

*Brookings*

**Otter Trawl Investigations**

**Annual Report**

**January 1, 1969-December 31, 1969**

**Fish Commission of Oregon  
Research Division**

**January 1971**

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## Otter Trawl Investigations

### Annual Report

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#### Personnel

Several changes and additions were made in the staff of Otter Trawl Investigations during the year. In July 1969, Terry Link was transferred to the new foreign fisheries position. Mike Hosie joined the staff in July as an Aquatic Biologist 1 on the PL 88-309 shrimp study. In September, Brent Forsberg was hired as an Aquatic Biologist 1 to fill the PL 88-309 bottomfish position vacated by Link.

Seasonal employees included Jeff Marliave, Roy Stein, and Douglas Hamilton for the June-September season and Mike Tagliavento during the September-November period.

#### Fleet Activities

The market for shrimp remained firm through August. At that time some weakness occurred resulting in the closing down of most shrimp operations in Newport. Many boats switched to tuna fishing during August thus reducing the shrimp fleet in Garibaldi and Astoria. The fleet from Coos Bay remained in the shrimp fishery although some vessels changed grounds, some moving north as far as Gray's Harbor, Washington.

The market for trawl caught fish was firm throughout the year. Landings, however, were down through September due to the fact that many vessels were committed to the shrimp and later the tuna fishery. By October, however, most vessels had returned to the fishery. October landings were two and one-half times the October 1968 landings. Table 1 lists the vessels landing groundfish and shrimp by port of landing.

Table 1. Vessels Landing Groundfish and Shrimp in Oregon by Port by Fishery, 1969

Boat	Port of Landing						Fishery		Boat	Port of Landing						Fishery	
	A	G	N	C	P	B	S	G		A	G	N	C	P	B	S	G
Advance 1/	x	*	-	-	-	-	+	+	Kodiak	*	-	-	-	-	-	-	+
Al-W 1/	-	-	-	*	-	-	+	-	Lituya 1/	*	-	-	-	-	-	-	+
Amak	x	-	-	x	*	-	+	-	Madeline J	-	x	*	-	-	-	+	+
Aquarius 1/	-	-	-	-	-	*	-	+	Marian F	*	-	-	-	-	-	-	+
Azalea 1/	-	-	-	*	-	-	+	-	Margareta	*	-	-	-	-	-	-	+
Barbara S 1	*	-	-	-	-	-	-	+	Margaret E	*	-	-	-	-	-	-	+
Bonnie C 1/	-	-	-	*	-	-	+	+	Mari Joann 1/	x	*	x	-	-	-	+	-
Bristol	-	-	-	x	*	-	+	-	Martle 1/	-	-	*	-	-	-	-	+
Christina J	-	-	-	*	-	-	+	-	McKinley 1/	*	-	-	-	-	-	-	+
Columbia	-	-	-	*	-	-	-	+	Mitkof	*	-	-	-	-	-	+	+
Coolidge II	*	-	-	-	-	-	+	-	Miss Connie	-	-	*	-	-	-	+	+
Corsair	-	x	*	-	-	-	+	-	Morning Star	-	-	-	*	-	-	-	+
Coral Sea 1/	*	-	-	-	-	-	-	+	Nel-Ron-Dic	-	-	-	*	-	-	+	-
Daisy 1/	-	-	*	-	-	-	-	+	Nestucca	*	-	-	-	-	-	+	+
Daphne 1/	-	-	-	*	x	-	+	-	New Mexico	*	-	-	-	-	-	-	+
Dare II	x	x	-	*	-	-	+	+	Oregonian	-	-	*	-	-	-	+	+
Diana 1/	-	-	-	*	-	-	+	-	Orion 1/	-	*	-	x	-	-	+	-
Defender	-	x	-	*	-	-	+	-	Owners Joy 1/	*	-	-	-	-	-	+	-
Destiny	-	-	*	-	-	-	-	+	Pacific	-	-	-	*	-	-	-	+
Donna B 1/	-	-	-	-	-	*	-	+	Pacific Queen	-	-	*	-	-	-	-	+
Elaine Dell	-	-	-	*	-	-	+	-	Panda	x	-	-	x	-	*	+	+
Empire II 1/	-	-	-	*	-	-	+	-	Paragon 1/	*	-	-	-	-	-	-	+
Empress	*	-	-	-	-	-	-	+	Pisces	-	x	-	*	-	-	+	-
Flyer 1/	-	-	-	*	-	-	+	-	Rainbow	x	-	*	-	-	-	+	+
Frank F	x	-	-	*	-	-	+	-	Rose Ann Hess	*	-	-	-	-	-	-	+
Faymar	-	x	-	-	-	*	+	+	Ruth Ellen	-	-	*	-	-	-	+	-
Fargo	-	*	x	-	-	-	+	-	San Vito	*	-	-	-	-	-	-	+
Frank Lowe	-	-	-	*	-	-	+	-	Sea 1/	-	-	-	*	-	x	+	-
Frances E 1/	-	-	-	*	x	-	+	-	Sea Master 1/	-	-	x	*	-	-	+	-
Guide	-	-	-	*	-	-	-	+	Seal 1/	-	-	-	-	*	-	-	+
Harmony	-	-	-	*	-	-	-	+	Silver Queen 1/	-	-	-	*	-	-	+	-
Havana 1/	x	-	*	-	-	-	+	+	Stephanie 1/	-	-	-	*	-	-	+	-
Helen Louise	-	x	x	*	-	-	+	-	Sunrise	*	-	-	-	-	-	-	+
Ikaros II	-	-	-	*	-	-	-	+	Tom & Al	*	-	-	-	-	-	-	+
Intrepid	-	-	-	-	-	*	+	+	Tonquin	*	-	-	-	-	-	-	+
Irene Kay	-	x	-	x	-	*	+	+	Tralee	*	-	-	-	-	-	-	+
Ironsides	-	-	-	*	-	-	+	-	Trask	*	-	-	-	-	-	+	+
Jaka-B	-	x	*	-	-	-	+	-	Trego	-	-	-	*	-	-	+	+
Jefferson	-	-	-	-	-	*	+	+	Valhalla II	*	-	-	-	-	-	-	+
Jennie Decker	*	-	-	-	-	-	-	+	Washington (Big)	*	-	-	-	-	-	+	+
Karen	-	x	-	*	-	-	+	-	Washington (Little)	-	x	-	*	-	-	+	+
Kangaroo	-	x	-	*	-	-	+	-	WCF #1	-	-	*	-	-	-	+	-
Kathy Jo 1/	*	-	-	-	-	-	-	+	Western	*	-	-	-	-	-	-	+
Kincheloe	-	-	-	-	-	*	-	+	Western Maid	*	-	-	-	-	-	+	+

1/ Out-of-state boat.

Key A = Astoria-Warrenton  
 G = Garibaldi  
 N = Newport  
 C = Coos Bay-Winchester Bay  
 P = Port Orford  
 B = Brookings

S = Shrimp fishery  
 G = Groundfish  
 x = Delivered in this port  
 \* = Home port for Oregon boats or  
 main port for out-of-state boats

### Reports

Reports were prepared for the PMFC annual meeting held in September, at Sitka, Alaska, and the International Trawl Fishery Technical Subcommittee meeting in June at Seattle, Washington.

The following papers were published during 1969.

1. Demory, Robert L. Investigation of the abundance and recruitment of bottomfish off Oregon with emphasis on Dover sole. PL 88-309 Annual Prog. Rep., August 1969 (processed).
2. Hosie, Michael. Report of Cruise 69-7, shrimp. Fish Comm. Oreg., December 1969 (processed).
3. Lukas, Gerald. Report of Cruise 69-2, shrimp. Fish Comm. Oreg., September 1969 (processed).
4. Meehan, James M. and Larry H. Hreha. Oregon albacore tuna fishery statistics, 1961-67. Fish Comm. Oreg. Data Rep. Ser. (1) 143 p, May 1969.
5. \_\_\_\_\_ . Fish Commission exploratory and oceanographic cruises for albacore, 1959-67. Fish Comm. Oreg. Data Rep. Ser. (3); 57 p, September 1969.
6. Milburn, Gary S. and Jack G. Robinson. Catch and effort data by depth interval for areas fished by Oregon shrimp trawlers, 1958-66. Fish Comm. Oreg., Data Rep. Ser. (2) 46 p, June 1969.
7. Robinson, Jack G. Study on the distribution and abundance of pink shrimp, (*Pandalus jordani*) in the Pacific Ocean off Oregon. PL 88-309 Ann. Proj. Rep., August 1969 (processed).

The following papers were submitted during 1969.

1. Demory, Robert L. Depth distribution of some juvenile flat fish off the northern Oregon-southwestern Washington coasts.

2. Forsberg, Brent O. Report of Cruise 69-5, lingcod.
3. Hosie, Michael. Report of Cruise 69-6, shrimp.
4. Lukas, Gerald. Report of Cruise 69-4, shrimp.
5. Meehan, James M., *et al.* Trawl Investigation progress report, January 1, 1967-December 31, 1968.
6. Milburn, Gary S. and Jack G. Robinson. The vertical distribution and diel migration of pink shrimp (*Pandalus jordani*) off Oregon.
7. Robinson, Jack G. The distribution and abundance of pink shrimp (*Pandalus jordani*) off Oregon.

#### Regulation Changes

1. On March 12, the staff recommended, and the Fish Commission adopted, a change in mesh restrictions governing shrimp trawls. The 1 1/4-2 inch mesh requirement was dropped. Staff reasoning was that (1) no biological reason for the mesh restriction was evident, (2) studies by the California Department of Fish and Game indicated young (age group I) shrimp mortality was in excess of growth for populations off California. This means "savings" of small shrimp were biologically doubtful. The third reason for the change was to make possible testing and use of the new BCF designed sorter trawl which utilizes mesh less than 1 1/4 inches. Only one fisherman subsequently utilized the trawl during 1969--and that only during October, with fair results.
2. The staff also recommended OFC action to support the California Area A closure at a public hearing on July 25. The OFC closed Oregon to landings of shrimp caught south of the 42nd parallel effective August 5, after the California quota was filled. This

action received no opposition from industry for the first time since joint OFC-CDFG action began. Fishermen and processors generally favored (or did not oppose) the closure due to the predominance of 1-year-old shrimp in catches and the subsequent poor economics of continued harvest.

