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The Trawl Fishery in the Strait of Georgia and Vicinity, 1945-77

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ABSTRACT

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The 1945-77 trawl fishery in Georgia Strait and vicinity (Area 4B) was reviewed with respect to landing statistics, current regulations, and stock assessment of important species in Regulated Areas. All-species landings exhibited no trend during 1961-77, while fishing effort declined. Landings-per-hour-trawled (LPUE) increased after 1970, but remained substantially smaller than LPUEs from offshore grounds. Effects, if any, of the mesh regulation imposed in 1962 were obscured by the declining fishing effort and declining landings of species which would allegedly benefit. Pacific cod (*Gadus macrocephalus*) is the single most important species (>50% of annual landings), and overall abundance exhibited no overall trend. Among areas, contrasting trends counterbalanced one another. English sole (*Parophrys vetulus*) abundance declined after the mid-1960s, even in areas where severe regulations were in effect since 1947. Lingcod (*Ophiodon elongatus*) abundance also declined substantially, based on landings of line-caught fish. Trawl landings exhibited no trend, but were a negligible portion of total lingcod landings.

Key words: Trawl fishery, Strait of Georgia, statistics, regulation, stock assessment, Pacific cod, English sole.

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RÉSUMÉ

Westrheim, S. J. 1980. The trawl fishery in the Strait of Georgia and vicinity, 1945-77. Can. MS Rep. Fish. Aquat. Sci. 1563: 130 p.

L'étude porte sur la pêche au chalut dans le détroit de Géorgie et ses environs (zone 4B), de 1945 à 1977, en ce qui concerne les statistiques sur les débarquements, la réglementation et l'évaluation des stocks des espèces importantes dans les zones réglementees. Les débarquements de toutes les espèces n'ont révélé aucune tendance marquée entre 1961 et 1977, alors que l'effort de pêche baissait. Des débarquements par heure de chalutage ont augmenté après 1970, mais sont restés nettement plus faibles que les chiffres concernant les pêcheries hauturières. On n'a pas pu noter d'effets attribuables à la réglementation du maillage imposée en 1962, car l'effort de pêche déclinait en même temps, tout comme les débarquements des espèces qui auraient dû en bénéficier. La morue du Pacifique (Gadus macrocephalus) est l'espèce la plus importante (plus de 50% des débarquements annuels), et l'abondance globale n'a pas montré de tendance générale. D'une zone a l'autre, des tendances contradictoires se contrebalancaient. L'abondance de plie grand-père (Parophrys vetulus) a décliné après le milieu des années 1960, même dans les régions où une réglementation stricte était en vigueur depuis 1947. L'abondance de morue longue du Pacifique (Ophiodon elongatus) a aussi nettement baissé, si l'on se fonde sur les débarquements de poissons pris à la ligne. Les débarquements de prises réalisées au chalut n'ont montré aucune tendance précise, mais constituaient une partie négligeable du total des débarquements de morue longue du Pacific.

Mots clés: Pêche au chalut, détroit de Géorgie, statistiques, réglementation, évaluation des stocks, morue du Pacifique, plie grand-père.

INTRODUCTION

Trawl fishing for groundfish in the Strait of Georgia and vicinity (Area 4B) first became important during the 1940s. Forrester and Ketchen (1963) chronicled the history of this fishery through 1960. Their report also included landing statistics (1945-60), regulations, and stock assessments for Pacific cod (*Gadus macrocephalus*) and English (lemon) sole (*Parophrys vetulus*). Forrester and Smith (1974) provided a sequel for 1960-72.

This report reviews the period 1945-77 with respect to landing statistics, regulations, and stock assessments for important species in Regulated Areas.

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METHODS AND MATERIALS

Sources of trawl-landing statistics were published reports and computer data banks. For statistics from Area 4B as a whole, and its Minor Statistical Areas (MSAs), the sources were published reports as follows:

Calendar Year	Source
1945-59	Thomson and Yates (1960; 1961a, b, c, d; 1962a, b, c)
1960-61	Thomson and Yates (1961e; 1962d)
1962-63	Thomson and Lippa (1963; 1964)
1964	Thomson, Lippa, and Holmberg (1965)
1965	Thomson and Holmberg (1966)
1966	Holmberg (1967)
1967-68	Prest (1968; 1969)
1969-77	Smith (1970-78)

In the course of the present study, some discrepancies were noted between trawl-landing statistics reported in the two previous studies (Forrester and Ketchen, 1963; Forrester and Smith, 1974) and those reported in the aforementioned published reports. In all cases, the discrepancies were resolved in favor of the published reports. All landing records in this report are in pounds of round fish.

Statistics for regulated areas were obtained from the following sources:

Calendar Year	Source
1945-60	Forrester and Ketchen (1963)
1960-72	Forrester and Smith (1974)
1972-76	Computer Tape 24017, Pacific Biological Station
1977	Computer Tape 6370, Pacific Biological Station

These records were obtained by port liaison officers in Vancouver who interview trawl captains at time of landing. For Nanoose Bay and all regulated areas in MSA 14, virtually all landings were accounted for, at least through 1975 (R. M. Wowchule, pers. comm.). For Boat Harbour-Pylades Channel and Satellite Channel, coverage of landings was much less, because many of the catches were landed at small ports on Vancouver Island, where interview coverage is negligible.

STATISTICAL AREA 4B

DESCRIPTION

Statistical Area 4B includes all marine waters lying between Vancouver Island and the mainland of British Columbia (Fig. 1). The northern boundary is a line drawn north and south (magnetic) through Pine Island at the northern end of Queen Charlotte Strait. The southern boundary is the Canada-U.S. boundary from Point Roberts westward through Juan de Fuca Strait to Tatoosh Island, thence northward to Bonilla Point on Vancouver Island.

Within Area 4B, there are 11 Minor Statistical Areas (MSAs) -- Numbers 12-20, 28 and 29 (Fig. 1).

REGULATIONS

During October 1976-September 1977[1], a number of fishery regulations[2] were in effect which were applicable throughout Area 4B. These dealt with closed seasons, minimum size of fish retained, and gear restraints. Closed areas will be discussed in later sections dealing with individual Minor Statistical Areas.

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[1]Historical fishing year (see Forrester and Ketchen, 1963).

[2]Details on their history are contained in Appendix I.

Closed seasons. Species affected are: dogfish, *Squalus acanthias*, (July 1-December 31 for floating gill nets operated in areas closed to salmon fishing; lingcod, *Ophiodon elongatus*, (December 1 to last day of February for the trawl and line fisheries; and to March 31 for spear fisheries), except in MSA 12; seaperch, Embiotocidae, (June 1-August 31); and petrale sole[3], *Eopsetta jordani*, (December 20-April 15).

Minimum size. Species affected are: blackcod, *Anoplopoma fimbria*, (4 lb); English, petrale, and rock soles (*Lepidopsetta bilineatas*), and starry flounder, *Platichthys stellatus*, (12 in, total length); and lingcod (3 lb, dressed, head off, or 23 in, total length).

Gear restraints. These apply to minimum mesh size for trawl nets, and dimensions of scupper doors on trawlers. Minimum mesh sizes (internal measure, after immersion) for otter and beam trawls used for species other than shrimp in Area 4B (except MSA 12 and 20) are: 4.75 in for manila or sisal nets; 4.5 in for cotton nets; and 4.25 in for nets of synthetic fibres. In MSA 12 and 20, minimum mesh size is 3.5 in. Vessels trawling for species other than shrimp, and greater than 40 ft, overall length, must be equipped with a scupper door with an opening not less than 36 in wide, and where multiple openings are necessary, no single opening shall be less than 12 in wide.

LANDING STATISTICS

For October-September 1945-77, all-species[4] trawl landings of groundfish ranged from 1,424,000 lb, in 1947-48, to 7,876,000 lb in 1954-55 (Fig. 2, Table 1). Little trend is evident after 1962-63. LPUE (landings per hour trawled) based on interviewed landings ($\bar{X}$ = 47% of total landings) ranged from 148 lb/hr, in 1946-47, to 835 lb/hr in 1976-77. While no trend is apparent during 1945-69, LPUE exhibited an upward trend during 1970-77. Calculated nominal fishing effort in Area 4B generally declined during 1954-77 -- 10,838-23,302 hr during 1954-60; 2,395-4,274 hr during 1960-77. This decline is thought to be due to higher LPUEs elsewhere. During 1956-75, 5-year mean LPUEs ranged from 378-559 lb/hr in Area 4B, compared to 852-2,653 lb/hr in all other areas off British Columbia (Table 2). Interestingly, only in Area 4B did the LPUEs exhibit a rising trend for all-species trawl landings of groundfish.

Throughout 1945-77, October-March was the principal period of production. The following mean landing data, extracted from Table 3, indicate the relative importance of the October-March landings:

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[3]Except incidental catches not exceeding 3,000 lb per boat trip -- maximum two trips per month. This regulation was promulgated to benefit offshore stocks in Areas 3C and 3D.

[4]Excluding dogfish.

	1945-60	1960-77
October-September	3,650,000 lb	2,851,000 lb
October-March	1,649,000	1,931,000
% October-March	73	68

Principal MSAs for production were 14, 17, 18, and 20. For October-September, these four MSAs produced 79% of Area 4B trawl landings during 1945-60, and 80% during 1960-77 (Table 3). For October-March, the corresponding values were 82 and 78%, respectively.

Principal species landed by trawlers from Area 4B were Pacific cod and English sole. For October-September, Pacific cod comprised 51% of the 1945-60 landings, and 54% of the 1960-77 landings (Table 4). Comparable values for English sole were 18 and 19%. For October-March, Pacific cod comprised 56% of the 1945-60 landings and 60% of the 1960-77 landings. Corresponding values for English sole were 19 and 16%, respectively. Dover sole (Microstomus pacificus) was singularly important in MSA 20. The category Other Foodfish contains a mixture primarily of flatfishes (Pleuronectidae and Bothidae), rockfishes (Scorpaenidae), and walleye pollock (Theragra chalcogramma). The mixture varies with time and locality. Dogfish shark landings have been excluded as was done in the two preceding reports.

Pacific cod. Annual trawl landings from Area 4B during October-September averaged 1,407,000 lb for 1945-60, and 1,286,000 lb for 1960-77 (Table 4). October-March values for the same time periods were 1,157,000 and 986,000 lb, respectively -- 82 and 77% of the October-September values. During 1945-77, October-September landings ranged from 259,000 to 2,576,000 lb/annum (Fig. 3). Annual fluctuations were substantial and numerous, but no particular trend was evident. Annual landings from MSA 14, Nanoose Bay (MSSA[5] 17N), Gulf Islands (17S + 18), and Juan de Fuca Strait (19 + 20) exhibited similar trends throughout time periods when cod landings were appreciable.

English sole. Annual trawl landings from Area 4B during October-September averaged 506,000 lb for 1945-60, and 447,000 for 1960-77 (Table 4). October-March values for the same time periods were 391,000 and 270,000 lb, respectively -- 77 and 60% of the comparable October-September values. During 1945-77, October-September landings ranged from 155,000 to 842,000 lb/annum (Fig. 4). Annual fluctuations in landings were less substantial, but no less numerous, than for Pacific cod. Since 1952-53, a downward trend in annual landings is evident. Among the three principal sources of English sole in Area 4B, MSA 14 and MSSA 17S (N. Gulf Islands) productions exhibit the same downward trend. MSA 18 production exhibits no trend.

Lingcod. In Area 4B, the line fishery is the traditional primary producer of lingcod (Forrester and Ketchen, 1963). During 1951-77, the January-December landings of line- plus trawl-caught lingcod ranged from

[5]Minor Statistical Sub-Area.

725,000 to 4,122,000 lb/annum, of which only a minor portion was trawl-caught (Fig. 5, Appendix II, Table 1). Landings of line-caught lingcod have declined precipitously since 1961. No validated explanation is available at this time, but overfishing is a prime suspect.

Annual trawl landings of lingcod from Area 4B during October - September, averaged 143,000 lb during 1945-60 and 142,000 lb during 1960-77 (Table 4). October-March values for the same time periods were both 88,000 lb -- 62% of the comparable October-September values. Annual fluctuations were relatively minor, and in only two fishing years did landings exceed 200,000 lb -- 1959-60 (726,000 lb) and 1960-61 (467,000 lb) (Fig. 6). These anomalous landings originated from a ground in East Juan de Fuca Strait (MSA 19). No trend was evident in the trawl landings from Area 4B, or from the two principal sources of trawl-caught lingcod -- Gulf Islands (17S + 18) and Juan de Fuca Strait (19 + 20).

Mink food. Mean annual landings for October-September were 906,000 lb during 1945-60, and 583,000 lb during 1960-77 (Table 4). Comparable values during October-March were 593,000 and 290,000 lb, respectively -- 65 and 50% of the October-September values. During 1945-77, annual landings during October-September ranged from 6,000 to 3,363,000 lb (Fig. 7). Landings peaked in 1955-56; declined to about 500,000 lb during 1969-72; and were negligible during 1972-77. These fluctuations reflected the expansion of the mink-raising industry in British Columbia during 1950-56 (Forrester 1958), and the subsequent decline in utilization of whole groundfish for minkfood (Forrester 1968).

Species composition of mink food landings from Area 4B was only determined intermittently. In 1956, 11.0 million lb were landed in British Columbia, and 3.1 million lb (28%) were landed from Area 4B (Forrester 1958). Principal species landed from all B.C. areas were arrowtooth flounder (*Atheresthes stomias*) (58%) and walleye pollock (*Theragra chalcogramma*) (23%); and from Area 4B, arrowtooth flounder (76%) and starry flounder (17%). Similar results were reported for British Columbia landings during 1957-66 (Forrester 1968), but no details were provided for Area 4B.

Dogfish. Detailed discussion of dogfish has been omitted from this report, primarily because of difficulties with landing statistics. These problems include accurately determining time and location of catches during the liver fishery, and accurate conversion of landed liver weights to round weight of dogfish from which the livers were extracted at sea. In recent years, dogfish have been landed in increasing quantities for human consumption.

For October-September, mean annual landings of dogfish were 950,000 lb during 1945-60, and 447,000 lb during 1960-77. Comparable values for October-March were 705,000 and 382,000 lb, respectively -- 74 and 85% of the October-September values (Appendix II, Table 2). During 1945-77, October-September landings ranged from 1,800 to 2,419,000 lb (Fig. 8). Extremely variable demand precludes relating trends in landings to trends in stock abundance.

Principal sources of dogfish production during October-September were MSAs 18(39% during 1945-60; 38% during 1960-77), 14(27; 17%), 17(11; 30%), and 29(14; 15%) (Appendix II, Table 2).

MINOR STATISTICAL AREAS 12, 13, 15, 16

DESCRIPTION

MSAs 12, 13, 15, and 16 include Queen Charlotte Strait, Johnstone Strait, and the northeast portion of Georgia Strait (Fig. 1). The northern boundary is a line drawn north and south (magnetic) through Pine Island at the northern end of Queen Charlotte Strait. The southern boundary abuts MSAs 14 and 17. The southern extremity is a line connecting the southern tip of Lasquetti Island with the southern tip of the Sechelt Penninsula.

REGULATIONS

Regulations applicable only to MSAs 12, 13, 15, and 16 are closures to trawling of all or part of the following: Discovery Passage to Seymour Narrows (1925[6]), Salmon Bay (1937), Hoskyn Inlet (1947), Lewis Channel (1947), Sutil Channel (1947), Waddington Channel (1947), Pendrell Sound (1947), Homfray Channel (1947), and that portion of Georgia Strait north of a line connecting Shelter Point (Vancouver Island) and Lund (1947). This line lies approximately 19 miles north of Cape Lazo.

LANDING STATISTICS

Combined trawl landings of foodfish[7] from MSAs 12, 13, 15, and 16 have been small and of minor importance, because of area closures and paucity of trawlable grounds. Combined landings from these MSAs comprised only 4% of the October-September totals for Area 4B as a whole (Table 3).

Mean October-September landings of foodfish were 130,000 lb/annum during 1945-60, and 107,000 lb/annum during 1960-77. Comparable values for October-March were 105,000 lb/annum and 85,000 lb/annum, respectively -- 81 and 79% of the October-September values. Principal species landed during October-September was Pacific cod -- 41% during 1945-60 and 1960-77.

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[6]Year of promulgation.

[7]The term foodfish refers to fish landed for human consumption.

Secondary species was English sole (12 and 19%). "Other species" comprised 44 and 39%, and consisted primarily of rock sole, starry flounder, and rockfish.

Pacific cod. For October-September, mean annual trawl landings were 53,000 lb during 1945-60, and 41,000 lb during 1960-77 (Table 5). Comparable values for October-March were 45,000 lb and 35,000 lb. No trend in landings is evident.

English sole. For October-September, mean annual trawl landings were 16,000 lb during 1945-60, and 20,000 lb during 1960-77 (Table 5). Comparable values for October-March were 13,000 lb and 15,000 lb, respectively. No trend in landings is evident.

Lingcod. For October-September, mean annual trawl landings were 4,000 lb for 1945-60 and 1960-77. Comparable values for October-March were 2,000 lb and 1,000 lb, respectively. No trend in landings is evident.

MINOR STATISTICAL AREA 14

DESCRIPTION

MSA 14 extends along the east coast of Vancouver Island, from Shelter Point (approximately 19 mi north of Cape Lazo) south to about Northwest Bay (Fig. 1). Most of the Vancouver Island coastline is trawlable in MSA 14.

REGULATIONS

Trawl regulations exclusive to MSA 14 include area closures and quotas. Comox Harbour was closed in 1933; Baynes Sound in 1946; and all other areas south of Cape Lazo were closed in 1947. During 1948-52, portions of the closed areas of MSA 14 were reopened on an experimental time-area basis, with or without a quota. These have been designated Regulated Areas (Forrester and Ketchen 1963), and will be discussed individually in this report. They include Cape Lazo (1948-date); Union Bay (1951-date); Fanny Bay (not reopened); Deep Bay (1952-58); Yellow Rock-Lambert Channel (1952-date); and Qualicum-Parksville (1952-date) (Fig. 9).

LANDING STATISTICS

October-September trawl landings of foodfish from MSA 14 averaged 685,000 lb/annum during 1945-60, and 333,000 lb/annum during 1960-77 (Table 6). Comparable values for October-March were 560,000 lb and 306,000 lb -- 82 and 92% of the October-September values. Principal species were Pacific cod (39% during 1945-60; 41% during 1960-77) and English sole (30% during 1945-60; 35% during 1960-77). Lingcod was 3% during 1945-60 and 4% during 1960-77).

Pacific cod. October-September landings of Pacific cod from MSA 14 averaged 264,000 lb for 1945-60, and 136,000 lb for 1960-77 (Table 6). Annual landings exhibited a general decline during 1952-77 (Fig. 3)

English sole. Mean annual landing from MSA 14 for October-September 1945-60 was 204,000 lb, and for 1960-77, 117,000 lb (Table 6). Annual landings exhibited a general decline during 1952-77.

REGULATED AREAS -- MSA 14

Mean October-March landings of foodfish from regulated areas in MSA 14 were 568,000 lb during 1947-60 and 266,000 lb during 1960-77 (Table 7). For 1960-77, these represented 80% of total foodfish landings from MSA 14 during October-March, and for 1947-60, 81%.

CAPE LAZO-HORNBY ISLAND REGULATED AREA

Description. Cape Lazo-Hornby Island Regulated Area (hereafter referred to as Cape Lazo RA) lies between Cape Lazo and Denman Island (Fig. 9). Appendix I contains a detailed description.

Regulations. The original Cape Lazo RA (see Appendix I, and Fig. 9) was reopened in 1948 for the period February 20-March 20. During 1949-52, the open season was variable: December 1-January 15 in 1948-49; December 1-January 31, 1949-50: and December 1-February 14, 1950-52. During 1952-59, the open season was mid-October to mid-February. For the 1959-60 season, the area was sub-divided into the (new) Cape Lazo RA and Hornby Island RA with different open periods for each. During 1959-77, the new Cape Lazo RA was open mid-October to mid-February, and the Hornby Island RA was open mid-October to March 20. The shorter season in the new Cape Lazo RA was imposed to minimize the capture of spent (thin) English sole.

Landing Statistics[8]. Mean October-March landings of foodfish were 154,299 lb during 1947-60, and 109,458 lb during 1960-77 (Table 8). Principal species were English sole (46%, 1947-60 and 1960-77) and Pacific cod (39%, 1947-60; 37% 1960-77). Lingcod comprised 1% of the 1945-60 landings, and 3% of the 1960-77 landings.

English sole landings fluctuated between 200 and 145,000 lb/annum during 1947-77, and exhibited a general decline during 1956-77 (Fig. 10). LPUE (landing per hr trawled) ranged from 54 to 426 lb/hr, though all but four values ranged between 90 and 160 lb/hr. No clear trend is evident for LPUE values.

Pacific cod landings during 1947-77 fluctuated between 10,000 and 120,000 lb/annum (Fig. 10). Landings during 1964-77 were generally smaller than those during 1950-64. No trend is evident within either time period. LPUE for 1947-77 ranged from 80 to 157 lb/hr; generally varied directly with landings; but exhibited no trend. All but two values occupied the range of 80-125 lb/hr. As with English sole, LPUE probably does not reflect major changes in abundance.

Stock Assessment - English sole. Forrester and Ketchen (1963) estimated the annual sustainable yield during 1949-60, to be 85,000 lb, based on a simple model adjusted to generally reflect observed LPUE (which exhibited no temporal trend). They further concluded that the current level of fishing was less than that which would provide maximum yield from a given recruitment. Economic restraints were not discussed with respect to the Cape Lazo fishery. Forrester and Smith (1974) estimated the sustainable annual yield to be "closer to" 60,000 lb, based on the mean annual landings during 1960-72, and a lack of temporal trend in LPUE during the same period.

Another approach to stock assessment involves among-year variations in mean length of females[9] landed (Table 9, Fig. 11), and their relationship to corresponding annual landings (Fig. 10). Four time periods have been delineated which appear to reflect changes in stock size and productivity. These are listed below together with pertinent parameters of female mean lengths and annual landings:

	Female lengths (mm)			Total landings (1000 lb)		
Time period	Mean	Range	C.V.(%)	Mean	Range	C.V.(%)
1947-54	395	384-420	3.3	72.0	27-122	50
1955-61	383	381-386	0.6	72.3	44-145	50
1961-67	371	362-382	2.1	73.2	43-108	38
1967-73	371	360-377	1.7	40.8	34-47	12

[8]Separate catch statistics from the "new" Cape Lazo, and Hornby Island RAs are not included.

[9]Males were excluded because of their minority position in the landings, and slower growth after maturation.

Mean length of females declined from 395 mm during 1947-54 to 371 mm during 1961-73, and intra-period variability was small -- coefficient of variation was 0.6-3.3%. This decline in mean length probably reflected the shortened longevity, due to an increase in fishing mortality rate, natural mortality rate, or both. Mean annual landings were 72,000-73,200 lb (C.V. = 38-50%), for the three time periods prior to 1967, and probably reflect the sustainable yield. Mean annual landing during 1967-73 was 40,800 lb (C.V. = 12%) and probably reflected a substantial decrease in sustainable yield. A further decrease probably occurred during 1973-75, when landings were negligible. By 1976-77, a substantial increase had occurred in LPUE (to 426 lb/hr), landings (to 65,107 lb), and mean length of females (to 388 mm). The large size of females in 1976-77, suggests that the increase was primarily due to an extension of the longevity of the fish due to the small amount of fishing effort expended during 1973-75, rather than an increase in abundance.

In summary, the English sole stock in the Cape Lazo Regulated Area is currently at a relatively low level of productivity. The reason for this is unknown.

Stock Assessment - Pacific cod. Forrester and Ketchen (1963) noted the substantial annual fluctuations in landings and LPUE, which were similar to those in other MSAs of Area 4B. They made no assessment of the Pacific cod stock in the Cape Lazo Regulated Area. Forrester and Smith (1974) noted the absence of trend in LPUE and suggested that variations in LPUE reflected "natural variations in recruitment". During 1947-77, no trend is evident for LPUE, but landings exhibit a distinct downward trend, although the cyclic fluctuations continue (Fig. 10). Peaks in landings have been substantially smaller during 1965-77, than during 1949-55, as is indicated below:

Peak Landing (1000 lb)	Year	LPUE (lb/hr)
87	1950-51	81
89	1951-52	81
97	1954-55	215
100	1959-60	164
120	1963-64	151
50	1966-67	108
68	1971-72	196
22	1975-76	197

These data suggest that abundance of Pacific cod is poorly reflected by LPUE, and that abundance, based on landings, is now at a substantially lower level than during 1950-64. Failure of LPUE to reflect this apparent substantial decline in abundance may be caused by economic factors. That is, at lower levels of abundance, LPUE reflects the minimum rate of remuneration acceptable to the fishermen. The cause of the decline in Pacific cod abundance is not known.

UNION BAY REGULATED AREA

Description. Union Bay RA occupies north Baynes Sound (Fig. 9). It is bounded on the east by Comox Bar and Denman Island, and on the south by the Fanny Bay RA. Appendix I contains a detailed description.

