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REPORT OF THE TECHNICAL SUB-COMMITTEE OF THE INTERNATIONAL TRAWL FISHERY COMMITTEE

Appointed By
The Second Conference On Coordination
Of Fisheries Regulations Between

CANADA
AND THE
UNITED STATES

MINUTES OF THE FOURTH ANNUAL MEETING
JUNE 17-18, 1963
VANCOUVER, BRITISH COLUMBIA

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Report of the Technical Sub-Committee of the Trawl Fishery Committee appointed by the Second Conference on Coordination of Fisheries Regulations between Canada and the United States.

DATE: June 17 and 18, 1963

PLACE: Canadian Department of Fisheries, 1155 West Robson Street, Vancouver, British Columbia

PARTICIPANTS:

CANADA - S. J. Westrheim
J. A. Thomson
C. R. Forrester (Observer)
R. A. Crouter (Observer)
R. M. Wilson (Observer)

UNITED STATES - Washington - D. E. Kauffman - Chairman
E. K. Holmberg

Oregon - D. W. Chapman
A. R. Magill

California - E. A. Best

PMFC - R. S. Croker (Observer)
L. A. Verhoeven (Observer)

The fourth meeting of the Technical Sub-Committee was held in accordance with the instructions of the parent committee as recorded in the minutes of the first sub-committee meeting held January 19-20, 1960. The business of the meeting was guided by a prepared outline which is included in these minutes as Appendix A.

Continuing with the format of the previous meetings, the items on the agenda were discussed in order. The following is therefore a report of the items as they appeared.

I. Austin R. Magill of Oregon was appointed Secretary.

II. The tentative agenda was approved with the addition of an item 5 under VI. This was a suggestion by Oregon that the several organizations make available to each other a compilation of tags released by area.

III. STATUS REPORTS ON IMPORTANT FISHERIES

Status reports by the various organizations are reported as they were presented except the tagging data are included as Appendix D.

(1) Petrale Sole

Canada

Southern stock (South of Esteban) Catch of petrale sole by United States and Canadian trawlers from the stock off the lower west coast of Vancouver Island in 1962 was about 2.0 million pounds or approximately 30% higher than the average catch during the 1953-62 period. There has been a slight upward trend in catch per unit of effort of petrale sole from this stock since 1956. Coincident with this trend in catch/effort there has been a downward trend in average length and average age of female fish. This is the result of some improvement in recruitment. However, catch per unit of effort is still about 40% below the level which prevailed during the 1948-50 period.

The Station's vessel A. P. Knight, while working off the lower west coast of Vancouver Island in September, 1962 encountered large numbers of petrale sole which were about ages four and five (1957 and 1958 year classes). These year classes are only now beginning to enter the fishery and it will not be known until 1963 or later whether they will be strong enough to bring about a further improvement in fishing success.

Northern stock (North of Esteban) Catch of petrale sole by United States and Canada from the northern stock was about 1.7 million pounds in 1962, highest catch since 1957, but slightly less than the average of 1.9 million pounds in the 1953-62 period.

As noted for the southern stock, there has been a gradual downward trend in average length of female fish since 1956. Unlike the southern stock, this recruitment has not been reflected in catch per unit of effort data which has remained at a low level.

Total catch of petrale sole from the northern stock is not very different from that taken from the southern stock. However, total catch of other species taken from the northern grounds is substantially higher than catch of other species from southern grounds. Qualification level for catch per unit of effort of petrale sole is appearance of any petrale in the catch and under these conditions the incidence of incidental catches of petrale sole is probably greater in northern waters. It is probable, therefore, that catch per unit of effort data are less reliable than from the southern area. It is also possible that the stock has been reduced to such an extent that normal recruitment is insufficient to bring about improvement in fishing.

Washington

The landings of petrale sole by the Washington fleet declined from 3.5 million pounds in 1961 to 3 million pounds in 1962. Effort increased from 19 to 20 thousand hours. Therefore, catch per hour decreased from 185 to 149 pounds, about 20%. The Esteban area catch declined slightly from 455 thousand pounds in 1961 to 422 thousand in 1962. Effort was about equal to 2.1 thousand hours. Catch per hour dropped 6%, from 212 to 199 pounds per hour. Small but encouraging increases were noted in fishing success in the Goose Island and Cape Scott areas where 42 and 64 per cent increases in catch occurred in 1962. Goose Island catch per unit increased from 76 to 108 pounds per hour, and Cape Scott increased from 90 to 148 pounds per hour.

The lower west coast of Vancouver Island (Area 3C) showed adverse trends in 1962 as compared with 1961. Landings decreased from 2 to 1.55 million pounds. Effort increased from 7 to 7.6 thousand hours or 8%. Catch per unit decreased from 285 to 205 pounds per hour or 28%.

Off the Washington coast, Area 3B, the decline was worse. Landings declined 51% from 683 thousand pounds in 1961 to 337 thousand pounds in

1962. Effort decreased 35% from 7 thousand to 4.5 thousand hours and catch per hour slid from 98 to 75 pounds or 24%. The catch per hour is still above the eight-year average of 60 pounds.

The new petrale fishery off LaPerouse Spit decreased from 827 thousand pounds in 1961 to 474 thousand pounds in 1962. This area was discovered in 1960 when 512 thousand pounds were taken. Effort increased from 1.6 thousand hours in 1960 to 2.4 thousand in 1961 to 3.2 thousand hours in 1962. Catch per unit increased from 278 pounds per hour during 1960 to 285 pounds in 1961, and then declined to 205 pounds during 1962. This is a 28% decline in fishing success.

Oregon

The total petrale catch by Oregon boats in 1962 exceeded 1961 by about 3/4 million pounds and was the highest of the past six years. The total Oregon catch for the past six years are as follows:

Year	Poundage (in millions)
1957	2.10
1958	1.75
1959	1.27
1960	2.14
1961	1.84
1962	2.61

Catch per unit of effort has not been determined for 1962 but appears not to be appreciably changed from 1961.

California

The total 1962 catch for California is down to 3.0 million pounds from 3.4 million in 1961. Decreases were noted in Area 1A and from Oregon waters. The 1962 catch per hour was equal to or had increased over 1961 in all areas. Severe market limits on Dover sole during the summer months in northern California may have had an effect on the total petrale catch. Also an excellent English sole fishery developed during the late fall and

winter at San Francisco which diverted much effort from the petrale fishery.

It appears that the 1956 year class from northern California will be larger than other recent year classes. The 1959 year class is now entering the catch in greater numbers than expected, although there are still very few in the catch.

(a) Status of petrale sole recruitment study by FRBC - The results of the recruitment study by the Fisheries Research Board of Canada were reported by C. R. Forrester. This work is still in the manuscript stage and a summary should be out in six weeks and will definitely be out before the November PMFC meeting. The study has shown that the downward trend in average length of petrale sole is improving in recent years. The northern petrale stocks show the catch per unit of effort still low while the southern stock shows an increase in the catch per hour and appears to be coming back.

(b) Special emphasis on Area 3C (Esteban) petrale - The data collected by Canada and Washington on the density of the petrale sole in Area 3C indicate an increase in the available petrale. It is thought that the winter closed season has made this possible.

(c) Recommendations on the winter petrale fishery - Canada and Washington were in favor of continuing the winter closure on petrale while Oregon would like to see the restriction lifted. California expressed no opinion as their fishing is not affected by the regulations.

Canada expressed doubts as to the biological significance of the closure but could not at present say that it has no effect and thus should be removed. They felt that in the long run maintaining the status quo will cause less damage than a premature return to open fishing. Washington felt that the closure may be largely responsible for the increase noted in the 1962 petrale catches, that it was effectively reducing the heavy removal of spawning fish and therefore wanted it continued.

Oregon felt that the effectiveness of the winter petrale closure in Oregon was questionable. Assuming the purpose of the closure to be sound, the landing limits are frequently violated at the Oregon ports. The original purpose of Oregon adopting the closure, which was to keep Oregon boats from fishing petrale in Esteban Deep, has been effectively fulfilled, however. Several trips unloaded at Astoria during the winter of 1962-1963 were in excess of the 6,000 lbs. trip limit. The excess poundages were not listed as petrale, nor would the plant manager confide in the Oregon Fish Commission as to the disposition of these excess poundages. Oregon had poor cooperation from the producers as well as the fishermen regarding the petrale closure. The Oregon law enforcement agency was not able to apprehend any violators, although they canvassed the waterfront occasionally. Several large petrale trips were landed in a California port by an Oregon boat fishing off Oregon during the period of restricted petrale landings. Some persons consider this a moral violation.

Oregon, therefore, requested a removal of the winter petrale regulation as it is not serving any useful or biological purpose to the fishermen or fisheries of Oregon.

California mentioned that several trips with petrale catches in excess of 6,000 pounds were caught off Oregon and landed in California during the period of closure. This was by a vessel common to both Oregon and California ports.

Since the major area of concern affects primarily British Columbia and Washington fishermen and the present regulation has reduced catch and effort and the stocks in question have shown some improvement in recruitment, the sub-committee recommends that the regulation remain unchanged until results of the evaluation, currently underway by the Fisheries Research Board, can be considered.

(2) Lingcod

Canada

Total Canadian trawl catch of lingcod in 1962 was just over two million pounds--a decrease of almost one million pounds from the 1961 total. Until 1962 there had been an upward trend evident over the past decade. The decline in catch for Canada was most noticeable off the lower west coast of Vancouver Island where, since 1954, over half the total Canadian trawl catch has been taken. In 1962 this area produced only 494,000 pounds or 25% of the total trawl catch. Catch per unit of effort dropped in 1962 to the lowest level since 1955. In the years 1958 to 1961, inclusive, landings of lingcod from the lower west coast were composed of a high percentage of fish in the 50-65 cm. dressed (head off) length range (average 77% for 1958-61). In 1962, however, the fish landed were substantially larger and only 46% of the fish were in the 50-65 cm. range. The fishery in recent years has been operating mainly on fish close to the minimum Canadian size (three pounds dressed weight--approximately 50 cm. dressed length). Reduced catch per unit of effort in 1962 may be caused by temporarily reduced availability which could arise through separation of size groups on the grounds or may be caused by a failure in recruitment. In view of the increase in size of fish, over-fishing is not suspected.

The percentage of total lingcod landings caught by trawlers has been increasing in recent years. In 1952-53 trawlers landed 25% of the total catch and in 1961, 45%. The balance of the catch has been taken mainly by the traditional line gear.

Washington

Total landings of lingcod taken during 1962 were below those of 1961 by about 1.3 million pounds, or 3.34 million pounds compared to

4.62 million in 1961. The peak occurred during 1960 when 4.65 million pounds were harvested. The eight-year average is 3.5 million pounds. Effort has remained at about 20.4 thousand hours for the last three years. Fishing success was best during 1959 when 269 pounds per hour were caught. Success declined to 227 and 226 pounds per hour in 1960 and 1961, and then to 164 in 1962. Declines in landings were general from all areas except Queen Charlotte Sound (Areas 5A and 5B), where a record 975 thousand pounds was reported. This is the best catch in our eight-year record.

Off the lower west coast of Vancouver Island, Area 3C, catches declined from 3.1 million pounds in 1961 to 1.9 million in 1962. Effort increased from 8,800 hours in 1961 to 9,100 in 1962. Catch per unit declined rather sharply from 349 pounds per hour in 1961 to 209 in 1962.

All trends are downward in the area off Washington (PMFC Area 3B). Landings were increasing during 1961 when 734,000 pounds were caught, but only 327,000 pounds were taken here during 1962. Effort declined from 8,200 hours in 1961 to 5,600 hours during 1962. Catch per unit declined from 90 pounds per hour in 1961 to 58 pounds per hour in 1962.

An analysis of the 1960 tagging of lingcod of Forty-mile Bank gave an 8% survival rate.

Oregon

Catches increased from 618 thousand pounds in 1961 to 756 thousand in 1962. The majority of this came from Area 2D or directly north and south of the Columbia River. Most of this poundage was landed incidental to bottom fish landings as the fleet does not fish specifically for lingcod.

California

Total 1962 catch was about 800 thousand pounds which was a decrease from the 1.1 million landed in 1961. Most of this catch was from PMFC Area 1B or off San Francisco. A fairly large sport fishery occurs on lingcod

in California and this poundage does not appear in the above figures. Some fish occur in the animal food landings.

(a) Minimum size limit on lingcod - This item was included in the agenda because of earlier complaints by Canadian fishermen regarding the operations of Washington trawlers catching and keeping undersize lingcod. Washington has no minimum size while Canada has a three-pound dressed minimum weight or 62 cm. total length minimum and both fleets fish upon the same grounds. Canada reported that this matter has died down in recent months, and their sampling shows no indication of overfishing. Washington reported that they had made no studies on this matter. The sub-committee therefore recommended no action or change in the lingcod minimum-size regulation.

(3) Pacific Cod

Canada

True cod display a rapid growth rate, a high natural mortality rate, and show wide variations in abundance which appear to be related to changes in recruitment. Total catch and catch per unit of effort on various offshore grounds have been declining in recent years, possibly as a result of the failure of two or more successive year classes. Total offshore catch in 1962 was 4.9 million pounds, 1.3 million pounds greater than in 1961 but still one million pounds below the mean for the past five years.

Length-frequency distributions of market samples suggest some improvement in recruitment in 1962 in stocks off the lower west coast of Vancouver Island. In that area catch per unit of effort in 1962 was 1.5 times greater than in 1960 and 1961. Length frequencies of northern cod have shown no similar increase in 1962 in numbers of small fish; however, this may be because of market restrictions. Fluctuations in catch and catch per unit of effort are such as to strongly discount the theory of over-fishing.

Trends in both have been of short-term duration.

Several taggings by the Fisheries Research Board have shown that Pacific cod show very little migration. The projects indicate that cod have only about three years in the fishery.

Washington

Although the ocean landings are lower in total for 1962, there are increases in some areas which may indicate a reversal of the downward trend in catch statistics the last few years. The 1962 ocean landings were 1.8 million pounds compared to 2.1 million taken during 1961. These are feeble catches compared to the over 11 million pounds caught in 1955 and again in 1959.

Hecate Strait (PMFC Areas 5C and D) showed continued drastic declines as the effort fell off 62% from 1,200 hours to 460 hours of fishing from 1961 to 1962. Catches declined about 80% from 833,000 pounds to 177,000 pounds in the two years. Catch per hour decreased from 690 to 380 pounds per hour. Pacific cod has rapidly become an incidentally caught species by Washington fishermen in the Hecate Strait area.

In Areas5B and 5A (Queen Charlotte Sound), the 104% recovery of poundage in 1962 over 1961 is what we hope will continue to be a recovery in the whole coastal cod fishery. Catches increased from 186,000 pounds in 1961 to 380,000 pounds in 1962. Effort also increased from 1,800 hours in 1962. This represents a 55% increase in effort. Fishing success increased from 103 pounds per hour taken during 1961 to 135 pounds per hour in 1962.

Area 3D (Esperanza and Esteban) continued to decline. Catches were 1.4 million pounds in 1955, 64,000 pounds in 1961, and 46,000 pounds during 1962. Fishing intensity has declined from the peak of 3,800 hours during 1955 to 1,600 hours in 1961, and then increased to 1,800 hours in 1962. Although catch per hour was 363 pounds in 1955, 1959 was better with 386 pounds per hour (0.5 million pound catch). Success was 41 pounds per hour

in 1961 and only 25 pounds per hour in 1962.

Area 3C (lower west coast of Vancouver Island) produced over a million pounds during each of the two years 1956 and 1957, but catches here had dwindled to 260,000 pounds in 1961. During 1962, catches were increased to 531,000 pounds, another 104% increase over 1961. Effort has increased but 300 hours from 2,400 hours in 1961 to 2,700 in 1962 for 13%. Therefore, the rate of success is greater than for Queen Charlotte Sound.

Area 3B (Washington coast) showed declines in catch, effort, and catch per unit when comparing 1962 with 1961 or any other year for eight years. Catches varied from 3.5 million pounds in 1955 to 1.6 million pounds in 1960. Poundage then declined to 0.75 million in 1961 and 0.52 million in 1962. Effort was almost 14,000 hours of fishing in 1955, 10,000 hours in 1960, 7,000 hours in 1961 and 5,500 hours in 1962. Catch per hour was 250 pounds per hour in 1955, increased to 370 pounds per hour in 1959, 150 pounds per hour in 1962. We have blamed the decline on natural causes, and a recovery is expected.

Oregon

Catches of Pacific cod in Oregon have dropped to almost nothing. Landings dropped from 103,000 in 1961 to 18,600 in 1962. This entire amount was landed incidentally with other trawl landings. No length frequency or sampling was attempted on Pacific cod.

California

No landings of Pacific cod were reported in California in 1962.

(a) Comparison of U. S. and Canadian data in Areas 3C and 5D - The data collected independently by the two countries was in fair agreement. Both countries' data for Area 3C showed improvement over the low production in 1961. The Canadian total catch here did not reach that of 1961; but the catch per hour showed a substantial improvement.

In Area 5D, the catch by the Washington fleet fell drastically because of reduced effort and catch per hour while Canada also showed a decreasing catch per hour although the total catch held close to that of 1961.

(4) Pacific Ocean Perch

Canada

The trawl fishery for Pacific ocean perch by British Columbia trawlers is, for the most part, dependent on specific contracts for a specified total poundage. Since ocean perch are rarely found in commercial quantities in waters shallower than 100 fathoms, the problem of intention of the trawler is easily resolved. If there is a market, the larger trawlers will fish the deeper waters for the species until the quota or contract is filled. This economic restriction serves to explain the varying catch for the past 10 years. Total annual landings of ocean perch taken mainly in the Goose Islands region have ranged from 23,000 pounds to just over one million pounds, the catch in 1962. Catch per unit of effort has remained at a high level as shown in the following table. However, because of the light exploitation by Canadian fishermen, the statistics of catch per unit of effort should be viewed with caution.

Canadian Catch and Catch Per Unit of Effort of Pacific Ocean Perch from PMFC Areas 5A and 5B

Year	Total Catch (1000 Lbs)	Catch/Effort* (Lbs/Hour)
1953	407	2,580
1954	475	930
1955	23	2,475
1956	310	1,400
1957	200	2,390
1958	694	1,480
1959	510	1,160
1960	786	2,513
1961	272	2,457
1962	1,176	2,275

* Catch per unit of effort data based on the performance of double gear trawlers of more than 75 gross tons where landings of ocean perch equal or exceed 50% of the total landing for a particular trip.

Length frequencies taken from Goose Island area catches for the past three years show no appreciable changes in modal length.

Washington

Without this species and the other rockfishes, the Washington otter trawl fishery would be bankrupt. Perch and other rockfish constituted 48.8% of the foodfish catch of 42.96 million pounds taken during 1962. Perch landings were 11.4 million pounds in 1962 compared to 7.9 million pounds in 1961. The 1962 catch is a new record for perch and would have been greater had not limits been set by the market. Effort was also at a record 13,200 hours compared to the next highest year (1961) with 9,400 hours. Fishing success was 868 pounds per hour which was the highest since 1959 when 1,051 pounds per hour were recorded. The area off Washington was the only area to show decreased poundage, and this was slight. Major production came from Areas 3C and 3D and Queen Charlotte Sound.

Oregon

Landings of Pacific Ocean perch in Oregon in 1962 were the highest of the last six years. Total landings of 5.79 million pounds was a 1.25 million pound increase over 1961 and nearly double 1957-60 average. The Oregon landings by year for the past six years are as follows:

Year	Poundage (in millions)
1957	2.99
1958	2.47
1959	2.47
1960	2.73
1961	4.57
1962	5.79

The majority of Oregon's landings came from PMFC Areas 2D and 2C. Several large trips were also made in Area 2B. As with the northern agencies, Oregon's landings would have been larger if landing quotas had not been imposed during periods of heavy catches.

California

No landings reported in 1962. A single specimen was observed in mink food landings at Santa Barbara. This specimen was saved for toxonomic studies and comparison with original description from fish caught off Santa Barbara Islands.

(5) Other Species

Oregon indicated that Rex sole was becoming important in their trawl catches and that they were undertaking an ageing and growth study in this species. This study is being done by a graduate student from University of Washington working as a summer employee with the otter trawl investigation.

IV. REVIEW OF ADEQUACY OF PMFC TRAWL AREA 3A (WASHINGTON-OREGON)

A review of the adequacy of this area as an origin of catches in relation to fleet activities and past records was aimed at improving the accuracy of the coast-wise catch statistics. Oregon and Washington agreed to combine the landings from Areas 2D and 3A and designate them 2D-3A, and leave the present boundary between the two areas as a dotted line for use of data prior to 1963 and for tagging purposes. This line would follow latitude 46° 40' N. A revised chart is included in the appendices as Appendix B.

V. REVIEW OF TECHNIQUES FOR ASSESSING CATCH PER UNIT OF EFFORT

It was agreed that the qualification levels used for computing catch per unit of effort should be referenced in tables.

Canada

Effort data is collected in hours, by locality fished from skippers' logs by port observers. The coverage is approximately 85% for outside waters and 75% for inside waters (Area 4B). The catch by locality or ground by species is related to total catch from that particular ground, and the qualification level is punched onto IBM cards which also bears information

as to date, vessel, gear, and class, depth range, effort and fishing locality. The various criteria used are based on examination of the particular species concerned as indicated below.

Petrale Sole

1. Southern stock - 1945-62 (Esteban South-Area 3C)

   Single-gear vessels of 25-49 tons landing any petrale sole from PMFC Area 3C during May-August period. It will probably be necessary to change to double gear vessels in 1963 and future years.

2. Northern stock (Esteban North)

   Weighted picture obtained by reference to 4 grounds from Cape Scott through to Bonilla Is. (Hecate St.) area.

Seasons

Cape Scott - March through December
Goose Is. Grounds - April - October
Horseshoe Grounds (53°10'N 131°W) - May - September
White Rocks (Bonilla Is.) - April - December

Gear

No restrictions on type of gear or size of vessel.

Catch/effort for each of the four areas weighted by total U. S. and Canadian catch on the particular grounds to obtain a total C/E for the northern stock.

English Sole

Northern Hecate Strait

Double gear trawlers of 25-49 gross tons operating during the months of March-June inclusive. Significant landing is 20% or more of English sole in catch.

Rock Sole

Northern Hecate Strait

Double gear trawlers (all) landing 50% or more of rock sole per trip from grounds during the months of May-October inclusive.

Pacific True Cod

1. Northern Hecate Strait - Double gear vessels, 25-49 tons, where Pacific cod is 25% or more of a landing during the months of January to April inclusive.

2. Queen Charlotte Sound - as above with season April to August.

3. Lower west coast (Vancouver Island) - as above with season May to July inclusive.

Lingcod

Lower west coast (Vancouver Island) all gear (double and single) 25% qualification - all year (no season).

