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AN INTERIM REPORT ON U.S.-JAPAN BLACKCOD TAGGING
EXPERIMENTS CONDUCTED IN THE ALEUTIAN REGION
AND GULF OF ALASKA IN 1978 AND 1979

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Japan had temporarily suspended the implementation of blackcod tagging experiments in the north Pacific since 1973, but they were restored in association with the U.S.-Japan joint abundance survey for blackcod and Pacific cod executed in the Gulf of Alaska by means of longline fishing gear in 1978. The experiments conducted in 1979 and 1980 successively and the experimental area has been extended from the Gulf of Alaska to the Aleutian Region since 1979. It will still take some time to conclude the experiment under way, but, taking into account the recovery of more than 150 tagged blackcod reported out of those released in 1978 and 1979, here are preliminarily presented the outline of the blackcod tagging experiments conducted in 1978 and 1979 and the results derived from the recovery report as follows:

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Release

It was mostly the same method as conducted up to 1972 that the catch caught by longline fishery was released with tagging implemented thereto. The anchor type Floy tag adopted since 1978 has improved the efficiency of the operation substantially enough to enable a massive release of tagged fish samples within a short period of time. The length of tag is approximately 56 mm and 25 mm respectively for its tube and filament, both of which are shorter than those which U.S. and Canada use for blackcod. The colour of the tube has been changed to the most distinguishable one of international orange since 1979 instead of orange colour used in 1978. On both sides of the tube were printed key words to express the name of the institution implementing the experiment (namely, "Far Seas Fish. Res. Labo., Shimizu, Japan").

As for the survey carried out in 1979, the tags used were provided by U.S. because of unavailability of such preparation locally in time for the survey. The U.S. tag is of about 70 mm and 35 mm long respectively for its tube and filament, which is longer than the one used by Japan since 1978, and of yellow colour. The U.S. tags (SA tag series) were used in the whole research areas of the Aleutian Region through Southeastern area in the Gulf of Alaska. The Japanese tags (JU tag series), procured in the midst of the survey, were applied primarily for Yakutat and Southeastern areas.

In 1978, 6,986 tagged blackcod in all were released in the area of Shumagin through Southeastern in the Gulf of Alaska. In 1979 totally 16,128 blackcod were discharged with tagging respectively provided in the Aleutian Region, including the Area 1 of the Bering Sea, and the Gulf of Alaska (Table 1). The majority of blackcod released with tags were caught by longline gear or otherwise partly by use of pots.

Recoveries

It was reported that 76 and 79 tagged blackcod had been recovered up to August 1980 out of those released respectively in 1978 and 1979 (Table 2). The recoveries by nation were reported to be about two thirds by Japan (112 tags) and a remaining third shared by U.S. (32 tags), Canada (10 tags) and Korea (1 tag).

96 blackcod out of 112 recovered by Japanese vessels were caught by longline fishery (Table 3). Those 96 blackcod consist of 20 blackcod discovered and reported by U.S. observers on board, 9 ones (released in 1978) recovered during the period of the U.S.-Japan joint survey and the remaining 67 recovered by efforts of the crews of the longline vessels. The release of those 67 recovered blackcod was made for 32 in 1978 and for 35 in 1979. As for the reports of recoveries of the same 67 blackcod, 52 blackcod approximating to 80% of all were reported only by 5 vessels out of the total 22 longline vessels while 13 vessels reported even only one catch for each.

The quota of blackcod for the Japanese longline fishery was more or less equally allocated to the above 22 longline fishing vessels and their operation has become confined to comparatively limited narrow areas due to the recent intensification of restriction on fisheries. Thus, it can be assumed that scarce difference existed in opportunities for those 22 longline fishing vessels to recover tagged blackcod. Provided, therefore, that the above 5 vessels which recovered the major recoveries of tags reported almost in a perfect manner and that other vessels may have samely recovered tagged blackcod, it may be possible to assume that the Japanese longline fisheries may have recovered 123 blackcod out of the tagged release in 1978 and 106 out of the release made in 1979, totally 229, up to the end of August 1980. This results in a further assumption of the reporting ratio of recoveries for the whole longline fisheries being 26% and 33% respectively as for the 1978

and 1979 releases. The foregoing estimate value is better than the reporting ratio of 18.8% computed for the Japanese longline fishing vessels based on the model of U.S. blackcod tagging experiments conducted in the Southeastern area of the Gulf of Alaska before (INPFC Doc. 2167), but is yet desired for further improvement to be made to a satisfactory extent.

