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SHELLFISH GROWING WATER SANITARY SURVEY
OF
HARDY BAY
BRITISH COLUMBIA, 1971

SURVEILLANCE REPORT EPS 5-PR-73-5

PACIFIC REGION

MARCH, 1973

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1971 SHELLFISH GROWING WATER SANITARY SURVEY OF HARDY BAY, B. C.

by

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ABSTRACT

A bacteriological survey of the waters of Hardy Bay, on the north-east coast of Vancouver Island was carried out during August, 1971, by personnel of Public Health Engineering, Department of National Health and Welfare.

The purpose of the survey was to determine the effect of the existing multiple sewage discharge on the bacteriological quality of the shellfish growing waters and the water movement over the proposed sewage treatment plant outfall.

The unacceptably high coliform counts in the surveyed waters are attributed to raw sewage discharges and septic tank effluent seepage to the bay. Occasional discharges from fishing and pleasure boats using the mooring facilities of Hardy Bay contribute to the contamination of the waters.

Float studies show that effluent discharged from the new sewage treatment plant would be carried over the clam beds at the mouth of the Tsulquate River and could cause further deterioration of the shellfish growing water quality.

A recommendation is made to maintain the existing closure on the shellfish growing areas of Hardy Bay.

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L I S T O F F I G U R E S

1. INTRODUCTION

From August 18 to 22, 1971, a bacteriological survey was carried out by Public Health Engineering, Department of National Health and Welfare, in the waters of Hardy Bay, in the vicinity of Port Hardy at the northern end of Vancouver Island, British Columbia.

There are at least nine outfalls discharging raw sewage and septic tank effluent to the bay. Other possible sources of contamination are discharges from fishing and pleasure boats using the mooring facilities and septic tank effluent seepage from the dwellings at the head of Hardy Bay. According to the local public health inspector, these dwellings have poor subsurface disposal systems.

The village is presently installing a secondary sewage treatment plant with a new outfall as shown in Figure 2. The outfalls in the inner part of the bay will remain however, as the collection system will not extend further south than the Latitude 50^{o} 43' 12" 22N., line on Figure 2. Beaches in the area of the existing town outfall and new outfall are clam producers which have been closed due to the high total coliform counts in the waters.

The geographical location of the survey is shown in Figure 1.

2. SAMPLING AND ANALYSES

For the purpose of determining the bacteriological quality of the waters in Hardy Bay, 12 sampling stations were established. Station 4 to 12 are shown on Figure 2; Stations 1 and 2 (not shown) were located in the area of the new village outfall, and at the beach in front of Tsulquate I.R. #4 respectively. A list of the sampling stations is appended to this report. Station 11 was in the tidal flat area, hence at low tide the station was not accessible.