Pacific Ocean Perch

Queen Charlotte Sound - Double gear vessels of more than 75 gross tons - 50% qualification level - no season - all such landings used to determine catch per unit of effort.

Washington

No special techniques are used to assess or establish a criterion level of catch per unit of effort to use as a basis for studying trends in stock abundance. It was determined early in the study that high significance levels underestimated changes in stock abundance which in turn made trend detection difficult. Therefore, the lowest level is used. Although this level tends to overestimate changes in stock abundance, the trends are easily and quickly detected.

Catch per unit of effort for any particular species in a particular area is calculated by using only the effort that is expended in exploiting that species.

The catch data for each species are coded by decile levels of composition as these contribute to the poundage caught in each series of tows by a vessel in an area at any particular time. Purely exploratory fishing tows are eliminated. The data can be studied at any significant level of catch contribution if the need arises. Catch per unit of effort is used to identify stocks of adjacent fishing areas by studying the trend patterns. No attempt has been made to obtain a quantitative determination of stock abundance from the catch per unit data.

Oregon

The qualification level used by the Oregon Fish Commission is 29% of the total trip minus the poundages landed for animal food. Determination of

catch per significant landing is only attempted for English, Dover and petrale sole and Pacific ocean perch. The fishing data is acquired in Oregon by port interviews and log books. Coverage is approximately 95% of the entire fleet.

California

All vessels in the California trawl fleet are required to maintain fishing logs and mail carbon copies in at monthly intervals. Log books and pre-paid addressed envelopes are supplied by the Department of Fish and Game. Fish processing plants are required to submit fish receipts twice a month. The logs and receipts from a particular vessel are matched on a trip basis. The landing for an entire trip is coded to a California Department of Fish and Game block (10' longitude by 10' latitude) by 10 fathom depth intervals. Effort for the entire trip is recorded in hours. When a trip covers two or more fishing areas, the landing is coded to that fish and game block from which the largest catch came. Ties go to the block with greatest effort.

A description of this method is given California Fish Bulletin No. 44, pages 37-40, and No. 86, pages 29-32.

It was agreed at Canada's suggestion that the various agencies list and describe in detail the methods used for assessing catch per unit of effort, and supply these to the other cooperating agencies.

(1) Review of Effort Summary by FRBC - Canada

An "effort summary" in the form of the Fisheries Research Board of Canada Circular (statistical series), No. 12, entitled "A Summary of Total Effort and Catch by the Trawl Fishery Along the West Coast of the United States and Canada, 1959-1961 by J. A. Thomson". This pamphlet was published as an immediate method to get the catch and effort data to the various agencies and represented actual use of PMFC published statistics on catch. It is not to

be considered as replacing the PMFC Data Record series. John Thomson was commended for his effort in getting this publication out and encouraged to continue this series.

(2) PMFC Data Record Series

Mr. Croker, PMFC executive director, reported that the first report would be out prior to the November PMFC meeting. The first report will be mainly trawl data, containing corrected tables from the 14th PMFC annual report. Also included will be 1961 trawl data and possibly 1962 if it is available by printing time as well as glossary of commonly-caught trawl fish.

The map of the PMFC trawl areas will be included in the data report and will be called International Statistical Areas (trawl fishery). This map is included as Appendix B of this report. All areas and boundaries will stand as shown in last year's trawl sub-committee minutes except for changing Area 2D and 3A boundary to a dotted line as indicated previously under Item IV.

VI. PROGRESS OF THE 1962 RECOMMENDATIONS TO THE SUB-COMMITTEE

(1) Catalog of Market Sampling Techniques - Market sampling techniques were discussed and prepared outlines were submitted to the secretary for inclusion in the minutes. (See Appendix C)

(2a) Early Publication of Tagging Results - The current results of the many recent tagging projects by the coastwise agencies are summarized and incorporated into Appendix D. These taggings are arranged by chronological order of tagging working from the north to the south. Detailed results of each tagging project will be published by the tagging agency as soon as the recoveries are determined to be complete.

(2b) Publication of Map of PMFC Trawl Fishery Statistical Areas - The map of the PMFC Trawl Fishery statistical areas was discussed earlier under Item IV and is included as Appendix B.

(3) Data on Physical Properties of Important Demersal Species - Canada was the only agency reporting and their work consisted mainly of a literature survey. The report by Canada was as follows:

Physical properties of Pacific cod eggs

Fertilized eggs are demersal and initially adhesive. Adhesiveness lost within 30 hours (imbibition).

References:

Thomson, J. A., in press. On the demersal quality of the fertilized eggs of Pacific cod, (Gadus macrocephalus, Tilesius). Submitted to J. Fish. Res. Bd., Canada.

Forrester, C. R. MS Laboratory observations on embryonic development and larvae of the Pacific cod (Gadus macrocephalus, Tilesius). Submitted to J. Fish. Res. Bd., Canada.

Lingcod eggs

Demersal - adhesive

References:

Wilby, G. V., 1937. The lingcod, Ophiodon elongatus Girard, Bul. 54, Biol. Bd. of Canada.

English sole

Pelagic

References:

Budd, Paul L. 1940. Development of eggs and early larvae of six California fishes. Fis. Bul. 56, Division of Fish and Game, Bureau of Marine Fisheries, State of California.

Ketchen, K. S. 1956. Factors influencing the survival of the lemon sole (Parophrys vetulus) in Hecate St., British Columbia. J. Fish. Res. Bd., Canada 13 (5) pp. 647-694.

Rock sole eggs

Demersal - adhesive

References:

Pertseva-Ostroumova, T. A., 1961. The reproduction and development of far-eastern flounders. Akad. Nauk SSSR, 438 pp. (in Russian).

Smith, R. T. 1936. Report on the Puget Sound otter trawl investigation. State of Wash. Biol. Rept. No. 36B. In this report Smith states L. bilineata have buoyant eggs (unlikely). (Our experiments show demersal adhesive eggs.)

The Sub-committee agreed that more work along this line is needed, especially in reference to Dover and petrale sole eggs.

(4) "Frame" - Whole Fish Conversion Factor - It was noted during the 1962 sub-committee meeting that there was a discrepancy in flatfish measurements taken by Canada and the United States. The United States agencies measured fish whole while Canada measured frames. Canada volunteered to study the problem by comparing measurements from both whole fish and frames. The results of this study are as follows:

Measurements of Flatfish

Limited sampling for frame length vs. whole fish length has been conducted on petrale sole, rock sole and English sole on the Vancouver waterfront. In all species there was an increase in length from the round to the frame length. Greatest increase was in petrale sole, but even here the increase was, on the average, less than 1% for fish lengths of 32 to 48 cm. (Table I). There was no apparent trend in absolute increase with size of fish.

It is commonly believed there is a shrinkage of fish on icing. Therefore, it would seem desirable to sample frames for length. This would compensate slightly for shrinkage.

Table I. Flatfish Round Length vs. Frame Length Sampled at Vancouver B. C., (iced fish).

Species	Location	Size Range (mm)	Average Length (mm) Round	Frames	% Increase	Number of Fish
Petrale sole	Horseshoe	320-480	398.3	401.0	0.6	50-60
English sole	St. of Georgia	280-480	376.5	378.0	0.4	50-60
Rock sole	Horseshoe	310-480	386.7	387.6	0.2	50-60
Rock sole	St. of Georgia	290-440	368.0	369.0	0.3	50-60

(5) Tagging Summary - This summary of recent taggings was distributed by Oregon, and included data on tag numbers, type of tag, date, area and species. These data make it possible for other agencies to determine fish movements when re-

covering Oregon tags and gives all agencies a concise source of taggings undertaken and will be valuable in planning future programs. It was agreed that all agencies would compile and circulate such a summary as soon as possible and include depth of tagged releases and PMFC trawl area.

VII. NEW PROPOSALS FOR TRAWL REGULATIONS

No new proposals for otter trawl regulations were forthcoming from the Sub-committee. The chairman suggested that the summary of otter trawl regulations included in the 1960 minutes be brought up-to-date and included in the 1963 minutes. These regulations are included as Appendix E.

VIII. REVIEW OF CURRENT AND PROPOSED RESEARCH PROGRAMS

Canada

The staff consists of three biologists, five technicians and two summer aides with three vessels available. These are divided between two projects--near-seas and far-seas operations. The near-seas investigation is concerned with the present otter trawl fishery. Field work during the year will consist of a survey of the rock sole fishery in northern Hecate Strait and exploring for small petrale on the west coast of Vancouver Island. No major tagging projects are anticipated. Laboratory work will include publication of manuscripts on petrale and rock sole, compilation of PMFC data, and possibly some analysis of gear efficiency and a description of British Columbia trawl gear.

The far-seas operation will work mainly in the Gulf area from Dixon entrance to Unimak Island. Investigations will include species identification in the work area, early life history studies (especially age determination of Sebastodes alutus), compilation of hydrographic data and an attempt to determine the effects of the Gulf fishery on the stocks.

Washington

The staff consists of two and one half biologists, and one technician. Major emphasis is placed on monitoring the fishery through log book data

and interviewing fishermen. Compilation of PMFC catch data will continue. No cruises are planned for 1963 but there is a possibility of a petrale or Pacific cod tagging cruise in 1964.

Oregon

The staff consists of three biologists and two summer employees. The Dover sole and sablefish tagging program that was reported in 1962 is continuing with approximately four cruises annually. This program is financed by the Atomic Energy Commission. Much time is spent on the waterfront copying of fishermen's logs and recovering tagged fish. Market sampling is limited mainly to Dover sole with visual estimates taken of rockfish and mink food landings. A Rex sole ageing study in continuing.

California

The trawl staff consists of five men, one stationed in Eureka, one in Pacific Grove and three in Menlo Park. A market sampling program is maintained on Dover sole, English sole, petrale sole and animal food. The life histories of 10 species of rockfish are being worked up and rockfish sampling will continue throughout 1963. Field work will consist of deepwater tagging of petrale and Dover sole in Area 1A in November and December. The Nautilus will be available for one week every other month to explore for juvenile flatfish with shrimp trawls.

IX. OTHER BUSINESS

(1) California proposed that the meeting be held in California in 1964. This was approved by all present. The meeting will be held preferably in June, no earlier.

(2) The Chairman thanked Dick Crouter of the Canadian Department of Fisheries for arranging for and furnishing the meeting space.

(3) The Chairman suggested that it would be helpful if each agency would bring prepared outlines to the meeting next year. These outlines should be available to each agency and will facilitate assembling the minutes.

X. ADJOURNMENT

XI. APPENDICES

Appendix A. Tentative Agenda

Appendix B. Statistical Areas for the Trawl Fishery

Appendix C. Catalogue of Market Sampling Techniques

Appendix D. Dispersion of Tagged Fish by Individual Tagging

Appendix E. Synopsis of Otter Trawl Regulations

Appendix A.

Tentative Agenda

FOURTH MEETING OF THE TECHNICAL SUB-COMMITTEE
OF THE
INTERNATIONAL TRAWL FISHERY COMMITTEE
JUNE 17-18, 1963
VANCOUVER, CANADA

I. Appointment of secretary

II. Approval of agenda

III. Status reports by agency to include data on catch per unit of effort, size and age composition, new migration data, as well as gross catch statistics.

1. Petrale sole:
   a. Results of recruitment study by FRBC
   b. Special emphasis on Area 3C
   c. Recommendations on winter fishery
2. Lingcod:
   a. Special emphasis on minimum size limit proposal
   b. Comparison of U.S. and Canadian data in Area 3C
   c. Recommendations
3. Pacific Cod:
   a. Comparison of U.S. and Canadian data in Areas 3C and 5D
4. Ocean perch

IV. Review of adequacy of PMFC Trawl Area 3A (Washington-Oregon)

V. Review of techniques for assessing catch per unit of effort
1. Review by FRBC of "effort summary" in progress
2. PMFC data record series

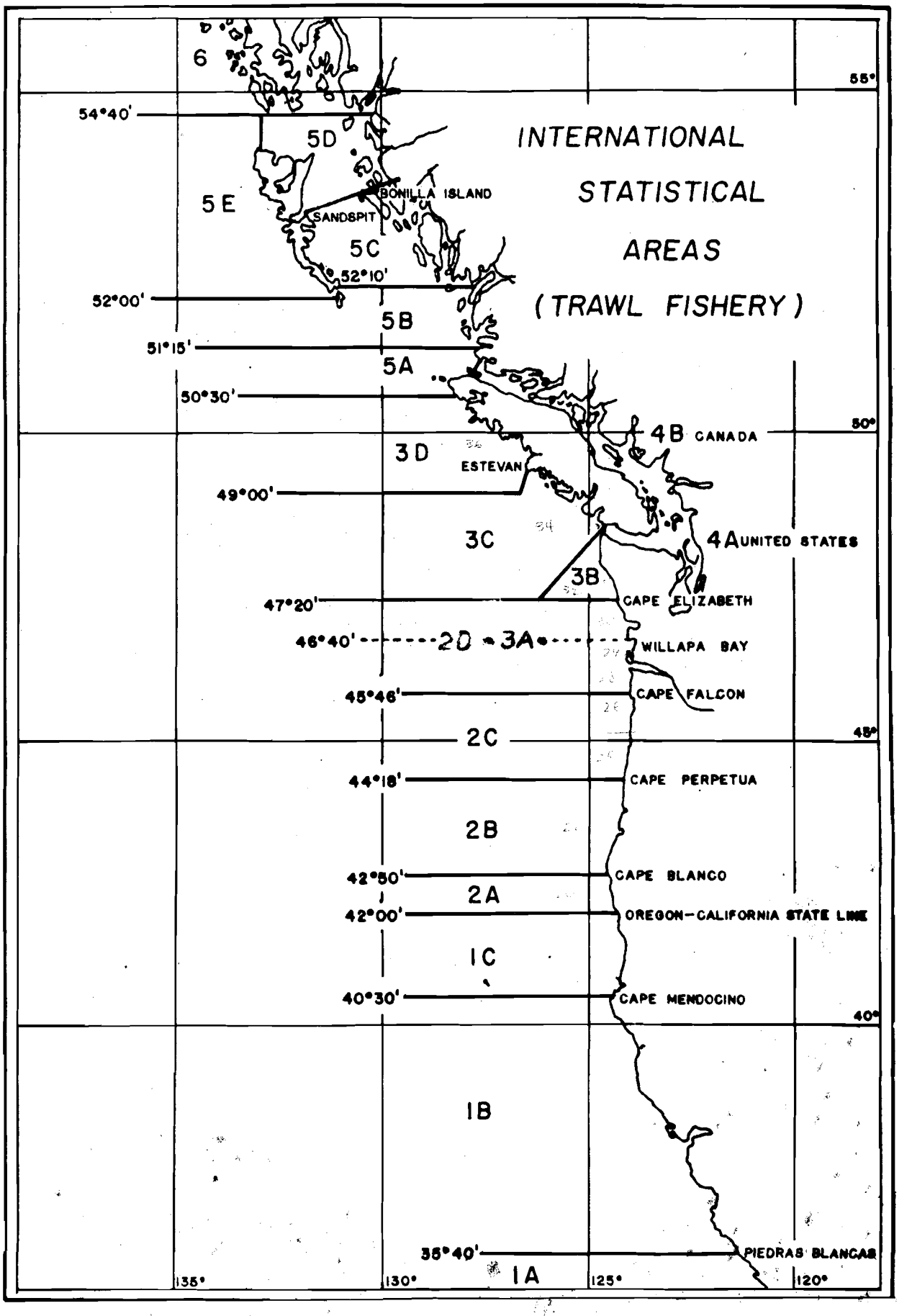
VI. Progress of 1962 Sub-committee recommendations to its own members (all states)
1. Catalog of market sampling techniques (exchange of prepared outlines)
2. Early publication of (a) tagging results; (b) map of PMFC trawl fishery statistical areas
3. Collection of information on physical properties of eggs of important demersal species
4. "Frame" - whole fish conversion factor
5. Tagging release summary

VII. New proposals for trawl regulations

VIII. Review of current and proposed research programs

IX. Other business

X. Adjournment



Appendix B. Statistical areas for the trawl fishery along the Pacific coast of the United States and Canada

Catalogue of Market Sampling Techniques Used by Canada, Washington, Oregon and Canada.

It was determined at the 1962 meeting that some method should be designed whereby all the agencies could compare sampling techniques. It was felt that this was needed to assure that samples were comparable from one agency to another, and to allow comparison of methods between agencies. The following is a summary of these techniques presented at the International Trawl Sub-Committee meeting.

Market Sampling Techniques of the Fisheries Research Board of Canada, Biological Station Nanaimo, B. C.

Objective = 1 sample per major species per major ground per week.

In the October 1961-September 1962 period 294 samples taken. Of these 160 were length measurements on true cod, lingcod, blackcod and turbot. The other 134 were otolith and length frequency samples, mainly of flatfish species and ocean perch.

Offshore samples by species were as follows:

True cod	= 79
Rock sole	= 53
Lingcod	= 32
Petrale sole	= 25
Lemon sole	= 18
Turbot	= 16
Blackcod	= 15
Ocean perch	= 11
Dover sole	= 5
Butter sole	= 5
Flounder	= 4

Inshore samples were as follows:

True cod	= 14
Lemon sole	= 12
Lingcod	= 2
Blackcod	= 2
Flounder	= 1

Flatfish

Total length = generally frames to the nearest centimeter.

Roundfish

True cod = total length of dressed fish.

Lingcod = dressed fish measured from the insertion of the dorsal fin to the centre of the tail.

Blackcod = dressed fish measured from the insertion of the dorsal fin to the centre of the tail.

Conversion factors available for lingcod, blackcod and true cod.

Also available is total weight of sample for roundfish and thus an average weight. These are sampled in tub lots or multiples of tub lots.

Randomness of Samples

Selection by plant, if any, is noted, otherwise straight run from boat.

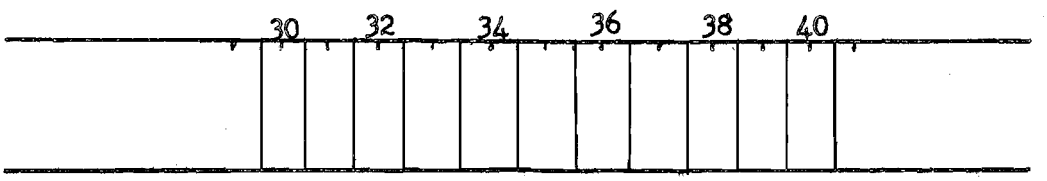
Sample Size

Flatfish - 3 consecutive 20's in a sample or 1-30 in a sample

Roundfish - same frequency if possible

Flatfish samples may run from 150 specimens (rock sole) to over 400 (petrale sole, Dover sole). Roundfish samples up to 350 specimens in each sample.

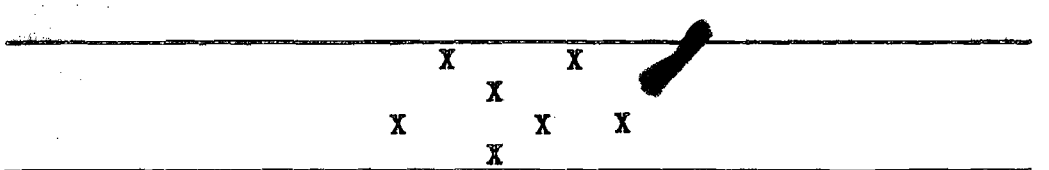
Measurements for flatfish and true cod are taken with a measuring board graduated in centimeters as below.



For example - cm. length groups
- dividing line at 295 and 305
- fish falling on line are counted in lower numbered space

The above for otolith samples

For length measurements only - fish length is recorded on a plastic sheet



Recorded on sample sheet by placing a scored glass grid over the marks as noted in first figure above.

Special samples - special techniques
- length girth
- length weight
- maturity etc.

Conversion Factors

Weight

True cod - dressed weight x 1.34 = total weight

Lingcod - dressed weight x 1.38 = total weight

Dogfish liver - liver weight x 6.67 = round weight

Length

Lingcod - Y = 1.228 x +0.558 where Y = total length (cm)
and X = origin of dorsal to fork of caudal length (cm).

Blackcod - Origin of dorsal fin to fork of caudal length times 1.32 = total length.

Market Sampling Techniques Used by Washington Department of Fisheries, Seattle, Washington.

A. Ocean Perch

1. Lengths (total, to nearest mm) and weights (nearest gram or tenth lb.) by sex (internal sexing). Sample size is about 100 fish.

2. Stratified scale sub-sample

a. Up to five scale samples taken for each length interval (10 mm) sampled, sexes separate.

b. Scales taken from mid-fish, below lateral line, before "de-scaling" process.

B. English sole

1. Lengths (total, to nearest mm) by sex (external and internal sexing). Sample size of about 200 fish.

2. Unstratified interopercle sub-sample, sample size 100 fish by sex.

C. Pacific cod - Length (total, to nearest mm) and weight (to nearest gram or tenth lb.) by sex (internal sexing). Sample size is usually a "cart-load" (about 200 fish).

D. Black cod

1. Various length measurements

2. Internal sexing

3. Scale samples

E. Petrale sole

1. Lengths (total, to nearest mm) by sex (internal sexing). Sample size about 200 fish.

2. Unstratified otolith sub-samples by sex. Sample size about 100 fish.

F. Lingcod - Lengths (total, to nearest mm) and weights (to nearest gram or tenth lb.) by sex (internal sexing). Sample size approximately 100 fish.

G. Rockfish - Cart load tally for species composition.

GENERAL NOTES:

1. Sampling includes only round, unprocessed fish.

2. Two types of measuring devices.

   a. "Trough" board (lingcod)

   b. Board with removable plastic sheet, lined by length intervals divided by sex.

3. Only fish from known areas are sampled.

4. With exception of age sub-samples, no statistically predetermined sample size.

5. All sampling is done monthly if possible.

Catalogue of Market Sampling Techniques Used by the Oregon Fish Commission, Astoria, Oregon

Many sampling techniques and methods are employed by the Oregon Fish Commission in taking market samples and in tagging operations. Listed below are some of the methods employed to get the desired result by species.

Petrale Sole

Age - Ageing is done by reading of otoliths. Both otoliths are removed for ageing. When getting a market sample for ageing purposes a total of 50 fish is sampled. Readability of otoliths is relatively poor and only slightly improved with immersion in papain.

Length - When tagging fish the length is measured to nearest lower centimeter. Tag recoveries, lengths taken in canneries for length-frequency data, and incidental measurements, are always to the nearest millimeter. Measuring is done on a concave slatted measuring board with the fish layed flat over a meter stick. Lengths are always over-all lengths.

