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Migrations of Atlantic Cod of NAFO Division 3Ps

by

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Introduction

During March, 1986, 6454 Atlantic cod were tagged on Burgeo Bank, southern St. Pierre Bank and southern Green Bank. This report presents the results of these tagging experiments and discusses other previous studies conducted on cod of NAFO Div. 3Ps.

Methods and Materials

During March 12-16, 1986, 3190 adult Atlantic cod (Gadus morhua) were tagged from depths of 139 to 180 m (Table 1) on Burgeo Bank (NAFO Div. 3Ps) (Fig. 1). The cod ranged in length from 42 to 143 cm (Table 2). During March 17-21, 1923 adult cod were tagged on the Southeastern slope of St. Pierre Bank (NAFO Div. 3Ps) (Fig. 2) in depths of 115-220 m (Tables 1 and 2). On March 21-23, 1341 cod (Table 2) were tagged on the southern slope of Green Bank (Fig. 3) in the vicinity of the boundary line dividing 3Ps and 30 in depths of 120-211 m. Bottom temperatures at the tagging locations ranged from -0.7 to 7.3 °C (Table 2).

The cod for tagging were obtained by the research vessel GADUS ATLANTICA using an Engel's High Rise otter trawl with codend mesh size of 130 mm. No liner was used in the codend. Generally the sets were of 30 minute duration although there were occasionally sets of shorter duration (15-25 min). The net was taken back slowly (8-10 m/min) to allow the cod to acclimate to the changing pressure and to prevent suffocation from overcrowding in the codend.

Only cod classified to be in excellent condition were tagged. Any fish showing signs of bruising, scars, scale loss, injuries to fins or gills, bleeding, and "pop-eye" condition or with distended swim bladders were routinely culled during the tagging procedures. The cod were held in holding tanks, with running sea water. From holding tanks cod were captured with dip nets, measured, examined for the gill parasite Lernaecocera branchialis, and tagged. The cod were then placed in tanks filled with running sea water until they fully recovered (i.e. actively swam in the tank) and were released through the rock hatch in the side of the ship and at the level of the water line. The cod were tagged using either Petersen disc and blank, Petersen disc and dangler combination or orange or yellow T-bar tags. These were generally applied in batches of 50 tags to cod randomly selected from the holding tank.

Results

Burgeo Bank. During the spring, summer and autumn of 1986 there was a total of 210 tags recaptured from the Burgeo Bank tagging. There were 18 recaptures from the vicinity of Burgeo Bank mainly near the coast (Fig. 1). There were 84 tags recaptured from NAFO Div 3Ps (40% of the total recaptures). There were 16 recaptures in 3L mainly around the southern Avalon Peninsula but there was one recaptured as far north as Bonavista Bay. There were no returns from White Bay or Notre Dame Bay. From neighboring 3Pn there were 19 returns. There was an apparently significant migration of tagged cod during the spring and summer into the Gulf of St. Lawrence as far north as the entrance of the Strait of Belle Isle. There were 74 recaptures (35% of the total) in 4R, 10 in 4S, 2 in 4T, and 1 in 4Vn. Two tags were recaptured during the summer near Spotted Islands on the coast of Labrador. Also, there were 2 recaptures on the southeast shoal of the Grand Bank (3N). During the winter (January-April) of 1987 most of the recaptures were from 3Pn, Burgeo Bank and around St. Georges Bay in NAFO Div. 4R.

Southern St. Pierre Bank. From the southern St. Pierre Bank tagging most of the recaptures were from the tagging area (16 of a total 29 recaptures). Three tags were recaptured inshore, all from the southern Avalon (Fig. 2). Most of the tags recaptured outside the tagging area during 1986 were to the east of the tagging locality, around the Virgin Rocks and in the shallow water of Div. 3N and 3O.

During January-April, 1987, most of the tags were recaptured near the tagging area and along the southwest slope of the Grand Bank (Div. 3O). There was one tag recaptured in each of Div. 4R, 3L and 2J.

Southern Green Bank. From the tagging on Southern Green Bank there were 39 tag recaptures during 1986, 13(33%) from the tagging area, 21 (54%) from the shallow part of the Grand Bank (Virgin Rocks and Southeast Shoal) in Div. 3N, 3O, and 3L to the east of the tagging area. There were 4 (10%) from inshore, mainly around the southern Avalon Peninsula (Fig. 3).

