Demersal Fish and Shellfish Resources of the Gulf of Alaska from Cape Spencer to Unimak Pass 1948 - 1976

A Historical Review

by

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INTRODUCTION

To examine long-term trends in the relative magnitude of fisheries resources within the Survey Area, a comparison was made between the catch per unit of effort (kg/hr) for the "1960" (actually 1961) survey by the IPHC and the BCF and the "1970" (actually 1973-1976) surveys by the NMFS.

Mean CPUEs (geometric) were calculated for each survey period, for each species or group, and for each region-depth zone. Where the various region-depth zones were combined, each mean CPUE was weighted in proportion to that part of the total area it represented.

Standard deviations were calculated for each region and depth zone, and a 2-standard deviation factor was used as a divisor and multiplier, respectively, to determine a confidence interval for the mean CPUE. If the mean CPUE index for either survey period fell within the 2-standard deviation confidence interval around the mean for the other period, no statistically-significant change in CPUE is presumed to have occurred. Where the geometric mean CPUE for the 1960's fell outside the 2-standard deviation confidence interval for the 1970's, and vice versa, a statistically-significant change is presumed to be evident.

Because of the relatively broad confidence intervals associated with the mean CPUE indices, few statistically-significant changes from the 1960's to the 1970's can be identified. Comparison between the mean CPUEs of the two periods, however, suggests that in many cases a large change occurred although statistical significance cannot be asserted.

To describe the nature of the changes that have occurred from 1960 until 1970 in the respective indices of density, the 1970 CPUE was divided by the 1960 CPUE and the resulting ratio coded and described as follows:

1970 ÷ 1960 CPUE	CODE	DESCRIPTION
0.51 to 2.00	0	No marked change
0.26 to 0.50	-	Moderate decrease
0.13 to 0.25	--	Large decrease
Less than 0.13	---	Very large decrease
2.01 to 4.00	+	Moderate increase
4.01 to 8.00	++	Large increase
Greater than 8.00	+++	Very large increase

DECADE COMPARISON BY SPECIES AND GROUP (GULF OF ALASKA)

For the Study Area as a whole, there were few statistically significant changes from 1960 to 1970 as determined by the comparison of the mean CPUEs (geometric) and confidence intervals. Statistically-significant increases were indicated for the roundfish group, Dover sole, and walleye pollock, while a statistically-significant decrease was indicated for Pacific ocean perch. Moderate increases in the CPUE index between 1960 and 1970 were determined for the invertebrate species group and rex sole (Table XII-1).

Table XII-1.--Decade comparison by species and species group (all regions and depth zones combined).

Species or Group	"1960s" Mean CPUE[1]	"1960s" Confidence Interval[2]	"1970s" Mean CPUE[1]	"1970s" Confidence Interval[2]	Confidence Interval Comparison[3]	CPUE Ratio 1970÷1960
Group						
Elasmobranchs	4.50	2.16- 9.36	5.39	2.62- 11.10	N.C.	1.20 (0)
Flatfish	82.99	42.13-163.49	147.25	90.90-238.55	N.C.	1.77 (0)
Roundfish	27.70	12.15- 63.16	94.49	47.25-188.98	C.	3.41 (+)
Rockfish	4.22	1.98- 8.99	2.65	1.47- 4.77	N.C.	0.63 (0)
Invertebrates	19.37	6.22- 60.43	47.60	21.83-103.77	N.C.	2.46 (+)
Species						
Skates	3.49	1.73- 7.05	5.24	2.54- 10.79	N.C.	1.50 (0)
Turbot	23.05	10.48- 50.71	44.85	23.12- 87.01	N.C.	1.95 (0)
Halibut	5.45	2.53- 11.72	4.69	2.19- 10.04	N.C.	0.86 (0)
Flathead sole	6.49	2.80- 15.06	7.96	2.97- 21.33	N.C.	1.23 (0)
Dover sole	1.36	0.94- 1.97	2.28	1.37- 3.78	C.	1.68 (0)
Rex sole	1.81	1.10- 2.99	4.26	1.72- 10.52	N.C.	2.35 (+)
Rock sole	2.74	1.41- 5.34	3.35	1.62- 6.93	N.C.	1.22 (0)
Sablefish	2.28	1.26- 4.13	1.69	1.02- 2.81	N.C.	0.74 (0)
Cottids	4.50	2.74- 7.38	4.37	2.13- 8.96	N.C.	0.97 (0)
Pacific cod	4.71	1.96- 11.30	8.78	3.77- 20.46	N.C.	1.87 (0)
Walleye pollock	2.86	1.44- 5.66	17.57	5.09- 60.62	C.	6.14 (++)
Pac. o. perch	3.57	1.66- 7.68	1.38	0.84- 2.28	C.	0.39 (-)
Tanner crab	5.66	1.79- 17.94	5.78	2.28- 14.68	N.C.	1.02 (0)
King crab	1.69	0.86- 3.31	2.22	1.14- 4.25	N.C.	1.31 (0)

1/ Weighted geometric mean catch per unit of effort (kg/hour).

2/ Mean CPUE $\pm$ 2 standard deviations.

3/ C. = "Change" (both means outside the confidence limits); N.C. = "No Change" (one or both means within the confidence limits).

DECADE COMPARISON BY REGIONS OF THE GULF OF ALASKA

The Survey Area was divided into 9 regions of which 7 provided sufficient information in both the 1960 and 1970 surveys to permit comparison. Comparisons are made for Fairweather, Yakutat, Prince William, Kenai, Kodiak, Chirikof, and Sanak. The regions for which no comparisons are made include Shelikof and Shumagin (Figure XII-1).

1. Fairweather Region

In the Fairweather Region there were no statistically-significant changes in CPUE for any of the species groups; however, the CPUEs for all groups except elasmobranchs declined from 1960 to 1970 with moderate decreases indicated for flatfish and invertebrates. For the 14 species compared, only Tanner crab indicated a statistically-significant decrease while no statistically-significant increases were indicated. The CPUE ratio showed a moderate increase for 1 species, skates, while moderate decreases were indicated for turbot, halibut, Pacific cod, and Pacific ocean perch, and large decreases for sablefish and Tanner crab (Table XII-2).

