MID-PACIFIC OCEANOGRAPHY, PART VIII, MIDDLE LATITUDE WATERS, JANUARY-MARCH 1954

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By

James W. McGary, Oceanographer

and

E. D. Stroup, Physical Science Aid
Pacific Oceanic Fishery Investigations
U. S. Fish and Wildlife Service
Honolulu, T. H.

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ABSTRACT

The report presents the results of cruise 25 of the M/V *Hugh M. Smith* of the Pacific Oceanic Fishery Investigations, U. S. Fish and Wildlife Service, an oceanographic cruise to the central temperate North Pacific. The cruise surveyed the area bounded roughly by 141° and 165°W. longitude and 24° and 38°N. latitude. The report includes the observed and interpolated station data, the procedures used in the analysis of the data, a discussion of the general meteorological features of the North Pacific and those encountered on the cruise, and plots and discussions of the geopotential topography and geostrophic currents, GEK currents, temperature, salinity, temperature-salinity relationships, density, dissolved oxygen, and inorganic phosphate.

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MID-PACIFIC OCEANOGRAPHY, PART VIII, MIDDLE LATITUDE WATERS, JANUARY-MARCH 1954

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This report is concerned with cruise 25 of the M/V Hugh M. Smith, the first of a series of surveys planned to describe the oceanography of the central temperate North Pacific by the Pacific Oceanic Fishery Investigations, U. S. Fish and Wildlife Service. These studies are designed to describe the physical environment in the region north of Hawaii in connection with investigations on the albacore tuna, *Germo alalunga* (Bonnaterre). This cruise was concurrent with fishing by the John R. Manning, cruise 23, the results of which will appear separately.

The survey, made during January-March 1954, covered an area bounded roughly by 141° and 165°W. longitude, and by 24° and 38°N. latitude (fig. 1). Serial measurements of temperature, salinity, oxygen, and inorganic phosphate were made to a depth of approximately 1,200 meters; quantitative zooplankton collections were taken by oblique tows through the upper 200 meters and meteorological data were recorded. The surface currents were measured with the Geomagnetic Electrokinetograph during part of the cruise. This report presents the tabulated station data (except for the results of the plankton collections which will appear separately), meridional sections, and horizontal plots of oceanic and meteorological features, and brief analyses and descriptions of the results.

PROCEDURES

The vessel equipment and the methods of collecting and correcting the raw data have been described in previous reports (Cromwell 1951, Stroup 1954); the methods of analysis of the observed data leading to their presentation as meridional sections have also been described in detail (Stroup 1954). In essence, the analysis attempts to use all the data to achieve a comprehensive, consistent description of the distributions of the several variables. In the analysis of the individual stations, the vertical distribution of each variable is referred to temperature, as this is the only quantity measured continuously with depth. Rather than analyze each station independently, observed values from nearby stations are considered during the construction of the station curves. The vertical sections of density (sigma-t) distribution are influenced by the structure of the detailed bathythermograph (BT) temperature sections, and the sections of the other quantities are in turn influenced by the sigma-t distribution, in accordance with the principles of isentropic analysis. Insofar as possible, no quantity is considered independently of the over-all description.

The horizontal plots (excepting figs. 2-4) are based on a simple conic projection with standard parallels at 25° and 45°N.; the distance scale is the same as that used in the meridional sections. There is slight distortion, nowhere greater than about 1 percent, along the central and marginal parallels of latitude. The horizontal plots are based on values interpolated from the station curves and, whenever possible, the meridional sections were used to determine the contour intervals between stations.

The meteorology of the region is discussed in somewhat greater detail than in previous reports. The storm tracks were taken from the daily (1200Z) surface weather charts published by the U. S. Weather Bureau. The monthly positions of the limits of the trades and westerlies and the positions of the "Eastern North Pacific High" and the "Aleutian Low" (these are average, climatological features) during the period the cruise were obtained from the monthly average charts supplied by the Extended Forecast Section of the U. S. Weather Bureau. The long-term average monthly positions of these features are from Technical Paper No. 21, U. S. Weather Bureau, "Normal Weather Charts for the Northern Hemisphere," and from the U. S. Navy Hydrographic Office Pilot Charts for the North Pacific (H.O. 1401).

CLIMATE AND WEATHER

The oceans are a flexible medium whose circulation, temperature structure, salinity, and dissolved oxygen content are largely dependent upon the exchange of energy between the atmosphere and water. A discussion of oceanographic features of an area should not be undertaken without an understanding of at least the major features of climate and weather. The general ocean currents are more or less directly produced by the prevailing winds (Sverdrup 1943, p. 92) and hence should show some seasonal changes as the intensity or direction of the winds change. Locally, the major source of change in the thermal structure of the water is the mixing induced by wind waves or current shear caused by local variance in wind stress. Over wide areas, the major sources of change are from variations in the rate of exchange of heat by conduction, evaporation, precipitation, and radiation. These changes occur when water is transported by the general currents from warmer to colder regions (low to high latitudes), or vice versa, or when the atmospheric circulation carries air to an ocean area having a different temperature. Extensive changes in salinity in the open ocean can be caused only by an exchange of moisture with the atmosphere. Thus, we must consider features in the atmospheric or oceanic circulation which would be conducive to evaporation from the sea, such as the movement of cold air over warm water, or movement of warm water to a region of cooler air, or features conducive to precipitation, such as areas of frontal activity in the air. The dissolved oxygen capacity of the sea is a function of temperature, salinity, and vapor tension, as well as pressure, and is therefore subject to modification by the exchange of heat or moisture that takes place at the sea surface.

The mean monthly sea level pressure charts (U.S.W.B. 1952) show that the wind and weather of the North Pacific are dominated by a subtropical pressure maximum, commonly known as the Eastern North Pacific High or the North Pacific anticyclone, and a subpolar pressure minimum, commonly known as the Aleutian Low. These features define the principal wind belts. They undergo a northward shift from winter to summer and during this migration the subpolar low diminishes, practically disappearing during June and July, and the subtropical high increases (Namias 1953, Byers 1944).

The Eastern North Pacific High is the most permanent of the climatic features of the North Pacific. Its center is characterized by light winds and little or no storminess, but its migration affects the storm paths of the entire ocean. If the center is displaced farther north than normal, storms occur farther north; if it is displaced farther south, the storms sweep across the oceans at more southerly latitudes.

Actually, the Eastern North Pacific High is a great area of subsiding air. The effects of subsidence are most noticeable in the eastern sector as a result of air that has descended as it swept around the cell from the northwest and north. On the south side, as the air joins the trades, it begins to ascend again until it reaches a high point on the southwestern part of the cell. On the west side of the cell, fronts may be formed as the warmer air from the cell encounters the cooler air to the north. As a result of this circulation the areas of greatest evaporation are likely to be found to the east of the cell and areas of greatest precipitation to the west.

The Aleutian Low is maintained by intermittent outbursts of cold polar air which is steadily generated in the interior of Asia during the winter months. The greatest percentage (about 70 percent) of these outbreaks occur in the region of Japan, the China Sea, or the Yangtze Valley (Byers 1934). As the cold air moves over the warm sea and encounters the warmer tropical air masses, strong cyclonic vortices are formed. They have well-marked warm fronts of advancing tropical air with open warm sectors and well-defined cold fronts. The normal path of these storm centers is in a northeasterly direction. In most cases the fronts have occluded and died out by the time they reach Alaska. However, they are occasionally regenerated by influxes of cold air from the Yukon Valley. The cyclonic disturbances tend to occur in cycles, that is, large cyclones are followed by progressively smaller ones, each carrying the cold front farther toward the Equator than the preceding one until finally polar air flows directly into the trade wind region. Precipitation occurs when the warm, moist air of tropical or subtropical origin is forced to ascend over the colder, denser air (Byers 1944).

During the summer months, the Eastern North Pacific High is well developed and is the predominant climatic feature of the North Pacific. The mean position of the center of the high lies within the area covered by cruise 25 from April to September and just to the east of the area during the remainder of the year. Consequently, the prevailing winds of the area vary considerably from season to season as a result of the migration and fluctuation of the high. During the period from April to September, when it has its greatest development, strong, steady northeast trade winds prevail over the southern part of the cruise area. The mean northern limit of the northeast trades extends to 33°N. latitude on

165°W. during July and August and to 36°N. on 141°W. during August (U.S.N.H.O. 1401). In the northern part of the cruise area there is normally little or no wind because of the great extent of the center of the high.

During the winter months, October to March, when the high is weak the Aleutian Low is the predominant climatic feature of the North Pacific. In this period the mean northern limit of the northeast trade wind belt is much farther south, and the trade winds have lower velocities and greater variation in direction than during the summer months. Its most southern position is between 23°N. and 24°N. latitude during November, February, and March on 165°W. longitude, and at the same latitudes during November on 141°W. longitude (U.S.N.H.O. 1401). In the northern part of the area the prevailing winds are westerly because of cyclonic circulation around the Aleutian Low and anticyclonic circulation around the high. The mean position of the southern boundary of the westerlies is farthest south during January and February, when it is at approximately 30°N., from 165°W. to 155°W., and extends northeastwardly to approximately 34°N. on 141°W. longitude. The limits of westerlies are not as meaningful as those of the northeast trades because of the great variability in the paths and intensities of the lows that sweep across the North Pacific.

During the winter months another source of storms that affect the area covered by Hugh M. Smith cruise 25 is the subtropical cyclones which frequently develop near the Hawaiian Islands south of the main stream of the polar westerlies. These storms, locally known as Kona storms (Simpson 1952), form as waves in quasi-stationary cold fronts and, because of their proximity to the Eastern North Pacific High, usually develop slowly or die without becoming very intense. However, when they form as a new or secondary front associated with a frontal system farther north, they are vigorous and cause high winds and heavy rainfall.

The meteorological conditions during any given period deviate considerably from the average conditions described above. The manner and amount of the deviation and its effect on the actual conditions encountered is of importance when considering oceanographic data. Therefore, the mean monthly sea level pressure charts (furnished by the U.S.W.B.) and the daily weather charts (prepared by the U.S.W.B., Honolulu, T. H.) for January through March 1954 were compared to the normal charts. A composite of the major features of these charts is shown in figures 2 through 4.

Stations 1 through 28 were occupied January 12 to 31, during which time the mean surface pressure was very different from normal. The semi-permanent high, as indicated by the cell of greater than 1,020-mb. pressure (fig. 2), was much smaller than normal and centered slightly east of its normal position. The Aleutian Low was much weaker and more diffuse than normal; it actually consisted of four small cells, none of which attained the usual depth of less than 1,000 mb. These conditions are indicative of a period of relatively weak zonal westerlies whose limits extend farther south than normal. This is shown in figure 2 by the restricted westerly extent of the approximate limits of the westerlies and trades and the southerly shift of the limits relative to the mean position. The weakness of the zonal circulation is also shown by the differences in the paths of the lows which had their origin in the vicinity of Japan and the large number of lows that originated in mid-ocean. The effects of the southerly shift in the westerlies and the large number of lows that originated in mid-ocean are shown by the predominance of westerly winds (fig. 5) and the number of fronts (fig. 6) that were encountered along and between the transects on 165°W. and 160°W.

The general features of the mean sea level pressure chart for February, the period during which stations 29 through 63 were occupied, were similar to the normal chart in most respects (fig. 3). The Aleutian Low was about normal in intensity and centered only slightly southeast of its usual position, indicating that the storms that originated along the Asiatic coast were following their usual pattern. The eastern North Pacific High was displaced slightly northeast of its mean position and was slightly less intense than usual. The latter condition resulted in a 3- to 4-degree southerly displacement of the northern limit of the northeast trade wind belt. The most marked departure from normal was the trough which occurred in the area west of the Hawaiian Islands; this trough was the source of the storms which produced the high winds and fronts encountered by the Smith during February (figs. 5 and 6).

Of the three months covered by the cruise period, the mean surface pressure chart for March 1954 (stations 64 through 89 were occupied between March 1 and 16) departed most radically from normal (fig. 4). The center of the Aleutian Low was about normal in position and depth but was much smaller in area. The Eastern North Pacific High was centered 500 to 600 miles northwest of, and was equal in area and intensity to, the normal cells for July and August. Inspection of the daily weather maps showed that this was the result of a series of unusually intense (up to 1,047 mb.) slow-moving highs which began to appear during the last week of February and continued to occur during the first three weeks of March. As a result of this unusual pressure distribution, the northern limit of the northeast trades was at about the same position as the normal southern limit of the westerlies. The northerly migration of the trade wind belt is also shown by the winds observed during the cruise (fig. 5). The winds were almost entirely easterly after station 54, which was occupied on February 23. The only exceptions were shifts of short duration which occurred when fronts passed over the vessel. As during February, all of the fronts were generated by the lows which formed in the Hawaiian Islands area (fig. 6).

CURRENTS

Geopotential Anomalies (Dynamic Heights) and Geostrophic Currents

Since the discussion of the various fields of an ocean area is more understandable when the general character of the flow pattern has been established, the geopotential anomalies and the dynamic topography and geostrophic currents will be discussed first. The geopotential anomalies in dynamic meters of the standard isobaric levels relative to the 1,000-decibar surface for each north-south transect are shown in figures 7-16, and the dynamic topography of the 0-, 100-, 200-, 400-, and 600-decibar (m.) surfaces are shown in figures 17-21.

Before discussing the circulation pattern depicted by these plots, a review of the assumptions made and procedures used in their construction is in order. In addition to the assumption that the 1,000-decibar surface is the level of no motion, it is assumed that the cross-sections and contours represent a synoptic picture, although the time interval between the first and last station was 2 months. The curves were drawn to fit the observed data, and in a few cases, such as the trough in the upper 100 meters between 25° and 26°N. latitude on 165°W. longitude, features have been drawn in from differences in density indicated by the bathythermograph temperatures. This procedure gives a more confused current pattern than the usual smoothed curves, but it is probably much closer to the actual conditions. At stations 31 and 89 and at stations 55 and 85, which were less than 60 miles apart but were occupied 17 to 20 days apart, the heights and positions were averaged.

The dynamic topography of the sea surface, figure 17, shows that the general flow, except for the area just north of the Hawaiian Islands, is in an east-southeasterly direction. A number of both cyclonic and anticyclonic eddies are superimposed on this flow, the greatest number and most intense eddies occurring in the northeastern part of the area. The concentration is well to the east of 155°W. longitude, where the spacing of the transects was reduced from 5 degrees to 2 degrees of longitude, so they cannot be merely attributed to the increase in the station concentration. Neither can they be attributed to local winds or internal waves since the largest and most intense eddies, e.g., the large anticyclonic eddy centered at station 66, were not associated with storm passages and extended over two or more stations or transects. In the area just north of the Hawaiian Islands a narrow ridge of greater than 1.9 dynamic meters occurs. It extends as far east as 155°W. longitude and corresponds very closely to the February-March position of the center of the Subtropical Convergence[1/] indicated on the German Hydrographic Office (prepared by Schott) (Deutsche Seewarte 1942) current charts.

The principal changes in the dynamic topography with depth (figs. 17-21) are the gradual northward shift of the ridge which delineates the transition from eastward to westward flow and the broadening of the ridge with depth. In the western part of the area the center of the ridge shifts from just north of the Hawaiian Islands at the surface to approximately 30°N. on the 600-decibar surface. To the east it is apparently south of the area at the surface and shifts rapidly to the north below the 100-decibar surface so that it lies within the area as far east as 147°W. on the 400-decibar surface. A further shift to the north is indicated on the 600-decibar surface, but the two large anticyclonic eddies break the ridge into two parts which correspond to the "Y" shape of the Subtropical Convergence shown in the German Hydrographic Office current chart (Deutsche Seewarte 1942) and to the lobations which occur in the dynamic topography of the Carnegie data (Sverdrup et al. 1945, fig. 246).

1/ "Subtropical Convergence" refers to the zone of convergence between the easterly flowing water to the north and the westerly flowing water to the south.

The persistence of these anticyclonic eddies and a large percentage of the other eddies down to the 400-, 600-, and even to the 800-decibar surfaces, as shown by the cross sections, is further indication that they are part of the general circulation and not due to local or transient phenomenon such as wind shifts and internal waves.

A comparison of the dynamic heights of the stations which were occupied close together in space but at widely different times demonstrates that the assumption of steady state for the cruise period gives a realistic concept of the general circulation. The heights of all surfaces at station 85 were lower than those of station 55, which was occupied only 2 miles away 17 days earlier. The cross sections show, however, that the use of the heights of either, instead of the average values, would have merely increased (using station 85) or decreased (using station 55) the velocities around the south side of the anticyclonic eddy. Figure 9 also shows that although the difference in dynamic heights between stations 31 and 89, which were occupied 33 miles apart in space and 34 days in time, was as much as 0.145 dynamic meters (at the surface), the topography would have been basically the same if either had been used instead of the average.

The geostrophic current velocities indicated by the spacing of the dynamic height contours show that the flow was very weak even in the well-developed eddies. The maximum velocities at the surface occur in the three eddies centered on 145°W. and are only about 0.4 knot (20 cm./sec.). The maximum velocity in the general zonal (easterly) flow at the surface is about 0.2 knot (10 cm./sec.). However, velocities of this magnitude only occur in narrow bands and the average velocity would be more in the order of 0.1 knot (5 cm./sec.) or less. On the subsurface levels the velocities fall off rapidly below 100 meters. The maximum velocities of the general zonal flow have decreased to less than 0.1 knot over the entire area at the 200-decibar surface, and in the eddies they are less than 0.2 knot at 200 decibars and less than 0.1 knot at 400 decibars. On the 600-decibar surface the velocities are less than 0.02 knot (1 cm./sec.) in the general cyclonic flow through the area and have a maximum of between 0.04 and 0.06 knots (2-3 cm./sec.) in the remnants of the two anticyclonic eddies on 145°W. These values are well below the limits of accuracy to be expected from the dynamic topography and show that the use of a surface deeper than 1,000 decibars, such as the 2,500-decibar surface used in the Carnegie Report (Sverdrup et al. 1944-1945), as the reference level would not have made an appreciable difference in the dynamic topography of the upper levels.

Geomagnetic Electrokinetograph Currents

Current measurements at 30-mile intervals were made with the Geomagnetic Electrokinetograph (von Arx 1950) during the second part of Smith cruise 25. The k-factor was taken as unity, and correction was made for the droop of the electrodes following procedures outlined by Knauss (personal communication, see McGary 1955). Figure 22 gives the results together with the dynamic topography of the sea surface with respect to the 1,000-decibar level.

It is immediately evident that the GEK is measuring what may be considered a different part of the "spectrum" of water movement than that indicated by dynamic computations; the results are extremely variable in direction and attain considerably greater magnitudes than the geostrophic currents. Barnes and Paquette (1954) describe a very similar situation off the coast of Washington: the net (geostrophic) circulation there is also relatively slow and motions with tidal or inertial periods dominate the individual GEK measurements. They found that calculating the data as 48-hour running means removed most of these short-period variations, but the results seemed to agree more with the local winds than with the indicated geostrophic current. They concluded that the instrument was measuring real, transient, wind-driven currents, which are integrated into the longer-term net flow indicated by the distribution of mass.

Mr. Joseph Reid at Scripps Institution of Oceanography (personal communication) found that simple averaging of the GEK currents by calendar days seemed to remove most of the short-term variations from measurements taken off the coast of California, and the averaged results indeed show excellent agreement with the geostrophic currents. Reid subsequently averaged the Smith 25 data but the results show little agreement with the dynamic topography of the surface relative to the 1,000-decibar level (fig. 23).

Comparison of the GEK currents with the local winds (fig. 5) shows no obvious relationship. These results are not surprising, considering the complex nature of the geostrophic currents in the area and the large variations in the wind, which during much of the time was directed against the geostrophic surface current.

While we may feel certain from previous work that the GEK is giving an indication of real water motions, these motions are apparently largely of a transient or inertial character and are difficult to relate meaningfully to other data observed on the cruise.

DISTRIBUTION OF PROPERTIES

Temperature

The temperature cross sections (figs. 24-33) were constructed from bathythermograph observations taken at approximately 30-mile intervals. The plots of the surface temperatures above each cross section represent "bucket" temperatures from BT stations supplemented by reference to recording thermograph traces. These north-south profiles were then used to construct the horizontal plot of the surface temperature (fig. 34).

The surface temperature plot depicts only the gross features of the temperature field. Thermograph records (see fig. 35 for an example) show that the general decrease in temperature from south to north occurred in a series of steplike drops. These drops were usually less than 1°F., but occasionally were as large as 4°F. Frequently they occurred so rapidly that they appear as vertical lines on the thermograph traces. The thermograph records also show a large number of fluctuations superimposed on the general trend. These were generally of less than 1°F. but occasionally attained an amplitude of 3.5°F. A careful check of the bucket temperatures against the thermograph showed these variations were not the result of temperature changes in the engine-cooling water intake, where the sensitive unit of the thermograph was located, except when the engines were stopped. The stopping of the engines produced such distinct patterns that there was no possibility of confusing them with the fluctuations in the surface temperature. The fluctuations in the surface temperature varied in horizontal extent from those which were so small that they could barely be distinguished from the oscillations caused by the roll and vibration of the vessel to the large ones that embraced two or more BT casts, and which are incorporated in the temperature profiles.

When the variability of the winds, the season of the year, the geographical position of the area, and the geostrophic currents are considered, the complexity of the temperature field is quite comprehensible. Similar variations observed in other areas (Saelen 1952, Mackintosh 1946) seem to be associated with one or more of the following phenomena: large horizontal velocity gradients (shear zones), upwelling, convergence, and winter conditions in the middle and higher latitudes.

The general configurations of the surface isotherms (fig. 34) were consistent with the geostrophic currents (fig. 17). The isotherms which are continuous from east to west are roughly parallel to the dynamic height contours. The tonguelike pattern of the isotherms in the anticyclonic eddies centered on 145°W. longitude is characteristic of this type of circulation (Sverdrup and Fleming 1941). Many of the warm and cold cells occurred in areas of relatively large horizontal temperature gradients. For example, the cold cell of less than 62°F. centered at $32^{\circ}30'$N. on 160°W. is on the northern side of an area having relatively high velocities and where the curvature of the dynamic height contours is cyclonic.

An example of the effect of local wind mixing is illustrated by the tongue of less than 71°F. at approximately 23°N., 163°W. The weather data (figs. 5 and 6) show that two cold fronts with winds of over 30 knots had passed over the area in rapid succession just before the observations were made.

Charts of mean monthly surface temperatures (U. S. Navy Hydrographic Office 1944, Robinson 1951) show a large seasonal shift of the mean position of the isotherms in the cruise area. For example, the mean position of the 65°F. isotherm on 150°W. shifts from $42^{\circ}15'$N. in August to $30^{\circ}15'$N. in March. This indicates either that normal winter cooling, because of differences between the air and sea temperature, continues through March or that the flow through or into the area has a sufficiently large southerly component to offset the heating due to increased radiation.

The air temperatures observed at each bathythermograph station were plotted on the temperature cross sections (figs. 24-33) to ascertain whether there was any consistent difference between the air and sea temperatures. The plots show that the air over the southern part of the area was cooler than the water for the most part but that changes in the air circulation frequently reversed the gradient. The only area where the air was consistently warmer than the water was in the extreme north and in the area between 149°W. and 153°W., where the geostrophic flow (fig. 17) was southeasterly. This temperature difference indicates that at least some of the small surface temperature changes were the result of local heating or cooling.

The dotted lines on the horizontal plot of surface temperature (fig. 34) show the mean position of the 70°, 65°, 60°, and 55°F. isotherms. They have been interpolated from the U.S.N.H.O. Surface Temperature Atlas (1944) to correspond to the approximate time of transit on each leg, thus permitting a comparison of the temperature encountered on the cruise with mean conditions. The greatest and most consistent difference from normal occurs west of 155°W., where all the isotherms are farther north than normal. East of 155°W. the 55°F. isotherm, which is farther south than usual, is the only one that is consistently different.

The most significant features of the temperature field were several abrupt meridional changes of 2°-4°F. They are shown by the large gradients on the surface temperature plot (fig. 34) and on the surface temperature profiles (figs. 24-33). The changes were sharpest in the western part of the area, where they coincided with steep gradients in the dynamic topography. The most striking example occurred on the 160°W. transect, where the thermograph record (fig. 35) shows a rise (vessel course was 180°T.) from 58°F. to 60°F. in about 4 minutes followed by a series of more gradual rises to almost 63°F. over the following 2 hours and 45 minutes. At the 8.5-knot average speed of the Smith this represents a rise of almost 5°F. in 25 miles. According to Mackintosh (1946) such abrupt changes in temperature are characteristic of areas of convergence between water masses.

Major changes in the vertical temperature structure were frequently associated with surface temperature discontinuities. At many, the south to north shallowing of the isotherms (see figs. 24-33) increased sharply. The increase in slope affected all of the isotherms instead of only the shallow ones, as in the case of changes of slope which are attributed to internal waves.

North of the discontinuities which occurred at temperatures of 60°F. or less, the homogeneous surface layer was almost entirely missing, the bathythermograph trace showing either a gradual decrease to 900 feet or a series of small steplike changes. Again, the phenomenon was most pronounced in the western part of the area, where the flow was basically zonal. The BT traces from the stations on 160°W. have been reproduced in figure 36 to illustrate the change in their structure from south to north. Both the abrupt change in slope of the isotherms and the absence of a homogeneous surface layer are characteristic of the zones where mixing and sinking take place at the convergence between two water types (Sverdrup and Fleming 1941).

Density

The internal distribution of density (sigma-t) in the ocean reflects both the field of motion and the modifying processes occurring at the surface. The effect of motion is seen in the distributions of mass giving rise to the pressure gradients associated with horizontal currents; by this association an examination of the sigma-t plots can yield a qualitative description of the major features of the circulation. The surface modifying processes directly affect a relatively thin upper layer, the "surface layer," keeping the layer nearly vertically homogeneous, and causing large time and space variations in its properties.

Turning first to this surface layer (fig. 37), we can see the general northward increase in density associated with the decrease in temperature. The meridional change in density in the area of our sections is less in the east; this is because water of lower salinity (more northern origin) is present farther to the south in the eastern part of the region. The greater northward decrease in salinity here tends to offset the decreasing temperature in determining the density of the surface water.

The sections (figs. 38-47) show the general northward thinning of the surface layer connected with the net easterly flow of the North Pacific Current. The surface layer becomes extremely shallow at the northern end of the eastern sections, another indication that this region is influenced by more northerly conditions than the western part of the area. The local irregularities and inversions to be expected in this area of rapidly changing conditions and slow water motion are evident on the sections.

The relatively sharp density gradient of the thermocline lies directly below the surface layer. The sigma-t surfaces show a net northward decrease in depth, again an indication of the easterly North Pacific Current. At the depths of the surface layer and upper thermocline the southern boundary of this current is at or beyond the southern limit of our sections, for there is no change in the slope of the upper thermocline to indicate a transition to the westerly flow of the North Equatorial Current. The large irregularities in the density structure associated with the eddies described previously may be seen in the sections at the longitudes of the eddies.

The depths of two sigma-t surfaces associated with the region of the thermocline are shown on horizontal plots (figs. 48 and 49); the shallower, sigma-t = 25.2, comes to the sea surface within the area of the cruise. While sea surface influences determine the northward extent of this layer, both surfaces otherwise reflect the circulation indicated by the plots of dynamic topography at these depths. The complex region of eddies is seen in the eastern part of the area, while the northward shift with depth of the boundary of the westerly North Equatorial Current is noticeable in the southwest corner of the area on the deeper (sigma-t = 26.0) surface. In general, there is more detail of the circulation evident on the sigma-t surfaces than in the smoothed dynamic topographies.

The deeper portions of the meridional sections (figs. 38-47) show a northward shift with increasing depth of the trough in the isopleths marking the transition from easterly to westerly zonal flow. The topography of the sigma-t = 26.8 surface (fig. 50), which corresponds closely to the position of the deep layer of minimum salinity of northern origin, again closely resembles the indicated geostrophic circulation at similar depths; the current is slow, turning broadly back toward the west, with southerly flow through a large part of the area.

Salinity

In the surface layer (fig. 51) the major features are the region of salinity maximum in the latitudes of the southern edge of the cruise area and the rapid decrease in salinity northward from this region, particularly in the east. The maximum is formed by the excess of evaporation over precipitation in these latitudes and is distributed in a broad zonal band by the currents (Jacobs 1951). The water to the north of the cruise area is partly of northern origin and is low in salinity; between is the area of transition characterized by a large meridional salinity gradient. This gradient is not smooth, but reflects the irregularities (such as the eddies) in the circulation.

Below the surface layer a deep salinity minimum (400-600 m.) is evident on all the sections (figs. 52-61), with a second shallow minimum appearing in the northeast part of the area. The deep minimum, characteristic of the greater part of the subtropical and temperate Pacific, is probably maintained by water formed in the northwest, in the convergent region between the Kuroshio Extension and the Oyashio (Sverdrup et al. 1942).

The shallow minimum occurring in the northeastern part of the cruise area seems to be formed by surface convergence. Figures 62 to 64 give the depth, salinity, and sigma-t at the level of this minimum, and show its southernmost extent. The flow is mostly parallel to the isohalines, and the depths indicate that part of the region of origin is close to or at the northern edge of the cruise area. The widely varying values of sigma-t suggest that considerable non-isentropic mixing is occurring at these relatively shallow depths, and also doubtless reflect irregularities in the formation of the minimum at the surface. This shallow minimum was mentioned by Sverdrup et al. (1942, fig. 202 and p. 723) and is apparently characteristic of this area. The waters of the upper minimum turn toward the south with the general circulation. More complete station coverage, especially to the east of the Smith cruise 25 area, is needed to describe the formation and distribution of this minimum.

The salinity distribution is shown on the three sigma-t surfaces discussed in the section on density (figs. 65-67). On the two shallower surfaces the isohalines very roughly parallel the geostrophic flow at these depths, with irregularities particularly noticeable in the eddy region. The shallowest surface, sigma-t = 25.2, is still somewhat within the direct influence of the sea surface and shows the greatest variations in salinity. On the intermediate surface, sigma-t = 26.0, the southward extension of low salinity in the east is connected with the intrusion of the upper salinity minimum, which is centered slightly above this sigma-t surface (see fig. 64).

On the deep surface, sigma-t = 26.8, very nearly coinciding with the center of the deep salinity minimum, the 34.00 ^{o}/oo isohaline lies across the flow. The flow here is very weak, however, and the salinity changes are small; the downstream salinity increase is the result of vertical mixing and diffusion.

Temperature-Salinity Relationships

Although it is not within the scope or intent of this report to enter into a detailed discussion of the temperature-salinity relationships from the standpoint of the origin of the water, they do help clarify the circulation. The curves for the 160^{o}W., 155^{o}W., 147^{o}W., and 141^{o}W. transects have been combined in single plots (figs. 68-71) in order to depict the salient features of the latitudinal and longitudinal changes. The limiting T-S curves of the three water masses into which the waters of the North Pacific are commonly divided (Sverdrup et al. 1942) are included in each plot for comparative purposes.

In the western part of the area (160°W.), the curves lie along the lower salinity limit of the Western North Pacific Central Water (fig. 68), except in the upper 100-200 m. and at temperatures of less than 8°C. at stations 3 and 28. At 8°C., the temperature at which the curves delineating the lower salinity limits of the Eastern Central Pacific Water and the Western North Pacific Water intersect, stations 3 and 28 depart abruptly from the other curves and follow the Eastern North Pacific Central Water.

At the shallower depths along 160°W. the interval between stations 22 and 23 (fig. 68) is the transition zone between the southern stations which have a salinity maximum at or near the surface and the northern stations which have a minimum at or near the surface. The shallow maximum at the southern stations is characteristic of a region where evaporation produces an increase in salinity at the surface, causing the water to sink and spread out at an intermediate depth. Instead of showing a gradual shift toward lower temperatures and salinities, the surface portion of the curves for the northern stations show an uneven change in temperature-salinity relationships. The small changes (e.g., sta. 17-18) correspond to and account for the relatively level zones in the dynamic heights. The large changes (e.g., sta. 18-19) represent transitions between waters of slightly different type and correspond to zones of relatively large geostrophic currents. The irregular shift between the curves leads to the conclusion that the decreased temperature and salinity in the surface layers are the result of masses of water of more northerly origin, that is, water containing greater percentages of Subarctic Water, being driven into the area by the winter westerlies instead of being simply the result of latitudinal changes of temperature and rate of precipitation or evaporation.

Moving east to 155°W. (fig. 69), the curves form a less compact band but still lie just below the lower salinity limit of the Western North Pacific Central Water, except at temperatures of less than 7°C., and in the surface water (upper 100-200 m.). At temperatures of less than 7°C. the curves do not follow the standard curves as closely as they did on 160°W. The discontinuity between the two southern stations (31 and 32) and the remainder of the stations is not as pronounced as on 160°W., the maximum difference amounting to only 0.1 °/oo. In the surface waters the abrupt change in the shape and position of the curves indicating the transition from the southern stations having a salinity maximum at or near the surface and the northern stations with a minimum at the surface occurs between stations 37 and 38. Again the sharp changes between the two groups of stations and within the groups correspond to zones of relatively large geostrophic current velocities.

The 147°W. transect (fig. 70) intersects the complex eddy system in the northeast part of the area, so the changes in the temperature-salinity relationships reflect the complex circulation around the eddies as well as the expected changes with latitude. Except for station 58, the curves along 147°W. form a compact band between 7° and 10°C. just below the lower salinity limits of the Western North Pacific Central Water. For the most part below 7°C. the salinity shows a gradual decrease at a given temperature from south to north with occasional slight reversals. As can be seen from the plot, the difference between the curve for station 82, the southernmost station, and those of the adjoining stations was the only one consistent enough to indicate a change in water mass.

At temperatures greater than 10°C. along 147°W. there is a sharp shift in temperature-salinity relationships between southern and northern stations, the change occurring between stations 55 and 56. Considering the southern stations, the only significant change is a shift between 17°C. and 10°C. from the lower salinity limit of the Eastern North Pacific Central Water to just below the lower limit of the Western North Pacific Central Water. The reason for the shift and the correspondence of the curves to Eastern North Pacific Central Water above 10°C. is apparent from the slight secondary salinity minimum which occurs at about 14°C. at stations 84, 85, and 55. This indicates that there is a subsurface influx of less saline water centered at about the 25.6 sigma-t surface. The extent and possible origin of the minimum is discussed in the section on salinity.

Because of the confused circulation resulting from the eddies there are no systematic shifts among the surface portions of the T-S curves at the northern stations on 147°W. For example, the salinities at all temperatures at station 58 were less than those at 59 and less than those at 60 at temperatures below 11°C.

The most pronounced difference between these northern stations and those from farther west is the presence of the salinity minimum at 100 to 230 meters (see fig. 62) instead of at the surface.

On 141°W. (fig. 71), the most easterly transect, the curves had two common features: all, except 79, formed a compact band between 6.5°C. and 8.5°C., and all had a deep and a shallow salinity minimum. As in the deeper water of the western sections, salinity gradually increased from north to south at temperatures less than 6.5°C. Again the difference between the southernmost station, station 79, and the adjoining station was sufficient to indicate a distinct change in water mass.

At temperatures greater than 8.5°C. there were three abrupt shifts among the curves. The most pronounced was between stations 75 and 76, but there was such a large space and time interval between these stations because of heavy weather that the sharpness and position of the break is suspect. South of station 76 the curves lie just below the minimum of Eastern North Pacific Central Water, a slight decrease in salinity from the southern stations of 147°W. North of station 75 the influx of Subarctic Water is again apparent from the large differences among the curves. All of these, except between stations 72 and 73, correspond to changes in the dynamic topography along the transect. If the contours of the dynamic topography at the surface are traced to the west (upstream), the more northerly origin of the surface water at station 72 is obvious.

Dissolved Oxygen

The dissolved oxygen content of the ocean provides an additional tool for tracing the origin and movements of water masses. It is absorbed at the sea surface in amounts dependent upon the salinity and temperature of the water and the pressure, which is usually considered to be standard (1,013 mb.), and moisture content of the air, which is usually neglected. Below the euphotic zone, biological processes lead to the consumption of oxygen so that the processes of diffusion and advection must be such that, if the oxygen content of the deeper layers remains constant, they lead to a replenishment that exactly balances the consumption (Seiwell 1937).

The longitudinal profiles of dissolved oxygen are shown in figures 72-81, the horizontal plot at 10 m. in figure 82, and the distribution on the 26.8 sigma-t surface in figure 83. The isopleths of percentage saturation have been included on some of the plots to show the degree of depletion of the subsurface oxygen and hence the implied direction of movement, if the consumption is assumed to be independent of the oxygen content until it is nearly depleted (ZoBell 1940). The saturation values used to compute the percentages were taken from Fox's tables (Harvey 1928), which were computed on the assumption that sometime during the past the water had been at the surface in contact with dry air at normal pressure (1013.3 mb.) at the *in situ* temperature and salinity.

The 10-m. samples were used to depict the dissolved oxygen content at the surface because the surface Nansen bottle was frequently in the turbulent area around the hull when the vessel was rolling heavily. The distribution of dissolved oxygen on the 10-m. surface (fig. 82) followed the pattern indicated by the temperature and salinity fields. The highest oxygen values were at the northern edge of the area where the lowest temperatures and salinities were observed, and the least oxygen in the area just north of the Hawaiian Islands, where the highest temperatures and salinities were observed.

The profiles of dissolved oxygen (figs. 72-81) show that the pattern of the vertical distribution is basically the same over the entire area. It consists of a surface layer of almost uniform content, a layer of small, variable negative gradient, a layer of large and almost uniform negative gradient, and in a few of the sections a layer in which the negative gradient decreases and changes to a positive gradient. The latter does not occur in all of the sections, since the oxygen minimum was below 1,000 m. in a large number of cases (see observed data).

As expected, at each station the surface layer of almost uniform dissolved oxygen content corresponded to the layer of uniform density resulting from wind and advective mixing. In almost all cases the values in this layer were within ±0.05 ml./l. of the 10-m. value.

Instead of a rapid decrease in the dissolved oxygen content just below the surface layer, such as occurred in the temperature and density fields, there was a layer of small and variable negative gradient between the surface and the band of large negative gradient. The cross sections (figs. 72-81) show that the 4.5-ml./l. isopleth, which varies between 300-550 m. in depth, approximates its lower limit. It is deepest between 30° and 32°N. or at about the same latitude as the ridge in the dynamic topography of the deeper isobaric surfaces. In the southern part of the area there are a number of inversions, such as the cell of greater than 5.5 ml./l. which is centered at 150 m. at 31°00'N. on 147°W. Further indications of the variability of either the oxygen consumption or the mixing in this layer are shown by the lack of similarity between the oxygen profiles and the sigma-t profiles (figs. 38-47) and the abrupt departure of the percentage of saturation isopleths on 165°W. (fig. 72) from the oxygen isopleths in the southern part of the area.

The layer having an almost uniform but large negative gradient, up to 2.0 ml./l. per 100 m., extends down to the 1.5-ml./l. isopleth on 160° and 165°W. and to the 1.0-ml./l. isopleth over the remainder of the area. The sigma-t (figs. 38-47) and percentage of saturation isopleths are basically parallel to those of dissolved oxygen in this zone, indicating that the rate of consumption and replenishment via diffusion and lateral mixing must be in equilibrium. The most interesting feature of this layer is that it also contains the deep salinity minimum. The center of the salinity minimum fluctuates between the 3.0- and the 4.0-ml./l. (O_2) isolines. This variation is probably due to the difficulty of locating the center of the minimum on the station because of the small salinity gradients.

The decrease in the dissolved oxygen gradient below the 1.0- and 1.5-ml./l. surfaces and its final shift to a positive gradient resulted in a minimum which, as reported by Sverdrup et al. (1942, p. 729), was about 400-500 m. below the deep salinity minimum. Because of the great thickness of the band of water with low oxygen content, the large spacing of the bottles at the depth at which it occurred, and the fact that it was not reached by the 1,000-m. casts on the northern part of the two westernmost transects (stations 7-25), no attempt has been made to contour it. However, sufficient data were available to show that a line drawn through the minimum between stations 7 and 75 would approximate the 1,000-m. contour. The deeper values were to the northwest and the shallower to the southeast, indicating that the depth of the minimum tended to decrease from northwest to southeast.

The isopleths of the oxygen content at the minimum had a radically different pattern from its depth contours. The lowest values formed a tongue of less than 0.4 ml./l. which entered the area between stations 62 and 75 and extended in a west-southwest direction as far as stations 54, 47, and 48. The highest minimal values formed a tongue of greater than 1.0 ml./l. which entered the area between stations 4 and 5 and extended eastward as far as station 28.

The only sigma-t surface on which there was a significant difference between the sigma-t and the dissolved oxygen contours was the 26.8 surface (fig. 83). On this surface the oxygen decreases in the direction of flow, indicating that oxygen is either being consumed by biological activity or depleted by diffusion. Evidence of the latter is shown by the decrease along the 600-m. contour from 3.01 ml./l. at station 47 to 2.06 ml./l. at station 28, while in contrast the oxygen minimum increases from 0.37 ml./l. to 1.02 ml./l.

Dissolved Inorganic Phosphate

The primary purpose of making dissolved inorganic phosphate determinations was to determine if there had been divergence or convective mixing in any part of the area of sufficient magnitude to bring nutrients to the surface layer in excess of the utilization by biological activity. The secondary purpose was to map the vertical distribution of the nutrients. The surface values are shown in figure 84 and the cross sections, except for the 155°W. transect, in figures 85-93. The profile for 155°W. was omitted because the Automatic Servo-Operated Photometer was not functioning properly between stations 30 and 38, and the resulting data were too erratic to be considered reliable.

Although most of the surface values (fig. 84) were near or below the lower limit of accuracy (about 0.4 µg. at./l.) of the molybdenum-blue method of determining dissolved inorganic phosphate (Wooster and Rakestraw 1951), the consistency of the distribution with the other fields indicates that they portray a valid picture of the distribution. As expected from the Carnegie data (Sverdrup et al. 1945), the surface phosphate content decreased from north to south on all sections.

When the surface phosphate distribution (fig. 84) is compared to the temperature and salinity fields, it is evident that the southerly shift from summer conditions is not entirely the result of convective mixing induced by winter cooling and increased wind mixing. In the northwestern part of the area, where the southerly shift of the westerlies is normally the greatest, the surface phosphates were the largest.

However, instead of the deep, homogeneous surface layer that should result from increased wind mixing and convective overturn, there was virtually none (figs. 24-33 and 36) in this area, indicating that some other mixing forces must be involved.

Comparison with the temperature, salinity, and dynamic topography shows that the large horizontal gradients in surface PO_4 correspond to sharp changes in these fields. Again using the 160° W. section as an example, the phosphate increased from 0.17 µg. at./l. at station 21 to 0.40 µg. at./l. at station 20, and from 0.36 µg. at./l. at station 19 to 0.55 µg. at./l. at station 18, corresponding to abrupt changes in surface temperature (figs. 24-34), distinct shifts in the T-S curves (fig. 68), and zones of relatively large geostrophic currents (fig. 17). In addition, the temperature-salinity relationships (figs. 68-71) show that the surface waters of the northwest part of the area contain less water of northern origin than the water at the same temperatures farther east. This indicates that mixing as a result of turbulence in the areas of relatively large horizontal current shear in the transition zone between waters of slightly different type (Sverdrup et al. 1942, p. 472) contributes to the enrichment of the surface water and accounts for the largest surface phosphate values being in the northwestern part of the area.

The isolated cell of greater than 0.2 µg. at./l. centered at about 30°N. on 165°W. (fig. 84) is based on the observations from a single station. However, it is probably real since, in addition to the relatively large horizontal velocity gradients and divergence in the surface currents indicated by figure 17, the station was occupied during a period of high winds (Beaufort force 7) (fig. 5).

In the southeastern part of the area, the 0.1 µg. at./l. contour is drawn as a dotted line to show that there was little or no phosphate in the surface waters. Further evidence of barrenness in this area was the deep blue color of the water (see table 1).

The vertical distribution of dissolved inorganic phosphate is shown in figures 85-93. As expected, its pattern is almost the opposite to that of the dissolved oxygen. At the surface, except in the areas of large horizontal velocity gradient mentioned above, there is a layer in which the concentration is relatively low and uniform. Below this layer the phosphate increases rapidly and, in general, uniformly with depth to about the 2.8 µg. at./l. isopleth, and the trend continues until a maximum of between 3.00 and 3.86 µg. at./l. is reached at about the same depth as the oxygen minimum.

Water Transparency

Whenever the sea and weather conditions permitted, water color determinations according to the Forel scale and transparency observations by means of a Secchi disk (Sverdrup et al. 1942, p. 82) were made immediately after the hydrographic cast. Only 13 reliable

Table 1. Transparency observations

Station No.	Latitude	Longitude	Date	Time 1/	Secchi disk	Surface temperatures	Cloud cover	Water color (Forel)
			1954	GCT	meters	°F.	tenths	
34	27°57'N.	155°05'W.	2/11	2330	24.0	68.4	4	-
50	37°02'N.	150°58'W.	2/21	0219	13.5	56.1	8	Blue green
56	31°01'N.	146°56'W.	2/24	1818	23.0	64.8	7	Blue green
58	33°55'N.	147°05'W.	2/25	1930	22.0	60.6	3	Blue green
60	37°09'N.	146°58'W.	2/26	2123	10.0	56.5	7	Green
62	37°04'N.	145°01'W.	2/28	(0020) 2/	21.0	57.6	7	Blue green
64	33°58'N.	144°58'W.	3/1	0112	29.5	61.0	8	Blue green
66	30°58'N.	144°44'W.	3/2	(0050) 2/	30.5	65.0	4	Blue green
67	29°25'N.	142°56'W.	3/2	1815	23.0	66.2	8	Blue green
69	32°37'N.	143°04'W.	3/3	1942	28.0	62.4	8	Blue green
71	35°32'N.	143°00'W.	3/4	1849	29.0	59.4	8	Blue green
77	27°52'N.	140°55'W.	3/9	1858	32.0	66.4	4	Blue
81	25°03'N.	145°03'W.	3/11	2020	29.0	69.6	6	Blue

1/ Time lowering was started. 2/ Estimated.

observations (table 1) were obtained because even in good weather the rolling motion of the vessel frequently generated an opaque layer of foam around the vessel.

DISCUSSION

Many of the similarities and differences between the circulation pattern and the distribution of the various chemical and physical fields observed on this cruise and those described by previous writers have been discussed in the description of these fields. Most of the differences can be attributed to the fact that many of the previous discussions have been either based on data taken during summer months, e.g., Carnegie data (Sverdrup et al. 1945), or have been based on averages from data taken over a number of years, e.g., (Schott's current chart)(Deutsche Seewarte 1942).

The most comprehensive summary of the general features of the physical oceanography of the cruise area was given by Sverdrup in his discussion of the water masses and currents of the oceans (Sverdrup et al. 1942, Sverdrup 1943). According to his charts of the water masses and mass transport of the North Pacific (Sverdrup et al. 1942, figures 196 and 205, and chart VII), the cruise covered one of the most complex areas of the North Pacific, including the broad transition zone between the Western and Eastern North Pacific Central Water masses and the transition zone between these water masses and the Subarctic Water. Under average conditions the cruise area should have included parts of the following major components of the North Pacific circulation: the North Equatorial Current, the North Pacific Current, the Subtropical Convergence, the Arctic Convergence or the North Polar Front, and the Eastern Gyral or Gyre.

The North Equatorial Current is the name given to the westerly flowing current in the lower north latitudes of the central Pacific. The geostrophic currents indicated by the dynamic topography (fig. 17-21) show only a small area of westerly flow just north of the Hawaiian Islands, the northerly limit of which shifts slightly to the north with depth. Within the westerly flow, except for the small cell of >0.2 µg. at./l. of inorganic phosphate at the surface at station 3 (fig. 23), there is no evidence of mixing, other than normal diffusion, of sufficient magnitude to cause enrichment of the euphotic zone (upper 80-100 m.). Station 3 is just north of Kauai, and the slightly higher phosphate content of the surface here was probably the result of the turbulence induced by the flow around the islands.

The Subtropical Convergence has already been defined (page 4) as the zone of convergence between the easterly flowing water to the north, the North Pacific Current, and the westerly flowing water to the south, the North Equatorial Current. The position, northerly shift, and broadening of the transition zone with depth have already been pointed out. The relatively large horizontal sigma-t gradients at the surface (fig. 37) illustrate the rapid poleward increase in density of the upper layers which is associated with the Subtropical Convergence (Sverdrup et al. 1942, p. 140). The occurrence of the salinity maximum at the surface in the area (figs. 51 and 52-61) indicates that it is part of the source of the subsurface salinity maximum found in the lower latitudes of the central North Pacific. Thus, it is an area of subsidence and should be unproductive. This is borne out by the low phosphate content of the surface waters (figs. 84 and 85-93).

The North Pacific Current is the name applied to the general eastward flow of warm water to the east of 160°E. It sends branches to the south, and normally the greater part has turned south before reaching 150°W. so that only a small portion flows south to the east of the Hawaiian Islands. The similarity of the T-S curves from the western part of the area to those of the western North Pacific Central Water (figs. 68-71) is evidence that the band of southeasterly flowing water whose northeastern limit is approximated by the 1.72-dynamic-meter contour at the surface (fig. 17) is a southern branch of this North Pacific Current which has penetrated farther east than normal. This was probably the result of the southeasterly shift of the limits of the westerlies and trades, which the January and February 1954 mean sea level pressure charts indicate was even farther than usual. The only evidence of enrichment of the surface layers within the North Pacific Current was at station 8 at 30°N. on 165°W., where the surface phosphate values were between 0.4-0.5 µg. at./l. Although this station was located in an area of relatively large and divergent surface currents, the local nature of the high phosphate content and the fact that the station was occupied just after a period of Beaufort 7 winds lead to the conclusion that it was a local phenomenon.

When the geostrophic currents are considered alone, the general easterly flow in the northern part of the cruise area appears to be a branch of the North Pacific Current, which continues east along the northern side of the Eastern Gyre. However, as has already been pointed out in the discussion of the temperature-salinity relationships, a series of abrupt shifts occur in the surface portion of the T-S curves, showing an intrusion of colder and less saline water from the north. A complete transition to Subarctic Water was not made on any of the transects, so the core of the Aleutian Current, being defined as an easterly flow of Subarctic Water, was not reached.

Previous authors have shown considerable variation in the latitude, extent, and nature of the eastern portion of the transition zone between the North Pacific Current and the Aleutian Current. Merz's chart of the currents of the Pacific in northern summer (Wüst 1929) shows it as a line beginning off the coast of Japan at about 36°N. and extending in a wide arc through 42°N., 170°E., to about 35°N. latitude, 160°W. longitude. He applies the name North Polar Front to the line. Schott (Deutsche Seewarte 1942) shows the transition as a line of convergence which corresponds to Merz's from the coast of Japan to 170°E., 42°N. It then continues northeast as an indefinite line to 45°N. latitude, 165°W. longitude. In the area north of the Hawaiian Islands, Schott indicates the line of divergence shown in figure 17. Sverdrup et al. (1942, figs. 205 and 209A) show the transition zone as the boundary between the Subarctic Water and the Eastern and Western North Pacific Central Water masses. They portray it as a zone extending in a wide arc completely across the Pacific. It also corresponds to Merz's Polar Front to about 180°. It then continues to about 40°N., 150°W., where it turns southward and parallels the coast of North America to approximately 20°N.

The differences in interpretation by the three authors are quite understandable when the small amount of data and the different methods used in the analysis of the circulation are considered. Schott used ship's drift, Sverdrup largely temperature-salinity relationships and Merz apparently a combination of both. However, Merz did not have the benefit of more recent surveys such as those of the Carnegie and the Bushnell. Actually, the major differences among these authors' interpretations of the cruise area can be reconciled. In the area where Schott shows a divergence in the surface current, Sverdrup et al. (1942, fig. 205) indicate a branching or divergence of the North Pacific Current. Wüst, in his discussion of Merz's North Polar Front, states that in the eastern part of the ocean, although the front has the unstable temperature characteristics of a convergence in the direction of flow, it shows mixing of the colder, deeper waters with the surface water. This would cause enrichment and cooling of the surface, which are the two most outstanding characteristics of an area of divergence.

If it is remembered that in the ocean an abrupt, discontinuous transition from one type of water to another is almost never found and that the line merely indicates that the transition takes place over a relatively short distance, Wüst's geographical limits of and description of the eastern part of the North Polar Front seem to fit the northwestern part of the cruise area. The T-S curves show that the incursion of the Subarctic Water took place in the form of a series of narrow streams rather than a broadly moving front. The dynamic topography shows that the bands of relatively high velocity, which resemble the multiple currents of the Gulf Stream described by Fuglister (1951), occurred in the boundaries between these streams. The turbulence in these zones of relatively large horizontal velocity gradient probably cause the mixing of the deep water with the surface waters described by Wüst and accounts for the large horizontal phosphate gradients in these zones and the occurrence of the highest phosphate values in the northwest part of the area.

The reported existence of the North Pacific Gyral, a clockwise gyral centered between the Hawaiian Islands and the west coast of North America, is based mainly on the characteristics of the water and results of current and mass transport computations (Sverdrup et al. 1942, p. 723). Its center is believed to coincide with the center of the Eastern North Pacific High, so it undergoes considerable seasonal migration and variation in size. Considering the radical shift that occurred in the mean position of the High bebtween February and March, it is not surprising that there was little evidence of a distinct gyral in the dynamic topography of the eastern part of the area. However, many of the other characteristics of the Gyral were present in the southeastern part of the cruise area. The isolated cell of sigma-t greater than 25.0 at the surface, the topography of the shallow salinity minimum, and the close approximation of the T-S curves at the southern stations on the 147°W. and 141°W. longitude transects to those of the Eastern North Pacific Central Water show that it is centered at about the southernmost of the two anticyclonic cells on 145°W. longitude. The maximum depths of up to 200 m. of the top of the thermocline which occurred just south of the center of this cell illustrate the effect of convergence in the surface waters. The impoverishment of the southern part of the Gyral is shown by the tongue of less than 0.1 µg. at./l. in the surface plot of inorganic phosphate, the large Secchi disk readings, and the blue color of the water.

In conclusion, the only areas in which there is an apparent source of continuous mixing which should provide enrichment of the surface layers are the zones of large horizontal current shear in the Polar Front. It is interesting to note that the albacore taken by the J. R. Manning (cruise 19), which was operating in the area concurrently with the Smith, were taken at or near these zones (Shomura and Otsu MS)[2]. For example, the best days' catch of 42 albacore (5.4/100 hooks) was made on the 160°W. transect at 33°58'N., just south of the area where the surface temperature rose from 58°F. to 63°F. in only 25 miles, and in the area where the first sharp increase in the surface phosphate occurred.

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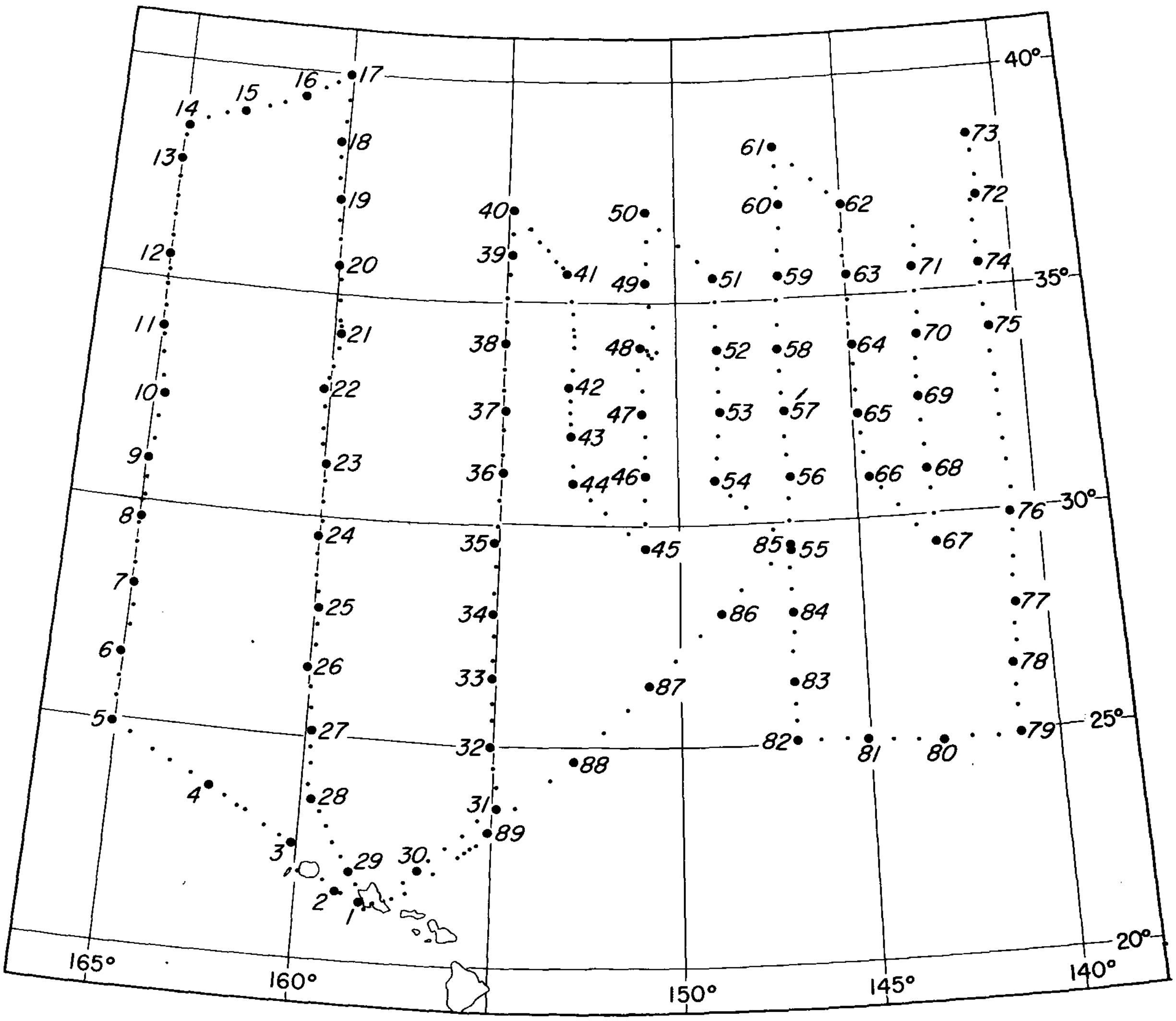

Figure 1.--Oceanographic station positions, Hugh M. Smith cruise 25, January-March 1954. Large numbered dots indicate oceanographic stations. Small dots indicate positions of BT lowerings between stations.

