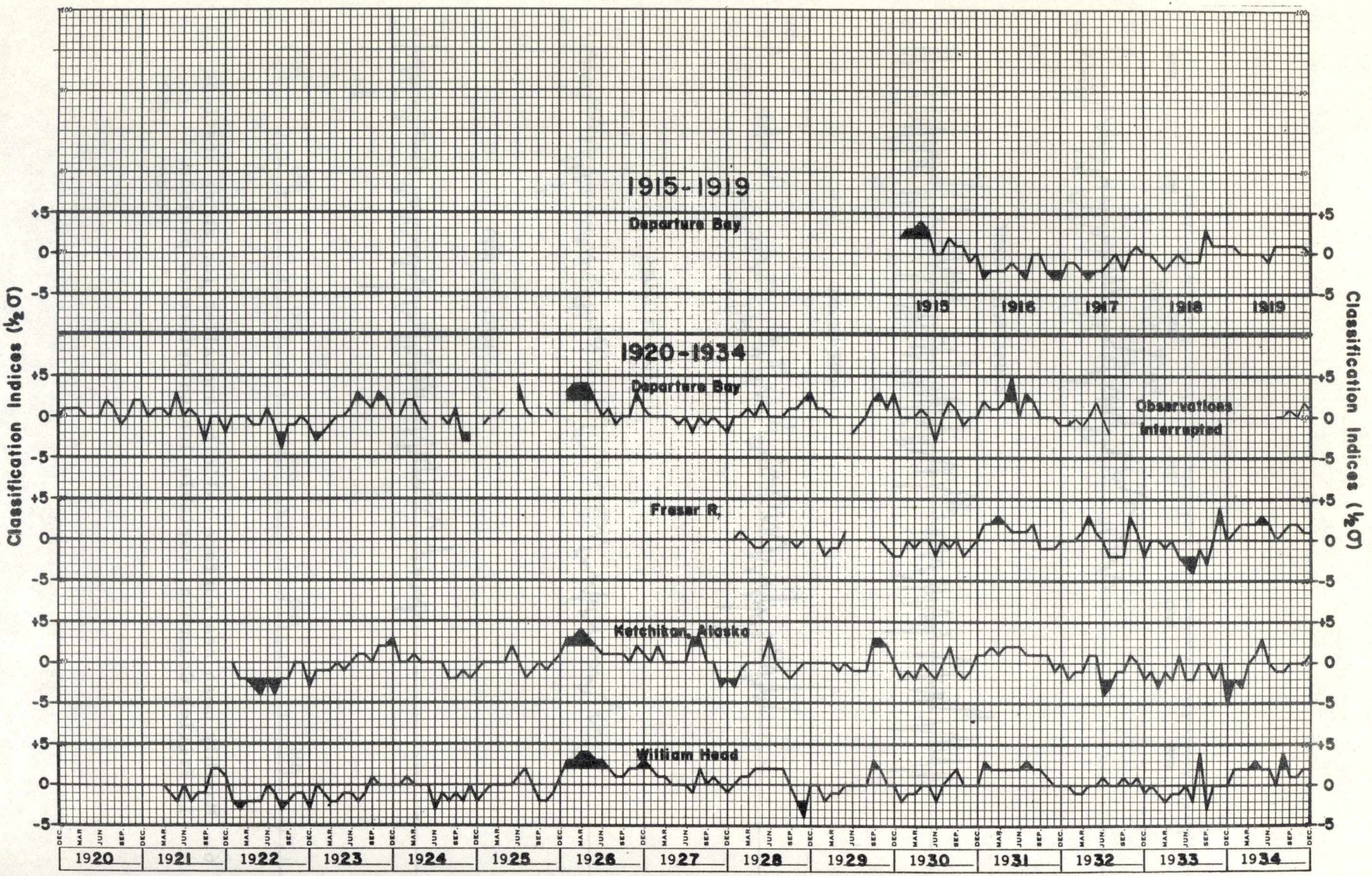

Fig. 7. Classification indices for monthly mean sea surface temperatures at shore stations along the British Columbia and Alaska coasts, 1915-1934.

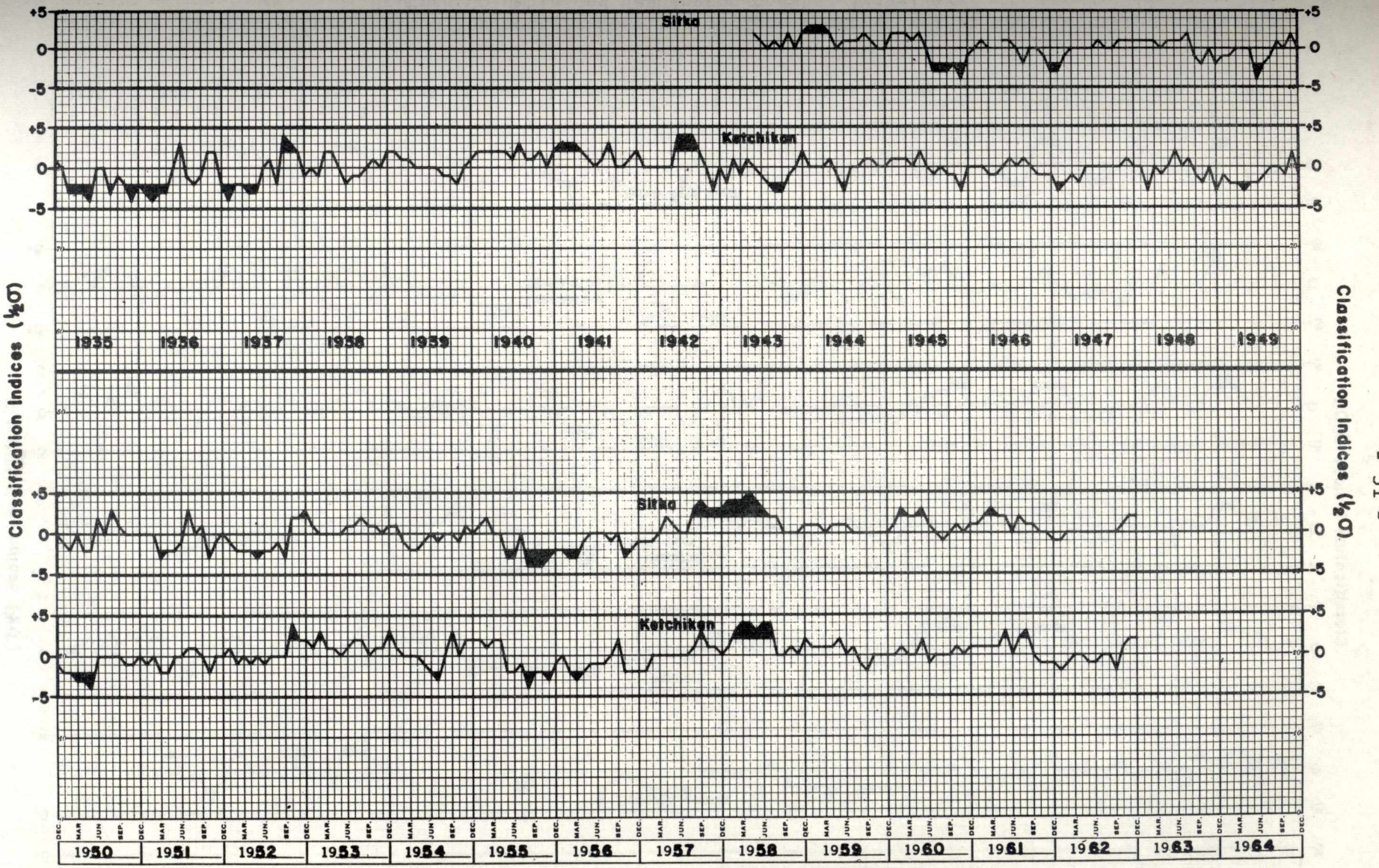

Fig. 8. Classification indices for monthly mean sea surface temperatures at shore stations along the Alaska coast, 1935-1962.

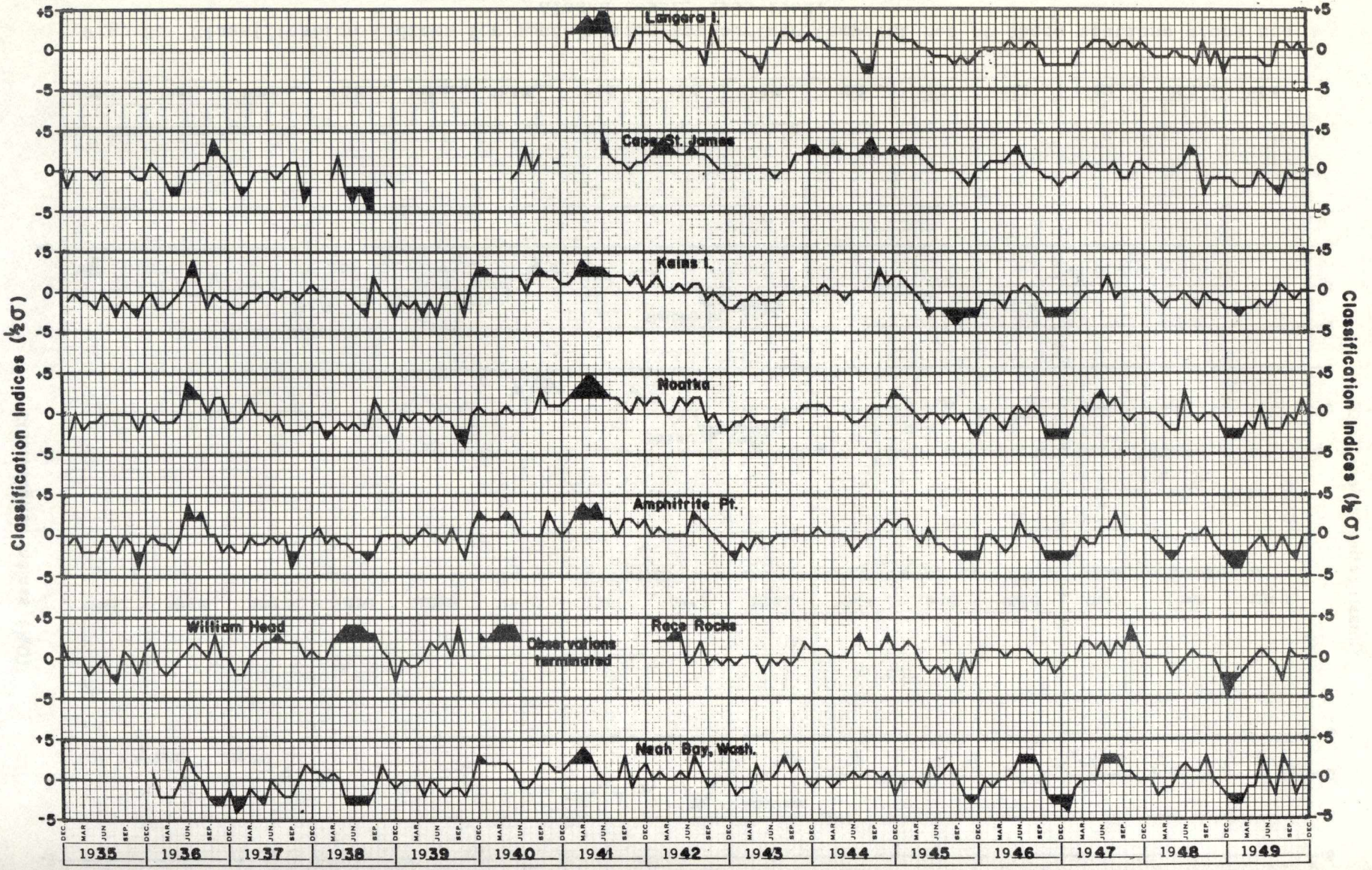

Fig. 9. Classification indices for monthly mean sea surface temperatures at shore stations along the British Columbia and Washington coasts, 1935-1949.

