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A PRELIMINARY LIST OF THE FISHES OF MALPEQUE BAY\*

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ABSTRACT.

Malpeque Bay, on the north side of Prince Edward Island, is separated by a long barrier beach from the southern Gulf of St. Lawrence where the temperatures, salinities and fauna are quite different. Commercial fishing is limited to herring, alewives, smelts, mackerel, eels and oysters. Twenty-seven other non-commercial fishes are listed as occurring in this region. The only two previous lists for this general area of the Gulf recorded sixteen and twenty-six species respectively. Common species not listed previously include *Pomolobus*, *Salmo*, *Pungitius*, *Apeltes*, *Siphostoma*, *Menidia*, *Myoxocephalus aeneus*, and *Microgadus*, while less typical ones include *Raja scabrata*, *Scomberesox*, *Amodytes*, *Poronotus*, *Pholis*, *Limanda* and *Lophopsetta*. Information is also given concerning the recent abundance of eels, the herring and smelt fishery, and the great abundance of silversides, as well as on the sizes, abundance and habitats of a number of the other species.

The fish fauna of Malpeque Bay, as shown by the existing records, is listed here as an example of many similar bays in the southern Gulf of St. Lawrence. These shallow, sheltered bays with their great seasonal range in temperatures have their characteristic fish fauna. Malpeque Bay is typical of those with relatively small drainage basins and, consequently, relatively high salinities.

The area of the bay is about 40,000 acres. It has highly indented shores and long branches, called locally "rivers" and creeks. A barrier beach many miles long separates the bay from the open Gulf of St. Lawrence leaving only a narrow

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entrance. The greatest depth is just over 50 feet and most of the bay is much shallower.

Although the normal tidal range is only from two to three and a half feet, the drainage area is so small that, in spite of the small exchange of water with the outside, the salinities remain high. Even towards the heads of the creeks they are commonly over 25 per mille as compared with an average of 28 to 29 per mille just outside the bay. Salinities in the main body of the bay are close to those at the surface outside and sometimes even slightly higher.

The shallowness, small tides and great degree of shelter combine to make the temperatures variable and quickly influenced by weather. For three to five months in the winter the bay and its tributaries are frozen over and the temperatures uniformly below 0° C. In summer, temperatures approach 20° C. throughout the bay and in the sheltered tributaries may exceed that level for some weeks and frequently pass 25° C. The temperature variation is great from day to day as well as from season to season, sometimes amounting to several degrees in two or three days.

The fauna a short distance outside the bay, where cold water is present the year round at moderate depths, is quite different. Records of fish occurring there are included in this list only as an indication of their possible presence in the bay as strays or seasonal visitors. We are concerned only with the fauna inside the bay.

The available data leave many gaps in our knowledge of the fish. Since commencing oyster investigations in the region in 1929 and the establishment of the Prince Edward Island Biological Station there in 1930, the writer has had an opportunity to sample the fish population principally by seining and to a lesser extent by gill-netting and line fishing. Some information has also been obtained by observation of commercial fishing. Gill-netting is carried on for herring in the spring and for smelts in the autumn and winter. Other commercial fishing includes spearing of eels, various oyster culture operations and the lobster fishery, all of which are of interest.

Reference has been made to the earlier published lists of Cornish<sup>1</sup> and Stafford<sup>2</sup>. The former, in his list of the fishes of Tignish, was interested principally in the fishes occurring in the open Gulf of St. Lawrence in this region. He includes several species which have not been found in the inlets and omits forms so important there as *Pomolobus*, *Salmo*, *Pungitius*, *Apeltes*, *Siphostoma*, *Menidia*, *Myoxocephalus aeneus* and *Microgadus*. Forms less typical of the inlets which he does not list are *Raja scabrata*, *Scomberesox*, *Ammodytes*, *Poronotus*, *Pholis*, *Limanda* and *Lophopsetta*. Stafford's list is so brief that it does not pretend to any degree of completeness. He does, however, provide our only record of *Thunnus thynnus* in Malpeque Bay.

