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 Eighth Annual Meeting
June 27-29, 1967
Nanaimo, British Columbia

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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 27-29, 1967

PLACE: Biological Station, Nanaimo, British Columbia

PARTICIPANTS:

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

I. CALL TO ORDER

The eighth annual meeting of the Technical Sub-Committee was called to order at 0900 hours on June 27, 1967, by Chairman T. Jow 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

J. Van Hyning, of Oregon, 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

1. Total Catch and Effort for the 1966 Trawl Fishery

The 1966 otter trawl catch by Canadian and United States fishermen from northeastern Pacific waters was 185 million pounds (Table 1). This was another record catch, exceeding the previous 1965 record (165 million pounds) by 20 million pounds (12%) and the mean 10-year catch (1956-65) of 137 million pounds by 48 million pounds (35%). Total effort of 157,735 hours was a 5% decrease from the 166,182 hours of 1965.

Highlights of the 1966 season included a strong foodfish market and resulting record harvests of Pacific cod and Pacific ocean perch, and the beginning of a Pacific hake fishery in Washington. Canada and Washington experienced record total catches which in 1966 were 55 and 69 million pounds, respectively, while Oregon's production declined to 26 million pounds due to the scarcity of Pacific ocean perch, and California's remained about the same as in previous years at 35 million pounds. The Alaskan catch by Pacific Coast fishermen was considered negligible. The market situation in early 1967 was much different than 1966 with boats on limits and many shifting to other fisheries. Canada reported a small but expanding export market for dogfish products in Europe.

2. Petrale Sole

The 1966 total catch of 8.5 million pounds was the same as in 1965 and 0.4 million pounds (4%) below the 10-year mean of 8.9 million pounds.

Table 1. Otter-trawl landings on the west coast by Canadian and United States vessels in 1965 and 1966 and mean catch for 1956-65, in millions of pounds.

	1956-65 Mean					1965					1966				
	B.C.	Wash.	Oregon	Calif.	Total	B.C.	Wash.	Oregon	Calif.	Total	B.C.	Wash.	Oregon	Calif.	Total
English sole	1.6	4.4	1.8	4.2	12.0	1.3	3.8	1.7	4.9	11.7	1.2	3.7	3.5	4.8	13.2
Petrale sole	1.0	3.0	1.9	3.0	8.9	1.3	2.7	1.8	2.7	8.5	1.3	2.5	1.8	2.9	8.5
Dover sole	0.3	2.5	4.2	8.7	15.7	0.4	1.4	3.6	10.8	16.2	0.5	1.1	3.5	10.3	15.4
Rock sole	3.4	0.7	0	tr.	4.1	3.1	1.0	tr.	0	4.1	7.2	1.4	tr.	0	8.6
Pacific cod	9.9	8.0	0.2	0	18.1	24.5	9.9	0.2	0	34.6	26.8	9.4	0.6	0	36.8
Lingcod	2.5	3.6	0.5	1.0	7.6	3.8	4.6	0.8	0.6	9.8	4.3	5.7	1.0	0.6	11.6
Sablefish	0.2	1.0	0.2	1.7	3.1	0.6	0.2	0.1	1.9	2.8	0.7	0.2	0.1	2.1	3.1
Pacific ocean perch	0.9	8.5	5.5	tr.	14.9	3.1	14.4	13.6	tr.	31.1	5.2	17.4	4.5	tr.	27.1
Other rockfish	0.4	6.3	4.4	10.7	21.8	0.6	6.5	4.1	7.6	18.8	0.5	9.3	5.3	8.5	23.6
Dogfish	2.5	1.0	tr.	tr.	3.5	0.2	1.9	tr.	tr.	2.1	0.4	1.4	0	tr.	1.8
Other sp.	1.0	4.5	1.6	4.1	11.2	1.2	3.3	3.0	3.4	10.9	1.5	9.4	2.3	3.6	16.8
Animal food	5.5	2.6	7.3	2.3[1]	17.7	3.8	3.8	4.2	2.9	14.7	4.8	7.2	3.5	2.4	17.9
Total lbs. of fish	29.3	45.8	27.6	34.5	137.2	43.9	53.6	33.2	34.8	165.4	54.6	68.9	26.2	35.2	184.9
Total hours	25,634	53,250[2]	30,062[3]	52,598[3]	161,544	29,029	49,600	29,254	58,299	166,182	28,124	51,837	23,676	54,098	157,735
% of total coastal catch	21.4	33.4	20.1	25.1		26.5	32.4	20.1	21.0		29.5	37.3	14.2	19.0	
Catch/hour--lbs.	1,046[4]	862[2]	950[3]	631[3]	849	1,505[4]	1,081	1,135	597	995	1,927[4]	1,329	1,107	650	1,172

1/ 5-year average
2/ 6-year average
3/ 7-year average
4/ Excludes dogfish

Canada. The Canadian catch of 1.3 million pounds was the same as in 1965 and one-third greater than the mean 1956-65 catch. The southern stock catch (Area 3C) was little more than half that of 1965 and the catch per effort was considerably lower than the previous year and the 10-year mean. Average length of females decreased slightly in 1966. No Canadian boats fished Estevan Deep. Landings of petrale sole in the northern area were 20% higher than in 1965 and double the mean catch for the previous 10 years. Catches and landings of petrale sole by Canadians are now largely incidental to those of other species.

Washington. Petrale sole landings totaled 2.5 million pounds in 1966, slightly less than in 1965, and 0.4 million pounds below the previous 10-year mean. Contributions of northern and southern stocks were about equal in catch and catch/effort. Relatively little activity by Washington trawlers is now occurring in Hecate Strait.

Oregon. Total landings of 1.8 million pounds were almost the same as in 1965 and the previous 10-year mean. Catch per significant landing (where the species is 29% or greater of the total landing) has fluctuated between 4,200 and 5,600 pounds during the past 6 years.

California. The 1966 catch of 2.9 million pounds was 10% greater than 1965 and 1% above the 10-year mean. A substantial winter fishery occurred only in Area 1C where one-half of the 744,000 pound catch was made in January, February, and December. The winter fishery in Area B was curtailed by weather and strikes.

3. Lingcod

Trawl landings of 11.6 million pounds in 1966 were 18% greater than the 9.8 million pounds in 1965 and 53% greater than the 10-year mean of 7.6 million pounds.

Canada. Total Canadian trawl catch of lingcod in 1966 at 4.3 million pounds was slightly greater than the 1965 catch, but 75% greater than the 10-year mean. Over 60% of the trawl catch was taken from grounds off Vancouver Island. Catch/effort has increased since 1962. The trawl fishery accounts for 62% of the total catch of lingcod; line fishing has declined in importance in recent years.

Washington. The 1966 lingcod catch reached a record 5.7 million pounds, up 1.1 million pounds or 24% over 1965 and 58% over the 10-year mean. Catch/effort in PMFC Area 3C, which is the principal producing area for Washington fishermen, was the highest of the past 7 years on record.

Oregon. Landings in 1966 were slightly over 1 million pounds. This is also a record but part of the increase may be an artifact due to better separation of lingcod and sablefish in the landings.

California. Lingcod remains an incidental species in the California catch. The 1966 catch was 0.6 million pounds compared to the 1956-65 mean of 1.0 million pounds.

4. Pacific Cod

Landings in 1966 of 37 million pounds exceeded 1965 landings by 2 million pounds and were twice as great as the 10-year mean. In both

1965 and 1966, cod was the most important single species in west coast landings.

Canada. Pacific cod was again the dominant species in B.C. trawl catches with a 1966 catch of 26.8 million pounds--10% greater than in 1965 and 2.7 times the 10-year mean. Ketchen prepared a review of the B.C. trawl fishery for Pacific cod which included a forecast for 1967 based on an observed relationship between size of cod landed in a given year and average fishing success in the succeeding year. Annual variations in fishing success depend on highly variable annual recruitment. A labor dispute and market difficulties may preclude an assessment of the validity of the prediction.

Washington. The 1966 Pacific cod landings of 9.4 million pounds were slightly less than the 9.9 million pounds landed in 1965 but still above the 1956-65 average of 8.0 million pounds.

Oregon. Total landings in 1966 of 628,000 pounds were three times higher than 1965 and 171% higher than the 10-year average. It was noted that good years for cod in the northern areas were also reflected in fisheries in the southern limit of the range.

California. No Pacific cod were taken by California trawlers in 1966.

5. Pacific Ocean Perch

The 1966 landings of 27 million pounds declined somewhat from the 1965 landings of 31 million pounds but were above the 10-year mean of 15 million pounds. Almost all the decrease was in Oregon; modest increases occurred in British Columbia and Washington.

Canada. Landings of perch by B.C. trawlers in 1966 were 5.2 million pounds—a record catch. This is almost 70% greater than in 1965 and almost six times the mean annual catch during the 1956-65 period. The bulk of the catch was taken in Queen Charlotte Sound (Areas 5A and 5B). The catch per effort remains high, suggesting: (1) that Canadian fishermen are still in the process of learning how and where to fish for perch, or (2) the stock is very large. Westrheim pointed out that depth sounders aboard the G. B. Reed do not usually detect rockfish schools beyond 170 fathoms.

Washington. Record landings of 17.4 million pounds occurred in 1966. Seventy-one per cent, or 12.4 million pounds, came from Queen Charlotte Sound. An additional 4.1 million pounds, or 24%, came from the lower west coast of Vancouver Island.

Oregon. The 1966 landings of 4.5 million pounds were the lowest since 1960. This is a decrease of 9.1 million pounds from the 1965 record of 13.6 million pounds and 18% less than the 10-year average. There was a decrease in effort due to competition with the Russian fleet. The catch-per-unit effort in most areas was down but one area brought the overall C/E up to a high level.

California. Landings of Pacific ocean perch in California were incidental and amounted to only 6,000 pounds.

6. English Sole

The 1966 English sole catch of 13.2 million pounds was above the 1965 catch of 11.7 million pounds and the 10-year mean of 12.0 million pounds.

Canada. B.C. fishermen landed 1.2 million pounds of English sole, slightly below 1965 and the 10-year mean. The incidental nature of the catch continued, making assessment of the stocks virtually impossible. The inshore fishery in the Strait of Georgia is becoming of lesser importance because it is more profitable to fish outside waters.

Washington. English sole landings of 3.7 million pounds in 1966 were virtually the same as in 1965 and were below the 1956-65 average of 4.4 million pounds.

Oregon. Record landings of 3.5 million pounds were made in 1966, an increase of more than 100% over 1965 and the 10-year average. Catch/effort was also high.

California. In 1966, California trawlers landed 4.8 million pounds of English sole, virtually the same as in 1965, and 14% above the 10-year average.

7. Dover Sole

Pacific Coast Dover sole landings of 15.4 million pounds in 1966 decreased from the 16.2 million pounds landed in 1965 but were about equal to the 10-year average.

Canada. Landings of Dover sole in B.C. in 1966 were just over one-half million pounds, slightly above average. This species remains incidental in Canadian catches.

Washington. Dover sole landings dropped to 1.1 million pounds in 1966, a decline of 0.3 million pounds from 1965 and less than half of the 1956-65 mean of 2.5 million pounds. A gradual decrease in market demand has been a factor in this decline.

Oregon. Catch of this species continued at a low level in 1966. The total landing of 3.5 million pounds was 3% lower than 1965 and 17% below the 10-year average. Increased effort in the English sole fishery is partly responsible for the continued low landings of Dover sole. The catch/effort has risen during the past 6 years.

California. Landings of Dover sole at California ports in 1966 decreased 4% from 1965, but were 18% greater than the 10-year mean. A total of 10.3 million pounds was taken in 1966 compared to 10.8 million and 8.7 million pounds, respectively, for 1965 and the 1956-65 mean.

V. REVIEW OF EXCHANGE OF DATA PROCEDURES

1. Formats and Procedures of Current Exchanges of Data

The Sub-Committee discussed the categories of Food Fish, Animal Food, and Reduction Fish in light of the increasing future importance of industrial fish. A committee composed of Verhoeven, Forrester, Meehan, and DiDonato met to consider the question of how trawl fish used for reduction should be recorded in the Bottomfish Section of the PMFC Data Series. Their report is as follows:

> "It was decided that area tables similar to those on pages 205 to 221 inclusive of the 1965 trawl data series report should each have a line entitled 'REDUCTION USE' inserted between 'ANIMAL FOOD' and 'TOTAL.' Then the ANIMAL FOOD table would be followed by a new table entitled 'OTTER TRAWL CAUGHT FISH FOR REDUCTION USE FROM INTERNATIONAL STATISTICAL AREAS IN 1966 (landings in thousands of pounds).' The format for this table would not have the names of the species provided in advance. It is anticipated that trawl-caught anchovy and shad would be shown.

Future tables such as pages 224 and 225 showing the annual catch by species by area would have a line entitled 'REDUCTION USE' inserted between 'ANIMAL FOOD' and 'TOTAL.'

The question of what to do with bottomfish caught incidentally in shrimp trawls was discussed. It was decided to hold the recording of these catches in abeyance and to let each agency prepare its own rough tabulation for 1967. These tabulations would be evaluated to see if the data warranted and could be easily incorporated into the Data Series.

A suggestion to precede each subsequent year of data, in the future, with a page of introductory comments was accepted."

The PMFC split area 2D-3A was discussed; it was decided to combine the two sub-areas into one and call it 3A beginning with 1966 data. Problems with 3D and 3C were voiced by the Canadian delegation. Area 3D formerly encompassed all the fishing grounds in the Estevan Deep but this designation is no longer valid as new fishing grounds now extend Estevan into area 3C. The concensus, however, was to keep the area boundaries as they presently are.

2. Data Exchange

Data reports summarizing sampling and catch and effort statistics from Canada and Oregon were noted. California and Washington are putting all their biological information on IBM cards which will allow better retrieval and exchange of data.

3. Use of PMFC Data Record

At last year's meeting the Sub-Committee agreed that it would be appropriate to have summaries of data on completed tagging experiments in

the PMFC Data Series, but the PMFC Executive Director has been unable to develop a format due to pressure of other duties. Recommendations 2 and 3 of last year to the Sub-Committee were reaffirmed and a committee composed of Jow and Forrester was organized to prepare a format.

