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Numbers Landed-At-Age and Associated Standardized Landing Statistics for Pacific Cod (*Gadus macrocephalus*) from Important Area-Time Cells off Southwest Vancouver Island, and in Queen Charlotte Sound and Hecate Strait, 1956-82

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NUMBERS LANDED-AT-AGE AND ASSOCIATED STANDARDIZED LANDING STATISTICS
FOR PACIFIC COD (Gadus macrocephalus) FROM IMPORTANT AREA-TIME CELLS
OFF SOUTHWEST VANCOUVER ISLAND, AND IN QUEEN CHARLOTTE
SOUND AND HECATE STRAIT, 1956-82.

by

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ABSTRACT

Foucher, R. P. and S. J. Westrheim. 1984. Numbers landed-at-age and associated standardized landing statistics for Pacific cod (Gadus macrocephalus) from important area-time cells off southwest Vancouver Island, and in Queen Charlotte Sound and Hecate Strait, 1956-82. Can. MS Rep. Fish. Aquat. Sci. 1775: 59 p.

Canada-U.S. landings (tonnes and numbers-at-age) and standardized effort (h) have been compiled for Pacific cod (Gadus macrocephalus) from important area-time cells off southwest Vancouver Island, and in Queen Charlotte Sound and Hecate Strait. Landing statistics and age compositions were based on detailed records from Canadian interviewed landings. Age compositions were derived from length-frequency samples. The method is described for selecting the representative area-time cell, in each region, from which the representative LPUEs (landing per unit effort) are derived.

Key words: age composition, landing statistics, Pacific cod, S.W. Vancouver Island, Queen Charlotte Sound, Hecate Strait

RÉSUMÉ

Foucher, R. P. and S. J. Westrheim. 1984. Numbers landed-at-age and associated standardized landing statistics for Pacific cod (Gadus macrocephalus) from important area-time cells off southwest Vancouver Island, and in Queen Charlotte Sound and Hecate Strait, 1956-82. Can. MS Rep. Fish. Aquat. Sci. 1775: 59 p.

Des données sur les débarquements (tonnes et nombre selon l'âge) effectués au Canada et aux États-Unis et sur l'effort normalisé (h) ont été recueillies pour la morue du Pacifique (Gadus macrocephalus) dans d'importantes cases zone-temps au large de la côte sud-ouest de l'île Vancouver et dans les détroits d'Hécaté et Reine-Charlotte. Les statistiques sur les débarquements et les compositions par âge, calculées à partir des échantillons des fréquences de longueurs, sont basées sur les données obtenues d'examen des débarquements canadiens. On décrit la méthode de sélection de la case zone-temps témoin dans chaque région, case utilisée pour le calcul des DUE (débarquements par unité d'effort) représentatifs.

Mots-clés: composition par âge, statistiques des débarquements, morue du Pacifique, sud-ouest de l'île Vancouver, détroit Reine-Charlotte, détroit d'Hécaté

INTRODUCTION

Pacific cod (Gadus macrocephalus) in British Columbia waters are noted for the substantial fluctuations in abundance of individual year classes, and concomitant fluctuations in trawl landings (Stocker 1981). Studies are underway at the Pacific Biological Station (Nanaimo, B.C.) to determine if fishing is a factor in these fluctuations, and to develop a method for predicting the fluctuations in abundance.

Landing statistics, and numbers landed at age, were published for the three major offshore regions--southwest Vancouver Island (Westrheim and Foucher 1983), Queen Charlotte Sound (Foucher and Westrheim 1983), and Hecate Strait (Foucher and Jacobs 1981). However, these data are now obsolete, due to corrections of recently discovered encoding errors in landing statistics (J.E. Leaman, pers. comm.), an improved method for allotting effort to individual species in mixed-species trawl fisheries (Westrheim 1983) and standardization of trawling effort (Westrheim and Foucher, in preparation). Revised landing statistics, by sub-divisions within each important offshore region, were published by Foucher (1984). These records include Pacific cod and its two important shelf co-habitants in each offshore region, and incorporate corrections of encoding errors, new effort allotment, and effort standardization.

The purpose of this report is to produce a revised set of landing-at-age data for Pacific cod from each important sub-division of the three offshore regions - southwest Vancouver Island (Area 3C-N)^a; Queen Charlotte Sound (Areas 5A and 5B) and Hecate Strait (Areas 5C and 5D) (Fig. 1).

MATERIALS AND METHODS

Landings

Canada-U.S. landings of Pacific cod were compiled by major statistical area and month, from the PMFC^b Groundfish Data Series, which began in 1956 and is continuing. Allotment of Canada-U.S. cod landings to sub-divisions (minor statistical area and/or grounds) of major statistical areas was based on the actual disposition of Canadian interviewed landings, which were rarely less than 70% of the total Canadian landings. Results are contained in Foucher (1984).

^a Area 3C-N is the Canadian portion of Canada-U.S. Major Statistical Area 3C.

^b Pacific Marine Fisheries Commission; Portland, Oregon, U.S.A.

Effort

Standardized equivalent effort for any area-time cell was computed by dividing the total Canada-U.S. landings in that area-time cell by the representative standardized LPUE (Foucher 1984) for the major area containing the area-time cell.

LPUE

Landings per unit effort (LPUEs) were calculated using the Option-2 method (Westrheim 1983) applied to the Canadian interviewed landing statistics. Briefly described, the method involves arranging all-species (or selected-species) standardized effort and individual species' landings by depth interval in area-time cells. In any area-time cell, each species is allotted the all-species (or selected-species) effort expended in the depth intervals containing the rank-1 (largest) and rank-2 (second-largest) landings for that species.

A modification of the Option-2 method was necessary for the data from Area 3C-N, 5A, and 5B (Fig. 1), because of the heterogeneous fisheries. Canadian and U.S. vessels did not participate equally in the fishery for rockfishes, which are generally caught in deeper waters than are occupied by Pacific cod. Hence, "selected species" (Pacific cod plus its two most important shelf co-habitants) was substituted for all-species in the extrapolations of Canadian interviewed landings to Canada-U.S. landings for the mixed-species fisheries on the continental shelf (here defined as ≤ 100 fath).

Representative LPUEs

Four criteria were established for selecting the representative area-time cell in each major area from which representative LPUEs were calculated. These criteria were: (1) relative quantity landed; (2) length of time series; (3) degree to which LPUEs reflect fluctuations in landings; and (4) regulations affecting landings. Thus a representative area-time cell should: (1) account for a substantial proportion of the annual landings; (2) these should be distributed throughout the study period; (3) its LPUEs should reflect fluctuations in landings from its major area; and (4) no regulations should be in effect which affect quantities landed.

Relative age composition

The size compositions by month and by ground were obtained by combining length-frequency samples consisting of approximately 100-300 fish each. These were collected by port-liaison officers from Canadian interviewed trawl landings.

Age compositions of landings were derived from size compositions using the method of Foucher and Fournier (1982), an application to Pacific cod of the generalized method of Schnute and Fournier (1980).

Numbers landed-at-age

Numbers of Pacific cod landed-at-age ($\hat{n}_i$) in Canadian interviewed landings were calculated, by month, by extrapolating the numbers sampled as follows:

$$\hat{n}_i = (W/w)(n)(p_i)$$

where: $\hat{n}_i$ = estimated numbers landed at age i ,
 W = weight (t) of Canadian interviewed landings,
 w = weight (t) of fish sampled (estimated using length-weight formula (Westrheim 1977) if not actually weighed),
 n = number of fish sampled,
 and p_i = proportion of fish sampled in age-group i .

Monthly age compositions for Pacific cod in Canadian interviewed landings were summed by quarter year for each age and then extrapolated to Canada-U.S. numbers landed-at-age by quarter year as follows:

$$\hat{N}_i = (W/w)(\hat{n}_i)$$

where: $\hat{N}_i$ = estimated numbers in Canada-U.S. landings at age i ,
 W = Canada-U.S. landings (t),
 w = Canadian interviewed landings (t),
 and $\hat{n}_i$ = estimated numbers in Canadian interviewed landings at age i .

In the case of Queen Charlotte Sound, age compositions were derived from length frequencies by quarter-year rather than by month.

RESULTS

LANDINGS -AT-AGE

Table 1 provides an index to the appendix tables which contain the Pacific cod age compositions (numbers landed) for important area-time cells in each region, together with total weight (t) landed and effort (h) expended.

Each of the three offshore regions presented individual problems with respect to establishing an index of cod abundance by means of LPUes. Hence, each will be treated separately.

LANDING STATISTICS

Area 3C-N. During 1960-82, the mean annual Canada-U.S. Pacific cod landing from Area 3C-N was 2,108 t of which most was landed in Quarters I (44%) and II (36%) (Table 2). Four trawling grounds produced 95% of the Pacific cod landed in Canada from Area 3C-N--Amphitrite Bank (49%); Big Bank (26%); Swiftsure Bank (12%); and Clo-oose Ground (8%) (Fig.2).

Big Bank/Quarters II + III was selected as the representative area-time cell for calculating LPUEs for Area 3C-N, because it met all the criteria. Mean annual landings were 212 t for Quarter II and 220 t for Quarter III - in total, 80% of the annual mean for the Bank (Table 2); time-series extended throughout the study period; LPUEs generally reflected production trends; and no regulations were imposed which affected landings (Fig. 3). Table 3 contains the Canada-U.S. landing statistics for Pacific cod from Big Bank during April-September 1956-82.

Other important area-time cells considered, based on Table 2, were Amphitrite Bank/Quarters I and II, Clo-oose/Quarters I and II, and Swiftsure/Quarter II. Amphitrite Bank/Quarter I yielded large landings, but a short time series (Fig. 4). Furthermore, LPUEs did not reflect production trends, caused in part by a substantial change in trawling technique; and regulations were imposed during 1978-83 which adversely affected landings. Amphitrite Bank/Quarter II was rejected because LPUEs did not reflect fluctuations in cod landings. Clo-oose/Quarters I and II were rejected because of the short time series (Fig. 5). Swiftsure/Quarter II was rejected because of a substantial change in catchability (Fig. 6). Trawling effort increased with increasing vessel horsepower on this tide-swept ground, and trawling area increased due to improved navigational aids.

Queen Charlotte Sound (Areas 5A and 5B). During 1960-82, mean annual Canada-U.S. Pacific cod landing was 1,324 t, and principal time cells were Quarters II (49%) and III (38%) (Table 4). Area 5A contributed 44%, and Area 5B, 56%.

Two large banks dominate the shelf area of Queen Charlotte Sound--Cook Bank in Area 5A, and Goose Island Bank in Area 5B (Fig. 7). Individual trawling grounds are not well defined on either bank, and therefore the landing statistics for Pacific cod were segregated only by major statistical area.

Area 5A. Mean annual Canada-U.S. landing of Pacific cod from Area 5A was 581 t, and principal time cells were Quarters II (48%) and III (34%) (Table 4). Quarters II + III was selected as the representative time cell for calculating LPUEs, for Area 5A, because all criteria were met. Table 5 contains the Canada-U.S. landing statistics for Pacific cod landed from Area 5A during April-September 1956-82.

Area 5B. Mean annual Canada-U.S. landing of Pacific cod from Area 5B was 743 t, and principal time cells were Quarters II (50%) and III (41%) (Table 4). Quarters II + III was selected as the representative time cell for calculating LPUEs for Area 5B, because all criteria were met. Table 5 contains the Canada-U.S. landing statistics for Pacific cod landed from Area 5B during April-September 1956-82.

Hecate Strait (Areas 5C and 5D). During 1960-82, mean annual Canada-U.S. Pacific cod landing was 3,916 t, and principal time cells were Quarters I (24%), II (36%), and III (31%) (Table 6). Area 5C contributed 33% and Area 5D, 67%.

Area 5C. Mean annual Canada-U.S. landing of cod from Area 5C was 1,310 t, and the principal time cells were Quarters I (19%), II (55%), and III (24%) (Table 6). Three grounds produced 98% of the cod landed from Area 5C--Horseshoe (66%), Ole Spot (18%), and Reef Island-Cumshewa (14%) (Fig. 8).

Horseshoe/Quarters II + III was selected as the representative area-time cell for calculating LPUEs for Area 5C, because it met all criteria (Fig. 9). Ole Spot and Reef Island-Cumshewa grounds were rejected due to short time series (Fig. 10, 11). As well, trawl regulations in effect during 1980-82 substantially reduced landings from the Reef Island-Cumshewa Ground. Table 7 contains the Canada-U.S. landing statistics for Pacific cod from Horseshoe Ground during April-September 1956-82.

Area 5D. Mean annual Canada-U.S. landing of cod was 2,606 t, and the principal time cells were Quarters I (27%), II (27%), and III (35%) (Table 6). Three grounds produced 92% of the cod landed from Area 5D - Two Peaks-Butterworth (54%); White Rocks-Bonilla (31%); and Shell (7%) (Fig. 8).

Two Peaks-Butterworth/Quarters II + III was selected as the representative area-time cell for calculating LPUEs for Area 5D, because it met all criteria (Fig. 12). The principal time cells from White Rocks-Bonilla Ground (I, 55%; IV 25%) were rejected, because LPUEs did not reflect fluctuations in production (Fig. 13). Shell Ground was rejected because of its short time series (Fig. 14). Table 7 contains the Canada-U.S. landing statistics for Pacific cod from Two Peaks-Butterworth Ground during April-September 1956-82.

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Table 1. Index to appendix tables containing Pacific cod landings (t), effort (h) and age compositions (nos. landed) for important area-time cells in offshore regions, 1956-82.

