MANUSCRIPT REPORTS OF THE BIOLOGICAL STATIONS

No. ~~178~~ 182

Report on warm water survey of Chaleur bay.

by

W. G. Jones

FISHERIES RESEARCH BOARD OF CANADA

MANUSCRIPT REPORTS OF THE BIOLOGICAL STATIONS

No. ~~178~~ 182

Title

Report on warm water survey of Chaleur bay.

Author

W. G. Jones

Original Manuscript No. 392

REPORT

on

WARM WATER SURVEY OF CHALEUR BAY

by

W. G. Jones

University of New Brunswick, Fredericton, N. B.

1924

REPORT ON THE WARM WATER SURVEY OF CHALEUR BAY, 1924.

W. G. Jones,
University of New Brunswick,
Fredericton, N. B..

INTRODUCTION AND OBJECT.

During the summer of 1924 a warm water survey of a number of our eastern bays and inlets was carried out under the direction of the Atlantic Biological Station. The areas chosen were mainly those where it was suspected, but not certain, that conditions suitable for the reproduction of the lobster existed.

In the Bulletin of the Biological Board of Canada, Doctor A. G. Huntsman in his "Natural Lobster Breeding", says: "Although it has been clearly demonstrated that certain areas are regularly suitable, that others are occasionally suitable and that still others are never suitable for lobster breeding our knowledge of this aspect of the lobster question is still far from complete. All bays and inlets that are at all doubtful in respect to success or failure for natural lobster breeding should be investigated. . . ."

With this idea in mind it was decided to examine a number of the doubtful bays and inlets. Among the areas where conditions relative to the reproduction of the lobster were investigated was Chaleur Bay. It is with the conditions of temperature and salinity found there that this report deals.

CONDITIONS NECESSARY FOR THE DEVELOPMENT OF LOBSTER FRY.

Previous investigations and experiments have shown that although waters are suitable for the adult lobster and for the hatching of lobster eggs, they may not be suitable for lobster fry.

The adult will live and the eggs will hatch in water which is several degrees too cold to permit the fry to live and develop. For successful development of the fry, the temperature of the surface water to a fair depth, probably five fathoms at least, must reach 12.5°C., for a considerable part of the summer season. A temperature of 12.5°C. is somewhat d doubtful, and it may be or it may not be suitable, but it has been conclusively demonstrated that lobster fry will live and develop in water where the temperature reaches 15°. provided that salinity and other conditions are suitable.

A salinity of 2% or more is probably necessary for the lobsters. No very definite data of the lower limit in salinity for the lobster is available but it would seem that the above percentage is approximately that limit.

GENERAL CHARACTERISTICS OF THE REGION.

Observations was confined to the New Brunswick side of the bay, with the one exception of Station No. 8 which was situated off the Quebec shore,

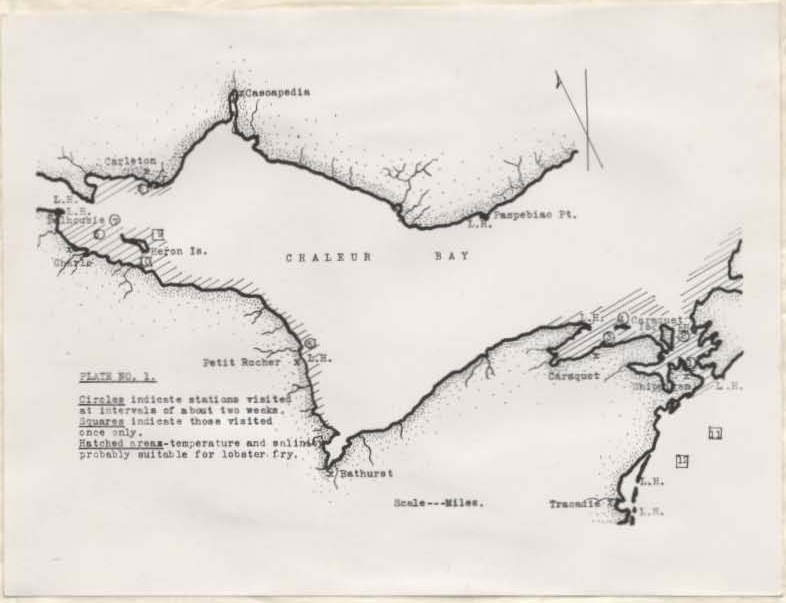


PLATE NO. 1.

Circles indicate stations visited at intervals of about two weeks.
Squares indicate those visited once only.
Hatched areas-temperature and salinity probably suitable for lobster fry.

near Carleton. The stations of which seven are along the New Brunswick coast and one off the Quebec coast, are so situated as to give a fair indication of conditions along the entire south side and west end of the bay, and the conditions observed at each are likely to be typical of the region which surrounds it.

The stations were visited at intervals of approximately two weeks for the purpose of collecting the data which follows in this report. This data, collected at various places and at regular intervals, may be taken to indicate the conditions of temperature and salinity likely to be found along the south shore during the summer season.

It would seem that the eastern part of the Bay Chaleur differs from the western part in temperature and in the distribution of fauna. This difference in fauna is doubtlessly due to the difference in temperature and to the fact that the shore waters in the eastern part are shallow while in the western part the bottom drops off much more rapidly giving a greater depth and lower temperatures. A further contrast is apparent in the character of the shore and bottom. In the west thay are much more rugged and rocky while in the east the slope of the shore and bottom is more gentle and they are frequently sandy or muddy.

Doctor W. F. Ganong, along with other scientists, suggests that conditions in the eastern part, Shippigan and Caraquet, resemble those of Shediac Harbour and that the marine invertebrates occurring here are a part of the southern colony distributed along the North Shore from Bay Verte to Caraquet while the fauna of the western part of the bay belongs to a more northern colony such as is found in the Bay of Fundy where conditions are quite similar to those encountered in the western part of Chaleur Bay.

Table No. 5 of this report seems to indicate that such a division exists. That is, the marine fauna of the eastern part of the bay is of a more southern type than the colony occurring in the western part of Bay Chaleur.

POSITIONS OF THE VARIOUS STATIONS.

Plate No. 1 is merely a rough chart of Chaleur Bay indicated approximately the position of the various stations referred to in this report. These stations may be more accurately located from the following data:-

Station No. 1:

Series:	Chaleur
Locality:	Shippegan Gully
Position:	Shippegan light, bearing 169° true; S by W quarter W---half mile: Point North Paint Pt., bearing 50° true, E by N half N, half mile.
Latitude:	47°45'36"N.
Longitude:	64°42' W.
Bottom:	Mud
Depth:	3 1/2 fathoms.