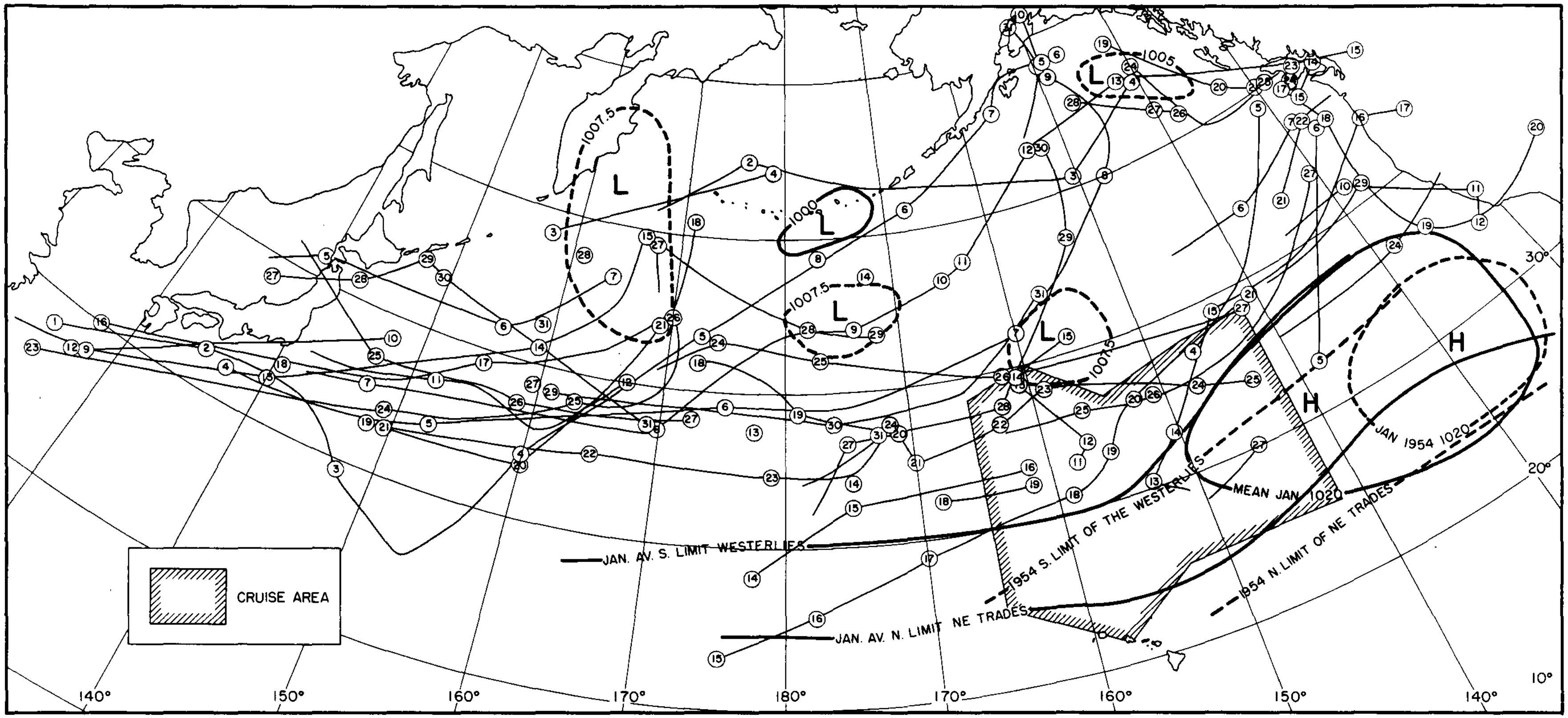

Figure 2. --Mean (heavy solid lines) and mean January 1954 (broken lines) positions of Aleutian Low(s) and Eastern North Pacific High; normal and 1954 mean monthly limits of northeast trades and westerlies; tracks of centers of low pressure areas, showing daily position.

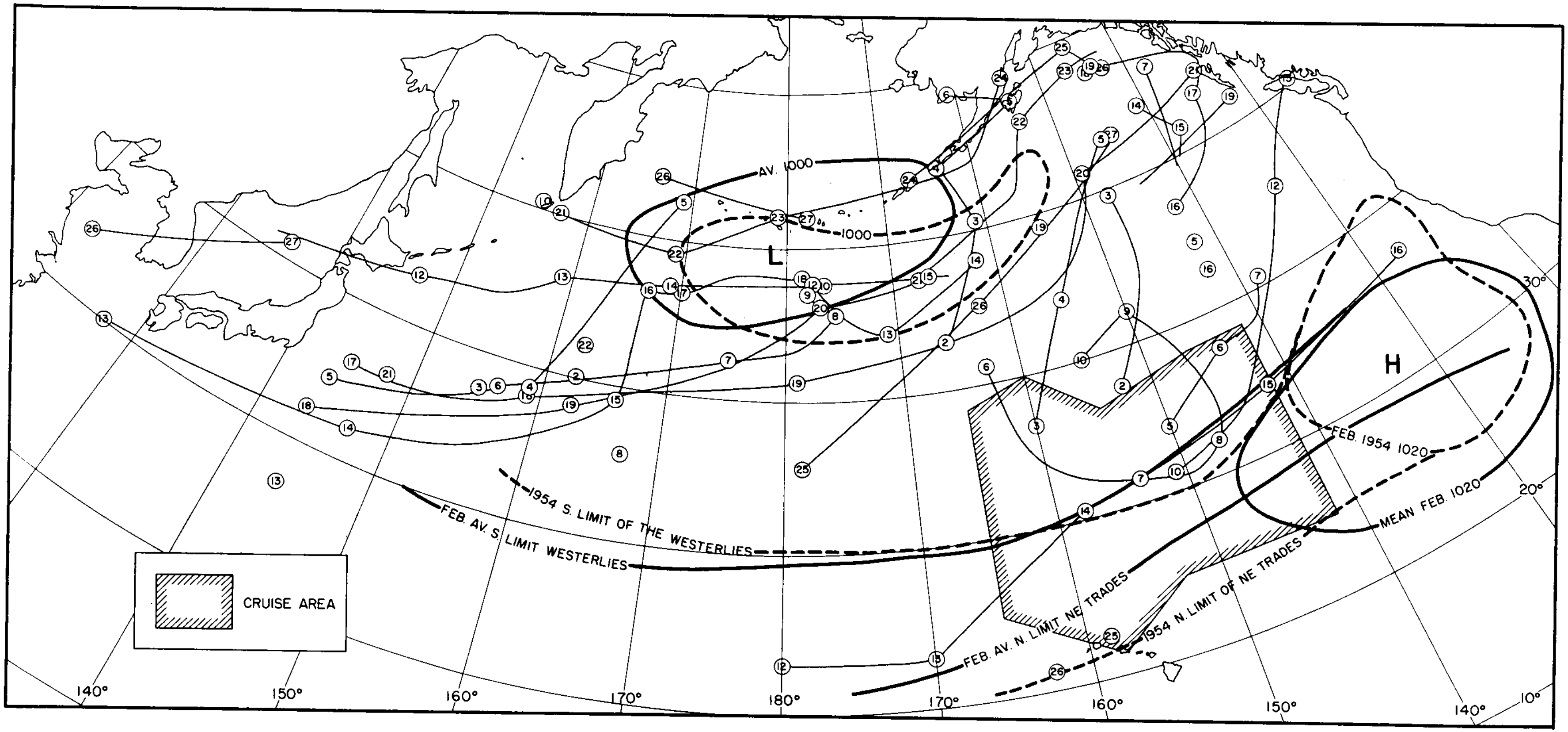

Figure 3. --Mean (heavy solid lines) and mean February 1954 (broken lines) positions of Aleutian Low and Eastern North Pacific High; normal and 1954 mean monthly limits of northeast trades and westerlies; tracks of centers of low pressure areas, showing daily position.

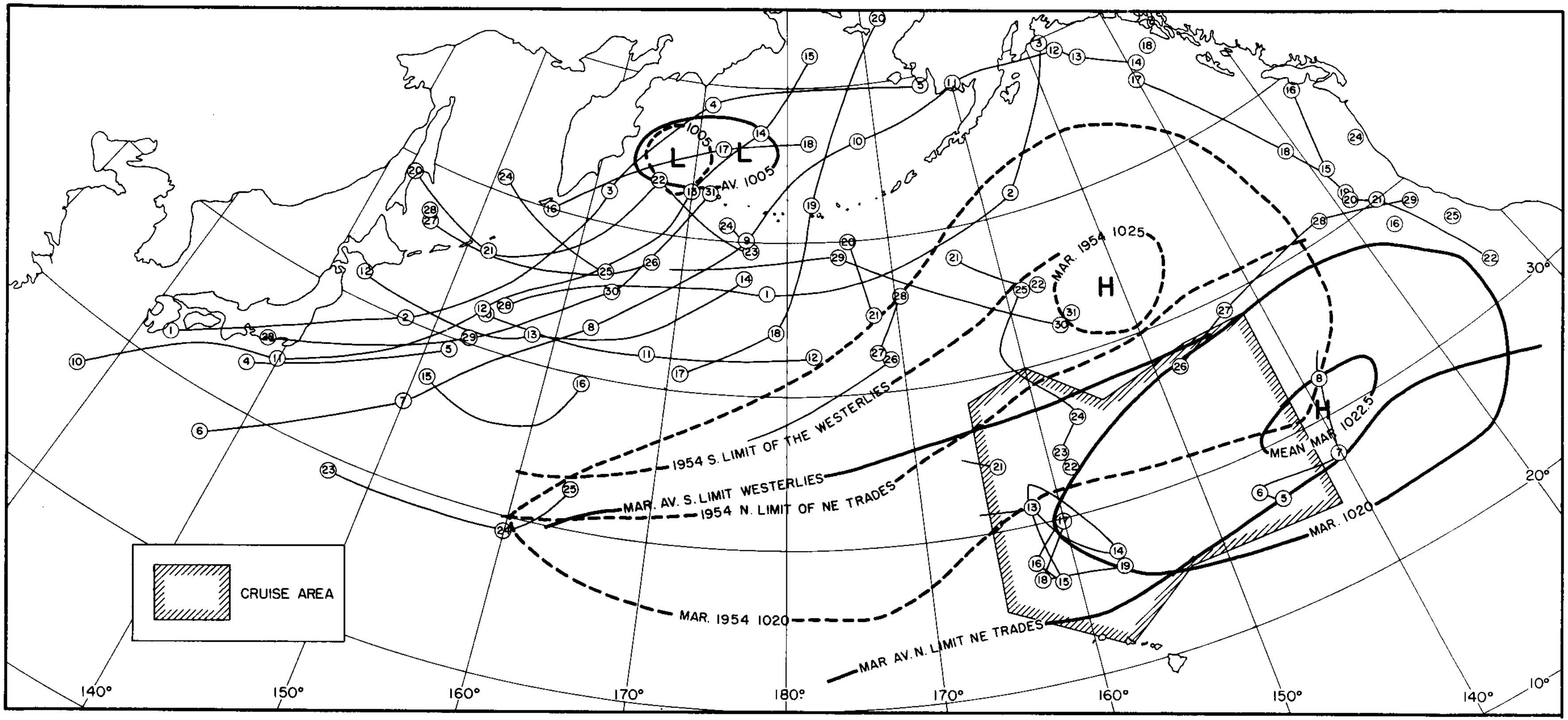

Figure 4. --Normal (heavy solid lines) and mean March 1954 (broken lines) positions of Aleutian Low and Eastern North Pacific High; normal and 1954 mean monthly limits of northeast trades and westerlies; tracks of centers of low pressure areas, showing daily position.

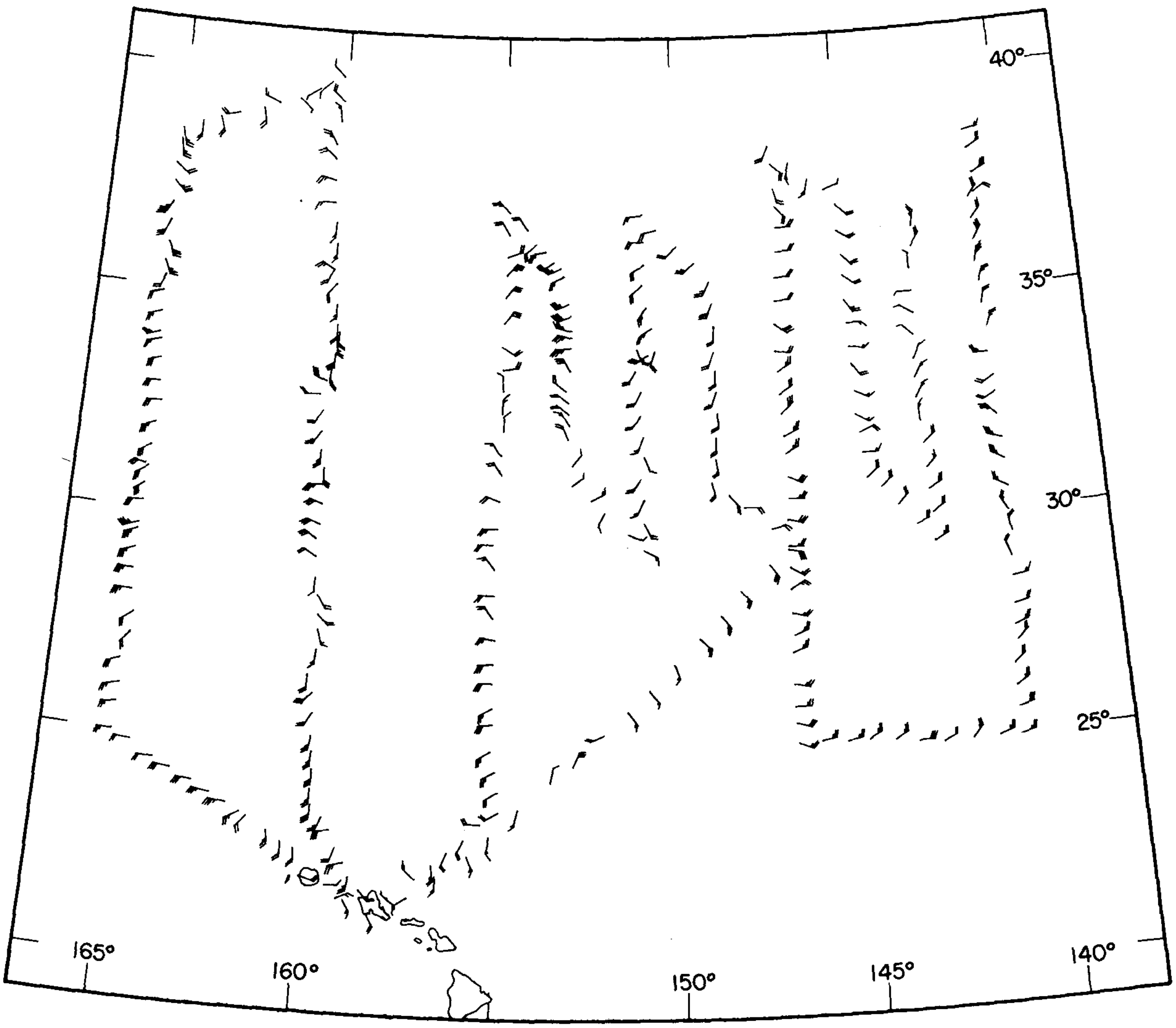

Figure 5.--Wind data taken at bathythermograph lowerings. Arrows point in direction of wind; given in Beaufort force, e.g., 1 long and 1 short barb indicates a Beaufort force 3 wind.

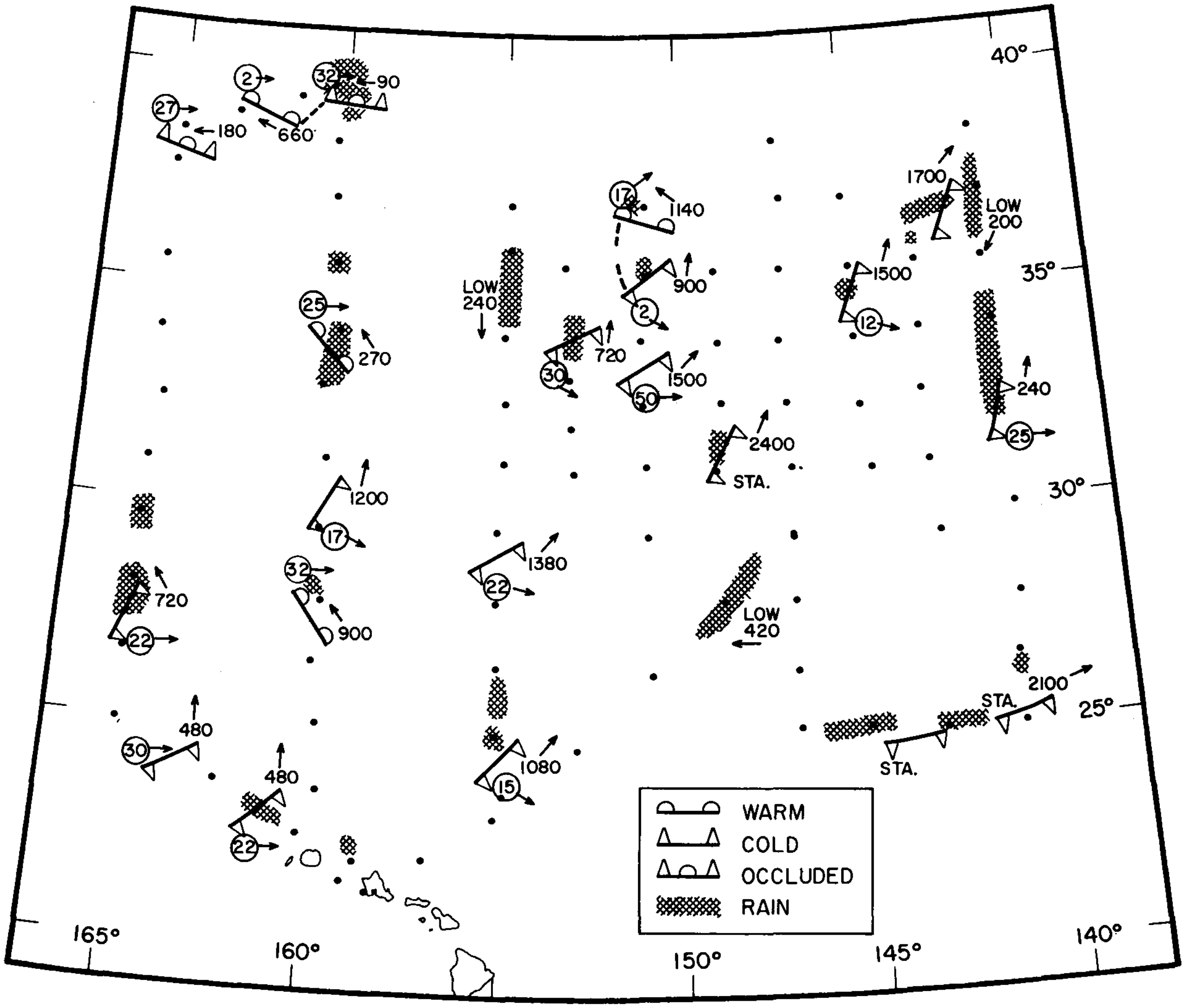

Figure 6.--Location, type, and motion of frontal systems passing over vessel and areas of observed precipitation. Larger values and adjacent arrows indicate the distance (mi.) and direction to the center of the low; the smaller encircled values and adjacent arrows indicate the direction and speed (knots) of the frontal movement. Points indicate station positions. Abbreviations: sta. - stationary, dis. - dispersing.

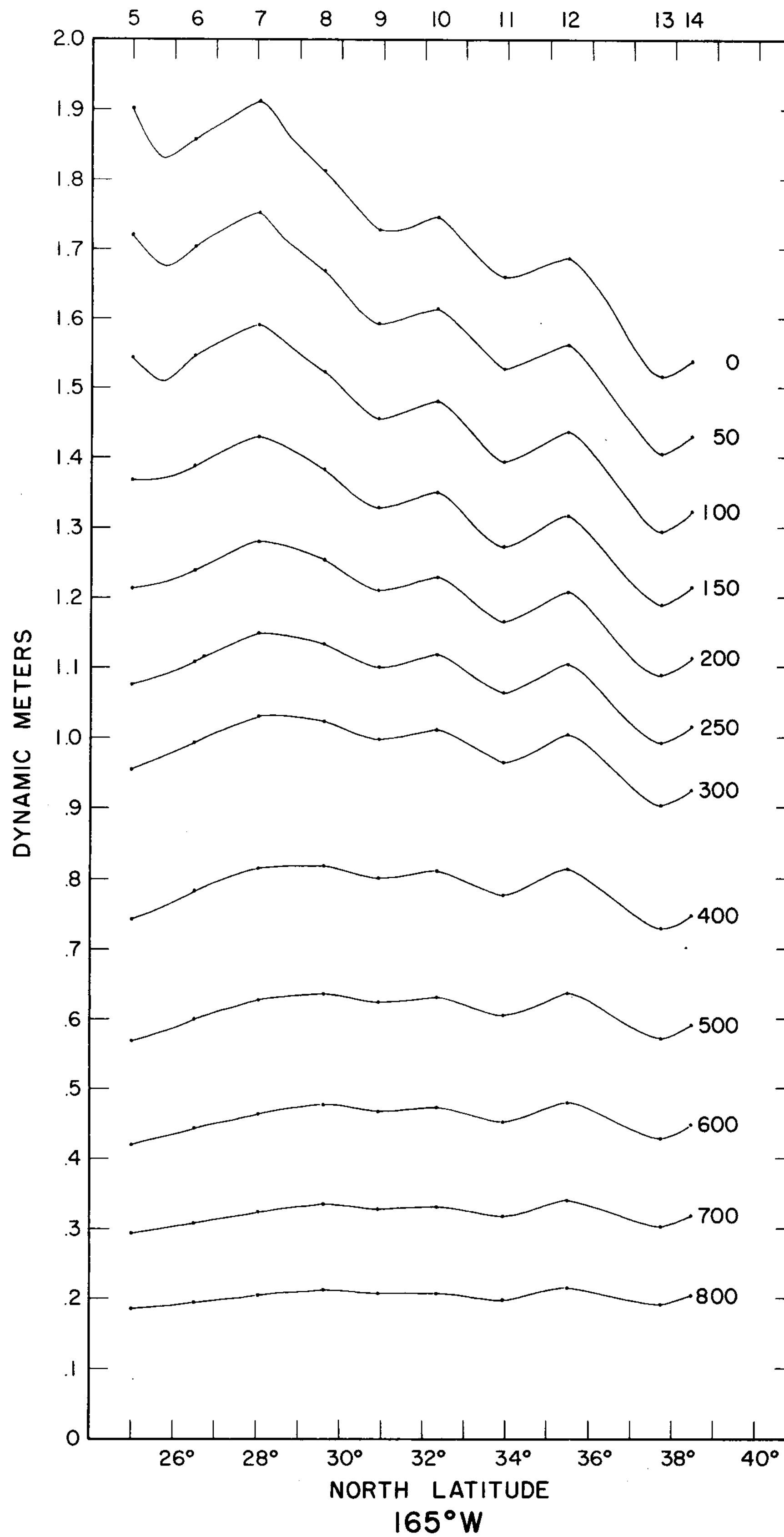

Figure 7.--Smoothed geopotential anomaly of isobaric surfaces relative to the 1,000-db. surface, 165°W. longitude, stations 5-14. Points represent computed values.

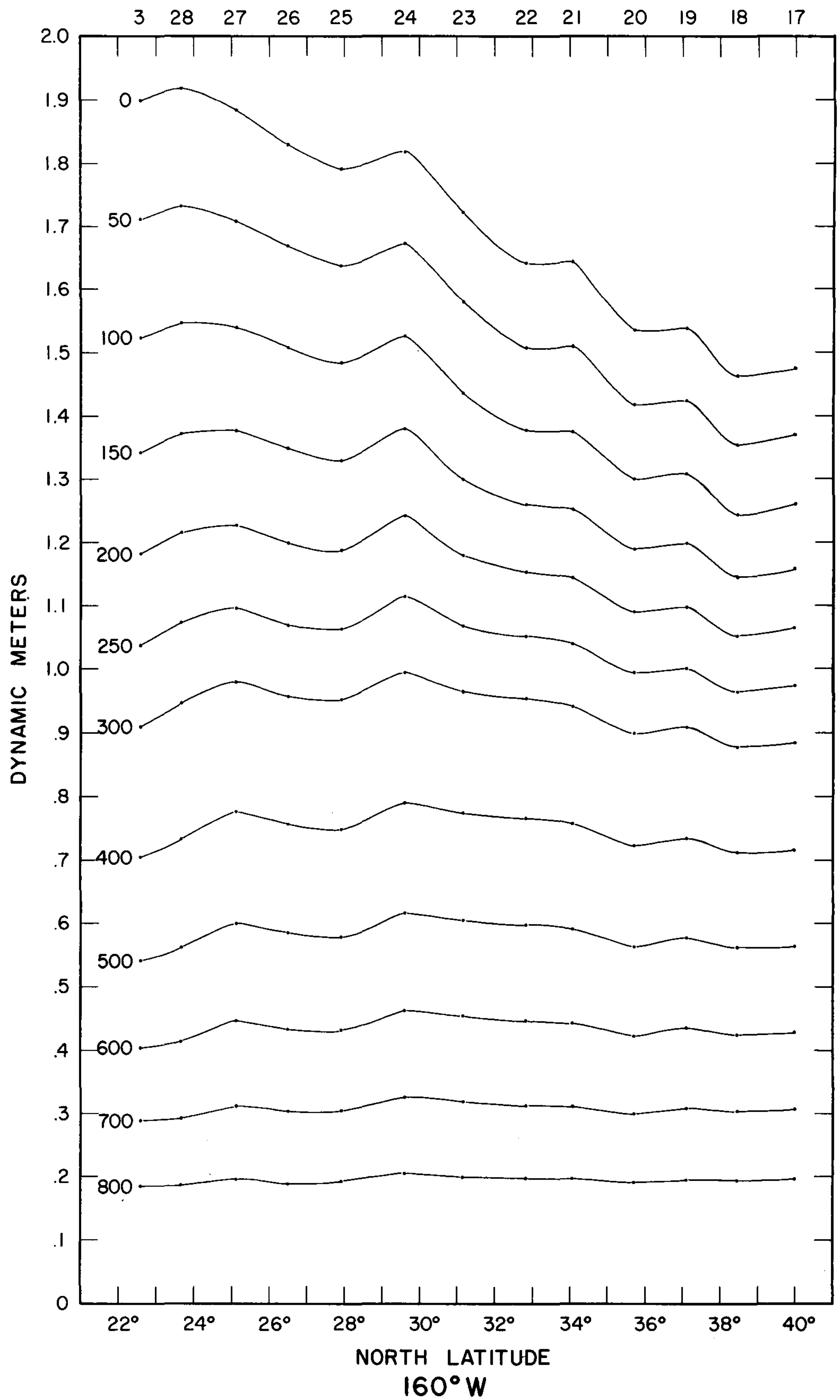

Figure 8. --Smoothed geopotential anomaly of isobaric surfaces relative to the 1,000-db. surface, 160°W. longitude, stations 17-28. Points represent computed values.

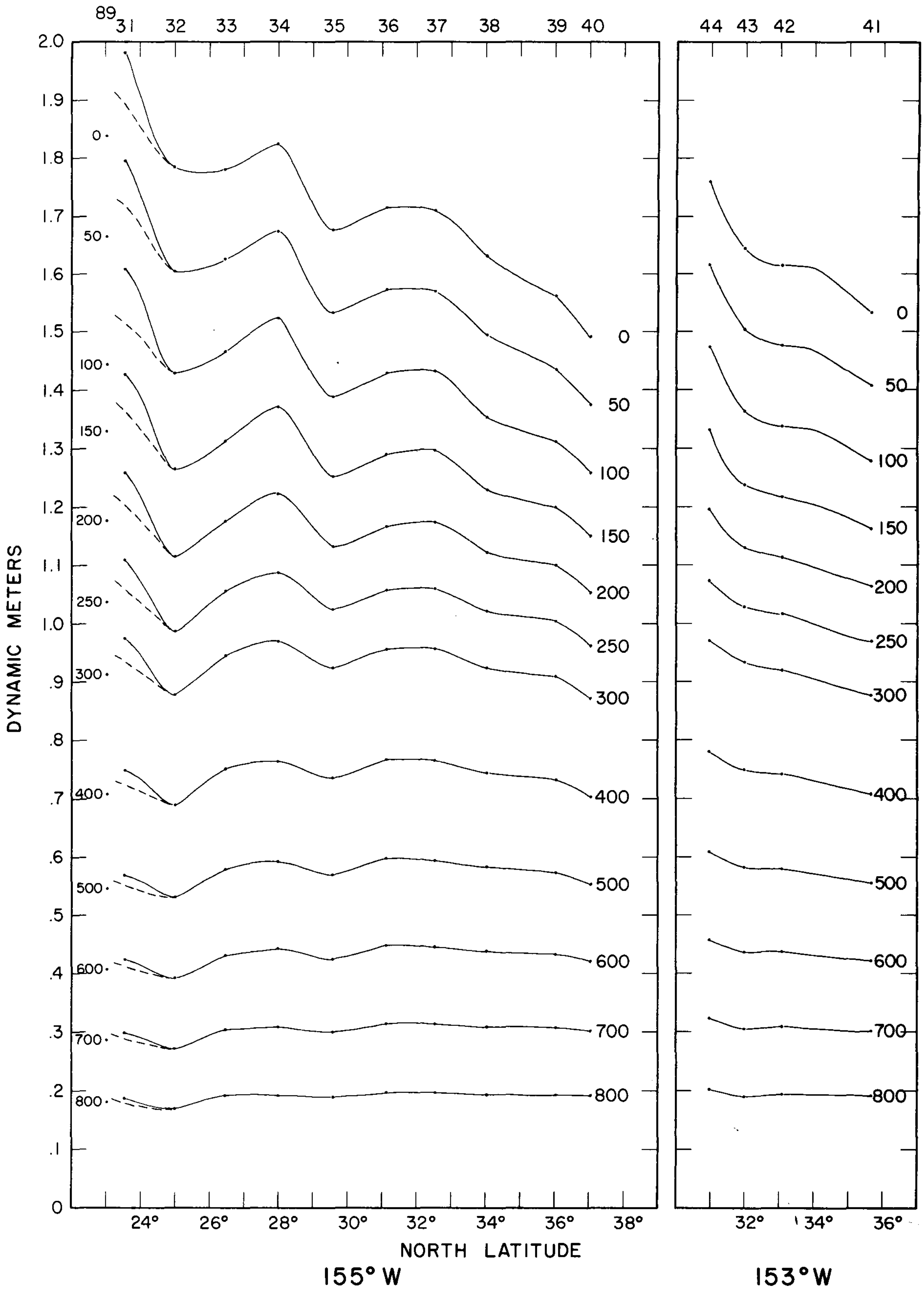

Figure 9.--Smoothed geopotential anomaly of isobaric surfaces relative to the 1,000-db. surface, along 155°W. longitude, stations 31-40. Points represent computed values.
Figure 10.--Same for 153°W. longitude, stations 41-44.

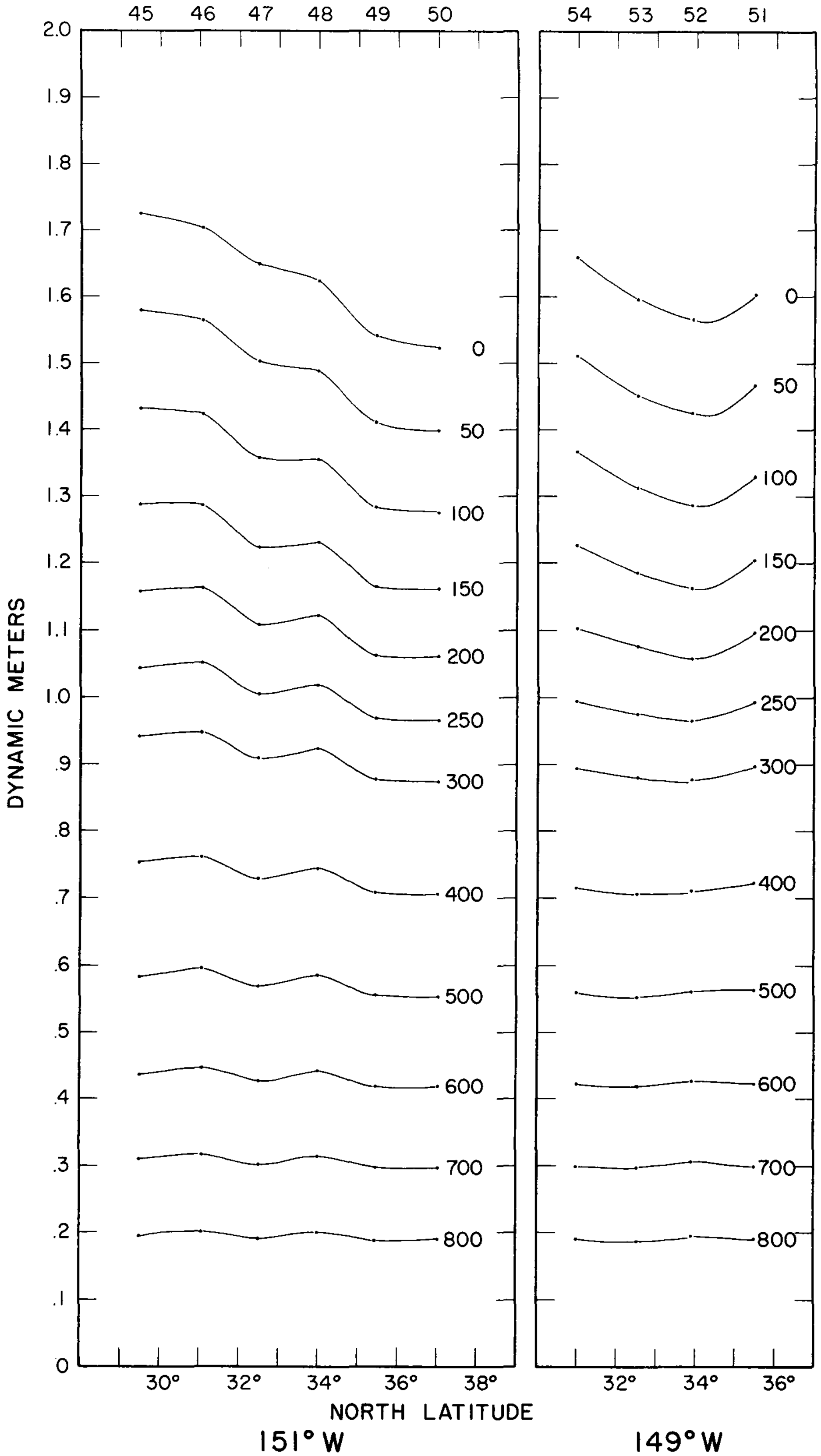

Figure 11.--Smoothed geopotential anomaly of isobaric surfaces relative to the 1,000-db. surface, along 151°W. longitude, stations 45-50. Points represent computed values.
Figure 12.--Same for 149°W. longitude, stations 51-54.

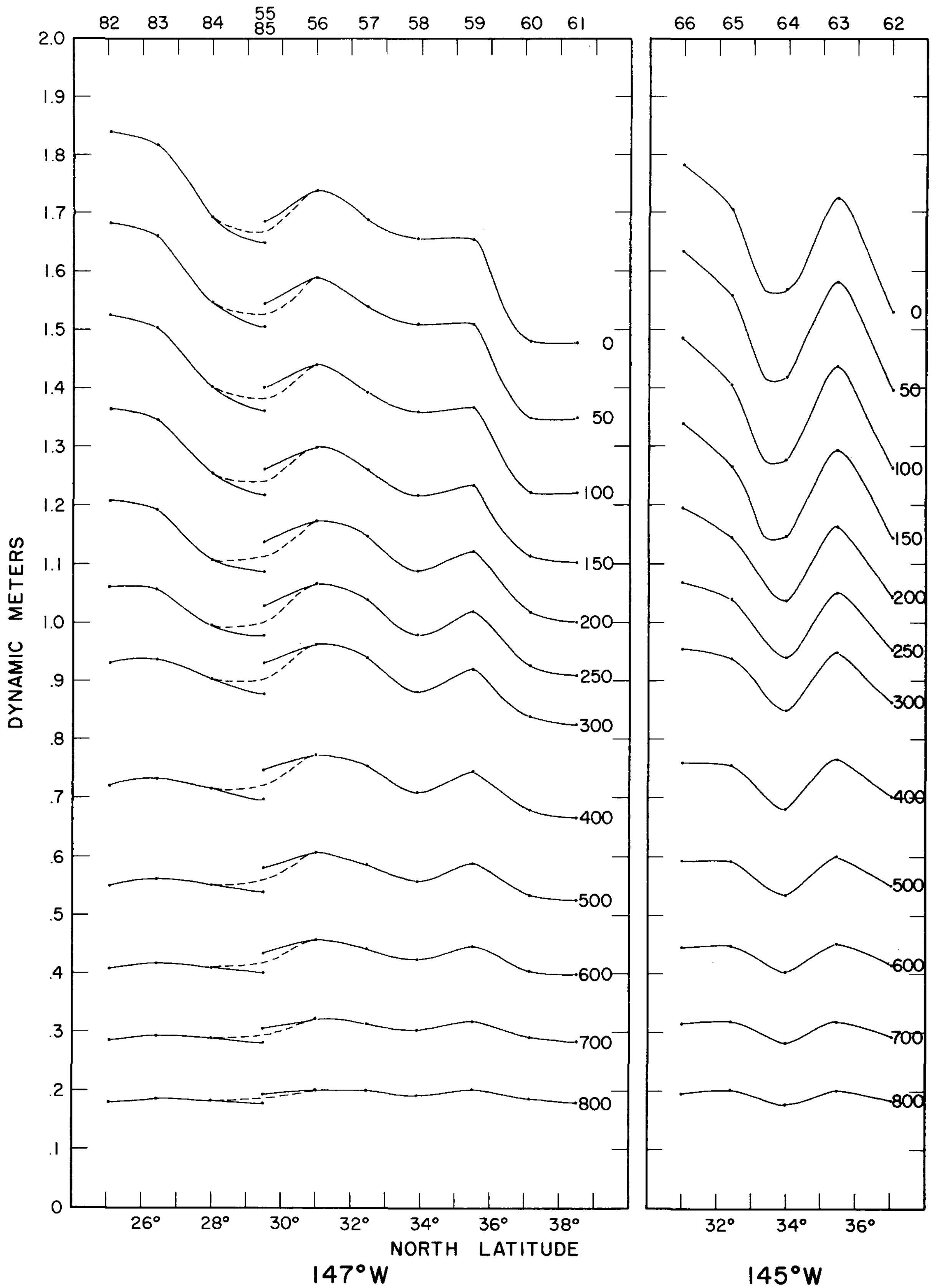

Figure 13.--Smoothed geopotential anomaly of isobaric surfaces relative to the 1,000-db. surface along 147°W. longitude, stations 55-61 and 82-85. Points represent computed values.
Figure 14.--Same for 145°W. longitude, stations 62-66.

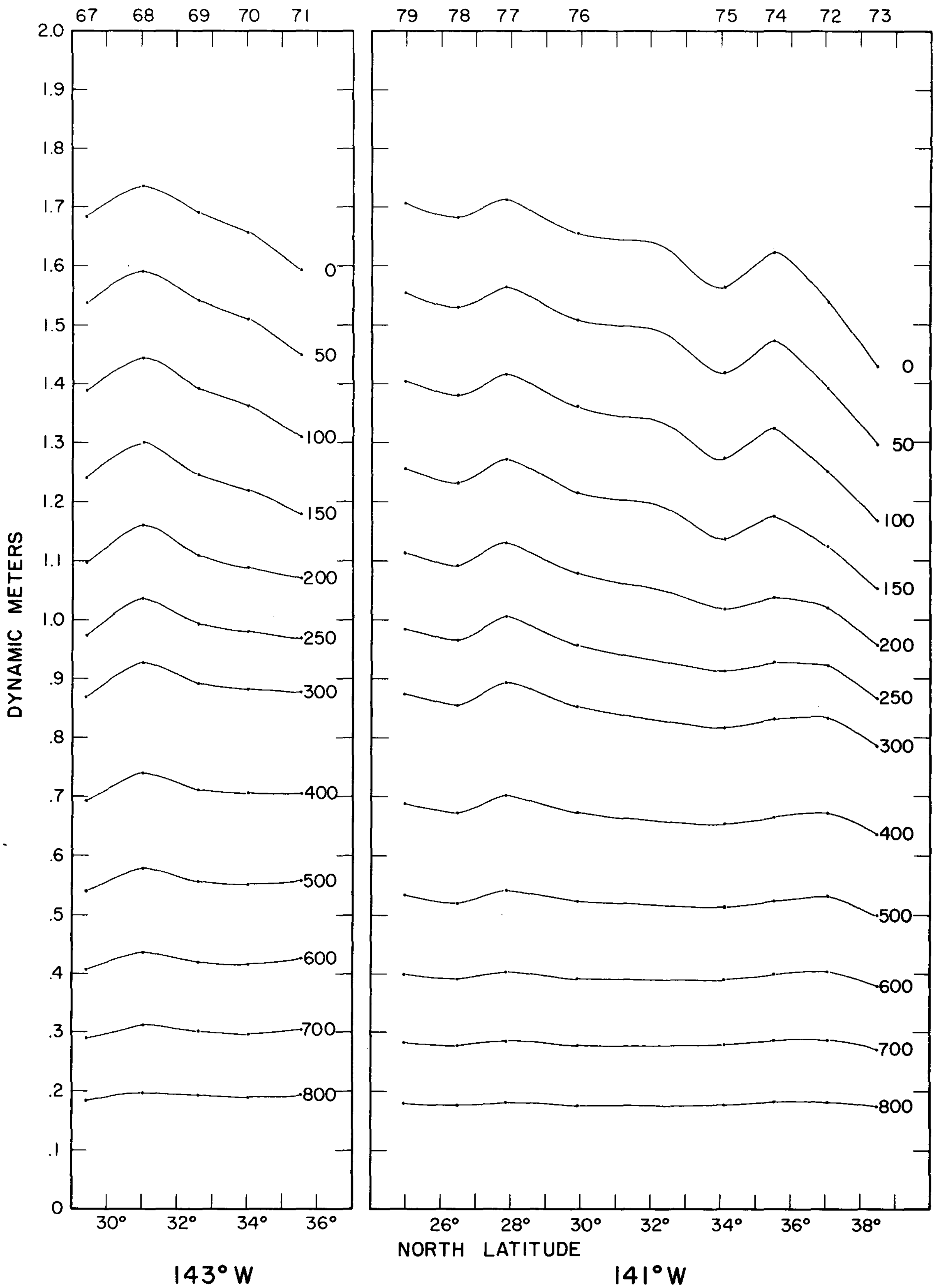

Figure 15.--Smoothed geopotential anomaly of isobaric surfaces relative to the 1,000-db. surface along 143°W. longitude, stations 67-71. Points represent computed values.
Figure 16.--Same for 141°W. longitude, stations 72-79.

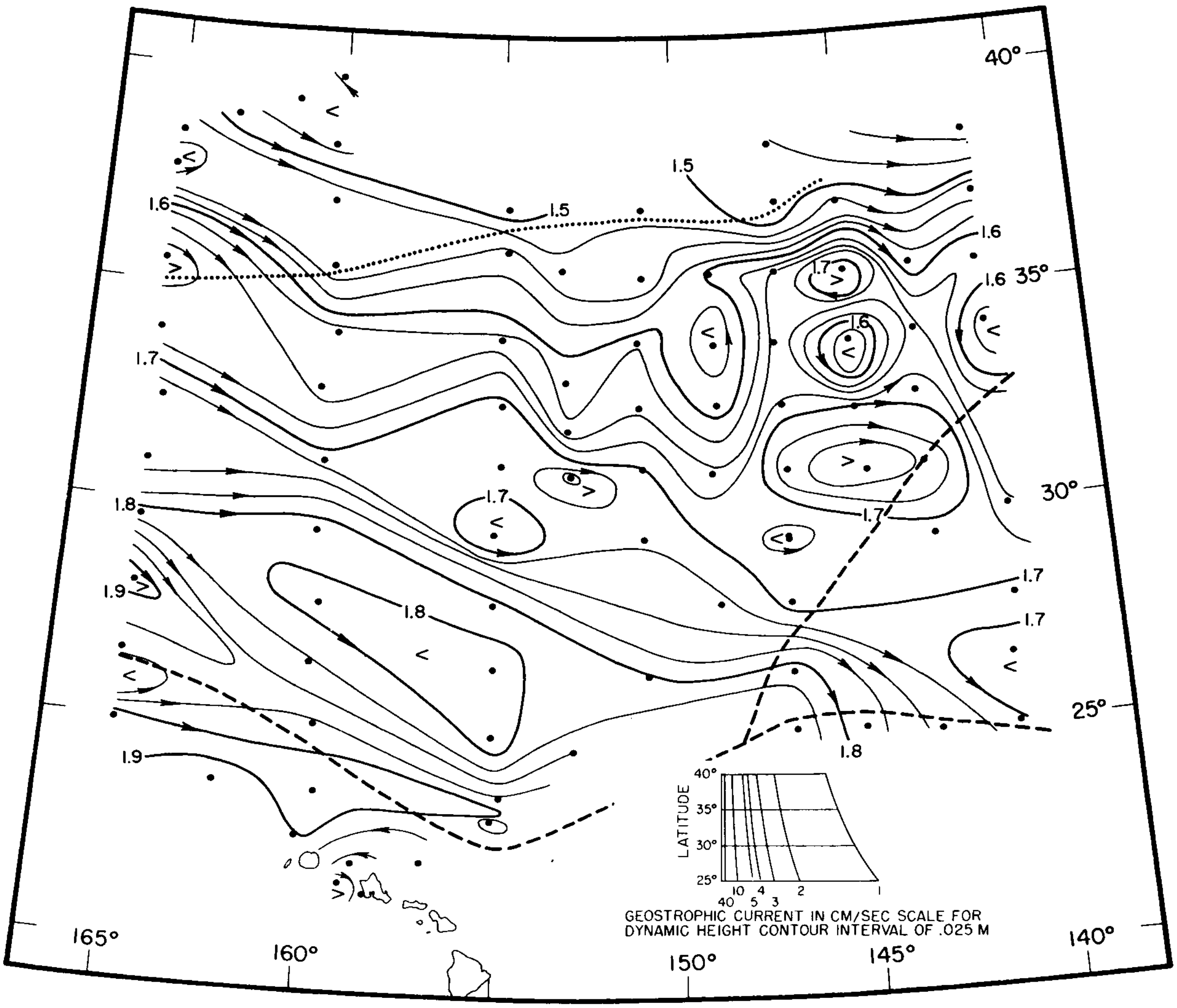

Figure 17. --Anomaly of geopotential topography of the sea surface relative to the 1,000-db. surface. Positions of Subtropical Convergence (dashed) and indicated divergence (dotted) given according to Schott. Points indicate computed values.

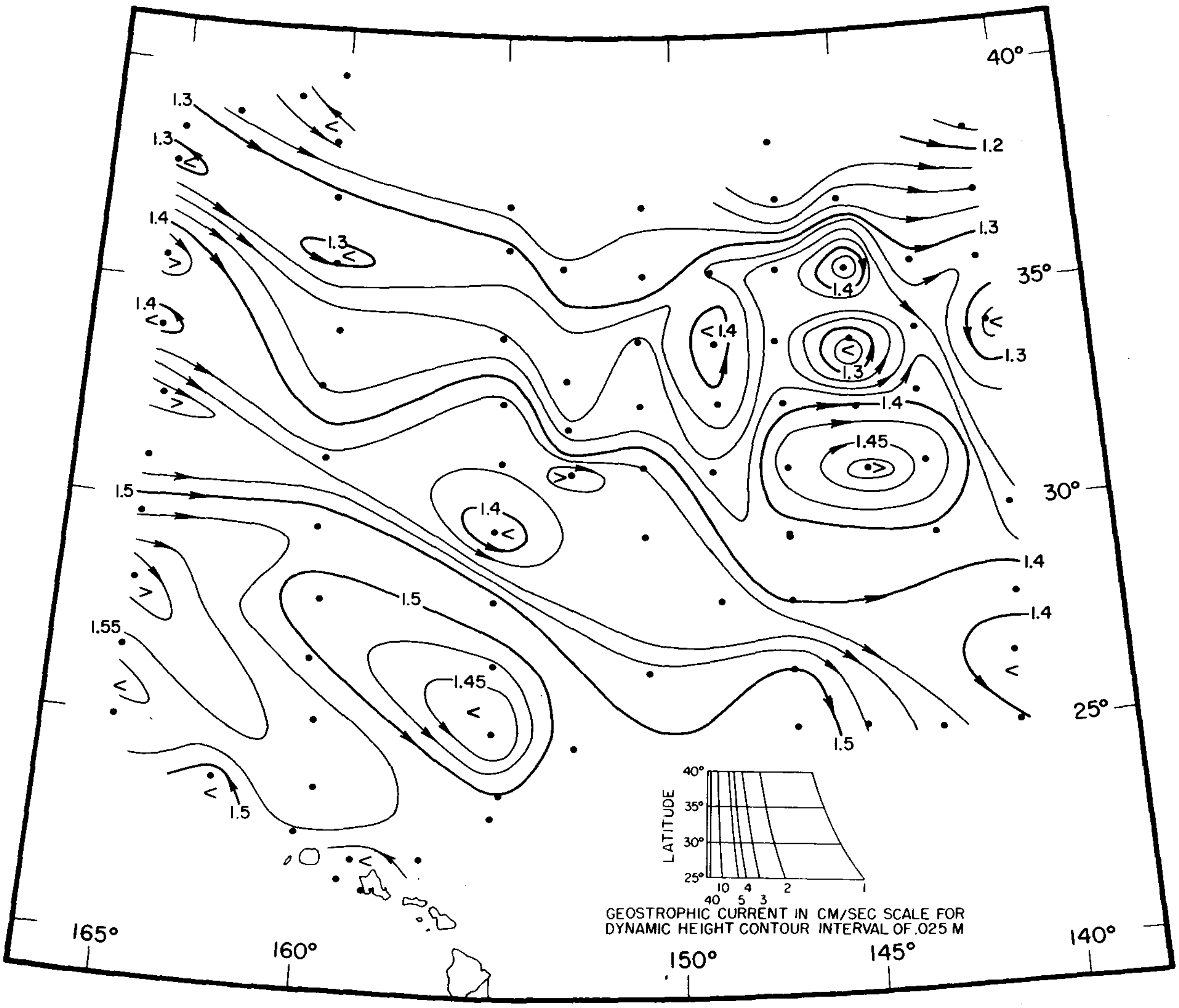

Figure 18.--Anomaly of geopotential topography of the 100-db. surface relative to the 1,000-db. surface. Points indicate computed values.

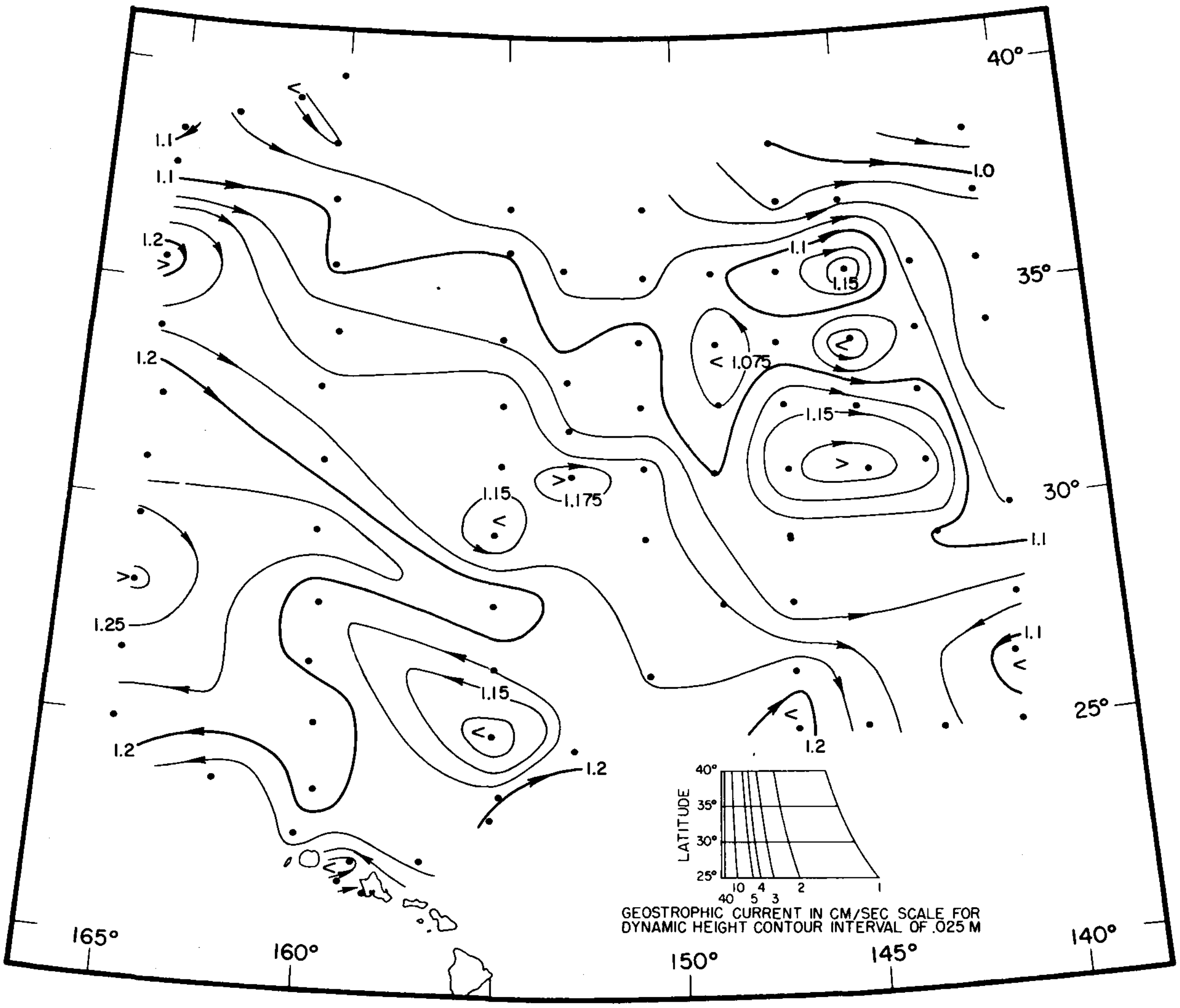

Figure 19.--Anomaly of geopotential topography of the 200-db. surface relative to the 1,000-db. surface. Points indicate computed values.

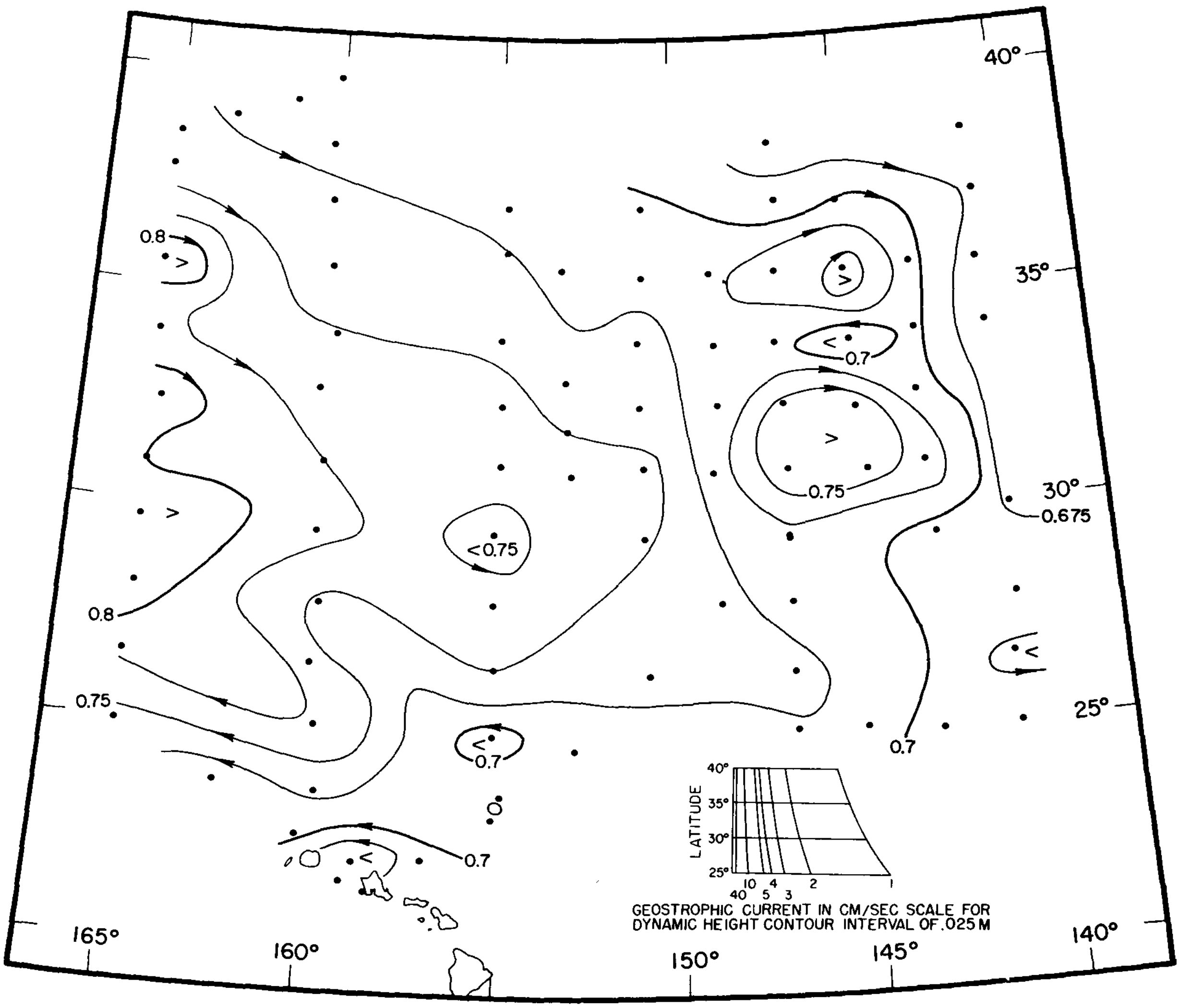

Figure 20.--Anomaly of geopotential topography of the 400-db. surface relative to the 1,000-db. surface. Points indicate computed values.