Major area	Location	Quarter- year	Years	Appendix table
<u>Southwest Vancouver Island (Area 3C-N)</u>				
3C-N	Amphitrite Bank	Jan-Mar	1965-82	1
		Apr-Jun	1956-82	2
	Big Bank	Apr-Jun	1956-82	3
		Jul-Sep	1956-82	4
	Clo-oose Ground	Jan-Mar	1956-82	5
		Apr-Jun	1956-82	6
	Swiftsure Bank	Apr-Jun	1956-82	7
<u>Queen Charlotte Sound (Areas 5A + 5B)</u>				
5A		Apr-Jun	1956-82	8
		Jul-Sep	1956-82	9
5B		Apr-Jun	1956-82	10
		Jul-Sep	1956-82	11
<u>Hecate Strait (Areas 5C + 5D)</u>				
5C	Horseshoe	Apr-Jun	1958-82	12
		Jul-Sep	1958-82	13
5D	Two Peaks- Butterworth	Apr-Jun	1959-82	14
		Jul-Sep	1959-82	15
5D	White Rocks- Bonilla	Jan-Mar	1961-82	16
		Oct-Dec	1957-82	17

Table 2. Mean annual Canada-U.S. landings(t) of Pacific cod from Area 3C-N, by locality and quarter-year, 1960-82^a

Locality		Quarter-year				Total	%
		I	II	III	IV		
Total	t	923	755	330	100	2108	100
	%	44	36	16	5	101	
Amphitrite Bank	t	804	210	23	2	1039	49
	%	77	20	2	T ^b	99	
Big Bank	t	44	212	220	65	541	26
	%	8	39	41	12	100	
Clo-oose	t	63	87	15	3	168	8
	%	37	52	9	2	100	
Swiftsure	t	8	195	29	22	254	12
	%	3	77	11	9	100	
Other	t	4	51	43	8	106	5
	%	4	48	41	8	101	

^aExcluding 1961 and 1980 (extrapolation problems).

^bT=trace= 0.5 t.

Table 3. Canada-U.S. landing statistics for Pacific cod from Big Bank (Area 3C-N), April-September 1956-82.

Year	Effort (h)	Landings (t)	LPUE (kg/h)
1956	1451	179	123
57	3343	360	108
58	2540	213	84
59	3026	109	36
1960	2929	152	52
61	2886	49	17
62	2811	96	34
63	1541	143	93
64	447	127	284
1965	3072	611	199
66	3360	706	210
67	1448	106	73
68	1026	79	77
69	2805	167	60
1970	2040	272	133
71	2312	1096	474
72	3106	1499	483
73	1936	370	191
74	3118	605	194
1975	3858	605	157
76	4460	803	180
77	3344	497	149
78	2060	346	168
79	2559	571	223
1980	2233	279	125
81	1776	109	61
82	2979	108	36

Table 4. Mean annual Canada-U.S. landings (t) of Pacific cod from Queen Charlotte Sound, by area and quarter-year, 1960-82.

Area	Quarter-year				Total	%
	I	II	III	IV		
Total	47 4	649 49	498 38	130 10	1324 101	100
5A	28 5	278 48	195 34	80 14	581 101	44
5B	19 3	371 50	303 41	50 7	743 101	56

Table 5. Canada-U.S. landing statistics for Pacific cod from Areas 5A and 5B, April-September 1956-82.

Year	Area 5A			Area 5B		
	Effort (h)	Landings (t)	LPUE (kg/h)	Effort (h)	Landings (t)	LPUE (kg/h)
1956	3442	696	202	2385	444	186
57	2041	1620	794	837	294	351
58	(14063) ^a	515	(37) ^a	1423	446	313
59	1710	504	295	1508	331	219
1960	2055	198	96	1796	336	187
61	1059	74	70	1470	127	86
62	2168	125	58	1516	232	153
63	3539	250	71	3033	380	125
64	1406	358	255	1639	670	409
1965	1338	484	362	1862	1119	601
66	2663	740	278	2382	691	290
67	2763	482	174	3868	730	189
68	3156	538	170	2783	304	109
69	3555	276	78	2730	267	98
1970	1891	134	71	6711	101	15
71	3257	392	120	6863	443	65
72	1841	653	355	8263	1462	177
73	1349	487	361	6243	1245	199
74	2740	757	276	6545	1360	208
1975	1377	620	450	6004	1529	255
76	4041	1036	256	4212	903	214
77	3573	667	187	3797	487	128
78	2703	883	327	3544	882	249
79	1921	807	420	4365	864	198
1980	1733	498	287	3259	613	188
81	1196	253	212	2581	451	175
82	1565	227	145	2663	313	118

^aQuestionable. Extrapolation based on small Canadian landings.

Table 6. Mean annual Canada-U.S. landings(t) of Pacific cod from Hecate Strait by major area, locality and quarter-year, 1960-82.

Locality		Quarter-year				Total	%	%
		I	II	III	IV			
Total	t	952	1423	1230	311	3916		100
	%	24	36	31	8	99		
Area 5C	t	248	719	311	32	1310	100	33
	%	19	55	24	2	100		
Ole Spot	t	75	143	20	2	240	18	
	%	31	60	8	1	100		
Horseshoe	t	55	516	282	14	867	66	
	%	6	60	33	2	101		
Reef Is.-	t	113	55	2	7	177	14	
Cumshewaa	%	64	31	1	4	100		
Other	t	5	5	7	9	26	2	
	%	19	19	27	35	100		
Area 5D	t	704	704	919	279	2606	100	67
	%	27	217	35	11	100		
Two Peaks-	t	154	412	788	56	1410	54	
Butterworth	%	11	29	56	4	100		
Shell ^a	t	37	134	13	-	184	7	
	%	20	73	7	-	100		
White Rocks-	t	446	74	82	205	807	31	
Bonilla	%	55	9	10	25	99		
Other	t	67	84	36	18	205	8	
	%	33	41	18	9	101		

^aNo appreciable landings prior to 1967.

Table 7. Canada-U.S. landing statistics for Pacific cod from Horseshoe (Area 5C) and Two Peaks-Butterworth (Area 5D) grounds, April-September 1956-82.

Year	Horseshoe			Two Peaks-Butterworth		
	Effort (h)	Landings (t)	LPUE (kg/h)	Effort (h)	Landings (t)	LPUE (kg/h)
1956	85	142	1671	884	980	1109
57	510	94	184	538	1087	2020
58	476	832	1748	1114	1236	1110
59	551	638	1158	974	1203	1235
1960	1094	397	363	942	744	790
61	151	32	212	748	543	726
62	258	99	384	609	531	872
63	464	622	1341	1246	755	606
64	772	1233	1597	1049	1773	1690
1965	1835	2215	1207	1177	2368	2012
66	2038	3001	1473	1830	2492	1362
67	1100	1060	964	664	852	1283
68	1662	596	359	2580	946	367
69	1507	357	237	1865	707	379
1970	548	31	57	1671	430	257
71	508	139	274	2237	501	224
72	707	579	819	1869	1181	632
73	1001	1299	1298	1257	1260	1002
74	1347	1329	987	1374	1519	1106
1975	1668	757	454	2588	1672	646
76	1457	881	605	3085	1233	400
77	772	286	370	5220	1858	356
78	882	459	520	2553	603	236
79	2032	1260	620	5393	2082	386
1980	2028	977	482	4832	1466	303
81	1720	435	253	6089	1156	190
82	1510	313	207	1938	934	482

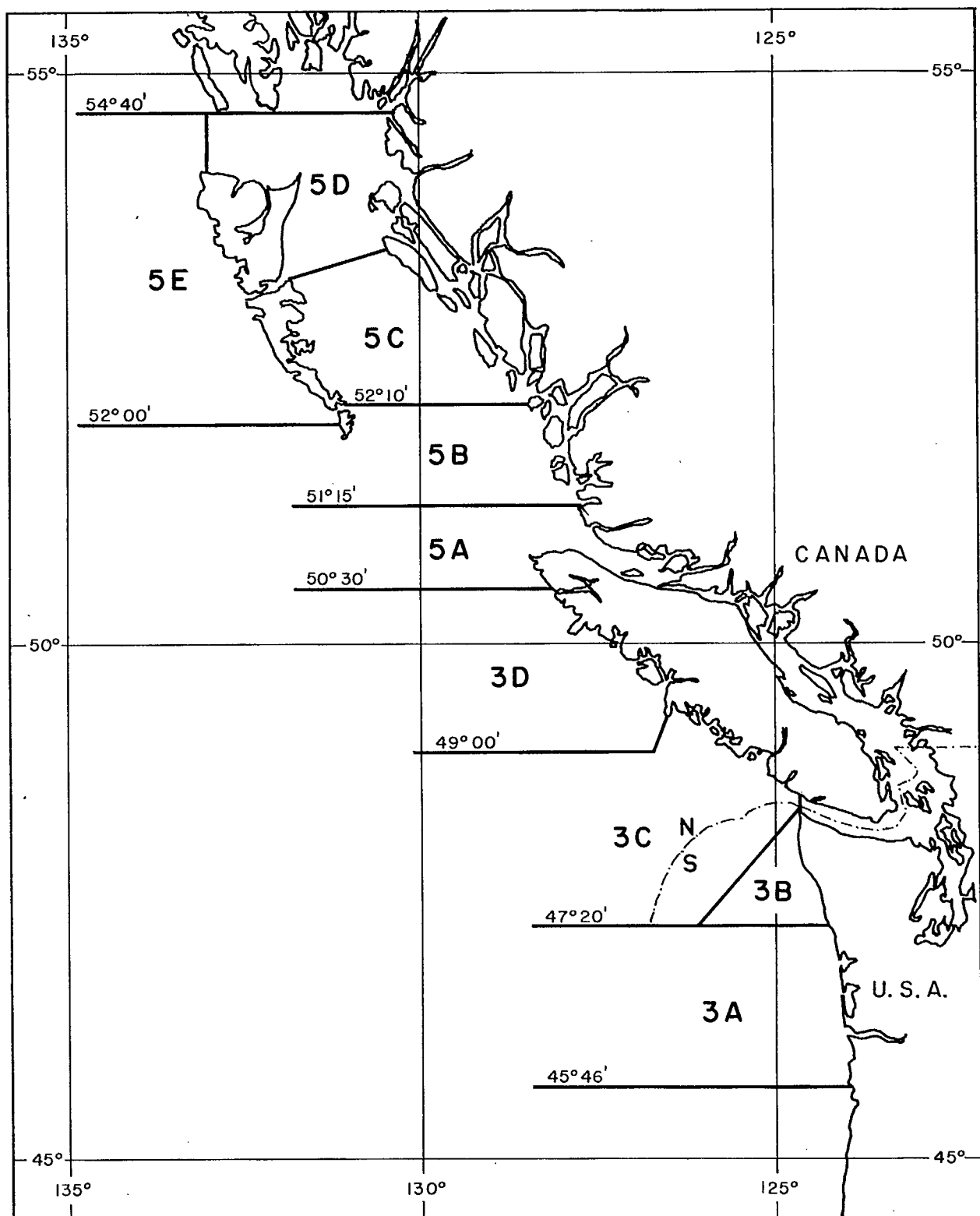


Fig. 1. Major statistical areas for Canada-U.S. groundfish statistics.

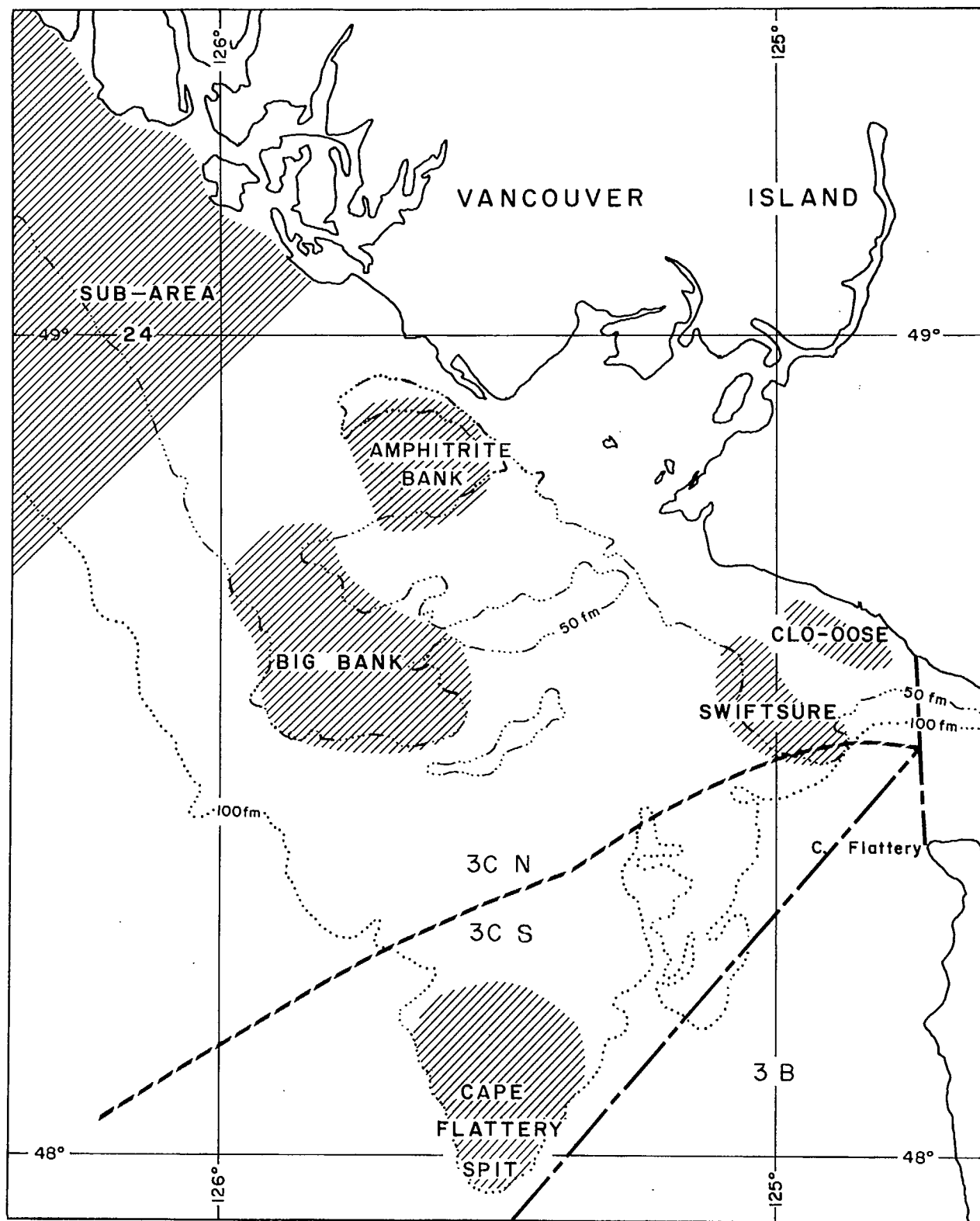


Fig. 2. Trawling grounds in Area 3C.