Regulations. Union Bay RA was closed to trawling in 1947, and first reopened in 1951. Forrester and Ketchen (1963) chronicled the complex history of regulations which ensued. These are summarized below:

	Regulations		
Year	Open period	Quota (lb)	Remarks
1951	Oct.-?; 2 days per week	100,000	Open Oct. 6-7; 154,000 lb landed; 13 trawlers participated.
1952	Oct.-?	100,000	Open Oct. 15-17; 239,000 lb landed; 35 trawlers participated.
1953	Fridays only, mid-Oct. to mid-Dec.	100,000	Open 5 Fridays
1954-57	Fridays only, mid-Oct. to mid-Dec.	nil	Open 10 Fridays
1958	No Change	30,000	Open 5 Fridays
1959	No Change	30,000	Open 4 Fridays
1960	No Change	30,000	Open 9 Fridays
1961-77	No Change	50,000	Open 10 Fridays

Landing Statistics. Mean annual landings of foodfish were 117,752 lb for 1951-61 and 54,725 lb for 1961-76 (Table 10). Principal species was English sole -- 71% during 1951-61 and 73% during 1961-76. Secondary species were starry flounder (13 and 4%), Pacific cod (8 and 10%), and lingcod (1 and 2%).

English sole annual landings have fluctuated between 1,400 and 239,000 lb during 1951-77 (Fig. 12). However, most of these fluctuations resulted from regulations. LPUE ranged from 164 lb/hr to 769 lb/hr, and exhibited no trend. For all but three values, the range was 200-600 lb/hr.

Stock Assessment -- English sole. Forrester and Ketchen (1963) concluded, on the basis of an analysis similar to that applied to the Cape Lazo English sole, that the annual sustainable yield was 50,000 lb. However, they noted that recruitment was variable, and that substantial changes in recruitment would require a re-evaluation of sustainable yield. Forrester and Smith (1974) noted a decline in recruitment during 1964-72,

based on the size of female English sole landed, and a substantial decline in LPUE. They concluded that the sustainable yield was "somewhat less than the originally estimated 50,000 lb."

Assessment, in this study, of the English sole stock in the Union Bay RA was undertaken similarly to that for Cape Lazo RA. For the period 1951-76, three phases of productivity were noted, based on mean length of female English sole landed, and annual landings. These are listed below with pertinent parameters of female lengths and total landings:

	Female lengths (mm)			Total landing (1000 lb)		
Time period	Mean	Range	C.V.	Mean	Range	C.V.
1951-55	409	392-425	3.3	122.7	44-239	63
1961-69	382	370-389	1.8	52.3	39-61	13
1970-77	(403)[a]	-	-	23.4	1-36	55

[a]1970 only.

For 1951-55, mean length was large ($\bar{X}$ = 409 mm), and reflected a stock of older fish which accumulated during the 1947-51 closure (Fig. 13, Table 11). Landings also reflected this condition (Fig. 12, Table 10). Following the "fishing up" of the accumulated older fish, there was a brief period of regulatory re-adjustment (1956-60). During 1961-77, regulatory conditions were constant (10 Fridays per season, and a quota of 50,000 lb), but recruitment appears to have shifted to a lower level after 1969. Mean length of female English sole was smaller ($\bar{X}$ = 382 mm), but relatively stable during 1960-69 (range = 372-389 mm). Unfortunately, no samples were collected during 1971-77. Mean annual landing was 52,300 lb during 1961-69, and 23,400 lb during 1970-76. The increasing landings during 1973-77 probably reflect the fishing up of a small accumulation of English sole created by the evident decrease in fishing effort during 1972-74.

In summary, the English sole stock in the Union Bay Regulated Area is currently at a relatively low level of abundance. The reason for this is unknown.

FANNY BAY REGULATED AREA

Description. Fanny Bay RA lies in central Baynes Sound (Fig. 9). It is bordered on the north by the Union Bay RA and on the south by Deep Bay RA.

Landing statistics. Fanny Bay RA was closed to trawling in April 1946 and has remained closed to date (1978). Forrester and Ketchen (1963) reported that the main reason for this closure was to provide some

protection for fish subject to heavy exploitation in the adjacent Union Bay and Deep Bay RAs. Furthermore, the English sole stock consisted primarily of small (juvenile) fish, many of which eventually migrate to the Union Bay RA as adults. No recent studies have been undertaken in Fanny Bay.

DEEP BAY REGULATED AREA

Description. Deep Bay RA lies in south Baynes Sound (Fig. 9). It is bounded in the north by Fanny Bay RA and in the south by Yellow Rock-Lambert Channel RA.

Regulations. Deep Bay RA was closed to trawling in April 1946 and reopened during 1952-58 for varying periods, primarily to divert some trawling effort away from Union Bay RA, and RAs to the south (Forrester and Ketchen 1963). Annual production was disappointingly low, and a significant segment of the catches consisted of juvenile English sole. The ground has remained closed to date (1978).

YELLOW ROCK-LAMBERT CHANNEL AND QUALICUM-PARKSVILLE REGULATED AREA

Description. Yellow Rock-Lambert Channel RA (herafter referred to as Yellow Rock) extends from south Baynes Sound and mid-Lambert Channel southward to the Big Qualicum River, north boundary of the Qualicum-Parksville RA (Fig. 9). South boundary of the Qualicum-Parksville RA is a straight line eastward from Dorcas Point (Vancouver Island to Ballenas Island Light).

Regulation. Yellow Rock and Qualicum-Parksville RAs have a common history of regulation. Both were closed in August 1947 and reopened in October 1952, concurrently with Deep Bay RA (Forrester and Ketchen 1963). First open period was October 15-November 15, 1952; and the second, October 15, 1953-March 20, 1954. During 1954-77, the open period was mid-October to the following March 20. No quotas were imposed.

Landing statistics. Mean annual foodfish landings from Yellow Rock RA were 195,531 lb for 1952-60 and 80,588 lb for 1960-77 (Table 12). Comparable values for Qualicum-Parksville RA were 94,530 lb and 20,793 lb, respectively (Table 13). Mean annual LPUE for foodfish landed from Yellow Rock RA during 1952-60 was 446 lb/hr, and for 1960-77, 396 lb/hr. Comparable values for Qualicum-Parksville RA were 346 and 416 lb/hr, respectively. Principal species landed from both grounds was Pacific cod -- 53 and 55%, respectively, during 1952-60; and 47 and 22%, respectively, during 1960-77. Secondary species in landings from Yellow Rock RA were rock sole (17 and 13%) and starry flounder (14 and 15%); and from Qualicum - Parksville RA, lingcod (13 and 23%), and English sole (12 and 15%).

Pacific cod statistics during 1952-77, exhibited different patterns on the two grounds, (Fig. 14). Landings from Yellow Rock RA were generally large (45,000-215,000 lb) during 1953-60, and again during 1972-77 (62,000-123,000 lb). Corresponding LPUEs were 123-404 lb/hr and 225-679 lb/hr. During the intervening years (1960-72), annual cod landings ranged from 1,900 to 6,000 lb, and LPUEs, 14-142 lb/hr. At Qualicum-Parksville RA, Pacific cod landings were negligible (0-53 lb/annum) after the 1963-64 season. LPUEs followed a similar pattern (0-61 lb/hr), except for the anomalous values for 1972-73, 1975-76 and 1976-77.

Stock assessment -- Pacific cod. Forrester and Ketchen (1963) noted that during 1952-60, landings and LPUEs varied without trend for both RAs. Forrester and Smith (1974) noted that during 1960-72 Pacific cod landings from both RAs declined "much more than can be attributed to reduced fishing effort."

For 1952-77, the Pacific cod fisheries on the Yellow Rock and Qualicum-Parksville RAs are different. For the Yellow Rock RA, Pacific cod landings fluctuated substantially, but without trend, and LPUE during 1972-77 was higher than during 1953-59, when annual landings were similar (Fig. 14). The abnormally small annual landings of Pacific cod during 1965-71 coincided with above-average landings of starry flounder (Table 12). The reason for this shift of emphasis is not known.

For the Qualicum-Parksville RA, Pacific cod landings were negligible after 1963-64 (Fig. 14). Emphasis shifted to other species in 1961-63 and 1964-67 (Table 13). Overall annual trawling effort has been negligible since 1964-65. The reason for this substantial decrease in effort is unknown. Possibly, Pacific cod have ceased to occupy this ground, at least during the open fishing period. None of the nearby regulated areas have experienced such a phenomenon.

In summary, the Pacific cod stock in the Yellow Rock Regulated Area appears to be in satisfactory condition, despite severe fluctuations in abundance. In contrast, the Pacific cod stock in the Qualicum-Parksville Regulated Area appears to have been fished out, or have changed its habits.

MINOR STATISTICAL AREA 17

DESCRIPTION

Minor Statistical Area 17 extends along the east coast of Vancouver Island, from about Northwest Bay to Active Pass (mid-Gulf Islands) (Fig. 1). Trawlable area is limited to a small ground off Nanoose Bay (MSSA 17N) and the grounds in the north Gulf Islands (MSSA 17S) -- Pylades Channel, Boat Harbour, Stewart Channel and Trincomali Channel.

REGULATIONS

Trawl regulations exclusive to MSA 17 include closures of Nanaimo Harbour and Departure Bay (prior to 1923); Ladysmith Harbour (1927); northern three-quarters of MSA 17, and Porlier Pass (1947); and portions of Trincomali Channel (1956 and 1963). Regulated areas were created in 1948 at Nanoose Bay and in the Boat Harbour-Pylades Channel sector of the Gulf Islands.

LANDING STATISTICS

October-September trawl landings of foodfish from MSA 17 averaged 500,000 lb/annum during 1945-60, and 393,000 lb/annum during 1960-77 (Table 14). Comparable values for October-March were 420,000 and 338,000 lb/annum, respectively -- 84 and 86% of the October-September landings. No trend in annual landings was evident. Principal species for October-September was Pacific cod -- 63% during 1945-60 and 68% during 1960-77. Secondary species were English sole (21 and 14%) and lingcod (4 and 5%).

Pacific cod landings averaged 316,000 lb/annum during October-September 1945-60 and 271,000 lb/annum during 1960-77. These landings exhibited no evident trend.

REGULATED AREAS -- MSA 17

NANOOSE BAY REGULATED AREA

Description. Nanoose Bay RA lies off the mouth of Nanoose Bay (Fig. 9). Actual fishing area consists of two somewhat circular grounds, neither of which is more than one-half mi in diameter. Appendix I contains a detailed description.

Regulations Nanoose Bay Ground was closed to trawling in August 1947, and first reopened in 1948, February 20-March 20. The ensuing open periods were December 1-January 15, 1948-49; February 20-March 20, 1950, February 1-March 20, 1951-70; and January 31-March 20, 1971-77.

Landing statistics. Mean annual landings of foodfish were 251,700 lb during 1947-60, and 175,700 lb during 1961-77 (Table 15). Corresponding mean catch rates were 422 and 574 lb/hr, respectively. Principal foodfish species landed was Pacific cod, 94% during 1947-60 and 92% during 1961-77. Secondary species were lingcod (1%) and English sole (1 and Tr%).

Pacific cod landings during 1948-77 ranged from 500 to 630,000 lb/annum and exhibited no trend (Fig. 15). LPUE range was 77-982 lb/hr, also without trend.

Stock assessment -- Pacific cod. Forrester and Ketchen (1963) concluded that, while availability and/or abundance fluctuated substantially during 1948-60, there was no trend, and these fluctuations were not caused by trawling. Forrester and Smith (1974) concurred with this conclusion, after reviewing the available data through 1972.

The present study also concurs with the original conclusion of Forrester and Ketchen (1963), but notes the unusual decline in landings during 1975-77. In most of the areas, cod landings increased during 1975-77, and coincidental above-average landings from the Gulf Islands and, particularly, Juan de Fuca Strait (Fig. 3) suggest interception of Pacific cod destined for Nanoose Bay.

BOAT HARBOUR-PYLADES CHANNEL REGULATED AREA

Description. Boat Harbour-Pylades Channel RA occupies the northern half of the Gulf Islands (Fig. 9). Its northern boundary is Dodd Narrows (and False Narrows), and its southern boundary is a line connecting Yellow Point (Vancouver Island) and Shelter Point (Valdez Island).

Regulations. This ground was closed to trawling in July 1947 to protect the Gulf Islands (17S + 18) spawning stock of English sole (Forrester and Ketchen 1963). It was first reopened for the period May 15-January 14, 1948-49. This open period has remained unchanged through 1977, except for 1953-54, when the open period was May 15-January 31.

Landing statistics. Unresolved problems (in previous reports)[10] with landing records for the Boat Harbour-Pylades Channel Regulated Area led to the use of landing records for Minor Statistical Sub-Area (MSSA) 17S (17S = MSA 17 less Nanoose Bay) to assess the stocks in the Boat Harbour-Pylades Channel Regulated Area.

Principal species is thought to be English sole. For the North Gulf Islands (Minor Statistical Sub-area 17S) as a whole, English sole was the second most important species in the October-September landings -- 35% during 1945-60; 24% during 1960-77 (Table 16). English sole landings from MSSA 17S have fluctuated with a downward trend (Fig. 16) similar to that noted for regulated areas at Cape Lazo (Fig. 11), and Union Bay (Fig. 13). However, English sole landings from MSA 18 have fluctuated without trend (Fig. 4).

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[10]See Table XVIII of Forrester and Ketchen (1963) and Table 12 in Forrester and Smith (1974).

Stock Assessment -- English sole. Without definitive catch statistics, stock assessment is difficult. Mean lengths are available for female English sole landed from this regulated area in January[11] during 1950-71 (Table 17). Four periods of production from MSSA 17S appear to have occurred after regulations were stabilized, and are summarized below:

Period (Oct.-Sept.)	Landings (lb)[a]		Female length (cm)	
	Mean	C.V.	Mean	C.V.
1949-53	179,300	12	381	2.6
1954-60	51,000	42	384	1.9
1961-67	83,200	28	370[b]	1.4
1969-77	32,400	30	383[c]	1.3

[a]MSSA 17S.
[b]No data for 1962 and 1963.
[c]No data for 1972-77.

Chronologically, the production fluctuated, with an evident downward trend. Corresponding mean lengths of female English sole were relatively high in all periods, except 1961-67. This phenomenon is contrary to that noted for Cape Lazo and Union Bay English sole.

In summary, the limited information available suggests that the English sole stock in the Boat Harbour-Pylades Channel Regulated Area is generally declining in abundance. The cause for this decline is unknown.

MINOR STATISTICAL AREA 18

DESCRIPTION

Minor Statistical Area 18 comprises the southern half of the Gulf Islands, and Saanich Inlet (Fig. 1). Northern boundary is at Active Pass and the southern boundary is just north of Sidney.

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[11]The only month in which a relatively constant series of samples was collected.

REGULATIONS

Trawl regulations exclusive to MSA 18 include closures of Saanich Inlet and Cowichan Bay (prior to 1923); Sansum Narrows and Satellite Channel (1923 and 1947); Fulford Harbour (1928); and portions of Stuart Channel (1935). The eastern portion of Satellite Channel was converted to a regulated area in 1953.

LANDING STATISTICS

Mean annual landings of foodfish during October-September were 767,000 lb during 1945-60 and 632,000 lb during 1960-77 (Table 18). Comparable values for October-March were 689,000 lb and 511,000 lb -- 90% and 81%, respectively, of the October-September values. Principal species in the October-September landings was Pacific cod -- 81% for 1945-60, and 73% for 1960-77. Secondary species were English sole (8-11%) and lingcod (2-3%).

Pacific cod landings during October-September averaged 618,000 lb/annum during 1960-77 (Table 18). While landings fluctuated widely and frequently, no trend is evident.

English sole landings during October-September averaged 65,000 lb/annum during 1945-60 and 70,000 lb/annum during 1960-77, but exhibited no evident trend.

REGULATED AREAS -- MSA 18

SATELLITE CHANNEL REGULATED AREA

Description. Satellite Channel lies off the south coast of Saltspring Island (Fig. 9), and only the eastward section is open to trawling. Appendix I contains a detailed description.

Regulations. The western half of Satellite Channel was closed to net fishing in 1923, and has remained closed to date. The eastern portion was closed to trawling in July 1947. First re-opening was December 1, 1953-January 31, 1954, with an extension of February 10-March 20, 1954. Subsequently, through 1977, the open period has been mid-October to the following March 20.

Landing statistics. Accurate landing statistics are not available for this small area. Principal species in the trawl landings was probably English sole.

Stock assessment. No information is available on which to base a stock assessment.

MINOR STATISTICAL AREA 19

DESCRIPTION

Minor Statistical Area 19 extends from about Sidney (east coast of Saanich Peninsula) to Beacher Head, near Sooke (Fig. 1). Principal trawling ground is off Victoria, between Albert and William Heads.

REGULATIONS

Trawl regulations exclusive to MSA 19 include closure to trawling of Victoria Harbour (prior to 1923) and Esquimalt Harbour (1963). There are no regulated areas.

LANDING STATISTICS

Mean annual landings of foodfish from MSA 19 during October-September were 98,000 lb for 1945-60 and 304,000 lb for 1960-77 (Table 19). Comparable values for October-March were 92,000 lb and 225,000 lb -- 94 and 75%, respectively, of the October-September values. Principal species in the October-September landings were Pacific cod (44 and 73%) and lingcod (42 and 17%) -- proportions were similar for October-March. October-September mean landings of English sole comprised 5% during 1945-60 and 3% during 1960-77.

Pacific cod. Prior to 1957, October-September landings were negligible -- 0-49,000 lb/annum (Table 19). Landings abruptly rose to 311,000 lb for 1959-60 (302,000 lb during October-March), and since then have ranged from 27,000 to 1,024,000 lb/annum, without evident trend. Landings were particularly substantial during 1974-77. Currently, the fishery in MSA 19 is thought to exploit Pacific cod migrating through the area.

Lingcod. Prior to 1959, October-September landings were negligible -- 0-10,000 lb/annum (Table 19). Landings rose abruptly to 597,000 lb (594,000 lb for October-March) in 1959-60, and 340,000 lb (301,000 lb for October-March) in 1960-61. Subsequently, landings have ranged from 5,000 to 76,000 lb, without evident trend, and generally correlate directly with Pacific cod landings.

MINOR STATISTICAL AREA 20

DESCRIPTION

Minor Statistical Area 20 extends along the south coast of Vancouver Island from about Sooke to Bonilla Point, at the mouth of Juan de Fuca Strait (Fig. 1). Principal trawling ground lies off Port San Juan.

REGULATIONS

No trawl regulations exclusive to MSA 20 have been promulgated to date (1978).

LANDING STATISTICS

For October-September, mean annual landings of foodfish were 325,000 lb during 1945-60 and 409,000 lb during 1960-77 (Table 20). Comparable values for October-March were 75,000 and 127,000 lb -- 23 and 31%, respectively, of the October-September values. Principal species landed from MSA 20 was Dover sole -- 53% of the October-September landings during 1945-60, and 36% during 1960-77. Secondary species were Pacific cod (18 and 33%), English sole (5 and 10%), and lingcod (8 and 7%). MSA 20 differs from all other MSAs in Area 4B in time of principal production -- April-September rather than October-March.

Dover sole. Mean annual landings of Dover sole for October-September were 173,000 lb for 1945-60, and 149,000 lb for 1960-77 (Table 20). Comparable values for October-March were 42,000 and 45,000 lb -- 24 and 30%, respectively, of the October-September values. During 1945-77, October-September landings ranged from 6,000 to 707,000 lb, without trend.

Pacific cod. Mean annual landings of Pacific cod for October-September were 59,000 lb during 1945-60 and 135,000 lb during 1960-77 (Table 20). Comparable values for October-March were 14,000 and 47,000 lb -- 24 and 35%, respectively, of the October-September values. Prior to 1958, October-September landings were modest -- 0-99,000 lb/annum. During 1958-77, October-September landings ranged from 18,000 to 217,000 lb/annum, without trend.

MINOR STATISTICAL AREA 28

DESCRIPTION

Minor Statistical Area 28 includes Howe Sound, Burrard Inlet, and the shoreline of North and West Vancouver Cities included, inshore of a line connecting Gower Point (Bowen Island) and Prospect Point (First Narrows) (Fig. 1).

REGULATIONS

Trawl regulations exclusive to MSA 28 include closures of: outer Burrard Inlet (from Prospect Point westward to line connecting Pt. Atkinson and Pt. Grey) (1937); Horseshoe Bay and adjacent Queen Charlotte Channel (1939); Deep Cove (North Arm, Burrard Inlet) (1950); and all of Howe Sound (1954). Trawling for shrimp is permitted in the closed area of Burrard Inlet. That portion of Burrard Inlet lying between First Narrows and Deep Cove and all of North Arm is open to trawling, but no landings have been reported from this area. There are no regulated areas.

LANDING STATISTICS

No trawl landings of groundfish have been reported from MSA 28 during 1945-50 and 1951-77 (Table 21). The 1950-51 foodfish landings totalled 1,000 lb -- 1,000 lb of English sole and a trace (<500 lb) of lingcod.

MINOR STATISTICAL AREA 29

DESCRIPTION

Minor Statistical Area 29 includes the Canadian portion of Southeast Georgia Strait, and that part of outer Burrard Inlet, from Sechelt to the Canada-U.S. border at Point Roberts (Fig. 1). Principal trawling grounds lie off the Fraser River and near Point Roberts.

REGULATIONS

Trawl regulations exclusive to MSA 29 include: closure of outer Burrard Inlet, from Prospect Point to a line connecting Pt. Atkinson and Pt. Grey (1937); False Creek (1950); and a closed season, June 1-July 15, off the Fraser River (to protect moulting Dungeness Crabs) (1968). The closed season replaced an area closure imposed in 1939. There are no regulated areas.

LANDING STATISTICS

For October-September, mean annual landing of foodfish was 238,000 lb during 1945-60 and 91,000 lb during 1960-77 (Table 22). Corresponding values for October-March were 121,000 lb and 50,000 lb, respectively -- 48 and 55% of the October-September values. Principal species landed was English sole -- 40% during 1945-60 and 49% during 1960-77. Secondary species were Pacific cod (23 and 21%) and lingcod (6 and 8%). October-September and October-March landings declined sharply after 1969-70.

English sole. For September-October, annual landings averaged 96,000 lb during 1945-60, and 45,000 lb during 1960-77. Comparable values for October-March were 49,000 lb and 24,000 lb -- 51 and 53% of the October-September values. October-September and October-March landings declined sharply after 1969-70.

CONCLUSIONS AND DISCUSSION

For Area 4B as a whole, all-species trawl landings (excluding dogfish) and fishing effort followed similar patterns during 1945-66, but thereafter landings exhibited no trend while effort continued a decline which began after 1954-55 (Fig. 2). Not surprisingly, LPUE exhibited no trend during 1945-66, and increased thereafter. These patterns are not classic symptoms of overfishing. Perhaps the shift in emphasis (that began in 1964) to the more-lucrative offshore trawl fisheries was a factor in the decline in fishing effort. Mean annual (January-December) landings for 1952-63 and 1964-77 are listed below from Area 4B and all other areas combined:

Year	Mean landings[a] (Millions of pounds)	
	Area 4B	All other areas
1952-63	5.2 (3.4-7.3)	18.6 (10.8-21.9)
1964-77	3.3 (2.4-5.0)	38.3 (27.9-51.4)

[a]Extracted from appropriate references listed in page 1.

The increase in landings from offshore landings was both abrupt and substantial.

A second interpretation is proposed by Ketchen (1979), from an analysis of Area 4B trawl-landing statistics for October-March 1951-78. He hypothesized that fishing effort during the 1950s and early 1960s was sufficient to produce growth and/or recruitment overfishing for foodfish in general, and Pacific cod in particular. Declining effort reflected the withdrawal of vessels due to declining profitability and more attractive opportunities elsewhere. He further hypothesized that fishing effort continued to decline, due to relatively low profitability, despite increasing foodfish abundance after the mid-1960s.

For Pacific cod, the single most important species in the trawl landings, 1945-77 landings have exhibited no trend for Area 4B as a whole. Landings have generally declined in two important locations (MSA 14 and Gulf Islands); exhibited no trend in one (Nanoose Bay); and increased in the other one (Juan de Fuca Strait). Pacific cod abundance continues to fluctuate substantially, apparently independent of fishing.

For the secondary species, English sole, landings have been declining since the mid-1960s. Curiously, the decline in landings (here interpreted as reflecting abundance) even occurred in two localities where seasonal closures were particularly severe, i.e., Union Bay and Boat Harbour-Pylades Channel. Interestingly, LPUE values, where available, did not reflect the declining abundance. The cause for the general decline in abundance of English sole is not readily apparent, nor is its determination within the scope of this study.

Line-caught landings of lingcod from Area 4B have declined spectacularly since 1951, and presumably reflect an equally significant decline in abundance. Trawl-caught landings of lingcod from Area 4B have exhibited no trend, but are negligible with respect to line-caught landings, or trawl-caught landings of other species.

With respect to the regulated areas, Forrester and Ketchen (1963) suggested that perhaps most of the seasonal closures should be abolished "to provide the industry more freedom to adapt to changing economic conditions." However, they decided that from a scientific standpoint "it would be undesirable to make such a change in the regulations until sufficient time

has elapsed to permit appraisal of the effects of mesh regulation on the fishery as it now stands." Forrester and Smith (1974) noted that while increased yield of English sole and other flatfishes was expected from the trawl-mesh regulation imposed in 1962, any gains achieved were obscured by the general decline in fishing effort after 1962, and decline in English sole landings. They concluded that the relatively low productivity of Area 4B, compared to the offshore grounds, and the change in trawl fleet (to larger vessels) precluded any future detection of benefits which might have resulted from the mesh regulation. Their conclusion seems equally valid after reviewing events through 1977.

