

Selected Physical and Chemical Oceanographic Data from Quatsino Sound-Neroutsos Inlet, March 1979 Survey

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Canadian Data Report of Fisheries
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December 1979

SELECTED PHYSICAL AND CHEMICAL OCEANOGRAPHIC
DATA FROM QUATSINO SOUND-NEROUTSOS INLET.

MARCH 1979 SURVEY.

by

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ABSTRACT

Greer, G. L., P. G. Futer and I. G. Shand. 1979. Selected physical and chemical oceanographic data from Quatsino Sound-Neroutsos Inlet, March 1979 survey. Can. Data Rep. Fish. Aquat. Sci. 172: 28 p.

A survey of selected physical and chemical oceanographic measurements (temperature, salinity, oxygen content) was carried out on Quatsino Sound and Neroutsos Inlet waters during 20-24 March 1979. The present survey is a continuation of periodic monitoring of these waters over the past 20 years by Federal Government Personnel for the purpose of maintaining a continuing record of selected water quality data seaward of the effluent outfalls of the Port Alice sulfite mill.

Key words: Oceanographic, Quatsino Sound, Neroutsos Inlet, temperature, salinity, oxygen.

RESUME

Greer, G. L., P. G. Futer and I. G. Shand. 1979. Selected physical and chemical oceanographic data from Quatsino Sound-Neroutsos Inlet, March 1979 survey. Can. Data Rep. Fish. Aquat. Sci. 172: 28 p.

Une étude de certains facteurs océanographiques physico-chimiques (température, salinité, teneur en oxygène) a été effectuée du 20 au 24 mars 1979 dans la baie Quatsino et l'inlet Neroutsos. L'étude entre dans le cadre des contrôles périodiques qu'effectue depuis 20 ans le personnel du gouvernement fédéral. Le but de ces contrôles est de tenir un relevé de certaines données sur la qualité de l'eau en aval de la sortie des effluents de l'usine de pâte au bisulfite de Port Alice.

Mots clés: océanographie, baie Quatsino, inlet Neroutsos, température, salinité, oxygène.

INTRODUCTION

The present oceanographic survey of Quatsino Sound-Neroutsos Inlet is a continuation of a series of periodic surveys carried out on these inlet waters by Waldichuk (1958), Waldichuk et al. (1968), and Davis et al. (1977). Other oceanographic surveys of Neroutsos Inlet have been accompanied by biological observations (Davis et al. 1978). The continuing survey of these two inlets is motivated largely by the potential degradation of water quality stemming from the discharge of effluent from the ITT-Rayonier sulfite pulp mill located at Port Alice on the upper reaches of Neroutsos Inlet.

The Port Alice mill discharges effluent at the rate of about $120 \times 10^6 \text{ L/day}$ ($\sim 26 \times 10^6 \text{ Imp. GPD}$) from three outfalls located at elevations within the tidal zone. The present British Columbia Pollution Control Branch permit for the discharge of mill wastes from the Port Alice Division requires that by 31 December 1979, the effluent will be discharged via a submarine diffuser. The series of surveys carried out over the past 20 years, combined with further surveys following installation of the diffuser, should assist in evaluating the efficacy of diffuser discharge of the mill wastes.

STATION PROCEDURE AND METHODS OF OBSERVATION

The sampling program was carried out from aboard the CSS VECTOR in a manner similar to that described by Davis, Shand and Christie (1977) for previous surveys of Neroutsos Inlet-Quatsino Sound. In Neroutsos Inlet a series of 4 cross-inlet transects of 3 stations each plus an additional 2 stations were sampled over a 3 day period from 20-22 March 1979 (stns. Q15 - Q20, Fig. 1). In Quatsino Sound 6 stations were sampled on 23-24 March 1979 (Q1 - Q6, Fig. 1). Both sets of stations were sampled from NW to SE with the most seaward station occupied first on each sampling day. All stations were sampled on an ebb tide.

Station positions as given in Davis et al. (1977) were fixed by ship's radar and the exact position at the time of sampling was recorded by the ship's officer on duty.

Water samples were routinely taken with Nansen bottles at 0, 2, 4, 6, 10, 15, 20, 30, 50, 80, 100, 120 and 150 meters though at some stations there was insufficient depth to allow a full cast. Water temperature at depth was measured with paired reversing thermometers mounted on each Nansen bottle. Temperatures were recorded as soon as possible after filled bottles were brought on deck. Water was then collected for oxygen and salinity measurements. A secchi disc reading was made if sampling was being carried out during daylight hours. As the secchi disc was raised through the water column to a depth of 1-2 meters below the surface, a note was made of the water colour against the white background of the disc. Information including weather conditions, wind speed and direction, temperature, barometric pressure, cloud cover and sea state were recorded by the ship's officer on watch.

PRESENTATION OF RESULTS

The format used in this report to summarize results is adapted from that of Davis et al. (1977).

a) Heading of Tables

Station: Prefixed "Q" for the Quatsino-Neroutsos series and followed by the station number as indicated on the station location diagrams (Fig. 1). Position designated "A" or "C" is located on either side of a mid-channel station designated "B".

Latitude and Longitude: Position of the ship in degrees and minutes as determined by a radar fix at the time the messenger was dropped to trip the Nansen bottles.

Time: The time of day in Pacific Standard Time when the messenger was dropped.

Date: Given as day, month and year.

Depth: Approximate depth under the ship's keel at the time of sampling, as determined by the bridge echosounder readout (given in fathoms for chart reference).

Temperature: Air temperature given as: D - dry-bulb thermometer reading on ship's bridge, degrees Celsius; W - wet-bulb thermometer on ship's bridge, degrees Celsius.

Weather: Given as general word description.

Sea: General description of sea state as observed from the ship's bridge.

Wind: Given as direction (degrees true compass bearing) and speed in knots as measured on ship's bridge.

Cloud: Given as proportion of sky covered by cloud on a scale of 8 (8/8 = fully overcast). In some cases cloud type was observed and reported (Abbreviations: Cu = cumulus; St = stratus; As = altostratus; Sc = stratocumulus).

Barometer: Barometric pressure in millibars, as measured on ship's bridge (aneroid barometer - uncorrected).

Secchi: Secchi disc reading as determined by a secchi lowered from the ship's deck in daylight hours. Depth at which a white disc, 30 cm in diameter, just disappears from sight is recorded in meters. The color of the water over the disc at 1-2 meters depth is sometimes reported. (Abbreviations: lt = light; dk = dark; br = brown; gr = green; yl = yellow).

