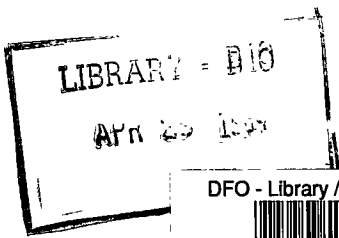


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Institute Note 64-11

CURRENT SURVEY BAIE CHALEUR

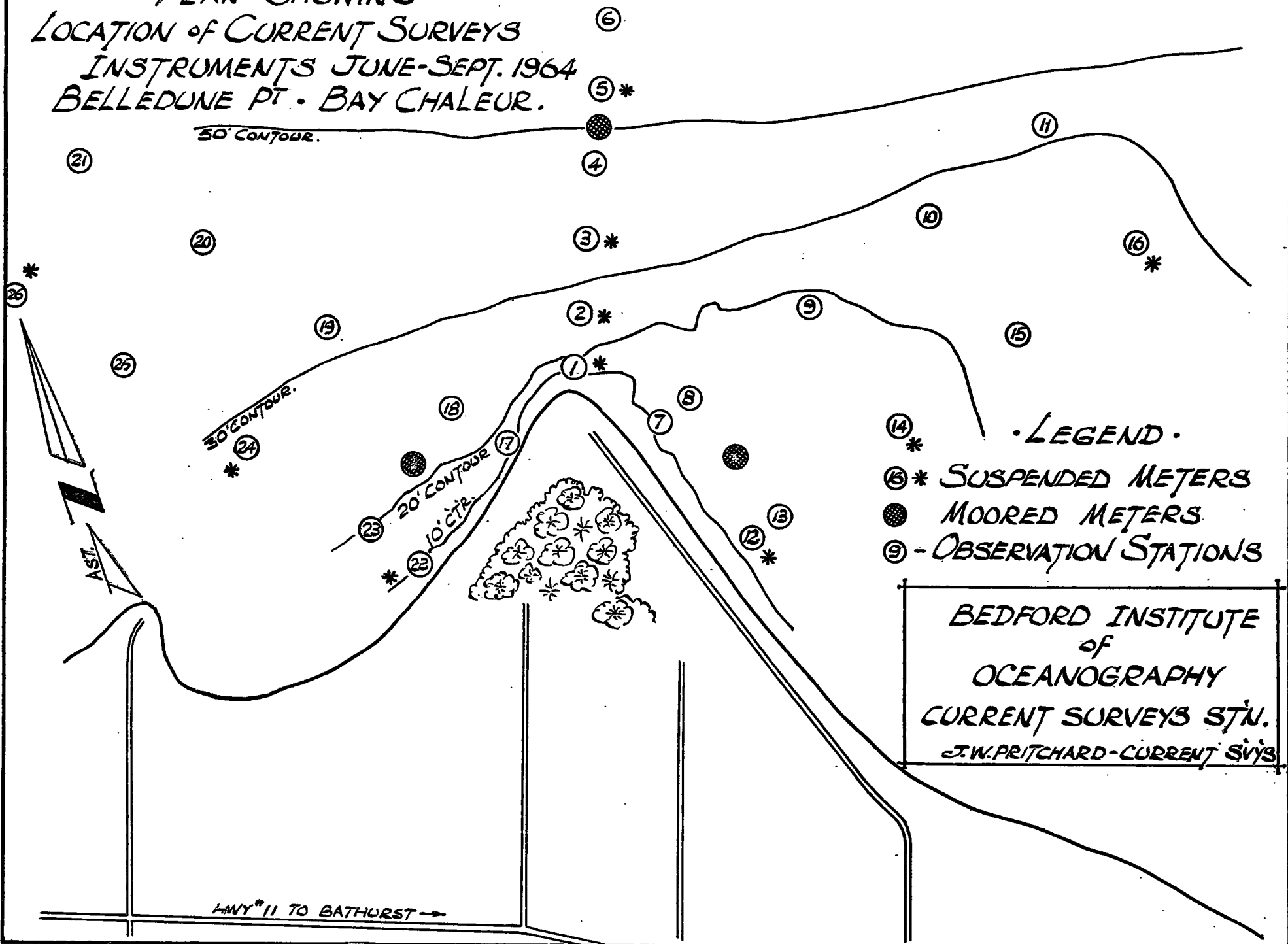
by

C. J. Langford

April 1964

Department of Mines and Technical Surveys  
Marine Sciences Branch  
Canada

PLAN SHOWING  
 LOCATION OF CURRENT SURVEYS  
 INSTRUMENTS JUNE-SEPT. 1964  
 BELLEDUNE PT. - BAY CHALEUR.



