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by

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Oysters on the Northumberland Strait coast of Nova Scotia

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To provide a basis for planning investigations on the oyster cultural problems and potentialities of the region, a brief preliminary examination of oyster-producing areas along the Northumberland Strait coast of Nova Scotia was made October 5th. to 9th., 1936. The writer was accompanied by Dr. H. Cumming of the Nova Scotia Department of Agreiculture, Supervisor Fraser and the local inspectors in their districts. Chief Supervisor Sutherland was able to meet us on the last day.

The region presents special conditions and problems which will require investigation before a sound basis for the development of oyster culture can be provided. These are discussed below and plans for investigations outlined. First, however, it is necessary to outline briefly the present conditions.

Production of oysters in the region. The following table gives the production of oysters (expressed in barrels) in each county during the past ten years.

Year.	Cumberland.	Colchester.	Pictou.	Antigonish.	Total.
1927	350	90	115	35	588
1928	425	70	129	45	669
1929	395	65	145	70	675
1930	500	130	209	125	964
1931	459	105	201	85	850
1932	186	315	603	105	1209
1933	247	565	408	76	1296
1934	275	200	250	66	791
1935	630	420	269	77	1396
1936 #	400	352	328	67	1145
Average	387	231	265	75	958

Figures for 1936 are to end of November only.

In Cumberland county oysters are produced in Pugwash river and in Wallace river and bay - the Wallace yield being the greater. In Colchester county oysters are produced in the south-western part of Tatamagouche bay and in Brule and Barachois harbours (branches of Tatamagouche bay). In Pictou county they are produced in Caribou harbour, in Merigomish harbour and small quantities in West river. In Antigonish county they are produced in Tracadie harbour with smaller quantities in South river.

The conditions in the various areas are discussed separately below but it may be noted here that the yield of the entire region is not very great (average of 958 bbl. in the past ten years) and that the yield of the individual inlets is small. The most important areas are Wallace and Tatamagouche, and only in these did the average exceed 200 bbl. in the past ten years. Caribou comes next with about 150 bbl. and the other areas have less important fisheries including Merigomish with close to 100 bbl., Tracadie with less than 75 bbl. and Pugwash river with oysters of inferior quality.

The smallness of the yields is noteworthy. When it is remembered that an acre of good oyster ground, properly developed, should yield over 50 bbl. annually, it is evident that the yields are small for the areas of these inlets. Several factors are apparently responsible among which may be mentioned: public fishing not offset by any worth while effort at culture; predominance of deep channels and tidal flats, and relative scarcity of deep firm bottoms; and limitation of the natural production to the heads of the inlets where sufficiently high temperatures occur but where low salinities make the quality low on much of the ground. More knowledge of the local conditions and development of the culture methods adapted to them are necessary before an increase in production may be expected. It seems, however, that the region has a potential production very much higher than its present level.

Pugwash river. Pugwash river and River Phillip are shown in Chart 1. They are long, narrow estuaries with deep channels and wide tidal flats. In the lower reaches the channels are very deep and the currents in them very strong. Farther up the channels become shallower and the bottoms are predominantly muddy.

While some oysters occur in River Phillip they are not fished owing to poor quality and limited supplies. The fishery in Pugwash river sometimes yields over 100 bbl. It extends from Doherty creek to the highway bridge above, with the greatest yields in the up-river part of this stretch. Some oysters occur in the lower part of Pugwash river but not in commercial quantities.

On October 5th. with the tide rising and nearly high the salinity at "A" (near the lower limit of the fishing) was 2.67% at the surface and down 12 feet. At "B" at the upper limit off fishing it was 1.73% at the surface and 1.84% at the bottom at 12 feet. Such salinities at high tide indicate that the present oyster production is in water of relatively low salinity extending down close to the lower limit for oysters.

The low salinities, combined with the prevalence of soft bottoms which produce long and irregular shapes, make the quality of Pugwash river oysters low. The fishing is done with rakes principally along the sides of the channel on rather soft bottom. Oysters sampled on October 5th. were fresh in flavour and of poor shape. Prices obained for them are low.