During January-April, 1987, most of the tag recaptures were from the tagging area or along the southwestern slope of the Grand Bank. There was one recapture from each of the Burgeo Bank and Funk Island Bank.

Discussion

Templeman (1962), Templeman and Fleming (1962) stated that on the St. Pierre Bank the winter-early spring concentrations of cod are on the western and southern slopes of the bank with a large concentration at the southern end of the Halibut Channel and there are late spring, summer, and autumn feeding concentrations on the shallower parts of the bank. Many of the cod over-wintering on St. Pierre Bank migrate to the inshore waters of the eastern half of the south coast of Newfoundland in late spring to early summer but there is apparently a stock which tends to remain throughout the year on St. Pierre Bank.

In addition to the St. Pierre Bank stocks, Templeman (1962) has shown that the cod stock occupying Burgeo Bank in the winter to early spring spends the summer in the inshore waters of the western half of the south coast of Newfoundland, intermingling to a modest extent with the cod of the northern Gulf of St. Lawrence and the Avalon-Burin stock. Pinhorn (1967) presented evidence that cod of 3Pn were of a separate stock than those inhabiting Burgeo Bank. Templeman (1974), on the basis of tagging, concluded that the St. Pierre Bank cod overlapped only slightly at the Avalon Peninsula with the cod of the 2J3KL stock complex and were not taken on the northern Grand Bank. The cod of the Burgeo Bank stock intermingled with the Avalon-Burin stock complex in the summer and autumn feeding season near the Burin and Avalon peninsulas and in winter-summer in smaller numbers on St. Pierre Bank. It was concluded on the distribution of tag recaptures that it was likely that the Burgeo Bank cod belonged to a southwestern Newfoundland stock complex whose interrelationships were little understood.

Templeman (1979) concluded, from recaptures of cod tagged during 1962-66 in inshore and bank areas impinging on the Avalon and St. Pierre channels and in related

channels and bays, that these cod intermingled enough in summer-autumn and became separated enough in winter-spring to be considered as the Avalon stock complex. This stock complex consisted of the following components which were named from their wintering and spawning areas: Placentia Bay, St. Mary's Bay, St. Pierre Bank, Halibut Channel, northwestern slope of the Grand Bank, and the Avalon Channel. Lear (1984) reported that cod tagged on the northwestern slope of St. Pierre Bank during February 10-24, 1980 were recovered during April-December mainly from shallow areas on the central and northern part of St. Pierre Bank and from inshore areas in Placentia Bay, Fortune Bay, south coast of Newfoundland and St. Mary's Bay. During January-March, in years following the tagging, the recaptures were mainly from the general area in which they had been tagged. Generally most tag recoveries (87%) were within NAFO Div. 3Ps.

The distribution of tag returns from cod tagged during March 1986 on Burgeo Bank are very similar to results reported by Templeman (1979) from cod tagged on Burgeo Bank during March 30-April 7, 1963. There appears to be a migration of a portion of the northern Gulf stock to Burgeo Bank during the winter and these fish subsequently return to the Gulf during the summer. The greater number of returns during the summer were from 3Ps indicating that possibly most of the cod found on Burgeo Bank during the winter remain in Div. 3Ps throughout the year. The recaptures from cod tagged on the southern St. Pierre Bank and Green Bank suggest that the concentrations found in these areas during the winter tend to stay offshore and migrate to the shallow water of the southern and central Grand Bank during the summer and autumn.

References

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Table 1. Locations, dates, depths, temperatures and numbers of Atlantic cod tagged in NAFO Div. 3Ps during March, 1986.

Location	Date	Depth (m)	Bottom Temp. (°C)	Number Tagged
Burgeo Bank	March 12-16	139-180	1.7 to 6.3	3190
Southern St. Pierre Bank	March 17-21	115-220	-0.5 to 6.4	1923
Southern Green Bank	March 21-23	120-211	-0.7 to 7.3	1341

Table 2. Fork length distributions of adult Atlantic cod tagged on Burgeo Bank, southern St. Pierre Bank and southern Green Bank during March 12-23, 1986.