Movement of Tagged Blackcod

The movement of tagged blackcod was observed among INPFC areas as for 153 recovered blackcod (74 released in 1978 and 79 in 1979) with proved recovery location. The case of INPFC area released different from that captured varied to share from 0% through 100% with the average of 53% for 1978 release and 35% for 1979 (Table 4). The value of 53% is deemed substantially high taking into consideration the fact that only two years lapsed for the release in 1978 and the value includes such short term recoveries as not allowing sufficient time to enable certain movements effectively done.

Out of 151 blackcod with proved recovery dates and locations, 46 ones equivalent to 30% were captured within three months of release (Table 5). The reason of small short term recoveries for 1978 release was that in the course of exhausting the quota allocated for blackcod capture the blackcod fishing operation of the Japanese longline vessels were subject to the restriction from fall to winter. 97 blackcod, 64% of the above 151, moved over 30 nautical miles from their released sites, as shown in the Fig. 1 and 2. The longest distance was travelled by a blackcod released in Chirikof area in July 1978 and recovered in Coos Bay of the State of Oregon, U.S.A. in August 1979. And it was also reported that the one released in Shumagin area in 1978 was captured at Pratt Seamount located at the center of the Gulf of Alaska in a year afterward.

Only two years have passed since the restoration of blackcod tagging release by Japan in 1978. Inferring, however, from the recoveries made during those two years, it should not be deemed that a long distance movement of blackcod would be an exceptional phenomenon visible only for limited individuals but it can be justified to suggest that there possibly happens a considerable geographical mixing over an extensively broad range of areas even in comparatively short term as indicated earlier.

Growth

The collection of information and data on growth is one of the essential objects of tagging experiments. It is, however, difficult to obtain highly precise data because of difficulty in measuring correct length of fish when released and of imprecise measurement of length when captured by those engaged in the fisheries. Out of the reports on 155 recovered blackcod, comparatively reliable preciseness of data seems to be found in the cases with the discovery and measurement by U.S. observers on board of Japanese vessel, the measurement of samples brought back to the laboratory in frozen form and the data obtained from the recoveries by the research vessels. Further out of them, 24 blackcod captured after 8 to 15 months from their respective release were analyzed for growth on the assumption that all of them would have recovered one year after the release. The analysis was given without distinguishing male or female because of such a limited number of samples. As a result of the analysis, fish released with fork length under 60 cm showed positive growth values particularly with the more rapid growth for the smaller (young aged) fish, while even negative values were shown in case of fork length over 60 cm at release (Table 6). Such negative growth values seem to have been due to the misunderstanding likely caused by the fact that an error of 1 to 3 cm would be inherent to measuring the fork length of

live fish when released while there would be only a very small annual growth achieved for fish over 60 cm. The tagging experiments, thus, suggested that the growth of blackcod over 60 cm in fork length would considerably slow down.

Table 1. Number of tagged blackcod by INPFC area released during U.S.-Japan longline and pot survey in the Aleutian region and Gulf of Alaska in 1978 and 1979.

INPFC AREA	1 9 7 8			1 9 7 9						
	JU TAG SERIES			JU TAG SERIES			SA TAG SERIES			TOTAL
	LONGLINE	POT	TOTAL	LONGLINE	POT	TOTAL	LONGLINE	POT	TOTAL	
ALEUTIAN	-	-	-	-	-	-	1,000	-	1,000	1,000
BERING AREA-1	-	-	-	-	-	-	241	-	241	241
SHUMAGIN	844	211	1,055	-	-	-	1,541	31	1,572	1,572
CHIRIKOF	935	30	965	-	-	-	1,748	-	1,748	1,748
KODIAK	1,765	-	1,765	180	-	180	1,493	-	1,493	1,673
YAKUTAT	2,064	11	2,075	2,335	-	2,335	2,636	-	2,636	4,971
SOUTHEASTERN	1,126	-	1,126	2,590	-	2,590	2,333	-	2,333	4,923
TOTAL	6,734	252	6,986	5,105	-	5,105	10,992	31	11,023	16,128

Table 2. Recoveries by nation of tagged blackcod released during U.S.-Japan longline and pot survey in the Aleutian region and Gulf of Alaska in 1978 and 1979. Numerals are number of tags reported up to the end of August, 1980.