Dover Sole

Age - Scales were found to be most satisfactory technique for ageing Dover sole. During the summer period of heavy Dover sole landings a weekly sample of 50 fish is taken for age analysis. These scales are subsequently read on a Rayoscope onto paper strips for later comparison when re-reading.

Length - In addition to recording the length of this 50 fish sampled, an additional 350 fish are measured for a total sample of 400. These fish measured for the weekly samples as well as

the fish during tagging are measured to the nearest lower centimeter. Recovered tagged fish are measured to the nearest millimeter.

Sex - The weekly sample of 400 sole are cut open with dissecting knives to determine sex, as sex is not determinable externally.

English Sole

Age - Ageing of English sole from tag recoveries is by otoliths and interopercle bone. Both of these structures are collected for more accurate ageing, by comparative readings.

Length - Length is measured to the nearest lower centimeter when tagging and to the nearest millimeter on recovered tagged fish. Measuring is done on a meter stick mounted on a concave measuring board.

Sex - Sex can be determined on English sole by holding the fish up to the light and observing the ovaries or the absence of ovaries.

Black Cod

For tagging and tag recovery purposes black cod are measured to the nearest lower centimeter (fork length). Sex is determined by internal examination and length measured on those black cod caught and not tagged.

Randomness is usually assumed in regard to the placement of the fish aboard the boat. During the unloading process, one container full of fish is considered similar to another container as long as they were captured in the same area. Much mixing of the different tows takes place in the icing down and unloading process. When working from a line or conveyer belt, randomness is achieved by grabbing the fish nearest as more fish are needed. These procedures are not perfect but due to the need of expeditiousness while working in canneries, they are used of necessity. When measuring a specific amount of fish, such as a cart full, all the fish in the cart are measured. This cancels the chance of the samples being selective to large or small fish.

Animal food landings are monitored regularly to determine percentages by species. These estimates are visual and are taken whenever animal food is observed being unloaded.

Market Sampling Technique Used by California Department of Fish and Game.

One sample per week of Dover, English and petrale sole is the goal at the ports of Eureka and San Francisco. At Fort Bragg, Monterey, Morro Bay, and Santa Barbara the goal is two samples per month of these three species. All samples are subject to the availability of the fish.

Total length of the whole fish is measured on a flat measuring board divided into 2 mm. units. Sex is determined by examination of the gonad. Age determinations are made by means of an age-length key. Otoliths from one male and one female fish from each centimeter group are collected to establish the age-length key. Total weight of the males and females is also recorded.

Sample size for Dover and petrale sole is 50 fish. English are sorted by size for the markets and 25 fish are sampled from the sorted fish.

Animal food landings and rockfish are grossly sampled when available, to determine the species composition by weight.

Dispersion of Tagged Fish by Individual Tagging for Canada, Washington, Oregon and California

The following summaries are listed in chronological order of tagging by species for the various cooperating agencies, starting with Canada and working south to California. These summaries are not intended to be used as complete and final tagging data as they are presented here only as an up-to-date indication of fish movement. Detailed and comprehensive analysis of each tagging will be undertaken by the sponsoring agency when the study is considered complete.

INDEX TO APPENDIX D.

DISPERSION of TAGGED FISH BY P.M.F.C. AREA

SPECIES PETRALE

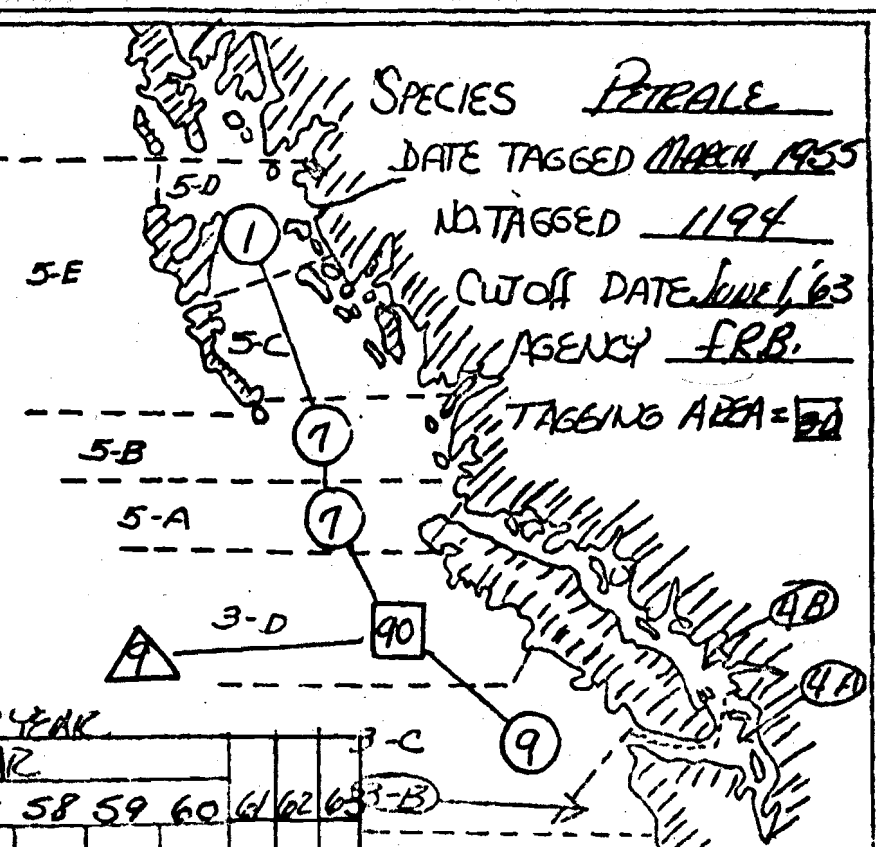
DATE TAGGED MARCH, 1955

NO. TAGGED 1194

CUT OFF DATE June 1, '63

AGENCY F.R.B.

TAGGING AREA = 2-D



RECOVERIES BY YEAR

PMFC AREA	55	56	57	58	59	60	61	62	63	
5-E										
5-D					1					
5-C										
5-B	3		1	1	2					7
5-A	2	4	1							7
4-B										
4-A										
3-D	28	17	38	3				3	1	90
3-C	2	4	1	2						9
3-B										
3-A										
2-D										
2-C										
2-B										
2-A										
1-C										
1-B										
1-A										
UNK.	2	3	3				1			9
TOTAL	37	28	44	6	3		1	3	1	123

DISPERSION of TAGGED FISH BY P.M.F.C. AREA

SPECIES PETRALE

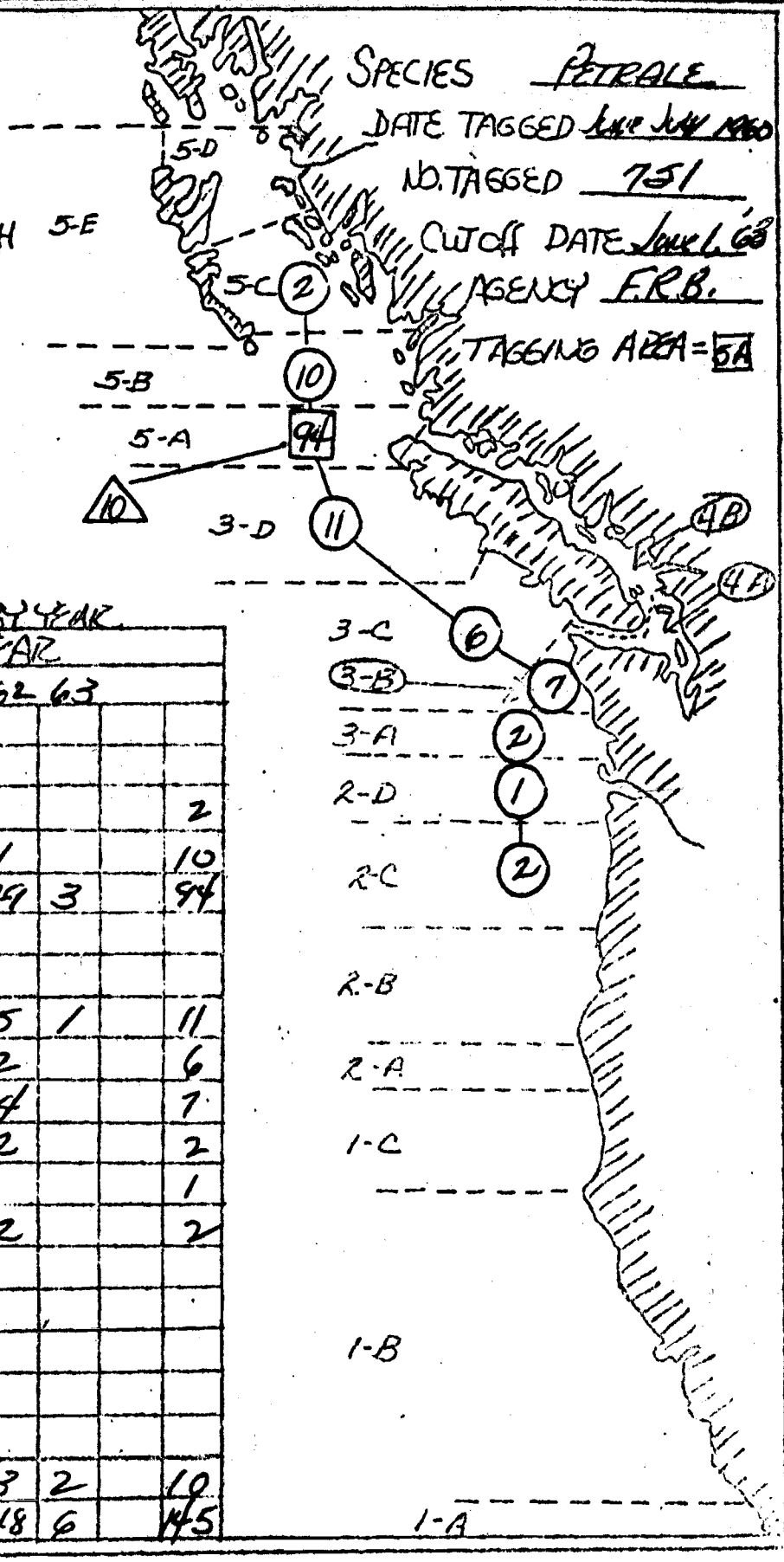
DATE TAGGED Late July 1960

NO. TAGGED 751

CUTOFF DATE June 6, 63

AGENCY F.R.B.

TAGGING AREA = 5A

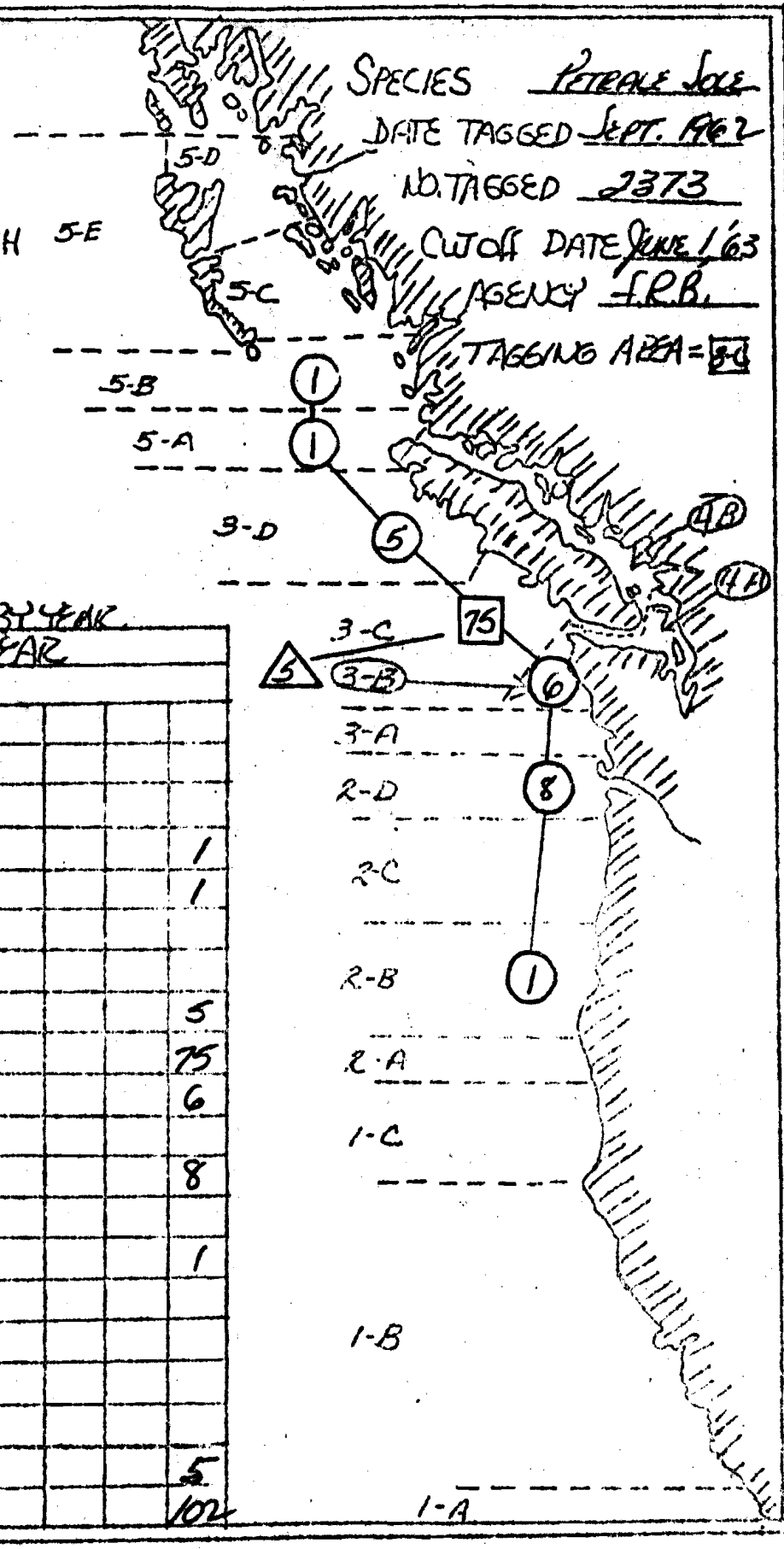


RECOVERIES BY YEAR

PMFC AREA	YEAR 60	61	62	63		
5-E						
5-D						
5-C	2					2
5-B	1	8	1			10
5-A	29	33	29	3		94
4-B						
4-A						
3-D		5	5	1		11
3-C		4	2			6
3-B		3	4			7
3-A			2			2
2-D		1				1
2-C			2			2
2-B						
2-A						
1-C						
1-B						
1-A						
UNK.		5	3	2		10
TOTAL	32	59	48	6		145

DISPERSION of TAGGED FISH BY P.M.F.C. AREA

SPECIES Female Sole
DATE TAGGED Sept. 1962
NO. TAGGED 2373
CUT OFF DATE June 1/63
AGENCY F.R.B.
TAGGING AREA = 5-C

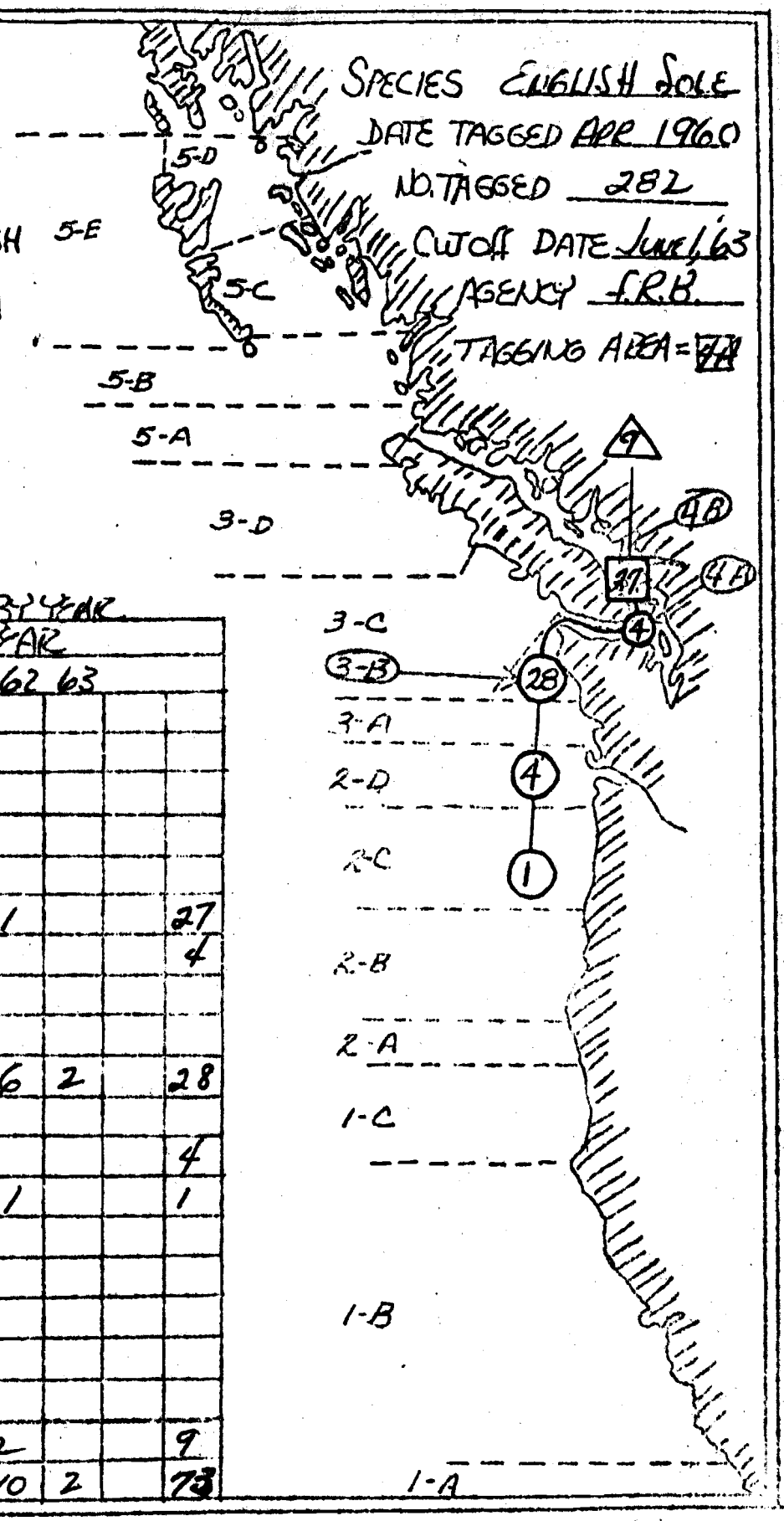


RECOVERIES BY YEAR

PMFC AREA	YEAR 62	63				
5-E						
5-D						
5-C						
5-B		1				1
5-A		1				1
4-B						
4-A						
3-D	1	4				5
3-C	60	15				75
3-B		6				6
3-A						
2-D		8				8
2-C						
2-B		1				1
2-A						
1-C						
1-B						
1-A						
UNK.	1	4				5
TOTAL	62	40				102

DISPERSION of TAGGED FISH BY P.M.F.C. AREA

SPECIES ENGLISH SOLE
DATE TAGGED APR 1960
NO. TAGGED 282
CUTOFF DATE June 1, 63
AGENCY F.R.B.
TAGGING AREA = 4A



RECOVERIES BY YEAR

PMFC AREA	60	61	62	63		
5-E						
5-D						
5-C						
5-B						
5-A						
4-B	26		1			27
4-A	2	2				4
3-D						
3-C						
3-B	7	13	6	2		28
3-A						
2-D	2	2				4
2-C			1			1
2-B						
2-A						
1-C						
1-B						
1-A						
UNK.	2	5	2			9
TOTAL	39	22	10	2		73

DISPERSION of TAGGED FISH BY P.M.F.C. AREA

SPECIES Pacific Cod ~~Sablefish~~

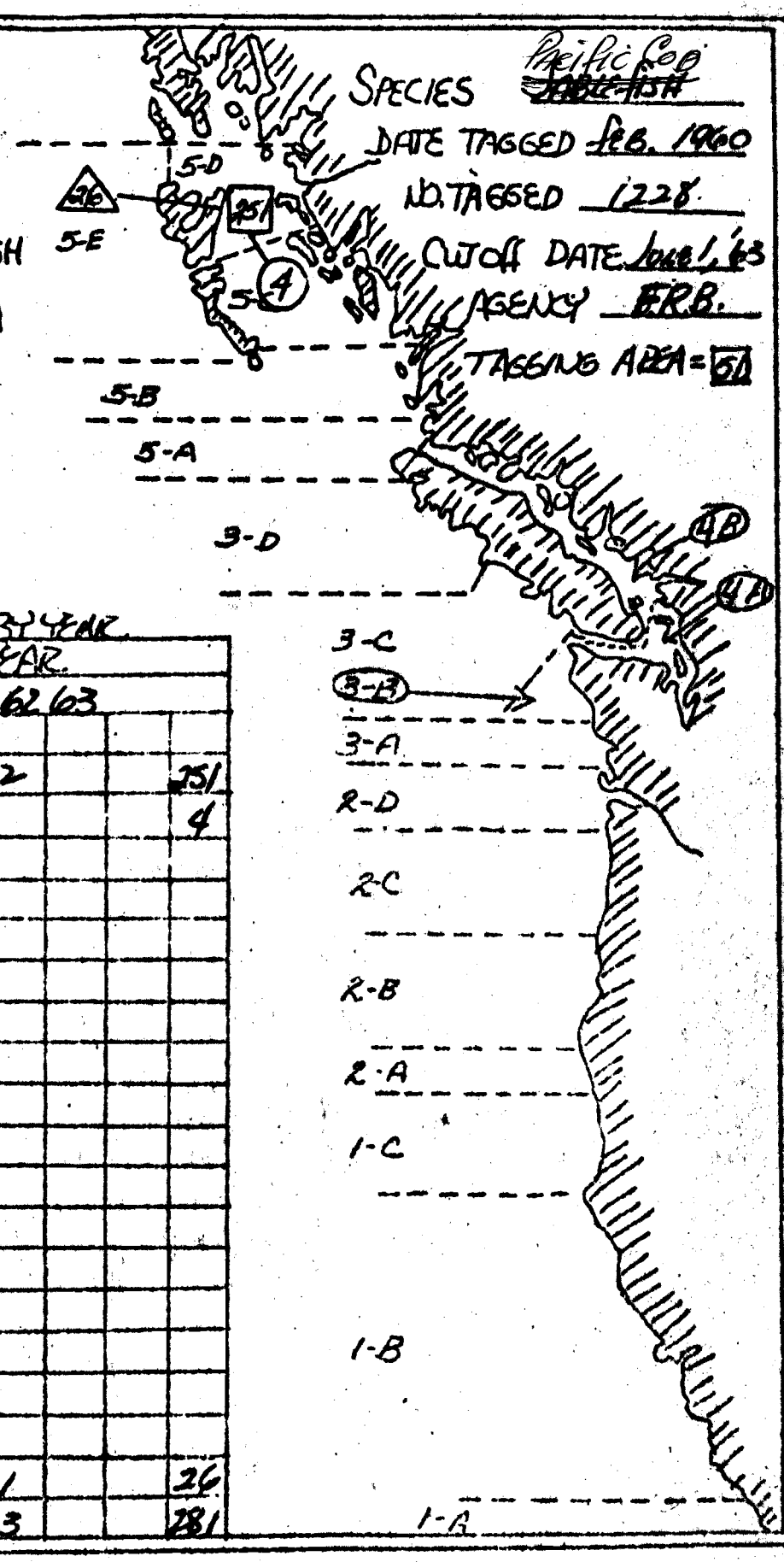
DATE TAGGED Feb. 1960

NO. TAGGED 1228

CUT OFF DATE June 1, 63

AGENCY F.R.B.