Samples were taken six inches below the water surface

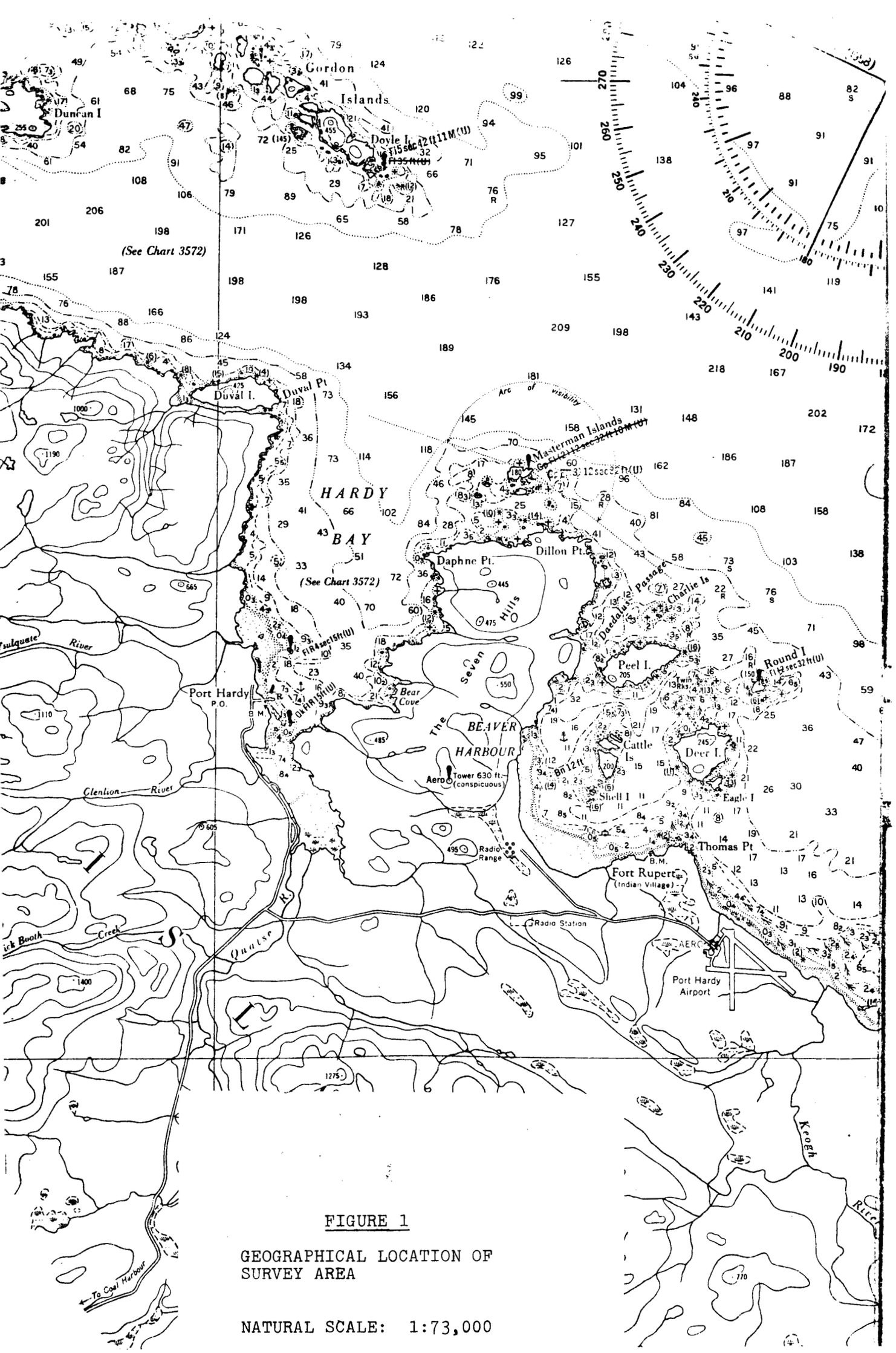
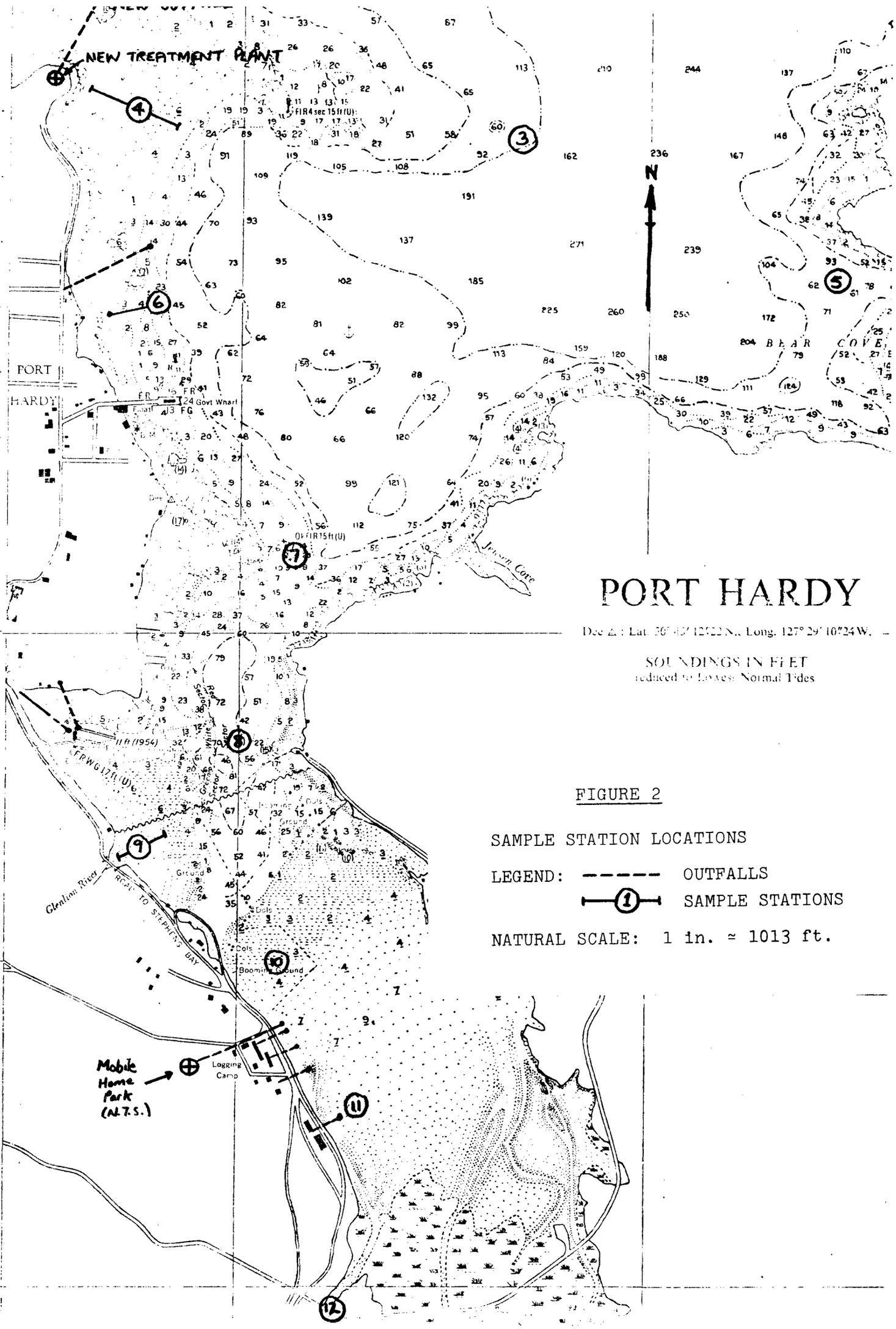


