MANUSCRIPT REPORTS OF THE BIOLOGICAL STATIONS

No. 31

Set hook experiments in the intertidal zone.

By

R. A. McKenzie

BIOLOGICAL BOARD OF CANADA

MANUSCRIPT REPORTS OF THE BIOLOGICAL STATIONS

No. 31

Title

Set Hook Experiments in the Intertidal Zone

Author
R. A. McKenzie

SET HOOK EXPERIMENTS IN THE INTERTIDAL ZONE

R. A. McKenzie.

A short experiment in the early part of 1932 was conducted in the vicinity of St. Andrews, N. B., to determine what fish, if any, were in the shallow water at this time of year and what hooks and baits were best for the taking of each species. The work was carried out in two parts, the first from February 10/32 to March 8/32 and the second from April 18/32 to June 2/32. It was intended originally to carry the work on right into the summer continuously from February, but owing to unfortunate circumstances a break in the work occurred at a rather important time.

In carrying out this experiment, hooks were set in two places. The one was on the south side of Brandy Cove, St. Croix river, just north of the Atlantic Biological Station (the whole about a mile up river from St. Andrews, but still many miles below the head of the tide) and the other at the extreme tip of St. Andrews point where it projects out towards the centre of Passamaquoddy bay. These hooks were set on the beach just at low tide mark and were generally moved up and down the beach as the low tide mark changed. However this was not always done, since sometimes they were left at an intermediate point and visited just as the tide left them bare and baited again just as the advancing tide was covering them. Frequently, intervals of a number of days or a week occurred between each series of sets.

The gear consisted on the average of about four hooks each, of three different sizes, namely Arthur James, long shank, eyed, black, number twelve hook (large size); James same style, num-

ber seventeen hook (medium size) and a small curved, black, so-called flounder hook (small size). Each hook was attached to a separate stake by about half a fathom of regular "snood" line. The stakes were driven into the beach in a line along the low tide mark at intervals of about twenty-five feet. The hooks were arranged in sets of three, i.e. one stake having a large hook for example, the next a medium and the next a small one. The next or fourth stake would begin the same series over again, having a large hook. Thus in every seventy-five feet there was one of each size of hook.

As may be concluded from the above, the bottom had to be of such a nature as would permit of driving stakes. In both the above mentioned places it was possible to set some of the hooks over a sandy bottom as well as among stones and rocks of various sizes, and even close to ledges and large rocky expanses. Thus all types of bottom with the exception of straight mud were fished. During the early part of the experiment there were no large plants growing on the bottom, but towards the end considerable growth was present in the various locations but none of the hooks were actually among such growths.

Three different types of baits were used throughout as well as other odd things. Unfortunately, during the second part of the experiment frozen herring were not available and fresh herring were used whenever they could be obtained towards the end of the experiment. The sets were always made in series, i.e., if a week had elapsed since the hooks had been baited last, one bait would be used the first day, another the second and so on until all the different baits available just then, were tried.

Thus, as nearly as possible, all the baits were tried out before the conditions had undergone much change. If any time had to elapse when the hooks could not be tended, it was always arranged so that it came between these series of sets, not in the middle of one.

One of the baits used was shelled clams (fresh) (Mya arenaria). Herring, pickled in strong brine, was a second continuous source of bait. These fish had been in pickle about four months before the experiment began. During the first part of the experiment frozen herring formed a third continuous source of bait, having been in storage about three months at the beginning of the experiment. The clams and pickled herring were used in the second part also, but there was no frozen herring available. Fresh herring was used towards the end when obtainable.

In respect to the results of setting out and baiting these hooks at certain intervals it should be stated that no fish were caught during the first part of the experiment. However a few fish were taken during the second part, although only in Brandy cove, not on St. Andrews point. The following is a list of the fish taken.

April 25/32 - 1 flounder (Pseudopleuronectes americanus W.)
- 2 sculpins (Myoxocephalus octodecimspinosus M.)

April 28/32 - 1 flounder (P. americanus W.)

April 29/32 - 1 sculpin (M. scorpius groenlandicus C. and V.)

May 18/32 - 1 sculpin (M. octodecimspinosus M.)

May 26/32 - 1 sculpin (M. octodecimspinosus M.)

On May 13/32 a small weir was partially completed close to the hooks and certain fish were observed in it.

May 13/32 - A lot of small pollock, some sculpins and flounders.

May 18/32 - A lot of sardines (small Herring).

May 13/32 - An eelpout (Zoarces anguillaris Peck.) was found run aground near the hooks.

In the river directly off Brandy cove, some commercial line trawling was done in deep water during the second part of the experiment. It was reported by one of the fishermen that he took on,-

May 5/32 - a large number of cod
- 2 haddock

May 10/32 - 32 cod
- 4 haddock

May 30/32 - 34 haddock (This catch was actually seen,
- 6 cod
- 3 eelpouts and hence the list of non-com-
- 1 skate
- 1 flounder mercial fish.)
- 7 red perch

