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Title

Smelt Tagging, 1943-44, Miranichi Area.

Author

R. A. McKenzie

SMELT TAGGING, 1943 - 1944, MIRAMICHI AREA.

R.A. Mc Kenzie. August, 1944

Methods.

To obtain information re migrations and fishing intensity in the Miramichi area 4701 Smelt were marked from June 1943 to January 1944.

After experimenting for some months with various kinds of marks on Smelt in the Atlantic Biological Station tanks a thin scarlet celluloid mark attached to the operculum appeared to be the best. A heart shaped piece $5/16''$ wide, $3/8''$ long with a strip $3/32''$ wide projecting $5/8''$ beyond the head is bent sharply back at its junction with this heart-shaped section and pressed tightly against this section while in warm water. A small dish of water continuously on a "low" electric burner is best for this purpose. The tag is held at the hinge point with one pair of small forceps and the strip is bent back with another pair. Cooled in air it retains this shape. Various types of notches on the heart section made with "delivery" punches before bending the celluloid, were used to distinguish various lots of tags.

The narrow pointed strip is forced through the operculum about $\frac{1}{2}$ an inch forward of its posterior edge and then turned so that the narrow part along the inner surface and the heart section along the outer surface of the operculum point posteriorly.

To do this the fish is held belly up, head forward in the hollow of the left hand. Holding it with the fingers of this hand the right hand tip of the thumb is inserted under the ventral edge of the fish's left-hand operculum to hold it out clear of the gill membranes while the tag is being attached. If the heart section of the tag only is held with a broad-tipped pair of forceps, the tail part of the tag will be bent out from the back of the heart section sufficiently to allow its sharp point to be forced through the membranes between the operculum and the cheek. As soon as this is done the tag can be turned parallel with the operculum and slid back into place with its free ends one on each side of the posterior edge of the operculum.

With someone handling the tagger both the fish and the forceps with the tag in place it is possible to tag 7 to 10 a minute for short periods. Even with only someone putting the tag in the forceps it is possible to tag 500 smelt in 4 hours (weather being at least moderate) and this time includes changing water in the tubs of fish, returning the fish to the water etc., etc.

Tagging.

From June 10 to 19, 1943 inclusive, 201 Smelt were tagged with heart-shaped unnotched scarlet celluloid tags (design no. 1) and released below the old dam in French Fort brook. They were held for some time in tubs to check their reactions, but all seemed O.K. Being late in the spawning season these fish were almost all males and left the brook within several days of tagging.

On November 24/43 500 smelt were tagged (with design #2, a V notch cut in the side of the heart) at Eel River bridge. These fish were caught with a trap net in the river just above the bridge, placed in a dory half full of water, tagged and put into another dory. This dory was finally towed out and overturned releasing the fish about 1 1/3 miles below the bridge or in the S.W. corner of Baie Ste. Anne.

On November 25 and 26, 1943, 500 more were caught just above Lower Neguac Wharf, tagged from one half-filled dory into another and released a short distance off the end of the wharf. This tag had the tip of the "heart" cut off straight and was designated as design #5.

From November 29 to December 4, 1943 inclusive 500 were tagged and released off Rockhead or Forrests Corners, several miles above Loggieville. Tag design #6 was used here -- a rectangular notch cut in the side of the heart. The fish were taken in bag nets fishing on stubs in "open water" but there was slush ice running all the time. The nets were hauled and the fish dipped into the scow. By far the greatest part of the catch was tomcod but there were some smelt and a few small (3-4 1/2 inch) striped bass. The smelt and young bass were quickly picked out of the mass of fish in the scow as the dipping proceeded and put into a dory half-full of water along-side the scow. Rapid as was the picking out of the smelt and bass from the scow, still many smelt did not recuperate and no bass survived at all. Rolling the mass of fish about in the net and the subsequent dipping out through the bunt was too much for the bass and many smelt, yet the tomcod would "come around" in the dory very quickly. The tagging was done at, and the fish released along, the shore.

On December 8, 1943 after the ice had formed enough to set nets in Bay du Vin river live smelt were secured from nets fishing farthest upriver. These fish were placed in tubs of water on the ice right at the nets. Tagging was done right there and the fish put back through the ice 100 yards from any net. At this point 500 were tagged using design #3, a V notch cut in the tip of the heart.

Then, about the middle of the fishing season (Jan. 15th.) 2500 more were tagged in lots of 500 at points as widely separated as fishing operations would permit securing fish from commercial gear. Compared with earlier this later tagging was done at points nearer Miranichi Bay proper, for at this time of year the fish withdraw from the smaller inlets and mouths of the streams entering the Bay and are concentrated in the deeper more expanded sections. For example, there is practically no smelt fishing in the main river above the Oak Point to Point Cheval line in Bay du Vin river or Eel River at this time of year. Earlier operations are located handier inshore where open water gear can be fished with a measure of protection or in the inner reaches on the ice where it forms first. Operations in the more open parts of the Bay are governed entirely by when the ice forms, for no one attempts to set open water gear in these places.