3. A minimum mesh size of 2 1/2 inches for trawls used in the hake fishery was enacted in April 1969. This brought Oregon regulations in line with the bilateral agreement between the U.S. and the U.S.S.R.

#### Groundfish Landings

Annual Oregon landings from 1960 to 1969 by species are shown in Table 2. Table 3 presents the total catch for 1965-69 by international statistical area (Figure 1), hours fished, and catch per hour. State-wide landings for 1969 are below the 10-year average. The decline in Pacific ocean perch landings continued to a new low. English sole, Pacific cod, lingcod, and animal food landings also decreased in 1969. Dover sole, Rex sole, other rockfish, and sablefish landings increased. The state-wide catch rate continued its decrease due to continued decline in the landings of Pacific ocean perch and animal food.

The catch rates and total landing of Dover, English, and petrale sole and Pacific ocean perch for the years 1959-69 are shown in Tables 4 through 7.

#### Groundfish Market Sampling

Sampling effort in 1969 resulted in 47 English sole samples, 57 petrale sole samples, 50 Dover sole samples, 8 Pacific ocean perch samples, and 98 rockfish species composition samples.

Table 2. Yearly Oregon Trawl Landings from 1960 to 1969  
(landings in thousands of pounds)

Species	Year										Mean '60-'69
	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	
English sole	2,454	1,789	2,295	1,948	1,562	1,678	3,537	2,304	2,306	1,716	2,159
Rock sole	0	0	0	0	0	4	18	8	51	25	11
Petrale sole	2,143	1,838	2,607	2,295	1,877	1,838	1,838	1,771	1,653	1,835	1,970
Dover sole	5,208	4,054	4,454	5,345	5,529	3,631	3,492	3,565	4,325	5,554	4,516
Rex sole	1,280	988	1,333	1,033	806	985	1,498	1,219	1,075	1,215	1,143
Starry flounder	234	403	706	273	528	410	477	277	454	251	401
Other flatfish	204	138	216	73	143	62	205	255	215	506	202
Pacific cod	224	103	19	67	200	194	628	430	385	47	230
Lingcod	664	619	756	493	736	852	993	1,067	1,526	1,084	879
Sablefish	172	159	150	188	183	130	68	67	56	135	131
Pac. ocean perch	2,734	4,568	5,789	7,982	9,548	13,647	4,518	1,706	1,649	940	5,308
Other rockfish	5,392	4,832	7,125	4,681	4,147	4,121	5,069	4,061	4,253	5,101	4,878
Misc. species	413	117	65	6	32	23	12	8	31	4	71
Dogfish	45	0	0	0	0	1	0	0	2	Tr.	5
Animal food	4,435	5,790	6,176	5,540	5,990	4,152	3,357	3,999	2,815	2,599	4,485
Reduction use <sup>1/</sup>	-	-	-	-	-	1,498	79	18	49	45	169
<b>Total</b>	<b>25,602</b>	<b>25,398</b>	<b>31,691</b>	<b>29,924</b>	<b>31,290</b>	<b>33,226</b>	<b>25,789</b>	<b>20,745</b>	<b>20,899</b>	<b>21,057</b>	<b>26,562</b>
<b>Total hours</b>	<b>30,005</b>	<b>29,929</b>	<b>35,254</b>	<b>32,412</b>	<b>31,312</b>	<b>29,254</b>	<b>23,676</b>	<b>20,183</b>	<b>24,456</b>	<b>25,692</b>	<b>28,167</b>
<b>Catch/hour</b>	<b>853</b>	<b>863</b>	<b>899</b>	<b>923</b>	<b>999</b>	<b>1,136</b>	<b>1,089</b>	<b>1,028</b>	<b>855</b>	<b>818</b>	<b>946</b>

<sup>1/</sup> New category introduced in 1965, previously included with miscellaneous fish.

Table 3. Total Oregon Trawl Landings (by area fished), Calculated Hours Fished, and Catch Per Hour by International Statistical Areas for 1965-69

International Statistical Area		Year					Mean '65-69
		1965	1966	1967	1968	1969	
5-A/5-B	Pounds	-	701,000	98,000	2,017,000	655,000	868,000
	Hours	-	187	105	1,277	502	518
	Lbs/Hr	-	3,749	933	1,579	1,305	1,676
3-D	Pounds	25,000	-	-	190,000	162,000	126,000
	Hours	40	-	-	114	118	91
	Lbs/Hr	625	-	-	1,667	1,373	1,385
3-C	Pounds	373,000	637,000	57,000	45,000	66,000	236,000
	Hours	295	434	33	41	55	172
	Lbs/Hr	1,264	1,468	1,727	1,098	1,200	1,372
3-B	Pounds	249,000	258,000	1,061,000	2,203,000	565,000	867,000
	Hours	272	299	800	2,324	722	883
	Lbs/Hr	915	863	1,326	948	783	982
3-A	Pounds	12,217,000	13,911,000	11,981,000	9,311,000	9,925,000	11,469,000
	Hours	10,122	11,197	10,883	10,825	12,087	11,023
	Lbs/Hr	1,207	1,242	1,101	860	821	1,040
2-C	Pounds	14,011,000	5,622,000	3,530,000	2,382,000	1,719,000	5,453,000
	Hours	10,151	6,380	4,273	4,234	2,575	5,523
	Lbs/Hr	1,380	881	826	563	668	987
2-B	Pounds	5,540,000	3,870,000	3,599,000	3,994,000	5,868,000	4,574,000
	Hours	6,628	3,954	3,380	4,543	5,905	4,842
	Lbs/Hr	836	979	1,065	879	994	945
2-A	Pounds	523,000	511,000	140,000	339,000	1,762,000	655,000
	Hours	1,354	769	277	520	2,875	1,159
	Lbs/Hr	386	664	505	652	613	565

Table 3. (Continued)

International Statistical Area		Year					Mean '65-69
		1965	1966	1967	1968	1969	
1-C	Pounds	288,000	279,000	280,000	418,000	335,000	320,000
	Hours	392	456	432	572	853	541
	Lbs/Hr	735	612	648	731	393	591
State-wide Total	Pounds	33,226,000	25,789,000	20,746,000	20,899,000	21,057,000	24,343,000
	Hours	29,254	23,676	20,183	24,456	25,692	24,652
	Lbs/Hr	1,136	1,089	1,028	855	818	987

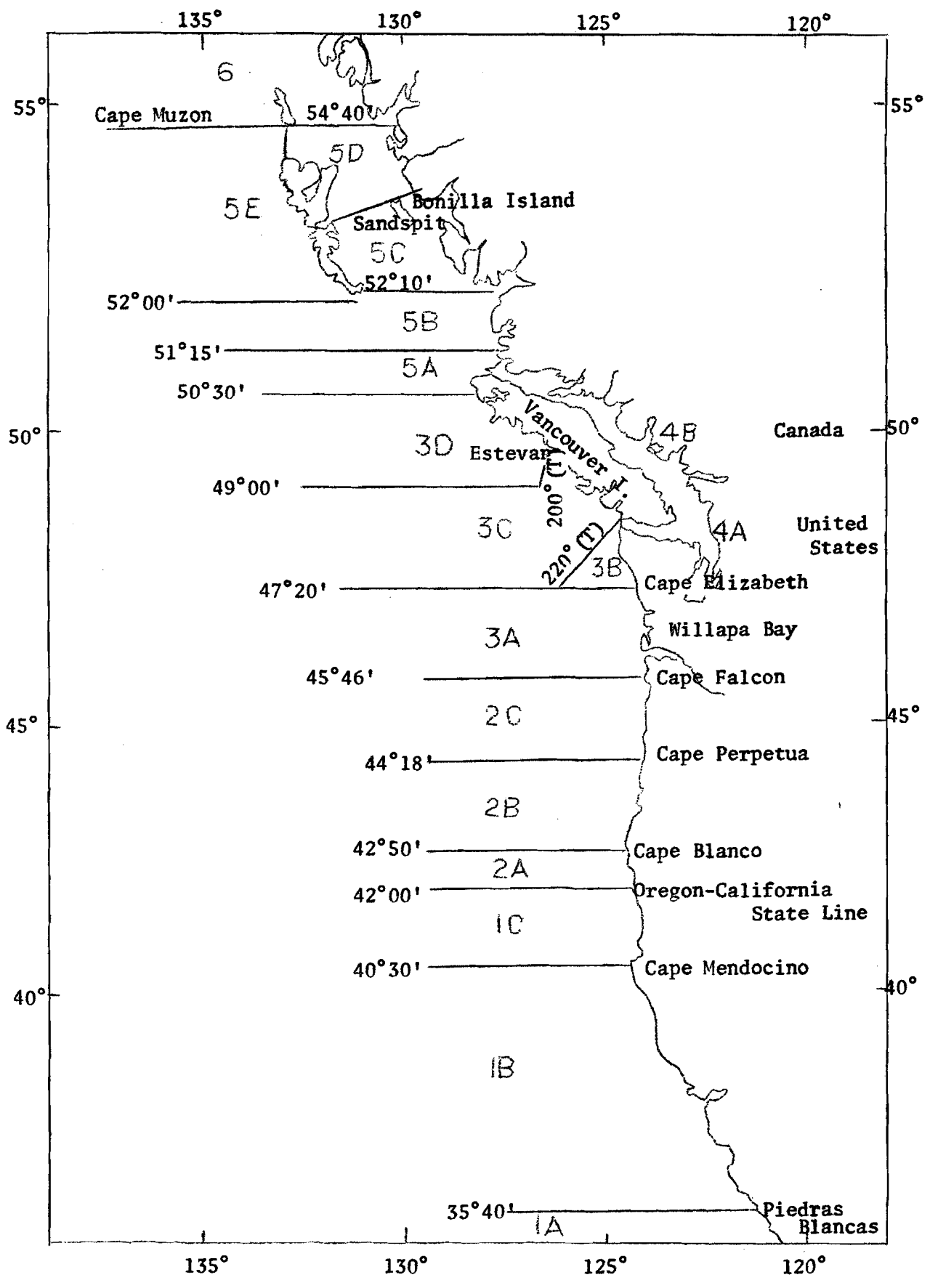


Figure 1. Chart of Pacific Coast Showing International Statistical Areas

Table 4. Total Pounds Landed and Pounds Per Hour Per Significant Landing by International Statistical Area for Dover Sole, 1959-69 (catch in thousands of pounds)