RELEASED YEAR	JAPAN	U.S.A.	CANADA	REPUBLIC OF KOREA	TOTAL
1978	56	11	9	-	76
1979	56	21	1	1	79
TOTAL	112	32	10	1	155

Table 3. Japanese recoveries by type of fishery of tagged blackcod released during U.S.-Japan longline and pot survey in the Aleutian region and Gulf of Alaska in 1978 and 1979.

RELEASED YEAR	LONGLINE FISHERY			TRAWL FISHERY			UNKNOWN			T O T A L		
	JAPANESE FISHERMEN	U.S. OBSERVER	TOTAL									
1978	41	9	50	-	-	-	-	6	6	41	15	56
1979	35	11	46	1	5	6	3	1	4	39	17	56
TOTAL	76	20	96	1	5	6	3	7	10	80	32	112

Table 4. Recoveries of tagged blackcod by INPFC area released during U.S.-Japan longline and pot survey in the Aleutian region and Gulf of Alaska in 1978 and 1979.

INPFC AREA WHERE RELEASED	INPFC AREA WHERE CAPTURED											TOTAL
	ALEUTIAN	BERING AREA-1	SHUMAGIN	CHIRIKOF	KODIAK	YAKUTAT	SOUTHEASTERN	CHARLOTTE	VANCOUVER	COLUMBIA	SEAMOUNT	
<u>1978 RELEASE</u>												
SHUMAGIN	-	-	2	1	1	-	-	-	-	-	1	5
CHIRIKOF	1	-	-	-	1	-	2	4	-	2	-	10
KODIAK	-	-	-	1	13	5	1	3	1	-	-	24
YAKUTAT	1	-	1	-	5	14	2	1	-	-	-	24
SOUTHEASTERN	-	-	-	-	1	3	6	-	-	1	-	11
T O T A L	2	-	3	2	21	22	11	8	1	3	1	74
<u>1979 RELEASE</u>												
ALEUTIAN	-	1	-	-	2	-	-	-	-	-	-	3
BERING AREA-1	-	-	-	-	-	-	-	-	-	-	-	-
SHUMAGIN	-	1	5	1	2	-	-	-	-	-	-	9
CHIRIKOF	-	-	-	7	2	-	-	-	-	-	-	9
KODIAK	-	-	-	-	11	-	-	-	-	-	-	11
YAKUTAT	-	2	2	-	4	14	4	1	-	-	-	27
SOUTHEASTERN	-	-	-	2	-	3	15	-	-	-	-	20
T O T A L	-	4	7	10	21	17	19	1	-	-	-	79

Table 5. Number of tagged blackcod recovered and the travelled distance by time free, which were released during U.S.-Japan longline and pot survey in the Aleutian region and Gulf of Alaska in 1978 and 1979.

MONTHS FREE	TRAVELLED DISTANCE IN NAUTICAL MILE							TOTAL
	0-30	31-60	61-120	121-240	241-480	481-960	961-1,920	
<u>1978 RELEASE</u>								
0 - 3	-	2	3	1	1	-	-	7
4 - 6	-	-	-	-	-	-	-	-
7 - 12	15	1	3	4	8	10	-	41
13 - 18	7	-	1	2	2	3	1	16
19 - 24	1	2	1	-	3	-	1	8
TOTAL	23	5	8	7	14	13	2	72
<u>1979 RELEASE</u>								
0 - 3	19	4	7	4	4	1	-	39
4 - 6	7	2	2	3	-	3	-	17
7 - 12	5	4	3	2	3	6	-	23
TOTAL	31	10	12	9	7	10	-	79

Table 6. Length increase of tagged blackcod captured after 8-15 months since they were released during U.S.-Japan longline and pot survey in the Aleutian region and Gulf of Alaska in 1978 and 1979.