Tide: The state of the tide is indicated in a plot of tidal height versus standard time, yielding a tide curve. The state of the tide at the time of the bottle cast is illustrated by the arrow on the tide curve. Tidal heights and times are based on Canadian Tide and Current Tables (1979) with

corrections made on predicted tides for Tofino using Port Alice as a secondary port. Mean water corrections are applied to HHW, LHW, LLW and HLW.

b) Body of Tables

Depth (M): Depth of water in meters at which a given Nansen bottle was tripped by a messenger dropped from above. The top of the upper (zero depth) bottle was 2-3 cm below the surface prior to tripping and other bottles were positioned using a meter block and remote readout dial.

T ($^{\circ}$ C): Temperature was determined by reversing thermometers attached in pairs to each Nansen bottle and corrected using a Culbertson slide rule according to standard practice (U.S. Navy Hydrographic Office, Publication #607, 1955). Results are reported to the nearest 0.01 $^{\circ}$ Celcius.

S ($^{\circ}$ /oo): Total salt content of water expressed in parts per thousand ($^{\circ}$ /oo). The conductivity ratio of the water samples was determined using a Guildline Instruments Model 8400 Autosal salinometer and converted to salinity ($\pm 0.01^{\circ}$ /oo) from tables derived from the formula described in the manufacturer's manual.

σ_t : Density, which is a function of salinity and in situ temperature, was determined from 'Tables for Sea Water Density' (U.S. Navy Hydrographic Office, Publication #615, 1952) and is reported as σ_t where $\sigma_t = (\text{density} - 1) \times 10^3$.

Oxygen (mL/L, mg/L): Dissolved oxygen content of water samples processed according to the standard modified Winkler method (Strickland & Parsons 1965) expressed as: mL/L = milliliters O₂/liter water; mg/L = milligrams O₂/liter water; % sat. = % saturation of oxygen at in situ salinity and temperature according to: % sat. = observed dissolved oxygen conc.
saturation dissolved oxygen conc.

The saturation concentration was determined from formulae relating salinity, temperature and saturation (Truesdale and Gameson 1957, Table 2). Values are not corrected for ambient pressure.

ACKNOWLEDGEMENTS

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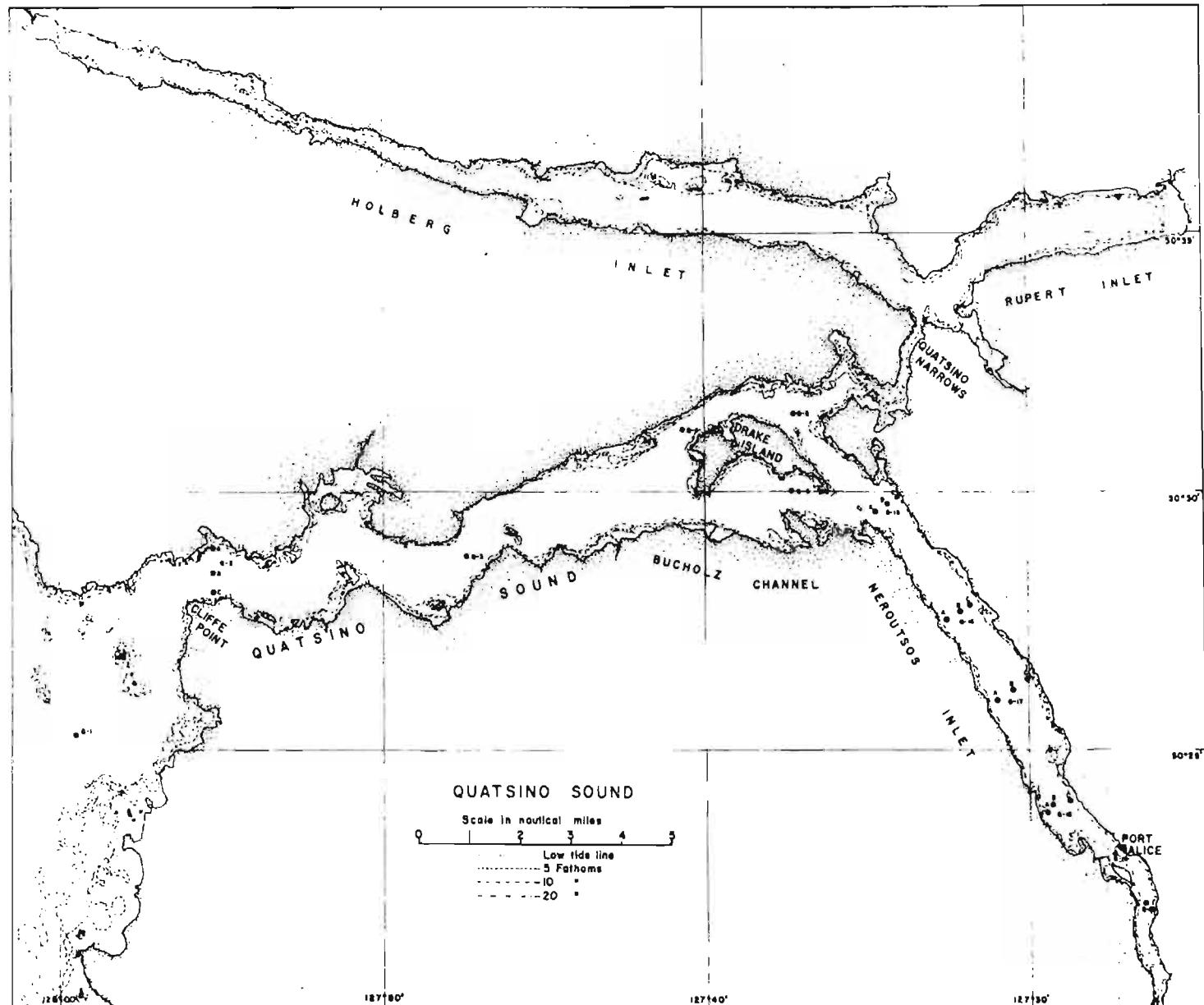
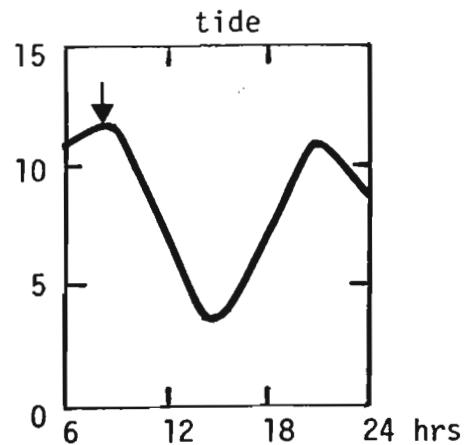


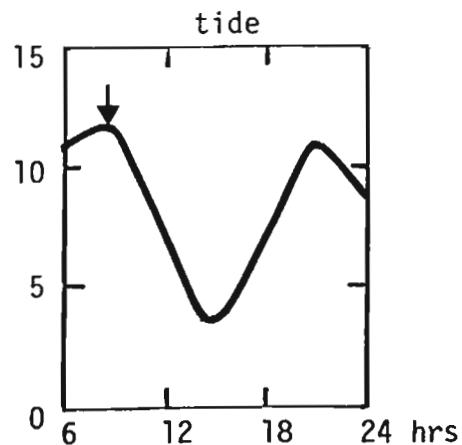
Fig. 1. Station locations in Neroutsos Inlet and Quatsino Sound.