FIGURE 1

GEOGRAPHICAL LOCATION OF SURVEY AREA

NATURAL SCALE: 1:73,000



PORT HARDY

Dec Δ : Lat. 50° 43' 12"22 N., Long. 127° 29' 10"24 W.

SOUNDINGS IN FEET
reduced to Lowest Normal Tides

FIGURE 2

SAMPLE STATION LOCATIONS

LEGEND: ----- OUTFALLS

(1) SAMPLE STATIONS

NATURAL SCALE: 1 in. ≈ 1013 ft.

in a 6 ounce sterile glass bottle attached to the end of a 5 foot sampling rod. Total coliform determinations by the membrane filtration method were carried out within three hours of sampling in the Public Health Engineering mobile laboratory located at Port Hardy Airport. During each sampling run the tidal stage and weather conditions were noted.

During most of the sampling days, float studies were carried out in the vicinity of the new village outfall. Two studies were also carried out at the existing village outfall. The floats used were: (1) poles 6 feet long, weighted to float vertically with a 1 foot of length above the water surfaces; (2) crossed vanes each 18 inches wide by 12 inches deep, the mid-point being about 2 feet below the water surface. The vane floats were buoyed by plastic bottles. The vane floats were used to lessen any wind effect that might have affected the pole floats, but it was found that the two types used together had similar movement. Wind and water conditions were noted as was the tidal stage during the studies.

3. DISCUSSION OF RESULTS

(a) Bacteriological results show bacterial contamination throughout the bay. Lowest median count, of 104 per 100 mℓ, is at Station 3.

(b) Bacteriological water quality over clam beds (Stations 2 and 4) exceeds the maximum total coliform median of 70 per 100 mℓ criteria for approved shellfish growing waters.

(c) Results from other surveys have invariably given higher coliform counts using the MPN technique.

(d) Station 4 counts were generally higher at low tides possibly indicating movement of sewage from the existing outfall out along the shore.

(e) Float studies show that sewage discharged from the new village outfall would move over the clam beds at the mouth of the Tsulquate River and into the harbour toward the Government Wharf on a rising tide and low wind