Notes on the individual species follow. The nomenclature is that used by Bigelow and Welsh<sup>3</sup> in "Fishes of the Gulf of Maine".

1. *Petromyzon marinus* Linnaeus. Lamprey. Cornish<sup>1</sup> reports this species as being found attached frequently to mackerel and as the latter is common in Malpeque Bay the lamprey may be expected to occur with it.

2. *Raja diaphanes* Mitchill. Big or Eyed Skate. Two specimens (♀ 47 cm. and ♂ 62 cm.) were caught in gill nets, September 21 and October 7, 1932. Cornish<sup>1</sup> reports it as common about the wharves at Tignish in the summer and it may well be common in Malpeque Bay as gear suitable for its capture is seldom used.

3. *Raja scabrata* Garman. Prickly Skate. A single specimen 14 cm. long was seined just inside the mouth of the bay, August 26, 1932.

4. *Anguilla rostrata* LeSueur. Eel. The eel is of common and regular occurrence in the bay throughout the year. It is apparently most abundant towards the heads of the tributary inlets, occurring also in fresh water. During the summer a few are speared at night with a light and in the late autumn

<sup>1</sup> Cornish—*Contrib. Can. Biol.* 1906-10, pp. 79-81, 1912.

<sup>2</sup> Stafford—*Contrib. Can. Biol.* 1906-10, pp. 37-44, 1912.

<sup>3</sup> Bigelow and Welsh—*Bull. U. S. Bur. of Fish.*, vol. 40, Pt. I, 567 pp. (1925)

and early spring many are speared in the mud. They commonly occur in seine hauls.

For a few years previous to 1929 they were scarce. In that year and in 1930 numerous small specimens (6 to 12 inches long) were found in bags of shells used for the collection of oyster spat. The abundance of the adults increased, producing a recovery of the fishery first noticeable in 1934.

5. *Clupea harengus* Linnaeus. Herring. Herring are abundant spring visitors to the bay, proceeding at that time well up the tributary inlets though not quite to the head of tide. They support a considerable gill-net fishery commencing almost immediately after the ice leaves which may be from the end of March to the beginning of May. They remain usually for about a month with the peak of the spawning in the latter part of their stay. The temperatures are rising rapidly at this time being close to freezing when they arrive and commonly passing 15° C. within a few days of the cessation of the fishery.

Herring are not known to occur throughout the summer but are present again in the autumn in much smaller numbers than in the spring. Two gill nets set from September 19 to November 1, 1932, at the mouth of Bideford "river" (an important tributary of Malpeque Bay) where important catches are made in the spring, caught only one specimen. It was a spawning male, 27 cm. long, caught on October 7.

6. *Pomolobus pseudoharengus* Wilson. Gaspereau, Alewife. Gaspereaux are common in Malpeque Bay, ascending the brooks to spawn in the early summer, when they are gill-netted in the estuaries. Four specimens were seined, June 22, 1934, in salt water near the head of Bideford "river", of which three were ripe ( ♀ ♀ 27 cm. and 28 cm., ♂ 24 cm., immature 21 cm.). Eight specimens were seined there July 18, 1937, all spent. No other adults have been seined but a few large individuals (20 to 25 cm.) were gill-netted near the mouth of Bideford "river" in September and October, 1937, and a few are taken in smelt nets in the autumn. They are apparently present throughout the open water season.

Small gaspereaux have been seined in the late summer and autumn: August 26, 1932, 8 specimens, 4 to 7 cm., in three places in the open bay; September 17, 1931, 2 specimens, 9.5 and 10 cm., near the head of Bideford "river"; September 28, 1934, 71 specimens 10 to 13.5 cm., at the mouth of the bay. These small specimens, probably spawned the same summer, seem to be more abundant towards the open than at the heads of the tributary inlets.