TAGGING AREA = 61



RECOVERIES BY YEAR

PMFC AREA	YEAR 60	61	62	63		
5-E						
5-D	225	24	2			251
5-C	4					4
5-B						
5-A						
4-B						
4-A						
3-D						
3-C						
3-B						
3-A						
2-D						
2-C						
2-B						
2-A						
1-C						
1-B						
1-A						
UNK.	20	5	1			26
TOTAL	249	29	3			281

DISPERSION of TAGGED FISH BY P.M.F.C. AREA

SPECIES Rock Sole

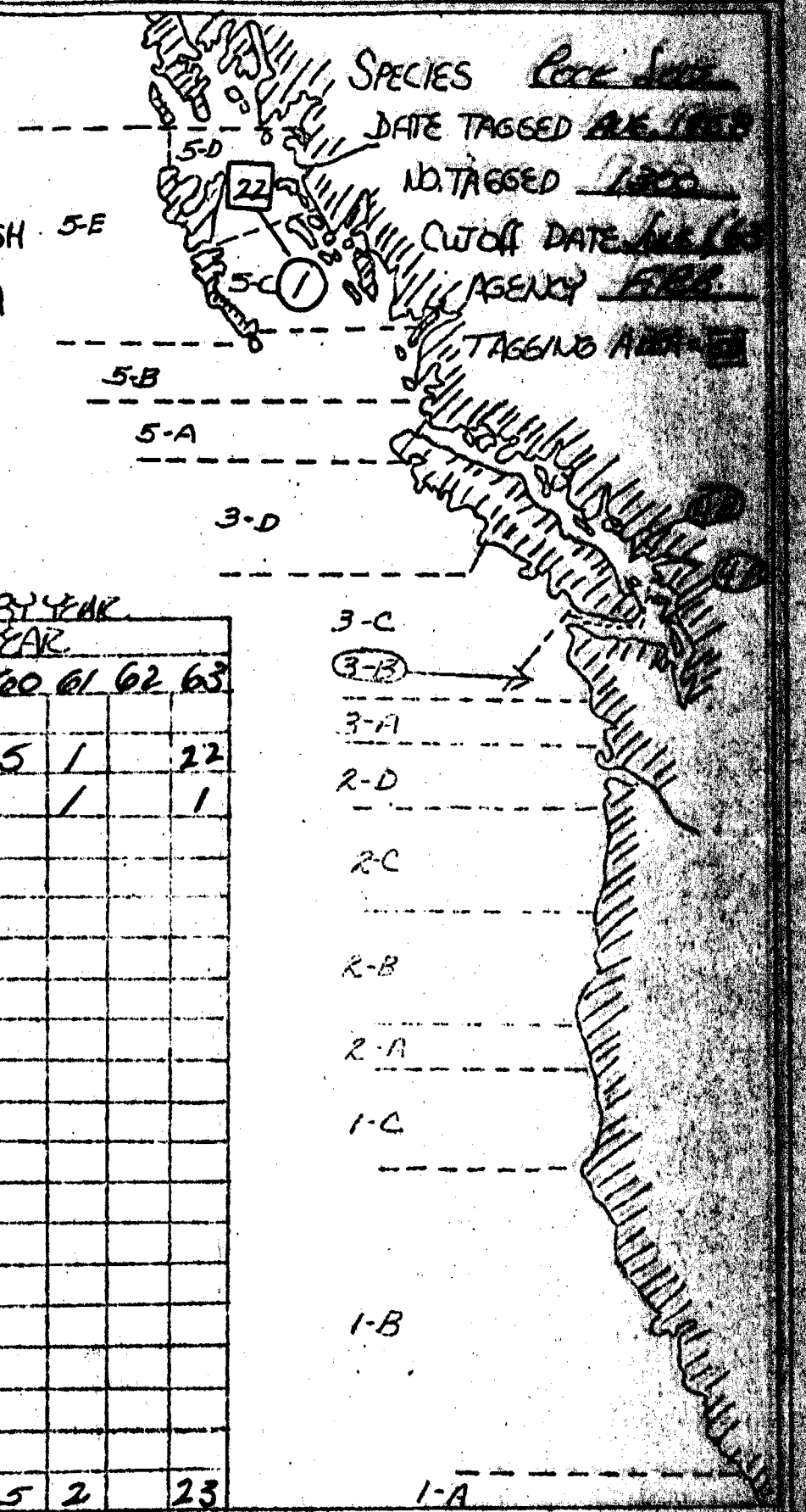
DATE TAGGED [illegible]

NO. TAGGED 1000

CUTOFF DATE [illegible]

AGENCY [illegible]

TAGGING AREA [illegible]

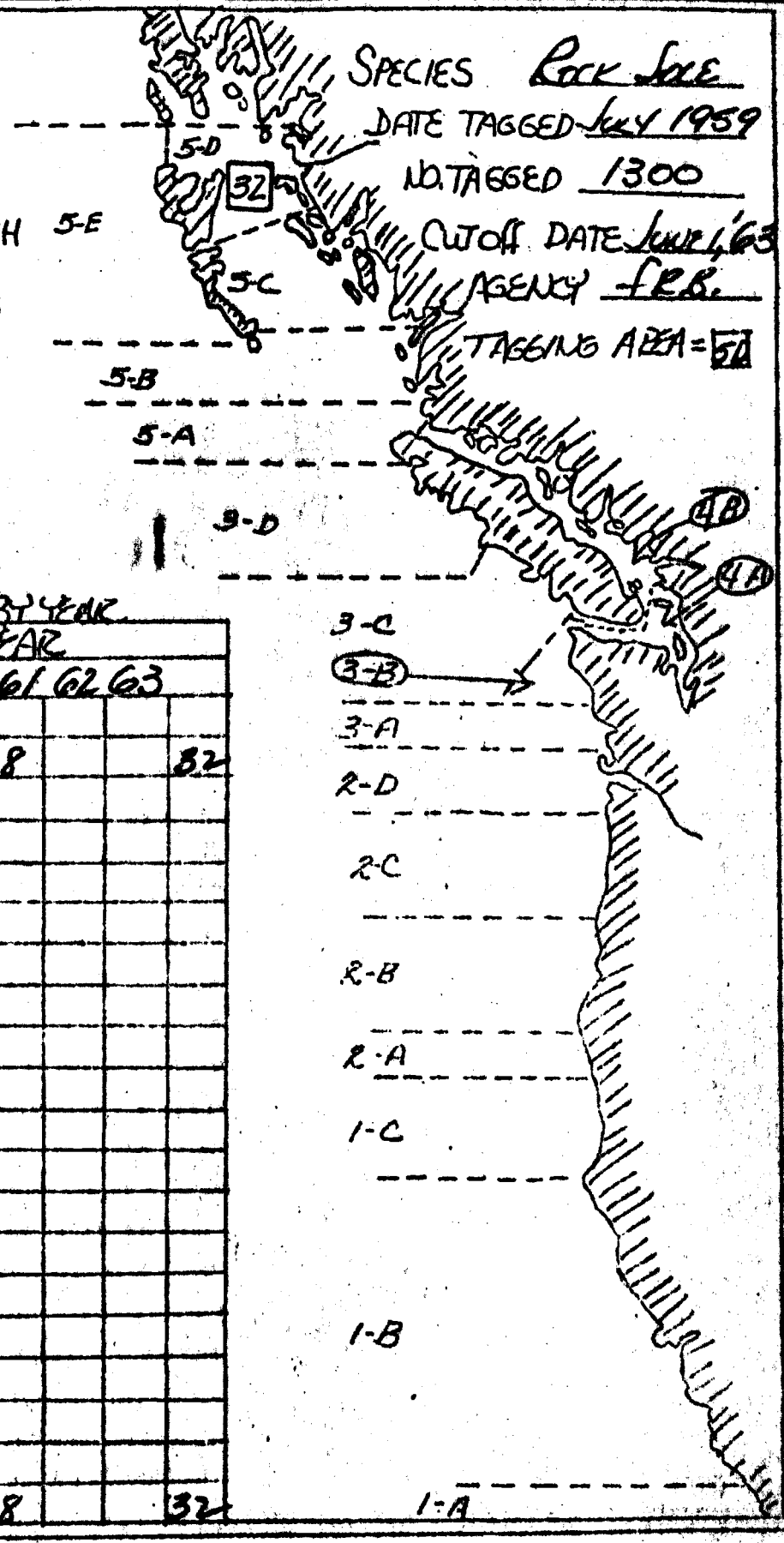


RECOVERIES BY YEAR

PMFC AREA	YEAR 58	59	60	61	62	63
5-E						
5-D	12	3	5	1		22
5-C				1		1
5-B						
5-A						
4-B						
4-A						
3-D						
3-C						
3-B						
3-A						
2-D						
2-C						
2-B						
2-A						
1-C						
1-B						
1-A						
UNK.						
TOTAL	13	3	5	2		23

DISPERSION of TAGGED FISH BY P.M.F.C. AREA

SPECIES Rock Sole
DATE TAGGED July 1959
NO. TAGGED 1300
CUTOFF DATE June 1, 63
AGENCY F.R.B.
TAGGING AREA = 5D

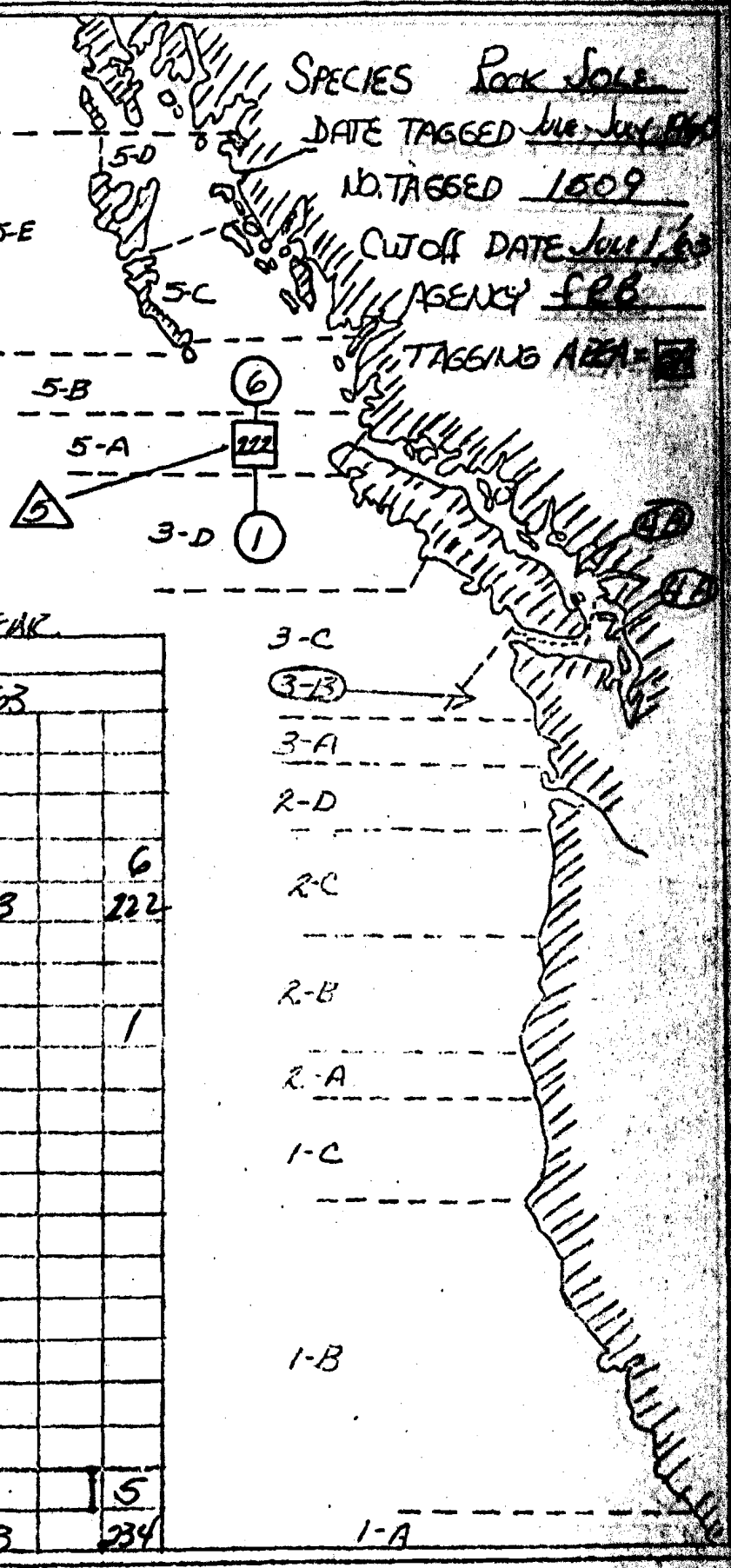


RECOVERIES BY YEAR

PMFC AREA	59	60	61	62	63	
5-E						
5-D		24	8			32
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3-C						
3-B						
3-A						
2-D						
2-C						
2-B						
2-A						
1-C						
1-B						
1-A						
UNK.						
TOTAL		24	8			32

DISPERSION of TAGGED FISH BY P.M.F.C. AREA

SPECIES Rock Sole
DATE TAGGED June-July 1963
NO. TAGGED 1609
CUT OFF DATE July 1, 63
AGENCY FRB
TAGGING AREA = 5-A

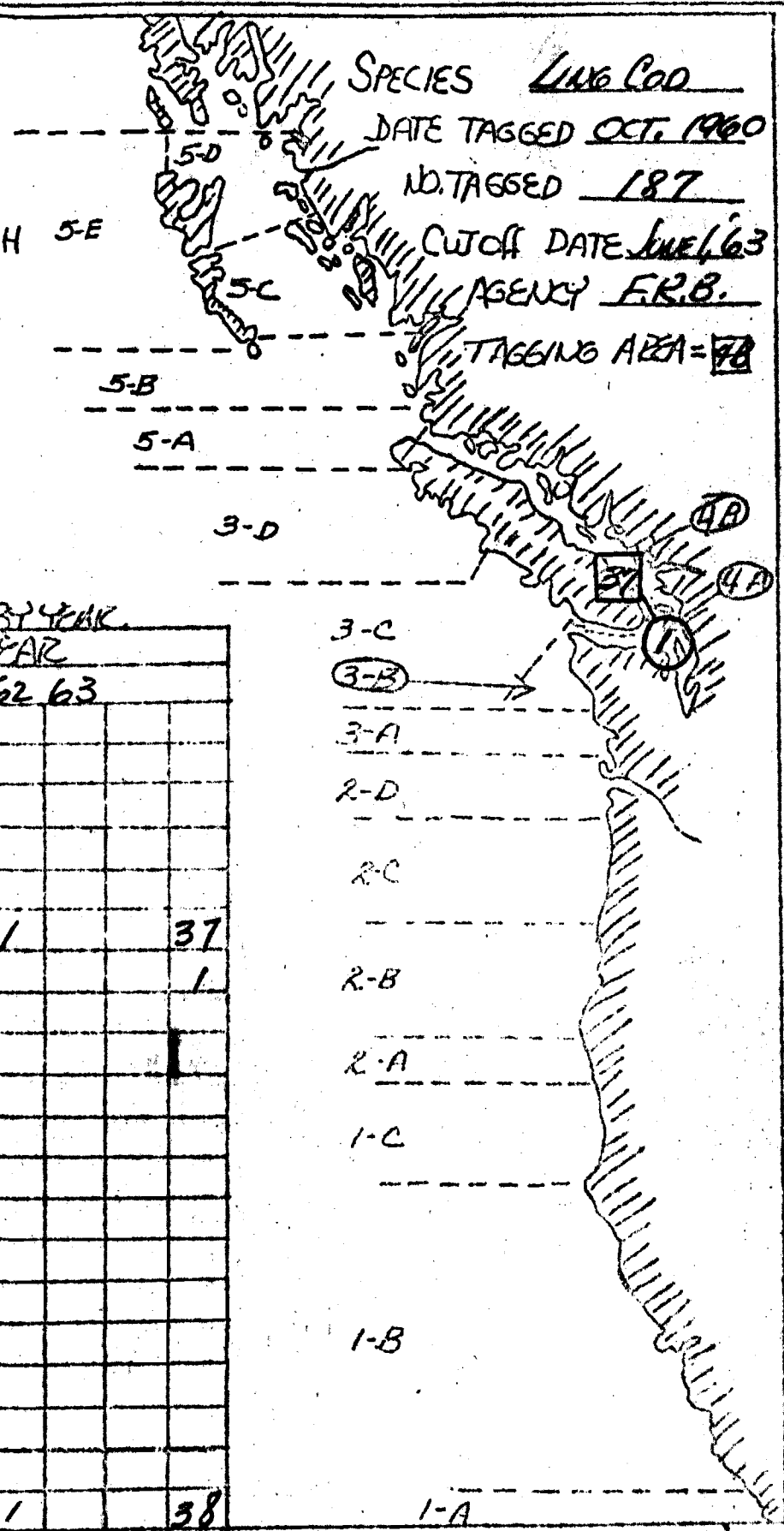


RECOVERIES BY YEAR

PMFC AREA	60	61	62	63		
5-E						
5-D						
5-C						
5-B	5	1				6
5-A	109	70	40	3		222
4-B						
4-A						
3-D			1			1
3-C						
3-B						
3-A						
2-D						
2-C						
2-B						
2-A						
1-C						
1-B						
1-A						
UNK.		2	3			5
TOTAL	114	73	44	3		234

DISPERSION of TAGGED FISH BY P.M.F.C. AREA

SPECIES Lake Cod
DATE TAGGED Oct. 1960
NO. TAGGED 187
CUTOFF DATE June 1, 63
AGENCY F.R.B.
TAGGING AREA = 4B

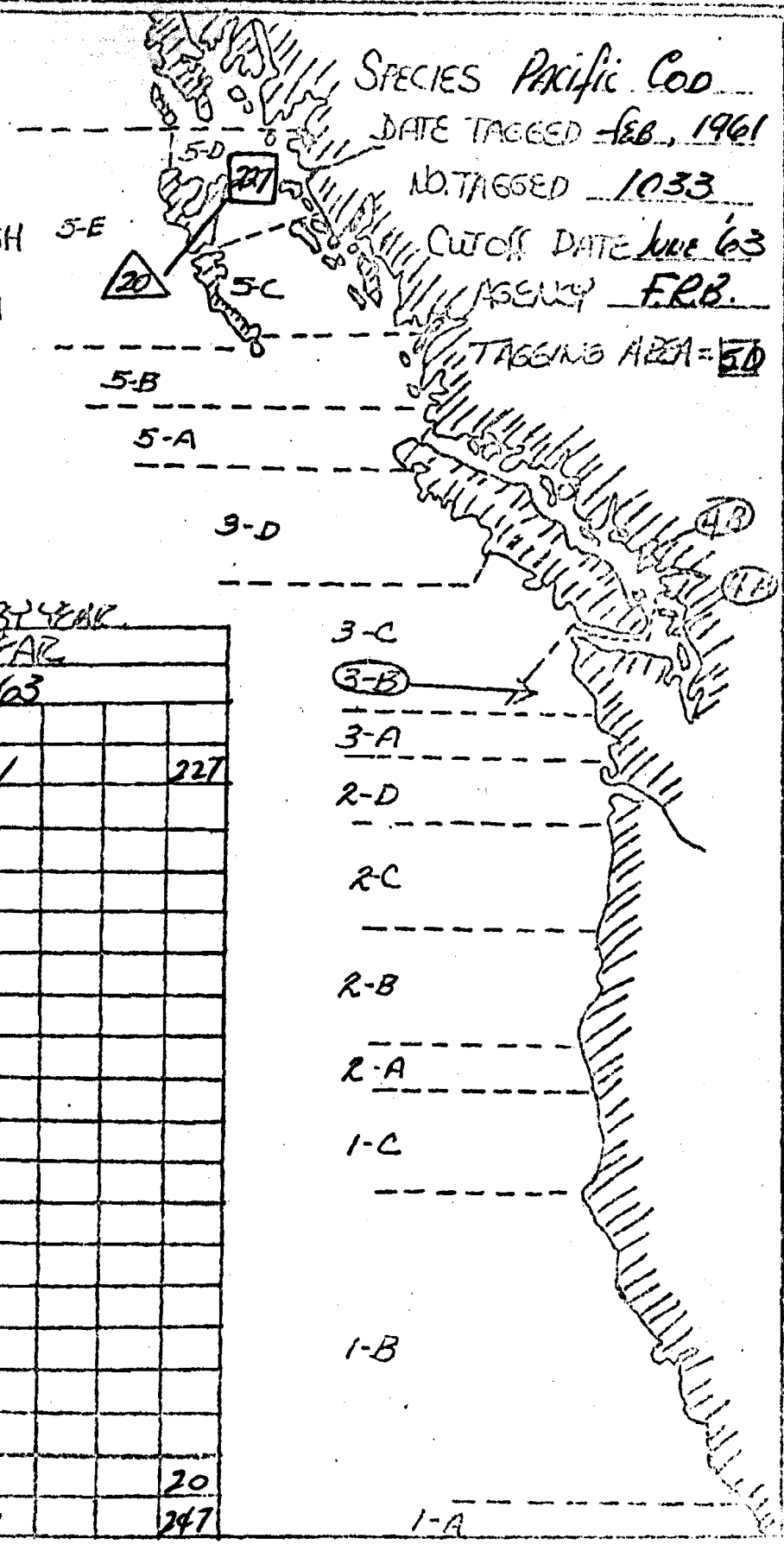


RECOVERIES BY YEAR

PMFC AREA	YEAR 60	61	62	63		
5-E						
5-D						
5-C						
5-B						
5-A						
4-B	22	14	1			37
4-A		1				1
3-D						
3-C						
3-B						
3-A						
2-D						
2-C						
2-B						
2-A						
1-C						
1-B						
1-A						
UNK.						
TOTAL	22	15	1			38