Charts showing the distribution of Tanner crab in 1961 (Figure XI-177) and in 1976 (Figure XI-477) in the Fairweather Region indicate that greater densities of this species occurred between Cape Spencer and Yakutat Bay during the earlier survey than in the later.

2. Yakutat Region

In the Yakutat Region there were no statistically-significant changes in either the species groups or species, although 3 groups (elasmobranchs, flatfish, and roundfish) and 5 species (skates, turbot, Dover sole, rex sole, and pollock) showed moderate increases, and 1 species, Pacific ocean perch, showed a moderate decrease (Table XII-3).

3. Prince William Region

For the Prince William Region statistically-significant increases were shown in the roundfish group and the invertebrate group from 1960 to 1970, and a moderate increase was suggested for the flatfish group. Much of the roundfish increase was probably because of an increase in walleye pollock; no other species increased significantly. Moderate increases in the CPUE index did occur for turbot, flathead sole, Dover sole, rex sole, cottids, and Pacific cod, and a very large increase occurred for Tanner crab. The only marked decrease in the CPUE index from 1960 to 1970 was for Pacific ocean perch (Table XII-4). The increase in the density of walleye pollock from 1961 (Figure XI-217) to 1975 (Figure XI-432) as reflected by CPUE appeared to be general throughout the entire Prince William Region. The 18-fold increase in the mean CPUE for pollock, together with lesser increases in the densities of Pacific cod, cottids, and sablefish, accounted for the large increase in the CPUE for roundfish. The more than 20-fold increase in the CPUE for invertebrates from 1960 (Figure XI-136) to 1970 (Figure XI-411) occurred principally among the Tanner crab in a broad arc from Kayak Island to Cape Cleare at the southwest end of Montague Island.

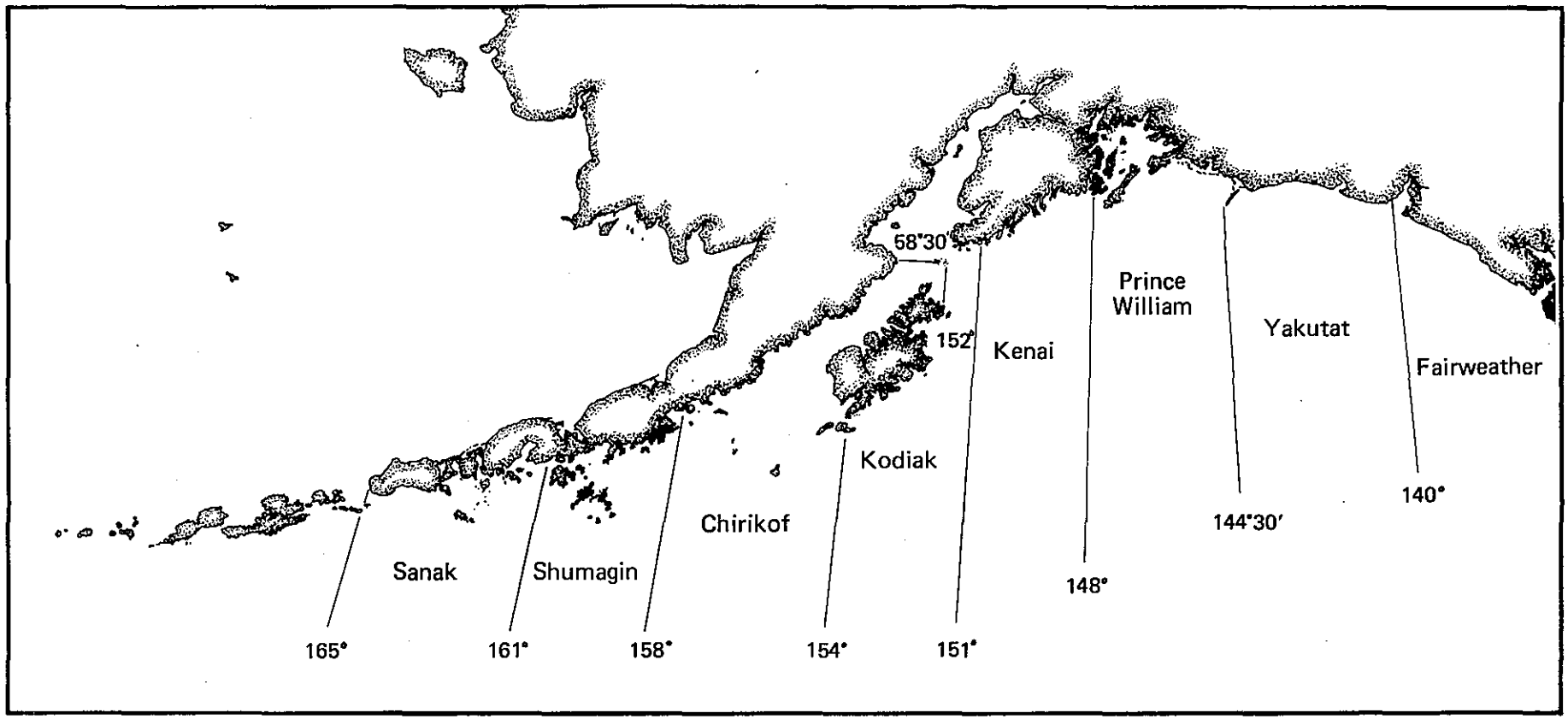

Figure XII-1.--Regions of the northern Gulf of Alaska Survey Area.

Table XII-2.--Decade comparison by species and species groups for the Fairweather Region (depth zones combined).