7. *Salmo salar* Linnaeus. Atlantic salmon. Salmon ascend the brooks tributary to Malpeque Bay in the late autumn to spawn. A few large salmon become tangled each autumn in gill nets set for smelts in the salt water of the "rivers". Small salmon are commonly caught by anglers in the brooks near the head of tide. A single smolt (13 cm.) was seined, May 21, 1932, in the salt water in Bideford "river" over a mile from fresh water.

8. *Salvelinus fontinalis* Mitchill. Brook trout. Trout are abundant in the tributary brooks of the bay and are often caught in salt water near the head of tide.

9. *Osmerus mordax* Mitchill. Smelt. There is a gill-net fishery for smelts in Malpeque Bay from the middle of October until February. In the spring they spawn generally in the brooks tributary to the bay. Seining indicates that some smelts at least are present throughout the summer both in the open bay and in the tributary inlets. Both young smelts (spawned in the same spring) and yearlings have been seined in the "rivers" in summer and autumn.

10. *Fundulus heteroclitus* Linnaeus. Killifish. Mummichug. This is one of the most abundant fishes of the bay. It has been seined throughout the open water season. Its greatest abundance is towards the heads of the tributary inlets. The largest seen was 13 cm. long and all sizes have been taken down to about 2.5 cm., which appears to be the lower limit for the seines used.

11. *Scomberesox saurus* Walbaum. Needlefish. A single specimen, 40 cm. long, was caught in a smelt gill net in Bideford "river", October 16, 1931. Fishermen did not recollect

ever having seen one before. That there was an unusual invasion of the Gulf of St. Lawrence is suggested by the writer's observation on the same day of two *Scomberesox* in a smelt fisherman's boat at Shediac, N. B. Fishermen there agreed that none had been seen before 1930 and that they were very rare that year and in 1931.

12. *Pungitius pungitius* Linnaeus. Nine-spined Stickleback. This species is common in the "rivers" and creeks, and is apparently present throughout the year. It is most numerous at the heads of the creeks and seined in smaller numbers over a mile down the inlet.

13. *Gasterosteus aculeatus* Linnaeus. Stickleback. This is the most abundant stickleback of the region, as many as 700 being taken in a single haul of 100-foot seine. It is most numerous in the upper parts of the tributary inlets but has also been seined in the open bay. It seems to extend farther seaward than either *Pungitius* or *Apeltes*. It is apparently present throughout the year.

14. *Apeltes quadracus* Mitchill. Four-spined Stickleback. This is the least numerous of the three sticklebacks of the region but is common and generally distributed in the inlets tributary to the bay.

15. *Siphostoma fuscum* Storer. Pipefish. Pipefish were common and generally distributed in seine hauls at the head of Bideford "river" in 1931 though not numerous. They were always found associated with eel-grass and after the mortality of the latter in 1932 were not seen again until the summer of 1938. A few were seined then, again where eel-grass occurred.

16. *Menidia notata* Mitchill. Silverside. This is the most abundant fish of the bay. Hardly a seine haul has been taken without catching several and as many as 3,500 have been taken at once. They seem to be present on all shores throughout the open-water season and can be taken through the ice in winter.

Spawning occurs in June and the young silversides reach lengths up to several centimetres by the end of the summer,

showing great individual variation. The size frequencies suggest that most of the spawners are only one year old, although at least one older age group is present.

17. *Ammodytes americanus* DeKay. Sand lance. Sand lance have been seined in the autumn near the mouth of the bay and near the mouth of Bideford "river". Numerous small lance (4 to 6.5 cm. long) were seined for the first time towards the head of Bideford "river" July 18, 1937, and a few again in 1938. Larger areas of sandy bottom occur towards the open and the lance seem to be more numerous there.

18. *Scomber scombrus* Linnaeus. Mackerel. These are regular summer and early autumn visitors to the Gulf just outside the bay where they are hooked in considerable numbers. Twenty-three from 26 to 45 cm. long were gill-netted at the mouth of Bideford "river" September 20 to October 10, 1932. A single specimen 20 cm. long was seined at the head of Bideford "river" in September, 1931. They may visit the bay regularly in considerable numbers, as little gear suitable for catching them is employed before the middle of October.

