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 SEVENTH ANNUAL MEETING

JUNE 28-30, 1966

PORTLAND, OREGON

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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

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DATE: June 28 - 30, 1966

PLACE: Public Service Building, Portland, Oregon

PARTICIPANTS:

CANADA	-	J. A. Thomson - Chairman C. R. Forrester A. W. Argue
UNITED STATES		
Washington	-	D. E. Kauffman E. K. Holmberg G. S. DiDonato (observer)
Oregon	-	J. M. Van Hyning J. M. Meehan A. R. Magill (observer)
California	-	T. Jow
PMFC	-	L. A. Verhoeven (observer)

I. CALL TO ORDER

The seventh annual meeting of the Technical Sub-Committee was called to order at 0900 hours on June 28, 1966, by Chairman J. Thomson under instructions set forth by the parent committee in 1959. The business of the meeting was guided by a prepared agenda which is included as Appendix A.

II. APPOINTMENT OF SECRETARY

T. Jow, of California, was appointed to act as recording secretary for the meeting.

III. APPROVAL OF AGENDA

The agenda as circulated prior to the meeting was approved and each item discussed consecutively.

IV. STATUS REPORTS

A change from the format of comparing current catch and effort with that of the previous 5 years to one of comparison with data of the previous 10 years was agreed upon by a majority of Sub-Committee members prior to the meeting. There was discussion on which years should constitute the 10-year period and how the 10-year mean catch per effort should be calculated. The 10-year period, prior to 1965, was agreed upon as was the mean C/E of the 10 values for 1955-1964.

1. Total Catch and Effort for the 1965 Trawl Fishery

The 1965 otter trawl catch by Canadian and United States fishermen from northeastern Pacific waters was approximately 164.8 million pounds. This total includes catch from PMFC areas 4A and 4B, Puget Sound and Strait of Georgia, respectively. This catch was 21% greater than the 136 million pound catch of 1964 and 25% greater than the mean 10-year catch of 131.5 million pounds (Table 1).

Total effort increased 2% from 163,012 hours in 1964 to 166,182 hours in 1965. The catch/effort for all species increased to 992 pounds per hour from the 835 pounds per hour of 1964. The 1965 catch/effort was also greater than the average for 1955-1964 of 814 pounds per hour (Table 1).

The Alaskan catch by Pacific coast fishermen was negligible in 1965. Canada and Washington had record catches of 43.9 and 52.8 million pounds, respectively. The Oregon catch of 33.2 million pounds was the highest for the past decade, while the California catch of 34.8 million

pounds was the highest since 1959.

There were substantial increases in landings of Pacific cod and Pacific ocean perch, the major individual species for the past few years. Landings in 1965 of Pacific cod and Pacific ocean perch increased 58 and 42%, respectively, over 1964 landings.

The 1965 sole catch of 47.9 million pounds was a 2% increase over the 1964 catch of 47.1 million pounds. Dover sole continued to be the leading flatfish in Pacific coast landings.

2. Petrale Sole

The 1965 total catch of 8.5 million pounds was 7% above the 1964 catch of 8.0 million pounds but 3% below the 1955-1964 mean catch. Canadian and Washington catches increased over those of 1964 while Oregon and California catches decreased slightly. This downward trend in Oregon and California was attributed to diversion of effort to Pacific ocean perch and Dover sole, respectively.

Canada. The Canadian catch of 1.3 million pounds was 5% greater than that of 1964 and 39% greater than the mean 1955-1964 catch. There were increases in catches for both southern (PMFC area 3C) and northern stocks (PMFC areas 3D through 5D). Average lengths of female petrale sole from both stocks increased in 1965 which together with reduced catch/effort suggests that there was no appreciable recruitment to the stocks in 1965.

Washington. The 1965 petrale catch was 2.7 million pounds. For the northern stocks, catch/effort was approximately equal to the mean for the past 10 years. Catch/effort for southern stocks (Area 3C) have improved over that of 1964 to the level of the 10-year mean. This is contrary to Canadian data but the improved Washington catch/effort is attributed

Table 1. Otter-trawl landings by Canadian and United States vessels from international statistical areas (PMFC) in 1965 and mean catch for 1955-1964.

	British Columbia	Washington	Oregon	California	Total	1955-1964 mean
English sole	1,335	4,484	1,678	4,893	12,390	11,909
Petrale sole	1,288	2,738	1,838	2,659	8,523	8,807
Dover sole	434	1,376	3,631	10,760	16,201	15,598
Pacific cod	24,466	9,942	194		34,602	16,412
Lingcod	3,840	4,570	852	618	9,880	7,154
Pacific Ocean perch	3,075	14,388	13,647	38	31,148	12,379
Other rockfish	642	6,517	4,121	7,635	18,915	21,788
Other species	5,028	7,163	3,113	5,324	20,628	20,517
Animal food	3,812	1,658	4,152	2,875	12,497	16,937
Total fish	43,920	52,836	33,226	34,802	164,784	131,501
Total hours	29,029	49,600	29,254	58,299	166,182	161,498
% of total catch	26.6	32.1	20.2	21.1		
Catch per hr. (lb)	1,513	1,065	1,085	597	992	814

to the new "rockpile" fishery at the southwest edge of the Cape Flattery Spit in 150-200 fathoms. Dogfish shark continue to interfere with petrale fishing in Area 3C.

Oregon. Total petrale landings of 1.8 million pounds were the lowest since 1961 and were 2% less than those of 1964, but they were 1% greater than the 10-year mean. Catch/effort in 1965 was slightly above that of 1964. During the January to March winter fishery, nearly 0.5 million pounds were taken in 1965 compared to 0.4 million pounds in 1964. Continued interest in Pacific ocean perch has caused a decrease in petrale sole fishing effort during most of the year.

California. The 1965 catch by California fishermen of 2.7 million pounds was almost identical to that of 1964 but was 13% below the 10-year mean for 1955-1964. Less effort was expended for petrale sole in 1965 as there was increased effort for Dover sole. Inclement weather again curtailed petrale fishing during winter.

3. Lingcod

Trawl landings of lingcod of 9.9 million pounds in 1965 were 37% greater than both the 7.2 million pound catch of 1964 and the 10-year mean. Canada and Washington shared the major proportion of the catch as Oregon and California fisheries for lingcod remain incidental to those for other species.

The catch from PMFC Area 3C (lower west coast of Vancouver Island) by Canadian and Washington fishermen increased 59% over that of 1964. There was a slight decrease in catch/effort for both Canadian and Washington trawlers in this area.

Canada. The Canadian trawl catch of lingcod in 1965 of 3.8 million pounds exceeded the 1964 catch by a million pounds and was 70% greater than the 10-year mean. Over 68% of the trawl catch was taken from grounds off the west coast of Vancouver Island with 1.7 million pounds from PMFC Area 3C and 0.9 million pounds from Area 3D. The Area 3C catch was 80% greater than that of 1964 and 63% greater than the 1955-64 mean. Catch/effort was 786 lb/hr. in 1965 compared to 878 lb/hr. in 1964, but 22% above the 10-year mean.

Washington. Lingcod landings during 1965 were 4.6 million pounds. Catch/effort was above average.

Oregon. The 1965 catch of 0.9 million pounds exceeded the 1964 catch by 16%. Lingcod are not fished intensively by Oregon fishermen but are generally caught incidental to flatfish in shallow areas.

California. In 1965, the 0.6 million pound catch was an 8% decrease from 1964. This catch was also 36% below the mean for 1955-64. As is the case in Oregon, lingcod are caught incidentally by trawlers fishing for flatfish.

4. Pacific Cod

Landings in 1965 of 34.6 million pounds exceeded 1964 landings by 58% and were over two times greater than the 10-year mean catch. The record 1965 Canadian catch of 24.5 million pounds exceeded the 1964 coastal total of 22 million pounds. Washington's catch of 9.9 million pounds accounted for most of the remaining total. Oregon had a catch of 0.2 million pounds while no Pacific cod were landed in California.

Canada. The 1965 British Columbia catch of 24.5 million pounds of Pacific cod was 57% greater than that of 1964 and three times the 1955-64 mean catch. The bulk of the catch, almost 19 million pounds, was taken in PMFC Areas 5C and 5D, while just over 2.5 million pounds were taken in Area 3C.

In northern Hecate Strait (Area 5D) the catch/effort of 1,951 pounds per hour slightly exceeded the record rate of 1964 and was substantially greater than the 10-year mean of 1,126 pounds per hour. Area 3C catch/effort of 768 pounds per hour decreased from that of 1964 and was about 10% less than the previous 10-year mean.

Analysis of length composition and tag returns suggest that the recent fishery has been supported principally by the exceptional strong 1962 year class. Sampling also suggests that fishermen are increasing exploitation in areas which usually do not produce heavy Pacific cod catches.

Assessment of current status of cod stocks is complicated by sharp variations in year-class strength coupled with changes in location of fishing activity. However, there is as yet no evidence of over-fishing.

Washington. The 1965 Washington trawl catch of Pacific cod was 9.9 million pounds. The 1965 catch/effort of 969 pounds per hour for Pacific cod in Hecate Strait was almost identical to that of 1964. Washington fishermen no longer expend enough effort in this area to provide data representative of stock fluctuations.

Oregon. Pacific cod landings of 194,000 pounds were 3% lower than those of 1964 and 20% below the 10-year average.

5. Pacific Ocean Perch

In 1965, Pacific ocean perch landings of 31.1 million pounds increased 42% over those of 1964 and were two and one-half times greater than the 10-year mean. As in recent years, the catch by Washington and Oregon fishermen of 14.4 and 13.6 million pounds, respectively, comprised most of the coastal landings. The Canadian catch of 3.1 million pounds and the California catch of 38,000 pounds formed the remainder. The recent upward trend in catch/effort established by Washington and Oregon fishermen was continued.

Canada. British Columbia trawlers landed a record catch of 3.1 million pounds of Pacific ocean perch. The 1965 catch taken primarily from PMFC Areas 5A and 5B (Queen Charlotte Sound) was almost three times that of 1964 and five times the mean catch for 1955-64. Catch/effort in 1965 for Canadian vessels in Queen Charlotte Sound was about 2,800 pounds per hour.

Washington. The 1965 Washington catch of 14.4 million pounds was the highest on record and exceeded the 1964 catch of 11.3 million pounds by 27%. The improved catch was made because there were no market limits imposed during 1965. The upward trend in catch/effort continued in 1965.

Oregon. The Pacific ocean perch catch by Oregon fishermen of 13.7 million pounds also represented a new high. This catch exceeded the previous 1964 high by 43%. The majority of the catch was taken from grounds off the Siletz River (PMFC Area 2C). Grounds off Coquille Point (Area 2B) and the south side of the Columbia River (Area 2D) were also productive in 1965. Catch/effort has increased along with total landings in recent years.

California. The incidental nature of California Pacific ocean perch landings is reflected in the 38,000 pound catch taken mostly from upper California, PMFC Area 1C.

6. English Sole

The 1965 coastal English sole catch of 12.3 million pounds was slightly above the 11.7 million pound catch of 1964 and the 10-year mean of 11.9 million pounds. Canadian landings decreased while the landings in other areas increased slightly. Washington and California with 4.5 and 4.9 million pounds, respectively, shared the bulk of the 12 million pound coastal catch.

Canada. British Columbia fishermen landed 1.3 million pounds of English sole in 1965. This catch was 8% below that of 1964 and 17% below the 10-year mean. The majority of the catch was made in PMFC Area 5D (northern Hecate Strait) where estimation of the condition of the stock has become increasingly difficult due to the shift in interest of fishermen to Pacific cod. In addition, the seasonal pattern of English sole landings has been altered by the change in fishing emphasis. An increasing percentage of landings of this species is being made incidental to catches of other species.

Washington. Although English sole are reported from all ocean areas, the bulk of the landings (89%) are from the northern Washington coast (PMFC Area 3B) where almost two-thirds of the effort for this species is expended. The catch/effort of 204 pounds per hour equaled the 10-year average. The trend in catch/effort since 1956 has displayed an increase to 281 pounds per hour in 1959 followed by a decrease to 161 pounds per hour in 1963 and an increase to 206 pounds an

hour in 1964.

Oregon. English sole landings for 1965 of 1.7 million pounds increased 7.5% over those of 1964. This catch was equal to the 10-year mean for the years 1955-64. Catch/effort for English sole increased in 1965.

California. The catch of English sole increased in all areas off California but the catch by California fishermen from PMFC Area 2A, lower Oregon, decreased along with fishing effort. The 1965 catch of 4.9 million pounds was 7% greater than the 1964 catch.

7. Dover Sole

Pacific coast Dover sole landings of 16.2 million pounds in 1965 decreased 5% from those of 1964 but exceeded the 10-year mean by 4%. Slight decreases in landings were reported by Canada and Washington. Oregon landings were down 34% from 1964, while California landings increased 16% over those of 1964. This species remains incidental in the Canadian trawl fisheries, while in Oregon and California, it is a major species in landings.

Canada. The Dover sole fishery by British Columbia trawlers continues to be a small-scale operation with 1965 landings of about 0.4 million pounds. Approximately 50% of the catch was taken in the Port San Juan area off the west coast of Vancouver Island (PMFC Area 4B) and the balance was landed incidental to other catch.

Washington. The 1.4 million pound catch of 1965 placed Dover sole eighth in poundage and value among the 10 species which comprise the bulk of Washington trawl landings. Dover sole are usually

caught incidental to Pacific ocean perch, rockfish, and even petrale sole in the winter fishery. There were a few occasions in 1965 when catches were principally of this species.