On Jan. 10, 1944 the second tagging series was begun in order to have it finished so that Jan. 15th. might be used as a convenient date for calculations. On this date 500 smelt were tagged and released about 2 miles directly inside the Portage -- Fox Island Gulley. The nearest nets to the Gulley and open water were located at this point. The tag used was design #4 with a crescent cut out of one side of the heart.

Because there was little snow on the ice and it was possible to drive all over the ice during the whole smelt fishing season of 1943-1944, few fishermen put shanties out on the ice beside their gear. Therefore, to provide some shelter in which to tag a pung was equipped with canvas sides, top, etc. and drawn behind the car right to the nets where the fish were to be obtained and tagged. A small kerosene stove provided some heat against the cold weather and handling the fish bare-handed from slush covered water.

On January 15, 1944 500 were tagged and released about $\frac{1}{2}$ mile off shore and the same distance above Grand Dune Island. Tag design #7 with the right side of the heart cut off straight was used here.

On January 17, 1944 500 more were tagged and released about a $\frac{1}{2}$ mile inside Thibidault Gulley (Fox Gulley) between Huckleberry and Fox Island in Baie Ste. Anne. The weather was extremely cold and there was trouble in holding fish alive in the tubs as slush formed and filled the tubs very quickly. As an alternative to the tubs a net bag was hung down several feet into the water through one of the smelt net holes in the ice. The fish survived in this "pound arrangement" in fine shape and were dipped from it 50 or so at a time, tagged quickly and released as soon as the lot was finished. Tag design #8 was used here, the tip of the heart and the left side cut straight.

Using tag design #9 (a rectangular notch cut out of both sides of the heart) 500 smelt were tagged Jan. 18, 1944 and released about $\frac{1}{2}$ mile west of the middle of Baie du Vin.

Tag design #10 (a V notch cut out of both sides of the heart) was used in tagging 500 smelt Jan. 19, 1944 on Josh's Shoal inside Portage Gully between Portage and Lower Portage Islands.

The cost of these 4500 smelt used in tagging amounted to about \$67.80. Tag rewards of 25¢ were paid for each tag with or without any accompanying information since it was anticipated that most of the tags would be recovered in the packing sheds where the fish are all mixed up and the origin unknown. However, the fishermen became interested in making an extra dollar, for many tagged fish were recaptured, and actually found 81% of all those recovered. The main reason for securing so many of the retaken tags was no doubt the fact that the fishermen had to go to no trouble to obtain their reward money. They did not have to write a letter or go to the Post Office, etc. Such bother, though little to some of us, looms large enough to many fishermen to prevent them doing anything with the tags.

To circumvent this, rewards were paid in cash for the tags on the ice or anywhere, by all fisheries officers and many buyers. In addition I spent almost all my time on the ice among the fishermen, buyers and officers buying up tags from anyone who had them.

Not all of the recovered tags were turned in for the following reasons. Some tags come loose as the nets are hauled, for rubbing against the net or another fish will quite easily push the tag back out of the hole in the operculus. Forward motion of the fish tends to force it on tighter but any other movement loosens it. Fishermen report seeing other fish in the nets snapping at the tags. On several occasions loose tags were found clipped over the twine in the net.

In taking the tags off fish out on the ice some have been known to blow away in the wind for they are very light and difficult to hold in a wind with cold fingers. Many tags were taken to the fishermen's homes, put somewhere and forgotten. Another place many were never recovered from was the deeper corners of the pockets of the fishermen's heavy winter clothing. Those put in these pockets were also often lost when pulled out along with such things as mitts. Then, after the catches are put in containers for the packing sheds, "working" one fish on another loosens the tags and they come off and are lost in the trash that accumulates in the bottom of the containers. During mild weather the fish at the packing sheds are often put outside at night to freeze. This additional handling, racking etc. loosens some tags and they are lost in the snow outside the packing sheds. Others which come loose may drop through the wire bottoms of the packing tables into the trash below where they are lost.

However, those that were still on the fish when they reached the packing tables had a 4 to 1 chance of being found. Special tags were placed on 119 fish (dead) and these fish during the course of the packing season were placed unknown to anyone among the fish to be packed in the various packing sheds. Of the 119 thus put out 96 were recovered or 81%. Few tagged fish thus escaped the packers.

Results

The following table summarizes the returned tags very briefly.

From the first series (excluding #1) 49% of the 2000 were returned by Jan. 14/44 and 11% more or 61% in all were recaptured by Feb. 15/44.

Tag Returns

Tag Number	Returns to Jan. 14/44 (incl.)	Returns from Jan. 15/44	Total Returns
#1	0	1	1
#2	210	47	257
#3	395	35	430
#5	138	58	196
#6	<u>246</u>	<u>82</u>	<u>328</u>
	<u>989</u>	<u>223</u>	<u>1212</u>
#4	(Not tagged till Jan. 15th.) ...	391	391
#7		346	346
#8		412	412
#9		317	317
#10		<u>377</u>	<u>377</u>
		<u>1843</u>	<u>1843</u>

Moved out of Miramichi Bay.