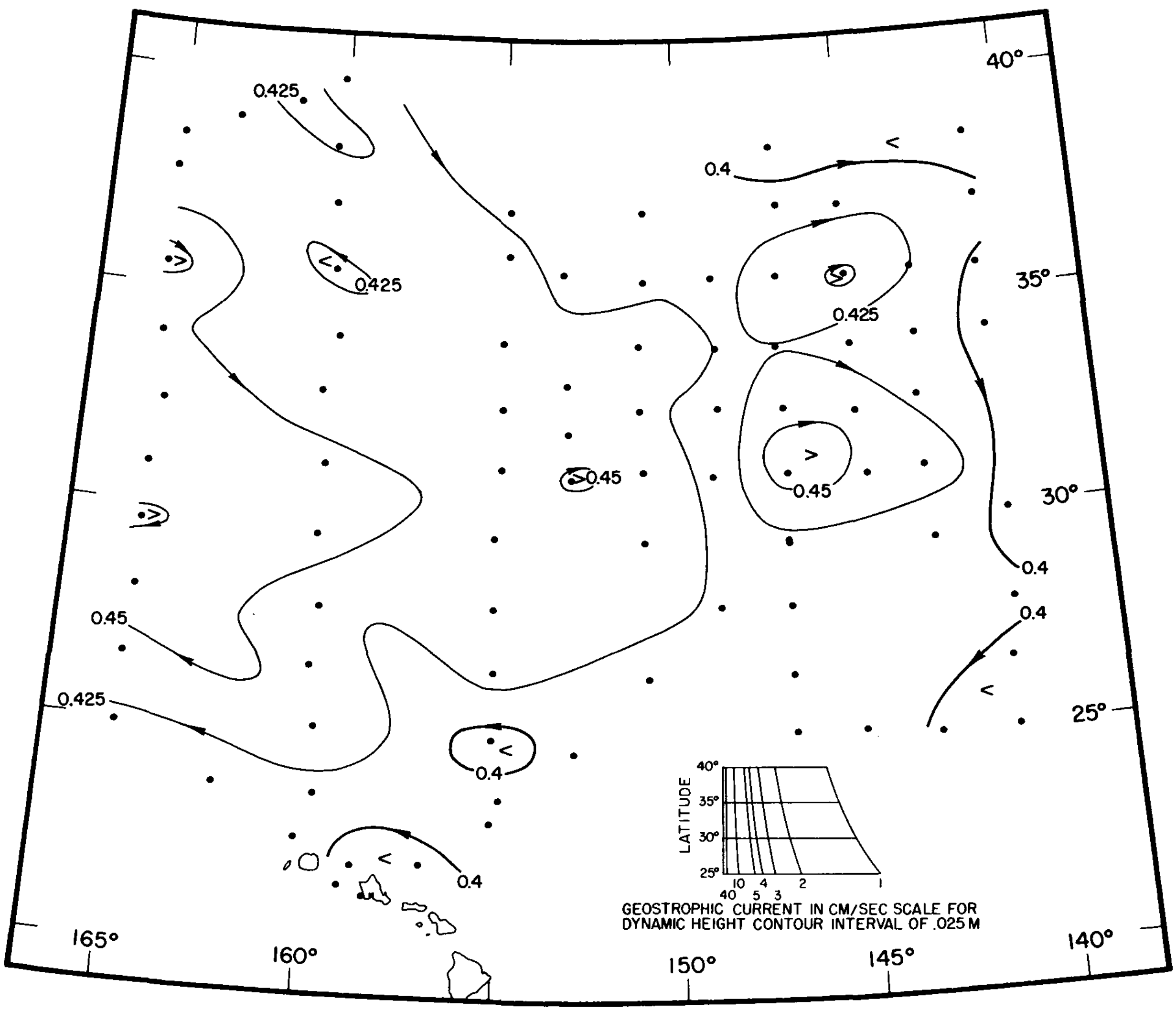

Figure 21.--Anomaly of geopotential topography of the 600-db. surface relative to the 1,000-db. surface. Points indicate computed values.

positions.

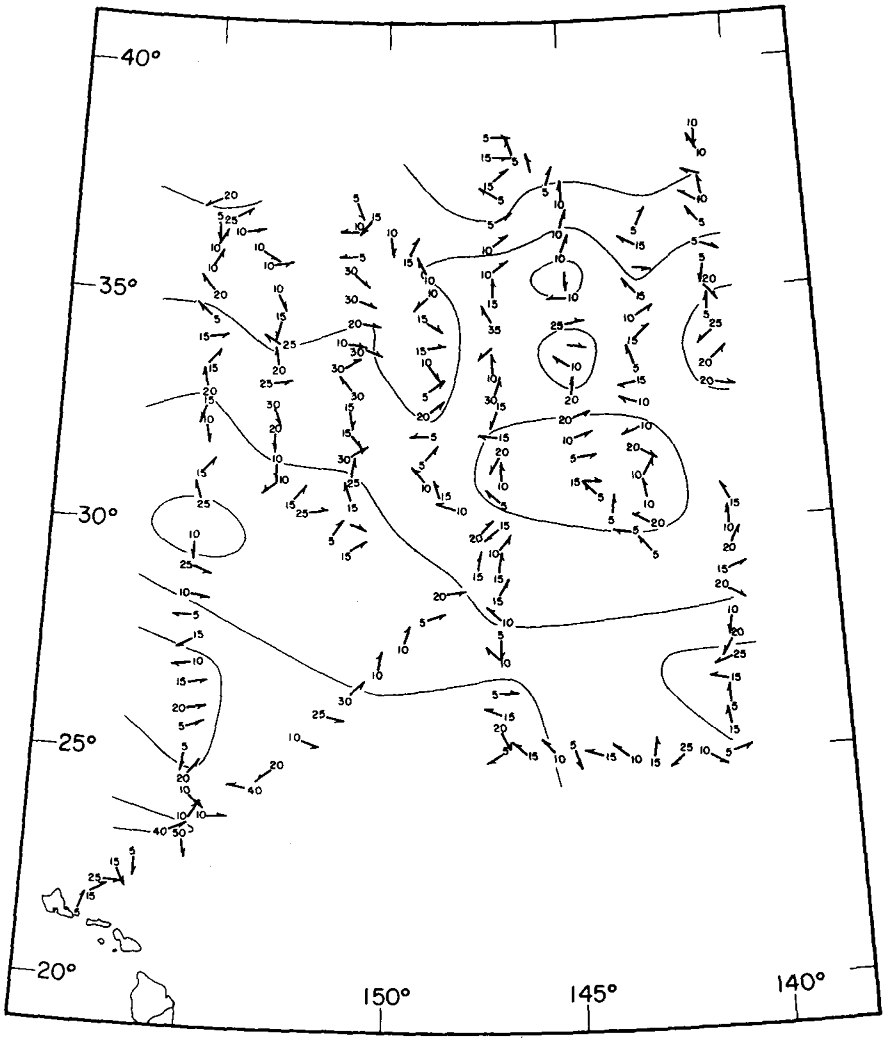

Figure 22.--Currents by Geomagnetic Electrokinetograph. Arrows show the direction of the current; speed is given to the nearest 5 cm./sec. Instantaneous observed values. Contours show surface dynamic topography (see fig. 17).

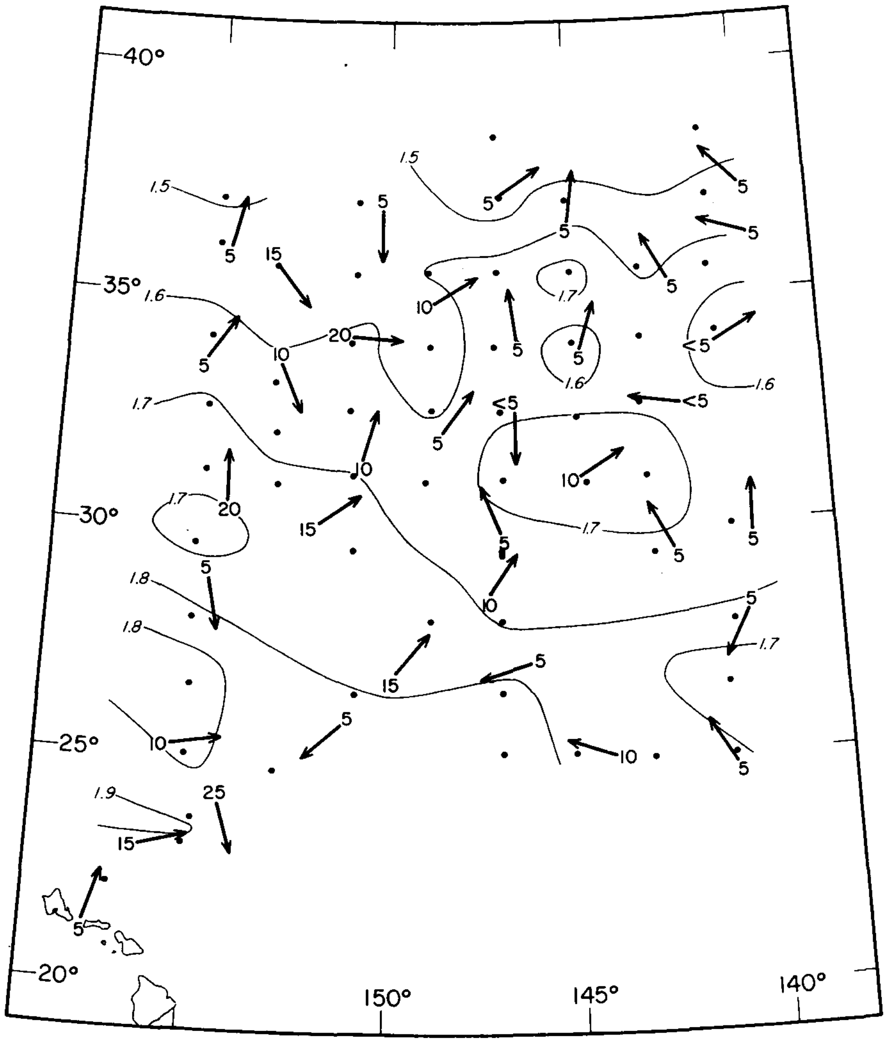

Figure 23.--Currents by Geomagnetic Electrokinetograph. Arrows show the direction of the current; speed is given to the nearest 5 cm./sec. Values averaged by calendar day. Contours show surface dynamic topography (see fig. 17). Points indicate station positions.

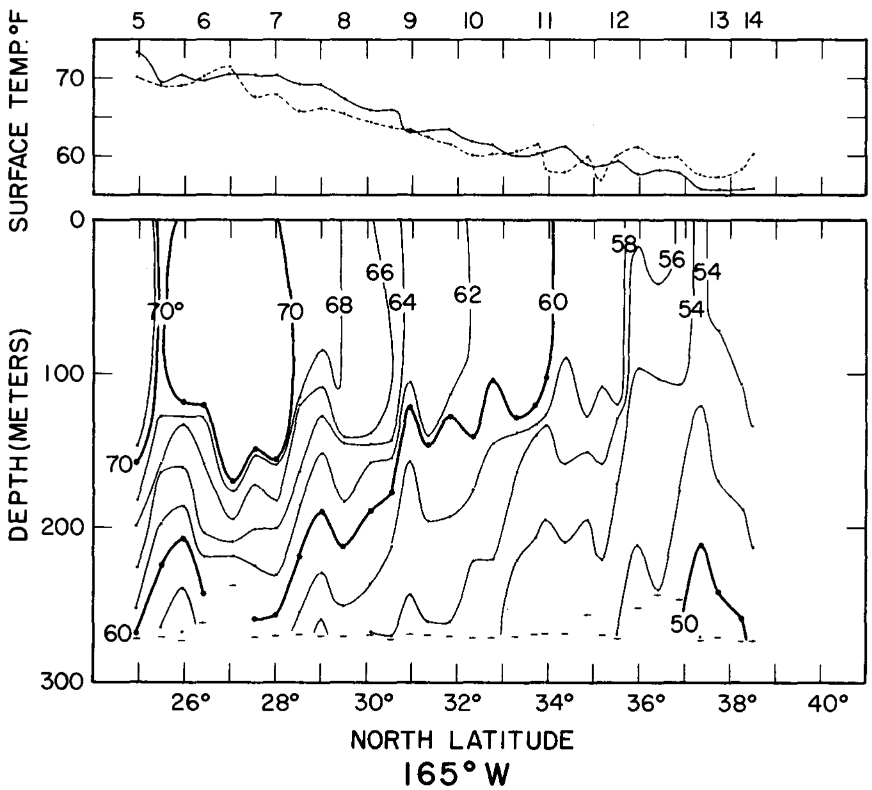

Figure 24.--Temperature sections from BT casts along 165°W. longitude, stations 5-14. Upper panel air (dotted) and surface (solid) temperatures. Lower panel temperature from BT slides. Dashes indicate depth of casts.

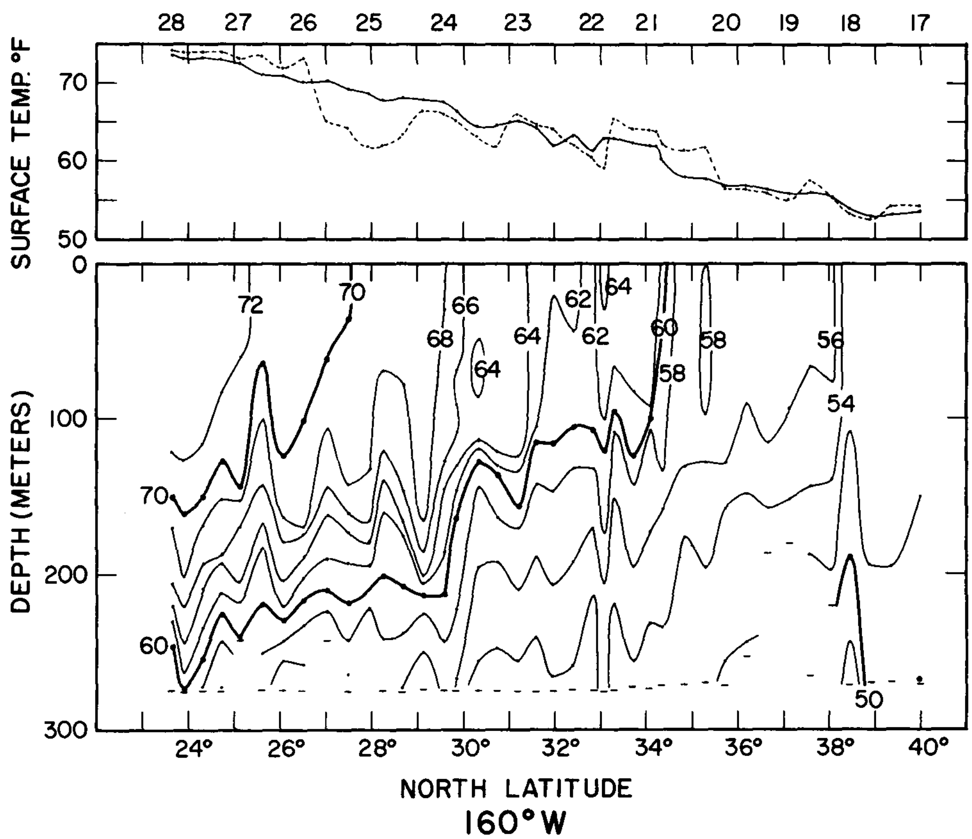

Figure 25.--Temperature sections from BT casts along 160°W. longitude, stations 17-28. Upper panel air (dotted) and surface (solid) temperatures. Lower panel temperature from BT slides. Dashes indicate depth of casts.

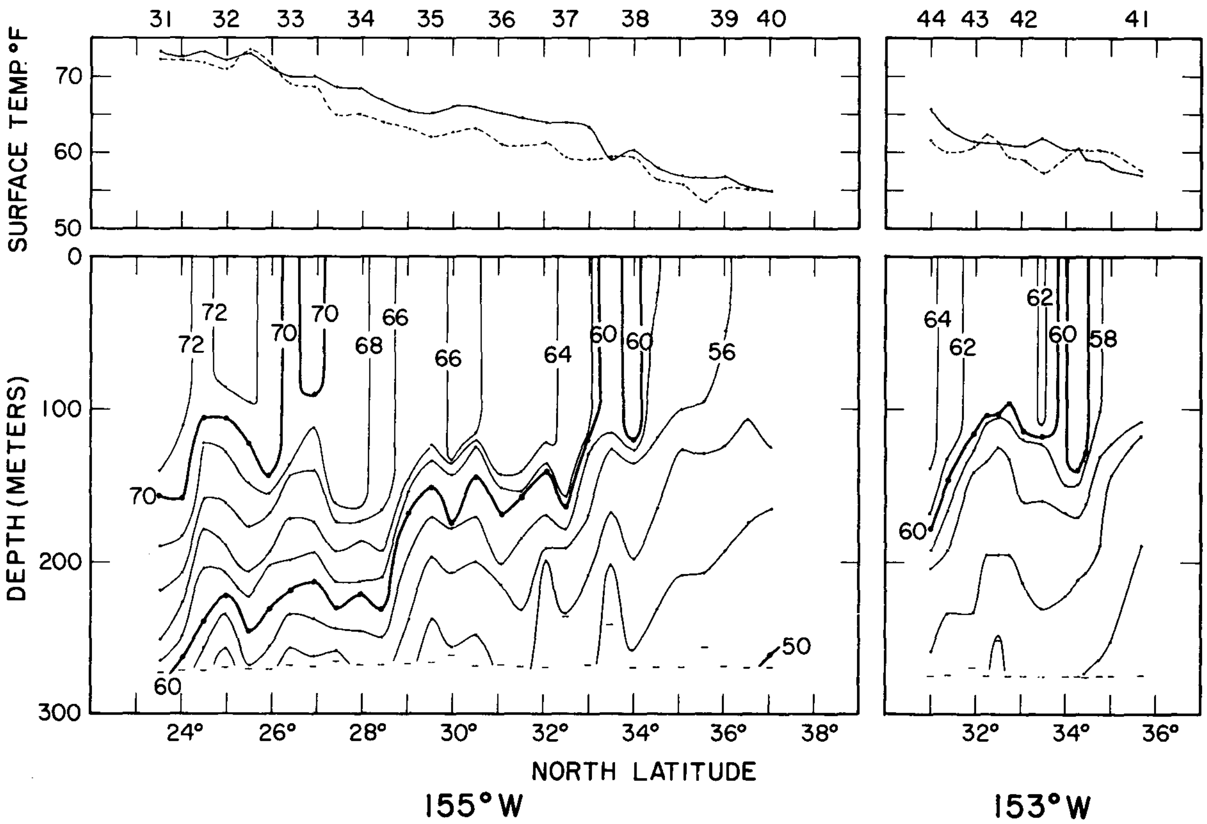

Figure 26.--Temperature sections from BT casts along 155°W. longitude, stations 31-40. Upper panel air (dotted) and surface (solid) temperatures. Lower panel temperatures from BT slides. Dashes indicate depth of casts.

Figure 27.--Same for 153°W. longitude, stations 41-44.

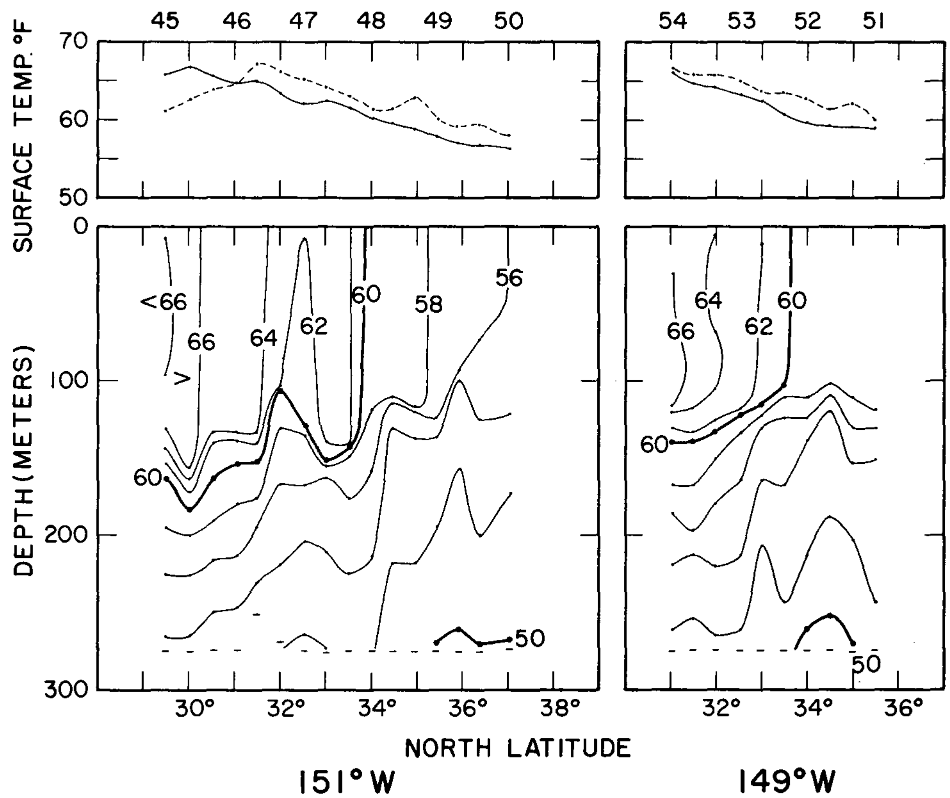

Figure 28.--Temperature sections from BT casts along 151°W. longitude, stations 45-50. Upper panel air (dotted) and surface (solid) temperatures. Lower panel temperatures from BT slides. Dashes indicate depth of casts.

Figure 29.--Same for 149°W. longitude, stations 51-54.

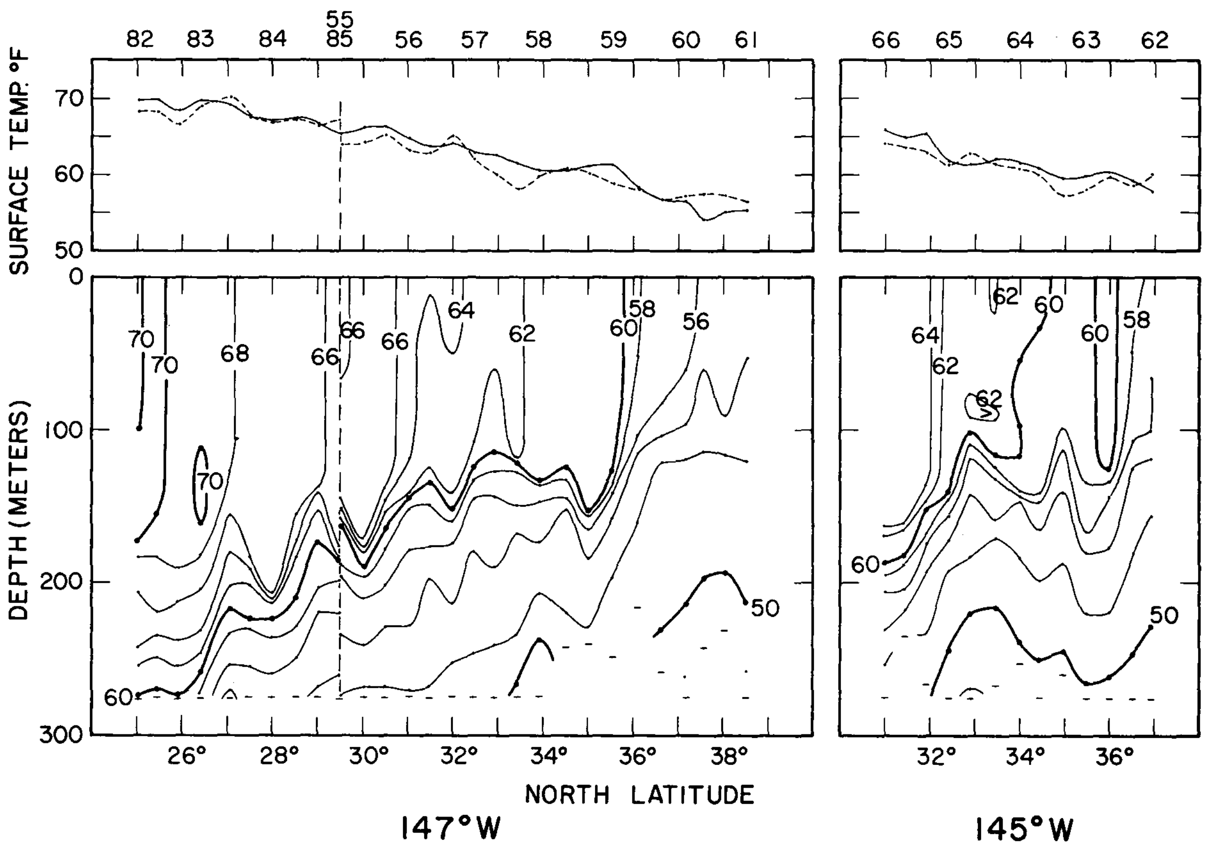

Figure 30.--Temperature sections from BT casts along 147°W. longitude, stations 55-61 and 82-85. Upper panel air (dotted) and surface (solid) temperatures. Lower panel temperature from BT slides. Dashes indicate depth of casts.

Figure 31.--Same for 145°W. longitude, stations 62-66.

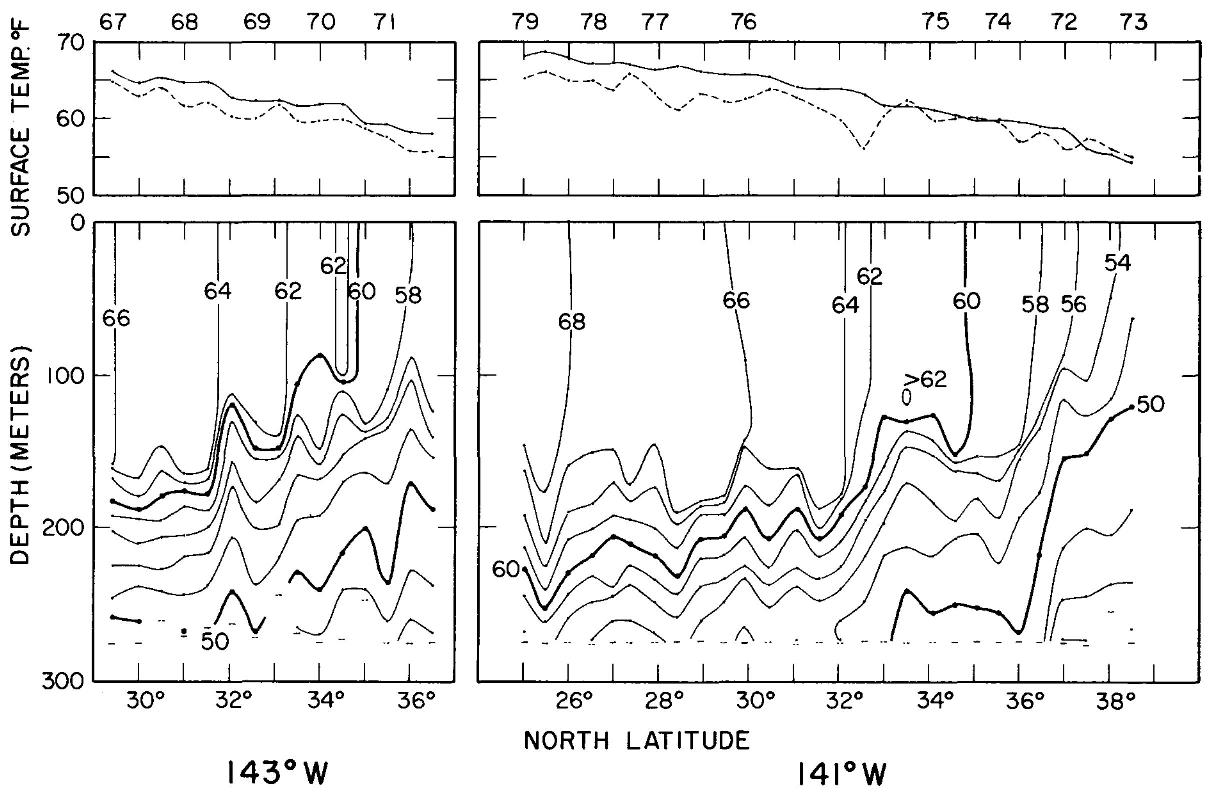

Figure 32.--Temperature sections from BT casts along 143°W. longitude, stations 67-71. Upper panel air (dotted) and surface (solid) temperatures. Lower panel temperature from BT slides. Dashes indicate depth of casts.

Figure 33.--Same for 141°W. longitude, stations 72-79.

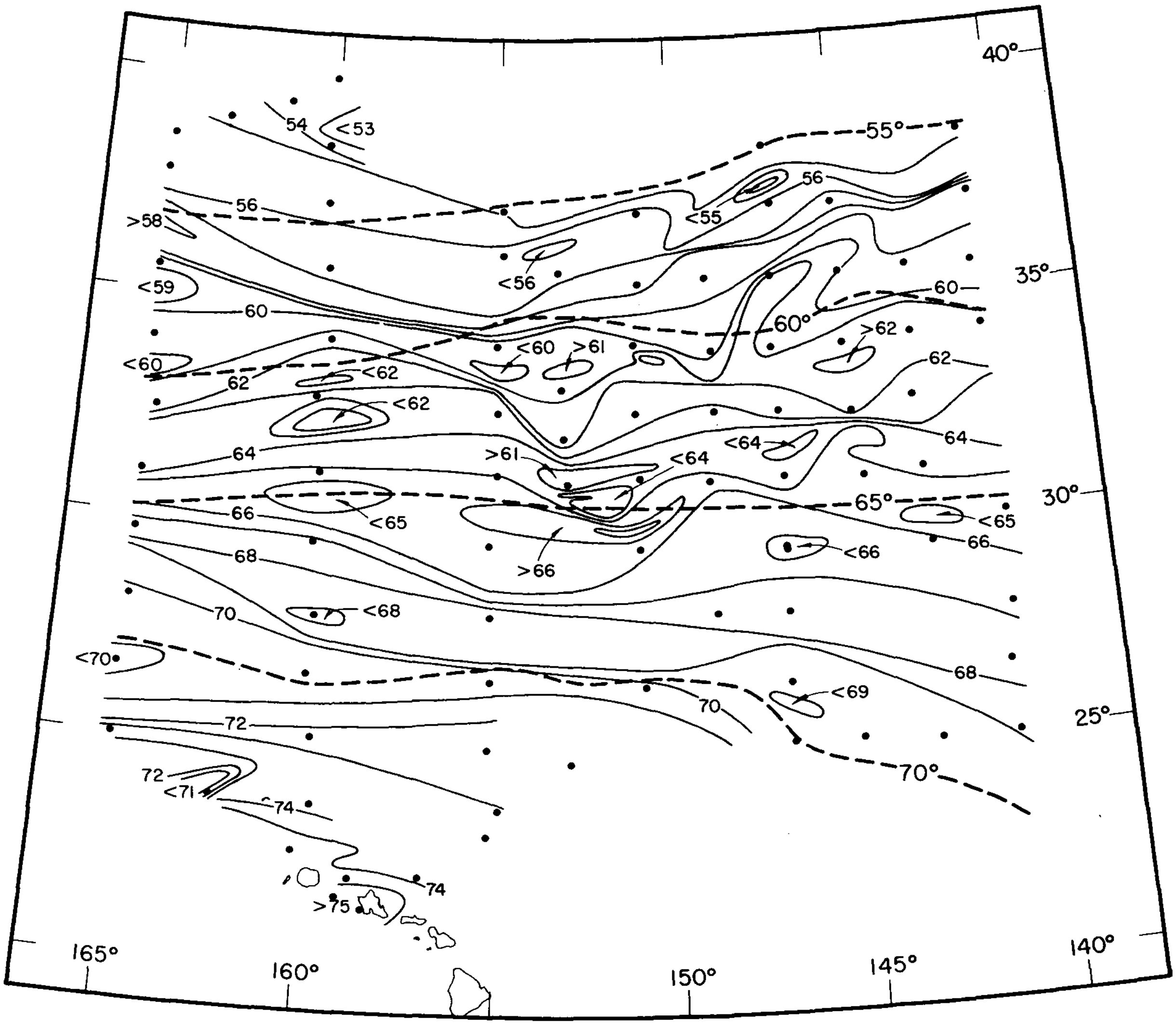

Figure 34.--Surface (bucket) temperatures in °F. (solid) and mean positions of selected isotherms (dotted). Points indicate station positions.

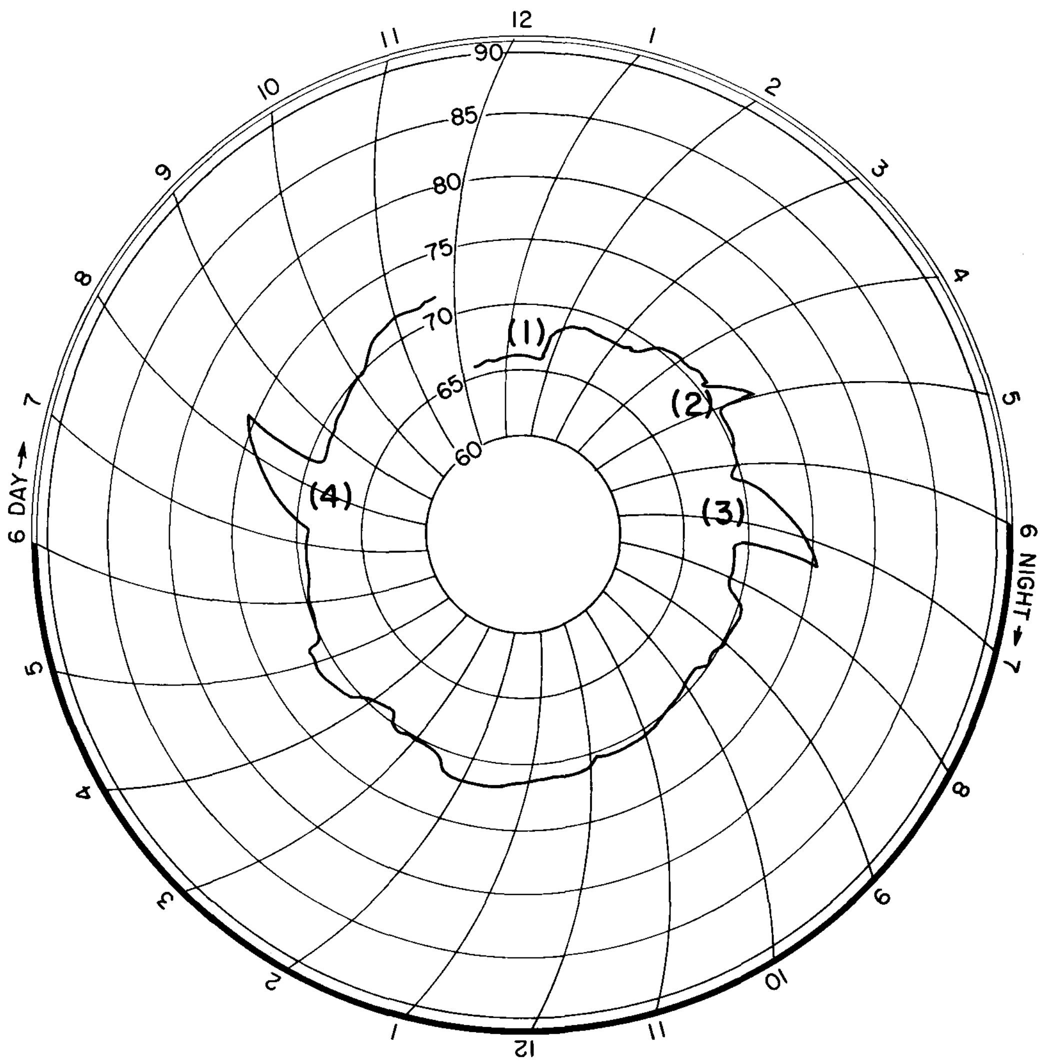

Figure 35.--Sample trace from surface recording thermograph. (1) Period of rapid temperature change; (2), (3), and (4) periods when vessel was stopped. Note: instrument was adjusted to read approximately 8° high, in order to keep the trace on scale.

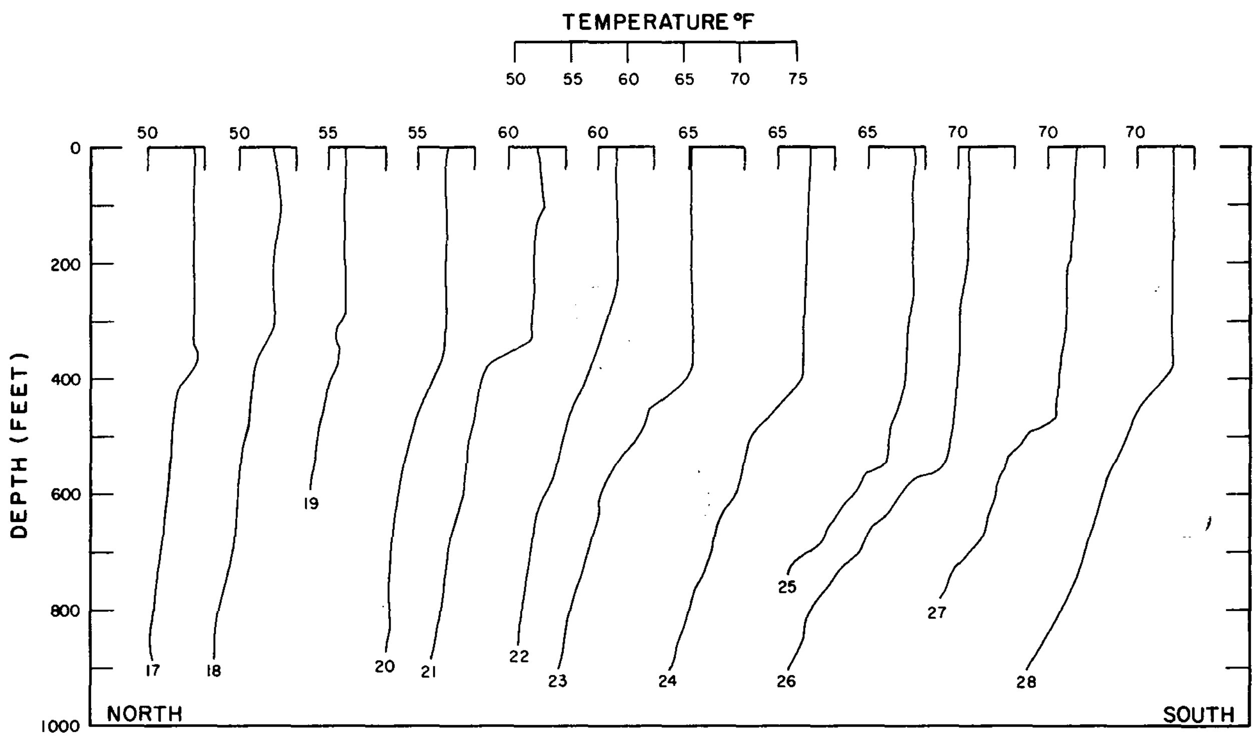

Figure 36.--Selected bathythermograph traces, 160°W. longitude.

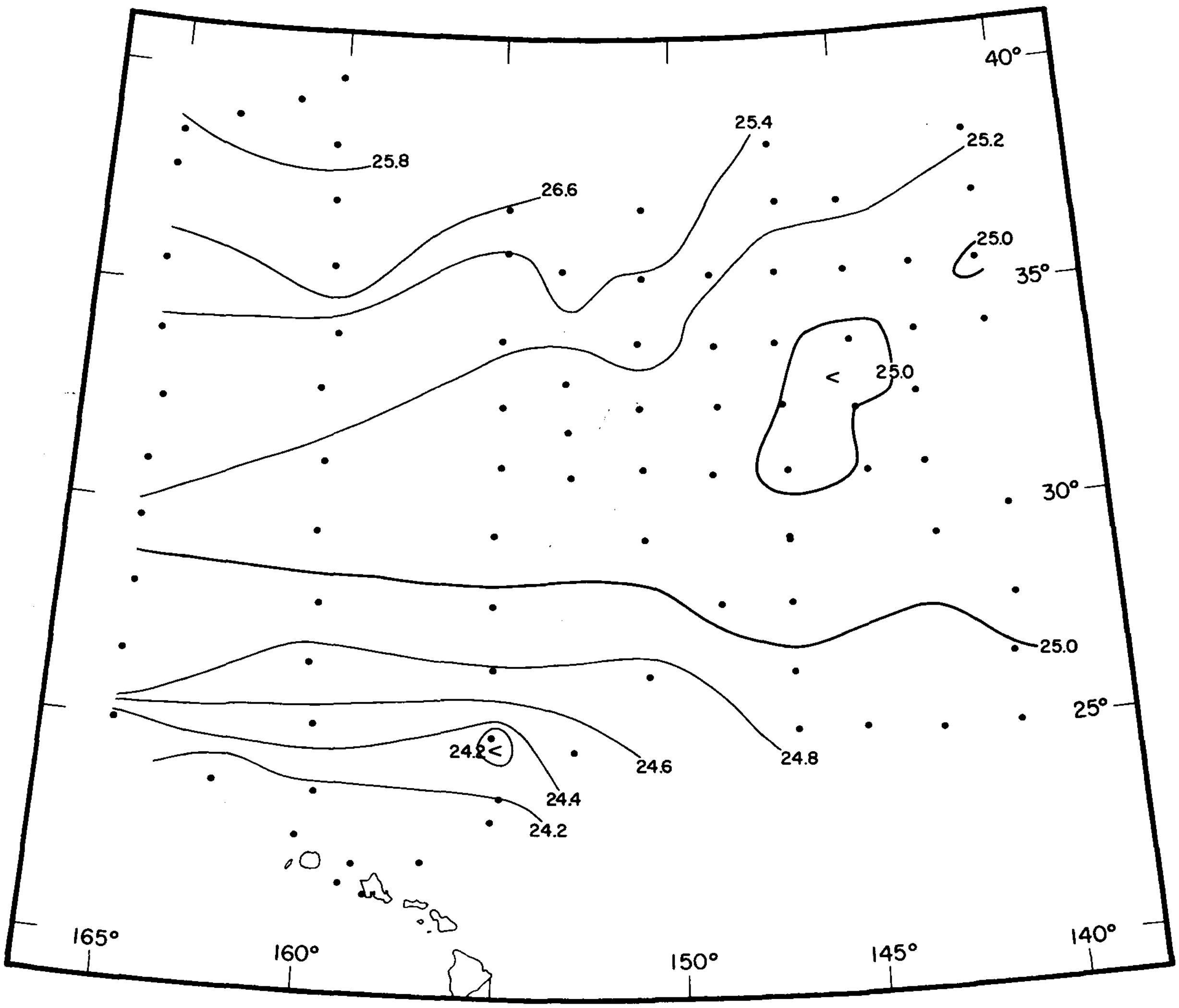

Figure 37.--Surface sigma-t. Points indicate station positions.

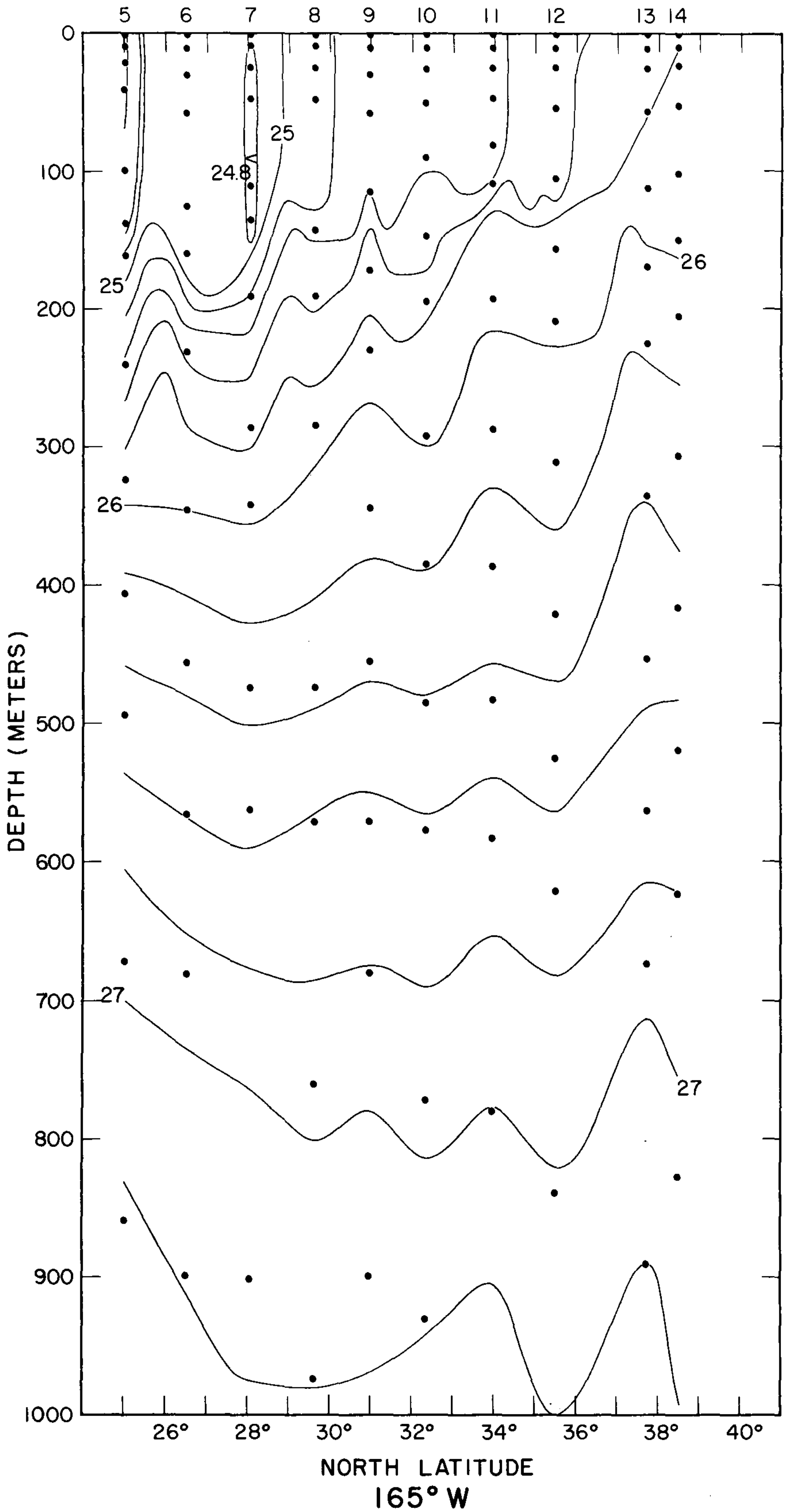

Figure 38.--Vertical section of sigma-t along 165°W. longitude, stations 5-14. Points indicate observed values.

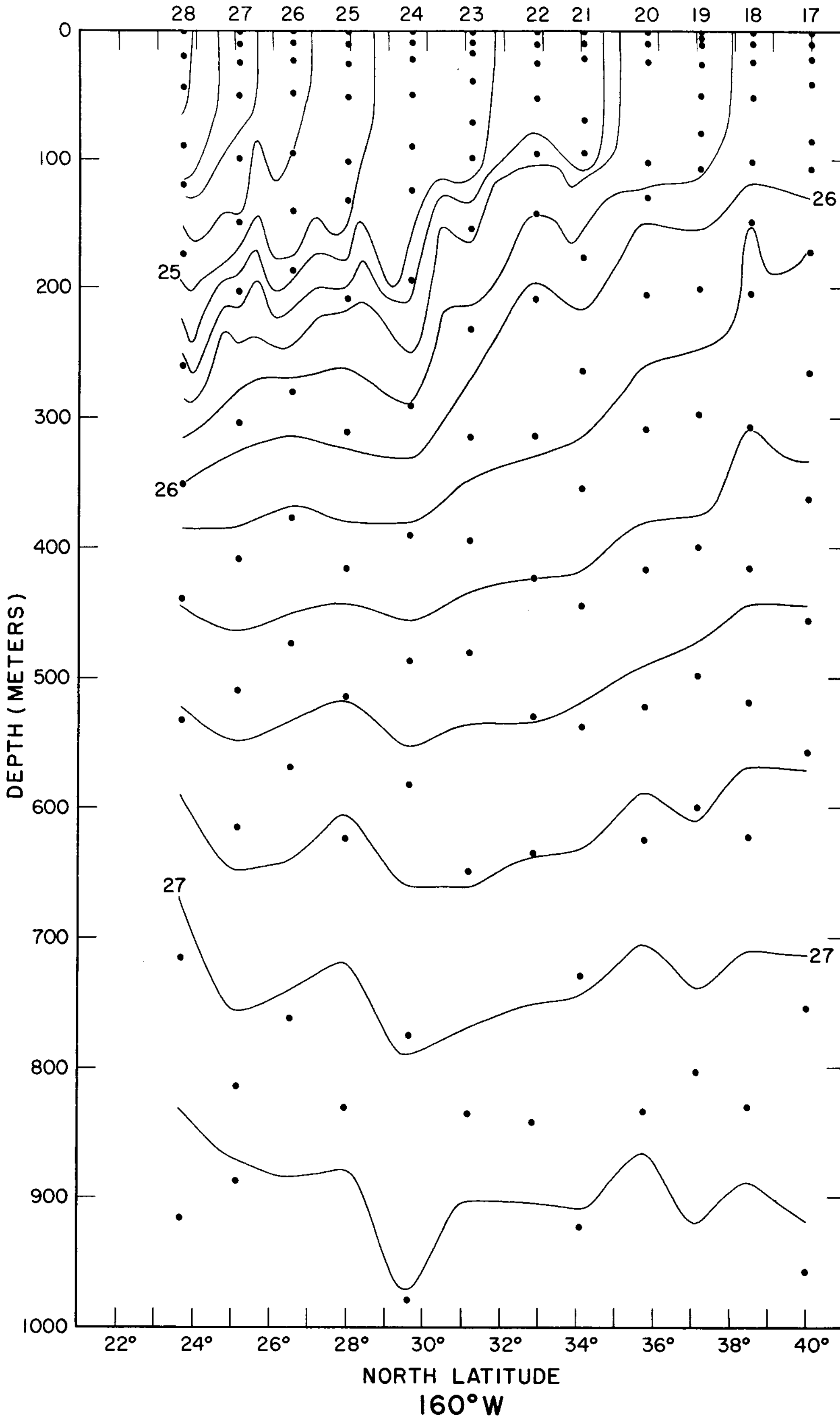

Figure 39.--Vertical section of sigma-t along 160°W. longitude, stations 17-28. Points indicate observed values.

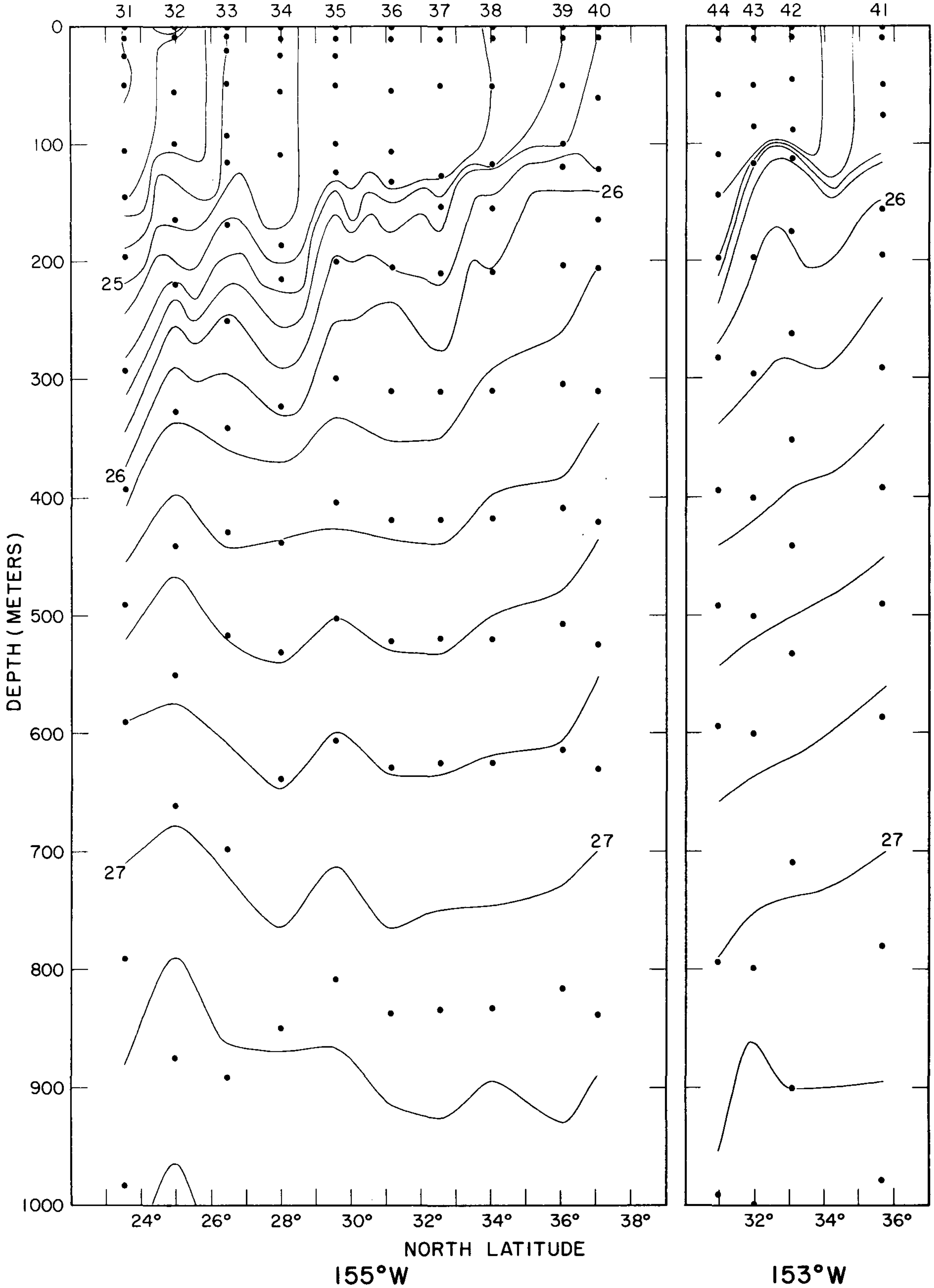

Figure 40.--Vertical section of sigma-t along 155°W. longitude, stations 31-40. Points indicate observed values.
Figure 41.--Same for 153°W. longitude, stations 41-44.

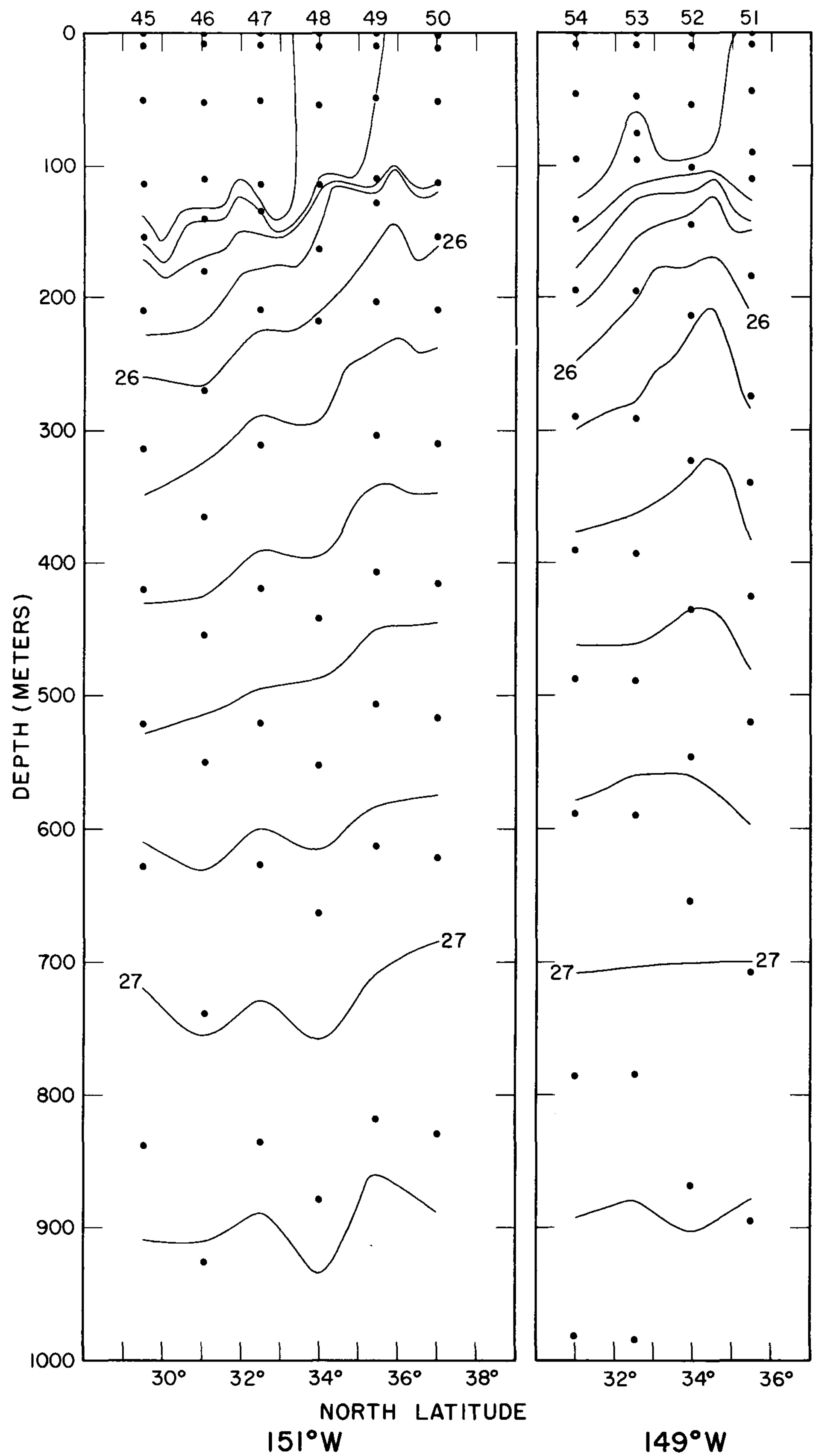

Figure 42.--Vertical section of sigma-t along 151°W. longitude, stations 45-50. Points indicate observed values.
Figure 43.--Same for 149°W. longitude, stations 51-54.