Although the bottom conditions are not known in the lower part of the channel, it is evident that there is little or no firm ground at a sufficient depth to escape ice. Only the seaward part of the river has hydrographic conditions suitable for the production of high quality oysters, and all the ground there is either tidal flat or deep channel with strong currents. There is little prospect for the development of oyster culture in this river unless a satisfactory method of growing oysters on flats is developed.

Wallace river and bay. Wallace river and bay are shown on Chart 2. This area was examined in 1930 and 1931 in connection with the development by the Wallace Oyster Fishermen's Federation of an oyster area the position of which is indicated on the chart.

About 4 miles from its mouth the deep channel of Wallace bay divides, the southern branch leading to the Wallace river and the northern branch up a narrow and shallow inlet with relatively small inflow of fresh water. Wallace river is tidal and somewhat salt for about six miles of narrow winding channel. Near the mouth of the river is a highway bridge and about 2 miles up is a railway bridge. Up to the branching of the channel and along the north branch there are extensive tidal flats. The river has steep banks of mud or rock, heavy currents and is quite deep (25 feet or more in places). The north branch is much shallower and has more gentle sloping shores.

Most of the fresh water enters by Wallace river and fairly high salinities occur in the bay. Thus in early Sept., 1930, salinities from 2.8% to over 2.9% were found near the junction of the channels and 2.8% at the dyke at the head of the North branch, while the salinity was below 2.2% at the railway bridge and 0.9% 6½ miles up. At the end of June, 1931, after wetter weather salinities were about 2.4% at the head of the North branch and 2.2% in the mouth of the river. It will be seen from this that the North branch is an area of relatively high salinity but that the water rapidly becomes fresher up the river. Water warm enough for rapid growth and good reproduction occurs both towards the head of the North branch and in the river.

The hydrography is reflected in the quality of the oysters. In the lower part of the river and up the North branch it is high. Up the river it is poorer, the uppermost oysters being unsaleable.

The area fished in 1936 as defined by Inspector R. S. Smith is shown on Chart 2. The principal producing grounds are from the junction of the two channels to the highway bridge and in the upper part of the North branch ("A" to "B"). Some oysters are fished at times above the highway bridge.

Fishing is done chiefly with rakes although there has been much picking by hand since the eel-grass disappeared.

Wallace bay and river show the typical results of public fishing. The good quality and poor reproduction in the saltier and colder water towards the open has led to the lowermost grounds being fished out. Oysters which occur well up the river cannot be sold. The fishery persists between these extremes.

In this area there are some shell beds below or in the lower part of the fishing area shown on the chart, which are now barren and are suitable for development. The hydrographic conditions and the limited experience of the Federation indicate good conditions for spat production in the river and at the head of the North branch. The potentialities are much larger than the present yield would indicate. Deep, firm bottom is, however, limited and the successful use of tidal flats would expand the prospects.

Tatamagouche bay. Tatamagouche bay is shown in Chart 3, The western part is also sometimes known as Malagash bay.

Oysters are taken in this area almost entirely by picking at low tide. The bay is shallow and has shelving shores and wide tidal flats. The channels at the head of the bay and its branches

are narrow. There is little or no deep, firm bottom in evidence except sandy grounds too exposed to be safe. The natural production is on the flats and oyster culture in this bay will depend on using them.

Public fishing areas in 1936, the limits of which are indicated in yellow on the chart, were at the western end of the bay and in Brule harbour. Some oysters occur in the channel of Barachois harbour and have at times been raked.

A slainity of 2.72% observed on October 6th at low tide just inside the mouth of the "Basin" indicates that fairly high salinities occur on the oyster-producing grounds, as might be expected from the fairly open bay and limited inflow of fresh water.

The quality of the oysters varies with the firmness of the bottom on which they are picked but is predominantly high.

Three leases issued by the Province under the agreement of 1912 are in effect. They are at the mouth of "The Basin".

Stoney bars at the mouth of "The Basin" bore large quantities of oysters which are subject to high mortality in winter. The principal bar is on the lease of Mrs. Embree and she stated that a much smaller proportion reach marketable size than on the flats. Such large quantities of small oysters show that good spat production may occur in this area when suitable materials are present.