Sufficient time has passed since promulgation of the mesh regulation, that a general review of the area-time restrictions on the trawl fishery in Area 4B would seem appropriate.

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REFERENCES

Forrester, C. R. 1958. The recent rise in landings of whole fish for mink feed in British Columbia. Fish. Res. Board Can. Progr. Rep. Pac. Coast Stn. No. 111: 20-21.

Forrester, C. R. 1968. Utilization of fish for animal food in B.C. Fisheries of Canada 20(10): 17-21.

Forrester, C. R., and K. S. Ketchen. 1963. A review of the Strait of Georgia trawl fishery. Fish. Res. Board Can. Bull. No. 113: 81 p.

Forrester, C. R. and J. E. Smith. 1974. The trawl fishery in the Strait of Georgia and vicinity, 1960-72. Fish. Res. Board Can. Circ. No. 96: 47 p.

Holmberg, Deanna. 1967. Catch and effort statistics of the British Columbia trawl fishery in 1966. Fish. Res. Board Can. Tech. Rep. 7: 87 p.

Ketchen, K. S. 1979. An overview of the Strait of Georgia winter trawl fishery, 1951-52 to 1977-78. Fish. Mar. Serv., MS Rep. 1511: 63 p.

Prest, Janice. 1968. Catch and effort statistics of the British Columbia trawl fishery in 1967. Fish. Res. Board Can. Tech. Rep. 56: 85 p.

Prest, Janice. 1969. Catch and effort statistics of the British Columbia trawl fishery in 1968. Fish. Res. Board Can. Tech. Rep. 117: 93 p.

Smith, J. E. 1970. Catch and effort statistics of the British Columbia trawl fishery in 1969. Fish. Res. Board Can. Tech. Rep. 181: 89 p.

Smith, J. E. 1971. Catch and effort statistics of the British Columbia trawl fishery in 1970. Fish. Res. Board Can. Tech. Rep. 257: 97 p.

Smith, J. E. 1972. Catch and effort statistics of the British Columbia trawl fishery in 1971. Fish. Res. Board Can. Tech. Rep. 317: 66 p.

Smith, J. E. 1973. Catch and effort statistics of the Canadian groundfish fishery on the Pacific coast in 1972. Fish. Mar. Serv. Tech. Rep. 98: 83 p.

Smith, J. E. 1974. Catch and effort statistics of the Canadian groundfish fishery on the Pacific Coast in 1973 (Data Record). Fish. Mar. Serv. Tech. Rep. 459: 72 p.

Smith, J. E. 1975. Catch and effort statistics of the Canadian groundfish fishery on the Pacific coast in 1974 (Data Record). Fish. Mar. Serv. Tech. Rep. 542: 74 p.

Smith, J. E. 1976. Catch and effort statistics of the Canadian groundfish fishery on the Pacific Coast in 1975. Fish. Mar. Serv. Tech. Rep. 657: 73 p.

Smith, J. 1977. Catch and effort statistics of the Canadian groundfish fishery on the Pacific Coast in 1976. Fish. Mar. Serv. Tech. Rep. 736: 83 p.

Smith, J. E. 1978. Catch and effort statistics of the Canadian groundfish fishery on the Pacific Coast in 1977. Fish. Mar. Serv. Tech. Rep. 835: 85 p.

Thomson, J. A. and D. M. Holmberg. 1966. British Columbia landings of trawl-caught groundfish by month, by major and minor statistical area; and total hours of effort by month, by major area. Vol. 14, 1965. Fish. Res. Board Can. Circ. (Stat. Ser.) No. 19: 69 p.

Thomson, J. A. and E. J. R. Lippa. 1963. British Columbia landings of trawl-caught groundfish by month, by major and minor statistical area. Vol. 11, 1962. Fish. Res. Board Can. Circ. (Stat. Ser.) No. 11: 79 p.

Thomson, J. A. and E. J. R. Lippa. 1964. British Columbia landings of trawl-caught groundfish by month, by major and minor statistical area. Vol. 12, 1963. Fish. Res. Board Can. Circ. (Stat. Ser.) No. 13: 73 p.

Thomson, J. A., E. J. R. Lippa, and D. M. Holmberg. 1965. British Columbia landings of trawl-caught groundfish by month, by major and minor statistical area; and total hours of effort by month, by major area. Vol. 13, 1964. Fish. Res. Board. Can. Circ. (Stat. Ser.) No. 14: 77 p.

Thomson, J. A., and A. N. Yates. 1960. British Columbia landings of trawl-caught groundfish by month, by major statistical area. Vol. 1, 1945-1949. Fish. Res. Board Can. Stat. Circ. Ser. No. CNS 1: 86 p.

Thomson, J. A., and A. N. Yates. 1961a. British Columbia landings of trawl-caught groundfish by month, by major statistical area, Vol. 2, 1950-54. Fish. Res. Board Can. Stat. Circ. Ser. No. CNS 2: 88 p.

Thomson, J. A., and A. N. Yates. 1961b. British Columbia landings of trawl-caught groundfish by month, by major statistical area. Vol. 3, 1955-1959. Fish. Res. Board Can. Stat. Circ. Ser. No. CNS 3: 73 p.

Thomson, J. A., and A. N. Yates. 1961c. British Columbia landings of trawl-caught groundfish by month, by minor statistical area. Vol. 4, 1945-47. Fish. Res. Board Can. Circ. (Stat. Ser.), No. 4: 44 p.

Thomson, J. A., and A. N. Yates. 1961d. British Columbia landings of trawl-caught groundfish by month, by minor statistical area. Vol. 5, 1948-1950. Fish. Res. Board Can. Circ. (Stat. Ser.) No. 5: 44 p.

Thomson, J. A., and A. N. Yates. 1961e. British Columbia landings of trawl-caught groundfish by month, by major and minor statistical area. Vol. 9, 1960. Fish. Res. Board Can. Stat. Circ. Ser. No. CNS 9: 52 p.

Thomson, J. A., and A. N. Yates. 1962a. British Columbia landings of trawl-caught groundfish by month, by minor statistical area. Vol. 6, 1951-1953. Fish. Res. Board Can. Circ. (Stat. Ser.) No. 6: 46 p.

Thomson, J. A. and A. N. Yates. 1962b. British Columbia landings of trawl-caught groundfish by month, by minor statistical area. Vol. 7, 1954-56. Fish. Res. Board Can. Circ. (Stat. Ser.) No. 7: 44 p.

Thomson, J. A., and A. N. Yates. 1962c. British Columbia landings of trawl-caught groundfish by month, by minor statistical area. Vol. 8, 1957-1959. Fish. Res. Board Can. Circ. (Stat. Ser.) No. 8: 52 p.

Thomson, J. A., and A. N. Yates. 1962d. British Columbia landings of trawl-caught groundfish by month, by major and minor statistical area. Vol. 10, 1961. Fish. Res. Board Can. Circ. (Stat. Ser.), No. 10: 79 p.

TABLES

Table 1. All-species trawl landings (1000 lb), calculated effort (hr), and LPUE (lb/hr) in Georgia Strait and vicinity (Area 4B), October-September, 1945-77 (excluding dogfish).

Year	Interviewed			Total landing (1000 lb)	Calc. total effort (hr)	Year	Interviewed			Total landing (1000 lb)	Calc. total effort (hr)
	Effort (hr)	Landings (1000 lb)	LPUE (lb/hr)				Effort (hr)	Landing (1000 lb)	LPUE (lb/hr)		
1945-46	8,500	1,366	161	3,484	21,640	1960-61	4,895	1,735	354	4,080	11,525
1946-47	7,900	1,165	148	3,310	22,365	1961-62	3,924	1,223	312	4,083	13,087
1947-48	9,800	618	221	1,424	6,443	1962-63	3,717	1,001	269	2,918	10,848
1948-49	5,200	1,004	191	1,507	7,890	1963-64	5,745	1,435	250	4,274	17,096
1949-50	9,200	2,141	232	2,427	10,461	1964-65	3,787	1,258	332	3,610	10,873
1950-51	10,900	3,124	285	4,251	14,916	1965-66	3,945	1,243	315	3,079	9,775
1951-52	12,100	3,003	249	4,562	18,321	1966-67	3,188	1,495	469	3,151	6,719
1952-53	13,000	3,610	278	5,056	18,187	1967-68	4,161	1,148	276	2,395	8,678
1953-54	11,300	4,094	361	6,339	17,560	1968-69	3,478	1,128	324	2,441	7,534
1954-55	12,000	4,052	338	7,876	23,302	1969-70	3,491	1,050	301	2,699	8,967
1955-56	8,100	2,774	341	6,747	19,786	1970-71	4,161	1,753	421	3,369	8,002
1956-57	4,900	1,848	379	4,601	12,140	1971-72	2,479	1,271	513	2,965	5,780
1957-58	6,200	2,118	482	5,224	10,838	1972-73	2,179	1,715	787	4,210	5,349
1958-59	5,500	2,598	470	5,911	12,577	1973-74	1,342	651	485	2,450	5,052
1959-60	5,300	2,217	415	5,613	13,525	1974-75	1,925	1,078	560	2,874	5,132
						1975-76	3,111	1,959	630	4,084	6,483
						1976-77	2,348	1,961	835	3,227	3,865

Table 2. All-species LPUE (lb landed/hr trawled) for Canadian trawlers operating off British Columbia by International Area, by 5-yr time periods, 1956-75 (excluding dogfish).

Area	Time			
	1956-60	1961-65	1966-70	1971-75
4B - Strait of Georgia and vicinity	495	378	439	559
3C - SW Vancouver Island	1,120	1,051	1,023	1,444
3D - NW Vancouver Island	852	1,050	1,230	968
5A - S. Queen Charlotte Sound	1,163	1,561	1,452	1,466
5B - N. Queen Charlotte Sound	1,255	1,468	1,703	1,533
5C - S. Hecate Strait	1,828	2,653	1,847	1,803
5D - N. Hecate Strait and Dixon Entrance	1,832	1,983	2,060	2,087
Mean	1,721	1,449	1,393	1,409

Table 3. All-species trawl landings (1000 lb) by Minor Statistical Area in the Strait of Georgia and vicinity during October-September and October-March 1945-77 (excluding dogfish).

Year	12, 13 15, 16	14	17	18	19	20	28	29	Total
				October-September					
1945-46	9	663	494	1,227	13	15	-	328	2,749
1946-47	276	448	215	474	-	514	-	248	2,175
1947-48	47	181	155	146	-	226	-	193	948
1948-49	40	206	258	175	-	99	-	236	1,014
1949-50	132	234	871	304	Tr	191	-	279	2,011
1950-51	164	638	630	912	43	929	1	220	3,537
1951-52	240	1,389	882	1,183	4	681	-	320	4,699
1952-53	194	950	753	1,332	16	225	-	242	3,712
1953-54	44	1,418	580	1,692	63	578	-	538	4,913
1954-55	107	1,102	275	2,792	37	443	-	940	5,696
1955-56	246	624	560	2,260	108	357	-	1,710	5,865
1956-57	257	846	379	1,322	82	292	-	811	3,989
1957-58	240	662	770	1,068	119	420	-	561	3,840
1958-59	88	583	804	1,689	308	896	-	391	4,759
1959-60	115	505	736	855	1,090	219	-	322	4,842
Mean 1945-60	147	697	557	1,162	126	472	Tr	489	3,650
Percent	4	19	15	32	3	13	Tr	13	99

Table 3 (cont'd)

Year	12, 13 15, 16	14	17	18	19	20	28	29	Total
				October-September					
1960-61	144	393	399	813	819	635	-	246	3,449
1961-62	131	444	346	762	337	1,300	-	341	3,661
1962-63	99	301	472	779	182	830	-	241	2,904
1963-64	150	552	572	1,338	258	1,073	-	231	4,174
1964-65	135	265	303	940	291	1,249	-	194	3,377
1965-66	55	320	204	420	549	1,413	-	88	3,049
1966-67	178	332	496	584	87	985	-	55	2,717
1967-68	88	267	452	406	184	784	-	111	2,292
1968-69	140	272	279	576	113	989	-	72	2,441
1969-70	96	225	345	747	246	852	-	137	2,648
1970-71	88	337	879	714	149	804	-	62	3,033
1971-72	21	302	743	524	144	1,007	-	36	2,777
1972-73	53	474	397	562	39	280	-	91	1,896
1973-74	55	196	438	698	120	86	-	16	1,609
1974-75	96	276	231	642	673	326	-	45	2,289
1975-76	127	354	283	1,133	1,120	200	-	15	3,232
1976-77	194	389	204	1,142	654	333	-	9	2,925
Mean 1960-77	109	335	414	752	351	773	-	117	2,851
Percent	4	12	15	26	12	27	-	4	100

Table 3 (cont'd)

Year	12, 13 15, 16	14	17	18	19	20	28	29	Total
				October-March					
1945-46	3	561	428	1,210	-	1	-	262	2,465
1946-47	256	298	159	455	-	91	-	131	1,390
1947-48	45	133	119	122	-	58	-	80	557
1948-49	40	134	190	151	-	6	-	125	646
1949-50	123	160	651	251	Tr	37	-	166	1,388
1950-51	130	378	552	728	36	256	1	94	2,175
1951-52	199	1,072	768	1,031	3	136	-	151	3,360
1952-53	154	660	640	1,069	16	84	-	102	2,725
1953-54	24	1,140	495	1,534	51	161	-	135	3,540
1954-55	80	1,016	200	2,548	37	77	-	189	4,147
1955-56	174	549	396	2,014	97	45	-	796	4,071
1956-57	164	824	325	1,225	29	126	-	526	3,219
1957-58	219	652	689	1,016	118	109	-	454	3,257
1958-59	65	496	677	1,605	125	268	-	239	3,475
1959-60	87	484	618	781	1,019	211	-	203	3,403
Mean 1945-60	118	570	460	1,049	102	111	Tr	244	2,655
Percent	4	21	17	40	4	4	Tr	9	99

Table 3 (cont'd)

Year	12, 13 15, 16	14	17	18	19	20	28	29	Total
				October-March					
1960-61	121	309	334	780	668	207	-	115	2,534
1961-62	85	440	328	726	226	247	-	140	2,192
1962-63	93	286	308	555	151	275	-	150	1,818
1963-64	135	550	460	1,235	253	367	-	111	3,111
1964-65	75	264	250	855	283	532	-	174	2,433
1965-66	42	320	155	388	549	394	-	71	1,919
1966-67	178	332	477	524	87	455	-	22	2,075
1967-68	86	267	398	313	161	130	-	54	1,409
1968-69	126	272	220	481	98	162	-	27	1,386
1969-70	82	223	322	602	246	211	-	88	1,774
1970-71	84	326	829	590	125	167	-	39	2,160
1971-72	21	271	692	424	86	291	-	18	1,803
1972-73	29	336	362	463	39	189	-	49	1,467
1973-74	18	148	355	547	-	2	-	9	1,079
1974-75	44	245	217	466	467	29	-	34	1,502
1975-76	78	339	223	851	626	53	-	-	2,170
1976-77	171	310	148	774	397	190	-	7	1,997
Mean 1960-77	86	308	358	622	263	229	-	65	1,931
Percent	5	16	18	32	14	12	-	3	100

Table 4. Trawl landings (1000 lb) of principal species from Georgia Strait and vicinity (Area 4B), October-September and October-March 1945-77.

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total food fish[b]	Mink food	Total
			October-September				
1945-46	1,363	842	89	419	2,713	36	2,749
1946-47	570	605	191	801	2,167	8	2,175
1947-48	259	314	62	299	934	134	1,068
1948-49	366	316	34	277	993	21	1,014
1949-50	897	417	65	626	2,005	6	2,011
1950-51	1,553	538	92	1,311	3,494	42	3,536
1951-52	1,771	712	107	1,810	4,400	299	4,699
1952-53	1,693	762	76	645	3,176	537	3,713
1953-54	2,576	536	99	766	3,977	936	4,913
1954-55	2,284	498	151	592	3,525	2,171	5,696
1955-56	1,376	443	114	569	2,502	3,363	5,865
1956-57	1,225	439	75	585	2,324	1,665	3,989
1957-58	1,458	435	162	596	2,651	1,199	3,850
1958-59	1,931	339	109	538	2,917	1,842	4,759
1959-60	1,781	393	726	488	3,388	1,454	4,842
Mean 1945-60	1,407	506	143	688	2,784	906	3,659
Percent	51	18	5	25	99		

Table 4 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish [a]	Total food fish [b]	Mink food	Total
			October-September				
1960-61	1,062	361	467	550	2,440	1,048	3,488
1961-62	958	588	182	801	2,579	1,265	3,794
1962-63	1,236	474	114	656	2,480	567	3,047
1963-64	1,702	621	143	732	3,198	1,054	4,252
1964-65	1,106	635	183	633	2,557	917	3,474
1965-66	716	555	194	625	2,090	1,064	3,154
1966-67	1,022	446	97	413	1,978	839	2,817
1967-68	838	436	129	392	1,795	597	2,392
1968-69	717	485	198	394	1,794	784	2,578
1969-70	1,121	552	118	449	2,240	573	2,813
1970-71	1,639	464	106	440	2,649	516	3,165
1971-72	1,463	407	127	439	2,436	484	2,920
1972-73	1,131	277	48	340	1,796	106	1,902
1973-74	1,158	155	40	232	1,585	8	1,593
1974-75	1,634	419	98	277	2,428	27	2,455
1975-76	2,416	282	99	424	3,221	19	3,240
1976-77	1,974	441	71	481	2,967	49	3,016
Mean 1960-77	1,286	447	142	487	2,364	583	2,947
Percent	54	19	6	21	100		

Table 4 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish [a]	Total food fish [b]	Mink food	Total
			October-March				
1945-46	1,341	707	47	334	2,429	36	2,465
1946-47	467	448	91	376	1,382	8	1,390
1947-48	188	220	25	123	556	6	562
1948-49	236	221	18	155	630	16	646
1949-50	705	287	16	380	1,388	2	1,390
1950-51	1,133	375	41	601	2,150	25	2,175
1951-52	1,462	539	48	1,061	3,110	250	3,360
1952-53	1,230	625	49	507	2,411	317	2,728
1953-54	2,080	426	52	554	3,112	428	3,540
1954-55	1,879	344	97	395	2,715	1,432	4,147
1955-56	1,115	347	52	395	1,909	2,162	4,071
1956-57	1,068	378	40	404	1,890	1,329	3,219
1957-58	1,312	389	65	466	2,232	1,049	3,281
1958-59	1,661	264	54	325	2,304	1,171	3,475
1959-60	1,494	275	631	336	2,736	667	3,403
Mean 1945-60	1,157	391	88	427	2,064	593	2,657
Percent	56	19	4	21	100		

Table 4 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other food fish [a]	Total food fish [b]	Mink food	Total
			October-March				
1960-61	897	234	360	425	1,916	618	2,534
1961-62	757	365	103	473	1,698	494	2,192
1962-63	788	247	71	405	1,511	307	1,818
1963-64	1,488	404	57	477	2,426	685	3,111
1964-65	954	456	112	368	1,890	543	2,433
1965-66	607	375	126	317	1,425	494	1,919
1966-67	933	309	50	294	1,586	489	2,075
1967-68	652	249	72	284	1,257	152	1,409
1968-69	481	265	137	275	1,158	228	1,803
1969-70	870	289	72	272	1,503	271	1,774
1970-71	1,372	273	61	244	1,950	230	2,180
1971-72	1,176	179	74	155	1,584	219	1,803
1972-73	902	188	30	241	1,361	106	1,467
1973-74	835	102	7	131	1,075	4	1,079
1974-75	1,102	184	72	118	1,476	26	1,502
1975-76	1,633	208	45	266	2,152	18	2,170
1976-77	1,313	260	42	338	1,953	44	1,997
Mean 1960-77	986	270	88	299	1,642	290	1,932
Percent	60	16	5	18	99		

[a]Excluding dogfish.
[b]Fish sold for human consumption.

Table 5. Trawl landings (1000 lb) of principal species from Minor Statistical Areas 12, 13, 15, and 16, October-September and October-March, 1945-77.

Year	Pacific cod	English sole	Lingcod	Other fish [a]	Total food fish	Mink food	Total
			October-September				
1945-46	Tr [b]	-	-	9	9	-	9
1946-47	53	76	12	134	275	1	276
1947-48	9	11	3	24	47	-	47
1948-49	21	13	3	3	40	-	40
1949-50	19	13	1	99	132	-	132
1950-51	54	21	3	86	164	-	164
1951-52	91	26	3	109	229	11	240
1952-53	100	17	3	49	169	25	194
1953-54	18	5	Tr	17	40	4	44
1954-55	40	11	1	32	84	23	107
1955-56	37	14	1	93	145	101	246
1956-57	151	3	5	63	222	35	257
1957-58	129	7	18	59	213	27	240
1958-59	41	9	2	24	76	12	88
1959-60	36	9	4	62	111	4	115
Mean 1945-60	53	16	4	58	130	16	147
Percent	41	12	3	44	100		

Table 5 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total foodfish	Mink food	Total
			October-September				
1960-61	26	7	7	104	144	-	144
1961-62	21	23	8	75	127	4	131
1962-63	31	20	4	41	96	3	99
1963-64	36	35	4	68	143	7	150
1964-65	39	20	15	59	133	2	135
1965-66	28	8	-	17	53	2	55
1966-67	114	11	-	47	172	6	178
1967-68	36	20	6	26	88	-	88
1968-69	36	39	1	64	140	-	140
1969-70	25	33	2	36	96	-	96
1970-71	17	22	-	49	88	-	88
1971-72	7	5	1	6	19	2	21
1972-73	24	14	1	14	53	-	53
1973-74	36	7	9	3	55	-	55
1974-75	58	11	5	22	96	-	96
1975-76	55	27	5	40	127	-	127
1976-77	117	39	-	38	194	-	194
Mean 1960-77	41	20	4	42	107	2	109
Percent	38	19	4	39	100		

Table 5 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total food fish	Mink food	Total
			October-March				
1945-46	Tr[b]	-	-	3	3	-	3
1946-47	53	74	6	122	255	1	256
1947-48	9	10	1	25	45	-	45
1948-49	21	13	3	3	40	-	40
1949-50	19	12	1	91	123	-	123
1950-51	47	17	2	64	130	-	130
1951-52	83	13	1	91	188	11	199
1952-53	85	10	2	42	138	15	154
1953-54	6	3	Tr	12	21	3	24
1954-55	24	8	Tr	25	57	23	80
1955-56	27	10	Tr	68	105	69	174
1956-57	112	1	Tr	18	132	33	164
1957-58	124	7	13	49	193	26	219
1958-59	33	8	2	15	58	7	65
1959-60	30	6	3	44	83	4	87
Mean 1945-60	45	13	2	45	105	13	118
Percent	43	12	2	43	100		

Table 5 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total foodfish	Mink food	Total
				October-March			
1960-61	25	5	4	87	121	-	121
1961-62	19	11	4	51	85	-	85
1962-63	30	20	4	38	92	1	93
1963-64	35	28	3	62	128	7	135
1964-65	29	17	1	27	74	1	75
1965-66	22	5	-	13	40	2	42
1966-67	114	11	-	47	172	6	178
1967-68	36	20	5	25	86	-	86
1968-69	31	32	1	62	126	-	126
1969-70	20	27	1	34	82	-	82
1970-71	17	20	-	47	84	-	84
1971-72	7	5	1	6	19	2	21
1972-73	15	10	-	4	29	-	29
1973-74	13	4	-	1	18	-	18
1974-75	42	2	-	-	44	-	44
1975-76	31	15	-	32	78	-	78
1976-77	106	31	-	34	171	-	171
Mean 1960-77	35	15	1	34	85	1	86
Percent	41	18	1	40	100		

[a]Excluding dogfish.
[b]Tr = less than 500 lb.

Table 6. Trawl landings (1000 lb) of principal species from Minor Statistical Area 14, October-September and October-March 1945-77. (Landings from unregulated areas in parentheses.)