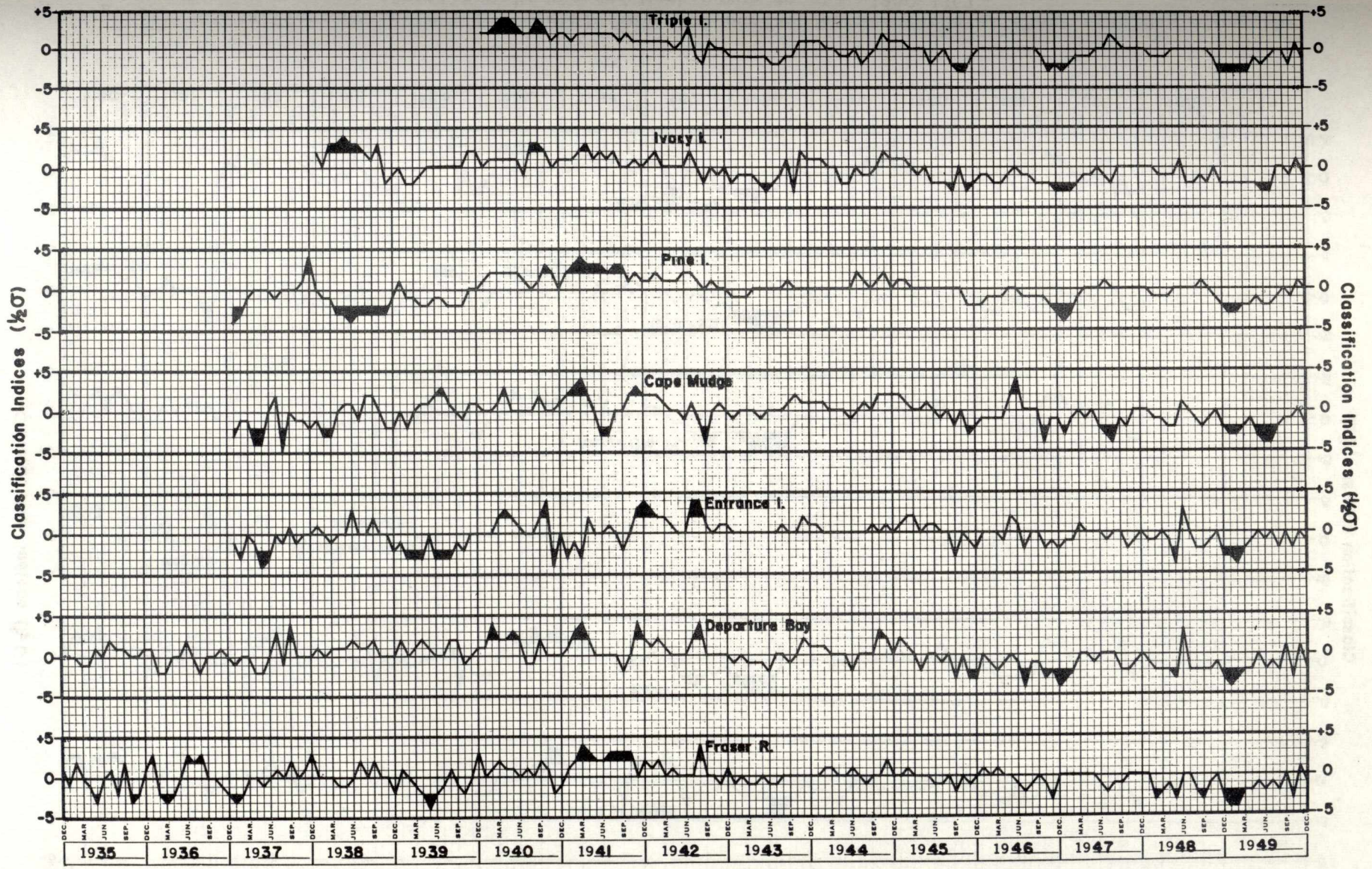

Fig. 10. Classification indices for monthly mean sea surface temperatures at shore stations along the British Columbia mainland coast, 1935-1949.

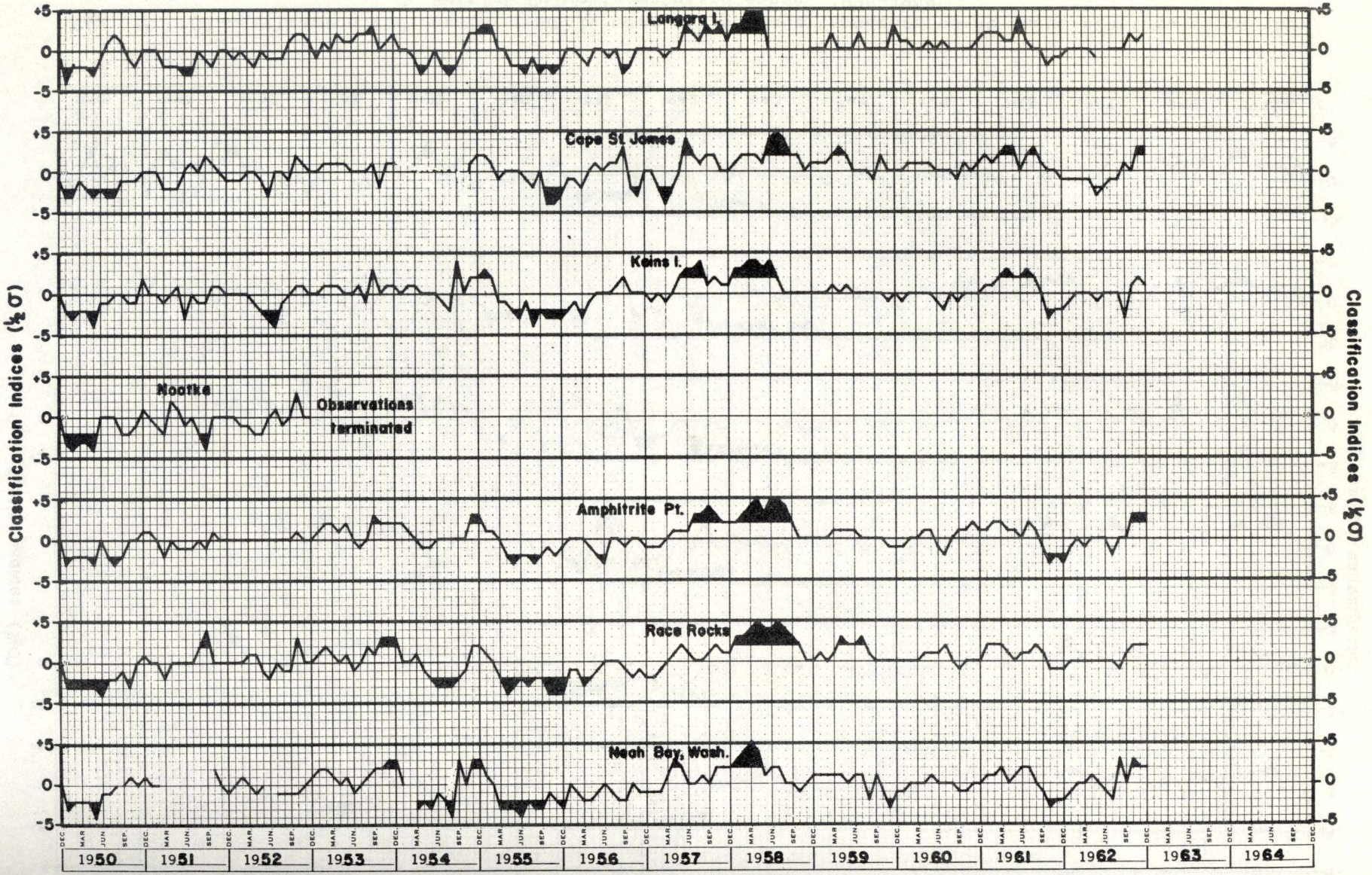

Fig. 11. Classification indices for monthly mean sea surface temperatures at shore stations along the British Columbia and Washington coasts, 1950-1962.

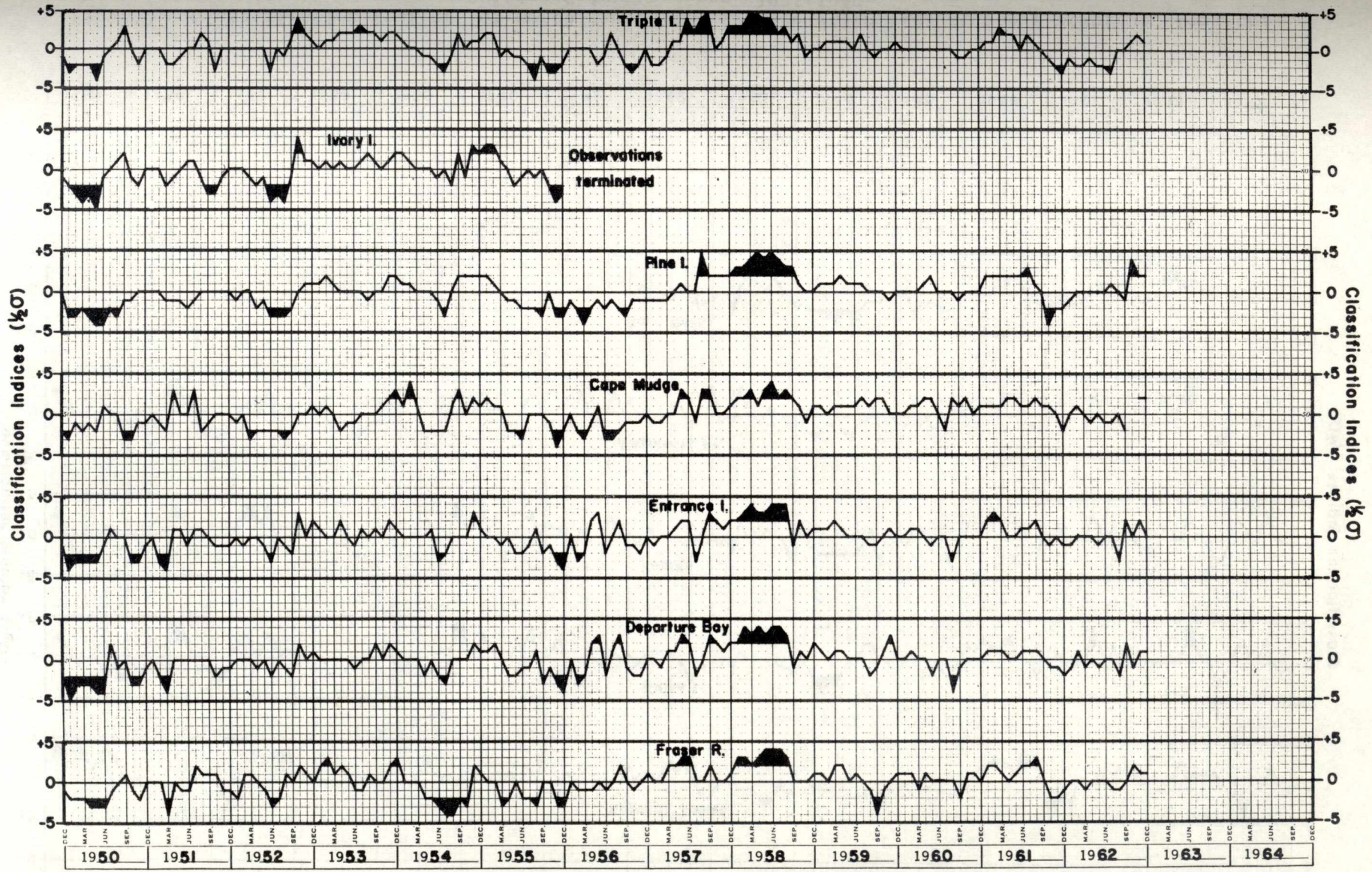

Fig. 12. Classification indices for monthly mean sea surface temperatures at shore stations along the British Columbia mainland coast, 1950-1962.

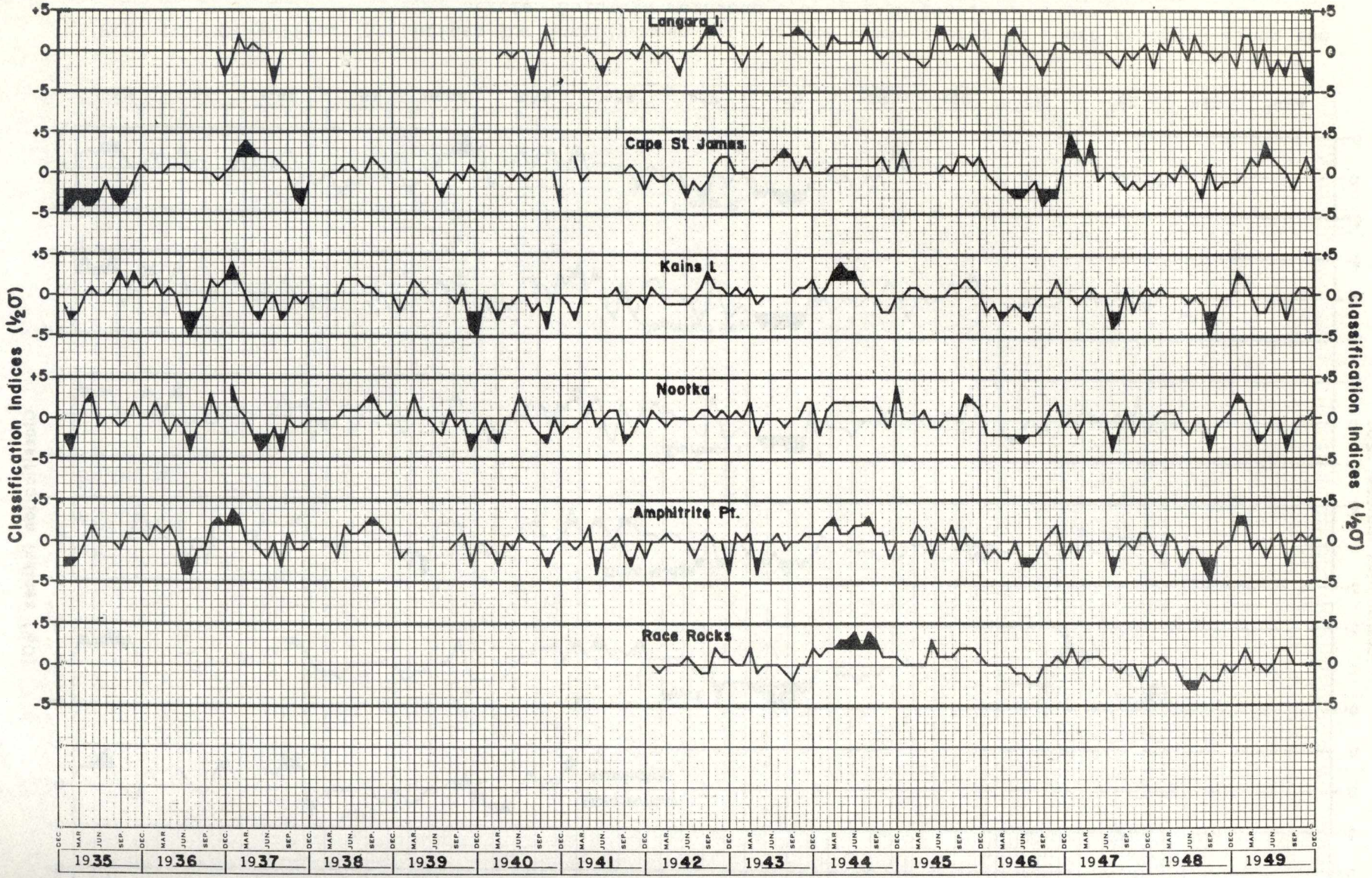

Fig. 13. Classification indices for monthly mean sea surface salinities at shore stations along the British Columbia coast, 1935-1949.