Station No. 2:

Series:	Chaleur
Locality:	Shippegan Sound
Position:	Marcelle Pt. light, bearing 220° true; WSW quarter S, 1 1/2 miles Pokesuedie light, bearing 308° true, NNW half W, 1 1/4 miles:

Station No. 2 (continued):
Latitude: 47° 48' 32" N
Longitude: 64° 43' W
Bottom: Mud
Depth: 6 1/2 fathoms.

Station No. 3:
Series: Chaleur
Locality: Off Lower Caraquet
Position: Caraquet Island light, bearing 19° true, NE, 1 1/4 miles:
Brideau Point, bearing 250° true, W half N, 1 mile:
Latitude: 47° 48' 24" N
Longitude: 64° 54' 28" W
Bottom: Sand
Depth: 4 1/2 fathoms.

Station No. 4:
Series: Chaleur
Locality: Inside west end of Fisheran Ledge
Position: Caraquet Island light, bearing 182° true, SSW half W, 1 3/4 miles
Mizonette Pt. light, bearing 258° true, W by N 4 1/4 miles:
Latitude: 47° 51' 24" N
Longitude: 64° 53' 42" W
Bottom: Sand
Depth: 7 fathoms

Station No. 5:
Series: Chaleur
Locality: Off Petit Rocher
Position: Rochette Pt. light bearing 180° true, SSW, 2 1/2 miles;
Seal Rock, bearing 302° true, NW by N, 1 1/2 miles:
Latitude: 47° 49' 50" N
Longitude: 65° 42' 10" W
Bottom: Mud
Depth: 7 fathoms

Station No. 6:
Series: Chaleur
Locality: Off Charlo
Position: Maguacha Pt. Hill, bearing 352° true, N by E 1/4 E, 3 1/2 miles;
Northwest end Heron Island, bearing 94° true, ESE 1/2 S, 3 miles:
Latitude: 48° 1' 11" N
Longitude: 66° 16' 20" W
Bottom: Mud
Depth: 4 1/2 fathoms.

Station No. 7:
Series: Chaleur
Locality: Off Charlo
Position: Maria Cliffs, bearing 62° true, E half N, 11 miles;
west shore of Maguacha Pt., bearing 297° true, NW 1/2 N, 2 3/4 miles
Latitude: 48° 2' 40" N
Longitude: 66° 14' W
Bottom: Mud
Depth: 15 fathoms.

Station No. 8:
Series: Chaleur
Locality: Off Carleton, P. Q. 178°
Position: Heron Island light bearing 257° true, SSW, 5 3/4 miles;
Maguacha Pt., bearing 257° true, W by N, 6 1/4 miles:
Latitude 48° 5' 30" N
Longitude: 66° 8' 25" W
Bottom: Mud
Depth: 7 fathoms.

Station No. 9:
Series: Chaleur
Locality: Off Heron Island
Position: Heron Island light, bearing 256° true, W by N, 1 3/4 miles;
Tracadigash Pt. bearing 348° true, N by E, 5 miles:
Latitude: 48° 0' 30" N
Longitude: 66° 5' 30" W
Bottom: Mud
Depth: 7 fathoms.

Station No. 10:
Series: Chaleur
Locality: Off Heron Island
Position: East end Heron Island bearing 38° true, NE by E half E, 1 1/4 miles;
Black Point bearing 120° true, SE 3/4 S, 1 1/4 miles;
Latitude: 47° 57' 55" N
Longitude: 66° 8' W
Bottom: Rocks.
Depth: 5 fathoms.

Station No. 11:
Series: Chaleur
Locality: Gulf of St. Lawrence
Position: Shippegan light, bearing 339° true, N 1/4 E, 6 miles;
Pokemouche light, bearing 288° true, NW 1/4 W, 7 miles:
Latitude: 47° 37' 48" N
Longitude: 64° 36' 12" W
Bottom: Sand
Depth: 13 fathoms.

Station No. 12:
Series: Chaleur
Locality: Gulf of St. Lawrence
Position: Pokemouche Gully light bearing 157° true, S 6 miles;
Tracadie Church, bearing 247° true, W 9 miles:
Latitude: 47° 34' 40" N
Longitude: 64° 42" 20" W
Bottom: Sand
Depth: 12 fathoms.

CONDITIONS OF TEMPERATURE AND SALINITY.

Stations No. 1 to No. 8, inclusive, were visited during the summer at intervals of about two weeks, Stations No. 9 and No. 10 were visited once

only, the date being August 29, 1924. The data for Station No. 11 was obtained on August 11, 1924, and that for Station No. 12 on August 30, 1924.

On all occasions the temperatures below the surface were taken with a reversing thermometer and the water samples, which were forwarded to the Atlantic Biological Station at St. Andrews, N. B., where they were titrated to determine the salinity, were taken with a metal water bottle. In accordance with the usual procedure of the Atlantic Biological Station with hydrographic records the time of day, the direction of the wind, the colour of the water, the level of the tide, the temperature of the air and the condition of the sky were noted and recorded.

The results of the observations at the various stations are listed below:

Station No. 1:
Series:- Chaleur: Locality:- Shippigan Gully. Depth:- 3 1/2 fathoms.

Date:	June 26, 1924	Tide:	
Time:	6:05 p. m.	Temp. of Air:	17.6°C.
Wind:	Northwest	Sky:	Clear
Colour of Water:	Blue		
Depth:	Temperature of Water	Salinity:	
Surface	-		25.75‰
5 metres	-		25.79
Bottom	-		25.79

Date:	July 14, 1924	Tide:	3 hours flood
Time:	10:53 a. m.	Temp. of Air:	19°C.
Wind:	Northwest	Sky:	partly cloudy
Colour of water:	Gray-green		
Depth:	Temperature of Water	Salinity:	
Surface	19.35°C.		25.41‰
5 metres	18.95		25.73
Bottom	18.95		25.81

Date:	July 28, 1924	Tide:	Low water
Time:	7:39 p. m.	Temp. of Air:	22.5°C.
Wind:	West	Sky:	Cloudy
Colour of water:	Gray-green		
Depth:	Temperature of water	Salinity:	
Surface	18.85°C.		26.08‰
5 metres	18.15		26.06
Bottom	18.03		26.08

Date:	August 11, 1924	Tide:	2 hours ebb
Time:	5:40 p. m.	Temp. of Air:	22°C.
Wind	North northwest	Sky:	overcast
Colour of water:	Gray		
Depth:	Temperature of water:	Salinity:	
Surface	19.75°C.		26.62‰
5 metres	18.65		26.69
Bottom	18.34		26.69

Station No. 1 (Cont'd.):

Date: August 26, 1924
Time: 3:35 p. m.
Wind: South southeast
Colour of water: Gray
Tide: 2 1/4 hours ebb
Temp. of Air: 15.9°C.
Sky: overcast

Depth:	Temperature of water	Salinity:
Surface	17.05°C.	27.07‰
5 metres	16.65	27.07
Bottom	16.24	27.07

Date: September 12, 1924
Time: 11:55 a. m.
Wind: West
Colour of water: Green
Tide: 2 1/2 hours flood
Temp. of Air: 14.5°C.
Sky: clear

Depth:	Temperature of water:	Salinity:
Surface	14.85°C.	27.43‰
5 metres	14.45	27.45
Bottom	14.24	27.47

Station No. 2:

Series:- Chaleur: Locality:- Shippigan Sound. Depth:- 6 1/2 fathoms.