Species or Groups	"1960s" Mean CPUE[1]	"1960s" Confidence Interval[2]	"1970s" Mean CPUE[1]	"1970s" Confidence Interval[2]	Confidence Interval Comparison[3]	CPUE Ratio 1970÷1960
Group						
Elasmobranchs	11.99	1.16- 124.46	14.02	1.80-180.94	N.C.	1.17 (0)
Flatfish	191.01	20.54-1776.39	83.02	12.05-572.15	N.C.	0.43 (-)
Roundfish	16.16	1.26- 207.01	14.80	2.76- 79.48	N.C.	0.92 (0)
Rockfish	4.93	0.59- 41.07	2.86	0.38- 21.34	N.C.	0.58 (0)
Invertebrates	73.47	6.22- 868.42	36.88	4.43-307.21	N.C.	0.50 (-)
Species						
Skates	6.67	0.56- 78.84	13.53	1.89- 97.01	N.C.	2.03 (+)
Turbot	94.26	6.33-1402.59	31.21	3.42-284.64	N.C.	0.33 (-)
Halibut	5.20	0.76- 36.19	2.47	0.39- 15.71	N.C.	0.48 (-)
Flathead sole	7.11	0.42- 119.31	5.55	0.30-101.90	N.C.	0.78 (0)
Dover sole	2.06	0.46- 9.15	1.58	0.99- 2.53	N.C.	0.77 (0)
Rex sole	2.87	0.43- 19.00	4.84	0.54- 43.66	N.C.	1.69 (0)
Rock sole	1.39	0.37- 5.20	1.13	0.73- 1.75	N.C.	0.81 (0)
Sablefish	4.92	0.38- 63.03	1.09	0.71- 1.68	N.C.	0.22 (--)
Cottids	1.19	0.37- 3.80	1.30	0.56- 3.04	N.C.	1.09 (0)
Pacific cod	4.05	0.39- 42.48	1.97	0.34- 11.33	N.C.	0.49 (-)
Walleye pollock	1.69	0.54- 5.29	2.28	0.42- 12.47	N.C.	1.35 (0)
Pac. o. perch	3.40	0.46- 25.36	1.20	0.31- 4.63	N.C.	0.35 (-)
Tanner crab	10.03	2.89- 34.80	1.68	0.29- 9.66	C.	0.17 (--)
King crab	1.09	0.43- 2.79	1.14	0.41- 3.14	N.C.	1.05 (0)

1/ Weighted geometric mean catch per unit of effort (kg/hour).

2/ Mean CPUE ± 2 standard deviations.

3/ C. = "Change" (both means outside the confidence limits); N.C. = "No Change" (one or both means within the confidence limits).

Table XII-3.--Decade comparison by species and species group for the Yakutat Region (depth zones combined).

Species or Group	"1960s" Mean CPUE[1/]	"1960s" Confidence Interval[2/]	"1970s" Mean CPUE[1/]	"1970s" Confidence Interval[2/]	Confidence Interval Comparison[3/]	CPUE Ratio 1970÷1960
Group						
Elasmobranchs	9.06	0.98- 83.44	21.80	5.44- 87.42	N.C.	2.41 (+)
Flatfish	76.16	10.83-535.40	166.20	40.54-681.42	N.C.	2.18 (+)
Roundfish	17.69	1.98-158.15	45.83	7.89-266.27	N.C.	2.59 (+)
Rockfish	9.60	1.04- 88.42	8.74	1.77- 43.26	N.C.	0.91 (0)
Invertebrates	43.22	4.42-422.69	43.90	7.56-255.06	N.C.	1.02 (0)
Species						
Skates	6.45	1.13- 36.77	20.34	4.87- 85.02	N.C.	3.15 (+)
Turbot	30.05	3.54-255.45	74.59	15.22-365.49	N.C.	2.48 (+)
Halibut	4.51	0.78- 26.20	3.60	0.63- 20.70	N.C.	0.80 (0)
Flathead sole	5.02	0.56- 45.28	4.74	0.44- 51.19	N.C.	0.94 (0)
Dover sole	1.89	0.47- 7.52	3.81	0.31- 46.86	N.C.	2.02 (+)
Rex sole	2.81	0.56- 14.19	6.66	0.47- 94.24	N.C.	2.37 (+)
Rock sole	1.14	0.59- 2.19	1.14	0.70- 1.85	N.C.	1.00 (0)
Sablefish	4.16	0.61- 28.37	2.85	0.32- 25.48	N.C.	0.69 (0)
Cottids	1.06	0.61- 1.67	1.60	0.37- 6.90	N.C.	1.00 (0)
Pacific cod	4.46	0.63- 31.35	4.83	0.70- 33.28	N.C.	1.08 (0)
Walleye pollock	4.05	0.53- 30.82	8.74	1.06- 72.11	N.C.	2.16 (+)
Pac. o. perch	6.34	0.59- 68.47	2.02	0.31- 13.11	N.C.	0.32 (-)
Tanner crab	3.34	0.58- 19.21	2.80	0.53- 14.73	N.C.	0.84 (0)
King crab	1.03	0.47- 2.25	--	--	--	--

1/ Weighted geometric mean catch per unit of effort (kg/hour).

2/ Mean CPUE ± standard deviations.

3/ C. = "Change" (both means outside the confidence limits); N.C. = "No Change" (one or both means within the confidence limits).

Table XII-4.--Decade comparison by species and species group for the Prince William Region (depth zones combined).