Caribou harbour. (CHart 4). The public fishing occurs at the north-western end of the harbour (farthest from the open) and in Caribou river and Weir's gut. In the open bay the oysters are obtained principally by hand picking on the flats. In the river rakes are used. Oysters occur in small quantities seaward from the fishing areas.

Caribou harbour has shelving shores and wide flats. Deep, firm bottoms are reported to be scarce. The Department, through Mr. Ernest Kemp, improved some deep bottom seaward from the fishing areas but oysters were never established there in a lasting way. The use of tidal flats would be essential for any considerable development of oyster farming here, unless further exploration reveals suitable deep, firm bottoms.

Limited observations indicate that salinities in the bay itself are fairly high and that lower salinities occur in the river. Oysters picked on the flats are considered to be of good quality.

West river, Pictou harbour. The conditions in this area, where a small fishery occurs, are not well known to the writer. It is believed that serious pollution is possible.

Merigomish. (Chart 5). The limits of the fishing area in 1936 are shown in yellow. The principal producing grounds are in the mouth of Sutherland river and in the vicinities of Big Gut and Pine Tree Gut.

The fishery yields about 100 bbl. annually on the average, having varied from 57 bbl. to 144 bbl. in the past ten years. Inspector McDonald states that there are about 20 fishermen. The oysters occur in or close to the intertidal zone and picking by hand is the principal method although some small rakes are used.

Salinities at the mouth of Sutherland river and in Indian cove of about 2.7% at low tide on October 7th indicate fiarly salty water over the oyster areas. Most of the oysters, however, are taken on soft bottom and the shape is often poor.

South river, Antigonish county. A small fishery is carried on in South river, south of the railroad bridge. The conditions are not well known to the writer.

Tracadie Bay. (Chart6). The yellow line is the south-east limit of the grounds on which oysters were fished in 1936 as reported by Inspector Harris. It was reported locally on October 7th that the biggest production was at the western end of the west arm.

A surface salinity of 2.26% in the west arm on October 7th. with the tide fairly high indicates the prevalence of fairly low salinities there. Saltier water would, of course, be expected towards the open.

The tidal amplitude is less than in the other oyster areas of this region being only about 2½ to 4 feet. The intertidal zone is more limited and the topography is similar to that in bays on the north shore of Prince Edward Island where the tidal amplitude is similar.

Fishing is principally with rakes.

More exploration is necessary to estimate the amount of firm bottom in this area not occupied by the public fishery.

Need for further investigations. This preliminary survey showed that, with the possible exception of Tracadie bay, conditions in the oystersareas of the "Gulf Shore" region are widely different in certain characteristics from those in the region to which most attention has hitherto been given in our waters - the north shore of Prince Edward Island. Many of the results obtained in the Malpeque area and elsewhere are applicable in this region, but it will be necessary to develop some new methods adapted to the local needs. Chief among the fields requiring investigation and experimental farming are the estuarial conditions and the use of tidal flats.

Importance of tidal flats in the "Gulf Shore" region. With the exception of Tracadie bay, where it is the same, the tidal amplitude is greater than on the north shore of Prince Edward Island. It is 6½ to 8 feet at Tatamagouche, Wallace and Pugwash, and slightly less at Caribou and Merigomish. The bigger tides are associated (as they are in the Charlottetown region) with a tendency towards wide tidal flats and well-defined deep channels. They are associated, too, with the importance of the flats in the oyster production. As in the Charlottetown region, the natural production is largely on the flats or in very restricted areas towards the heads of narrow channels.

Further exploration is needed, but our present information indicates that the area of firm bottom unexposed at extreme low tides and suitable for oyster culture is quite limited. Some such ground is known to exist and more will doubtless be discovered and it can be used in the ordinary way. But for any great expansion of the oyster industry in this region it will be necessary to use tidal flats. This is a field which has not yet been touched in our waters, and intensive investigations and experiments will be needed.

It is planned to study the growth, mortality, reproduction etc. on tidal flats under various conditions of level, bottom, shelter, etc. to obtain a sound basis of information for the development of methods of using the flats to best possible advantage. It has also occurred to the writer that the use of low dykes to retain water over the flats at low tide may improve conditions for growing oysters and experiments are planned along this line and other possible ways of artificially improving the conditions.