Year	Pacific cod	English sole	Lingcod	Other fish [a]	Total food fish	Mink food	Total
			October-September				
1945-46	39	426	10	188	663	-	663
1946-47	67	194	78	109	448	-	448
1947-48	27	119	11	24	181	Tr	181
1948-49	60	86	11	48	205	1	206
1949-50	59	74	8	93	234	-	234
1950-51	343	171	18	106	638	-	638
1951-52	203	309	15	861	1,388	1	1,389
1952-53	375	370	32	173	950	Tr	950
1953-54	808	218	22	338	1,386	32	1,418
1954-55	547	206	62	220	1,035	67	1,102
1955-56	300	161	13	116	590	34	624
1956-57	307	258	13	250	828	18	846
1957-58	221	208	16	203	648	14	662
1958-59	302	139	21	120	582	1	583
1959-60	296	120	6	71	493	12	505
Mean 1945-60	264	204	22	195	685	12	697
Percent	39	30	3	28	100		

Table 6(cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total foodfish	Mink food	Total
			October-September				
1960-61	172 (81)	120(70)	13 (1)	81	386	7	393
1961-62	121 (14)	191(21)	27 (Tr)	101	440	4	444
1962-63	106 (27)	113(16)	15 (-4)	64	298	3	301
1963-64	245 (24)	142(31)	23 (1)	127	537	15	552
1964-65	81 (17)	119(23)	9 (2)	55	264	1	265
1965-66	39 (5)	193(21)	20 (9)	65	317	3	320
1966-67	62 (Tr)	168(34)	18(-Tr)	84	332	-	332
1967-68	48 (1)	120(13)	26 (Tr)	71	265	2	267
1968-69	37 (9)	112(13)	43 (8)	80	272	-	272
1969-70	56 (18)	98 (9)	9 (Tr)	62	225	-	225
1970-71	178(106)	94(12)	10 (1)	55	337	-	337
1971-72	152 (45)	94(20)	6 (3)	47	299	3	302
1972-73	331(212)	87(36)	3 (2)	53	474	-	474
1973-74	128 (55)	30(28)	6 (0)	32	196	-	196
1974-75	163 (23)	55(30)	2(-Tr)	56	276	-	276
1975-76	184 (58)	114(44)	1 (Tr)	54	353	1	354
1976-77	216(127)	133(31)	3 (2)	36	388	1	389
Mean 1960-77	136 (48)	117(27)	14 (2)	66	333	2	335
Percent	41 (35)	35(38)	4 (14)	20	100		

Table 6 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish [a]	Total food fish	Mink food	Total
			October-March				
1945-46	32	366	4	159	561	-	561
1946-47	29	125	55	89	298	-	298
1947-48	17	102	3	11	133	-	133
1948-49	25	68	6	34	133	1	134
1949-50	19	65	1	75	160	-	160
1950-51	152	135	1	90	378	-	378
1951-52	118	294	12	647	1,071	1	1,072
1952-53	110	360	22	168	660	Tr	660
1953-54	564	211	19	332	1,126	14	1,140
1954-55	474	198	61	218	951	65	1,016
1955-56	237	156	12	112	517	32	549
1956-57	284	255	13	254	806	18	824
1957-58	219	205	16	198	638	14	652
1958-59	227	131	19	118	495	1	496
1959-60	280	115	6	71	472	12	484
Mean 1945-60	186	186	17	172	560	11	570
Percent	33	33	3	31	100		

Table 6 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total foodfish	Mink food	Total
			October-March				
1960-61	103	113	12	74	302	7	309
1961-62	118	190	27	101	436	4	440
1962-63	96	111	15	61	283	3	286
1963-64	245	141	23	126	535	15	550
1964-65	81	118	9	55	263	1	264
1965-66	39	193	20	65	317	3	320
1966-67	62	168	18	84	332	-	332
1967-68	48	120	26	71	265	2	267
1968-69	37	112	43	80	272	-	272
1969-70	56	98	9	60	223	-	223
1970-71	168	93	10	55	326	-	326
1971-72	124	94	6	44	268	3	271
1972-73	205	77	2	52	336	-	336
1973-74	96	26	-	26	148	-	148
1974-75	145	43	2	55	245	-	245
1975-76	170	113	1	54	338	1	339
1976-77	143	130	1	35	309	1	310
Mean 1960-77	114	114	13	65	306	2	308
Percent	37	37	4	22	100		

[a]Excluding dogfish.

Table 7. Trawl landings (1000 lb) of foodfish from regulated areas in Minor Statistical Area 14, October-March 1960-77. (Excluding dogfish.)

Year	Regulated Area				Total
	Cape Lazo	Union Bay	Yellow Rock	Qualicum-Parksville	
Mean 1947-60[a]	154	124	195	95	568[b]
1960-61	94	63	87	46	290
1961-62	210	83	71	49	413
1962-63	116	67	31	31	245
1963-64	227	70	142	49	488
1964-65	108	51	79	11	249
1965-66	150	70	50	25	295
1966-67	165	71	73	17	326
1967-68	96	79	58	28	261
1968-69	94	64	53	18	229
1969-70	79	74	31	16	200
1970-71	142	48	38	14	242
1971-72	119	62	52	-	233
1972-73	78	27	110	19	234
1973-74	1	1	106	-	108
1974-75	27	25	178	-	230
1975-76	67	35	134	17	253
1976-77	85	48	77	12	222
Mean 1960-77	109	55	81	21	266

[a] Forrester and Ketchen (1963.) Mean for years season was open.

[b] Excluding Deep Bay, which was only open during 1952-58 ($\bar{X}$ = 118,000 lb).

Table 8. Statistics of the regulated fishery at Cape Lazo, October-March, 1960-77.

Year	Effort (hr)	Landings (lb)						LPUF (lb/hr)		
		English sole	Pacific cod	Lingcod	Other fish[a]	Total foodfish	Mink food	English sole	Pacific cod	All foodfish
Mean 1947-60[b]	593	71,318	59,893	1,418	21,667	154,299	1,654	124	113	273
Percent		46	39	1	14	100				
1960-61	344	43,865	40,011	14	10,415	94,305	410	128	116	274
1961-62	849	108,136	71,353	2,369	27,920	209,778	1,250	127	84	247
1962-63	391	43,161	61,434	984	10,661	116,240	725	110	157	297
1963-64	796	56,105	119,842	2,984	47,747	226,678	-	70	151	285
1964-65	434	52,206	27,404	3,041	25,828	108,479	-	120	63	250
1965-66	395	105,404	26,219	1,642	16,790	150,055	-	264	67	376
1966-67	469	75,261	50,499	11,115	28,631	165,506	-	160	108	353
1967-68	352	41,173	29,693	11,954	12,899	95,719	-	117	84	272
1968-69	293	45,927	18,239	23,183	6,606	93,955	-	157	62	321
1969-70	329	39,112	26,415	1,904	12,041	79,472	-	119	80	242
1970-71	491	46,903	59,753	3,240	31,857	141,753	-	96	122	289
1971-72	346	38,129	67,940	450	12,864	119,383	2,537	110	196	345
1972-73	225	33,816	36,861	101	7,359	78,137	-	150	164	347
1973-74	4	217	414	-	607	1,238	-	54	102	310
1974-75	72	8,590	11,606	162	6,856	27,214	-	119	161	378
1975-76	114	40,206	22,423	248	4,531	67,408	-	353	197	591
1976-77	153	65,107	16,577	-	3,788	85,472	1,436	426	108	559
Mean 1960-77	356	49,607	40,393	3,729	15,729	109,458	374	139	113	307
Percent		46	37	3	14	100				

[a]Excluding dogfish.

[b]Forrester and Ketchen (1963).

Table 9 . Mean length (mm) of male and female English sole, and percentage males, landed from the Cape Lazo Regulated Area, October-March 1961-77 (See Forrester and Ketchen, 1963 for detailed records for 1947-60).

Year	Mean length (mm)		% Males
	Male	Female	
1961-62	324	368	33
1962-63	339	375	28
1963-64	323	363	41
1964-65	327	362	18
1965-66	319	374	32
1966-67	333	382	16
1967-68	330	374	29
1968-69	327	368	32
1969-70	334	368	38
1970-71	322	360	39
1971-72	331	377	31
1972-73	337	376	32
1973-74	-	-	-
1974-75	-	-	-
1975-76	-	-	-
1976-77	344	388	32
Mean 1961-77	330	392	31
C.V.(%)	2.2	2.2	130

Table 10. Statistics of the regulated fishery at Union Bay, October-December, 1961-76.

Year	Effort (hr)	Landings (lb)							LPUE (lb/hr)	
		English sole	Starry flounder	Pacific cod	Lingcod	Other fish[a]	Total foodfish	Mink food	English sole	Total foodfish
Mean 1951-61[b]	232	83,296	15,243	9,386	1,597	8,231	117,752	2,342	371	521
Percent		71	13	8	1	7	100			
1961	192	57,358	9,018	5,566	1,603	8,922	82,467	-	299	430
1962	175	50,615	3,160	3,904	2,789	6,356	66,824	1,765	289	382
1963	192	48,844	882	10,682	1,336	8,811	70,555	-	254	367
1964	156	38,503	2,158	4,357	246	6,099	51,363	-	247	329
1965	112	60,712	311	3,372	363	5,385	70,143	900	542	626
1966	108	55,448	1,221	4,448	1,312	8,617	71,046	-	513	658
1967	138	61,142	1,824	8,569	3,137	3,991	78,663	200	443	570
1968	172	49,175	214	6,134	3,778	4,974	64,275	-	286	374
1969	185	49,197	324	8,936	2,244	13,203	73,904	-	266	399
1970	132	33,047	3,798	5,045	830	5,717	48,437	-	250	367
1971	154	35,512	913	11,060	757	13,978	62,220	1,971	231	404
1972	97	15,891	1,210	7,345	241	2,492	27,179	-	164	280
1973	6	1,412	-	-	-	-	1,412	-	235	235
1974	42	16,553	2,338	4,425	-	1,229	24,545	-	394	584
1975	49	25,443	2,152	2,392	-	4,662	34,609	-	519	706
1976	72	36,152	3,664	5,394	-	2,749	47,959	-	502	666
Mean 1961-76	124	39,688	2,074	5,727	1,165	6,072	54,725	302	320	441
Percent		73	4	10	2	11	100			

[a]Excluding dogfish.

[b] Forrester and Ketchen (1963).

Table 11. Mean length (mm) of male and female English sole, and percentage males, landed from the Union Bay Regulatory Area, October-December 1960-77.

Year	Mean length (mm)		%
	Male	Female	Males
1960	331	378	27
1961	335	372	18
1962	346	388	23
1963	347	383	16
1964	344	377	28
1965	334	383	19
1966	335	385	23
1967	343	389	13
1968	352	388	28
1969	338	370	20
1970	354	403	30
1977	-	-	-
Mean 1960-70	342	383	22
C.V. (%)	2.2	2.4	25

Table 12. Statistics of the regulated fishery at Yellow Rock, October-March, 1960-77.

Year	Effort (hr)	Landings (lb)							LPUE (lb/hr)		
		Pacific cod	Rock sole	Starry flounder	Lingcod	Other fish[a]	Total foodfish	Mink food	Pacific cod	Rock sole	Total foodfish
Mean 1952-60[b]	467	104,634	32,274	27,988	5,091	25,544	195,531	5,646	236	77	446
Percent		53	17	14	3	13	100				
1960-61	281	33,206	24,149	12,331	1,105	16,177	86,968	2,510	118	86	309
1961-62	234	27,888	15,641	6,692	2,349	18,880	71,450	3,000	119	67	305
1962-63	118	11,838	4,425	6,585	915	7,227	30,990	750	100	38	263
1963-64	465	66,054	21,288	13,670	8,889	31,915	141,816	4,690	142	46	305
1964-65	247	32,087	14,851	3,989	2,214	25,611	78,752	-	130	60	319
1965-66	214	4,174	9,361	11,315	1,840	23,530	50,220	-	20	44	235
1966-67	225	6,523	13,866	14,054	2,676	36,268	73,387	-	29	62	326
1967-68	188	6,981	8,340	24,033	4,492	13,735	57,581	1,005	37	44	306
1968-69	163	2,277	9,191	26,804	3,791	11,121	53,184	-	14	56	326
1969-70	101	1,888	5,638	12,098	1,946	8,919	30,489	-	19	56	302
1970-71	114	5,170	9,689	11,431	2,024	9,851	38,165	-	45	85	335
1971-72	127	28,302	2,861	5,909	1,368	14,039	52,479	100	223	23	413
1972-73	278	62,431	5,232	11,316	1,083	30,241	110,303	415[c]	225	19	397
1973-74	107	72,670	7,215	7,179	-	19,185	106,249	-	679	67	993
1974-75	255	123,417	12,503	23,112	2,192	16,153	177,377	1,899	484	49	696
1975-76	233	94,403	15,820	11,414	81	11,877	133,595	178[d]	405	68	573
1976-77	104	62,346	4,958	1,577	355	7,760	76,996	-	599	48	740
Mean 1960-77	203	37,744	10,884	11,971	2,195	17,793	80,588	856	186	54	396
Percent		47	13	15	3	22	100				

[a]Excluding dogfish.

[b]Forrester and Ketchen.

[c]Reduction.

[d]53 lb reduction.

Table 13. Statistics of the regulated fishery at Qualicum-Parksville, October-March, 1960-77.

Year	Effort (hr)	Landings (lb)						LPUE (lb/hr)		
		Pacific cod	English sole	Lingcod	Other fish[a]	Total foodfish	Mink food	Pacific cod	English sole	Total foodfish
Mean 1952-60[b]	279	51,813	11,520	12,703	18,494	94,530	5,638	174	57	346
Percent		55	12	13	20	100				
1960-61	134	18,296	6,462	10,554	10,448	45,760	-	137	48	341
1961-62	102	1,427	4,810	20,245	22,938	49,420	-	14	47	485
1962-63	68	1,719	3,617	14,744	11,459	31,539	-	25	53	464
1963-64	130	24,815	6,185	8,355	10,232	49,587	-	191	48	381
1964-65	53	258	5,754	1,707	2,919	10,638	-	5	109	201
1965-66	45	598	5,731	6,778	12,218	25,325	1,638	13	127	563
1966-67	27	221	3,600	2,976	9,963	16,760	-	8	133	621
1967-68	72	1,711	5,146	6,114	15,280	28,251	400	24	71	392
1968-69	44	1,144	4,072	3,836	9,006	18,058	-	26	93	410
1969-70	32	637	838	2,729	11,862	16,066	-	20	26	502
1970-71	39	2,374	2,075	2,616	6,648	13,713	-	61	53	352
1971-72	1	-	114	-	-	114	-	-	114	114
1972-73	46	12,059	883	69	5,591	18,602	380[a]	262	19	404
1973-74	-	-	-	-	-	-	-	-	-	-
1974-75	4	142	-	-	290	432	-	36	-	108
1975-76	16	7,116	4,032	577	5,266	16,991	-	445	252	1,062
1976-77	29	4,624	1,126	603	5,872	12,225	-	159	39	422
Mean 1960-77	50	4,538	3,203	4,818	8,235	20,793	142	91	64	416
Percent		22	15	23	40	100				

[a] Excluding dogfish.

[b] Forrester and Ketchen (1963).

Table 14. Trawl landings (1000 lb) of principal species from Minor Statistical Area 17, October-September and October-March, 1945-77.

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total food fish	Mink food	Total
			October-September				
1945-46	243	152	33	63	491	3	494
1946-47	48	108	27	32	215	-	215
1947-48	77	49	9	19	154	1	155
1948-49	85	123	4	31	243	15	258
1949-50	519	215	28	109	871	-	871
1950-51	334	176	26	92	628	2	630
1951-52	552	170	30	109	861	21	882
1952-53	431	177	13	105	726	27	753
1953-54	364	69	14	77	524	56	580
1954-55	137	35	10	52	234	41	275
1955-56	263	44	18	65	390	170	560
1956-57	202	30	10	41	283	96	379
1957-58	489	84	19	49	641	129	770
1958-59	489	51	14	42	596	208	804
1959-60	500	76	25	49	650	86	736
Mean 1945-60	316	104	19	62	500	57	557
Percent	63	21	4	12	100		

Table 14 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total foodfish	Mink food	Total
				October-September			
1960-61	220	52	34	54	360	39	339
1961-62	152	70	19	47	288	58	346
1962-63	334	56	5	52	447	25	472
1963-64	305	117	23	51	496	76	572
1964-65	99	106	45	29	279	24	303
1965-66	36	86	40	33	195	9	204
1966-67	334	72	16	23	445	51	496
1967-68	278	51	37	70	436	16	452
1968-69	129	45	35	48	257	22	279
1969-70	204	41	25	53	323	22	345
1970-71	749	32	27	54	862	17	879
1971-72	666	19	20	37	742	1	743
1972-73	293	21	15	68	397	-	397
1973-74	318	27	6	85	436	2	438
1974-75	165	41	3	17	226	5	231
1975-76	197	41	6	39	283	Tr	283
1976-77	133	40	7	24	204	Tr	204
Mean 1960-77	271	54	21	46	393	22	414
Percent	68	14	5	12	99		

Table 14 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total food fish	Mink food	Total
			October-March				
1945-46	235	122	9	59	425	3	428
1946-47	36	93	6	24	159	-	159
1947-48	69	28	5	16	118	1	119
1948-49	61	91	2	21	175	15	190
1949-50	437	136	6	72	651	-	651
1950-51	302	154	19	75	550	2	552
1951-52	510	133	13	91	747	21	768
1952-53	386	150	9	83	628	12	640
1953-54	331	53	9	58	451	44	495
1954-55	111	20	3	32	166	34	200
1955-56	227	34	3	46	310	86	396
1956-57	190	26	4	29	249	76	325
1957-58	459	71	10	39	579	110	689
1958-59	447	44	5	31	527	150	677
1959-60	450	61	8	40	559	59	618
Mean 1945-60	283	81	7	48	420	41	460
Percent	68	19	2	11	100		

Table 14 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total foodfish	Mink food	Total
			October-March				
1960-61	211	40	9	46	306	28	334
1961-62	148	66	15	43	272	56	328
1962-63	213	36	1	40	290	18	308
1963-64	258	85	5	39	387	73	460
1964-65	94	93	22	22	231	19	250
1965-66	30	70	15	31	146	9	155
1966-67	330	67	9	20	426	51	477
1967-68	265	40	14	62	382	16	398
1968-69	111	28	18	41	198	22	220
1969-70	196	39	14	51	300	22	322
1970-71	729	27	11	47	814	15	829
1971-72	639	12	8	32	691	1	692
1972-73	278	14	9	61	362	-	362
1973-74	292	22	4	35	353	2	355
1974-75	160	35	1	16	212	5	217
1975-76	170	26	1	26	223	-	223
1976-77	97	32	1	18	148	Tr	148
Mean 1961-77	248	43	9	37	338	20	358
Percent	73	13	3	11	100		

[a]Excluding dogfish.

Table 15. Statistics of the regulated fishery at Nanoose Bay, February-March, 1961-77.

Year	Effort (hr)	Landings (lb)						LPUE (lb/hr)	
		Pacific cod	English sole	Lingcod	Other fish[a]	Total foodfish	Mink food	Pacific cod	Total foodfish
Mean 1947-60[b]	596	236,196	2,992	3,886	9,434	251,681	4,223	396	422
Percent		94	1	1	4	100			
1961	667	177,727	1,364	632	7,323	187,046	140	266	280
1962	323	94,827	984	432	7,910	104,153	1,380	294	322
1963	273	109,136	3,009	507	8,202	120,854	-	400	443
1964	506	137,580	1,465	756	8,873	148,674	-	272	294
1965	262	62,516	1,389	868	1,299	66,072	-	239	252
1966	9	1,085	-	-	3,551	4,636	-	121	515
1967	223	219,011	1,940	1,960	3,742	226,653	-	982	1,016
1968	517	196,744	803	5,619	30,376	233,542	9,361	381	452
1969	203	38,137	702	6,392	6,292	51,523	-	188	254
1970	173	90,798	94	2,226	22,169	115,287	1,250	525	666
1971	649	629,879	233	5,846	31,185	667,143	133	971	1,028
1972	630	548,039	303	4,969	23,802	577,113	-	870	916
1973	285	145,780	350	5,471	25,511	177,112	-	512	621
1974	360	223,494	108	2,676	11,798	238.076	1,622	621	661
1975	89	55,552	-	482	1,463	57,407	-	624	646
1976	25	10,774	150	-	148	11,072	-	431	443
1977	4	512	24	-	-	536	-	128	134
Mean 1961-77	306	161,270	760	2,284	11,391	175,705	817	527	574
Percent		92	Tr	1	7	100			

[a]Excluding dogfish.

[b]Forrester and Ketchen (1963).

Table 16. Trawl landings (1000 lb) of principal species from Minor Statistical Sub-Area 17S[a] (N. Gulf Islands), October-September and October-March 1945-77.

Year	Total landings (1000 lb) for Pacific cod from Tables 16-18	Pacific cod	English sole	Lingcod	Other fish[b]	Total food fish	Mink food	Total
			October-September					
1945-46	1,268	243	152	33	63	491	3	494
1946-47	374	48	108	27	32	215	0	215
1947-48	104	20	49	9	14	92	1	93
1948-49	215	82	123	4	30	239	15	254
1949-50	576	323	211	27	102	663	0	663
1950-51	830	126	168	8	66	368	2	370
1951-52	814	0[c]	162	20	96	278	20	298
1952-53	745	43	176	12	84	315	27	342
1953-54	1,324	42	69	10	70	291	56	247
1954-55	1,410	79	34	8	43	164	39	203
1955-56	689	79	43	17	62	201	166	367
1956-57	512	74	29	9	37	149	91	240
1957-58	525	124	80	15	39	258	121	379
1958-59	971	129	45	13	29	216	204	420
1959-60	628	215	75	24	45	359	79	438
Mean 1945-60		115	102	16	54	287	55	342
Percent		40	35	6	19	100		

Table 16. (cont'd)

Year	Total landings (1000 lb) for Pacific cod from Tables 16-18	Pacific cod	English sole	Lingcod	Other fish[b]	Total food fish	Mink food	Total
			October-September					
1960-61	387	43	49	33	47	172	39	211
1961-62	413	57	69	19	39	184	57	241
1962-63	724	224	53	5	44	326	25	351
1963-64	939	169	115	22	42	348	76	424
1964-65	508	37	105	44	28	214	24	238
1965-66	204	35	87	40	30	192	9	201
1966-67	456	116	70	14	19	219	51	270
1967-68	294	82	50	32	39	203	7	210
1968-69	364	90	45	29	41	205	22	227
1969-70	537	113	41	23	31	208	20	228
1970-71	511	119	32	21	23	195	17	212
1971-72	491	118	18	15	14	165	1	166
1972-73	562	148	20	9	43	220	-	220
1973-74	638	94	26	4	74	198	Tr	198
1974-75	589	108	41	2	16	167	5	172
1975-76	1,108	187	41	6	39	273	Tr	273
1976-77	982	133	40	7	24	204	Tr	204
Mean 1960-77		110	53	19	35	217	21	238
Percent		51	24	9	16	100		

Table 16 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[b]	Total food fish	Mink food	Total
			October-March				
1945-46	235	122	9	59	425	3	428
1946-47	36	93	6	24	159	0	159
1947-48	12	28	5	11	56	1	57
1948-49	58	91	2	20	171	15	186
1949-50	241	132	5	65	443	0	443
1950-51	93	147	1	49	290	2	292
1951-52	0[c]	125	3	78	100	20	120
1952-53	0[c]	148	8	62	217	12	229
1953-54	109	53	5	51	218	44	262
1954-55	53	19	1	23	96	32	128
1955-56	43	33	2	43	121	82	200
1956-57	62	25	3	25	115	71	186
1957-58	94	67	6	29	196	102	298
1958-59	87	38	4	18	147	146	293
1959-60	165	60	7	36	268	52	320
Mean 1945-60	86	79	4	40	201	39	240
Percent	41	38	2	19	100		

Table 16 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[b]	Total foodfish	Mink food	Total
				October-March			
1960-61	33	40	8	39	120	28	148
1961-62	53	64	15	35	167	55	222
1962-63	103	33	Tr	32	168	18	186
1963-64	119	84	4	30	237	73	310
1964-65	31	93	21	21	166	19	185
1965-66	29	70	15	27	141	9	150
1966-67	111	65	7	16	199	51	250
1967-68	70	39	8	32	149	7	156
1968-69	72	27	12	35	146	22	168
1969-70	104	39	12	29	184	21	205
1970-71	99	27	5	16	147	15	162
1971-72	91	13	3	8	115	1	116
1972-73	131	14	4	35	184	-	184
1973-74	67	22	1	23	113	-	113
1974-75	103	35	1	15	154	5	159
1975-76	159	26	1	26	212	-	212
1976-77	97	32	1	18	148	Tr	148
Mean 1960-77	87	42	7	26	162	19	181
Percent	54	26	4	16	100		

[a] 17S = MSA 17 less Nanoose.

[b] Excluding dogfish. Mainly rockfish and rock sole.

[c] Forrester and Ketchen (1963) report larger landings from Nanoose Bay through from MSA 17.

Table 17: Mean length (mm) of male and female English sole, and percentage males, landed from Boat Harbour - Pylades Channel Regulated Area, January 1949-71.

Year	Mean length (mm)		%
	Male	Female	Males
1949	316	376	48
1950	320	379	30
1951	344	370	42
1952	345	387	51
1953	328	395	21
1954	318	391	42
1955	321	377	40
1956	312	372	69
1957	333	389	43
1958	331	388	50
1959	334	388	51
1960	331	381	65
1961	331	379	39
1962	-	-	-
1963	-	-	-
1964	321	369	27
1965	319	367	35
1966	327	369	34
1967	320	367	25
1968	-	-	-
1969	318	380	28
1970	324	381	34
1971	330	389	37
Mean 1949-71	326	380	41
C.V. (%)	2.7	2.3	31

Table 18. Trawl landings (1000 lb) of principal species from Minor Statistical Area 18, October-September and October-March, 1945-77.