Formats for tagging data summaries and inventories of tagging experiments were prepared and are being distributed to Sub-Committee members for approval.

4. Catch/Effort Analysis

The problems of analyzing and interpreting catch-effort statistics were discussed in some detail. Obtaining hours of fishing by month and PMFC zone was a major step; a further refinement would be to divide these areas into depth intervals. This approach would come closer to measuring actual fishing success and abundance and might eliminate the necessity for using qualification levels. Catch and effort by shallower or deeper than 100 fathoms was suggested as a possibility. It appeared that catch and effort statistics presently being gathered by the agencies would permit such a breakdown. The Sub-Committee decided to reflect on this problem and consider it for a recommendation.

VI. REVIEW OF CURRENT AND PROPOSED RESEARCH

Research programs of all agencies remain essentially the same as reported previously. Only important changes from those listed in last year's minutes are given.

Canada. The Groundfish staff of the FRBC in 1966 consisted of 3 biologists, 7 technicians, and 2 summer assistants. Vessel operations for the Near-Seas Investigation in 1966 were confined chiefly to collection of mature fish for laboratory studies of egg development. Hatching of

petrale sole eggs was achieved for the first time. A controlled feeding and growth experiment on sablefish was initiated in 1966. Much effort was directed to summarizing various statistical and sampling material, in particular by the means of computer programs. The problem of aging cod will receive increased effort in the future. The exploratory fishing program sponsored by the Industrial Development Service, undertaken in 1965, was continued in 1966.

The Distant-Seas Investigation continued field studies on the distribution and size and age composition of Pacific ocean perch. Distribution, taxonomic, and maturity studies on various species of rockfish were also continued.

Washington. The groundfish staff of 3 biologists and 1 technician was bolstered during 1966 by the addition of two additional fisheries technicians under a PL 88-309 program. Collection of catch and effort statistics continued. Modification of an existing computer program which extrapolates interview data to total landings was made for added efficiency. Market sampling received increased emphasis. Two tagging cruises were completed in 1966, one on English sole in Area 3B (Cape Flattery) and the other on Pacific cod in 4A (Puget Sound-Gulf of Georgia). Three additional cruises have been completed and two more are scheduled in 1967. It is planned to intensify studies on Pacific ocean perch and other rockfish in 1967 and to begin studies on the mid-water trawl hake fishery.

Oregon. Studies continued along the same lines as last year. Logbooks have been improved with the addition of a tear-out sheet that can be mailed in. Development of a satisfactory method for aging Dover sole

with scales was completed. A data report summarizing sampling information from 1948-65 was distributed.

California. A total of 1,612 English sole were tagged in early 1967 in Area 1B (Cape Mendocino-Piedras Blancas). Additional English sole tagging is scheduled for early 1968. An aquarium experiment is underway to determine tag effects and mortality of sole tagged with spaghetti tags. Additional effort on bottomfish research has been made possible through the implementation of the PL 88-309 Data Analysis Project. This project is headed by a biometrician, assisted by two biologists, an account clerk, and a keypunch operator. The project is engaged in developing and maintaining a computer-oriented system for the storage and retrieval of shellfish and bottomfish data. A study of available fisheries models will be undertaken to determine their applicability to our fisheries problems and to serve as a basis for the generation of new hypothetical models for fisheries management.

Forrester suggested an exchange of computer programs and sampling card design. It was decided that each agency should list the titles of programs available, and the machine and language they are designed for.

VII. REVIEW OF JOINT PROJECTS

1. PMFC Bulletin No. 7

Verhoeven reported that he has manuscripts from everyone and will start editing soon. The Bulletin will be out this year.

The groundfish bibliography being compiled by Washington is temporarily suspended due to other higher priority projects, however, it was agreed to take the references which have been compiled and circulate

these to each agency for additions. Two MS theses from the University of Washington on English and rex soles were suggested for possible inclusion in Bulletin 7.

2. Closed Winter Season for Petrale Sole

The Technical Sub-Committee reviewed available information on the abundance and biology of petrale sole for the purpose of assessing the efficacy of a closed season which was designed to protect spawning concentrations of that species. Effective international control of winter fishing, applying to trawl fishermen of Oregon, Washington, and British Columbia, was first achieved in 1958. This action was the outcome of discussions which expressed concern over declining success of the inshore (summer) fishery for petrale sole and rapid development of an offshore (winter) fishery for spawning fish in deep water.

The Sub-Committee was unable to find any conclusive evidence that the exceptionally large catch made in January and February of 1957 from one of the major spawning concentrations (Estevan Deep) had either an immediate or a long-term detrimental effect on the success of fishing. Catches and apparent fishing success on the inshore grounds of British Columbia in 1957 were not significantly lower than in 1955 and 1956 when removals from the Estevan Deep were relatively light. The large removal of spawning fish did not result in a weaker-than-average 1957 year class. In fact it was stronger than 9 consecutive year classes produced prior to the discovery of petrale sole spawning grounds in deep water in 1953, and by parent stocks which apparently were larger than those present in 1957.

Thus, there is as yet no evidence that the size of a spawning stock determines the number of young which will eventually be recruited to the fishery. Variations in the abundance of petrale sole ~~in waters~~

adjacent to British Columbia (and probably farther to the south) appear to reflect factors in the natural environment which affect survival of young and which, until now, have played a more important role than the effects of fishing.

Although natural factors, rather than those associated with man's activities, appear to govern the supply of petrale sole to the fishery, scientific evidence suggests that the fishery is taking close to the maximum which can be expected from that supply. In theory, some increase in total yield (possibly no more than 5%) could be achieved by more intensive fishing.

In light of these several conclusions, the Sub-Committee recommends that the winter closure on fishing for petrale sole be rescinded, with the understanding (1) that the fisheries agencies of the two countries shall undertake to develop and coordinate more effective procedures to monitor the effects of unrestricted fishing, and (2) that in the event such unrestricted fishing should prove detrimental to the interests of fishermen in either country the door would be open for reconsideration of the need for conservation measures.

The latter qualification is made in recognition of the fact that in addition to biological consequences of unrestricted fishing there are economic and sociological ones which are difficult to predict with any accuracy. For example, it is possible that prolonged unrestricted fishing on winter spawning concentrations of petrale sole, though it might result in a small increase in total yield, would reduce availability on the inshore (summer) grounds and thus reduce the catches by fishermen who are, for one reason or another, unable to fish offshore in winter months.

3. Hake.

Washington presented a summary of the 1966-67 hake fishery in Puget Sound and off the Washington coast. Although the initial 1966 coastal season was poor due to competition with the Soviet fleet, excellent fishing has prevailed to date in 1967. Physical competition between the fleets this year has been negligible as a result of the 12-mile limit and a negotiated area between Grays Harbor and the Columbia River in which the Soviets have agreed to refrain from fishing inside of approximately 60 fathoms. About 9 million pounds of hake were landed in the 1966-67 Puget Sound fishery. Limited markets restricted total potential landings as in the previous season. The mid-water trawl was shown to be more effective than the bottom trawl for catching hake in Puget Sound.

The Sub-Committee discussed the fishery as it exists and concluded that although it is presently not a fishery of U.S.-Canada concern, there is a need for additional research on hake and it will be reported upon under "Review of Projects of Mutual Interest."

4. Proposals for New Projects

The problem of catch-per-unit effort as a measure of abundance was discussed and it was proposed to attempt to establish a more reliable and refined method. The agencies will exchange views during the coming year on what data are required and methods to implement their collection.

It was agreed that close monitoring of the status of the petrale stock should continue with particular emphasis between Canada and the state of Washington. A joint, rather than independent, estimate of abundance should be strived for.

VIII. INTERNATIONAL PROBLEMS

1. Status of Foreign Trawl Fisheries off the West Coast of Canada and United States

Foreign fishing fleets have continued to fish off the west coast with concentrations of vessels extending southward to California waters in 1967. On the basis of average catches by month of different kinds of Soviet vessels and numbers of boats observed off British Columbia, Ketchen has estimated the 1966 USSR catch of rockfish off B.C. as 121 million pounds. The Soviet catch of hake in 1966 has been estimated at 280 million pounds and additionally 22 million pounds of rockfish, primarily ocean perch, were caught off the U.S. coast. The Soviet fleet off California in 1967 numbered as many as 20 vessels mostly about 25 miles offshore from Monterey Bay. They have been fishing primarily for rockfish and sablefish.

Note was taken of the impending fall arrival in the agencies fishing areas of a Japanese fleet consisting of three mother ships and their catcher boats.

2. Report on Fisheries Agreements Respecting Fisheries for West Coast Groundfish

The Soviet-U.S. agreement which resulted from the meeting in Washington, D.C. in January 1967 was briefly described. Another meeting is scheduled for late July 1967, in Seattle, which will consider methods of statistical and biological data exchange and possible cooperative research programs. Canada has had no formal negotiations with the USSR regarding fishing agreements.

3. Recommendations for Cooperative Programs for Conservation of Joint Stocks which are Exploited by Foreign Fleets

Verhoeven discussed PMFC Resolution No. 11 of 1966 which called for increased research efforts on groundfish biology and the effect of foreign fishing. A meeting of U.S. groundfish specialists was held in March 1967 and a program formulated and sent to members of Congress for emergency funding. No money has been appropriated as yet. However, Verhoeven felt that this program or request had resulted in more support for funding of the Commercial Fisheries Research and Development Act, the Anadromous Fish Act, and the Sea Grant College Act and Program.

A cooperative groundfish age reading unit in Seattle has been proposed which would include participation by the Bureau of Commercial Fisheries, Washington Department of Fisheries, and Fish Commission of Oregon. This unit would be initially involved with Pacific ocean perch and hake. The unit would benefit by instruction in perch age reading from Canadian specialists.

It was recommended that Washington and Canada exchange by correspondence requirements for adequate sampling of Pacific ocean perch and petrale sole. Canada will take the initiative on setting standards and Oregon and California will be informed.

IX. NEW PROPOSALS FOR TRAWL REGULATIONS

Estimates of natural mortality for lingcod derived independently by Canada and Washington are very different which affects the desirability of having a size limit on this species.

Mesh regulations in the various areas were reviewed. Enforcement of Canada's mesh restriction in the Strait of Georgia has not been successful in court due to problems in mesh measurement.

X. NEW BUSINESS

1. Marine Protein Concentrate and Its Impact on Groundfish Management Programs

The potential expansion of the fisheries for fish meal and fish protein concentrate, the need for regulations, and the resulting impact on presently utilized species were discussed.

The fishery agencies will be facing increased pressure to relax regulations and they must continue research on the stocks, regardless of what they are used for. Because of increased utilization, there will be a need for more and better information.

XI. OTHER BUSINESS

The U.S. delegation expressed appreciation for the fine Canadian hospitality.

XII. RECOMMENDATIONS

A. Future Work, For Sub-Committee Action

The Sub-Committee recommends:

1. that an exchange of correspondence be initiated for determining requirements for adequate monitoring of Pacific ocean perch and petrale sole stocks;
2. that agencies examine feasibility of determining depth distribution of catch for all species and be prepared to determine a satisfactory breakdown at next year's meeting;
3. that a standardized technique for age determination of Pacific ocean perch be studied;

4. reaffirmation of Sub-Committee recommendations 2 and 3 of the seventh annual meeting that all agencies submit for inclusion in the PMFC Data Series tagging summaries of terminated experiments and inventories of all tagging experiments;

5. that computer programs and card design be exchanged among agencies with each agency listing the titles and language of available programs.

B. Recommendations to Parent Committee

1. The Technical Sub-Committee recommends that the winter closure on petrale sole be rescinded. (See Section VII 2.)

2. The Technical Sub-Committee reaffirms Recommendation No. 2 of the 1966 Annual Meeting to the Parent Committee and points out that further intensification of trawling activities off the west coast is likely due to increasing interest in industrial fish and fish protein concentrate.

3. The Technical Sub-Committee recommends that the International Trawl Fishery Committee should attempt to obtain data on catch by species and effort expended by nationals, other than those of Canada and the United States, fishing off the west coast of the United States and Canada.

XIII. SCHEDULE OF MEETINGS (Tentative)

1. Parent Committee

The International Trawl Fishery Committee will meet the afternoon of November 29, 1967, at Salishan Lodge, Oregon.

2. Technical Sub-Committee

The ninth annual meeting will be held in June 1968 in San Francisco, California.

XIV. ELECTION OF CHAIRMAN

Tom Jow, California Department of Fish and Game, was re-elected Chairman for another year.

XV. ADJOURNMENT

The meeting was adjourned at noon, June 29, 1967.