TABLE 1

TOTAL COLIFORMS PER 100 ml

BY MEMBRANE FILTRATION METHOD

DATE AND SAMPLING TIME [1] 1971	SAMPLE STATIONS												
	1	2	3	4	5	6	7	8	9	10	11	12	REMARKS-TIDES & WEATHER
Aug. 18 0935-1110	198	320	53	600-800	195	920	230	370	6500	140	(NS)	110	Rising 0655-2.3' NE Breeze 5-10 Tide 1240-12.2'
Aug. 18 1440-1610	577	> 3000	45	900	(NS)	930	245	199	4600	9	680	105	Falling 1240-12.7' NE 4-5 Tide 1840-6.9' NE Swell
Aug. 19 0910-1030	1740	2345	410	1000	64	1280	2820	4025	5900	1040	(NS)	600	Rising 0735-2.1' Easterly Breeze Tide 1355-13.2' NE Swell
Aug. 19 1325-1425	12	2010	23	300	17	680	30	100	4800	262	470	1320	Rising 1355-13.2' E 0-5 Ebb 1925-6.2' NE Swell
Aug. 20 0915-1112	246	2035	104	7000	510	1250	620	320	800	930	(NS)	1150	Rising 0750-2.1' SE Breeze Tide 1409-13.6' SE Swell
Aug. 20 1435-1530	(NS)	940	(NS)	1790	(NS)	1020	(NS)	(NS)	200	2830	810	430	Falling 1409-13.6' SSE 8-10 Tide 1409-13.6' SE Swell
Aug. 21 1030-1200	1200	320	1420	6700	460	2255	2555	2990	4200	1210	(NS)	590	Rising 0820-2.3' W <2 Tide 1429-13.9' NE Swell
Aug. 21 1600-1720	820	1090	1150	1600	590	1760	1340	2345	3300	620	1000	610	Falling 1439-13.9' SSW < 5 Tide 2020-5.2' Chop 2-5
No. of Samples	7	8	7	8	6	8	7	7	8	8	4	8	
Range	12-1740	320- 3000	23-1420	300-7000	17-590	680-2755	30-2820	100-4025	200-6500	9-2830	470-1000	105-1320	
Median	577	1550	104	1300	370	1135	620	370	4400	775	Aug.740	595	

Notes:

(1) All times are Pacific Daylight Saving Time

(2) Tide data is for Alert Bay Reference Port. All compass bearings are true bearings.

conditions. (Float Studies #2, 4 and 5). There is also good movement away from the new village outfall area on falling tides where there is no opposing wind (Float Studies #1 and 4) and when there is an opposing wind on rising tides (Float Study #3). Float Study #2 was anomalous, i.e., movement away from the harbour during the latter part of a rising tide although the wind and swell from the NE to E possibly caused some movement toward the shore.

(f) Float studies over the existing village outfall show movement into the harbour and onto the shore on a rising tide with little wind and parallel to the shore seaward on a falling tide under calm conditions.

4. CONCLUSIONS

(a) Inner harbour water will retain its high total coliform counts when the new village outfall commences operation since discharges from unsewered areas at the head of the harbour will remain.

(b) There will be movement of sewage from the new village outfall onto the shellfish beds in the area of the Tsulquate River under certain tidal and wind conditions.

(c) There will be movement of sewage from the new village outfall into the harbour during a rising tide when there is no opposing wind.

5. RECOMMENDATION

The shellfish growing areas should remain closed, as the bacteriological quality of the waters over these areas exceeds the maximum total coliform median of 70 per 100 mℓ criteria for approved shellfish growing waters.

ACKNOWLEDGEMENTS

The sanitary survey including the bacteriological membrane filter analyses was conducted by D. Ellis (P. Eng.0, and G. Bradshaw (Technician).

Mr. Bradshaw compiled the technical data and Mr. Ellis prepared the report.

A P P E N D I X 1

DESCRIPTION OF SAMPLE STATION LOCATIONS

DESCRIPTION OF SAMPLE STATION LOCATIONS

SAMPLE STATION	DESCRIPTION
1	Over the position of the new Village of Port Hardy outfall.
2	In the bay in front of Tsulquate Indian Reserve.
3	Mid-point on a line from the outer harbour light (FIR 4 sec 15 ft. (U) on chart) to the point at the north side of Beaver Cove.
4	Tidal area between point on which the new sewage treatment plant is located and the outer harbour light.
5	In Bear Cove about 100 yards from shore in the northern half.
6	At the foot of Douglas Street in Port Hardy.
7	At the inner harbour light (OK FIR 15 ft. (U) on chart).
8	Mid-point on line from the inner mooring facility to the small point on the opposite shore.
9	At the mouth of the Glenlion River.
10	About 1/3 of the distance from the west shore on a line between the Tidal Boundary sign on each shore in the inner harbour.
11	In the tidal area in the inner harbour on the west side out from the MacMillan Bloedel machine shop. Can only be sampled in a high tide condition.
✓ 12	Quatse River, at the bridge for the road to the east side of the inner harbour.