Station: Q1
Latitude: $50^{\circ}25.3'N$
Longitude: $127^{\circ}59.5'W$
Time: 0808
Date: 23/3/79
Depth: 82 fms
Temperature: D 5 W 2
Weather: sunny
Sea: 3 ft. swell
Wind: $030^{\circ}T$ 8 knots
Cloud Amount: 0/8
Barometer: 1026 mb.
Secchi: 8.5 m



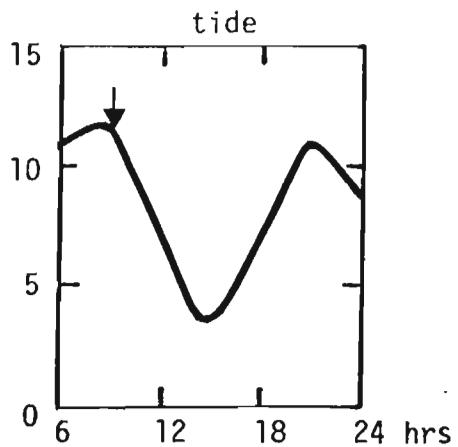
Depth (m)	T (°C)	Sal. (°/oo)	Density (στ)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	7.72	29.77	23.24	6.09	8.70	90.91
2	7.72	29.83	23.29	6.12	8.75	91.43
4	7.85	29.91	23.33	6.09	8.70	91.39
6	7.91	30.27	23.60	6.14	8.78	92.42
10	7.88	30.42	23.62	6.11	8.73	91.99
15	7.86	30.67	23.92	5.94	8.49	89.56
20	7.83	31.01	24.19	5.82	8.32	87.95
30	7.95	31.15	24.29	5.81	8.30	88.02
50	7.82	31.83	24.84	5.68	8.12	86.29
80	7.94	32.40	25.27	5.04	7.20	77.09
100	7.96	32.52	25.36	4.88	6.97	74.63
120	7.95	32.61	25.43	4.72	6.75	72.35

Station: Q2A
Latitude: 50°28.1'N
Longitude: 127°55.28'W
Time: 0853
Date: 23/3/79
Depth: 65 fms.
Temperature: D 8 W 7
Weather: sunny
Sea: rippled
Wind: 100°T 10 knots
Cloud Amount: 0/8
Barometer: 1026 mb
Secchi: 8.0 m yel-gr.



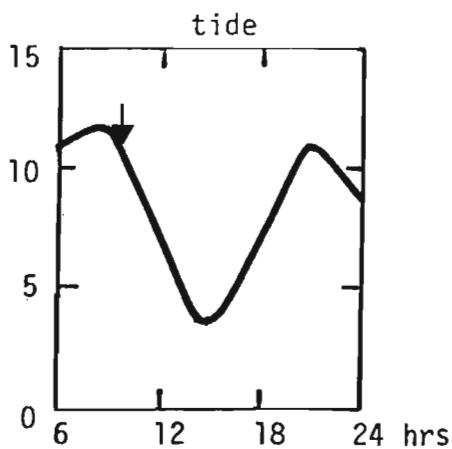
Depth (m)	T (°C)	Sal. (‰)	Density (στ)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	7.56	28.09	21.94	5.54	7.92	81.48
2	7.35	29.11	22.77	5.28	7.55	77.92
4	7.42	29.64	23.18	5.53	7.90	81.87
6	7.38	29.95	23.43	5.65	8.08	83.90
10	7.59	30.19	23.58	5.86	8.38	87.57
15	7.59	30.33	23.69	5.86	8.38	87.66
20	7.61	30.56	23.87	7.02	10.03	105.03
30	7.54	30.13	23.54	6.91	9.87	102.92
50	7.59	31.51	24.62	6.83	9.76	102.95
80	7.73	31.90	24.90	6.75	9.64	102.34

Station: Q2B
Latitude: 50° 28.45'N
Longitude: 127° 55.28'W
Time: 0920
Date: 23/3/79
Depth: 102 fms.
Temperature: D 8 W 7
Weather: sunny
Sea: rippled
Wind: 100°T 10 knots
Cloud Amount: 0/8
Barometer: 1026.5 mb
Secchi: 6.7 m yel-gr.



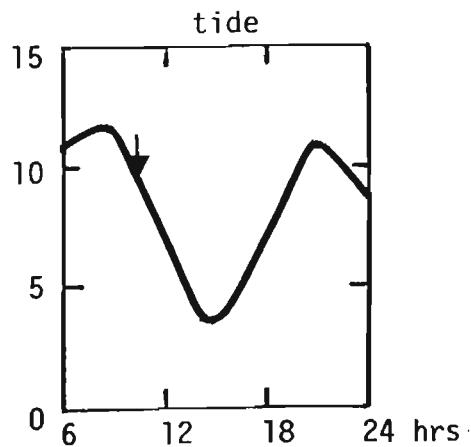
Depth (m)	T (°C)	Sal. (°/oo)	Density (στ)	(mL/L)	Oxygen (mg/L)	% Sat.
0	7.48	28.52	22.29	6.65	9.50	97.94
2	7.49	28.62	22.37	6.64	9.48	97.73
4	7.42	28.79	22.51	6.60	9.44	97.22
6	7.39	29.05	22.72	6.66	9.52	98.25
10	7.32	29.65	23.20	6.75	9.64	99.69
15	7.58	30.19	23.59	7.20	10.28	107.42
20	7.52	30.42	23.77	7.05	10.08	105.22
30	7.48	31.13	24.34	6.98	9.98	104.72
50	7.50	31.57	24.68	6.73	9.61	101.16
80	7.70	31.88	24.89	6.70	9.58	101.59
100	7.74	32.26	25.19	6.64	9.48	100.96
120	7.79	32.15	25.09	6.45	9.21	98.08
150	-	32.20	-	6.32	9.04	-

Station: Q2C
Latitude: $50^{\circ}28.9'N$
Longitude: $127^{\circ}55.28'W$
Time: 0952
Date: 23/3/79
Depth: 60 fms
Temperature: D 8 W 7
Weather: sunny
Sea: rippled
Wind: $140^{\circ}T$ 5 knots
Cloud Amount: 0/8
Barometer: 1026.5 mb.
Secchi: 8.0 m yel-gr.