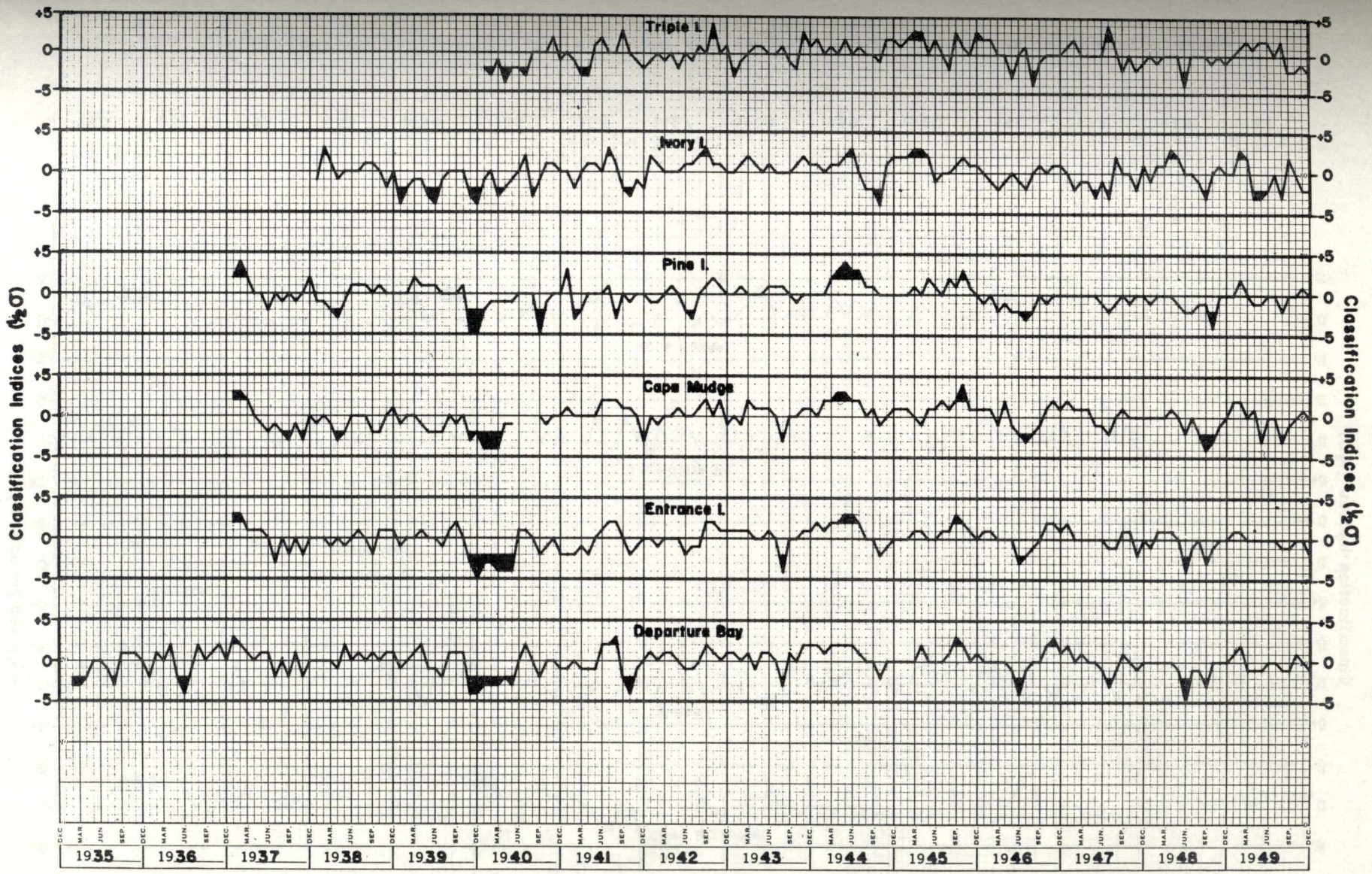

Fig. 14. Classification indices for monthly mean sea surface salinities at shore stations along the British Columbia mainland coast, 1935-1949.

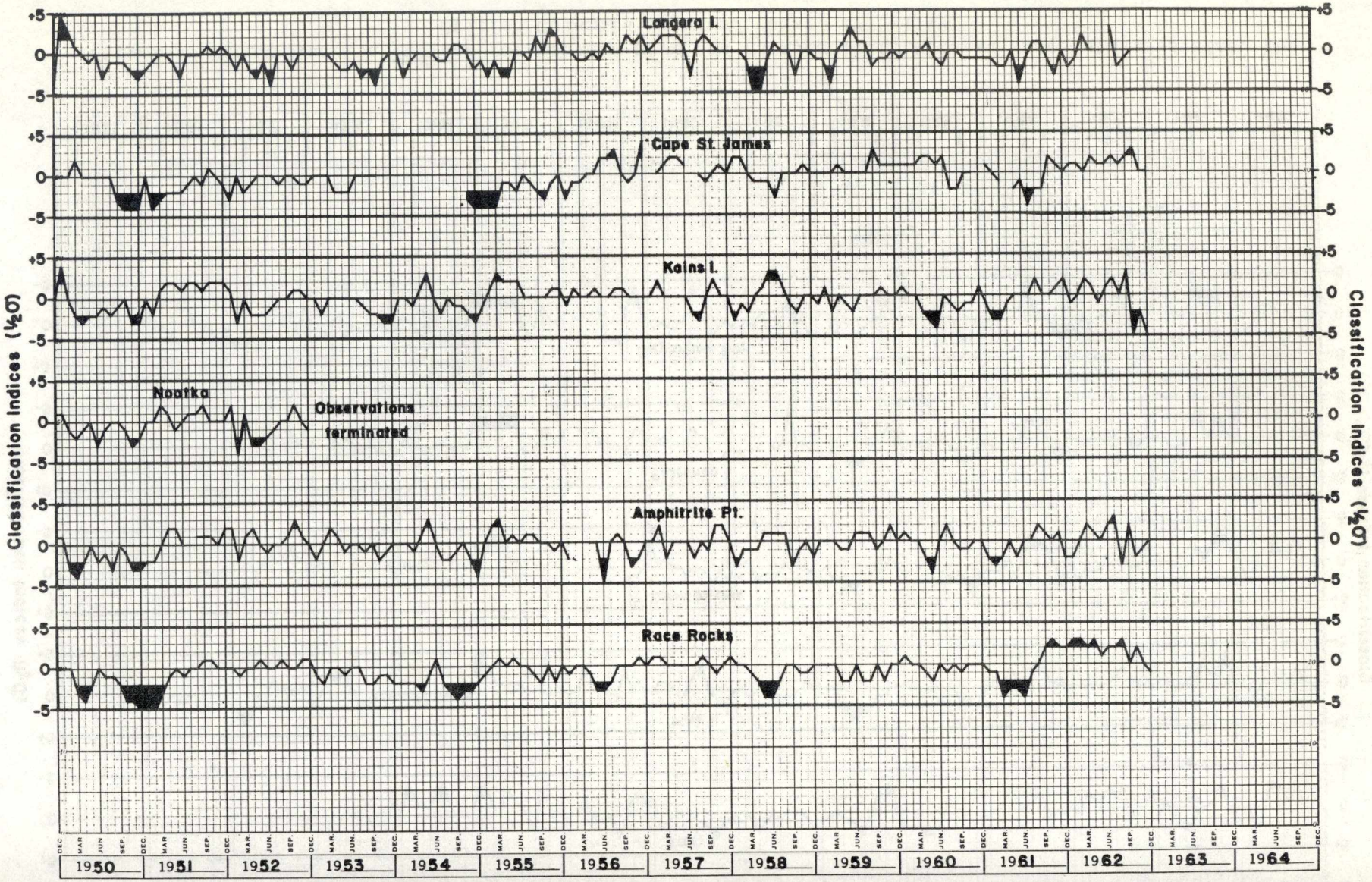

Fig. 15. Classification indices for monthly mean sea surface salinities at shore stations along the British Columbia coast, 1950-1962.

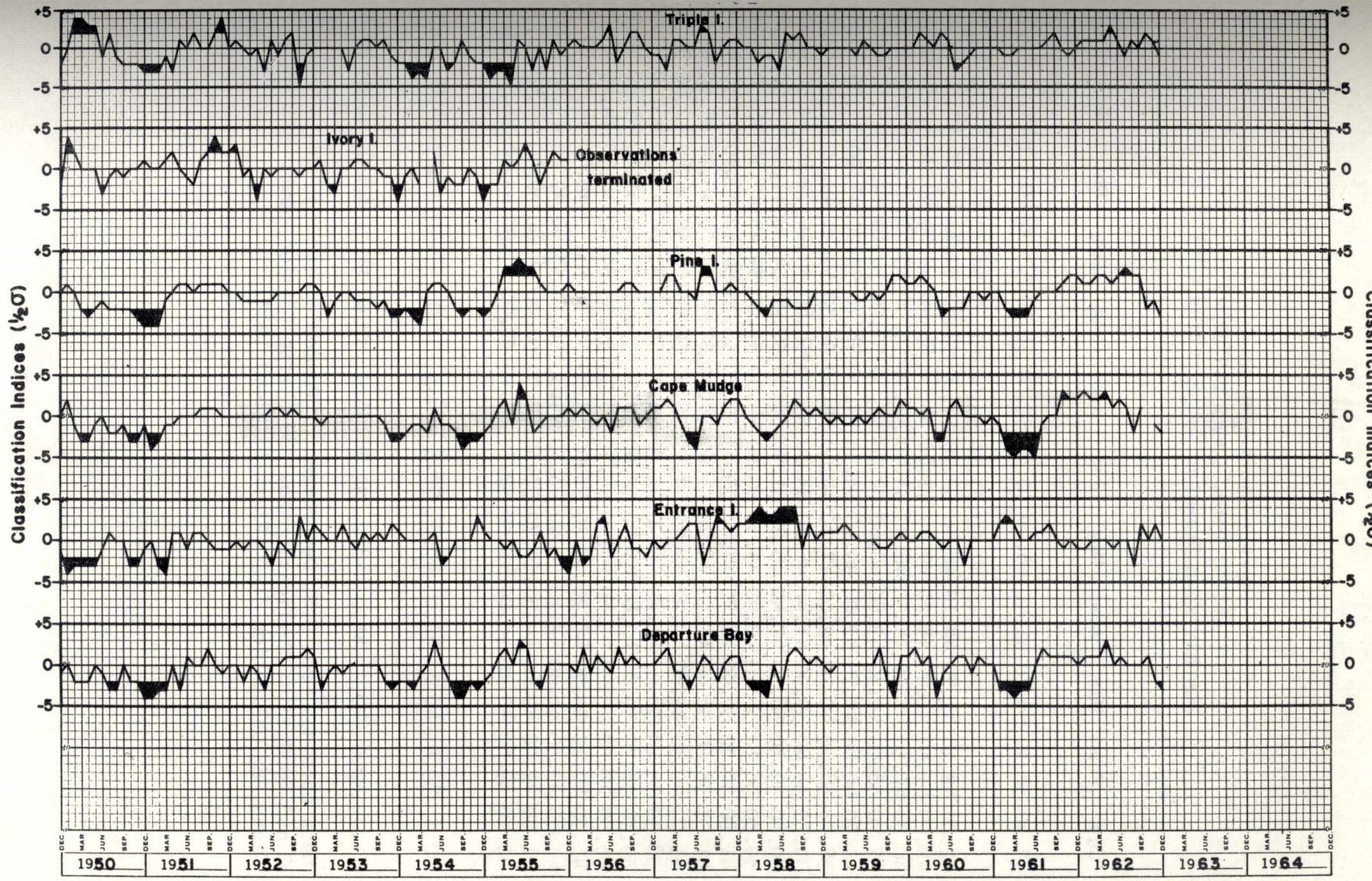

Fig. 16. Classification indices for monthly mean sea surface salinities at shore stations along the British Columbia mainland coast, 1950-1962.