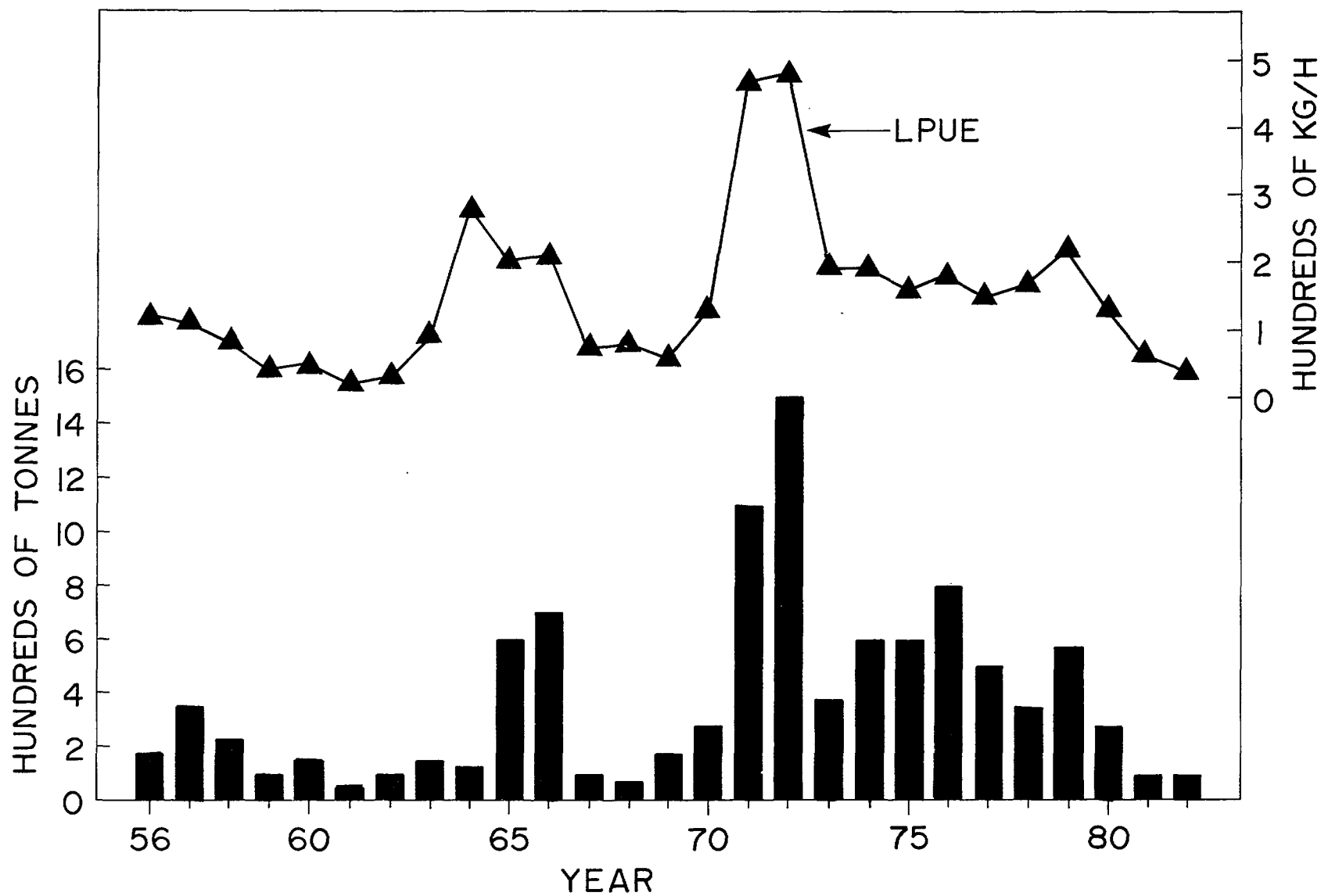


Fig. 3. Canada-U.S. landings (t) and LPUEs (kg/h) for Pacific cod from Big Bank (Area 3C-N), April-September, 1956-82. (Source: Foucher 1984, Table 5.)

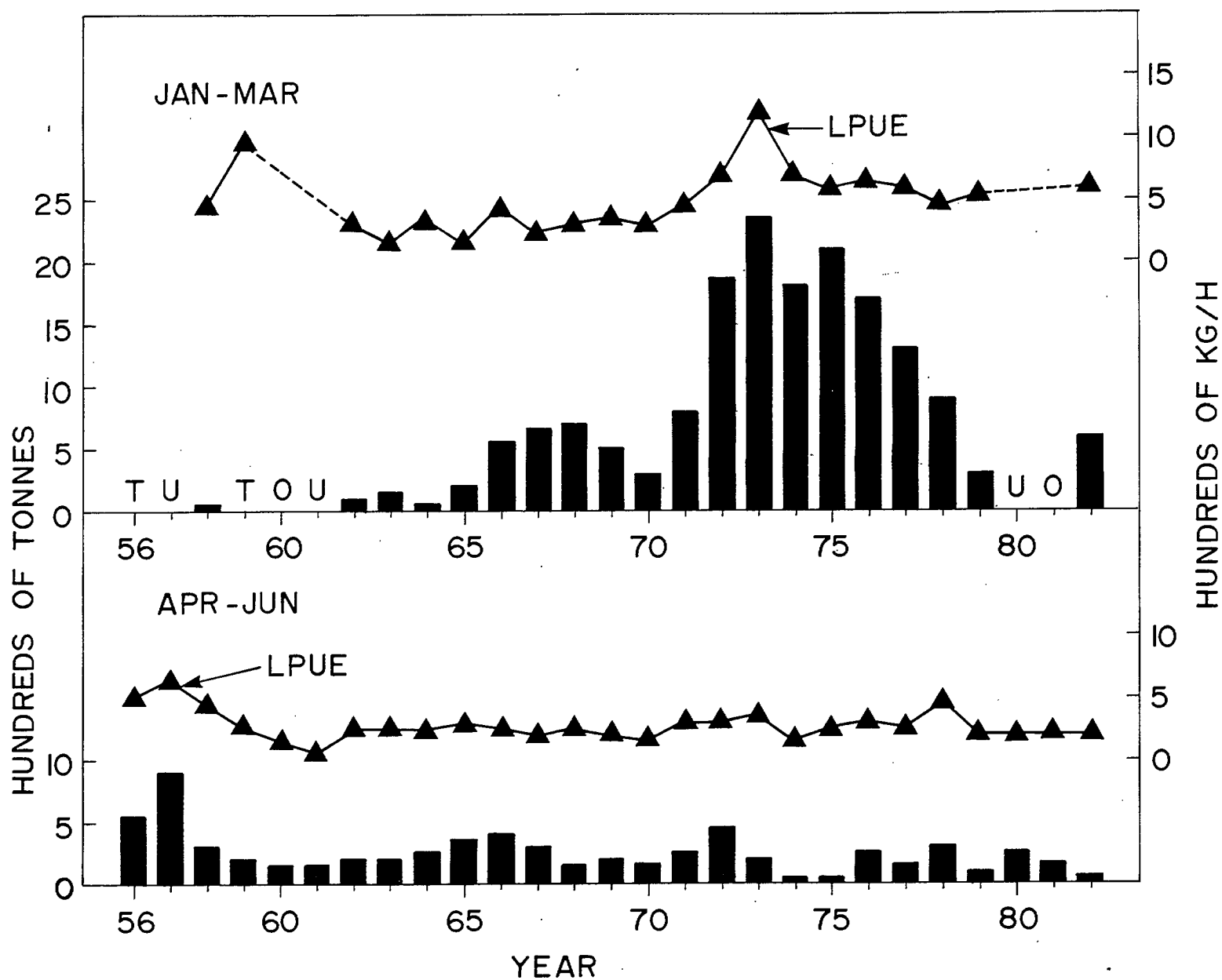


Fig. 4. Canada-U.S. landings (t) and LPUEs (kg/h) for Pacific cod from Amphetrite Bank, January-March and April-June, 1956-82. (Source: Foucher 1984, Table 4.) Note: for this and subsequent figures, 0=no landings; T=trace=<0.5 t; and U=unknown.

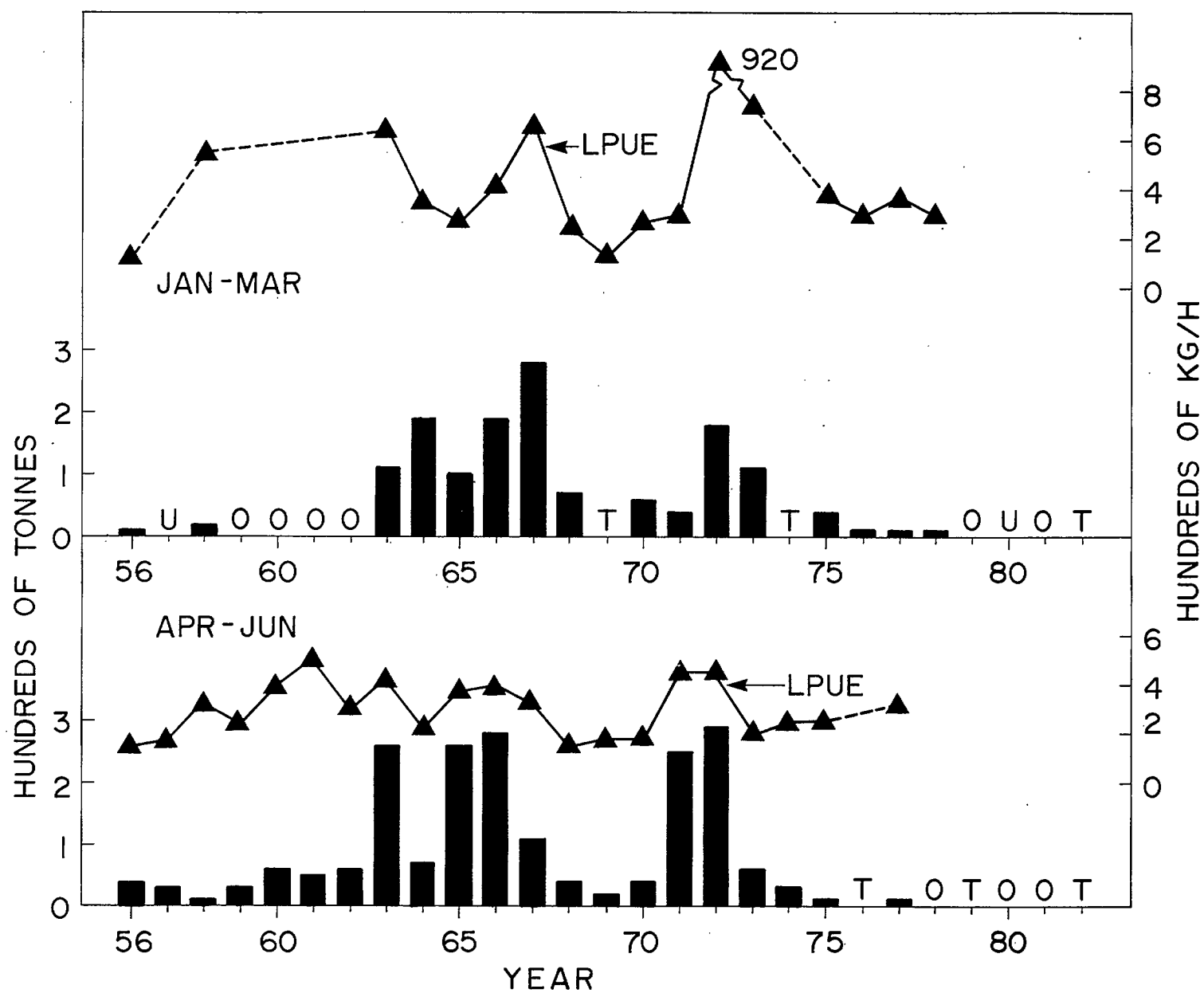


Fig. 5. Canada-U.S. landings (t) and LPUEs (kg/h) for Pacific cod from Clooose Ground, January-March and April-June, 1956-82. (Source: Foucher 1984, Table 6.)