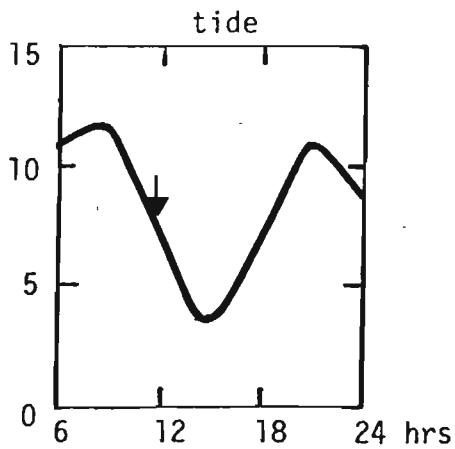
Depth (m)	T ($^{\circ}C$)	Sal. ($^{\circ}/oo$)	Density (σ_t)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	7.44	28.85	22.55	6.66	9.52	98.25
2	7.46	28.92	22.61	6.63	9.47	97.73
4	7.44	28.91	22.60	6.61	9.45	97.52
6	7.38	28.90	22.60	6.63	9.47	97.63
10	7.45	29.28	22.89	6.70	9.58	99.17
15	7.56	30.16	23.56	7.14	10.20	106.47
20	7.60	30.37	23.72	7.17	10.25	107.22
30	6.83	31.05	24.36	6.87	9.82	101.45
50	7.44	31.55	24.67	6.76	9.66	101.58
80	6.64	-	-	6.65	9.50	-

Station: Q3
Latitude: $50^{\circ}28.8'N$
Longitude: $127^{\circ}47.4'W$
Time: 1043
Date: 23/3/79
Depth: 86 fms
Temperature: D 6.5 W 6
Weather: sunny
Sea: calm
Wind: nil
Cloud Amount: 0/8
Barometer: 1026 mb.
Secchi: 7.3 m yel-gr.



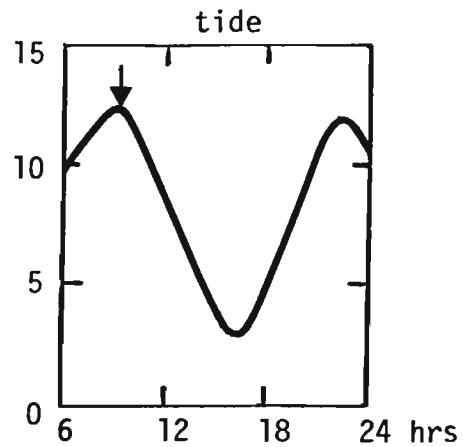
Depth (m)	T (°C)	Sal. (°/oo)	Density (στ)	(mL/L)	Oxygen (mg/L)	% Sat.
0	7.61	28.69	22.41	6.54	9.34	96.59
2	7.56	28.75	22.46	6.82	9.74	100.62
4	7.39	28.86	22.57	6.40	9.15	94.33
6	7.21	29.22	22.87	6.38	9.12	93.83
10	7.07	29.36	23.00	6.27	8.96	91.99
15	7.00	29.76	23.32	6.42	9.18	94.35
20	7.00	30.35	23.79	6.63	9.47	97.73
30	7.01	30.80	24.14	6.73	9.61	99.48
50	7.19	31.47	24.64	6.74	9.63	100.63
80	7.60	31.97	25.47	6.74	9.63	101.90
100	7.61	31.90	24.92	6.70	9.58	101.27
120	7.67	32.05	25.03	6.70	9.58	101.70

Station: Q4
Latitude: $50^{\circ}31.2'N$
Longitude: $127^{\circ}40.7'W$
Time: 1130
Date: 23/3/79
Depth: 66 fms.
Temperature: D 6.5 W 6
Weather: sunny
Sea: calm
Wind: nil
Cloud Amount: 0/8
Barometer: 1026 mb
Secchi: --



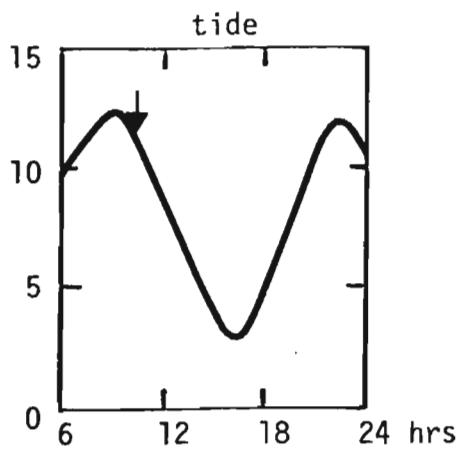
Depth (m)	T (°C)	Sal. (‰)	Density (στ)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	7.71	28.54	22.28	6.48	9.26	95.96
2	7.63	28.54	22.29	6.57	9.39	97.10
4	7.56	28.58	22.33	6.48	9.26	95.56
6	7.55	28.69	22.41	6.45	9.21	95.14
10	7.37	28.85	22.56	6.42	9.18	94.54
15	7.15	29.32	22.96	6.40	9.15	94.04
20	7.08	29.72	23.28	6.41	9.16	94.34
30	6.99	31.67	24.83	6.48	9.26	96.46
50	7.09	31.45	24.64	6.47	9.24	96.25
80	7.23	31.63	24.76	6.46	9.23	96.65
100	7.22	31.68	24.80	6.45	9.21	96.44
120	7.24	31.68	24.80	6.46	9.23	96.75

Station: Q5
Latitude: $50^{\circ}31.5'N$
Longitude: $127^{\circ}37.3'W$
Time: 0946
Date: 24/3/79
Depth: 60 fms
Temperature: D 6 W 5.5.
Weather: overcast
Sea: rippled
Wind: 360° T 6-8 knots
Cloud Amount: 7/8 C
Barometer: 1024.5 mb.
Secchi: --



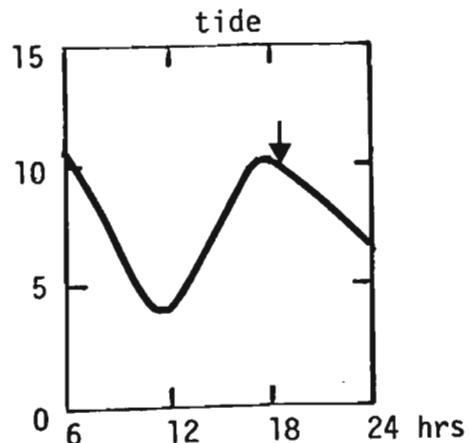
Depth (m)	T (°C)	Sal. (‰)	Density (στ)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	7.56	28.73	22.45	6.36	9.08	93.80
2	7.45	28.83	22.54	6.38	9.12	94.12
4	7.47	28.81	22.52	6.38	9.12	94.12
6	7.42	28.94	22.63	6.20	8.86	91.34
10	7.33	29.14	22.80	6.16	8.80	90.82
15	7.11	30.04	23.53	6.10	8.72	89.99
20	7.05	30.52	23.91	5.89	8.41	86.97
30	7.05	31.18	24.43	6.27	8.96	93.04
50	7.30	31.55	24.69	6.31	9.02	94.55
80	7.42	31.70	24.79	6.41	9.16	96.32