NOTE:

(1) Stations 2, 4, 6, and 9 were taken in water depths of 2 to 3 ft. regardless of the tidal stage.

A P P E N D I X 2

FLOAT STUDIES

FIGURE 3(A)

FLOAT STUDY NO. 1

AUGUST 18, 1971

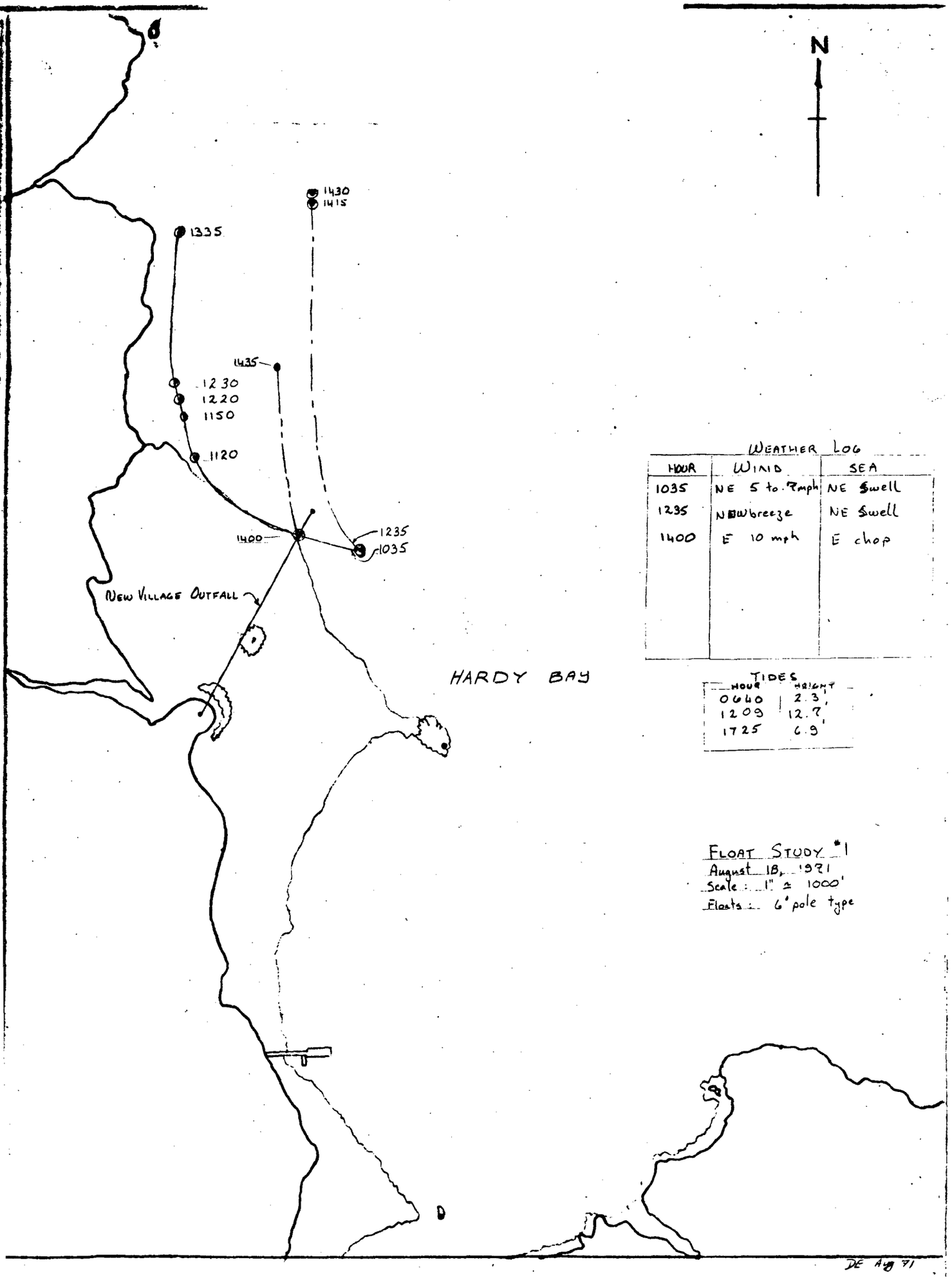
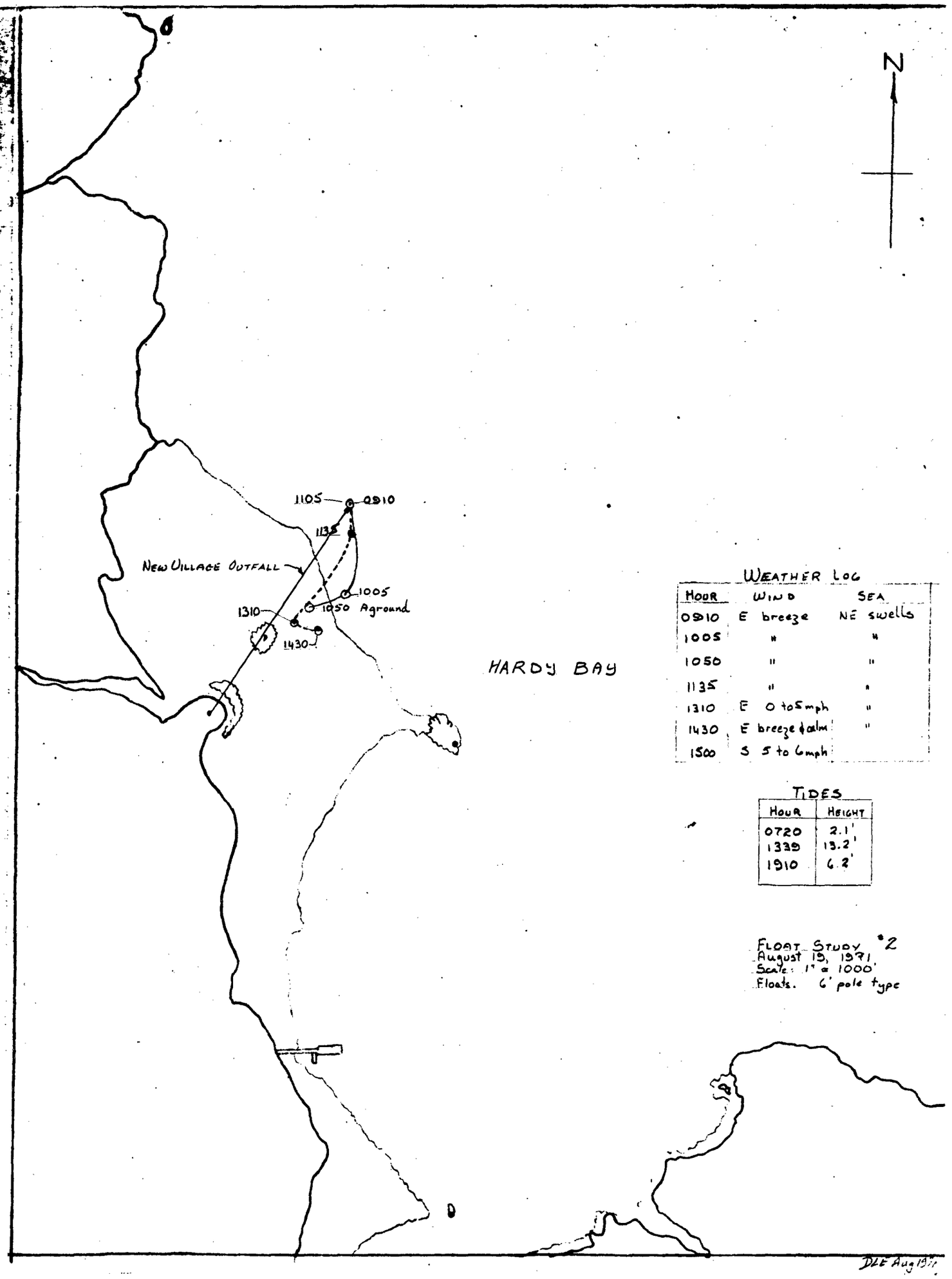