Oregon. The Oregon catch of Dover sole declined in 1965. The 1965 total of 3.6 million pounds was 34% below the 1964 catch. It was also the lowest annual catch since 1958 and was 13% below the 10-year average. Catch/effort for Dover sole remained at the level of recent years. Increased effort for Pacific ocean perch was largely responsible for the decrease in the Dover sole catch.

California. The 1965 Dover sole catch of 10.8 million pounds was the second highest annual catch recorded and exceeded only by the record 1952 catch of 11.7 million pounds. The 1965 catch was 16% greater than that of 1964 and exceeded the mean for 1955-64 by 28%. The largest increase occurred in upper California, PMFC Area 1C, where trawlers fished throughout the year and landings were limited only by plant capacities.

V. REVIEW OF EXCHANGE OF DATA PROCEDURES

1. Extended Use of PMFC Data Record

The Sub-Committee discussed the incorporation of market sampling data and tagging records in the Data Series. Canada will study the feasibility of summarizing their sampling information with publication in their Statistical Series. Oregon is preparing a summary of bottomfish sampling information in a data series type of publication. Such summaries for all agencies could be useful in the Data Series. All agencies agreed that it would be appropriate to have summaries of data

on completed tagging experiments in the Data Series. Leon Verhoeven, PMFC Executive Director, reported on the progress of development of a format for tagging data.

2. Exchange of Market Sampling Data (sample inventory)

Inventories of market samples had been exchanged along with status reports among agencies during the past two years. There were no problems in this exchange nor any anticipated in the exchange of specific data on samples.

The exchange of Status Reports was also discussed. At Leon Verhoeven's suggestion, all agencies will label their data tables to avoid confusion in compilations for the Data Series.

3. Catch/Effort Analysis

The Sub-Committee agreed that the possibilities of standardizing catch/effort were indeed remote; however, methods of deriving such data should be clearly definable and similar trends in catch/effort would be expected for different calculations on mutually fished stocks. It was emphasized that absolute values of catch/effort data of different agencies must be used with caution in view of the different calculating methods. Methods in use by the different agencies are defined in the 1963 Report of the Fourth Annual Meeting of the Technical Sub-Committee.

VI. REVIEW OF CURRENT AND PROPOSED RESEARCH

Research programs of all agencies remain essentially the same as reported previously. However, certain new groundfish investigations have been made possible through funds made available through the

Industrial Development Service of the Canadian Department of Fisheries and United States Public Law 88-309.

Canada. The groundfish staff of the Fisheries Research Board of Canada on the Pacific coast consists of three biologists, six technicians, and two summer assistants, and they are engaged in two projects; the near-seas and the distant-seas investigations.

The near-seas group maintains a watch on various stocks which support the trawl fishery in waters adjacent to British Columbia. A major portion of the work involves collection and analysis of catch and fishing effort. Routine sampling of various species at major ports of landing provide data which yield information on growth, mortality, and recruitment in the various fisheries. In May, 1965, the near-seas unit tagged 3,600 Pacific cod in Area 5D.

In 1965, special attention was given to results of tagging and sampling to provide an assessment of the recent upsurge in the Hecate Strait Pacific cod fishery. Further laboratory work was conducted on the embryonic development of certain groundfish species. The development of English sole eggs as affected by variations in salinity and temperature came under study early in 1966, and work on cod eggs continued with the addition of oxygen as the third variable. The use of an improved incubation chamber enhanced the survival of cod eggs to hatching. It is hoped to initiate petrale sole embryonic studies in the winter of 1966-67.

The Distant-Seas Investigation has nearly completed field studies designed to define general features of the summer distribution and size and age composition of Pacific ocean perch throughout its range from Unalaska Island to Cape Blanco. The Dixon Entrance to

Estevan Point area remains to be surveyed and is scheduled for investigation in September, 1966.

Compilation and analysis is underway of data on 10,000 otoliths from juvenile and adult ocean perch. Blackcod studies were temporarily suspended in 1965 with the resignation of the scientist in charge of this work.

In 1965, exploratory fishing was conducted in the western portion of lower Hecate Strait and upper Queen Charlotte Sound (Areas 5C and 5B) with Industrial Development Service funds, which provide for vessel charter, gear, and the addition of a summer technician and a full-time term technician to the staff. This special project was continued in 1966 with explorations in the eastern portions of Areas 5C and 5B.

Washington. The staff of three biologists and a fisheries technician will be increased by the addition of two technicians with funds made available under PL 88-309.

Considerable effort of the present staff is directed to fishermen interviews in order to obtain and analyze basic data on catch and catch/effort. Biological studies include a market sampling program on both "inside" (Puget Sound) and offshore fisheries. Sampling of Pacific cod, English sole, and petrale sole for age, size, and sex has first priority. Effort was directed to obtaining petrale otolith samples from the Estevan ground as well as samples of Pacific ocean perch from the "rockpile" and Goose Island grounds.

No groundfish tagging was undertaken in 1965. Returns from 1962 petrale tagging in the Willapa deep is scheduled for analysis and reporting.

Tagging is planned for English sole in Puget Sound with

disc and dart tags. In addition, tagging is scheduled with PL 88-309 support for petrale on the Estevan and "rockpile" grounds, Pacific cod in the Strait of Juan de Fuca and English sole off Cape Flattery. Market sampling will be conducted in conjunction with these tagging programs.

Oregon. The Oregon groundfish staff consists of ~~four~~ one Technician biologists and two summer assistants. Two groundfish biologists are supported by PL 88-309 funds.

Much effort is expended in maintaining fleet contact to obtain logbook information for catch and catch/effort data and for tag recovery information from three recent Dover sole and one petrale sole tagging experiments. The market sampling program has been continued. Weekly length frequency samples are obtained for Dover, English, and petrale soles and Pacific ocean perch. In addition, animal food landings are monitored to determine species composition.

The two current PL 88-309 studies are projects on shrimp and sole. One biologist and another devoting half-time are carrying out the shrimp project which is designed to determine the distribution and relative abundance of Pandalus jordani off the Oregon coast. The sole project, conducted by two biologists, is comprised of biological studies with emphasis on abundance and recruitment of Dover sole. Technological studies on hake and dogfish are being sub-contracted to Oregon State University Department of Food Science.

During shrimp sea investigations in 1966, incidental tagging of Dover sole and yellowtail rockfish and sampling of all species were accomplished.

Requests are pending for additional tagging studies on

lingcod and Pacific ocean perch. These studies call for two biologists as well as the charter of a suitable vessel. In the 1966-67 fiscal year, a trawl vessel is being chartered for shrimp, bottomfish, and albacore research on a year-round basis.

California. The Bottomfish staff of five biologists conducts investigations of the rockfish and flatfish projects. The senior biologist assigned to the rockfish project conducts taxonomic and biological studies. He is also the principal investigator of sablefish and lingcod. The four biologists engaged in flatfish project studies maintain a constant surveillance of the fishery through market sampling and log book and landing receipt analysis. The sampling program affords meaningful biological information necessary for the interpretation of statistical data. Market sampling emphasis is on Dover, English, and petrale soles with animal food also receiving attention.

No tagging studies have been conducted since 1964, as analyses and reporting of results of previous tagging work and other groundfish studies have priority. English sole tagging off central California (Area 1B) is planned for spring, 1967.

Electrophoretic work on the protein of eye lenses of rockfish and flatfish initiated with the cooperation of California's Tuna group, has shown promise in taxonomic and population studies.

A PL 88-309 project designed to analyse and report on accumulated data of previous years will be operative this summer (1966). An expanded sea survey program, under PL 88-309, is currently underway for investigations of the pelagic environment. Although this project is conducted by the Terminal Island Laboratory and covers only lower California and part of upper California (Area 1-A), data are collected

on certain species found in trawl landings.

VII. REVIEW OF JOINT PROJECTS

1. English Sole (PMFC Bulletin)

Leon Verhoeven, PMFC Executive Director, reported on manuscript commitment and space assignments for Bulletin 7. The major part of this bulletin will be comprised of English sole papers contributed by member agencies of the Technical Sub-Committee.

2. Petrale Sole

Discussion on petrale sole was culminated with the reaffirmation that a statement will be provided in 1967 on assessment of fisheries with winter restrictions and on California's petrale fishery which has no closures.

3. Savings Gear

The increased use of synthetic materials and savings gear studies were discussed. It was agreed to delete this item from the agenda.

4. Bibliography (PMFC Bulletin)

This bibliography being prepared by the Washington Department of Fisheries involves 56 groundfish species of importance to the Pacific Coast trawl fisheries. It is intended that the bibliography be readied for inclusion into the forthcoming PMFC Bulletin #7. A terminal date for inclusion of papers into the bibliography was discussed in order that copies of the manuscript might be distributed to members of the Sub-Committee for review. Since preparation time is rapidly becoming short, it was suggested that a supplemental bibliography of references not covered at this time be later incorporated into the PMFC Data Series Report.

5. Hake

Washington reported on their new hake fishery. The Sub-Committee discussed the probable enlargement of the fishery with possible future international implications and recognizes the need for further research, biological monitoring, provisions for catch statistics, and regulations.

6. New Proposals

Hake tagging was considered on a coastwise basis. All agencies agreed that this should be deferred until a suitable tag is developed and the fishery is of the magnitude to give adequate returns.

VIII. SEISMIC PROBLEMS

Agencies discussed seismic activities in their respective areas. There appeared to be no major problems arising from seismic explorations at this time. California reported on the U. S. Navy detonation of CHASE V off Cape Mendocino, Area 1C and CHASE VI scheduled for summer, 1967, off Prince William Sound, Alaska.

IX. INTERNATIONAL PROBLEMS

The PMFC Executive Director and Canada reported on efforts of the parent committee (International Trawl Fishery Committee) to obtain, through their respective State departments, catch data of foreign fleets as recommended last year by the Technical Sub-Committee.

Foreign fishing fleets of concern to the Technical Sub-Committee since 1961, have continued to fish off the west coast with concentrations of vessels extending southward to Oregon waters in 1965. Observations suggest that Pacific ocean perch and hake comprise the bulk of the foreign catch. The Sub-Committee discussed methods of

estimating the foreign catch and concluded that while accuracy of such estimates are questionable minimum catch estimates could be made. All agencies agreed that in order to assess the effect of foreign fishing, information must be obtained on the magnitude of their catch and the effort required to make this catch.

X. NEW PROPOSALS FOR TRAWL REGULATIONS

There were no new proposals; recent minor regulatory changes were reviewed.

Current regulations for all agencies are listed in Appendix B.

XI. COMBINED PROGRAM FOR FUTURE MANAGEMENT

The feasibility of establishing a coordinated research program which would combine the resources of all agencies was discussed. It was concluded that such a program could not be initiated with the present research emphasis of each agency. The Sub-Committee recognizes the continuing need for a coordinated effort on trawl research and management activities along the Pacific coast. Present programs are directed toward this end. Due to inadequate funds, however, limitations as to the scope of trawl studies in most areas have hindered the attainment of this objective.

XII. OTHER BUSINESS

The Sub-Committee discussed the advisability of inviting contributions on hake by USFWS Bureau of Commercial Fisheries and agreed that this matter be referred to the parent committee.

The PMFC Executive Director, Leon Verhoeven, discussed the possibility of using a computer for compiling the trawl data series.

XIII. RECOMMENDATIONS

A. For Sub-Committee Action

1. Recommends that hake catch statistics be included in trawl data regardless of catch method.
2. Recommends that all agencies submit tagging data summaries upon termination of recoveries to PMFC Executive Director for inclusion in the Data Series.
3. Recommends that an inventory of tagging experiments be submitted to PMFC Executive Director for inclusion in the Data Series.
4. Recommends that agencies have petrale fishery assessments available for the 1967 meeting of the Sub-Committee.
5. Recommends that information on foreign fishing fleets be exchanged among agencies.

B. Recommendations to Parent Committee

1. The Technical Sub-Committee recommends that the current restrictions on the petrale sole fishing remain unchanged, at least until the end of the 1966-67 winter fishery when assessments of the effect of regulations can be made.
2. The Technical Sub-Committee recognizes that there has been an intensification of foreign and domestic trawling activities off the west coast of the United States and Canada and that further intensification is likely. This activity has emphasized the inadequacy of current knowledge of stocks involved. Past and present programs have not been and are not extensive enough to

provide the detailed information necessary for stock assessments of the precision needed to measure the impact of foreign fleet activities even if data on the magnitude and fishing success of these fleets were available to the Sub-Committee. In this regard, the technical Sub-Committee reiterates the stand taken as early as 1961. Necessary assessments must include estimations of such biological parameters as stock size, age and growth, fishing and natural mortality rates, and general life history studies. Obviously, the determination of such estimations will require adequate support in both funds and personnel. The Technical Sub-Committee, therefore, strongly recommends the immediate intensification of research programs to provide the necessary information for precise assessments of the various species involved.

XIV. 1. SCHEDULE OF PARENT COMMITTEE

The International Trawl Committee will meet Wednesday evening, November 16, 1966 at the Olympic Hotel in Seattle.

2. TECHNICAL SUB-COMMITTEE EIGHTH ANNUAL MEETING

The eighth annual meeting will be held in Nanaimo, British Columbia, in June, 1967.

XV. ELECTION OF CHAIRMAN

Tom Jow, California Department of Fish and Game, was elected Chairman for 1967.

XVI. ADJOURNMENT

The meeting was adjourned at 12:15 pm, June 30, 1966.