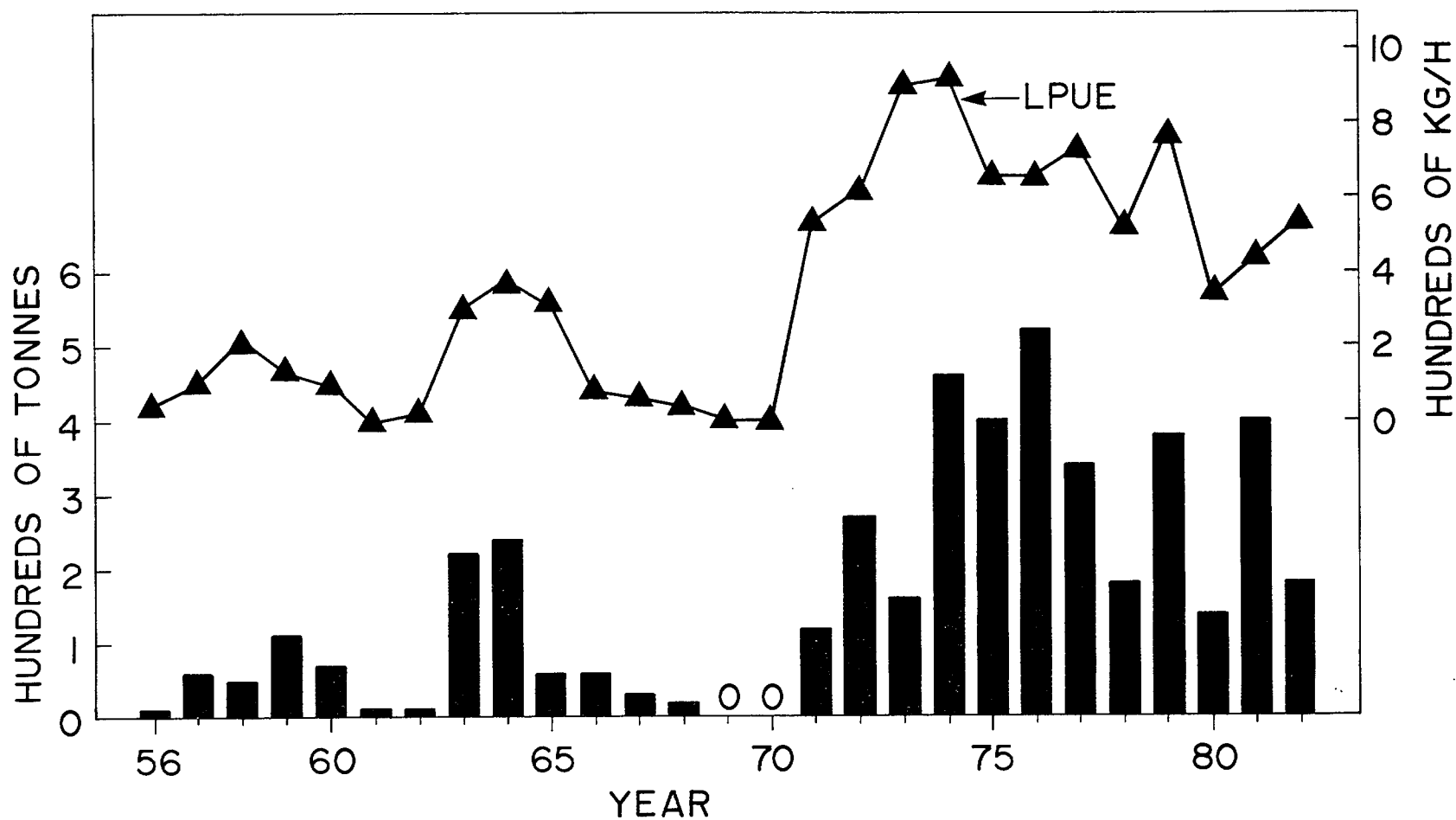


Fig. 6. Canada-U.S. landings (t) and LPUEs (kg/h) for Pacific cod from Swiftsure Bank, April-June, 1956-82.

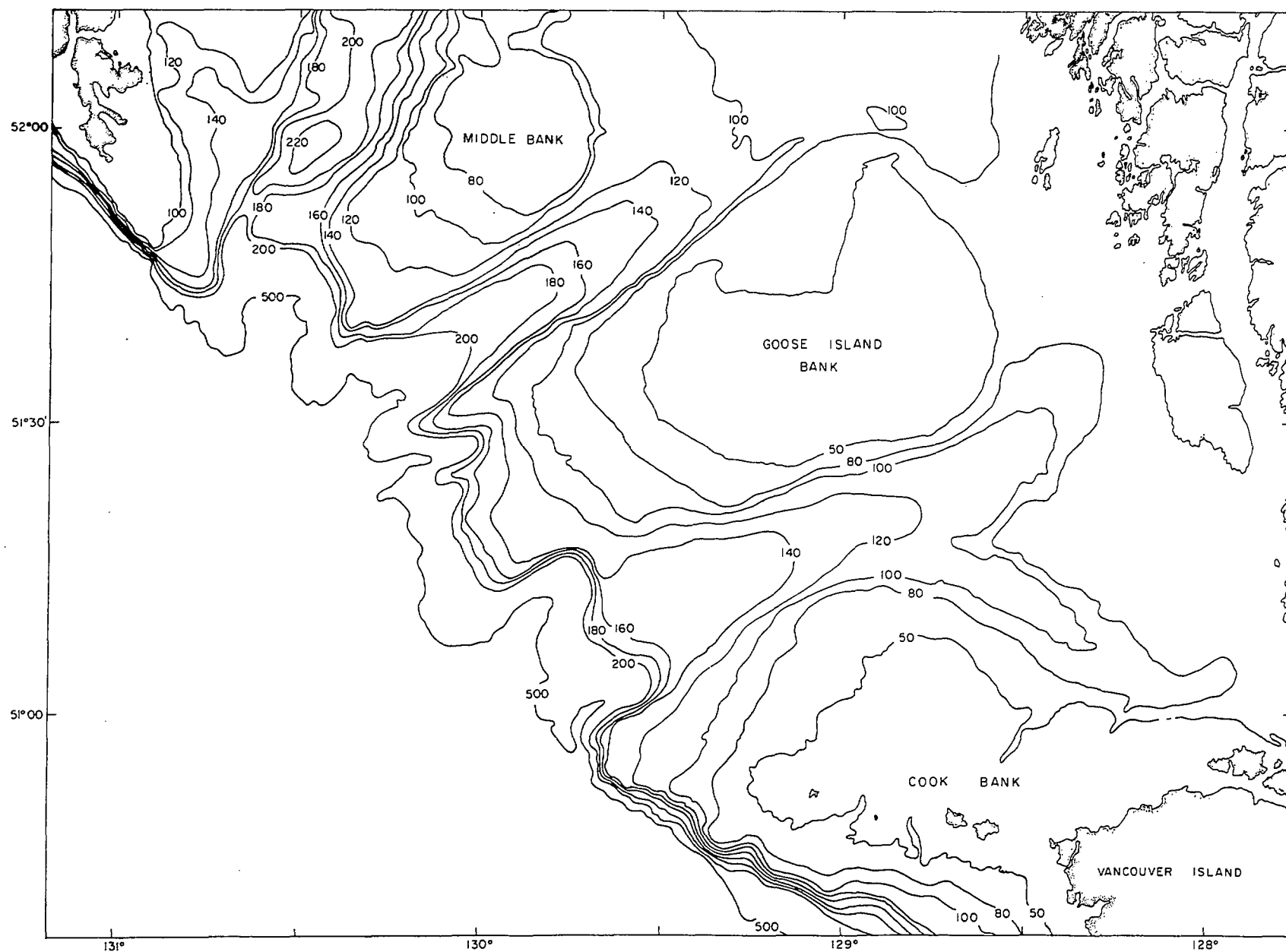


Fig. 7. Trawling grounds in Queen Charlotte Sound.

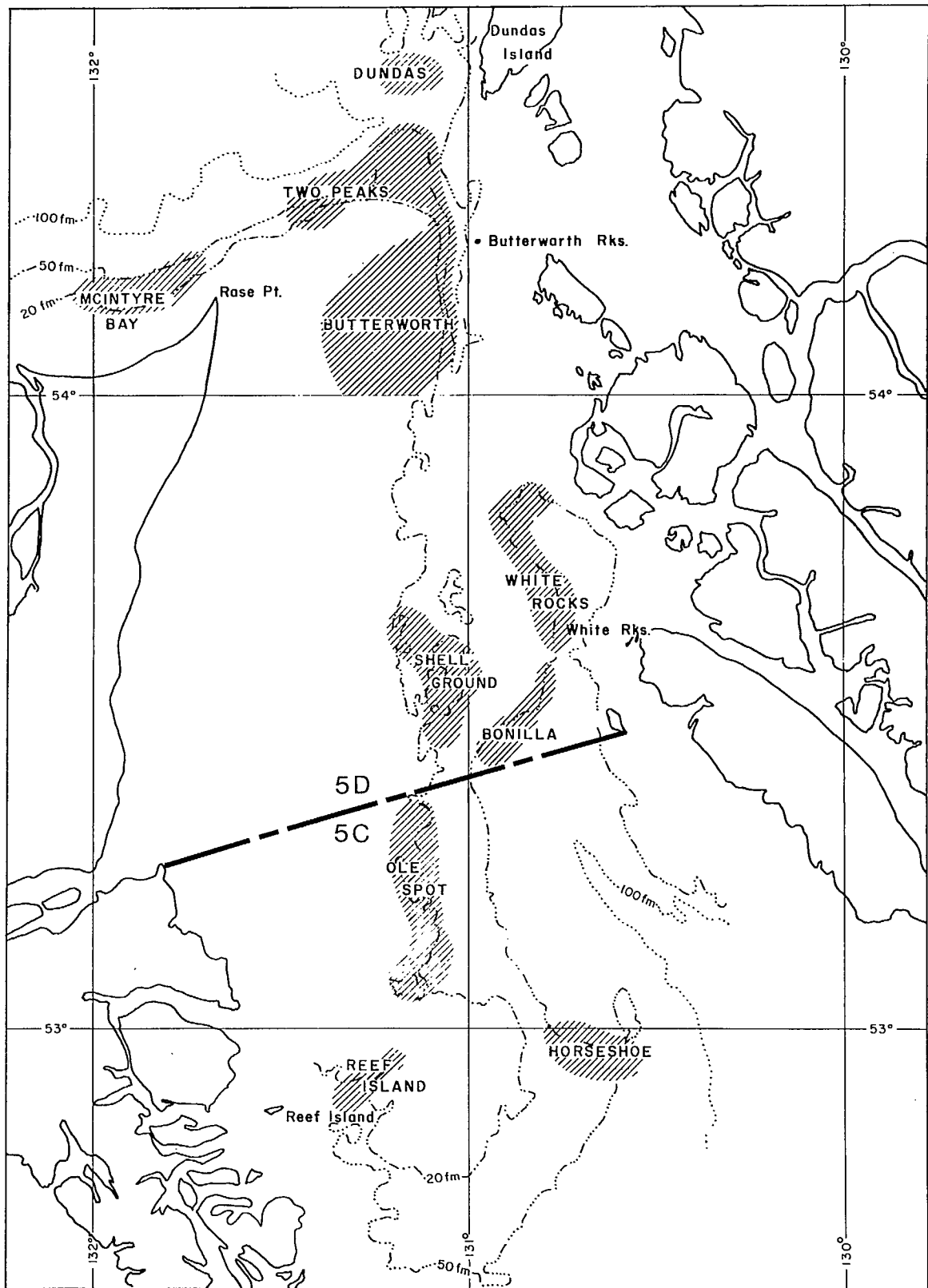


Fig. 8. Trawling grounds in Hecate Strait.

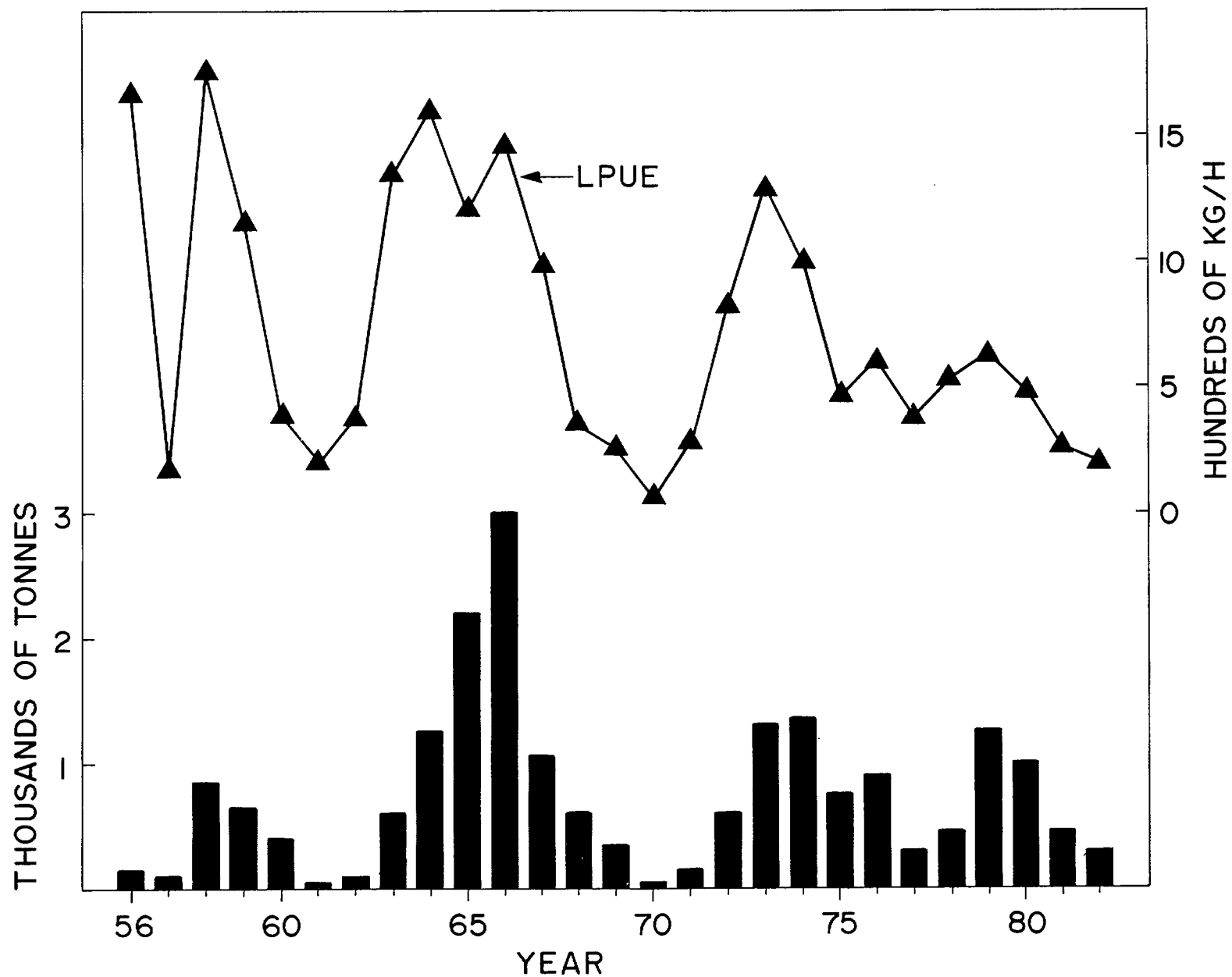


Fig. 9. Canada-U.S. landing statistics for Pacific cod from Horseshoe Ground, April-September, 1956-82. (Source: Foucher 1984, Table 34.)