Species or Group	"1960s" Mean CPUE[1]	"1960s" Confidence Interval[2]	"1970s" Mean CPUE[1]	"1970s" Confidence Interval[2]	Confidence Interval Comparison[3]	CPUE Ratio 1970÷1960
Group						
Elasmobranchs	5.20	0.73- 37.28	7.94	0.95- 66.14	N.C.	1.53 (0)
Flatfish	32.12	8.09-127.52	107.09	25.38-451.92	N.C.	3.33 (+)
Roundfish	6.66	0.93- 47.75	100.65	24.55-412.67	C.	15.11 (+++)
Rockfish	3.99	0.61- 26.13	2.34	0.38- 14.30	N.C.	0.59 (0)
Invertebrates	5.30	1.02- 27.61	119.14	30.24-469.41	C.	22.48 (+++)
Species						
Skates	3.97	0.50- 31.76	7.61	0.90- 64.69	N.C.	1.92 (0)
Turbot	11.89	2.57- 54.93	41.59	13.86-124.77	N.C.	3.50 (+)
Halibut	3.37	0.72- 15.87	6.50	1.05- 40.11	N.C.	1.93 (0)
Flathead sole	4.32	1.37- 13.65	14.09	2.70- 73.41	N.C.	3.26 (+)
Dover sole	1.12	0.77- 1.62	2.59	0.68- 9.89	N.C.	2.31 (+)
Rex sole	1.48	0.69- 3.17	5.34	1.19- 23.92	N.C.	3.61 (+)
Rock sole	1.30	0.52- 3.22	1.17	0.50- 2.76	N.C.	0.90 (0)
Sablefish	1.58	0.80- 3.11	1.99	0.69- 5.75	N.C.	1.26 (0)
Cottids	1.03	0.84- 1.26	2.67	0.74- 9.69	N.C.	2.59 (+)
Pacific cod	2.09	0.36- 12.27	6.64	0.99- 44.42	N.C.	3.18 (+)
Walleye pollock	2.36	0.62- 8.92	41.66	4.48-387.44	C.	17.65 (+++)
Pac. o. perch	3.75	0.56- 25.09	1.29	0.39- 4.24	N.C.	0.34 (-)
Tanner crab	3.82	0.76- 19.10	45.36	3.76-547.04	N.C.	11.87 (+++)
King crab	--	--	--	--	--	--

1/ Weighted geometric mean catch per unit of effort (kg/hour).

2/ Mean CPUE $\pm$ 2 standard deviations.

3/ C. = "Change" (both means outside the confidence limits); N.C. = "No Change"(one or both means within the confidence limits).

4. The Kenai Region

In the Kenai Region there was a statistically-significant decrease in the elasmobranch group's CPUE from 1960 to 1970, a large decrease in the rockfish group, and a moderate increase in the roundfish group. Among the 14 species, a statistically-significant decrease in CPUE occurred only for skates, a substantial part of the elasmobranch group. A moderate decrease took place in flathead sole, and very large decreases occurred in Pacific ocean perch and Tanner crab. The CPUE showed a very large increase from 1960 through 1970 for Dover sole, a large increase for rex sole, and a moderate increase for walleye pollock (Table XII-5).

The occurrence of moderate numbers of skates (elasmobranchs) in the Blying Sound area in 1961 (Figure XI-154) and their apparent lack in 1975 (Figure XI-425) accounts in large measure for the decline in the elasmobranch and skate CPUE indices over the decade. The apparent availability of pollock in the Kenai Region increased by a factor of more than 3 from 1961 (Figure XI-217) to 1975 (Figure XI-432).

5. The Kodiak Region

In the Kodiak Region no statistically-significant changes occurred in any of the species groups; however, 1 species, walleye pollock, showed a statistically-significant increase. A moderate increase also occurred in the roundfish and flatfish species groups. Among the species, moderate increases were found in Pacific cod, rock sole, Dover sole, and turbot, and moderate decreases occurred for Tanner crab and king crab (Table XII-6).

The increases in walleye pollock density from 1961 (Figure XI-218) to 1973 (Figure XI-433) largely occurred on Albatross Bank, Portlock Bank, and in the basin north of Portlock Bank.

6. The Chirikof Region

For the Chirikof Region, no statistically-significant changes were found in any of the species groups, and only 1 species, walleye pollock, had a statistically-significant increase. A moderate increase in the CPUE was found for the roundfish group, and moderate decreases occurred for flatfish and rockfish. Among the 14 species considered, a moderate increase was shown in the CPUE for Pacific cod and moderate decreases for the cottids, Pacific ocean perch, and king crab (Table XII-7).

The increase in the density of walleye pollock from 1960 to 1970 was widespread throughout the Chirikof Region (Figure XI-218 and Figure XI-433).

7. The Sanak Region

For the species groups and individual species in the Sanak Region, statistically-significant increases in CPUE occurred for the flatfish group, turbot, and sablefish, and no significant decreases were indicated. Large increases were noted for the roundfish and invertebrate groups, as well as for the king crab. Rex sole, rock sole, sablefish, and Pacific cod showed moderate increases and walleye pollock a very large increase. A moderate decrease was indicated for the cottids (Table XII-8).

Table XII-5.--Decade comparison by species and species group for the Kenai Region (depth zones combined).

Species or Group	"1960s" Mean CPUE[1]	"1960s" Confidence Interval[2]	"1970s" Mean CPUE[1]	"1970s" Confidence Interval[2]	Confidence Interval Comparison[3]	CPUE Ratio 1970÷1960
Group						
Elasmobranchs	19.91	2.75- 144.15	1.73	0.61- 4.90	C.	0.09 (---)
Flatfish	118.21	14.93- 936.22	103.96	11.07-976.18	N.C.	0.88 (0)
Roundfish	55.82	2.72-1143.75	112.43	18.05-700.44	N.C.	2.01 (+)
Rockfish	21.12	1.22- 365.16	4.40	0.51- 31.71	N.C.	0.21 (--)
Invertebrates	26.67	3.33- 213.36	14.66	1.09-197.32	N.C.	0.55 (0)
Species						
Skates	16.03	1.92- 133.53	1.73	0.61- 4.90	C.	0.11 (---)
Turbot	71.34	11.22- 453.72	50.26	5.46-462.89	N.C.	0.70 (0)
Halibut	2.40	0.32- 17.74	2.59	0.26- 25.23	N.C.	1.08 (0)
Flathead sole	36.32	4.06- 324.70	11.91	0.54-261.78	N.C.	0.33 (-)
Dover sole	1.03	0.89- 1.19	9.33	0.69-125.58	N.C.	9.06 (+++)
Rex sole	1.04	0.89- 1.22	7.03	0.90- 54.62	N.C.	6.76 (++)
Rock sole	--	--	--	--	--	--
Sablefish	4.07	1.29- 12.86	3.16	0.47- 21.14	N.C.	0.78 (0)
Cottids	1.51	0.44- 5.22	2.29	0.44- 11.93	N.C.	1.52 (0)
Pacific cod	11.19	0.50- 248.42	18.54	3.10-111.05	N.C.	1.65 (0)
Walleye pollock	14.56	0.73- 289.60	50.86	3.45-749.17	N.C.	3.49 (+)
Pac. o. perch	19.22	0.93- 397.85	1.79	0.33- 9.70	N.C.	0.09 (---)
Tanner crab	24.96	1.22- 511.43	1.54	0.28- 8.59	N.C.	0.06 (---)
King crab	--	--	1.47	0.20- 10.97	--	--