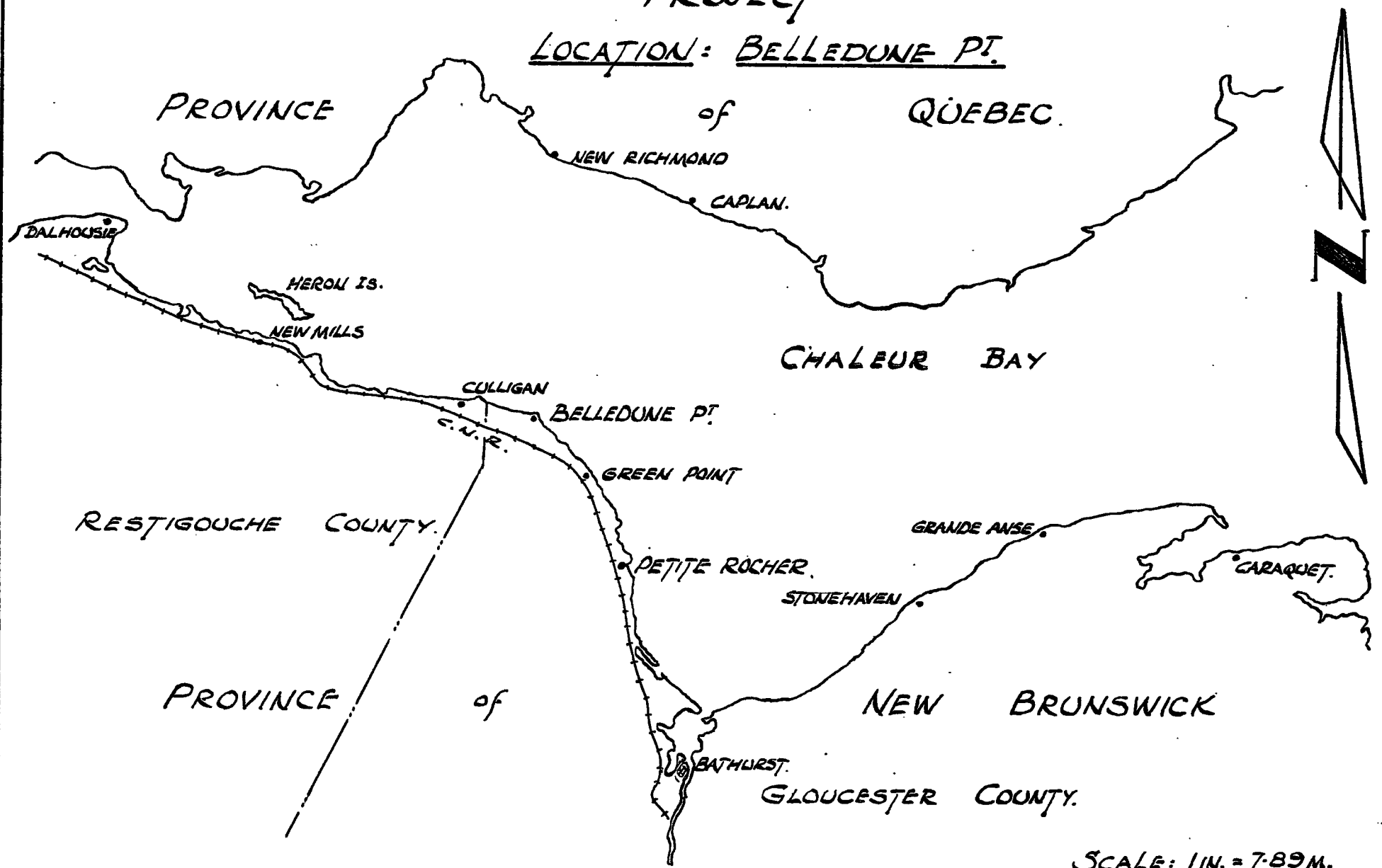
- LEGEND •
- ⑥\* SUSPENDED METERS
  - MOORED METERS
  - ⑨ - OBSERVATION STATIONS

BEDFORD INSTITUTE  
 of  
 OCEANOGRAPHY  
 CURRENT SURVEYS STN.  
 J.W. PRITCHARD - CURRENT SVYS.