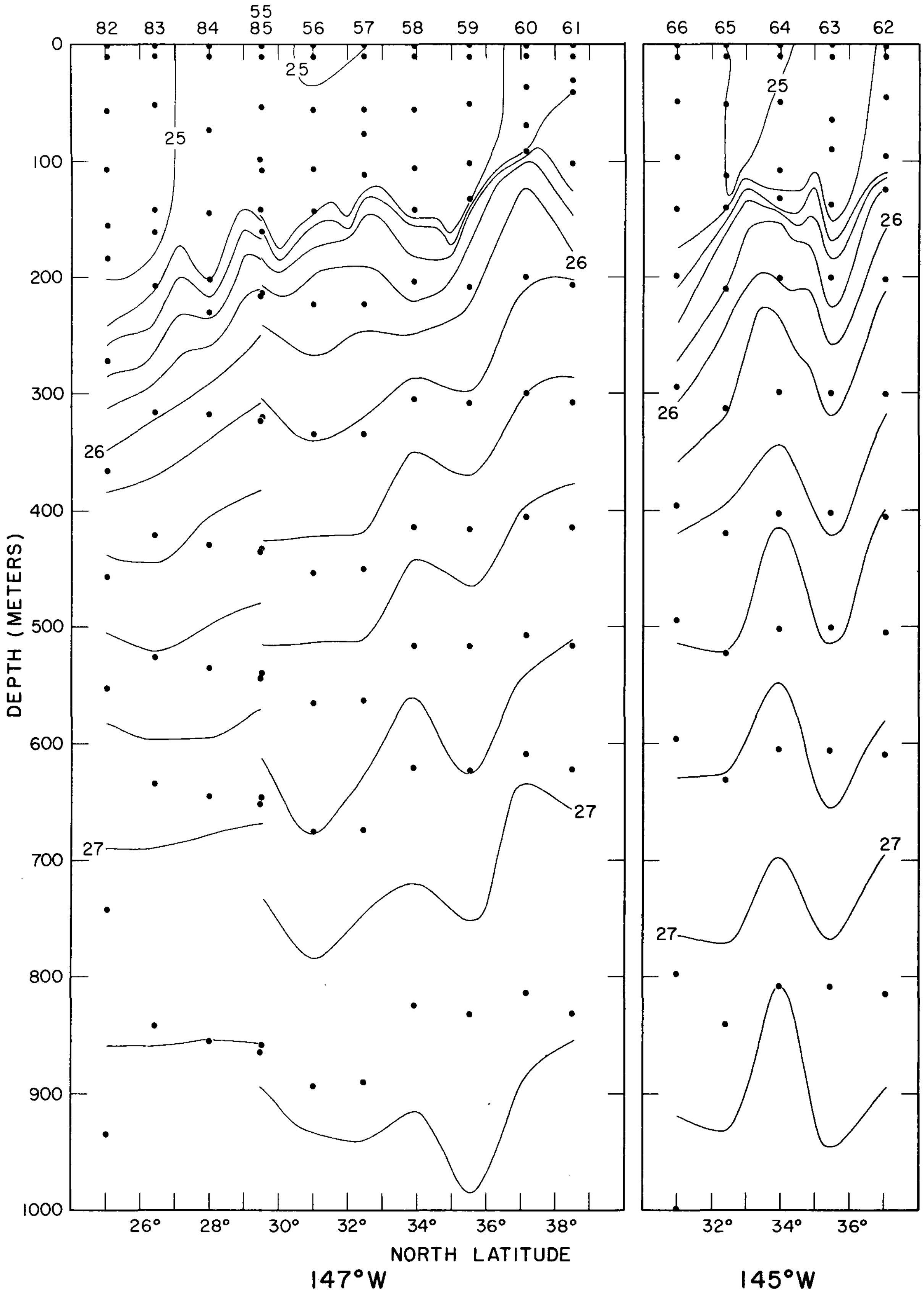

Figure 44.--Vertical section of sigma-t along 147°W. longitude, stations 55-61. Points indicate observed values.

Figure 45.--Same for 145°W. longitude, stations 62-66.

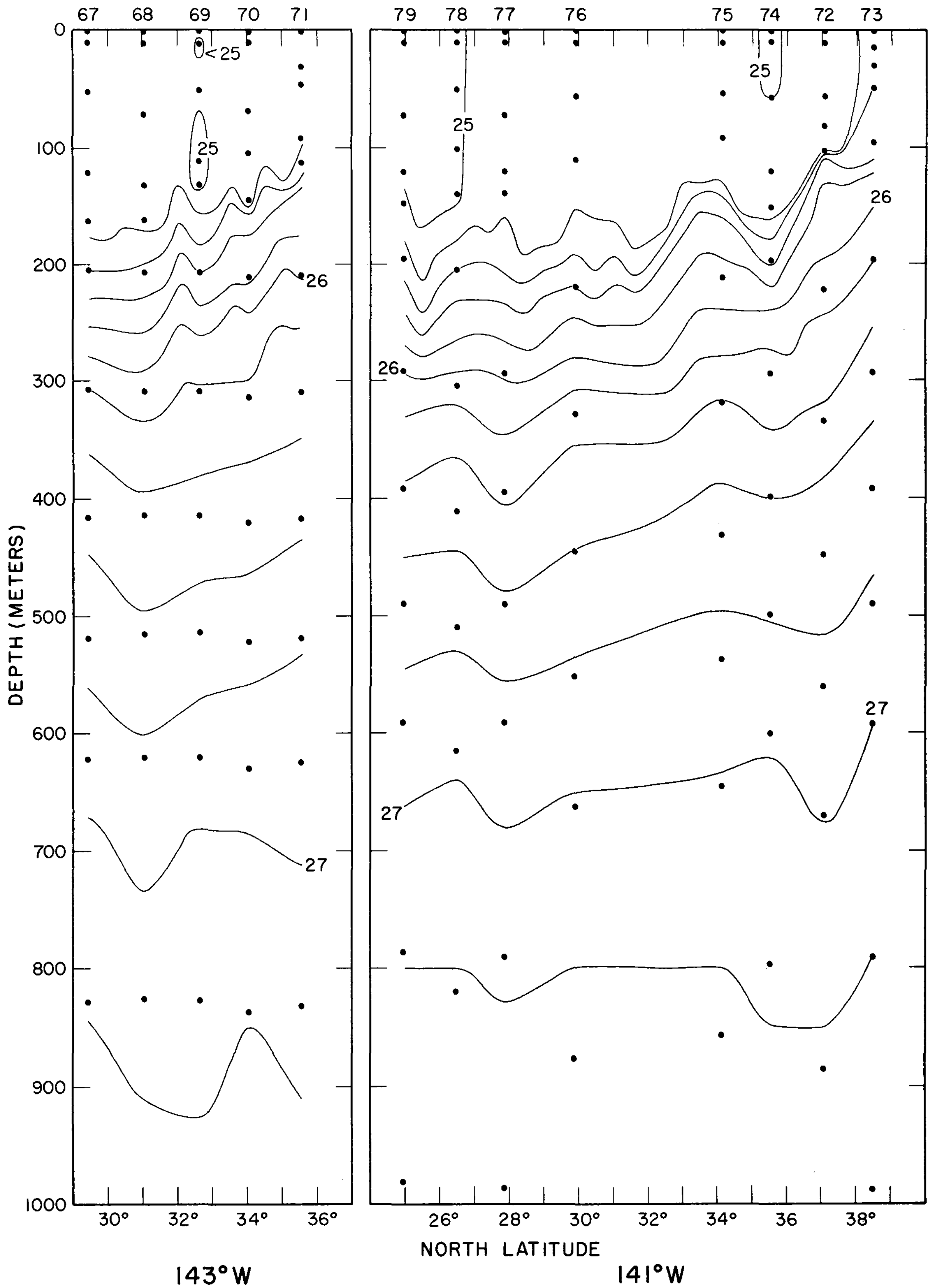

Figure 46.--Vertical section of sigma-t along 143°W. longitude, stations 67-71. Points indicate observed values.
Figure 47.--Same for 141°W. longitude, stations 72-79.

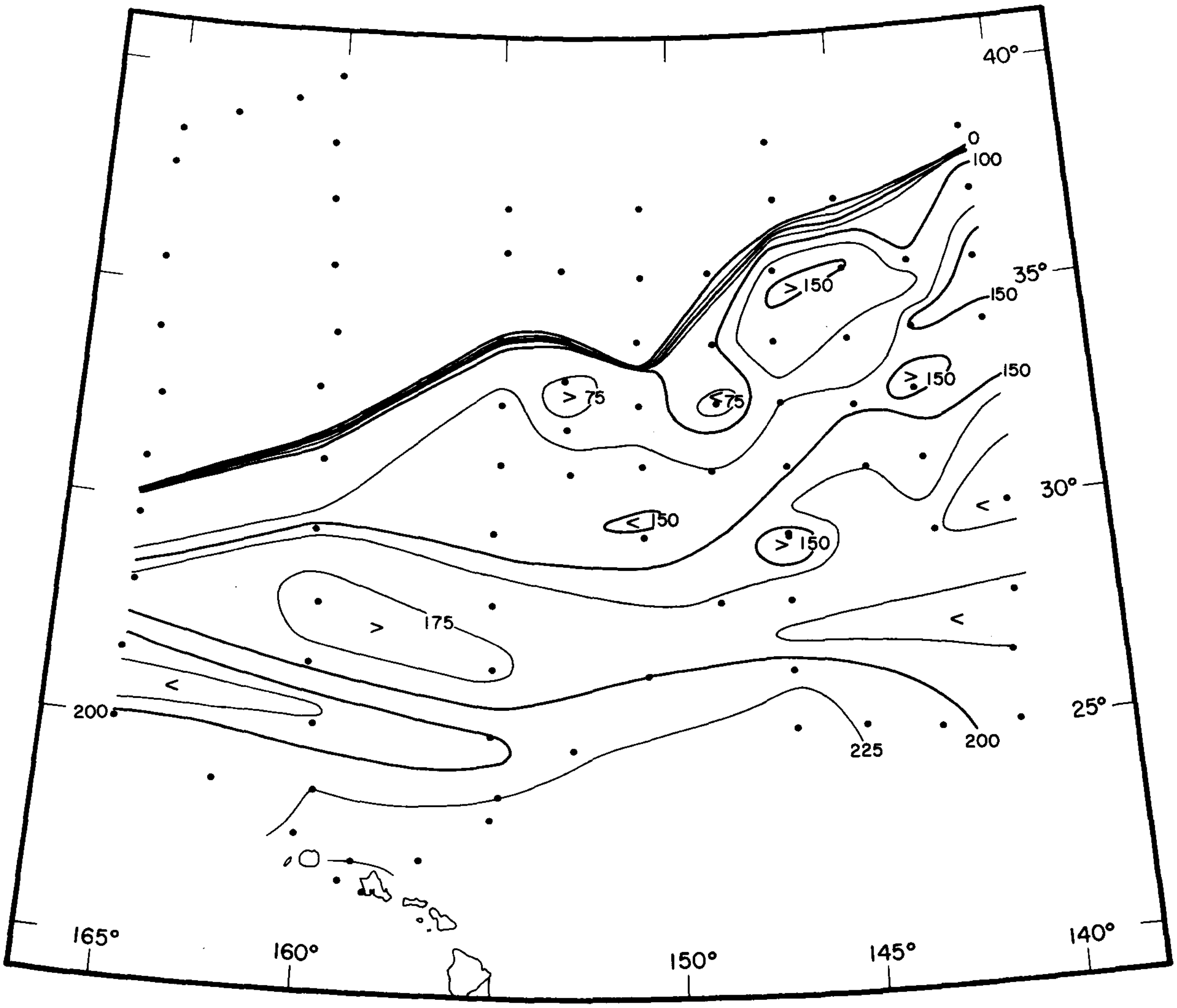

Figure 48.--Depth of 25.2 sigma-t surface in meters. Points indicate station positions.

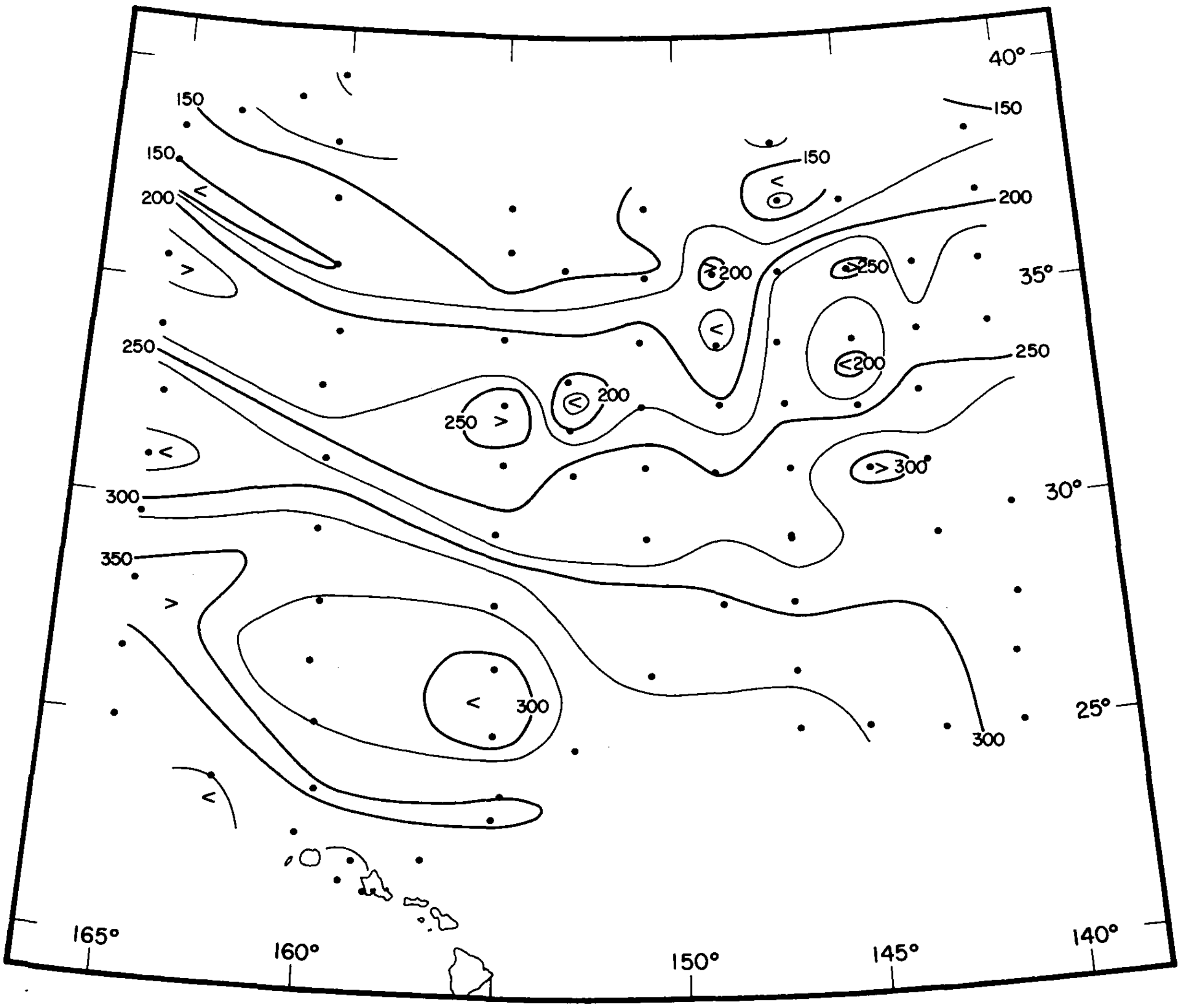

Figure 49.--Depth of 26.0 sigma-t surface in meters. Points indicate station positions.

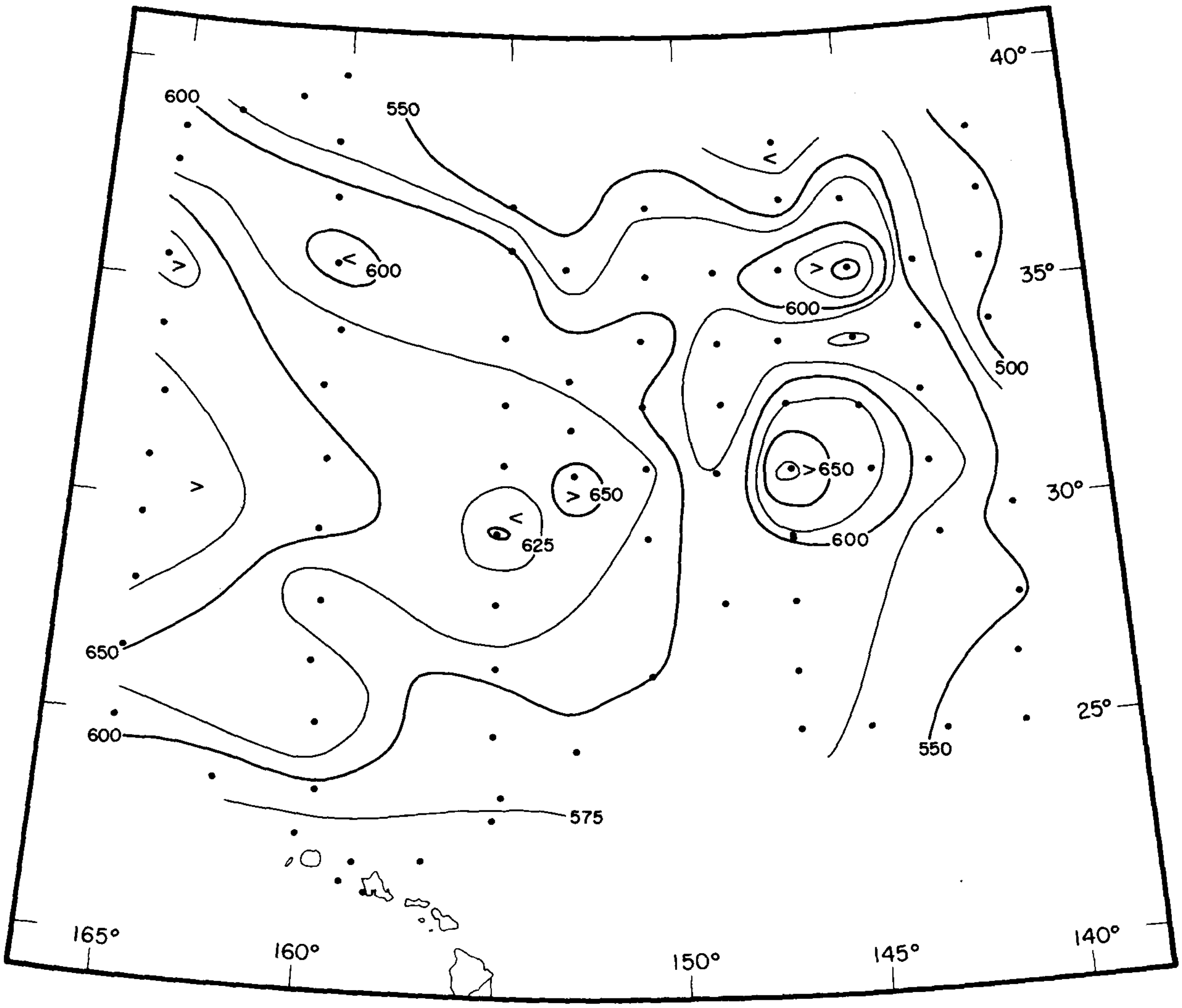

Figure 50.--Depth of 26.8 sigma-t surface in meters. Points indicate station positions.

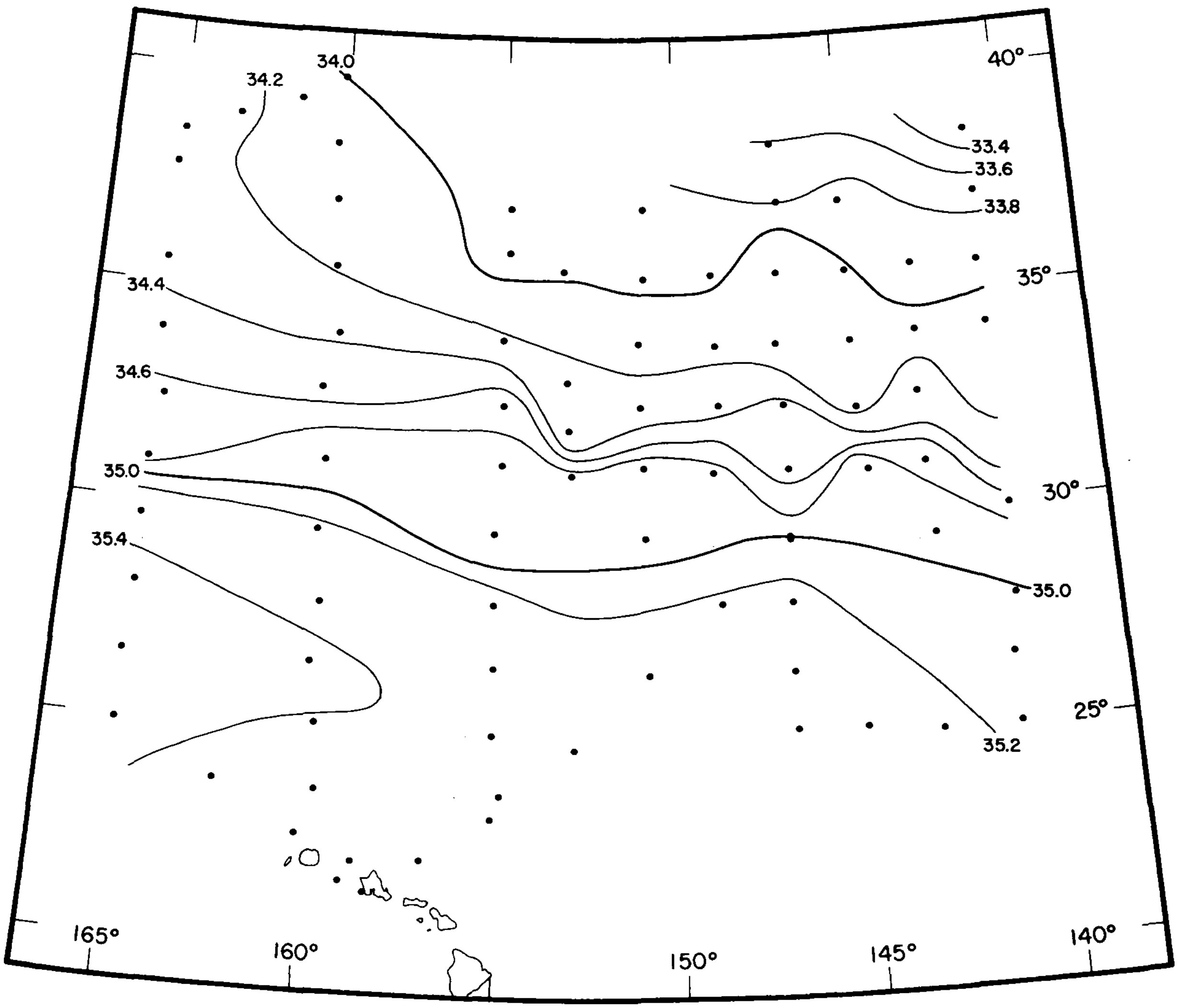

Figure 51.--Surface salinity in parts per thousand. Points indicate observed values.

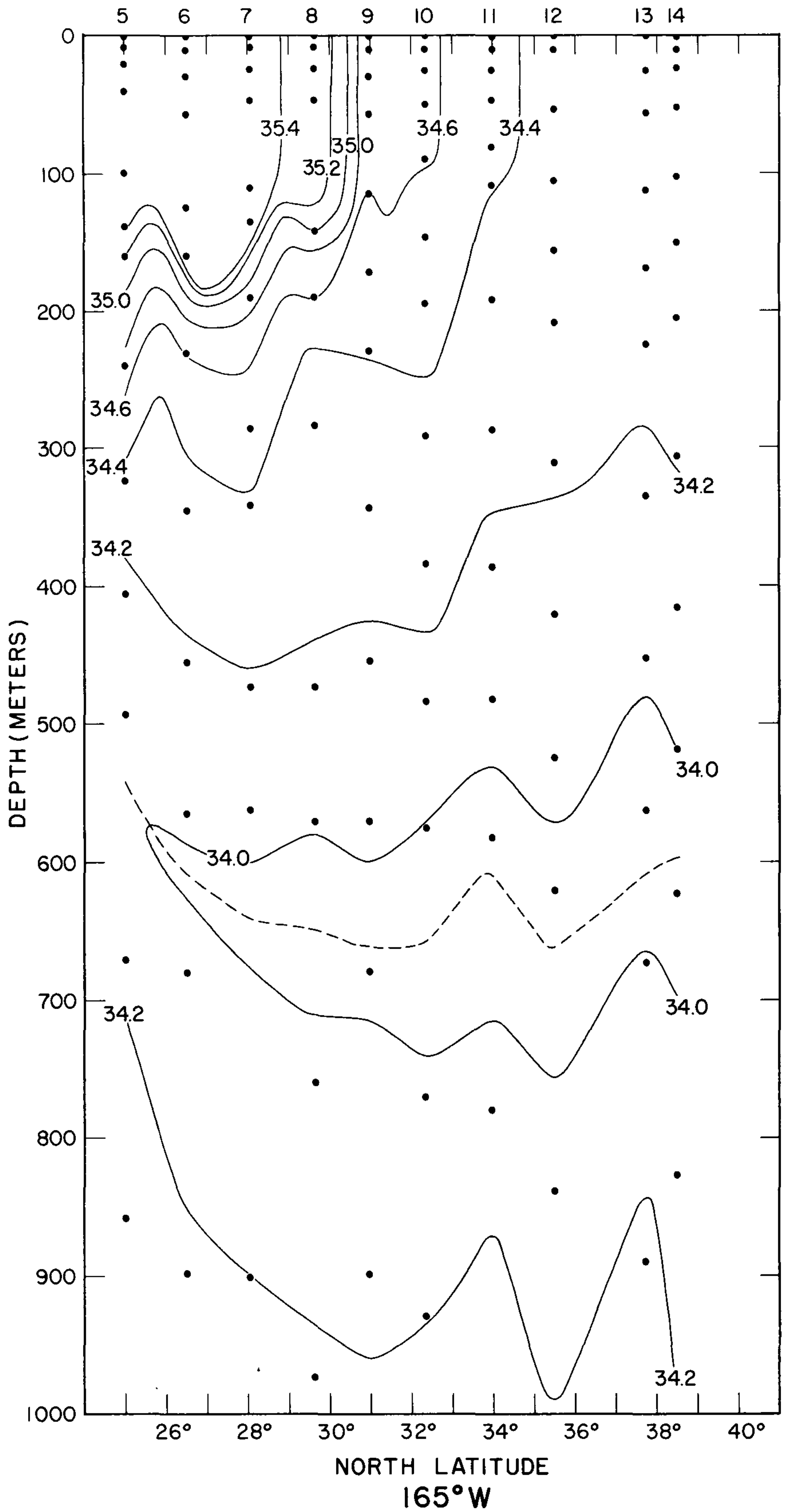

Figure 52.--Vertical section of salinity in parts per thousand along 165°W. longitude, stations 5-14. Dotted line indicates depth of salinity minima. Points indicate observed values.

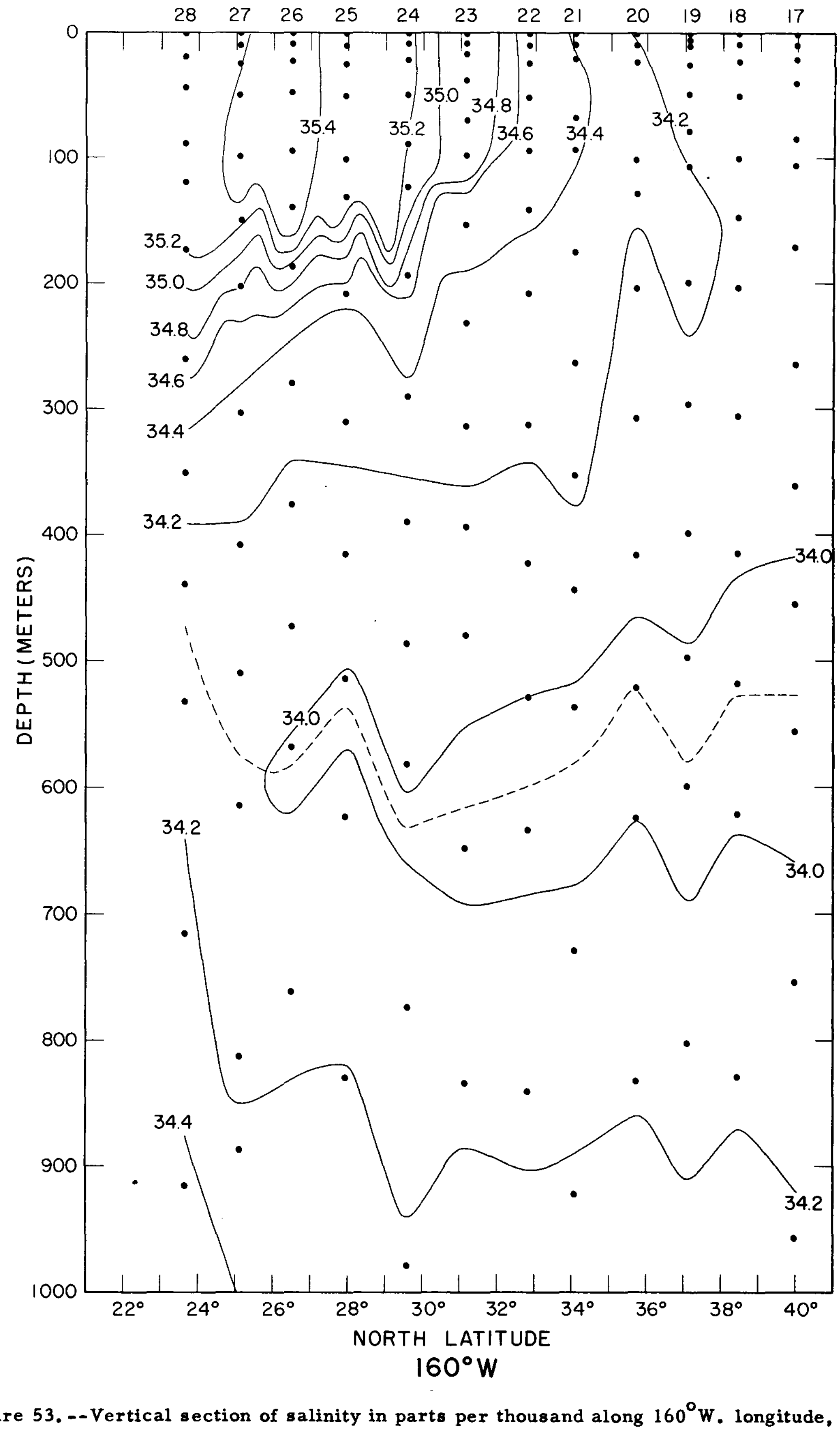

Figure 53.--Vertical section of salinity in parts per thousand along 160°W. longitude, stations 17-28. Dotted line indicates depth of salinity minima. Points indicate observed values.

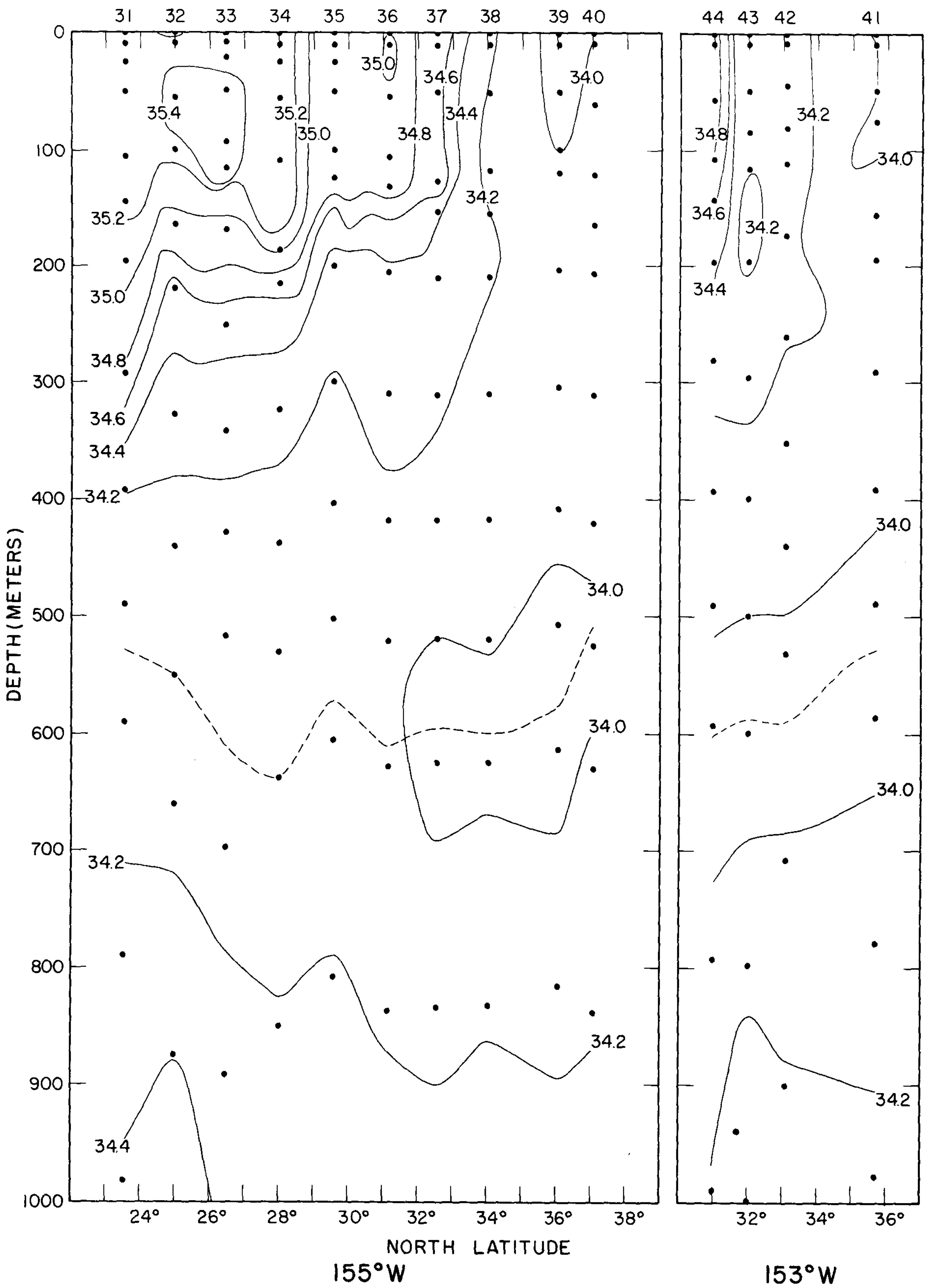

Figure 54.--Vertical section of salinity in parts per thousand along 155°W. longitude, stations 31-40. Dotted line indicates depth of salinity minima. Points indicate observed values.
Figure 55.--Same for 153°W. longitude, stations 41-44.

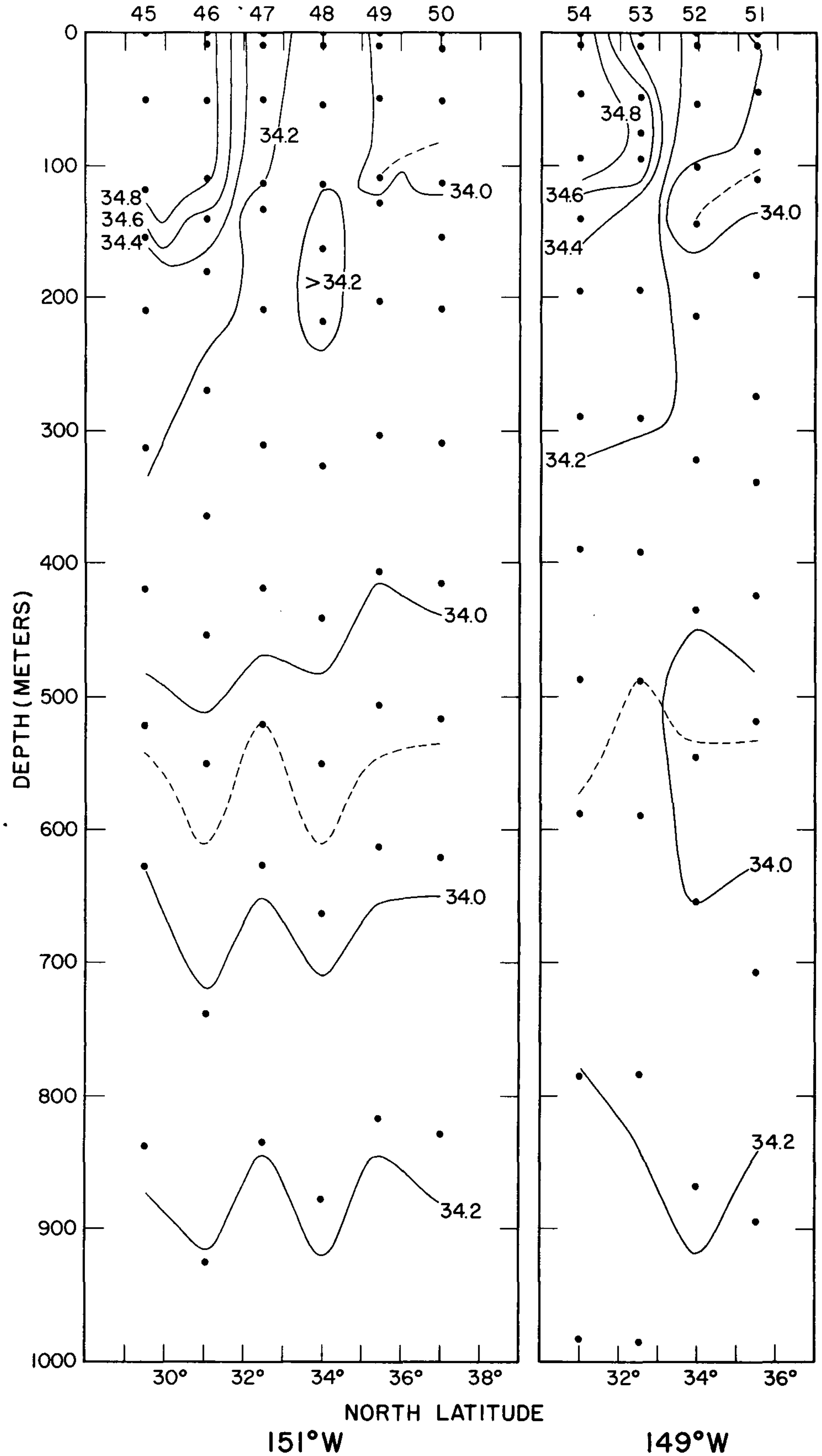

Figure 56.--Vertical section of salinity in parts per thousand along 151°W. longitude, stations 45-50. Dotted lines indicate depths of salinity minima. Points indicate observed values.
Figure 57.--Same for 149°W. longitude, stations 51-54.

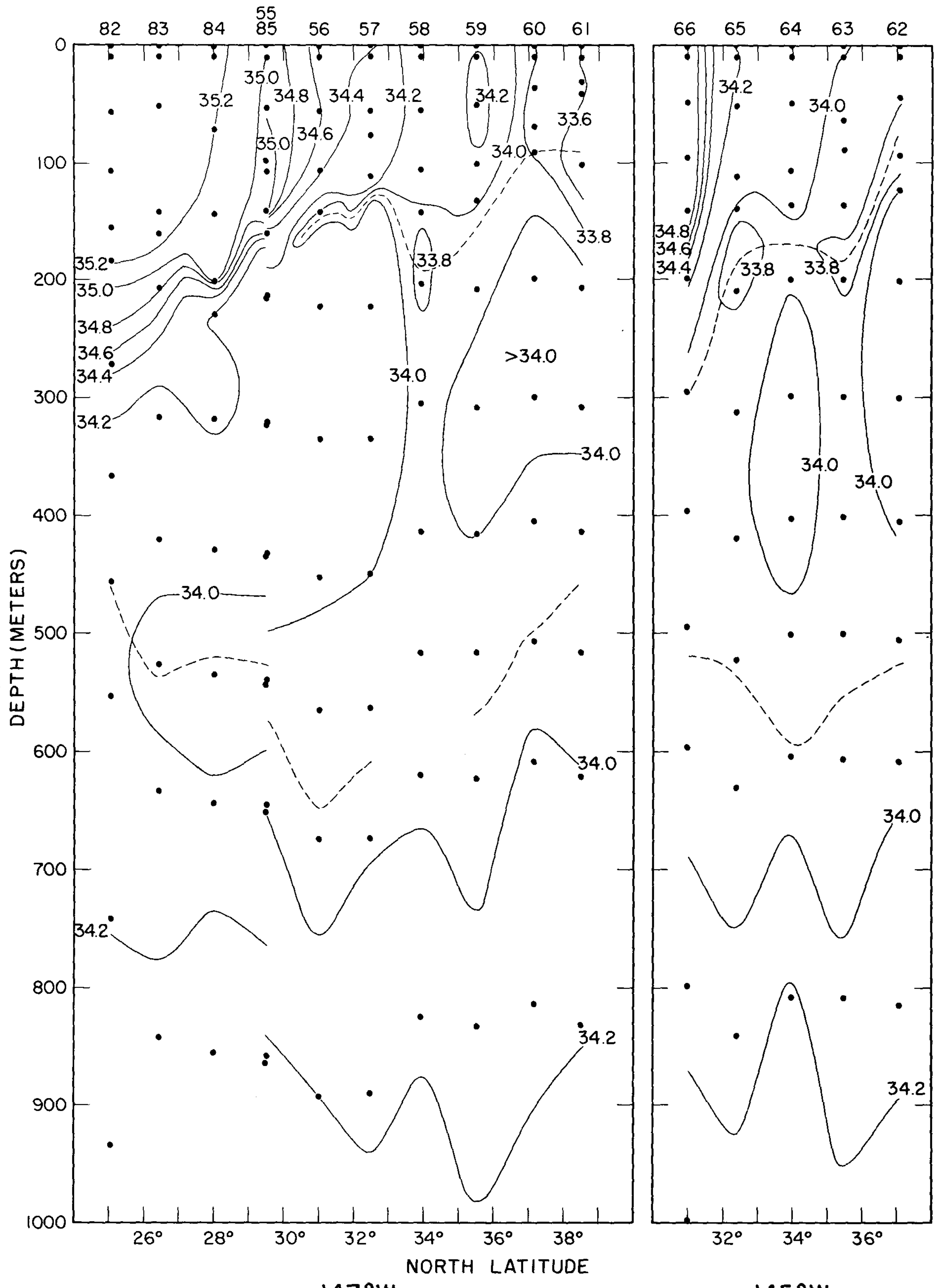

Figure 58.--Vertical section of salinity in parts per thousand along 147°W. longitude, stations 55-61 and 82-85. Dotted lines indicate depths of salinity minima. Points indicate observed values.
Figure 59.--Same for 145°W. longitude, stations 62-66.

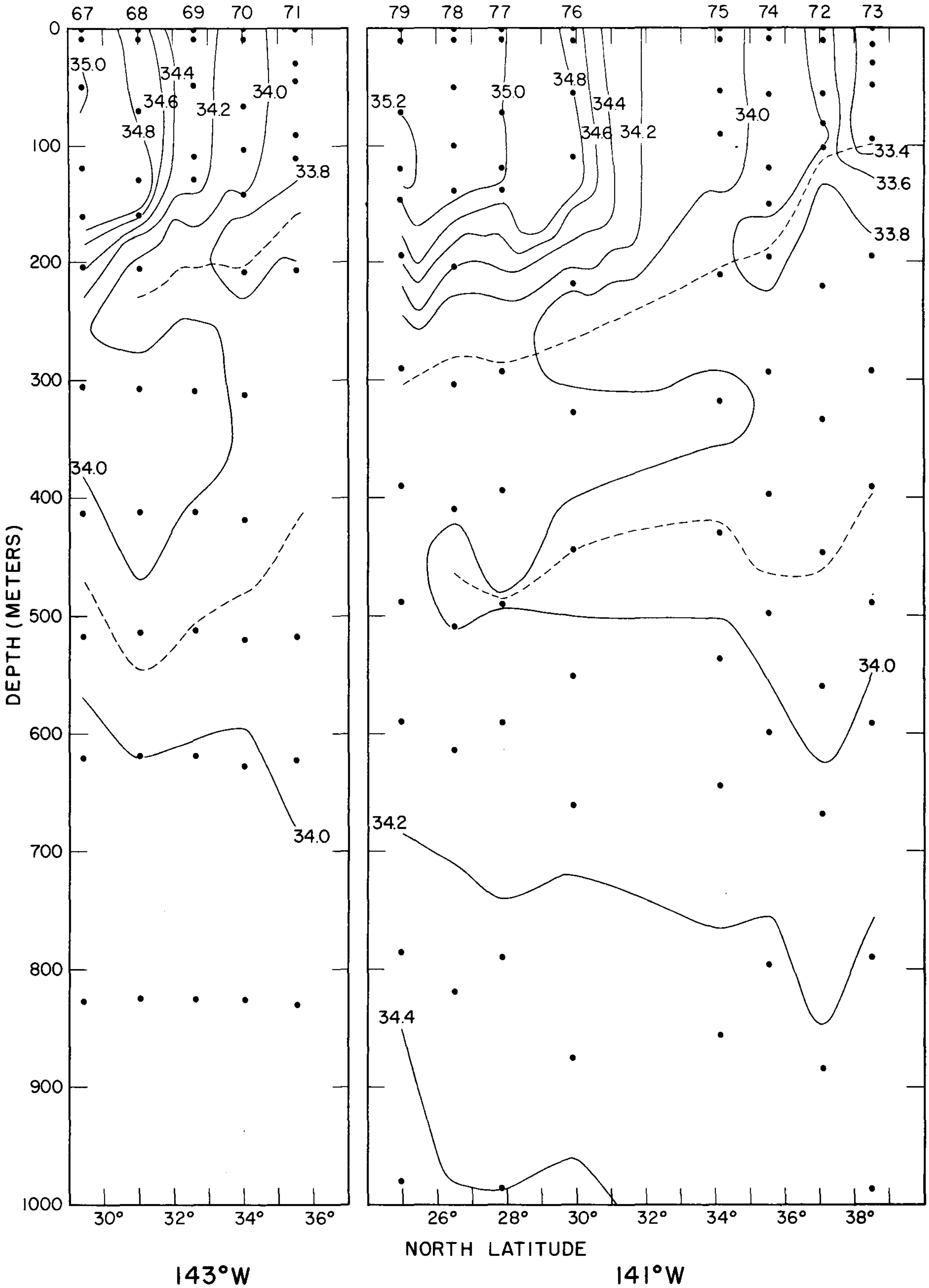

Figure 60.--Vertical section of salinity in parts per thousand along 143°W. longitude, stations 67-71. Dotted lines indicate depths of salinity minima. Points indicate observed values.
Figure 61.--Same for 141°W. longitude, stations 72-79.

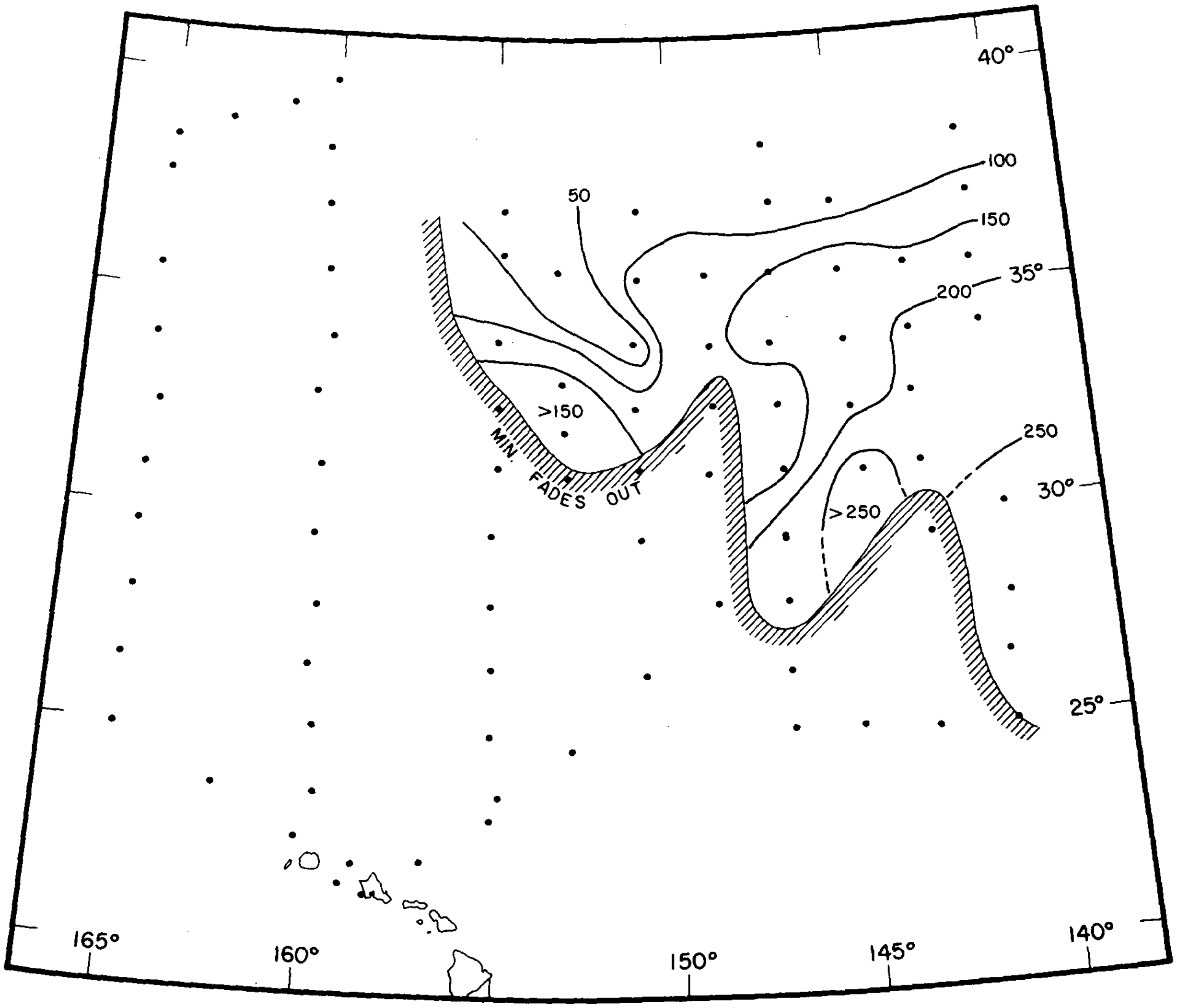

Figure 62. --Depth in meters of the shallow salinity minimum. Points indicate station positions.

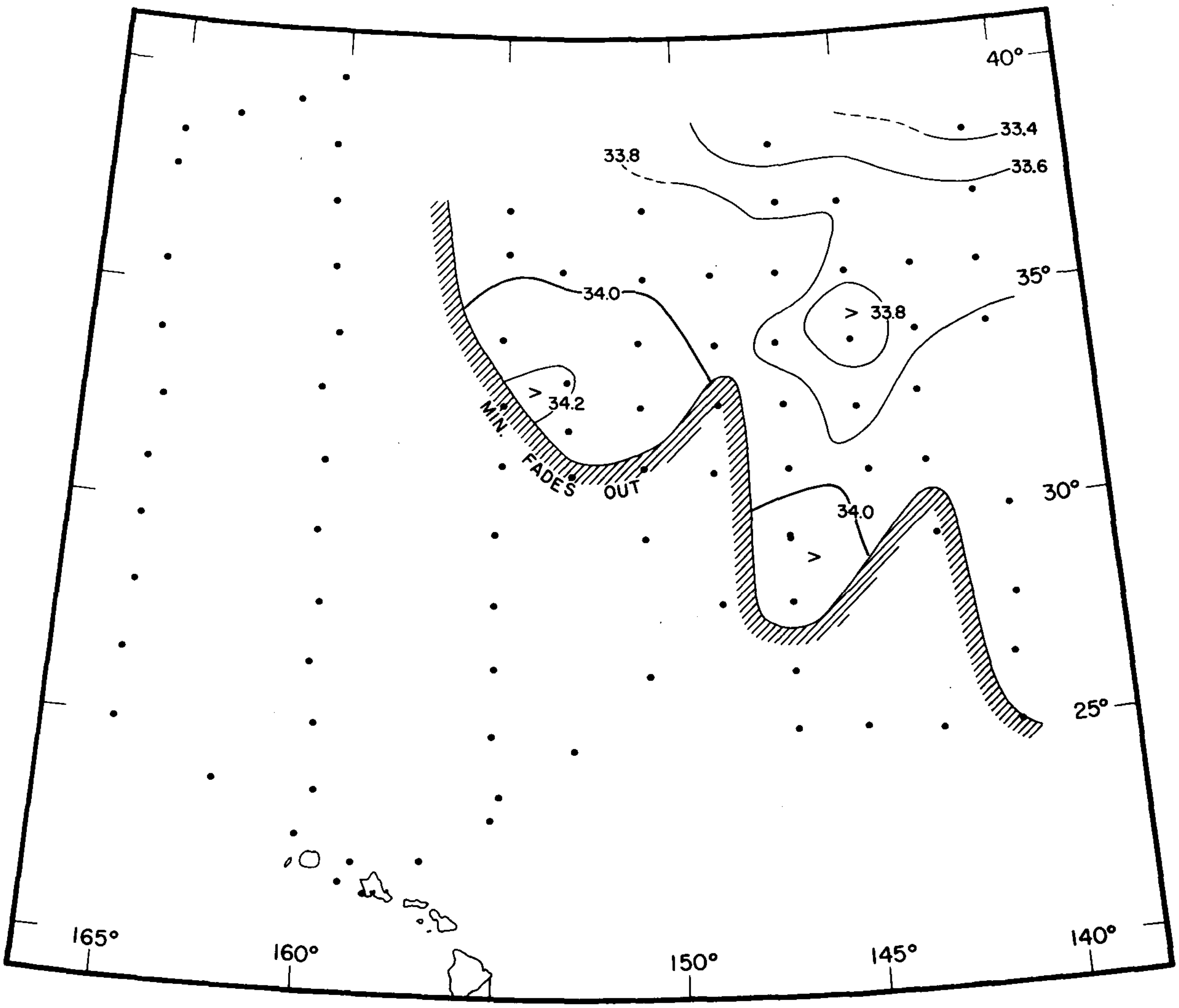

Figure 63.--Salinity in parts per thousand at the shallow salinity minimum. Points indicate station positions.