Fork length (cm)	Burgeo Bank	St. Pierre Bank	Green Bank
42-44	10	1	1
45-47	157	4	8
48-50	294	6	7
51-53	424	19	11
54-56	483	30	12
57-59	429	44	15
60-62	339	62	15
63-65	244	70	18
66-68	196	96	19
69-71	121	123	21
72-74	95	183	14
75-77	87	237	32
78-80	66	275	51
81-83	46	258	66
84-86	29	214	121
87-89	24	140	171
90-92	28	80	203
93-95	28	33	204
96-98	10	18	137
99-101	9	10	96
103-104	18	7	53
105-107	12	3	23
108-110	6	4	18
111-113	10	1	9
114-116	5	1	7
117-119	3		4
120-122	5	1	1
123-125	2		1
126-128	4	1	1
129-131	1	1	
132-134	2	1	1
135-137	1		1
138-140			
141-143	2		
Total	3190	1923	1341

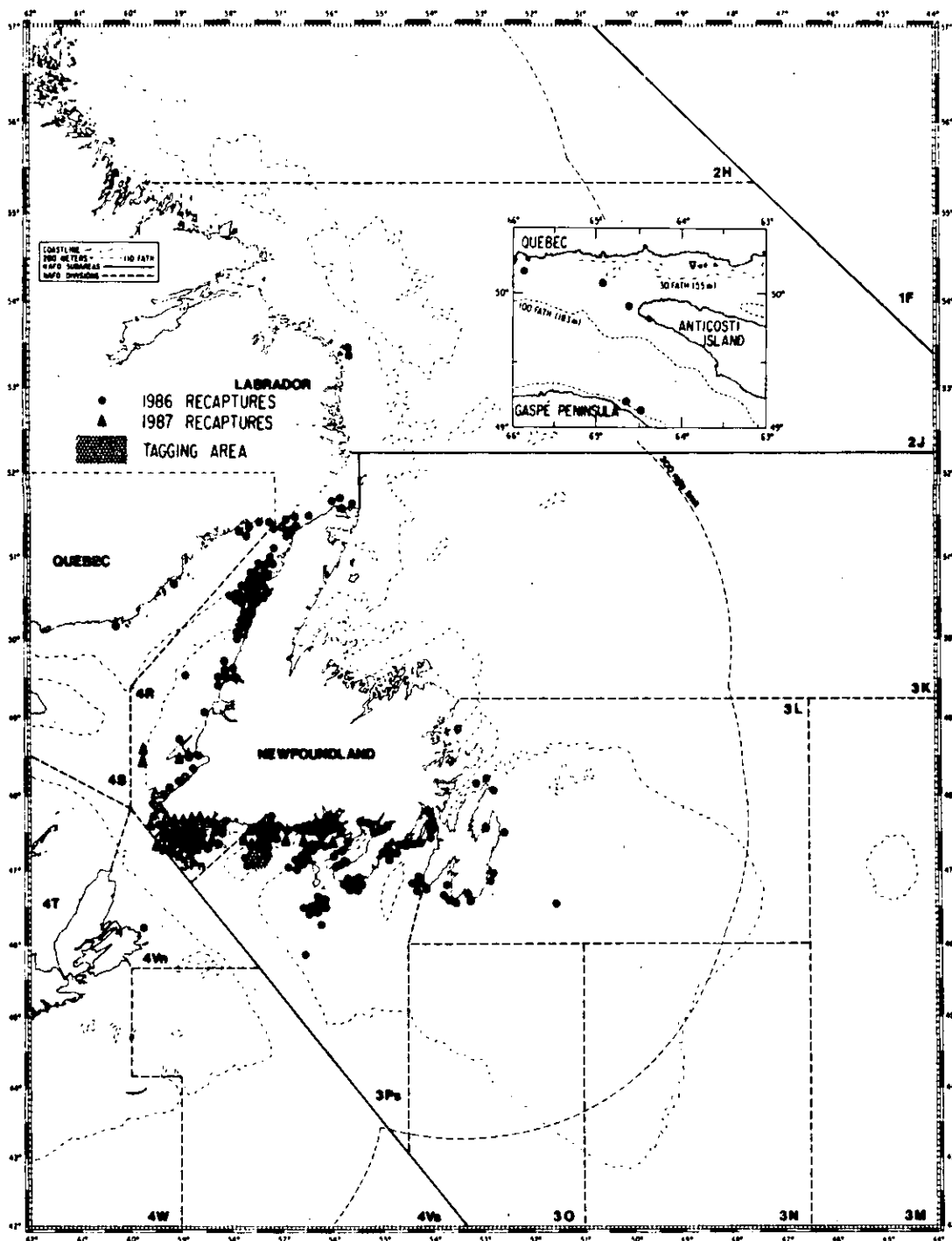


Fig. 1. Locations of returns in 1986 and 1987 from cod tagged on Burgeo Bank during March 12-16, 1986.