Station: Q6
Latitude: $50^{\circ}30.0'N$
Longitude: $127^{\circ}37.3'W$
Time: 1023
Date: 24/3/79
Depth: 77 fms
Temperature: D 7 W 6
Weather: cloudy
Sea: rippled
Wind: $290^{\circ}T$ 10 knots
Cloud Amount: 6/8 C
Barometer: 1024.5 mb
Secchi: --



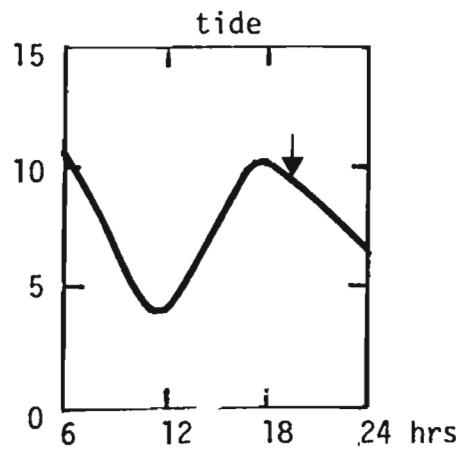
Depth (m)	T (°C)	Sal. (‰)	Density (στ)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	7.81	28.05	21.88	6.70	9.58	99.17
2	7.87	28.22	22.01	6.56	9.37	97.20
4	7.66	28.45	22.21	6.51	9.31	96.28
6	7.56	28.63	22.37	6.50	9.29	95.87
10	7.18	29.21	22.87	6.27	8.96	92.09
15	6.96	29.70	23.28	6.27	8.96	91.90
20	7.00	29.79	23.35	6.20	8.70	89.41
30	7.08	30.84	24.16	5.86	8.38	86.93
50	7.09	31.35	24.56	5.96	8.52	88.66
80	7.15	31.52	24.69	6.30	9.00	91.74
100	7.14	31.53	24.69	6.27	8.96	93.53
120	7.16	31.55	24.71	6.32	9.04	94.46

Station: Q15A
Latitude: 50° 29.6'N
Longitude: 127° 34.85'W
Time: 1824
Date: 20/3/79
Depth: 40 fms.
Temperature: D 9.5 W 7.7
Weather: clear
Sea: rippled
Wind: 350°T 10-15 knots
Cloud Amount: 0/8
Barometer: 1016.2 mb
Secchi: --



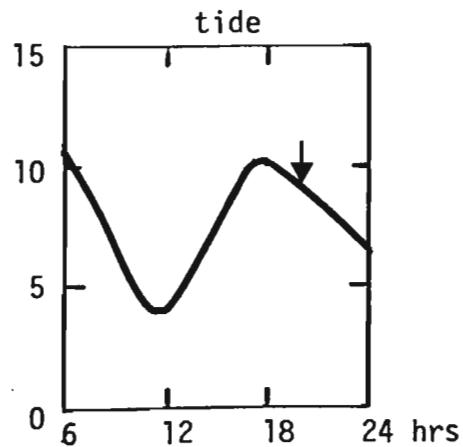
Depth (m)	T (°C)	Sal. (°/oo)	Density (στ)	(mL/L)	Oxygen (mg/L)	% Sat.
0	8.16	26.44	20.58	5.42	7.74	79.88
2	7.84	27.06	21.10	5.52	5.52	56.79
4	7.34	28.28	22.12	5.80	8.29	85.03
6	7.08	28.92	22.66	5.73	9.16	93.76
10	7.07	29.11	22.81	5.74	9.18	94.06
15	7.01	29.22	22.90	5.78	9.24	94.58
20	6.97	29.47	23.10	5.54	8.88	90.89
30	6.90	30.23	23.71	5.62	8.99	92.39
50	7.18	31.34	24.54	5.22	8.35	87.16
80	7.15	31.61	24.76	5.48	8.76	91.44

Station: Q15B
Latitude: 50° 29.77 'N
Longitude: 127° 34.54 'W
Time: 1910
Date: 20/3/79
Depth: 84 fms.
Temperature: D 9.5 W 7.7
Weather: clear
Sea: rippled
Wind: 000° T 10-15 knots
Cloud Amount: 0/8
Barometer: 1016.2 mb
Secchi: --



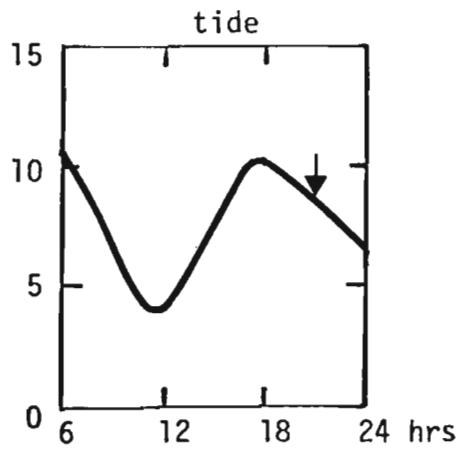
Depth (m)	T (°C)	Sal. (°/oo)	Density (στ)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	7.80	27.26	21.26	5.63	8.05	82.82
2	7.22	28.52	22.33	5.70	8.14	83.40
4	7.13	28.79	22.55	5.71	8.16	83.52
6	7.05	28.96	22.69	5.66	8.09	82.80
10	7.01	29.11	22.81	5.62	8.03	82.19
15	6.98	29.28	22.95	5.72	8.18	83.81
20	6.61	29.53	23.19	5.71	8.16	82.84
30	6.92	30.16	23.65	5.61	8.97	92.19
50	7.15	31.25	24.47	5.24	8.38	87.29
80	7.20	31.47	24.64	5.30	7.58	79.21
100	7.17	31.61	24.75	5.57	7.95	83.07
120	7.71	31.84	24.86	4.61	6.59	69.88
150	-	32.43	-	2.75	3.93	-

Station: Q15C
Latitude: $50^{\circ}29.94'N$
Longitude: $127^{\circ}34.28'W$
Time: 1937
Date: 20/3/79
Depth: 57 fms
Temperature: D 8 W 7.2
Weather: clear
Sea: rippled
Wind: $010^{\circ}T$ 5-10 knots
Cloud Amount: 2/8 Cu Ni
Barometer: 1016.2 mb
Secchi: --