XVII. APPENDICES

APPENDIX A

TENTATIVE AGENDA (2)
Technical Sub-Committee of the
International Trawl Fishery Committee
Portland, June 28-30, 1966
7th Annual Meeting

I. CALL TO ORDER

II. APPOINTMENT OF SECRETARY

III. APPROVAL OF AGENDA

IV. STATUS REPORTS (10 Year Mean)

1. Total Catch and Effort for the 1965 Trawl Fishery
2. Petrale Sole
   a) Catch/Effort
   b) Definition of Stocks
   c) Winter Fishery (± 100 fathoms)
   d) Effectiveness of Regulation
3. Lingcod
   a) Catch/Effort (Area 3C)
4. True Cod
   a) Catch/Effort (Areas 3C 5D)
5. Pacific Ocean Perch
   a) Catch/Effort (Areas 3B to 5B)
6. English Sole
7. Dover Sole

V. REVIEW OF EXCHANGE OF DATA PROCEDURES

1. Extended Use of P.M.F.C. Data Record
2. Exchange of Market Sampling Data (sample inventory)
3. Catch/Effort Analysis

VI. REVIEW OF CURRENT AND PROPOSED RESEARCH

1. Tagging
2. Biological Studies
3. Sampling (Priorities)
4. Special Projects (IDS + USPL 88-309)

VII. REVIEW OF JOINT PROJECTS

1. English Sole (PMFC Bulletin)
2. Petrale Sole
3. Savings Gear
4. Bibliography (PMFC Bulletin)
5. Hake
6. New Proposals

VIII. SEISMIC PROBLEMS

IX. INTERNATIONAL PROBLEMS

1. Assessment of foreign catch monitoring

X. NEW PROPOSALS FOR TRAWL REGULATIONS

XI. COMBINED PROGRAM FOR FUTURE MANAGEMENT

XII. OTHER BUSINESS

XIII. RECOMMENDATIONS

1. - Future Work

2. - Parent Committee

XIV. 1. SCHEDULE OF PARENT COMMITTEE MEETING

2. 8TH ANNUAL MEETING

XV. ELECTION OF CHAIRMAN

XVI. ADJOURNMENT

Synopsis of Otter Trawl Regulations in Effect July 1, 1966, in the Several Jurisdictions of the Pacific Coast

Revised July 1, 1966
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 through March 31, no petrale sole may be taken except for an incidental catch allowance not exceeding 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 and the Strait of Juan de Fuca.

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. Permits may be issued by the Department to possess, only for the purpose of transportation, trawl or dragnets in this area.

Oregon

Otter trawl fishing limited to waters of the Pacific Ocean.

Washington

Otter trawl fishing prohibited in numerous named areas in inside waters of Puget Sound and Strait of Juan de Fuca.

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 B, page 8.

Oregon

See Appendix B, page 8.

*Washington

See Appendix B, page 8.

Canada

See Appendix B, page 9.

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 (Paralichthys californicus) which weighs less than 4 pounds in the round, or less than 3½ pounds dressed head on, or less than 3 pound 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 2-1/2 lbs. dressed head off for sablefish (black cod).

Minimum size of 23 in. tip of snout to tip of tail, and minimum weight of 3 lbs. dressed head off.(Ling Cod)

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

No restrictions.

Washington

Taking or disposal of foodfish except for human consumption or fishing bait prohibited except following species may be used for any purpose:

Mud shark or sixgill shark	*Hexanchus griseum*
Soupfin shark	*Galeorhinus zyopterus*
Dogfish	*Squalus acanthias*
Turbot	*Atheresthes stomias*
Pacific hake	*Merluccius productus*

Pollock	*Theragra chalcogrammus*
Pacific Tomcod	*Microgadus proximus*
Butter or Bellingham sole	*Isopsetta isolepis*
Carp	*Cyprinus carpio*
Pacific sardine or pilchard	*Sardinops sagax*
Northern anchovy	*Engraulis mordax*
Pacific herring	*Clupea pallasi*
(when lawfully taken in Puget Sound Herring Fishing Areas 2 and 2A)	
Blue rockfish	*Sebastodes mystinus*
Pacific sand dab	*Citharichthys sordidus*
Slender sole	*Lyopsetta exilis*
Ratfish	*Hydrolagus colliei*
Longnose skate	*Raja rhina*
Big skate	*Raja binoculata*
All other species of skate	*Rajidae*

Canada

No limitation on utilization of legally-caught bottom fish.

Alaska

No restrictions.

6. MISCELLANEOUS REGULATIONS

Oregon

Trawl boat operators must keep a daily log in log books provided by the Fish Commission. The required recording includes:

(a) Time, date and place of each haul, each trip.
(b) Duration of haul and approximate composition of catch for each haul.

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 a season but has no restrictions on the 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 more than 500 pounds of fish other than shrimp or prawns on a boat engaged in the shrimp fishery. This does not apply to salmon taken with hook and line.

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 latitutde 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

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1. LEGAL DEFINITION OF MINIMUM MESH SIZE

California

No natural or snythetic 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 allowed that shall not cover more than the last 120 meshes in length of net and bag combined and not more than the bottom one-half of the circumference of the net and bag. Not more than 8 rib-lines may be attached to any type bag or cod-end.

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 code-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. Not 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 a manner that the size of any mesh is not reduced by the layer attached to that mesh.

Minimum mesh size in trawl is 3-1/2 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 - 4-1/2 in.
(c) Synthetic fiber - 4-1/4

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

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, while wet, 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

Web is stretched under tension, usually by hanging a 10 pound weight and measurement is made using a ruler or flexible 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

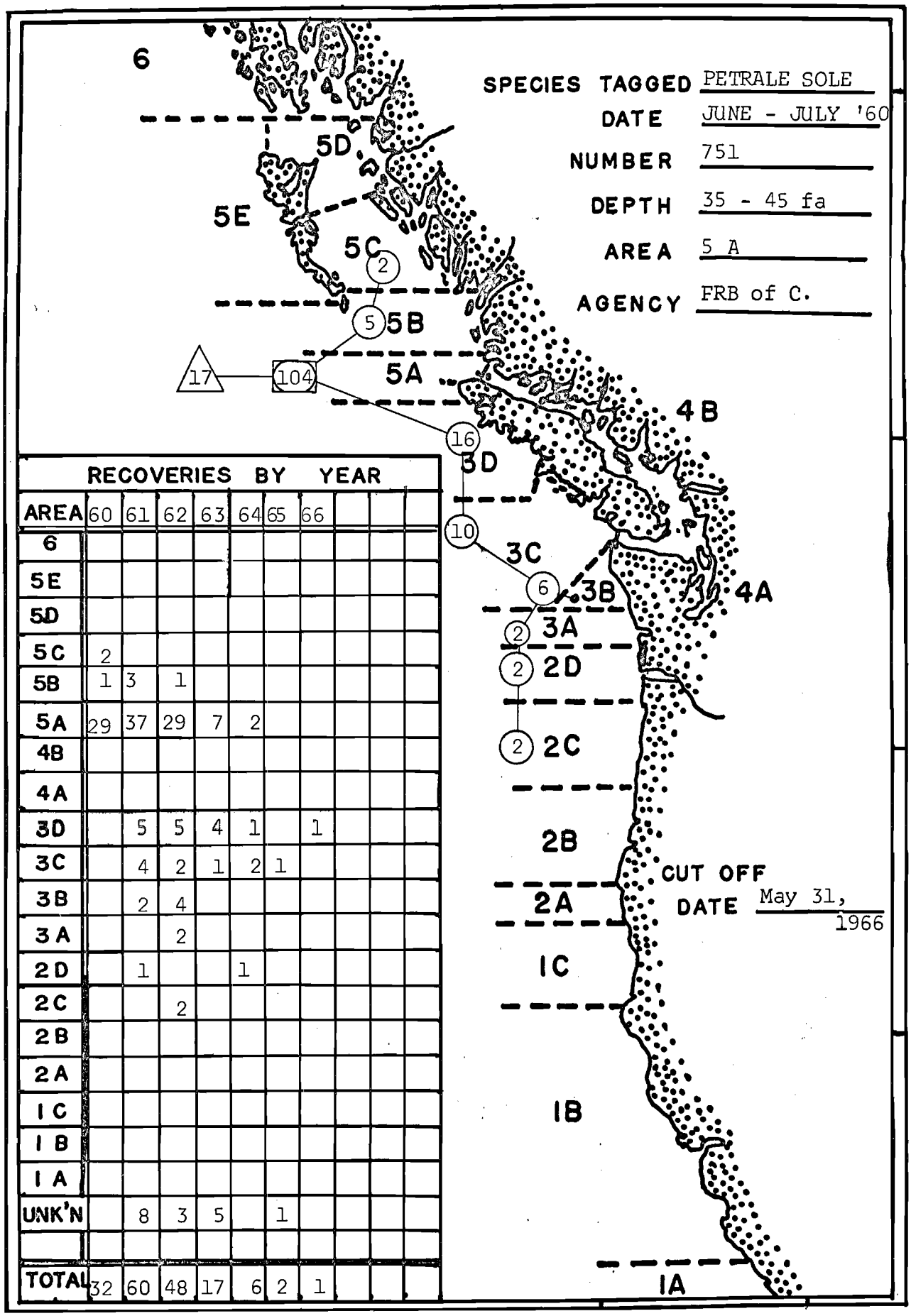
No special device.is used.

Canada

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

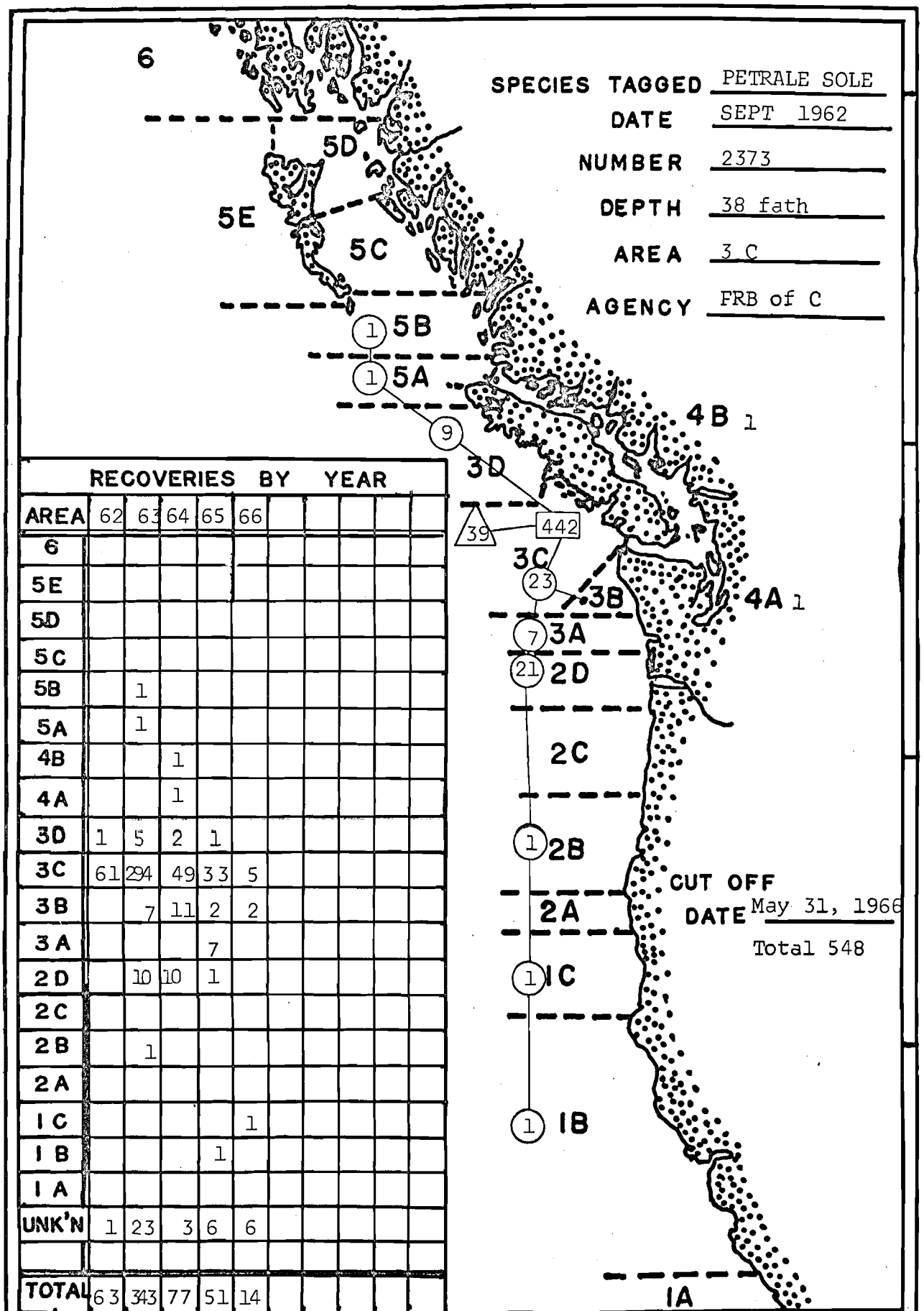
Alaska

Nil.