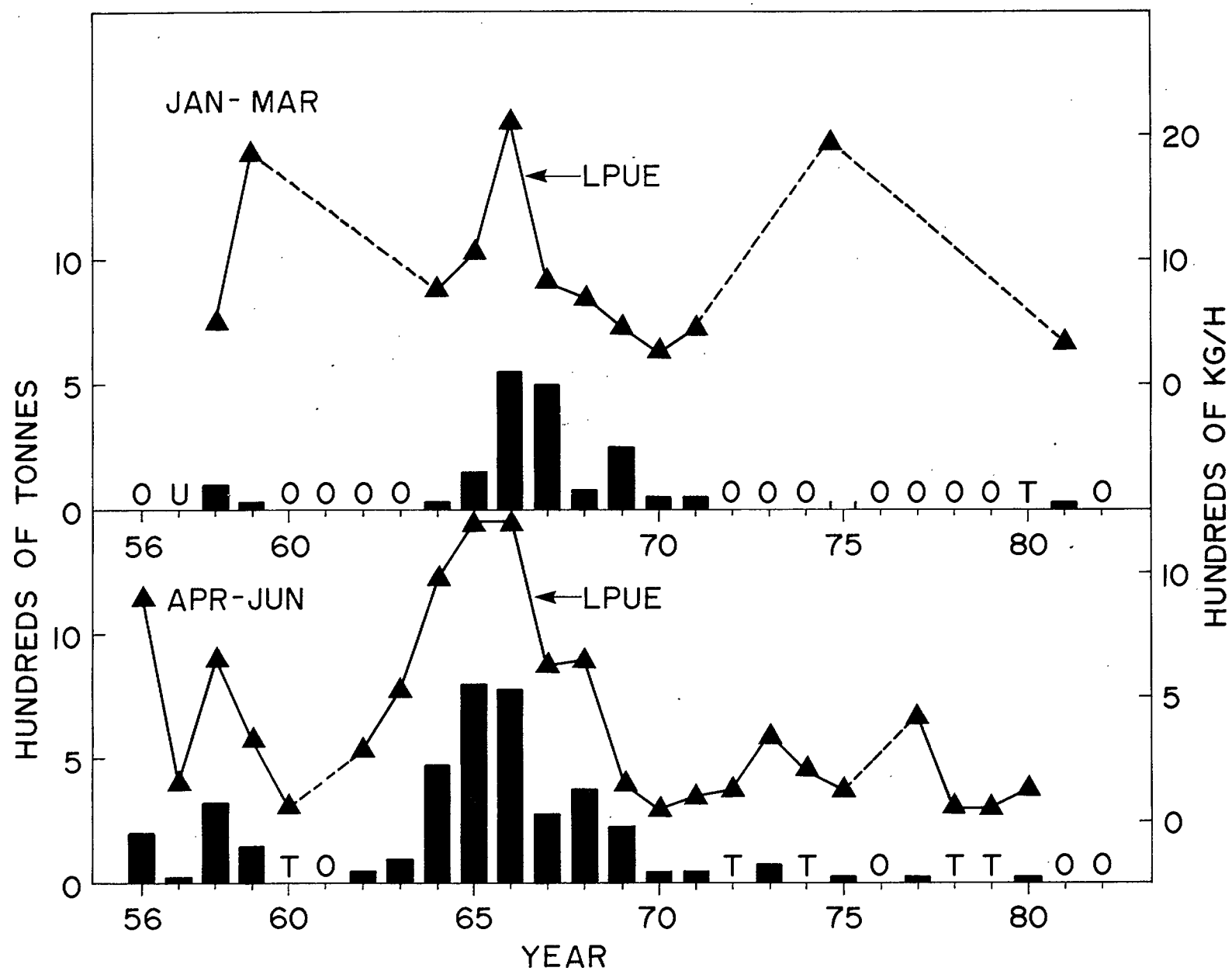


Fig. 10. Canada-U.S. landings (t) and LPUEs (kg/h) for Pacific cod from Ole Spot, January-June, 1956-82. (Source: Foucher 1984, Table 33.)

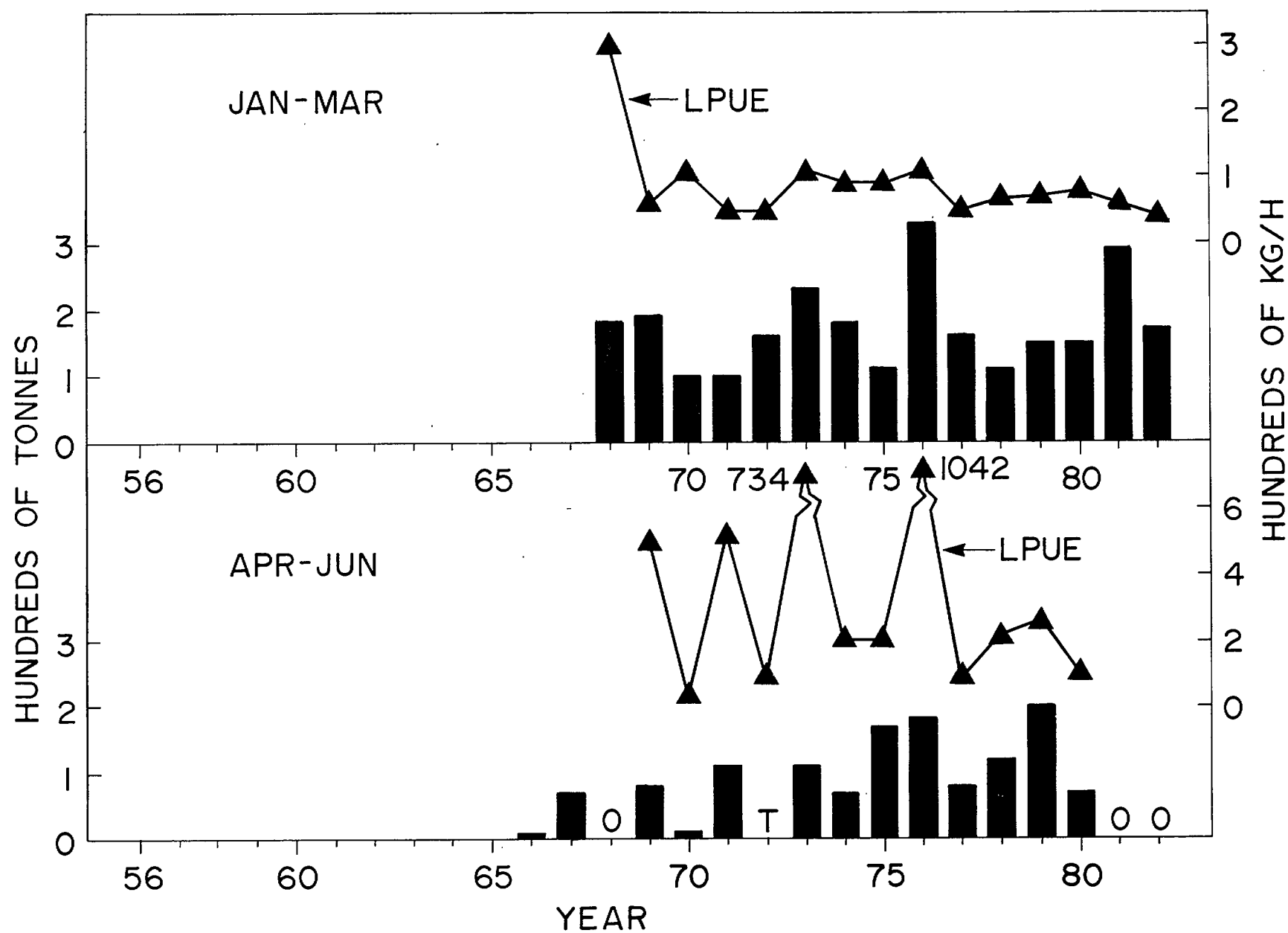


Fig. 11. Canada-U.S. landings (t) and LPUEs (kg/h) for Pacific cod from Reef Island-Cumshewa Ground, October-March 1956-82. (Source: Foucher 1984, Table 35.)

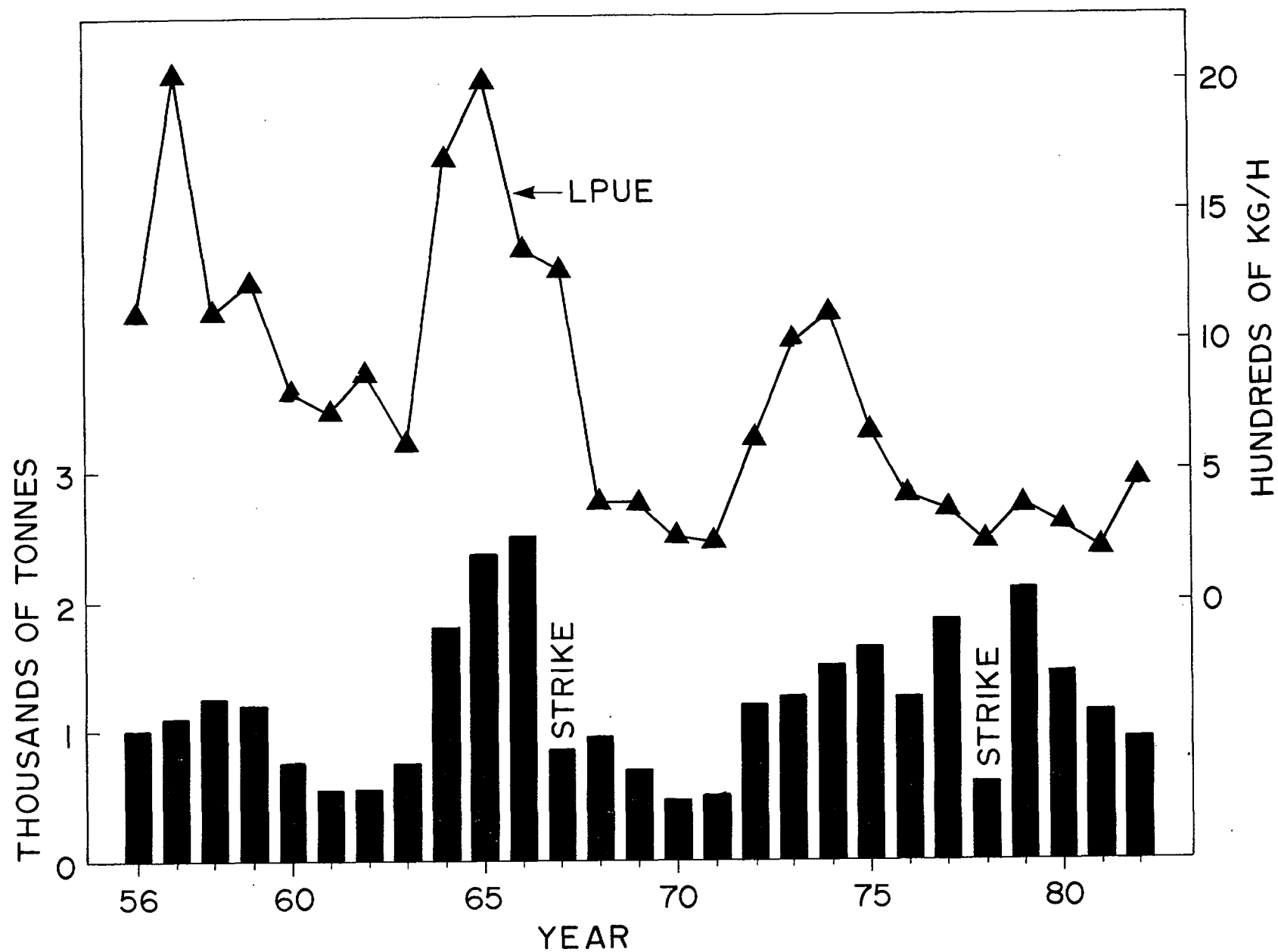


Fig. 12. Canada-U.S. landing statistics for Pacific cod from Two Peaks-Butterworth Ground, April-September 1956-82. (Source: Foucher 1984, Tables 46 and 47.)