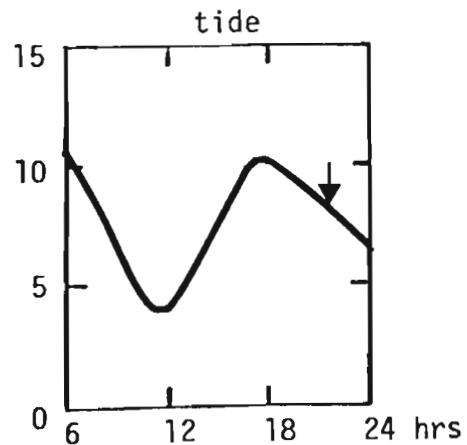
Depth (m)	T ($^{\circ}C$)	Sal. ($^{o}/oo$)	Density (σ_t)	(mL/L)	Oxygen (mg/L)	% Sat.
0	7.22	27.86	21.81	5.75	8.22	83.79
2	7.24	28.58	22.37	5.72	8.17	83.79
4	7.12	28.83	22.58	5.17	7.39	75.49
6	7.05	29.02	22.74	5.68	8.11	83.01
10	7.03	29.22	22.90	5.04	7.20	73.69
15	7.00	29.30	22.96	5.68	8.12	83.20
20	6.93	29.41	23.06	5.70	8.14	83.23
30	6.85	30.05	23.57	5.62	8.99	92.21
50	7.14	31.26	24.48	5.15	7.36	76.67
80	6.67	31.49	24.72	5.27	7.53	77.63

Station: Q16A
Latitude: $50^{\circ}27.53'N$
Longitude: $127^{\circ}32.55'W$
Time: 2044
Date: 20/3/79
Depth: 96 fms
Temperature: D 8 W 7
Weather: clear
Sea: chop
Wind: $320^{\circ}T$ 25 knots
Cloud Amount: 2/8 C
Barometer: 1019 mb
Secchi: --



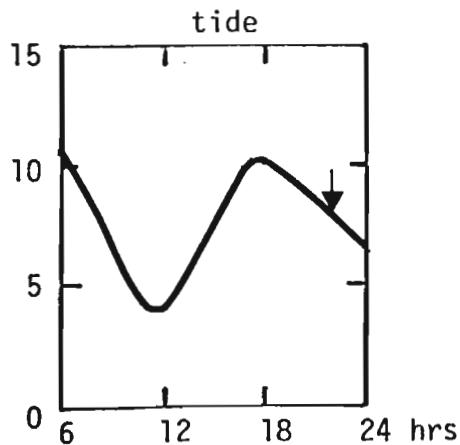
Depth (m)	T ($^{\circ}$ C)	Sal. ($^{\circ}/oo$)	Density (σ_t)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	7.86	27.54	21.48	5.72	8.17	84.31
2	7.53	27.64	21.60	5.67	8.12	83.28
4	7.25	28.18	22.05	5.71	8.16	83.44
6	7.04	28.86	22.61	5.65	8.08	82.62
10	7.04	29.07	22.78	5.66	8.99	92.02
15	6.97	29.36	23.02	5.72	8.18	83.73
20	6.97	29.49	23.12	5.66	8.09	82.89
30	6.93	30.36	23.80	5.47	7.82	80.54
50	7.12	31.21	24.45	5.88	7.45	77.52
80	7.40	31.47	24.61	2.28	3.84	40.29

Station: Q16B
Latitude: 50°27.7'N
Longitude: 127°32.15'W
Time: 2126
Date: 20/3/79
Depth: 104 fms
Temperature: D 8 W 7
Weather: clear
Sea: chop
Wind: 360°T 25 knots
Cloud Amount: 2/8 C
Barometer: 1019 mb
Secchi: --



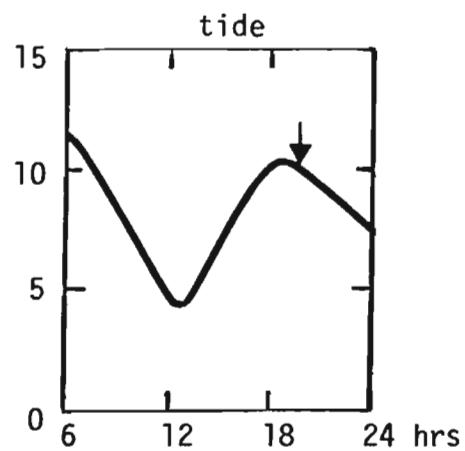
Depth (m)	T (°C)	Sal. (‰)	Density (στ)	(mL/L)	Oxygen (mg/L)	% Sat.
0	7.67	28.07	21.91	5.72	8.17	84.31
2	7.22	28.29	22.15	5.68	8.12	83.03
4	7.24	28.28	22.13	5.68	8.12	83.11
6	7.10	28.60	22.40	5.66	8.09	82.64
10	7.03	29.07	22.78	5.57	7.96	81.47
15	6.99	29.22	22.90	5.63	8.04	82.29
20	6.97	29.41	23.05	5.57	7.96	81.47
30	6.87	30.29	23.76	5.52	7.88	80.99
50	7.12	31.17	24.41	5.21	7.45	77.44
80	7.38	31.57	24.69	5.05	7.21	75.74
100	7.43	31.57	24.69	4.79	6.84	71.92
120	-	31.92	-	3.59	5.12	-
150	-	32.49	-	2.58	3.69	-

Station: Q16C
Latitude: 50°27.85'N
Longitude: 127°31.73'W
Time: 2159
Date: 20/3/79
Depth: 52 fms.
Temperature: --
Weather: clear
Sea: chop
Wind: 360° T 20 knots
Cloud Amount: 2/8 C
Barometer: 1019 mb
Secchi: --



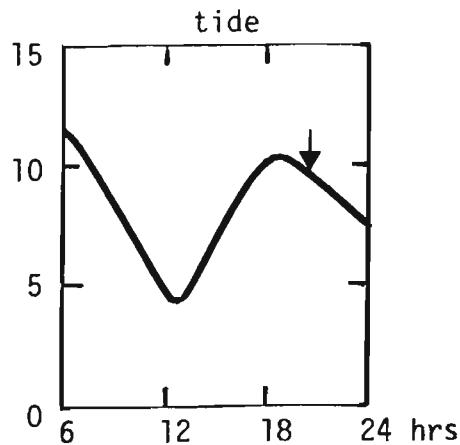
Depth (m)	T (°C)	Sal. (‰)	Density (στ)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	7.05	28.56	22.38	5.61	8.01	81.73
2	7.12	28.69	22.47	5.62	8.03	82.19
4	7.12	28.77	22.53	5.57	7.96	81.47
6	7.07	28.98	22.70	5.58	7.98	81.68
10	7.01	29.09	22.80	5.60	8.00	81.80
15	7.00	29.28	22.95	5.62	8.03	82.27
20	6.93	29.39	23.04	5.58	7.98	81.60
30	6.95	30.25	23.71	5.52	7.88	81.15
50	6.10	31.21	24.57	5.39	7.55	76.73