Sitka, Alaska, U.S.A.
(Lat. 57°03'n, Long. 135°20'w)
Monthly Mean Seawater Temperatures (°F)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1924											42.30	39.70
1925	37.40	38.10	38.70	41.40	46.90	50.70	53.60	56.10	52.50	49.50	44.90	43.70
1943					49.60	53.10	55.40	57.60	54.00	49.80	45.10	43.70
1944	42.80	42.10	41.70	44.10	48.40	52.90	57.00	57.60	54.70	49.30	45.30	42.10
1945	42.40	41.50	41.20	43.20	49.80	51.80	53.60	55.40	52.00	48.00	42.30	41.20
1946	40.50	40.50	40.10	44.50	48.90	53.40	56.50	55.90	53.60	48.60	43.90	39.40
1947	37.20	38.80	40.30	42.80	48.60	52.20	57.60	57.20	54.10	49.30	45.50	43.50
1948	41.70	40.80	40.70	43.00	49.10	53.30	57.20	58.10	53.20	47.90	44.30	40.20
1949	38.70	38.70	40.10	42.00	47.20	49.60	54.10	56.30	54.40	49.00	46.40	42.90
1950	39.30	38.40	39.90	41.40	46.00	53.80	55.90	58.80	54.20	49.20	44.50	42.00
1951	39.80	39.30	38.30	41.40	46.20	51.50	58.80	57.20	54.20	47.80	43.90	42.20
1952	39.30	38.10	38.70	40.90	45.30	50.60	54.20	56.00	52.40	49.70	46.30	44.40
1953	41.60	39.70	39.90	42.70	47.40	53.40	57.70	58.20	54.40	49.40	45.30	42.80
1954	41.00	38.60	38.40	40.70	46.70	51.60	54.70	57.30	54.00	48.20	45.60	41.80
1955	41.00	40.30	39.80	42.20	44.70	49.50	55.50	54.20	51.50	46.60	42.80	39.70
1956	38.30	37.10	38.00	41.20	46.90	51.80	56.00	56.20	53.20	46.30	43.20	40.70
1957	39.10	38.30	39.60	42.80	47.70	52.40	56.50	59.50	57.30	51.10	47.40	44.70
1958	43.80	42.50	42.20	45.50	49.90	55.30	58.10	59.50	54.60	48.30	44.40	43.20
1959	41.30	40.10	39.70	43.20	48.20	53.90	57.00	57.50	53.50	48.40	44.50	42.70
1960	41.60	42.30	41.40	44.10	50.90	53.50	55.80	56.10	53.60	49.20	45.20	43.60
1961	41.90	41.90	42.60	44.50	50.70	53.30	57.90	58.90	54.80	48.40	44.40	41.30
1962	40.10	39.60	40.10	43.00	48.80	52.70	56.20	57.00	53.90	49.60	46.50	43.90
1943 -62	40.6	39.9	40.1	42.8	48.0	52.5	56.3	57.2	53.9	48.7	44.8	42.2
1953 -62	41.0	40.0	40.2	43.0	48.2	52.7	56.5	57.4	54.1	48.6	44.8	42.3

Data obtained from U.S. Department of Commerce,
C and GS Special Publication No. 280 (Fifth Edition) and
C and GS Publication 31-3 (First Edition) 1962.

Sitka, Alaska, U.S.A.

Classifications of Monthly Mean Seawater Temperatures

(Units of $\frac{1}{2}$ Standard Deviations)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1943					+2	+1	-0	+1	+0	+2	+0	+2
1944	+3	+3	+3	+2	+0	+1	+1	+1	+2	+1	+0	-0
1945	+2	+2	+2	+1	+2	-0	-3	-3	-3	-2	-4	-1
1946	+0	+1	+0		+1	+1	+0	-2	-0	-0	-1	-3
1947	-3	-1	+0	+0	+0	-0	+1	+0	+0	+1	+1	+1
1948	+1	+1	+1	+0	+1	+1	+1	+2	-1	-2	-0	-2
1949	-1	-1	+0	-0	-0	-4	-2	-1	+1	+0	+2	+0
1950	-1	-2	-0	-2	-2	+2	-0	+3	+1	+0	-0	-0
1951	-0	-0	-3	-2	-2	-1	+3	+0	+1	-3	-1	+0
1952	-1	-2	-2	-2	-3	-2	-2	-1	-3	+2	+2	+3
1953	+1	-0	-0	+0	-0	+1	+1	+2	+1	+1	+0	+1
1954	+1	-1	-2	-2	-1	-0	-1	+0	+0	-1	+1	-0
1955	+1	+2	+0	+0	-3	-3	-0	-4	-4	-4	-3	-2
1956	-2	-3	-3	-1	+0	+0	-0	-1	-0	-3	-2	-1
1957	-1	-1	+0	+2	+1	+0	+0	+3	+4	+3	+3	+3
1958	+4	+4	+4	+5	+4	+3	+2	+2	+0	-0	-0	+1
1959	+1	+1	+0	+1	+1	+1	+0	+0	-0	-0	-0	+0
1960	+1	+3	+2	+2	+3	+1	-0	-1	-0	+1	+0	+1
1961	+1	+2	+3	+2	+2	+0	+2	+1	+1	-0	-0	-1
1962	-1	-0	-0	+0	+0	-0	-0	-0	-0	+1	+2	+2
Stnd.	1.2	0.9	0.8	0.8	1.2	1.3	1.1	1.0	0.8	0.7	1.1	1.4
Devn.	1.7	1.8	1.5	1.5	2.0	1.8	1.7	1.6	1.5	1.4	1.4	1.6

Ketchikan, Alaska, U.S.A.
(Lat. 55°20'n, Long. 131°38'w)
Monthly Mean Seawater Temperatures (°F)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1922	41.90	40.80	41.00	41.70	45.20	53.10	54.00	56.70	52.00	48.60	45.00	40.80
1923	41.00	41.00	41.10	43.50	47.40	54.70	58.40	58.80	53.80	50.00	46.20	44.20
1924	42.20	41.90	42.80	43.90	47.80	54.90	56.70	56.80	52.30	48.00	44.00	42.20
1925	42.30	41.50	42.00	43.50	49.80	54.30	55.60	57.00	53.60	48.00	44.90	43.30
1926	43.70	43.00	44.60	46.40	50.00	55.60	58.20	59.00	54.60	49.10	46.20	43.60
1927	42.10	42.70	42.40	43.90	47.70	55.40	59.70	60.40	53.60	48.70	43.50	41.40
1928	40.30	41.00	42.10	44.40	48.70	57.10	58.10	57.00	52.00	48.00	45.10	42.80
1929	42.10	41.90	42.30	43.20	48.40	54.00	56.30	57.20	55.80	50.40	46.40	42.30
1930	40.80	41.00	40.60	43.50	47.50	53.20	57.60	59.70	52.90	47.50	44.40	43.50
1931	42.60	42.80	43.20	45.70	49.60	56.10	58.50	58.80	54.50	49.60	44.20	43.00
1932	40.80	41.40	41.40	44.80	49.10	51.80	54.70	57.00	52.90	49.80	44.80	42.00
1933	40.80	40.50	41.50	43.20	49.30	52.30	55.00	57.70	53.80	47.30	44.60	39.20
1934	40.30	40.10	41.70	45.10	50.70	54.30	55.60	57.20	53.40	48.70	45.30	43.20
1935	41.70	39.70	39.90	42.40	46.00	53.80	57.90	55.60	52.70	47.50	41.70	40.60
1936	39.40	37.20	39.70	41.20	49.10	57.60	55.90	55.90	52.50	50.50	46.20	39.70
1937	38.30	38.30	40.10	41.00	45.90	55.40	57.90	55.40	56.50	51.40	46.60	40.30
1938	40.60	39.00	42.80	45.10	48.00	52.30	55.60	55.90	54.30	50.00	45.50	43.30
1939	42.10	41.40	42.30	43.30	48.20	54.00	56.50	55.60	52.70	47.50	45.00	43.00
1940	43.00	42.60	43.00	46.20	50.20	55.40	58.80	57.40	54.70	50.70	45.50	44.20
1941	43.50	43.00	44.20	46.20	49.80	54.30	57.60	58.00	54.10	50.00	46.00	44.00
1942	41.50	41.00	42.30	44.00	48.90	59.00	61.50	59.70	55.40	49.80	41.50	41.40
1943	38.80	41.70	40.50	45.30	48.60	53.40	54.30	53.80	51.00	48.20	45.30	44.40
1944	41.50	41.40	41.70	45.10	47.50	50.90	56.30	56.30	55.20	50.40	45.30	41.90
1945	42.40	41.50	42.60	44.40	50.40	53.60	55.80	57.10	52.80	48.90	42.60	42.10
1946	41.70	41.50	41.40	43.00	49.30	55.90	57.40	57.60	54.50	48.70	43.70	41.50
1947	38.70	39.90	41.70	43.20	48.60	54.50	56.50	56.10	54.30	48.90	45.30	42.60
1948	41.90	39.60	41.70	43.50	48.90	57.20	57.90	58.10	52.70	48.00	44.20	40.50
1949	40.60	39.60	40.50	41.90	48.00	52.00	55.60	56.30	54.10	48.30	46.60	41.60
1950	39.40	39.60	39.80	40.90	45.00	54.80	56.10	57.50	54.00	48.30	43.10	42.60
1951	40.00	40.90	40.10	41.90	47.70	53.50	58.20	58.00	53.80	47.60	44.30	42.20
1952	41.80	39.90	40.80	41.90	47.80	52.40	56.30	56.90	53.20	50.80	46.60	43.80
1953	42.20	42.70	41.70	44.20	48.50	55.60	57.80	58.10	54.20	49.70	45.80	44.00
1954	42.30	41.10	41.50	42.50	46.90	52.10	55.00	57.40	55.00	49.10	47.00	43.50
1955	42.40	41.40	42.10	43.80	46.40	52.10	56.10	55.00	53.20	47.80	42.40	41.70
1956	41.10	39.20	39.20	41.40	46.70	52.00	55.90	57.10	54.60	47.50	43.30	40.90
1957	39.90	41.00	41.10	42.50	47.20	54.10	56.20	58.00	55.80	49.20	45.70	42.60
1958	42.20	43.40	44.10	45.90	49.30	57.90	59.50	57.60	54.10	49.60	45.30	43.70
1959	41.90	41.90	42.20	44.20	48.60	53.40	57.70	56.70	53.20	49.00	44.10	42.70
1960	41.50	42.50	42.00	43.60	49.30	51.90	56.30	57.50	54.00	49.60	45.40	43.80
1961	42.50	42.20	43.00	44.80	50.10	54.00	58.40	59.20	54.40	48.50	43.70	42.00
1962	40.90	40.70	41.60	43.10	46.80	52.20	57.10	56.90	53.20	49.40	46.60	44.10
1922-61	41.3	41.0	41.7	43.6	48.3	54.3	56.9	57.2	53.9	49.0	44.8	42.4
1952-61	41.8	41.5	41.8	43.5	48.1	53.6	56.9	57.4	54.2	49.1	44.9	42.9

Data obtained from U.S. Department of Commerce,
C and GS Special Publication No. 280 (Fifth Edition) and
C and GS Publication 31-3 (First Edition) 1962.

1943-62	41.2	41.1	41.5	43.4	48.1	53.7	56.7	57.1	53.9	48.9	44.8	42.7
1938-62	41.4	41.1	41.8	43.7	48.3	53.9	57.0	57.1	53.9	49.0	44.8	42.7
1928-62	41.2	40.9	41.6	43.6	48.3	54.1	56.9	57.1	53.9	49.0	44.8	42.4

Ketchikan, Alaska, U.S.A.

Classifications of Monthly Mean Seawater Temperatures

(Units of $\frac{1}{2}$ Standard Deviations)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1922	+0	-2	-2	-3	-4	-2	-4	-2	-2	-0	+0	-3
1923	-1	-1	-1	-0	-1	-0	+1	+1	+0	+2	+2	+3
1924	+0	+0	+1	-0	-0	+0	-0	-2	-2	-1	-2	-1
1925	+0	-0	-0	-0	+2	-0	-2	-1	+0	-1	-0	+1
1926	+3	+3	+4	+3	+2	+1	+1	+1	+1	+0	+2	+1
1927	+0	+2	+0	-0	-0	+0	+3	+3	+0	-0	-3	-2
1928	-3	-1	-0	+0	+0	+3	+0	-1	-2	-1	+0	+0
1929	+0	+0	+0	-1	+0	-1	-1	-1	+3	+3	+2	-0
1930	-2	-1	-2	-0	-1	-2	+0	+2	-1	-2	-1	+1
1931	+1	+2	+1	+2	+2	+2	+1	+1	+1	+1	-1	+0
1932	-2	-1	-1	+1	+1	-4	-3	-1	-1	+1	-0	-2
1933	-1	-3	-1	-2	+1	-2	-2	-0	+0	-2	-0	-5
1934	-2	-3	-0	+1	+3	-0	-1	-1	-0	-0	+0	+1
1935	+0	-3	-3	-3	-4	-0	+0	-3	-1	-2	-4	-2
1936	-3	-4	-3	-3	+0	+3	-1	-2	-1	+2	+2	-2
1937	-4	-2	-2	-3	-3	+0	+1	-2	+4	+3	+2	-1
1938	-0	-1	+2	+2	-0	-2	-1	-1	+0	+1	+0	+2
1939	+2	+1	+1	-0	-0	-0	-0	-1	-1	-2	+0	+1
1940	+2	+2	+2	+2	+2	+1	+3	+1	+1	+2	+0	+2
1941	+3	+3	+3	+2	+1	+0	+1	+3	+0	+0	+1	+2
1942	+0	+0	+0	+0	+0	+4	+4	+4	+2	+0	-3	-0
1943	-2	+1	-1	+1	+0	-1	-2	-3	-3	-1	+0	+2
1944	+0	+0	+0	+1	-1	-3	-0	-0	+1	+1	+0	-0
1945	+1	+0	+1	+0	+2	-0	-1	+0	-1	-1	-3	-0
1946	+0	+0	-1	-1	+0	+1	+0	+1	+0	-1	-1	-1
1947	-3	-2	-1	-2	-0	+0	-0	-0	+0	-0	+1	-0
1948	+0	-3	-0	-1	-0	+2	+0	+1	-1	-2	-0	-3
1949	-1	-2	-2	-3	-2	-2	-1	-0	+0	-1	+2	-1
1950	-2	-2	-3	-3	-4	+0	-0	+0	+0	-1	-1	+0
1951	-1	+0	-2	-2	-0	-0	+1	+1	+0	-2	+0	+0
1952	+1	-1	-0	-1	-0	-1	-0	+0	-0	+4	+2	+2
1953	+1	+3	+1	+1	+0	+1	+2	+2	+0	+1	+1	+3
1954	+1	+0	+0	-0	-1	-2	-3	+0	+3	+0	+2	+2
1955	+2	+1	+2	+2	-2	-2	-1	-4	-2	-2	-3	-1
1956	+0	-2	-3	-2	-1	-1	-1	+0	+2	-2	-2	-2
1957	-2	+0	+0	+0	-0	+0	-0	+1	+3	+1	+1	+0
1958	+1	+3	+4	+4	+3	+4	+4	+0	-0	+1	+0	+2
1959	+1	+1	+1	+1	+2	-0	+1	-1	-2	+0	-0	-0
1960	-0	+1	+0	+0	+2	-1	-0	+0	-0	+1	+0	+1
1961	+1	+1	+1	+1	+3	+0	+2	+3	+0	-1	-1	-1
1962	-2	-1	-0	-0	-1	-1	+0	-0	-2	+1	+2	+2
Stnd. Devn.	0.8	0.7	0.7	1.0	0.9	1.2	0.9	0.7	0.7	0.8	0.8	0.8
	1.7	1.8	1.4	1.8	1.6	2.3	2.0	1.6	1.6	1.4	1.7	1.8