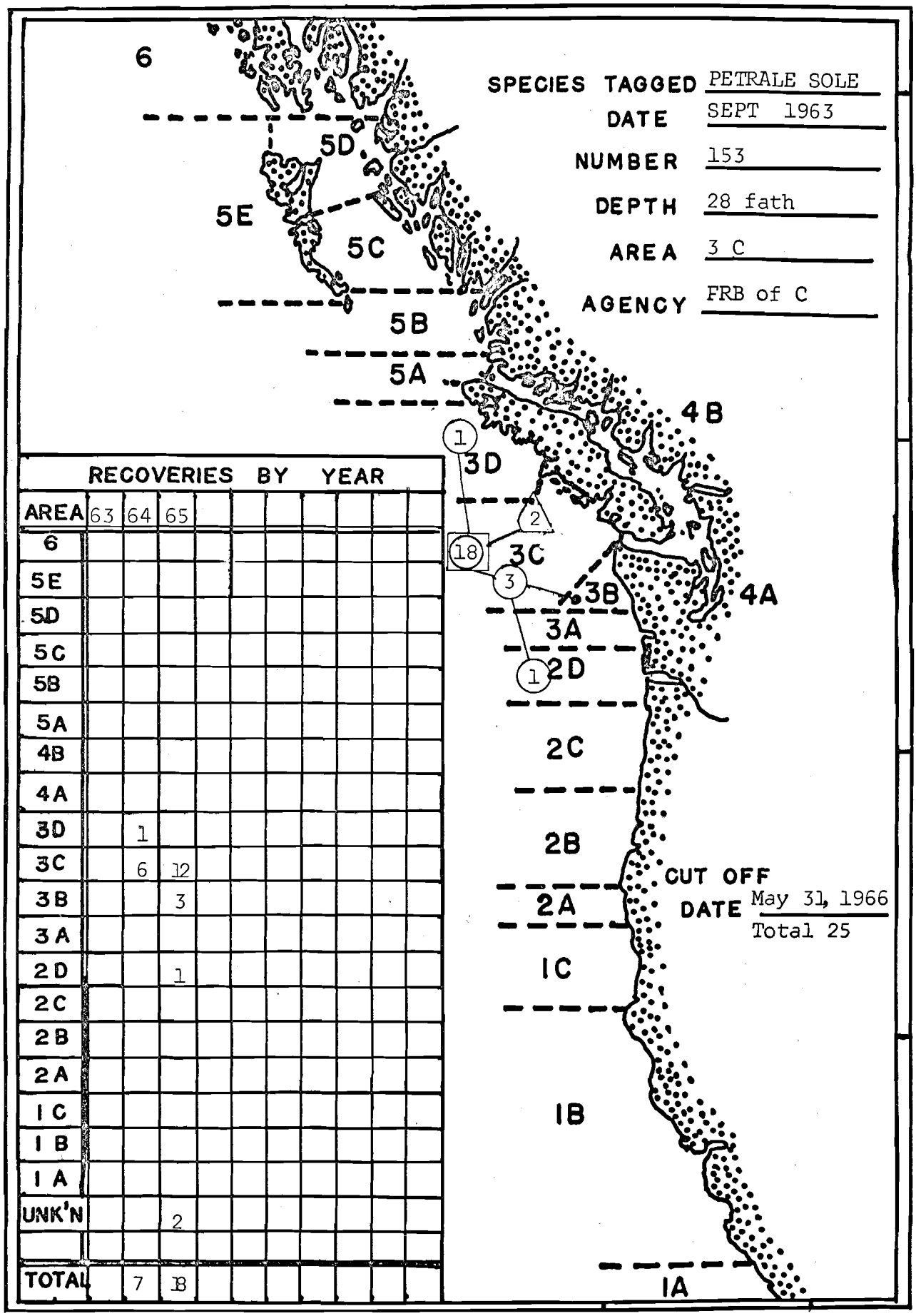
RECOVERIES BY YEAR

AREA	60	61	62	63	64	65	66			
6										
5E										
5D										
5C	2									
5B	1	3	1							
5A	29	37	29	7	2					
4B										
4A										
3D		5	5	4	1		1			
3C		4	2	1	2	1				
3B		2	4							
3A			2							
2D		1			1					
2C			2							
2B										
2A										
1C										
1B										
1A										
UNK'N		8	3	5		1				
TOTAL	32	60	48	17	6	2	1			



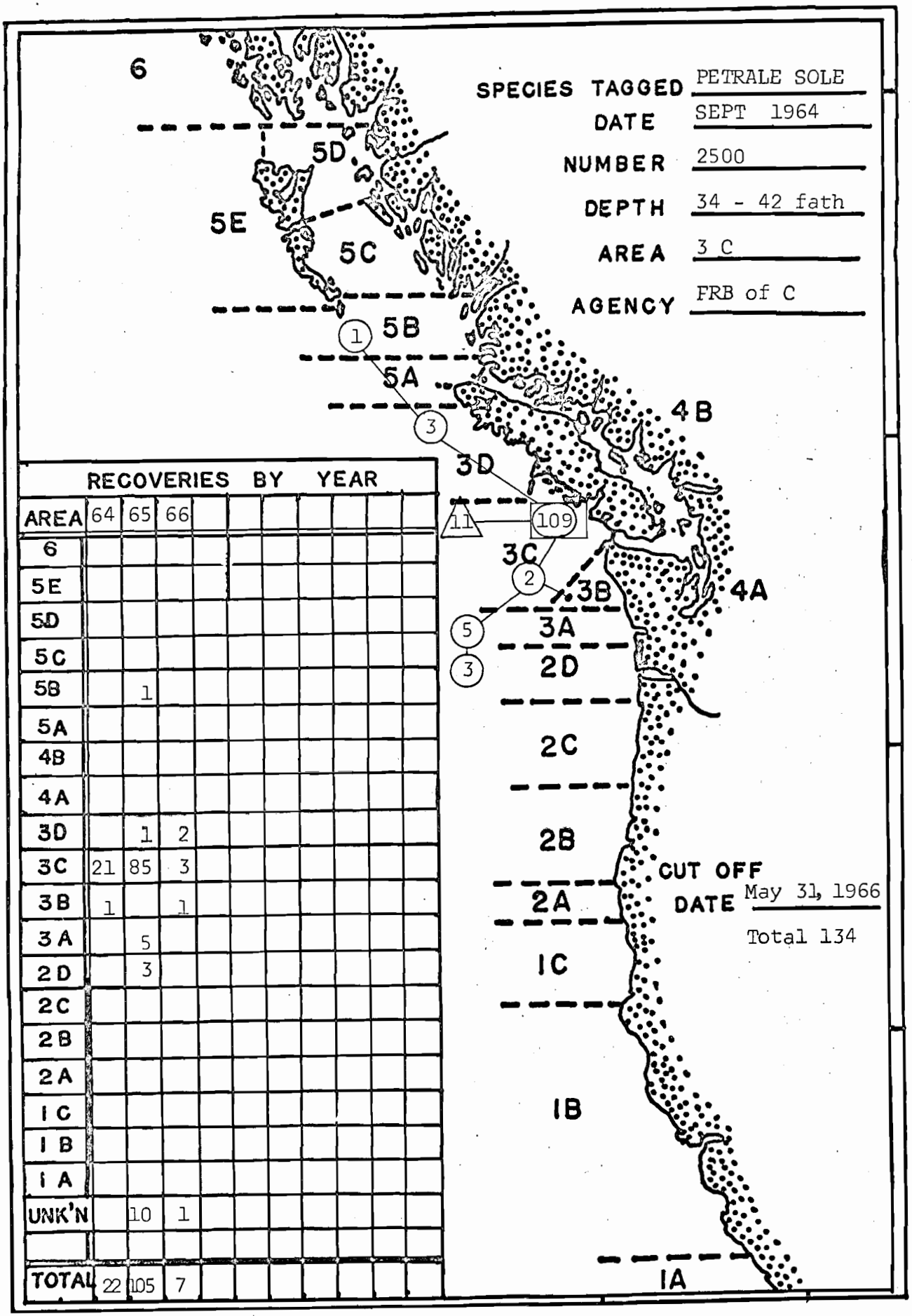
RECOVERIES BY YEAR

AREA	62	63	64	65	66					
6										
5E										
5D										
5C										
5B		1								
5A		1								
4B			1							
4A			1							
3D	1	5	2	1						
3C	61	294	49	33	5					
3B		7	11	2	2					
3A				7						
2D		10	10	1						
2C										
2B		1								
2A										
1C					1					
1B				1						
1A										
UNK'N	1	23	3	6	6					
TOTAL	63	343	77	51	14					



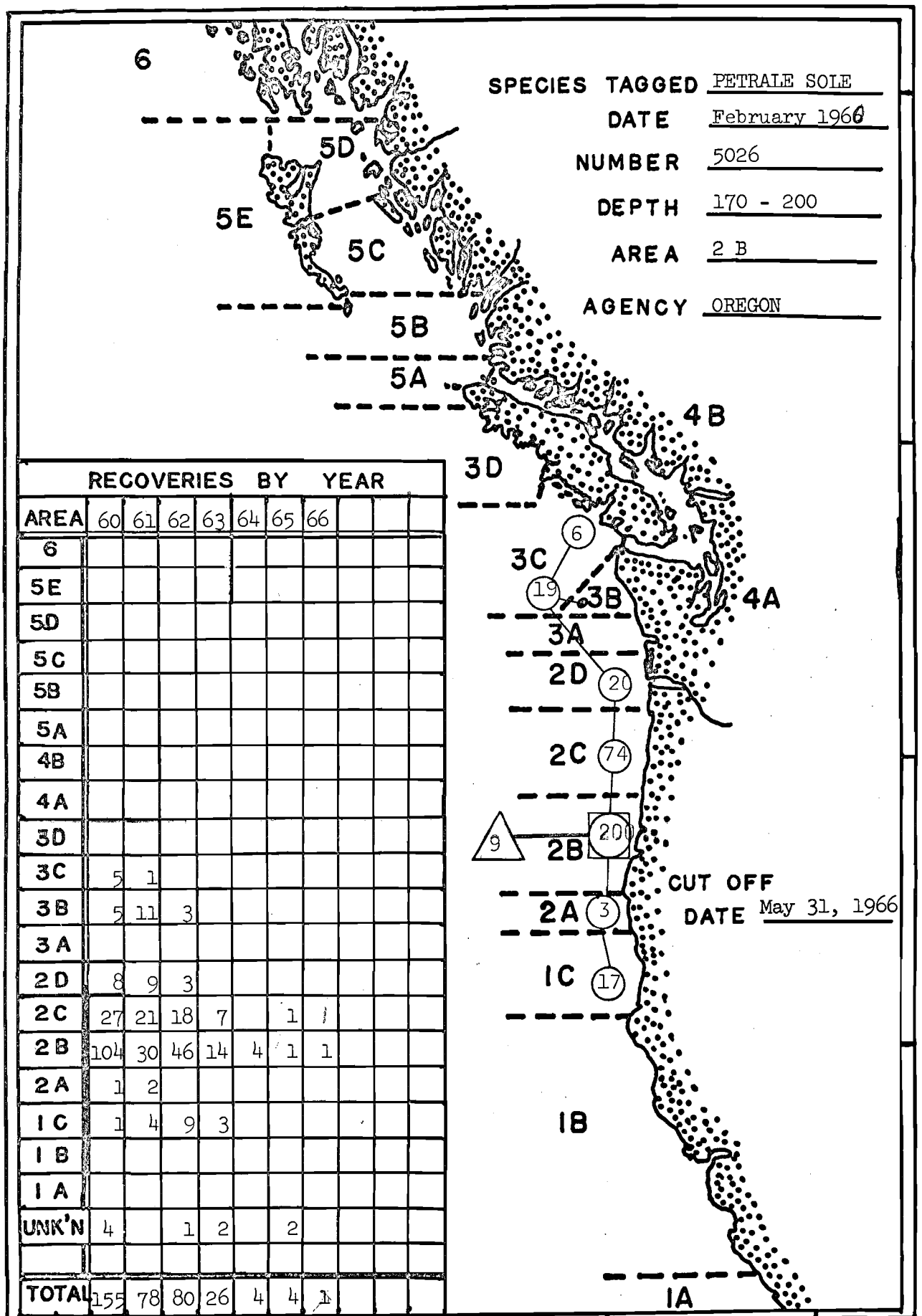
RECOVERIES BY YEAR

AREA	63	64	65							
6										
5E										
5D										
5C										
5B										
5A										
4B										
4A										
3D		1								
3C		6	12							
3B			3							
3A										
2D			1							
2C										
2B										
2A										
1C										
1B										
1A										
UNK'N			2							
TOTAL		7	18							