19. *Thunnus thynnus* Linnaeus. Tuna, albacore. Stafford<sup>2</sup> reports seeing a specimen stranded on mud flats near the mouth of the bay.

20. *Poromotus triacanthus* Peck. Butterfish. A single specimen 13 cm. long was gill-netted at the mouth of Bideford "river" in September, 1932.

21. *Roccus linneatus* Bloch. Striped bass. Striped bass are gill-netted in small numbers in early summer towards the head of Grand "river", one of the two large inlets tributary to the bay.

22. *Tautogolabrus adspersus* Walbaum. Cunner. Small cunners, locally called "perch", are common throughout the bay. They have been seined from the mouth of the bay to the creeks and are commonly found in bags of shells used for the collection of oyster spat, in lobster traps, etc. None larger than 13.5 cm. have been seen by the writer in this region.

23. *Myoxocephalus aeneus* Mitchill. Little sculpin. This is the common sculpin of the bay. It has been seined commonly both in the open bay and in the tributary inlets and is often taken in gill-nets. It is probably present throughout the year.

24. *Myoxocephalus octodecimspinosus* Mitchill. Long-horn sculpin. This species is present but not abundant. It occurs in the catches of smelt gill-nets in the autumn. One specimen was seined at the mouth of the bay, August 26, 1932, and four at the mouth of Biddeford "river", November 2, 1934.

25. *Pholis gunnellus* Linnaeus. Rock eel. A few rock eels have been seined and the newly spawned eggs have been taken.

26. *Microgadus tomcod* Walbaum. Tomcod. The tomcod is one of the common fishes of the inlets tributary to Malpeque Bay, appearing in seine hauls near the head of Biddeford "river" at all seasons. It is also commonly taken in the gill-nets of the herring fishery in the spring and of the smelt fishery in the autumn and early winter. Ripe fish have been observed in the late autumn and small tomcod (less than 5 cm. long) have been seined in June.

27. *Gadus callarias* Linnaeus. Cod. Though fished commercially just outside, cod have never occurred in our seine hauls or been observed by the writer inside the bay. They are included here only on the strength of a reported autumn fishery in the past in the deep water of the main channel just inside the mouth of the bay.

28. *Urophycis tenuis* Mitchill. Hake. Small hake, which appear to belong to this species, are common in the autumn in the tributary inlets. They appear in two size groups, the smaller reaching lengths of 15 to 20 cm. and the larger 25 to 32 cm. in the autumn. They occur in seine hauls and in gill-nets set for smelts. In gill-nets set at surface and bottom at the mouth of Biddeford "river" in 1932 many hake were taken in the surface net and none at the bottom.

29. *Limanda ferruginea* Storer. Rusty dab. Three spent females, 23 to 29 cm. long, were seined at the mouth of the



bay on August 26, 1932. Two small specimens, 7 and 8 cm. long, were taken in the same haul, and two others, 3.5 and 11 cm. long, at the mouth of Bideford "river", November 2, 1934. This species has never been taken in the more numerous seine hauls farther up the inlets.

30. *Pseudopleuronectes americanus* Walbaum. Winter flounder.

31. *Liopsetta putnami* Gill. Smooth flounder. Both these flounders are abundant in Malpeque Bay and its tributaries. They are apparently present throughout the year and all lengths up to 25 cm. are well represented with a few winter flounders up to 30 cm. The very small of both are present, and spawning winter flounders have been taken in June. There seems to be a tendency for the smooth flounder to be relatively more abundant on soft, mud bottoms and the winter flounders on firmer grounds.

32. *Lophopsetta maculata* Mitchill. Sand flounder. Eight small individuals, 3 to 8 cm. long, were seined at the mouth of the bay, August 26, 1932, and eleven, 5 to 13 cm. long, were seined at the mouth of Bideford "river" in November, 1934. This species, like *Limanda ferruginea*, has not been taken towards the heads of the inlets. No large individuals have been taken.