Langara Island

Monthly Mean Seawater Temperatures (°F)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1936											50.50	46.10
1937	43.30	41.10	43.40	45.00	47.60	49.40	53.20	53.40				
1938	Observations discontinued											
1939												
1940			46.60	48.00	50.70	52.60	53.40	55.40	53.20	51.90	48.20	47.30
1941	45.90	45.70	46.00	47.60	48.60	51.80	54.90	53.40	52.30	50.90	48.80	46.50
1942	46.30	45.70	45.30	45.90	48.00	49.80	52.80	52.30	50.90	52.80	47.00	44.80
1943	42.50	42.60	42.10	44.20	45.80	49.70	52.20	54.90	53.70	51.80	48.30	46.70
1944	45.40	44.50	43.70	45.10	46.90	49.60	51.70	50.40	50.20	52.30	49.00	46.30
1945	45.60	44.70	44.40	44.50	47.20	49.10	51.70	51.70	50.80	50.50	45.10	43.60
1946	43.50	43.30	43.10	45.00	47.70	49.90	52.80	53.90	52.80	49.90	44.70	42.5g
1947	40.90	40.40	43.10	44.60	47.70	50.20	53.10	52.90	53.20	51.60	47.50	45.50
1948	43.70	40.80	42.70	44.10	47.40	49.10	51.50	50.90	53.20	50.00	46.60	42.00
1949	42.00	40.90	42.20	43.80	46.70	48.80	51.00	53.80	53.30	50.60	48.30	43.50
1950	38.10	40.00	41.50	43.60	45.80	49.30	53.40	54.40	53.60	50.30	44.90	44.00
1951	42.80	42.40	41.30	43.40	45.90	48.40	50.60	53.40	51.30	49.70	47.10	43.70
1952	41.30	41.60	42.10	43.60	46.60	48.80	51.40	51.70	53.30	52.30	48.80	45.40
1953	40.80	43.40	43.10	45.00	47.40	49.80	53.00	54.20	54.80	51.20	48.10	45.90
1954	42.30	42.00	42.00	42.80	45.70	49.20	50.70	50.40	51.60	50.90	48.70	46.10
1955	45.30	44.20	42.30	43.70	45.40	48.30	49.50	51.50	50.60	49.50	44.40	42.20
1956	41.80	41.10	41.80	43.00	46.40	49.30	50.30	52.70	50.00	49.70	46.60	44.00
1957	42.20	41.70	41.80	43.70	46.40	50.00	52.70	54.00	55.30	51.90	50.10	45.10
1958	45.10	45.00	45.30	48.40	50.10	47.20	51.40	51.90	53.30	51.20	49.10	43.90
1959	41.40	41.90	44.00	44.90	46.90	49.10	53.10	52.90	52.40	50.60	47.10	46.80
1960	43.90	43.40	43.20	43.70	47.60	49.20	52.20	52.10	52.50	51.00	47.30	45.60
1961	44.80	44.60	44.20	45.20	48.00	51.30	52.60	52.40	53.10	49.40	46.30	44.10
1962	43.40	42.70	42.60	44.50	46.00	48.60	51.10	52.20	52.20	51.80	48.60	46.40
1943 -62	42.8	42.6	42.8	44.3	46.9	49.2	51.8	52.6	52.6	50.8	47.3	44.7
1940 -62	43.1	42.8	43.2	44.7	47.2	49.5	52.0	52.8	52.5	50.9	47.4	44.9

Langara Island

Classifications of Monthly Mean Seawater Temperatures

(Units of $\frac{1}{2}$ Standard Deviations)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1936											+4	+2
1937	-0	-1	-0	+0	+1	-0	+1	+0				
1938				Observations discontinued								
1939												
1940			+4	+4	+7	+6	+3	+3	+1	+1	+1	+3
1941	+2	+2	+3	+4	+3	+5	+4	+0	-0	-0	+2	+2
1942	+2	+2	+2	+1	+1	+0	+0	-0	-2	+3	-0	+0
1943	-0	-0	-1	-1	-3			+2	+2	+1	+1	+2
1944	+1	+1	+0	+0	-0	-0	-1	-3	-3	+2	+2	+2
1945	+1	+1	+1	-0	+0	-1	-1	-1	-2	-1	-2	-1
1946	+0	+0	-0	+0	+1	+0	+0	+1	+0	-2	-2	-2
1947	-2	-2	-0	-0	+1	+1	+1	+0	+1	+1	+0	+1
1948	+0	-1	-1	-1	+0	-1	-1	-2	+1	-2	+0	-3
1949	-1	-1	-1	-1	-1	-2	-2	+1	+1	-0	+1	-1
1950	-4	-2	-2	-2	-3	-1	+1	+2	+1	-1	-2	-0
1951	-0	-0	-2	-2	-2	-3	-3	+0	-1	-2	+0	-0
1952	-1	-0	-1	-2	-0	-1	-1	-1	+1	+2	+2	+1
1953	-1	+1	+0	+2	+1	+1	+2	+2	+3	+0	+1	+2
1954	+0	+0	-1	-3	-2	-0	-2	-3	-2	+0	+2	+2
1955	+3	+3	-0	-0	-2	-2	-3	-1	-3	-2	-3	-2
1956	-0	-0	-1	-2	-0	+0	-1	+0	-3	-2	-0	-0
1957	+0	-0	-1	+0	+0	+3	+2	+1	+3	+2	+3	+1
1958	+3	+3	+5	+5	+5	-4	+0	-1				-0
1959	-0	-0	+2	+0	+0	+0	+2	+0	-0	-0	-0	+3
1960	+1	+1	+0	+0	+1	+0	+1	+0	+0	+0	-0	+1
1961	+2	+2	+2	+1	+1	+4	+1	+0	+0	-3	-1	-1
1962	+0	-0	-0	+0	-1		-0	-0	-0	+2	+1	+2
Stnd.	1.5	1.2	0.5	0.6	0.6	0.5	0.9	1.1	1.2	0.8	1.4	1.2
Devn.	2.5	2.1	1.4	1.6	1.3	1.0	1.3	1.5	1.7	1.0	1.7	1.6

Refer to note 1, p. 7

Langara Island

Monthly Mean Seawater Salinities (S ‰)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1936											32.08	31.87
1937	32.04	32.51	32.35	32.44	32.36	32.34	31.90	32.27				
1938				Observations discontinued								
1939												
1940			32.13	32.37	32.29	32.30	32.32	31.84	32.29	32.38	32.17	32.11
1941	32.22	32.37	32.35	32.27	32.26	32.14	32.11	32.17	32.23	32.18	31.97	32.22
1942	32.13	32.20	32.21	32.22	32.15	32.34	32.26	32.50	32.80	32.40	32.30	32.26
1943	32.36	32.18	32.25	32.30	32.44	32.41	32.30	32.61	32.58	32.40	32.33	32.31
1944	32.35	32.29	32.51	32.45	32.44	32.48	32.35	32.66	32.38	32.09	32.11	32.18
1945	32.24	32.26	32.17	32.11	32.26	32.64	32.57	32.43	32.40	32.16	32.44	32.17
1946	32.01	32.15	31.86	32.53	32.54	32.46	32.18	32.20	31.72	32.09	32.30	32.29
1947	32.34	32.31	32.23	32.35	32.36	32.34	32.14	32.09	32.16	32.07	32.02	32.23
1948	31.92	32.44	32.31	32.64	32.43	32.27	32.45	32.41	32.14	32.11	32.03	32.03
1949	31.94	32.56	32.56	32.18	32.44	32.14	32.16	31.95	32.17	32.14	31.63	31.63
1950	32.97	32.65	32.43	32.30	32.25	32.39	31.98	32.18	31.98	32.09	31.82	31.72
1951	31.79	32.17	32.25	32.32	32.29	32.14	32.24	32.29	32.26	32.27	31.09	32.24
1952	32.27	32.06	32.26	32.16	32.17	32.27	31.73	32.31	32.21	32.03	32.10	32.09
1953	32.19	32.33	32.19	32.24	32.16	32.11	32.02	31.92	31.89	31.83	31.82	32.01
1954	32.17	31.94	32.13	32.29	32.36	32.22	32.03	32.07	32.26	32.16	32.01	31.74
1955	31.99	31.84	32.14	31.97	32.04	32.22	32.06	32.05	32.29	32.10	32.36	32.29
1956	32.34	32.39	32.14	32.18	32.24	32.18	32.19	32.18	32.12	32.29	32.22	32.27
1957	32.19	32.50	32.48	32.48	32.43	32.30	31.66	32.25	32.29	32.23	32.03	31.93
1958	32.11	32.26	32.20	31.15	31.07	32.14	32.14	32.15	32.22	31.80	32.00	32.01
1959	31.95	31.98	31.91	32.21	32.37	32.39	32.19	32.21	32.00	31.95	31.88	31.96
1960	31.98	32.09	32.19	32.22	32.36	32.17	31.71	32.18	32.22	31.95	31.98	31.90
1961	32.06	32.00	31.98	31.73	32.25	32.02	31.77	32.20	32.29	31.94	31.72	31.98
1962	31.94	32.02	32.35	32.16	32.33	32.32	32.32	32.02	32.04	32.03	31.94	31.91
1943 -62	32.16	32.22	32.23	32.20	32.26	32.28	32.11	32.22	32.18	32.09	32.05	32.04
1940 -62	32.16	32.23	32.23	32.21	32.26	32.28	32.12	32.21	32.21	32.12	32.06	32.06

Langara Island

Classifications of Monthly Mean Salinities

(Units of $\frac{1}{2}$ Standard Deviations)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1936											-0	-3
1937	-1	+2	+0	+1	+0	-0	-4	-0				
1938				Observations discontinued								
1939												
1940			-1	+0	-1	-0	+0	-4	+0	+3	+0	-0
1941	-0	+0	+0	-0	-1	-3	-1	-1	-0	+0	-1	+1
1942	-0	-1	-0	-1	-3	-0	+0	+1	+3	+3	+1	+1
1943	+0	-2	-0	-0	+1			+2	+2	+3	+2	+1
1944	+0	-0	+2	+1	+1	+1	+1	+3	+0	-1	+0	+0
1945	-0	-1	-1	-2	-1	+3	+3	+0	+1	-0	+2	+0
1946	-1	-2	-4	+2	+3	+1	-0	-1	-3	-1	+1	+1
1947	+0	-0	-0	+0	+0	-0	-1	-2	-0	-1	-0	+1
1948	-2	+1	+0	+3	+1	-1	+2	+0	-0	-1	-0	-0
1949	-2	+2	+2	-2	+1	-3	-1	-3	-0	-0	-3	-4
1950	+5	+3	+1	-0	-1	+0	-3	-1	-1	-1	-2	-3
1951	-2	-1	-0	-0	-1	-3	-0	-0	-0	+1	+0	+1
1952	+0	-2	-0	-2	-3	-1	-4	-0	+0	-2	+0	+0
1953	-0	+0	-0	-1	-2	-2	-1	-3	-2	-4	-1	-0
1954	-0	-3	-1	-0	+0	-0	-1	-1	+1	+1	-0	-2
1955	-1	-3	-1	-3	-3	-0	-0	-1	+2	+0	+3	+2
1956	+0	+0	-1	-1	-0	-1	+1	+0	+0	+2	+1	+2
1957	+0	+1	+2	+2	+2	+1	-3	+1	+2	+1	+0	-0
1958	-0	-0	-1	-5	-5	-1	+1	+0	+0	-3	-0	+0
1959	-1	-1	-4	+0	+1	+3	+1	+1	-2	-1	-1	-0
1960	-1	-0	+0	+0	+1	-1	-2	+0	+0	-1	-1	-1
1961	-1	-1	-2	-2	+0	-4	-1	+1	+1	-1	-3	-0
1962	-2	-1	+2	+0	+0		+3	-2	-1	+0	-0	-0
Stnd. Devn.	0.12 0.32	0.16 0.26	0.13 0.19	0.15 0.35	0.11 0.38	0.08 0.16	0.16 0.23	0.10 0.22	0.12 0.[illegible]9	0.10 0.16	0.15 0.24	0.21 0.27