Year	Pacific cod	English sole	Lingcod	Other fish [a]	Total food fish	Mink food	Total
			October-September				
1945-46	1,025	97	14	79	1,215	12	1,227
1946-47	326	82	20	44	472	2	474
1947-48	84	41	10	10	145	1	146
1948-49	133	20	3	19	175	Tr	175
1949-50	253	21	7	22	303	1	304
1950-51	704	73	18	90	885	27	912
1951-52	814	55	21	110	1,000	183	1,183
1952-53	702	103	15	148	968	364	1,332
1953-54	1,200	134	26	90	1,450	242	1,692
1954-55	1,331	88	45	80	1,544	1,248	2,792
1955-56	610	67	37	88	802	1,458	2,260
1956-57	438	56	13	39	546	776	1,322
1957-58	401	48	21	54	524	544	1,068
1958-59	842	24	11	41	918	771	1,689
1959-60	413	71	10	69	563	292	855
Mean 1945-60	618	65	18	66	767	395	1,162
Percent	81	8	2	9	100		

Table 18 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total foodfish	Mink food	Total
			October-September				
1960-61	344	56	24	92	516	297	813
1961-62	356	66	21	132	575	187	762
1962-63	500	45	15	93	653	126	779
1963-64	770	102	17	129	1,018	320	1,338
1964-65	471	117	30	110	728	212	940
1965-66	169	50	19	81	319	101	420
1966-67	340	51	15	46	452	132	584
1967-68	212	46	18	74	350	56	406
1968-69	274	73	25	68	440	136	576
1969-70	424	76	27	56	583	164	747
1970-71	392	82	28	41	543	171	714
1971-72	373	55	26	28	482	42	524
1972-73	414	71	12	62	559	3	562
1973-74	544	60	6	82	692	6	698
1974-75	481	82	4	53	620	22	642
1975-76	921	55	13	131	1,120	13	1,133
1976-77	849	96	5	144	1,094	48	1,142
Mean 1960-77	460	70	18	84	632	120	752
Percent	73	11	3	13	100		

Table 18 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish [a]	Total food fish	Mink food	Total
			October-March				
1945-46	1,024	84	14	76	1,198	12	1,210
1946-47	321	75	14	43	453	2	455
1947-48	71	34	6	10	121	1	122
1948-49	113	16	3	19	151	-	151
1949-50	213	18	4	15	250	1	251
1950-51	585	43	10	68	706	22	728
1951-52	718	37	14	82	851	180	1,031
1952-53	603	47	10	134	794	275	1,069
1953-54	1,118	120	20	79	1,337	197	1,534
1954-55	1,186	72	26	72	1,356	1,192	2,548
1955-56	551	54	28	82	715	1,299	2,014
1956-57	415	50	9	36	510	715	1,225
1957-58	377	45	18	53	493	523	1,016
1958-59	810	19	9	38	876	729	1,605
1959-60	387	63	8	63	521	260	781
Mean 1945-60	566	52	13	58	689	361	1,049
Percent	82	8	2	8	100		

Table 18 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total foodfish	Mink food	Total
				October-March			
1960-61	335	48	18	85	486	294	780
1961-62	340	61	19	125	545	181	726
1962-63	312	38	11	80	441	114	555
1963-64	717	88	15	112	932	303	1,235
1964-65	441	100	18	95	654	201	855
1965-66	166	46	7	69	288	100	388
1966-67	303	44	12	41	400	124	524
1967-68	168	24	11	64	267	46	313
1968-69	241	65	19	55	380	101	481
1969-70	346	56	16	42	460	142	602
1970-71	306	89	19	34	428	162	590
1971-72	298	42	18	25	383	41	424
1972-73	356	40	8	56	460	3	463
1973-74	433	44	3	65	545	2	547
1974-75	337	65	4	40	446	20	466
1975-76	679	45	10	104	838	13	851
1976-77	558	52	2	119	731	43	774
Mean 1960-77	373	55	12	71	511	111	622
Percent	73	11	2	14	100		

[a]Excluding dogfish. Includes lemon sole, skate, octopus, rockfish, and perch.

Table 19. Trawl landings (1000 lb) of principal species from Minor Statistical Area 19, October-September and October-March, 1945-77.

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total food fish	Mink food	Total
			October-September				
1945-46	-	-	1	12	13	-	13
1946-47	-	-	-	-	-	-	-
1947-48	-	-	-	-	-	-	-
1948-49	-	-	-	-	-	-	-
1949-50	Tr	-	Tr	-	-	-	Tr
1950-51	34	3	1	5	43	Tr	43
1951-52	3	-	Tr	1	4	-	4
1952-53	12	1	1	2	16	Tr	16
1953-54	49	8	2	4	63	-	63
1954-55	23	3	2	2	30	7	37
1955-56	33	16	3	33	85	23	108
1956-57	18	5	2	1	26	56	82
1957-58	88	14	2	9	113	6	119
1958-59	77	21	10	14	122	186	308
1959-60	311	4	597	46	958	132	1,090
Mean 1945-60	43	5	41	9	98	27	126
Percent	44	5	42	9	100		

Table 19 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total foodfish	Mink food	Total
			October-September				
1960-61	227	9	340	27	603	216	819
1961-62	109	13	53	35	210	127	337
1962-63	82	6	32	12	132	50	182
1963-64	164	18	5	20	207	51	258
1964-65	179	10	45	17	251	40	291
1965-66	259	17	76	43	395	154	549
1966-67	49	3	5	3	60	27	87
1967-68	109	10	8	17	144	40	184
1968-69	45	2	40	10	97	16	113
1969-70	177	6	20	16	219	27	246
1970-71	105	5	16	9	135	14	149
1971-72	44	1	39	28	112	32	144
1972-73	27	2	7	3	39	-	39
1973-74	113	1	5	1	120	-	120
1974-75	569	19	64	21	673	-	673
1975-76	1,024	7	58	27	1,116	4	1,120
1976-77	537	6	48	63	654	-	654
Mean 1960-77	224	8	51	21	304	47	351
Percent	73	3	17	7	100		

Table 19 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total food fish	Mink food	Total
			October-March				
1945-46	-	-	-	-	-	-	-
1946-47	-	-	-	-	-	-	-
1947-48	-	-	-	-	-	-	-
1948-49	-	-	-	-	-	-	-
1949-50	Tr	-	Tr	-	Tr	-	Tr
1950-51	31	2	1	2	36	Tr	36
1951-52	3	-	-	-	3	-	3
1952-53	12	1	1	2	16	Tr	16
1953-54	41	7	1	2	51	-	51
1954-55	23	3	2	2	30	7	37
1955-56	28	15	1	30	74	23	97
1956-57	15	5	1	2	23	6	29
1957-58	86	14	1	11[b]	112	6	118
1958-59	75	20	5	10	110	15	125
1959-60	302	1	594	35	932	87	1,019
Mean 1945-60	41	5	40	6	92	10	102
Percent	45	5	43	7	100		

Table 19 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total foodfish	Mink food	Total
				October-March			
1960-61	202	6	301	20	529	139	668
1961-62	76	10	27	30	143	83	226
1962-63	63	4	31	11	109	42	151
1963-64	162	18	3	19	202	51	253
1964-65	177	10	45	15	247	36	283
1965-66	261	17	75	43	396	153	549
1966-67	49	3	5	3	60	27	87
1967-68	95	10	8	15	128	33	161
1968-69	38	2	38	6	84	14	98
1969-70	177	6	20	16	219	27	246
1970-71	95	3	15	3	116	9	125
1971-72	29	1	34	2	66	20	86
1972-73	27	2	7	3	39	-	39
1973-74	-	-	-	-	-	-	-
1974-75	383	17	61	6	467	-	467
1975-76	570	4	32	16	622	4	626
1976-77	315	4	34	44	397	-	397
Mean 1960-77	160	7	43	15	225	38	263
Percent	71	3	19	7	100		

[a]Excluding dogfish.

Table 20. Trawl landings (1000 lb) of principal species from Minor Statistical Area 20, October-September and October-March, 1945-77.

Year	Dover sole	Pacific cod	English sole	Lingcod	Other fish[a]	Total food fish	Mink food	Total
				October-September				
1945-46	10	-	Tr	1	4	15	-	15
1946-47	405	31	14	27	37	514	-	514
1947-48	174	9	2	12	27	224	2	226
1948-49	43	7	7	7	35	99	Tr	99
1949-50	115	25	10	10	29	189	2	191
1950-51	707	57	13	17	124	918	11	929
1951-52	316	73	16	26	189	620	61	681
1952-53	65	40	19	4	35	163	63	225
1953-54	66	46	16	23	50	201	377	578
1954-55	111	99	17	21	27	275	168	443
1955-56	88	49	8	22	20	187	170	357
1956-57	114	30	5	11	13	173	119	292
1957-58	137	93	15	74	33	352	68	420
1958-59	191	135	45	39	66	476	420	896
1959-60	57	189	51	74	96	467	752	1,219
Mean 1945-60	173	59	16	25	52	325	148	472
Percent	53	18	5	8	16	100		

Table 20 (cont'd)

Year	Dover sole	Pacific cod	English sole	Lingcod	Other fish[a]	Total food fish	Mink food	Total
				October-September				
1960-61	101	65	16	31	55	268	367	635
1961-62	223	172	39	38	97	569	731	1,300
1962-63	284	157	14	37	46	538	292	830
1963-64	261	120	42	59	46	528	545	1,073
1964-65	257	194	97	31	74	653	596	1,249
1965-66	282	168	58	29	90	627	786	1,413
1966-67	111	114	14	41	83	363	622	483
1967-68	92	127	37	26	29	311	483	784
1968-69	102	180	43	42	14	381	608	989
1969-70	148	209	44	25	67	493	359	852
1970-71	175	189	57	23	50	494	310	804
1971-72	189	217	74	23	100	603	404	1,007
1972-73	63	24	18	5	67	177	103	280
1973-74	6	18	34	8	20	86	-	86
1974-75	38	184	17	18	69	326	-	326
1975-76	81	31	23	14	50	199	1	200
1976-77	121	121	30	8	53	333	-	333
Mean 1960-77	149	135	39	27	59	409	365	774
Percent	36	33	10	7	14	100		

Table 20 (cont'd)

Year	Dover sole	Pacific cod	English sole	Lingcod	Other fish[a]	Total food fish	Mink food	Total
				October-March				
1945-46	-	-	Tr	Tr	1	1	-	1
1946-47	77	6	5	2	1	91	-	91
1947-48	42	6	2	1	7	58	-	58
1948-49		1	Tr	1	4	6	-	6
1949-50	14	10	6	1	6	37	-	37
1950-51	227	11	1	4	12	255	1	256
1951-52	70	13	3	4	17	107	29	136
1952-53	19	24	13	2	25	83	1	84
1953-54	2	11	9	2	19	43	118	161
1954-55	14	17	3	2	1	37	40	77
1955-56	9	10	3	4	5	31	14	45
1956-57	17	14	Tr	6	7	44	82	126
1957-58	73	20	4	3	9	85	24	109
1958-59	56	47	17	9	24	153	115	268
1959-60	14	25	4	7	37	87	124	211
Mean 1945-60	42	14	5	3	12	75	37	111
Percent	56	19	7	4	16	102		

Table 20 (cont'd)

Year	Dover sole	Pacific cod	English sole	Lingcod	Other fish[a]	Total food fish	Mink food	Total
				October-March				
1960-61	57	17	1	12	31	118	89	207
1961-62	50	47	6	6	35	144	103	247
1962-63	98	65	6	7	25	201	74	275
1963-64	83	45	6	6	14	154	213	367
1964-65	92	92	60	10	33	287	245	532
1965-66	62	74	19	4	21	180	214	394
1966-67	34	72	7	6	55	174	281	455
1967-68	32	32	2	5	4	75	55	130
1968-69	22	20	9	15	5	71	91	162
1969-70	39	61	3	6	23	132	79	211
1970-71	32	51	15	6	21	125	42	167
1971-72	29	77	16	4	13	139	152	291
1972-73	49	14	11	2	10	86	103	189
1973-74	1	-	-	-	1	2	-	2
1974-75	-	26	TR	3	-	29	-	29
1975-76	22	13	5	1	12	53	-	53
1976-77	56	93	6	4	31	190	-	190
Mean 1960-77	45	47	10	6	20	127	102	229
Percent	35	37	8	5	16	101		

[a]Excluding dogfish.

Table 21. Trawl landings (1000 lb) of principal species from Minor Statistical Area 28, October-September and October-March, 1945-60. (No landings reported for 1960-77).

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total food fish	Mink food	Total
			October-September				
1945-50	-	-	-	-	-	-	-
1950-51	-	1	Tr	-	1	-	1
1951-60	-	-	-	-	-	-	-
Mean 1945-60	-	0.07	-	-	0.07	-	0.07
Percent	-	100	-	-	100	-	-
			October-March				
1945-50	-	-	-	-	-	-	-
1950-51	-	1	Tr	-	1	-	1
1951-60	-	-	-	-	-	-	-
Mean 1945-60	-	0.07	-	-	0.07	-	0.07
Percent	-	100	-	-	100	-	-

[a]Excluding dogfish.

Table 22. Trawl landings (1000 lb) of principal species from Minor Statistical Area 29, October-September and October-March, 1945-77.

Year	Pacific cod	English sole	Lingcod	Other fish [a]	Total food fish	Mink food	Total
			October-September				
1945-46	56	167	30	54	307	21	328
1946-47	45	131	27	40	243	5	248
1947-48	53	92	17	21	183	10	193
1948-49	60	67	6	98	231	5	236
1949-50	22	84	11	159	276	3	279
1950-51	27	80	9	101	218	2	220
1951-52	35	136	12	115	298	22	320
1952-53	33	75	8	68	184	58	242
1953-54	91	86	12	124	313	225	538
1954-55	107	138	10	68	323	617	940
1955-56	84	133	20	66	303	1,407	1,710
1956-57	79	82	21	64	246	565	811
1957-58	37	59	12	42	150	411	561
1958-59	45	50	12	40	147	244	391
1959-60	36	62	10	38	146	176	322
Mean 1945-60	54	96	14	73	238	251	489
Percent	23	40	6	31	100		

Table 22 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total foodfish	Mink food	Total
			October-September				
1960-61	18	52	18	36	124	122	246
1961-62	27	53	16	91	187	154	341
1962-63	26	77	6	64	173	68	241
1963-64	62	87	12	30	191	40	231
1964-65	43	69	8	32	152	42	194
1965-66	17	33	10	14	74	14	88
1966-67	9	27	2	16	54	1	55
1967-68	28	62	8	13	111	-	111
1968-69	16	34	12	8	70	2	72
1969-70	26	89	10	11	136	1	137
1970-71	9	40	2	7	58	4	62
1971-72	4	16	12	4	36	-	36
1972-73	18	58	5	10	91	-	91
1973-74	1	12	-	3	16	-	16
1974-75	14	27	2	1	44	1	45
1975-76	4	7	2	2	15	-	15
1976-77	1	6	-	2	9	-	9
Mean 1960-77	19	45	7	20	91	26	117
Percent	21	49	8	22	100		

Table 22 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total food fish	Mink food	Total
			October-March				
1945-46	50	135	20	36	241	21	262
1946-47	22	76	8	20	126	5	131
1947-48	16	44	9	7	76	4	80
1948-49	15	33	3	74	125	-	125
1949-50	7	50	3	105	165	1	166
1950-51	5	22	4	63	94	-	94
1951-52	17	59	4	63	143	8	151
1952-53	10	44	3	34	88	14	102
1953-54	9	23	1	50	83	52	135
1954-55	44	40	3	31	118	71	189
1955-56	35	75	4	43	157	639	796
1956-57	38	41	7	41	127	399	526
1957-58	27	43	4	34	108	346	454
1958-59	22	25	5	33	85	154	239
1959-50	20	25	5	32	82	121	203
Mean 1945-60	22	49	6	44	121	122	244
Percent	18	41	5	36	100		

Table 22 (cont'd)

Year	Pacific cod	English sole	Lingcod	Other fish[a]	Total food fish	Mink food	Total
			October-March				
1960-61	4	21	4	25	54	61	115
1961-62	9	21	5	38	73	67	140
1962-63	9	32	2	52	95	55	150
1963-64	26	38	2	22	88	23	111
1964-65	40	58	7	29	134	40	174
1965-66	15	25	5	13	58	13	71
1966-67	3	9	-	10	22	-	22
1967-68	7	33	3	11	54	-	54
1968-69	3	17	3	4	27	-	27
1969-70	14	60	6	7	87	1	88
1970-71	6	26	-	5	37	2	39
1971-72	2	9	3	4	18	-	18
1972-73	7	34	2	6	49	-	49
1973-74	1	6	-	2	9	-	9
1974-75	9	22	1	1	33	1	34
1975-76	-	-	-	-	-	-	-
1976-77	1	5	-	1	7	-	7
Mean 1960-77	9	24	3	14	50	15	65
Percent	18	48	6	28	100		

[a]Excluding dogfish.

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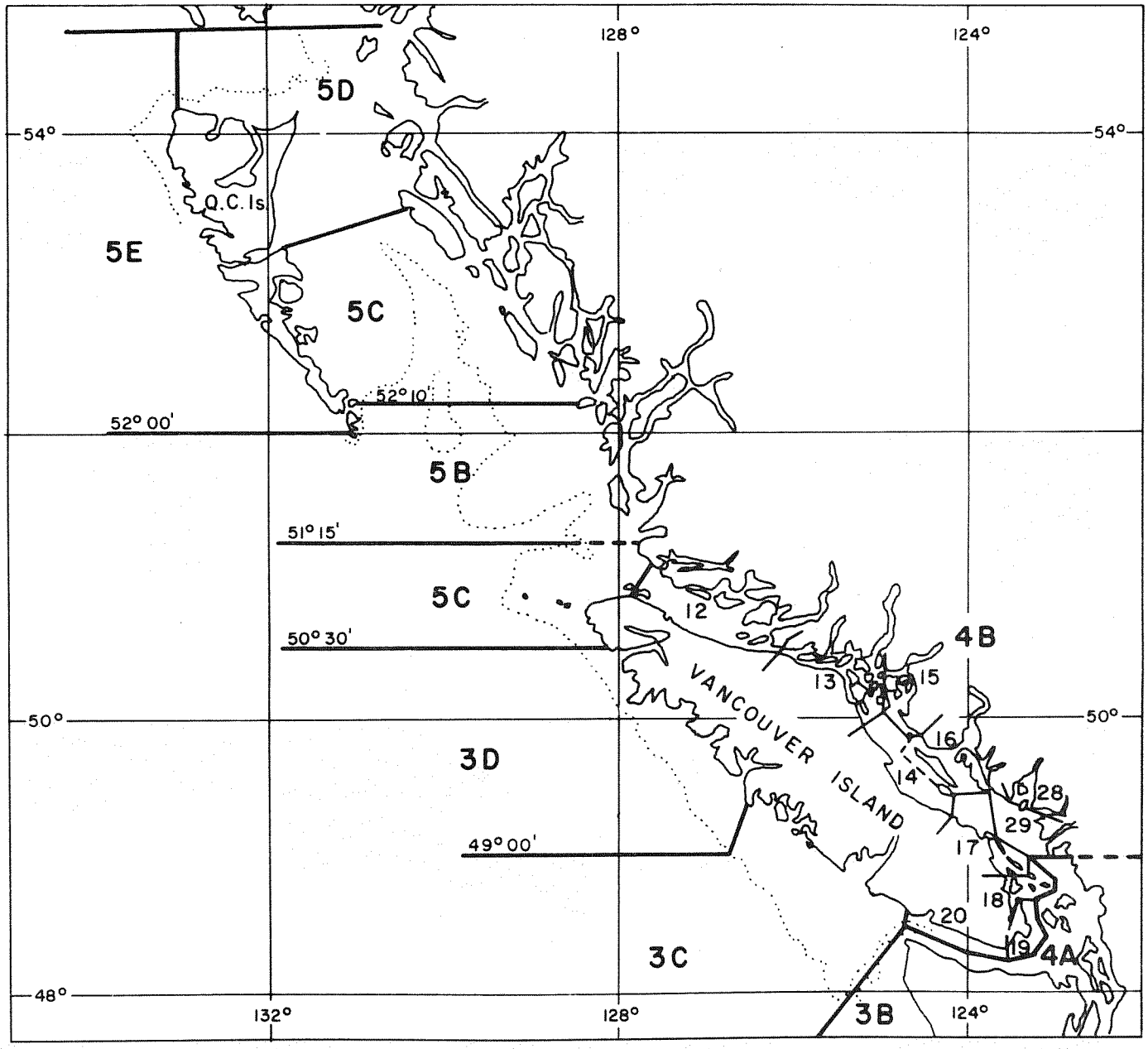

Fig. 1. Major statistical areas for groundfish caught in British Columbia waters, and minor statistical areas for Area 4B.

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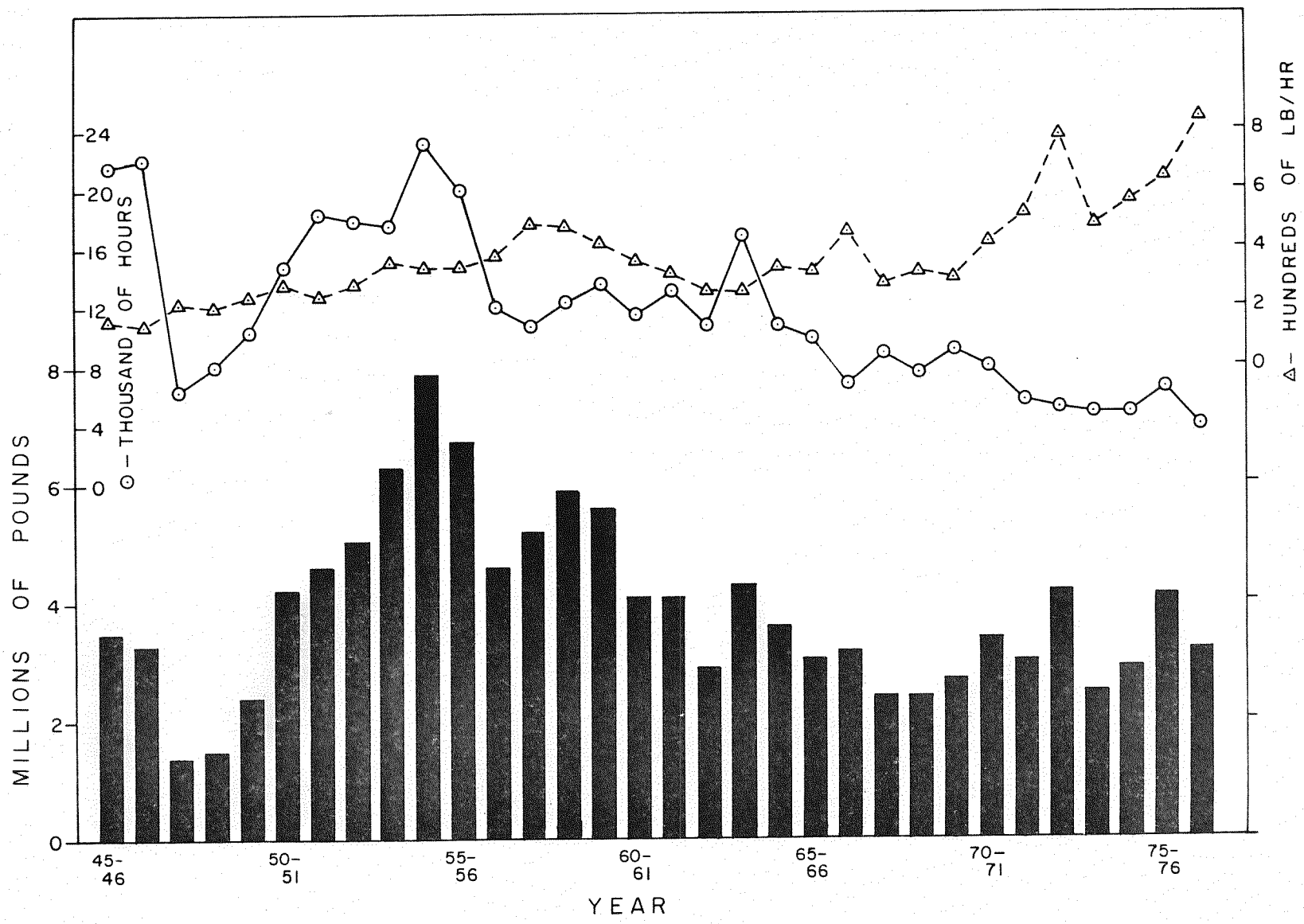

Fig. 2. All-species trawl landings (lb), effort (hr), and LPUE (lb/hr) for Georgia Strait and vicinity (Area 4B), October - September, 1945-77 (Excluding dogfish).