HWY #11 TO BATHURST →

PLAN SHOWING  
PROPOSED AREA FOR 1964 CURRENT SURVEYS  
PROJECT

LOCATION: BELLEDUNE PT.



RESTIGOUCHE COUNTY.

PROVINCE of

NEW BRUNSWICK

GLOUCESTER COUNTY.

OPERATIONS BASE: PETITE ROCHER.

SCALE: 1 IN. = 7.89 M.

## CURRENT SURVEY BAIE CHALEUR

### Object:

This survey will obtain data for the benefit of the Dept. of Public Works and National Research Council for the express purpose of building a harbour at Belledune Point. The harbour will serve as a shipping point thru' which ores smelted at the Brunswick Mining Co., Belledune Point smelter, now under construction, will pass. The maximum required depth for vessels using the port is 40 ft. at LW the breakwaters will therefore extend out to this depth.

The data required is a general pattern of the current movements in Baie Chaleur and detailed measurements in the immediate vicinity of Belledune Point including littoral drift and silt measurements.

The survey will be a combined effort of Tidal Survey, Geological Survey of Canada, Fisheries Research Board and Topographic Surveys. Mr. Dale Buckley, Geological Survey of Canada is consultant for and will in effect direct the measurements for littoral drift and associated coring. Mr. P. Cant will conduct the counting and analysis of the silt sampling and comment on sampling techniques and locations. Mr. R. Moore of Topographic Surveys of Canada (Air Surveys) is consultant and will assist in the planning and direction of the measurements of current by aerial photography.

### Summary:

Phase I      June 1st. to 15th. mooring current meters, installing tide gauges and checking instrumentation for silt and other observations.

Phase II     June 15 to July 15, detailed investigation of Belledune Point.

Phase III July 15 to Aug. 30 current measurement by photogrammetric methods completion of other current and oceanographic observations.

Summary:

Moored Meter Positions

Section Line Belledune Pt. to Caplan Wharf

Position (47) moored in 50 ft. of water one buoyant type H.W. and one non-buoyant H.W. current meter. The bottom meter will be 5 ft. above the sea bed and the upper meter 15 ft. below the surface. (i.e. 45 ft. & 15 ft. from surface).

Position (48) moored in 102 ft. of water one buoyant type H.W. and one non-buoyant H.W. Depths 15 ft. & 97 ft. below surface.

Position (49) moored in 50 ft. of water one buoyant type H.W. and one non-buoyant type H.W. Depths 15 ft. & 45 ft.

Approximate locations of the above Positions are:

(47) 0.4 miles 027 from Belledune Pt.

(48) 6.6 miles 027 " " "

(49) 12.0 miles 027 " " "

These are the initial positions and depths where these meters will be moored for the first 30 day period of observations. They will be serviced after about 15 days and the records examined, also by this time some observations of the temperature structure across this section line will have been obtained. Using information from both these sources it will be decided whether to replace the meters at these same positions and depths for a further 30 day period or relocate them at depths better suited to gather important information.

Suspended Meter Positions  
Phase I Across Section Line Belledune Pt. to Caplan Wharf

Observation Periods 25 Hrs.

All observations with the meters suspended from the launch will be made in profile in depths up to 50 ft. each 5 ft. level will be observed, over 50 ft. each 10 ft. level will be observed. Each series of observations will begin with an observation 1 ft. below the surface and end with a reading as near bottom as possible.

Positions for Observations

- (1) In shore of moored meter at Pos'n.1 in 20 ft. of water
- (2) 3.7 miles 027 from Belledune Pt.
- (3) 9.2 miles 027 from Belledune Pt.