Refer to note 1, p. 7

Cape St. James

Monthly Mean Seawater Temperatures (°F)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1934								56.20	55.60	49.90	48.10	47.80
1935	44.00	45.00	44.80	45.70	47.50	50.00	53.00	55.20	54.50	50.70	46.70	46.00
1936	47.20	45.00	44.20	44.70	46.80	50.70	53.50	56.60	55.00	51.90	50.00	47.40
1937	44.50	41.60	44.00	46.10	47.60	50.40	52.20	54.50	55.30	51.10	44.80*	45.60*
1938			44.30*	46.80*	47.10*	48.60*	51.50*	51.00*	50.80*		46.80*	45.10*
1939				Temperature data unreliable								
1940					47.40	50.70	55.10	55.60	55.90		49.20*	48.20*
1941							54.70*	56.90*	55.30*	50.40*	49.10	48.50
1942	47.90	48.00	47.00	47.20	48.60	51.30	55.50	57.70	55.80	51.10	48.30	46.80
1943	45.50	44.50	44.30	45.50	47.40	49.90	51.70	53.90	52.70	50.20	49.40	49.30
1944	48.80	46.70	45.90	46.80	48.90	51.20	53.80	55.90	55.20	50.30	49.40	49.10
1945	48.20	47.20	46.10	46.10	48.20	50.20	52.20	53.70	52.70	49.60	46.60	45.70
1946	45.70	45.20	45.20	45.60	48.60	51.50	53.00	54.10	53.20	49.60	47.10	44.40
1947	43.60	43.10	44.20	45.70	47.90	49.60	52.00	54.90	52.10	49.60	48.80	47.20
1948	45.90	44.50	44.20	44.80	47.20	50.90	54.10	55.30	50.90	49.50	47.20	44.90
1949	43.50	42.30	42.90	44.20	47.30	48.90	51.10	52.10	53.00	49.50	47.20	44.90
1950	41.70	41.20	43.20	44.00	45.50	48.60	50.80	52.00	51.70	49.50	47.10	46.10
1951	44.90	44.10	42.70	43.90	46.20	49.80	53.10	54.30	54.10	50.10	47.90	44.90
1952	43.00	43.30	44.40	44.80	46.80	48.30	51.90	54.30	52.20	50.30	48.70	46.80
1953	45.00	45.80	45.10	46.10	48.00	50.00	52.40	54.50	53.60	49.40	48.60	47.00
1954	45.80	45.60	44.20	45.40	47.50	50.00	51.80	53.40	52.90	48.30	48.50	47.30
1955	46.70	45.30	43.40	44.60	47.10	50.00	51.20	52.40	52.20	47.20	44.80	43.20
1956	43.00	43.00	42.70	44.70	47.70	49.30	52.80	54.90	54.60	48.10	44.90	45.60
1957	45.10	42.10	41.00	43.70	47.00	52.10	53.80	54.70	54.70	50.20	46.50	45.40
1958	45.40	45.40	45.30	45.80	47.70	54.40	57.70	57.30	54.90	50.40	47.30	46.50
1959	45.60	45.40	45.00	46.90	48.30	50.90	53.20	54.90	52.10	50.90	47.80	45.80
1960	45.40	45.30	45.00	45.70	47.80	50.40	52.50	54.90	52.60	50.20	47.10	47.00
1961	46.90	45.80	45.80	47.20	48.80	50.30	55.40	57.50	54.30	49.90	47.20	45.10
1962	44.60	44.10	43.20	44.60	46.60	49.10	52.00	53.40	54.10	49.50	49.20	48.10

Note: Temperature data marked with asterisk* for years 1937 to 1941 are subject to reconsideration, because of possible instrument and/or observer errors.

1943 -62	45.2	44.5	44.2	45.3	47.5	50.3	52.8	54.4	53.2	49.6	47.6	46.2

Cape St. James

Classifications of Monthly Mean Seawater Temperatures

(Units of ½ Standard Deviations)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1934								+0	+1	-1	+0	+0
1935	-2	-0	-0	-0	-1	-0	-0	-0	-0	+0	-1	-1
1936	+1	-0	-1	-3	-3	+0	+0	+1	+1	+4	+2	+1
1937	-1	-3	-2	+0	-0	+0	-1	-0	+1	+1	-4*	-2*
1938			-1*	+2*	-2*	-4*	-2*	-4*	-6*		-1*	-2*
1939												
1940					-1	+0	+3	+0	+2		+1*	+1*
1941						+5*	+2*	+1*	+1*	-0*	+1	+1
1942	+2	+3	+4	+3	+2	+2	+3	+2	+2	+1	+0	-0
1943	+0	+0	-0	+0	+0	+0	-1	-0	-0	+2	+2	+3
1944	+3	+2	+2	+3	+2	+2	+2	+3	+4	+2	+2	+3
1945	+2	+3	+3	+2	+1	+0	-0	-0	-0	-1	-2	-0
1946	+0	+1	+1	+1	+2	+3	+1	+0	+0	-1	-1	-2
1947	-1	-1	-0	+1	+0	-0	-0	+1	-1	-1	+1	+1
1948	+0	+0	-0	-0	-0	+1	+3	+2	-3	-1	-1	-1
1949	-1	-2	-2	-2	-0	-1	-2	-3	+0	-1	-1	-1
1950	-3	-3	-1	-2	-3	-2	-3	-3	-1	-1	-1	-0
1951	-0	-0	-2	-2	-2	-0	+1	+0	+2	+1		-1
1952	-1	-1	+0	-0	-1	-3	-0	+0	-1	+2	+1	+0
1953	-0	+1	+1	+1	+1	+0	-0	+0	+1	-2		
1954											+1	+2
1955	+2	+1	-1	-0	-0	+0	-1	-2	-0	-4	-4	-3
1956	-1	-1	-2	-0	+1	-0	+1	+1	+3	-2	-3	-0
1957		-2	-4	-2	-0	+4	+2	+1	+2	+2	-0	-0
1958	+1	+2	+2	+2	+1	+4	+5	+4	+2	+2	+0	+1
1959	+1	+1	+2	+3	+2	+0	+0	+0	-1	+2	+0	-0
1960	+0	+1	+1	+1	+1	-0	-0	+0	-1	+1	-0	
1961	+2	+1	+2		+3	-0	+2	+3	+1	+0	+0	-1
1962	-1	-1	-1	-1	-3	-2	-1	-1	+1	+0	+3	+3
Stnd. Devn. 1943-62	1.1	1.2	0.8	0.7	0.6	0.7	0.9	1.0	0.9	0.3	0.8	1.0
	2.1	1.8	1.4	1.0	1.0	1.7	1.9	1.5	1.2	1.2	1.4	1.7

*Classification indices are subject to reconsideration because of questionable temperature observations. (cf. note 2, p. 7)

Cape St. James

Monthly Mean Seawater Salinities (S ‰)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1934							32.01	31.79	31.72	32.01	31.90	32.16
1935	31.86	31.97	31.90	31.77	31.87	31.88	31.96	31.80	31.85	32.17	32.30	32.58
1936	32.34	32.34	32.35	32.50	32.39	32.37	32.20	32.14	32.17	32.38	32.32	32.49
1937	32.39	32.61	32.82	32.70	32.48	32.48	32.41	32.30	32.16	32.20	32.11	32.26
1938	32.37	32.45	32.25	32.24	32.39	32.35	32.19	32.11	32.32	32.50	32.45	32.48
1939	32.29	32.29	32.32	32.24	32.25	32.09	31.71	31.92	32.13	32.31	32.53	32.42
1940	32.32	32.29	32.16	32.19	32.09	32.15	31.90	32.20	32.20	32.38	32.48	31.95
1941	32.29	32.58	32.06	32.19	32.20	32.26	32.15	32.07	32.22	32.49	32.42	32.20
1942	32.26	32.18	32.11	32.24	32.08	31.93	31.91	31.81	32.11	32.51	32.58	32.64
1943	32.30	32.24	32.29	32.50	32.40	32.36	32.37	32.43	32.36	32.46	32.59	32.49
1944	32.28	32.35	32.43	32.44	32.40	32.37	32.30	32.30	32.27	32.57	32.45	32.43
1945	32.42	32.38	32.27	32.27	32.29	32.33	32.37	32.16	32.35	32.55	32.54	32.63
1946	32.35	32.22	32.03	32.10	32.03	31.92	31.83	31.95	31.94	32.18	32.11	32.50
1947	32.65	32.63	32.33	32.76	32.15	32.18	32.12	31.99	32.06	32.78	32.26	32.25
1948	32.28	32.33	32.17	32.22	32.30	32.20	31.85	31.74	32.27	32.29	32.32	32.22
1949	32.26	32.33	32.41	32.51	32.59	32.46	32.31	32.17	32.05	32.40	32.59	32.38
1950	32.29	32.42	32.40	32.26	32.26	32.23	32.15	32.07	31.81	31.91	31.86	31.91
1951	32.33	31.89	31.96	32.02	32.00	31.96	31.92	32.00	32.01	32.50	32.46	32.16
1952	32.09	32.25	32.06	32.21	32.24	32.17	32.10	31.90	32.19	32.29	32.21	32.21
1953	32.26	32.24	32.24	31.94	32.00	32.00	32.01	32.00	32.07	32.27	31.99	31.77
1954	31.87	31.83	31.91	31.96	32.00	31.99	32.05	31.95	31.98	32.10	31.77	31.32
1955	31.48	31.42	31.58	31.99	32.00	31.98	32.10	31.89	31.89	31.93	31.97	32.06
1956	31.54	31.96	31.97	32.11	32.10	32.39	32.25	32.28	32.07	32.10	32.27	33.10
1957	31.96	32.05	32.30	32.39	32.46	32.30	32.06	32.06	31.92	32.11	32.42	32.33
1958	32.38	32.37	32.22	32.02	31.96	32.04	31.88	32.02	32.00	32.14	32.32	32.16
1959	32.12	32.15	32.12	32.24	32.11	32.13	32.08	31.97	32.20	32.31	32.29	32.46
1960	32.34	32.35	32.35	32.28	32.26	32.21	32.17	31.87	31.90	32.26	32.24	32.22
1961	32.21	32.02	31.85	31.90	31.95	32.04	31.73	31.83	31.91	32.32	32.35	32.37
1962	32.42	32.21	32.07	32.30	32.35	32.21	32.20	32.06	32.11	32.39	32.24	31.99
1943 -62	32.19	32.18	32.14	32.22	32.19	32.17	32.09	32.03	32.07	32.27	32.26	32.25
1938 -62	32.21	32.21	32.15	32.22	32.19	32.17	32.07	32.03	32.09	32.31	32.31	32.27
1935 -62	32.21	32.22	32.17	32.23	32.20	32.18	32.08	32.04	32.09	32.30	32.30	32.38

Cape St. James

Classifications of Monthly Mean Salinities

(Units of $\frac{1}{2}$ Standard Deviations)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1935	-5	-4	-3	-4	-4	-3	-1	-3	-4	-3	-1	+1
1936	+0	+0	+0	+1	+1	+1	+0	+0	-0	-0	-1	+0
1937	+1	+3	+4	+3	+2	+2	+2	+1	-0	-3	-4	-1
1938			-0	-0	+1	+1	+0	+0	+2	+1	+0	+0
1939		-0	+0	-0	-0	-1	-3	-1	-0	-1	+1	+0
1940	+0	-0	-0	-0	-1	-0	-1	+0	+0	-0	+0	-4
1941		+2	-1	-0	-0	+0	+0	-0	+0	+1	-0	-2
1942	-0	-1	-1	-0	-1	-3	-1	-2	-1	+1	+2	+2
1943	+0	-0	+0	+1	+1	+1	+2	+3	+2	+0	+2	+0
1944	+0	+0	+1	+1	+1	+1	+1	+1	+1	+2	+0	+0
1945	+3	+0	-0	-0	-0	+0	+1	+0	+2	+2	+1	+2
1946	+0	-1	-2	-2	-3	-3	-2	-1	-4	-3	-3	+1
1947	+5	+3	+1	+4	-1	-0	+0	-1	-2	-1	-2	-1
1948	-1	-0	-0	-1	+1	+0	-1	-3	+1	-2	-1	-1
1949	-1	-0	+2	+1	+4	+2	+1	+0	-2	-0	+2	+0
1950	-0	+0	+2	-0	-0	+0	+0	+0	-3	-4	-4	-4
1951	-0	-4	-3	-2	-2	-2	-1	-0	-1	+1	+0	-1
1952	-3	-0	-2	-1	-0	-0	-0	-1	+0	-0	-1	-1
1953	-0	-0	+0	-2	-2	-2	-0	-0	-0	-0		
1954											-3	-4
1955	-4	-4	-4	-1	-1	-2	+0	-1	-2	-3	-1	-0
1956	-3	-1	-1	-0	-0	+2	+2	+3	+0	-1	+0	+4
1957		-0	+1	+2	+2	+1		+0	-1	-0	+1	+0
1958	+2	+2	+0	-1	-1	-1	-3	-0	+0	-0	+1	+0
1959	+0	+0	+0	+1	-0	+0	+0	-0	+3	+1	+1	+1
1960	+1	+1	+1	+2	+2	+1	+2	-2	-2	+0	+0	
1961	+1	-0	-1		-2	-1	-4	-2	-2	+2	+1	+0
1962	+1	+1	+0	+2	+1	+1	+2	+1	+2	+3	+0	-0
Stnd. Devn.	0.05	0.13	0.12	0.14	0.12	0.13	0.09	0.10	0.09	0.11	0.14	0.19
	0.48	0.33	0.25	0.25	0.21	0.19	0.38	0.21	0.18	0.25	0.27	0.44