XVI. APPENDICES

A. Agenda

B. Dispersion of Tagged Petrale Sole

C. Dispersion of Tagged English Sole

D. Dispersion of Tagged Dover Sole

E. Dispersion of Tagged Pacific Cod

F. Dispersion of Tagged Lingcod

AGENDA AS ADOPTED FOR 8TH ANNUAL MEETING TECHNICAL SUB-COMMITTEE OF THE INTERNATIONAL TRAWL FISHERY COMMITTEE NANAIMO June 27-29, 1967

I CALL TO ORDER

II APPOINTMENT OF SECRETARY

III APPROVAL OF AGENDA

IV STATUS REPORTS

1. Total Catch and Effort for the 1966 Trawl Fishery
2. Petrale Sole
   a) Catch/Effort
   b) Definition of Stocks
   c) Winter Fishery (± 100 Fathoms)
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. Formats and Procedures of Current Exchanges of Data
2. Expansion of Data Exchange
3. Use of PMFC Data Record
4. Catch/Effort Analysis

VI REVIEW OF CURRENT AND PROPOSED RESEARCH

1. Tagging
2. Biological Studies
3. Sampling Programs
4. Special Projects (IDS + US PL 88-309)
5. Other Studies

VII REVIEW OF JOINT PROJECTS

1. Status of English Sole PMFC Bulletin
2. Petrale Sole
   a) Assessment of restricted and unrestricted fisheries and preparation of a statement for parent committee
3. Hake
4. Proposal for New Projects

VIII INTERNATIONAL PROBLEMS

1. Status of Foreign Trawl Fisheries off the West Coast of Canada and the United States
2. Report on Fisheries Agreements Respecting Fisheries for West Coast Groundfish
3. Recommendations for Cooperative Programs for Conservation of Joint Stocks which are Exploited by Foreign Fleets

IX NEW PROPOSALS FOR TRAWL REGULATIONS

X NEW BUSINESS

1. Marine Protein Concentrate and Its Impact on Groundfish Management Programs

XI OTHER BUSINESS

XII RECOMMENDATIONS

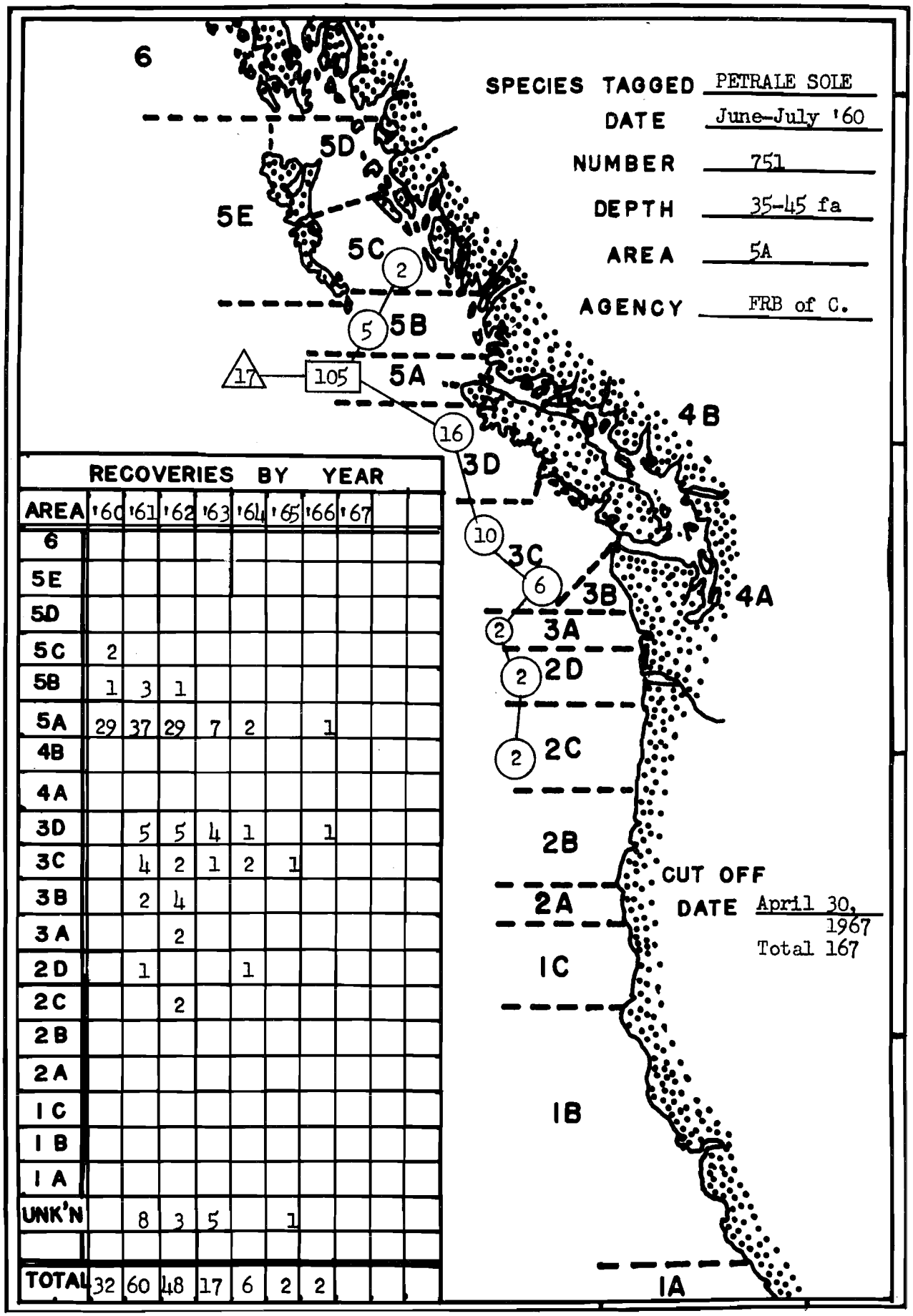
1. Future Work
2. Parent Committee

XIII SCHEDULE OF MEETINGS

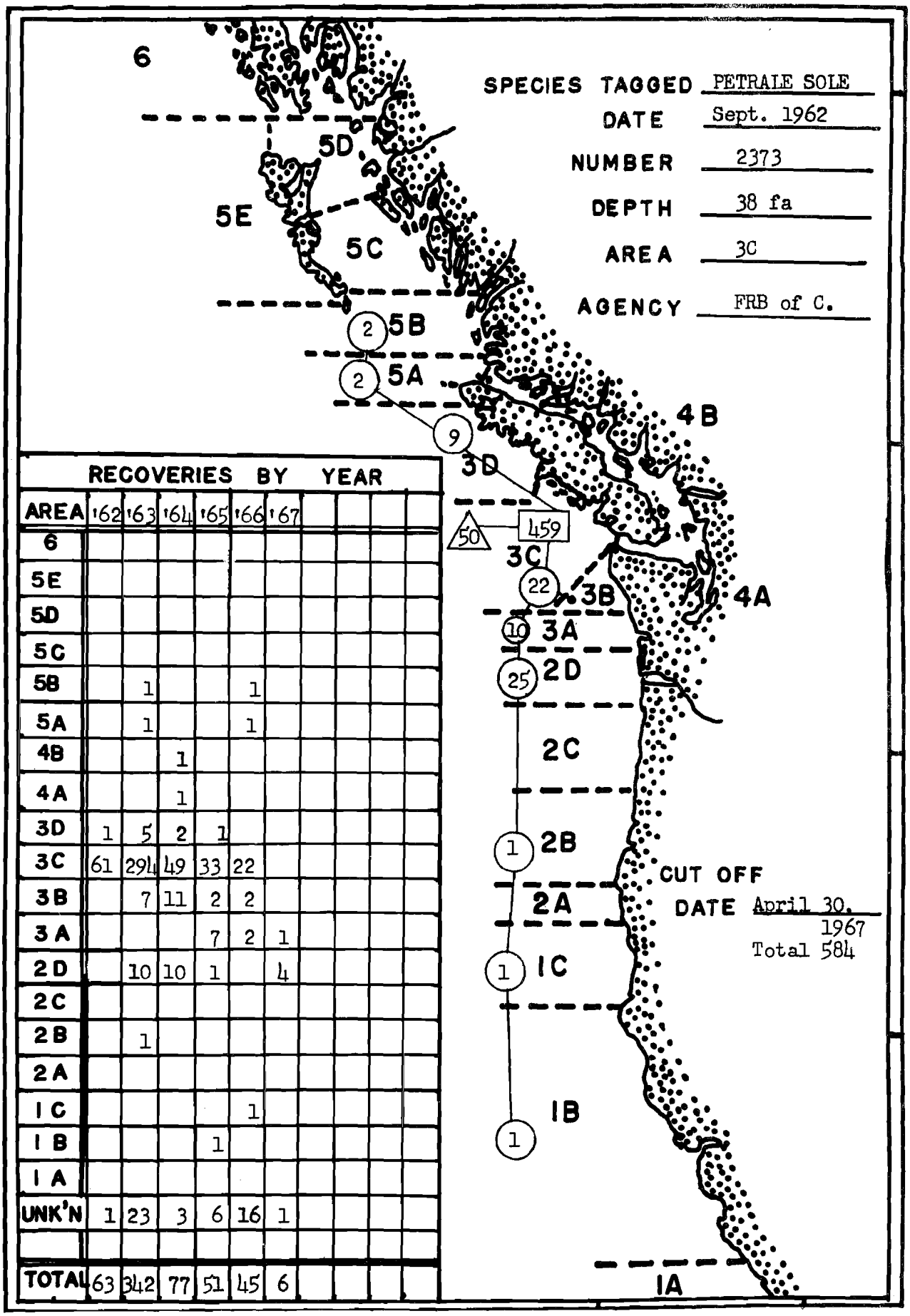
1. Parent Committee Meeting
2. 9th Annual Meeting of Technical Sub-Committee

XIV ELECTION OF CHAIRMAN

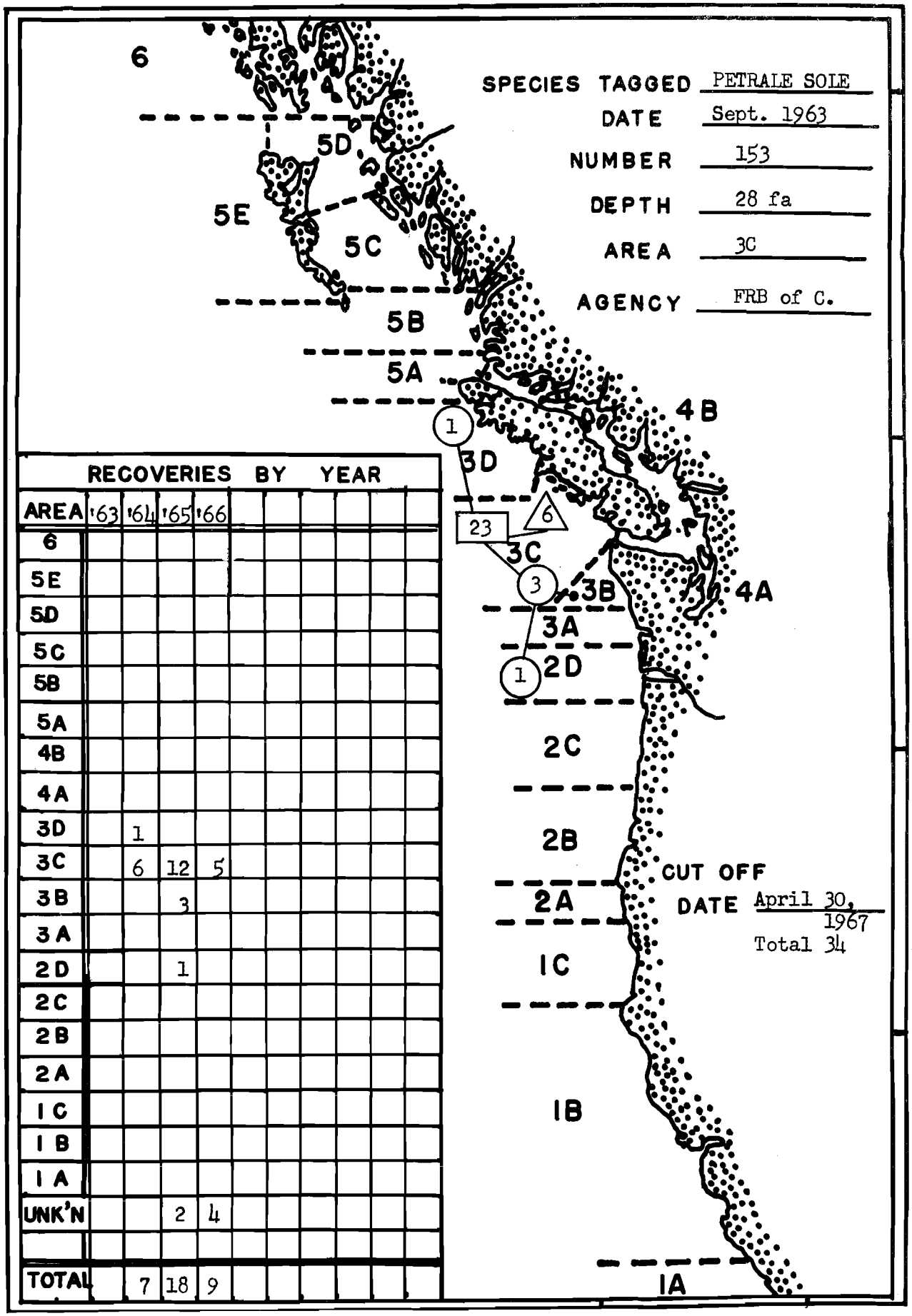
XV ADJOURNMENT



RECOVERIES BY YEAR										
AREA	'60	'61	'62	'63	'64	'65	'66	'67		
6										
5E										
5D										
5C	2									
5B	1	3	1							
5A	29	37	29	7	2		1			
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	2			