Date: June 26, 1924
Time: 7:10 p. m.
Wind: Northwest
Colour of water: Blue
Tide:
Temp. of Air: 17°C.
Sky: Clear

Depth:	Temperature of water:	Salinity:
Surface	-	25.82‰
5 metres	-	25.86
~~Bottom~~ 10 m.	-	25.97

Date: July 14, 1924
Time: 10:26 a. m.
Wind: Northwest
Colour of water: Gray-green
Tide: 2 1/2 hours flood
Temp. of Air: 18.9°C.
Sky: partly clear

Depth:	Temperature of water:	Salinity:
Surface	18.95°C.	25.48‰
5 metres	19.05	25.55
10 metres	18.64	25.68

Date: July 28, 1924
Time: 8:10 p. m.
Wind: West
Colour of water: Gray-green
Tide: 1/2 hour flood
Temp. of Air: 21.2°C.
Sky: cloudy

Depth:	Temperature of water:	Salinity:
Surface	18.55	26.00‰
5 metres	17.45	25.99
10 metres	17.14	25.99

Date: August 11, 1924
Time: 3:00 p. m.
Wind: North northeast
Colour of water: Gray
Tide: 2 1/4 hours ebb
Temp. of Air: 22.2°C.
Sky: overcast

Depth:	Temperature of water:	Salinity:
Surface	19.05°C.	26.74‰
5 metres	17.14	26.89
10 metres	16.24	27.00

Station No. 2 (Cont'd):

Date:	August 26, 1924	Tide:	1 hour ebb
Time:	2:21 p. m.	Temp. of Air:	16.6°C.
Wind:	South southeast	Sky:	overcast
Colour of water: Gray			
Depth:	Temperature of water:	Salinity:	
Surface	17.05°C.		27.03‰
5 metres	16.85		27.03
10 metres	15.84		27.03

Date:	September 12, 1924	Tide:	Low water
Time:	9:25 a. m.	Temp. of Air:	12.0°C.
Wind:	Southwest	Sky:	overcast
Colour of water: Gray			
Depth:	Temperature of water:	Salinity:	
Surface	14.25°C.		27.66‰
5 metres	14.05		(27.59)
10 metres	12.83		28.03

Station No. 3:

Series:- Chaleur. Locality:- Off Lower Caraquet. Depth:- 4 1/2 fathoms.

Date:	June 27, 1924	Tide:	
Time:	1:40 p. m.	Temp. of Air:	29°C.
Wind:	Southeast	Sky:	Clear
Colour of water: Blue-green			
Depth:	Temperature of water:	Salinity:	
Surface	-		24.67‰
5 metres	-		25.48
Bottom	-		25.53

Date:	July 15, 1924	Tide:	2/3 hours ebb
Time:	3:20 p. m.	Temp. of Air:	23.3°C.
Wind:	West	Sky:	Clear
Colour of water: Green			
Depth:	Temperature of water:	Salinity:	
Surface	17.65°C.		25.43‰
5 metres	16.73		25.44
Bottom	16.83		25.48

Date:	July 29, 1924	Tide:	1/3 hour ebb
Time:	2:40 p. m.	Temp. of Air:	26°C.
Wind:	North northeast	Sky:	Cloudy
Colour of Water: Gray-green			
Depth:	Temperature of water:	Salinity:	
Surface	18.65°C.		25.75‰
5 metres	16.73		26.27
Bottom	16.94		26.29

Station No. 3 (continued):

Date:	August 12, 1924	Tide:	1 1/2 hours ebb
Time:	2:00 p. m.	Temperature of Air:	19.7°C.
Wind:	Northeast	Sky:	cloudy
Colour of water: Gray			
Depth:	Temperature of water:	Salinity:	
Surface	17.25°C.		27.03‰
5 metres	16.64		27.03
Bottom	16.24		27.03
Date:	August 27, 1924	Tide:	1 3/4 hours ebb
Time:	3:47 p. m.	Temp. of Air:	16.8°C.
Wind:	Northwest	Sky:	Cloudy
Colour of water: Gray-green			
Depth:	Temperature of water:	Salinity:	
Surface	16.45°C.		26.92‰
5 metres	15.64		27.30
Bottom	15.44		27.30
Date:	September 11, 1924	Tide:	High water
Time:	2:15 p. m.	Temp. of Air:	18°C.
Wind:	South southwest	Sky:	Overcast
Colour of water: Gray			
Depth:	Temperature of water:	Salinity:	
Surface	15.45°C.		27.29‰
5 metres	14.85		27.48
Bottom	14.45		27.52

Station No. 4:

Series:- Chaleur. Locality:- Inside West End Fisherman Ledge. Depth:- 7 fathoms.

Date:	June 27, 1924	Tide:	
Time:	3:10 p. m.	Temp. of Air:	25°C.
Wind:	Southeast	Sky:	Clear.
Colour of Water: Blue-green			
Depth:	Temperature of Water:	Salinity:	
Surface	-		25.60‰
5 metres	-		25.73
10 metres	-		25.90
Date:	July 15, 1924	Tide:	1 1/2 hours ebb
Time:	4:07 p. m.	Temperof Air:	19.2°C.
Wind:	West	Sky:	Clear
Colour of Water: Green			
Depth:	Temperature of Water:	Salinity:	
Surface	16.65°C.		25.34‰
5 metres	15.74		25.37
10 metres	15.64		25.37
Date:	July 29, 1924	Tide:	1 1/2 hours ebb
Time:	3:50 p. m.	Temp. of Air:	27.2°C.
Wind:	North northeast	Sky:	Clear
Colour of Water: Green			
Depth:	Temperature of water:	Salinity:	
Surface	16.85°C.		26.55‰
5 metres	14.04		26.69
10 metres	12.74		26.80

Station No. 4 (Continued):

Date:	August 12, 1924.	Tide:	3 hours ebb
Time:	3:20 p. m.	Temp. of Air:	19.4°C.
Wind:	Northeast	Sky:	Cloudy
Colour of Water:	Gray		
Depth:	Temperature of Water	Salinity:	
Surface	15.05°C.		26.91‰
5 metres	14.64		27.11
10 metres	13.44		27.52

Date:	August 27, 1924	Tide:	1 hour ebb
Time:	2:53 p. m.	Temp. of Air:	18.5°C.
Wind:	Northwest	Sky:	Cloudy
Colour of Water?	Gray-green		
Depth:	Temperature of Water:	Salinity:	
Surface	14.55°C.		26.91‰
5 metres	14.45		27.57
10 metres	13.43		27.57

Date:	September 11, 1924	Tide:	1 1/4 hours ebb
Time:	3:30 p. m.	Temp. of Air:	17.2°C.
Wind:	South southwest	Sky:	Overcast
Colour of Water:	Gray		
Depth:	Temperature of water:	Salinity:	
Surface	14.25°C.		27.57‰
5 metres	13.64		27.57
10 metres	12.52		

Station No. 5:

Series:- Chaleur. Locality:- Off Petit Rocher. Depth:- 7 fathoms.