DISPERSION of TAGGED FISH by PAC. AREA

SPECIES Pacific Cod
DATE TAGGED Feb., 1961
NO. TAGGED 1033
CUT OFF DATE June 63
AGENCY F.R.B.
TAGGING AREA = 5D

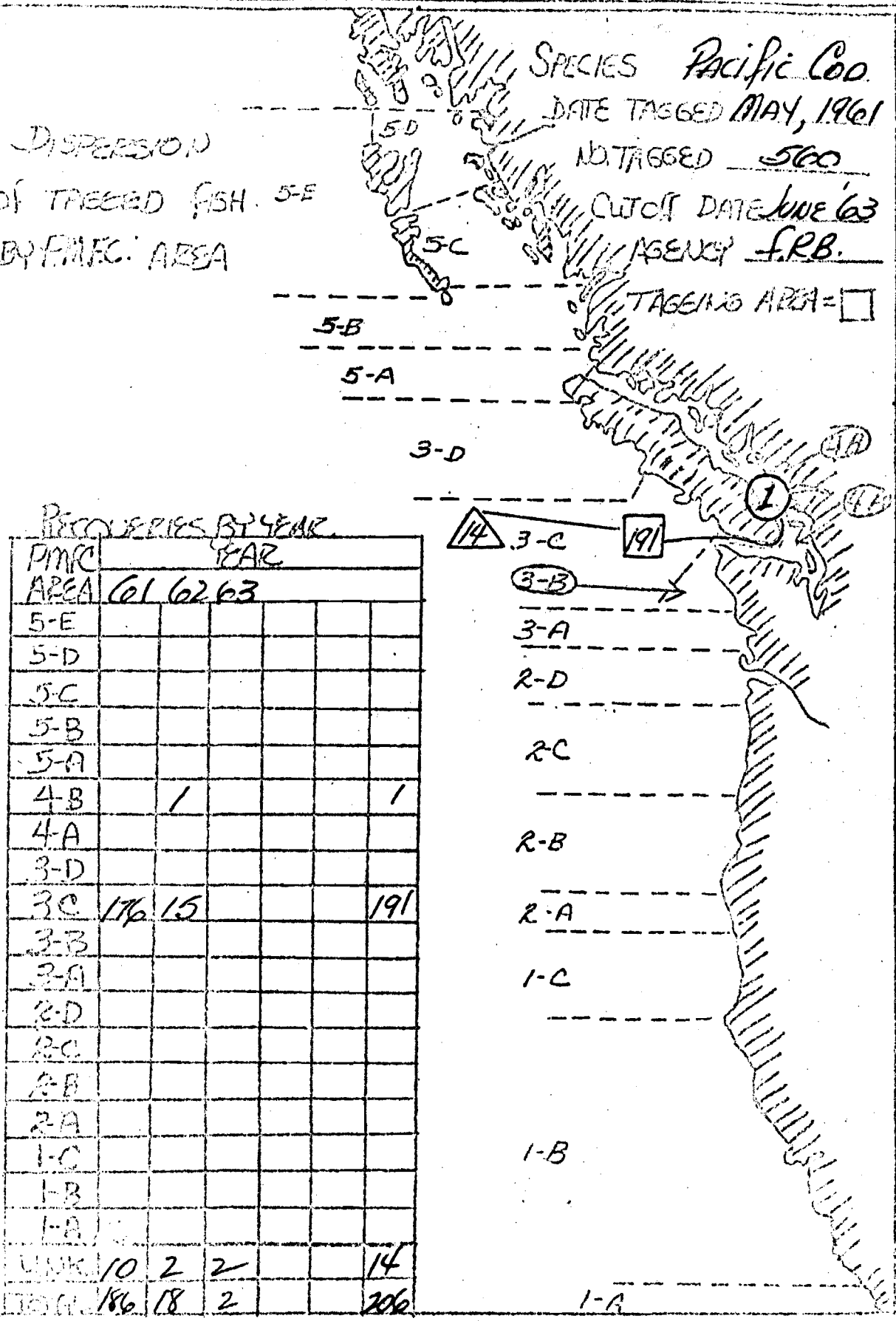


RECOVERIES BY YEAR

PAC. AREA	61	62	63			
5-E						
5-D	201	25	1			227
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3-C						
3-B						
3-A						
2-D						
2-C						
2-B						
2-A						
1-C						
1-B						
1-A						
UNK.	18	2				20
TOTAL	219	27	1			247

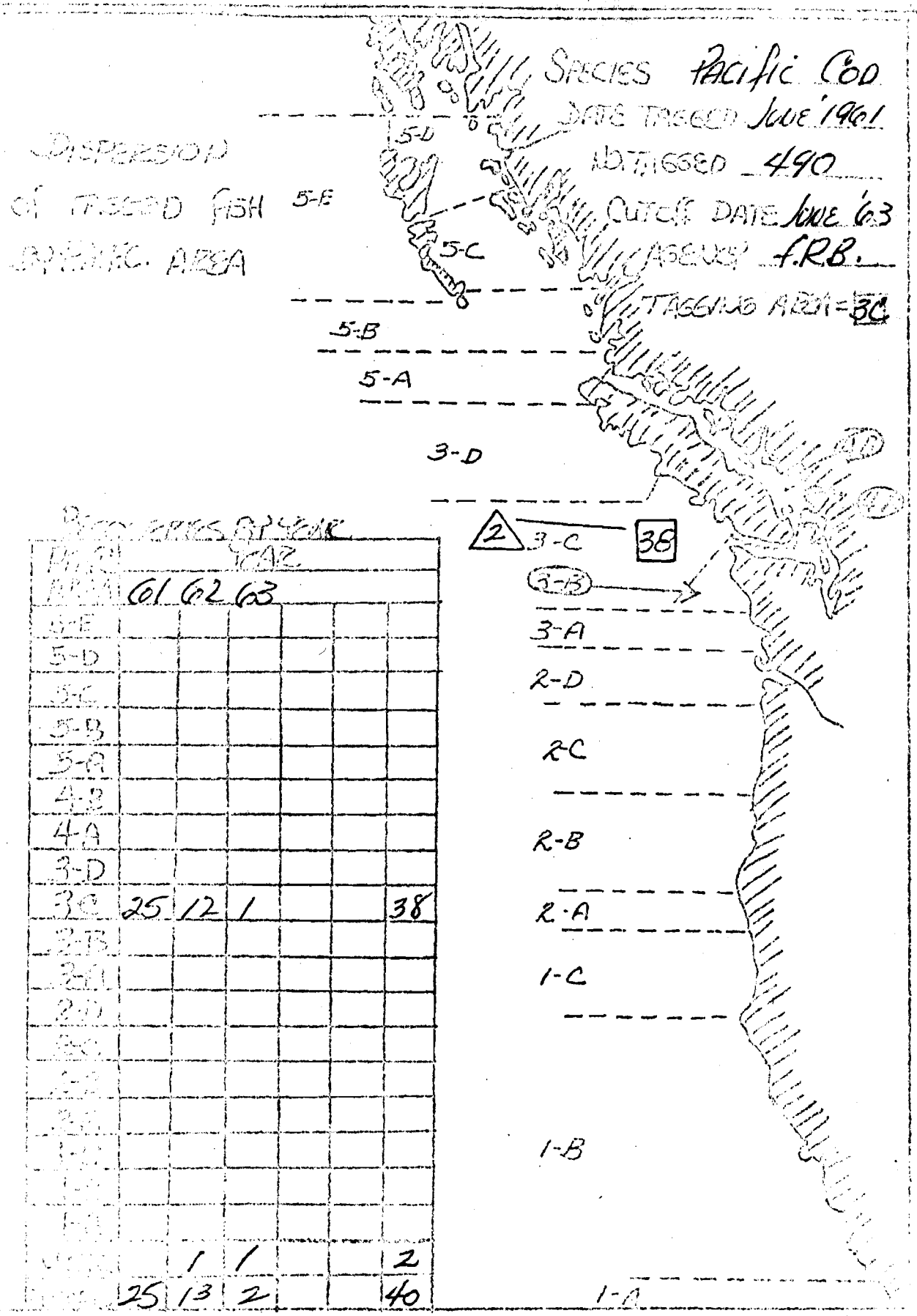
DISPERSION OF TAGGED FISH BY P.M.F.C. AREA

SPECIES Pacific Cod
DATE TAGGED MAY, 1961
NO. TAGGED 560
CUTOFF DATE June '63
AGENCY F.R.B.
TAGGING AREA = □



RECOVERIES BY YEAR

PMFC AREA	61	62	63			
5-E						
5-D						
5-C						
5-B						
5-A						
4-B		1				1
4-A						
3-D						
3C	176	15				191
3-B						
3-A						
2-D						
2-C						
2-B						
2-A						
1-C						
1-B						
1-A						
UNK	10	2	2			14
TOTAL	186	18	2			206



RECOVERIES BY YEAR

STAT. AREA	61	62	63			
5-E						
5-D						
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3C	25	12	1			38
3-B						
3-A						
2-D						
2-C						
2-B						
2-A						
1-C						
1-B						
1-A						
		1	1			2
	25	13	2			40

SPECIES Pacific Cod

RELEASE DATE APR, 1960

NO. TAGGED 230

CUTOFF DATE June 1963

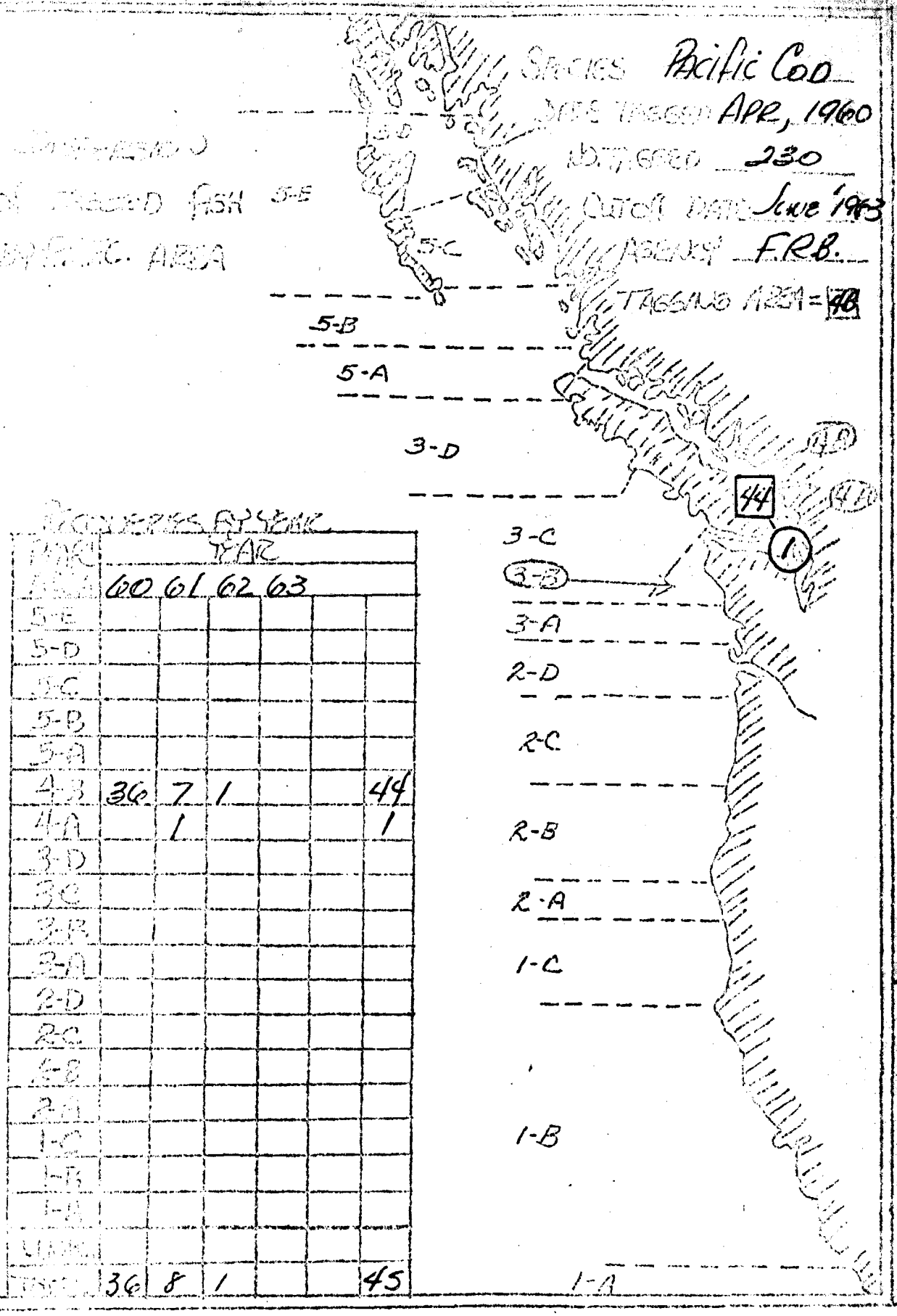
AGENCY F.R.B.

TAGGING AREA = 4B

NUMBER OF TAGGED FISH BY STAT. AREA

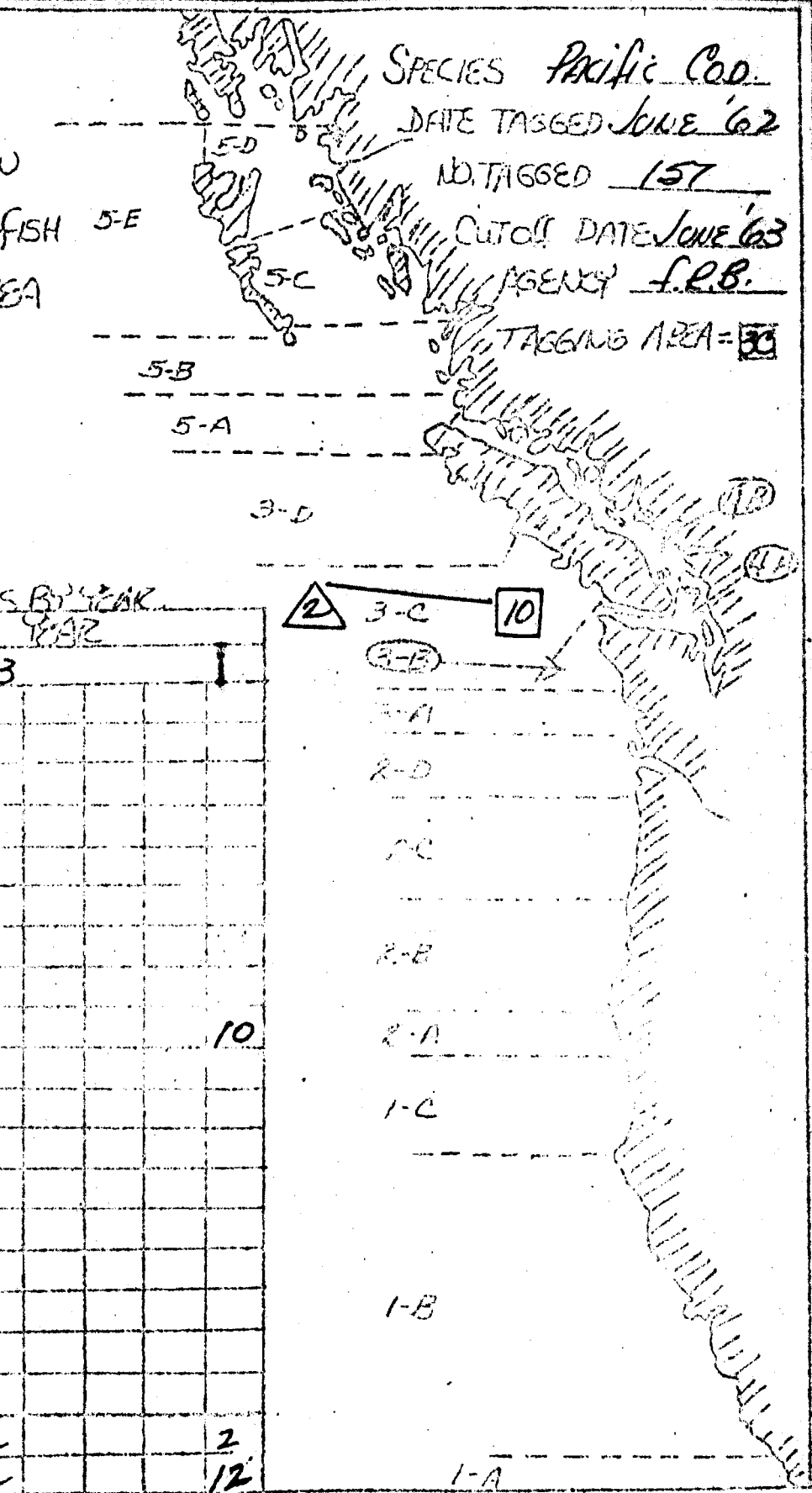
RECOVERIES BY YEAR

MAR AREA	YEAR 60	61	62	63		
5-E						
5-D						
5-C						
5-B						
5-A						
4-B	36	7	1			44
4-A		1				1
3-D						
3-C						
3-B						
3-A						
2-D						
2-C						
2-B						
2-A						
1-C						
1-B						
1-A						
UNK						
TOT	36	8	1			45



DISPERSION of TAGGED FISH BY P.M.F.C. AREA

SPECIES Pacific Cod
DATE TAGGED June '62
NO. TAGGED 157
CUTOFF DATE June '63
AGENCY F.R.B.
TAGGING AREA = 3C

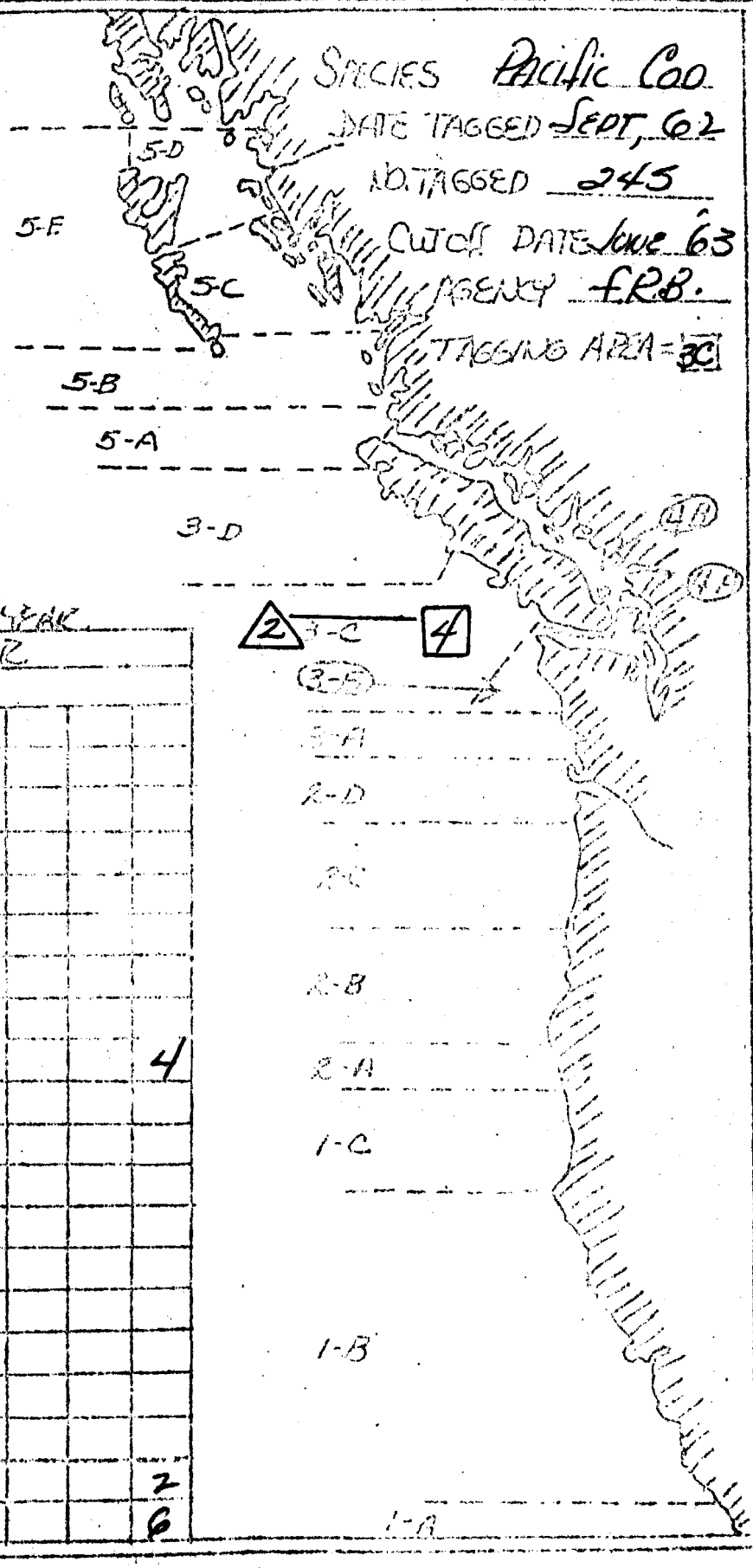


RECOVERIES BY YEAR

PMFC AREA	62	63				
5-E						
5-D						
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3-C	10					10
3-B						
3-A						
2-D						
2-C						
2-B						
2-A						
1-C						
1-B						
1-A						
UNK.		2				2
TOTAL	10	2				12