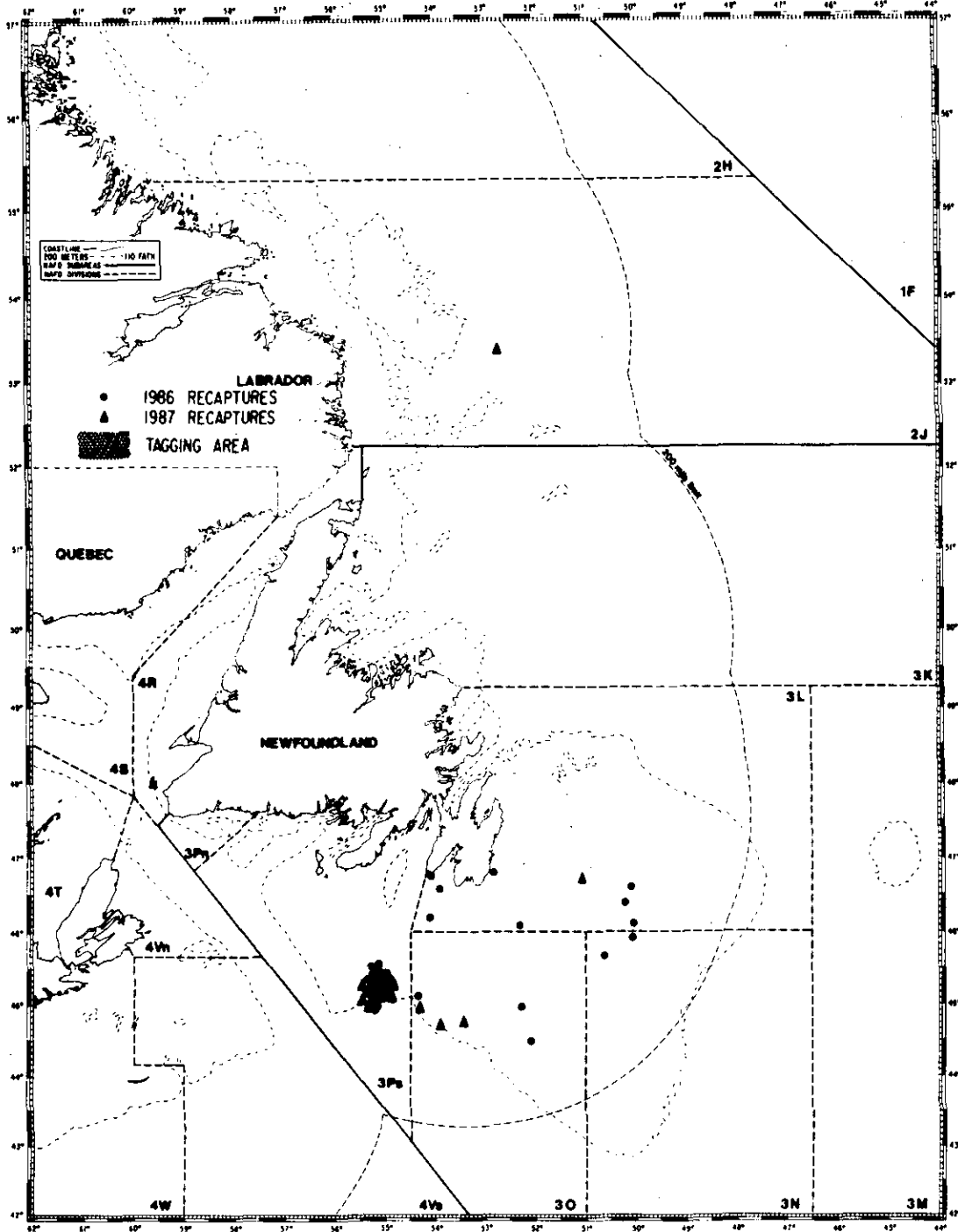


Fig. 2. Locations of returns in 1986 and 1987 from cod tagged on southern St. Pierre Bank during March 17-21, 1986.