1/ Weighted geometric mean catch per unit of effort (kg/hour).

2/ Mean CPUE ± 2 standard deviations.

3/ C. = "Change" (both means outside the confidence limits); N.C. - "No Change (one or both means within the confidence limits).

Table XII-6.--Decade comparison by species and species group for the Kodiak Region (depth zones combined).

Species or Group	"1960s" Mean CPUE[1]	"1960s" Confidence Interval[2]	"1970s" Mean CPUE[1]	"1970s" Confidence Interval[2]	Confidence Interval Comparison[3]	CPUE Ratio 1970÷1960
Group						
Elasmobranchs	1.52	0.47- 4.89	1.11	0.65- 1.89	N.C.	0.73 (0)
Flatfish	134.76	36.72- 494.57	363.40	158.69- 832.19	N.C.	2.70 (+)
Roundfish	76.40	22.54- 259.00	233.18	20.95-2595.29	N.C.	3.05 (+)
Rockfish	2.46	0.42- 14.44	1.88	0.59- 3.53	N.C.	0.76 (0)
Invertebrates	45.75	1.85-1133.69	74.94	7.66- 732.91	N.C.	1.64 (0)
Species						
Skates	1.48	0.46- 4.72	1.11	0.65- 1.89	N.C.	0.68 (0)
Turbot	13.42	1.93- 93.40	33.12	5.21- 210.64	N.C.	2.47 (+)
Halibut	12.26	1.09- 137.93	13.10	2.62 65.50	N.C.	1.07 (0)
Flathead sole	5.53	0.76- 40.04	8.79	0.69- 111.46	N.C.	1.59 (0)
Dover sole	1.01	0.90- 1.13	2.21	0.58- 8.35	N.C.	2.19 (+)
Rex sole	1.34	0.54- 3.32	1.70	0.35- 8.18	N.C.	1.27 (0)
Rock sole	16.94	1.65- 174.14	55.48	0.94-3281.64	N.C.	3.28 (+)
Sablefish	1.20	0.67- 2.16	1.40	0.60- 3.28	N.C.	1.17 (0)
Cottids	39.65	9.40- 167.32	39.96	6.28- 254.15	N.C.	1.01 (0)
Pacific cod	5.97	0.73- 48.77	23.06	1.01- 527.38	N.C.	3.86 (+)
Walleye pollock	1.60	0.24- 10.48	25.77	0.47-1421.22	C.	17.36 (+++)
Pac. o. perch	2.26	0.39- 13.13	1.35	0.67- 2.69	N.C.	0.60 (0)
Tanner crab	13.72	0.97- 194.14	5.78	0.63- 53.23	N.C.	0.42 (-)
King crab	13.52	0.51- 359.36	6.62	0.40- 108.83	N.C.	0.49 (-)

1/ Weighted geometric mean catch per unit of effort (kg/hour).

2/ Mean CPUE ± 2 standard deviations.

3/ C. = "Change" (both means outside the confidence limits); N.C. = "No Change" (one or both means within the confidence limits).

Table XII-7.--Decade comparison by species and species group for the Chirikof Region (depth zones combined).

Species or Group	"1960s" Mean CPUE[1]	"1960s" Confidence Interval[2]	"1970s" Mean CPUE[1]	"1970s" Confidence Interval[2]	Confidence Interval Comparison[3]	CPUE Ratio 1970÷1960
Group						
Elasmobranchs	2.49	0.96- 6.45	1.46	0.61- 3.49	N.C.	0.59 (0)
Flatfish	158.14	57.51-434.89	68.60	16.26-289.49	N.C.	0.43 (-)
Roundfish	59.47	19.00-186.14	125.10	33.72-464.12	N.C.	2.10 (+)
Rockfish	4.66	0.70- 31.18	2.23	0.64- 7.72	N.C.	0.48 (-)
Invertebrates	19.48	1.70-223.44	20.28	3.42-120.26	N.C.	1.04 (0)
Species						
Skates	2.42	0.92- 6.39	1.46	0.61- 3.49	N.C.	0.60 (0)
Turbot	28.20	8.25- 96.44	22.23	5.64- 87.59	N.C.	0.79 (0)
Halibut	10.05	1.91- 52.86	5.32	1.20- 23.62	N.C.	0.53 (0)
Flathead sole	7.90	2.03- 15.80	10.65	1.89- 60.07	N.C.	1.35 (0)
Dover sole	1.53	0.71- 3.27	1.79	0.71- 4.49	N.C.	1.17 (0)
Rex sole	2.67	0.67- 10.71	2.48	0.71- 8.66	N.C.	0.93 (0)
Rock sole	5.01	2.98- 8.42	2.78	0.77- 10.01	N.C.	0.55 (0)
Sablefish	2.27	0.92- 5.58	1.58	0.75- 2.50	N.C.	0.70 (0)
Cottids	20.11	4.62- 87.48	5.61	1.38- 22.78	N.C.	0.28 (-)
Pacific cod	3.77	1.06- 13.42	8.08	1.50- 43.39	N.C.	2.14 (+)
Walleye pollock	3.43	0.83- 14.20	29.22	3.92-217.98	C.	8.52 (+++)
Pac. o. perch	4.42	0.67- 28.95	1.40	0.54- 3.65	N.C.	0.32 (-)
Tanner crab	4.06	0.03-493.33	5.16	1.03- 25.80	N.C.	1.27 (0)
King crab	8.07	0.84- 77.31	2.27	0.39- 13.32	N.C.	0.28 (-)

1/ Weighted geometric mean catch per unit of effort (kg/hour).