Kains Island

Monthly Mean Seawater Temperatures (°F)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1935	44.70	45.90	45.60	47.40	49.60	52.90	54.10	54.20	54.60	51.70	46.80	46.80
1936	45.70	43.90	44.60	46.70	50.50	55.30	59.70	56.90	54.00	52.90	48.40	47.00
1937	43.90	43.30	45.60	47.30	50.60	52.90	54.50	55.90	55.30	52.40	49.80	48.80
1938	46.90	45.70	46.90	48.90	50.90	52.50	53.70	54.10	56.90	53.50	48.10	45.40
1939	44.80	43.20	45.60	45.70	50.30	51.00	55.00	56.40	55.80	51.50	50.90	50.40
1940	49.60	48.10	48.40	50.60	52.20	55.10	55.30	57.50	57.80	54.50	51.20	49.30
1941	47.90	48.10	50.10	51.70	52.60	55.80	57.30	57.50	57.00	53.70	51.00	47.90
1942	47.90	47.70	47.20	48.90	51.50	54.00	56.50	56.70	54.60	53.40	48.40	45.90
1943	43.80	44.70	45.70	48.00	50.00	52.80	54.60	56.00	55.40	52.80	49.90	48.00
1944	46.80	46.70	46.80	48.10	50.40	53.00	54.90	55.60	55.50	54.60	50.90	49.60
1945	49.40	47.60	46.80	47.40	49.40	51.40	53.20	54.10	52.40	51.20	46.60	44.90
1946	45.30	44.80	45.50	46.30	50.40	53.60	55.70	55.40	54.70	50.90	46.40	44.30
1947	42.60	43.80	46.10	47.90	50.60	54.00	56.60	55.20	55.10	52.20	49.50	47.80
1948	45.90	44.90	45.20	46.80	50.00	53.00	54.20	54.80	54.80	51.80	48.10	44.80
1949	43.40	42.50	44.40	46.50	50.20	51.50	54.10	56.60	55.00	52.10	50.00	46.80
1950	43.20	42.10	43.90	45.30	47.60	52.10	54.00	55.90	54.40	51.80	48.10	48.80
1951	46.30	45.10	45.10	47.20	50.90	51.10	54.70	55.10	53.90	53.40	49.60	46.90
1952	44.70	44.60	45.70	46.40	48.80	50.60	52.00	55.00	54.40	53.40	50.20	47.20
1953	46.10	46.30	46.40	47.60	50.20	52.20	55.20	54.80	56.50	52.30	50.20	48.70
1954	46.00	45.70	46.10	47.10	49.70	52.50	53.10	54.30	57.60	52.50	50.90	48.60
1955	47.50	46.40	44.70	46.20	48.40	50.10	53.40	53.40	53.90	50.70	46.60	43.50
1956	43.30	43.30	43.80	46.30	49.20	52.20	53.60	55.60	56.40	52.10	48.70	46.30
1957	44.30	44.00	44.50	46.90	50.80	53.70	55.50	58.60	56.50	53.40	50.50	48.70
1958	47.80	48.30	48.30	49.50	52.20	55.40	55.50	56.20	55.50	52.20	48.90	47.20
1959	45.90	45.80	46.30	47.50	50.50	53.00	54.60	53.80	55.30	52.60	48.20	47.30
1960	44.90	45.60	45.20	47.40	50.40	51.40	52.50	55.50	54.80	52.10	49.20	47.50
1961	47.00	47.00	47.10	49.30	51.70	54.50	56.60	56.90	55.60	50.50	47.00	44.90
1962	44.70	45.30	45.30	47.80	49.50	52.90	54.20	55.20	53.90	52.60	50.80	48.40
1943 -62	45.4	45.2	45.6	47.3	50.0	52.6	54.4	55.4	55.1	52.3	49.0	47.0
1938 -62	45.8	45.5	46.0	47.6	50.3	52.8	54.6	55.6	55.3	52.5	49.2	47.2
1935 -62	45.7	45.4	46.0	47.6	50.3	52.9	54.8	55.6	55.2	52.4	49.1	47.2

Kains Island

Classifications of Monthly Mean Seawater Temperatures

(Units of $\frac{1}{2}$ Standard Deviations)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1935	-1	+0	-1	-1	-2	-0	-1	-3	-1	-2	-3	-1
1936	-0	-2	-2	-1	-0	+2	+4	+1	-2	-0	-1	-1
1937	-2	-2	-1	-1	-0	-0	-1	-0	-0	-1	+0	+1
1938	+0	-0	+0	+0	+0	-1	-2	-3	+2	+0	-1	-3
1939	-1	-2	-1	-3	-1	-3	-0	+0	+0	-3	+1	+3
1940	+3	+2	+2	+2	+2	+2	-0	+2	+3	+2	+2	+1
1941	+1	+2	+4	+3	+3	+3	+2	+2	+2	+1	+2	-0
1942	+1	+2	+0	+0	+1	+0	+1	+1	-1	+0	-1	-2
1943	-2	-1	-1	-0	-1	-1	-1	-0	-0	-0	+0	+0
1944	+0	+1	+0	-0	-1	-0	-0	-0	-0	+3	+1	+2
1945	+2	+1	+0	-1	-3	-2	-2	-3	-4	-3	-3	-3
1946	-1	-1	-1	-2	-0	+0	+1	-0	-1	-3	-3	-3
1947	-3	-2	-1	-0	-0	+0	+2	-1	-0	-0	+0	+0
1948	-0	-1	-2	-1	-1	-0	-1	-2	-0	-1	-1	-2
1949	-2	-3	-2	-2	-1	-2	-1	+1	-0	-1	+0	-0
1950	-2	-3	-2	-2	-4	-1	-1	+0	-0	-1	-1	+2
1951	+0	+0	-1	-0	+1	-3	-0	-1	-1	+1	+1	+0
1952	-0	-0	+0	-1	-2	-3	-4	-1	-0	+1	+1	+0
1953	+0	+1	+1	+1	+0	-0	+1	-1	+3	-0	+1	+1
1954	+0	+1	+1	+0	-0	+0	-1	-2	+4	+0	+2	+2
1955	+3	+2	-1	-1	-2	-3	-1	-4	-2	-3	-3	-3
1956	-2	-1	-3	-1	-0	+0	-0	+1	+2	-0	-0	-0
1957	-1	-0	-1	+0	+2	+3	+3	+4	+1	+2	+1	+1
1958	+3	+3	+4	+4	+3	+4	+2	+0	+0	-0	-0	-0
1959	+0	+0	+1	+0	+1	+0	+0	-0	-0	+0	-1	
1960	-1	+0	-0	+0	+0	-1	-2	+0	-1	-0	-0	+0
1961	+1	+1	+2	+3	+2	+2	+3	+2	-0	-3	-2	-2
1962	-1	-0	-0	+0	-1	+0	-0	-0	-3	+1	+2	+1
Stnd. Devn.	1.4	1.3	0.8	0.6	0.9	1.0	1.0	0.6	0.8	0.7	1.2	1.5
	2.4	2.0	1.6	1.8	1.3	1.6	1.8	1.5	1.5	1.3	1.7	2.1

Kains Island

Monthly Mean Seawater Salinities (S ‰)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1935	28.79	27.76	29.10	30.36	31.34	31.44	31.81	32.49	32.39	31.26	31.11	29.99
1936	30.01	31.14	29.85	30.62	30.78	30.72	29.75	31.42	31.74	31.79	30.39	30.30
1937	30.86	30.85	30.10	29.52	29.47	31.32	31.49	31.55	31.62	31.08	29.08	29.37
1938	28.99	29.59	29.92	30.07	31.39	32.24	32.61	32.57	32.15	31.05	29.67	29.27
1939	28.32	29.72	30.69	30.68	30.45	32.00	31.73	32.41	31.69	31.21	27.75	26.22
1940	29.03	28.95	28.67	29.82	30.28	31.76	32.08	31.74	31.67	29.08	29.43	29.15
1941	28.69	27.76	29.77	30.53	30.86	31.50	31.95	32.47	31.67	30.30	29.66	28.26
1942	29.94	29.98	29.45	29.76	30.27	31.22	31.97	32.58	32.45	31.29	30.33	28.71
1943	29.79	29.84	30.40	29.92	30.61	31.65	32.11	32.40	31.89	31.23	30.36	30.31
1944	29.08	30.24	31.37	31.49	31.87	32.35	32.43	32.39	31.94	29.71	28.66	29.69
1945	29.70	30.31	30.42	30.46	30.90	31.42	32.19	32.52	32.07	31.71	30.20	29.06
1946	28.34	28.94	28.52	29.48	30.13	31.04	31.31	32.01	31.86	31.05	30.90	29.20
1947	29.32	28.74	30.22	30.57	30.56	31.48	31.00	31.83	32.07	29.69	29.27	29.68
1948	28.86	30.08	30.41	30.59	30.63	31.19	31.89	31.98	30.17	29.51	29.50	29.18
1949	30.16	30.84	30.26	29.62	29.94	31.41	32.01	31.47	31.78	31.19	30.49	29.31
1950	31.39	29.58	28.93	28.88	29.95	30.87	31.50	31.69	31.36	30.22	28.42	28.05
1951	29.25	29.04	30.56	31.25	31.39	31.84	32.53	32.53	32.38	31.81	30.90	29.92
1952	30.34	28.18	30.27	29.25	29.81	30.89	31.58	32.25	31.87	31.31	30.55	29.36
1953	29.62	28.11	29.83	30.15	30.57	31.21	31.61	31.75	31.04	29.56	27.50	27.99
1954	29.50	29.26	29.30	30.45	31.50	31.22	31.10	31.84	31.09	29.86	28.38	27.48
1955	28.86	29.90	31.24	31.16	31.23	31.68	31.83	31.80	31.69	30.35	30.31	29.65
1956	29.27	29.78	29.95	29.95	31.02	31.23	31.48	32.16	32.06	30.35	29.34	28.77
1957	29.66	30.67	30.30	30.07	30.79	31.40	31.04	31.18	31.38	31.65	29.87	28.47
1958	27.95	28.77	29.20	29.91	31.14	31.96	32.44	32.15	31.20	29.69	29.71	28.59
1959	28.61	29.78	28.88	30.00	30.27	30.81	31.47	32.07	31.61	31.16	30.62	29.09
1960	29.65	29.53	30.08	29.19	29.55	30.23	31.74	31.59	31.08	30.20	29.00	29.21
1961	28.81	27.99	28.13	29.67	30.56	31.00	31.61	32.23	31.41	30.38	30.09	29.58
1962	28.67	29.49	31.06	30.51	30.31	31.45	32.18	31.86	32.21	27.42	28.31	25.25
1943 -62	29.34	29.45	29.97	30.13	30.64	31.32	31.75	32.04	31.61	30.40	29.62	28.89
1938 -62	29.97	29.40	29.91	30.14	30.64	31.40	31.82	32.10	31.67	30.44	29.57	28.78
1935 -62	29.34	29.46	29.89	30.14	30.63	31.38	31.73	32.03	31.70	30.54	29.64	28.90

Kains Island

Classifications of Monthly Mean Salinities

(Units of $\frac{1}{2}$ Standard Deviations)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1935	-1	-3	-2	+0	+1	-0	+0	+1	+3	+1	+3	+1
1936	+1	+2	-0	+1	+0	-3	-5	-3	-1	+2	+1	+2
1937	+4	+2	+0	-2	-3	-1	-0	-3	-2	+0	-1	+0
1938	-0	+0	-0	-0	+2	+2	+2	+1	+1	+0	+0	+0
1939	-2	+0	+2	+1	-0		-0	+0	-1	+1	-4	-5
1940	-0	-1	-3	-1	-1	+0	+0	-2	-1	-4	-0	-0
1941	-1	-3	-0	+0	+0	-0	+0	+1	-1	-1	+0	-1
1942	+1	+0	-1	-1	-1	-1	+0	+1	+3	+1	+1	-0
1943	+1	+0	+1	-1	-0	+0	+0	+0	-0	+1	+1	+2
1944	-0	+1	+3	+4	+3	+3	+1	+0	+0	-2	-2	+0
1945	+0	+1	+1	+0	+0	-0	+0	+1	+1	+2	+1	+0
1946	-2	-1	-3	-2	-1	-2	-3	-1	-0	+0	+2	+0
1947	+0	-1	+0	+1	-0	-0	-4	-3	+1	-2	-0	+1
1948	-0	+1	+0	+0	-0	-1	+0	-1	-5	-2	-0	+0
1949	+3	+2	+0	-2	-2	-0	+0	-3	+0	+1	+1	+0
1950	+4	-0	-2	-3	-2	-2	-1	-2	-1	-0	-3	-3
1951	-0	-2	+1	+2	+2	+1	+2	+2	+1	+2	+2	+2
1952	+1	-3	+0	-2	-2	-2	-1	+0	+0	+1	+1	-0
1953	+0	-2	-0	-0	-0	-0	-0	-1	-2	-2	-3	-3
1954	-0	-0	-1	+1	+3	-0	-2	-0	-1	-1	-2	-3
1955	-1	+1	+3	+2	+2	+2	+0	-0	+0	-0	+1	+1
1956	-1	+1	-0	-0	+1	-0	-0	+1	+1	-0	-0	-0
1957	-0	+2	+0	-0	+0	+0	-2	-3	-0	+2	+0	-0
1958	-3	-1	-2	-0	+1	+3	+3	+1	-1	-2	+0	-0
1959	-1	+1	-2	-0	-1	-2	-0	+0	+0	+1	+0	+0
1960	+1	+0	+0	-2	-3	-4	+0	-1	-2	-1	-1	+1
1961	-1	-3	-3	-1	-0	-0	+0	+2	-0	-0	+1	+2
1962	-1	+0	+2	+1	-1	+1	+2	-0	+3	-5	-2	-5
Stnd. Devn.	0.54	0.64	0.61	0.55	0.47	0.28	0.38	0.28	0.24	0.67	0.65	0.53
	0.89	0.91	0.91	0.82	0.92	0.49	0.75	0.42	0.64	0.88	1.14	1.12