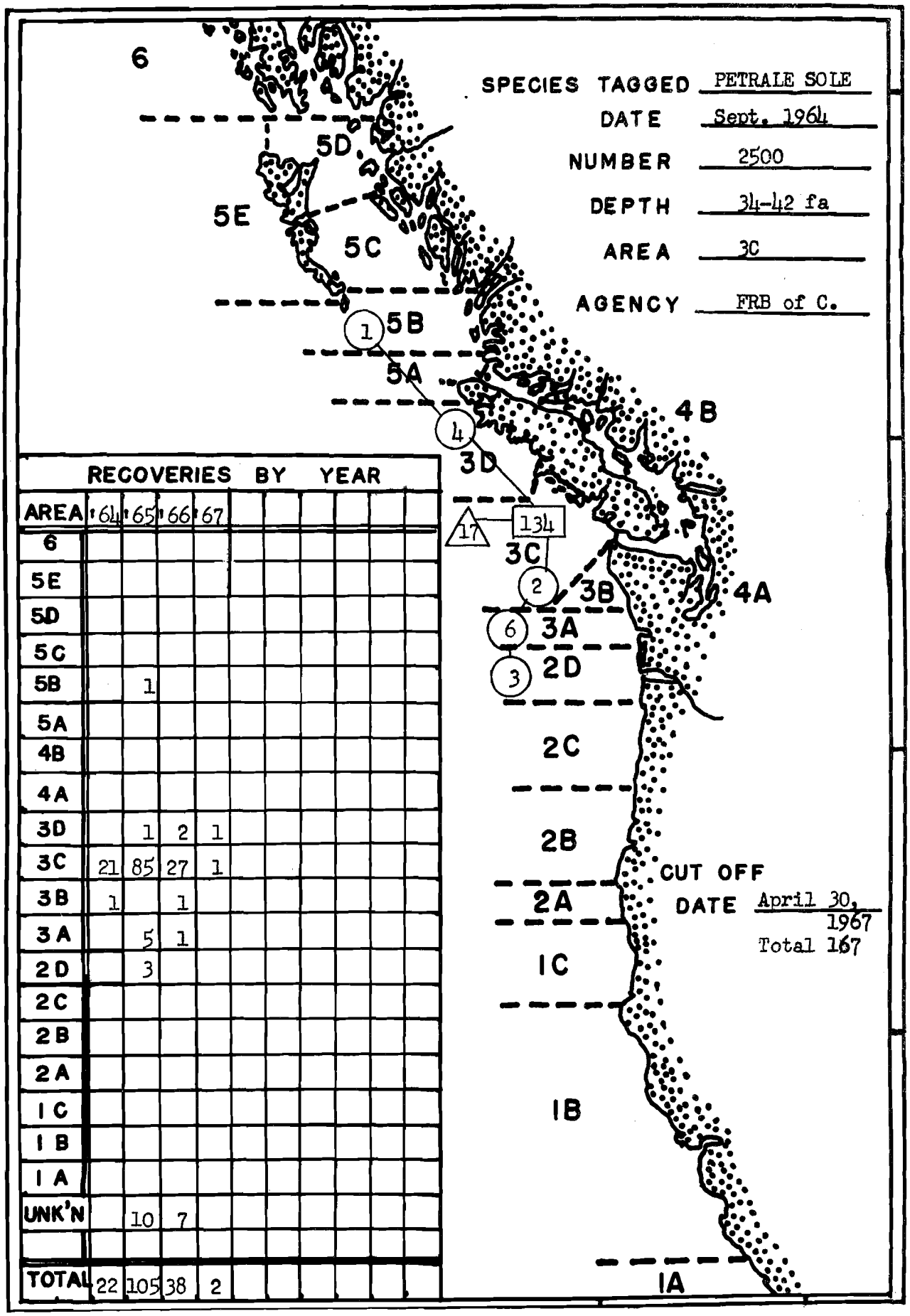


RECOVERIES BY YEAR										
AREA	'62	'63	'64	'65	'66	'67				
6										
5E										
5D										
5C										
5B		1			1					
5A		1			1					
4B			1							
4A			1							
3D	1	5	2	1						
3C	61	294	49	33	22					
3B		7	11	2	2					
3A				7	2	1				
2D		10	10	1		4				
2C										
2B		1								
2A										
1C					1					
1B				1						
1A										
UNK'N	1	23	3	6	16	1				
TOTAL	63	342	77	51	45	6				

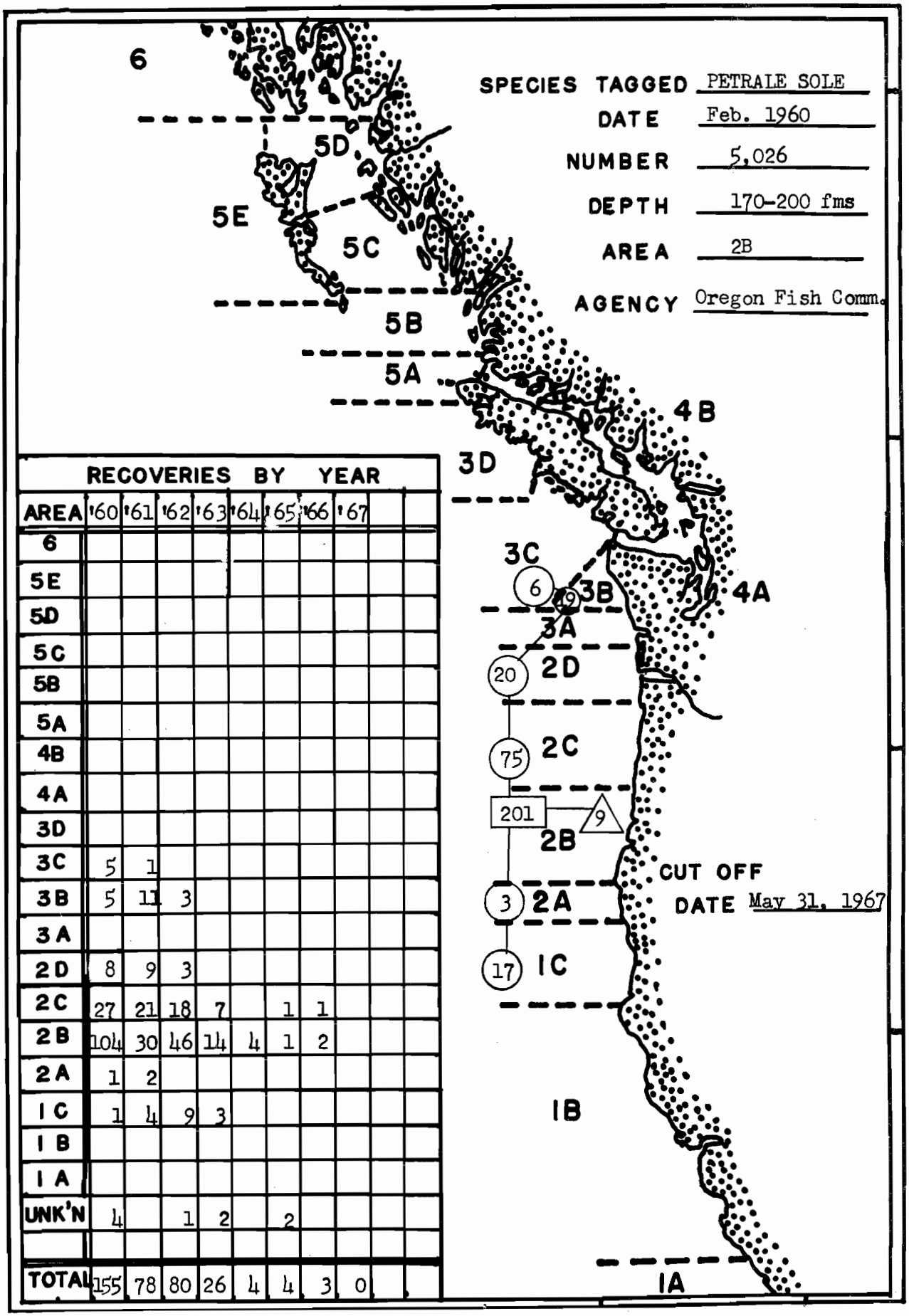


RECOVERIES BY YEAR

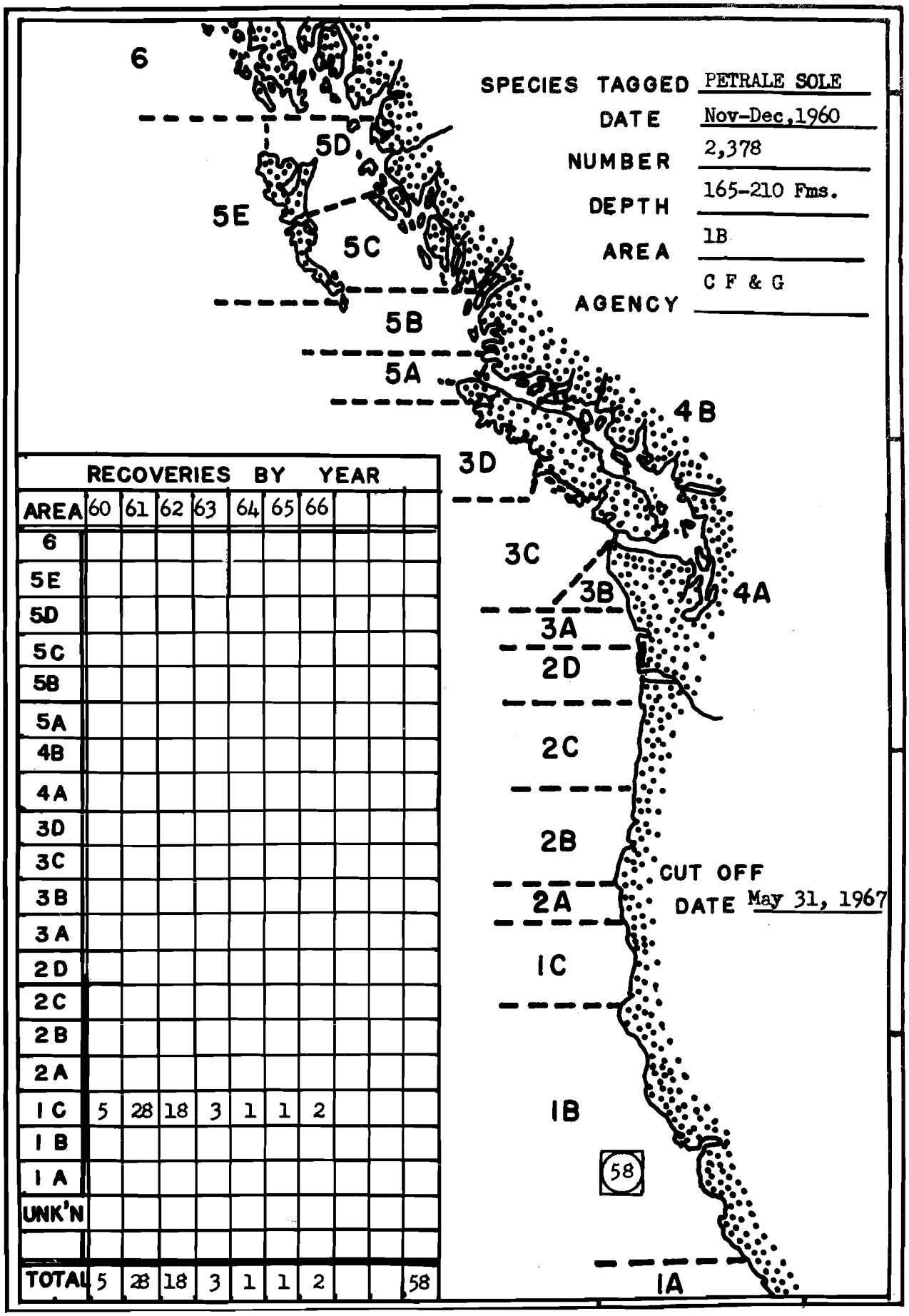
AREA	'63	'64	'65	'66
6				
5E				
5D				
5C				
5B				
5A				
4B				
4A				
3D		1		
3C		6	12	5
3B			3	
3A				
2D			1	
2C				
2B				
2A				
1C				
1B				
1A				
UNK'N			2	4
TOTAL		7	18	9



RECOVERIES BY YEAR				
AREA	64	65	66	67
6				
5E				
5D				
5C				
5B		1		
5A				
4B				
4A				
3D		1	2	1
3C	21	85	27	1
3B	1		1	
3A		5	1	
2D		3		
2C				
2B				
2A				
1C				
1B				
1A				
UNK'N		10	7	
TOTAL	22	105	38	2

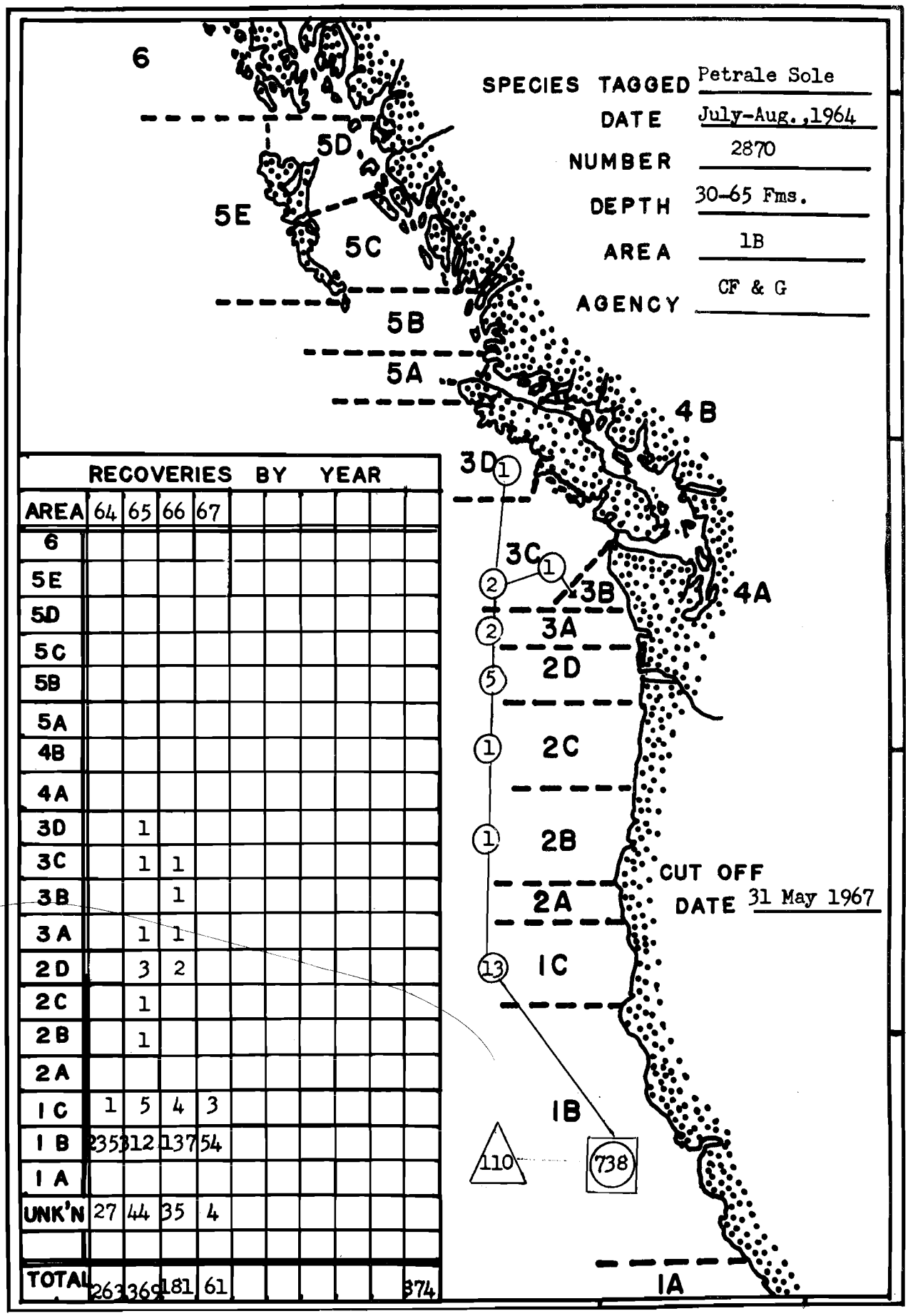


RECOVERIES BY YEAR										
AREA	'60	'61	'62	'63	'64	'65	'66	'67		
6										
5E										
5D										
5C										
5B										
5A										
4B										
4A										
3D										
3C	5	1								
3B	5	11	3							
3A										
2D	8	9	3							
2C	27	21	18	7		1	1			
2B	104	30	46	14	4	1	2			
2A	1	2								
1C	1	4	9	3						
1B										
1A										
UNK'N	4		1	2		2				
TOTAL	155	78	80	26	4	4	3	0		