Year of Landing	Area of Catch																		Annual landing	Mean C/E
	1-C		2-A		2-B		2-C		3-A		3-B		3-C		3-D		5-A-B			
	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E		
1959	0	-	0	-	2,279	528	360	275	1,853	423	51	245	0	-	0	-	0	-	4,543	445
1960	2	na	3	na	2,326	412	534	262	2,220	369	94	336	27	204	2	na	0	-	5,208	369
1961	0	-	7	307	1,944	405	259	183	1,743	349	101	242	0	-	0	-	0	-	4,054	348
1962	5	956	98	60	1,937	440	478	246	1,893	345	41	289	3	81	0	-	0	-	4,455	326
1963	1	58	34	94	2,241	430	501	250	2,472	332	90	181	6	na	0	-	0	-	5,345	344
1964	29	na	163	126	2,281	555	722	232	2,210	316	90	312	31	306	0	-	3	na	5,529	346
1965	98	305	177	337	1,242	408	598	304	1,471	384	29	310	9	153	7	na	0	-	3,631	368
1966	82	382	270	473	1,069	379	346	247	1,683	448	6	na	37	na	0	-	0	-	3,491	405
1967	87	376	56	326	1,532	572	235	260	1,563	364	89	377	2	na	0	-	1	na	3,565	431
1968	177	457	178	480	1,985	649	261	271	1,532	315	140	213	1	na	1	na	50	352	4,325	448
1969	119	333	770	458	2,968	625	115	200	1,537	334	33	333	2	na	1	na	9	na	5,554	479

Table 5. Total Pounds Landed and Pounds Per Hour Per Significant Landing by International Statistical Area for English Sole, 1959-69 (catch in thousands of pounds)

Year of Landing	Area of Catch																		Annual Landing	Mean C/E
	1-C		2-A		2-B		2-C		3-A		3-B		3-C		3-D		5-A-B			
	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E		
1959	0	-	0	-	107	218	41	103	1,363	363	104	300	0	-	0	-	0	-	1,615	324
1960	0	-	0	-	234	284	380	179	1,627	368	198	372	3	na	12	na	0	-	2,454	309
1961	0	-	17	359	187	213	111	160	1,286	274	188	320	0	-	0	-	0	-	1,789	259
1962	11	203	80	83	496	386	241	183	1,411	278	57	391	0	-	0	-	0	-	2,296	257
1963	6	63	37	74	255	214	307	252	1,251	259	90	401	2	na	0	-	0	-	1,948	241
1964	34	124	115	99	124	132	309	233	904	301	64	389	12	141	0	-	0	-	1,562	225
1965	32	189	93	195	150	195	397	174	960	381	34	435	12	na	0	-	0	-	1,678	265
1966	74	273	75	279	455	460	406	212	2,424	502	86	590	18	252	0	-	0	-	3,538	420
1967	91	446	34	269	342	272	310	198	1,237	354	290	538	0	-	0	-	0	-	2,304	311
1968	102	434	57	317	280	240	293	207	993	280	615	268	0	-	1	na	19	359	2,360	292
1969	42	111	202	171	156	335	247	198	948	251	119	409	1	na	0	-	1	na	1,716	229

Table 6. Total Pounds Landed and Pounds Per Hour Per Significant Landing by International Statistical Area for Petrale Sole, 1959-69 (catch in thousands of pounds)

Year of Landing	Area of Catch																		Annual Landing	Mean C/E
	1-C		2-A		2-B		2-C		3-A		3-B		3-C		3-D		5-A-B			
	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E		
1959	0	-	0	-	538	330	187	600	528	291	22	na	0	-	0	-	0	-	1,275	334
1960	0	-	6	na	646	396	494	302	936	297	50	na	5	na	6	na	0	-	2,143	323
1961	0	-	8	120	315	185	511	344	919	239	54	162	31	na	0	-	0	-	1,838	243
1962	4	na	37	na	623	220	594	276	1,321	297	27	271	0	-	0	-	0	-	2,606	269
1963	11	108	26	82	534	234	321	195	1,361	246	39	226	3	na	0	-	0	-	2,295	228
1964	19	60	65	209	271	169	379	298	1,091	242	39	106	13	na	0.5	na	0	-	1,877	222
1965	27	183	53	243	369	214	644	243	684	300	9	na	52	536	0	-	0	-	1,838	257
1966	31	127	33	169	239	219	449	224	1,048	283	7	na	29	na	0	-	1	na	1,837	243
1967	25	na	18	183	213	129	365	215	1,061	300	80	na	7	na	0	1	2	na	1,771	257
1968	31	136	33	205	241	352	350	174	801	228	142	na	1	na	16	186	28	na	1,653	216
1969	37	61	283	308	319	370	234	336	930	257	28	na	1	na	0	-	3	na	1,835	-

Table 7. Total Pounds Landed and Pounds Per Hour Per Significant Landing by International Statistical Area for Pacific Ocean Perch, 1959-69 (catch in thousands of pounds)

Year of Landing	Area of Catch																		Annual Landing	Mean C/E
	1-C		2-A		2-B		2-C		3-A		3-B		3-C		3-D		5-A-B			
	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E	Catch	C/E		
1959	0	-	0	-	446	376	1,435	823	587	587	4	na	0	-	0	-	0	-	2,472	628
1960	0	-	0	-	141	261	1,154	623	1,053	734	130	993	141	1,067	115	na	0	-	2,734	640
1961	0	-	0	-	408	554	2,165	692	1,968	774	28	268	0	-	0	-	0	-	4,569	702
1962	0	-	1	57	449	455	2,534	608	2,772	682	33	1,413	0	-	0	-	0	-	5,789	625
1963	0	-	2	589	931	537	3,610	1,009	3,267	630	167	429	5	na	0	-	0	-	7,982	733
1964	0	-	1	na	2,505	835	3,755	1,000	2,310	574	829	744	62	392	0	-	86	1,089	9,548	787
1965	0	-	Tr.	-	1,956	909	8,847	1,544	2,610	806	30	690	133	375	13	324	0	-	13,660	1,180
1966	0	-	21	na	420	926	2,177	922	1,132	1,221	22	na	138	605	0	-	608	4,780	4,518	1,098
1967	0	-	0	-	247	402	1,032	747	324	826	16	na	6	na	0	-	81	529	1,706	663
1968	0	-	0	-	170	423	450	320	120	353	55	1,129	2	na	1	na	851	1,095	1,649	891
1969	4	-	23	-	218	-	335	-	46	-	0	-	9	-	9	-	296	740	940	-

The mean length and sample size for English, petrale, and Dover sole and Pacific ocean perch by sex, month, and area of catch, are listed in Tables 8 through 11.

#### Animal Food Fishery

The purpose of this phase of the investigation is to determine the species composition of whole fishes landed annually as animal food. The landings are of a multispecies nature and no segregation of fishes is listed in the landing records. The entire landing is utilized by mink ranchers. Animal food landings are listed in Table 12 by species by port. The trend in overall landings continued downward (Table 13). Decline in the availability of arrowtooth flounder plus stiff competition from chicken and turkey by-products, have contributed to the reduction in landings.

#### Tagging Studies

A total of 58 lingcod were tagged off the Columbia River during September-November 1969. Returned fish will provide information on stock movement.

A total of 129 Dover sole were tagged in deep water (out to 350 fathoms) off Coos Bay in December 1969. Returns from this and subsequent taggings will aid in determining the interchange between deep-water and shallow-water stocks of Dover sole. Recoveries made from several prior tagging studies are treated individually below. International statistical areas referred to are shown in Figure 1.





Table 12. 1969 Animal Food Landings in Pounds by Port by Species

	Astoria	Newport	Winchester Coos Bay	Total
English sole	534,607	28,912	9,271	572,790
Dover sole	84,657	14,327	10,638	109,622
Petrале sole	39,751	8,861	7,535	56,147
Rex sole	154,204	15,749	16,548	186,501
Butter sole	46,954	-	-	46,954
Sand sole	15,128	9,767	-	24,895
Sand dab	181,354	21,507	32,615	235,476
Starry flounder	41,240	873	-	42,113
Arrowtooth flounder	711,083	71,601	178,441	961,125
Misc. sole	5,170	-	-	5,170
Skate	1,364	119,723	80,663	271,750
Sablefish	36,575	11,707	-	48,282
Lingcod	3,447	-	-	3,447
Rockfish	14,553	5,854	32,393	52,800
Pacific ocean perch	383	-	-	383
Misc. fish	32,554	14,521	1,293	48,368
Unknown	5,400	-	4,900	10,300
<b>Total</b>	<b>1,978,430</b>	<b>323,402</b>	<b>374,267</b>	<b>2,676,099<sup>1/</sup></b>
% Total Landing	73.93	12.08	13.99	100.00
% Sampled	18.87	18.63	20.15	19.02

<sup>1/</sup> Plus 596 pounds at Port Orford.  
Plus 985 pounds at Brookings.

Table 13. Yearly Oregon Animal Food Landings from 1965 to 1969 (landings in thousands of pounds)

	1965	1966	1967	1968	1969	1965-69 Average
English sole	565	56	465	405	573	413
Dover sole	78	54	212	139	110	121
Petrале sole	85	16	147	72	56	75
Rex sole	249	183	306	155	187	216
Sand dab	201	132	179	140	235	177
Starry flounder	70	66	55	25	42	52
Butter sole	96	109	101	88	47	88
Arrowtooth flounder	2,307	2,204	2,208	1,089	961	1,754
Rockfish	222	286	80	307	53	190
Pacific ocean perch	102	6	1	-	-	22
Skate	100	163	131	366	272	206
Other	76	77	202	110	142	121
<b>Total</b>	<b>4,150</b>	<b>3,352</b>	<b>4,087</b>	<b>2,896</b>	<b>2,678</b>	<b>3,435</b>

Dover Sole, May 1961 to May 1964

During this period, 9,013 Dover sole were tagged and released from 50 to 450 fathoms southwest of the Columbia River. A total of 996 tags had been recovered through December 31, 1969 (Table 14).