Nootka

Monthly Mean Seawater Temperatures (°F)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1934								61.80	58.50	53.10	48.30	45.60
1935	41.10	43.90	43.60	48.60	52.50	56.60	59.70	59.80	58.10	52.90	46.90	45.80
1936	44.90	43.50	44.20	48.60	53.60	59.50	62.90	61.80	58.80	55.20	50.50	45.50
1937	43.30	44.00	48.10	49.30	53.70	55.70	58.90	58.40	56.70	51.50	46.60	45.20
1938	42.90	42.00	43.90	48.40	52.00	55.90	57.20	58.50	59.70	54.20	47.20	44.60
1939	43.70	43.00	45.80	49.30	52.80	56.40	58.30	59.00	56.40	50.70	47.80	46.60
1940	44.40	44.60	45.80	50.30	53.60	56.40	60.30	60.70	60.30	54.60	49.50	46.90
1941	46.30	46.50	49.80	52.90	55.60	58.70	62.00	61.50	59.10	54.20	50.40	46.50
1942	46.40	46.20	46.40	50.10	54.50	56.80	61.70	61.80	57.50	54.00	46.80	44.70
1943	43.20	43.30	45.10	48.60	52.70	55.60	58.50	60.10	58.00	53.70	49.60	46.70
1944	45.20	45.40	46.10	49.70	53.20	55.80	58.40	60.60	59.20	55.00	49.70	47.40
1945	46.20	45.70	45.90	48.40	53.70	56.80	58.30	60.00	57.00	52.90	46.60	43.30
1946	43.90	43.80	45.10	47.80	53.70	57.10	58.80	60.70	58.60	50.80	45.50	43.00
1947	41.60	43.70	46.90	48.90	54.80	58.30	60.20	62.10	58.50	52.40	48.30	45.80
1948	44.90	44.40	45.20	47.90	52.20	59.40	60.10	59.80	58.20	53.30	47.00	42.50
1949	41.40	42.50	44.90	47.70	54.40	55.50	58.30	59.70	58.30	52.30	50.00	45.30
1950	40.00	40.70	43.40	45.80	50.50	57.10	59.50	60.60	57.20	51.70	46.40	46.50
1951	44.30	43.00	44.10	49.80	54.10	55.90	59.60	59.70	55.90	52.80	48.40	44.50
1952	43.10	42.30	44.60	46.90	51.10	56.30	59.50	59.60	58.30	55.20	48.20	45.60
1953	43.60	43.30	46.60	47.80	53.60	55.20						

Observations Terminated

1935 -52	43.7	43.8	45.5	48.8	53.3	56.9	59.6	60.2	58.1	53.2	48.1	45.3

Nootka

Classifications of Monthly Mean Seawater Temperatures

(Units of $\frac{1}{2}$ Standard Deviations)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1935	-3	-0	-2	-1	-1	-0	-0	-0	-0	-0	-2	-0
1936	+0	-1	-1	-1	+0	+4	+3	+2	+0	+2	+2	
1937	-1	-0	+2	-0	+0	-1	-0	-2	-2	-2	-2	-1
1938	-1	-3	-2	-1	-2	-1	-2	-2	+2	+0	-1	-3
1939		-1	-0	-0	-1	-0	-1	-1	-3	-4	-0	+1
1940	+0	+0	-0	+1	+0	-0	+0	+0	+3	+1	+1	+1
1941	+2	+3	+4	+5	+4	+3	+2	+2	+1	+0	+2	+1
1942	+2	+2	+0	+0	+2	+0	+2	+2	-1	+0	-2	-2
1943	-1	-1	-0	-1	-1	-1	-1	-0	-0	+0	-1	-1
1944	+1	+1	+0	+0	-0	-1	-1	+0	+1	+1	+1	+3
1945	+2	+1	-0	-1	+0	+0	-1	-0	-1	-0	-2	-3
1946	-1	-0	-1	-2	+0	+1	-0	+1	+0	-3	-3	-3
1947	-3	-1	+1	-0	+2	+3	+1	+2	+0	-1	+0	+0
1948	+0	-0	-1	-2	-2	+3	+0	-1	-0	+0	-1	-3
1949	-3	-3	-1	-2	+1	-2	-2	-2	-0	-1	+2	+0
1950	-3	-4	-3	-3	-4	-0	-0	-0	-2	-2	-1	+1
1951	+0	-1	-2	+2	+1	-1	+0	-2	-4	-0	+0	-0
1952	-0	-1	-1	-2	-2	-0	+1	-1	+0	+3	+0	+0
Stnd.	1.3	1.2	0.9	1.2	1.0	0.9	0.7	0.7	0.7	1.1	1.5	0.9
Devn.	2.2	1.7	1.8	1.8	1.4	1.3	1.8	1.2	1.3	1.5	1.7	1.8

Nootka

Monthly Mean Seawater Salinities (S ‰)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1934								29.58	29.71	25.66	20.59	23.92
1935	20.37	20.07	23.25	27.66	29.31	26.56	28.58	30.14	28.32	25.91	27.66	22.25
1936	23.98	28.72	24.60	23.41	25.47	25.83	24.52	29.35	29.44	28.41	24.07	22.55
1937	30.98	28.19	24.22	23.38	21.86	24.19	27.79	27.89	29.16	23.91	21.73	22.84
1938	23.45	27.08	24.73	24.84	27.13	28.73	30.69	31.58	30.98	26.69	23.43	23.99
1939	24.21	26.77	28.75	26.28	25.72	26.57	26.12	30.87	28.52	26.22	17.47	20.19
1940	24.97	23.20	21.09	25.31	25.94	30.64	30.82	29.07	27.79	21.94	24.71	20.77
1941	22.91	23.58	25.76	27.86	24.62	27.50	30.38	30.92	27.09	22.77	23.98	21.09
1942	26.70	26.41	23.34	25.93	25.23	26.85	28.94	31.10	29.89	24.97	25.27	22.31
1943	27.45	26.41	27.21	23.47	26.53	28.27	29.17	29.52	29.37	26.17	26.78	24.96
1944	21.47	28.40	27.26	27.68	28.98	30.55	31.64	31.61	30.62	26.06	21.77	26.94
1945	24.73	25.67	25.77	26.24	23.78	26.23	28.21	30.53	28.70	28.98	26.59	24.99
1946	20.96	23.74	21.54	23.61	22.72	24.07	27.25	28.71	28.12	26.73	28.23	21.75
1947	23.99	22.81	26.19	25.97	25.83	27.19	24.24	29.85	29.75	22.06	25.04	23.46
1948	25.05	26.42	27.53	27.09	24.34	24.18	29.14	30.14	24.50	23.84	23.70	24.80
1949	28.08	28.26	23.72	21.85	23.16	28.40	29.50	26.51	27.34	25.72	24.54	25.61
1950	26.61	24.05	22.85	23.58	24.32	23.49	26.53	29.41	29.16	23.73	20.93	21.91
1951	25.91	25.19	28.39	27.04	23.30	27.79	30.47	31.19	30.79	25.29	24.94	25.04
1952	29.08	19.68	27.90	21.01	20.94	23.56	26.76	29.19	28.86	27.83	25.63	23.39
1953	19.18	20.42	25.59	25.52	22.15	26.17						

Observations Terminated

1935 -52	25.10	25.26	25.23	25.12	24.95	26.70	28.38	29.87	28.80	25.40	24.25	23.31

Nootka

Classifications of Monthly Mean Salinities

(Units of $\frac{1}{2}$ Standard Deviations)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1935	-2	-4	-1	+2	+3	-1	-0	-0	-1	+0	+2	-0
1936	-0	+2	-0	-2	-0	-1	-4	-1	+0	+3	+0	
1937	+4	+1	-0	-2	-4	-3	-1	-3	+0	-1	-1	+0
1938	-0	+0	-0	-0	+1	+1	+1	+2	+3	+1	-0	+1
1939		+0	+3	+0	-0	-1	-2	+1	-1	+0	-4	-2
1940	+0	-2	-3	-0	-0	+3	+1	-1	-2	-3	+0	-2
1941	-1	-1	+0	+2	-1	-0	+1	+1	-3	-2	+0	-1
1942	+1	+0	-1	+0	+0	-0	+0	+1	+1	-0	+1	-0
1943	+1	+0	+2	-2	+0	+0	+0	-1	+0	+0	+2	+2
1944	-2	+1	+2	+2	+2	+2	+2	+2	+2	+0	-1	+4
1945	-0	-0	+0	+1	-1	-1	-0	+0	-0	+3	+2	+1
1946	-2	-2	-2	-2	-2	-3	-2	-2	-1	+1	+2	-1
1947	-0	-2	+0	+0	+0	-0	-4	-1	+1	-2	+0	+0
1948	+0	+1	+1	+1	-1	-2	+0	-0	-4	-1	-0	+1
1949	+3	+2	-1	-3	-2	+0	+0	-4	-1	+0	-0	+1
1950	+1	-1	-2	-1	-0	-3	-1	-0	+0	-1	-3	-2
1951	+0	-0	+2	+1	-1	+0	+1	+1	+2	-0	+0	+0
1952	+2	-4	+1	-3	-3	-2	-1	-0	+0	+2	+0	-1
Stnd.	1.94	1.75	2.00	1.56	1.62	1.87	1.69	0.89	1.13	1.80	1.72	1.38
Devn.	2.93	2.62	2.47	2.23	2.13	2.33	2.21	1.23	1.76	2.19	2.96	2.07

Amphitrite Point

Monthly Mean Seawater Temperatures (°F)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1934								57.10	54.20	50.80	50.20	48.20
1935	45.20	45.70	45.30	47.90	49.90	52.90	54.90	54.60	54.90	52.20	46.60	47.10
1936	46.40	43.90	45.70	47.40	50.80	56.70	57.70	58.20	55.30	53.10	48.40	47.10
1937	44.40	43.40	46.50	48.50	50.50	53.10	53.90	55.30	53.10	51.80	50.70	48.30
1938	46.90	44.20	46.30	48.60	50.00	51.60	52.40	53.70	53.90	52.90	49.50	46.70
1939	46.30	44.10	47.40	50.20	51.50	52.60	53.40	56.70	54.20	51.60	51.00	50.10
1940	47.70	47.60	48.60	51.90	53.10	53.50	54.40	55.90	55.40	54.40	51.70	48.50
1941	47.20	48.30	49.90	52.10	54.40	55.50	57.40	55.60	56.30	53.90	51.60	49.40
1942	45.70	46.50	46.40	49.20	52.00	53.80	58.40	57.60	56.00	52.70	48.90	46.40
1943	43.90	44.60	45.40	49.20	50.00	52.50	54.30	55.40	55.40	52.90	50.40	48.50
1944	47.10	45.90	46.60	48.90	51.20	51.30	53.60	56.20	55.00	53.70	52.60	49.10
1945	48.20	47.70	47.70	48.40	52.60	51.60	53.50	54.60	53.40	51.10	47.10	45.70
1946	46.30	45.30	46.50	47.90	50.70	54.70	54.80	55.20	53.80	50.70	46.80	45.00
1947	43.70	44.20	46.60	48.70	50.50	54.30	56.00	57.70	54.60	52.40	50.50	47.20
1948	45.60	44.50	45.00	46.60	50.20	52.90	55.10	56.00	55.40	51.70	47.30	44.10
1949	41.30	41.80	44.70	47.50	51.60	51.10	53.50	55.70	53.80	50.10	49.60	47.30
1950	41.40	42.60	44.80	46.70	47.80	52.40	52.50	53.70	53.50	51.80	49.60	48.20
1951	46.70	45.10	44.70	48.50	49.90	51.90	53.20	56.10	54.00	52.70	49.70	47.10
1952	44.50	45.20	46.20	47.60	50.80	52.40	53.90	55.60	54.60	52.70	48.60	46.70
1953	46.70	47.10	47.40	48.50	52.20	52.50	53.40	55.70	55.80	53.50	51.50	49.30
1954	48.00	46.00	46.40	47.20	4930	52.20	54.30	55.20	54.70	52.40	52.20	49.80
1955	47.10	45.70	45.30	46.40	47.90	50.80	52.80	53.30	53.20	51.40	47.50	45.30
1956	44.60	44.50	45.20	47.00	47.90	50.00	54.20	54.80	53.70	52.00	49.10	46.20
1957	43.50	43.30	45.20	48.00	51.00	52.70	55.10	56.90	57.40	54.00	52.00	49.20
1958	47.80	49.00	48.80	50.80	53.90	56.70	58.60	58.20	56.00	52.30	49.90	48.00
1959	46.60	46.20	47.20	49.20	51.30	53.80	54.10	55.30	55.40	52.30	48.40	46.90
1960	44.90	46.20	45.90	49.40	51.80	51.50	52.20	56.00	56.20	53.00	52.00	48.70
1961	47.50	48.00	48.20	49.10	52.20	53.30	57.40	56.70	54.90	50.70	47.10	45.00
1962	44.80	46.10	45.70	49.00	51.10	51.90	52.20	55.60	55.50	54.90	53.60	50.60
1943 -62	45.5	45.4	46.2	48.2	50.7	52.5	54.2	55.7	54.8	52.3	49.9	47.4
1938 -62	45.8	45.6	46.5	48.7	51.0	52.7	54.4	55.7	54.9	52.5	50.0	47.6
1935 -62	45.7	45.4	46.4	48.6	50.9	52.9	54.5	55.8	54.8	52.5	49.9	47.6