FORK LENGTH AT RELEASED (cm)	NUMBER OF SAMPLE	RANGE OF LENGTH INCREASE AT RECOVERED (mm)	MEAN LENGTH INCREASE (mm)
47	1		+40
54	1		+30
56	3	4 - 14	+ 8
57	1		+ 1
59	2	(- 2) - 16	+ 7
60	2	2 - 4	+ 3
62	1		- 4
63	1		+30
64	2	(-10) - 2	- 4
66	3	(-11) - (- 3)	- 5
68	1		+10
69	2	(-10) - 5	- 3
70	2	(- 2) - 20	+ 9
71	1		-10
73	1		± 0

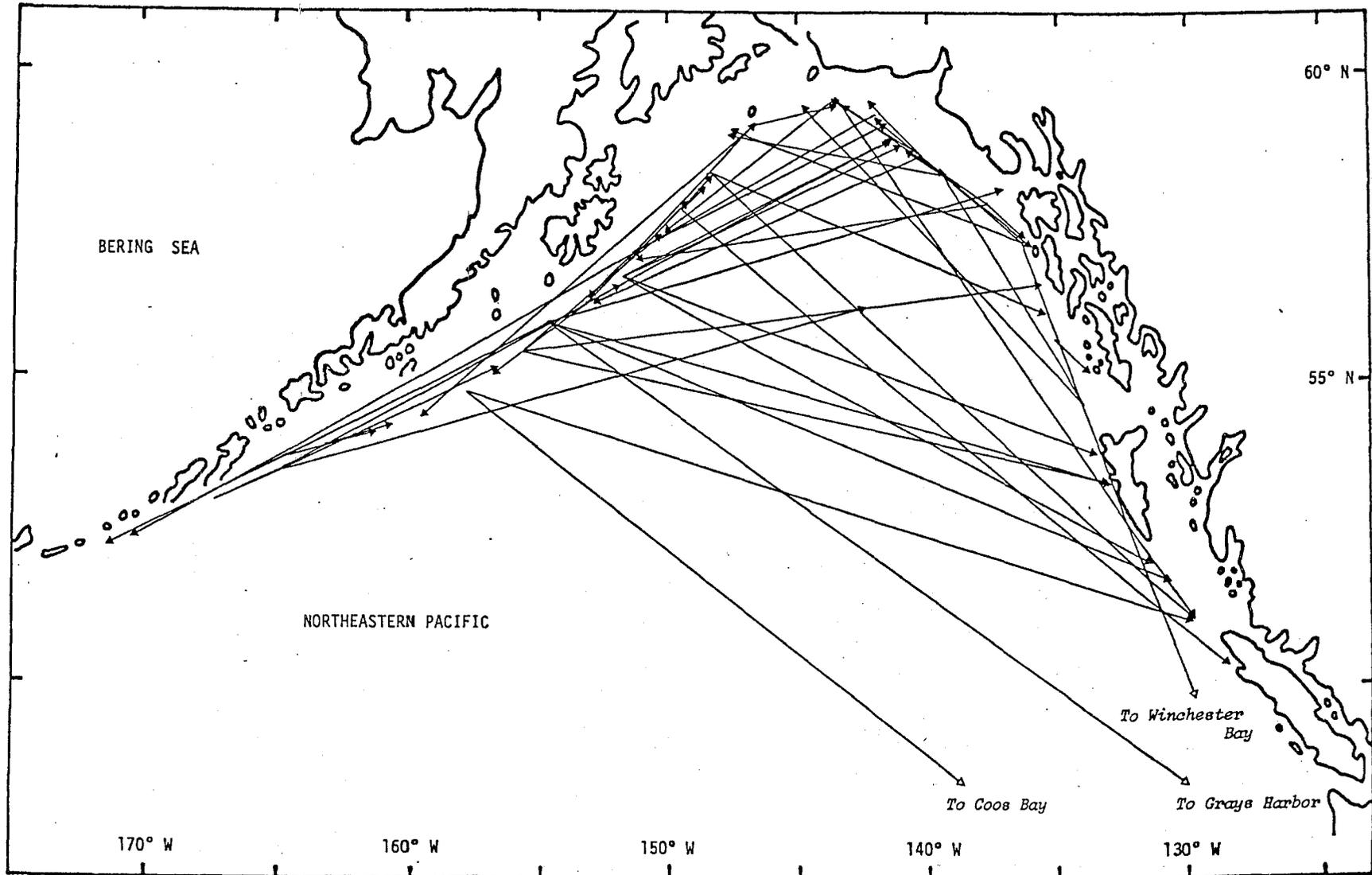


Fig. 1. Recovery locations for 51 blackcod moved over 30 nautical miles from released site of which tagged in 1978 U.S.-Japan longline survey in the Northeastern Pacific.