2/ Mean CPUE $\pm$ 2 standard deviations.

3/ C. = "Change" (both means outside the confidence limits); N.C. = "No Change" (one or both means within the confidence limits).

Table XII-8.--Decade comparison by species and species group for the Sanak Region (depth zones combined).

Species or Group	"1960s" Mean CPUE[1]	"1960s" Confidence Interval[2]	"1970s" Mean CPUE[1]	"1970s" Confidence Interval[2]	Confidence Interval Comparison[3]	CPUE Ratio 1970÷1960
Group						
Elasmobranchs	1.31	0.56- 3.04	2.26	0.42- 12.14	N.C.	1.73 (0)
Flatfish	69.42	20.72-232.56	282.99	106.39- 752.75	C.	4.08 (++)
Roundfish	82.45	18.20-373.50	361.30	66.05-1976.31	N.C.	4.38 (++)
Rockfish	1.49	0.52- 4.26	1.11	1.09- 1.13	N.C.	0.74 (0)
Invertebrates	8.70	0.26-288.14	48.07	6.57- 351.87	N.C.	5.53 (++)
Species						
Skates	1.28	0.56- 2.93	2.26	0.42- 12.14	N.C.	1.77 (0)
Turbot	9.83	2.11- 45.81	53.11	12.21- 231.03	C.	5.40 (++)
Halibut	7.87	1.14- 54.22	5.90	0.90- 38.65	N.C.	0.75 (0)
Flathead sole	6.22	0.89- 43.29	7.67	0.67- 87.97	N.C.	1.23 (0)
Dover sole	1.03	0.82- 1.29	1.30	0.46- 3.68	N.C.	1.26 (0)
Rex sole	1.24	0.66- 2.33	3.04	0.31- 29.73	N.C.	2.45 (+)
Rock sole	10.21	1.04- 99.85	25.80	1.90- 350.88	N.C.	2.53 (+)
Sablefish	1.15	0.63- 2.12	2.81	1.98- 4.19	C.	2.44 (+)
Cottids	48.68	9.17-258.49	19.19	1.94- 189.41	N.C.	0.39 (-)
Pacific cod	8.08	0.87- 75.14	29.95	3.25- 275.84	N.C.	3.71 (+)
Walleye pollock	2.47	0.52- 11.76	33.26	0.59-1890.17	N.C.	13.47 (+++)
Pac. o. perch	1.49	0.53- 4.22	1.10	1.09- 1.11	N.C.	0.74 (0)
Tanner crab	4.74	0.21-108.40	5.46	0.40- 75.02	N.C.	1.15 (0)
King crab	1.99	0.18- 22.39	9.98	0.94- 105.69	N.C.	5.02 (++)

1/ Weighted geometric mean catch per unit of effort (kg/hour).

2/ Mean CPUE $\pm$ 2 standard deviations.

3/ C. = "Change" (both means outside the confidence limits); N.C. = "No Change" (one or both means within the confidence limits).

The increase in the CPUE for the roundfish group from 1960 to 1970 stems largely from the increase in walleye pollock (Figure XI-218 and Figure XI-433).

DECADE COMPARISON BY DEPTH ZONE

On the inner shelf, 0-100 m, a comparison of geometric mean CPUEs for the 5 species groups indicates that all increased from the 1960's, and for the species, all but 2 also increased. On the outer shelf, 101-200 m, CPUEs for 4 of the species groups increased from 1960 to 1970; among the 14 species considered, CPUEs for 8 increased and those for 6 decreased. With the species groups in the upper slope zone, 2 increased and 3 declined; there were increases in CPUEs for 7 species, decreases in 6, and no change in 1.

1. The 0-100 m Depth Zone

For the 0-100 m depth zone, the inner shelf, there were statistically-significant increases in CPUE from 1960 to 1970 in the flatfish and roundfish groups and for turbot; there were no statistically-significant decreases in any group or species (Table XII-9).

In the ratios of the 1970 mean CPUE divided by that for 1960, there were moderate increases in Pacific cod and Tanner crab and large increases for invertebrates and walleye pollock.

2. The 101-200 m Depth Zone

For the 101-200 m depth zone, the outer shelf, there was a statistically-significant increase from 1960 to 1970 for only a single species, the walleye pollock, and there were no significant decreases. Moderate increases in the mean CPUE occurred with the roundfish and invertebrate species groups and with rex sole; a moderate decrease occurred with Pacific ocean perch (Table XII-10).

3. The 201-400 m Depth Zone

For the 201-400 m depth zone, the upper slope, there were no statistically-significant changes from 1960 to 1970 in species group CPUEs, but a significant decrease did occur for Pacific ocean perch. A moderate increase was indicated in the roundfish group and large increases occurred in Dover sole and rex sole, while moderate decreases occurred in the rockfish group and Tanner crab (Table XII-11).

DECADE COMPARISON BY REGION-DEPTH ZONE

The changes in each region-depth zone from 1960 to 1970 based upon comparisons of mean CPUEs (geometric) are listed below:

1. The Inner Shelf (0-100 m) Depth Zone (Table XII-12).

a. Fairweather Region

No marked changes: Elasmobranchs, rockfish, and invertebrates.
Moderate decreases: Halibut, rex sole, rock sole, walleye pollock, and Tanner crab.
Large decreases: Roundfish.
Very large decreases: Flatfish, turbot, flathead sole, and Pacific cod.

Table XII-9.--Decade comparison by species and species group for the 0-100 m depth zone (all regions combined).