Table 14. Number of Dover Sole Recovered by Year of Tagging and Year of Recovery (AEC study)

Year of Tagging	Number Tagged	Recoveries by Year									Total
		1961	1962	1963	1964	1965	1966	1967	1968	1969	
1961	1,585	9	12	9	9	-	3	-	-	-	42
1962	2,808	-	65	76	46	30	9	9	5	2	242
1963	1,902	-	-	26	23	13	5	3	3	-	73
1964	2,718	-	-	-	270	176	84	62	34	13	639
Total	9,013	9	77	111	348	219	101	74	42	15	996

Dover Sole, November 1967 to April 1968

A total of 1,494 Dover sole were tagged off the mouth of the Columbia River in depths of 40-215 fathoms. Table 15 lists the recoveries by year of recovery and international statistical area.

Table 15. Recoveries of Dover Sole by Year by International Statistical Area (November 1967-April 1968, Columbia River)

International Statistical Area	Recoveries by Year		Total
	1968	1969	
2-D	21	11	32
Total	21	11	32

## Shrimp Fishery

A record 53 vessels delivered 10,504,823 pounds into Oregon ports in 1969. This was exceeded only in 1968 (10,976,300 pounds) and

was the 3rd consecutive year in which landings exceeded 10 million pounds (Table 16). Continued abundance of shrimp off northern Oregon and off Washington plus booming market conditions were major reasons for the excellent 1969 fishery. Ex-vessel value of the fishery exceeded 1 million dollars for the 3rd consecutive year (Figure 2). Fishermen received a record price of 12¢ per pound for fresh-pack shrimp. Shrimp sold for canning were worth 9¢ per pound.

Table 16. Annual Oregon Shrimp Landings by Port, 1960-69 (landings in thousands of pounds, heads on, raw)

Year	Astoria Warrenton	Gari- baldi	Newport	Coos Bay- Winchester	Port Bay Orford	Brookings	Total
1960	590	0	0	84	0	459	1,133
1961	768	0	0	431	0	257	1,456
1962	395	0	0	886	19	1,451	2,751
1963	1,072	0	0	1,570	0	473	3,115
1964	233	0	31	4,414	405	394	5,477
1965	73	0	21	925	180	552	1,751
1966	102	0	622	2,800	665	562	4,751
1967	1,722	1,290	3,092	2,653	784	832	10,373
1968	2,340	559	2,048	4,122	1,271	637	10,977
1969	2,726	2,358	1,505	3,696	74	146	10,505

A trend toward replacement of manual processing (hand-peel) by mechanical peeler machines continued from 1968. Total machine-peeled landings nearly equalled that processed manually in 1969, for the first time since 1961 (Figure 3). The new presteam blanch machines are entirely responsible for this trend. Higher cost of labor, new FDA sanitation requirements, and improved appearance of machine-peeled tails combined to encourage processors to install

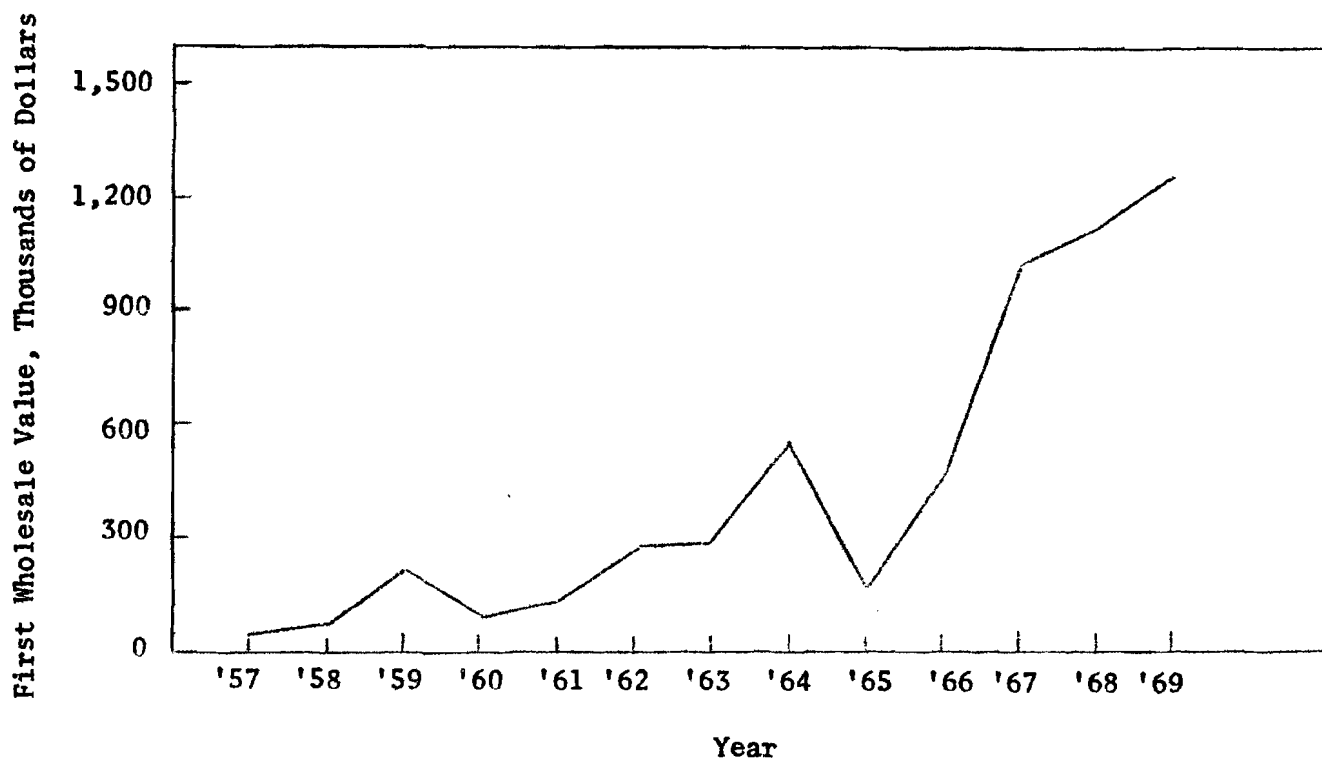


Figure 2. First Wholesale Value of Oregon Shrimp Catch, by Year

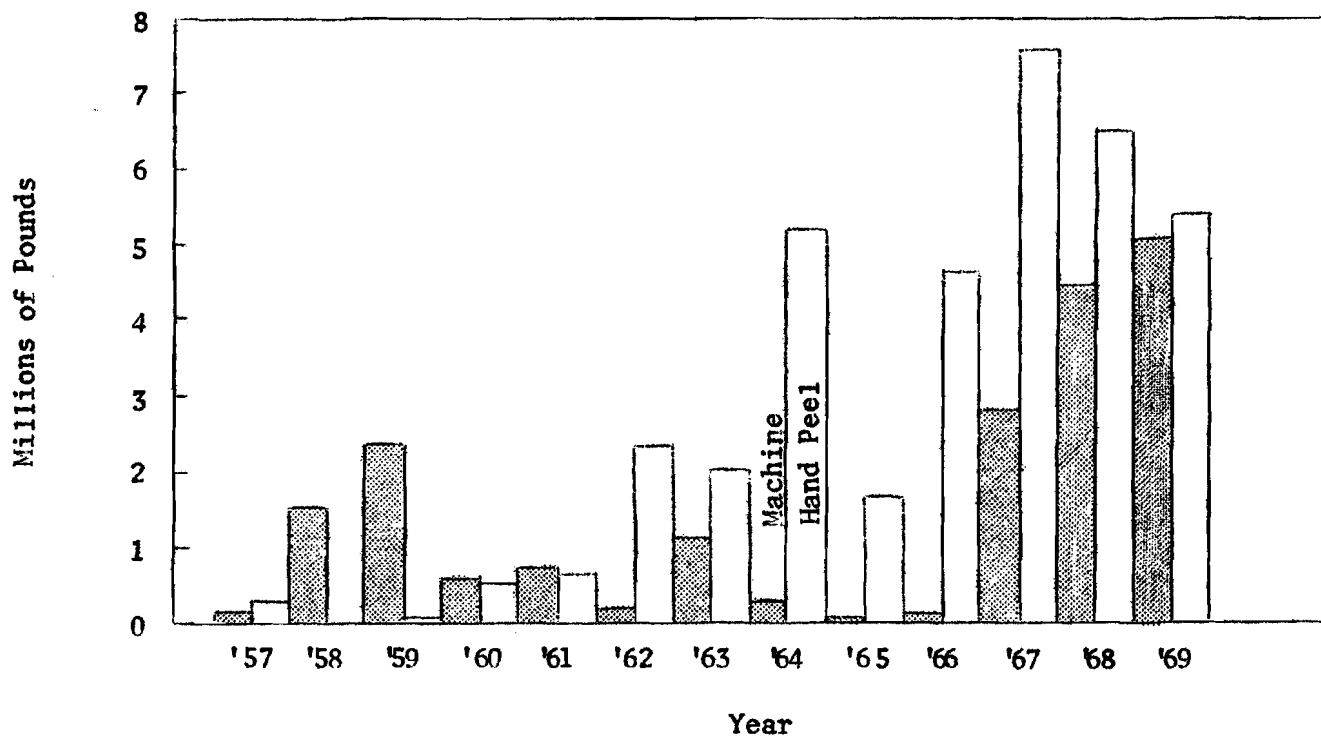


Figure 3. Comparative Catch Processed by Mechanical and Manual Methods, 1957-69, in Oregon

the new machines, and to sell the product on the fresh frozen market. Two processors in the Coos Bay area, two in Newport, and one each in Garibaldi, Astoria, and Albany utilized the new machines in 1969. One Newport and one Warrenton plant continued utilizing the old style machines; product from them was sold canned to retail markets.

### Catch Statistics

Record landings were made at Astoria and Garibaldi, reflecting the overall excellent fishing experienced in areas adjacent to those ports. A good catch was made at Newport, and Coos Bay deliveries were third highest in history there. Little was landed at Port Orford or Brookings, reflecting scarcity of shrimp adjacent to these ports and, in the case of Brookings, poor quality of shrimp off northern California (high incidence of "pinheads" = 1-year-old shrimp). Timing of the catch at each port is summarized in Table 17. Majority of landings and catch were made during May through July in Astoria, Garibaldi, Newport, and Brookings. Landings at Coos Bay were comparatively steady from March through October, although March, April, and July were peak months. Effort at Coos Bay during March has trended upward since 1967, especially during the first half of the month when many female shrimp are still carrying eggs. Table 18 summarized number of vessels making landings at Coos Bay by weekly and biweekly period during March.