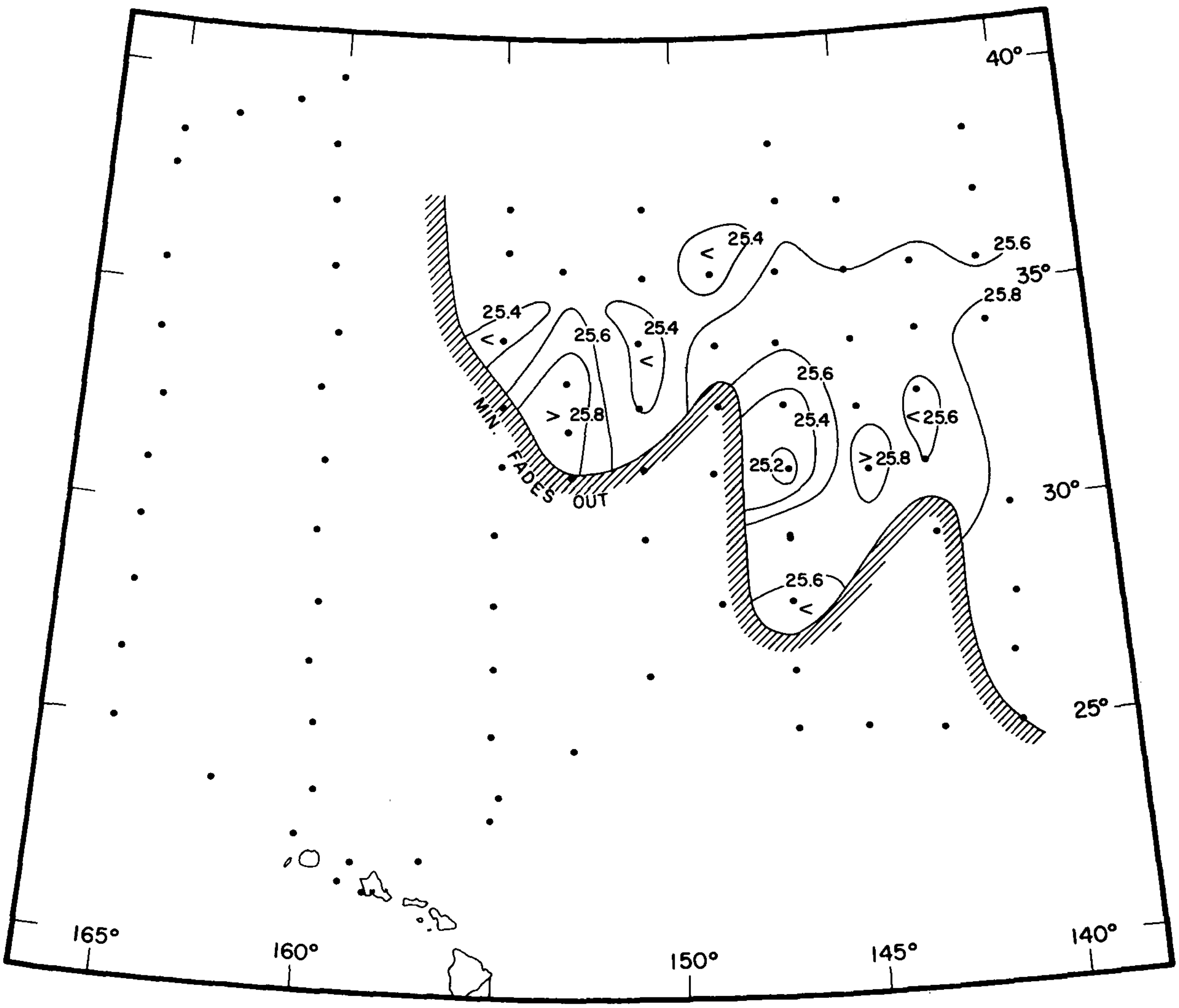

Figure 64.--Sigma-t at the shallow salinity minimum. Points indicate station positions.

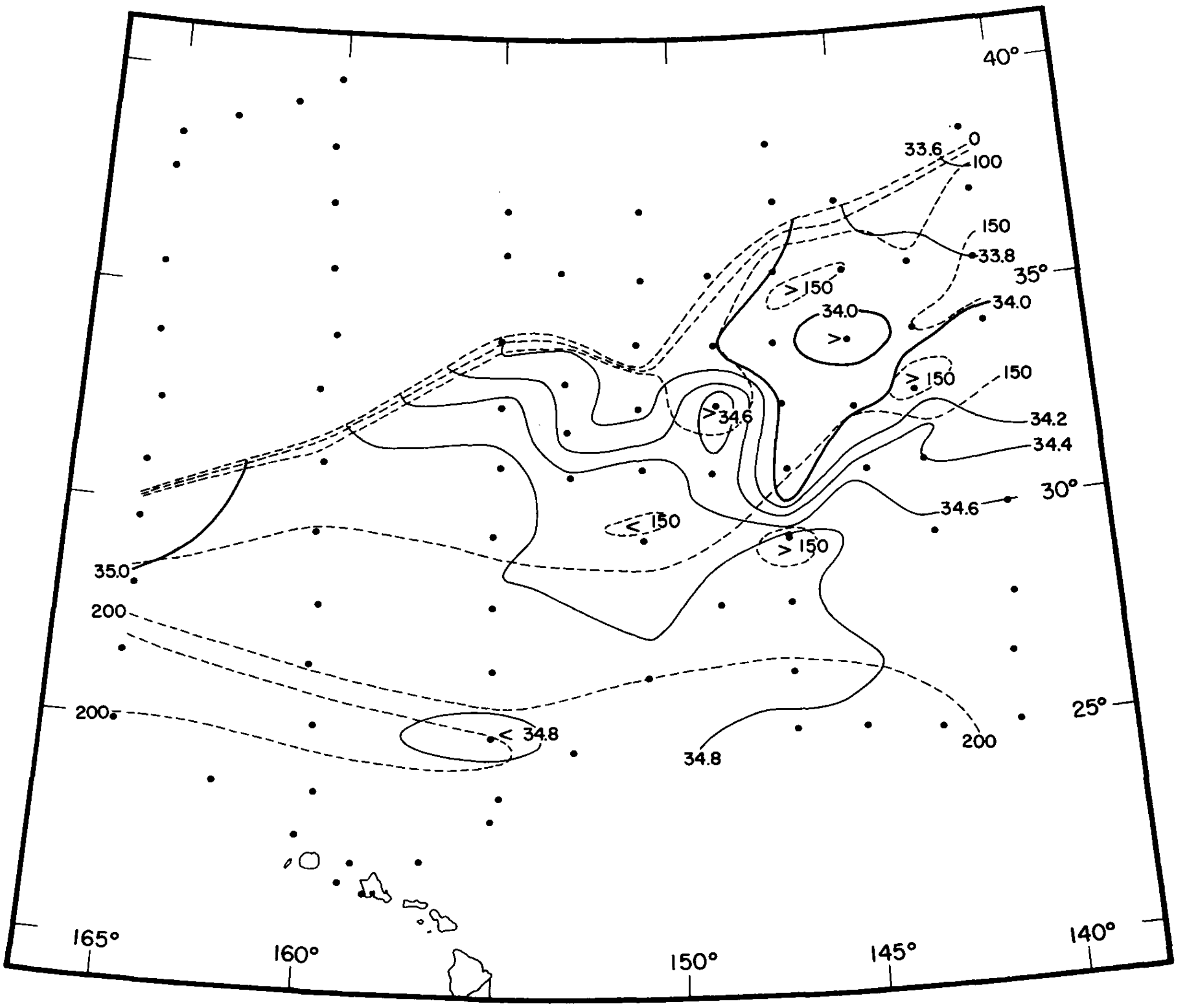

Figure 65.--Salinity in parts per thousand (solid lines) on the 25.2 sigma-t surface (depth in meters, dotted lines). Points indicate station positions.

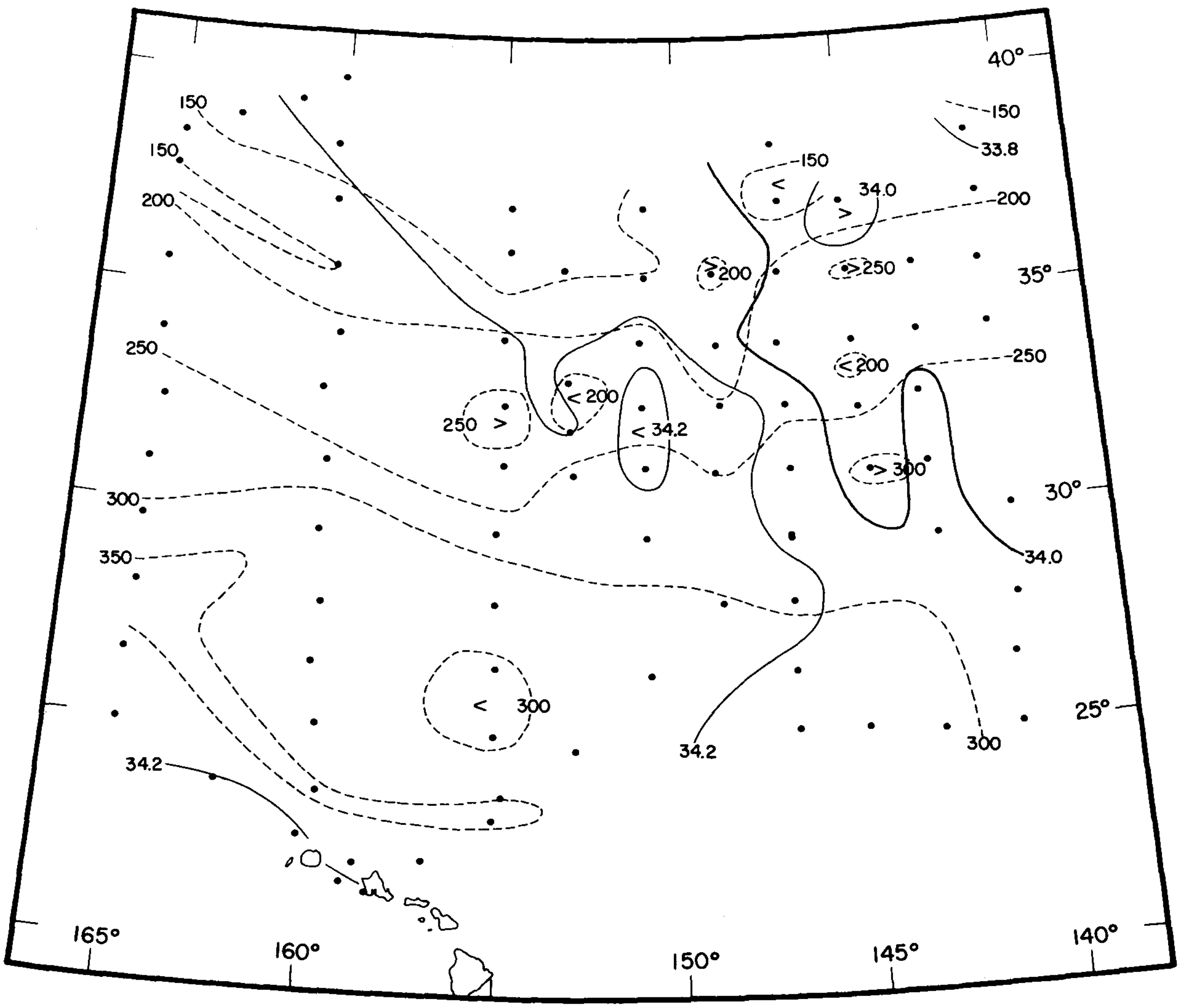

Figure 66.--Salinity in parts per thousand (solid lines) on the 26.0 sigma-t surface (depth in meters, dotted lines). Points indicate station positions.

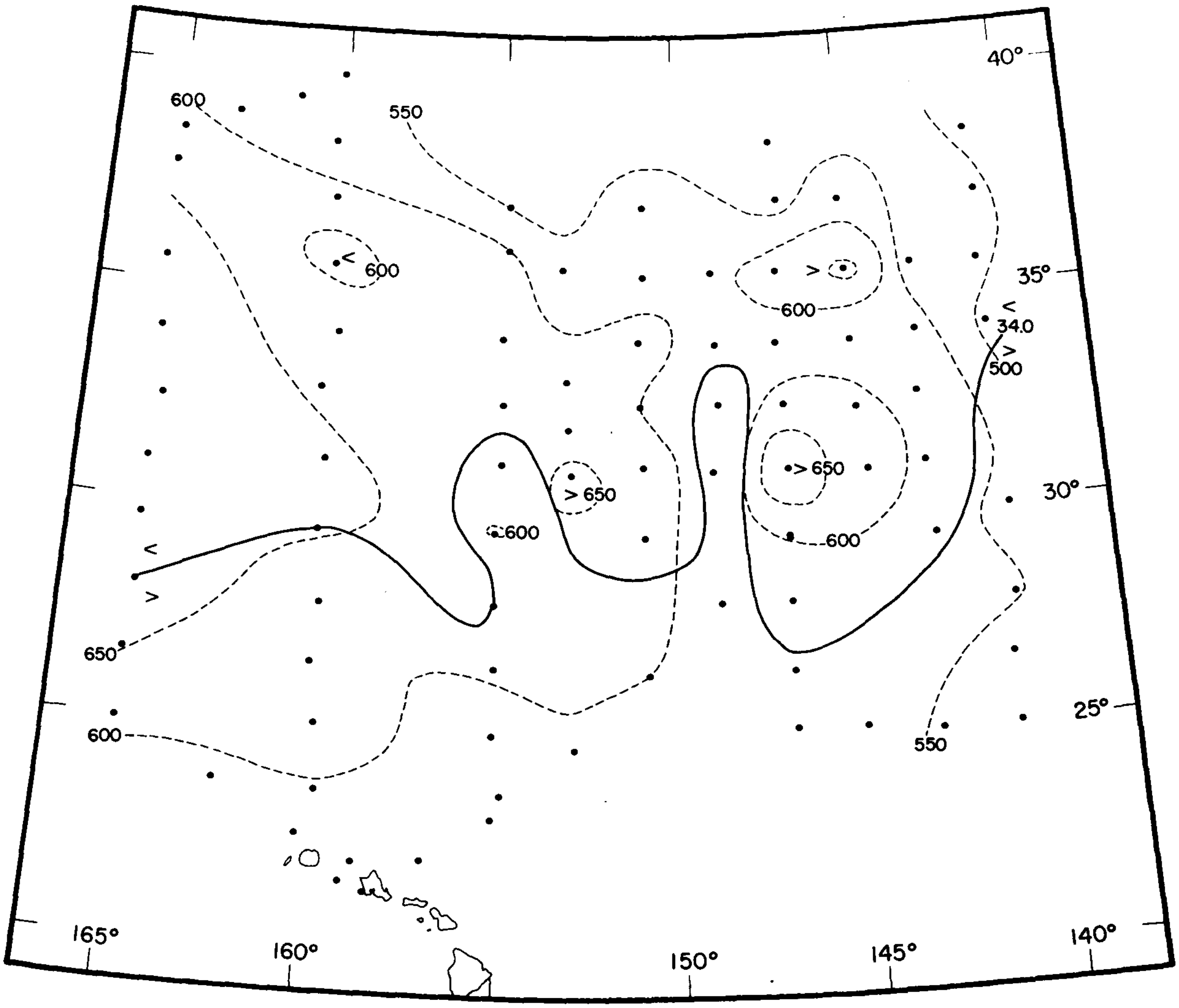

Figure 67.--Salinity in parts per thousand (solid lines) on the 26.8 sigma-t surface (depth in meters, dotted lines). Points indicate station positions.

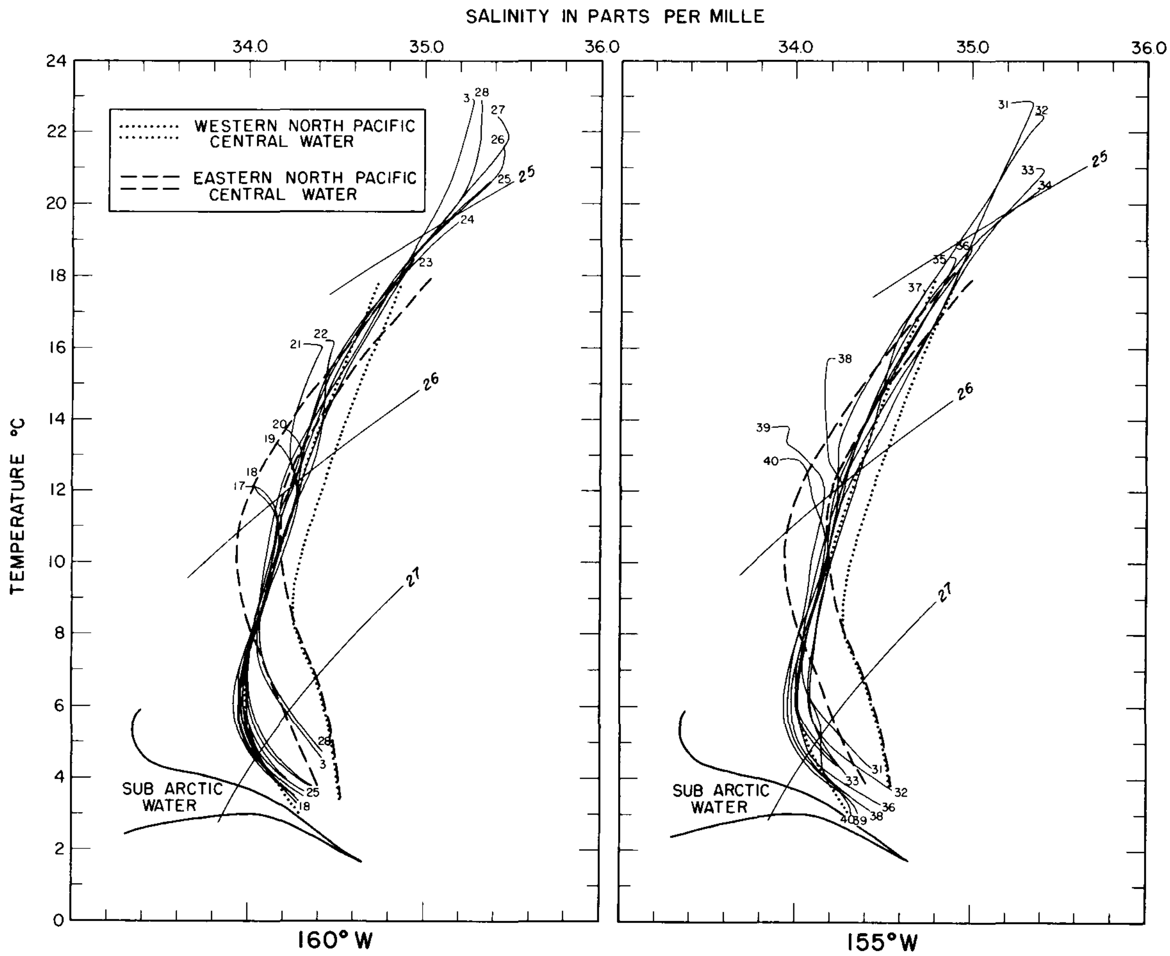

Figure 68.--Superimposed temperature-salinity curves for the meridional station series along 160°W. longitude, stations 17-28.

Figure 69.--Same for 155°W. longitude, stations 31-40.

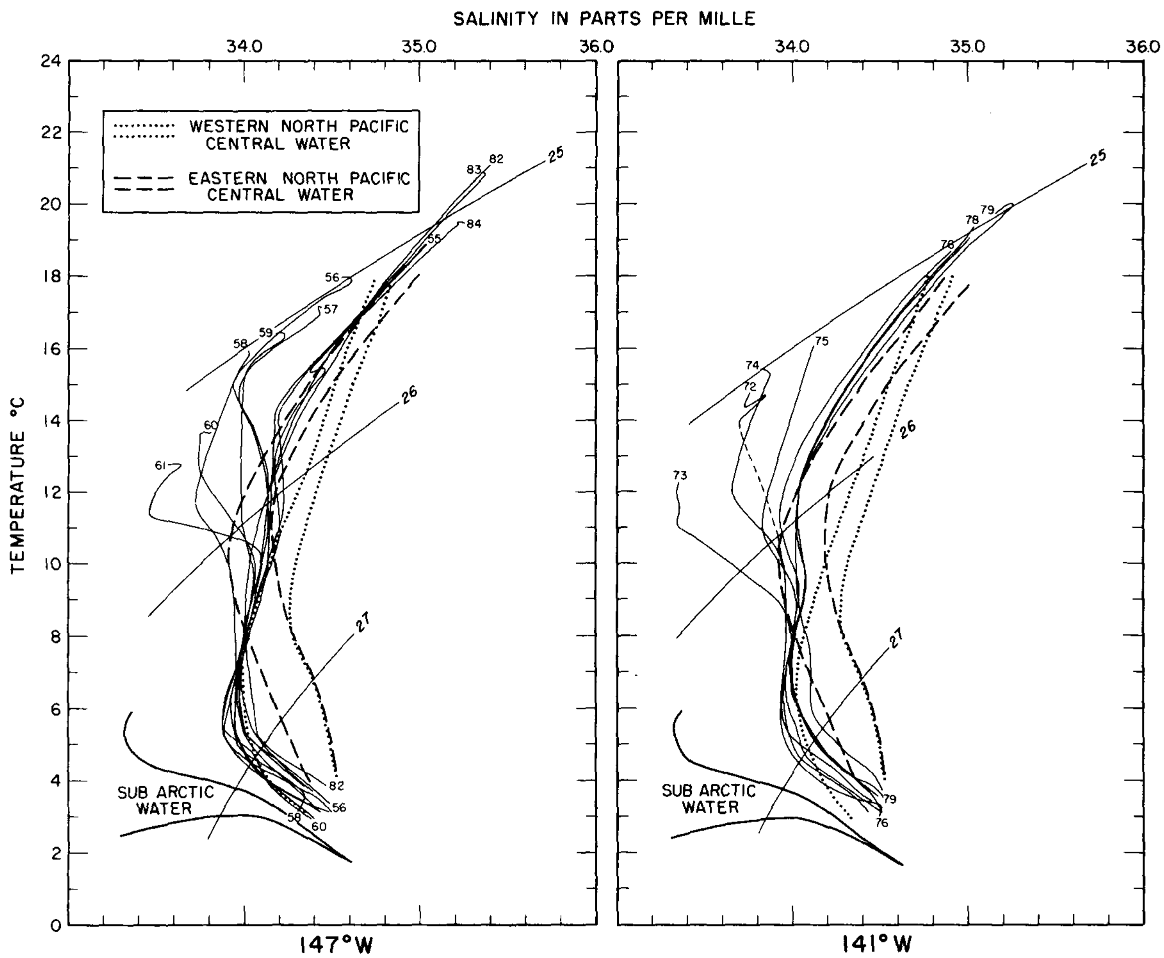

Figure 70.--Superimposed temperature-salinity curves for the meridional station series along 147°W. longitude, stations 55-61 and 82-85.

Figure 71.--Same for 141°W. longitude, stations 72-79.

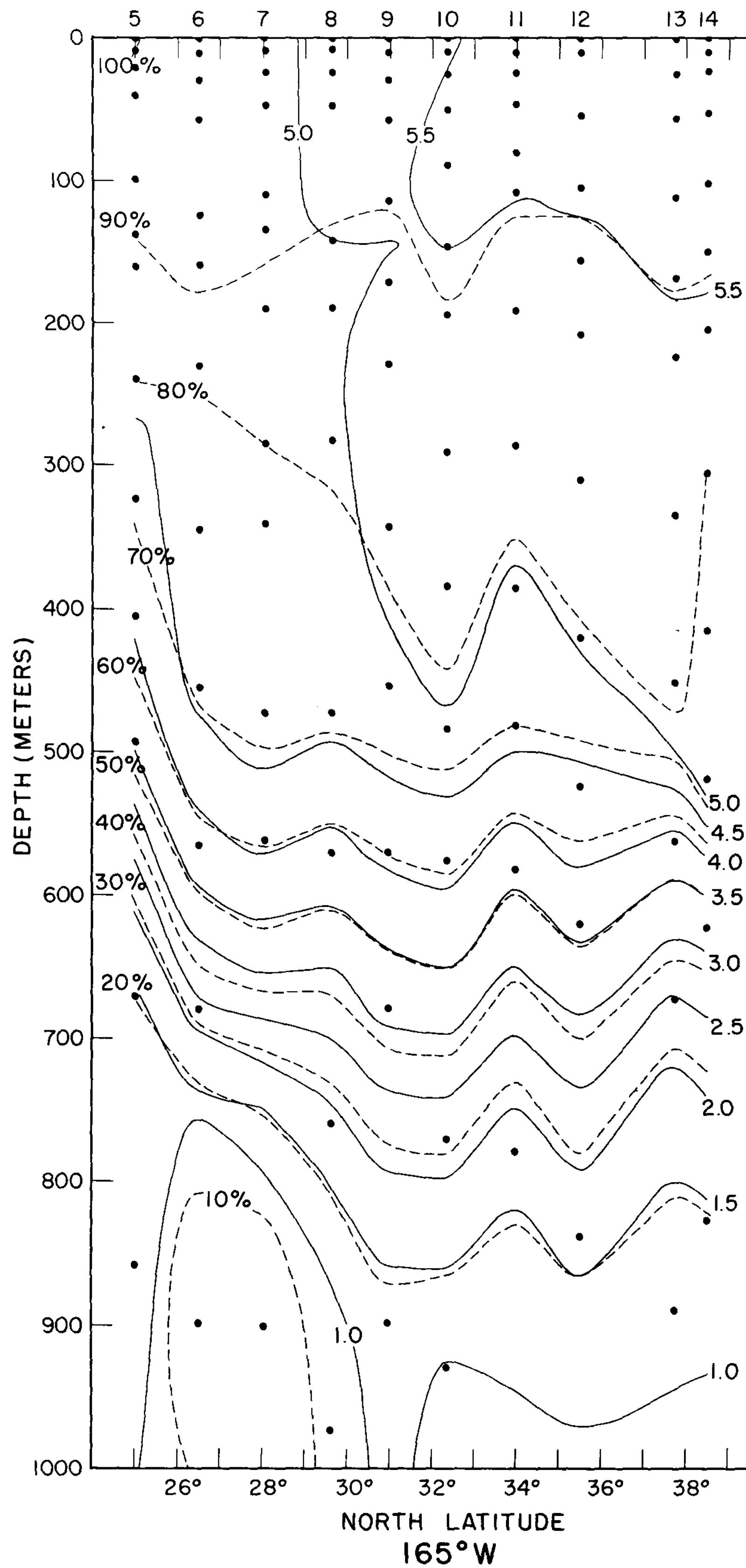

Figure 72. --Vertical sections of oxygen in milliliters per liter along 165°W. longitude, stations 5-14. Dotted lines indicate % saturation. Points indicate observed values.

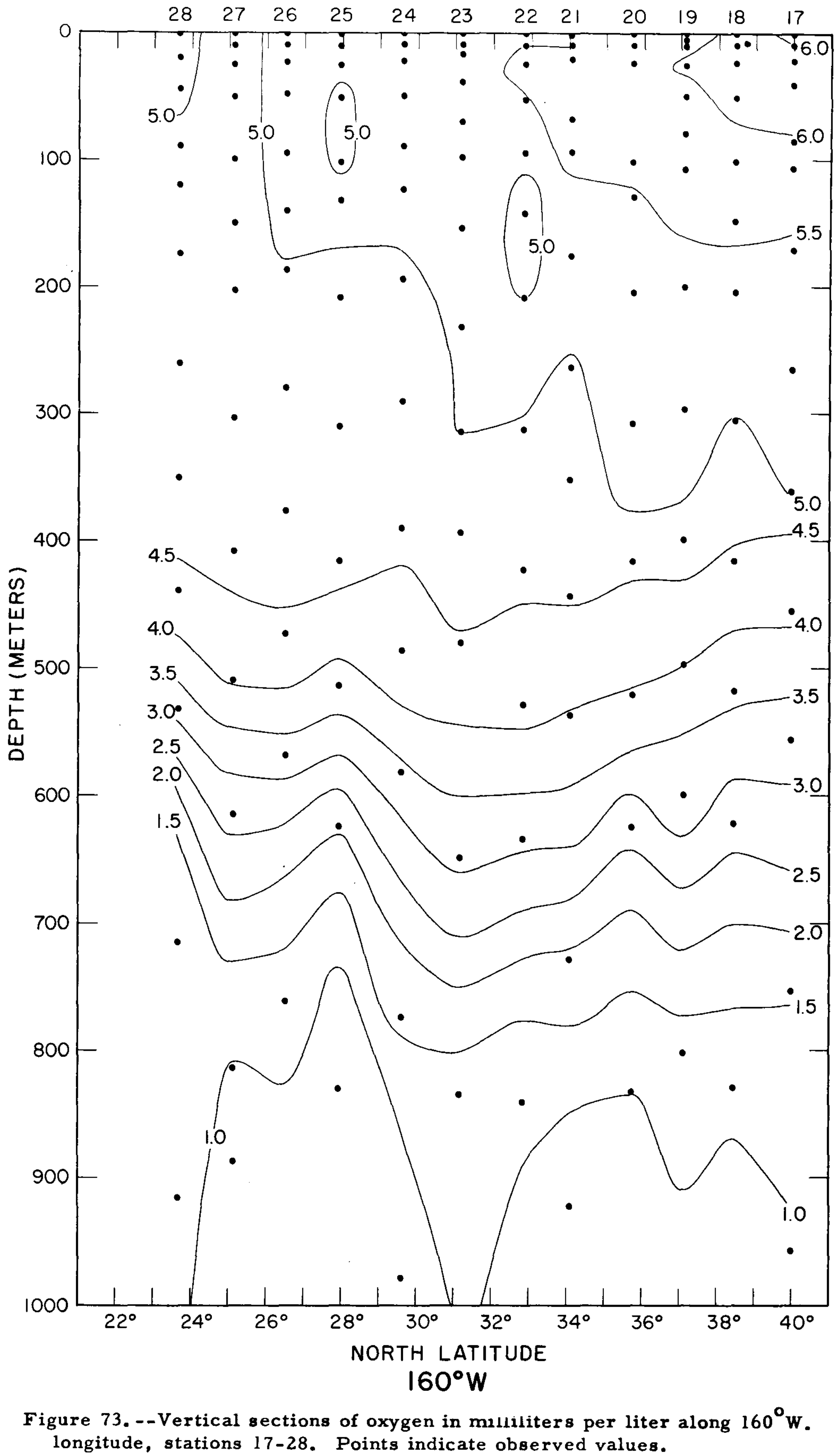

Figure 73.--Vertical sections of oxygen in milliliters per liter along 160°W. longitude, stations 17-28. Points indicate observed values.

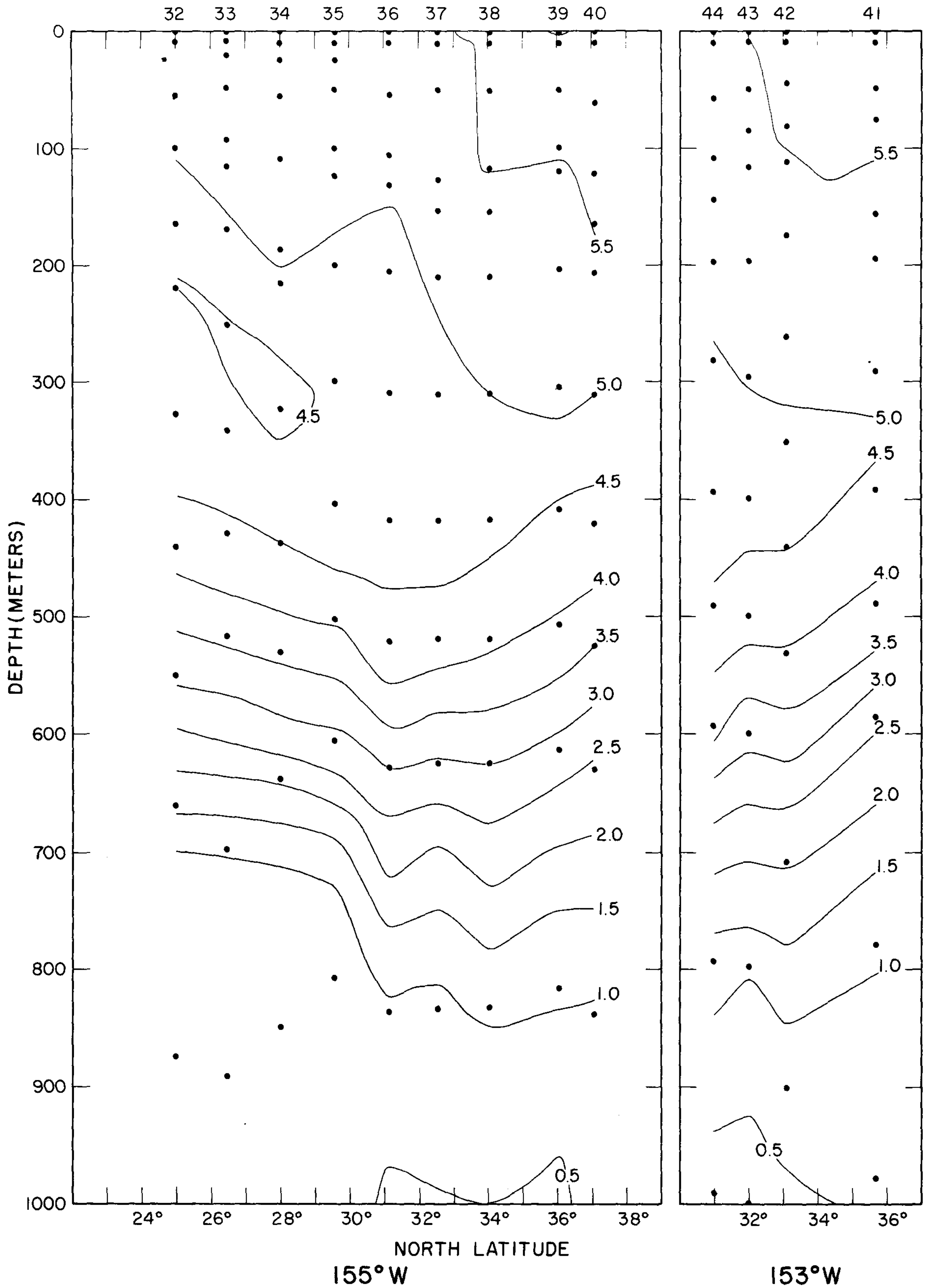

Figure 74.--Vertical section of oxygen in milliliters per liter along 155°W. longitude, stations 32-40. Points indicate observed values.
Figure 75.--Same for 153°W. longitude, stations 41-44.

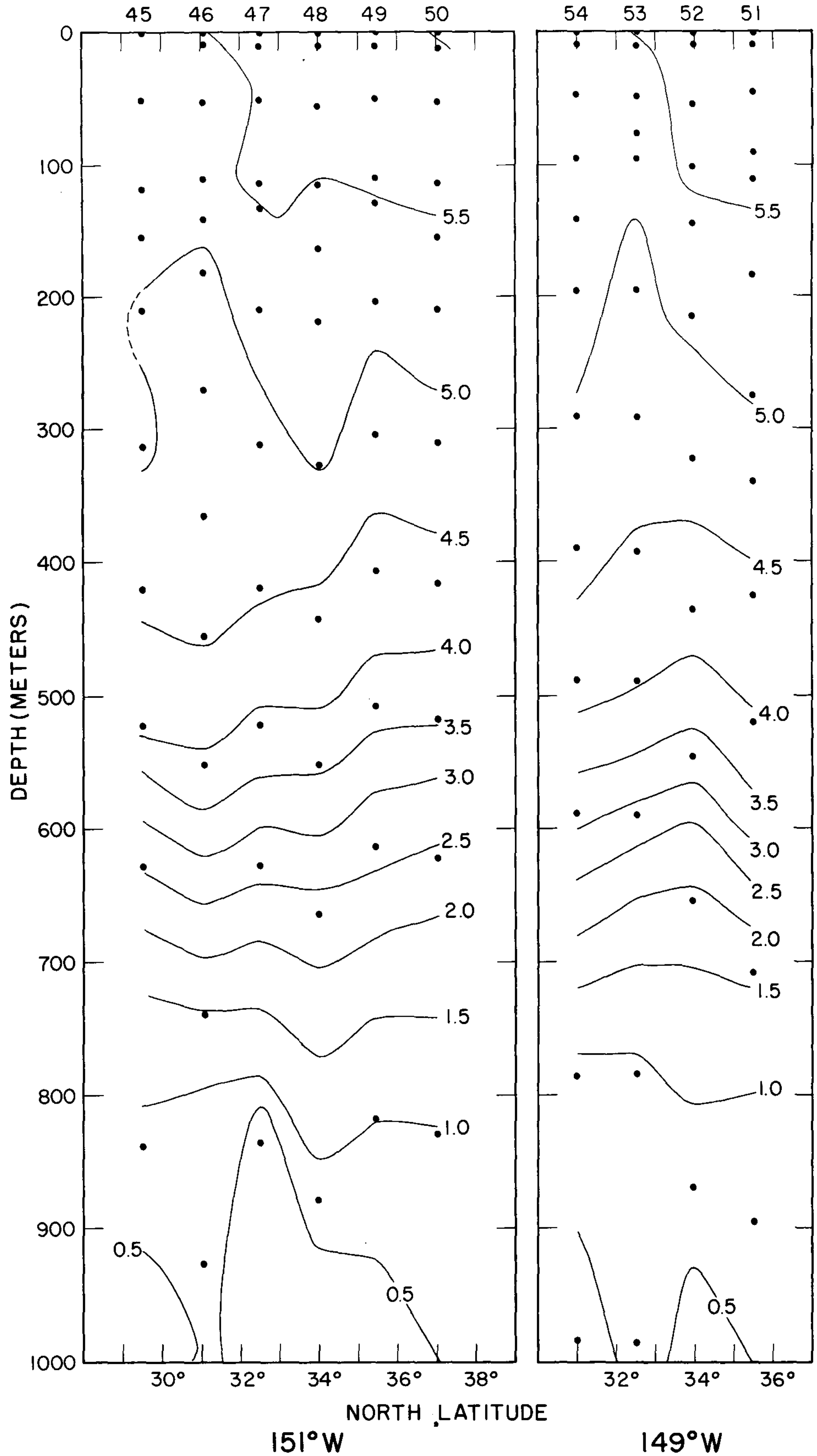

Figure 76.--Vertical section of oxygen in milliliters per liter along 151°W. longitude, stations 45-50. Points indicate observed values.
Figure 77.--Same for 149°W. longitude, stations 51-54.

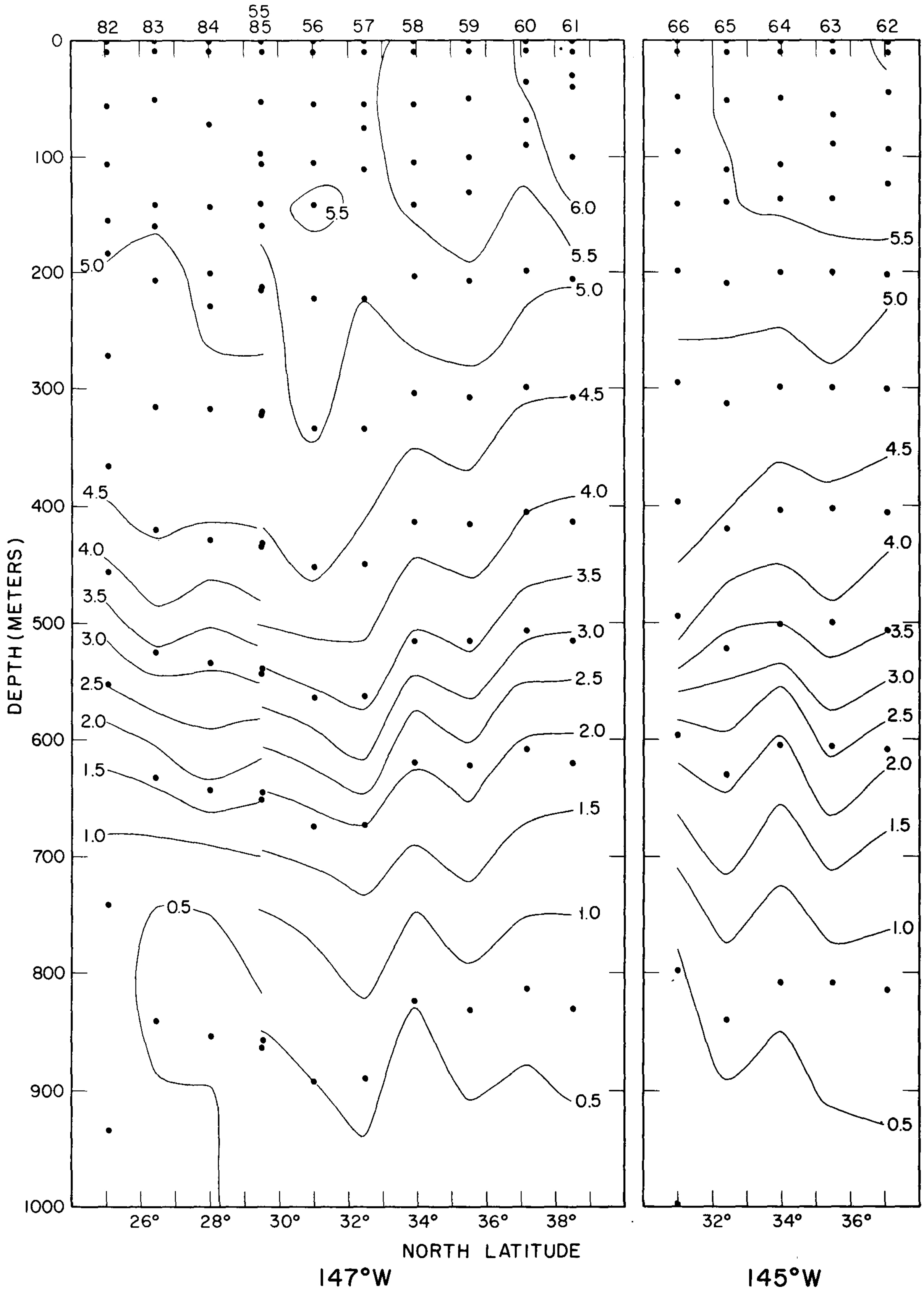

Figure 78.--Vertical section of oxygen in milliliters per liter along 147°W. longitude, stations 55-61 and 82-85. Points indicate observed values.
Figure 79.--Same for 145°W. longitude, stations 62-66.

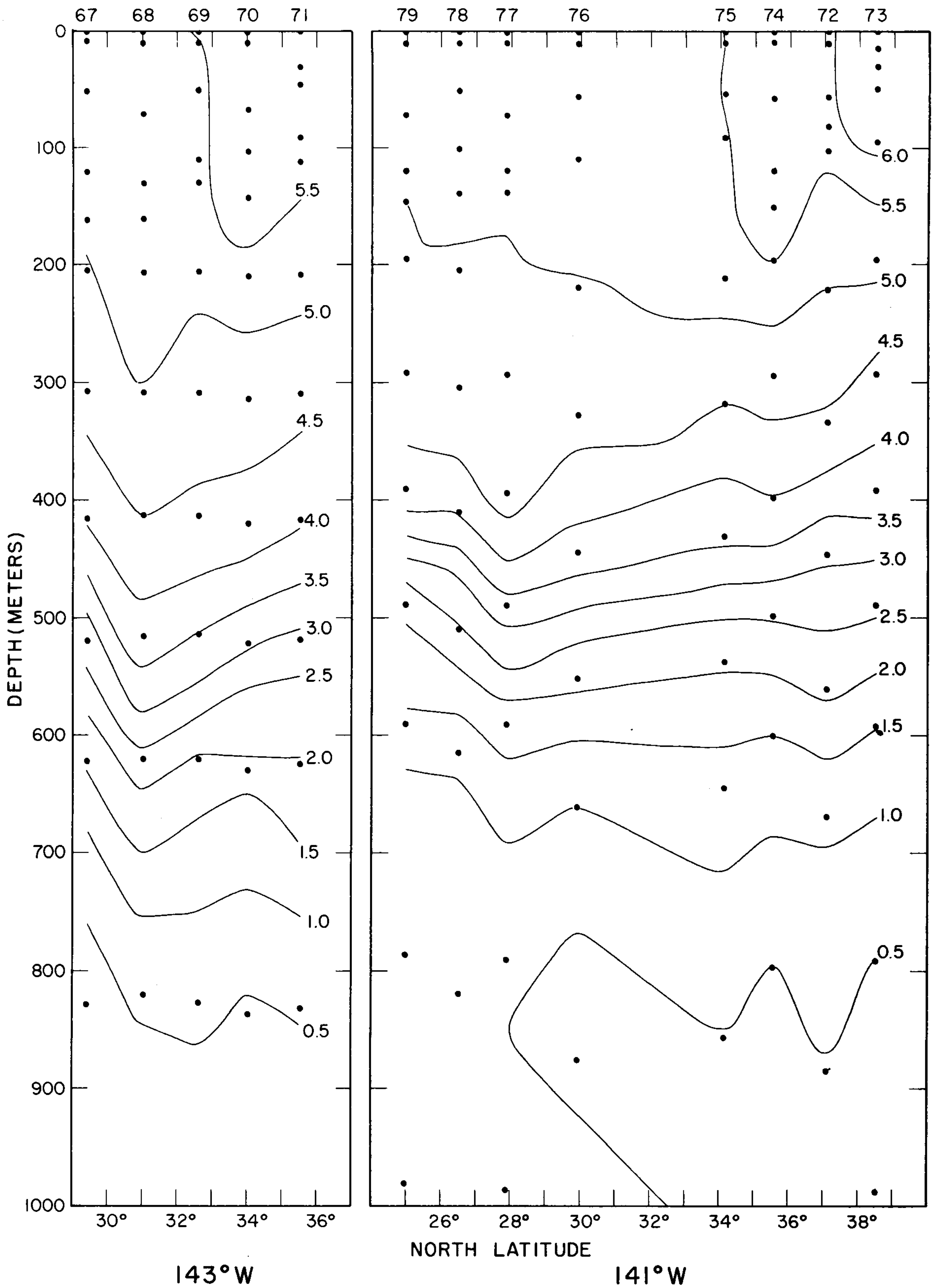

Figure 80.--Vertical section of oxygen in milliliters per liter along 143°W. longitude, stations 67-71. Points indicate observed values.
Figure 81.--Same for 141°W. longitude, stations 72-79.

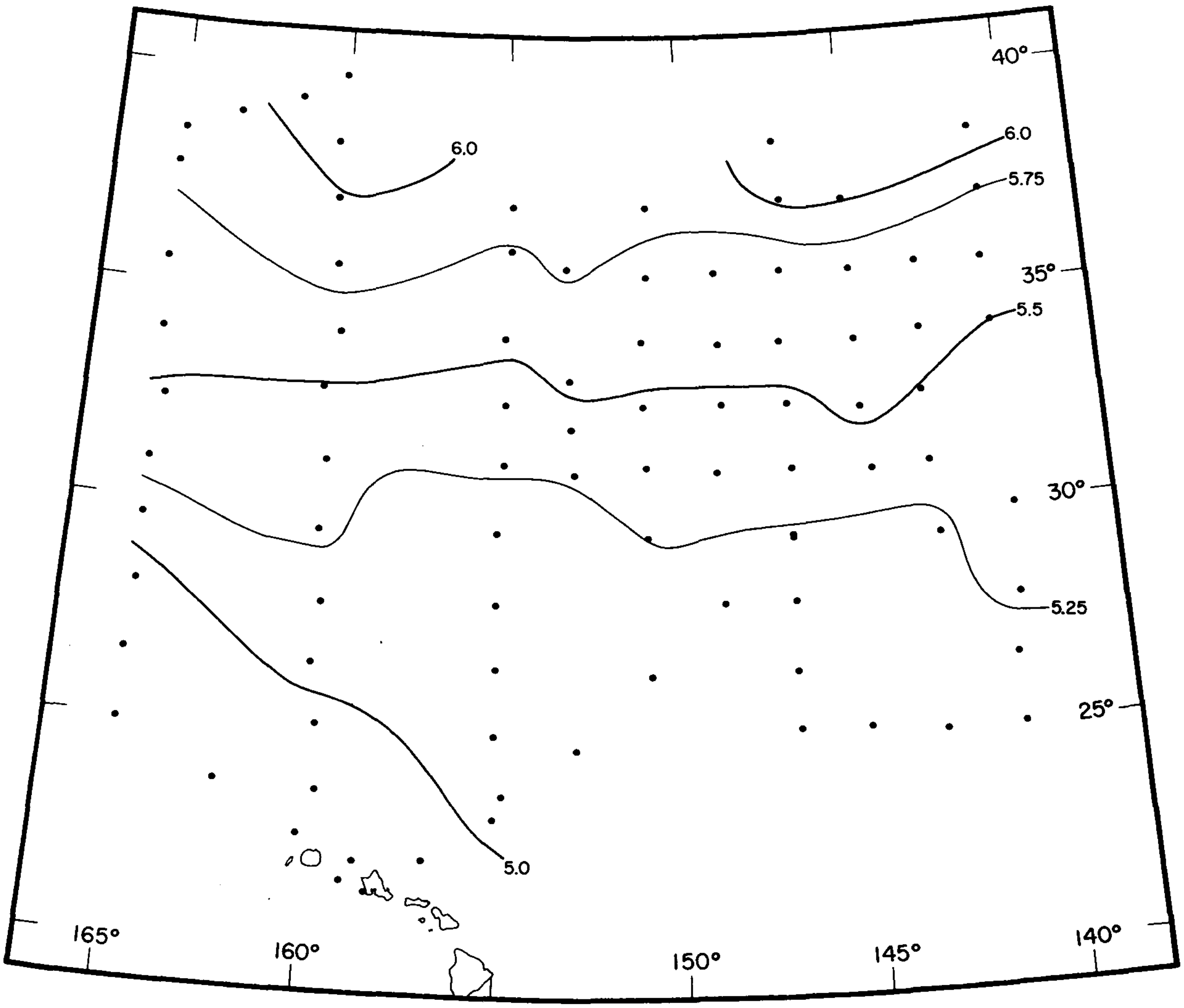

Figure 82. --Oxygen at 10 meters in milliliters per liter. Points indicate observed values.

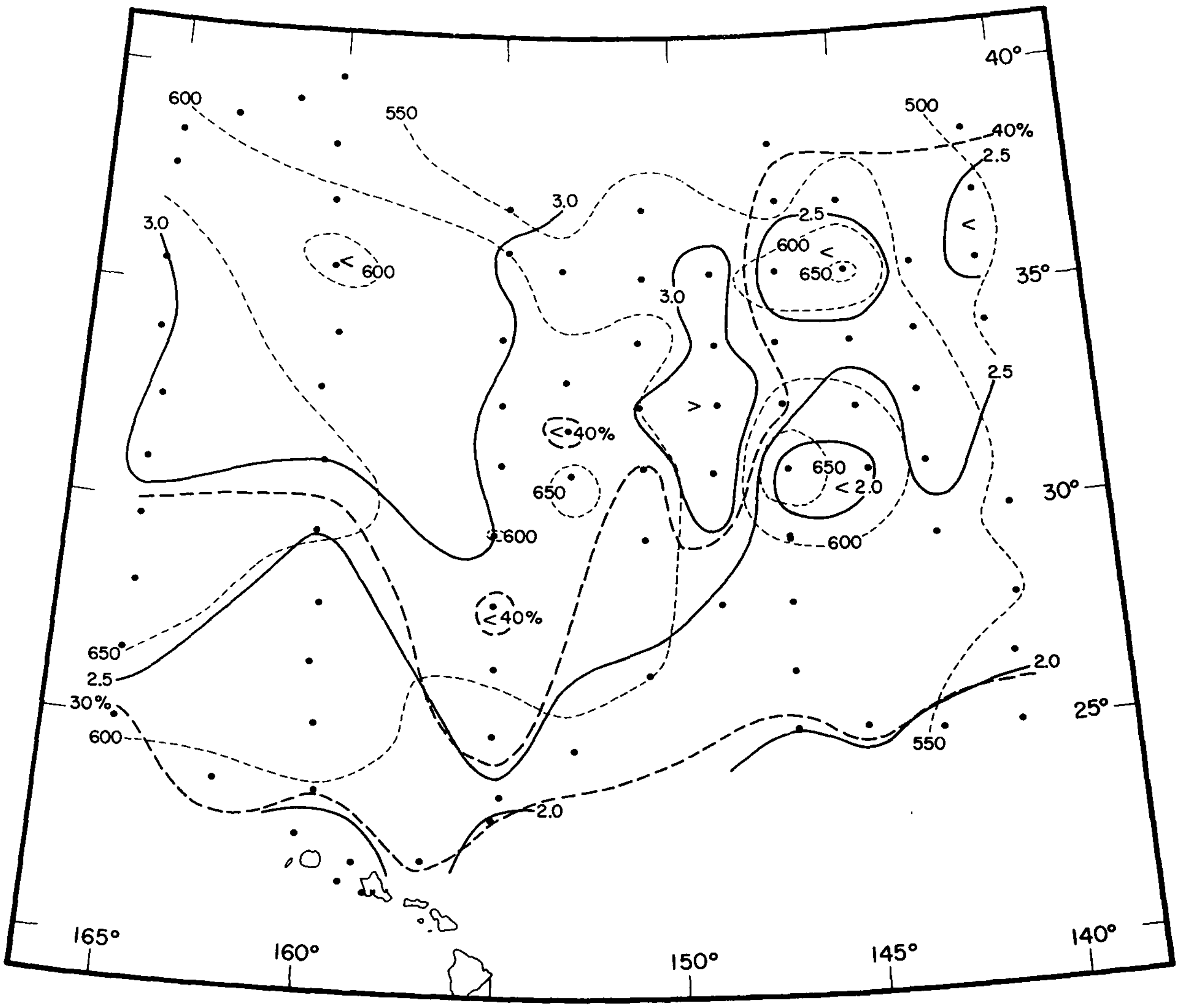

Figure 83. --Oxygen in milliliters per liter (solid lines) and percentage of oxygen saturation (heavy dotted lines) on 26.8 sigma-t surface (depth in meters, light dotted lines). Points indicate station positions.

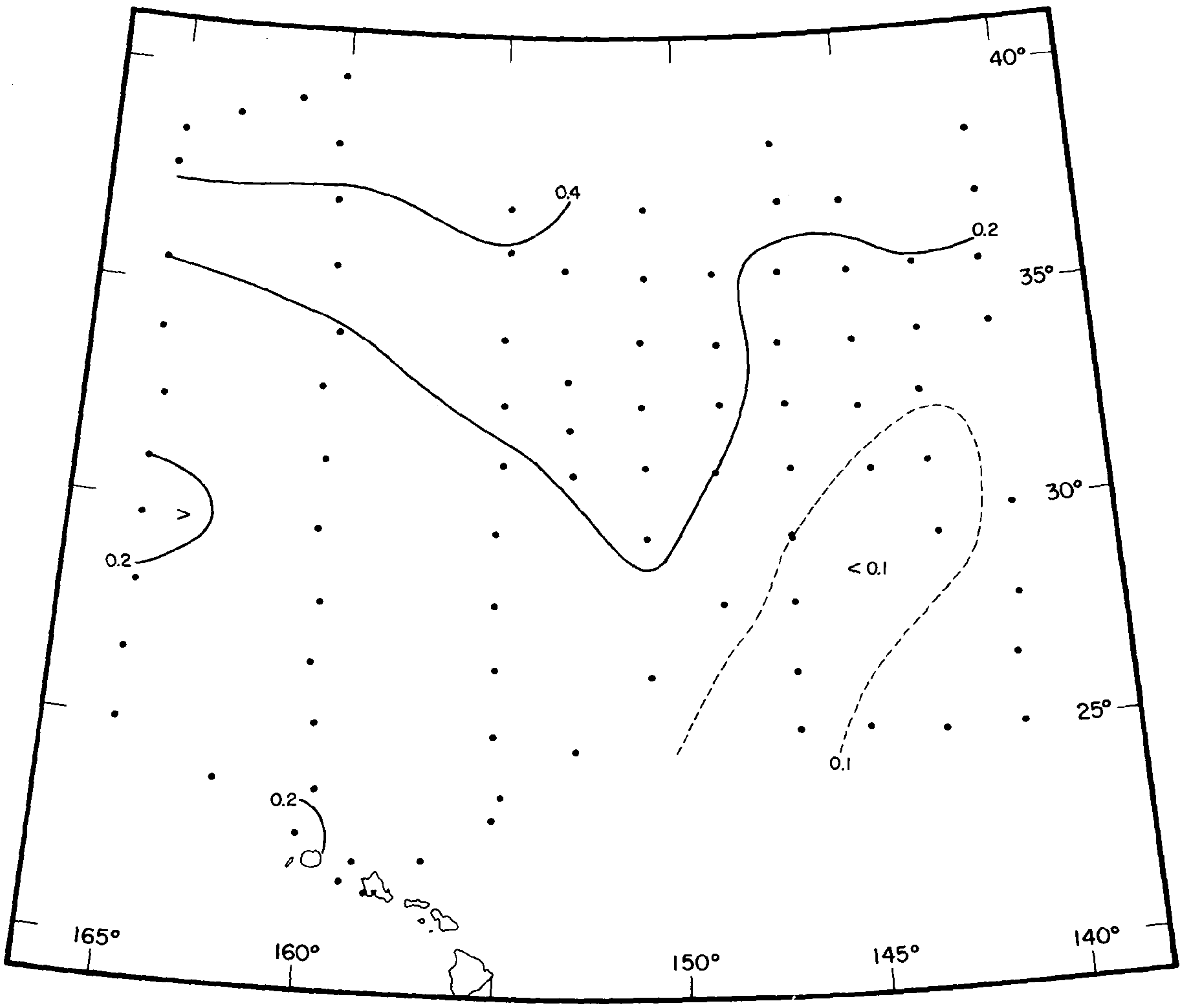

Figure 84.--Surface inorganic phosphate distribution in microgram-atoms per liter. Points indicate observed values.