Species or Group	"1960s" Mean CPUE[1]	"1960s" Confidence Interval[2]	"1970s" Mean CPUE[1]	"1970s" Confidence Interval[2]	Confidence Interval Comparison[3]	CPUE Ratio 1970÷1960
Group						
Elasmobranchs	2.19	0.93- 5.17	2.83	1.05- 7.64	N.C.	1.30 (0)
Flatfish	63.93	22.91-178.36	178.98	86.88-369.70	C.	2.80 (+)
Roundfish	29.73	7.56-116.84	126.12	41.22-385.93	C.	4.24 (++)
Rockfish	1.08	0.79- 1.47	1.09	0.69- 1.73	N.C.	1.00 (0)
Invertebrates	9.87	0.99- 98.01	57.18	13.76-237.30	N.C.	5.79 (++)
Species						
Skates	1.82	0.77- 4.30	2.76	1.03- 7.37	N.C.	1.52 (0)
Turbot	6.49	2.02- 20.83	29.70	11.08- 79.60	C.	4.58 (++)
Halibut	9.13	2.13- 39.17	12.22	3.13- 47.66	N.C.	1.34 (0)
Flathead sole	3.02	0.87- 10.51	5.04	1.20- 21.22	N.C.	1.67 (0)
Dover sole	1.03	0.87- 1.23	1.20	0.80- 1.80	N.C.	1.17 (0)
Rex sole	1.49	0.82- 2.70	2.28	0.91- 5.68	N.C.	1.53 (0)
Rock sole	8.72	1.96- 38.99	16.51	3.60- 75.62	N.C.	1.89 (0)
Sablefish	1.30	0.86- 1.98	1.13	0.80- 1.59	N.C.	0.87 (0)
Cottids	7.99	2.54- 25.09	14.33	3.62- 56.75	N.C.	1.79 (0)
Pacific cod	5.40	1.13- 25.92	12.31	1.91- 79.40	N.C.	2.28 (+)
Walleye pollock	1.71	0.66- 4.45	11.65	0.84-162.05	N.C.	6.83 (++)
Pac. o. perch	1.07	0.81- 1.41	1.00	0.99- 1.01	N.C.	0.93 (0)
Tanner crab	2.85	0.45- 17.84	7.93	1.42- 44.25	N.C.	2.78 (+)
King crab	2.51	0.40- 15.76	3.57	1.01- 12.60	N.C.	1.42 (0)

1/ Weighted geometric mean catch per unit of effort (kg/hour).

2/ Mean CPUE $\pm$ 2 standard deviations.

3/ C. = "Change" (both means outside the confidence limits); N.C. = "No Change" (one or both means within the confidence limits).

Table XII-10.--Decade comparison by species and species group for the 101-200 m depth zone (all regions combined).

Species or Group	"1960s" Mean CPUE[1/]	"1960s" Confidence Interval[2/]	"1970s" Mean CPUE[1/]	"1970s" Confidence Interval[2/]	Confidence Interval Comparison[3/]	CPUE Ratio 1970÷1960
Group						
Elasmobranchs	5.59	1.76- 17.77	6.82	2.05- 22.64	N.C.	1.22 (0)
Flatfish	92.10	31.33-270.77	116.50	48.54-279.60	N.C.	1.26 (0)
Roundfish	28.10	7.81-101.16	92.23	32.36-262.86	N.C.	3.28 (+)
Rockfish	4.90	1.18- 20.43	2.78	0.96- 8.03	N.C.	0.57 (0)
Invertebrates	20.46	4.18-100.25	45.47	15.68-131.86	N.C.	2.22 (+)
Species						
Skates	4.17	1.27- 13.72	6.59	1.98- 21.88	N.C.	1.58 (0)
Turbot	38.10	10.61-136.78	47.77	16.76-136.14	N.C.	1.25 (0)
Halibut	6.31	2.07- 19.25	3.14	0.98- 10.05	N.C.	0.50 (-)
Flathead sole	9.35	2.40- 36.47	11.57	2.31- 57.85	N.C.	1.24 (0)
Dover sole	1.20	0.70- 2.06	1.98	0.83- 4.75	N.C.	1.65 (0)
Rex sole	1.67	0.76- 3.69	4.71	1.15- 19.22	N.C.	2.83 (+)
Rock sole	1.72	0.72- 4.09	1.68	0.61- 4.65	N.C.	0.97 (0)
Sablefish	2.23	0.78- 6.40	1.43	0.81- 2.53	N.C.	0.64 (0)
Cottids	4.34	2.38- 7.90	3.08	1.21- 7.85	N.C.	0.71 (0)
Pacific cod	5.42	1.41- 20.81	9.36	3.27- 26.77	N.C.	1.73 (0)
Walleye pollock	3.45	1.10- 10.87	30.58	5.80-161.16	C.	8.87 (+++)
Pac. o. perch	4.18	1.02- 17.18	1.55	0.69- 3.49	N.C.	0.37 (-)
Tanner crab	7.85	1.13- 54.48	5.48	1.37- 21.87	N.C.	0.70 (0)
King crab	1.33	0.78- 2.27	1.98	0.75- 5.25	N.C.	1.49 (0)

1/ Weighted geometric mean catch per unit of effort (kg/hour).

2/ Mean CPUE ± 2 standard deviations.

3/ C. = "Change" (both means outside the confidence limits); N.C. = "No Change" (one or both means within the confidence limits).

Table XII-11.--Decade comparison by species and species group for the 201-400 m depth zone (all regions combined).