Table 19 summarized monthly catch and catch per effort (pounds and pounds/hour tow) and number of vessels fishing in each state area of catch (Figure 4). Bulk of the catch came from areas 30 (Grays Harbor), 28 (Tillamook Head), 26 (Cape Lookout), and 22 (Coos Bay). These areas accounted for 9.8 million pounds, or 93.2% of the 1969 Oregon landings.

Table 17. Oregon 1969 Shrimp Catch and Number of Vessels, by Port and Month

	Astoria	Gari- baldi	Newport	Coos Bay	Port Orford	Brookings	Total
March C	110,071	36,571	198,564	555,752	14,750	2,115	917,823
V	3	2	6	18	2	1	29
April C	393,650	101,608	186,561	717,070	6,500	0	1,405,389
V	7	2	8	28	1	0	43
May C	649,903	452,930	479,274	181,319	11,563	98,250	1,873,239
V	6	9	7	12	2	3	36
June C	712,436	679,195	334,465	534,988	21,800	31,800	2,314,684
V	6	15	7	17	1	4	37
July C	564,841	563,217	207,865	666,063	0	11,050	2,013,036
V	8	9	4	15	0	2	35
August C	174,453	198,147	0	319,454	19,050	0	711,104
V	8	8	0	14	2	0	28
September C	117,165	172,458	30,197	372,716	0	850	693,386
V	6	8	2	20	0	1	30
October C	3,840	153,426	68,404	348,692	0	1,800	576,162
V	1	4	4	16	0	1	22
Total C	2,726,359	2,357,552	1,505,330	3,696,054	73,663	145,865	10,504,823
V	15	15	12	32	4	6	53

Table 18. Number of Shrimp Boats Making Deliveries at Coos Bay during March by Weekly and Biweekly Period by Year

Year <sup>1/</sup>	Period of Month				Average/2 Weeks	
	1-7	8-14	15-21	22-31	1-14	15-31
1963	7	7	9	9	7	9
1964	2	10	18	17	6	17
1965	4	6	6	8	5	7
1966	5	6	0	10	5	5
1967	12	13	13	14	12	13
1968	6	10	12	14	8	13
1969	9	15	13	18	12	15

<sup>1/</sup> No landings were made in March at Coos Bay prior to 1963.

Table 19. Oregon 1969 Shrimp Catch and Catch Per Effort by Area of Catch and Month

OFC Area	1/	March	April	May	June	July	August	Sept.	Oct.	Total
32	C	0	0	0	0	158,107	8,280	0	0	166,387
	C/E	-	-	-	-	744	296	-	-	692
	V					7	2	0	0	8
30	C	0	0	0	396,257	428,919	130,872	91,650	0	1,047,698
	C/E	-	-	-	862	692	537	470	-	691
	V				6	10	6	3	0	12
29	C	0	0	0	0	0	6,035	13,681	0	19,716
	C/E	-	-	-	-	-	170	353	-	307
	V				0	0	4	6	0	8
28	C	108,661	58,820	358,377	363,133	263,023	29,266	25,151	13,595	1,220,026
	C/E	900	897	975	678	461	463	300	371	662
	V	3	5	17	17	15	3	6	3	25
26	C	118,563	620,973	1,214,930	850,150	482,074	198,147	185,878	181,388	3,852,103
	C/E	765	910	852	475	392	290	356	612	567
	V	5	15	22	25	15	9	9	6	29
24	C	114,882	1,550	8,800	50,756	3,800	0	4,660	30,687	215,135
	C/E	717	42	506	335	195	-	265	254	430
	V	6	4	2	6	2	0	1	4	12
22	C	517,637	711,684	169,547	584,865	664,446	297,611	370,716	350,401	3,666,907
	C/E	539	485	311	494	427	416	328	386	431
	V	19	28	12	18	15	13	20	17	33
21	C	55,965	12,062	22,835	25,161	1,617	40,893	800	91	159,424
	C/E	535	347	350	318	241	426	107	61	398
	V	10	3	7	2	2	6	1	1	13

Table 19. (Continued)

OFC Area	1/	March	April	May	June	July	August	Sept.	Oct.	Total
20	C	0	300	500	1,300	0	0	0	0	2,100
	C/E	0 <u>2/</u>	34	100	74	-	-	-	-	58
	V	2	1	1	1	0	0	0	0	2
19	C	2,115	0	0	11,382	600	0	850	0	14,947
	C/E	76	-	-	193	194	-	na	-	157
	V	1	0	0	4	1	0	1	0	6
18	C	0	0	98,250	31,680	10,450	0	0	0	140,380
	C/E	-	-	1,069	258	262	-	-	-	551
	V	0	0	3	4	2	0	0	0	6
Total	C	917,823	1,405,389	1,873,239	2,314,684	2,013,036	711,104	693,386	576,162	10,504,823
	C/E	598	623	742	528	473	387	348	420	522
	V	29	43	36	37	35	28	30	22	53

(20,073 hrs)

1/ C = catch in pounds, C/E = pounds per hour tow, V = number vessels.

2/ 6 hours effort, no catch.

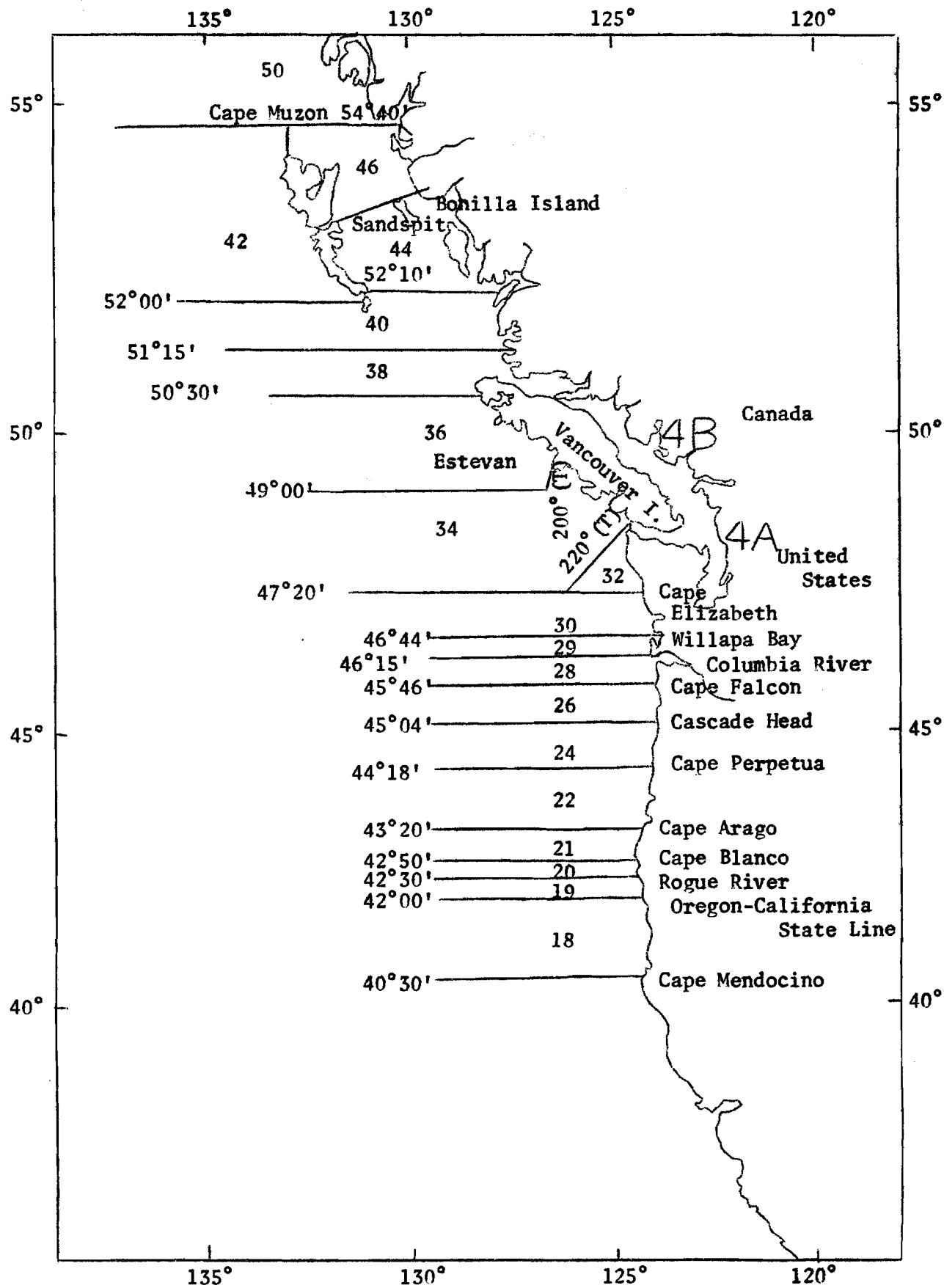


Figure 4. Chart of Pacific Coast Showing State Statistical Areas

Only 140,380 pounds were taken out of area 18 (California Area A). Evidently shrimp were scarce in areas 20 (Port Orford) and 19 (Brookings) between St. George Reef and Cape Blanco, after supporting a record 1968 fishery of over 1.6 million pounds (most of it from area 20). We cannot show that fishing was responsible for the decline in population in area 20. Although a record poundage was taken from it in 1968 (Table 20), catch per effort at the end of 1968 was still very good (see 1967-68 progress report) and indicated at least an average population was present at season's end. Shrimp are thought, by OFC and CDFG biologists, to migrate irregularly between Cape Sebastian and Klamath River; there is no reason to suppose such movement does not occur between areas 20 and 21 around Cape Blanco (or from the South, or from offshore either). There is reason to believe shrimp do annually move into the bed in area 20 from outside of it, based on research and commercial fishing data. The movement appears to occur about the time prevailing winds change from SE to NW in late March to mid-April. Fishing in area 20 prior to April in most years has failed to catch shrimp in as good abundance as later in the spring. The absence of the 1968 year class in area 20 cannot be attributed to fishing, since this year class was hatched prior to the fishery in 1968 and was not subject to it that year; yet the year class was very strong in all areas north and south of area 20. In area 22, fishing was better than average for an odd numbered year, but was influenced adversely by the predominance of 1-year-old shrimp too small to economically process.