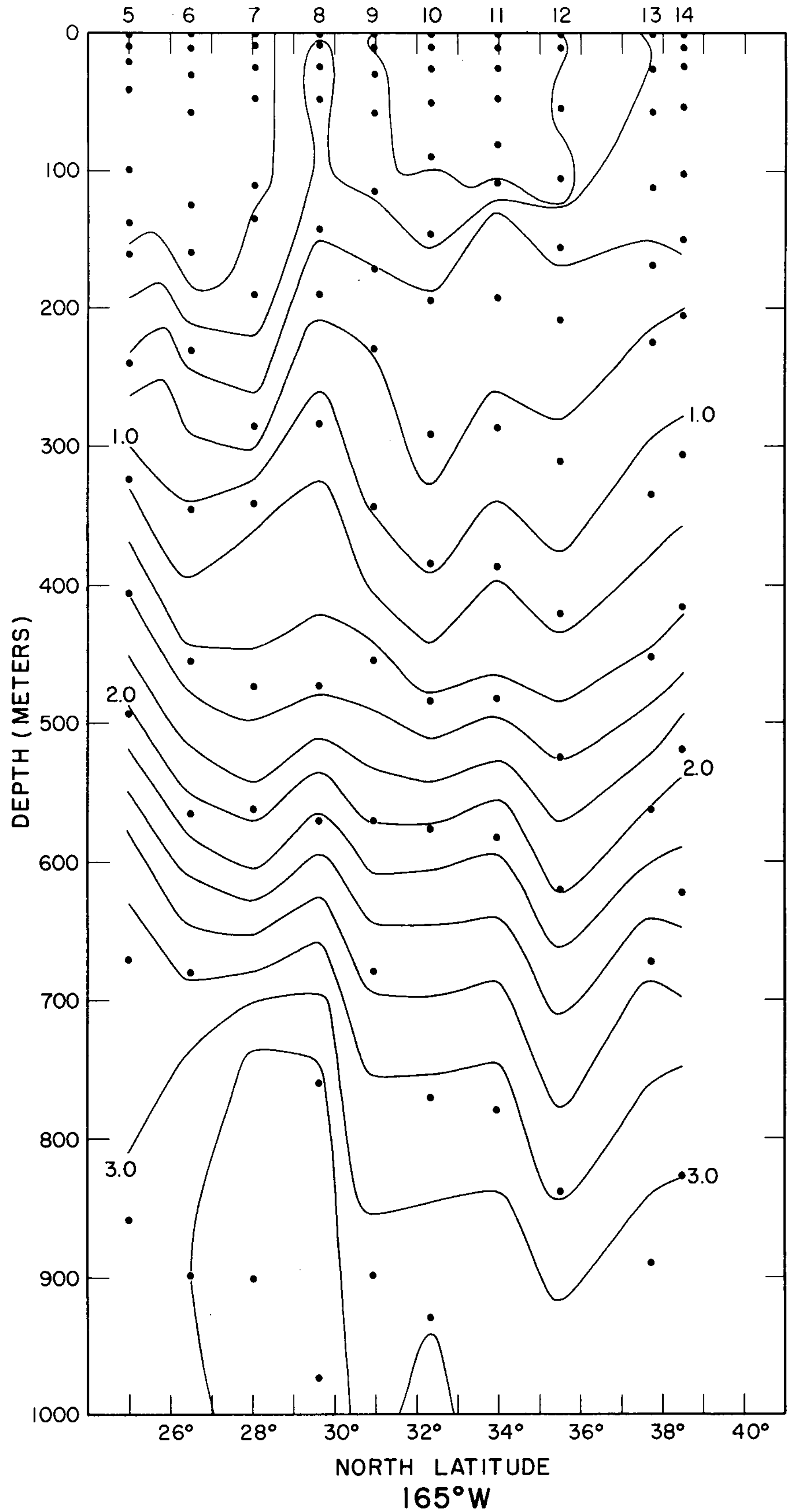

Figure 85.--Vertical section of inorganic phosphate in microgram-atoms per liter along 165°W. longitude, stations 5-14. Points indicate observed values.

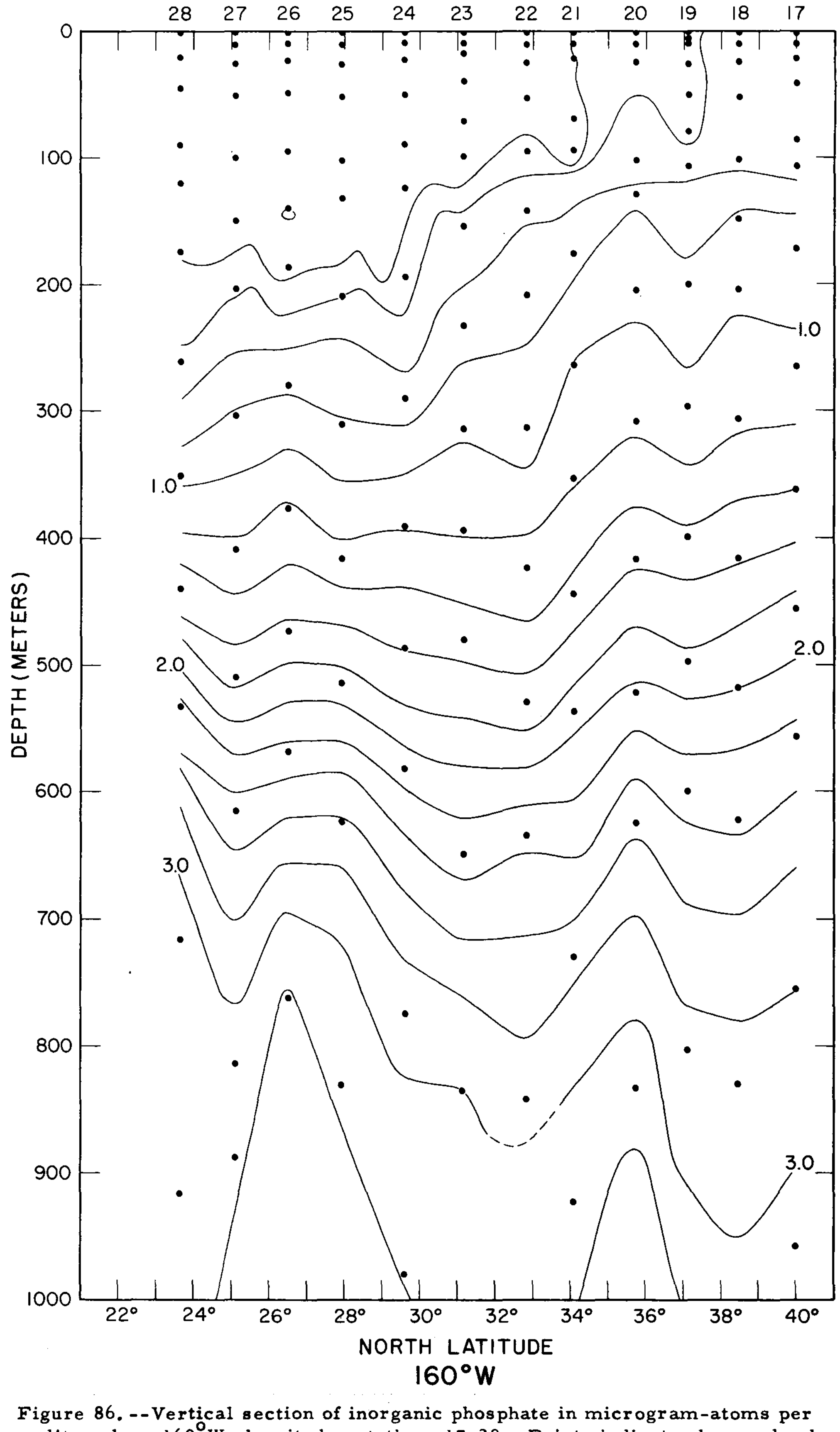

Figure 86.--Vertical section of inorganic phosphate in microgram-atoms per liter along 160°W. longitude, stations 17-28. Points indicate observed values.

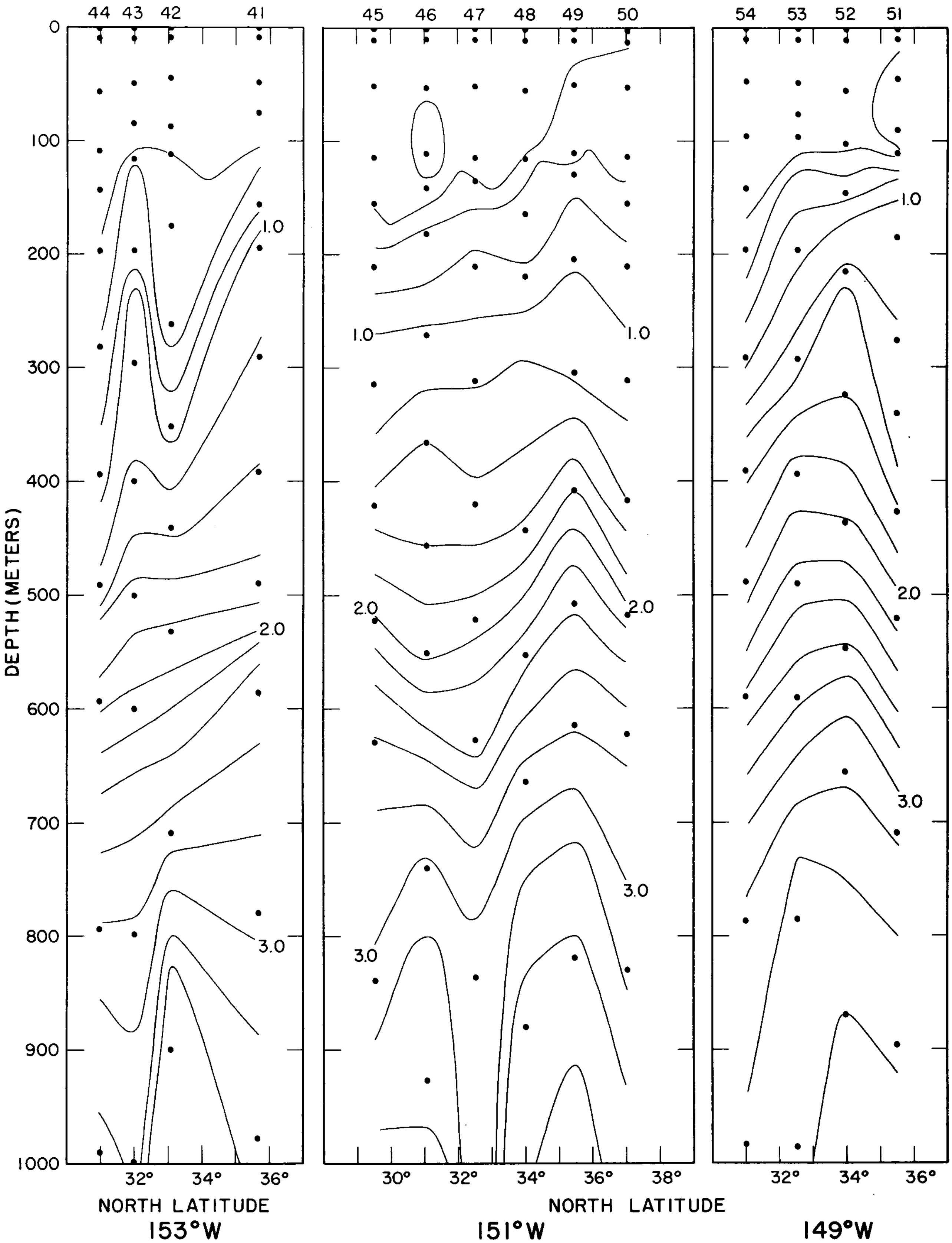

Figure 87.--Vertical section of inorganic phosphate in microgram-atoms per liter along 153°W. longitude, stations 41-44. Points indicate observed values.
Figure 88.--Same for 151°W. longitude, stations 45-50.
Figure 89.--Same for 149°W. longitude, stations 51-54.

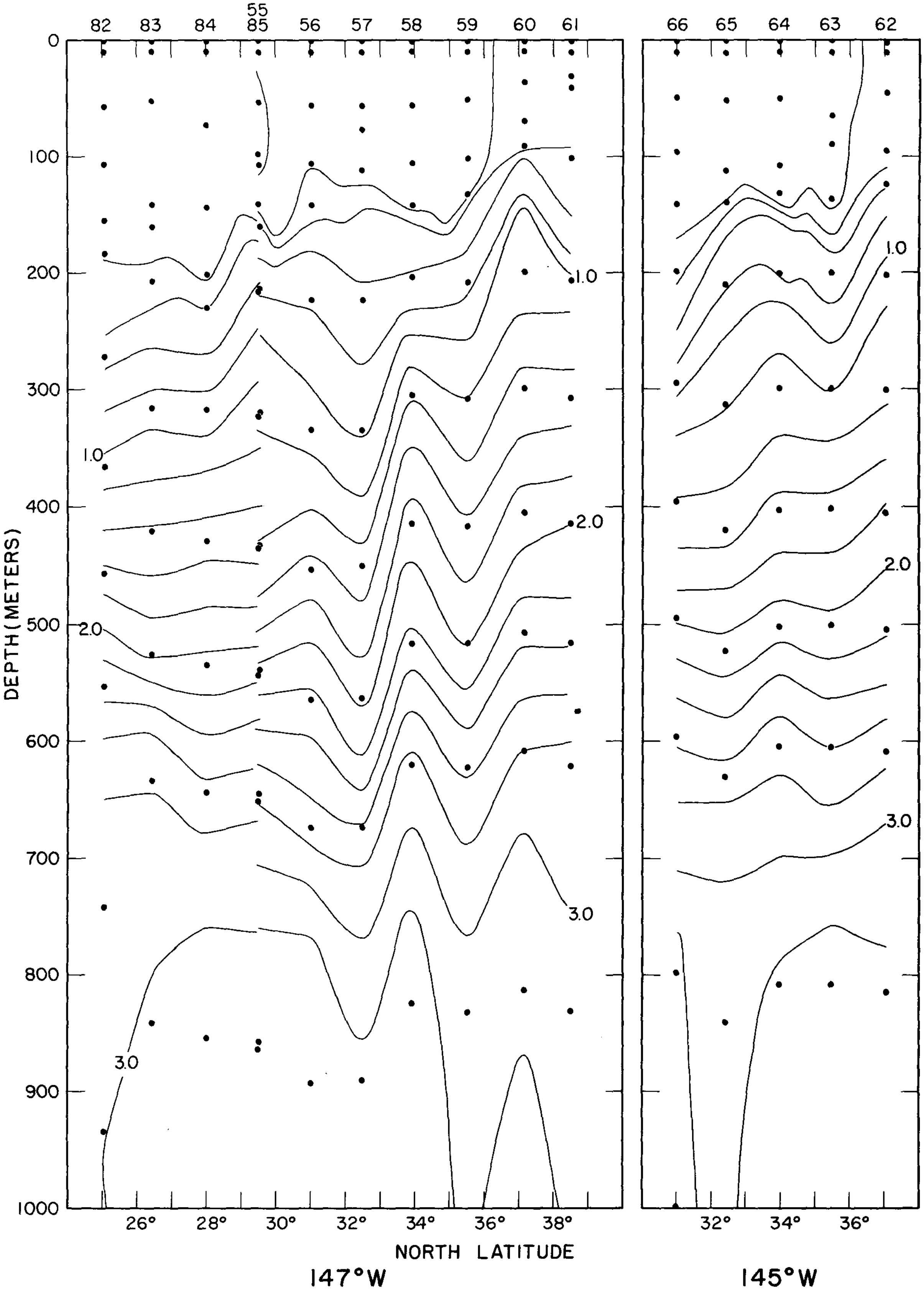

Figure 90.--Vertical section of inorganic phosphate in microgram-atoms per liter along 147°W. longitude, stations 55-61 and 82-85. Points indicate observed values.
Figure 91.--Same for 145°W. longitude, stations 62-66.

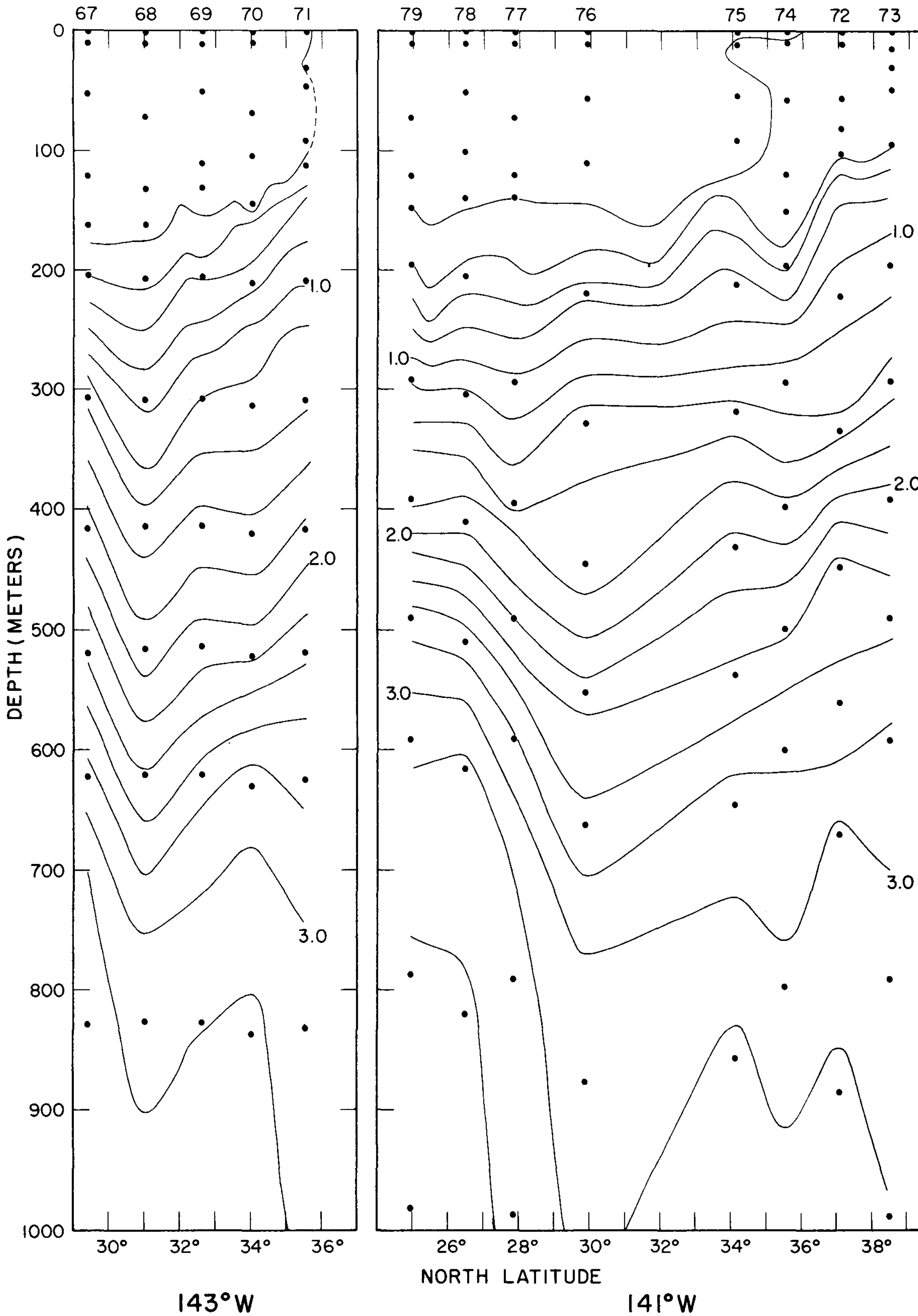

Figure 92.--Vertical section of inorganic phosphate in microgram-atoms per liter along 143°W. longitude, stations 67-71. Points indicate observed values.
Figure 93.--Same for 141°W. longitude, stations 72-79.

NOTES ON THE TABULATED DATA, HMS-25

In every case, any variation from the standard 13-bottle cast has been noted and explained. (See explanatory code.)

Where more than one cast was taken on a station, they are divided in the observed data by a horizontal line. The cast number is indicated by a Roman numeral at the left margin.

Where the duplicate temperature readings differed by more than 0.05° below 300 m., or more than 0.10° above 300 m., and where the duplicate salinity titrations differed by more than 0.02 °/oo, and where the duplicate phosphate determinations differed by more than 0.01 extinction (about 0.05 µg. at/l.), both values were plotted on the station graphs. If one of these values was used in drawing the curve, it is carried in the data and the other discarded. If no choice can be made between them, the value interpolated from the curve is used. This interpolation is rare in the salinity values and is indicated where present; it is common for phosphate, and not indicated; it did not occur in the temperature values.

Weather is recorded in the ww (present weather) code given in the U. S. Weather Bureau Circular M, eighth edition, Manual of Marine Meteorological Observations. Cloud cover is given in tenths of sky covered. Wind velocity was measured with an anemometer 30 meters above the sea surface. The direction (given to the nearest 10°) is that from which the wind was blowing, measured clockwise through 360° from north.

Explanatory Code for Tabulated Data

a/ No analysis made for this property, or analysis faulty and discarded.

b/ Nansen bottle pretripped; no water sample or temperature.

c/ Individual water sample lost.

d/ Value definitely bad and discarded.

e/ Value seems anomalous, but not positively out.

f/ Only one titration made due to insufficient sample.

g/ Duplicate salinity titration values differ by more than 0.02 °/oo but less than 0.07 °/oo; value tabulated is interpolated between the duplicates from the station curve.

STATION 1

M/V Hugh M. Smith: Cruise 25, 21°23'N., 158°18'W., January 16, 1954. Messenger time: 0812 GCT. Weather: 02, cloud coverage 2. Wind: Calm. Sea: 0 ft. Wire angle: 00°. Depth of water: 700 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.88	35.25	23.89	a/	a/
10	23.87	35.23	23.88		
26	23.86	35.24	23.88		
51	23.78	35.25	23.92		
87	23.53	35.28	24.01		
102	22.78	c/	-		
210	17.65	34.82	25.24		
311	12.52	34.23	25.91		
418	08.03	34.14 e/	26.62		
520	06.54	34.15	26.83		
628	05.74	34.28	27.04		
836	04.74	34.42	27.27		
1039	04.11	34.52	27.41		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	23.88	35.25	23.89	0.000	1.835
10	23.87	35.23	23.87	0.040	1.795
20	23.88	35.24	23.88	0.081	1.754
30	23.85	35.24	23.89	0.121	1.714
50	23.80	35.25	23.91	0.202	1.633
75	23.72	35.25	23.93	0.302	1.533
100	22.95	35.28	24.18	0.400	1.435
150	20.20	35.10	24.80	0.575	1.260
200	18.30	34.90	25.14	0.727	1.108
250	15.35	34.47	25.51	0.864	0.971
300	12.92	34.17	25.79	0.985	0.850
400	08.55	34.06	26.47	1.182	0.653
500	06.78	34.14	26.79	1.330	0.505
600	05.90	34.24	26.99	1.455	0.380
700	05.34	34.32	27.12	1.565	0.270
800	04.86	34.39	27.23	1.663	0.172
1000	04.20	34.51	27.40	1.835	0.000

STATION 2

M/V Hugh M. Smith: Cruise 25, 21°36'N., 158°59'W., January 16, 1954. Messenger time: 1457 GCT. Weather: 03, cloud coverage 4. Wind: 160°, 10 kt. Sea: < 1 ft. Wire angle: 00°. Depth of water: 2,200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.77	35.26	23.93	a/	a/
10	23.78	35.25	23.92		
26	23.78	35.24	23.91		
51	23.80	35.25	23.91		
92	23.72	c/	-		
118	d/	35.21	-		
210	18.39	34.94	25.15		
311	11.92	34.13	25.95		
418	08.00	34.06	26.56		
520	06.75	34.11	26.77		
626	05.85	34.19	26.95		
834	04.80	34.42	27.26		
1037	04.12	34.48	27.38		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	23.77	35.26	23.93	0.000	1.879
10	23.78	35.25	23.92	0.040	1.839
20	23.78	35.24	23.91	0.080	1.799
30	23.79	35.24	23.91	0.120	1.759
50	23.80	35.25	23.91	0.201	1.678
75	23.79	35.24	23.91	0.301	1.578
100	23.60	35.24	23.96	0.402	1.477
150	21.33	35.16	24.54	0.588	1.291
200	19.00	35.00	25.04	0.749	1.130
250	16.20	34.61	25.42	0.890	0.989
300	12.79	34.19	25.83	1.013	0.866
400	08.47	34.06	26.49	1.207	0.672
500	06.95	34.10	26.74	1.358	0.521
600	06.05	34.17	26.91	1.489	0.390
700	05.40	34.30	27.10	1.603	0.276
800	04.95	34.40	27.23	1.703	0.176
1000	04.21	34.47	27.36	1.879	0.000

STATION 3

M/V Hugh M. Smith: Cruise 25, 22°35'N., 160°03'W., January 18, 1954. Messenger time: 0532 GCT. Weather: 02, cloud coverage 2. Wind: 180°, 14 kt. Sea: 1-3 ft. Wire angle: 16°. Depth of water: 2,500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.16	35.26	24.11	5.03	0.39
08	23.18	35.28	24.11	4.89	0.43
21	23.00	35.26	24.15	4.88	0.46
42	22.98	35.26	24.16	4.87	0.40
76	22.98	35.27	24.16	c/	c/
97	22.96	35.27	24.17	4.90	0.31
173	20.02	35.09	24.84	4.60	0.45
258	16.64	34.69	25.38	4.44	0.59
349	11.06	34.13	26.11	4.14	1.46
436	08.72	34.07	26.45	3.90	2.03
531	06.92	34.09	26.74	2.12	2.79
719	05.36	34.31	27.11	0.97	3.17
913	04.58	34.42	27.29	1.20	2.99

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	23.16	35.26	24.10	0.000	1.900
10	23.15	35.28	24.12	0.038	1.862
20	23.00	35.26	24.15	0.076	1.824
30	23.00	35.26	24.15	0.114	1.786
50	22.98	35.26	24.16	0.190	1.710
75	22.98	35.27	24.16	0.284	1.616
100	22.94	35.27	24.18	0.379	1.521
150	21.17	35.18	24.60	0.559	1.341
200	19.24	35.00	24.98	0.720	1.180
250	17.00	34.73	25.33	0.865	1.035
300	13.52	34.32	25.78	0.991	0.909
400	09.60	34.08	26.32	1.196	0.704
500	07.43	34.06	26.64	1.360	0.540
600	06.22	34.17	26.89	1.497	0.403
700	05.45	34.29	27.08	1.613	0.287
800	05.00	34.36	27.19	1.715	0.185
1000	04.40	34.43	27.31	1.900	0.000

STATION 4

M/V Hugh M. Smith: Cruise 25, 23°42'N., 162°26'W., January 19, 1954. Messenger time: 0426 GCT. Weather: 02, cloud coverage 2. Wind: 280°, 30 kt. Sea: 8-12 ft. Wire angle: 35°. Depth of water: 2,500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.20	35.27	24.10	4.85	a/
09	23.19	35.26	24.10	4.87	
26	23.21	35.28	24.11	4.83	
51	23.20	35.29	24.12	4.88	
102	22.78	35.28	24.23	4.74	
128	21.68	35.18	24.46	4.72	
206	17.98	34.86	25.19	4.47	
309	12.48	34.22	25.91	4.32	
410	09.04	34.07	26.40	4.11	
516	07.43	34.04	26.62	3.09	
619	05.84	34.11	26.89	1.79	
826	04.47	c/	-	c/	
1052	03.82	34.43	27.37	1.10	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	23.20	35.27	24.10	0.000	1.876
10	23.19	35.26	24.10	0.038	1.838
20	23.20	35.27	24.10	0.077	1.799
30	23.21	35.28	24.11	0.115	1.761
50	23.20	35.29	24.12	0.191	1.685
75	23.20	35.28	24.11	0.287	1.589
100	23.18	35.28	24.11	0.384	1.492
150	20.68	35.10	24.68	0.563	1.313
200	18.35	34.90	25.13	0.719	1.157
250	14.80	34.47	25.63	0.853	1.023
300	12.85	34.26	25.87	0.969	0.907
400	09.30	34.08	26.37	1.167	0.709
500	07.67	34.04	26.59	1.331	0.545
600	06.10	34.09	26.84	1.473	0.403
700	05.18	34.21	27.05	1.592	0.284
800	04.60	34.30	27.19	1.696	0.180
1000	03.96	34.41	27.34	1.876	0.000

STATION 5

M/V Hugh M. Smith: Cruise 25, 24°59'N., 165°02'W., January 20, 1954. Messenger time: 0506 GCT. Weather: 03, cloud coverage 2. Wind: 270°, 18 kt. Sea: 5-8 ft. Wire angle: 35°. Depth of water: 2,700 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	22.86	35.44	24.33	5.29	0.16
08	22.84	35.43	24.33	4.83	0.10
20	22.87	35.44	24.33	4.83	0.14
40	22.84	35.45	24.34	4.78	0.19
98	22.64	35.49	24.43	4.79	0.12
137	22.61	35.49	24.44	4.64	0.18
160	20.55	35.18	24.77	4.56	0.22
239	16.62	34.73	25.42	4.55	0.64
323	12.94	34.34	25.91	4.37	1.16
405	10.37	34.15	26.24	4.06	1.59
492	08.44	34.07	26.50	3.60	2.04
670	05.71	34.15	26.94	1.43	2.88
859	04.62	34.35	27.23	1.13	3.02

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	22.86	35.44	24.33	0.000	1.901
10	22.85	35.43	24.32	0.036	1.865
20	22.87	35.44	24.32	0.072	1.829
30	22.86	35.44	24.33	0.108	1.793
50	22.80	35.45	24.35	0.181	1.720
75	22.70	35.48	24.40	0.270	1.631
100	22.64	35.49	24.43	0.359	1.542
150	21.29	35.29	24.65	0.532	1.369
200	18.40	34.93	25.14	0.688	1.213
250	16.12	34.67	25.49	0.825	1.076
300	13.95	34.44	25.78	0.947	0.954
400	10.53	34.16	26.23	1.157	0.744
500	08.30	34.06	26.51	1.332	0.569
600	06.51	34.08	26.78	1.481	0.420
700	05.50	34.18	26.99	1.607	0.294
800	04.89	34.30	27.16	1.715	0.186
1000	04.26	34.42	27.32	1.901	0.000

STATION 6

M/V Hugh M. Smith: Cruise 25, 26°30'N., 165°02'W., January 20, 1954. Messenger time: 1715 GCT. Weather: 03, cloud coverage 2. Wind: 250°, 22 kt. Sea: 5-8 ft. Wire angle: 20°. Depth of water: 2,500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	21.00	35.44	24.84	4.98	0.11
10	21.02	35.44	24.84	4.94	0.14
29	21.04	35.47	24.86	4.88	0.19
57	21.06	35.45	24.84	4.97	0.20
124	21.04	35.45	24.84	4.88	0.10
158	20.98	35.46	24.86	4.91	0.10
230	15.68	34.61	25.54	4.73	0.51
345	12.36	34.31	26.01	4.63	1.03
454	10.04	34.17	26.32	4.60	1.45
568	07.47	34.02	26.60	3.84	2.11
679	05.59	34.04	26.87	2.35	2.77
899	04.02	34.23	27.19	0.70	3.20
1137	03.44	34.42	27.40	0.85	3.12

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	21.00	35.44	24.85	0.000	1.859
10	21.02	35.44	24.84	0.031	1.828
20	21.03	35.45	24.85	0.062	1.797
30	21.04	35.47	24.86	0.094	1.765
50	21.05	35.45	24.84	0.156	1.703
75	21.05	35.45	24.84	0.234	1.625
100	21.05	35.45	24.84	0.313	1.546
150	21.00	35.46	24.86	0.471	1.388
200	17.80	34.86	25.23	0.620	1.239
250	14.90	34.53	25.65	0.751	1.108
300	13.58	34.42	25.85	0.867	0.992
400	11.18	34.23	26.16	1.077	0.782
500	08.92	34.10	26.45	1.259	0.600
600	06.86	34.00	26.67	1.416	0.443
700	05.30	34.06	26.92	1.551	0.308
800	04.40	34.16	27.10	1.664	0.195
1000	03.80	34.30	27.27	1.859	0.000

STATION 7

M/V Hugh M. Smith: Cruise 25, $28^{\circ}03'$N., $164^{\circ}57'$W., January 21, 1954. Messenger time: first cast 0407 GCT, second cast 0448 GCT. Weather: 81, cloud coverage 8. Wind: 270°, 32 kt. Sea: 5-8 ft. Wire angle: first cast 36°, second cast 48°. Depth of water: 2,800 f.

OBSERVED

Cast	DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
	00	21.32	35.50	24.80	4.93	0.08
	08	21.34	35.48	24.78	4.89	0.10
	24	21.36	35.44	24.75	4.94	0.10
	47	21.37	35.47	24.77	4.97	0.11
	110	21.36	35.46	24.76	4.93	0.11
	134	21.35	35.47	24.77	4.94	0.23
I	189	17.96	34.88	25.21	4.65	0.27
	285	14.42	34.49	25.72	4.72	0.69
II	341	12.90	34.38	25.95	d/	1.12
I	473	10.06	34.17	26.31	4.66	1.49
	565	07.98	34.05	26.55	4.03	1.91
II	b/	-	-	-	-	-
	901	04.20	34.20	27.15	0.57	3.49

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD1000 - ΔD (dyn. m)
00	21.32	35.50	24.81	0.000	1.911
10	21.34	35.48	24.79	0.032	1.879
20	21.35	35.45	24.76	0.064	1.847
30	21.36	35.45	24.76	0.096	1.815
50	21.37	35.47	24.77	0.160	1.751
75	21.37	35.46	24.76	0.240	1.671
100	21.36	35.46	24.76	0.321	1.590
150	21.35	35.46	24.77	0.482	1.429
200	17.40	34.81	25.29	0.632	1.279
250	15.25	34.57	25.60	0.763	1.148
300	14.03	34.46	25.78	0.882	1.029
400	11.65	34.29	26.12	1.097	0.814
500	09.40	34.13	26.39	1.284	0.627
600	07.25	34.00	26.62	1.447	0.464
700	05.52	34.02	26.86	1.587	0.324
800	04.66	34.13	27.05	1.706	0.205
1000	03.95	34.25	27.22	1.911	0.000

STATION 8

M/V Hugh M. Smith: Cruise 25, 29°37'N., 164°59'W., January 21, 1954. Messenger time: 2011 GCT. Weather: 02, cloud coverage 8. Wind: 260°, 29 kt. Sea: 20-40 ft. Wire angle: 45°. Depth of water: 2,500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	19.64	35.28	25.09	5.09	0.38
08	19.65	35.26	25.07	5.11	0.42
24	19.66	35.26	25.07	5.09	0.52
47	19.68	35.28	25.08	5.19	0.46
95	19.64	35.27	25.08	5.19	0.40
142	17.67	34.97	25.35	4.91	0.58
189	15.60	34.60	25.55	4.85	0.74
283	13.16	34.38	25.90	4.97	1.09
376	11.62	c/	-	4.82	c/
473	09.67	34.13	26.35	4.66	1.58
567	07.50	34.01	26.59	3.85	2.22
760	05.10	34.04	26.93	1.90	3.24
973	03.96	34.22	27.19	0.79	-

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	19.64	35.28	25.09	0.000	1.813
10	19.65	35.26	25.07	0.029	1.784
20	19.66	35.26	25.07	0.058	1.755
30	19.67	35.27	25.07	0.087	1.726
50	19.68	35.28	25.08	0.145	1.668
75	19.66	35.28	25.08	0.218	1.595
100	19.65	35.27	25.08	0.291	1.522
150	17.30	34.88	25.37	0.431	1.382
200	15.33	34.57	25.59	0.559	1.254
250	14.16	34.47	25.76	0.679	1.134
300	12.82	34.36	25.95	0.790	1.023
400	11.27	34.25	26.16	0.994	0.819
500	09.00	34.09	26.43	1.177	0.636
600	06.96	33.98	26.64	1.337	0.476
700	05.63	33.99	26.82	1.478	0.335
800	04.79	34.08	26.99	1.601	0.212
1000	03.85	34.22	27.20	1.813	0.000

STATION 9

M/V Hugh M. Smith: Cruise 25, 30°57'N., 164°58'W., January 22, 1954. Messenger time: 0710 GCT. Weather: 02, cloud coverage 9. Wind: 270°, 25 kt. Sea: 12-20 ft. Wire angle: 25°. Depth of water: 3,100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	17.29	34.73	25.26	5.52	0.20
10	17.28	34.73	25.26	5.36	0.18
28	17.31	34.71	25.24	5.43	0.24
57	17.32	34.74	25.26	5.43	0.22
114	16.29	34.59	25.39	5.24	0.37
171	14.24	34.45	25.73	4.91	0.63
229	13.27	34.41	25.90	5.08	0.79
343	11.70	34.29	26.11	5.11	0.98
454	09.76	34.16	26.36	4.83	1.45
570	07.33	34.04	26.64	4.11	1.99
680	05.64	33.98	26.82	3.11	2.55
899	04.08	34.16	27.13	1.31	3.04
1130	03.38	34.27	27.29	d/	d/

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	17.29	34.73	25.26	0.000	1.729
10	17.28	34.73	25.26	0.027	1.702
20	17.29	34.72	25.25	0.055	1.674
30	17.31	34.71	25.24	0.082	1.647
50	17.32	34.73	25.25	0.137	1.592
75	17.32	34.74	25.26	0.206	1.523
100	17.10	34.72	25.29	0.274	1.455
150	14.75	34.47	25.64	0.402	1.327
200	14.00	34.44	25.77	0.519	1.210
250	12.85	34.37	25.95	0.629	1.100
300	12.19	34.33	26.05	0.733	0.996
400	10.81	34.24	26.24	0.929	0.800
500	08.81	34.11	26.47	1.106	0.623
600	06.80	34.00	26.68	1.262	0.467
700	05.45	33.98	26.84	1.400	0.329
800	04.60	34.09	27.02	1.522	0.207
1000	03.75	34.22	27.21	1.729	0.000

STATION 10

M/V Hugh M. Smith: Cruise 25, 32°20'N., 164°48'W., January 22, 1954. Messenger time: 1902 GCT. Weather: 02, cloud coverage 2. Wind: 260°, 27 kt. Sea: 12-20 ft. Wire angle: 35°. Depth of water: 2,800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	16.66	34.64	25.34	5.38	0.14
09	16.66	34.63	25.33	5.48	0.18
25	16.69	34.63	25.32	5.51	0.15
49	16.70	34.65	25.33	5.52	0.09
89	16.68	34.65	25.34	5.57	0.12
146	15.69	34.51	25.46	5.50	0.32
194	14.36	34.50	25.74	5.23	0.65
291	12.66	34.36	25.98	5.14	0.73
384	11.28	34.27	26.17	5.34	0.97
483	09.22	34.12	26.42	4.88	1.41
576	07.24	34.00	26.62	4.15	2.01
770	04.86	34.02	26.94	2.22	2.85
955	03.76	34.23	27.22	0.71	3.24

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	16.66	34.64	25.34	0.000	1.745
10	16.66	34.63	25.33	0.027	1.718
20	16.67	34.63	25.33	0.053	1.692
30	16.69	34.63	25.32	0.080	1.665
50	16.70	34.65	25.34	0.133	1.612
75	16.69	34.64	25.33	0.200	1.545
100	16.14	34.55	25.39	0.266	1.479
150	15.59	34.51	25.48	0.396	1.349
200	14.24	34.49	25.76	0.517	1.228
250	13.19	34.40	25.91	0.629	1.116
300	12.55	34.35	26.00	0.735	1.010
400	10.99	34.24	26.21	0.935	0.810
500	08.80	34.08	26.45	1.115	0.630
600	06.82	33.97	26.65	1.273	0.472
700	05.55	33.97	26.82	1.413	0.332
800	04.70	34.04	26.97	1.538	0.207
1000	03.60	34.26	27.26	1.745	0.000

STATION 11

M/V Hugh M. Smith: Cruise 25, 33°57'N., 164°59'W., January 23, 1954. Messenger time: 0820 GCT. Weather: 02, cloud coverage 1. Wind: 250°, 19 kt. Sea: 5-8 ft. Wire angle: not recorded. Depth of water: 3,200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σt	O_2 (ml/l)	PO_4-P (μg at/l)
00	15.92	34.42	25.34	5.64	0.13
10	15.94	34.42	25.33	5.65	0.08
24	15.95	34.42	25.33	5.66	0.08
47	15.96	34.41	25.32	5.70	0.12
80	15.94	34.43	25.34	5.62	0.18
108	15.48	34.41	25.43	5.57	0.23
192	12.54	34.32	25.98	5.38	0.69
287	11.48	34.25	26.12	5.29	0.85
386	10.14	34.17	26.30	4.94	1.17
482	08.74	34.06	26.44	4.61	1.51
583	06.48	33.96	26.69	d/	2.15
781	04.53	34.06	27.00	1.73	2.90
978	03.77	34.30	27.27	0.97	3.12

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σt	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	15.92	34.42	25.34	0.000	1.659
10	15.94	34.42	25.33	0.026	1.633
20	15.94	34.42	25.33	0.053	1.606
30	15.95	34.42	25.33	0.080	1.579
50	15.96	34.42	25.33	0.133	1.526
75	15.97	34.42	25.33	0.200	1.459
100	15.89	34.42	25.35	0.266	1.393
150	13.09	34.34	25.88	0.387	1.272
200	12.51	34.31	25.97	0.494	1.165
250	11.81	34.27	26.08	0.596	1.063
300	11.36	34.23	26.13	0.695	0.964
400	09.96	34.15	26.32	0.883	0.776
500	08.31	34.03	26.49	1.055	0.604
600	06.26	33.96	26.72	1.208	0.451
700	05.17	33.98	26.87	1.342	0.317
800	04.41	34.09	27.04	1.460	0.199
1000	03.76	34.30	27.28	1.659	0.000

STATION 12

M/V Hugh M. Smith: Cruise 25, 35°29'N., 165°01'W., January 23, 1954. Messenger time: 2148 GCT. Weather: 03, cloud coverage 7. Wind: 160°, 19 kt. Sea: 3-5 ft. Wire angle: 24°. Depth of water: 2,900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	15.05	34.37	25.50	5.61	0.20
10	15.06	34.37	25.50	5.61	0.17
24	15.08	34.37	25.49	5.64	0.20
53	15.08	34.36	25.48	5.66	0.21
105	15.06	34.36	25.49	5.64	0.18
156	13.14	34.29	25.83	5.31	0.56
208	12.58	34.29	25.94	5.28	0.67
311	11.30	34.21	26.12	5.38	0.86
420	10.14	34.16	26.29	5.05	1.14
525	08.27	34.06	26.52	4.34	1.58
630	06.20	33.96	26.73	3.52	2.08
838	04.46	34.06	27.01	1.70	2.75
1052	03.66	34.24	27.24	0.71	3.13

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	15.05	34.37	25.49	0.000	1.687
10	15.06	34.36	25.48	0.025	1.662
20	15.08	34.36	25.48	0.050	1.637
30	15.09	34.36	25.48	0.075	1.612
50	15.10	34.36	25.48	0.126	1.561
75	15.10	34.36	25.48	0.189	1.498
100	15.06	34.36	25.48	0.252	1.435
150	13.18	34.29	25.83	0.371	1.316
200	12.60	34.29	25.94	0.480	1.207
250	11.93	34.26	26.05	0.584	1.103
300	11.41	34.22	26.11	0.684	1.003
400	10.36	34.17	26.26	0.875	0.812
500	08.78	34.09	26.46	1.051	0.636
600	06.72	33.97	26.67	1.208	0.479
700	05.42	33.96	26.82	1.347	0.340
800	04.68	34.03	26.96	1.472	0.215
1000	03.81	34.20	27.19	1.687	0.000

STATION 13

M/V Hugh M. Smith: Cruise 25, 37°44'N., 165°01'W., January 24, 1954. Messenger time: 1528 GCT. Weather: 01, cloud coverage 1. Wind: 130°, 15 kt. Sea: 8-12 ft. Wire angle: 10°. Depth of water: 3,000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	13.18	34.23	25.78	5.81	0.51
10	13.17	34.22	25.77	5.87	0.40
25	13.18	34.23	25.78	5.83	0.44
56	13.19	34.25	25.79	5.89	0.45
112	12.42	34.22	25.92	5.80	0.49
168	12.29	34.32	26.03	5.61	0.67
224	11.44	34.28	26.15	5.40	0.83
335	09.51	34.15	26.39	5.46	1.10
452	07.96	34.01	26.52	5.47	1.42
563	06.32	33.98	26.73	3.84	2.02
674	04.94	34.01	26.92	2.45	2.56
890	03.90	34.22	27.20	1.16	3.05
1106	03.30	34.32	27.33	0.67	3.13

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	13.18	34.23	25.78	0.000	1.515
10	13.17	34.22	25.77	0.022	1.493
20	13.18	34.24	25.79	0.045	1.470
30	13.18	34.24	25.79	0.067	1.448
50	13.19	34.24	25.79	0.111	1.404
75	13.00	34.24	25.82	0.167	1.348
100	12.55	34.22	25.90	0.221	1.294
150	12.34	34.28	25.98	0.326	1.189
200	11.85	34.30	26.09	0.427	1.088
250	10.97	34.24	26.21	0.524	0.991
300	10.04	34.19	26.33	0.614	0.901
400	08.69	34.06	26.45	0.786	0.729
500	07.18	33.99	26.62	0.944	0.571
600	05.83	33.96	26.77	1.087	0.428
700	04.74	34.04	26.97	1.213	0.302
800	04.21	34.15	27.11	1.323	0.192
1000	03.58	34.27	27.27	1.515	0.000

STATION 14

M/V Hugh M. Smith: Cruise 25, 38°29'N., 164°58'W., January 24, 1954. Messenger time: 2147 GCT. Weather: 01, cloud coverage 6. Wind: 170°, 17 kt. Sea: 3-5 ft. Wire angle: 24°. Depth of water: 3,000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	13.11	34.23	25.79	5.84	0.47
09	13.08	34.23	25.80	5.89	0.45
23	12.98	34.25	25.84	5.87	0.41
52	12.72	34.23	25.87	5.91	0.46
102	12.63	34.25	25.90	5.82	0.52
150	12.57	34.26	25.93	5.74	0.54
205	11.66	34.28	26.11	5.36	0.82
307	10.32	34.21	26.30	5.13	1.08
415	08.84	34.10	26.46	d/	1.37
519	06.90	34.00	26.67	5.09	1.91
623	05.55	33.96	26.81	3.17	2.31
828	04.20	34.11	27.08	1.41	2.99
1050	03.53	34.24	27.25	0.72	3.24

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	13.11	34.23	25.79	0.000	1.537
10	13.05	34.24	25.81	0.022	1.515
20	13.00	34.24	25.82	0.044	1.493
30	12.92	34.24	25.84	0.066	1.471
50	12.73	34.23	25.87	0.109	1.428
75	12.66	34.24	25.89	0.163	1.374
100	12.64	34.25	25.90	0.216	1.321
150	12.57	34.26	25.92	0.323	1.214
200	11.75	34.28	26.10	0.425	1.112
250	11.13	34.25	26.19	0.522	1.015
300	10.41	34.21	26.28	0.614	0.923
400	09.09	34.12	26.44	0.789	0.748
500	07.23	34.01	26.63	0.947	0.590
600	05.80	33.96	26.78	1.090	0.447
700	04.95	34.00	26.91	1.218	0.319
800	04.30	34.10	27.06	1.334	0.203
1000	03.68	34.20	27.20	1.537	0.000

STATION 15

M/V Hugh M. Smith: Cruise 25, 38°59'N., 163°14'W., January 25, 1954. Messenger time: first cast 0850 GCT, second cast 0913 GCT. Weather: 02, cloud coverage 2. Wind: 250°, 16 kt. Sea: 3-5 ft. Wire angle: first cast 23°, second cast 20°. Depth of water: 3,000 f.

OBSERVED

Cast	DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
	00	12.72	34.22	25.86	5.96	0.51
	10	12.72	34.22	25.86	5.96	0.47
	24	12.70	34.23	25.87	5.95	0.52
I	48	12.72	34.23	25.87	5.87	0.49
	106	12.67	34.24	25.89	5.80	0.54
	144	11.99	34.29	26.06	5.50	0.72
	197	11.14	34.23	26.17	5.33	0.92
	295	10.06	34.17	26.32	5.29	1.10
	406	08.40	34.08	26.51	5.08	1.46
	504	06.44	33.95	26.69	3.96	2.00
II	608	05.32	33.97	26.84	2.84	2.39
	813	04.12	34.14	27.11	1.31	2.98
	1014	03.46	34.30	27.31	0.66	3.20

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	12.72	34.22	25.86	0.000	1.484
10	12.72	34.22	25.86	0.021	1.463
20	12.70	34.23	25.88	0.043	1.441
30	12.71	34.23	25.87	0.064	1.420
50	12.72	34.23	25.87	0.107	1.377
75	12.70	34.23	25.88	0.161	1.323
100	12.68	34.24	25.89	0.215	1.269
150	11.93	34.28	26.06	0.318	1.166
200	11.07	34.22	26.18	0.416	1.068
250	10.38	34.18	26.27	0.508	0.976
300	09.99	34.16	26.32	0.598	0.886
400	08.45	34.08	26.50	0.767	0.717
500	06.55	33.96	26.68	0.920	0.564
600	05.39	33.96	26.83	1.056	0.428
700	04.68	34.04	26.97	1.179	0.305
800	04.16	34.12	27.09	1.290	0.194
1000	03.55	34.26	27.27	1.484	0.000

STATION 16

M/V Hugh M. Smith: Cruise 25, 39°26'N., 161°27'W., January 25, 1954. Messenger time: first cast 2004 GCT, second cast 2032 GCT. Weather: 03, cloud coverage 7. Wind: 130°, 03 kt. Sea: 3-5 ft. Wire angle: first cast 20°, second cast 10°. Depth of water: 2,900 f.

OBSERVED

	DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
	00	12.14	34.09	25.88	6.08	0.58
	10	12.11	34.09	25.88	6.06	0.58
	24	12.13	34.09	25.88	6.08	0.53
	52	12.12	34.09	25.88	6.08	0.54
I	105	11.88	34.14	25.96	5.87	0.66
	154	11.23	34.18	26.11	-	0.85
	212	10.45	34.14	26.22	5.52	0.98
	317	09.14	34.05	26.37	5.21	1.26
	428	07.78	34.00	26.54	4.57	1.62
	571	05.36	33.93	26.81	2.99	2.34
II	684	04.59	34.06	27.00	2.56	2.68
	902	03.71	34.21	27.21	0.85	3.02
	1120	03.19	34.33	27.36	0.57	3.17

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	12.14	34.09	25.88	0.000	1.459
10	12.11	34.09	25.88	0.021	1.438
20	12.13	34.09	25.88	0.043	1.416
30	12.12	34.09	25.88	0.064	1.395
50	12.12	34.09	25.88	0.107	1.352
75	12.10	34.09	25.88	0.160	1.299
100	11.92	34.13	25.95	0.213	1.246
150	11.29	34.18	26.10	0.314	1.145
200	10.62	34.16	26.21	0.410	1.049
250	09.99	34.10	26.27	0.501	0.958
300	09.35	34.06	26.35	0.590	0.869
400	08.14	34.01	26.50	0.758	0.701
500	06.32	33.92	26.68	0.911	0.548
600	05.06	33.97	26.87	1.045	0.414
700	04.46	34.07	27.02	1.163	0.296
800	04.05	34.14	27.12	1.270	0.189
1000	03.41	34.27	27.29	1.459	0.000

STATION 25

M/V Hugh M. Smith: Cruise 25, 27°56'N., 159°56'W., January 30, 1954. Messenger time: 1045 GCT. Weather: 02, cloud coverage 9. Wind: 130°, 11 kt. Sea: 1-3 ft. Wire angle: 05°. Depth of water: 2,700 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	20.64	35.36	24.88	5.04	0.10
10	20.62	35.37	24.89	5.04	0.07
26	20.63	35.37	24.89	5.02	0.04
51	20.66	35.37	24.88	4.98	0.06
102	20.64	35.36	24.88	4.99	0.04
132	20.18	35.25	24.92	5.03	0.06
209	15.49	34.48	25.48	4.86	0.35
311	12.28	34.23	25.96	4.79	0.84
416	09.79	34.10	26.30	4.62	1.27
517	07.48	33.99	26.58	3.81	1.86
624	05.84	34.03	26.83	2.03	2.62
831	04.38	34.21	27.14	0.63	3.19
1033	03.80	34.37	27.33	0.50	3.22

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	20.64	35.36	24.88	0.000	1.791
10	20.62	35.37	24.90	0.031	1.760
20	20.62	35.37	24.90	0.061	1.730
30	20.63	35.37	24.89	0.092	1.699
50	20.66	35.37	24.89	0.154	1.637
75	20.65	35.36	24.88	0.231	1.560
100	20.64	35.36	24.88	0.309	1.482
150	19.50	35.10	24.99	0.463	1.328
200	16.19	34.57	25.39	0.605	1.186
250	13.61	34.32	25.76	0.729	1.062
300	12.58	34.25	25.91	0.841	0.950
400	10.20	34.12	26.25	1.043	0.748
500	07.73	34.00	26.55	1.214	0.577
600	06.12	34.02	26.79	1.361	0.430
700	05.13	34.09	26.96	1.487	0.304
800	04.50	34.18	27.10	1.598	0.193
1000	03.90	34.33	27.29	1.791	0.000

STATION 26

M/V Hugh M. Smith: Cruise 25, 26°30'N., 160°01'W., January 30, 1954. Messenger time: 2140 GCT. Weather: 02, cloud coverage 2. Wind: 180°, 16 kt. Sea: 1-3 ft. Wire angle: 27°. Depth of water: 2,500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	21.68	35.45	24.67	5.17	0.08
09	21.66	35.45	24.67	5.11	0.04
23	21.62	35.44	24.68	5.11	0.09
48	21.58	35.44	24.69	5.11	0.08
95	21.18	35.45	24.80	5.13	0.04
141	20.92	35.42	24.85	5.12	0.04
187	18.64	34.95	25.09	4.95	0.16
280	13.05	34.30	25.86	4.86	0.76
377	10.54	34.15	26.22	4.79	1.21
472	08.66	34.05	26.45	4.38	1.64
569	06.89	34.00	26.67	3.30	2.25
762	04.68	34.12	27.03	1.22	3.22
965	03.83	34.33	27.29	0.74	3.37

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	21.68	35.45	24.67	0.000	1.831
10	21.66	35.45	24.67	0.033	1.798
20	21.62	35.44	24.68	0.066	1.765
30	21.60	35.44	24.68	0.098	1.733
50	21.57	35.44	24.69	0.164	1.667
75	21.32	35.45	24.77	0.245	1.586
100	21.17	35.45	24.81	0.325	1.506
150	20.83	35.41	24.87	0.483	1.348
200	17.70	34.80	25.21	0.633	1.198
250	14.19	34.38	25.69	0.763	1.068
300	12.49	34.26	25.94	0.876	0.955
400	10.02	34.12	26.28	1.075	0.756
500	08.10	34.03	26.52	1.247	0.584
600	06.42	34.00	26.73	1.398	0.433
700	05.23	34.06	26.93	1.529	0.302
800	04.50	34.16	27.09	1.643	0.188
1000	03.70	34.38	27.35	1.831	0.000

STATION 27

M/V Hugh M. Smith: Cruise 25, 25°07'N., 159°55'W., January 31, 1954. Messenger time: first cast 0822 GCT, second cast 0846 GCT. Weather: 02, cloud coverage 6. Wind: 190°, 19 kt. Sea: 3-5 ft. Wire angle: first cast 9°, second cast 10°. Depth of water: 2,600 f.