FIGURE 3(B)

FLOAT STUDY NO. 2

AUGUST 19, 1971



WEATHER LOG

Hour	Wind	Sea
0910	E breeze	NE swells
1005	"	"
1050	"	"
1135	"	"
1310	E 0 to 5 mph	"
1430	E breeze & calm	"
1500	S 5 to 6 mph	

TIDES

Hour	Height
0720	2.1'
1339	13.2'
1910	6.2'

Float Study #2
August 19, 1971
Scale: 1" = 1000'
Floats. 6' pole type

FIGURE 3(C)

FLOAT STUDY NO. 3

AUGUST 20, 1971

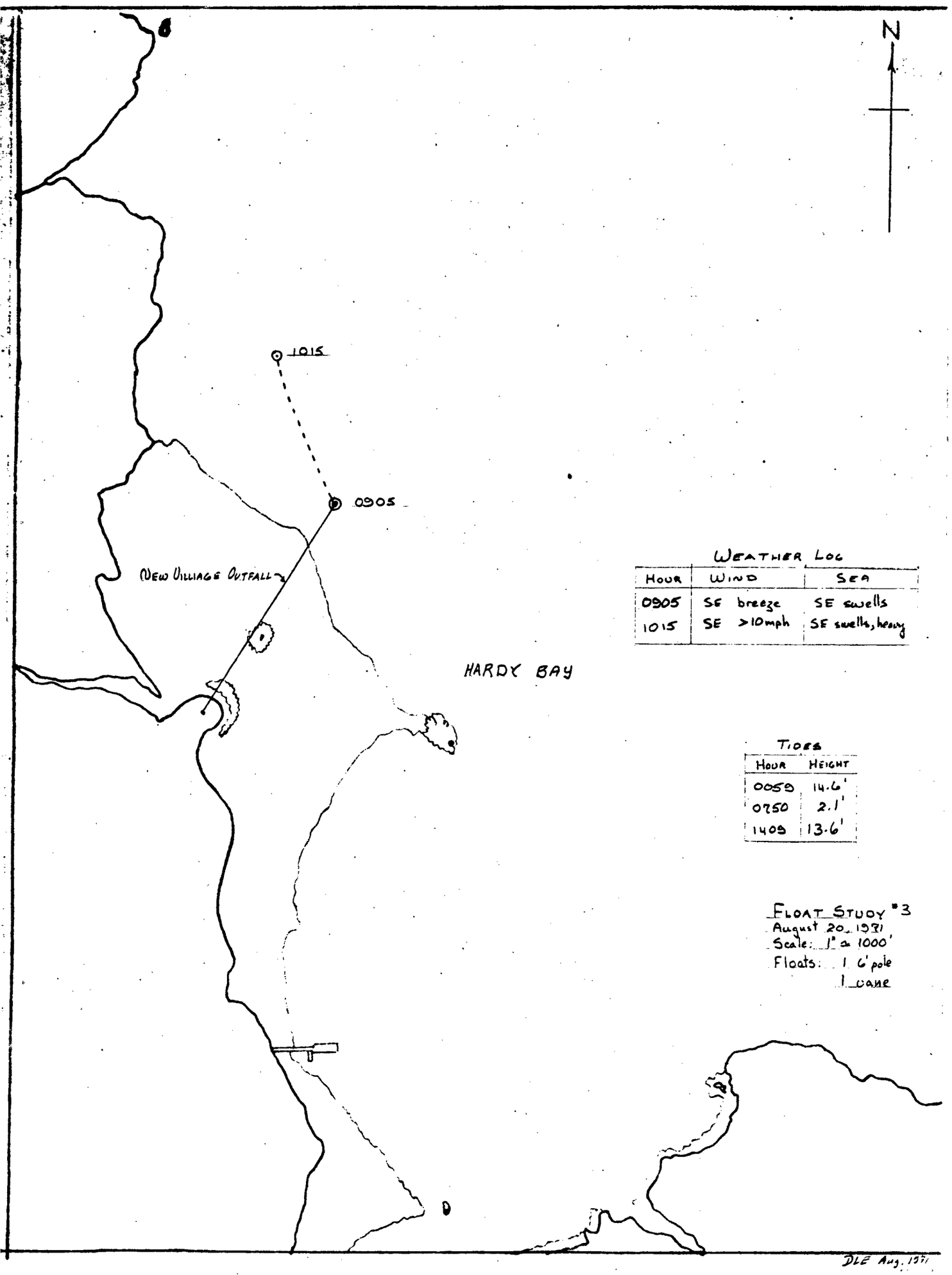