Date:	June 30, 1924	Tide:	
Time:	1:00 p. m.	Temp. of Air:	25.1°C.
Wind:	West	Sky:	Partly clear
Colour of Water:	Blue-green		
Depth:	Temperature of Water:	Salinity:	
Surface	-		25.39‰
5 metres	-		26.69
10 metres	-		27.21

Date:	July 18, 1924	Tide:	2 hours flood
Time:	2:35 p. m.	Temp. of Air:	17.5°C.
Wind:	Southeast	Sky:	Partly clouded
Colour of Water:	Gray-green		
Depth:	Temperature of Water:	Salinity:	
Surface	10.05°C.		26.42‰
5 metres	7.03		27.23
10 metres	6.22		27.65

Date:	August 2, 1924	Tide:	5 hours ebb
Time:	9:25 a. m.	Temp. of Air:	14,2°C.
Wind:	North	Sky:	Cloudy
Colour of water:	Gray		
Depth:	Temperature of Water:	Salinity:	
Surface	16.65°C.		26.46‰
5 metres	15.95		26.46
10 metres	15.65		26.46

Station No. 5 (Continued):

Date: August 14, 1924.
Time: 1:25 p. m.
Wind: East
Colour of water: Gray.

Depth:	Temperature of Water:	Salinity:
Surface	18.05°C.	26.78‰)
5 metres	13.42	26.55)
10 metres	10.21	-

Tide: 3 1/4 hours flood
Temp. of Air: 20.1°C.
Sky: Overcast (rain)

Date: August 28, 1924
Time: 6:15 p. m.
Wind: West
Colour of Water: Green

Depth:	Temperature of Water^	Salinity:
Surface	15.05°C.	27.30‰
5 metres	14.85	27.30
10 metres	13.64	27.39

Tide: 3 1/3 hours ebb
Temp. of Air: 18°C.
Sky: Clear

Date: September 9, 1924
Time: 5:56 p. m.
Wind: Southeast
Colour of Water: Gray

Depth:	Temperature of Water:	Salinity:
Surface	16.05°C.	27.43‰)
5 metres	14.42	27.09)
10 metres	12.81	27.45

Tide: 5 1/3 hours ebb
Temp. of Air: 16.8°C.
Sky: Cloudy

Station No. 6:
Series:- Chaleur. Locality:- Off Charlo. Depth:- 4 1/2 fathoms.

Date: July 17, 1924
Time: 9:30 a. m.
Wind: East
Colour of Water: Gray

Depth:	Temperature of Water:	Salinity:
Surface	9.65°C.	25.46‰
5 metres	7.65	27.23
Bottom	7.44	27.65

Tide: 4 3/4 hours ebb
Temp. of Air: 14.2°C.
Sky: Overcast

Date: August 1, 1924
Time: 10:06 a. m.
Wind: West
Colour of Water: Green

Depth:	Temperature of Water	Salinity:
Surface	12.35°C.	25.55‰
5 metres	10.82	25.90
Bottom	10.62	26.35

Tide: 6 1/4 hours ebb
Temp. of Air: 18°C.
Sky: Clear

Date: August 15, 1924
Time: 9:36 a. m.
Wind: West
Colour of Water: Green

Depth:	Temperature of Water:	Salinity:
Surface	13.85°C.	-
5 metres	13.14	25.79‰
Bottom	12.84	-

Tide: 5 3/4 hours ebb
Temp. of Air: 15°C.
Sky: Clear

Station No. 6 (Continued):

Date: August 29, 1924.
Time: 3:40 p. m.
Wind: North
Colour of water: Green

Depth:	Temperature of water:	Salinity:
Surface	14.05°C.	26.78‰
5 metres	12.64	27.07
Bottom	12.03	27.14

Tide: 1/3 hours ebb
Temp. of Air: 17.2°C.
Sky: Clear

Date: September 10, 1924
Time: 2:45 p. m.
Wind: South southeast
Colour of water: Green

Depth:	Temperature of Water:	Salinity:
Surface	13.65°C.	26.85‰
5 metres	12.23	27.11
Bottom	11.83	27.11

Tide: 1 1/3 hours ebb
Temp. of Air: 18.7°C.
Sky: Clear

Station No. 7:
Series:- Chaleur. Locality:- Off Charlo. Depth:- 15 fathoms.

Date: July 17, 1924
Time: 10:30 a. m.
Wind: East
Colour of Water: Gray

Depth:	Temperature of Water:	Salinity:
Surface	10.05°C.	26.26‰
5 metres	8.63	26.56
10 metres	6.23	27.75
25 metres	5.13	28.15

Tide: Low water
Temp. of Air: 14.4°C.
Sky: Overcast.

Date: August 1, 1924
Time: 11:00 a. m.
Wind: West
Colour of Water: Green.

Depth:	Temperature of Water:	Salinity?
Surface	12.15°C.	25.97‰
5 metres	10.64	26.35
10 metres	6.33	27.95
25 metres	4.83	29.14

Tide: 1/2 hours flood
Temp. of Air: 18.5°C.
Sky: Clear.

Date: August 15, 1924
Time: 10:20 a. m.
Wind: West
Colour of Water: Green

Depth:	Temperature of Water:	Salinity:
Surface	14.05°C.	25.84‰
5 metres	12.74	25.90
10 metres	12.64	26.17
25 metres	5.54	28.49

Tide: 6 1/2 hours ebb
Temp. of Air: 15°C.
Sky: Clear

Station No. 7 (Continued):

Date:	August 29, 1924	Tide:	1 1/3 hours ebb
Time:	4:38 p. m.	Temp. of Air:	18.1°C.
Wind:	Northeast	Sky:	Clear.
Colour of Water:	Green		
Depth:	Temperature of Water:	Salinity:	
Surface	14.85°C.		27.09‰
5 metres	12.82		27.14
10 metres	11.41		27.57
25 metres	5.74		27.88

Date:	September 10, 1924	Tide:	2 hours ebb.
Time:	3:35 p. m.	Temp. of Air:	18.5°C.
Wind:	South southeast	Sky:	Clear
Colour of water:	Green.		
Depth:	Temperature of Water:	Salinity:	
Surface	13.85°C.		26.85‰
5 metres	12.43		27.32
10 metres	11.21		27.39
25 metres	5.53		27.57

Station No. 8:

Series:- Chaleur. Locality:- Off Carleton, P. Q.. Depth:- 7 fathoms.