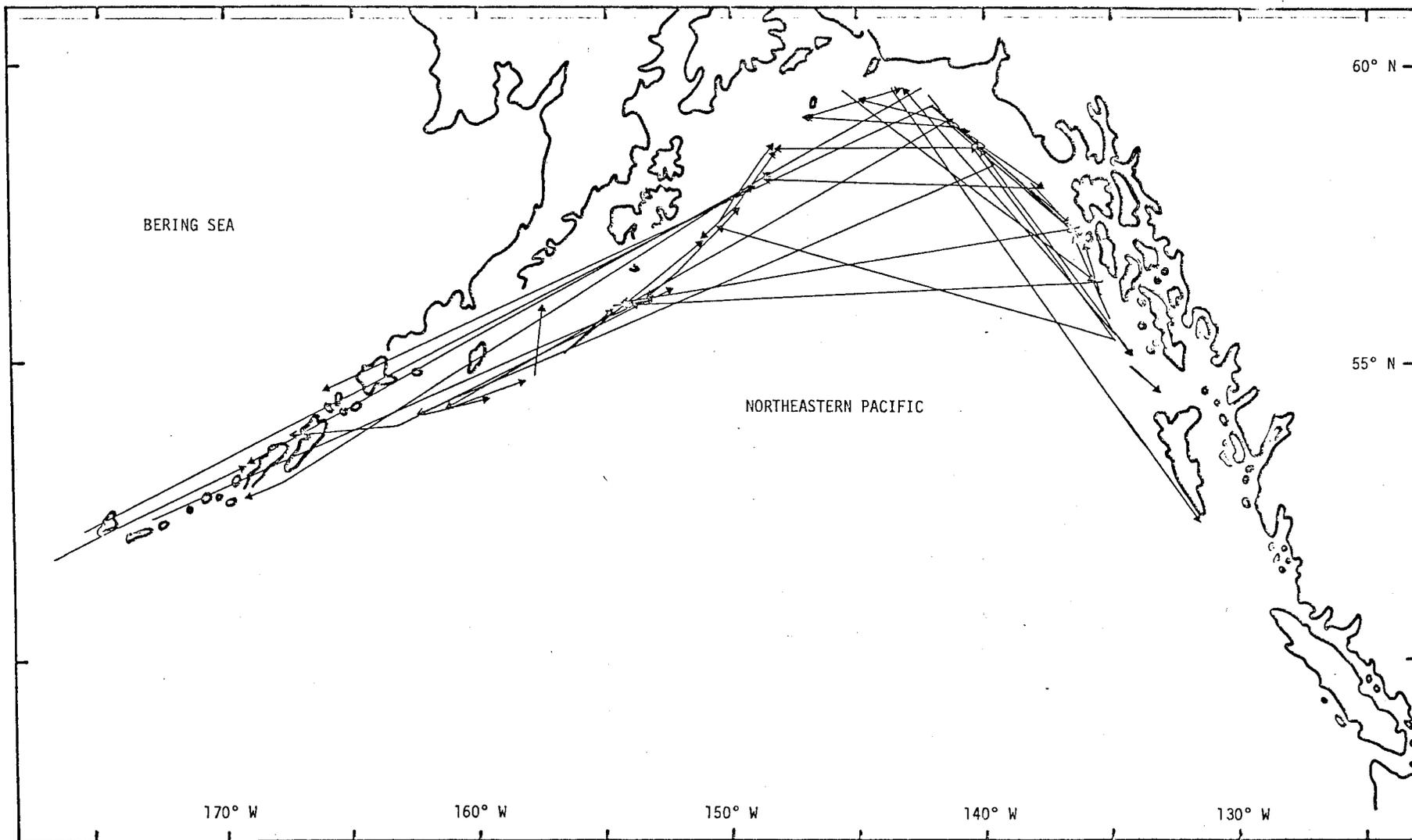


Fig. 2. Recovery locations for 48 blackcod moved over 30 nautical miles from released site of which tagged in 1979 U.S.-Japan longline survey in the Northeastern Pacific.