Tag Design	No of Recaptures	Point of Recapture
#2		
Feb. 16/44 --	1	Tabusintec Bay
" 18/44 --	$\frac{1}{2}$	" "
#4		
Feb. 8/44 --	$\frac{1}{1}$	Tabusintec Bay
#5		
Dec. 8/44 --	1	Tabusintec Bay
" 18/44 --	1	Lower end Tabusintec Bay
" 20/43 --	1	Mouth of " River
" 30/43 --	1	Off Tabusintec
" 31/43 --	1	Tabusintec River
Jan. 3/44 --	1	" "
" 4/44 --	1	" Bay
" 6/44 --	1	" "
" 7/44 --	1	Lower Tabusintec Bay
" 11/44 --	1	" " "
" 13/44 --	1	" " "
" 31/44 --	1	" " "
Feb. 14-		
18/44 --	1	Ste. Sison River (Shippigan)
Jan. 18/44 --	1	Lower end Big Tracadie River
Feb. 5/44 --	1	Tracadie Bay
" 1/44 --	1	Lower end Big Tracadie River
" 10/44 --	$\frac{1}{17}$	Shippigan Harbour
#6		
Dec. 30/44 --	1	Off Tabusintec
Jan. 4/44 --	1	Tabusintec Bay
" 8/44 --	$\frac{1}{3}$	" "
#10		
Jan. 8/44 --	$\frac{1}{1}$	Tabusintec Bay

From the second series tagged on or about Jan. 15/44 1843 or 74% were returned by Feb. 15/44.

In the first series of taggings those at Bel River, Neguac and Rockhead were released before there was a great concentration of fishing gear in the general vicinity. Hence, the fish had a good opportunity to disperse. However, in Bay du Vin river they had to run the gauntlet of a whole series of nets in the lower parts of this small river in order to get back down to Bay du Vin itself. In doing so over 60% were recaptured. Thus only one lot of the first series was subjected to intense fishing as soon as they were released.

The second series in all cases was released when the maximum number of nets for the season was operating. Thus, no matter which way they moved they met many nets and as a result great numbers were retaken in the first few days before they had a chance to disperse at all.

This no doubt accounts in part at least for greater returns from the second than the first series.

The commercial fishery in Northumberland county where the tagging was done and most of the fish recaptured were taken, yielded 12,013 cwt. of smelt from Dec. 1/43 to Jan. 15/44 and 9,178 cwt. from then to the end of the season Feb. 15/44.

In all, 3055 tags were turned back and of these only 179 had no information and only 24 were from smelt recaptured outside of Miramichi Bay.

Dealing with the recaptures from outside Miramichi Bay it is seen that 19 of the 24 came from the Tabusintac region or just out and northeast of the Bay. Of the remainder 3 came from the Tracadie region and 2 from Shippigan. None at all were returned from southward along the coast, i.e. in the Northumberland Strait direction. This is in direct opposition to Roger's conclusions based on the increase in average size of the smelt caught to the southward of the Miramichi.

Only 2 of these 24 migrants were fish tagged in the 2nd. series of taggings, all the others were tagged early in the season and 17 of them were tagged off Lower Neguac. Of the first series 6 were recovered within 1 month, 10 during January or the second month and 6 during the first half of February. In the second series only 2 were recaptured during the first month outside the Bay. Thus, there seems to be a greater tendency for the fish of the Neguac region of the Bay to leave early in the fishing season and move northward along the shore than than for the fish in any other part of the Bay or even in this Neguac region later in the season.

This emigration of the earlier fish tagged, together with the greater concentration of nets when the later tagging was done, may in whole or in part account for the fact that only 61% of them were retaken compared to 74% of the others, in spite of the fact that 57% of the season's catch was made during the first part of the season when only 49% of the first series of tags was retaken, compared to 74% of the second series of tags being returned during the last part of the season when only 43% of the catch was taken. Thus with evidence of greater fishing effort during the first part of the season than in the second part, it is reasonable to assume that at least as high - if not a higher - proportion of the tags put on then should have been retaken as was retaken from those put on later, if the fish were there to be caught and the tags stayed in place. Since the same tagging methods yielded a higher return later it appears that the explanation lies in emigration from the Miramichi to more northerly regions where the fishing intensity was not as great.

Movements within the Bay have yet to be worked out but it is known that few of those tagged on Horse Shoe Shoal, or in fact tagged anywhere, were recaptured in this region, yet fishing continued at as high a level in this location as anywhere in the Bay. Therefore, since the fishery at this point was sustained by untagged fish they must have originated outside the Bay for there were tagged fish everywhere inside the Bay.

Only 1 tag of the earliest or June/43 tagging was returned and this from within the Bay. This extremely small Percentage of returns when the others were so large seems to indicate that the tags must have come off the fish. Otherwise some of them should have been recaptured somewhere along the coast.