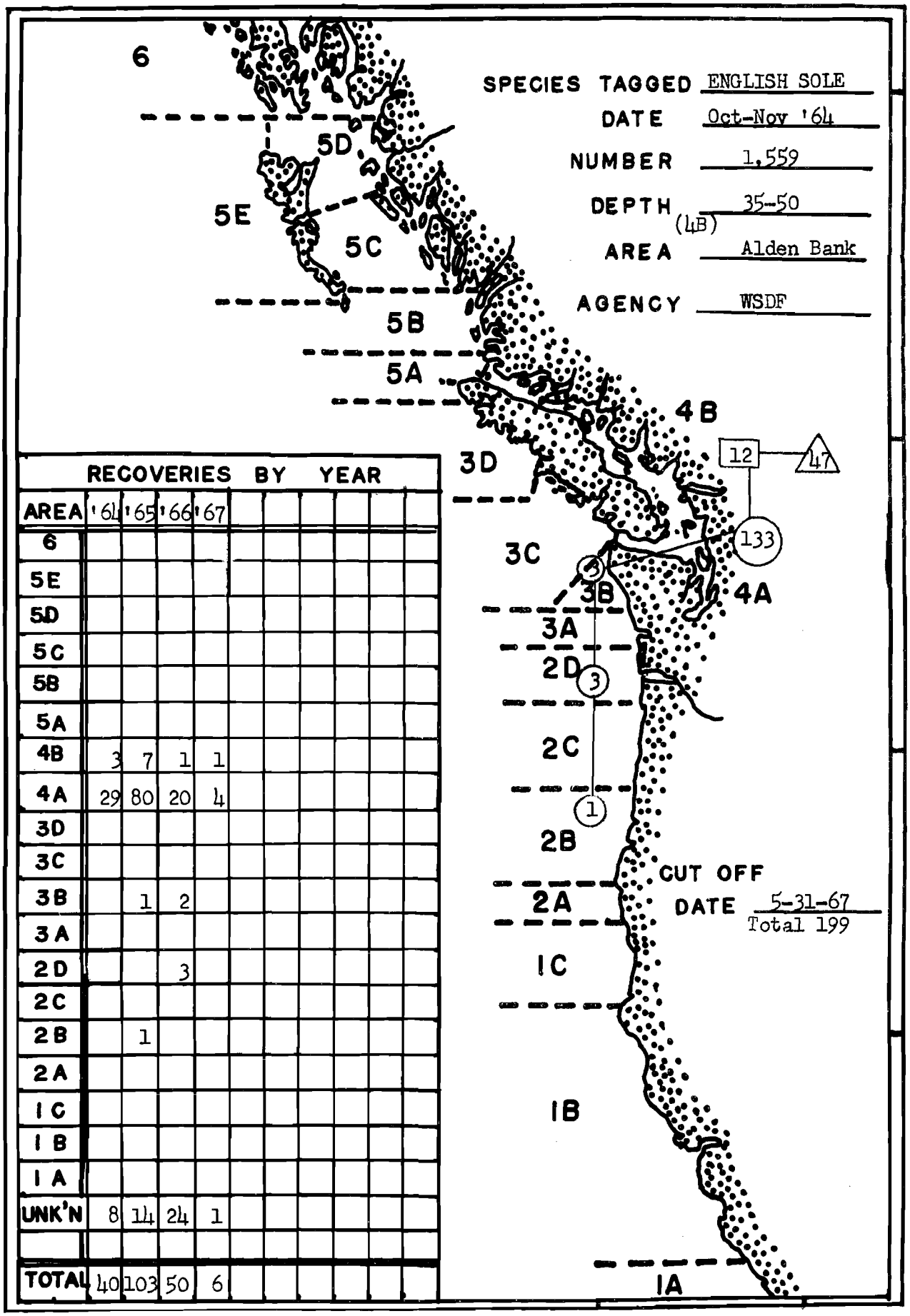


RECOVERIES BY YEAR

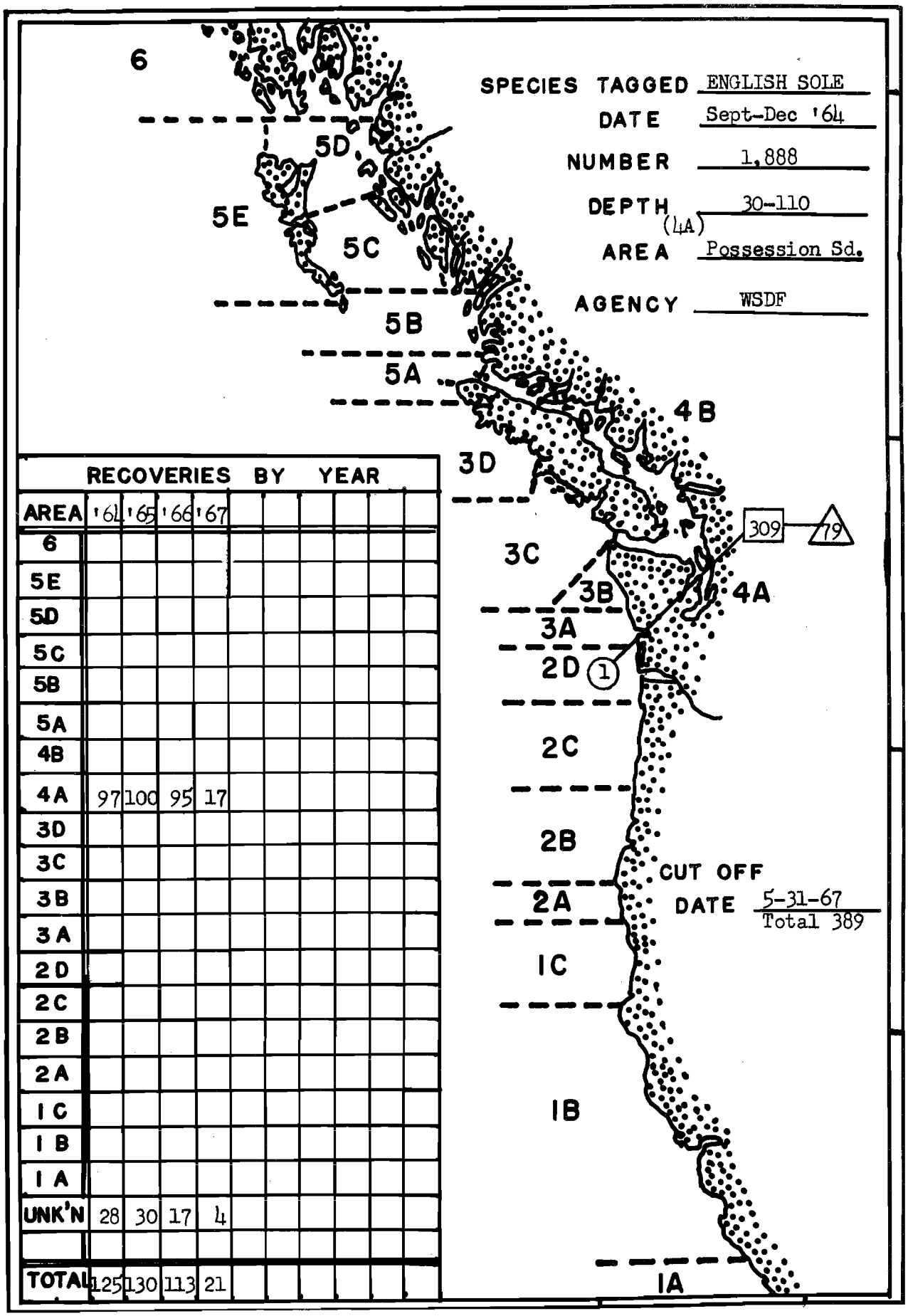
AREA	60	61	62	63	64	65	66			
6										
5E										
5D										
5C										
5B										
5A										
4B										
4A										
3D										
3C										
3B										
3A										
2D										
2C										
2B										
2A										
1C	5	28	18	3	1	1	2			
1B										
1A										
UNK'N										
TOTAL	5	28	18	3	1	1	2			58



RECOVERIES BY YEAR											
AREA	64	65	66	67							
6											
5E											
5D											
5C											
5B											
5A											
4B											
4A											
3D		1									
3C		1	1								
3B			1								
3A		1	1								
2D		3	2								
2C		1									
2B		1									
2A											
1C	1	5	4	3							
1B	23	53	12	13	7	54					
1A											
UNK'N	27	44	35	4							
TOTAL	26	36	9	181	61						374

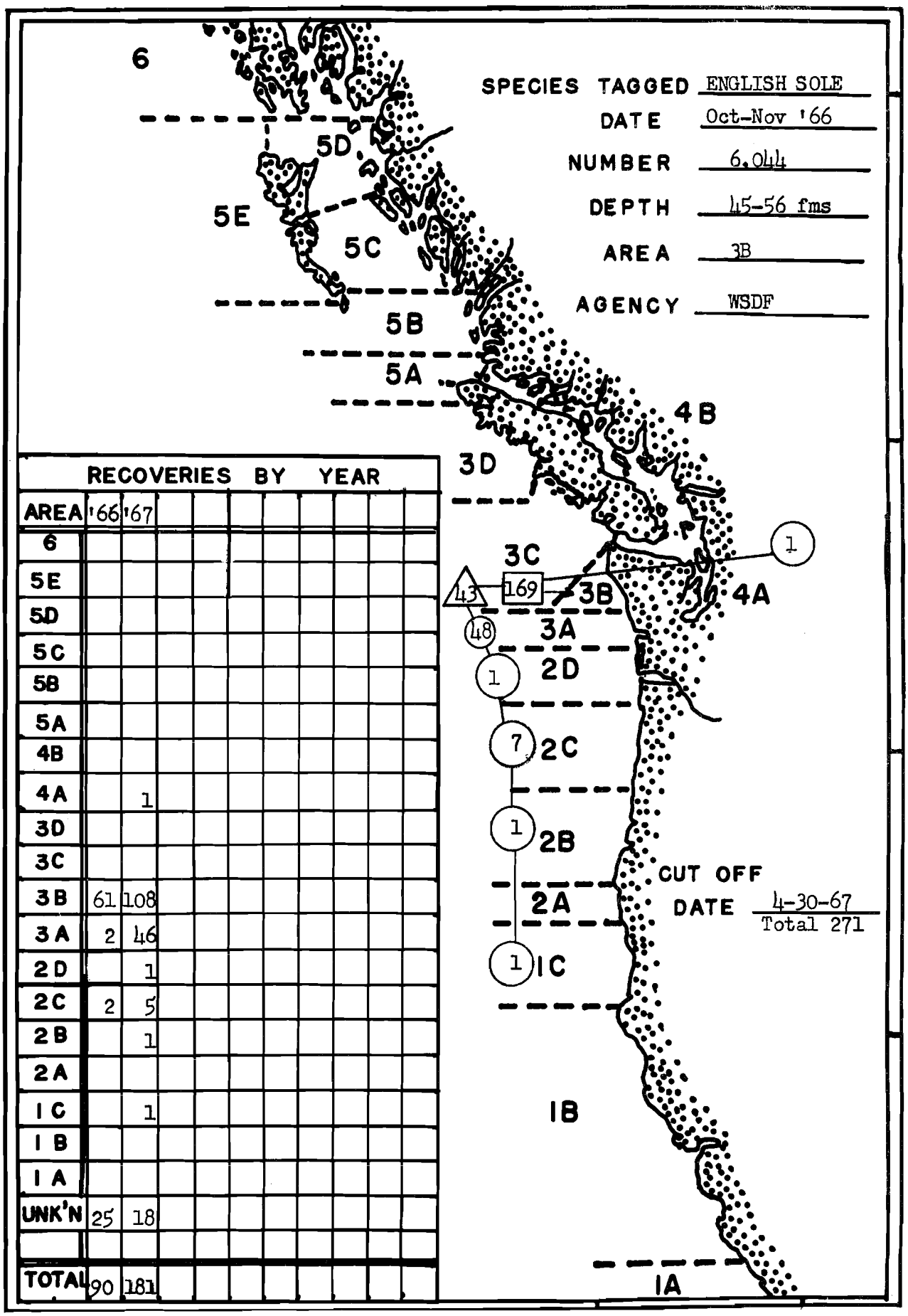


RECOVERIES BY YEAR											
AREA	'64	'65	'66	'67							
6											
5E											
5D											
5C											
5B											
5A											
4B	3	7	1	1							
4A	29	80	20	4							
3D											
3C											
3B		1	2								
3A											
2D			3								
2C											
2B		1									
2A											
1C											
1B											
1A											
UNK'N	8	14	24	1							
TOTAL	40	103	50	6							