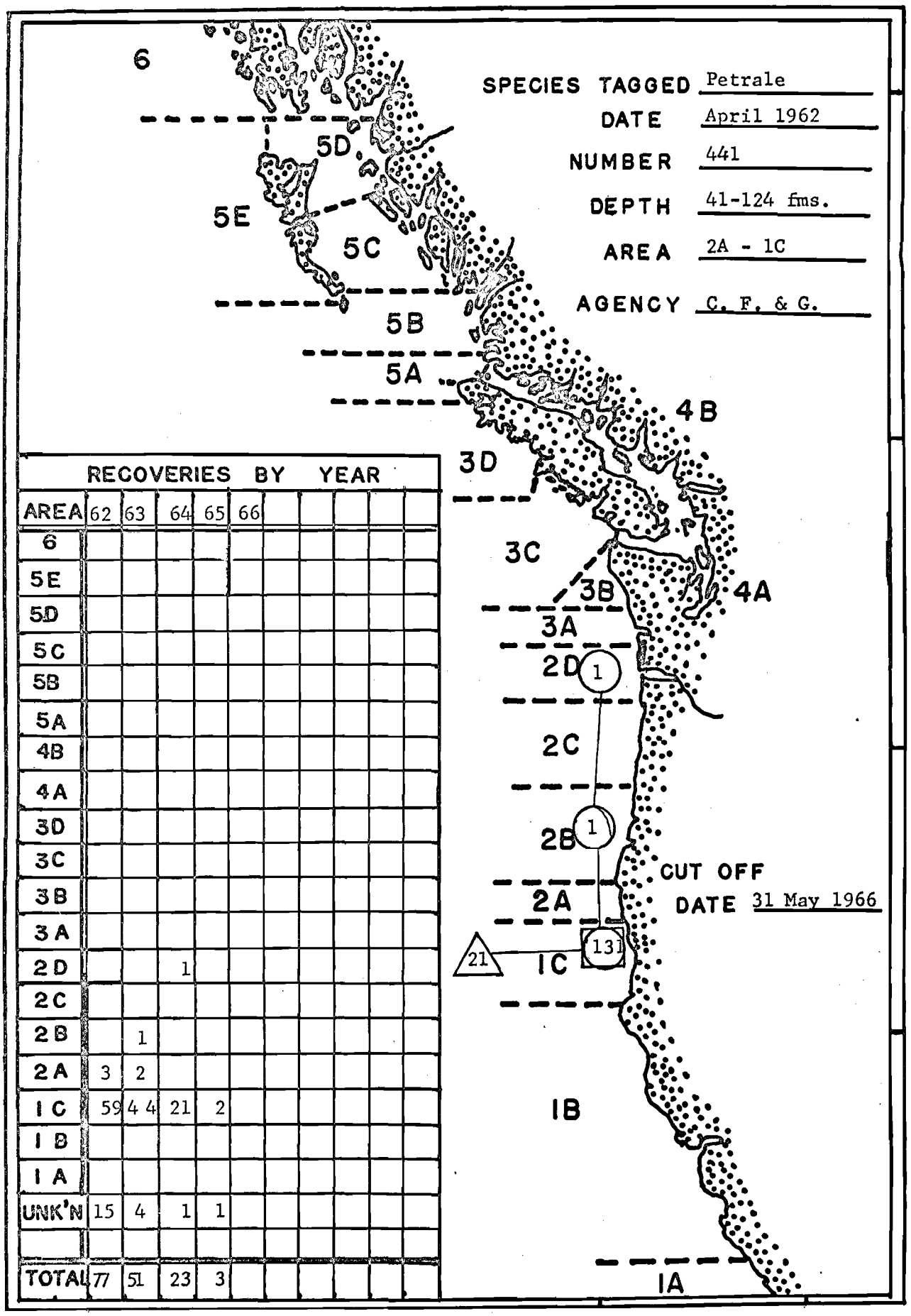
RECOVERIES BY YEAR

AREA	64	65	66
6			
5E			
5D			
5C			
5B		1	
5A			
4B			
4A			
3D		1	2
3C	21	85	3
3B	1		1
3A		5	
2D		3	
2C			
2B			
2A			
1C			
1B			
1A			
UNK'N		10	1
TOTAL	22	105	7



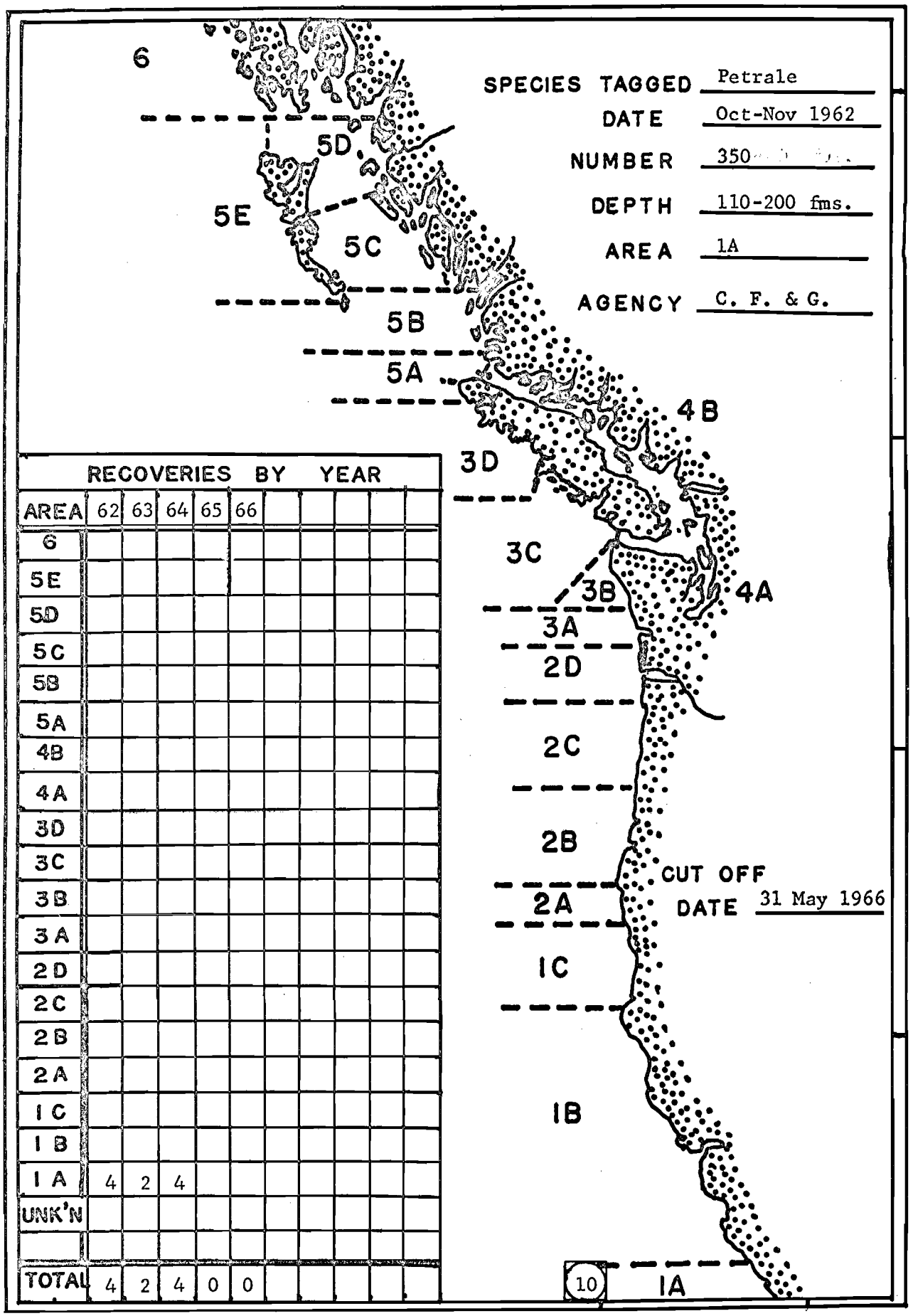
RECOVERIES BY YEAR

AREA	60	61	62	63	64	65	66			
6										
5E										
5D										
5C										
5B										
5A										
4B										
4A										
3D										
3C	5	1								
3B	5	11	3							
3A										
2D	8	9	3							
2C	27	21	18	7		1	1			
2B	104	30	46	14	4	1	1			
2A	1	2								
1C	1	4	9	3						
1B										
1A										
UNK'N	4		1	2		2				
TOTAL	155	78	80	26	4	4	1			

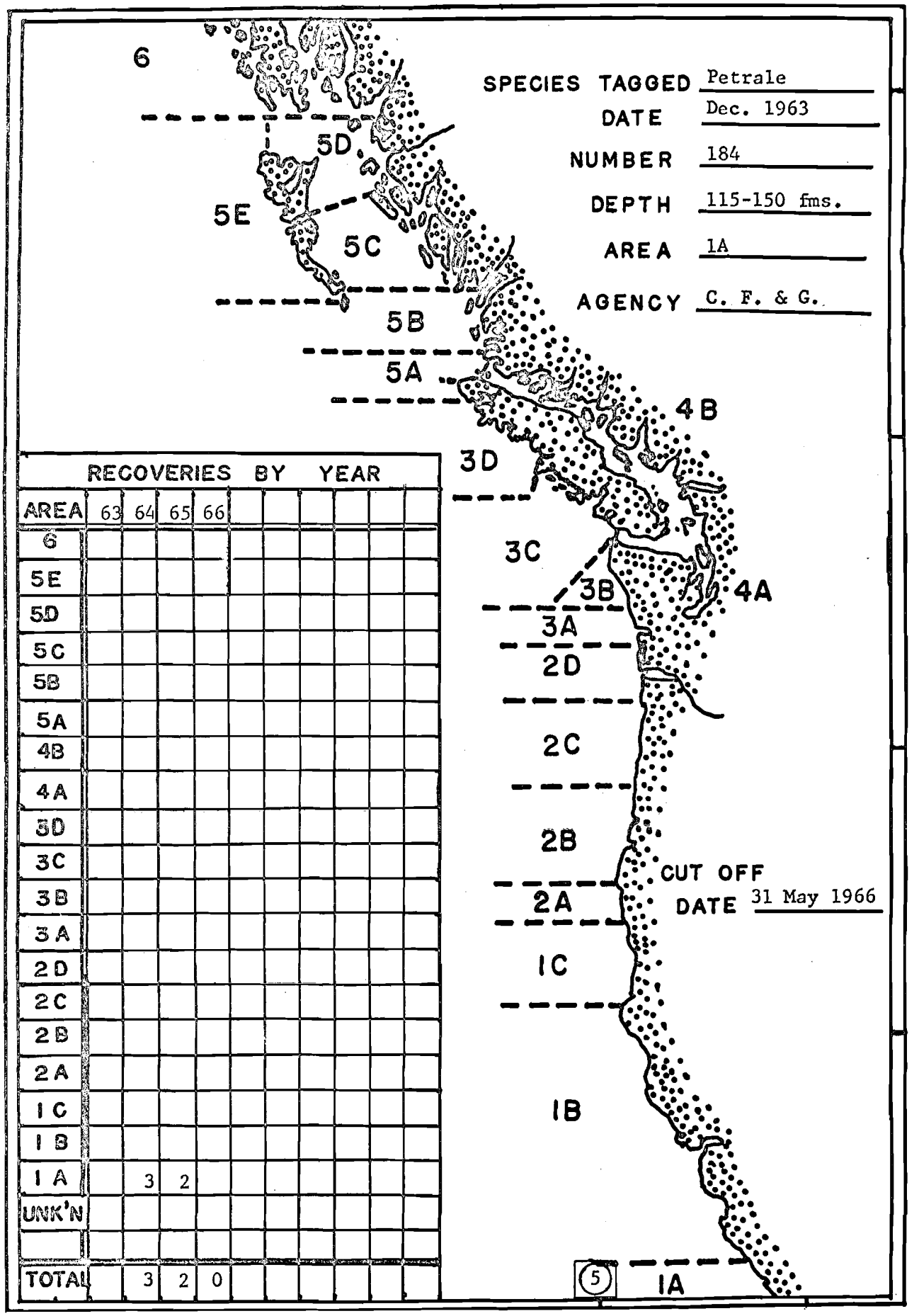


RECOVERIES BY YEAR

AREA	62	63	64	65	66					
6										
5E										
5D										
5C										
5B										
5A										
4B										
4A										
3D										
3C										
3B										
3A										
2D			1							
2C										
2B		1								
2A	3	2								
1C	59	44	21	2						
1B										
1A										
UNK'N	15	4	1	1						
TOTAL	77	51	23	3						

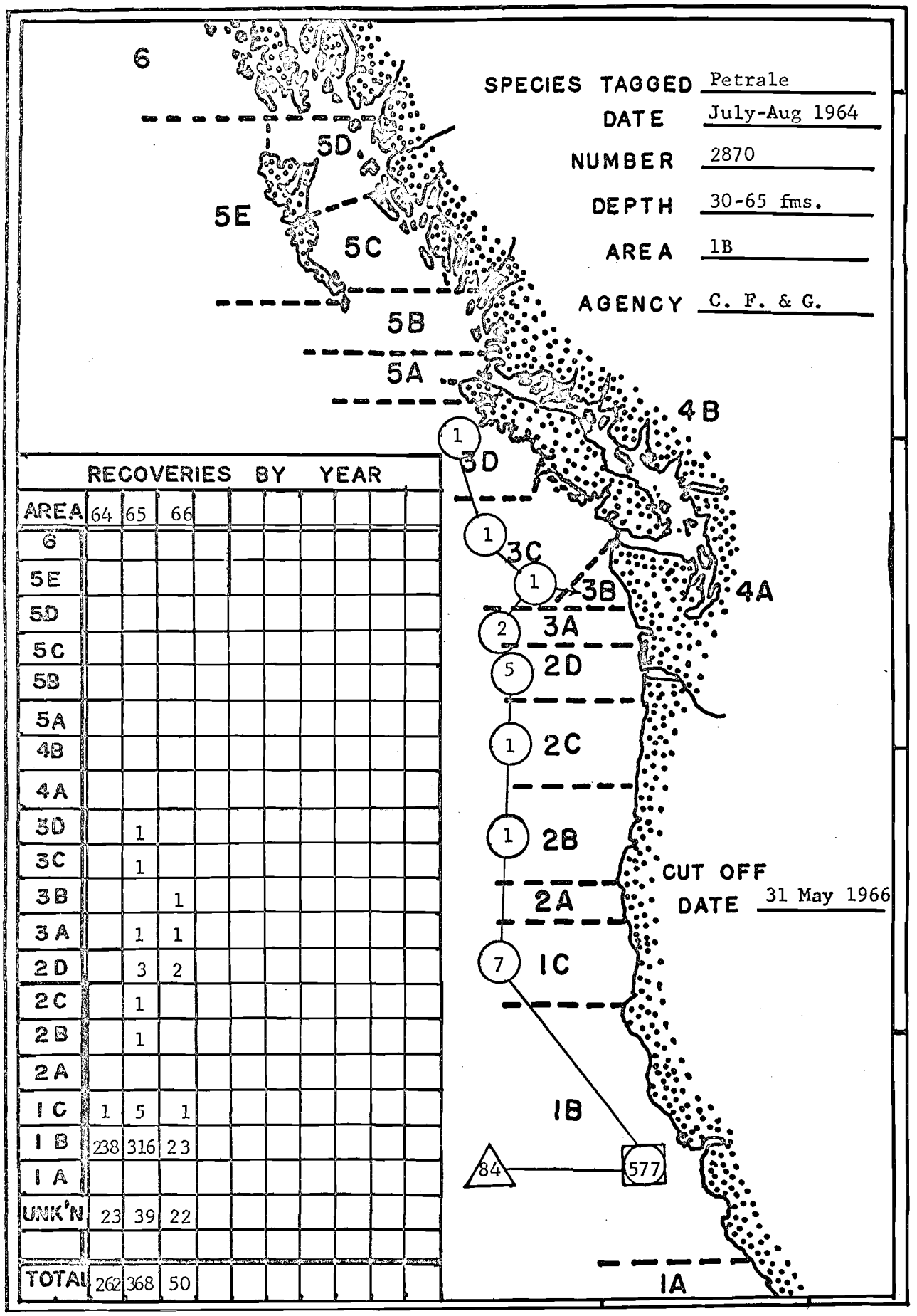


RECOVERIES BY YEAR										
AREA	62	63	64	65	66					
6										
5E										
5D										
5C										
5B										
5A										
4B										
4A										
3D										
3C										
3B										
3A										
2D										
2C										
2B										
2A										
1C										
1B										
1A	4	2	4							
UNK'N										
TOTAL	4	2	4	0	0					