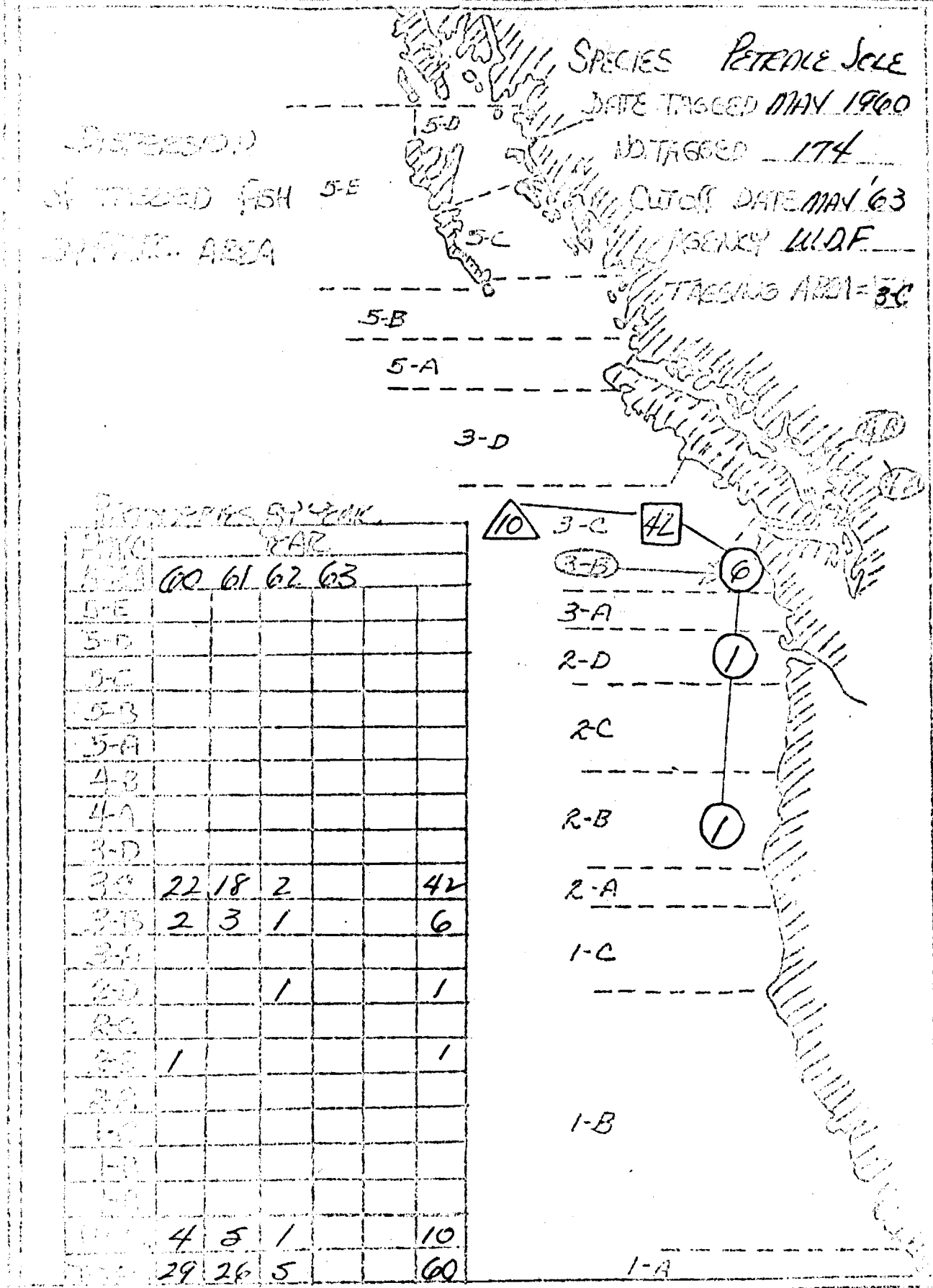
DISPERSION of TAGGED FISH BY P.M.F.C. AREA

SPECIES Pacific Cod
DATE TAGGED Sept, 62
NO. TAGGED 245
CUT OFF DATE June 63
AGENCY F.R.B.
TAGGING AREA = 3C



RECOVERIES BY YEAR

PMFC AREA	YEAR 62	63				
5-E						
5-D						
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3-C	1	3				4
3-B						
3-A						
2-D						
2-C						
2-B						
2-A						
1-C						
1-B						
1-A						
UNK		2				2
TOTAL	1	5				6



RECOVERIES BY YEAR						
AREA	60	61	62	63		
5-E						
5-D						
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3-C	22	18	2			42
3-B	2	3	1			6
3-A						
2-D			1			1
2-C						
2-B	1					1
2-A						
1-C						
1-B						
1-A	4	5	1			10
TOTAL	29	26	5			60

SPECIES Petrale Sole

DATE TAGGED Feb 1962

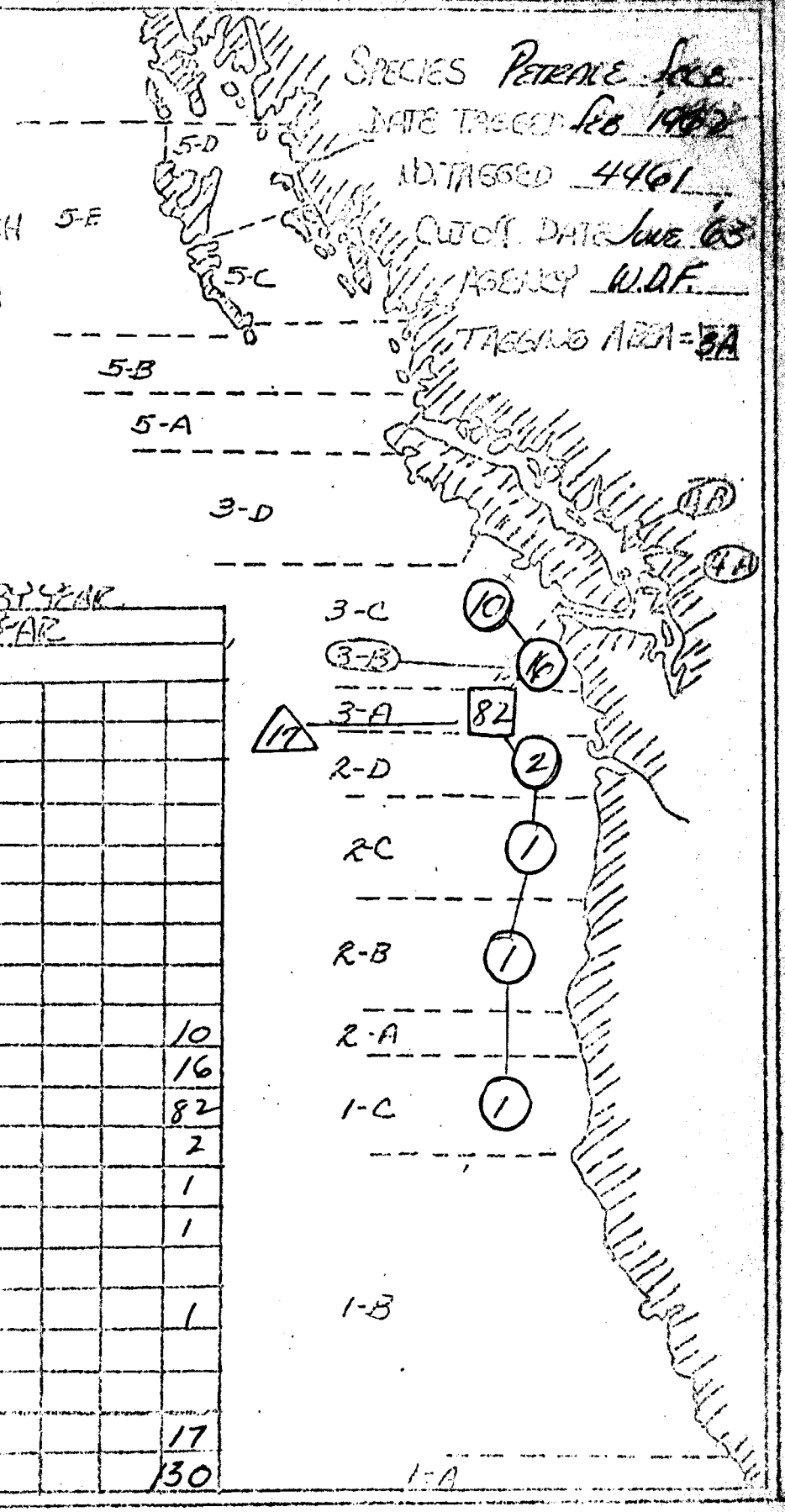
NO. TAGGED 4461

CUT OFF DATE June '63

AGENCY W.D.F.

TAGGING AREA = 3A

DISTRIBUTION OF TAGGED FISH BY STATISTICAL AREA

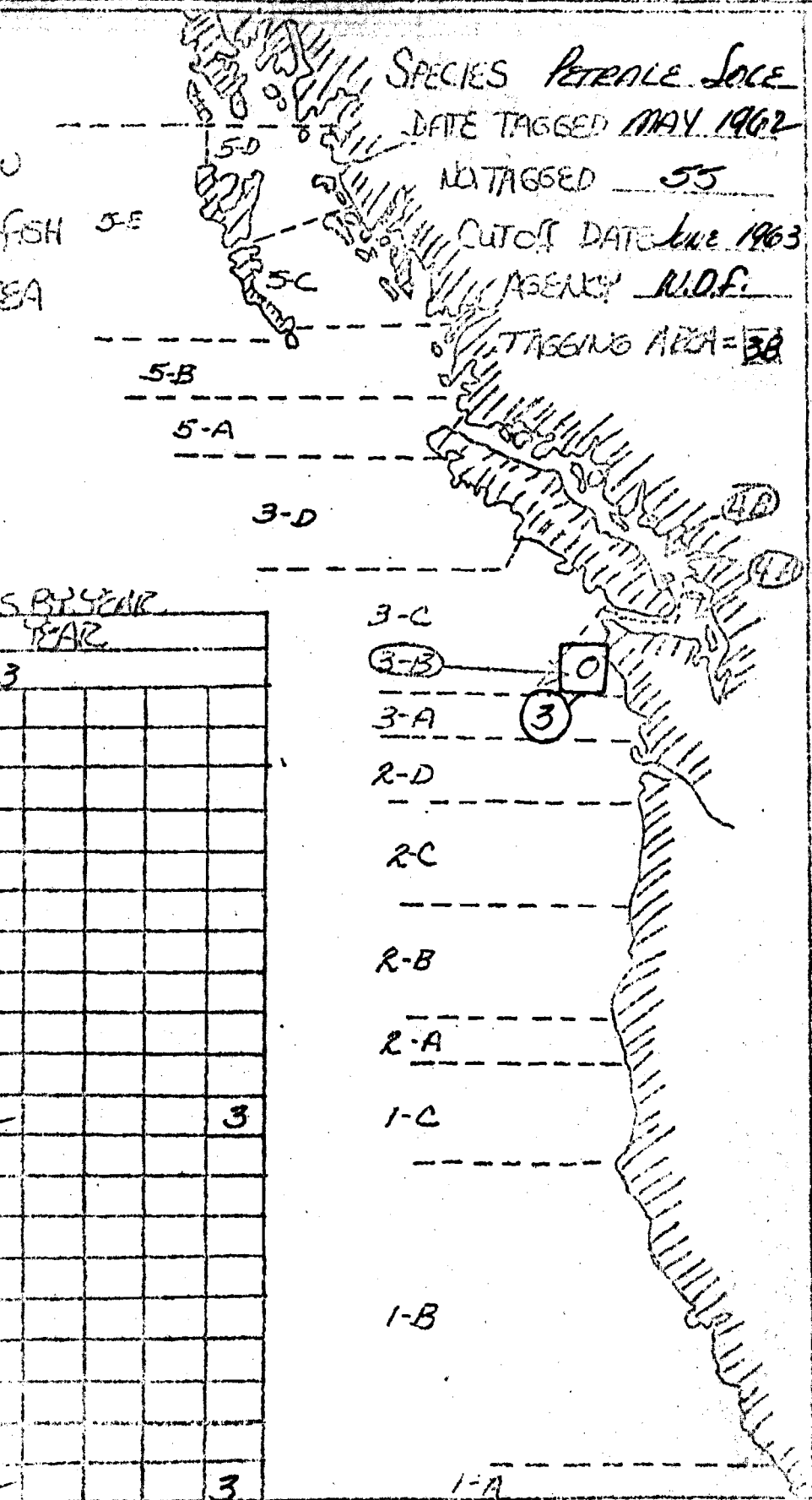


RECOVERIES BY YEAR

TAGGING AREA	YEAR 62	63				
5-E						
5-D						
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3-C	10					10
3-B	14	2				16
3-A	56	46				82
2-D	2					2
2-C		1				1
2-B	1					1
2-A						
1-C		1				1
1-B						
1-A						
	16	1				17
	79	51				130

SPECIES Petrale Sole
DATE TAGGED MAY 1962
NO TAGGED 55
CUTOFF DATE June 1963
AGENCY W.D.F.
TAGGING AREA = 3B

DISPERSION OF TAGGED FISH BY P.M.F.C. AREA

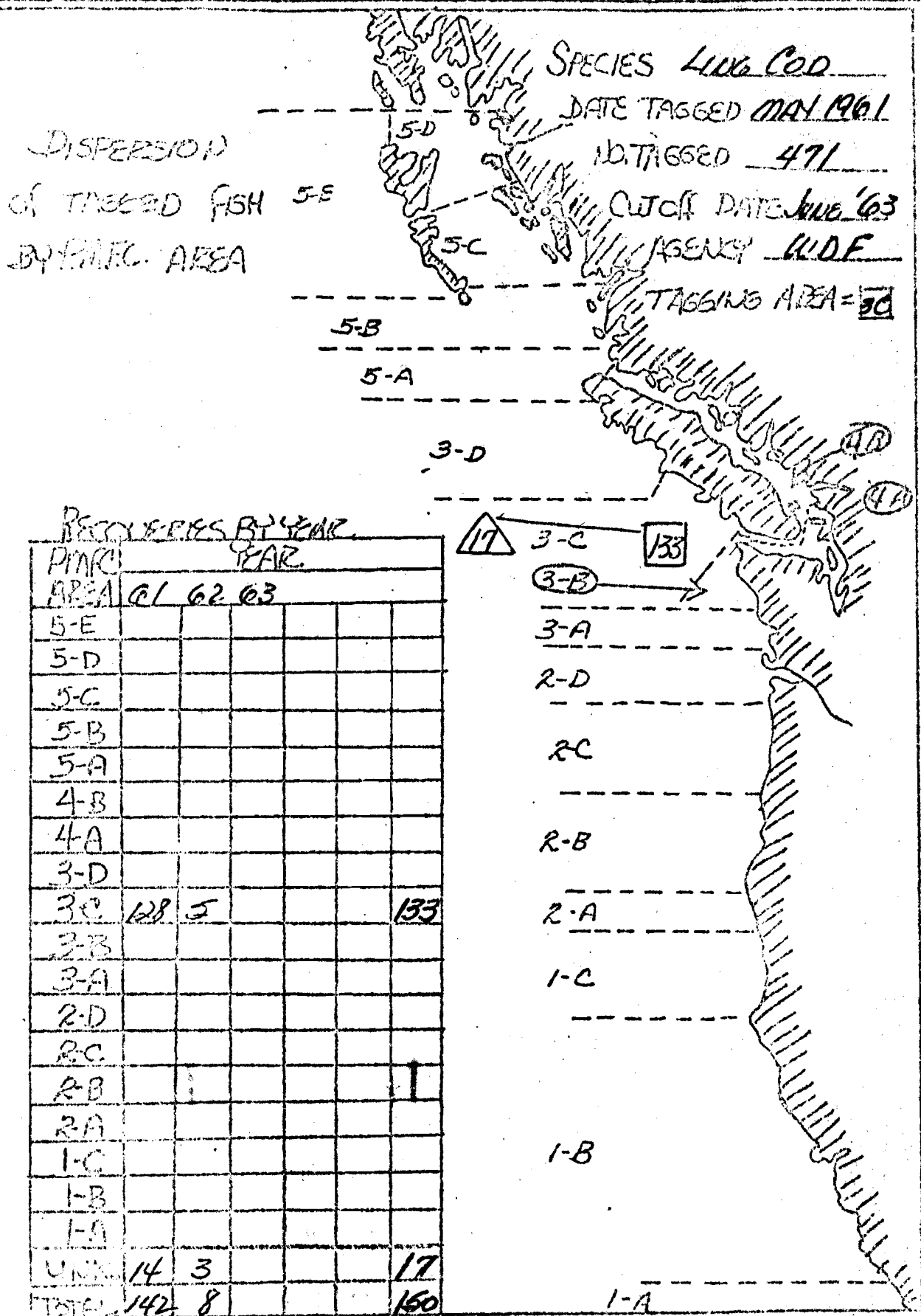


RECOVERIES BY YEAR

P.M.F.C. AREA	YEAR 62	63				
5-E						
5-D						
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3-C						
3-B						
3-A	1	2				3
2-D						
2-C						
2-B						
2-A						
1-C						
1-B						
1-A						
UNK.						
TOTAL	1	2				3

DISPERSION OF TAGGED FISH BY STAT. AREA

SPECIES Ling Cod
DATE TAGGED MAY 1961
NO. TAGGED 471
CUTOFF DATE June '63
AGENCY ODF
TAGGING AREA = 3C

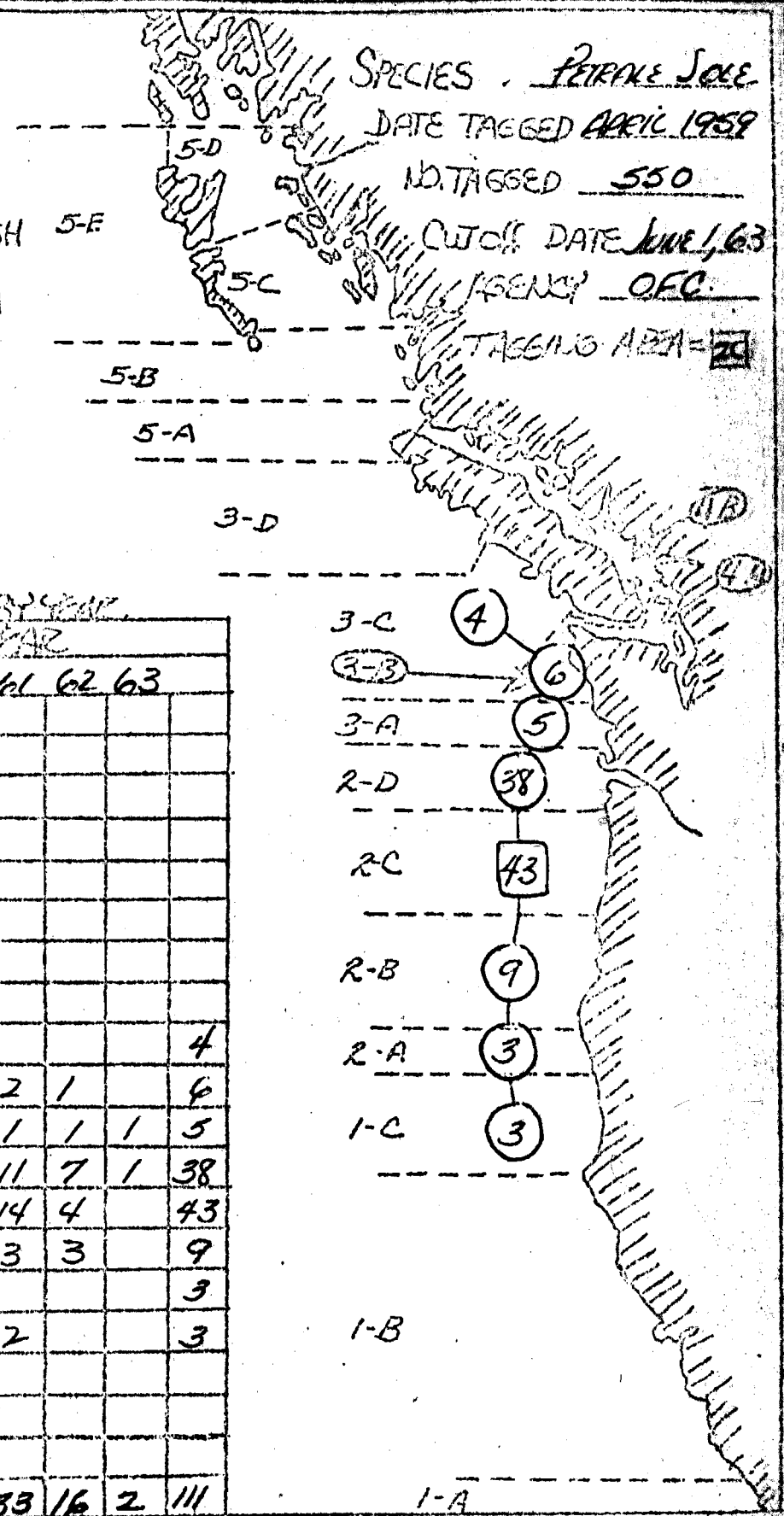


RECOVERIES BY YEAR

STAT. AREA	YEAR 61	62	63			
5-E						
5-D						
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3-C	128	5				133
3-B						
3-A						
2-D						
2-C						
2-B		1				1
2-A						
1-C						
1-B						
1-A						
UNK.	14	3				17
TOTAL	142	8				160

DISPERSION OF TAGGED FISH BY P.M.F.C. AREA

SPECIES . PERFECT SOLE
DATE TAGGED APRIL 1959
NO. TAGGED 550
CUT OFF DATE JUNE 1, 63
AGENCY OFC.
TAGGING AREA = 2C

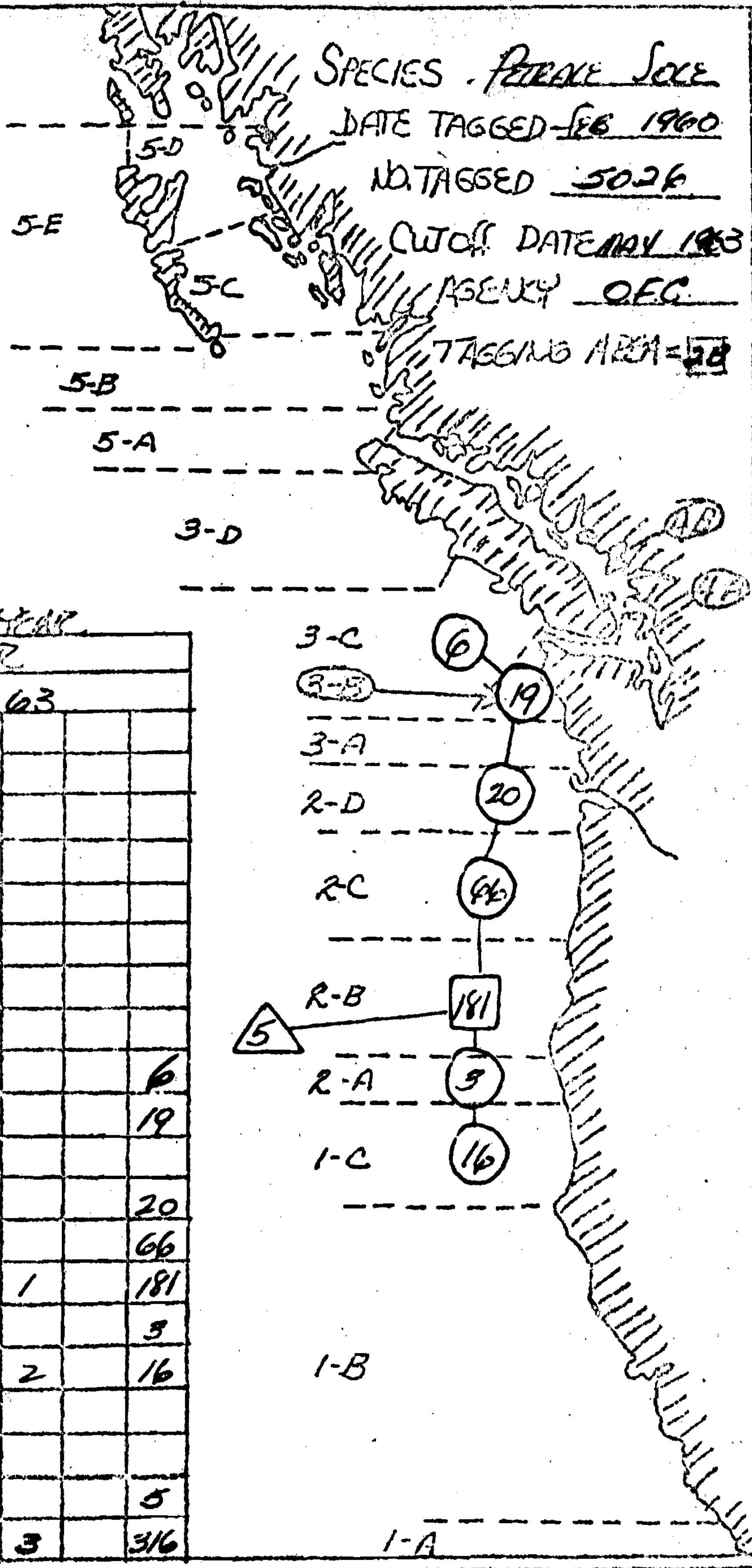


RECOVERIES BY YEAR

PMFC AREA	59	60	61	62	63	
5-E						
5-D						
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3-C	3	1				4
3-B	1	2	2	1		6
3-A		2	1	1	1	5
2-D	5	14	11	7	1	38
2-C	7	18	14	4		43
2-B		3	3	3		9
2-A	2	1				3
1-C	1		2			3
1-B						
1-A						
UNK.						
TOTAL	19	41	33	16	2	111