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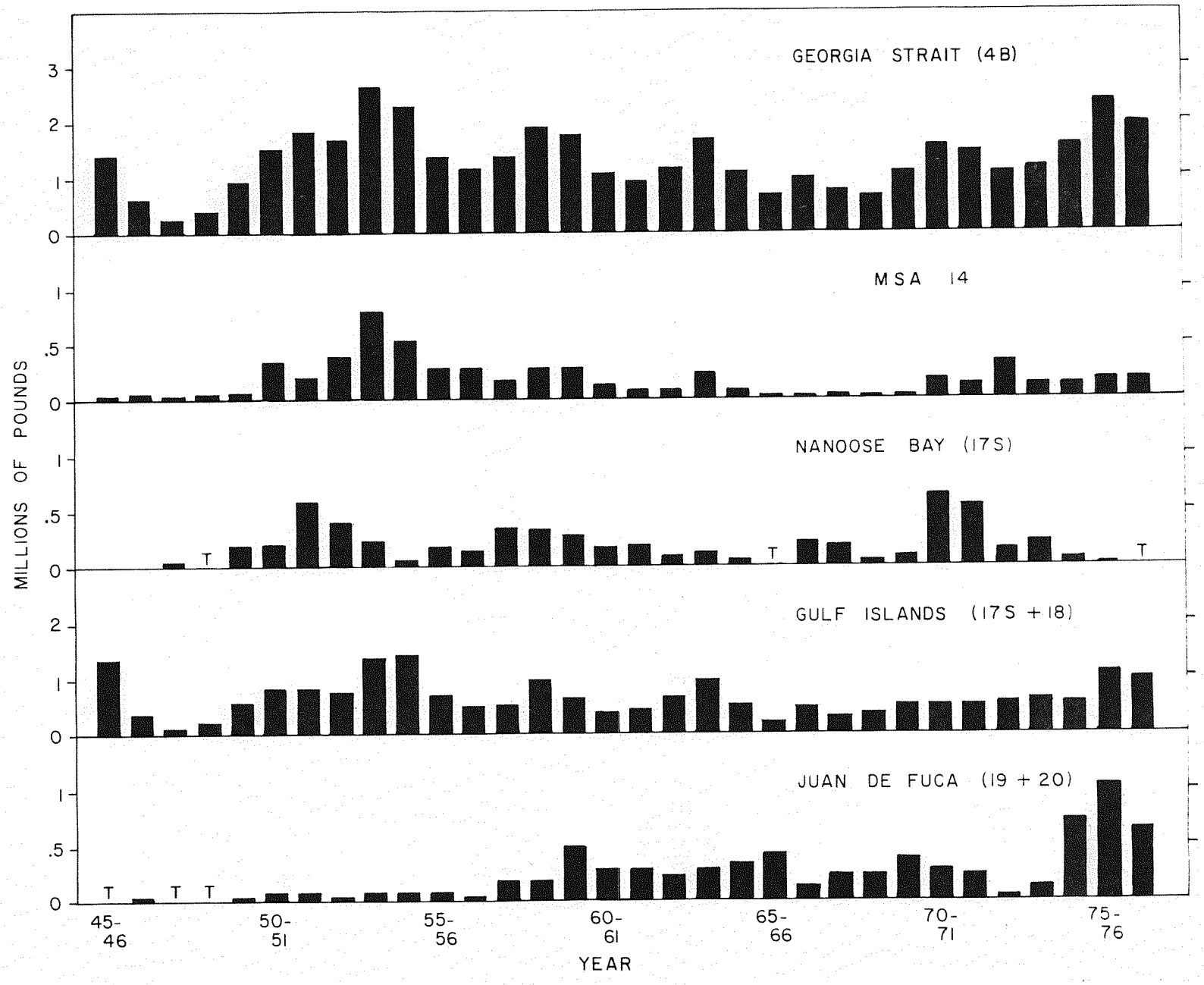

Fig. 3. Trawl landings (lb) of Pacific cod from Georgia Strait and vicinity (Area 4B), and important MSAs, October - September, 1945-77.

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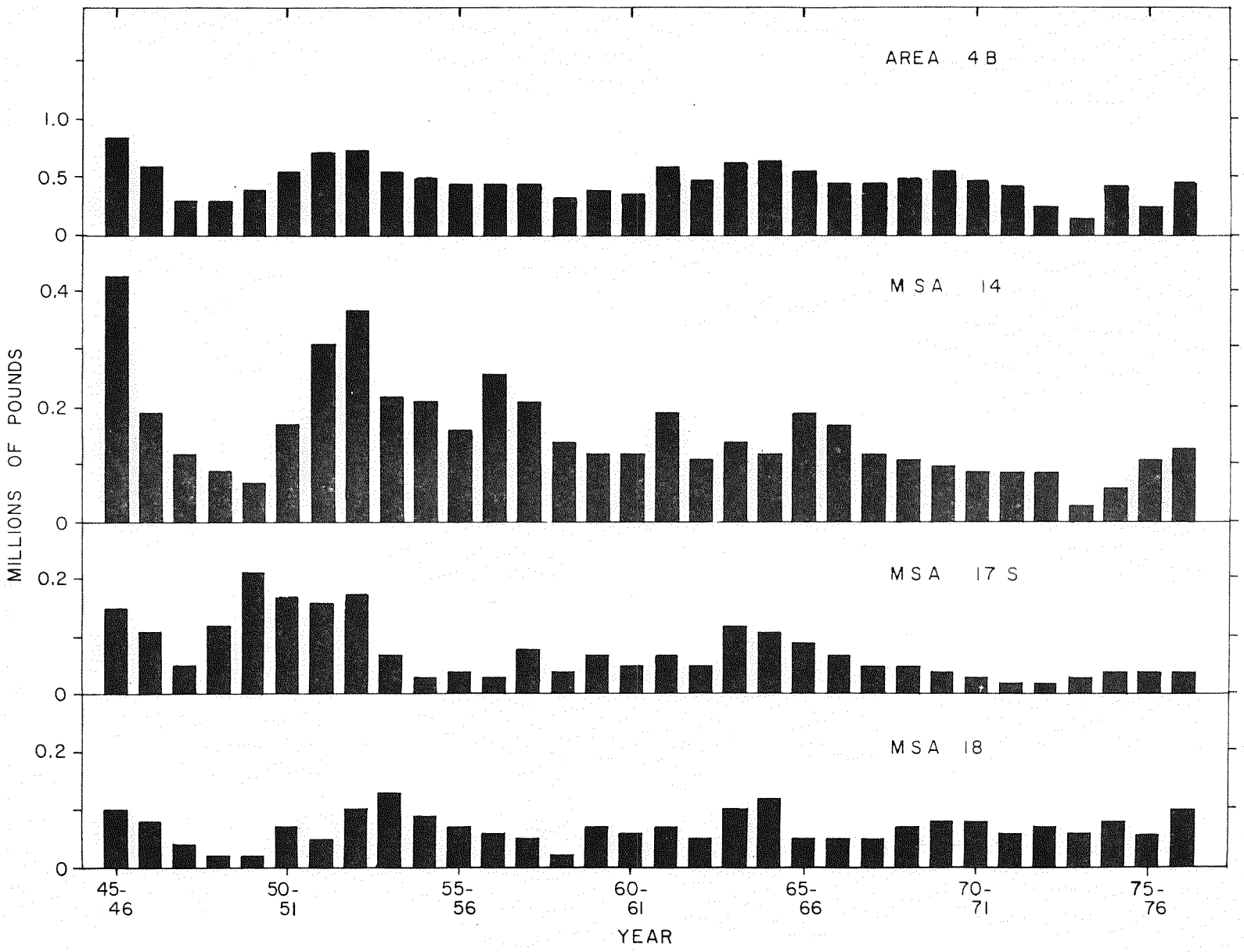

Fig. 4. Trawl landings (lb) of English sole from Georgia Strait and vicinity (Area 4B), and important MSAs, October - September, 1945-77.

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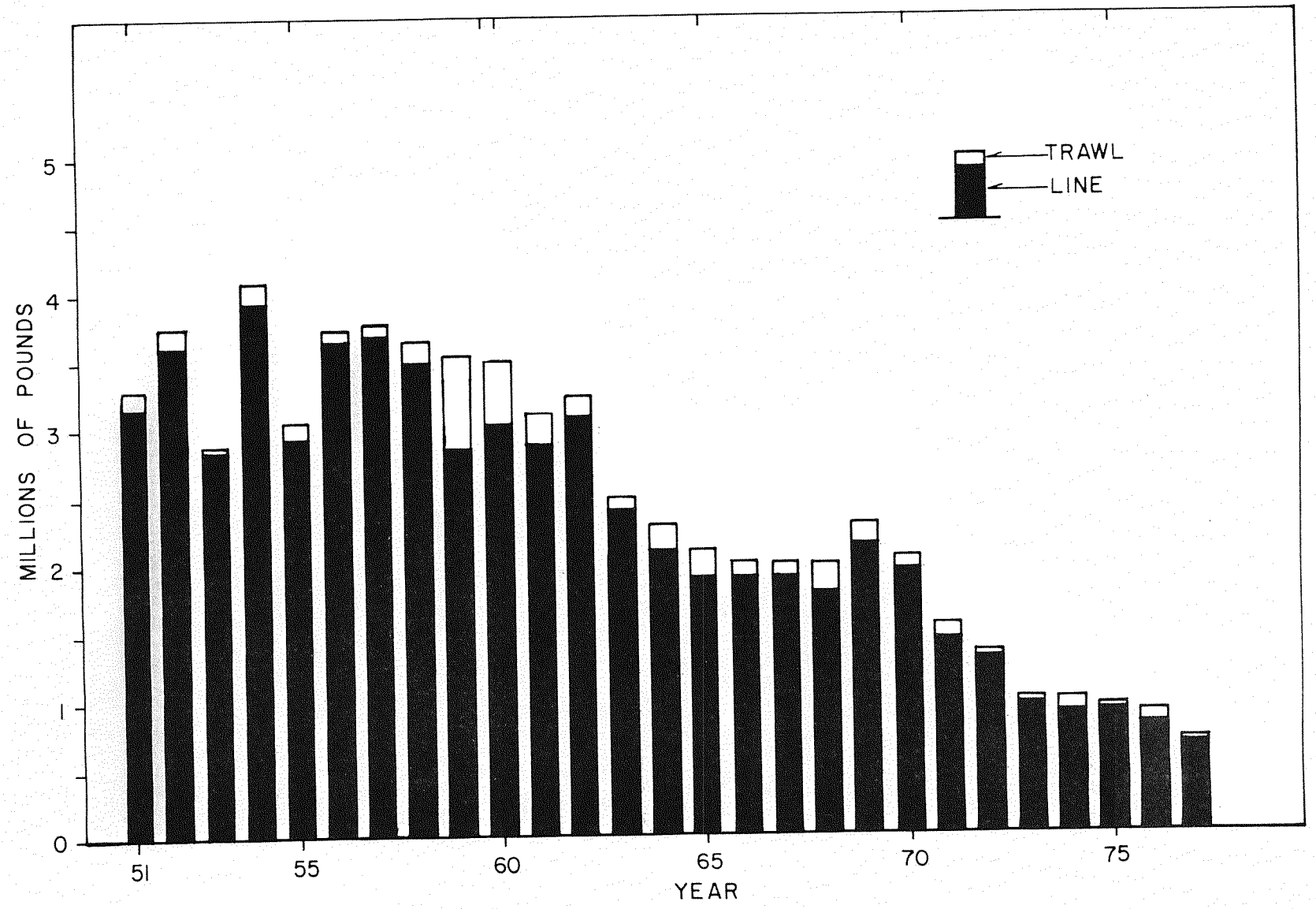

Fig. 5. Line and trawl landings (lb) of lingcod from Georgia Strait and vicinity (Area 4B), January - December, 1951-77.

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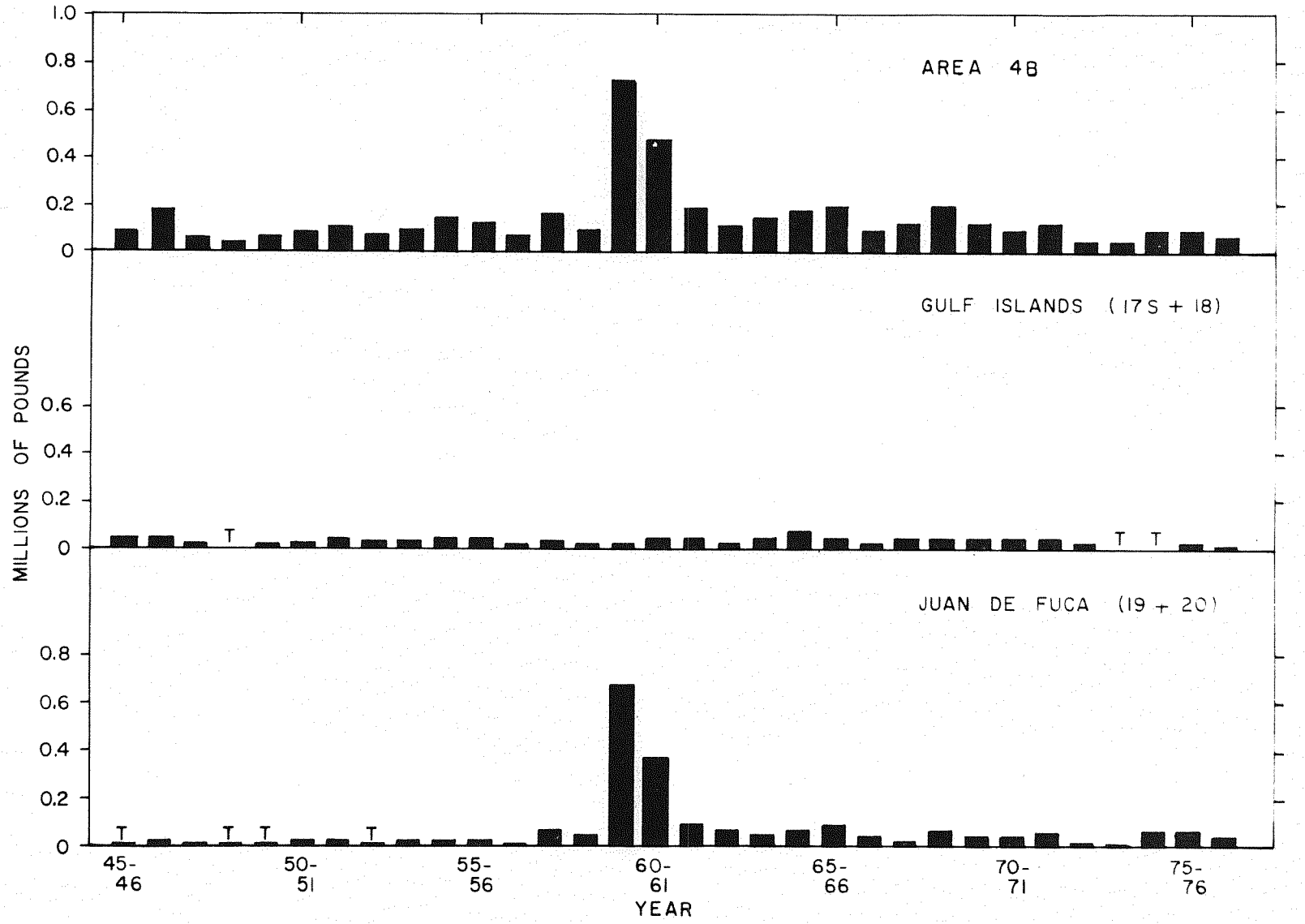

Fig. 6. Trawl landings (lb) of lingcod from Georgia Strait and vicinity (Area 4B), and important MSAs, October - September, 1945-77.

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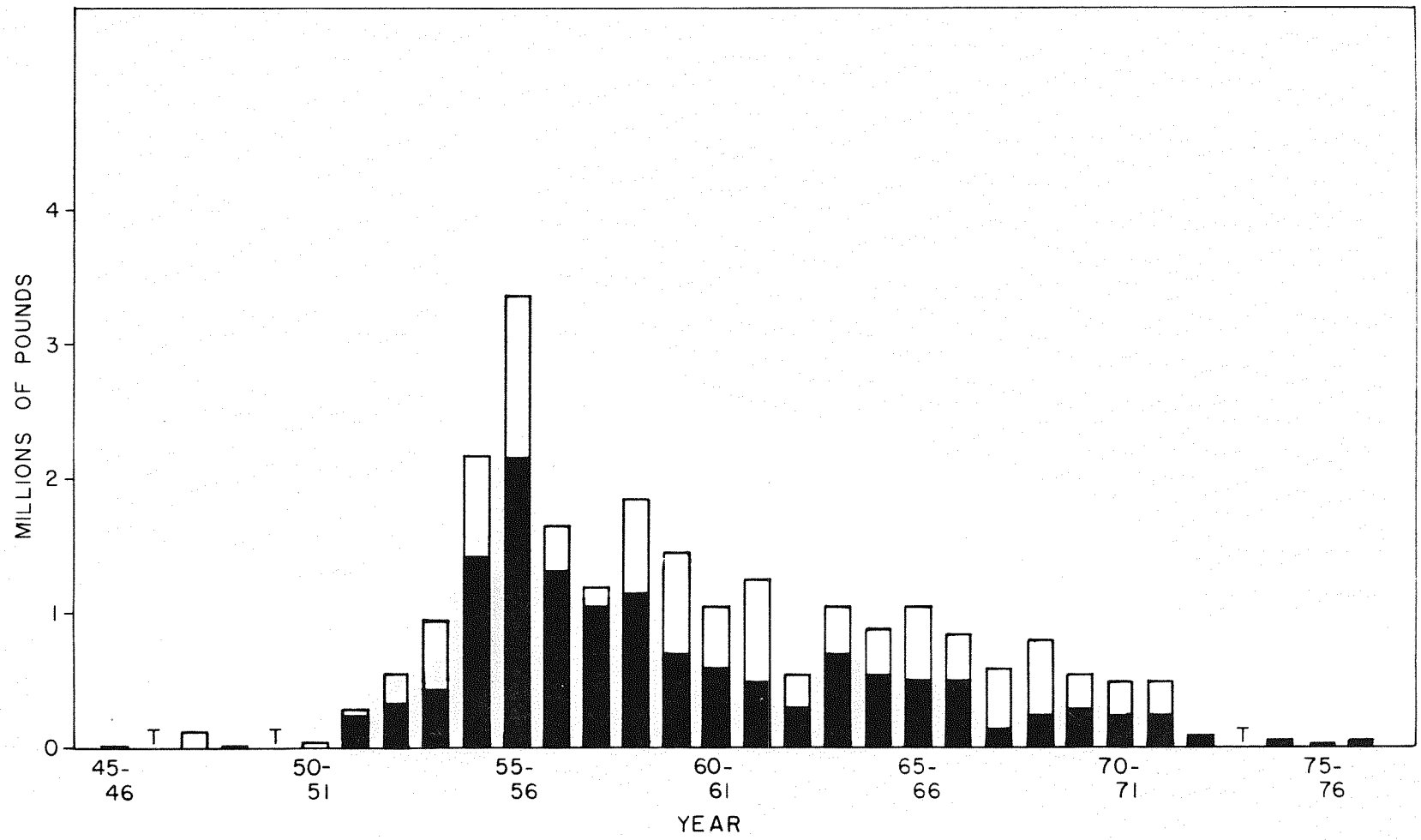

Fig. 7. Trawl landings (lb) of mink food from Georgia Strait and Vicinity (Area 4B), October - September, 1945-77 (October - March shaded).

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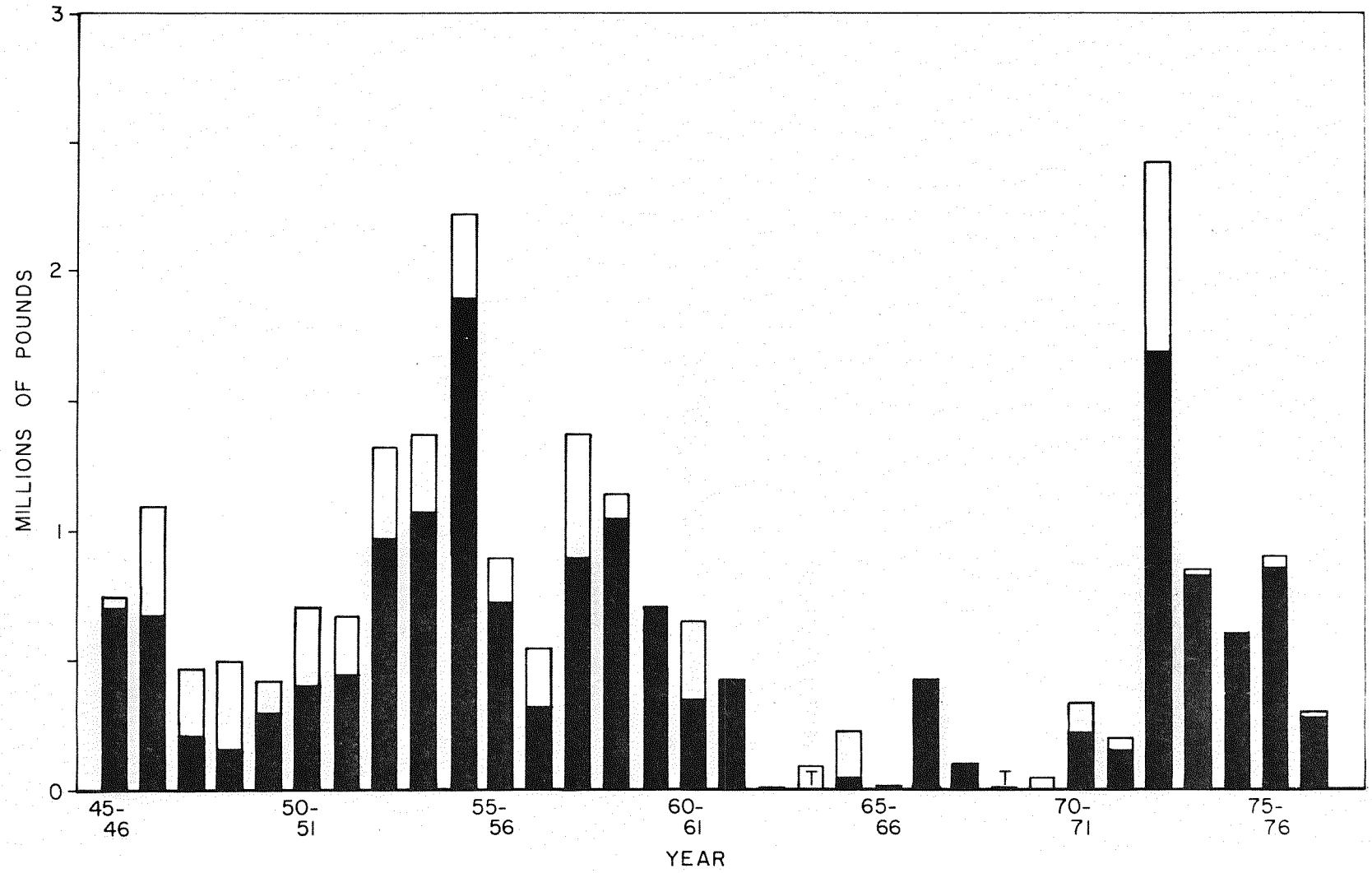

Fig. 8. Trawl landings (lb) of dogfish from Georgia Strait and vicinity (Area 4B), October - September, 1945-77 (October - March shaded).

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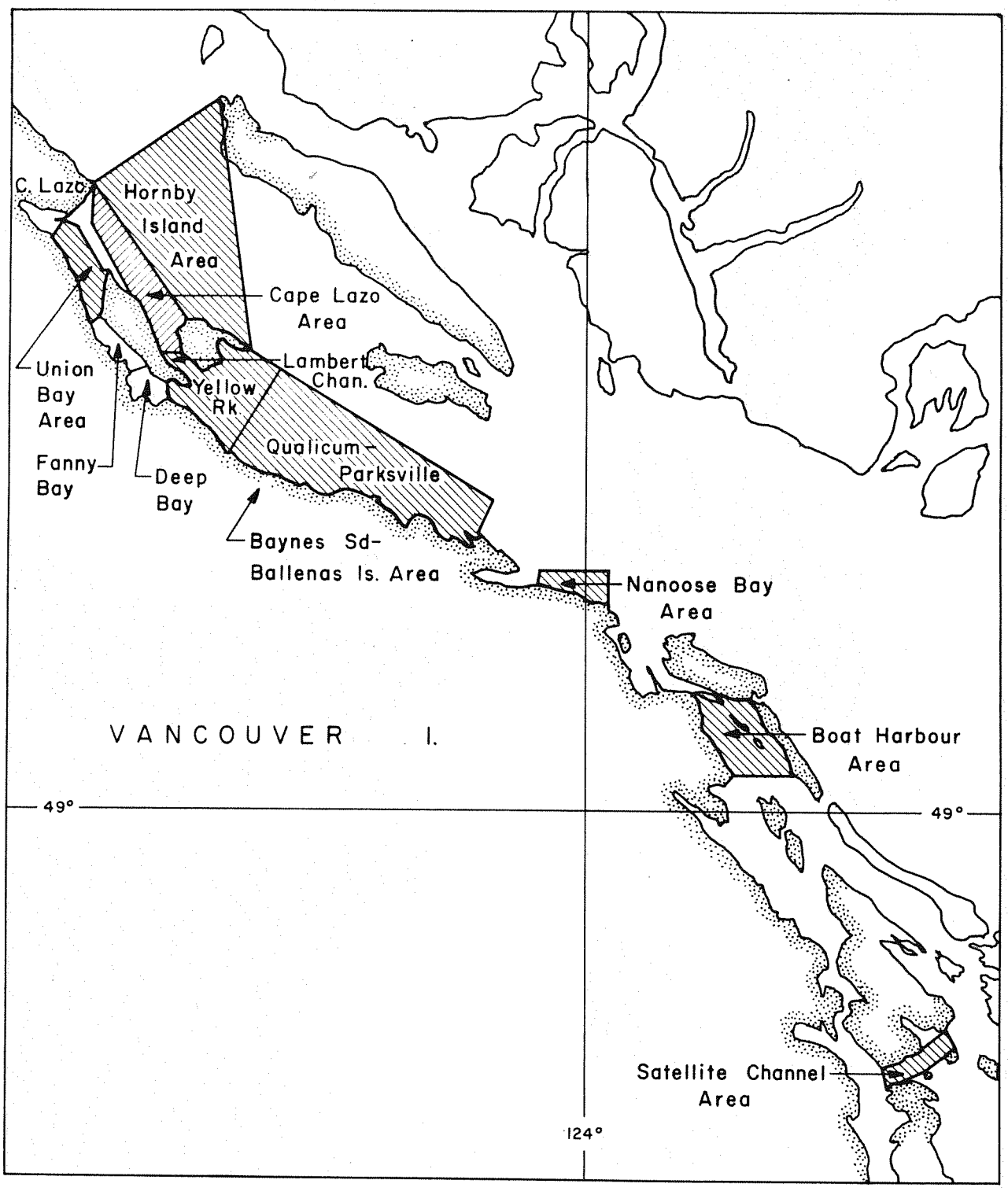

Fig. 9. Chart of Regulated Areas in Georgia Strait.