Date:	July 17, 1924	Tide:	1 1/4 hours flood.
Time:	11:40 a. m.	Temp. of Air:	14°C.
Wind:	East	Sky:	Overcast
Colour of Water:	Gray		
Depth:	Temperature of Water:	Salinity:	
Surface	11.05°C.		26.53‰
5 metres	10.14		26.74
10 metres	8.93		26.94

Date:	August 1, 1924	Tide:	1 3/4 hours flood
Time:	12.05 p. m.	Temp. of Air:	19.2°C.
Wind:	West	Sky:	Cloudy.
Colour of Water:	Gray		
Depth:	Temperature of Water:	Salinity:	
Surface	11.65°C.		26.62‰
5 metres	10.43		26.85
10 metres	7.79		27.97

Date:	August 15, 1924	Tide:	1 1/3 hours flood
Time:	11:22 a. m.	Temperature of Air:	21.1°C.
Wind:	West	Sky:	Cloudy
Colour of Water:	Blue		
Depth:	Temperature of Water:	Salinity:	
Surface	15.05°C.		26.15‰
5 metres	13.95		26.35
10 metres	10.81		27.36

Station No. 8 (Continued):

Date:	August 29, 1924	Tide:	2 1/2 hours ebb
Date:	5:40 p. m.	Temp. of Air:	17.1°C.
Wind:	Northeast	Sky:	Clear
Colour of Water: Green			
Depth:	Temperature of Water:	Salinity:	
Surface	14.65°C.		27.29‰
5 metres	13.24		27.57
10 metres	11.61		27.88

Date:	September 10, 1924	Tide:	3 1/2 hours ebb
Time:	4:52 p. m.	Temp. of Air:	17.8°C.
Wind:	South southeast	Sky:	Clear
Colour of Water: Green			
Depth:	Temperature of Water:	Salinity:	
Surface	14.55°C.		27.57‰
5 metres	12.83		27.90)
10 metres	11.11		27.65)

Station No. 9:

Series: - Chaleur. Locality:- Off Heron Island. Depth:- 7 fathoms.

Date:	August 29, 1924	Tide:	3 3/4 hours ebb.
Time:	6:53 p. m.	Temp. of Air:	13.4°C.
Wind:	East	Sky:	Clear.
Colour of Water: Gray			
Depth:	Temperature of Water:	Salinity:	
Surface	14.45°C.		27.16‰
5 metres	13.64		27.52
10 metres	13.03		27.83

Station No. 10:

Series:- Chaleur. Locality:- Off Heron Island. Depth:- 5 fathoms.

Date:	August 29, 1924	Tide:	4 1/2 hours ebb
Time:	7:40 p. m.	Temp. of Air:	12°C.
Wind:	East	Sky:	Clear.
Colour of Water: Gray			
Depth:	Temperature of Water:	Salinity:	
Surface	14.55°C.		27.23‰
5 metres	14.85		27.23
Bottom	14.65		27.27

Station No. 11:

Locality:- Gulf of St. Lawrence. Depth:- 13 fathoms.

Date:	August 11, 1924	Colour of Water:	Blue
Time:	10:00 a. m.	Temp. of Air:	19.5°C.
Wind:	North northwest	Sky:	Cloudy
Depth:	Temperature of Water:		
Surface	18.75°C.		
5 metres	17.05		
10 metres	12.84		
20 metres	9.11		

Station No. 12:

Locality:- Gulf of St. Lawrence. Depth:- 12 fathoms.

Date: August 30, 1924
Time: 10:30 a. m.
Wind: Northwest
Colour of Water: Gray-green
Temp. of Air: 17.2°C.
Sky: Cloudy

Depth:	Temperature of Water:
Surface	18.05°C.
5 metres	17.23
10 metres	11.44
22 metres	7.82
*20 metres	7.44

*This result was obtained at 3:00 p. m. two miles south southwest of the position where the first set of readings for this station was taken.

Brackets in the case of salinity values indicate that the values bracketed are apparently reversed. This is probably due to the water samples being mixed or being improperly marked.

Table No. 1: Average Temperatures at the Various Depths.

	Surface	5 metres	10 metres or bottom	25 metres
Station No. 1	17.97°C.	17.37°C.	17.16°C.	-
2	17.55	16.91	16.14	-
3	17.09	16.12	15.48	-
4	15.47	14.50	13.55	-
5	15.17	13.13	11.71	-
6	12.71	11.29	10.95	-
7	12.99	11.45	9.56	5.35
8	13.39	12.12	10.05	-
All Stations	15.29	14.11	13.13	-

Table No. 2:	Average Temperature (all depths)	Maximum Temperature	Minimum Temperature
Station No. 1	17.50°C.	19.75°C.	14.24°C.
2	16.86	19.05	12.83
3	16.39	18.65	14.45
4	14.51	16.85	12.52
5	13.33	18.05	6.22
6	11.65	14.05	7.44
7	9.84	14.85	4.83
8	11 .85	15.05	7.79
All Stations	14.17**		

Table No. 3: Average Salinity at the Various Depths.

	Surface	5 metres	10 metres or bottom	25 metres.
Station No. 1	26.39‰	26.46‰	26.48‰	-
2	26.45	26.48	26.61	-
3	26.18	26.50	26.52	-
4	26.51	26.64	26.59	-
5	26 .63	26.88	27.23	-
6	26.17	26.62	27.06	-
7	26.40	26.65	27.36	28.24‰
8	26.83	27.08	27.56	-
All Stations	26.44	26.66	26.92	-

Table No. 4:	Average Salinity (all depths)	Maximum Salinity	Minimum Salinity
Station No. 1	26.44‰	27.47‰	25.41‰
2	26.51	28.03	25.48
3	26.40	27.52	25.43
4	26.56	27.59	25.34
5	26.90	27.65	25.39
6	26.61	27.65	25.46
7	27.16	29.14	25.84
8	27.15	27.97	26.15
All Stations	26.67**		

**The values for Station No. 7, depth 25 fathoms, were omitted in determining both the average temperature and average salinity.

The average, maximum and minimum values for temperature and salinity given in Tables 1, 2, 3 and 4 were determined from the data obtained for Stations Nos. 1 to 8 inclusive, and the term "All Stations" refers to these stations. The data for Stations Nos. 9 to 12 inclusive, was not considered in calculating the temperature and salinity values shown in Tables Nos. 1 to 4 inclusive.