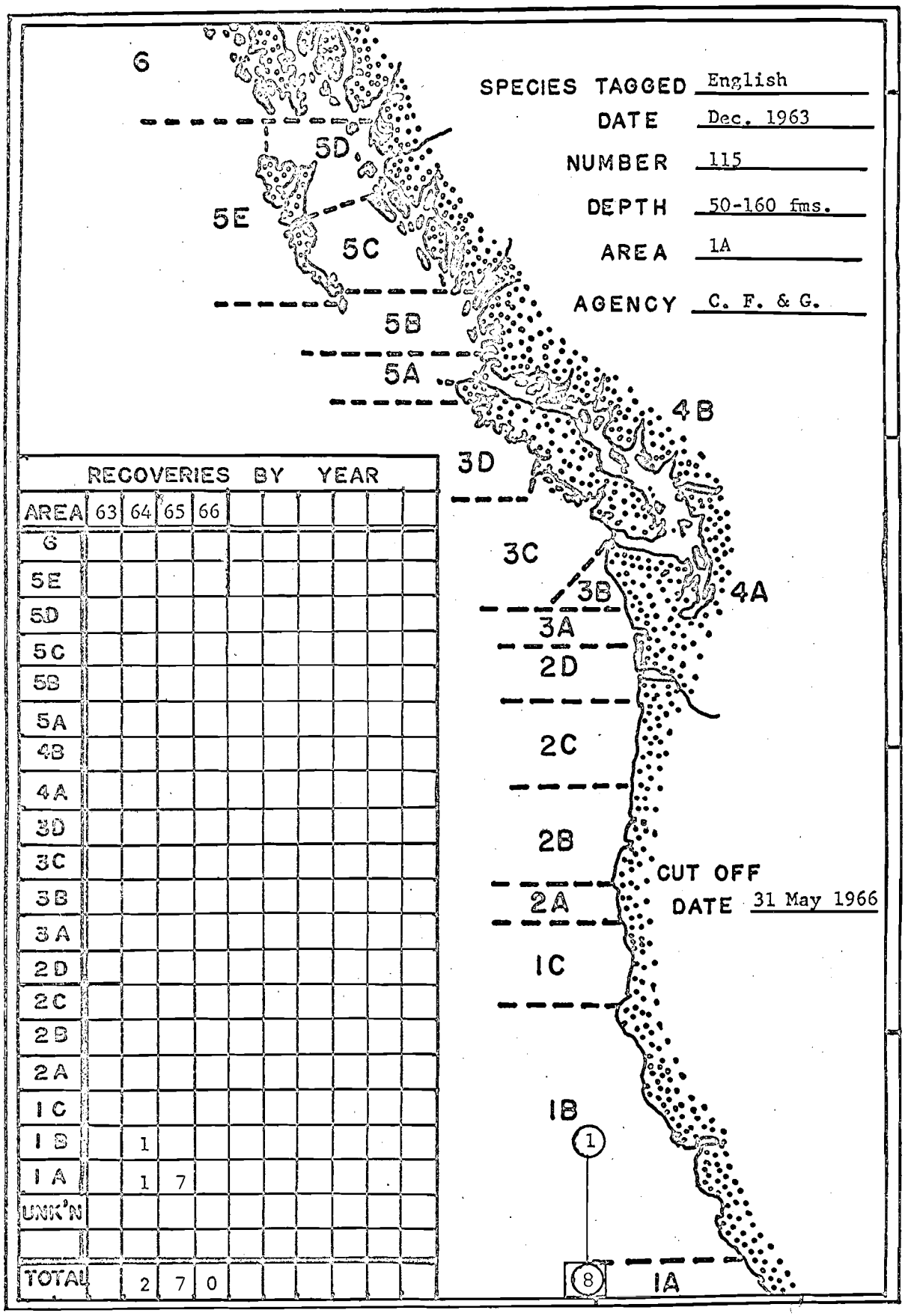
RECOVERIES BY YEAR

AREA	63	64	65	66						
6										
5E										
5D										
5C										
5B										
5A										
4B										
4A										
3D										
3C										
3B										
3A										
2D										
2C										
2B										
2A										
1C										
1B										
1A		3	2							
UNK'N										
TOTAL		3	2	0						



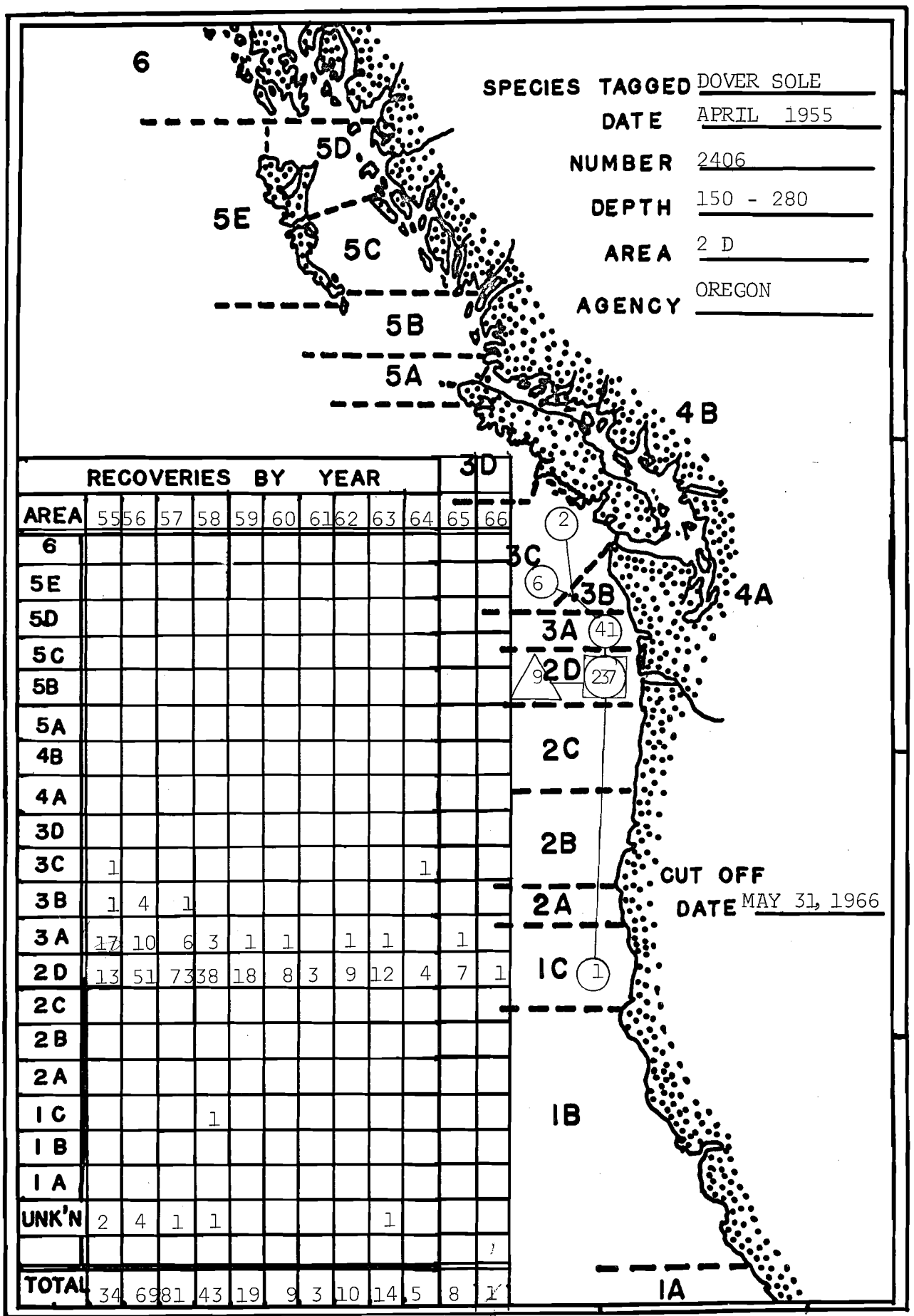
RECOVERIES BY YEAR

AREA	64	65	66							
6										
5E										
5D										
5C										
5B										
5A										
4B										
4A										
3D		1								
3C		1								
3B			1							
3A		1	1							
2D		3	2							
2C		1								
2B		1								
2A										
1C	1	5	1							
1B	238	316	23							
1A										
UNK'N	23	39	22							
TOTAL	262	368	50							



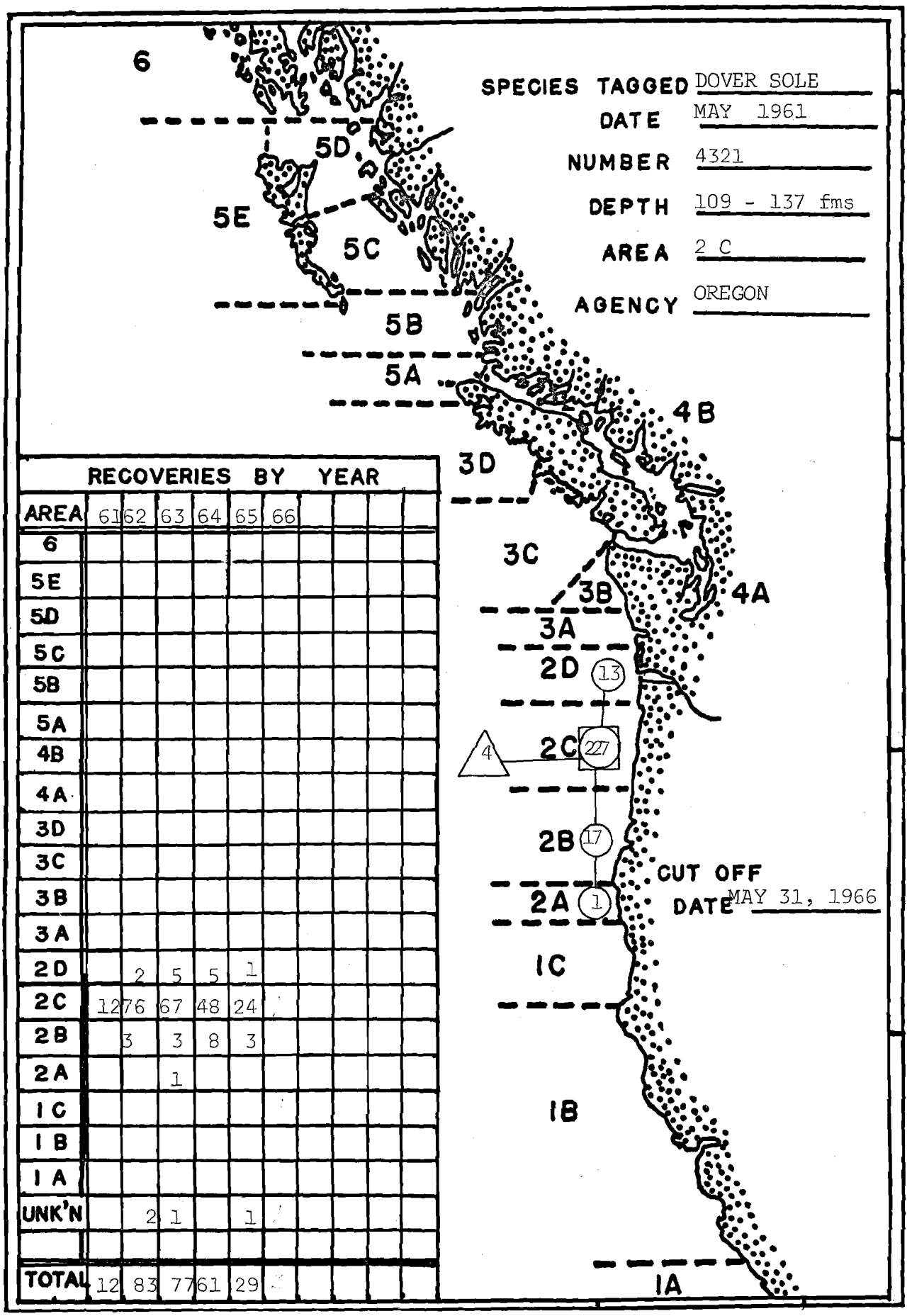
RECOVERIES BY YEAR

AREA	63	64	65	66
6				
5E				
5D				
5C				
5B				
5A				
4B				
4A				
3D				
3C				
3B				
3A				
2D				
2C				
2B				
2A				
1C				
1B		1		
1A		1	7	
UNK'N				
TOTAL		2	7	0