Table 20. Annual Oregon Shrimp Catch and Catch/Effort,  
by Area of Catch, 1957-69

Year		Area of Catch 1/									
		32	30 2/	28	26	24	22	21	20	19	18
1957	C	0	0	116,800	0	0	286,800	0	0	0	0
	C/E	-	-	na	-	-	na	-	-	-	-
1958	C	0	81,100	1,017,800	423,300	0	0	0	0	0	0
	C/E	-	386	569	569	-	-	-	-	-	-
1959	C	2,034	191,700	980,000	1,149,900	0	50,100	0	0	16,100	374,200
	C/E	120	505	526	523	-	501	-	-	240	510
1960	C	0	2,000	339,800	249,100	0	82,300	0	0	136,700	322,500
	C/E	-	250	300	345	-	445	-	-	318	644
1961	C	0	367,400	214,900	185,200	0	431,100	0	0	74,900	182,400
	C/E	-	356	311	354	-	562	-	-	550	839
1962	C	0	101,700	183,000	110,300	0	681,500	223,000	6,400	151,400	1,293,000
	C/E	-	394	325	380	-	336	640	na	470	574
1963	C	0	14,900	441,200	588,800	0	1,205,300	421,100	3,600	113,000	326,900
	C/E	-	340	615	511	-	540	820	360	286	495
1964	C	0	11,300	77,700	145,500	2,010	2,639,900	1,894,200	496,100	0	210,800
	C/E	-	342	600	582	183	549	837	771	-	518
1965	C	0	3,800	8,800	83,400	0	739,900	181,600	212,600	446,000	74,400
	C/E	-	172	231	268	-	309	367	450	315	386
1966	C	0	0	24,400	226,300	473,200	1,928,800	837,800	862,200	350,800	47,700
	C/E	-	-	469	680	553	502	562	729	368	401
1967	C	0	102,900	1,636,500	2,705,700	1,656,500	1,678,200	1,028,200	733,600	744,600	87,800
	C/E	-	672	677	625	580	321	512	655	482	794

Table 20. (Continued)

Year		Area of Catch <sup>1/</sup>									
		32	30 <sup>2/</sup>	28	26	24	22	21	20	19	18
1968	C	0	25,200	1,771,600	2,660,800	325,900	4,062,800	238,900	1,302,700	307,200	281,200
	C/E	-	494	792	635	556	580	636	1,087	554	895
1969	C	166,400	1,067,400	1,220,000	3,852,100	215,100	3,666,900	159,400	2,100	15,000	140,400
	C/E	692	690	662	567	430	431	398	58	157	551

<sup>1/</sup> 32, 30, 28, 26, and 24.

<sup>2/</sup> Combines areas 30 and 29.

North of area 22, fishing was good, although area 24 (Newport) supported only a marginal fishery. Areas 26 and 28 supported record and near-record catch and c/e especially during March through May. The usual July slump in fishing success (c/e) was coincident with very good albacore tuna fishing. As a result, several boats, including most of the Newport fleet, converted to tuna fishing in August. The fishery did not show much change until mid-October, when good fishing was again experienced off Cape Lookout (area 26). Coincident with slumping catch/effort in areas 26 and 28, northern Oregon vessels found the best fishing in years off Washington state, especially area 30. They also had very good fishing in area 32 (Destruction Island) during July.

#### Market Sampling

Most biological work was confined to market sampling at Astoria, Warrenton, Newport, and Charleston. Length-frequency graphs for sampled catches from areas 32, 30, 29 (Willapa Bay) (Figure 5); 28 (Figure 6); 26 (Figure 7); and 22 (Figure 8), show approximate relative strength of year classes, monthly growth, and sex ratio.

In area 29 through 32, the 1966 (age group III) year class was dominant, while the 1967 (age group II) was very weak. The 1968 (age group I) year class was apparently of fair strength. Very little sex change was apparent among the 1968 year class, while a nearly normal sex change (from male to female) occurred in the 1967 and older year classes. Many 1966 year class shrimp which failed to mature as females in 1968 did so in 1969. Most transitional individuals were of the 1966 year class. In area 22, the 1968 year class was more dominant than in other areas, and in this area alone there was a significant sex change in the 1968

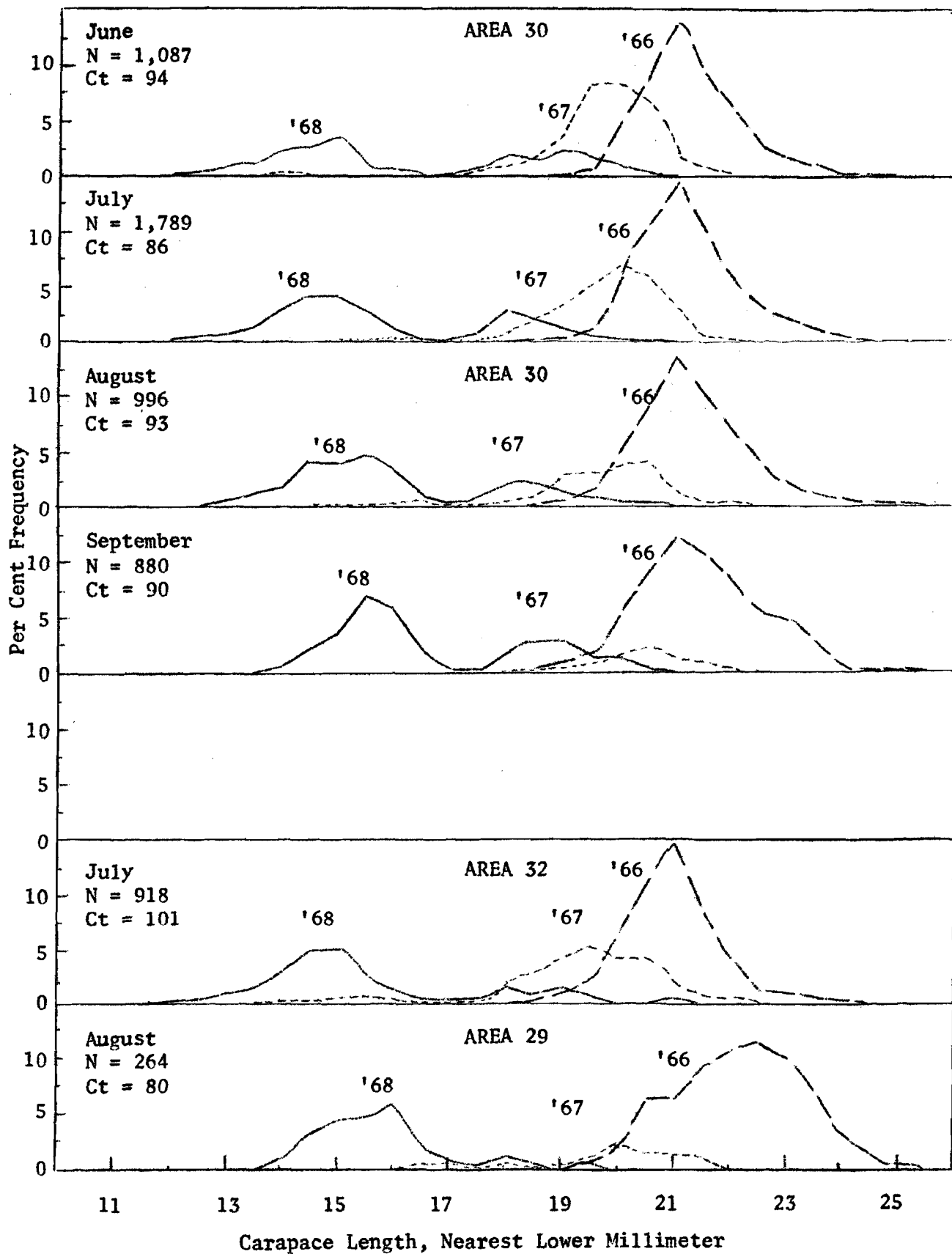


Figure 5. Length Frequency by Sex for Shrimp Samples Captured Off Washington State During 1969