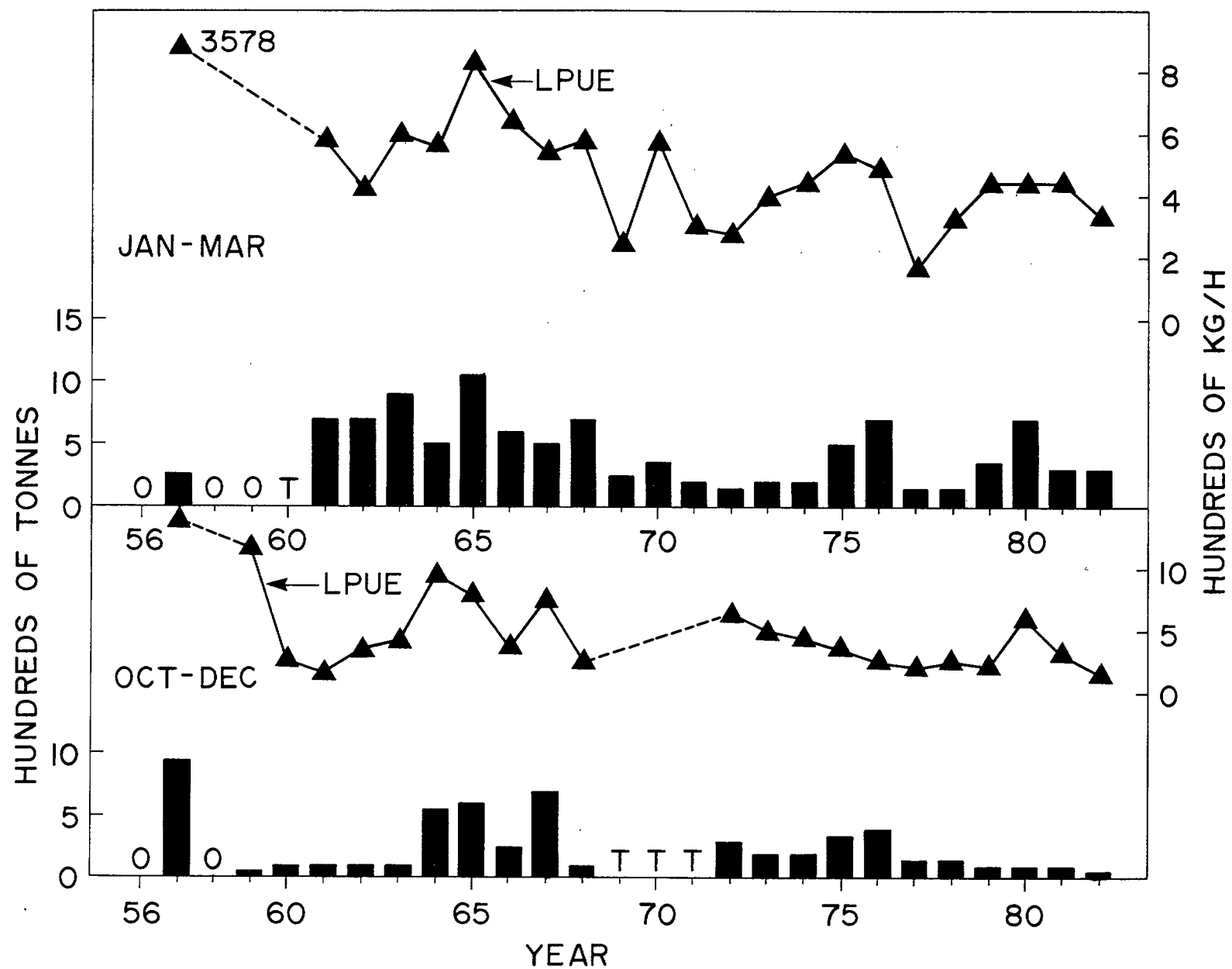


Fig. 13. Canada-U.S. landings (t) and LPUEs (kg/h) for Pacific cod from White Rocks-Bonilla Ground, October-March 1956-82. (Source: Foucher 1984, Table 48.)

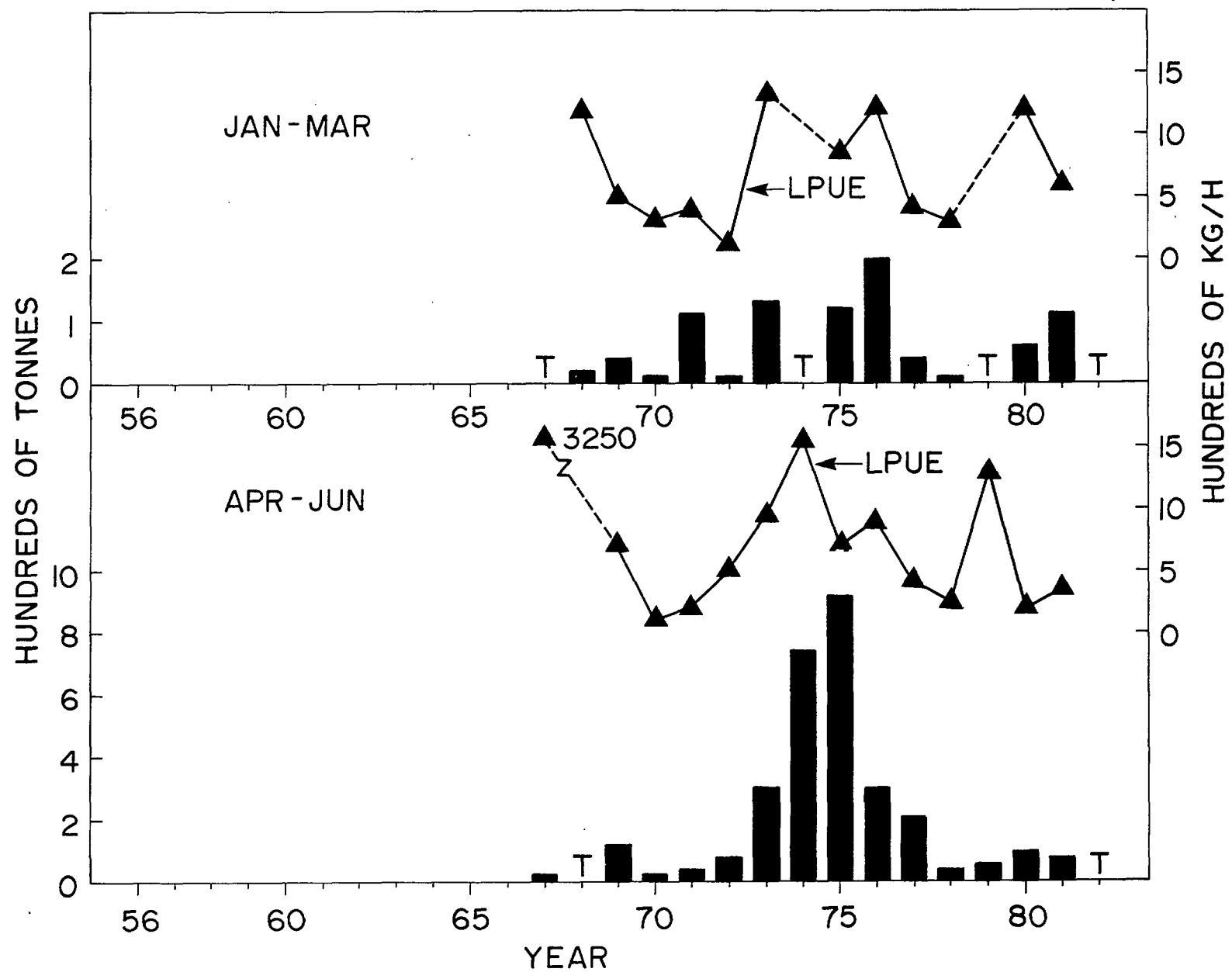


Fig. 14. Canada-U.S. landings (t) and LPUEs (kg/h) for Pacific cod from Shell Ground, January-June 1956-82. (Source: Foucher 1984, Table 49.)

Appendix Table 1. Canada-U.S. landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from Amphitrite Bank during January-March, 1965-82.

Year	Land (t)	Eff ^a (h)	1	2	3	4	5	Age 6	7	8	9	10
1965	182	641	0	0	45255	20293	5926	2076	518	0	0	0
1966	550	2764	0	14345	133458	43975	15373	428	733	190	0	223
1967	643	3062	0	17086	142134	61141	12629	9732	1386	830	0	0
1968	721	9877	0	12370	125787	64610	33306	10743	4562	704	0	0
1969	514	6675	0	4199	91763	39518	21223	13671	3317	2094	0	0
1970	298	4967	0	14496	41509	40926	12112	2638	837	278	0	0
1971	784	5895	0	55102	185832	54564	23504	5643	3448	1437	0	0
1972	1852	3907	0	80756	419881	139894	45564	8001	2975	2856	0	0
1973	2347	4859	0	45699	376818	221758	78275	25171	3544	2309	0	0
1974	1801	9429	0	19995	138011	258201	102072	27530	12670	2820	901	0
1975	2097	10809	0	16814	479876	147099	76515	36767	5795	3621	440	0
1976	1699	10822	0	12921	319320	228866	79418	8390	3719	2010	388	0
1977	1306	7256	0	33541	166520	161796	64819	20236	6820	1024	0	0
1978	882	5919	0	1241	153657	85985	52461	3104	11174	1241	1553	0
1979	303	1804	0	2959	26509	34309	18625	1390	3416	436	587	0
1980	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0
1982	620	10164	0	10832	105535	79416	33881	10761	4657	1484	991	0

^aUsed LPUE from previous April-September to calculate equivalent effort.

Appendix Table 2. Canada-U.S. landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from Amphitrite Bank during April-June, 1956-82.

Year	Land (t)	Eff (h)	Age									
			1	2	3	4	5	6	7	8	9	10
1956	560	4553	0	42219	80025	56401	29384	4455	2474	2123	0	187
1957	913	8454	0	159760	123662	56454	33412	8065	1537	768	384	0
1958	280	3333	0	5659	78221	24536	9243	888	932	0	0	0
1959	219	6083	0	3712	33476	21942	5503	929	531	0	0	199
1960	151	2904	0	628	30532	17969	6710	1021	0	0	0	0
1961	165	9706	0	0	11860	34447	14807	439	1193	0	0	0
1962	196	5765	0	71842	16181	12619	5609	1511	109	0	0	0
1963	211	2269	0	40343	38639	12973	2177	0	568	0	0	0
1964	264	930	0	25969	79689	17058	4328	254	0	0	0	0
1965	374	1879	0	38186	53474	43225	14140	4144	0	91	0	0
1966	387	1843	0	19793	103255	37777	7134	1558	931	0	0	0
1967	320	4384	0	3766	74588	42794	6207	4549	376	0	0	32
1968	160	2078	0	7395	40493	9509	471	822	0	0	0	0
1969	181	3017	0	14838	37247	15907	6043	611	1454	383	0	0
1970	169	1271	0	57040	32306	12591	1332	296	0	0	0	0
1971	260	549	930	57077	51092	13418	2078	523	120	0	0	0
1972	430	890	0	122393	81282	15235	2952	0	455	0	0	0
1973	208	1089	157	11341	34649	25888	5396	547	235	0	0	0
1974	33	170	0	2851	1981	2165	2599	1558	81	137	81	0
1975	44	280	0	4681	10147	2349	622	0	0	0	0	0
1976	254	1411	0	6379	48257	34851	925	2035	0	0	0	0
1977	159	1067	0	15323	22337	18114	6816	1299	518	518	0	0
1978	289	1720	0	28300	53428	25783	7627	1524	1437	119	0	0
1979	91	408	0	9468	20722	8265	2533	166	125	249	0	0
1980	272	2176	0	54333	42754	19979	8297	5872	0	0	0	0
1981	160	2623	0	6079	50240	12084	3295	219	1319	0	0	0
1982	70	1944	240	8263	20484	4888	172	379	0	0	0	0

Appendix Table 3. Canada-U.S. landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from Big Bank during April-June, 1956-82.

Year	Land (t)	Eff (h)	1	2	3	4	Age 5	6	7	8	9
1956	97	789	0	604	18258	12714	5278	759	343	0	0
1957	45	417	0	5878	5775	3868	1368	0	0	0	0
1958	59	702	0	0	20813	576	2503	96	96	0	0
1959	8	222	0	227	1083	1275	432	43	0	0	0
1960	36	692	0	150	7278	4284	1596	246	0	0	0
1961	18	1059	0	0	1293	3759	1617	49	129	0	0
1962	19	559	0	6958	1566	1224	543	144	11	0	0
1963	7	75	0	1911	945	425	89	16	9	0	0
1964	102	359	0	5168	2620	15873	8196	4135	592	333	0
1965	185	930	0	30249	36596	7838	2197	1019	234	234	0
1966	174	829	0	28209	14650	7927	2842	819	219	0	0
1967	32	438	0	356	9508	2505	103	128	103	76	0
1968	39	506	0	7081	3285	3610	1248	407	0	0	0
1969	82	1367	0	20894	7118	4793	1728	176	529	0	0
1970	72	541	0	22776	10655	3150	1649	545	0	44	0
1971	678	1430	0	226654	103565	13251	3138	1395	349	349	0
1972	927	1919	0	369287	94872	36725	6122	1531	1531	0	0
1973	171	895	0	24314	31985	9589	1917	684	0	0	0
1974	249	1284	0	61283	15991	27315	7822	2335	700	1283	0
1975	361	2299	0	26513	125465	4984	4676	2020	92	0	0
1976	393	2183	0	39582	91712	32340	10605	1060	527	882	0
1977	300	2013	0	28915	42141	34182	12862	2450	979	979	0
1978	255	1518	0	1654	79966	27022	1654	0	0	0	0
1979	285	1278	0	58713	39307	19946	10491	828	209	529	0
1980	166	1328	0	33300	14950	15706	9212	2343	0	0	0
1981	47	770	0	2990	17237	1337	135	724	227	0	0
1982	40	1111	0	1442	10629	3789	637	83	185	0	0

Appendix Table 4. Canada-U.S. landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from Big Bank during July-September, 1956-82.

Year	Land (t)	Eff (h)	1	2	3	4	Age 5	6	7	8	9
1956	82	667	0	3145	7115	12303	4857	0	164	0	0
1957	315	2917	0	0	50897	34073	19876	5164	781	482	222
1958	154	1833	0	1699	51236	7230	1248	1283	143	0	0
1959	101	2806	0	5735	12801	14454	2925	99	143	0	0
1960	116	2231	0	1261	29883	12528	2858	184	57	0	0
1961	31	1824	0	1240	1178	5536	2945	341	0	0	0
1962	77	2265	0	25437	8129	3065	693	130	169	0	0
1963	136	1462	0	52267	10510	5066	1743	187	0	0	0
1964	25	88	0	0	7417	2327	875	52	0	0	0
1965	426	2141	0	29503	91000	38060	6579	1172	881	0	0
1966	532	2533	0	454	113877	72842	18701	10543	1482	0	0
1967	74	1014	0	4950	9057	7446	841	408	0	0	0
1968	40	519	0	8156	5701	2807	596	280	0	0	0
1969	85	1417	0	13330	17585	6290	1296	399	178	0	0
1970	200	1504	48	61352	20003	11486	3136	309	323	82	0
1971	418	882	3376	142990	48323	6517	746	563	569	122	0
1972	572	1184	7922	185977	62082	15264	2949	723	152	0	0
1973	199	1042	127	38942	29863	16140	2368	3368	596	0	0
1974	356	1835	0	108618	27557	29563	9113	3683	572	499	0
1975	244	1554	0	60489	38387	11982	2675	2443	0	349	0
1976	410	2278	0	56537	92074	32709	8221	1015	1015	0	0
1977	197	1322	0	31435	35078	15420	592	2202	0	0	0
1978 ^a	91	542	0	0	0	0	0	0	0	0	0
1979	286	1283	496	46734	44409	23041	7458	2447	440	0	0
1980	113	904	3475	17329	15470	7098	4747	831	0	0	0
1981	62	1016	2520	16793	4403	4677	1609	121	244	0	0
1982	68	1889	0	32473	2263	2980	0	0	0	0	0

^a No samples available to estimate age composition.