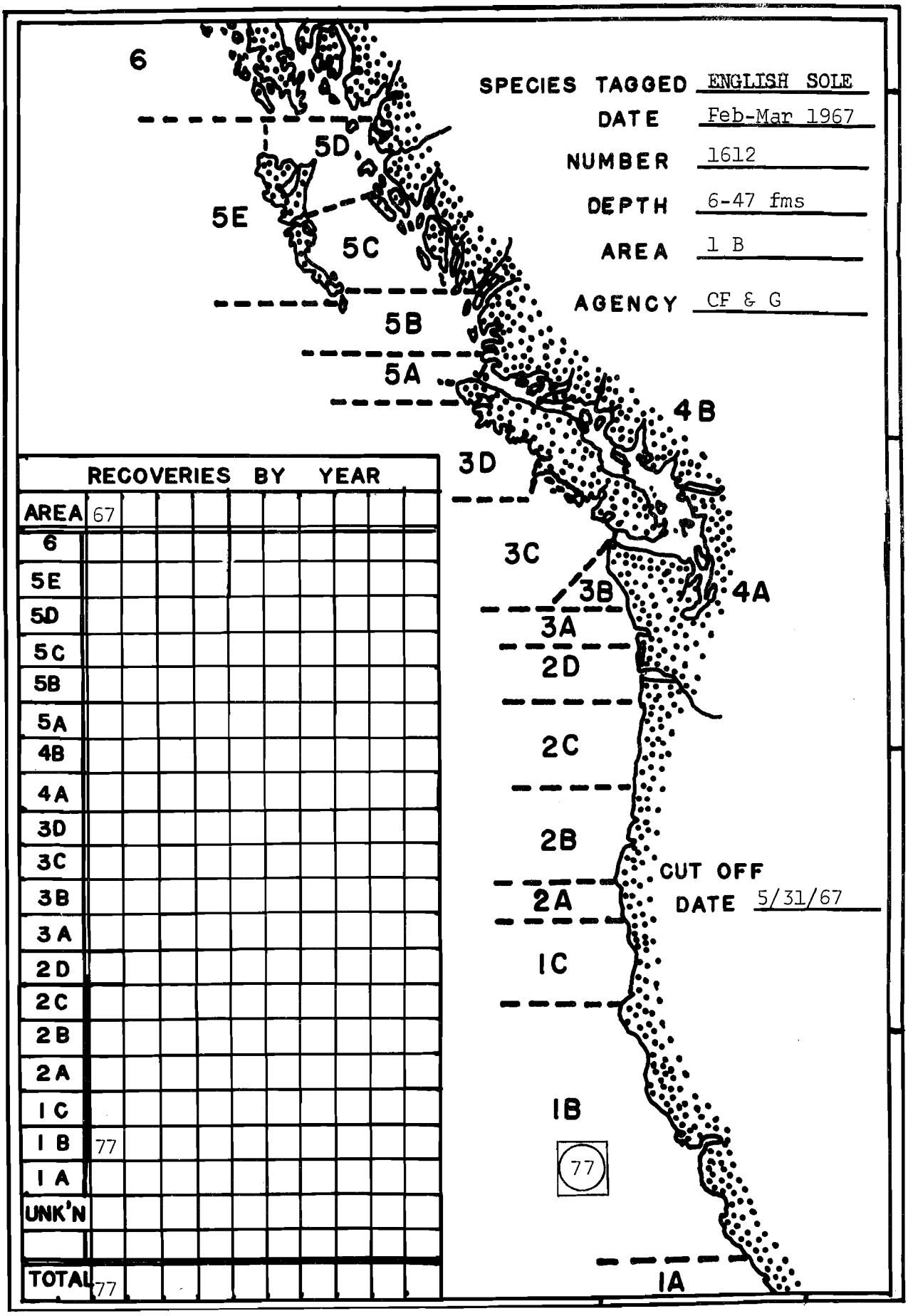


RECOVERIES BY YEAR

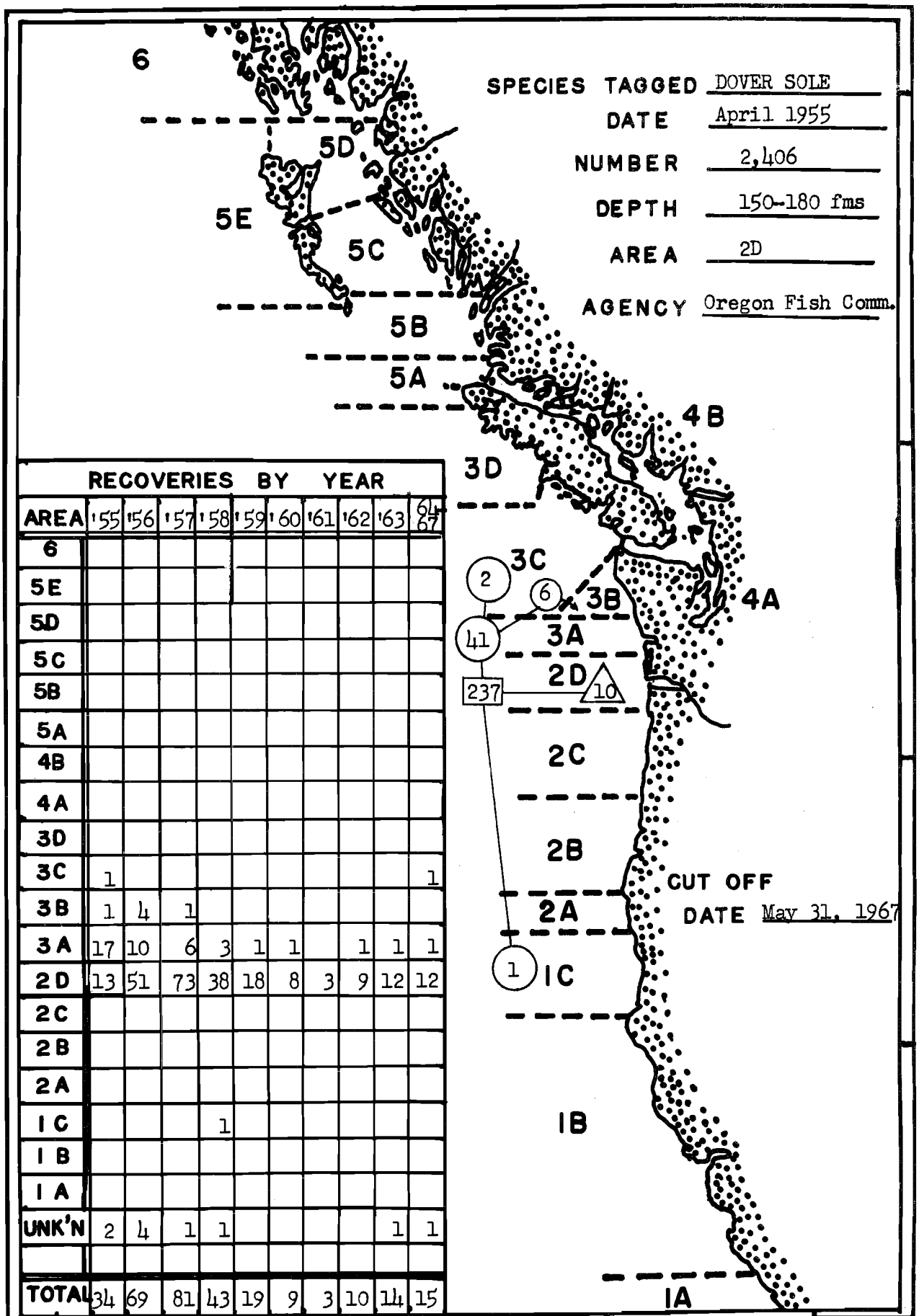
AREA	'64	'65	'66	'67
6				
5E				
5D				
5C				
5B				
5A				
4B				
4A	97	100	95	17
3D				
3C				
3B				
3A				
2D				
2C				
2B				
2A				
1C				
1B				
1A				
UNK'N	28	30	17	4
TOTAL	125	130	113	21



RECOVERIES BY YEAR		
AREA	'66	'67
6		
5E		
5D		
5C		
5B		
5A		
4B		
4A		1
3D		
3C		
3B	61	108
3A	2	46
2D		1
2C	2	5
2B		1
2A		
1C		1
1B		
1A		
UNK'N	25	18
TOTAL	90	181

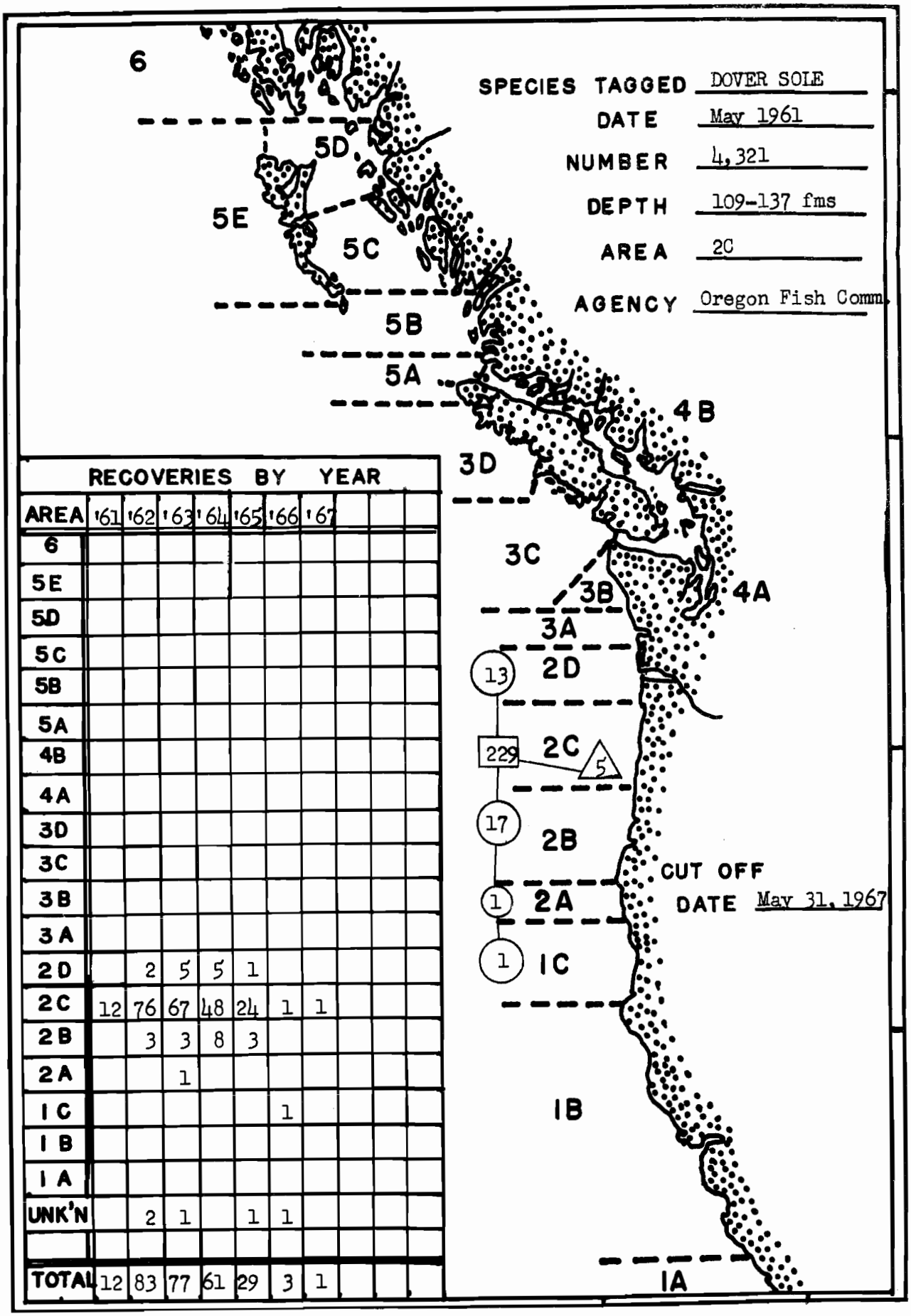


RECOVERIES BY YEAR										
AREA	67									
6										
5E										
5D										
5C										
5B										
5A										
4B										
4A										
3D										
3C										
3B										
3A										
2D										
2C										
2B										
2A										
1C										
1B	77									
1A										
UNK'N										
TOTAL	77									