DISPERSION OF TAGGED FISH BY P.M.F.C. AREA

SPECIES: PETRALE SOLE
DATE TAGGED: FEB 1960
NO. TAGGED: 5026
CUTOFF DATE: MAY 1963
AGENCY: O.F.C.
TAGGING AREA = 2B

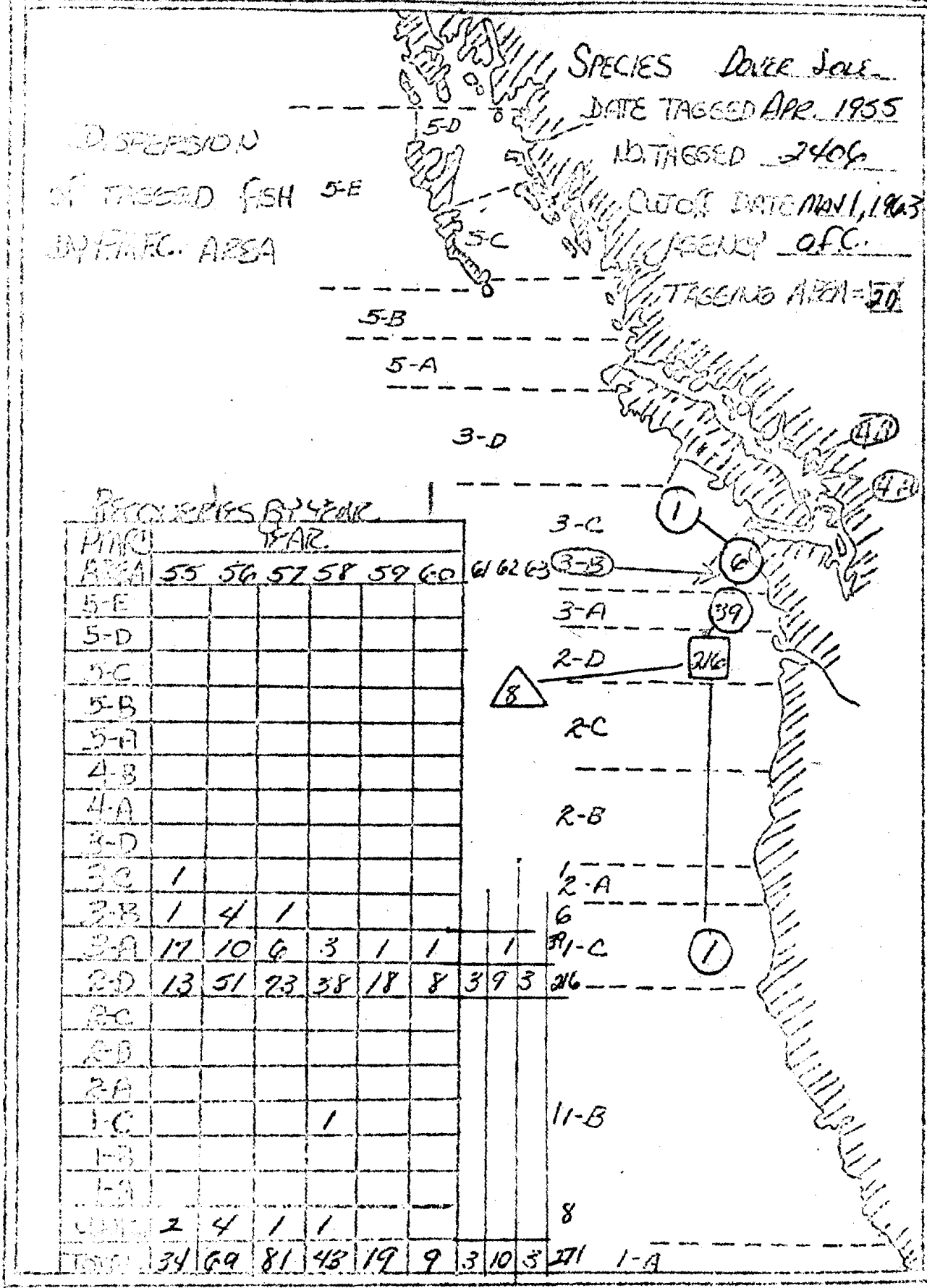


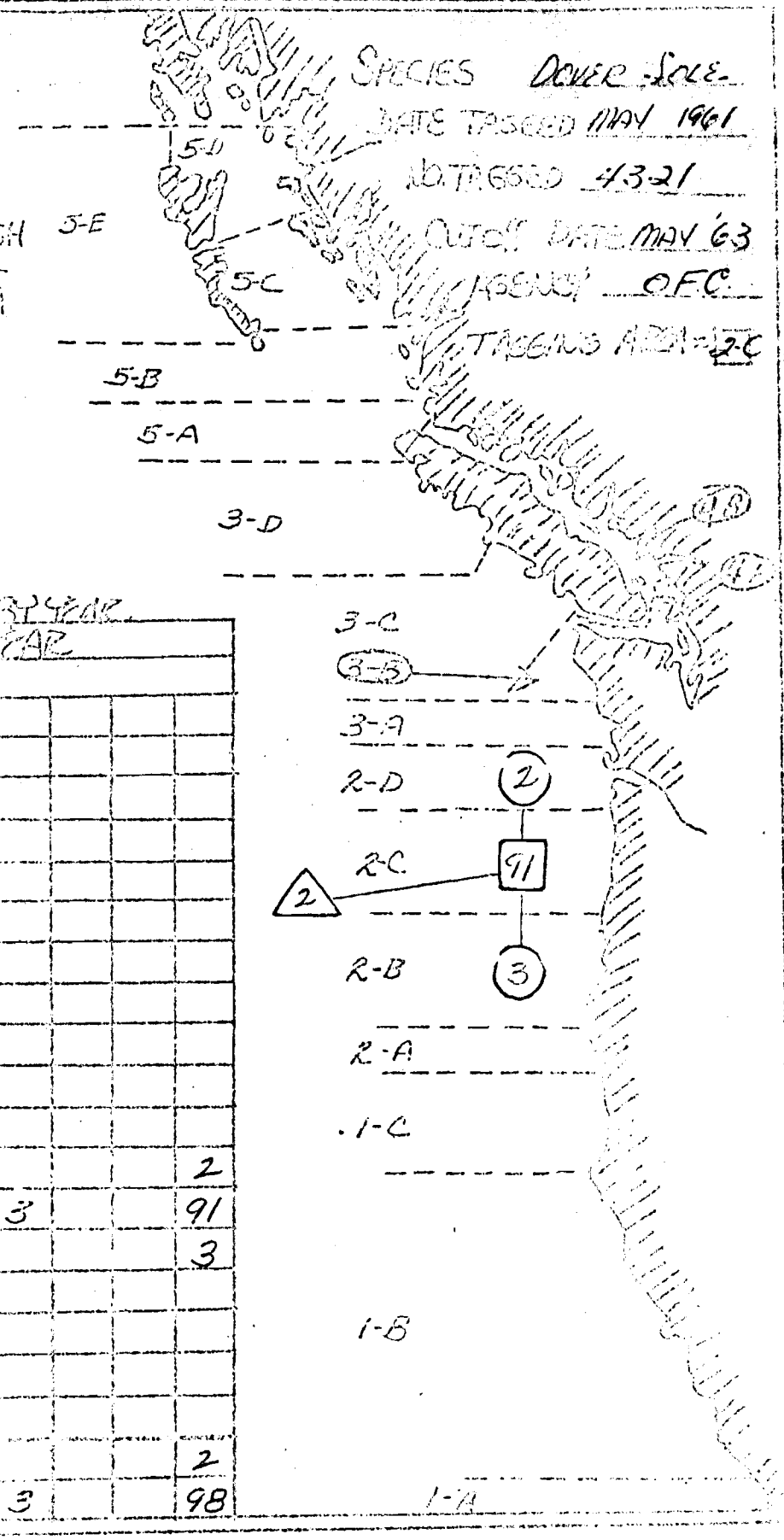
RECOVERIES BY YEAR

PMFC AREA	YEAR 60	61	62	63		
5-E						
5-D						
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3-C	5	1				6
3-B	5	11	3			19
3-A						
2-D	8	9	3			20
2-C	27	21	18			66
2-B	104	30	46	1		181
2-A	1	2				3
1-C	1	4	9	2		16
1-B						
1-A						
UNK.	4		1			5
TOTAL	155	78	80	3		316

+25 through May of 1964

5 to Eureka


SPECIES Dover Sole
DATE TAGGED APR. 1955
NO. TAGGED 2406
CUT OFF DATE NOV 1, 1963
AGENCY O.F.C.
TAGGING AREA = 20
DISPERSION OF TAGGED FISH BY STAT. AREA
5-D
5-E
5-C
5-B
5-A
3-D
3-C
3-B
3-A
2-D
2-C
2-B
2-A
1-C
1-B
1-A
4-B
4-A
RECOVERIES BY YEAR
STAT. AREA
55 56 57 58 59 60 61 62 63
5-E
5-D
5-C
5-B
5-A
4-B
4-A
3-D
3-C 1
3-B 1 4 1
3-A 17 10 6 3 1 1 1 39
2-D 13 51 23 38 18 8 3 9 3 216
2-C
2-B
2-A
1-C 1
1-B
1-A
UNK 2 4 1 1 8
TOTAL 34 69 81 43 19 9 3 10 3 271
1
6
39
216
8
1



RECOVERIES BY YEAR

AREA	YEAR					
5-E						
5-D						
5-C						
5-B						
5-A						
4-D						
4-B						
3-D						
3-C						
3-B						
3-A						
2-D		2				2
2-C	12	76	3			91
2-B		3				3
2-A						
1-C						
1-B						
1-A		2				2
	12	83	3			98

SPECIES Dover Sole

DATE TAGGED MAY 1961-63

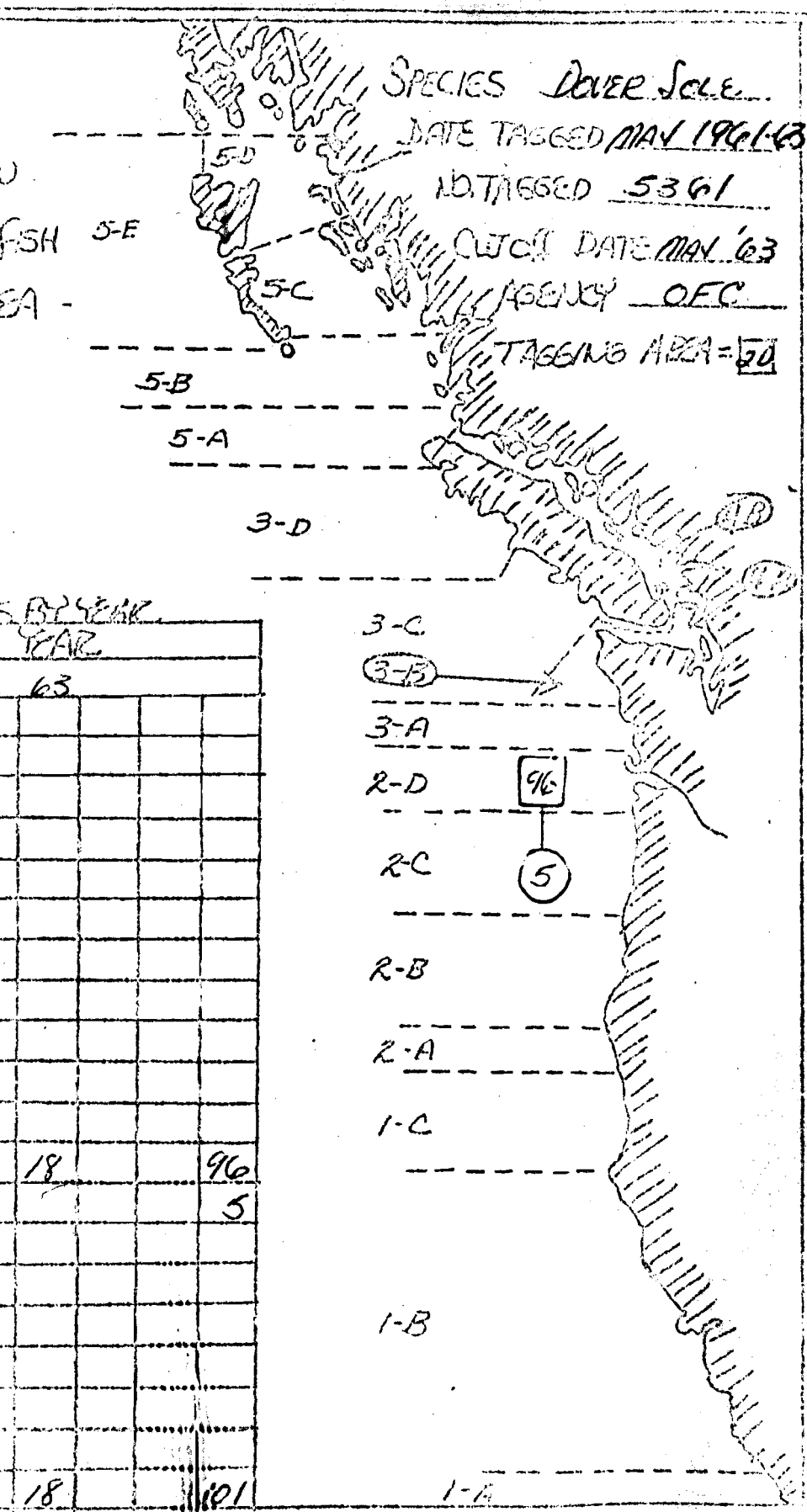
I.D. TAGGED 5361

CATCH DATE MAY '63

AGENCY OEC

TAGGING AREA = 5D

DISPERSION OF TAGGED FISH BY P.M.F.C. AREA -

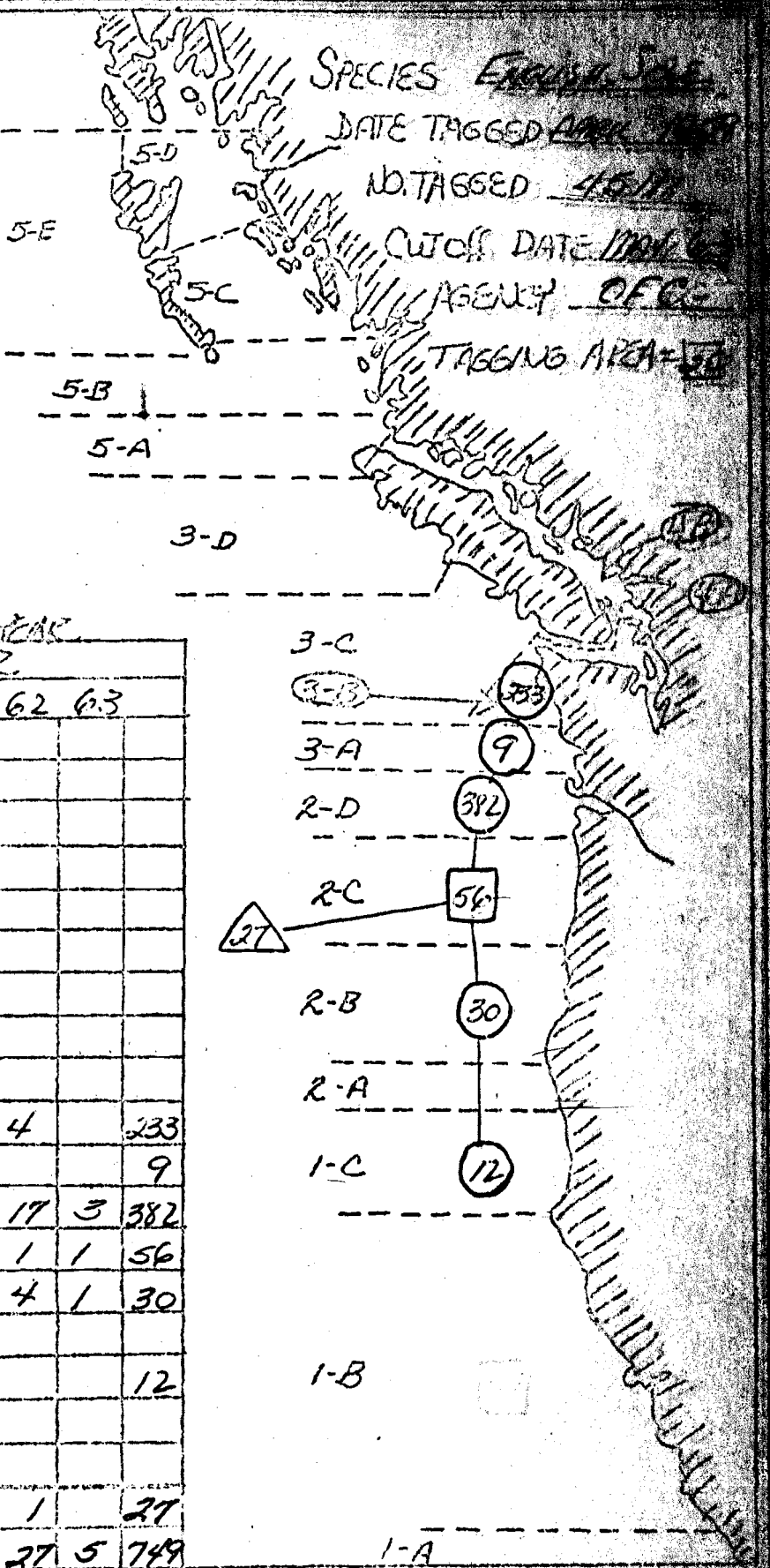


RECOVERIES BY YEAR

PMFC AREA	YEAR 61	62	63			
5-E						
5-D						
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3-C						
3-B						
3-A						
2-D	7	71	18			96
2-C		5				5
2-B						
2-A						
1-C						
1-B						
1-A						
UNK						
TOT	7	76	18			101

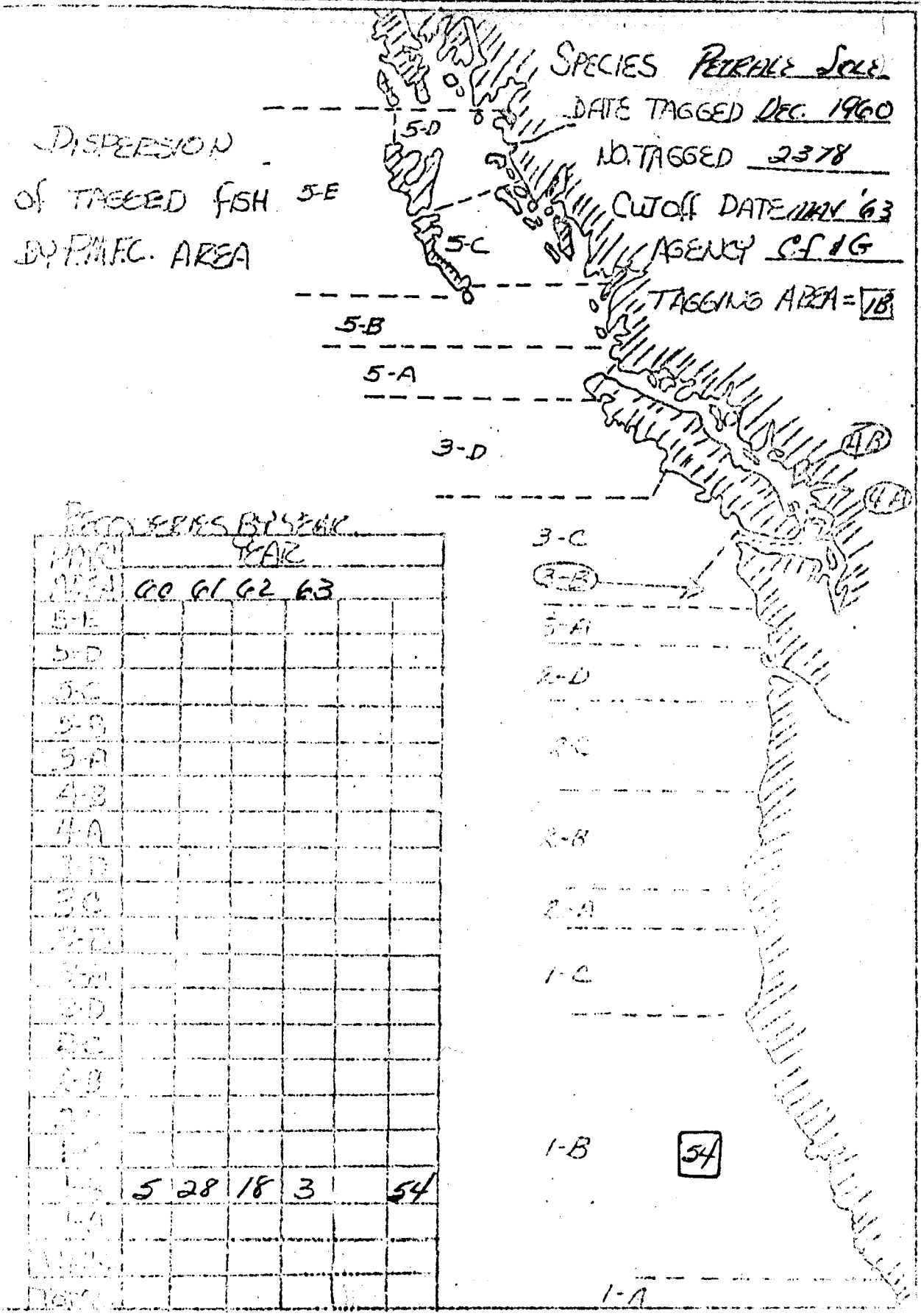
DISPERSION
of TAGGED FISH
BY RIVER AREA

SPECIES English Sole
DATE TAGGED March 1963
NO. TAGGED 4518
CUTOFF DATE March 63
AGENCY OFC
TAGGING AREA = 3-B