Time permitting check observations will be taken alongside the moored meters at the appropriate depths, making allowance for the state of the tide to obtain comparative readings to check the readings of both types of meters.

During the taking of these measurements, observations of silt content, temperature and density will be taken every 2 hours. A short core or grab sample will also be taken at each of these positions.

Tide Gauges:

Tide gauges will be established at Belledune Pt. and Caplan Wharf at new sites and connected to the Geodetic levelling system. Other gauges will be installed at places requiring further records (e.g. Bathurst, Dalhousie) however these sites will be chosen in cooperation with those installed by the Kapuskasing sounding survey.

Phase II  
Silt, Littoral Drift, & Current Observations  
Belledune Pt.  
Observation Periods 25 hours

This phase of the survey will study in detail the conditions existing at and in the immediate vicinity of the site for the proposed harbour.

Measurements of Silt Movement

These measurements will be made using turbidisond which samples the silt in suspension. From Belledune Point, seaward along the moored meter section line, 6 positions 500 ft. apart will be observed over a 25 hour period. The launch passing from one station to the next taking three samples at each. (i.e. surface(3 ft.)mid depth, and near bottom). This will be repeated every two hours. At 500 ft. east and west of the point and 1500 ft. east and west of the point there are observation lines perpendicular to the shore line. The launch will carry out similar observations along these lines altho<sup>o</sup> here the positions seaward are separated by 1,000 ft. except close to shore, 5 positions per line. Depending upon the sampling and launch speed it is hoped that two of these lines might be covered in one day.

Samples taken will be processed with a Coulter Counter to discover the amount and distribution of the suspended material by Mr. Paul Cant in the office ashore.

Current Observations:

During the silt sampling a Buoyant H.W. Meter will be moored, 1,000 ft. east and west of the point and 500 ft. off perpendicular to the shore. This will remain in operation until suspended meter observations at 10 positions 3 to the east and west, and four to the north of the point along the short section lines are completed. The observations at these positions will be the profile type, reading at each

5 ft. level with an extra reading taken close to the bottom.

Time permitting an attempt will be made to measure the "longshore" current keeping the current meter in about 2 ft. of water as the tide rises and falls over the beach area. If possible these observations will be made while littoral drift observations are in progress. If successful these observations will be repeated at the Point and 1,000 ft. either side over 12 hour periods.

At the time of the reconnaissance visit to the area in April (Report Reprinted as Appendix "A" to this Note) there appeared to be a significant longshore current which may have a direct bearing on the movement of material along the beach.

#### Littoral Drift Observations

Glass beads of the appropriate grain size will be used to measure movements of material along the beach. Dumps of 5 lbs. each of mixed grain sizes will be placed between the HW & LW lines. A sampling grid will then be laid out and short (6") cores of the surface material taken for a quantitative analysis. The cores will be taken along lines 5, 10, 25, 50, 100, 200 and 400 ft. apart on either side of the dumping area, and 10 ft. apart between High & Low Water lines. The samples will be collected during the period of low water. The beads will be colored red and blue, beads dumped above mean tide level will be blue those below red. A quantity of different colored beads will be dumped at the 3,000 ft. mark on the radial section lines around the point.

The actual beach dumps will be replenished once a day and samples taken once a day at low water. The observations will continue for four days, however, the beads dumped in the deep water will not be replenished but a large amount dumped on the first day of these operations.

If possible these observations will be carried out during a period of large tides.

These samples will be returned to B.I.O. where a mechanical sieve analysis will be carried out on them in an attempt to separate the beads and produce a quantitative analysis of the moving material.

Phase III  
Suspended Meter Positions  
Observation Periods 25 Hours

These observations will be carried out in the same way as for Phase I including silt observations, etc.

Positions for Phase III

- (4) In 50 ft. of water 0.8 miles  $090^{\circ}$  from Petit Rocher Wharf.
- (5) Heron Channel 1.0 miles  $090^{\circ}$  from Heron Rk.
- (6) Centre of entrance channel off Bon Amie Pt. Dalhousie.

Temperature and Salinity Observations

Observations will again be taken along the Belledune Point - Caplan Wharf section line and Donax Point to Pasepebiac Point, 11 stations on each line.