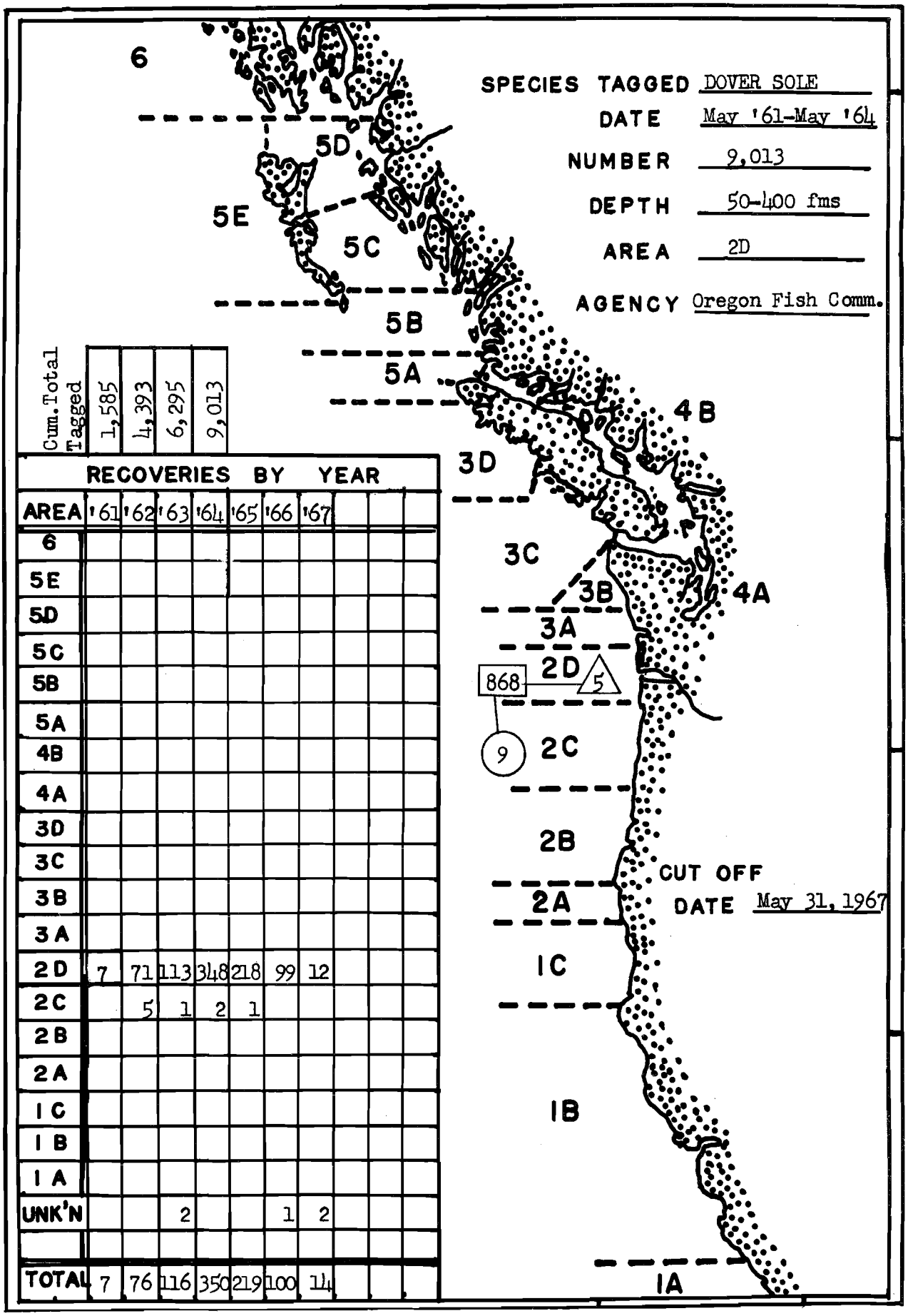


RECOVERIES BY YEAR

AREA	'55	'56	'57	'58	'59	'60	'61	'62	'63	64-67
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	12
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	15



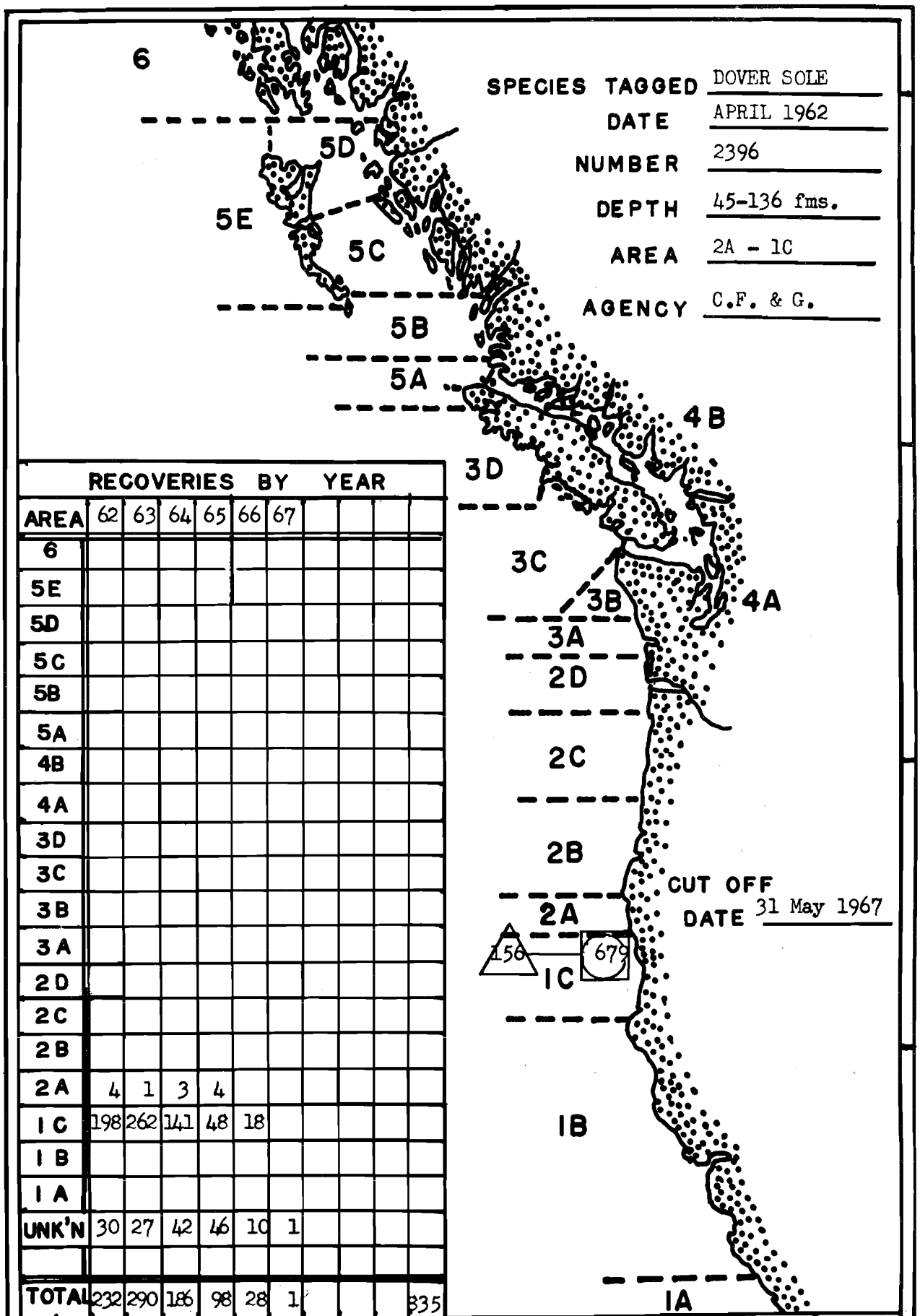
RECOVERIES BY YEAR										
AREA	'61	'62	'63	'64	'65	'66	'67			
6										
5E										
5D										
5C										
5B										
5A										
4B										
4A										
3D										
3C										
3B										
3A										
2D		2	5	5	1					
2C	12	76	67	48	24	1	1			
2B		3	3	8	3					
2A			1							
1C					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



Cum. Total Tagged	1,585	4,393	6,295	9,013

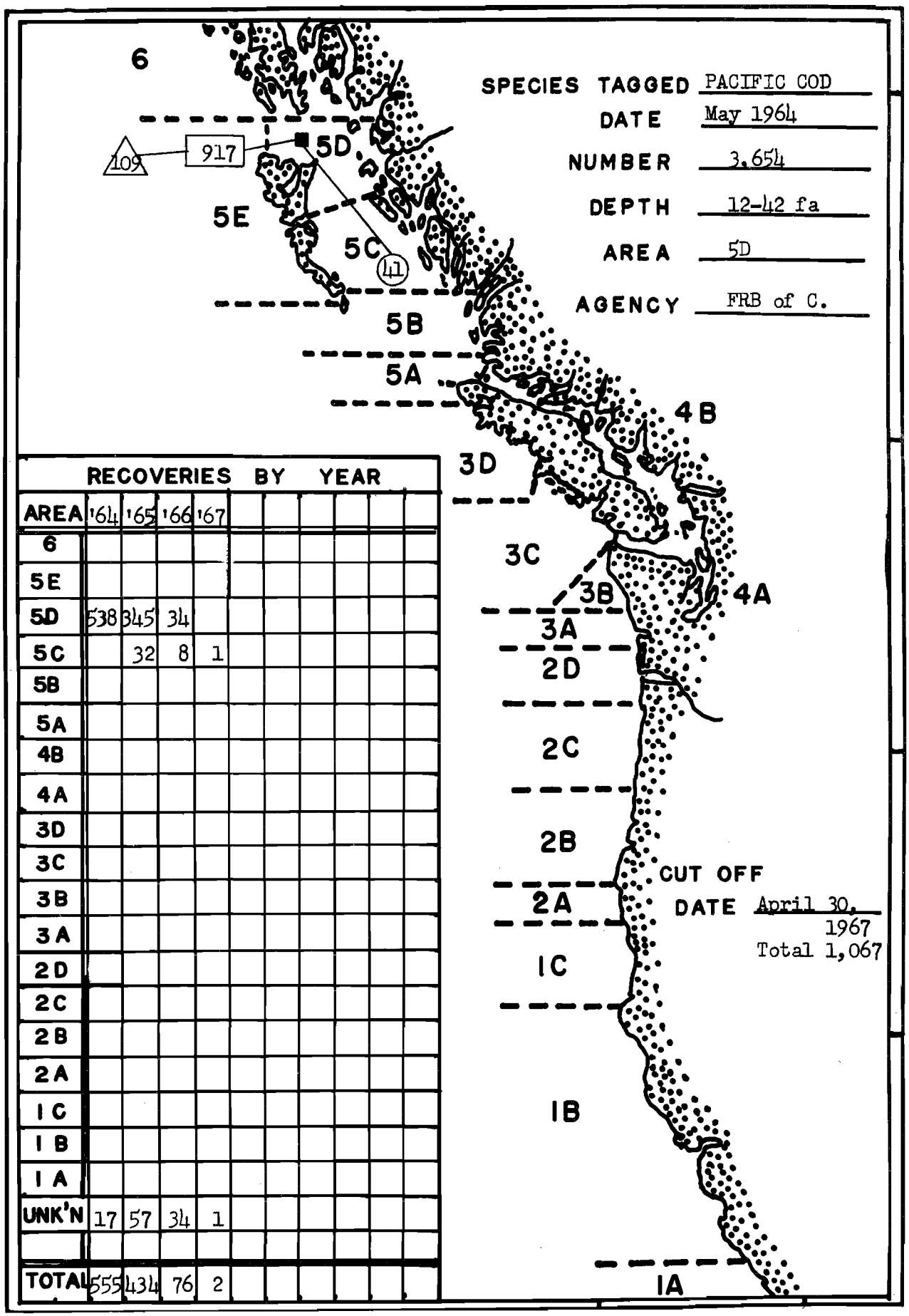
RECOVERIES BY YEAR

AREA	'61	'62	'63	'64	'65	'66	'67
6							
5E							
5D							
5C							
5B							
5A							
4B							
4A							
3D							
3C							
3B							
3A							
2D	7	71	113	348	218	99	12
2C		5	1	2	1		
2B							
2A							
1C							
1B							
1A							
UNK'N			2			1	2
TOTAL	7	76	116	350	219	100	14



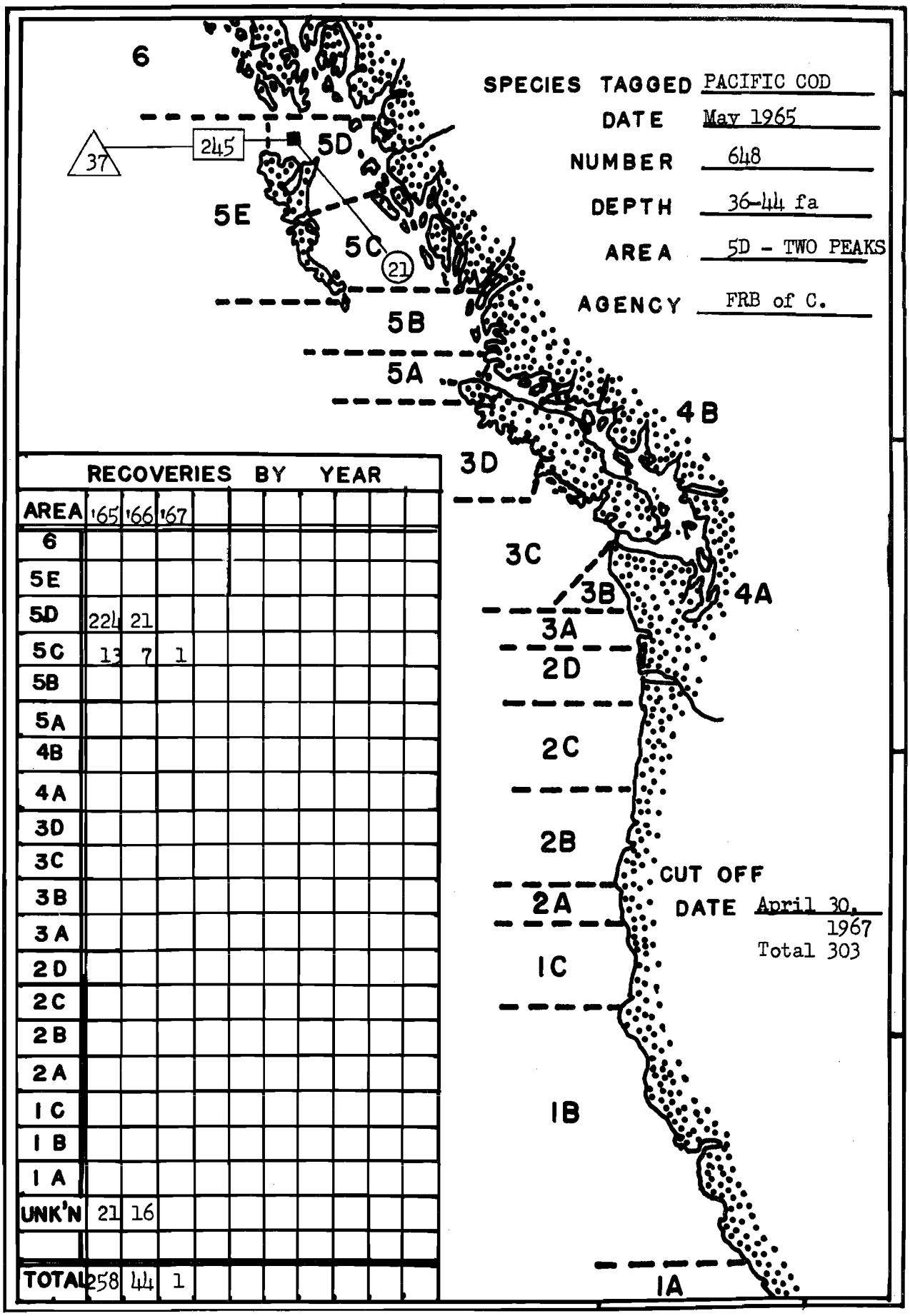
RECOVERIES BY YEAR

AREA	62	63	64	65	66	67				
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	18					
1B										
1A										
UNK'N	30	27	42	46	10	1				
TOTAL	232	290	186	98	28	1				835