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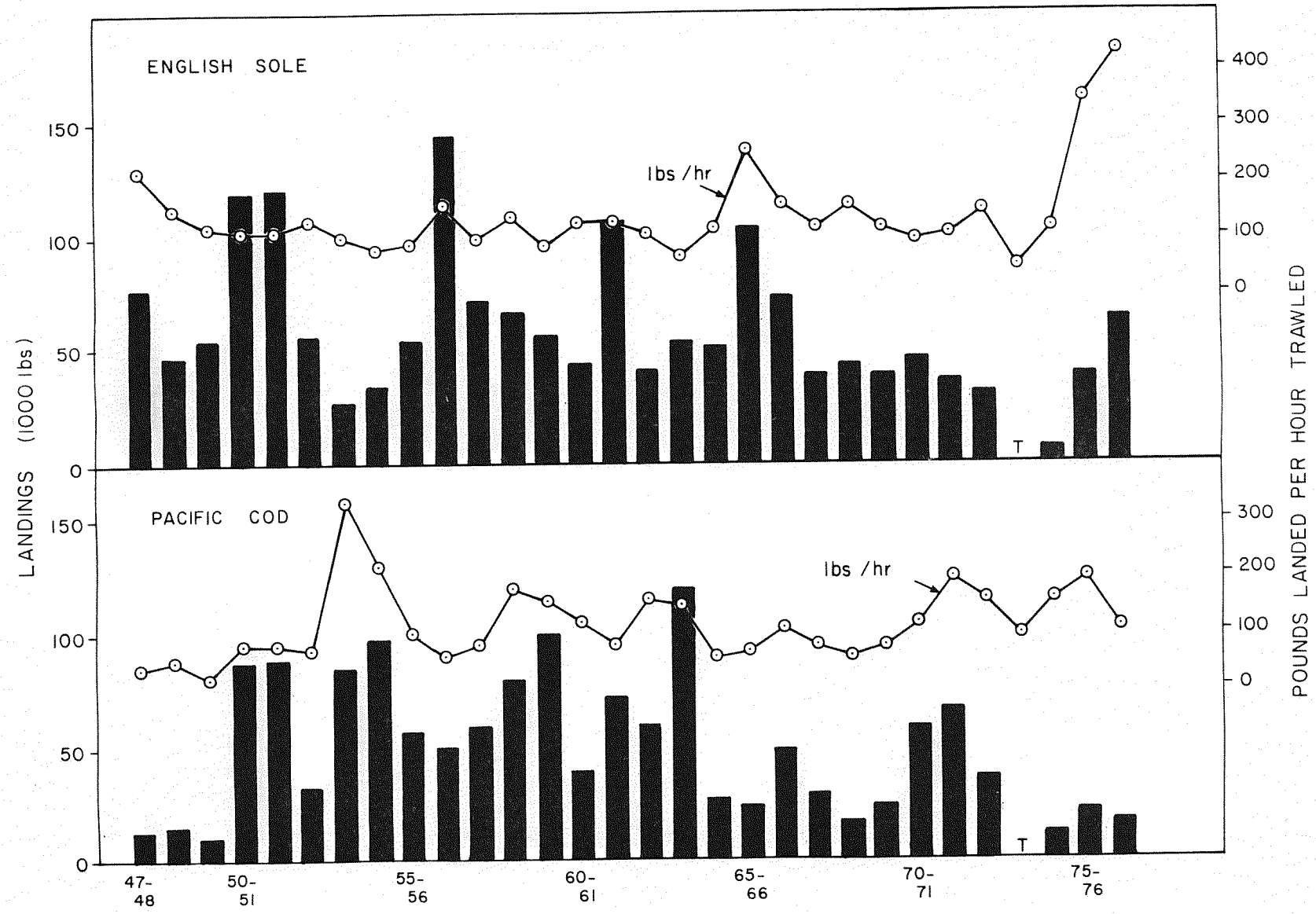

Fig. 10. Trawl landing (lb) and LPUE (lb/hr) for English sole and Pacific cod from Cape Lazo Ground, October - March 1947-77.

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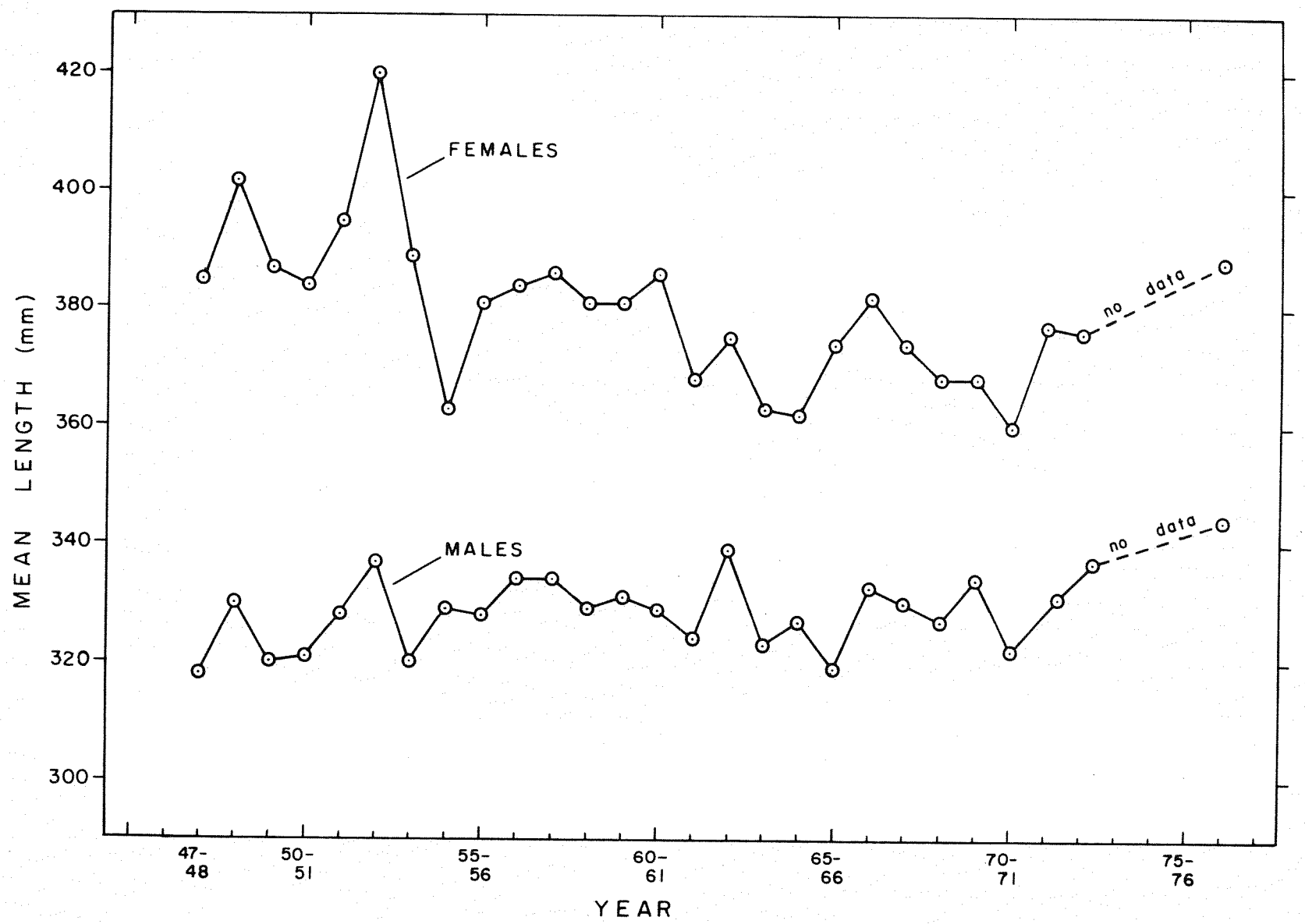

Fig. 11. Mean lengths (mm), by sex, of trawl-caught English sole landed from Cape Lazo Ground, October - March, 1947-70. (1946-72 data from Forrester and Smith, 1974.)

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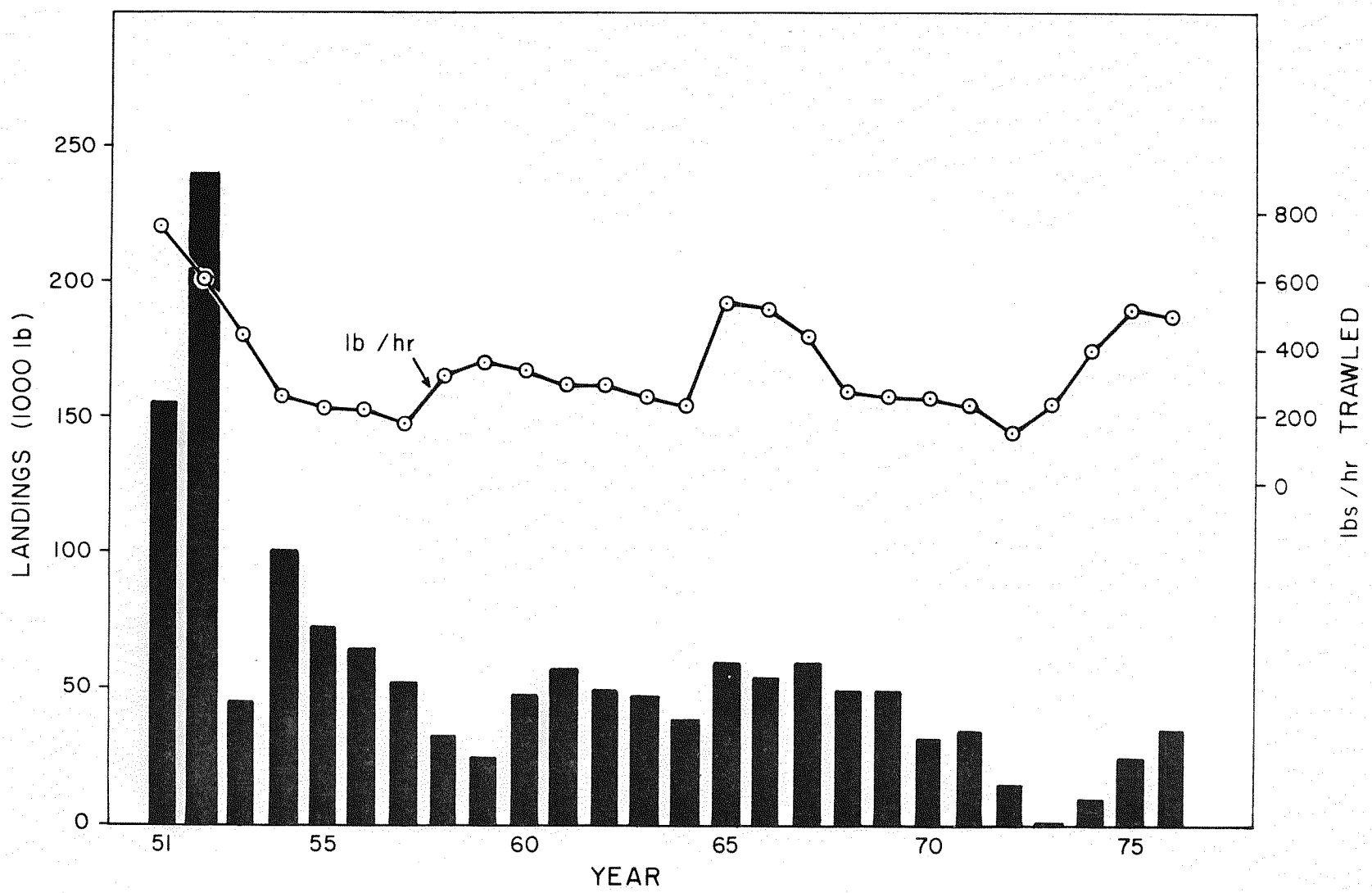

Fig. 12. Trawl landings (lb) and LPUE (lb/hr) for English sole from Union Bay Regulated Area, October - December, 1951-77.

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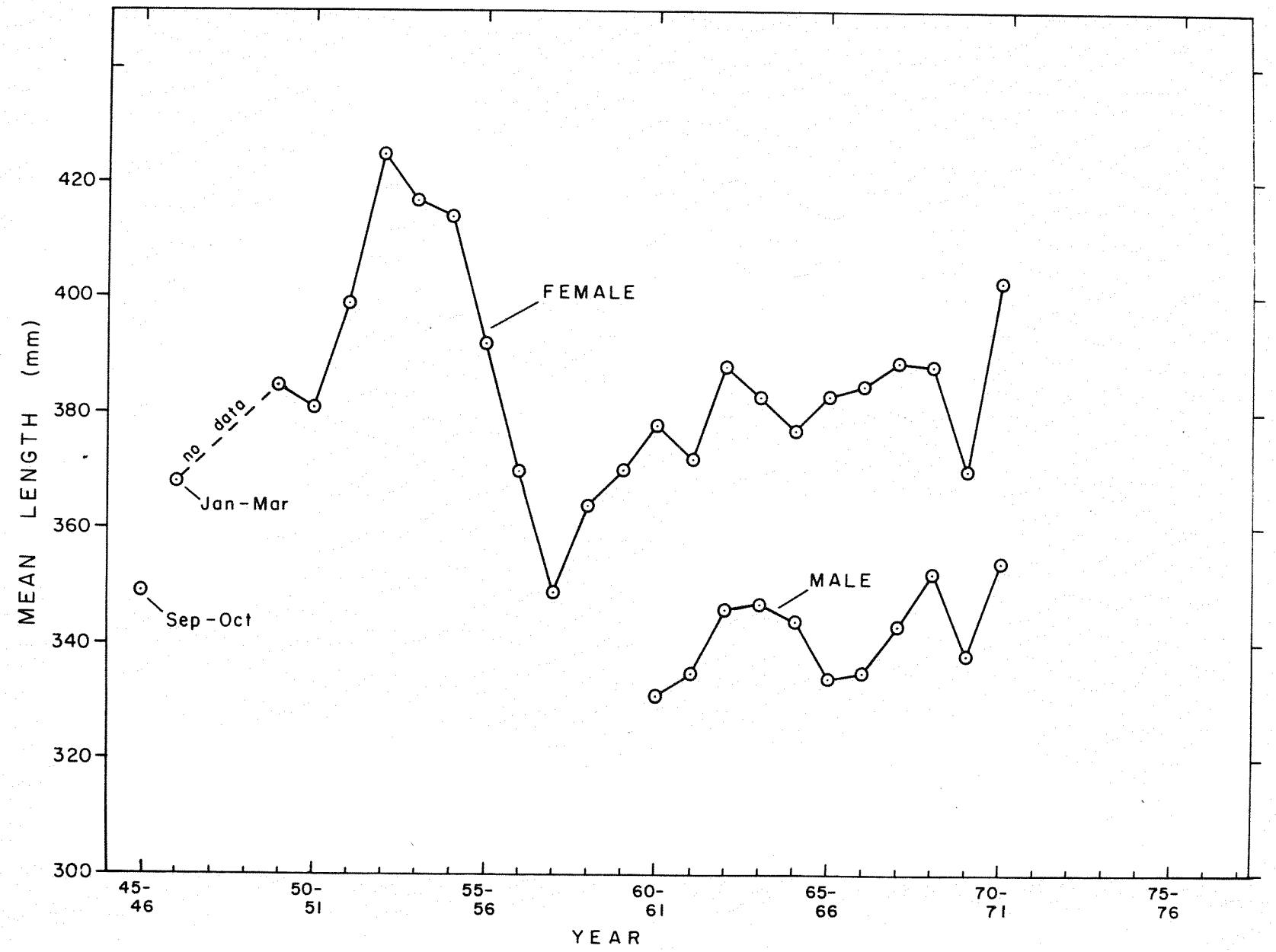

Fig. 13. Mean lengths (mm), by sex, of trawl-caught English sole landed from Union Bay Regulated Area, October - September 1945-47 and October - December 1951-77. (1945-60 data from Forrester and Ketchen 1963.)

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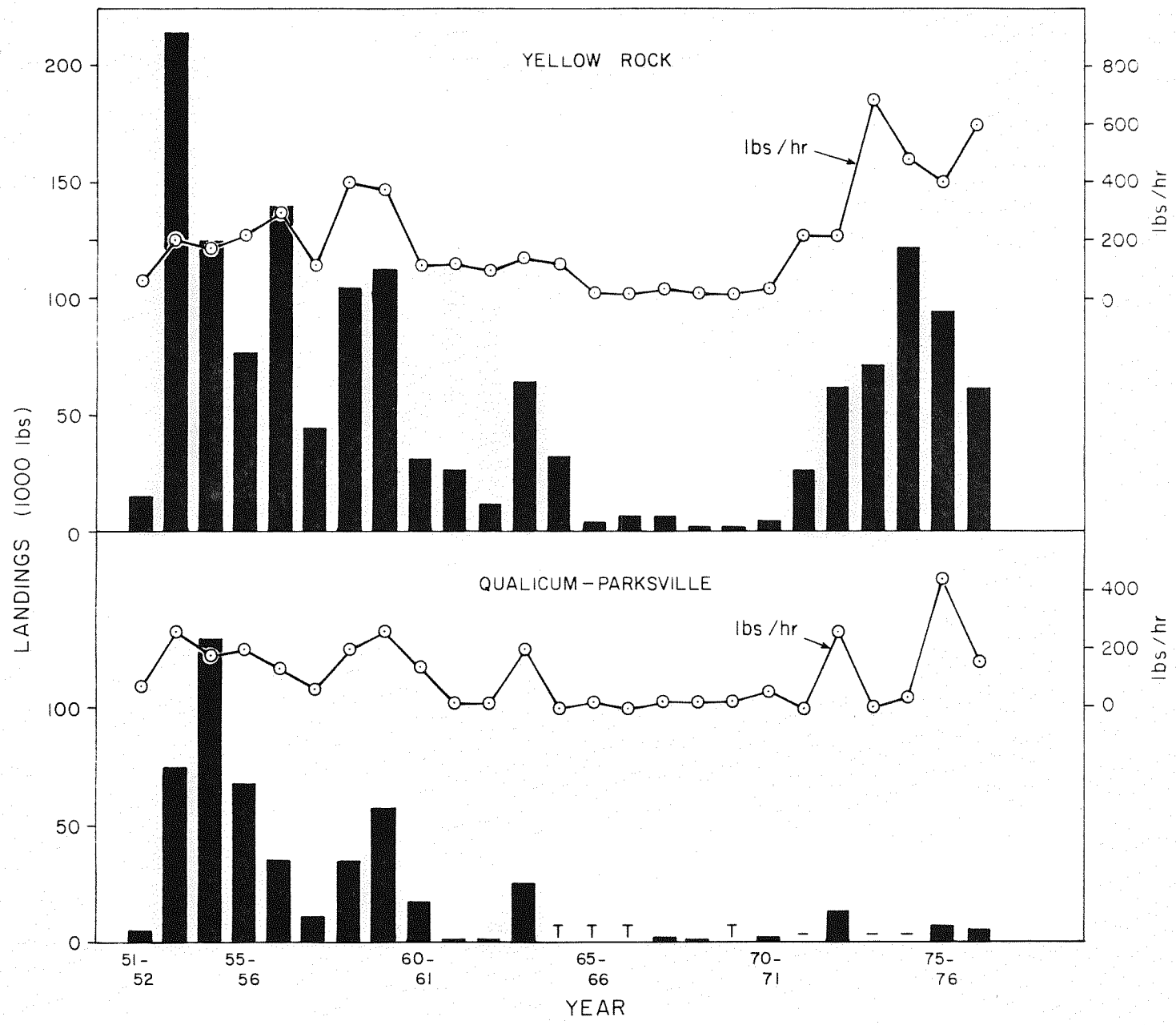

Fig. 14. Trawl landings (lb) and LPUE (lb/hr) for Pacific cod from Yellow Rock - Lambert Channel and Qualicum - Parksville Regulated Area, October - March 1952-77.

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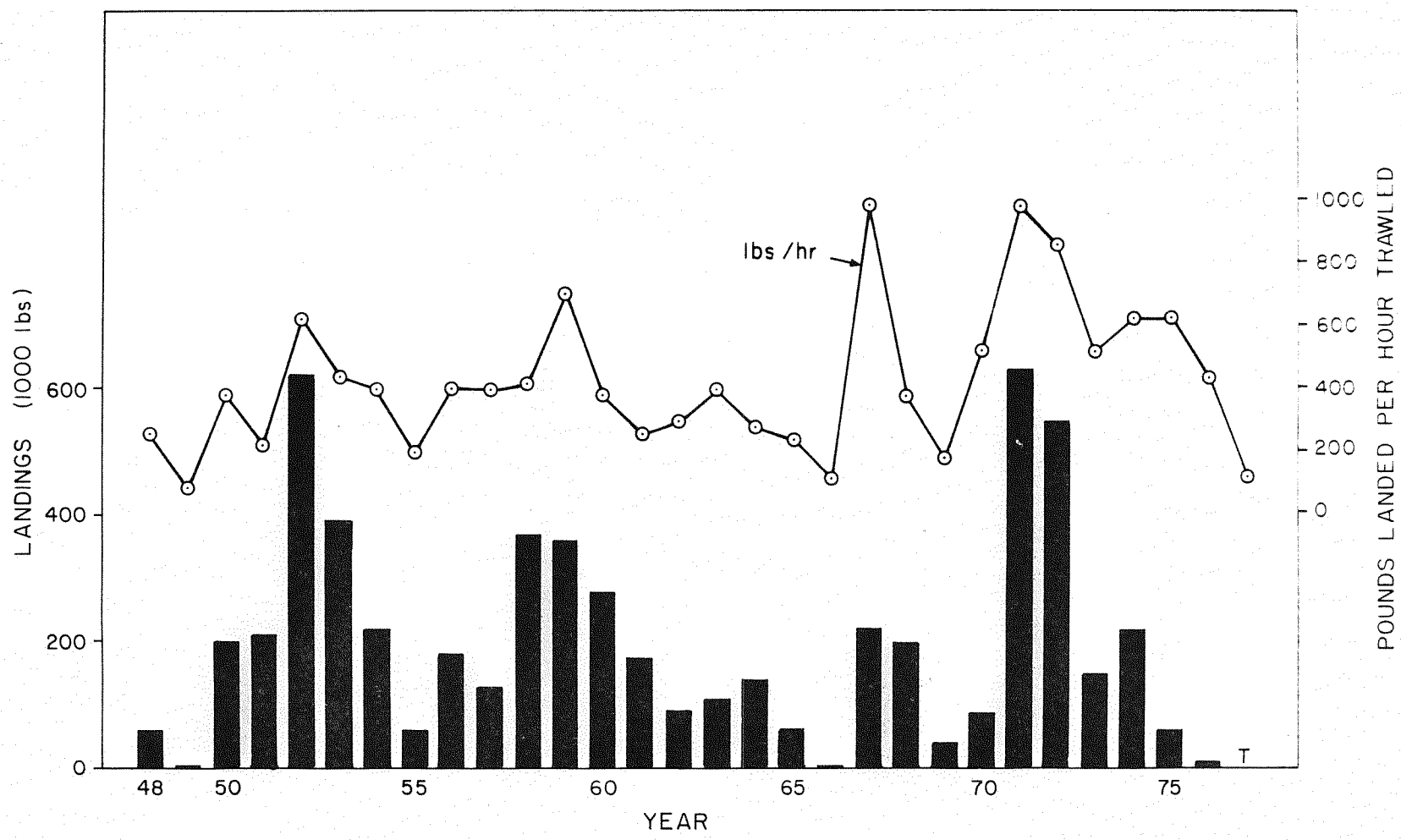

Fig. 15. Trawl landings (lb) and LPUE (lb/hr) for Pacific cod from Nanoose Bay Regulated Area, January - March, 1948-77. ("1949" = December 1, 1948 - January 15, 1949.)