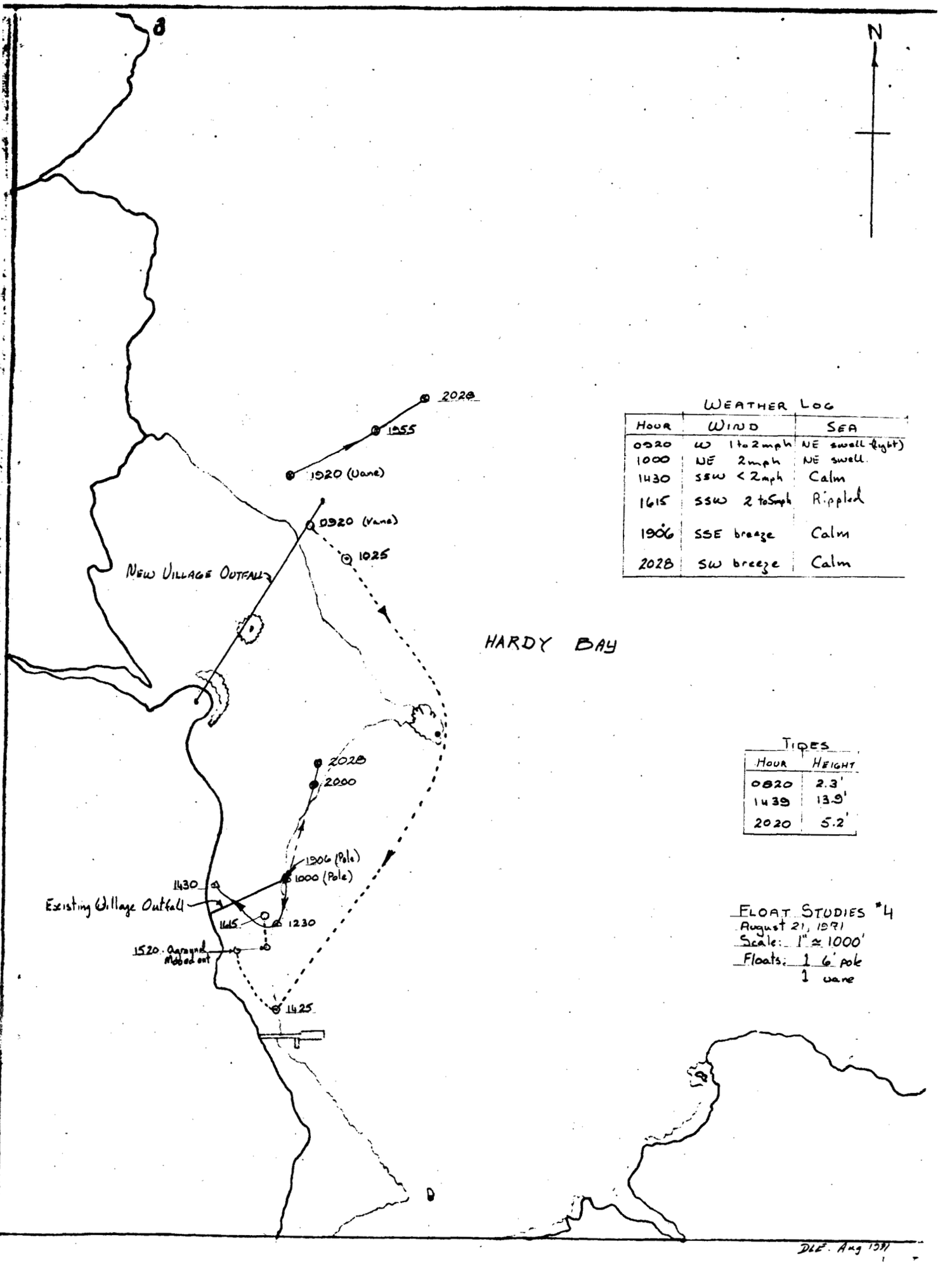


FIGURE 3(D)

FLOAT STUDY NO. 4

AUGUST 21, 1971



WEATHER LOG

HOUR	WIND	SEA
0820	W 1 to 2 mph	NE swell (light)
1000	NE 2 mph	NE swell
1430	SSW < 2 mph	Calm
1615	SSW 2 to 5 mph	Rippled
1906	SSE breeze	Calm
2028	SW breeze	Calm

TIDES

HOUR	HEIGHT
0820	2.3'
1439	13.9'
2020	5.2'

FLOAT STUDIES #4
August 21, 1971
Scale: 1" ≈ 1000'
Floats: 1 6' pole
1 vane

FIGURE 3(E)

FLOAT STUDY NO. 5

AUGUST 22, 1971