Photogrammetric Current Measurements

Final arrangements as to flying height, camera cycling, etc. have not been made however, the plan of the survey will be as follows:

Targets:

Two types of targets will be used (I) Plywood 4 x 4 floats under which parachute drogues will be suspended at 30 ft. depth to measure subsurface velocities. (II) Aluminum powder bombs, dropped from a low flying aircraft.

Seeding:

Seeding will commence two hours before the first flight time. The aircraft will seed the entire area at a density of 1 mile between

targets. There after the aircraft will only seed where gaps are appearing as the targets dissolve. To prevent confusing the photo interpreter seeding of these later targets will only take place along specified section lines to be patrolled by the aircraft. Seeding around Belledune Point its self will be denser approximately 1/4 mile between targets or to the satisfaction of the person doing the seeding that a good coverage is being maintained. Again reseeding this area will take place at one location only.

The Plywood floats and drogues will be stored aboard marker floats and be released four every hour (total 25). However, nothing as yet is known of the subsurface currents in the Baie and seeding of these targets will depend upon their strength. For the collection of drogue targets when clear of the photo area one launch will patrol a section and with the help of the seeding aircraft recover them.

Floats:

Eight floats of 8' x 8' plywood sheets will be constructed and anchored out as markers. Four will be anchored 7,000 ft. offshore and four others 14,000 ft. offshore, along lines perpendicular to the shore line. The lines will be spaced three miles apart beginning approximately 4½ miles west of the point and progressing eastward. The anchored floats are necessary for the photo interpreter to remove parallax from sides of the photos where no land appears. These floats will be anchored with 3 - 150 lb. anchors to reduce their swing.

Flight Line:

There will be only one flight line parallel to the trend of the coastline, direction approximately 110° (T) about nine miles long and producing eight overlapping photographs each run. The line will be re-flown every 15 minutes throughout the daylight hours this will give

approximately 8 hours observation, allowing time for refueling during sun spot spoil (4 hrs.) of photographs. Three days later the tidal cycle will have been retarded by about three hours and at this time the line will be re flown using the same procedure.

#### Proposed Flying Specifications:

The specifications for flying this photography which will appear in a later note are still to be worked out in detail in Ottawa. However, it is reasonable to expect that the following items will be included. Camera 6" focal length, approximate coverage per photo 3 miles (15,000 ft.) 1 mile of terrain and 2 miles of water, scale of photography 1:30,000 flying speed 120 mph approx. with a camera cycling speed of 40.9 seconds  $\pm$  2% error. A suitable aircraft would be a Piper Apache. This photography will be scheduled for the first two weeks in August during this time spring tides with a maximum range of 5.0 ft. will occur between the 5th. & 10th.

#### Survey Planning

##### Phase I

This phase will cover organizing the shore base, mooring of the self recording instruments and installation of tide gauges. One set of temperature and salinity observations and one or more 25 hour current profile stations along the Belledune - Caplan Wharf section line.

##### Phase II

Phase I will have established a broad pattern of observations for the general circulation. Phase II will deal with the detailed observations of littoral drift, current and silt concentrations, in the immediate vicinity of Belledune Point.

### Phase III

This will cover the photogrammetric current measurements, relocation of moored meters if necessary, and continuation of the 25 hour current meter observations to obtain a full knowledge of the general circulation system. (i.e. Suspended meters positions 4, 5 & 6). Also observations of temperature and salinity will be along the two basic section lines.

### Shore Base

The party will be based at Petit Rocher where the only accommodation and wharf facilities are available on this stretch of coast. At low tide there is 15 ft. alongside the inner wall of the breakwater. The port is mainly used by small fishing vessels landing lobster and salmon, however larger draggers shelter there later in the year. Information received from Mr. Y. Hache, Manager of the Fish Processing Plant was that the middle of the summer is a relatively quiet period and wharf space should not present any difficulty. Appendix "A" to this note gives details of storage and living accommodation available.

Present arrangements are:

1. CHL Anderson and Falcon will berth at the Petit Government Wharf.
2. Storage and workshop facilities will be at Mr. Edward Boudreau, Esso Service Station.
3. Accommodation and office space will be taken at the Rainbow Motel.
4. The Rainbow Dining Room will provide catering.