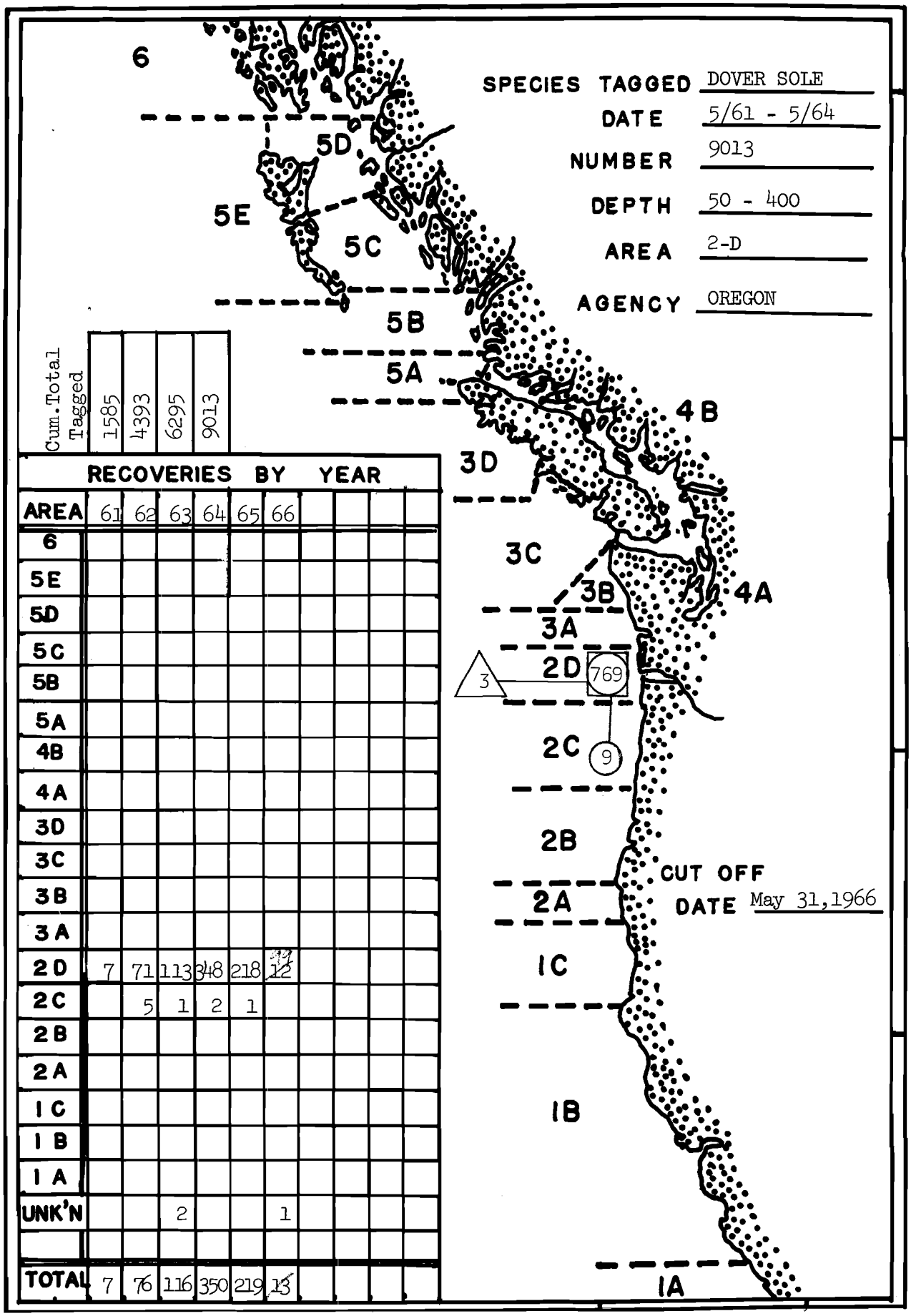
RECOVERIES BY YEAR

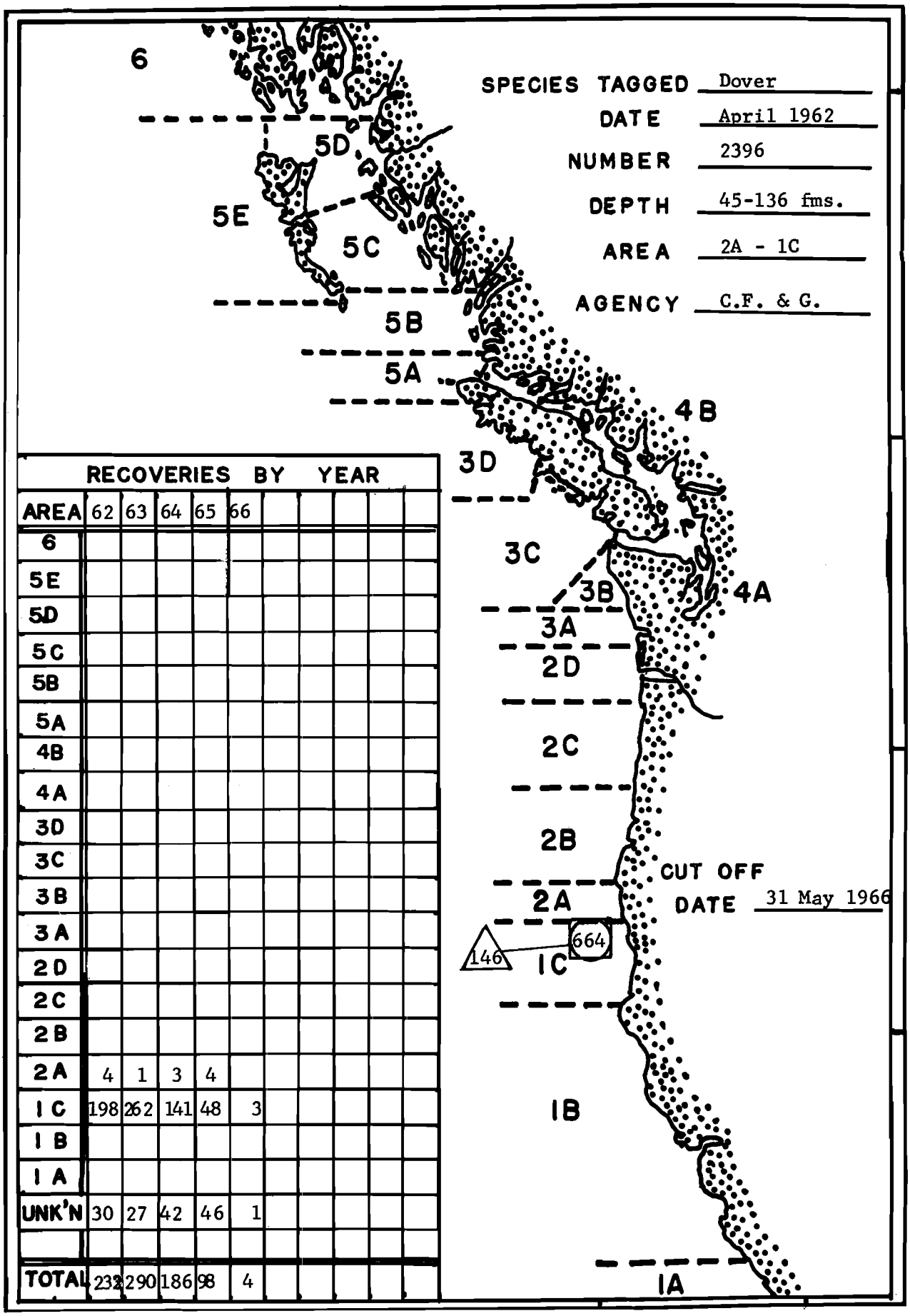
AREA	55	56	57	58	59	60	61	62	63	64	65	66
6												
5E												
5D												
5C												
5B												
5A												
4B												
4A												
3D												
3C	1									1		
3B	1	4	1									
3A	17	10	6	3	1	1		1	1		1	
2D	13	51	73	38	18	8	3	9	12	4	7	1
2C												
2B												
2A												
1C				1								
1B												
1A												
UNK'N	2	4	1	1					1			
												1
TOTAL	34	69	81	43	19	9	3	10	14	5	8	1



RECOVERIES BY YEAR

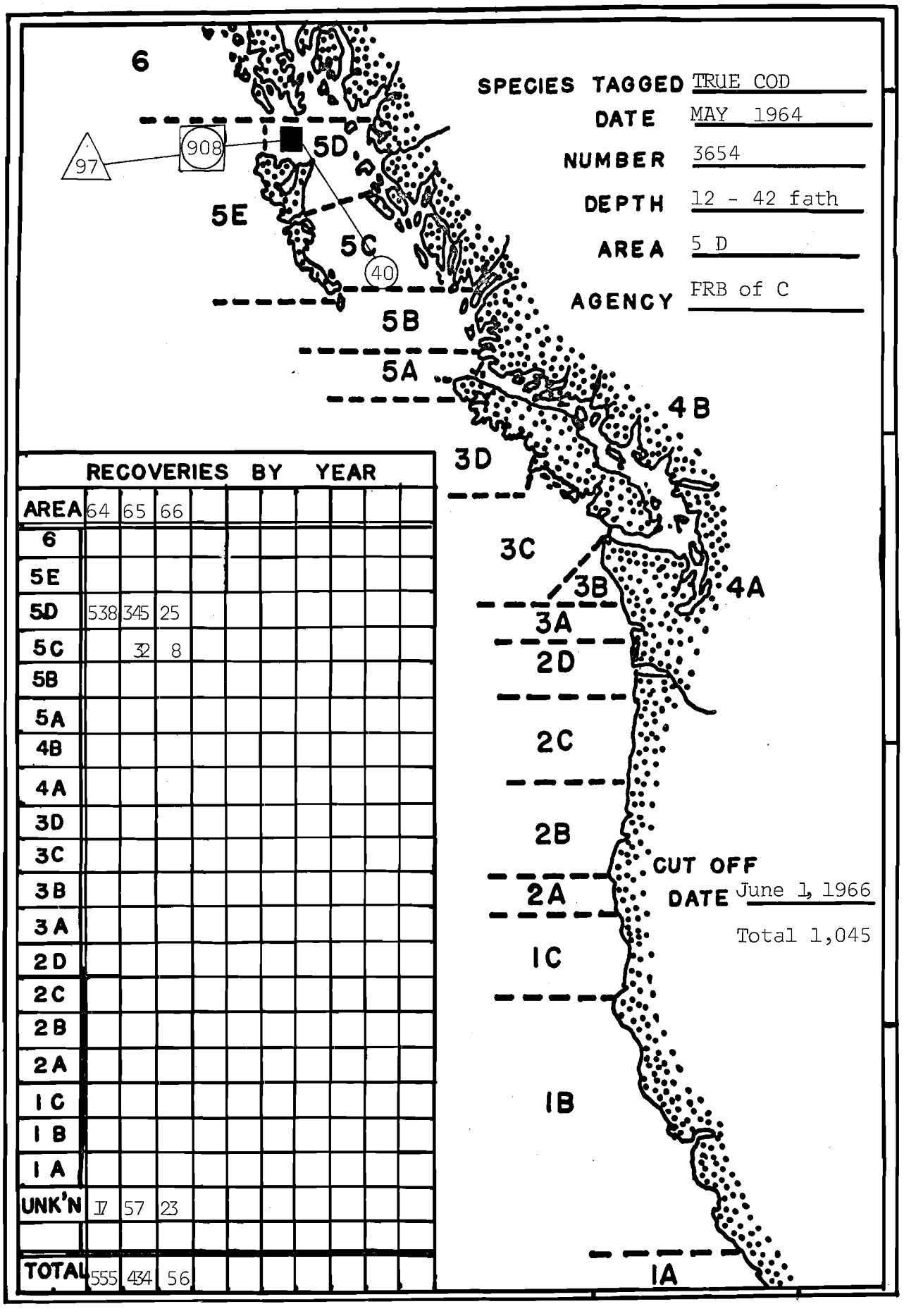
AREA	61	62	63	64	65	66				
6										
5E										
5D										
5C										
5B										
5A										
4B										
4A										
3D										
3C										
3B										
3A										
2D		2	5	5	1					
2C	12	76	67	48	24					
2B		3	3	8	3					
2A			1							
1C										
1B										
1A										
UNK'N		2	1		1					
TOTAL	12	83	77	61	29					