Table No. 5:
Shippigan Stations No. 1 and No. 2.

Date	Name	Length	Number
10/7/24	Mytilus edulis	2-5 mm	7
25/7/24	Fundulus heteroclitus	2.5-3.5 cm.	25
26/7/24	Argulus alosae	2-6 mm	5
26/7/24	Idothea baltica	1 cm.	1
26/7/24	Gasterosteus aculeatus	-	14
26/7/24	Pygosteus pungitius	-	1
27/7/24	Michtheimysis stenolepis	-	Many
27/7/24	Cancer irroratus	5.4 & 6.5 cm.	2
27/7/24	Metridium dianthus		2
27/7/24	Asterias vulgaris	4 & 9 cm.	2
27/7/24	Littorina litorea	-	12
27/7/24	" rudis	-	1

Table No. 5 (Continued):

Date	Name	Length	Number
27/7/24	Crepidula fornicata	9, 10 and 12 mm	3
7/8/24	Menidia notata	3.5 - 4 cm.	7
7/8/24	Tautoglabrus adspersus	11-16.5 cm	5
8/8/24	Pygosteus pungitius	4.5 to 5 cm.	3
5/8/24	Macoma baltica (shell)	-	-
5/8/24	Mya arenaria	5.5 & 6.5 cm.	2
5/8/24	Myoxocephalus aeneus	9 & 10 cm.	2
5/8/24	Pseudopleuronectes americanus	15 cm.	1
15/8/24	Osmerus mordax	-	15
30/8/24	Tautogolabrus adspersus	3 cm.	2
Caraquet	Stations No. 3 and No. 4		
15/7/24	Littorina litorea	1.3 to 1.6 cm.	3
15/7/24	" rudis	3-8 mm.	4
15/7/24	Tritia trivittata	10 mm	1
15/7/24	Mytilus edulis	3 cm.	1
15/7/24	Balanus balanoidés	1.3 to 1.5 cm	3
Petit Rocher	Station No. 5		
2/8/24	Crago Septemspinosus	—	3
2/8/24	Littorina litorea	-	8
2/8/24	" rudis	-	15
2/8/24	" palliata	-	4
2/8/24	Homarus americanus	6.7 & 9 cm.	2
2/8/24	Cancer irroratus	1.9 cm	1
2/8/24	Pholis gunnellus	15.5 cm.	1
Gulf of St. Lawrence	Stations No. 11 and No. 12		
26/8/24	Asterias vulgaris	4.5 & 6.5 cm.	2
	Pecten magellanicus	6.5 cm.	1
	Echinarachinus parma	6 cm.	1
	Polynices heros	3 cm.	1
	Buccinum undatum	6.5 cm.	1
	Crytodaria siliqua	9.5 cm.	1
	Solaster andeca	18 cm.	1
	Neptunea decemcostata	10 cm.	1
	Crossaster papposus	7 cm.	1
	Squalus acanthias	15 cm.	1
	Strongylocentrotus drobachiensis	2 cm.	1
	Ophiopholis aculeata	-	1

Specimens of the above varieties were collected at the places and times indicated and forwarded to the Atlantic Biological Station, at St. Andrews, N. B., where they were identified.

In addition to the above, the following forms were found occurring in the vicinity of the stations indicated below:-

Stations 1 & 2	Stations 3 & 4	Station 5	Stations 6, 7, & 8.
Herring	Herring	Herring	Herring
Cod	Cod	Cod	Cod
Tomcod	Tomcod	Tomcod	Tomcod
Smelt	Smelt	Smelt	Smelt
Cunner	Cunner	Cunner	Cunner
Winter Flounder	Winter Flounder	Winter Flounder	Winter Flounder
Lobster	Lobster	Lobster	Lobster
Long-spined Sculpin	-	Long-spined Sculpin	Long-spined Sculpin
Mackerel	Mackerel	Mackerel	-
Sea Urchin	-	Sea Urchin	Sea Urchin
Ling or Hake	-	Ling or Hake	-
Haddock	-	Haddock	-
Halibut	-	Halibut	-
-	-	Salmon	Salmon
Scallop	Scallop	-	Scallop
-	Oyster	-	-
Dogfish	-	Dogfish	-

CONCLUSIONS.

In a preceding section of this report it was pointed out that the lower salinity limit for the lobster is probably about 2%. if this is the case, the water of Chaleur Bay, so far as salinity is concerned, is suitable for the development of the lobster. As shown in the Table No. 4 the average salinity was found to be 2.667% and in no case was the lower limit of 2% reached. The minimum salinity observed was 2.534% and was recorded on July 15th at Station No. 4. This examination of the salinity values indicates that the salinity of the water of the whole area examined is satisfactory for the development of the lobster.

From the preceding data it would seem that temperature conditions at Stations Nos. 1 to 4 are suitable for the development of lobster fry. The average temperatures at these stations are respectively 17.5°, 16.86°, 16.39° and 14.31°. Three of which give a safe margin over the temperature recognized as suitable, namely 15° and all of which are in excess of 12.5° which may be suitable. The fact that on no occasion was the temperature at any depth observed to be less than 12.5°, is probably more a convincing indication that the temperature of the water at these stations is suitable for lobster fry.

The probably extent of water of this temperature is shown by the dotted area in Plate No. 1. Further investigation of this region is necessary to fix the exact limits of the warm water to be found in the eastern part of Chaleur Bay.

The wide, sandy beaches over which the water passes at each ebb and flood of the tide, have their effect in warming up the water. The gradual dropping off of the bottom helps to give the water of this region a temperature

higher than that encountered farther west in the bay, where a depth of ten fathoms may usually be found from one to two miles offshore, while in the vicinity of Caraquet and Shippigan Islands a similar depth is not encountered until five or six miles offshore. This section of the bay is also protected to some extent by its position in respect to that of the land both to the east and to the west. On the east Miscou Island diverts the current of the incoming tides toward the middle of the Bay and similarly on the west, Maisonette Point and the shore west of this point tend to direct the current when the tide is falling, toward the middle also. The colder water from the greater depths is thus prevented, to some extent at least, from being driven onshore in this vicinity.

Plates Nos. 2 and 3 show temperatures at definite depths for the successive visits to these stations. The isotherms of Plate No. 6 show the distribution of the water of the various temperatures at Stations Nos. 1-4, from the surface to a depth of ten metres, in its changes during the progress of the summer. In all cases the water is above 12.5° in temperature and also a fair amount was found to be above 15° at each of these stations while at Stations Nos. 1 and 2 a considerable part is above 17.5° with a lesser amount in the case of Station No. 3 and none above 17.5° at Station No. 4. On the whole, however, it would appear that conditions here are satisfactory for the development of the lobster.