Station: Q17A
Latitude: $50^{\circ}25.93'N$
Longitude: $127^{\circ}31.0'W$
Time: 1931
Date: 21/3/79
Depth: 59 fms.
Temperature: D 9.7 W 9.7
Weather: clear
Sea: calm
Wind: weak; variable
Cloud Amount: 0/8
Barometer: 1016.3 mb
Secchi: --



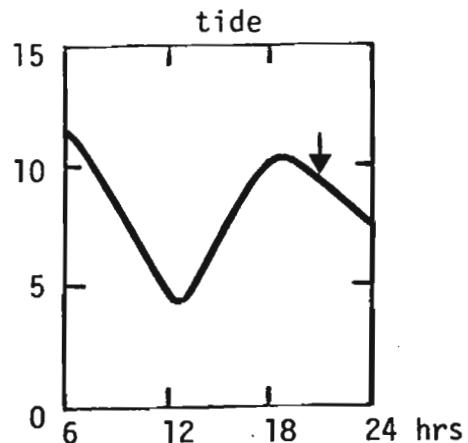
Depth (m)	T (°C)	Sal. (‰)	Density (στ)	Oxygen		% Sat.
				(mL/L)	(mg/L)	
0	7.38	27.54	21.54	5.76	8.24	84.17
2	7.53	27.62	21.58	5.82	8.32	85.33
4	7.33	28.34	22.17	5.78	8.25	84.62
6	7.14	28.74	22.51	5.82	8.32	85.16
10	7.02	29.11	22.81	5.73	8.19	83.83
15	7.00	29.25	22.92	5.76	8.24	84.34
20	6.95	29.51	23.14	5.73	8.19	83.91
30	7.12	30.51	23.90	5.15	7.36	76.27
50	7.21	31.28	24.49	5.25	7.50	78.29
80	7.29	31.51	24.66	5.20	7.44	77.99
100	7.24	31.61	24.74	5.25	7.50	78.53
120	8.26	32.03	24.93	3.51	5.02	53.98

Station: Q17B
Latitude: $50^{\circ}26.13'N$
Longitude: $127^{\circ}30.55'W$
Time: 2017
Date: 21/3/79
Depth: 100 fms.
Temperature: D 9.5 W 7.5
Weather: clear
Sea: rippled
Wind: $175^{\circ}T$ 10-15 knots
Cloud Amount: 0/8
Barometer: 1016.9 mb
Secchi: --



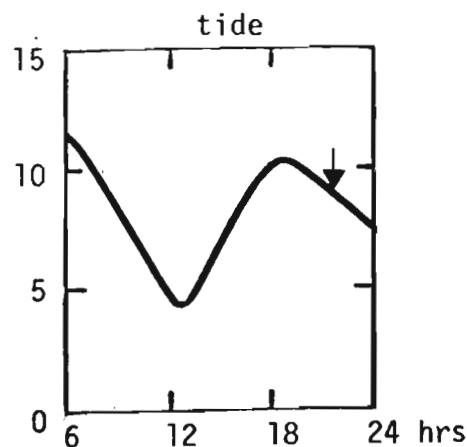
Depth (m)	T ($^{\circ}$ C)	Sal. ($^{\circ}/oo$)	Density (σ_t)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	7.95	27.27	21.25	5.15	7.36	76.03
2	7.65	27.84	21.74	5.72	8.17	84.05
4	7.27	28.54	22.33	5.76	8.24	84.51
6	7.14	28.79	22.55	5.72	8.17	83.62
10	7.01	29.07	22.78	5.72	8.17	83.54
15	6.98	29.28	22.95	5.82	8.32	85.16
20	6.92	29.68	23.27	5.76	8.24	84.34
30	7.06	30.48	23.88	5.15	7.36	76.11
50	7.21	31.32	24.52	5.25	7.50	78.29
80	7.47	-	-	4.95	7.07	-
100	7.45	31.67	24.76	4.74	6.78	71.37
120	8.42	31.99	24.88	3.10	4.43	47.79
150	-	32.51	-	2.37	3.39	-

Station: Q17C
Latitude: $50^{\circ}26.35'N$
Longitude: $127^{\circ}30.12'W$
Time: 2050
Date: 21/3/79
Depth: 50 fms.
Temperature: D 9 W 7
Weather: clear
Sea: rippled
Wind: $17^{\circ}T$ 10 knots
Cloud Amount: 0/8
Barometer: 1017 mb
Secchi: --



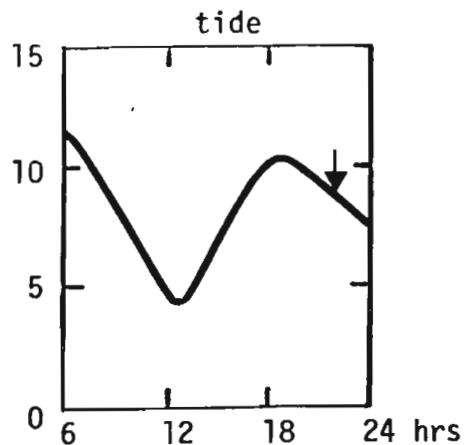
Depth (m)	T (°C)	Sal. (°/oo)	Density (στ)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	8.39	25.08	19.49	1.88	2.68	27.60
2	7.89	27.04	21.08	5.62	8.03	82.70
4	7.32	27.94	21.86	5.76	8.24	84.25
6	7.17	28.60	22.39	5.78	8.25	84.44
10	7.07	29.03	22.74	5.66	8.09	82.80
15	6.97	29.28	22.95	5.76	8.24	84.34
20	6.99	29.53	23.15	5.80	8.28	84.92
30	7.07	30.59	23.97	5.30	7.58	78.47
50	7.24	31.34	24.53	5.18	7.40	77.32

Station: Q18A
Latitude: $50^{\circ}23.8'N$
Longitude: $127^{\circ}29.52'W$
Time: 2127
Date: 21/3/79
Depth: 30 fms
Temperature: D 8 W 6
Weather: clear
Sea: rippled
Wind: $100^{\circ}T$ 5 knots
Cloud Amount: 0/8
Barometer: 1017.5 mb
Secchi: --