Thus it is seen that apparently there were no flounders or sculpins, of the same kind as taken in Brandy cove, in the vicinity of where the hooks were set on St. Andrews point, for the same gear and baits were used in both places and some of these fish were caught in Brandy cove. In respect to the Brandy cove catches it should be said that for the taking of the small sized flounders and sculpins caught, the small hooks were best and there appeared to be no difference in respect to fresh clams or pickled herring as baits. None of the other baits used caught anything, i.e.fresh herring which was used several times and scraps of meat. However these were not used much and the results mean little or nothing. During the first part of the experiment it was learned that fresh clams stayed on the hooks as long as

five days while the longest time for the pickled herring was two days and for the frozen herring one day. This was the state of things from February 10/32 to March 8/32. However during the second part of the experiment (April 18/32 to June 2/32) practically none of the baits remained on the hooks until they were lifted the day after being set. Only once was it found that about half the clam baits remained on the hooks for between one and two days and the same thing was found for the pickled herring baits once. In the case of the herring the skeleton was usually found on or close to the hook while nothing remained of the clams. Thus it is believed that the minute animal life on the bottom was responsible for cleaning the bait off the hooks. It is also apparent that this life is either absent or inactive during February and the early part of March, while it is present and very active from the middle of April until the first of June. Since small flounders were taken on the small hooks, it is reasonable to expect that if larger flounders had been present they too would have been taken, if not on the small hooks, then on the medium sized ones. Hence there were apparently no larger flounder around.

At the same time that these fish were taken on the set hooks, they were also taken in the nearby ebb-tide weir which was in the same depth of water, on the same type of bottom but slightly muddier, and between two ledges which extend out from the shore into deeper water. This weir is small and does not really fish a greater area than the set hooks. However many more sculpins and flounders were taken in it than on the hooks. At the same time

pollock and small herring were taken in the weir and not on the hooks. Thus the weir not only fishes more efficiently than the set hooks, but it takes a greater variety of fishes. Since the weir was not fishing at the same time the first fish were caught on the hooks, nothing may be said about its ability to indicate the presence or absence of certain species of fish compared to the hooks.

However, comparing the weir and set hooks with the commercial line trawl out in deeper water (30 metres) it is seen that, cod, haddock, skates, and Red perch were taken there and not inshore. (The medium-sized set hooks were the same as on the commercial trawl and these men were using fresh clams for bait). Thus apparently these fish were not inshore at this time of year.

During the second part of this experiment temperature records were kept and it was found that at that time of year the water about the hooks at low tide was considerably warmer as a rule than the surface water some distance offshore. However, by the time the water had moved in to high tide, the water on the bottom (16-18 feet deep) about the hooks was only slightly warmer than that at the same depth offshore some distance. Thus, these temperatures check fairly well with those recorded for station 6 in the St. Croix river, with the bottom temperature at the hooks during high tide ranging about half way between the surface and 10 metre depth temperatures at Station 6. From this it is seen that there is considerable variation in the temperature of the water about the hooks as the tide changes from high to low and back again. During the height of the warm weather the water at

high tide about the hooks will be considerably colder than at low tide and in the dead of winter it will likely be opposite. Anyway, in April when the first fish were taken (flounders and sculpins) the water temperatures at station 6 varied something about 1°C. from top to bottom, ranging about 3.5°C., while in where the hooks were set the temperature ranged from about 3.5° -5.0°C. Just about a week previous to the taking of these fish the water temperatures at station 6 began to show a decided variation from bottom to surface. Before this for some time there had been little difference from top to bottom. From this time on, a decided warming occurred, causing the temperature graphs for the different levels to diverge considerably.

Good catches of cod were being made about the first of May by the commercial fishermen, at which time the temperature of the bottom water on their fishing grounds was about 2-3°C. Only the occasional haddock was being taken at that time, for it seemed that these fish were just coming in onto these grounds, or at least they were just beginning to be taken. The pollock taken in the weir about the middle of May were caught when the surface and upper layer of the water was between 4° and 8°C. By the time haddock were plentiful towards the end of May, the bottom water had warmed up to about 4.5°-5.0°C. Sardines were taken just about the same time as the small pollock.

Because no haddock, cod, skate, or Red perch were taken on the set hooks does not mean that these fishes never come into the intertidal zone or that they do not take the hook, for at the head of the bay of Fundy set hooks and set lines (snoods attached to a line or wire which is fastened at the ends, not to separate stakes) are used to quite an extent in the taking of cod and

haddock.

Thus it is seen that flounders (one kind), sculpins (two species), small pollock, eelpouts and small herring are to be found inshore in the intertidal zone in April and May. Only the first two mentioned were taken on the set hooks. Haddock, cod, skate and Red perch were offshore in 25 metres of water or less, but were not taken in the intertidal zone, either on the hooks or in the weir. Almost all the flounders and sculpins were captured on the small hooks (flounder hooks). No difference was noticed in the attractiveness of the various baits used. However it was noticed that during February and March shelled clams (fresh) remained on the hooks as long as five days, pickled herring as long as two days and frozen herring only one day. However during April and May practically none of them ever remained on the hooks until the hooks were visited the next day. The herring skeletons were often found on the hooks signifying that the baits were devoured by small animals that cleared the meat of the bones instead of tearing the whole bait off the hook, devouring bones as well as the meat. The beginning of the catching of the few fish that were found to be in the region commenced the latter part of April when the bottom waster in 30 metres was between 2° and 3°C. and the water in the intertidal zone varied from 3° to 5°C. At such a time the cod catch in deep water was very fair and the haddock catch confined to one or two fish per day. By the time the deeper waters had warmed to about 5°C. the cod catch was quite small and the haddock catch very good. The flounders, sculpins, pollock and herring were taken in the intertidal zone when the water ranged from 4°C. to about 7°C.