Further evidence to sustain this may be taken from the fact that small lobsters were seen throughout the summer and also small cunners were plentiful at the wharfs both at Shippigan and Caraquet. No attempt was made to collect the fry of the cunner but many small fish of this variety, ranging from six to eight centimetres in length, were caught on different occasions.

The average and maximum temperatures for Station No. 5 being respectively 13.33° and 18.05° compare quite favourably with the corresponding temperature values of the four preceding stations. The minimum temperature for this station is 6.22°, which is about six degrees below the lowest temperature observed at the previous stations. This minimum was encountered on July 18th which was comparatively early and was the occasion of the first visit to this station. On July 18th the temperature at the various depths was:- 0 metres 10.05°; 5 metres 7.03°; and 10 metres 6.22°. All of which are low when compared with the temperatures for this station during the remainder of the season. It would seem that the water in this vicinity does not warm up as rapidly and as early in the season as it does in the neighbourhood of the more easterly stations.

Plate No. 7 shows a greater range of temperature at this station than at those represented in Plate No. 6. Here, practically the whole area is represented as being in excess of 12.5° with a considerable part of this above 15°. This fact, together with an average temperature of 13.33° seems to indicate that conditions here are suitable for the development of lobster fry.

This statement is further substantiated by the fact that young lobsters were found to be plentiful in this region. Small lobsters, from five to ten centimetres in length, were especially numerous at Green Point which is near this station. These small lobsters could be seen among the rocks near the shore at low water and were frequently picked up in tide pools.

The data for Stations Nos. 6, 7, and 8 do not indicate that temperature conditions are as favourable in the western part of the bay where these

three stations are situated, as in the eastern part of the bay. Their average temperatures, being respectively 11.65°, 9.84° and 11.85° are considerably lower than those of the other five stations. A similar decrease is noticeable in the case of their maximum temperatures, which are 14.05°, 14.88° and 15.05°. Their minimum temperatures, 7.44°, 4.83° and 7.79°, with the exception of that of Station No. 7 show an increase over the minimum of Station No. 5, but nevertheless all are five degrees or more below the minimum values observed at the first four stations. The average and minimum temperatures for Station No. 7 are especially low. This is partly due to the fact that at this station the temperature at a depth of twenty-five metres was recorded while at the other stations temperatures were not recorded at greater depths than ten metres.

Referring to Plate No. 7 it will be seen that at each of these three stations an area is indicated as being "probably suitable" in temperature, that is, having a temperature of 12.5° or above. At Stations Nos. 6 and 8 the area which is above 12.5° is a considerable part of the whole area while in the case of Station No. 7 it is somewhat smaller. The "certainly suitable" temperature, namely 15°, is not reached at all at Stations Nos. 6 and 7 and only to an insignificant extent at Station No. 8.

The above facts would seem to indicate that the water in the region of these stations may or may not be suitable in temperature for the development of the lobster. As a temperature of 15° or above was recorded on one occasion only and as the area above 12.5°, which temperature is itself doubtful, is only about half of the total area in the case of Stations Nos. 6 and 8 and still less in the case of Station No. 7, the whole region must be considered doubtful from the standpoint of its suitability for the development of lobster fry.

On the other hand, the presence of small lobsters and cunner of various sizes seems to indicate that the region is probably suitable. However, small lobsters were not nearly so plentiful in this region as at Green Point near Station No. 5. As far as numbers are concerned, no difference was apparent in the distribution of the cunner in this region, but taken in a group the individual fish was probably larger. This difference in size of the individual was not verified by measurement or weighing but was the impression found on seeing a fair number of these fish both in the water and out of it.

SUMMARY.

Salinity: It would appear that the salinity of the water of Chaleur Bay as a whole is suitable for the lobster. At least the water along the south shore in the neighbourhood of the stations indicated in this report is satisfactory, if the lower salinity limit for the lobster is 2% or thereabouts, for in all cases the salinities recorded are in excess of 2.5%.

Temperature: The temperatures encountered at Stations Nos. 1, 2, 3, and 4 seem to indicate that the eastern part of Chaleur Bay in the vicinity of Shippigan and Caraquet Islands is suitable for the development of lobster fry.

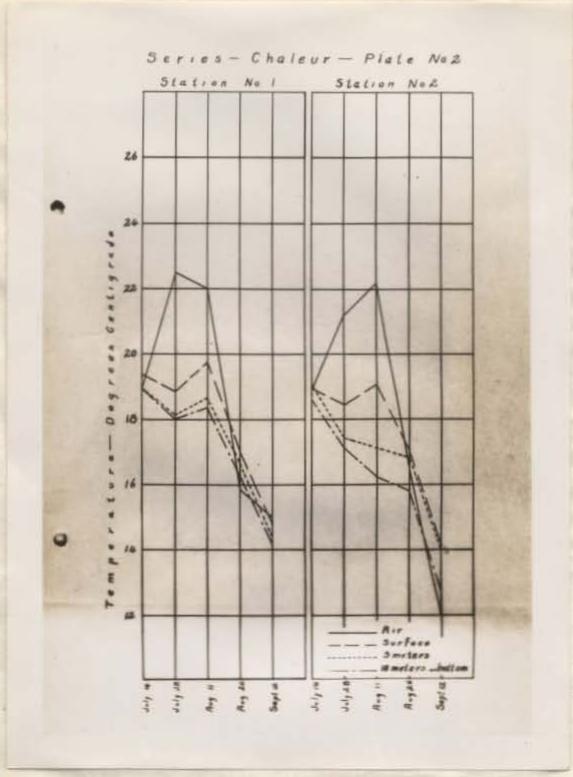
While the temperatures at Station No. 5 are not so high as at the four preceding stations, it seems feasible to say that this region is also suitable for the fry of the lobster, when we remember that a considerable portion of the water is above 15° for a part of the season.

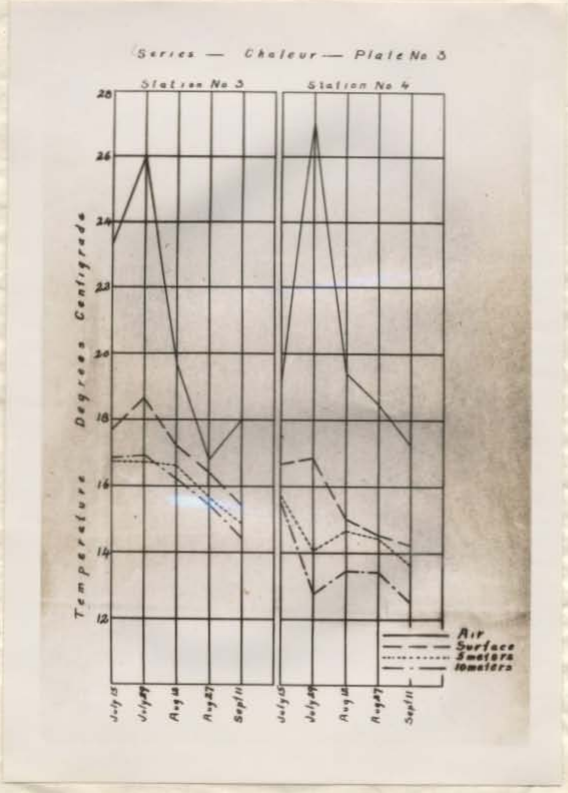
The temperatures recorded at Stations Nos. 6, 7 and 8 make it impossible to say whether or not the western part of Bay Chaleur is suitable for the development of the lobster.