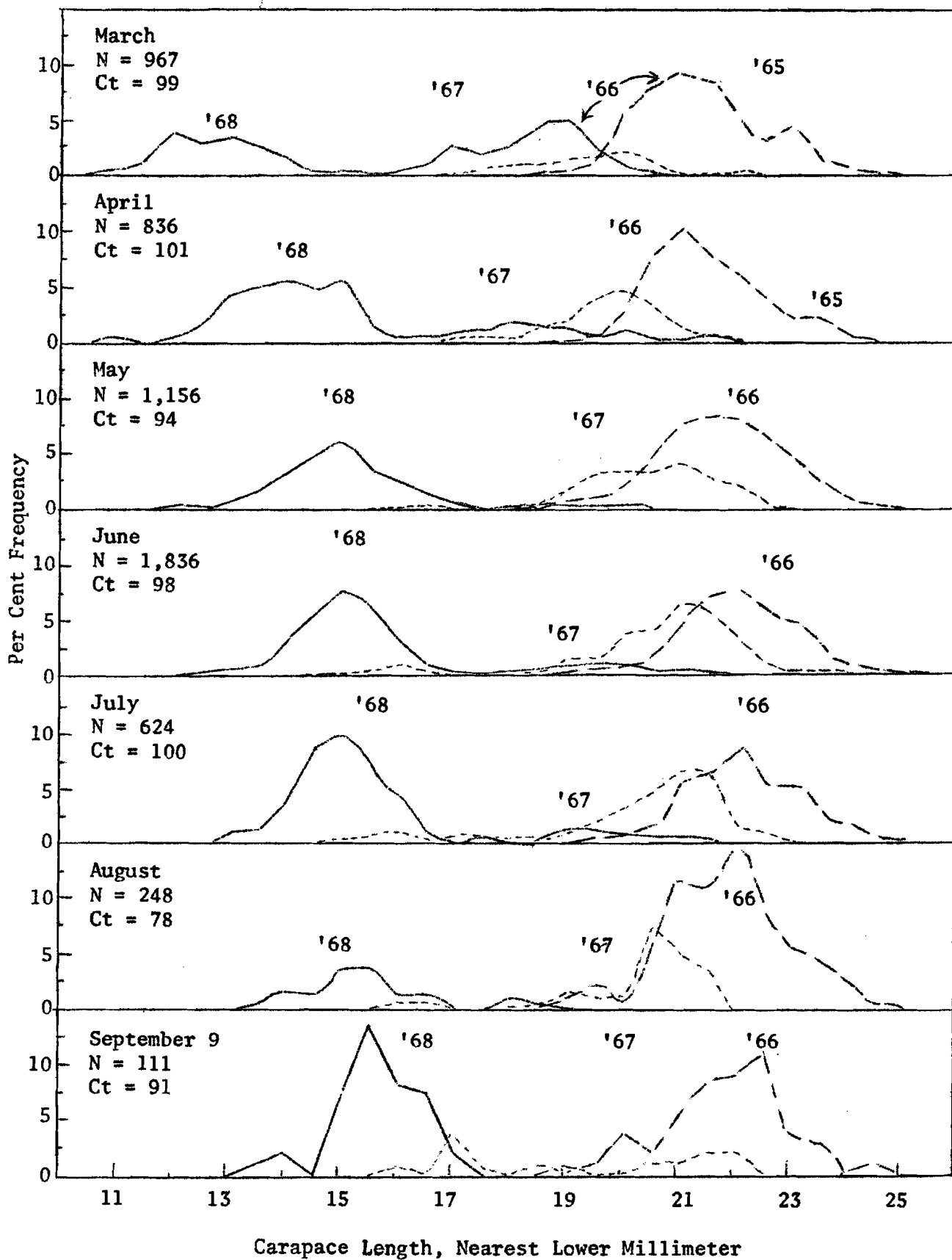


Figure 6. Length Frequency by Sex for Shrimp Samples from Area 28 in 1969

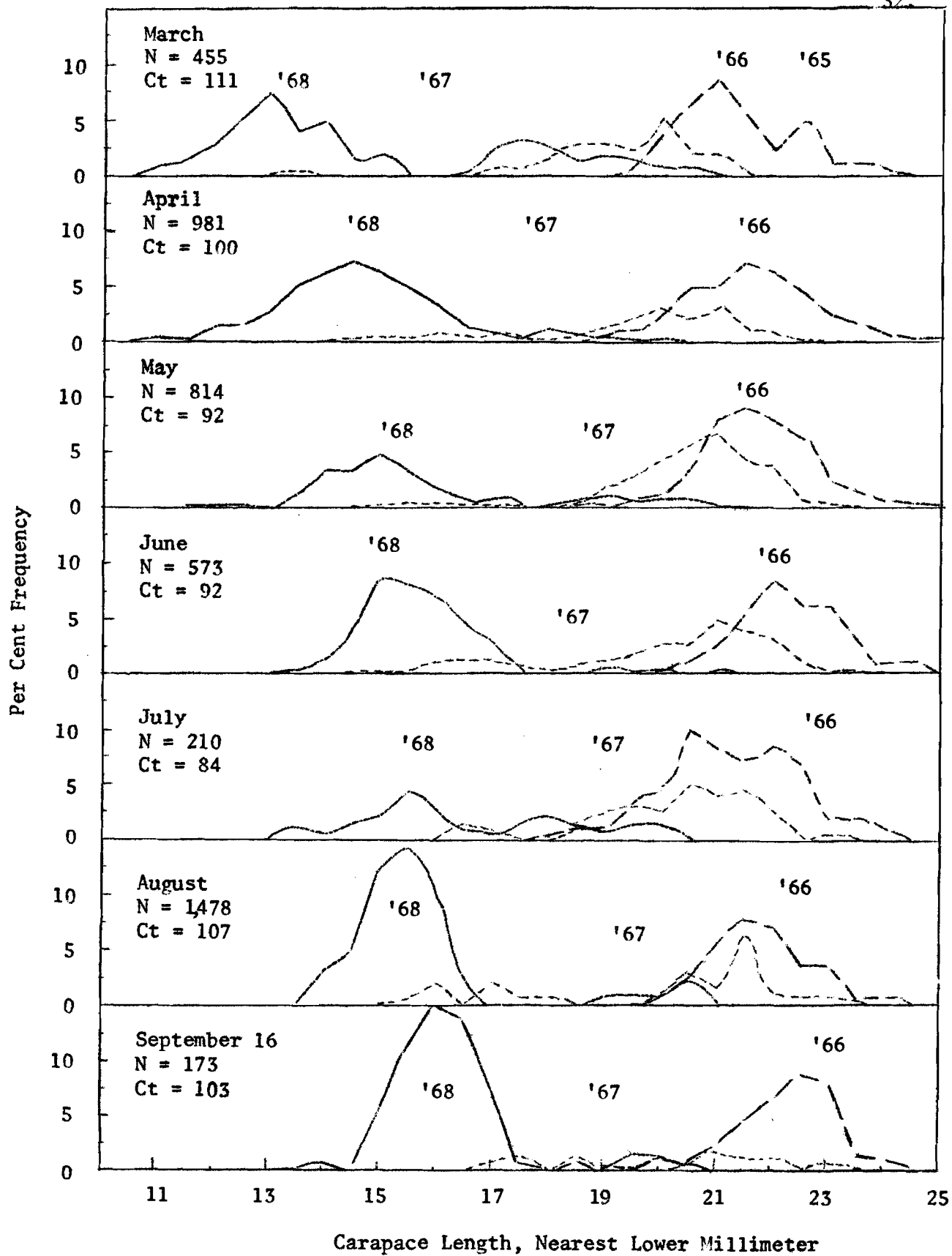


Figure 7. Length Frequency by Sex for Shrimp Samples from Area 26 in 1969.

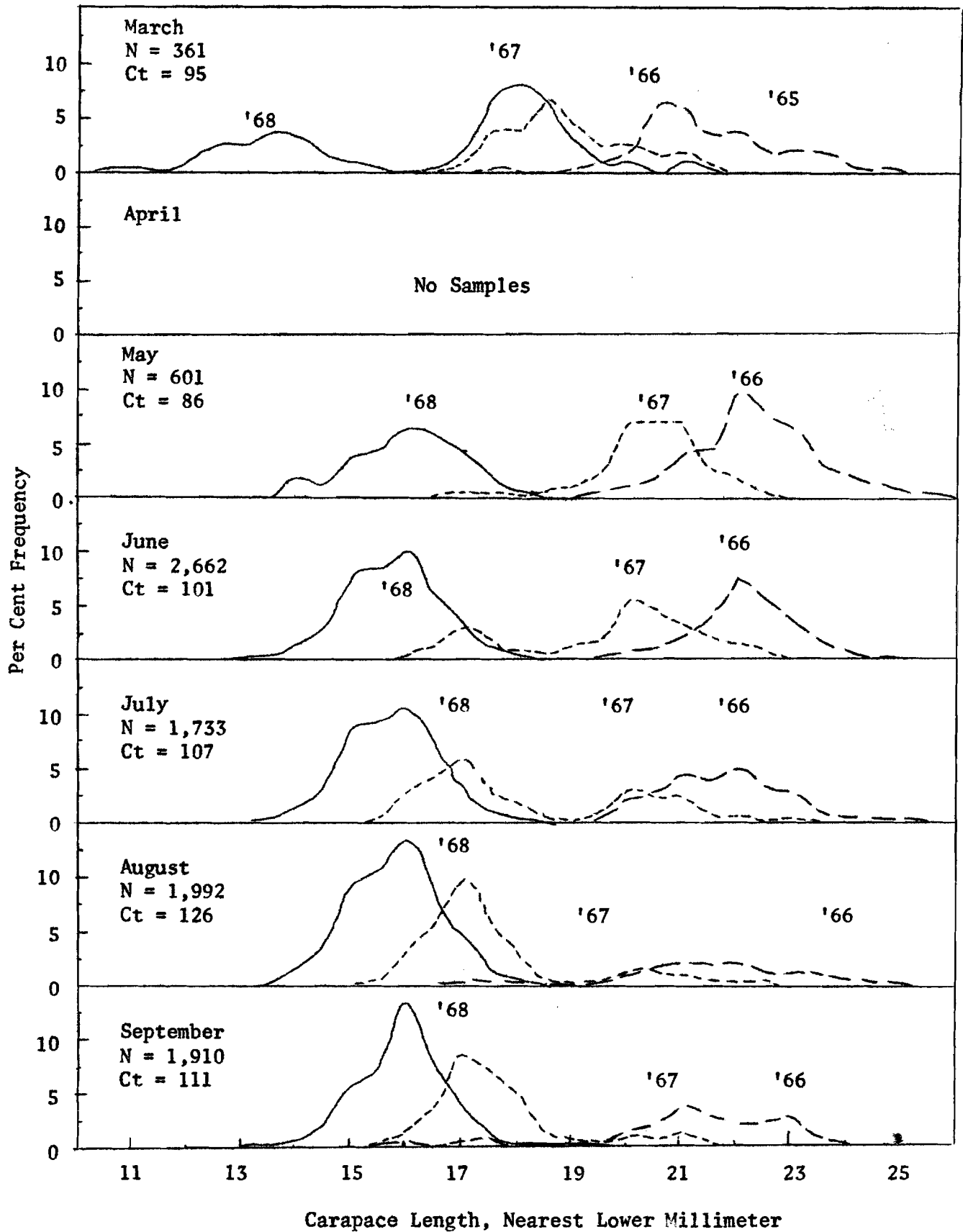


Figure 8. Length Frequency by Sex for Shrimp Samples from Area 22 in 1969

year class. Interestingly, the apparent faster growth in area 29 coincided with a relatively low density population as evidenced by c/e in Table 19.

In area 28, the 1966 year class was quite strong, but so apparently was the 1968 year class. The 1967 (group II) year class was scarce in catches. The strong 1966 year class, mostly females bearing eggs in March, should contribute toward a very strong 1969 year class if there is a parent-recruitment relationship unhindered by density-dependent mortality factors. This should hold true for virtually every area off Oregon, California, and Washington.