### Data Analysis & Processing

It is anticipated that most of the data collected will be analysed during the period of the survey so that a comprehensive report may be produced shortly after the survey ends, a target date being Sept. 30.

Possibly the only exception to this will be the interpretation of the aerial photographs which is a lengthy procedure.

Major Equipment Needs for Survey

- 1) Launch "Anderson" and speed boat (ex. Lake Winnipeg Survey) named "Falcon" for the purposes of the survey, fitted out as follows:  
Anderson: Two winch mounts fitted on either side opposite the outside doors to the plotting room.  
Extension added to the existing plotting shelf forward to accommodate large plot sheets. Installation of a research winch aft with davit and driving motor. Modification of cockpit aft (enlarging) to facilitate handling of current meter moorings and associated equipment. Installation of a bracket to contain three compressed air bottles. Installation of an eight foot boom portside and three foot boom starboard side for suspended current meter and bottle observations.  
Falcon: Erection of a plotting table in the fore end.
- 2) Motor vehicle preferably of the "carry all" type to move equipment from the workshop and storage space to the wharf. Transportation of samples from Belledune to BIO and equipment to Belledune. Also to be used for servicing and installing tide gauges.
3. Current Meters: 5, Buoyant H.W. type  
3, Non-Buoyant H.W. type  
1, Kelvin-Hughes Direct Reading  
2, Neyrpic Ott  
1, Ott Arkansas

5, Drift Poles (30 ft.)  
25, Parachute Drogues with targets  
Accessories: 8, Plywood marker floats  
10, Inflatable marker buoys  
45, 150 lb. concrete anchors  
500 fms. Polypropylene Rope- Yellow & Black

Party Members and Working Schedule

The party will consist of nine members:

Staff - Mr. Pritchard and Myself.

Crew - 1 Quartermaster

1 Coxswain

1 Gas Engineer

4 Seamen

When current meters are being laid every member of the party will take part using both launches.

For the 25 hour series of current and silt observations the party will be split into two watches, with a staff member in charge of each watch.

Regular watches will be 12 hours on watch and 8 hours off where an hours travelling time must be allowed for relieving and relieved crews. However in some instances if travelling time is too great it may be preferable for one watch to complete a 25 hour set of observations and then be relieved while the other crew completes another. The crew will be fully reimbursed for all overtime worked which during a normal working week of watchkeeping will be 8 hours per crew member and 12 for senior crew members.

General Remarks

As C.S.S. "Kapuskasing" will be working in the same general area, most of the equipment for this survey will be taken to Bathurst aboard her for trans-shipment to Petit Rocher by truck.

For plot sheets of observations for this area copies of the field sheets produced during the sounding survey will be used until the charts are produced. There will however be a requirement for preliminary rough sheets to be used as work sheets.

C.J. LANGFORD

RECONNAISSANCE VISIT TO BELLEDUNE POINT

A reconnaissance visit was paid to the Belledune Point area Baie Chaleur April 1 to 3, 1964. The following are on site observations and tentative arrangements made to carry out the current survey.

A very complex water movement exists about the point itself. The tide appeared to be rising altho' the movement near shore at the point and along the east beach was eastward (NO WIND) between 1500 and 1700 2-4-64 this movement became much stronger and the water in the centre of the bay could be seen to be setting westward. The eastward set seemed to be confined close to shore within about 15 ft.

The beach appeared to be overlaid with coarse gravel over fine sand and gave the general appearance of being freshly deposited and that the possible summer condition is the reverse. High up the beach between the HW & HHW marks the beach was mainly fine sand. This was a poor time of the year to see how the upper beach is constructed as the shore ice was impeding the rising water. However the line of debris from HW's before the ice made was well behind the H.H.W. line, as it now appears (30 ft.), this is most noticeable along the western beach. See Photos.

In general the bay was completely free of ice with the exception of some small bays and in the south passage between Heron Island and the mainland; Eel Bay was also covered with this ice. However the entrance to the Restigouche River was completely open and only pieces of floes grounded on the beaches could be seen from Bon Amie Pt. There was some oil slick and harbour debris to be seen in the water but no silt that could be associated with bed erosion coming from further up stream was noticeable.