6
5D
5E
5C
5B
5A
4B
3D
3C
3B
4A
3A
2D
769
3
2C
9
2B
2A
1C
1B
1A
CUT OFF
DATE May 31,1966
SPECIES TAGGED DOVER SOLE
DATE 5/61 - 5/64
NUMBER 9013
DEPTH 50 - 400
AREA 2-D
AGENCY OREGON
Cum. Total Tagged
1585
4393
6295
9013
RECOVERIES BY YEAR
AREA 61 62 63 64 65 66
6
5E
5D
5C
5B
5A
4B
4A
3D
3C
3B
3A
2D 7 71 113 348 218 12
2C 5 1 2 1
2B
2A
1C
1B
1A
UNK'N 2 1
TOTAL 7 76 116 350 219 13



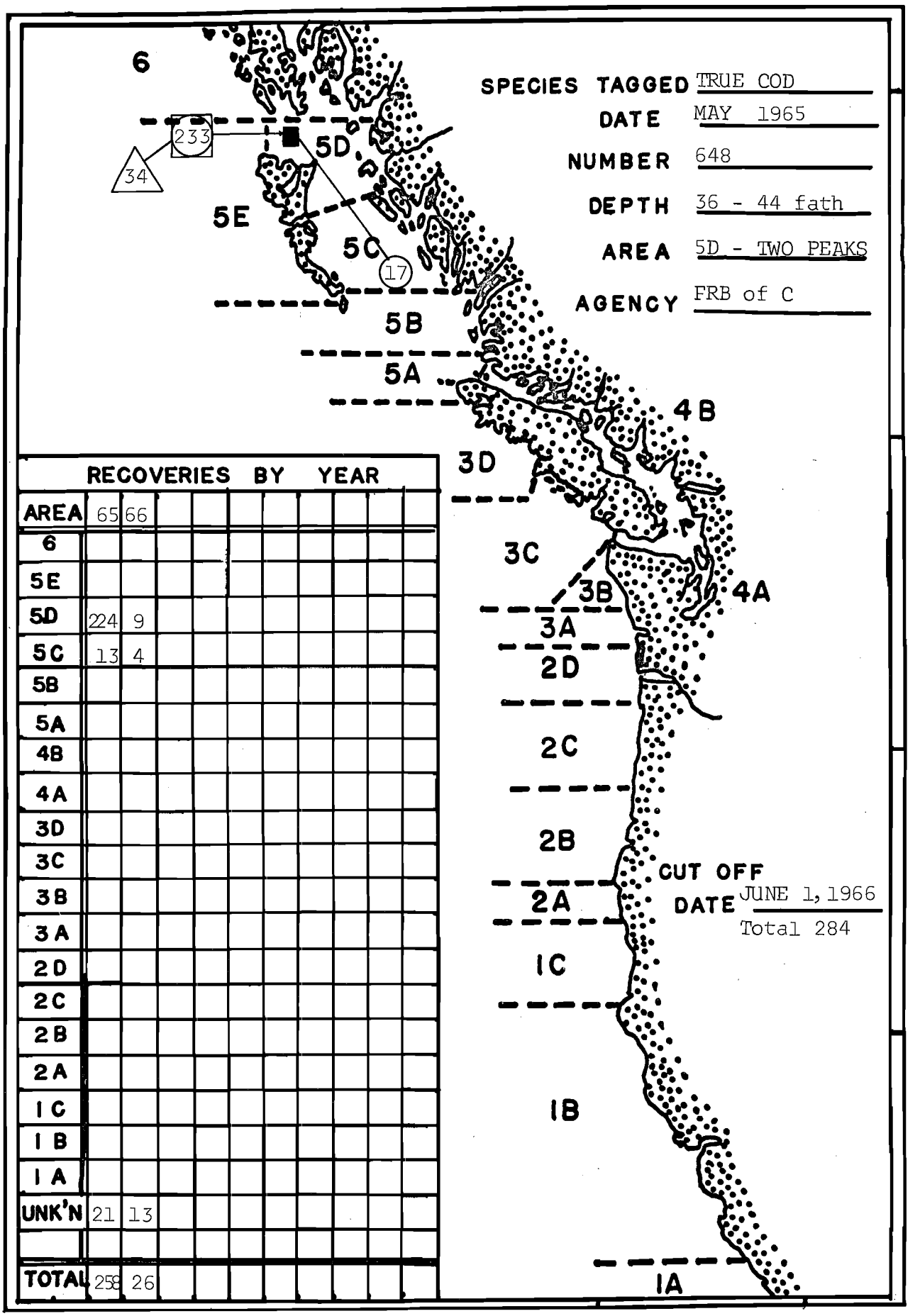
RECOVERIES BY YEAR

AREA	62	63	64	65	66
6					
5E					
5D					
5C					
5B					
5A					
4B					
4A					
3D					
3C					
3B					
3A					
2D					
2C					
2B					
2A	4	1	3	4	
1C	198	262	141	48	3
1B					
1A					
UNK'N	30	27	42	46	1
TOTAL	232	290	186	98	4

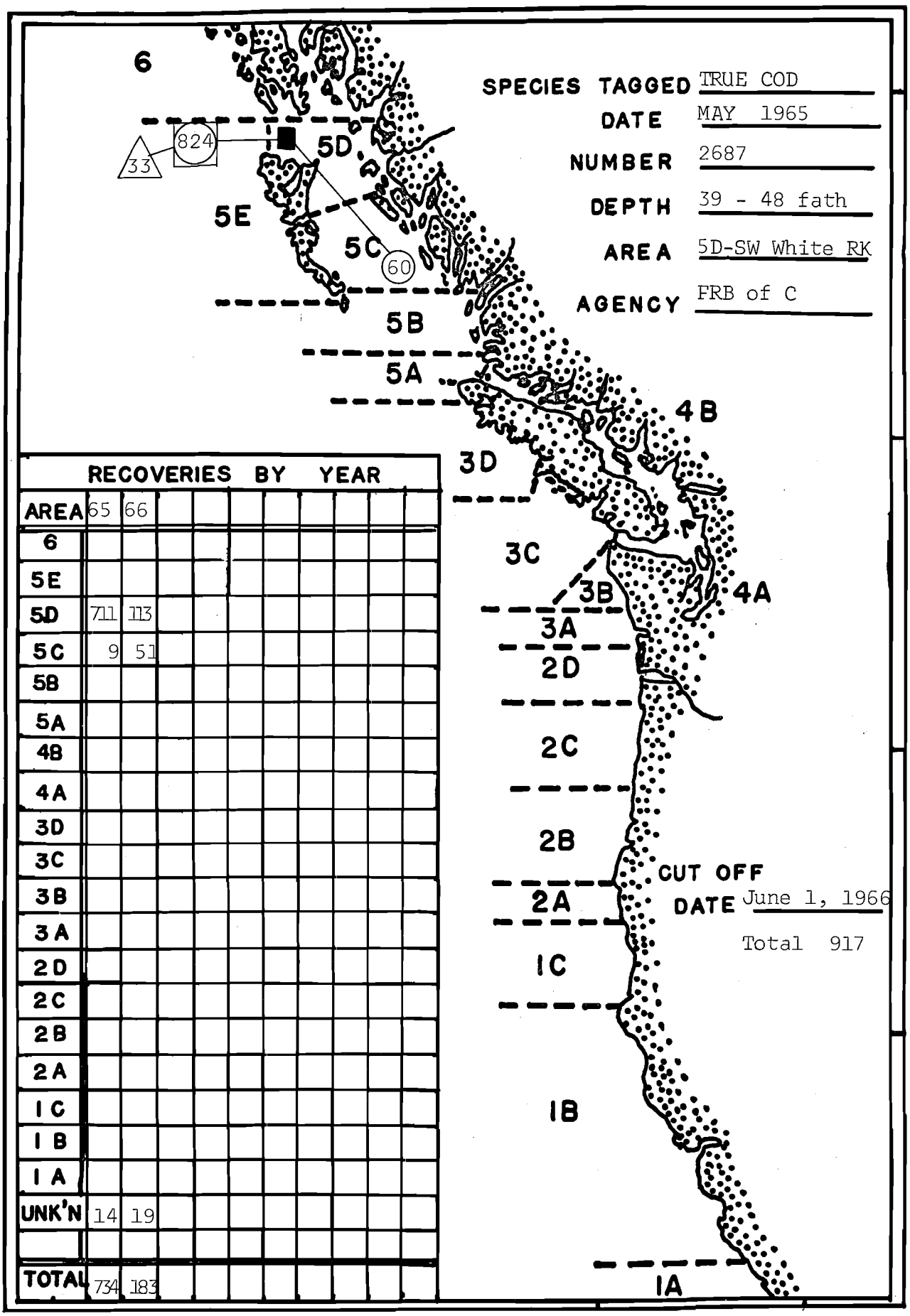


RECOVERIES BY YEAR

AREA	64	65	66							
6										
5E										
5D	538	345	25							
5C		32	8							
5B										
5A										
4B										
4A										
3D										
3C										
3B										
3A										
2D										
2C										
2B										
2A										
1C										
1B										
1A										
UNK'N	17	57	23							
TOTAL	555	434	56							

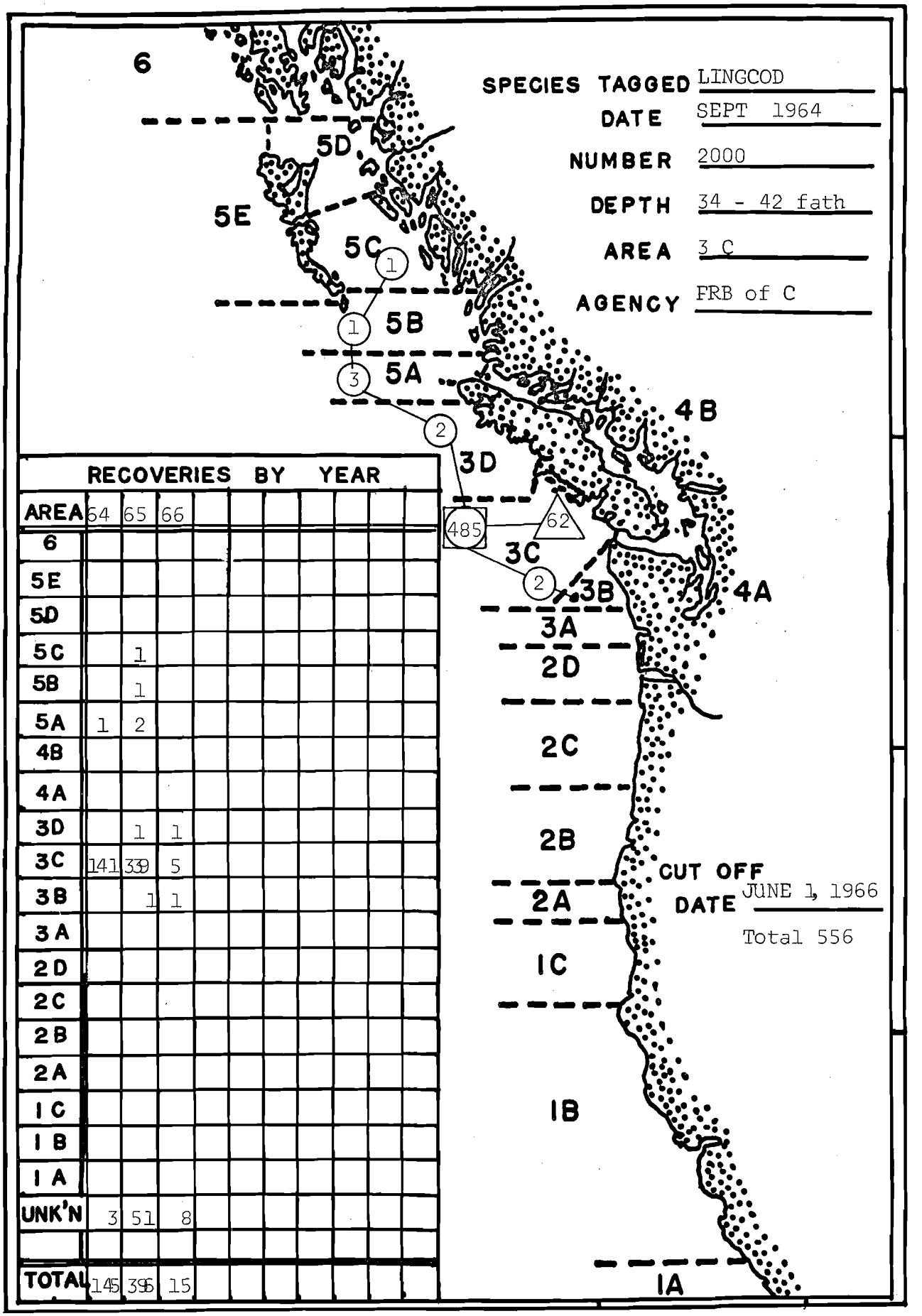


RECOVERIES BY YEAR										
AREA	65	66								
6										
5E										
5D	224	9								
5C	13	4								
5B										
5A										
4B										
4A										
3D										
3C										
3B										
3A										
2D										
2C										
2B										
2A										
1C										
1B										
1A										
UNK'N	21	13								
TOTAL	258	26								



RECOVERIES BY YEAR

AREA	65	66
6		
5E		
5D	711	113
5C	9	51
5B		
5A		
4B		
4A		
3D		
3C		
3B		
3A		
2D		
2C		
2B		
2A		
1C		
1B		
1A		
UNK'N	14	19
TOTAL	734	183



RECOVERIES BY YEAR

AREA	64	65	66							
6										
5E										
5D										
5C		1								
5B		1								
5A	1	2								
4B										
4A										
3D		1	1							
3C	141	339	5							
3B		1	1							
3A										
2D										
2C										
2B										
2A										
1C										
1B										
1A										
UNK'N	3	51	8							
TOTAL	145	396	15							