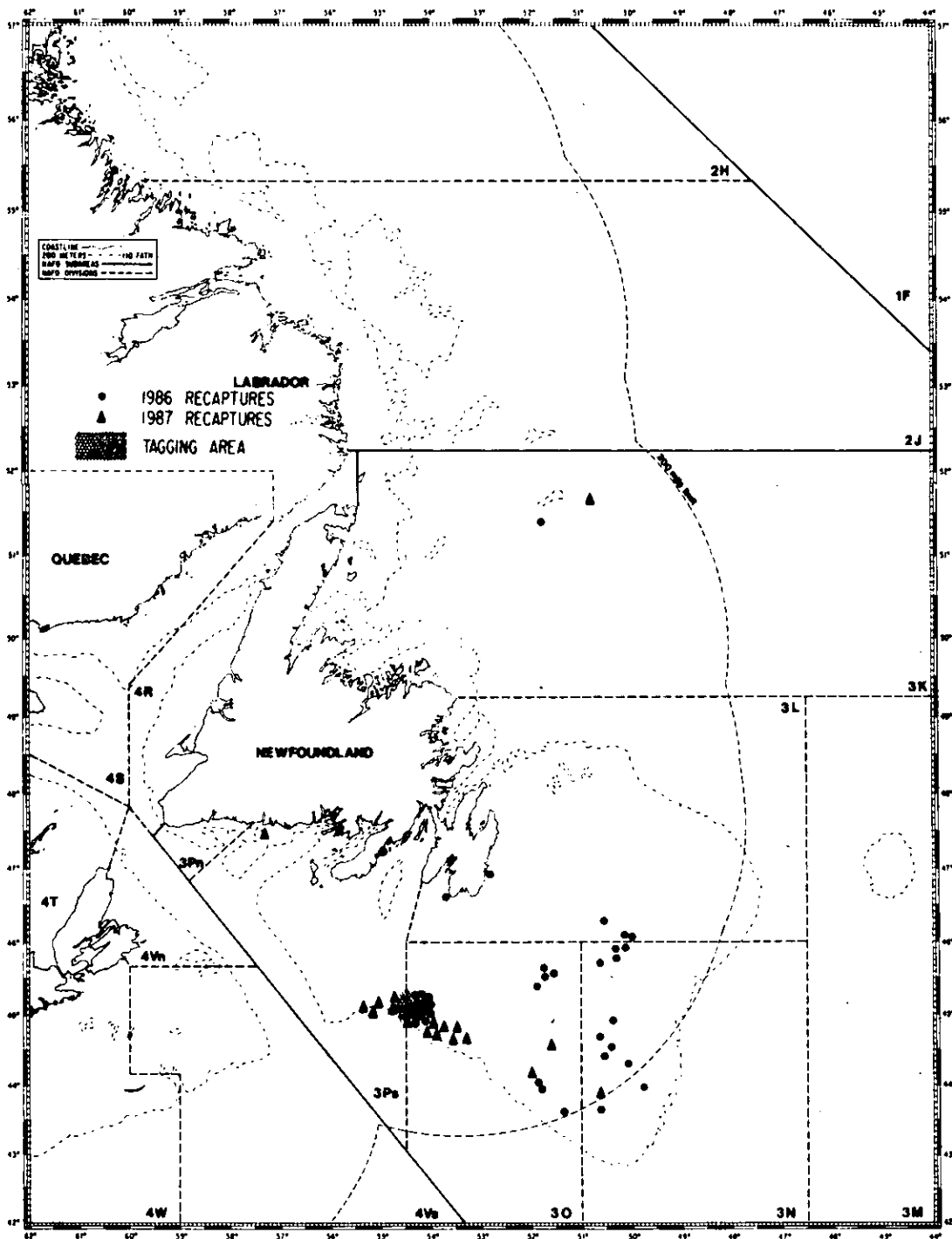


Fig. 3. Locations of returns in 1986 and 1987 from cod tagged on southern Green Bank during March 21-23, 1986.