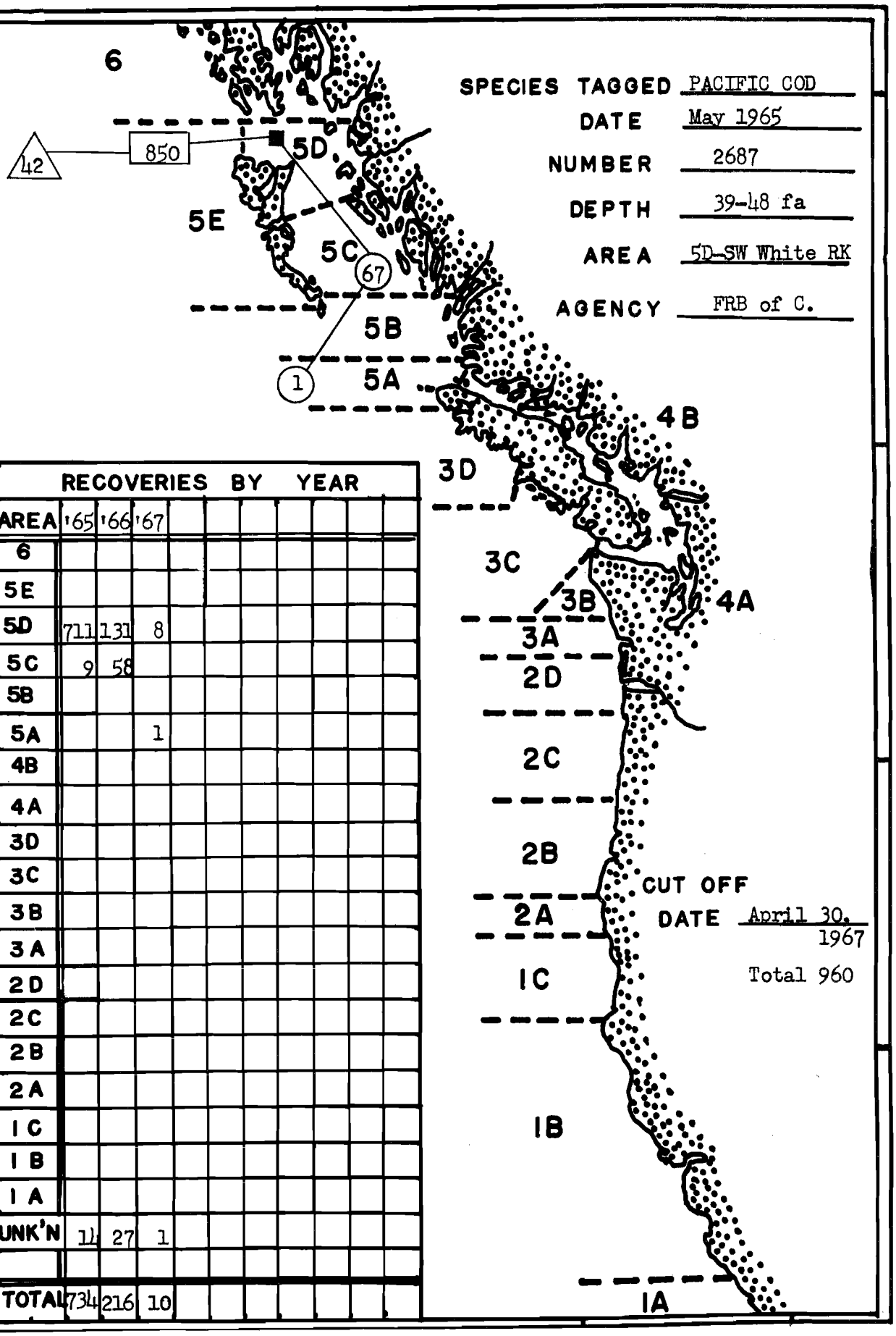
RECOVERIES BY YEAR

AREA	'64	'65	'66	'67
6				
5E				
5D	538	345	34	
5C		32	8	1
5B				
5A				
4B				
4A				
3D				
3C				
3B				
3A				
2D				
2C				
2B				
2A				
1C				
1B				
1A				
UNK'N	17	57	34	1
TOTAL	555	434	76	2



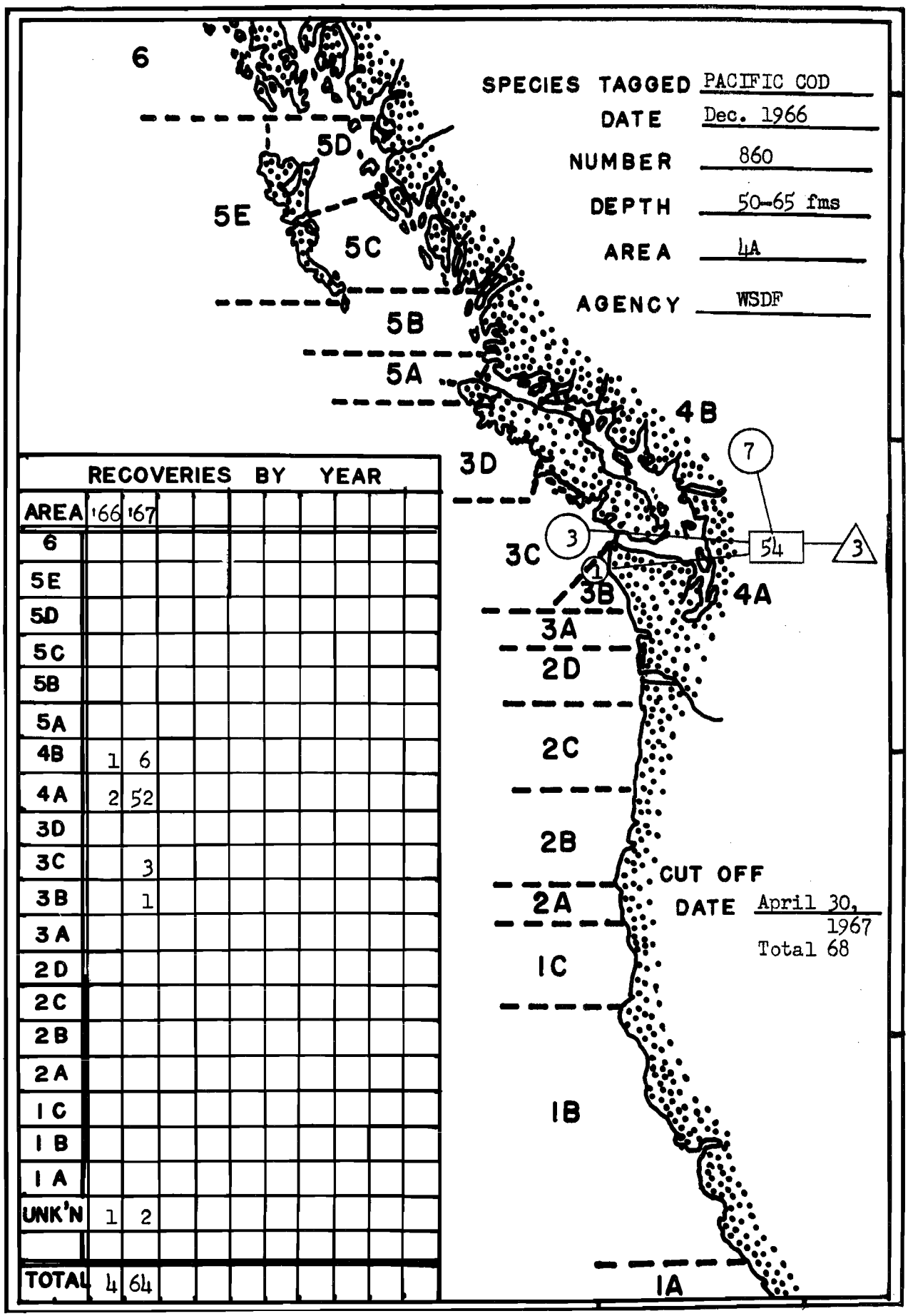
RECOVERIES BY YEAR

AREA	'65	'66	'67							
6										
5E										
5D	224	21								
5C	13	7	1							
5B										
5A										
4B										
4A										
3D										
3C										
3B										
3A										
2D										
2C										
2B										
2A										
1C										
1B										
1A										
UNK'N	21	16								
TOTAL	258	44	1							



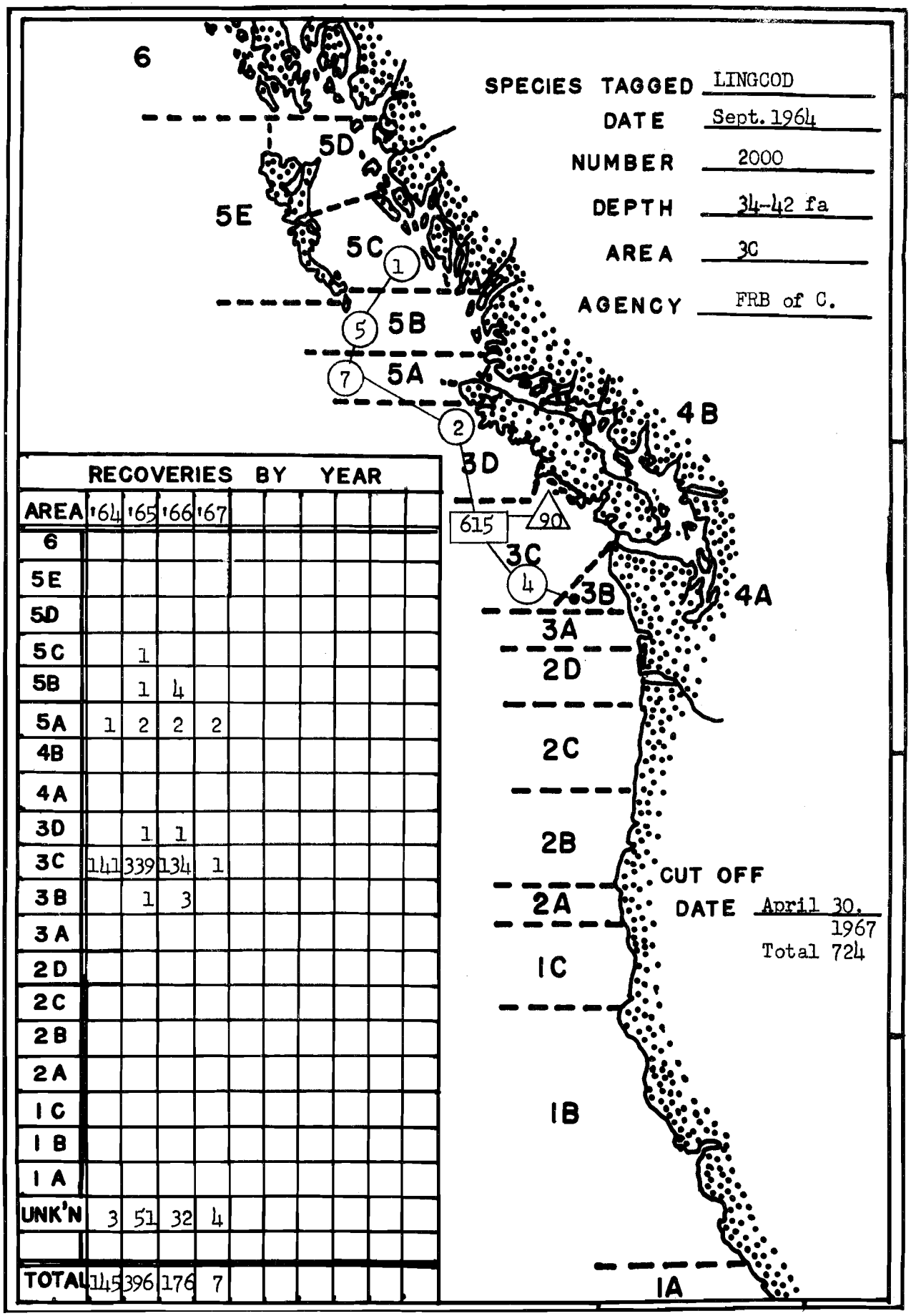
RECOVERIES BY YEAR

AREA	'65	'66	'67
6			
5E			
5D	711	131	8
5C	9	58	
5B			
5A			1
4B			
4A			
3D			
3C			
3B			
3A			
2D			
2C			
2B			
2A			
1C			
1B			
1A			
UNK'N	14	27	1
TOTAL	734	216	10



RECOVERIES BY YEAR

AREA	'66	'67
6		
5E		
5D		
5C		
5B		
5A		
4B	1	6
4A	2	52
3D		
3C		3
3B		1
3A		
2D		
2C		
2B		
2A		
1C		
1B		
1A		
UNK'N	1	2
TOTAL	4	64



RECOVERIES BY YEAR

AREA	'64	'65	'66	'67
6				
5E				
5D				
5C		1		
5B		1	4	
5A	1	2	2	2
4B				
4A				
3D		1	1	
3C	141	339	134	1
3B		1	3	
3A				
2D				
2C				
2B				
2A				
1C				
1B				
1A				
UNK'N	3	51	32	4
TOTAL	145	396	176	7