OBSERVED

	DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
	00	22.40	35.39	24.42	4.92	0.21
	10	22.40	35.39	24.42	4.92	0.11
	25	22.42	35.40	24.42	4.88	0.06
	50	22.34	35.42	24.46	4.90	0.03
I	99	21.84	35.47	24.64	4.93	0.06
	149	20.64	35.29	24.83	4.89	0.09
	203	17.38	34.80	25.28	4.72	0.35
	303	12.94	34.34	25.91	4.76	0.83
	408	10.35	34.17	26.26	4.65	1.24
	509	08.42	34.06	26.49	4.08	1.73
II	615	06.56	34.04	26.74	2.60	2.49
	819	04.60	34.20	27.11	0.98	3.12
	1021	03.86	34.38	27.33	1.02	3.23

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	22.40	35.39	24.42	0.000	1.884
10	22.40	35.39	24.42	0.035	1.849
20	22.41	35.40	24.43	0.070	1.814
30	22.41	35.41	24.43	0.106	1.778
50	22.34	35.42	24.46	0.176	1.708
75	22.05	35.46	24.57	0.262	1.622
100	21.84	35.47	24.64	0.346	1.538
150	20.58	35.28	24.84	0.509	1.375
200	17.66	34.83	25.24	0.659	1.225
250	14.92	34.51	25.63	0.790	1.094
300	13.08	34.35	25.89	0.906	0.978
400	10.51	34.18	26.24	1.109	0.775
500	08.52	34.07	26.49	1.285	0.599
600	06.77	34.03	26.71	1.438	0.446
700	05.69	34.08	26.89	1.573	0.311
800	04.75	34.17	27.07	1.690	0.194
1000	03.90	34.37	27.32	1.884	0.000

STATION 28

M/V Hugh M. Smith: Cruise 25, 23°39'N., 159°48'W., January 31, 1954. Messenger time: 2207 GCT. Weather: 02, cloud coverage 1. Wind: 190°, 26 kt. Sea: 5-8 ft. Wire angle: 36°. Depth of water: 2,600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	22.99	35.31	24.19	5.07	0.17
08	22.98	35.29	24.18	5.02	0.20
20	22.98	35.31	24.19	5.04	0.09
44	22.97	35.30	24.19	5.02	0.13
89	22.91	35.32	24.22	4.98	0.12
120	22.09	35.31	24.45	4.89	0.10
174	20.10	35.20	24.91	4.70	0.19
260	16.29	34.68	25.46	4.65	0.46
351	12.28	34.28	26.00	4.72	0.95
439	09.43	34.12	26.38	4.39	1.49
532	07.66	34.07	26.61	3.20	2.23
717	05.57	34.29	27.07	1.01	3.16
917	04.78	34.42	27.26	1.12	3.09

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	22.99	35.31	24.19	0.000	1.919
10	22.98	35.30	24.19	0.037	1.882
20	22.98	35.31	24.19	0.075	1.844
30	22.97	35.30	24.19	0.112	1.807
50	22.97	35.30	24.19	0.187	1.732
75	22.92	35.31	24.21	0.281	1.638
100	22.81	35.32	24.25	0.374	1.545
150	20.80	35.27	24.77	0.548	1.371
200	19.22	35.06	25.03	0.705	1.214
250	16.80	34.74	25.38	0.847	1.072
300	14.50	34.47	25.69	0.974	0.945
400	10.40	34.18	26.26	1.186	0.733
500	08.22	34.07	26.53	1.358	0.561
600	06.62	34.14	26.81	1.505	0.414
700	05.68	34.27	27.04	1.627	0.292
800	05.18	34.35	27.16	1.733	0.186
1000	04.48	34.47	27.34	1.919	0.000

STATION 29

M/V Hugh M. Smith: Cruise 25, 22°02'N., 158°41'W., February 1, 1954. Messenger time: 1435 GCT. Weather: 02, cloud coverage 2. Wind: 190°, 19 kt. Sea: 3-5 ft. Wire angle: 30°. Depth of water: 1,800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.74	35.25	23.93	4.89	0.11
09	23.74	35.25	23.93	4.88	0.09
21	23.76	35.25	23.92	4.87	0.08
43	23.43	35.26	24.03	4.94	0.06
85	23.16	35.26	24.11	4.83	0.08
124	21.70	35.16	24.44	4.73	0.09
169	20.26	35.16	24.83	4.65	0.17
251	16.30	34.66	25.44	4.38	0.52
337	11.73	c/	-	c/	c/
421	08.88	34.13	26.48	3.23	1.97
510	06.82	34.14	26.79	1.87	2.64
694	05.33	34.33	27.13	0.91	3.19
888	04.42	34.47	27.34	1.04	3.19

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD1000 - ΔD (dyn. m)
00	23.74	35.25	23.93	0.000	1.838
10	23.74	35.25	23.93	0.040	1.798
20	23.76	35.25	23.92	0.080	1.758
30	23.64	35.25	23.96	0.120	1.718
50	23.40	35.26	24.03	0.199	1.639
75	23.25	35.26	24.08	0.296	1.542
100	22.66	35.22	24.22	0.391	1.447
150	20.94	35.19	24.67	0.568	1.270
200	19.23	35.04	25.01	0.727	1.111
250	16.32	34.66	25.43	0.868	0.970
300	13.40	34.40	25.87	0.990	0.848
400	09.45	34.15	26.40	1.187	0.651
500	06.98	34.13	26.76	1.341	0.497
600	05.95	34.24	26.98	1.468	0.370
700	05.25	34.35	27.15	1.576	0.262
800	04.75	34.42	27.27	1.671	0.167
1000	04.17	34.52	27.41	1.838	0.000

STATION 30

M/V Hugh M. Smith: Cruise 25, 22°01'N., 157°00'W., February 9, 1954. Messenger time: 1425 GCT. Weather: 02, cloud coverage not recorded. Wind: 310°, 07 kt. Sea: 1-3 ft. Wire angle: 17°. Depth of water: 2,500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.10	35.43	24.25	5.06	0.20
10	23.12	35.26	24.12	4.92	0.32
53	22.94	35.52	24.37	4.95	0.16
106	22.88	35.70	24.52	4.92	0.09
169	20.84	35.14	24.66	4.65	0.14
213	19.62	35.03	24.90	4.67	0.12
318	13.02	34.31	25.87	4.61	0.89
430	08.95	34.09	26.43	3.39	1.56
537	06.79	34.02	26.70	2.57	1.99
646	05.72	34.20	26.98	1.00	2.64
856	04.68	34.41	27.27	0.91	2.88
1069	03.96	34.51	27.42	1.20	2.80
1274	03.56	34.54	27.48	1.35	2.65

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	23.10	35.43	24.25	0.000	1.880
10	23.12	35.26	24.12	0.037	1.843
20	23.10	35.30	24.15	0.075	1.805
30	23.07	35.36	24.21	0.113	1.767
50	22.95	35.48	24.33	0.187	1.693
75	22.93	35.60	24.43	0.276	1.604
100	22.90	35.68	24.50	0.364	1.516
150	22.25	35.53	24.57	0.537	1.343
200	20.18	35.09	24.80	0.703	1.177
250	17.19	34.78	25.32	0.853	1.027
300	14.02	34.42	25.75	0.979	0.901
400	09.70	34.12	26.34	1.185	0.695
500	07.40	34.03	26.62	1.349	0.531
600	06.07	34.13	26.88	1.487	0.393
700	05.36	34.26	27.07	1.605	0.275
800	04.85	34.38	27.22	1.706	0.174
1000	04.19	34.49	27.38	1.880	0.000

STATION 31

M/V Hugh M. Smith: Cruise 25, 23°33'N., 154°56'W., February 10, 1954. Messenger time: 0852 GCT. Weather: 02, cloud coverage 2. Wind: 240°, 14 kt. Sea: 3-5 ft. Wire angle: 18°. Depth of water: 2,300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	22.77	35.23	24.20	a/	a/
09	22.79	35.26	24.21		
48	22.82	35.21	24.17		
105	22.82	35.35	24.27		
143	22.40	c/	-		
196	20.02	35.08	24.83		
292	16.62	34.78	25.45		
392	11.36	34.20	26.11		
489	08.32	34.05	26.50		
591	06.34	34.07	26.80		
789	05.14	34.29	27.12		
983	04.34	34.43	27.32		
1187	03.78	c/	-		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	22.77	35.23	24.19	0.000	1.981
10	22.79	35.26	24.21	0.037	1.944
20	22.80	35.25	24.20	0.075	1.906
30	22.81	35.24	24.19	0.112	1.869
50	22.82	35.21	24.16	0.187	1.794
75	22.82	35.28	24.22	0.281	1.700
100	22.82	35.34	24.26	0.374	1.607
150	21.98	35.28	24.46	0.556	1.425
200	19.87	35.07	24.87	0.723	1.258
250	17.93	34.90	25.23	0.873	1.108
300	16.26	34.73	25.50	1.008	0.973
400	11.04	34.19	26.16	1.235	0.746
500	08.01	34.04	26.54	1.412	0.569
600	06.23	34.08	26.82	1.558	0.423
700	05.60	34.18	26.98	1.682	0.299
800	05.05	34.29	27.13	1.793	0.188
1000	04.30	34.44	27.33	1.981	0.000

STATION 32

M/V Hugh M. Smith: Cruise 25, 24°59'N., 155°05'W., February 10, 1954. Messenger time: 2045 GCT. Weather: 50, cloud coverage 7. Wind: 240°, 19 kt. Sea: 5-8 ft. Wire angle: 16°. Depth of water: 2,500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	22.47	35.03	24.13	5.19	a/
09	22.48	35.39	24.40	5.13	
54	22.50	35.41	24.41	5.12	
98	21.90	35.30	24.49	5.10	
163	19.06	d/	-	4.78	
218	16.14	34.56	25.40	4.49	
327	11.49	34.25	26.12	4.83	
441	08.54	34.13	26.53	4.18	
551	06.64	34.07	26.76	3.11	
661	05.38	34.13	26.96	1.63	
874	04.22	34.38	27.29	0.68	
1090	03.69	34.56	27.49	1.18	
1295	03.24	34.49	27.48	1.46	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	22.47	35.03	24.13	0.000	1.783
10	22.48	35.39	24.40	0.037	1.746
20	22.48	35.40	24.41	0.072	1.711
30	22.49	35.40	24.40	0.108	1.675
50	22.50	35.41	24.41	0.179	1.604
75	22.50	35.41	24.41	0.267	1.516
100	21.78	35.30	24.53	0.355	1.428
150	19.54	35.00	24.90	0.519	1.264
200	17.41	34.70	25.20	0.668	1.115
250	14.18	34.46	25.75	0.797	0.986
300	12.32	34.35	26.04	0.906	0.877
400	09.53	34.17	26.40	1.094	0.689
500	07.42	34.09	26.66	1.253	0.530
600	06.01	34.08	26.85	1.391	0.392
700	05.07	34.18	27.04	1.511	0.272
800	04.50	34.31	27.21	1.613	0.170
1000	03.84	34.50	27.43	1.783	0.000

STATION 33

M/V Hugh M. Smith: Cruise 25, 26°28'N., 155°04'W., February 11, 1954. Messenger time: 0925 GCT. Weather: 01, cloud coverage not recorded. Wind: 270°, 24 kt. Sea: 5-8 ft. Wire angle: 36°. Depth of water: 3,000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σt	O_2 (ml/l)	PO_4-P (μg at/l)
00	20.99	35.37	24.79	a/	a/
08	20.99	35.39	24.81		
19	21.01	35.37	24.79		
43	21.00	35.41	24.82		
92	20.98	35.41	24.83		
114	20.99	35.41	24.82		
168	18.13	34.94	25.21		
251	13.98	34.51	25.83		
341	11.34	34.23	26.13		
428	09.90	34.18	26.35		
517	08.10	34.11	26.58		
698	05.32	34.11	26.95		
892	04.14	34.29	27.23		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σt	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	20.99	35.37	24.80	0.000	1.781
10	20.99	35.38	24.80	0.032	1.749
20	21.01	35.37	24.79	0.063	1.718
30	21.00	35.38	24.80	0.095	1.686
50	21.00	35.41	24.83	0.158	1.623
75	20.99	35.41	24.83	0.237	1.544
100	20.99	35.41	24.83	0.316	1.465
150	18.80	35.04	25.12	0.468	1.313
200	16.70	34.78	25.43	0.606	1.175
250	14.01	34.51	25.83	0.727	1.054
300	12.40	34.33	26.01	0.836	0.945
400	10.32	34.19	26.29	1.031	0.750
500	08.42	34.12	26.54	1.202	0.579
600	06.59	34.08	26.77	1.350	0.431
700	05.30	34.12	26.97	1.478	0.303
800	04.63	34.21	27.11	1.589	0.192
1000	03.90	34.32	27.28	1.781	0.000

STATION 34

M/V Hugh M. Smith: Cruise 25, 27°59'N., 155°05'W., February 11, 1954. Messenger time: first cast 2239 GCT, second cast 2307 GCT. Weather: 02, cloud coverage 4. Wind: 320°, 15 kt. Sea: 12-20 ft. Wire angle: first cast 10°, second cast 25°. Depth of water: 3,000 f.

OBSERVED

	DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
	00	20.40	35.37	24.95	5.27	a/
	10	20.40	35.35	24.94	5.23	
	24	20.40	35.39	24.97	5.27	
	54	20.40	35.37	24.95	5.29	
I	108	20.41	35.37	24.95	5.28	
	186	18.98	35.03	25.06	5.06	
	215	16.94	34.69	25.31	4.93	
	323	12.38	34.27	25.97	4.34	
	437	09.46	c/	-	d/	
	531	07.82	34.05	26.57	d/	
II	638	06.01	34.00	26.79	d/	
	849	04.40	34.23	27.15	d/	
	1064	03.79	34.51 f/	27.44	d/	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	20.40	35.37	24.96	0.000	1.824
10	20.40	35.35	24.94	0.030	1.794
20	20.40	35.38	24.96	0.060	1.764
30	20.40	35.38	24.96	0.090	1.734
50	20.40	35.37	24.96	0.151	1.673
75	20.40	35.37	24.96	0.227	1.597
100	20.41	35.37	24.95	0.303	1.521
150	20.18	35.32	24.98	0.455	1.369
200	18.10	34.84	25.14	0.603	1.221
250	15.08	34.48	25.57	0.738	1.086
300	13.20	34.32	25.85	0.856	0.968
400	10.17	34.16	26.29	1.060	0.764
500	08.35	34.07	26.51	1.232	0.592
600	06.52	34.01	26.73	1.383	0.441
700	05.39	34.05	26.90	1.516	0.308
800	04.70	34.16	27.07	1.633	0.191
1000	03.93	34.41	27.35	1.824	0.000

STATION 35

M/V Hugh M. Smith: Cruise 25, 29°34'N., 155°05'W., February 12, 1954. Messenger time: 1335 GCT. Weather: 02, cloud coverage 6. Wind: 270°, 12 kt. Sea: 8-12 ft. Wire angle: 15°. Depth of water: 3,100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	18.46	34.90	25.10	5.14	a/
10	18.46	34.88	25.08	5.10	
24	18.50	34.94	25.12	5.14	
49	18.51	34.90	25.09	5.16	
98	18.48	34.90	25.09	5.15	
122	18.49	34.92	25.11	5.18	
200	13.41	34.34	25.82	4.97	
299	11.30	34.19	26.11	4.61	
403	09.88	34.18	26.35	4.75	
502	07.64	34.04	26.59	4.11	
606	05.94	34.02	26.81	2.91	
808	04.54	34.22	27.13	0.77	
1009	03.76	34.34	27.31	0.83	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	18.46	34.90	25.10	0.000	1.676
10	18.46	34.88	25.08	0.029	1.647
20	18.49	34.92	25.11	0.058	1.618
30	18.50	34.92	25.11	0.086	1.590
50	18.51	34.90	25.09	0.144	1.532
75	18.49	34.90	25.09	0.217	1.459
100	18.48	34.90	25.10	0.289	1.387
150	15.75	34.60	25.52	0.425	1.251
200	13.41	34.34	25.82	0.544	1.132
250	12.12	34.23	25.99	0.652	1.024
300	11.29	34.19	26.11	0.754	0.922
400	09.92	34.18	26.35	0.941	0.735
500	07.70	34.04	26.59	1.107	0.569
600	05.99	34.02	26.80	1.251	0.425
700	05.16	34.11	26.97	1.376	0.300
800	04.58	34.21	27.12	1.486	0.190
1000	03.80	34.33	27.30	1.676	0.000

STATION 36

M/V Hugh M. Smith: Cruise 25, 31°08'N., 154°59'W., February 13, 1954. Messenger time: 0232 GCT. Weather: 02, cloud coverage 5. Wind: 320°, 14 kt. Sea: 5-8 ft. Wire angle: 20°. Depth of water: 2,800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	18.72	34.99	25.10	5.28	a/
11	18.74	35.03	25.13	5.27	
53	18.71	34.99	25.10	5.23	
105	18.61	34.97	25.11	5.23	
132	18.52	34.96	25.13	5.22	
206	13.58	34.36	25.80	4.70	
310	11.59	34.25	26.10	4.90	
418	09.62	34.14	26.36	4.72	
522	07.85	34.07	26.59	4.30	
628	06.17	34.02	26.78	3.04	
837	04.25	34.16	27.11	0.97	
1050	03.71	34.36	27.33	0.44	
1256	03.28	34.49	27.47	0.78	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	18.72	34.99	25.10	0.000	1.715
10	18.74	35.03	25.13	0.029	1.686
20	18.73	35.02	25.12	0.057	1.658
30	18.73	35.01	25.12	0.086	1.629
50	18.71	34.99	25.11	0.143	1.572
75	18.66	34.98	25.11	0.215	1.500
100	18.62	34.97	25.11	0.288	1.427
150	16.70	34.71	25.38	0.426	1.289
200	13.90	34.39	25.76	0.550	1.165
250	12.10	34.28	26.03	0.659	1.056
300	11.62	34.26	26.11	0.760	0.955
400	10.02	34.17	26.32	0.949	0.766
500	08.24	34.08	26.54	1.118	0.597
600	06.55	34.02	26.73	1.268	0.447
700	05.35	34.04	26.90	1.401	0.314
800	04.46	34.12	27.06	1.517	0.198
1000	03.82	34.30	27.27	1.715	0.000

STATION 37

M/V Hugh M. Smith: Cruise 25, 32°32'N., 154°59'W., February 13, 1954. Messenger time: 1417 GCT. Weather: 02, cloud coverage 5. Wind: 000°, 7 kt. Sea: 3-5 ft. Wire angle: 00°. Depth of water: 2,800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	17.52	34.72	25.20	5.36	a/
10	17.56	34.74	25.20	5.27	
51	17.60	34.74	25.19	5.30	
127	17.60	34.72	25.17	5.32	
153	15.32	c/	-	5.21	
210	13.34	34.25	25.76	5.07	
311	11.56	34.23	26.09	4.92	
418	09.64	34.14	26.36	4.68	
519	07.64	34.00	26.56	4.29	
626	05.76	33.96	26.78	2.94	
835	04.13	34.14	27.11	0.92	
1038	03.57	34.31	27.30	0.46	
1245	03.23	c/	-	0.57	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	17.52	34.72	25.19	0.000	1.710
10	17.56	34.74	25.20	0.028	1.682
20	17.58	34.74	25.19	0.056	1.654
30	17.59	34.74	25.19	0.084	1.626
50	17.60	34.74	25.19	0.140	1.570
75	17.60	34.73	25.18	0.210	1.500
100	17.60	34.72	25.17	0.280	1.430
150	15.50	34.46	25.46	0.415	1.295
200	13.62	34.26	25.71	0.538	1.172
250	12.52	34.24	25.92	0.651	1.059
300	11.67	34.23	26.07	0.755	0.955
400	09.99	34.15	26.31	0.946	0.764
500	08.02	34.02	26.52	1.116	0.594
600	06.12	33.96	26.74	1.266	0.444
700	04.98	34.01	26.92	1.397	0.313
800	04.30	34.11	27.07	1.512	0.198
1000	03.70	34.26	27.25	1.710	0.000

STATION 38

M/V Hugh M. Smith: Cruise 25, 34°02'N., 155°00'W., February 14, 1954. Messenger time: 0236 GCT. Weather: 03, cloud coverage 9. Wind: 120°, 15 kt. Sea: 3-5 ft. Wire angle: 05°. Depth of water: 3,300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	15.78	34.22	25.22	5.71	a/
10	15.80	34.25	25.23	5.63	
51	15.72	34.18	25.20	5.64	
117	14.96	34.16	25.35	5.62	
154	12.68	34.20	25.86	5.25	
209	12.14	34.27	26.02	5.01	
311	10.60	34.18	26.23	5.01	
417	08.90	34.09	26.44	4.63	
520	07.26	34.02	26.63	4.12	
625	05.59	34.14 e/	-	3.03	
833	04.16	34.16	27.12	1.14	
1034	03.48	34.31	27.31	0.47	
1240	03.10	34.43	27.44	0.41	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	15.78	34.22	25.22	0.000	1.630
10	15.80	34.25	25.24	0.028	1.602
20	15.78	34.24	25.23	0.055	1.575
30	15.75	34.22	25.22	0.083	1.547
50	15.72	34.18	25.20	0.138	1.492
75	15.67	34.18	25.21	0.208	1.422
100	15.56	34.17	25.23	0.277	1.353
150	12.74	34.19	25.84	0.402	1.228
200	12.28	34.26	25.98	0.509	1.121
250	11.27	34.21	26.13	0.610	1.020
300	10.72	34.18	26.21	0.706	0.924
400	09.19	34.10	26.40	0.886	0.744
500	07.57	34.03	26.60	1.048	0.582
600	05.89	33.96	26.77	1.192	0.438
700	04.95	34.02	26.93	1.321	0.309
800	04.34	34.11	27.07	1.436	0.194
1000	03.58	34.30	27.29	1.630	0.000

STATION 39

M/V Hugh M. Smith: Cruise 25, 36°03'N., 154°55'W., February 14, 1954. Messenger time: 1922 GCT. Weather: 21, cloud coverage 8. Wind: 070°, 13 kt. Sea: 5-8 ft. Wire angle: 14°. Depth of water: 3,000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	13.81	33.86	25.36	5.49	0.37
10	13.82	33.96	25.44	5.72	0.52
50	13.34	33.95	25.53	5.76	0.45
99	13.26	33.98	25.57	5.75	0.48
119	12.24	34.16	25.91	5.34	0.69
203	11.16	34.14	26.10	5.26	0.88
304	10.14	34.09	26.24	5.13	1.20
408	08.64	34.05	26.45	4.47	1.59
507	06.78	33.95	26.64	3.91	1.93
613	05.42	33.95	26.81	2.85	2.61
817	04.10	34.11	27.09	1.15	3.14
1017	03.44	34.31	27.31	0.42	3.43
1223	03.02	34.36	27.39	0.46	3.64

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	13.81	33.86	25.37	0.000	1.561
10	13.82	33.96	25.44	0.026	1.535
20	13.82	33.96	25.44	0.051	1.510
30	13.78	33.96	25.45	0.077	1.484
50	13.34	33.95	25.53	0.127	1.434
75	13.32	33.95	25.54	0.189	1.372
100	13.25	33.98	25.57	0.251	1.310
150	11.55	34.16	26.04	0.362	1.199
200	11.20	34.14	26.09	0.462	1.099
250	10.60	34.11	26.17	0.559	1.002
300	10.18	34.09	26.23	0.653	0.908
400	08.78	34.05	26.43	0.830	0.731
500	06.87	33.96	26.64	0.988	0.573
600	05.59	33.94	26.79	1.129	0.432
700	04.73	34.01	26.94	1.255	0.306
800	04.16	34.10	27.08	1.368	0.193
1000	03.52	34.29	27.29	1.561	0.000

STATION 40

M/V Hugh M. Smith: Cruise 25, 37°03'N., 154°55'W., February 15, 1954. Messenger time: 0403 GCT. Weather: 01, cloud coverage 2. Wind: 320°, 21 kt. Sea: 5-8 ft. Wire angle: 25°. Depth of water: 3,000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	12.86	33.91	25.56	5.97	0.58
09	12.87	34.02	25.68	5.92	0.58
61	12.80	34.02	25.69	5.87	0.60
122	12.50	34.07	25.79	c/	0.77
164	11.15	c/	-	5.51	1.02
207	10.70	34.16	26.19	5.48	1.10
311	09.74	34.14	26.34	5.01	1.14
421	07.94	34.07	26.57	4.35	1.48
525	06.02	33.98	26.77	3.56	2.33
631	05.00	34.02	26.92	2.41	2.60
839	04.01	34.18	27.15	0.99	3.07
1051	03.44	34.29	27.30	0.50	3.38
1256	02.98	34.31	27.36	1.26	c/

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	12.86	33.91	25.60	0.000	1.490
10	12.87	34.02	25.68	0.024	1.466
20	12.85	34.02	25.68	0.047	1.443
30	12.82	34.02	25.69	0.070	1.420
50	12.81	34.02	25.69	0.116	1.374
75	12.79	34.02	25.70	0.175	1.315
100	12.75	34.03	25.71	0.233	1.257
150	11.39	34.12	26.04	0.341	1.149
200	10.74	34.16	26.19	0.438	1.052
250	10.23	34.16	26.28	0.530	0.960
300	09.83	34.14	26.33	0.620	0.870
400	08.33	34.08	26.52	0.787	0.703
500	06.42	33.98	26.72	0.937	0.553
600	05.22	34.00	26.88	1.070	0.420
700	04.65	34.06	26.99	1.189	0.301
800	04.18	34.15	27.11	1.298	0.192
1000	03.59	34.27	27.27	1.490	0.000

STATION 41

M/V Hugh M. Smith: Cruise 25, 35°40'N., 153°15'W., February 15, 1954. Messenger time: 1930 GCT. Weather: 02, cloud coverage 7. Wind: 240°, 21-29 kt. Sea: 8-12 ft. Wire angle: 35°. Depth of water: 3,000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	13.86	33.96	25.43	5.60	0.26
09	13.88	34.00	25.46	5.77	0.37
48	13.88	34.00	25.46	5.75	0.31
75	13.92	33.98	25.44	5.72	0.39
150	11.48	34.11	26.02	5.33	0.71
194	11.18	34.16	26.11	5.29	1.13
291	10.14	34.16	26.29	5.42	1.21
392	08.25	34.04	26.50	4.34	1.42
489	06.64	33.95	26.66	3.88	1.71
586	05.28	33.96	26.84	2.67	2.50
779	04.16	34.11	27.08	1.12	2.95
978	03.51	34.25	27.26	0.52	3.34
1175	03.12	34.36	27.39	0.72	3.34

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	13.86	33.96	25.43	0.000	1.533
10	13.88	34.00	25.46	0.025	1.508
20	13.88	34.00	25.46	0.051	1.482
30	13.88	34.00	25.46	0.076	1.457
50	13.87	34.00	25.46	0.127	1.406
75	13.92	33.98	25.44	0.191	1.342
100	13.87	33.98	25.45	0.255	1.278
150	11.48	34.11	26.02	0.370	1.163
200	11.15	34.17	26.12	0.470	1.063
250	10.65	34.19	26.23	0.565	0.968
300	09.98	34.14	26.30	0.656	0.877
400	08.12	34.03	26.52	0.825	0.708
500	06.53	33.95	26.68	0.977	0.556
600	05.15	33.97	26.86	1.112	0.421
700	04.55	34.05	26.99	1.232	0.301
800	04.05	34.13	27.11	1.341	0.192
1000	03.46	34.25	27.27	1.533	0.000

STATION 42

M/V Hugh M. Smith: Cruise 25, 33°05'N., 153°04'W., February 16, 1954. Messenger time: 1817 GCT. Weather: 50, cloud coverage 8. Wind: 300°, 16 kt. Sea: 8-12 ft. Wire angle: 40°. Depth of water: 3,100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	16.08	34.23	25.16	5.63	0.24
08	16.07	34.23	25.16	5.64	0.24
44	16.10	34.25	25.17	5.61	0.24
87	16.08	34.25	25.17	5.63	0.34
112	13.24	34.25	25.78	5.26	0.40
174	12.15	34.22	25.98	5.37	0.45
262	11.19	34.23	26.16	5.29	0.54
352	09.90	34.14	26.32	4.82	0.96
440	08.46	34.07	26.49	4.52	1.36
532	06.78	33.98	26.67	3.97	1.86
708	04.78	34.02	26.95	2.02	2.68
901	03.92	34.22	27.20	0.66	3.54
1094	03.40	34.34	27.34	0.36	3.46

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	16.08	34.23	25.16	0.000	1.615
10	16.07	34.23	25.16	0.028	1.587
20	16.08	34.23	25.16	0.056	1.559
30	16.09	34.24	25.16	0.085	1.530
50	16.10	34.25	25.17	0.141	1.474
75	16.09	34.25	25.17	0.212	1.403
100	15.00	34.25	25.41	0.280	1.335
150	12.53	34.22	25.90	0.398	1.217
200	11.78	34.24	26.06	0.502	1.113
250	11.27	34.23	26.15	0.601	1.014
300	10.59	34.18	26.23	0.696	0.919
400	09.13	34.10	26.41	0.874	0.741
500	07.38	34.00	26.60	1.035	0.580
600	05.84	33.96	26.77	1.179	0.436
700	04.84	34.02	26.94	1.307	0.308
800	04.32	34.13	27.08	1.419	0.196
1000	03.65	34.28	27.27	1.615	0.000

STATION 43

M/V Hugh M. Smith: Cruise 25, 31°59'N., 153°02'W., February 17, 1954. Messenger time: 0319 GCT. Weather: 02, cloud coverage 4. Wind: 340°, 13 kt. Sea: 3-5 ft. Wire angle: 28°. Depth of water: 2,900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	16.28	34.27	25.14	5.65	0.24
09	16.28	34.29	25.16	5.23	0.35
49	16.22	34.29	25.17	5.44	0.37
84	16.24	34.29	25.17	5.48	0.38
116	14.64	34.23	25.48	5.41	0.53
197	12.14	34.18	25.95	5.27	0.72
296	11.12	34.23	26.17	5.03	1.11
399	09.62	34.13	26.36	4.74	1.23
500	07.65	34.00	26.56	4.21	1.66
600	06.04	33.96	26.75	3.17	2.10
798	04.22	34.13	27.09	1.16	2.84
1000	03.61	34.29	27.28	0.44	3.09
1199	03.20	34.42	27.43	0.46	3.04

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	16.28	34.27	25.14	0.000	1.644
10	16.28	34.29	25.16	0.028	1.616
20	16.26	34.29	25.16	0.056	1.588
30	16.25	34.29	25.16	0.085	1.559
50	16.22	34.29	25.17	0.141	1.503
75	16.24	34.29	25.17	0.212	1.432
100	16.22	34.29	25.17	0.283	1.361
150	12.58	34.18	25.86	0.408	1.236
200	12.02	34.18	25.97	0.515	1.129
250	11.21	34.22	26.15	0.616	1.028
300	11.07	34.22	26.18	0.712	0.932
400	09.58	34.13	26.36	0.895	0.749
500	07.65	34.00	26.56	1.061	0.583
600	06.04	33.96	26.75	1.208	0.436
700	05.02	34.00	26.90	1.339	0.305
800	04.20	34.14	27.10	1.453	0.191
1000	03.61	34.29	27.28	1.644	0.000

STATION 44

M/V Hugh M. Smith: Cruise 25, 30°58'N., 153°00'W., February 17, 1954. Messenger time: 1115 GCT. Weather: 02, cloud coverage 7. Wind: 060°, 6 kt. Sea: 3-5 ft. Wire angle: 18°. Depth of water: 2,800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	18.46	34.94	25.13	5.32	0.21
09	18.48	34.96	25.14	5.28	0.32
57	18.46	34.90	25.10	5.22	0.34
108	17.88	34.76	25.14	5.33	0.21
143	17.37	34.65	25.18	5.37	0.30
197	15.78	34.43	25.38	5.39	0.43
282	12.01	34.27	26.04	4.95	0.63
393	09.94	34.14	26.31	4.73	0.92
491	08.22	34.02	26.49	4.43	1.29
593	06.50	33.96	26.69	3.60	1.95
793	04.46	34.05	27.00	1.26	2.82
991	03.77	34.27	27.25	0.44	3.26
1198	03.38	34.42	27.41	0.50	3.24

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	18.46	34.94	25.13	0.000	1.759
10	18.48	34.96	25.14	0.028	1.731
20	18.48	34.95	25.13	0.057	1.702
30	18.47	34.94	25.13	0.085	1.674
50	18.46	34.92	25.12	0.143	1.616
75	18.40	34.89	25.11	0.215	1.544
100	17.98	34.78	25.13	0.287	1.472
150	17.05	34.60	25.21	0.429	1.330
200	15.60	34.42	25.41	0.565	1.194
250	12.99	34.32	25.89	0.686	1.073
300	11.64	34.24	26.09	0.790	0.969
400	09.80	34.13	26.33	0.980	0.779
500	08.07	34.02	26.52	1.150	0.609
600	06.38	33.96	26.70	1.302	0.457
700	05.13	33.99	26.88	1.436	0.323
800	04.45	34.05	27.01	1.556	0.203
1000	03.74	34.28	27.26	1.759	0.000

STATION 45

M/V Hugh M. Smith: Cruise 25, 29°31'N., 150°59'W., February 18, 1954. Messenger time: first cast 0433 GCT, second cast 0505 GCT. Weather: 15, cloud coverage 7. Wind: 120°, 8 kt. Sea: 1-3 ft. Wire angle: first cast 00°, second cast not recorded. Depth of water: 3,000 f.

OBSERVED

	DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
	00	18.78	34.94	25.05	5.32	0.27
	10	18.77	34.92	25.03	-	0.27
	51	18.68	34.92	25.06	5.18	0.20
	118	18.71	34.92	25.05	5.20	0.27
	154	16.75	34.56	25.25	5.24	0.30
I	210	13.69	34.25	25.69	4.98	0.69
	313	11.36	34.22	26.12	5.02	1.06
	420	09.32	34.09	26.37	4.61	1.47
	522	07.32	33.96	26.58	4.10	2.03
	628	05.50	34.00	26.85	2.53	2.62
	838	04.22	34.16	27.12	0.82	3.04
II	1040	03.56	34.31	27.30	0.45	3.46
	1247	03.16	34.45	27.45	0.64	3.46

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	18.68	34.94	25.08	0.000	1.725
10	18.77	34.92	25.04	0.029	1.696
20	18.75	34.92	25.04	0.058	1.667
30	18.72	34.92	25.05	0.088	1.637
50	18.68	34.92	25.06	0.146	1.579
75	18.70	34.92	25.06	0.220	1.505
100	18.71	34.92	25.05	0.293	1.432
150	16.87	34.58	25.24	0.437	1.288
200	14.06	34.27	25.63	0.567	1.158
250	12.40	34.24	25.94	0.681	1.044
300	11.45	34.22	26.11	0.784	0.941
400	09.73	34.11	26.32	0.972	0.753
500	07.78	33.98	26.53	1.142	0.583
600	05.87	33.97	26.78	1.289	0.436
700	04.93	34.05	26.95	1.416	0.309
800	04.39	34.13	27.08	1.529	0.196
1000	03.68	34.28	27.27	1.725	0.000

STATION 46

M/V Hugh M. Smith: Cruise 25, 31°04'N., 150°59'W., February 18, 1954. Messenger time: 1717 GCT. Weather: 02, cloud coverage 7. Wind: 210°, 12 kt. Sea: 1-3 ft. Wire angle: 25°. Depth of water: 2,700 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	17.94	34.78	25.14	5.49	0.20
08	17.98	34.97 e,f/	25.27	5.34	0.20
52	18.00	34.88 e,f/	25.20	5.40	0.22
110	18.06	34.76	25.09	5.38	0.13
141	16.02	34.51	25.39	5.19	0.34
181	14.10	34.33	25.66	4.90	0.62
270	11.58	34.14	26.02	4.79	1.03
365	10.03	34.13	26.29	4.75	1.32
455	08.51	34.05	26.47	4.54	1.61
551	06.80	33.98	26.66	3.92	1.99
739	04.61	34.02	26.96	1.49	3.06
927	03.84	34.22	27.20	0.51	3.40
1125	03.44	34.40	27.39	0.52	3.44

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	17.94	34.78	25.14	0.000	1.703
10	18.00	34.96	25.26	0.028	1.675
20	18.00	34.94	25.24	0.055	1.648
30	18.00	34.90	25.21	0.083	1.620
50	18.00	34.88	25.20	0.138	1.565
75	18.02	34.84	25.16	0.209	1.494
100	18.05	34.82	25.14	0.280	1.423
150	15.76	34.49	25.43	0.417	1.286
200	13.75	34.31	25.73	0.540	1.163
250	12.18	34.17	25.93	0.652	1.051
300	11.01	34.14	26.12	0.755	0.948
400	09.48	34.09	26.35	0.941	0.762
500	07.72	34.01	26.56	1.108	0.595
600	06.07	33.96	26.74	1.255	0.448
700	04.94	33.99	26.90	1.386	0.317
800	04.30	34.08	27.05	1.502	0.201
1000	03.73	34.27	27.26	1.703	0.000

STATION 47

M/V Hugh M. Smith: Cruise 25, 32°30'N., 151°01'W., February 19, 1954. Messenger time: 0405 GCT. Weather: 02, cloud coverage 2. Wind: 210°, 12 kt. Sea: 1-3 ft. Wire angle: 02°. Depth of water: 3,000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	16.62	34.27	25.06	5.55	0.24
10	16.56	34.25	25.06	5.47	0.30
51	16.45	34.23	25.07	5.51	0.27
113	16.36	34.20	25.07	5.53	0.30
133	14.46	34.07	25.39	5.48	0.41
209	11.87	34.14	25.96	5.16	0.86
311	10.16	34.11	26.25	4.86	1.18
419	08.66	34.05	26.45	4.53	1.47
521	06.79	33.96	26.65	3.97	1.91
627	05.46	34.00	26.85	2.66	2.42
836	04.07	34.18	27.15	0.62	3.06
1038	03.56	34.34	27.33	0.38	3.12
1244	03.21	34.43	27.43	0.63	3.20

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	16.62	34.27	25.06	0.000	1.649
10	16.56	34.25	25.06	0.029	1.620
20	16.52	34.25	25.07	0.058	1.591
30	16.50	34.24	25.07	0.087	1.562
50	16.45	34.23	25.07	0.146	1.503
75	16.42	34.22	25.07	0.218	1.431
100	16.41	34.22	25.07	0.292	1.357
150	13.60	34.09	25.59	0.426	1.223
200	12.04	34.13	25.93	0.541	1.108
250	11.27	34.13	26.07	0.644	1.005
300	10.34	34.11	26.22	0.741	0.908
400	08.94	34.06	26.41	0.920	0.729
500	07.19	33.97	26.60	1.080	0.569
600	05.73	33.98	26.80	1.223	0.426
700	04.84	34.04	26.95	1.348	0.301
800	04.24	34.15	27.11	1.459	0.190
1000	03.62	34.31	27.30	1.649	0.000

STATION 48

M/V Hugh M. Smith: Cruise 25, 34°00'N., 151°02'W., February 19, 1954. Messenger time: 1613 GCT. Weather: 02, cloud coverage 6. Wind: 160°, 21 kt. Sea: 3-5 ft. Wire angle: 13°. Depth of water: 3,100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	15.24	34.11	25.25	5.76	0.26
10	15.24	34.11	25.25	5.60	0.36
54	15.10	34.14	25.31	5.76	0.23
114	14.34	34.18	25.50	5.49	0.45
163	12.78	34.23	25.86	5.30	0.67
218	11.90	34.22	26.02	5.43	0.85
327	10.45	-	-	5.00	1.28
442	08.30	34.05	26.50	4.38	1.63
552	06.18	33.95	26.72	3.56	2.34
663	04.98	33.96	26.88	2.32	2.90
879	03.92	34.16	27.15	0.77	3.48
1094	03.30	34.33	27.34	0.34	3.62
1300	03.06	34.40	27.42	0.34	3.65

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	15.24	34.11	25.25	0.000	1.624
10	15.24	34.11	25.25	0.027	1.597
20	15.20	34.12	25.27	0.054	1.570
30	15.18	34.13	25.28	0.082	1.542
50	15.10	34.14	25.31	0.136	1.488
75	15.06	34.12	25.30	0.203	1.421
100	15.04	34.12	25.30	0.271	1.353
150	13.00	34.22	25.81	0.394	1.230
200	12.28	34.23	25.96	0.503	1.121
250	11.33	34.20	26.11	0.605	1.019
300	10.70	34.17	26.20	0.701	0.923
400	09.10	34.10	26.42	0.880	0.744
500	07.14	33.98	26.62	1.040	0.584
600	05.62	33.94	26.78	1.182	0.442
700	04.75	33.99	26.93	1.310	0.314
800	04.26	34.08	27.05	1.425	0.199
1000	03.57	34.26	27.26	1.624	0.000

STATION 49

M/V Hugh M. Smith: Cruise 25, 35°27'N., 150°58'W., February 20, 1954. Messenger time: 1253 GCT. Weather: 20, cloud coverage 8. Wind: 230°, 16 kt. Sea: 3-5 ft. Wire angle: 12°. Depth of water: 3,100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	14.23	33.98	25.37	5.80	0.23
10	14.22	33.98	25.37	5.61	0.38
49	14.06	33.98	25.41	5.74	0.47
109	13.40	33.96	25.53	5.81	0.51
128	11.96	34.02	25.86	5.47	0.70
203	10.80	34.07	26.11	5.16	0.98
303	09.84	34.13	26.38	4.76	1.18
407	08.16	34.04	26.52	4.30	1.77
507	06.34	33.93	26.68	3.65	2.37
613	05.20	33.95	26.84	2.65	2.79
818	04.02	34.16	27.14	1.01	3.45
1019	03.40	34.31	27.32	0.48	3.66
1226	03.06	34.42	27.44	0.52	3.56

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	14.23	33.98	25.37	0.000	1.540
10	14.22	33.98	25.37	0.026	1.514
20	14.19	33.98	25.38	0.052	1.488
30	14.15	33.98	25.39	0.078	1.462
50	14.06	33.98	25.41	0.130	1.410
75	13.91	33.97	25.43	0.195	1.345
100	13.75	33.96	25.46	0.259	1.281
150	11.52	34.03	25.95	0.376	1.164
200	10.81	34.07	26.11	0.477	1.063
250	10.30	34.12	26.23	0.572	0.968
300	09.88	34.14	26.32	0.663	0.877
400	08.29	34.05	26.51	0.832	0.708
500	06.43	33.93	26.67	0.984	0.556
600	05.33	33.94	26.82	1.122	0.418
700	04.59	34.05	26.99	1.244	0.296
800	04.10	34.15	27.12	1.353	0.187
1000	03.43	34.30	27.31	1.540	0.000

STATION 50

M/V Hugh M. Smith: Cruise 25, 37°02'N., 150°58'W., February 21, 1954. Messenger time: 0151 GCT. Weather: 50, cloud coverage 8. Wind: 260°, 8 kt. Sea: 3-5 ft. Wire angle: 06°. Depth of water: 2,800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
02	13.40	33.91 g/	25.49	6.03	0.29
12	13.28	33.91	25.51	5.93	0.50
52	13.16	33.89	25.52	5.97	0.47
113	12.82	33.89	25.59	5.89	0.49
154	11.54	34.09	25.99	5.48	0.65
209	10.87	34.14	26.15	5.28	0.88
310	09.84	34.13	26.32	4.88	1.10
416	07.86	34.02	26.55	4.31	1.41
517	06.02	33.91	26.71	3.54	2.10
622	04.96	33.95	26.87	2.41	2.71
829	03.97	34.18	27.16	0.96	3.19
1031	03.38	34.29	27.30	0.46	3.57
1237	03.00	34.42	27.45	0.33	3.72

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	13.40	33.91	25.49	0.000	1.522
10	13.27	33.91	25.51	0.025	1.497
20	13.23	33.90	25.52	0.050	1.472
30	13.21	33.90	25.52	0.075	1.447
50	13.18	33.90	25.53	0.124	1.398
75	13.09	33.89	25.54	0.186	1.336
100	12.93	33.89	25.57	0.248	1.274
150	11.58	34.09	25.98	0.361	1.161
200	10.99	34.14	26.13	0.461	1.061
250	10.48	34.14	26.22	0.556	0.966
300	10.00	34.13	26.29	0.648	0.874
400	08.18	34.04	26.51	0.817	0.705
500	06.32	33.92	26.68	0.969	0.553
600	05.11	33.93	26.84	1.105	0.417
700	04.47	34.06	27.01	1.226	0.296
800	04.08	34.14	27.12	1.333	0.189
1000	03.46	34.28	27.29	1.522	0.000

STATION 51

M/V Hugh M. Smith: Cruise 25, $35^{\circ}30'$N., $148^{\circ}57'$W., February 21, 1954. Messenger time: first cast 1917 GCT, second cast 1943 GCT. Weather: 02, cloud coverage 8. Wind: 200°, 17 kt. Sea: 3-5 ft. Wire angle: first cast 25°, second cast 35°. Depth of water: 2,900 f.

OBSERVED

Cast	DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
	00	14.94	33.96	25.21	5.28	0.22
	09	14.94	34.02	25.25	5.73	0.37
	44	14.84	33.99 g/	25.25	5.69	0.46
I	89	14.68	33.98	25.28	5.66	0.47
	111	14.60	33.96	25.28	5.66	0.39
	184	11.69	34.07 g/	25.94	5.29	1.12
	275	11.01	34.20	26.17	5.02	1.22
	340	09.94	34.13	26.30	4.75	1.26
	426	08.54	34.09	26.50	4.40	1.59
II	520	06.76	33.96	26.65	3.92	2.12
	708	04.61	34.07	27.00	1.64	3.12
	896	03.80	34.22	27.21	0.63	3.54
	1095	03.29	34.40	27.40	0.46	3.81

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	14.94	33.96	25.20	0.000	1.602
10	14.92	34.02	25.25	0.028	1.574
20	14.88	34.00	25.25	0.055	1.547
30	14.87	33.99	25.24	0.082	1.520
50	14.84	33.99	25.25	0.137	1.465
75	14.75	33.99	25.27	0.206	1.396
100	14.63	33.96	25.27	0.274	1.328
150	12.29	34.02	25.79	0.399	1.203
200	11.60	34.09	25.98	0.507	1.095
250	11.26	34.17	26.10	0.609	0.993
300	10.60	34.18	26.23	0.705	0.897
400	09.00	34.11	26.44	0.881	0.721
500	07.07	33.97	26.62	1.040	0.562
600	05.70	33.98	26.81	1.181	0.421
700	04.66	34.07	27.00	1.304	0.298
800	04.12	34.15	27.12	1.412	0.190
1000	03.57	34.29	27.29	1.602	0.000

STATION 52

M/V Hugh M. Smith: Cruise 25, 33°57'N., 148°56'W., February 22, 1954. Messenger time: 0834 GCT. Weather: 02, cloud coverage not recorded. Wind: 200°, 15 kt. Sea: 3-5 ft. Wire angle: 12°. Depth of water: 3,100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	15.46	34.03 [g]	25.14	5.84	0.25
10	15.45	34.07 [g]	25.18	5.75	0.36
54	15.38	34.02	25.15	5.70	0.22
102	14.40	33.98	25.33	5.54	0.35
146	11.70	33.96	25.86	5.48	0.74
215	10.72	34.07	26.12	5.29	1.25
323	09.36	34.11	26.38	4.70	1.58
437	07.52	34.02	26.59	4.22	2.02
547	05.82	33.95 [g]	26.76	3.27	2.63
655	04.76	34.00	26.93	1.87	3.13
869	03.84	34.18	27.17	0.65	3.59
1083	03.32	34.34	27.35	0.38	3.74
1288	02.98	34.49 [g]	27.50	0.48	3.84

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	15.46	34.03	25.14	0.000	1.565
10	15.45	34.07	25.18	0.028	1.537
20	15.42	34.06	25.17	0.056	1.509
30	15.41	34.05	25.17	0.084	1.481
50	15.40	34.03	25.16	0.141	1.424
75	15.32	34.01	25.16	0.212	1.353
100	14.70	33.99	25.28	0.281	1.284
150	11.60	33.97	25.88	0.404	1.161
200	10.90	34.06	26.08	0.507	1.058
250	09.88	34.11	26.30	0.601	0.964
300	09.48	34.11	26.36	0.689	0.876
400	08.14	34.05	26.53	0.855	0.710
500	06.45	33.96	26.70	1.005	0.560
600	05.18	33.96	26.85	1.140	0.425
700	04.48	34.03	26.99	1.261	0.304
800	04.11	34.10	27.08	1.371	0.194
1000	03.50	34.27	27.28	1.565	0.000

STATION 53

M/V Hugh M. Smith: Cruise 25, 32°32'N., 148°51'W., February 22, 1954. Messenger time: 2100 GCT. Weather: 03, cloud coverage 7. Wind: 180°, 14 kt. Sea: 3-5 ft. Wire angle: 16°. Depth of water: 3,000 f.

OBSERVED

DEPTH (m)	T ($^{\circ}$C)	S ($^{\circ}$/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	17.00	34.36	25.04	5.52	0.25
10	16.98	34.36	25.05	5.42	0.53
48	17.46	34.65	25.15	5.37	0.31
76	17.64	34.78	25.21	5.30	0.22
96	17.36	34.72 [g]	25.23	5.25	0.20
196	12.60	34.31	25.96	4.86	0.91
292	10.92	34.23 [g]	26.21	4.87	1.28
393	08.64	34.07	26.47	4.42	1.86
489	07.07	34.02 [g]	26.66	4.02	2.29
590	05.75	34.05	26.85	2.88	2.78
785	04.27	34.13	27.09	1.00	3.55
986	03.72	34.38	27.34	0.96	3.56
1189	03.36	34.47	27.45	0.53	3.74

INTERPOLATED AND CALCULATED

DEPTH (m)	T ($^{\circ}$C)	S ($^{\circ}$/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	17.00	34.36	25.04	0.000	1.595
10	16.98	34.36	25.05	0.029	1.566
20	17.08	34.39	25.05	0.059	1.536
30	17.23	34.50	25.10	0.088	1.507
50	17.50	34.67	25.16	0.145	1.450
75	17.65	34.78	25.21	0.215	1.380
100	17.11	34.67	25.25	0.284	1.311
150	13.90	34.39	25.76	0.411	1.184
200	12.46	34.30	25.98	0.520	1.075
250	11.40	34.25	26.14	0.621	0.974
300	10.70	34.22	26.24	0.716	0.879
400	08.56	34.07	26.48	0.890	0.705
500	06.93	34.02	26.68	1.044	0.551
600	05.62	34.05	26.87	1.179	0.416
700	04.74	34.07	26.99	1.299	0.296
800	04.20	34.15	27.11	1.409	0.186
1000	03.70	34.36	27.33	1.595	0.000

STATION 54

M/V Hugh M. Smith: Cruise 25, 31°00'N., 149°00'W., February 23, 1954. Messenger time: 0940 GCT. Weather: 01, cloud coverage 3. Wind: 160°, 13 kt. Sea: 3-5 ft. Wire angle: 20°. Depth of water: 2,800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	18.58	34.88	25.05	5.33	0.14
09	18.60	34.85	25.02	5.37	0.29
47	18.39	34.83	25.06	5.36	0.15
95	18.26	34.78	25.06	5.36	0.29
142	16.08	34.46 g/	25.34	5.25	0.34
196	13.79	34.31	25.72	5.13	0.49
291	11.12	34.22	26.17	4.98	0.96
391	09.18	34.13	26.43	4.67	1.55
488	07.43	34.07 g/	26.64	4.19	1.91
589	05.96	34.04	26.82	3.10	2.48
787	04.46	34.20	27.12	0.93	3.28
983	03.88	34.33	27.29	0.37	3.44
1187	03.38	34.54	27.50	0.67	3.54

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	18.58	34.88	25.05	0.000	1.658
10	18.60	34.85	25.03	0.029	1.629
20	18.58	34.85	25.03	0.059	1.599
30	18.52	34.85	25.05	0.088	1.570
50	18.36	34.82	25.06	0.147	1.511
75	18.28	34.80	25.07	0.220	1.438
100	18.25	34.77	25.05	0.293	1.365
150	15.75	34.43	25.39	0.433	1.225
200	13.60	34.30	25.75	0.557	1.101
250	12.08	34.25	26.01	0.666	0.992
300	10.95	34.21	26.19	0.765	0.893
400	09.02	34.13	26.45	0.944	0.714
500	07.25	34.06	26.67	1.100	0.558
600	05.88	34.04	26.83	1.238	0.420
700	05.01	34.11	26.99	1.361	0.297
800	04.41	34.21	27.14	1.469	0.189
1000	03.86	34.33	27.29	1.658	0.000

STATION 55

M/V Hugh M. Smith: Cruise 25, 29°29'N., 146°59'W., February 24, 1954. Messenger time: 0525 GCT. Weather: 16, cloud coverage 7. Wind: 100°, 22 kt. Sea: 3-5 ft. Wire angle: 16°. Depth of water: 2,800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	18.67	34.99	25.12	5.26	0.10
10	18.66	34.99 g/	25.12	5.13	0.18
53	18.28	34.99	25.21	5.27	0.23
97	18.90	35.03	25.09	5.12	0.29
141	18.79	35.03 g/	25.11	5.14	0.07
216	12.78	34.16	25.81	4.80	0.75
323	10.73	34.20	26.22	4.81	1.17
436	08.90	34.07 g/	26.42	4.41	1.45
544	06.71	33.98 g/	26.67	3.42	2.09
652	05.32	34.00	26.87	1.89	2.79
864	04.06	34.22	27.18	0.47	3.35
1078	03.56	34.34	27.33	0.48	3.26
1285	03.14	34.43	27.44	0.83	3.25

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	18.67	34.99	25.12	0.000	1.684
10	18.66	34.99	25.12	0.029	1.655
20	18.60	34.99	25.13	0.057	1.627
30	18.48	34.99	25.16	0.085	1.599
50	18.28	34.99	25.21	0.141	1.543
75	18.72	35.02	25.13	0.212	1.472
100	18.90	35.03	25.09	0.284	1.400
150	16.70	34.67	25.35	0.424	1.260
200	12.95	34.17	25.78	0.548	1.136
250	11.60	34.19	26.06	0.656	1.028
300	10.92	34.20	26.19	0.754	0.930
400	09.51	34.11	26.36	0.937	0.747
500	07.63	33.99	26.56	1.103	0.581
600	05.90	33.97	26.77	1.249	0.435
700	04.96	34.04	26.94	1.377	0.307
800	04.35	34.15	27.10	1.489	0.195
1000	03.80	34.29	27.26	1.684	0.000

STATION 56

M/V Hugh M. Smith: Cruise 25, 31°01'N., 146°56'W., February 24, 1954. Messenger time: 1749 GCT. Weather: 02, cloud coverage 7. Wind: 110°, 24 kt. Sea: 3-5 ft. Wire angle: 05°. Depth of water: 2,900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	17.99	34.57 g/	24.96	5.30	0.15
10	17.97	34.56	24.96	5.39	0.21
56	17.86	34.61	25.03	5.41	0.11
106	17.25	34.42	25.03	5.42	0.19
142	15.04	33.93	25.16	5.64	0.25
223	12.30	34.14	25.89	5.25	0.78
335	10.62	34.11	26.17	5.01	1.10
453	08.54	34.04	26.46	4.59	1.64
565	06.36	33.93 g/	26.69	3.39	2.23
675	05.20	33.89	26.80	1.81	2.74
893	04.04	34.20	27.17	0.51	3.40
1111	03.56	34.41 g/	27.38	0.50	3.29
1319	03.14	34.49	27.49	0.89	3.29

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	17.99	34.57	24.96	0.000	1.737
10	17.97	34.56	24.96	0.030	1.707
20	17.93	34.57	24.98	0.060	1.677
30	17.90	34.58	24.99	0.090	1.647
50	17.87	34.60	25.02	0.149	1.588
75	17.81	34.60	25.03	0.223	1.514
100	17.40	34.45	25.02	0.298	1.439
150	14.48	33.98	25.32	0.440	1.297
200	12.60	34.13	25.82	0.564	1.173
250	11.88	34.14	25.96	0.672	1.065
300	11.12	34.12	26.09	0.775	0.962
400	09.52	34.07	26.33	0.964	0.773
500	07.50	33.98	26.57	1.131	0.606
600	05.90	33.90	26.72	1.280	0.457
700	05.00	33.91	26.83	1.415	0.322
800	04.40	34.06	27.02	1.536	0.201
1000	03.80	34.30	27.27	1.737	0.000

STATION 57

M/V Hugh M. Smith: Cruise 25, 32°28'N., 146°59'W., February 25, 1954. Messenger time: 0604 GCT. Weather: 01, cloud coverage 5. Wind: 050°, 22 kt. Sea: 3-5 ft. Wire angle: 09°. Depth of water: 3,100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σt	O_2 (ml/l)	PO_4-P (µg at/l)
00	17.28	34.36 g/	24.97	5.22	0.11
10	17.28	34.45	25.04	5.42	0.15
55	17.10	34.43	25.07	5.40	0.16
76	17.18	34.41 g/	25.04	5.41	0.16
112	16.96	34.43	25.10	5.34	0.07
223	12.08	34.13	25.92	5.01	0.65
335	10.37	34.11 g/	26.21	4.79	0.97
451	08.32	34.00	26.46	4.34	1.49
563	06.33	33.95	26.70	3.61	1.96
674	04.98	33.98	26.89	2.09	2.61
891	03.84	34.16	27.15	0.63	3.25
1108	03.42	34.31	27.32	0.33	3.29
1315	03.14	34.47	27.47	0.67	3.20

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σt	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	17.28	34.36	24.98	0.000	1.685
10	17.28	34.45	25.04	0.030	1.655
20	17.28	34.44	25.04	0.059	1.626
30	17.27	34.44	25.04	0.088	1.597
50	17.10	34.43	25.07	0.147	1.538
75	17.18	34.42	25.05	0.220	1.465
100	17.12	34.43	25.07	0.294	1.391
150	13.28	34.17	25.71	0.425	1.260
200	12.46	34.14	25.85	0.538	1.147
250	11.65	34.12	25.99	0.646	1.039
300	10.88	34.12	26.13	0.747	0.938
400	09.18	34.05	26.37	0.932	0.753
500	07.46	33.97	26.57	1.097	0.588
600	05.85	33.95	26.76	1.243	0.442
700	04.75	34.01	26.94	1.371	0.314
800	04.18	34.09	27.07	1.484	0.201
1000	03.65	34.22	27.22	1.685	0.000

STATION 58

M/V Hugh M. Smith: Cruise 25, 33°55'N., 147°05'W., February 25, 1954. Messenger time: 1901 GCT. Weather: 02, cloud coverage 3. Wind: 100°, 15 kt. Sea: 3-5 ft. Wire angle: 25°. Depth of water: 3,000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	16.03	34.04	25.03	5.74	0.13
09	16.02	34.02	25.01	5.71	0.18
55	16.02	34.03	25.02	5.73	0.18
105	15.90	34.02	25.04	5.62	0.14
142	15.48	33.96	25.09	5.61	0.16
203	11.64	33.72 g/	25.69	5.37	0.62
305	09.18	33.93 g/	26.27	4.73	1.38
414	07.48	33.95	26.54	4.20	1.87
517	06.12	33.95	26.73	3.39	2.26
621	04.97	33.96	26.88	2.06	2.84
825	04.25	34.18	27.13	0.53	3.30
1033	03.58	34.34	27.32	0.39	3.35
1236	03.15	34.29	27.33	0.51	3.31

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	16.03	34.04	25.02	0.000	1.655
10	16.02	34.02	25.01	0.030	1.625
20	16.02	34.02	25.01	0.059	1.596
30	16.02	34.03	25.02	0.089	1.566
50	16.02	34.03	25.02	0.148	1.507
75	16.00	34.02	25.01	0.222	1.433
100	15.90	34.02	25.04	0.297	1.358
150	14.20	33.86	25.28	0.439	1.216
200	11.72	33.72	25.67	0.567	1.088
250	10.41	33.87	26.02	0.677	0.978
300	09.28	33.93	26.26	0.774	0.881
400	07.65	33.94	26.51	0.946	0.709
500	06.32	33.94	26.70	1.096	0.559
600	05.12	33.95	26.85	1.231	0.424
700	04.60	34.05	26.99	1.352	0.303
800	04.33	34.14	27.09	1.462	0.193
1000	03.72	34.31	27.29	1.655	0.000

STATION 59

M/V Hugh M. Smith: Cruise 25, 35°31'N., 147°00'W., February 26, 1954. Messenger time: 0818 GCT. Weather: 02, cloud coverage 8. Wind: 090°, 16 kt. Sea: 3-5 ft. Wire angle: 10°. Depth of water: 3,000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	16.38	34.19 g/	25.06	5.60	0.09
10	16.36	34.21 g/	25.08	5.56	0.11
50	16.38	34.23	25.09	5.56	0.10
101	16.10	34.18	25.12	5.55	0.17
132	15.50	34.02 g/	25.13	5.62	0.15
208	11.30	33.98	25.95	5.46	0.74
308	10.04	34.06 g/	26.23	4.86	1.20
416	07.96	34.00	26.52	4.25	1.62
517	06.36	33.89	26.65	3.64	2.01
623	05.18	33.89	26.80	2.26	2.58
833	04.04	34.11	27.10	0.84	3.08
1037	03.58	34.26 g/	27.26	0.40	3.17
1246	03.13	34.42	27.43	0.47	3.18