Appendix Table 5. Canadian landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from Clo-oose during January-March, 1965-82.

Year	Land (t)	Eff ^a (h)	Age									
			1	2	3	4	5	6	7	8	9	10
1965	98	345	0	0	24368	10928	3190	1116	279	0	0	0
1966	189	950	0	5007	46292	15310	5369	146	290	73	0	73
1967	278	1324	0	7088	58633	25317	5266	4050	608	304	0	0
1968	66	904	0	1109	11295	5795	2988	974	408	68	0	0
1969	3	39	0	25	537	232	125	80	20	12	0	0
1970	58	967	0	2762	7903	7774	2292	492	150	43	0	0
1971	36	271	0	2659	8996	2644	1130	271	160	64	0	0
1972	183	386	0	7906	41315	13749	4468	756	275	275	0	0
1973	112	232	0	2223	18224	10715	3790	1203	183	110	0	0
1974	2	10	0	22	151	283	112	30	14	3	1	0
1975	36	186	0	266	7541	2320	1208	580	96	60	12	0
1976	7	45	0	54	1318	945	328	35	16	8	2	0
1977	9	50	0	229	1134	1103	443	136	46	6	0	0
1978	11	74	0	15	1916	1073	655	39	140	15	20	0
1979	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0
1982	1	16	0	18	174	131	56	18	8	2	2	0

^aUsed LPUE from previous April-September to calculate equivalent effort.

Appendix Table 6. Canadian landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from Clo-oose during April-June, 1956-82.

Year	Land (t)	Eff (h)	Age									
			1	2	3	4	5	6	7	8	9	10
1956	41	333	0	257	7717	5375	2230	321	144	0	0	0
1957	27	250	0	4725	3657	1669	989	238	46	22	12	0
1958	13	155	0	1983	3722	152	215	30	0	0	0	0
1959	30	833	0	508	4586	3006	754	128	73	0	0	28
1960	60	1154	0	127	7338	7410	1675	1657	0	0	0	0
1961	54	3176	0	3881	11274	4846	144	390	0	0	0	0
1962	64	1882	0	23439	5279	4117	1830	492	34	0	0	0
1963	258	2774	0	70408	34766	15632	3252	626	376	0	0	0
1964	70	246	0	11383	6483	7011	4196	147	118	0	0	0
1965	263	1322	0	43006	52030	11142	3120	1448	335	335	0	0
1966	278	1324	0	96928	29109	21677	3406	3716	0	0	0	0
1967	105	1438	0	1174	31197	8218	336	419	336	252	0	0
1968	43	558	0	1988	10914	2555	94	222	0	0	0	0
1969	24	400	0	6115	2083	1403	505	52	155	0	0	0
1970	43	323	0	6816	7703	6271	1636	159	136	0	0	0
1971	253	534	0	84577	38645	4944	1171	521	130	130	0	0
1972	289	598	0	115128	29577	11449	1908	478	478	0	0	0
1973	60	314	0	3604	18224	1133	2316	334	128	0	0	0
1974	27	139	0	17384	1933	459	60	100	0	0	0	0
1975	13	83	0	2934	2478	718	255	98	39	0	0	0
1976	3	17	0	146	566	375	35	6	3	8	0	0
1977	12	81	0	1157	1686	1367	515	98	40	40	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0
1979	3	13	0	261	548	267	116	26	3	0	3	0
1980	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0
1982	2	56	0	72	532	190	32	4	10	0	0	0

Appendix Table 7. Canada-U.S. landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from Swiftsure Bank during April-June, 1956-82.

Year	Land (t)	Eff (h)	1	2	3	4	Age 5	6	7	8	9
1956	12	98	0	74	2258	1572	653	94	43	0	0
1957	62	574	0	10850	8397	3834	2269	548	104	52	27
1958	53	631	0	0	18695	519	2251	86	86	0	0
1959	112	3111	0	1898	17119	11222	2814	476	272	0	101
1960 ^a	73	1404	0	0	0	0	0	0	0	0	0
1961 ^a	5	294	0	0	0	0	0	0	0	0	0
1962 ^a	8	235	0	0	0	0	0	0	0	0	0
1963	218	2344	0	59491	29377	13208	2748	529	318	0	0
1964	241	849	0	12212	6192	37507	19364	9768	1395	785	0
1965	57	286	0	9321	11278	2413	676	315	72	72	0
1966	56	267	0	9078	4716	2551	915	264	71	0	0
1967	30	411	0	431	9056	2132	85	203	72	0	0
1968	17	221	0	786	4314	1012	38	89	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0
1971	115	243	0	38445	17565	2247	532	237	59	59	0
1972	273	565	0	108754	27940	10815	1802	451	451	0	0
1973	162	848	0	9729	49203	3057	6255	904	347	0	0
1974	464	2392	0	135205	15150	54863	21119	1148	688	1378	0
1975	407	2592	0	91844	77558	22452	7959	3061	1224	0	0
1976	516	2867	0	25022	97151	64506	5865	977	586	1367	0
1977	344	2309	0	33153	48325	39192	14751	2811	1123	1123	0
1978	179	1065	0	11022	55198	11701	3222	3646	0	0	0
1979	377	1691	0	32580	64393	35346	16752	3996	307	307	0
1980	142	1136	0	28485	12789	13435	7880	2002	0	0	0
1981	400	6557	0	25446	146699	11374	1157	6168	1928	0	0
1982	176	4889	0	6344	46767	16671	2802	369	812	0	0

^a No samples available to estimate age composition.

Appendix Table 8. Canada-U.S. landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from Area 5A during April-June, 1956-82.

Year	Land (t)	Eff (h)	Age									
			1	2	3	4	5	6	7	8	9	10
1956	320	1584	0	119262	45159	8892	523	523	0	0	0	0
1957	833	1049	0	183219	129640	43838	12364	4121	375	1124	0	0
1958	334	9027	0	2546	63646	37703	13335	2303	1455	242	0	0
1959	347	1176	0	26735	84450	24755	5234	283	0	0	0	0
1960	138	1438	0	7332	15909	10015	8913	4600	335	527	288	0
1961	64	914	444	4488	8998	4754	2111	822	422	178	0	0
1962	46	793	0	3325	4439	4370	2177	2142	634	0	51	0
1963	67	944	0	7646	5480	8898	2870	1044	52	104	0	0
1964	210	824	0	49843	27255	9521	4667	1213	747	93	0	0
1965	276	762	0	12903	48603	24641	6500	2910	1164	291	0	0
1966	347	1248	0	63381	35182	10474	14637	6714	2283	1209	269	134
1967	237	1362	0	27133	35607	16947	3253	1969	342	342	0	0
1968	370	2176	0	38087	30845	37014	22128	4560	671	805	0	0
1969	157	2013	0	15236	19634	13706	6247	3761	2805	1657	637	64
1970	78	1099	0	23006	10975	1509	1773	113	339	0	0	0
1971	211	1758	0	60865	21675	8999	4064	968	194	0	0	0
1972	423	1192	0	80328	72143	36167	1142	571	0	0	0	0
1973	333	922	0	41417	49948	22625	7913	247	1484	0	0	0
1974	458	1659	0	53494	61089	31370	14694	1816	1651	991	0	0
1975 ^a	417	927	0	0	0	0	0	0	0	0	0	0
1976	425	1660	0	121588	78851	3633	6411	1282	1496	427	0	0
1977	406	2171	0	141380	57087	18286	4460	1338	446	0	0	0
1978	594	1817	1760	105320	134657	36965	11148	3520	0	0	0	0
1979	480	1143	0	210976	33669	20365	3530	2987	0	0	0	0
1980	315	1098	0	100800	46694	31129	3891	1668	1112	0	0	0
1981	219	1033	0	100418	18324	1808	0	0	0	0	0	0
1982	154	1055	0	42964	34605	5517	418	84	0	0	0	0

^aNo samples available to estimate age composition.

Appendix Table 9. Canada-U.S. landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from Area 5A during July-September, 1956-82.

Year	Land (t)	Eff (h)	1	2	3	4	Age 5	6	7	8	9
1956	376	1861	0	118693	17691	20908	0	3538	0	0	0
1957	787	991	6268	248276	56759	30643	5223	696	348	0	0
1958	181	4892	0	1380	34490	20431	7227	1248	788	131	0
1959	157	532	1440	27484	21411	9516	2254	438	63	0	0
1960	60	625	0	825	9361	5980	3320	969	82	82	0
1961	10	143	69	701	1406	743	330	128	66	28	0
1962	79	1362	0	23599	6917	4476	1701	0	296	0	0
1963 ^a	183	2577	0	0	0	0	0	0	0	0	0
1964	148	580	0	26361	13006	5830	3189	698	747	0	0
1965	208	575	0	44224	14687	18032	3835	653	0	163	0
1966	393	1414	0	100855	51712	15411	1199	1712	342	0	0
1967	245	1408	0	40476	29478	14243	4237	1442	0	0	270
1968	168	988	0	29133	16863	16109	4730	1234	343	0	137
1969	119	1526	0	17891	19022	9339	1868	639	393	0	0
1970	56	789	0	13244	11274	1192	104	0	0	104	0
1971	181	1508	0	87290	9381	1382	395	296	0	0	0
1972	230	648	0	43677	39227	19665	621	311	0	0	0
1973	154	427	1122	29178	39038	9379	160	1283	0	0	0
1974	299	1083	0	104131	19319	12194	548	822	0	0	0
1975 ^a	203	451	0	0	0	0	0	0	0	0	0
1976	611	2387	0	193367	121190	19135	2014	0	0	0	0
1977	261	1396	0	125411	35351	4882	2357	337	0	0	0
1978	289	884	0	35703	56751	32772	6128	1066	799	0	0
1979	327	779	5111	77821	56882	25061	0	0	0	0	0
1980	183	638	0	58560	27127	18085	2261	969	646	0	0
1981	34	160	0	15590	2845	281	0	0	0	0	0
1982	74	510	0	30290	13583	770	634	0	0	0	0

^aNo samples available to estimate age composition.

Appendix Table 10. Canada-U.S. landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from Area 5B during April-June, 1956-82.

Year	Land (t)	Eff (h)	1	2	3	4	5	Age 6	7	8	9	10	11
1956	187	1005	0	48489	13450	1448	138	4483	0	0	966	0	0
1957	230	655	0	62774	28168	7646	1408	503	0	0	0	101	0
1958	338	1080	0	29944	62137	20831	3787	1420	0	118	118	0	0
1959	249	1137	0	2126	44972	22977	7523	3352	818	0	0	0	0
1960	159	850	0	1737	23124	18906	3821	893	645	248	248	0	0
1961	114	1326	0	637	3011	7064	10394	6630	579	232	203	203	0
1962	109	712	0	4498	934	1524	2286	5826	5211	3245	787	123	147
1963	227	1816	0	36010	29566	25775	1516	758	569	190	379	0	0
1964	294	719	0	91785	30189	6769	4738	1895	0	0	0	0	0
1965	751	1250	0	61244	115854	63286	1786	6890	4338	1786	0	0	0
1966	437	1507	0	42050	29785	24260	28168	7952	1483	539	270	270	0
1967	480	2540	0	0	36498	47661	15929	14549	6647	2759	1380	0	0
1968	187	1716	0	32090	6686	13505	10028	2942	401	1203	0	0	0
1969	127	1296	0	1751	5961	6356	5198	904	4774	2429	169	565	141
1970 ^a	57	3800	0	0	0	0	0	0	0	0	0	0	0
1971	239	3677	0	14672	1321	4340	4057	9105	6605	5048	1038	519	472
1972	857	4842	0	155276	54618	1716	5719	28596	1716	26594	4861	2288	4575
1973	829	4166	0	17104	64491	155340	28320	3365	8692	0	0	3084	0
1974	859	4130	0	85557	102785	39128	41756	19272	876	2628	0	0	0
1975	653	2561	0	187448	122871	32463	3142	0	2094	1047	0	0	0
1976	268	1252	0	50854	61154	12488	2446	0	901	0	901	0	0
1977	232	1813	0	76858	26936	7662	5627	1437	718	479	0	0	0
1978	197	791	890	16552	61937	7475	178	356	445	712	0	445	0
1979	466	2354	8546	39785	18714	33449	24313	19893	2652	0	0	0	0
1980 ^a	314	1670	11655	43161	57378	12039	768	2049	512	0	0	512	0
1981 ^a	381	2177	0	0	0	0	0	0	0	0	0	0	0
1982	289	2449	9093	38370	47907	10646	3105	1331	444	0	0	0	0

^aNo samples available to estimate age composition.

Appendix Table 11. Canada-U.S. landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from Area 5B during July-September, 1956-82.