Area 26 samples were similar to those in area 28 in age and sex composition except during July and August. Comparative strength of the 1968 year class was opposite--strong in area 28; weak in area 26, during July; and the reverse during August. Growth was rapid in both areas during March to May, but very slow during June, July, and August.

Growth also was very slow in area 22, even slower than in areas north of it. Virtually no growth occurred from May to September. Older shrimp also showed little growth after April. Normally shrimp in this area grow more rapidly than in areas to the north. A substantial proportion of the 1968 year class was transitional (changing to females) during the summer and fall. By September, 43% of the year class was either changing to or was females. This was in sharp contrast to areas 26, 28, and 30 where few of the 1968 year class changed sex. Mature females of age groups II and III, however, were considerably more numerous in the northern areas during the fall than in area 22.

No samples were obtained from areas south of area 22; little fishing was done as has been mentioned before.

## PL 88-309 Studies

Abundance and Distribution of Shrimp

Analysis of Data: Manuscripts for studies done during 1966, 1967, and 1968 were submitted to Clackamas for editing. They were (1) Distribution and Abundance of Pink Shrimp (*Pandalus jordani*) off Oregon by J. G. Robinson, and (2) Vertical Distribution and Diel Migration of Pink Shrimp (*Pandalus jordani*) off Oregon, by Gary Milburn and Jack Robinson. They were submitted on July 22 and August 21, respectively. These were final reports on 1966-68 research studies.

Recruitment Survey: A study was begun in July 1969 to study the distribution and movement of shrimp in more detail than was possible in 1966-68. We chose to study the area off Tillamook Head, and made monthly cruises over a preselected grid of stations to record the distribution by depth and latitude of shrimp therein and changes thereof. We also hoped to record timing and location of 0-age shrimp recruitment to the population. Work done between July and December 1969 is summarized in the reports of cruises 69-2, 69-4, 69-6, and 69-7. One cooperative cruise (69-6) was made with the OSU Department of Oceanography research vessel *Cayuse* in October.

Shrimp Culture

A meeting with biologists of the BCF research lab at Galveston, Texas, on shrimp culture and mark recovery techniques was attended in December. A report on this trip was written and circulated. Work was started in the Astoria lab on research into culture of *P. jordani* in a circulating sea-water life support system.

### Bottomfish Distribution and Abundance

With the exception of a short tagging cruise on lingcod, all other work was devoted to English, petrale, and Dover sole. Highlights of the work are presented by species.

Lingcod: In late September a 5-day cruise was undertaken to tag lingcod. The fishing area ranged from Tillamook Head north to Willapa Bay. We made 12 hauls ranging in depth from 25 to 55 fathoms. Only 50 fish were tagged, the entire catch of lingcod. Size of fish tagged ranged from 45-109 cm. Inclement weather and other demands on the chartered vessel *Sunrise* precluded a planned cruise in which the method of capture was to use hook and line over reef areas.

English sole: Routine sampling and aging of interopercles continued. Age data, average length, and weight combined with a measure of c/e, was used to calculate year class strength. Year class strength was calculated for year classes 1955 through 1962 for age groups IV-VII. The calculations showed that the 1961 year class was the strongest yet recorded. The 1955 and 1962 year classes, although better than average, were about half the size of the 1961 year class.

Petrale sole: Other than routine sampling and aging of market samples, nothing was done with petrale sole. A sufficient backlog of data is still lacking to calculate year class strength.

Dover sole: A start was made on aging tagged fish returns from the 1964 AEC tagging study. Both scales and otoliths were utilized.

Routine aging of market samples continues via the use of scales. The age data is being utilized to follow year class strength.

Other aging work included the aquarium study and analysis of scales from the November 1967 and April 1968 tagging study. The tagging study has been beneficial in that scale patterns observed from tagged fish have enhanced interpretation of some scales from market samples. We also discovered that some fish do not lay down an annulus every year. The magnitude of this problem is not yet known.

The aquarium study continues with eight fish, all of which have been in residence for nearly 2 years. Stress marks associated with handling the fish have been observed. Scale patterns observed from this experiment have enhanced interpretation of scales.

A new technique for aging otoliths, burning, was tried. The procedure involves cutting the otolith in transverse section and heating a segment to redness in a crucible. The organic hyaline ring is oxidized to jet black, while the inorganic opaque material becomes grey. Contrast is increased by wetting the cut face with 15% glycerin. The technique appears promising especially for older fish. An experiment is planned to compare from the same fish, the scale reading, readings of the whole unburned otolith, and readings of the burned otolith.

Work on the population dynamics of Dover sole continues. Growth rates and estimates of total mortality were calculated. Growth rates over the size range of exploited fish is nearly a straight line. Estimates of total mortality for males is higher than for females. However, if males are recruited to deep water at sexual maturity and remain there mortality is overestimated since the estimates are based on data collected from an inshore summertime fishery.

### Boat Charter

The M/V *Sunrise* was chartered for the period July 1-29, 1969, and September 3, 1969, to July 15, 1970, for a cost of \$40,000. During 1969 the vessel made eight cruises totalling 36 days at sea. Table 21 lists the cruises, number of days, and purpose of the trip.

Table 21. Charter Cruises of the M/V *Sunrise*, June 30, 1969, to December 31, 1969

Cruise No.	Purpose	Inclusive Dates	No. of Days at Sea
69-1	Pre-season albacore cruise	6/30-7/11	10
69-2	Shrimp benthic distribution	7/16-7/19	4
69-3	Albacore tagging	7/25-8/1	8
69-4	Shrimp benthic distribution	9/8-9/10	3
69-5	Lingcod tagging	9/26-9/29	4
69-6	Shrimp benthic distribution	10/10-10/17	3
Unnumbered	KOAC albacore movie	10/28	1
69-7	Shrimp benthic distribution	11/11-11/13	3

### Foreign Fishing

Groundfish and Shrimp Investigations has a four-point program involving foreign fisheries. They are (1) monitoring of the foreign fleet, (2) coordination and exchange of information with other fishery agencies, (3) preparation of materials for use by the U. S. Department of State in unilateral negotiations with the USSR, Japan, and Canada, and (4) collection and compilation of biological and statistical information for exchange with scientists of the USSR.

Table 22 lists the average number of foreign vessels observed off the Oregon and Washington coasts in 1969.

Personnel from this investigation attended one meeting of the BCF Ad hoc Surveillance Committee in 1969.

Table 22. Average Number of Foreign Vessels Observed Off the Oregon and Washington Coast by Country of Origin by Month During 1969

	Oregon			Washington			Total		
	USSR	Japan	Total	USSR	Japan	Total	USSR	Japan	Total
January	0	0	0	0	1	1	0	1	1
February	1	0	1	1	1	2	2	1	3
March	1	0	1	0	1	1	1	1	2
April	5	0	5	1	1	1	5	1	6
May	35	0	35	3	0	3	38	0	38
June	18	0	18	29	0	29	47	0	47
July	2	0	2	47	1	46		1	48
August	0	0	0	36	3	36		3	36
September	9	1	9	23	1	18		1	27
October	17	2	17	5	1	5		1	22
November	5	3	6	2	3	4		3	10
December	0	1	1	0	2	2	0	2	2
Total Ship Months	93	7	95	147	15	148			243
Monthly Average	7.75	0.58	7.92	12.25	1.25	12.33			20.25

Background material for unilateral negotiations with Canada was prepared in January 1969.

Statistical information was submitted to INPFC and the Technical Sub-Committee of the International Trawl Fishery Committee in June and July 1969.

In 1967, fishery scientists of the U. S. and USSR agreed to exchange biological and statistical data for their respective fisheries in the northeast Pacific Ocean. Otter Trawl Investigations collected nine special Pacific ocean perch samples in 1969. Biological and statistical information for exchange with scientists of the USSR were submitted in June and November 1969.

#### Meetings Attended

During 1969 staff personnel attended 29 meetings concerned with fisheries on the West Coast. Table 23 lists the meetings attended, location, date, and remarks.

Table 23. Meetings Attended by Otter Trawl Personnel in 1969

Meeting	Location	Date	Remarks
American Fisheries Society	Corvallis	1/10-11	Oregon Chapter
Izaak Walton League	Forest Grove	1/16	Talk presented
Shrimp Trawl Workshop	Astoria	2/4	BCF sponsored
Interagency Coordination	Brookings	2/6	Calif.-Oregon Shrimp Staffs
The Wildlife Society	Newport	2/7-8	Oregon Chapter
FCO-OSU	Newport	2/17-18	Sea Grant Coordination
OSU Fur Farm Day	Corvallis	2/?	Mink Ranchers
FCO Meeting	Portland	3/12	Change mesh regulations
FCO-UW	Seattle	3/17	Shrimp culture techniques
PMFC	Portland	3/24-25	Groundfish Committee
PFB	Harrison, B.C.	3/26-28	Annual Meeting
Technical Sub-Committee	Seattle	6/17-19	International Trawl Fishery
FCO Meeting	Portland	7/25	Area A Closure
BCF-Industry	Astoria	8/13	Master Plan Advisory
FCO-OSU	Corvallis	8/15	Shrimp research coordination
PMFC-Advisors	Portland	9/5	Information Meeting
Fishery Committee	Sitka, Alaska	10/1	Annual Meeting
PMFC	Sitka, Alaska	10/1-3	Annual Meeting
Fish Expo. '69	Seattle	10/6-7	
Ad hoc Surveillance Committee	Seattle	10/28	BCF Committee
Interagency Meeting	Newport	11/4	FCO, OSU, BCF report on separator trawl
USSR-US Scientists	Seattle	11/18-20	Annual Meeting
Fishery Industry-Liaison Meeting	Harbor	12/1	FCO, BCF, OSU
Shrimp Tagging Research	Galveston, Tex.	12/1-5	Fact finding trip
Fishery Industry-Liaison Meeting	Charleston	12/2	FCO, BCF, OSU
Fishery Industry-Liaison Meeting	Newport	12/3	FCO, BCF, OSU
FCO Meeting	Portland	12/8	Legalize pots for Groundfish
Fishery Industry-Liaison Meeting	Astoria	12/15	FCO, BCF, OSU