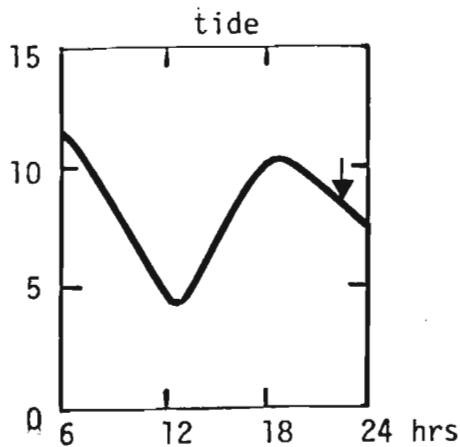
Depth (m)	T ($^{\circ}$ C)	Sal. ($^{\circ}/oo$)	Density (σ_t)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	7.94	25.08	19.54	4.79	6.84	69.58
2	7.60	28.00	21.87	5.43	7.76	80.25
4	7.40	28.33	22.15	5.61	8.01	82.24
6	7.23	28.50	22.31	5.67	8.11	83.09
10	7.00	29.11	22.81	5.66	8.09	82.80
15	6.92	29.41	23.06	5.71	8.16	83.35
20	6.94	29.66	23.25	5.62	8.03	82.36
30	7.07	30.44	23.85	5.12	7.32	75.62

Station: Q18B
Latitude: $50^{\circ}23.9'N$
Longitude: $127^{\circ}29.2'W$
Time: 2201
Date: 21/3/79
Depth: 73 fms
Temperature: D 8 W 6
Weather: clear
Sea: rippled
Wind: $140^{\circ}T$ 12 knots
Cloud Amount: 0/8
Barometer: 1617.5 mb
Secchi: --



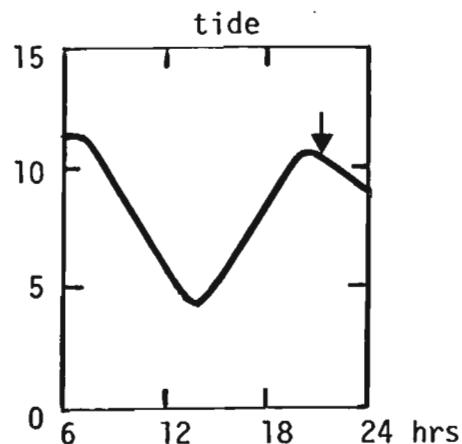
Depth (m)	T (°C)	Sal. (°/oo)	Density (στ)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	7.93	27.13	21.15	5.43	7.76	80.00
2	7.56	27.69	21.63	5.16	7.37	75.59
4	7.27	28.45	22.26	5.46	7.80	79.92
6	7.40	29.03	22.70	5.57	7.96	82.15
10	6.96	29.13	22.84	5.57	7.96	81.31
15	6.94	29.45	23.09	5.57	7.96	81.47
20	6.96	29.70	23.28	5.66	8.09	82.97
30	7.11	30.48	23.88	5.15	7.36	76.19
50	7.37	31.32	24.50	4.90	7.00	73.30
80	7.87	31.61	24.66	4.07	5.82	61.78
100	8.23	31.88	24.82	3.05	4.36	46.78
120	8.38	32.37	25.18	2.49	3.56	38.53

Station: Q18C
Latitude: $50^{\circ}24.08'N$
Longitude: $127^{\circ}28.83'W$
Time: 2240
Date: 21/3/79
Depth: 60 fms
Temperature: D 7 W 5
Weather: clear
Sea: chop
Wind: $150^{\circ}T$ 15 knots
Cloud Amount: 0/8
Barometer: 1017 mb
Secchi: --



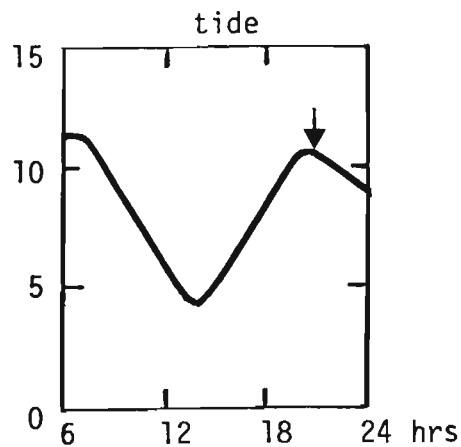
Depth (m)	T (°C)	Sal. (°/oo)	Density (στ)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	8.23	24.19	18.81	5.09	6.64	67.62
2	8.25	26.10	20.30	4.95	7.07	72.96
4	7.34	28.49	22.29	5.56	7.95	81.62
6	7.08	28.94	22.67	5.56	7.95	81.37
10	7.97	29.11	22.69	5.51	7.87	82.32
15	6.95	29.36	23.02	5.66	8.09	82.80
20	6.96	29.72	23.30	5.66	8.09	82.97
30	7.25	30.78	24.09	4.49	6.41	66.77
50	7.68	31.44	24.55	4.07	5.82	61.52
80	8.03	31.72	24.72	3.57	5.10	54.49

Station: Q20
Latitude: $50^{\circ}22.0'N$
Longitude: $127^{\circ}26.5'W$
Time: 2123
Date: 22/3/79
Depth: 32 fms
Temperature: --
Weather: clear
Sea: calm
Wind: $170^{\circ}T$ 12 knots
Cloud Amount: 0/8
Barometer: 1025 mb
Secchi: --



Depth (m)	T (°C)	Sal. (°/oo)	Density (στ)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	8.22	21.09	16.40	4.79	6.84	68.26
2	7.40	30.32	23.71	4.70	6.72	70.00
4	7.08	31.04	24.32	4.90	7.00	72.69
6	6.99	31.20	24.46	4.86	6.94	72.07
10	6.94	31.47	24.67	4.79	6.84	71.03
15	6.93	31.87	24.99	4.77	6.81	70.94
20	7.03	32.26	25.28	4.37	6.25	65.45
30	7.78	33.24	25.95	2.37	3.39	36.37
40	7.70	33.45	26.12	3.03	4.33	46.46

Station: Q19
Latitude: $50^{\circ}23.0'N$
Longitude: $127^{\circ}27.4'W$
Time: 2043
Date: 22/3/79
Depth: 26 fms
Temperature: D 9.5 W 8.5
Weather: clear
Sea: calm
Wind: $120^{\circ}T$ 12 knots
Cloud Amount: 0/8
Barometer: 1025 mb
Secchi: --



Depth (m)	T ($^{\circ}C$)	Sal. ($^{\circ}/oo$)	Density (σ_t)	Oxygen		
				(mL/L)	(mg/L)	% Sat.
0	8.03	24.76	19.28	2.68	3.84	39.10
2	7.53	28.14	21.99	4.52	6.46	66.46
4	7.24	28.53	22.33	4.65	6.65	68.21
6	7.08	28.89	22.63	4.79	6.84	70.01
10	6.98	29.29	22.96	4.71	6.73	68.95
15	6.94	29.57	23.18	4.80	6.86	70.29
20	7.01	30.14	23.62	4.53	6.48	66.74
30	7.44	33.05	25.85	3.28	4.68	49.73