The visit to Belledune Point took place during LW and until half rising tide the waters to the eastward of the point appeared clear of any silt in suspension and according to the local fisheries officer remains this way the year round. The area is well known for the large amounts of lobsters which are caught particularly to the east of the point. This would indicate that there the bottom is largely rocky perhaps with soft silt between them. However the only indication of any silt being present was found on a piece of ice well up the east beach but was a completely isolated case, other ice either contained sand or gravel.

As it would appear from the chart and maps the silting or general beach movement seems to be to the westward, the conditions between the East & West sides of the point may be completely different and more silting found to the westward. This couldn't be checked as the bay to the west of the point was completely covered by ice, the thickness of which was between a thin skim and two feet.

#### Survey Base Location

The only place suitable for a base for the current survey of Belledune Point is Petit Rocher. It is the only wharf along the coast between Bathurst & Dalhousie which has more than 4 ft. of water at low tide and affords any shelter from the weather. None of the other places along this coast presented any facilities at all for boats or accommodation of the shore party members. There are no Motels or Restaurants from Petit Rocher to Dalhousie. Petit Rocher has these plus a good service station and the party can be easily supplied with necessities from the village. There is 15 ft. of water alongside the wharf at low tide inside the outer arm and also has a boom capable of lifting 1 ton for loading and unloading supplies. The following arrangements have been tentatively arranged pending on the approval of estimates.

Accomodations

Mrs. Eva Beaudron,  
P.O. Box 106,  
Petit Rocher, N.B.  
3 men \$3.50 per day.

Mrs. Aleide Roy,  
P.O. Box 95,  
Petit Rocher, N.B.  
4 or 5 men \$3.50 per day.

Rainbow Motel

Mr. Phillip Best,  
9 men - 3 Doubles, 3 Singles, 1 Office,  
Doubles - \$4.00 per man  
Singles - \$6.00 per man  
Office at Single Rate  
STA- 3-2271 Petit Rocher Nord.

Catering

Rainbow Dining Room,  
Petit Rocher Nord,  
Miss Delores Godin,  
\$3.50 per man per day (3 months),  
24 hour service.

Storage

Petit Rocher,  
Imperial Emo Service Station,  
Approx. 7000c. ft. of storage,  
110V. AC on hand,  
Planer, table saw, metal cutting and welding tools available.  
\$30.00 per month.  
Lessee. Mr. Edward Boudreau

Wharf Facilities

Mr. Yves Hache,  
c/o W.S. Loggie Ltd.,  
Fish Plant,  
Petit Rocher, N.B.

Contact was made with Mr. Good of Engineering Consultants,  
the project engineer responsible for the development of the smelter on  
the point. He was very helpful in plowing out the access road to the  
end of the point and in providing names of possible boarding houses.

He also provided a plan at 1" = 100 ft. of the area contoured at 2 ft. intervals which is available for general use for those working in the area.

In general I would say that this two day visit has advanced the date when the party in the field will be completely organized and fully operational by more than a week. As Mr. Pritchard and myself are fully aware of the circumstances existing in the area. I wish to point out that the expense of facilities and accommodation may be somewhat high to what one might imagine for this area, but the area is quickly booming with many people coming into the area from Ontario & Quebec to work at and on the smelter and space is at a premium. This condition will tend to get worse as the summer approaches.

Pictures:

1. 1630 looking East along east beach.
2. 1630 looking straight out from point.  
In fore ground of photo note current setting east thru lead at about 1.5 kts.
3. 1635 from same location as (2) note position of leading edge of ice all the Bay to the east is ice covered from between 2 ft. thickness to just skim ice. 80% of main bay open water.
4. Taken from Point looking westward showing position of separation of fine gravel and large pebbles at about average HW line.
5. Close up of separation showing height.
6. Taken from position about 500 ft. West of point along west beach. Note the very heavy ice formation and

coverage and compare to the east beach. Thickness of shore ice approx. 5'6", ice pans laying about the beach up to 2 ft. thick.

C.J. LANGFORD