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	16.38	34.19	25.06	0.000	1.653
10	16.36	34.21	25.08	0.029	1.624
20	16.38	34.23	25.09	0.058	1.595
30	16.38	34.23	25.09	0.087	1.566
50	16.38	34.23	25.09	0.145	1.508
75	16.30	34.22	25.10	0.217	1.436
100	16.11	34.18	25.11	0.290	1.363
150	12.65	33.97	25.68	0.421	1.232
200	11.41	33.98	25.93	0.533	1.120
250	10.70	34.01	26.08	0.636	1.017
300	10.13	34.04	26.20	0.733	0.920
400	08.25	34.01	26.48	0.909	0.744
500	06.59	33.91	26.64	1.064	0.589
600	05.40	33.88	26.76	1.206	0.447
700	04.66	33.96	26.91	1.335	0.318
800	04.18	34.08	27.06	1.450	0.203
1000	03.70	34.21	27.21	1.653	0.000

STATION 60

M/V Hugh M. Smith: Cruise 25, 37°09'N., 146°58'W., February 26, 1954. Messenger time: 2055 GCT. Weather: 02, cloud coverage 7. Wind: 140°, 16 kt. Sea: 3-5 ft. Wire angle: 22°. Depth of water: 2,700 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	13.68	33.80	25.34	6.08	0.24
09	13.68	33.82	25.36	6.06	0.26
36	13.65	33.75	25.31	6.02	0.28
68	13.40	33.75	25.36	5.94	0.26
90	12.98	33.74 g/	25.44	5.76	0.34
199	10.35	34.04	26.16	5.19	1.02
299	08.88	34.04	26.41	4.57	1.45
405	06.85	33.93	26.62	3.99	1.91
507	05.55	33.87	26.74	3.04	2.35
610	04.80	34.05	26.97	1.95	2.81
814	03.88	34.13	27.13	0.71	3.16
1022	03.30	34.27	27.30	0.37	3.26
1225	02.93	34.38	27.42	0.34	3.29

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	13.68	33.80	25.35	0.000	1.479
10	13.68	33.82	25.36	0.026	1.453
20	13.67	33.79	25.34	0.053	1.426
30	13.65	33.77	25.33	0.079	1.400
50	13.45	33.75	25.35	0.132	1.347
75	13.39	33.75	25.37	0.198	1.281
100	11.62	33.86	25.80	0.259	1.220
150	10.72	34.00	26.07	0.365	1.114
200	10.33	34.04	26.17	0.462	1.017
250	09.61	34.05	26.30	0.554	0.925
300	08.85	34.04	26.41	0.640	0.839
400	06.97	33.93	26.60	0.800	0.679
500	05.65	33.85	26.71	0.945	0.534
600	04.83	34.03	26.95	1.074	0.405
700	04.30	34.09	27.05	1.187	0.292
800	03.92	34.14	27.13	1.291	0.188
1000	03.37	34.26	27.28	1.479	0.000

STATION 61

M/V Hugh M. Smith: Cruise 25, 38°30'N., 147°01'W., February 27, 1954. Messenger time: 0730 GCT. Weather: 02, cloud coverage 8. Wind: 200°, 16 kt. Sea: 1-3 ft. Wire angle: 06°. Depth of water: 2,900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	12.78	33.62	25.38	5.88	0.34
10	12.77	33.57	25.34	6.03	0.34
30	12.78	33.65 g/	25.40	6.06	0.36
40	12.78	33.64	25.40	6.05	0.30
101	11.44	33.46	25.51	6.20	0.41
207	10.32	34.09	26.21	5.04	1.05
308	08.69	34.04	26.43	4.51	1.48
415	06.54	33.93	26.66	3.81	1.99
517	05.39	33.94	26.81	2.87	2.37
622	04.57	34.00	26.95	1.77	2.86
830	03.76	34.18	27.18	0.65	3.05
1032	03.28	34.33	27.35	0.37	3.12
1240	02.87	34.40 g/	27.44	0.34	3.14

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	12.78	33.62	25.39	0.000	1.476
10	12.77	33.57	25.35	0.026	1.450
20	12.77	33.62	25.39	0.052	1.424
30	12.78	33.65	25.41	0.078	1.398
50	12.30	33.54	25.42	0.130	1.346
75	11.65	33.47	25.49	0.194	1.282
100	11.46	33.46	25.51	0.256	1.220
150	11.00	33.76	25.83	0.374	1.102
200	10.41	34.08	26.18	0.476	1.000
250	09.65	34.09	26.32	0.568	0.908
300	08.81	34.05	26.43	0.653	0.823
400	06.78	33.94	26.64	0.810	0.666
500	05.58	33.93	26.78	0.950	0.526
600	04.70	33.98	26.92	1.077	0.399
700	04.20	34.06	27.04	1.192	0.284
800	03.82	34.17	27.17	1.295	0.181
1000	03.35	34.30	27.32	1.476	0.000

STATION 62

M/V Hugh M. Smith: Cruise 25, 37°04'N., 145°01'W., February 27, 1954. Messenger time: 2349 GCT. Weather: 01, cloud coverage 7. Wind: 140°, 11 kt. Sea: 1-3 ft. Wire angle: 14°. Depth of water: 2,700 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	14.36	33.84	25.24	6.03	0.23
10	14.25	33.84	25.26	6.03	0.26
44	14.20	33.87	25.29	5.93	0.24
94	13.44	33.77	25.37	5.92	0.36
123	12.18	34.00	25.80	5.48	0.58
202	10.43	34.07	26.17	5.12	1.10
301	09.48	34.11	26.36	4.74	1.36
406	07.49	34.02	26.60	4.22	1.83
505	06.22	33.89	26.67	3.50	2.19
609	05.07	33.96	26.87	2.15	2.74
815	03.92	34.14	27.13	0.79	3.22
1015	03.36	34.31	27.32	0.40	3.21
1220	02.94	34.36	27.40	0.39	3.28

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	14.36	33.84	25.24	0.000	1.529
10	14.25	33.84	25.26	0.027	1.502
20	14.20	33.87	25.29	0.054	1.475
30	14.20	33.86	25.28	0.081	1.448
50	13.85	33.81	25.32	0.135	1.394
75	13.46	33.78	25.38	0.202	1.327
100	13.41	33.78	25.39	0.267	1.262
150	11.45	34.04	25.97	0.385	1.144
200	10.50	34.07	26.16	0.485	1.044
250	09.92	34.10	26.28	0.577	0.952
300	09.50	34.11	26.36	0.666	0.863
400	07.59	34.03	26.59	0.828	0.701
500	06.30	33.89	26.66	0.977	0.552
600	05.18	33.94	26.84	1.114	0.415
700	04.40	34.03	27.00	1.235	0.294
800	03.95	34.13	27.12	1.343	0.186
1000	03.38	34.30	27.31	1.529	0.000

STATION 63

M/V Hugh M. Smith: Cruise 25, 35°28'N., 144°59'W., February 28, 1954. Messenger time: 1303 GCT. Weather: 02, cloud coverage 4. Wind: 130°, 14 kt. Sea: 3-5 ft. Wire angle: 16°. Depth of water: 2,900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	15.40	34.04	25.16	5.44	0.16
10	15.40	33.98	25.12	5.66	0.17
63	15.40	33.95	25.10	5.70	0.17
88	15.24	33.89	25.09	5.53	0.19
137	14.80	33.86	25.16	5.59	0.19
200	11.94	33.78 g/	25.68	5.35	0.68
299	10.16	33.98 g/	26.15	4.90	1.18
402	08.40	33.89	26.36	4.43	1.66
501	06.59	33.82	26.57	3.83	2.06
606	05.26	33.82	26.73	2.61	2.60
808	04.12	34.04	27.03	0.82	3.24
1008	03.64	34.28	27.27	0.35	3.30
1214	03.28	34.31	27.33	0.43	3.39

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	15.40	34.04	25.16	0.000	1.722
10	15.40	33.98	25.12	0.028	1.694
20	15.40	33.97	25.11	0.057	1.665
30	15.40	33.96	25.10	0.086	1.636
50	15.40	33.95	25.09	0.143	1.579
75	15.38	33.94	25.09	0.216	1.506
100	15.00	33.88	25.13	0.288	1.434
150	14.60	33.85	25.19	0.430	1.292
200	11.94	33.78	25.67	0.560	1.162
250	11.05	33.94	25.96	0.672	1.050
300	10.16	33.98	26.15	0.774	0.948
400	08.42	33.89	26.36	0.958	0.764
500	06.59	33.82	26.57	1.122	0.600
600	05.37	33.81	26.71	1.270	0.452
700	04.60	33.91	26.88	1.403	0.319
800	04.12	34.04	27.03	1.520	0.202
1000	03.68	34.26	27.25	1.722	0.000

STATION 64

M/V Hugh M. Smith: Cruise 25, 33°58'N., 144°58'W., March 1, 1954. Messenger time: 0046 GCT. Weather: 02, cloud coverage 8. Wind: 100°, 9 kt. Sea: 1-3 ft. Wire angle: 15°. Depth of water: 2,700 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	16.46	34.04	24.92	5.67	0.17
10	16.44	34.04	24.93	5.59	0.15
49	15.88	34.13 g/	25.12	5.70	0.14
107	15.51	34.09	25.18	5.64	0.14
137	15.36	34.11	25.23	5.68	0.13
201	11.01	33.96	25.99	5.33	0.79
299	09.70	34.09	26.31	4.84	1.24
403	07.80	34.04	26.57	4.31	1.65
502	06.10	33.98	26.76	3.47	2.13
605	04.98	33.93 g/	26.86	1.82	2.74
808	04.08	34.23	27.19	0.60	3.21
1008	03.64	34.42	27.38	0.35	3.30
1214	03.24	34.49	27.48	0.47	3.34

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD1000 - ΔD (dyn. m)
00	16.46	34.04	24.92	0.000	1.567
10	16.44	34.04	24.93	0.030	1.537
20	16.44	34.04	24.93	0.061	1.506
30	16.40	34.05	24.95	0.091	1.476
50	15.87	34.12	25.12	0.150	1.417
75	15.65	34.10	25.15	0.221	1.346
100	15.58	34.09	25.16	0.292	1.275
150	12.30	33.98	25.76	0.421	1.146
200	11.03	33.96	25.98	0.530	1.037
250	10.05	34.07	26.24	0.628	0.939
300	09.69	34.09	26.31	0.718	0.849
400	07.88	34.04	26.56	0.885	0.682
500	06.15	33.98	26.75	1.031	0.536
600	05.00	33.92	26.84	1.163	0.404
700	04.55	34.04	26.99	1.284	0.283
800	04.12	34.22	27.18	1.390	0.177
1000	03.68	34.41	27.37	1.567	0.000

STATION 65

M/V Hugh M. Smith: Cruise 25, 32°24'N., 144°53'W., March 1, 1954. Messenger time: 1314 GCT. Weather: 02, cloud coverage 6. Wind: 120°, 9 kt. Sea: 1-3 ft. Wire angle: 00°. Depth of water: 2,900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	16.61	34.17	24.99	5.55	0.13
10	16.61	34.22	25.03	5.58	0.12
51	16.54	34.16	25.00	5.55	0.10
112	16.36	34.11	25.00	5.48	0.09
139	14.85	33.88 g/	25.17	5.49	0.29
210	11.08	33.73	25.79	5.28	0.74
313	09.92	33.96	26.17	4.75	1.19
420	08.21	33.98	26.46	4.41	1.54
523	06.38	33.82	26.59	3.24	2.09
631	05.04	33.89	26.81	2.13	2.65
841	04.05	34.09	27.08	0.62	3.18
1045	03.64	34.33	27.31	0.30	3.12
1253	03.21	34.45	27.45	0.55	3.18

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	16.61	34.17	24.99	0.000	1.704
10	16.61	34.22	25.03	0.030	1.674
20	16.60	34.20	25.01	0.059	1.645
30	16.60	34.20	25.01	0.089	1.615
50	16.54	34.16	25.00	0.148	1.556
75	16.40	34.12	25.00	0.223	1.481
100	16.35	34.10	25.00	0.298	1.406
150	13.50	33.80	25.38	0.439	1.265
200	10.92	33.74	25.83	0.560	1.144
250	10.52	33.90	26.02	0.667	1.037
300	10.05	33.95	26.14	0.767	0.937
400	08.60	33.99	26.41	0.949	0.755
500	06.80	33.85	26.56	1.111	0.593
600	05.35	33.86	26.75	1.257	0.447
700	04.60	33.96	26.92	1.386	0.318
800	04.20	34.05	27.03	1.502	0.202
1000	03.74	34.26	27.25	1.704	0.000

STATION 66

M/V Hugh M. Smith: Cruise 25, 30°59'N., 144°44'W., March 2, 1954. Messenger time: 0019 GCT. Weather: 02, cloud coverage 4. Wind: 060°, 14 kt. Sea: 1-3 ft. Wire angle: 16°. Depth of water: 3,000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	18.67	34.85 g/	25.01	5.39	0.09
10	18.68	34.86	25.01	5.36	0.09
43	18.62	34.85	25.02	5.34	0.09
96	18.62	34.88 g/	25.04	5.35	0.08
141	18.58	34.87	25.04	5.31	0.09
199	15.36	34.24 g/	25.32	5.08	0.34
295	11.34	33.96	25.92	4.98	0.93
397	09.14	33.98	26.32	4.63	1.41
495	07.10	33.89	26.55	4.29	1.96
597	05.78	33.93	26.76	2.11	2.59
798	04.74	34.13	27.04	0.47	3.24
998	03.94	34.34	27.29	0.40	3.27
1204	03.46	34.52	27.48	0.68	3.29

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	18.67	34.85	25.01	0.000	1.781
10	18.68	34.86	25.01	0.030	1.751
20	18.67	34.86	25.02	0.059	1.722
30	18.65	34.86	25.02	0.089	1.692
50	18.62	34.85	25.02	0.148	1.633
75	18.62	34.86	25.03	0.222	1.559
100	18.62	34.88	25.04	0.296	1.485
150	18.59	34.87	25.04	0.444	1.337
200	15.30	34.22	25.32	0.587	1.194
250	12.90	34.03	25.68	0.714	1.067
300	11.20	33.96	25.95	0.827	0.954
400	09.02	33.97	26.33	1.022	0.759
500	07.00	33.89	26.57	1.189	0.592
600	05.78	33.93	26.76	1.335	0.446
700	05.21	34.01	26.89	1.466	0.315
800	04.70	34.13	27.04	1.584	0.197
1000	03.92	34.35	27.30	1.781	0.000

STATION 67

M/V Hugh M. Smith: Cruise 25, 29°25'N., 142°56'W., March 2, 1954. Messenger time: 1744 GCT. Weather: 16, cloud coverage 8. Wind: 060°, 19 kt. Sea: 3-5 ft. Wire angle: 25°. Depth of water: 2,300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σt	O_2 (ml/l)	PO_4-P (μg at/l)
00	18.89	34.98 g/	25.05	5.25	0.06
09	18.90	34.96	25.03	5.22	0.06
51	18.92	35.01	25.07	5.21	0.10
120	18.92	34.96	25.03	5.19	0.09
162	18.89	34.98 g/	25.05	5.20	0.07
204	15.65	34.42	25.40	4.92	0.39
307	10.12	34.02	26.19	4.72	1.29
415	07.78	33.97	26.52	4.05	1.85
518	06.28	33.97 g/	26.73	2.82	2.33
622	05.20	34.04	26.91	1.52	2.89
828	04.28	34.25	27.18	0.45	3.33
1039	03.65	34.36	27.33	0.53	3.21
1244	03.22	34.42	27.42	0.97	3.28

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σt	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	18.89	34.98	25.05	0.000	1.681
10	18.90	34.96	25.03	0.029	1.652
20	18.91	34.97	25.04	0.059	1.622
30	18.91	34.98	25.05	0.088	1.593
50	18.92	35.01	25.07	0.146	1.535
75	18.93	34.98	25.04	0.220	1.461
100	18.92	34.97	25.04	0.294	1.387
150	18.92	34.98	25.05	0.442	1.239
200	15.95	34.47	25.37	0.584	1.097
250	12.72	34.11	25.78	0.708	0.973
300	10.26	34.02	26.16	0.813	0.868
400	08.00	33.99	26.50	0.989	0.692
500	06.45	33.97	26.70	1.141	0.540
600	05.40	34.02	26.87	1.274	0.407
700	04.73	34.14	27.05	1.392	0.289
800	04.35	34.23	27.16	1.496	0.185
1000	03.75	34.34	27.31	1.681	0.000

STATION 68

M/V Hugh M. Smith: Cruise 25, 31°02'N., 143°00'W., March 3, 1954. Messenger time: 0654 GCT. Weather: 02, cloud coverage 8. Wind: 040°, 10 kt. Sea: 1-3 ft. Wire angle: 09°. Depth of water: 2,600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	17.99	34.65	25.03	5.45	0.04
10	17.99	34.73	25.09	5.43	0.07
70	18.24	34.79	25.07	5.34	0.04
131	18.56	34.93	25.10	5.34	0.06
161	17.68	34.68	25.12	5.30	0.10
207	13.66	33.96	25.47	5.41	0.36
308	10.89	34.04	26.07	4.98	0.93
413	08.73	34.06 g/	26.44	4.52	1.48
515	06.96	33.96	26.63	3.76	1.89
620	05.49	34.00	26.85	2.30	2.43
826	04.35	34.14	27.09	0.55	3.14
1027	03.88	34.32	27.28	0.40	3.22
1233	03.29	34.46	27.45	0.81	3.12

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	17.99	34.65	25.03	0.000	1.734
10	17.99	34.73	25.09	0.029	1.705
20	18.02	34.74	25.09	0.058	1.676
30	18.11	34.76	25.08	0.087	1.647
50	18.22	34.79	25.08	0.145	1.589
75	18.27	34.80	25.07	0.218	1.516
100	18.38	34.84	25.07	0.291	1.443
150	18.25	34.86	25.12	0.437	1.297
200	14.04	33.97	25.40	0.575	1.159
250	12.32	33.97	25.75	0.699	1.035
300	11.01	34.04	26.05	0.808	0.926
400	08.99	34.07	26.41	0.995	0.739
500	07.18	33.97	26.60	1.156	0.578
600	05.75	33.98	26.80	1.298	0.436
700	04.90	34.06	26.96	1.423	0.311
800	04.40	34.13	27.07	1.536	0.198
1000	03.93	34.30	27.26	1.734	0.000

STATION 69

M/V Hugh M. Smith: Cruise 25, 32°37'N., 143°04'W., March 3, 1954. Messenger time: 1915 GCT. Weather: 02, cloud coverage 8. Wind: 030°, 6-9 kt. Sea: 1-3 ft. Wire angle: 09°. Depth of water: 3,000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	16.94	34.50 g,e/	25.16	5.52	0.14
10	16.94	34.24	24.97	5.49	0.17
50	16.98	34.31	25.01	5.47	0.15
110	16.99	34.25	24.96	5.47	0.13
130	16.94	34.26	24.98	5.48	0.09
206	12.92	33.93	25.60	5.16	0.53
308	10.14	34.06	26.22	4.74	1.18
413	08.20	33.99	26.47	4.39	1.66
513	06.24	33.90	26.68	3.48	2.11
620	05.06	34.02	26.91	1.96	2.66
827	04.19	34.17	27.13	0.63	3.15
1029	03.62	34.32	27.30	0.35	3.34
1232	03.22	34.41	27.41	0.59	3.39

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	16.94	34.50	25.16	0.000	1.689
10	16.94	34.24	24.96	0.029	1.660
20	16.95	34.26	24.98	0.059	1.630
30	16.97	34.28	24.99	0.089	1.600
50	16.98	34.31	25.01	0.149	1.540
75	17.00	34.28	24.98	0.223	1.466
100	17.00	34.26	24.97	0.299	1.390
150	15.70	34.11	25.15	0.446	1.243
200	13.27	33.92	25.52	0.581	1.108
250	11.55	34.00	25.92	0.698	0.991
300	10.28	34.05	26.18	0.799	0.890
400	08.43	34.00	26.45	0.978	0.711
500	06.50	33.91	26.65	1.134	0.555
600	05.23	34.00	26.88	1.270	0.419
700	04.61	34.09	27.02	1.388	0.301
800	04.25	34.16	27.11	1.496	0.193
1000	03.72	34.28	27.26	1.689	0.000

STATION 70

M/V Hugh M. Smith: Cruise 25, 34°02'N., 143°00'W., March 5, 1954. Messenger time: 0635 GCT. Weather: 02, cloud coverage 8. Wind: 310°, 5 kt. Sea: 1-3 ft. Wire angle: 00°. Depth of water: 3,100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	16.42	34.14	25.01	5.65	0.18
10	16.36	34.15 g/	25.03	5.62	0.20
67	16.16	34.09	25.03	5.62	0.14
103	15.77	34.04	25.08	5.63	0.17
143	15.34	33.99	25.14	5.64	0.16
210	11.27	33.73	25.76	5.44	0.69
313	09.52	33.96	26.24	4.75	1.26
420	07.70	33.95	26.51	4.26	1.66
522	06.03	33.93	26.73	3.03	2.20
629	05.08	34.03	26.92	1.62	2.86
837	04.24	34.25	27.19	0.47	3.24
1040	03.75	34.38	27.34	0.38	3.28
1248	03.25	34.47	27.46	-	3.18

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	16.42	34.14	25.01	0.000	1.655
10	16.36	34.15	25.03	0.029	1.626
20	16.32	34.15	25.04	0.059	1.596
30	16.28	34.14	25.04	0.088	1.567
50	16.22	34.13	25.05	0.147	1.508
75	16.10	34.08	25.04	0.221	1.434
100	15.81	34.05	25.08	0.294	1.361
150	15.00	33.95	25.18	0.438	1.217
200	11.50	33.73	25.72	0.567	1.088
250	10.26	33.85	26.03	0.676	0.979
300	09.67	33.94	26.20	0.774	0.881
400	08.05	33.96	26.47	0.950	0.705
500	06.40	33.93	26.68	1.104	0.551
600	05.30	34.00	26.87	1.239	0.416
700	04.79	34.10	27.01	1.359	0.296
800	04.40	34.20	27.13	1.466	0.189
1000	03.87	34.34	27.30	1.655	0.000

STATION 71

M/V Hugh M. Smith: Cruise 25, 35°32'N., 143°00'W., March 4, 1954. Messenger time: 1822 GCT. Weather: 02 (16), cloud coverage 8. Wind: 000°, 6 kt. Sea: 1-3 ft. Wire angle: 06°. Depth of water: 2,600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	15.27	33.90	25.09	5.70	0.18
30	14.82	33.86	25.15	5.67	0.21
45	14.75	33.86	25.17	5.72	0.19
91	14.96	33.91	25.16	5.67	0.18
112	14.49	33.87	25.23	5.66	0.23
208	10.42	33.82	25.98	5.25	0.98
309	09.26	34.00	26.32	4.64	1.37
417	07.22	33.91	26.55	4.06	1.84
518	05.66	33.93	26.77	2.85	2.35
624	04.86	33.95	26.88	1.97	2.72
832	03.96	34.15	27.14	0.56	3.11
1035	03.52	34.31	27.31	0.31	3.21
1242	03.18	34.42	27.43	0.54	3.24

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	15.27	33.90	25.09	0.000	1.591
10	15.25	33.89	25.08	0.029	1.562
20	15.10	33.88	25.11	0.058	1.533
30	14.82	33.86	25.15	0.086	1.505
50	14.75	33.87	25.18	0.143	1.448
75	14.92	33.90	25.16	0.213	1.378
100	14.79	33.90	25.19	0.284	1.307
150	11.59	33.74	25.71	0.412	1.179
200	10.59	33.81	25.94	0.523	1.068
250	09.79	33.94	26.18	0.624	0.967
300	09.39	33.99	26.29	0.716	0.875
400	07.52	33.92	26.52	0.886	0.705
500	05.90	33.93	26.74	1.034	0.557
600	05.00	33.94	26.86	1.166	0.425
700	04.48	34.02	26.98	1.287	0.304
800	04.08	34.11	27.09	1.397	0.194
1000	03.61	34.27	27.27	1.591	0.000

STATION 72

M/V Hugh M. Smith: Cruise 25, 37°05'N., 140°57'W., March 5, 1954. Messenger time: 2112 GCT. Weather: 02, cloud coverage 8. Wind: 060°, 14 kt. Sea: 8-12 ft. Wire angle: 08°. Depth of water: 2,900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	14.79	33.74	25.07	5.89	0.25
10	14.78	33.77	25.10	5.75	0.25
55	14.80	33.75	25.07	5.80	0.21
81	14.39	33.74	25.15	5.74	0.22
102	13.96	33.70	25.21	5.84	0.24
222	10.15	33.94	26.12	4.99	1.11
333	08.24	33.96	26.44	4.41	1.54
448	06.10	33.93	26.72	3.08	2.43
560	05.11	33.95	26.85	2.07	2.68
670	04.42	34.03	26.99	1.10	3.01
886	03.74	34.23 g/	27.22	0.48	3.22
1103	03.34	c/	-	0.35	3.28
1311	03.00	c/	-	0.54	3.27

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	14.79	33.74	25.07	0.000	1.537
10	14.78	33.77	25.09	0.029	1.508
20	14.79	33.77	25.09	0.058	1.479
30	14.79	33.77	25.09	0.087	1.450
50	14.80	33.77	25.09	0.145	1.392
75	14.35	33.74	25.16	0.216	1.321
100	14.20	33.70	25.16	0.287	1.250
150	11.09	33.87	25.90	0.412	1.125
200	10.68	33.92	26.01	0.517	1.020
250	09.68	33.96	26.21	0.614	0.923
300	08.90	33.97	26.35	0.704	0.833
400	06.85	33.95	26.63	0.865	0.672
500	05.60	33.93	26.78	1.005	0.532
600	04.85	33.98	26.91	1.133	0.404
700	04.32	34.06	27.03	1.249	0.288
800	04.00	34.14	27.12	1.355	0.182
1000	03.48	34.37	27.36	1.537	0.000

STATION 73

M/V Hugh M. Smith: Cruise 25, 38°30'N., 141°01'W., March 6, 1954. Messenger time: 0955 GCT. Weather: 02, cloud coverage not recorded. Wind: 110°, 12 kt. Sea: 5-8 ft. Wire angle: 17°. Depth of water: 2,500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	12.31	33.35	25.28	6.26	0.27
14	12.30	33.36	25.28	6.26	0.26
29	11.94	33.34	25.34	6.20	0.29
48	11.63	33.36	25.41	6.15	0.30
95	11.18	33.34	25.47	6.09	0.39
196	09.33	33.83	26.17	5.17	1.07
293	07.98	33.99	26.51	4.35	1.51
392	06.39	33.94	26.69	3.76	2.02
b/	-	-	-	-	-
592	04.55	34.05	26.99	1.54	2.84
791	03.96	34.23	27.20	0.52	3.10
988	03.55	34.35	27.34	0.33	3.21
1192	03.10	34.43	27.44	0.37	3.23

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	12.31	33.35	25.27	0.000	1.429
10	12.30	33.35	25.27	0.027	1.402
20	12.25	33.35	25.28	0.054	1.375
30	11.94	33.34	25.33	0.081	1.348
50	11.63	33.36	25.41	0.133	1.296
75	11.22	33.35	25.47	0.198	1.231
100	11.08	33.34	25.49	0.261	1.168
150	09.80	33.70	25.99	0.375	1.054
200	09.26	33.85	26.20	0.473	0.956
250	08.60	33.96	26.39	0.562	0.867
300	07.83	33.99	26.53	0.644	0.785
400	06.33	33.94	26.70	0.792	0.637
500	05.62	33.96	26.80	0.929	0.500
600	04.52	34.06	27.01	1.050	0.379
700	04.20	34.15	27.11	1.157	0.272
800	03.90	34.25	27.22	1.255	0.174
1000	03.52	34.36	27.35	1.429	0.000

STATION 74

M/V Hugh M. Smith: Cruise 25, 35°32'N., 141°01'W., March 7, 1954. Messenger time: 0806 GCT. Weather: 02, cloud coverage not recorded. Wind: 020°, 27 kt. Sea: 8-12 ft. Wire angle: 29°. Depth of water: 3,100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	15.42	33.81	24.98	5.80	0.18
09	15.42	33.82	24.99	5.69	0.21
57	15.40	33.82	25.00	5.69	0.21
120	15.42	33.82	24.99	5.68	0.21
151	15.36	33.87	25.04	5.63	0.21
197	11.98	33.65	25.57	5.49	0.57
294	09.50	33.96	26.24	4.78	1.26
398	07.18	33.95	26.59	3.98	1.84
498	05.66	33.94	26.78	2.60	2.35
600	04.94	34.04	26.94	1.49	2.75
797	04.32	34.23	27.16	0.49	3.07
1001	03.78	34.35	27.31	0.38	3.22
1202	03.41	34.45	27.43	0.61	3.18

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	15.42	33.81	24.98	0.000	1.622
10	15.42	33.82	24.99	0.030	1.592
20	15.41	33.82	24.99	0.060	1.562
30	15.41	33.82	24.99	0.089	1.533
50	15.40	33.82	24.99	0.149	1.473
75	15.41	33.82	24.99	0.224	1.398
100	15.42	33.82	24.99	0.299	1.323
150	15.38	33.86	25.03	0.448	1.174
200	11.88	33.66	25.59	0.584	1.038
250	10.22	33.93	26.10	0.695	0.927
300	09.40	33.96	26.26	0.790	0.832
400	07.12	33.95	26.60	0.957	0.665
500	05.60	33.95	26.79	1.098	0.524
600	04.94	34.04	26.94	1.223	0.399
700	04.60	34.15	27.07	1.336	0.286
800	04.32	34.24	27.17	1.439	0.183
1000	03.78	34.35	27.31	1.622	0.000

STATION 75

M/V Hugh M. Smith: Cruise 25, 34°08'N., 140°57'W., March 7, 1954. Messenger time: 1925 GCT. Weather: 16, cloud coverage 8. Wind: 000°, 15 kt. Sea: 12-20 ft. Wire angle: 16°. Depth of water: 2,900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	16.26	34.13	25.04	5.51	0.16
10	16.25	34.14	25.05	5.50	0.22
53	16.18	34.14	25.07	5.53	0.19
91	16.11	34.13	25.07	5.47	0.18
119	15.79	34.09	25.12	5.45	0.20
212	10.86	33.84	25.92	5.12	0.88
318	08.76	34.02	26.41	4.50	1.46
431	06.51	33.96	26.69	3.57	2.06
537	05.50	34.02	26.86	2.11	2.42
645	04.62	34.08	27.01	1.30	2.87
857	03.83	34.28	27.25	0.52	3.17
1070	03.45	34.41	27.39	0.37	3.22
1278	03.08	34.51	27.51	0.62	3.18

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	16.26	34.13	25.04	0.000	1.563
10	16.25	34.14	25.05	0.029	1.534
20	16.24	34.14	25.05	0.059	1.504
30	16.21	34.14	25.06	0.088	1.475
50	16.19	34.14	25.06	0.146	1.417
75	16.13	34.14	25.08	0.219	1.344
100	16.08	34.13	25.08	0.292	1.271
150	13.32	33.94	25.53	0.428	1.135
200	11.33	33.83	25.83	0.546	1.017
250	10.32	33.89	26.05	0.652	0.911
300	09.22	34.01	26.33	0.747	0.816
400	07.00	33.96	26.62	0.909	0.654
500	05.79	34.00	26.81	1.049	0.514
600	04.92	34.05	26.95	1.173	0.390
700	04.40	34.12	27.07	1.285	0.278
800	04.00	34.24	27.20	1.386	0.177
1000	03.62	34.35	27.33	1.563	0.000

STATION 76

M/V Hugh M. Smith: Cruise 25, 29°54'N., 140°47'W., March 9, 1954. Messenger time: 0256 GCT. Weather: 02, cloud coverage 4. Wind: 330°, 21 kt. Sea: 12-20 ft. Wire angle: 14°. Depth of water: 2,700 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	18.69	34.90	25.04	5.44	0.13
10	18.68	34.90	25.04	5.34	0.14
55	18.67	34.89	25.04	5.38	0.14
110	18.68	34.90	25.04	5.33	0.13
144	17.70	34.69	25.13	5.21	0.20
219	13.34	34.05	25.61	4.95	0.70
328	09.42	34.03	26.31	4.69	1.47
444	07.28	33.98	26.60	3.78	1.71
552	05.92	34.04	26.83	2.16	2.28
662	05.00	34.13	27.01	1.02	2.67
877	04.14	34.33	27.26	0.48	3.01
1093	03.61	34.46	27.42	0.64	2.99
1300	03.18	34.51	27.50	1.04	2.94

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	18.69	34.90	25.04	0.000	1.653
10	18.68	34.90	25.04	0.029	1.624
20	18.68	34.90	25.04	0.059	1.594
30	18.68	34.90	25.04	0.088	1.565
50	18.67	34.89	25.04	0.147	1.506
75	18.67	34.89	25.04	0.220	1.433
100	18.68	34.90	25.04	0.294	1.359
150	17.30	34.62	25.17	0.440	1.213
200	14.75	34.23	25.45	0.576	1.077
250	11.80	33.94	25.82	0.697	0.956
300	10.28	33.96	26.11	0.802	0.851
400	07.98	34.00	26.51	0.980	0.673
500	06.50	34.00	26.72	1.130	0.523
600	05.45	34.07	26.91	1.262	0.391
700	04.78	34.18	27.07	1.376	0.277
800	04.32	34.28	27.20	1.477	0.176
1000	03.80	34.42	27.37	1.653	0.000

STATION 77

M/V Hugh M. Smith: Cruise 25, 27°52'N., 140°55'W., March 9, 1954. Messenger time: 1827 GCT. Weather: 15, cloud coverage 4. Wind: 010°, 18 kt. Sea: 3-5 ft. Wire angle: 15°. Depth of water: 2,500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	19.03	35.01	25.04	5.31	0.12
10	19.03	35.02	25.04	5.30	0.15
72	19.03	35.00	25.03	5.29	0.16
120	19.04	35.01	25.03	5.26	0.16
139	18.74	34.93	25.05	5.21	0.18
196	16.16	34.48	25.33	4.94	0.40
293	11.35	34.02	25.97	4.80	1.05
394	09.29	34.07	26.36	4.66	1.57
490	07.16	34.00	26.63	3.28	2.20
591	05.72	34.05	26.86	1.76	2.82
791	04.50	34.25	27.16	0.55	3.32
987	03.86	34.40	27.35	0.57	3.36
1192	03.55	34.49	27.45	0.97	3.36

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	19.03	35.01	25.04	0.000	1.710
10	19.03	35.02	25.05	0.029	1.681
20	19.03	35.01	25.04	0.059	1.651
30	19.03	35.01	25.04	0.088	1.622
50	19.03	35.01	25.04	0.147	1.563
75	19.03	35.00	25.03	0.221	1.489
100	19.03	35.01	25.04	0.295	1.415
150	17.90	34.78	25.15	0.441	1.269
200	16.05	34.47	25.35	0.580	1.130
250	13.18	34.11	25.69	0.707	1.003
300	11.20	34.03	26.00	0.818	0.892
400	09.18	34.07	26.38	1.009	0.701
500	07.00	34.00	26.65	1.169	0.541
600	05.63	34.06	26.88	1.305	0.405
700	04.99	34.14	27.02	1.424	0.286
800	04.46	34.26	27.17	1.529	0.181
1000	03.85	34.40	27.35	1.710	0.000

STATION 78

M/V Hugh M. Smith: Cruise 25, 26°29'N., 141°03'W., March 10, 1954. Messenger time: 0508 GCT. Weather: 01, cloud coverage 2. Wind: 060°, 14 kt. Sea: 3-5 ft. Wire angle: 11°. Depth of water: 2,600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	19.45	35.06	24.97	5.36	0.16
10	19.45	35.05	24.96	5.20	0.17
50	19.41	35.03	24.96	5.21	0.14
100	19.40	35.05	24.97	5.19	0.15
139	19.37	35.03	24.97	5.18	0.15
205	15.64	34.41	25.40	4.87	0.48
304	10.63	34.02	26.10	4.67	1.25
410	08.04	34.01	26.51	4.06	1.92
509	06.31	34.00	26.74	2.43	2.69
615	05.25	34.12	26.97	1.16	3.22
820	04.24	34.29	27.22	0.52	3.41
1021	03.87	34.45	27.38	1.02	3.40
1227	03.48	34.52	27.48	1.26	3.39

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	19.45	35.06	24.97	0.000	1.680
10	19.45	35.05	24.96	0.030	1.650
20	19.44	35.05	24.97	0.060	1.620
30	19.43	35.04	24.96	0.090	1.590
50	19.41	35.03	24.96	0.151	1.529
75	19.41	35.04	24.97	0.226	1.454
100	19.40	35.05	24.98	0.302	1.378
150	18.20	34.83	25.11	0.450	1.230
200	16.00	34.45	25.34	0.590	1.090
250	13.00	34.09	25.71	0.717	0.963
300	10.82	34.02	26.07	0.826	0.854
400	08.27	34.02	26.49	1.009	0.671
500	06.44	33.99	26.72	1.160	0.520
600	05.39	34.10	26.94	1.290	0.390
700	04.78	34.19	27.08	1.403	0.277
800	04.30	34.28	27.20	1.503	0.177
1000	03.91	34.42	27.36	1.680	0.000

STATION 79

M/V Hugh M. Smith: Cruise 25, 24°58'N., 141°02'W., March 10, 1954. Messenger time: 1636 GCT. Weather: 02, cloud coverage 4. Wind: 080°, 18 kt. Sea: 3-5 ft. Wire angle: 18°. Depth of water: 2,600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	19.77	35.16	24.96	5.14	0.14
10	19.76	35.14	24.95	5.16	0.14
71	19.84	35.17	24.95	5.16	0.17
119	20.04	35.25	24.96	5.13	0.16
147	18.81	34.99	25.08	4.98	0.27
195	17.12	34.68	25.26	4.88	0.41
291	11.26	34.02	25.98	4.76	1.16
391	08.76	34.04	26.43	4.24	1.76
488	07.34	34.11	26.69	2.16	2.67
589	05.98	34.11	26.88	1.37	3.12
787	04.73	34.31	27.18	0.53	3.42
982	04.24	34.45	27.35	0.87	3.44
1186	03.73	34.51	27.44	1.11	3.41

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	19.77	35.16	24.96	0.000	1.705
10	19.76	35.14	24.95	0.030	1.675
20	19.77	35.15	24.96	0.060	1.645
30	19.77	35.15	24.96	0.090	1.615
50	19.80	35.16	24.96	0.151	1.554
75	19.90	35.17	24.94	0.227	1.478
100	20.01	35.24	24.96	0.303	1.402
150	18.69	34.96	25.09	0.452	1.253
200	16.80	34.63	25.30	0.594	1.111
250	13.45	34.16	25.67	0.723	0.982
300	11.00	34.02	26.03	0.834	0.871
400	08.60	34.05	26.46	1.019	0.686
500	07.17	34.10	26.71	1.173	0.532
600	05.90	34.11	26.88	1.307	0.398
700	05.18	34.22	27.06	1.424	0.281
800	04.67	34.33	27.20	1.526	0.179
1000	04.20	34.45	27.35	1.705	0.000

STATION 80

M/V Hugh M. Smith: Cruise 25, 24°58'N., 143°04'W., March 11, 1954. Messenger time: 0613 GCT. Weather: 52, cloud coverage 8. Wind: 070°, 16 kt. Sea: 3-5 ft. Wire angle: 17°. Depth of water: 2,400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	20.64	35.25	24.80	5.20	0.22
10	20.63	35.23	24.79	5.10	0.23
48	20.50	35.25	24.84	5.11	0.14
86	20.21	35.23	24.90	5.10	0.15
148	19.04	34.97	25.01	4.98	0.21
211	17.80	34.78	25.17	4.76	0.30
318	11.18	34.09	26.05	4.50	1.17
429	08.20	34.05	26.52	3.69	1.99
536	06.54	34.08	26.78	1.92	2.77
643	05.74	34.18	26.96	0.88	3.46 e/
643	-	-	-	-	3.36 e/
855	04.52	34.36	27.24	0.75	3.35
1069	03.96	34.48	27.40	1.03	3.37
1278	03.50	34.52	27.48	1.31	3.33

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	20.64	35.25	24.80	0.000	1.742
10	20.63	35.23	24.79	0.032	1.710
20	20.60	35.23	24.80	0.063	1.679
30	20.58	35.24	24.81	0.095	1.647
50	20.48	35.25	24.84	0.158	1.584
75	20.28	35.24	24.89	0.236	1.506
100	20.05	35.20	24.92	0.313	1.429
150	18.99	34.95	25.00	0.465	1.277
200	18.02	34.80	25.13	0.613	1.129
250	14.92	34.42	25.56	0.749	0.993
300	11.70	34.12	25.98	0.864	0.878
400	08.82	34.05	26.42	1.053	0.689
500	07.05	34.06	26.69	1.209	0.533
600	06.10	34.13	26.87	1.344	0.398
700	05.33	34.24	27.06	1.462	0.280
800	04.72	34.33	27.20	1.565	0.177
1000	04.07	34.46	27.37	1.742	0.000

STATION 81

M/V Hugh M. Smith: Cruise 25, 25°03'N., 145°03'W., March 11, 1954. Messenger time: 1952 GCT. Weather: 16, cloud coverage 6. Wind: 060°, 20 kt. Sea: 3-5 ft. Wire angle: 20°. Depth of water: 2,700 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	20.80	35.39	24.86	5.11	0.11
10	20.79	35.41	24.88	5.14	0.10
78	20.80	35.38	24.85	5.08	0.09
132	20.80	35.38	24.85	5.08	0.10
166	20.69	35.35	24.86	5.08	0.13
215	17.92	34.81	25.17	4.85	0.31
323	11.69	34.14	26.00	4.62	1.08
437	08.49	34.04	26.47	4.05	1.87
546	06.69	34.05	26.73	2.45	2.64
655	05.18	34.08	26.95	1.34	3.19
869	04.26	34.34	27.26	0.67	3.40
1083	03.80	34.46	27.40	1.04	3.38
1290	03.37	34.50	27.47	1.30	3.34

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	20.80	35.39	24.86	0.000	1.785
10	20.79	35.41	24.88	0.031	1.754
20	20.80	35.41	24.88	0.062	1.723
30	20.80	35.41	24.88	0.093	1.692
50	20.80	35.40	24.87	0.155	1.630
75	20.80	35.38	24.86	0.233	1.552
100	20.80	35.38	24.86	0.311	1.474
150	20.78	35.37	24.85	0.469	1.316
200	18.80	34.96	25.06	0.622	1.163
250	15.18	34.44	25.52	0.760	1.025
300	12.58	34.19	25.87	0.879	0.906
400	09.24	34.05	26.36	1.077	0.708
500	07.38	34.04	26.63	1.240	0.545
600	05.84	34.07	26.86	1.378	0.407
700	04.90	34.14	27.03	1.498	0.287
800	04.48	34.25	27.16	1.603	0.182
1000	03.98	34.42	27.35	1.785	0.000

STATION 82

M/V Hugh M. Smith: Cruise 25, 25°03'N., 146°58'W., March 12, 1954. Messenger time: 0852 GCT. Weather: 02, cloud coverage 8. Wind: 110°, 20 kt. Sea: 3-5 ft. Wire angle: 25°. Depth of water: 2,900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	20.90	35.37	24.82	5.15	0.08
09	20.91	35.37	24.82	5.08	0.10
57	20.94	35.37	24.81	5.09	0.09
106	20.92	35.37	24.82	5.03	0.08
155	20.92	35.37	24.82	5.03	0.09
183	20.83	35.34	24.82	5.09	0.15
272	15.84	34.53	25.44	4.57	0.49
367	10.80	34.06	26.10	4.61	1.07
457	08.36	34.01	26.46	3.87	1.63
553	06.78	34.04	26.71	2.50	2.31
742	04.74	34.17	27.07	0.70	2.96
935	04.24	34.36	27.27	0.89	3.00
1135	03.84	34.47	27.40	1.15	2.97

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	20.90	35.37	24.82	0.000	1.840
10	20.91	35.37	24.82	0.031	1.809
20	20.92	35.37	24.82	0.063	1.777
30	20.93	35.37	24.81	0.094	1.746
50	20.94	35.37	24.81	0.158	1.682
75	20.93	35.37	24.81	0.237	1.603
100	20.92	35.37	24.82	0.316	1.524
150	20.92	35.37	24.82	0.476	1.364
200	19.38	35.06	24.99	0.632	1.208
250	17.25	34.70	25.24	0.778	1.062
300	13.76	34.28	25.70	0.908	0.932
400	09.67	34.02	26.26	1.119	0.721
500	07.55	34.02	26.59	1.288	0.552
600	06.00	34.06	26.83	1.430	0.410
700	04.98	34.13	27.01	1.552	0.288
800	04.47	34.26	27.17	1.658	0.182
1000	04.06	34.41	27.33	1.840	0.000

STATION 83

M/V Hugh M. Smith: Cruise 25, 26°26'N., 146°59'W., March 12, 1954. Messenger time: 2127 GCT. Weather: 02, cloud coverage 3. Wind: 100°, 20 kt. Sea: 3-5 ft. Wire angle: 23°. Depth of water: 2,800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	20.84	35.36	24.83	5.18	0.05
09	20.82	35.34	24.82	5.11	0.04
51	20.80	35.35	24.83	5.03	0.04
141	20.82	35.37	24.84	5.10	0.05
160	20.66	35.34	24.86	5.05	0.03
207	17.94	34.83	25.18	4.67	0.28
316	11.80	34.13	25.97	4.63	0.91
421	09.28	34.04	26.34	4.54	1.41
527	07.16	33.98	26.62	3.37	2.01
633	05.51	34.04	26.87	1.63	2.78
842	04.34	34.24	27.17	0.43	3.02
1056	03.76	34.38	27.34	0.86	3.06
1261	03.36	34.48	27.46	1.30	2.95

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD1000 - ΔD (dyn. m)
00	20.84	35.36	24.83	0.000	1.816
10	20.82	35.34	24.82	0.031	1.785
20	20.81	35.34	24.82	0.063	1.753
30	20.81	35.35	24.83	0.094	1.722
50	20.80	35.35	24.83	0.157	1.659
75	20.81	35.36	24.84	0.236	1.580
100	20.81	35.36	24.84	0.314	1.502
150	20.77	35.36	24.85	0.472	1.344
200	18.25	34.89	25.14	0.624	1.192
250	15.06	34.38	25.50	0.760	1.056
300	12.53	34.16	25.85	0.880	0.936
400	09.70	34.06	26.29	1.083	0.733
500	07.67	33.98	26.54	1.253	0.563
600	05.92	34.02	26.81	1.398	0.418
700	04.98	34.13	27.01	1.521	0.295
800	04.48	34.22	27.14	1.628	0.188
1000	03.85	34.34	27.30	1.816	0.000

STATION 84

M/V <u>Hugh M. Smith</u>: Cruise 25, 28°00'N., 146°58'W., March 13, 1954. Messenger time: 1009 GCT. Weather: 02, cloud coverage 4. Wind: 100°, 19 kt. Sea: 3-5 ft. Wire angle: 20°. Depth of water: 2,600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	19.46	35.25	25.11	5.27	0.08
09	19.48	35.24	25.10	5.21	0.07
72	19.46	35.20	25.07	5.12	0.06
143	19.46	35.21	25.08	5.20	0.08
201	18.68	35.05	25.16	5.16	0.11
231	14.18	34.19	25.54	5.10	0.39
318	11.38	34.22	26.12	4.82	0.87
429	08.52	34.05	26.47	4.40	1.53
536	06.67	33.97	26.67	3.08	2.05
644	05.18	34.03	26.91	1.82	2.64
855	04.27	34.27	27.20	0.49	3.04
1069	03.70	34.40	27.36	0.66	3.07
1277	03.33	34.49	27.47	1.25	3.04

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	19.46	35.25	25.11	0.000	1.691
10	19.48	35.24	25.10	0.029	1.662
20	19.48	35.24	25.10	0.057	1.634
30	19.48	35.22	25.08	0.086	1.605
50	19.47	35.21	25.08	0.144	1.547
75	19.46	35.20	25.07	0.217	1.474
100	19.46	35.20	25.07	0.290	1.401
150	19.46	35.21	25.08	0.437	1.254
200	18.68	35.05	25.16	0.583	1.108
250	13.34	35.20	26.50	0.695	0.996
300	11.80	34.22	26.04	0.787	0.904
400	09.19	34.08	26.39	0.975	0.716
500	07.22	33.97	26.60	1.138	0.553
600	05.76	33.99	26.81	1.280	0.411
700	04.75	34.13	27.04	1.401	0.290
800	04.40	34.24	27.16	1.506	0.185
1000	03.87	34.36	27.31	1.691	0.000

STATION 85

M/V Hugh M. Smith: Cruise 25, 29°31'N., 146°59'W., March 13, 1954. Messenger time: 2207 GCT. Weather: 02, cloud coverage 2. Wind: 090°, 20 kt. Sea: 5-12 ft. Wire angle: 20°. Depth of water: 2,800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	18.76	35.02	25.11	5.31	0.09
10	18.74	34.99	25.10	5.33	0.08
53	18.70	34.99	25.11	5.23	0.09
107	18.60	34.99	25.13	5.31	0.07
160	16.74	34.60	25.29	5.11	0.23
213	12.66	34.16	25.83	5.13	0.64
320	10.42	34.14	26.23	4.87	1.09
432	08.26	34.04	26.50	4.42	1.54
539	06.16	33.96	26.73	3.28	2.14
646	05.02	34.05	26.94	1.56	2.70
858	04.17	34.26	27.20	0.48	3.05
1070	03.54	34.41	27.38	0.47	3.06
1276	03.15	34.48	27.48	0.91	3.00

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	18.76	35.02	25.12	0.000	1.647
10	18.74	34.99	25.10	0.029	1.618
20	18.73	34.99	25.10	0.057	1.590
30	18.72	34.99	25.10	0.086	1.561
50	18.70	34.99	25.11	0.144	1.503
75	18.65	34.99	25.12	0.216	1.431
100	18.61	34.99	25.13	0.288	1.359
150	18.02	34.86	25.18	0.431	1.216
200	13.19	34.16	25.72	0.560	1.087
250	11.72	34.15	26.00	0.670	0.977
300	10.75	34.14	26.17	0.770	0.877
400	08.90	34.09	26.44	0.950	0.697
500	06.95	33.97	26.64	1.107	0.540
600	05.41	34.00	26.86	1.245	0.402
700	04.67	34.14	27.05	1.363	0.284
800	04.30	34.22	27.16	1.467	0.180
1000	03.62	34.39	27.36	1.647	0.000

STATION 86

M/V Hugh M. Smith: Cruise 25, $28^{\circ}00'$N., $148^{\circ}56'$W., March 14, 1954. Messenger time: 1601 GCT. Weather: 50, cloud coverage 8. Wind: 140°, 21 kt. Sea: 5-8 ft. Wire angle: 27°. Depth of water: 2,800 f.

OBSERVED

DEPTH (m)	T ($^{\circ}$C)	S ($^{\circ}$/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	19.69	35.27	25.07	5.34	0.12
09	19.70	35.25	25.05	5.17	0.12
67	19.70	35.25	25.05	5.10	0.13
125	19.66	35.25	25.06	5.05	0.12
169	19.50	35.23	25.09	5.03	0.14
196	16.62	34.63	25.34	4.78	0.34
295	12.00	34.23	26.01	4.85	0.86
398	09.66	34.12	26.34	4.63	1.34
498	07.66	34.01	26.57	4.04	1.79
599	05.98	34.03	26.81	2.30	2.46
800	04.59	34.20	27.11	0.69	3.03
1006	03.82	34.37	27.32	0.49	3.10
1209	03.36	34.47	27.45	0.87	3.07

INTERPOLATED AND CALCULATED

DEPTH (m)	T ($^{\circ}$C)	S ($^{\circ}$/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	19.69	35.27	25.07	0.000	1.734
10	19.70	35.25	25.05	0.029	1.705
20	19.70	35.25	25.05	0.058	1.676
30	19.70	35.25	25.05	0.088	1.646
50	19.70	35.25	25.05	0.146	1.588
75	19.68	35.25	25.06	0.220	1.514
100	19.67	35.25	25.06	0.293	1.441
150	19.63	35.24	25.06	0.441	1.293
200	16.18	34.56	25.39	0.582	1.152
250	13.04	34.28	25.85	0.704	1.030
300	11.85	34.22	26.03	0.811	0.923
400	09.62	34.12	26.35	1.002	0.732
500	07.61	34.01	26.57	1.168	0.566
600	05.96	34.03	26.81	1.311	0.423
700	05.18	34.13	26.99	1.435	0.299
800	04.59	34.20	27.11	1.545	0.189
1000	03.82	34.37	27.33	1.734	0.000

STATION 87

M/V Hugh M. Smith: Cruise 25, 26°21'N., 150°51'W., March 15, 1954. Messenger time: 0944 GCT. Weather: 02, cloud coverage 8. Wind: 140°, 7 kt. Sea: 1-3 ft. Wire angle: 07°. Depth of water: 2,800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	21.24	35.39	24.74	5.07	0.11
10	21.21	35.38	24.74	5.16	0.11
50	21.16	35.39	24.76	5.08	0.14
100	20.97	35.37	24.80	5.01	0.12
130	20.59	35.33	24.87	5.02	0.12
205	17.76	34.83	25.22	4.71	0.34
305	12.70	34.29	25.92	4.65	0.85
410	09.54	34.12	26.36	4.51	1.39
511	07.55	34.05	26.61	3.43	1.91
617	05.96	34.05	26.83	2.22	2.48
816	04.29	34.21	27.15	0.57	3.10
1025	03.70	34.38	27.35	0.63	3.13
1233	03.30	34.50	27.48	1.05	3.11

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	21.24	35.39	24.74	0.000	1.800
10	21.21	35.38	24.74	0.032	1.768
20	21.20	35.38	24.75	0.064	1.736
30	21.18	35.39	24.76	0.096	1.704
50	21.16	35.39	24.77	0.160	1.640
75	21.06	35.38	24.79	0.241	1.559
100	20.97	35.37	24.80	0.320	1.480
150	20.00	35.20	24.93	0.477	1.323
200	17.94	34.85	25.19	0.626	1.174
250	14.62	34.45	25.65	0.757	1.043
300	12.80	34.29	25.90	0.873	0.927
400	09.74	34.12	26.33	1.071	0.729
500	07.70	34.05	26.59	1.237	0.563
600	06.18	34.04	26.79	1.381	0.419
700	05.15	34.11	26.97	1.506	0.294
800	04.40	34.20	27.13	1.616	0.184
1000	03.69	34.38	27.35	1.800	0.000

STATION 88

M/V Hugh M. Smith: Cruise 25, 24°41'N., 152°55'W., March 16, 1954. Messenger time: 0403 GCT. Weather: 63, cloud coverage 9. Wind: 020°, 22 kt. Sea: 3-5 ft. Wire angle: 40°. Depth of water: 2,900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	21.70	35.33	24.57	5.15	0.15
07	21.70	35.32	24.56	4.97	0.14
42	21.74	35.38	24.60	5.00	0.18
84	21.58	35.38	24.64	5.04	0.08
124	21.49	35.39	24.68	4.90	0.09
171	19.99	35.16	24.90	4.65	0.14
255	16.80	34.73	25.37	4.55	0.35
346	12.06	34.23	26.00	4.54	0.92
435	09.04	34.08	26.41	3.74	1.64
527	07.13	34.03	26.66	3.06	2.05
711	05.27	34.23	27.06	0.91	2.87
904	04.64	34.42	27.28	0.79	3.02
1100	04.00	34.48	27.40	1.05	3.09

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	21.70	35.33	24.57	0.000	1.852
10	21.71	35.32	24.56	0.034	1.818
20	21.72	35.34	24.57	0.068	1.784
30	21.73	35.36	24.59	0.101	1.751
50	21.73	35.38	24.60	0.169	1.683
75	21.61	35.38	24.63	0.253	1.599
100	21.52	35.39	24.67	0.336	1.516
150	20.78	35.28	24.79	0.500	1.352
200	18.86	34.98	25.06	0.655	1.197
250	16.85	34.74	25.37	0.796	1.056
300	14.14	34.41	25.72	0.923	0.929
400	10.10	34.13	26.28	1.133	0.719
500	07.61	34.04	26.60	1.301	0.551
600	06.24	34.06	26.80	1.444	0.408
700	05.34	34.22	27.04	1.567	0.285
800	04.98	34.37	27.20	1.670	0.182
1000	04.35	34.45	27.33	1.852	0.000

STATION 89

M/V Hugh M. Smith: Cruise 25, 23°02'N., 155°04'W., March 16, 1954. Messenger time: 2104 GCT. Weather: 02, cloud coverage 4. Wind: 190°, 10 kt. Sea: 1-3 ft. Wire angle: 07°. Depth of water: 2,400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	21.76	35.35	24.57	5.21	0.13
10	22.00	35.34	24.49	5.03	0.10
49	22.00	35.35	24.50	4.81	0.04
98	21.67	35.40	24.63	4.85	0.03
147	20.88	35.29	24.76	4.74	0.08
203	18.67	34.97	25.10	4.62	0.18
300	13.74	34.33	25.74	4.43	0.60
404	09.48	34.12	26.37	3.60	1.71
503	07.78	34.12	26.64	2.35	2.25
607	06.08	34.13	26.88	1.51	2.71
812	04.82	34.34	27.20	0.68	3.02
1014	04.24	34.47	27.36	0.98	3.18
1220	03.68	34.51	27.45	1.25	3.41

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	21.76	35.35	24.57	0.000	1.836
10	22.00	35.34	24.50	0.034	1.802
20	22.00	35.34	24.50	0.069	1.767
30	22.00	35.35	24.50	0.103	1.733
50	22.00	35.35	24.50	0.172	1.664
75	21.82	35.37	24.57	0.258	1.578
100	21.66	35.40	24.64	0.343	1.493
150	20.71	35.26	24.79	0.507	1.329
200	18.75	34.99	25.10	0.661	1.175
250	16.18	34.64	25.45	0.800	1.036
300	13.70	34.33	25.75	0.924	0.912
400	09.60	34.12	26.35	1.128	0.708
500	07.81	34.12	26.63	1.291	0.545
600	06.18	34.13	26.86	1.430	0.406
700	05.44	34.22	27.03	1.550	0.286
800	04.88	34.33	27.18	1.655	0.181
1000	04.25	34.47	27.36	1.836	0.000