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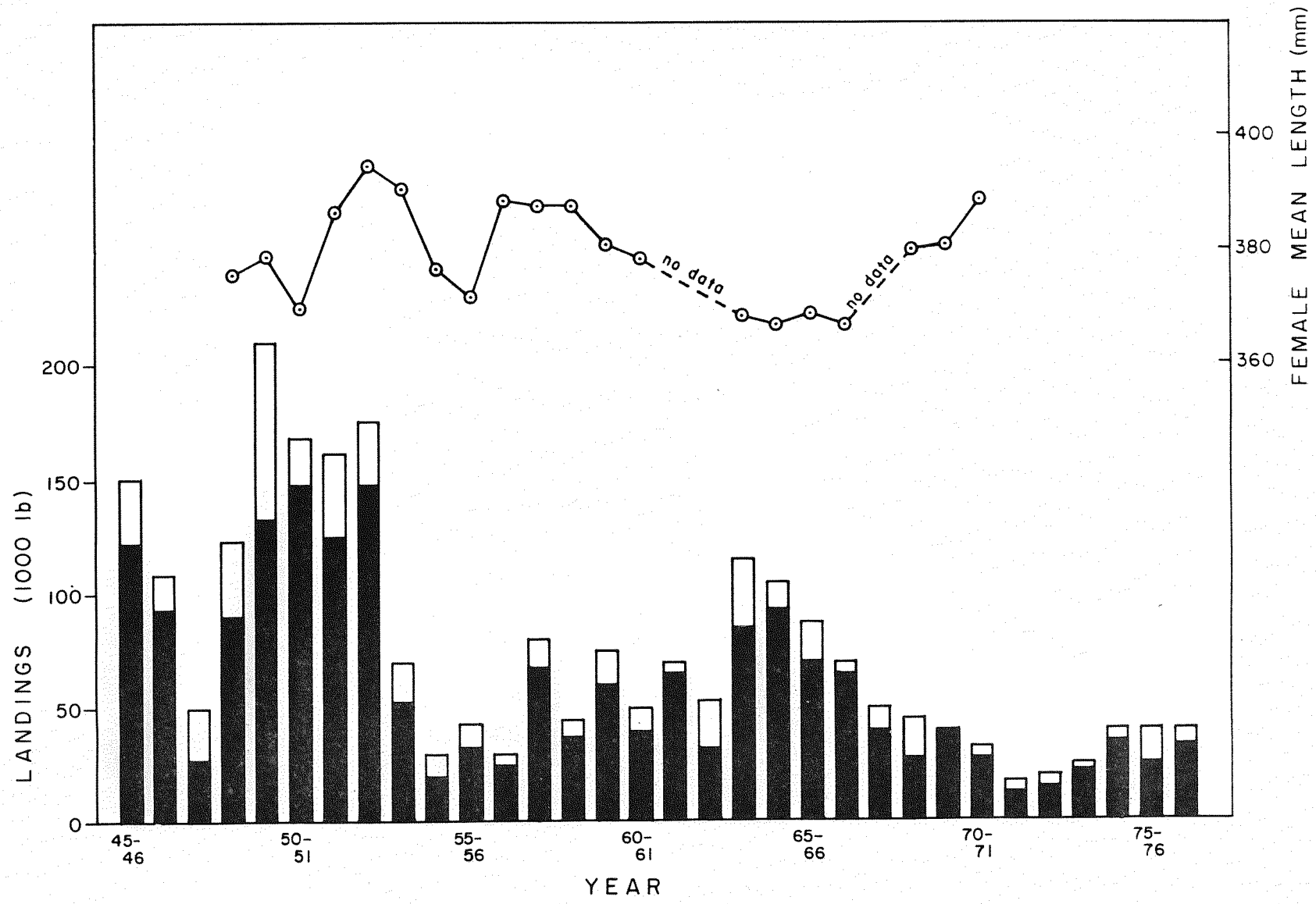

Fig. 16. Trawl landings (lb) of English sole from Minor Statistical Sub-Area 17S (N. Gulf Islands), October - September, 1945-77.

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APPENDIX I

REGULATIONS

Trawl regulations developed concerning specific grounds, 1961-77.[a]

Cape Lazo-Hornby Island

In 1959-60, the Cape Lazo ground was subdivided into two parts which have been designated "Cape Lazo area" and "Hornby Island area." This change was to permit taking of gray cod in deep water adjacent to Hornby Island and at the same time to provide protection for shallow grounds close to Cape Lazo. The limits, geographically, and the fishing period permitted in each, were:

Cape Lazo Area

Limits -- That area in the vicinity of the northerly portions of Hornby and Denman Islands, commencing at Cape Lazo in a straight line southeasterly to Collishaw Point on Hornby Island; thence to Phipps Point, thence in a straight line true west across Lambert Channel to a fishing boundary sign on the east coast of Denman Island, thence in a straight line in a northwesterly direction to Comox Bar Buoy, thence in a straight line in a northerly direction to the point of commencement at Cape Lazo.

Open periods --

1961-62	October 13, 1961-February 15, 1962
1962-63	October 12, 1962-February 15, 1963
1963-64	October 18, 1963-February 15, 1964
1964-65	October 16, 1964-February 15, 1965
1965-66	October 15, 1965-February 15, 1966
1966-67	October 14, 1966-February 15, 1967
1967-68	October 20, 1967-February 15, 1968
1968-69	October 18, 1968-February 15, 1969
1969-70	October 17, 1969-February 15, 1970
1970-71	October 16, 1970-February 14, 1971
1971-72	October 15, 1971-February 15, 1972
1972-73	October 13, 1972-February 15, 1973
1973-74	October 12, 1973-February 15, 1974
1974-75	October 11, 1974-February 15, 1975
1975-76	October 10, 1975-February 15, 1976
1976-77	October 8, 1976-February 15, 1977

[a] Area descriptions in this Appendix were extracted from Forrester and Ketchen (1963). See Forrester and Ketchen (1963) for a résumé of all trawl regulations prior to October 1, 1961.

Hornby Island Area

Limits -- That area to the north of Hornby Island, commencing at Cape Lazo in a straight line northeasterly to Kiddie Point at the north end of Texada Island; thence in a straight line in a southerly direction to St. John Point on Hornby Island; thence to Collishaw Point, thence in a straight line northwesterly to the point of commencement at Cape Lazo.

Open periods --

1961-62	October 13, 1961-March 20, 1962
1962-63	October 12, 1962-March 20, 1963
1963-64	October 18, 1963-March 20, 1964
1964-65	October 16, 1964-March 20, 1965
1965-66	October 15, 1965-March 20, 1966
1966-67	October 14, 1966-March 20, 1967
1967-68	October 20, 1967-March 20, 1968
1968-69	October 18, 1968-March 20, 1969
1969-70	October 17, 1969-March 20, 1970
1970-71	October 16, 1970-March 19, 1971
1971-72	October 15, 1971-March 20, 1972
1972-73	October 13, 1972-March 20, 1973
1973-74	October 12, 1973-March 20, 1974
1974-75	October 11, 1974-March 20, 1975
1975-76	October 10, 1975-March 20, 1976
1976-77	October 8, 1976-March 20, 1977

Union Bay Area

Limits -- That area along the east shore of Vancouver Island, commencing at Denman Point on Denman Island, thence southwesterly to a fishing boundary sign established on the east shore of Vancouver Island, thence following the easterly shore of Vancouver Island northward to the fishing boundary sign near Trent River, thence easterly to the fishing boundary on Goose Spit, thence southeasterly to the Red Can Buoy on the west side of Comox Bar, thence southerly to Longbeak Point on Denman Island, thence following the westerly shore of Denman Island southward to the point of commencement at Denman Point.

Open periods --

1961	October 13-December 15
1962	October 12-December 14
1963	October 18-December 13
1964	October 16-December 11
1965	October 15-December 10
1966	October 14-December 9
1967	October 20-December 15
1968	October 18-December 13
1969	October 17-December 12
1970	October 16-December 11
1971	October 15-December 11
1972	October 13-December 8
1973	October 12-December 8
1974	October 11-December 8
1975	October 10-December 12
1976	October 8-December 10

N.B. -- Union Bay Area -- trawling is permissible only on Fridays (6:00 a.m. - 6:00 p.m.) during the designated period, except that the season will be closed earlier if the catch reaches, or approaches closely to, 50,000 lb.

Baynes Sound -- Ballenas Island Area

Limits -- That area along the east shore of Vancouver Island, commencing at Mapleguard Point, thence following the easterly shore of Vancouver Island to Dorcas Point, thence easterly, to Ballenas Island Light, thence northeasterly to St. John Point on Hornby Island, thence to Phipps Point, thence in a straight line true west across Lambert Channel to a fishing boundary sign on the east coast of Denman Island, thence in a southerly direction along the east shore of Denman Island to Boyle Point, thence northward along the west shore of Denman Island to Repulse Point, and thence in a straight line to the point of commencement at Mapleguard Point.

Open periods --

1961-62	October 13, 1961-March 20, 1962
1962-63	October 12, 1962-March 20, 1963
1963-64	October 18, 1963-March 20, 1964
1964-65	October 16, 1964-March 20, 1965
1965-66	October 15, 1965-March 20, 1966
1966-67	October 14, 1966-March 20, 1967
1967-68	October 20, 1967-March 20, 1968
1968-69	October 18, 1968-March 20, 1969
1969-70	October 17, 1969-March 20, 1970
1970-71	October 16, 1970-March 19, 1971
1971-72	October 15, 1971-March 20, 1972
1972-73	October 13, 1972-March 20, 1973
1973-74	October 12, 1973-March 20, 1974
1974-75	October 11, 1974-March 20, 1975
1975-76	October 10, 1975-March 20, 1976
1976-77	October 8, 1976-March 20, 1977

Nanoose Bay Area

Limits -- That area lying easterly of, but not including Nanoose Bay, commencing at Neck Point on Vancouver Island, following the Vancouver Island shoreline in a westerly direction to Blunden Point, thence in a straight line to Maude Island Light, thence in a straight line drawn due east to the point of intersection with a straight line drawn due north from the aforesaid Neck Point.

Open periods --

1962	February 1-March 20
1963	February 1-March 20
1964	February 1-March 20
1965	February 1-March 20
1966	February 1-March 20
1967	February 1-March 20
1968	February 1-March 20
1969	February 1-March 20
1970	February 1-March 20
1971	January 31-March 19
1972	January 31-March 20
1973	January 31-March 20
1974	January 31-March 20
1975	January 31-March 20
1976	January 31-March 20
1977	January 31-March 20

Boat Harbour -- Pylades Channel Area

Limits -- That portion of the waters of the east coast of Vancouver Island lying south of Dodd Narrows and False Narrows including Pylades Channel to a straight line joining Yellow Point and Shingle Point.

Open periods --	
1961-78	May 15 to following January 14

Satellite Channel Area

Limits -- That area commencing at Cape Keppel on the southerly end of Saltspring Island and bounded by an imaginary straight line between the aforementioned Cape Keppel to Moses Point (previously James Point) Saanich Peninsula, thence in a straight line to the most northerly point of Piers Island, thence in a straight line to Kanaka Bluff on Portland Island, thence following the west shore of Portland Island northward to its most northerly point, thence in a straight line to Eleanor Point on Saltspring Island, thence in a straight line to Isabella Point, thence following the Saltspring Island shore in a southwesterly direction to Cape Keppel.

Open periods --

1961-62	October 13, 1961-March 20, 1962
1962-63	October 12, 1962-March 20, 1963
1963-64	October 18, 1963-March 20, 1964
1964-65	October 16, 1964-March 20, 1965
1965-66	October 15, 1965-March 20, 1966
1966-67	October 14, 1966-March 20, 1967
1967-68	October 20, 1967-March 20, 1968
1968-69	October 18, 1968-March 20, 1969
1969-70	October 17, 1969-March 20, 1970
1970-71	October 16, 1970-March 19, 1971
1971-72	October 15, 1971-March 20, 1972
1972-73	October 13, 1972-March 20, 1973
1973-74	October 12, 1973-March 20, 1974
1974-75	October 11, 1974-March 20, 1975
1975-76	October 10, 1975-March 20, 1976
1976-77	October 8, 1976-March 20, 1977

APPENDIX II

LANDING STATISTICS

Appendix II, Table 1. Landings (lb, rd wt[a]) of line-[b] and trawl[c]-caught lingcod from the Strait of Georgia, and vicinity (Area 4B), by Minor Statistical Area, 1951-77.

Area	Gear	1951	1952	1953	1954	1955
12	Line	56,400	28,400	13,800	38,400	15,500
	Trawl	139	654	518	720	456
13	Line	954,300	1,054,800	828,600	1,047,900	790,800
	Trawl	2,163	2,027	1,568	462	109
14	Line	213,000	200,100	202,400	377,600	202,200
	Trawl	29,687	25,094	25,654	64,543	9,737
15	Line	111,200	175,300	110,400	514,500	155,400
	Trawl	-	-	-	-	-
16	Line	240,000	406,100	398,500	586,900	584,500
	Trawl	-	909	-	-	78
17	Line	858,700	1,049,800	696,300	868,700	812,100
	Trawl	25,591	32,751	9,623	13,059	9,723
18	Line	606,600	564,800	428,900	405,100	269,300
	Trawl	22,712	19,913	16,011	32,300	52,674
19	Line	77,100	68,500	93,100	80,700	105,600
	Trawl	1,125	1,333	138	3,133	1,244
20	Line	41,400	62,300	71,700	36,500	19,200
	Trawl	17,278	23,775	3,308	23,246	22,200
28 &29	Line	10,000	16,800	10,800	15,900	600
	Trawl	7,280	12,575	5,470	12,158	12,127
Total	Line	3,168,700	3,626,900	2,854,500	3,972,200	2,955,200
	Trawl	105,975	119,031	62,290	149,621	108,348
	Both	3,274,675	3,745,931	2,916,790	4,121,821	3,063,557

Appendix II, Table 1 (cont'd)

Area	Gear	1956	1957	1958	1959	1960
12	Line	41,400	16,700	39,600	38,600	58,200
	Trawl	585	4,421	4,825	331	21
13	Line	1,353,500	1,299,700	1,191,300	810,600	809,700
	Trawl	332	453	13,051	1,909	4,742
14	Line	230,800	197,400	253,100	207,900	265,500
	Trawl	18,103	15,016	20,575	6,253	8,739
15	Line	145,400	257,000	190,200	75,300	113,100
	Trawl	-	304	-	-	-
16	Line	561,400	691,500	550,600	401,500	417,600
	Trawl	-	-	-	-	1,690
17	Line	950,700	873,900	839,300	827,400	906,200
	Trawl	19,196	9,311	19,163	16,174	22,529
18	Line	256,200	232,300	224,100	204,500	232,800
	Trawl	20,441	19,772	9,504	11,803	8,586
19	Line	105,600	129,300	177,300	250,800	198,400
	Trawl	3,002	1,273	6,129	598,874	303,103
20	Line	5,000	15,000	18,600	1,800	55,400
	Trawl	24,513	7,742	79,940	37,465	79,583
28 &29	Line	4,800	3,200	2,200	39,300	11,400
	Trawl	22,166	18,430	13,850	10,761	8,938
Total	Line	3,654,800	3,716,000	3,486,300	2,857,700	3,068,300
	Trawl	108,338	76,722	167,037	683,570	437,931
	Both	3,763,138	3,792,722	3,653,337	3,541,270	3,506,231

Appendix II, Table 1 (cont'd)

Area	Gear	1961	1962	1963	1964	1965
12	Line	77,000	384,500	163,100	87,200	72,600
	Trawl	414	6,986	242	344	14,694
13	Line	942,000	987,700	722,200	694,300	726,500
	Trawl	1,341	1,018	405	4,337	76
14	Line	223,300	275,000	153,200	103,800	125,700
	Trawl	32,345	18,606	22,391	13,280	2,004
15	Line	109,400	146,500	72,900	45,000	15,900
	Trawl	-	-	-	-	-
16	Line	440,100	338,300	382,300	407,300	325,300
	Trawl	6,047	-	-	-	-
17	Line	685,300	578,700	600,900	458,800	372,300
	Trawl	43,168	7,213	8,530	39,917	37,723
18	Line	154,400	137,100	111,000	129,500	119,900
	Trawl	31,421	21,848	11,887	21,113	25,052
19	Line	152,200	183,000	152,300	126,000	94,300
	Trawl	65,232	58,529	2,891	47,202	76,427
20	Line	71,100	46,300	49,500	51,300	26,700
	Trawl	24,581	39,533	35,632	60,502	25,859
28&29	Line	24,200	31,100	400	1,200	11,000
	Trawl	20,464	13,481	5,897	16,498	7,148
Total	Line	2,879,000	3,108,200	2,407,800	2,104,400	1,890,200
	Trawl	225,013	167,214	87,875	203,193	188,983
	Both	3,104,013	3,275,414	2,495,675	2,307,593	2,097,220

Appendix II, Table 1 (cont'd)

Area	Gear	1966	1967	1968	1969	1970
12	Line	106,400	117,600	121,500	163,100	110,900
	Trawl	28	306	1,219	112	215
13	Line	717,400	793,700	653,100	660,400	537,300
	Trawl	-	5,220	30	1,167	1,406
14	Line	147,900	133,900	130,100	195,600	97,200
	Trawl	17,330	24,383	42,154	11,231	7,692
15	Line	56,100	47,600	52,600	161,400	202,000
	Trawl	-	-	-	-	-
16	Line	304,200	318,900	250,100	363,800	204,800
	Trawl	-	-	-	-	-
17	Line	314,900	263,700	378,900	367,600	648,300
	Trawl	32,042	17,358	41,313	33,930	20,598
18	Line	146,500	166,500	127,000	143,600	88,800
	Trawl	24,457	13,402	19,052	25,546	30,606
19	Line	79,100	42,400	35,100	84,700	56,200
	Trawl	5,318	7,601	39,180	20,483	15,175
20	Line	42,100	16,700	25,100	32,900	18,000
	Trawl	32,604	39,675	36,241	33,886	24,282
28 & 29	Line	2,600	900	1,800	300	1,400
	Trawl	5,403	5,057	6,269	15,860	5,972
Total	Line	1,917,200	1,901,900	1,775,300	2,173,400	1,964,900
	Trawl	117,182	113,002	185,458	142,215	105,946
	Both	2,034,382	2,014,902	1,960,758	2,315,615	2,070,846

Appendix II, Table 1 (cont'd)

Area	Gear	1971	1972	1973	1974	1975
12	Line	119,900	94,800	51,000	39,000	23,000
	Trawl	68	175	1,083	-	-
13	Line	284,400	368,800	207,000	311,000	223,000
	Trawl	323	-	-	8,794	5,132
14	Line	75,600	60,300	21,000	33,000	36,000
	Trawl	6,387	4,024	1,872	6,720	2,772
15	Line	158,500	104,600	147,000	60,000	183,000
	Trawl	649	-	-	-	-
16	Line	216,000	194,800	90,000	61,000	63,000
	Trawl	-	-	-	-	-
17	Line	476,300	311,100	296,000	308,000	293,000
	Trawl	24,484	18,521	14,239	5,698	3,812
18	Line	53,800	47,000	82,000	52,000	27,000
	Trawl	30,853	14,169	7,750	7,820	10,153
19	Line	45,200	92,400	68,000	40,000	21,000
	Trawl	33,869	12,836	-	65,243	35,628
20	Line	5,400	5,700	3,000	8,000	12,000
	Trawl	21,170	21,913	2,825	11,339	15,720
28 & 29	Line	300	1,200	1,000	1,000	1,000
	Trawl	4,528	9,315	4,778	660	1,129
Total	Line	1,435,400	1,280,700	966,000	913,000	882,000
	Trawl	122,331	80,953	32,547	106,274	74,346
	Both	1,557,731	1,361,653	998,547	1,019,274	956,346

Appendix II, Table 1 (cont'd)

Area	Gear	1976	1977
12	Line	27,000	46,900
	Trawl	-	508
13	Line	230,000	196,800
	Trawl	4,582	94
14	Line	30,000	45,700
	Trawl	1,314	6,478
15	Line	178,000	92,000
	Trawl	-	-
16	Line	41,000	29,500
	Trawl	-	-
17	Line	198,000	162,600
	Trawl	5,752	11,575
18	Line	31,000	59,700
	Trawl	4,850	7,541
19	Line	24,000	23,500
	Trawl	60,126	29,115
20	Line	18,000	4,100
	Trawl	17,255	4,474
28 & 29	Line	15,000	3,800
	Trawl	1,826	181
Total	Line	792,000	664,600
	Trawl	95,705	59,966
	Both	887,705	724,566

[a]Round weight; = 1.5 × dressed weight.

[b]Line-caught landings from "British Columbia Catch Statistics, by Area and Type of Gear (as reported on sales slips received by the Department);" issued annually by the Department of Fisheries of Canada, Pacific Region.

[c]Trawl-caught landings from "British Columbia landings of Trawl-Caught Groundfish; " issued annually by the Pacific Biological Station (Nanaimo) in the Circular (Statistical Series) (1951-65) or Technical Report (1966-date) Series.

Appendix II, Table 2. Trawl landings (lb) of dogfish in the Strait of Georgia and vicinity (Area 4B) by Minor Statistical Area, October-September and October-March, 1945-77.

Year	12, 13 15, 16	Area 14	Area 17	Area 18	Area 19	Area 20	Areas 28 & 29	Total
				October-September				
1945-46	-	119,660	36,806	473,530	-	23,125	94,233	747,354
1946-47	63,092	279,719	100,990	320,555	-	262,297	84,736	1,111,389
1947-48	50,658	219,123	47,784	35,833	-	60,376	60,050	473,824
1948-49	6,996	377,954	55,200	19,563	-	23,239	25,932	508,884
1949-50	12,606	162,648	121,970	95,528	-	15,874	11,325	419,951
1950-51	6,003	245,423	97,521	323,783	-	10,579	27,546	210,855
1951-52	51,572	183,769	133,450	230,141	-	21,976	46,523	667,431
1952-53	106,163	242,089	245,858	485,319	-	28,228	227,730	1,335,387
1953-54	6,870	423,470	178,060	601,207	5,563	9,258	148,471	1,372,899
1954-55	4,423	477,234	90,462	1,278,449	-	1,067	362,595	2,214,230
1955-56	8,086	338,236	73,463	381,826	534	233	94,775	897,153
1956-57	5,136	147,441	107,963	95,234	-	-	188,929	544,703
1957-58	120,227	168,275	101,525	501,370	-	17,209	474,969	1,383,575
1958-59	10,531	231,244	143,532	701,238	-	2,534	61,257	1,150,336
1959-60	74,649	283,024	71,583	64,548	169,654	467	50,058	713,983
1960-61	143,206	221,280	50,896	158,208	31,653	16,873	23,121	645,237
1961-62	140,657	92,543	23,824	117,328	28,519	15,108	4,669	422,648
1962-63	-	-	-	7,228	-	-	3,001	10,229
1963-64	-	5,136	22,504	-	-	-	70,435	99,075
1964-65	5,336	19,343	32,684	-	-	173,420	1,007	231,790
1965-66	-	6,532	15,075	933	-	-	3,718	26,258
1966-67	75,538	77,576	48,003	231,598	2,763	-	-	435,478

Appendix II, Table 2 (cont'd)

Year	12, 13, 15, 16	Area 14	Area 17	Area 18	Area 19	Area 20	Areas 28 & 29	Total
				October-September				
1967-68	35,482	-	14,400	9,692	34,086	267	2,964	96,891
1968-69	-	1,755	-	-	-	-	-	1,755
1969-70	-	410	740	-	-	-	51,403	52,553
1970-71	-	19,577	22,994	227,660	7,445	-	59,159	336,835
1971-72	-	-	21,987	169,172	-	-	2,405	193,564
1972-73	152,180	725,255	1,130,706	380,527	-	-	30,643	2,419,311
1973-74	-	6,239	233,305	592,145	-	6,462	-	838,151
1974-75	-	44,934	312,888	207,744	21,595	-	1,911	589,072
1975-76	12,573	34,010	288,215	543,057	22,831	-	-	900,686
1976-77	-	2,104	23,004	211,515	63,428	-	-	300,051
				October-March				
1945-46	-	119,660	29,062	471,296	-	807	78,312	699,137
1946-47	61,578	126,756	74,497	299,557	-	75,284	25,613	663,285
1947-48	47,110	31,589	34,650	33,298	-	23,711	36,525	206,883
1948-49	6,863	89,624	34,383	16,562	-	9,385	5,515	162,332
1949-50	12,606	114,791	79,114	79,207	-	9,905	7,837	303,460
1950-51	5,603	51,492	73,343	266,173	-	1,167	3,168	400,946
1951-52	51,105	83,833	102,662	203,028	-	13,647	8,538	462,813
1952-53	106,163	126,825	218,911	474,533	-	28,228	25,019	979,679
1953-54	5,536	323,681	139,676	594,904	5,563	1,167	6,250	1,076,777
1954-55	3,796	402,290	79,089	1,262,942	-	1,067	158,218	1,907,402
1955-56	3,650	316,491	43,507	361,849	534	233	8,131	734,395
1956-57	5,136	136,836	101,086	77,078	-	-	8,784	328,920
1957-58	119,961	168,275	94,260	477,792	-	17,209	19,076	896,573
1958-59	10,531	178,238	139,930	701,105	-	2,334	11,205	1,043,343
1959-60	74,649	277,641	70,916	64,548	169,654	467	50,058	707,933
1960-61	101,498	112,385	40,069	73,611	20,892	4,428	465	353,348

Appendix II, Table 2 (cont'd)

Year	12, 13, 15, 16	Area 14	Area 17	Area 18	Area 19	Area 20	Areas 28 & 29	Total
	October-March							
1961-62	140,657	91,142	23,824	117,328	28,519	15,108	4,669	421,247
1962-63	-	-	-	7,228	-	-	3,001	10,229
1963-64	-	5,136	-	-	-	-	-	5,136
1964-65	5,336	19,343	24,679	-	-	-	1,007	50,365
1965-66	-	6,532	4,170	-	-	-	1,050	11,752
1966-67	75,538	77,576	46,653	231,598	2,763	-	-	434,128
1967-68	35,482	-	14,400	9,692	34,086	267	2,964	96,891
1968-69	-	1,755	-	-	-	-	-	1,755
1969-70	-	410	740	-	-	-	-	1,150
1970-71	-	19,577	22,994	185,072	7,445	-	-	235,088
1971-72	-	-	18,779	138,512	-	-	-	157,291
1972-73	81,847	722,335	1,016,451	334,863	-	-	30,643	2,186,139
1973-74	-	6,239	230,200	584,349	-	-	-	820,788
1974-75	-	44,934	312,888	207,744	21,595	-	1,911	589,072
1975-76	12,573	34,010	228,215	543,057	22,831	-	-	840,686
1976-77	-	-	23,004	211,294	51,510	-	-	285,808