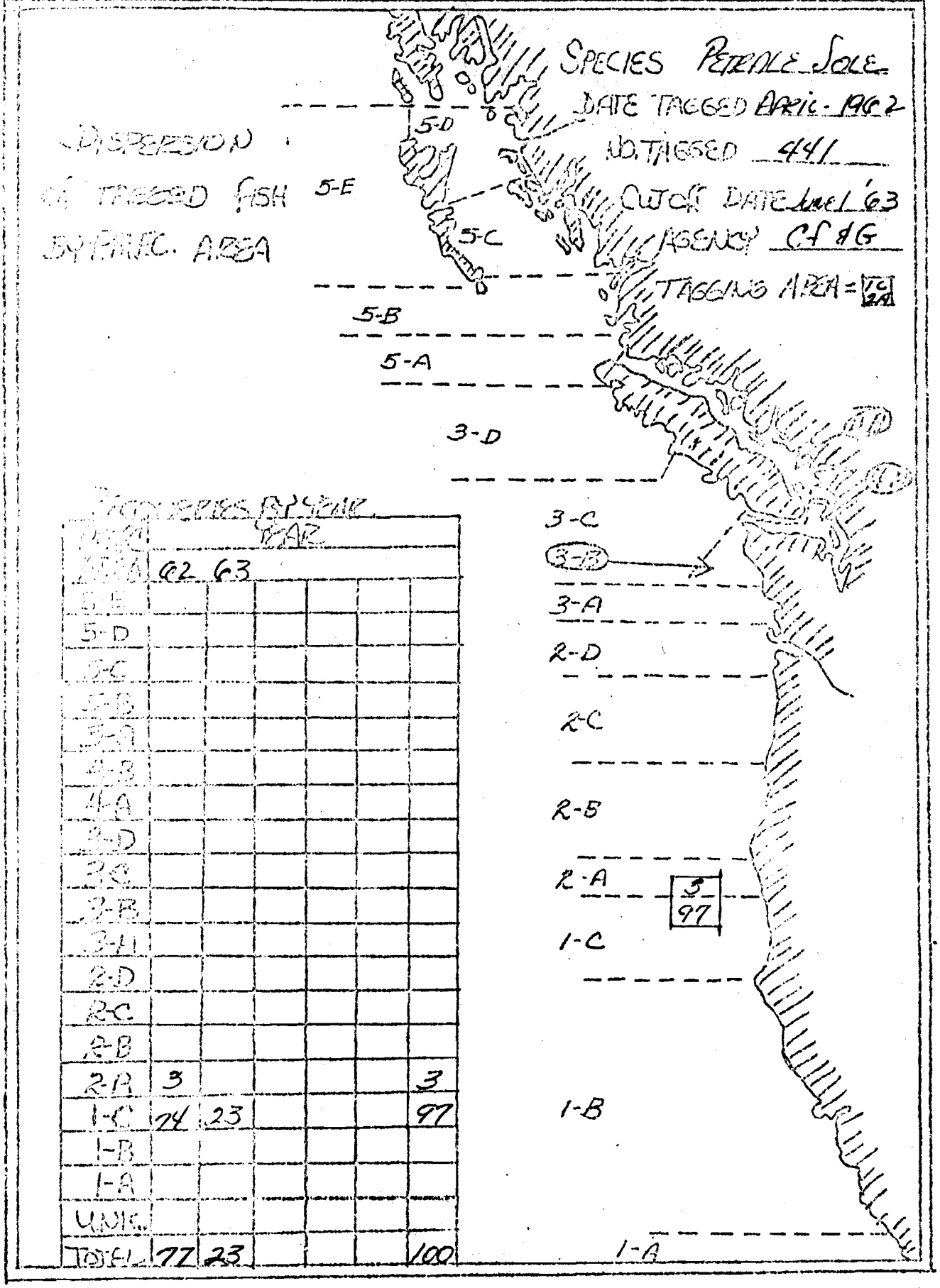


RECOVERIES BY YEAR

RIVER AREA	YEAR 59	60	61	62	63	
5-E						
5-D						
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3-C						
3-B	35	138	56	4		233
3-A	6	3				9
2-D	189	132	41	17	3	382
2-C	22	23	9	1	1	56
2-B	10	13	2	4	1	30
2-A						
1-C	2	6	4			12
1-B						
1-A						
OUT	4	20	2	1		27
TOTAL	268	355	114	27	5	749



PMFC AREA	TAG YEAR					
	60	61	62	63		
5-E						
5-D						
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3-C						
3-B						
3-A						
2-D						
2-C						
2-B						
2-A						
1-C						
1-B	5	28	18	3		54
1-A						
OFF						

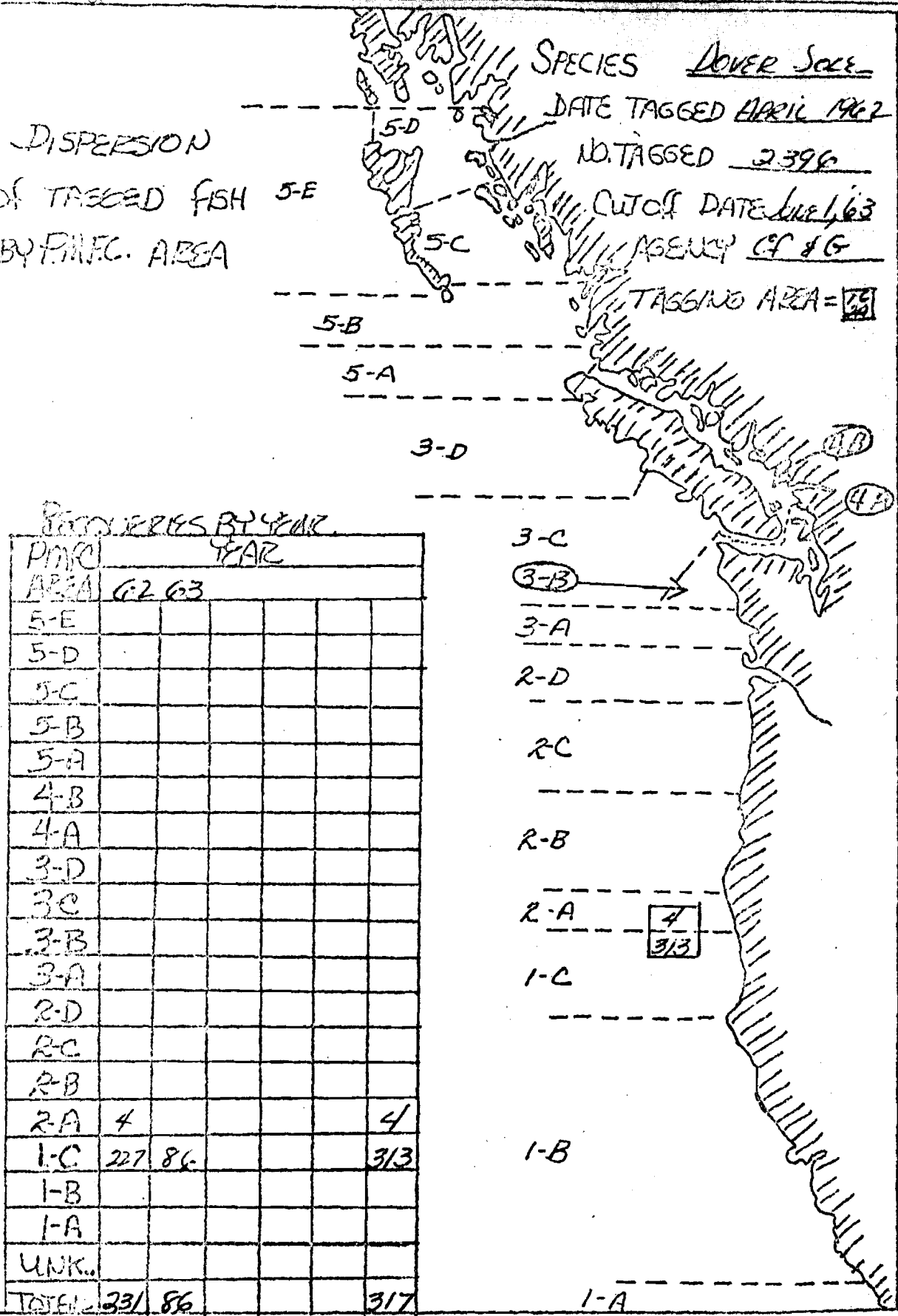


DISPERSION BY STAT. AREA

STAT. AREA	62	63				
5-E						
5-D						
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3-C						
3-B						
3-A						
2-D						
2-C						
2-B						
2-A	3					3
1-C	74	23				97
1-B						
1-A						
UNK.						
TOTAL	77	23				100

DISPERSION of TAGGED FISH BY P.M.F.C. AREA

SPECIES Dover Sole
DATE TAGGED April 1962
NO. TAGGED 2396
CUTOFF DATE June 1, 63
AGENCY CF & G
TAGGING AREA = 15/20



RECOVERIES BY YEAR

PMFC AREA	YEAR 62	63				
5-E						
5-D						
5-C						
5-B						
5-A						
4-B						
4-A						
3-D						
3-C						
3-B						
3-A						
2-D						
2-C						
2-B						
2-A	4					4
1-C	227	86				313
1-B						
1-A						
UNK.						
TOTAL	231	86				317

Appendix E (1).

Synopsis of Otter Trawl Regulations in Effect July 1, 1963, in the Several Jurisdictions of the Pacific Coast

Revised July 1, 1963
Originally Prepared
Jan. 1, 1960 by
M. C. James

Note: The following summary covers the fishery for fin-fish and cites only those regulations which are considered as having a direct bearing on the management and conservation of bottom fish stocks. Legal provisions having primary fiscal or administrative purposes, such as poundage taxes, keeping of records, submission of reports; or having general applications such as licenses, boat registrations, etc. are omitted. For purposes of this report, no effort is made to distinguish between territorial and non-territorial waters. The shrimp fishery may be considered as a trawl fishery but present distinct individual problems of management and regulation which have not yet become a matter of international concern. It is accordingly treated separately in a supplementary concluding analysis.

Type of Regulations

1. CLOSURE OF FISHING BY SEASON

California

No seasonal closure for fin-fish.

Oregon

During period January 1 to March 31, incidental catches of petrale sole limited to not more than 6,000 lbs. per boat trip. Not more than 100 such fish may be less than 11 in. No other seasonal closures for fin-fish.

Washington

During period December 23 to March 31 of year following, incidental catches of petrale sole limited to not more than 6,000 lbs. per boat trip not exceeding two trips per month per boat.

Five varying closure periods are applied to six local areas in the inside waters of Puget Sound.

Canada

During period December 20 to April 15 inclusive no brill (petrale sole) may be taken except for incidental catch not exceeding 3,000 lbs. per boat trip for a maximum of two boat trips per month.

During period December 1 to the last day of February no lingcod may be taken in the waters of the Strait of Georgia.

Several varying closure periods are applied to local areas inside the Strait of Georgia.

Alaska

Sablefish may be taken from May 1 to November 30 by long line only in southeastern Alaska. Otherwise, no restrictions on bottom fish.

2. CLOSURE OF FISHING BY AREA

California

Use of trawl nets prohibited in waters less than 3 nautical miles from nearest point of land on mainland shore, including certain named bays.

Possession of trawl net prohibited in California from Santa Barbara - Ventura County line south to Mexican border.

Oregon

Otter trawl fishing limited to waters of the Pacific Ocean.

Washington

Otter trawl fishing prohibited in 15 named areas in inside waters of Puget Sound.

Grays Harbor, Willapa Harbor and Columbia River excluded from "coastal waters" open to otter trawl fishing.

Canada

Chief Supervisor may prohibit all trawl fishing in any area at any time when deemed necessary to prevent adverse effects on population.

Numerous named areas in inside waters are closed entirely to trawl fishing.

Alaska

See Sect. 1 above.

3. DEFINITION OF LEGAL GEAR

California

See Appendix E (2).

Oregon

See Appendix E (2).

*Washington

See Appendix E (2).

Canada

See Appendix E (2).

Alaska

Trawls legal for bottom fish, with exception noted above.

* Nets having minimum mesh of 3 in. throughout may be operated in ocean perch fishery under permit.

4. MINIMUM SIZE LIMITS

California

No California halibut (Paralichtys californicus) which weighs less than 4 pounds in the round, or less than 3½ pounds dressed head on, or less than 3 pounds dressed head off, may be taken, possessed or sold. The holder of a commercial fishing license may possess during one day for non-commercial use not more than 30 pounds of California halibut of less than such minimum weight if taken incidentally in commercial fishing.

Oregon

Minimum size of 11 in. over-all for Dover, English or petrale sole, with tolerance of sub-legal fish of not to exceed 100 in the aggregate per boat trip.

Minimum size of 17 in. measured from origin of first dorsal to end of tail or 3 lbs. dressed weight for sablefish (black cod).

Washington

Minimum size of 11-1/2 in. for any species of flounder and sole, except minimum of 14-1/2 in. for starry flounder.

Minimum size of 17 in. from origin of first dorsal fin to end of tail for sablefish (black cod).

Minimum size of 48 in. and maximum size of 72 in. for round sturgeon and minimum of 33 in. and maximum of 53 in. for dressed sturgeon.

Canada

Minimum size of 12 in. tip of snout to tip of tail for lemon sole, rock sole, brill (petrale sole) and starry flounder.

Minimum size of 3 lbs. dressed head off for both lingcod and sablefish (black cod). (now 23" on longest total length)

Alaska

No restrictions.

5. REGULATION OF UTILIZATION (FOOD AND NON-FOOD USE)

California

Trawl-caught fish used for other than human consumption taxed 5¢ per 100 lbs. Whole fish ground for mink food must be held under refrigeration.

Oregon

Catching or disposal of Dover sole, English sole or petrale sole for animal food or reduction purposes prohibited. However, incidental catch tolerance for reduction or animal food purposes of above species allowed in the aggregate in the amount of 2,000 lbs. or 20% by weight, whichever is greater, of any single landing.

Washington

Taking or disposal of food fish except for human consuption or bait prohibited, with exception of following species:

Dogfish and other species of shark
Arrowtooth halibut
Hake
Pollock or whiting
Bellingham sole
* Priest fish (Sebastodes mystinus)
* Sand dabs
* Slender sole
** Herring

* When taken in waters of Pacific Ocean.
** In Strait of Georgia, Washington State Areas 2 and 2A.

Canada

No limitation on utilization of legally-caught bottom fish.

Alaska

No restrictions.

6. MISCELLANEOUS REGULATIONS

California

Otter or beam trawl operators must keep a daily log book and render the information to the Department. The required recording includes:

(a) Time and place of each haul, each trip.

(b) Duration of haul and approximate composition of catch for each haul.

(c) Time of trip.

(d) Total landed weight by species.

The Shrimp Fishery

Since the ocean shrimp fishery is apparently not within the present terms of reference of the Joint Trawl Committee no exhaustive digest of the regulations is herein presented. It may be noted that California sets over-all quotas on an area basis and has a winter closed season. Oregon has no restrictions on season or quantity of shrimp to be taken and permits use of "shrimp trawls" as well as beam trawls. Washington has seasonal closures in certain inside waters of Puget Sound, but permits year-round fishing with any suitable gear in coastal waters and waters of the Pacific Ocean. Washington regulations stipulate a maximum distance between otterdoors and wings of shrimp trawl nets and requires that undersized shrimp (described as unmarketable) must be returned to the water with a 10% tolerance. Canada apparently imposes no restrictions on an ocean shrimp fishery. However, the regulations governing the retention of a fin-fish caught incidental to a lawful shrimp fishery may be relevant to any study of the status of bottom fish stocks. The existing provisions are cited below:

California

It is unlawful to possess any fish other than shrimp or prawns on a boat engaged in the shrimp fishery.

Oregon

An incidental catch of not to exceed 3,000 lbs. of ocean or bottom fish per boat trip is permitted. Not more than 100 of such fish in the aggregate may be English, petrale or Dover sole of not less than 11 in. in length.

Washington

It is lawful to retain, for human consumption, bottom fish of legal size, other than halibut, not exceeding 3,000 lbs. per boat per trip when taken incidental to lawful shrimp fishing in the ocean.

Canada

No provisions covering incidental catches of fin-fish, although regulations imply that no fin-fish may be taken with less than 4 in. mesh.

Alaska

Regulations regarding shrimp fishing in Alaska are as follows:

Legal gear, shrimp - Shrimp may be taken by means of pots, beam trawls, and otter trawls except as follows:

(a) Shrimp may not be taken at any time by means of otter trawls in the combined area of District 8, District 10 eastward of the longitude of Cape Fanshaw, and District 6 northward of the latitude and eastward of the longitude of Point Baker.

(b) District 8: the minimum mesh size for beam trawls shall be 1½-inch cotton mesh or 1¼-inch nylon mesh. Open fishing season, shrimp: shrimp may be taken from January 1 to December 31. In the combined area of District 8, District 10 eastward of the longitude of Cape Fanshaw, and District 6 northward of the latitude and eastward of the longitude of Point Baker, shrimp may be taken from May 1 to February 14.

Summary of laws and regulations relating to definition and measurement of net mesh sizes on the Pacific Coast

1. LEGAL DEFINITION OF MINIMUM MESH SIZE

California

No natural or synthetic webbing less than 4½ in. may be possessed on boat.

Hog-ring bags or cod-ends shall have minimum mesh measurement not less than 6 in. when wet.

Double bags or cod-ends shall have individual meshes, coinciding knot for knot in each layer, not less than 4½ in. in length.

Chafing gear permissible.

Oregon

Meshes measuring more than 3 in. but less than 4 in. prohibited except the intermediate and cod-end sections must be of a mesh size of 3 in. or less or 4½ in. or greater.

Chafing gear permissible subject to restrictions as to mesh size (9 in.) or protective coverage.

Hog-ring cod-ends shall have minimum mesh measurement not less than 6 in.

Double bags or cod-ends shall have individual meshes, coinciding knot for knot in each layer, measuring 3 in. or less, or 5 in. or greater.

Washington

Minimum mesh size of 3½ in. in last 75 meshes of cod-end and intermediate, remainder of net may have meshes of any size greater than 3 in.

Hog-ring type cod-ends not more than 20 meshes in length or 100 meshes in circumference, and constructed of manila or hemp rope not more than 3/8 in. in diameter, and meshes shall measure not less than 6 in. when wet.

Double cod-ends - no meshes less than 5 in. between knots, and not more than 30 meshes in length or more than 100 meshes in circumference. Double bags must be constructed of cotton web or not more than 120 thread, and tied to the rib lines so that knots and meshes coincide the full length of the double layer.

Chafing gear shall not cover more than the last 120 meshes of the net and bag combined, not more than one-half of their circumference, and shall not be fastened to the net or bag at the trailing edge. Nor more than 8 rib lines may be used.

Canada

"Mesh size" means the distance between the inside of diagonally opposite knots of any mesh as determined after the net has been immersed in water.

It is not permissible to use a double layer of mesh in the cod-end of a trawl unless the layers are tied or knitted together in such manner that the size of any mesh is not reduced by the layer attached to that mesh.

Minimum mesh size in trawl is 4 in. (other than shrimp) with the following exceptions. In the Strait of Georgia minimum mesh size for trawl (other than shrimp) in the final 50 meshes including cod-end is:

(a) Manilla or sisal - 4-3/4 in.

(b) Cotton - 4½ in.

(c) Synthetic fiber - 4¼.

Operating vessel shall have a scupper opening not less than 36 in. wide or multiple openings not less than 12 in. each.

Alaska

No minimum mesh size.

2. LEGAL DEFINITION OF METHODS OF MEASUREMENT

California

"by taking at least four meshes and measuring them inside the knots while they are simultaneously drawn closely together"

Hog Rings - "by taking at least four meshes and measuring them inside the wire, hog-rings while they are simultaneously drawn closely together", and "measured when wet between proximal wires, rings, etc."

Oregon

Definitions are variable. By statute: "by measuring the mesh diagonally from opposite corner to opposite corner between the center of the knots, the mesh to be stretched taut so as to bring together the other 2 corners" by Fish Comm. Orders and in local statutes: "taut measure" "stretch measure between knots" or "opposing knots" or "hog-rings" or "by stretching mesh taut and measuring distance between knots of a single mesh".

Washington

Size of mesh is defined as the measurement of the distance between knots of each mesh when the mesh is stretched diagonally by hand using a reasonable tension.

Beginning January 1, 1965, the size of a mesh of any net shall be defined as the distance between the inside of one knot to the outside of the opposite vertical knot of one mesh when the mesh is stretched vertically, wet [redacted], by using a tension of ten pounds on any three consecutive meshes, then measuring the middle mesh of the three while under tension.

Canada
All regulations for B.C. specify "extension measure". This is not further defined.

Alaska
All mesh is measured from one knot to include the next knot.

3. METHODS OF MEASUREMENT USED BY ENFORCEMENT OFFICERS

California
As described above.

Oregon
Generally by stretching web and measuring single meshes with ruler or flexible tape.

Washington
Usually web is stretched by hand and distance between knots is measured with ruler or tape.

Canada
Officers measure when the net is wet by grasping diagonally opposite knots and applying tension so as to close the mesh. Measurement is made from the inside of one knot to the inside of the knot diagonally opposite.

Alaska
Nil

4. DEVICES USED OR CAPABLE OF USE FOR MEASUREMENT

California
No special devices.

Oregon
Constant pressure mesh measuring gauge manufactured in Holland is available at Research Lab.

Washington
None currently used. A constant tension device has been designed experimentally.

Canada
No special device. An official I.C.E.S. gauge is available - not used for enforcement.

Alaska
Nil