Year	Land (t)	Eff (h)	1	2	3	4	5	Age 6	7	8	9	10	11
1956	257	1382	0	66641	18485	1991	190	6162	0	0	1327	0	0
1957	64	182	0	15481	6556	1220	96	311	96	0	167	0	0
1958	108	345	3215	24685	6823	1000	0	0	0	0	0	0	0
1959	82	374	0	270	12937	7954	2185	172	933	98	0	0	0
1960	177	947	0	390	4854	16686	12396	5461	1344	1430	780	0	0
1961	13	151	0	156	477	876	1044	480	146	65	0	0	0
1962	123	804	222	15031	2791	2791	983	5835	1268	2378	190	222	0
1963	153	1224	0	22816	14647	16506	1408	282	451	225	0	0	0
1964	376	919	0	6506	65292	18588	14755	8597	2440	0	0	0	0
1965	368	612	0	1551	21981	37942	23531	4195	1551	456	0	0	0
1966	254	876	0	20019	15232	21262	3730	1181	497	249	0	0	0
1967	250	1323	0	4137	30667	12477	12280	788	4728	328	0	263	0
1968	117	1073	0	22064	6900	9090	2273	289	578	0	124	0	0
1969	140	1429	1023	7394	11951	21437	1070	2465	1163	0	0	0	0
1970 ^a	44	2933	0	0	0	0	0	0	0	0	0	0	0
1971	204	3138	0	12523	1128	3705	3463	7772	5638	4309	886	443	403
1972	605	3418	0	179873	22224	4362	1246	0	0	0	0	0	0
1973	416	2090	0	8583	32362	77951	14211	1688	4362	0	0	1548	0
1974	501	2409	0	49900	59948	22821	24354	11240	511	1533	0	0	0
1975	876	3435	0	184072	95445	46287	25117	1076	4665	718	1435	0	0
1976	635	2967	0	30652	92379	39742	21562	15009	3171	7187	1057	634	0
1977	255	1992	0	53171	30222	10655	3073	2561	1639	615	512	0	0
1978	685	2751	1692	23926	133891	65496	7975	5317	2417	0	0	967	0
1979	398	2010	1551	98001	32564	15817	7133	0	0	0	0	0	0
1980	299	1590	13004	56469	25164	25766	0	0	0	0	0	0	0
1981	70	400	0	15503	11828	1729	1575	247	0	0	0	0	0
1982	24	203	755	3186	3978	884	258	111	37	0	0	0	0

^aNo samples available to estimate age composition.

Appendix Table 12. Canada-U.S. landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from Horseshoe during April-June, 1958-82.

Year	Land (t)	Eff (h)	1	2	3	4	Age 5	6	7	8	9
1958	705	403	0	2989	303375	14290	11635	1293	0	0	0
1959	360	311	0	66844	51785	35405	10260	1159	0	0	0
1960	241	664	0	31919	52342	21919	3121	502	0	0	0
1961	27	127	0	0	6873	4239	491	312	10	49	0
1962	10	26	0	2164	2294	284	34	43	0	0	0
1963	500	373	0	67863	131799	26418	7880	298	0	0	0
1964	1062	665	0	418921	78937	37739	14593	3516	0	0	0
1965	1419	1176	0	16967	486487	128283	23217	6790	132	0	0
1966	1967	1335	0	31569	561328	135437	55837	7679	0	0	0
1967	578	600	0	54432	115407	44563	11646	5772	2207	0	0
1968	462	1287	0	5084	139070	31376	5458	954	716	198	195
1969	278	1173	0	128	7926	79568	2109	3718	0	170	0
1970 ^a	9	158	0	0	0	0	0	0	0	0	0
1971	132	482	0	10721	15984	19104	2340	583	0	0	0
1972	297	363	0	152852	19678	9243	2874	0	128	0	0
1973	777	599	0	77503	248447	35488	3432	4144	888	892	0
1974	609	617	0	219560	56807	31219	16106	4894	1304	0	0
1975	505	1112	0	10414	160936	42398	17409	2153	856	0	0
1976	338	559	1145	60281	79290	11404	863	4336	572	0	0
1977	149	403	0	34054	31501	10069	756	1130	169	0	0
1978	356	685	0	9781	100135	32585	4078	1444	729	0	0
1979	878	1416	0	232831	109023	115642	16380	4705	0	156	0
1980	762	1581	0	65284	261796	45413	13577	0	311	0	0
1981 ^a	314	1241	0	0	0	0	0	0	0	0	0
1982	203	981	651	28607	55232	14204	2458	53	462	338	0

^aNo samples available to estimate age composition.

Appendix Table 13. Canada-U.S. landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from Horseshoe during July-September, 1958-82.

Year	Land (t)	Eff (h)	1	2	3	4	Age 5	6	7	8	9
1958	127	73	0	3501	39974	8096	841	164	0	0	0
1959	278	240	0	82548	28965	8075	1999	0	0	0	0
1960	156	430	0	31922	26534	11464	1880	341	0	0	0
1961	5	24	0	0	419	902	612	137	115	20	11
1962	89	232	0	21021	17908	2127	510	268	0	0	0
1963	122	91	0	42428	15573	2697	613	0	0	0	0
1964	171	107	0	13359	38961	12824	1363	395	0	0	0
1965	796	659	0	71395	173227	37884	8823	2692	182	0	0
1966	1034	702	0	44868	111524	143619	27773	3754	252	0	0
1967	482	500	0	50877	78148	33754	12623	1178	853	426	0
1968	134	373	0	1314	33231	10624	2693	294	207	0	0
1969	79	333	0	23103	8560	4582	1084	99	27	0	0
1970 ^a	22	386	0	0	0	0	0	0	0	0	0
1971	7	26	0	568	847	1013	124	31	0	0	0
1972	282	344	0	163183	21467	4179	570	0	570	0	0
1973	522	402	0	100809	126732	6576	3272	987	0	0	0
1974	720	729	0	160126	62780	62548	20598	890	0	0	656
1975	252	555	0	10729	85166	6084	8297	0	332	0	0
1976	543	898	0	69911	152224	28944	6692	632	0	0	0
1977	137	370	0	19791	35177	2878	353	529	0	0	0
1978	103	198	0	4818	33816	4074	920	175	0	0	0
1979	382	616	0	135294	42827	22376	856	809	0	0	0
1980	215	446	0	7659	46572	37848	23	2362	0	0	0
1981 ^a	121	478	0	0	0	0	0	0	0	0	0
1982	110	531	0	31217	12607	5065	1159	0	0	0	0

^aNo samples available to estimate age composition.

Appendix Table 14. Canada-U.S. landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from Two Peaks-Butterworth during April-June, 1959-82.

Year	Land (t)	Eff (h)	Age									
			1	2	3	4	5	6	7	8	9	10
1959	346	280	0	62082	42601	32299	2948	2467	1081	0	0	0
1960	144	182	0	2994	54660	6465	2791	407	750	0	0	0
1961	327	450	0	8439	81047	30248	3633	941	1180	366	0	52
1962	129	148	0	7413	19826	12548	2188	2233	401	43	0	0
1963	298	492	0	13303	58790	39025	8871	5194	1521	0	0	0
1964	469	278	0	160859	56045	24169	5273	844	0	0	0	0
1965	270	134	0	3473	81705	27091	3449	932	0	0	0	0
1966	2037	1496	0	79725	228638	282303	76162	5902	5341	0	776	385
1967	267	208	0	12738	30696	21141	16100	4867	2123	797	0	0
1968	623	1698	0	15972	140891	28597	20140	12974	4412	1448	0	243
1969	304	802	0	57532	15699	29580	11248	1687	2724	782	332	66
1970	194	755	0	17523	43613	13596	2619	3074	1754	969	0	0
1971	153	683	0	60340	11171	5463	3833	326	163	245	0	0
1972 ^a	308	487	0	0	0	0	0	0	0	0	0	0
1973	278	277	0	138862	54628	13971	0	1043	0	0	0	0
1974	110	99	0	27745	11077	6487	3144	1397	0	0	49	0
1975	468	724	0	102663	78597	43452	13560	2844	1249	1258	435	0
1976	358	895	0	24933	83384	28389	4763	2498	0	476	0	0
1977	303	851	0	17167	54983	33493	4082	8282	2040	0	0	0
1978	250	1059	0	6321	26843	40415	15061	1278	1913	372	0	0
1979	667	1728	0	303981	23480	44393	18935	8365	673	0	0	562
1980	407	1343	0	65493	53611	44884	12395	2929	3014	159	0	0
1981	642	3379	0	53939	80374	95062	33380	2136	2136	0	0	0
1982	477	990	0	19911	87752	56779	12645	3741	568	0	531	0

^aNo samples available to estimate age composition.

Appendix Table 15. Canada-U.S. landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from Two Peaks-Butterworth during July-September, 1959-82.

Year	Land (t)	Eff (h)	Age									
			1	2	3	4	5	6	7	8	9	10
1959	857	694	252	119383	73409	76086	29923	8056	1840	139	0	0
1960	600	759	0	41637	68370	62702	12554	17354	5525	523	701	80
1961	216	298	0	14892	36205	22302	2707	1307	63	467	0	0
1962	402	461	0	33235	27632	27258	23525	8711	2987	0	1119	0
1963	457	754	3837	80217	39211	47467	12573	5166	649	2165	0	213
1964	1304	772	0	275258	160355	74293	15486	4507	2042	0	0	0
1965	2098	1043	0	55200	366546	239871	41917	9723	736	1155	0	0
1966	455	334	2843	46260	24232	31221	22884	10448	1880	46	0	0
1967	585	456	0	223179	53841	14735	4182	969	311	0	0	311
1968	323	880	503	35374	28168	26665	11389	2458	1615	0	503	0
1969	403	1063	0	22752	16532	35486	24089	7968	2591	306	0	306
1970	236	918	31	27242	28602	20625	7718	2267	454	61	0	756
1971	348	1554	4106	48837	23087	10766	15207	3551	3108	2331	0	0
1972	873	1381	0	309230	78093	42189	12119	0	3591	0	3591	0
1973	982	980	160	118063	101644	107058	20559	16639	1046	729	1713	567
1974	1409	1274	1878	322427	105806	142120	38817	10017	2505	2505	0	0
1975	1204	1864	0	62220	118115	69602	64330	0	26014	8788	2461	0
1976	875	2188	130	158143	157453	15663	31004	521	8223	0	780	0
1977	1555	4368	496	528112	199758	110667	26072	6198	4693	0	331	0
1978	353	1496	9448	25028	52496	22062	10871	840	631	547	0	0
1979	1415	3666	6259	359129	76550	104907	33296	10757	1933	2350	0	0
1980	1059	3495	0	350100	125478	25819	8778	6197	0	0	0	0
1981	514	2705	1439	166734	40391	49266	3289	3967	2159	0	0	0
1982	457	948	1156	45173	62593	43568	10473	2287	452	297	182	0

Appendix Table 16. Canada-U.S. landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from White Rocks-Bonilla during January-March, 1961-82.

Year	Land (t)	Eff (h)	Age									
			1	2	3	4	5	6	7	8	9	10
1961	720	911	0	3535	182642	74586	18269	909	957	1377	0	0
1962	679	935	0	28131	108617	68249	28417	10506	3190	1682	713	0
1963	872	1000	0	28779	182214	95816	31568	4191	7497	1940	1082	0
1964	506	835	0	1033	115066	54435	34397	5201	762	296	296	0
1965	1068	632	0	11206	250823	127943	38914	11618	906	1039	111	0
1966	613	305	0	2921	90754	84077	18776	11891	0	208	0	0
1967	498	366	0	23984	45277	53366	27763	13653	3637	1223	227	0
1968	692	539	0	2211	208173	46736	23359	11967	2172	951	652	0
1969	268	730	0	32974	25632	23804	8565	1128	1088	0	0	0
1970	362	955	0	3337	107649	19550	1060	2546	283	95	0	0
1971	224	872	0	83093	22749	11858	6875	257	0	0	0	0
1972	132	589	0	27960	21777	12641	5632	344	0	344	0	0
1973	179	283	0	13154	41085	18025	5684	2516	731	0	0	0
1974	184	184	0	15069	38215	20118	3496	389	0	0	389	0
1975	520	470	0	14862	122548	46250	21364	5751	2421	654	1639	305
1976	720	1115	0	1737	194422	64564	18807	12738	3267	267	817	0
1977	152	380	0	28273	27794	17102	3573	1140	0	0	0	0
1978	169	475	0	2104	58860	17299	3213	1223	333	157	0	0
1979	362	1534	0	34399	22022	62388	10386	2072	1895	241	0	0
1980	716	1855	0	34668	168104	89796	23871	10001	3294	1091	418	0
1981	308	1017	0	3668	43075	57614	25955	3262	2310	0	0	0
1982	301	1584	0	28154	68455	18027	13001	4552	999	301	0	0

Used LPUE from previous April-September to calculate equivalent effort.

Appendix Table 17. Canada-U.S. landings of Pacific cod(t), standardized equivalent effort(h) and no. landed by age from White Rocks-Bonilla during October-December, 1957-82.

Year	Land (t)	Eff (h)	1	2	3	4	Age 5	6	7	8	9
1957	930	460	0	298992	87671	14888	9098	2068	827	0	0
1958	0	0	0	0	0	0	0	0	0	0	0
1959	43	35	0	17179	3530	689	86	43	0	0	0
1960	105	133	0	27912	11482	5648	1074	373	187	0	0
1961	89	123	0	23832	7443	4736	0	1240	226	113	0
1962	113	130	2998	42426	7184	2546	1075	283	57	0	0
1963	86	142	7909	29610	8150	1736	772	48	0	0	0
1964	547	324	0	201851	59496	8150	1630	272	0	272	0
1965	577	287	2029	82971	78912	47122	12626	902	451	451	0
1966	274	201	1529	79406	18116	13881	3412	1294	0	0	0
1967	719	560	0	237737	45731	22239	6264	1253	0	0	0
1968	84	229	2665	5197	10100	6369	1412	613	293	0	0
1969	11	29	114	2938	740	4	106	12	4	0	0
1970	5	19	0	762	665	283	37	0	30	0	0
1971	7	31	22	2014	1012	430	72	25	40	0	0
1972	297	470	1521	80268	21764	9127	2106	1638	585	0	0
1973	208	208	15372	20954	16403	17862	11851	2233	1116	0	86
1974	196	177	242	50159	19967	8293	1530	0	161	0	161
1975	351	543	538	119007	37156	14001	7718	897	0	179	0
1976	414	1035	0	36484	48886	40522	10815	5047	1875	288	288
1977	143	402	0	68753	15199	4113	268	1073	0	0	0
1978	125	530	5895	7161	21045	11302	2387	682	244	0	0
1979	86	223	0	31899	5443	6247	3360	379	0	0	0
1980	122	403	4575	21583	22014	3929	1722	0	0	0	0
1981	95	500	9132	32862	11342	1687	2559	582	0	0	0
1982	69	143	460	9614	3637	223	0	0	0	0	0