Plans for further investigations. Further investigations of two kinds are needed - general exploration on the one hand, and intensive investigations and experimental farming on the other. More general exploration is needed to increase our knowledge of the conditions in the various inlets - their hydrography and topography, their oyster stocks and fisheries, the grounds available for development etc. Intensive investigations and experiments are even more important to develop oyster cultural methods adapted to the special needs of the region.

Intense investigations and experimental farming in the Wallace-Tatamagouche area. To obtain results of value intensive investigations must be concentrated in a single locality. General exploration is required in all the inlets but intensive work which must be continuous can be carried on only in one locality if the work is not to be handered and if duplication is to be avoided. Our limited resources make this even more necessary, but it is also a matter of proper supervision by a very limited trained staff.

In selecting the locality for such work two principles are important. The locality must present within a convenient working radius as great a variety of conditions as possible, which must in this case include estuaries and tidal flats. The area selected should also be convenient to as much as possible of the potential development. Experimental farming has as one of its chief functions the demonstration of cultural methods, and it may eventually assist the industry by providing "seed" stock. For both these functions it should be close to the important areas.

The Wallace-Tatamagouche area is the most suitable in the region. It offers within a very short distance a great variety of conditions including those characteristic of the region. It comprises in itself the two most important oyster areas of the region both as regards the present industry and the apparent potentialities for development.

It is proposed that work commenced in 1937 in this area should include - thorough investigation of hydrographic conditions (with special reference to estuarial conditions), spat collection

trials, investigation of the growth, survival and reproduction of oysters on tidal flats under various conditions, and experiments in the modification of conditions on the flats with dykes and other means on a small experimental scale. Plans do not entail the construction of a laboratory but they need the services of an investigator during much of the open water season and the establishment and protection of experimental plots. Further details will have to await development in the spring.

Experience has shown that no considerable development can be expected without work of this kind and without demonstration of the successful methods developed. While many fundamental investigations can be carried on to best advantage at the central experimental oyster farm at Ellerslie, branch experimental farms or "illustration stations" are required both to study special local problems and to bring demonstrations within reach of those interested.

The place and prospects for oyster culture in this region. It has been pointed out above that the present yield is very small in comparison with the apparent potentialities. It has been the universal experience that public fishing without oyster culture leads to a much lower level of production than can be maintained by oyster farming. The reasons for this have so often been treated at length that they hardly need mention here. The public fishery depletes first the seaward areas where the cooler, saltier water and firmer bottoms lead both to good quality and to slow growth and poor reproduction. The quantities of oysters and the average quality are, therefore, both reduced. Oyster farming can increase the natural production by collection of spat, protection from enemies, improvement of bottoms and in many other ways. It can use the best areas for reproduction as sources of "seed" stock to be matured on areas where quality is good, and can thus maintain both the quantity and quality at a higher level.

These principles apply to this region and it is only in oyster farming that there is any prospect for a lasting improvement of the industry. The leasing of grounds for oyster farming has always been an essential for the development of the industry through oyster culture, as it enables those who do the work to reap the benefits and encourages private enterprise. In the long run it assists the fishermen by providing increased employment. But, although these principles apply, there is not yet a sound basis of proven methods adapted to the region; and development will have to await the results of investigations and of experimental farming.

Furthermore general conditions in the region are not well enough known to formulate a sound leasing policy. The public fishing areas have been defined in a preliminary way and it is the Department's policy to interfere with them as little as possible; but it is believed that further investigations are needed to determine exactly what areas should, in the best public interests, be reserved for that purpose. The grounds available for oyster culture are not yet well enough known and our knowledge of other conditions is limited.

It seems, then, that, although the hope for a larger industry lies in oyster farming and although it is highly probable that successful oyster farming can be established, the formulation

of a definite policy in this regard will have to await further knowledge of the conditions in the region and the development thr ugh experimental farming of methods of proven value under the region's special conditions.

Ellerslie, P.E.I.,
March 3rd., 1937.