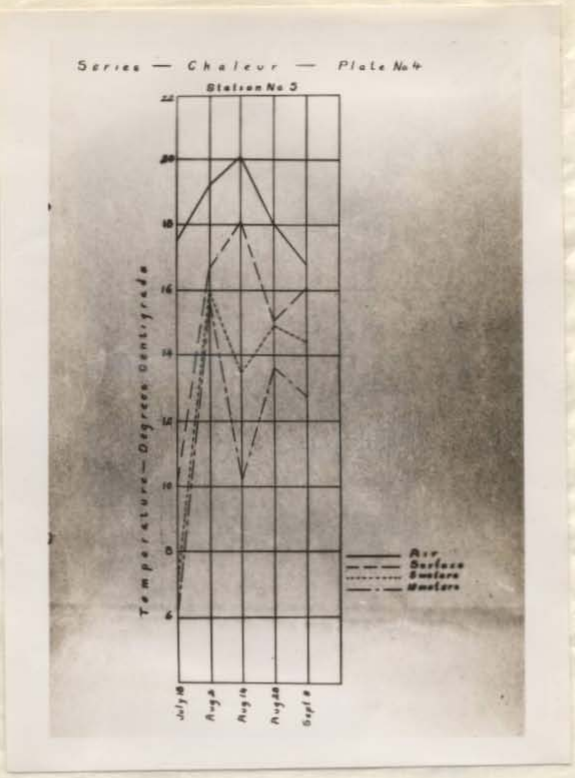
Small Lobsters: Small lobsters were found to be pretty generally distributed along the south shore from Shippigan to Bel River. They appeared to be more numerous west of Bathurst. The scarcity east of this point is probably due to the fact that all the beaches examined in this vicinity were of a flat muddy or sandy nature. However, their presence along the whole coast would seem to indicate that the region is suitable for the development of the lobster.

Gunner: The distribution of the gunner is general along the whole south shore from Shippigan Gully to Charlo. As conditions necessary for the development of the gunner are very similar to those of the lobster, this general distribution of the gunner would seem to indicate that the whole region is suitable for the lobster.

Summing up, we conclude that conditions at Stations Nos. 1, 2, 3, 4 and 5 are such as to make this part of Chaleur Bay favourable for the satisfactory development of lobster fry, while the conditions encountered at Stations 6, 7, and 8 indicate that this section is probably suitable but the temperature is such that this region must be classed as doubtful.


Series — Chaleur — Plate No 2
Station No 1
Station No 2
Temperature — Degrees Centigrade
26
24
22
20
18
16
14
12
July 14
July 28
Aug 11
Aug 26
Sept 8
July 14
July 28
Aug 11
Aug 26
Sept 8
Air
Surface
5 meters
10 meters - bottom


Series — Chaleur — Plate No 3
Station No 3
Station No 4
Temperature Degrees Centigrade
26
24
22
20
18
16
14
12
July 13
July 27
Aug 12
Aug 27
Sept 11
July 13
July 27
Aug 12
Aug 27
Sept 11
Air
Surface
5 meters
10 meters


Series — Chaleur — Plate No. 4
Station No. 3
Temperature — Degrees Centigrade
Air
Surface
5 meters
10 meters
July 15
Aug. 1
Aug. 15
Aug. 30
Sept. 15

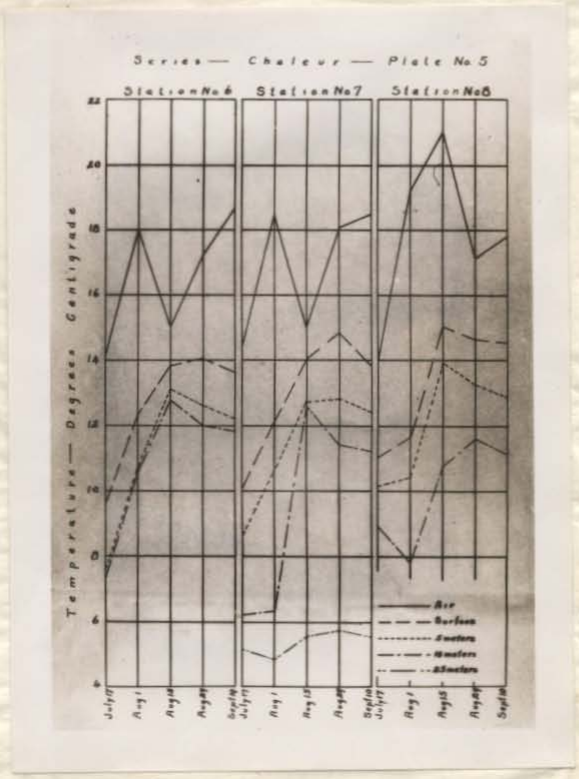

Series — Chaleur — Plate No. 5
Station No. 6
Station No. 7
Station No. 8
Temperature — Degrees Centigrade
Air
Surface
5 meters
10 meters
25 meters

Plate No 6

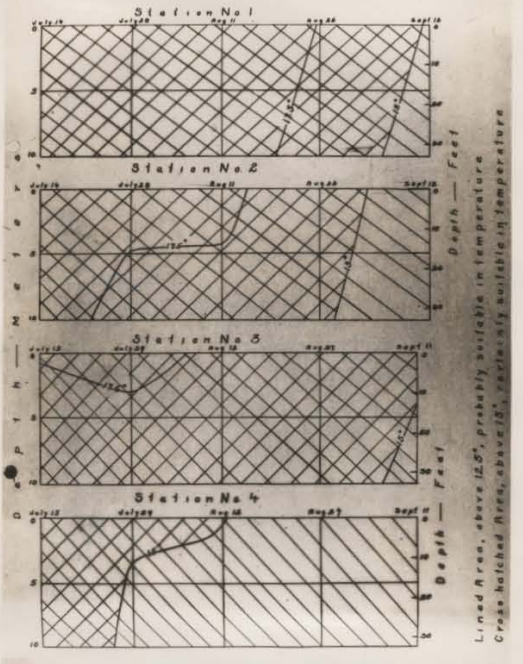


Plate No 7