Species or Group	"1960s" Mean CPUE[1]	"1960s" Confidence Interval[2]	"1970s" Mean CPUE[1]	"1970s" Confidence Interval[2]	Confidence Interval Comparison[3]	CPUE Ratio 1970÷1960
Group						
Elasmobranchs	10.43	1.30- 83.88	9.89	3.13- 31.25	N.C.	0.95 (0)
Flatfish	131.34	39.92-432.11	211.28	37.80-1181.06	N.C.	1.61 (0)
Roundfish	22.46	6.38- 79.06	53.85	10.97- 264.40	N.C.	2.40 (+)
Rockfish	51.01	15.65-166.29	16.38	4.93- 54.38	N.C.	0.32 (-)
Invertebrates	52.18	13.66-198.93	36.92	5.20- 262.13	N.C.	0.71 (0)
Species						
Skates	9.06	2.46- 33.34	9.82	2.98- 32.41	N.C.	1.08 (0)
Turbot	67.69	17.77-257.90	89.23	21.50- 370.30	N.C.	1.32 (0)
Halibut	2.05	0.77- 5.43	1.65	0.69- 3.96	N.C.	0.80 (0)
Flathead sole	10.10	2.14- 47.57	6.07	1.19- 31.02	N.C.	0.60 (0)
Dover sole	3.77	0.77- 18.55	15.17	0.69- 333.28	N.C.	4.02 (++)
Rex sole	3.74	0.89- 15.63	15.46	0.77- 310.44	N.C.	4.14 (++)
Rock sole	1.04	0.84- 1.29	1.04	0.87- 1.24	N.C.	1.00 (0)
Sablefish	8.58	2.28- 32.26	7.30	0.47- 112.42	N.C.	0.85 (0)
Cottids	1.43	0.92- 2.22	2.56	0.41- 16.00	N.C.	1.79 (0)
Pacific cod	2.18	0.97- 4.91	3.35	0.89- 12.63	N.C.	1.54 (0)
Walleye pollock	4.74	1.86- 12.09	6.53	1.50- 28.34	N.C.	1.38 (0)
Pac. o. perch	29.69	11.64- 75.71	1.90	0.30- 11.89	C.	0.06 (---)
Tanner crab	8.46	1.96- 36.55	3.90	1.05- 14.43	N.C.	0.46 (-)
King crab	1.52	0.83- 2.80	1.29	0.70- 2.37	N.C.	0.85 (0)

1/ Weighted geometric mean catch per unit of effort (kg/hour).

2/ Mean CPUE ± 2 standard deviations.

3/ C. = "Change" (both means outside the confidence limits); N.C. = "No Change" (one or both means within the confidence limits).

Table XII-12--Ratio of the 1970÷1960 geometric mean CPUE index (kg/hr) for the 0-100 m depth zone by region of the Gulf of Alaska.

Species or Group	REGION						
	Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak
Group							
Elasmobranchs	1.88	2.25	2.02	--	--	--	--
Flatfish	0.09	1.85	11.29	--	2.86	0.46	3.90
Roundfish	0.17	11.31	18.87	--	2.12	1.47	3.55
Rockfish	0.98	0.99	--	--	--	--	--
Invertebrates	1.83	2.48	87.05	--	4.99	0.52	3.18
Species							
Skates	3.13	3.37	2.64	--	--	--	--
Turbot	0.10	1.55	18.66	--	3.35	2.90	7.35
Halibut	0.38	3.06	3.64	--	2.26	0.21	0.88
Flathead sole	0.07	2.35	8.79	--	1.66	2.03	0.98
Dover sole	--	1.57	--	--	--	--	--
Rex sole	0.40	1.88	2.72	--	1.73	1.61	1.26
Rock sole	0.33	1.32	0.76	--	5.15	0.46	5.32
Sablefish	--	0.59	--	--	--	--	--
Cottids	--	0.82	--	--	1.22	0.50	0.96
Pacific cod	0.11	7.05	2.41	--	5.12	0.93	2.65
Walleye pollock	0.50	12.50	--	--	10.01	2.98	4.29
Pac. o. perch	--	0.99	--	--	--	--	--
Tanner crab	0.41	3.26	42.23	--	1.85	1.39	0.95
King crab	--	--	--	--	0.66	0.11	4.66

Moderate increases: Skates.
Large increases: None.
Very large increases: None.

b. Yakutat Region

No marked changes: Flatfish, rockfish, turbot, Dover sole, rex sole, rock sole, sablefish, cottids, and Pacific ocean perch.
Moderate decreases: None.
Large decreases: None.
Very large decreases: None.
Moderate increases: Elasmobranchs, invertebrates, skates, halibut, flathead sole, and Tanner crab.
Large increases: Pacific cod.
Very large increases: Roundfish and walleye pollock.

c. Prince William Region

No marked changes: Rock sole.
Moderate decreases: None.
Large decreases: None.
Very large decreases: None.
Moderate increases: Elasmobranchs, skates, halibut, rex sole, and Pacific cod.
Large increases: None.
Very large increases: Flatfish, roundfish, invertebrates, turbot, flathead sole, and Tanner crab.

d. Kenai Region

No comparative information in the 0-100 m deptn zone.

e. Kodiak Region

No marked changes: Flathead sole, rex sole, cottids, Tanner crab, and king crab.
Moderate decreases: None.
Large decreases: None.
Very large decreases: None.
Moderate increases: Flatfish, roundfish, turbot, and halibut.
Large increases: Invertebrates, rock sole, and Pacific cod.
Very large increases: Walleye pollock.

f. Chirikof Region

No marked changes: Roundfish, invertebrates, rex sole, Pacific cod, and Tanner crab.
Moderate decreases: Flatfish, rock sole, and cottids.
Large decreases: Halibut.
Very large decreases: King crab.
Moderate increases: Turbot, flathead sole, and walleye pollock.
Large increases: None.
Very large increases: None.

g. Sanak Region

No marked changes: Halibut, flathead sole, rex sole, cottids, and Tanner crab.
Moderate decreases: None.
Large decreases: None.
Very large decreases: None.
Moderate increases: Flatfish, roundfish, invertebrates, and Pacific cod.
Large increases: Turbot, rock sole, walleye pollock, and king crab.
Very large increases: None.

2. The Outer Shelf (101-200 m) Depth Zone (Table XII-13)

a. Fairweather Region

No marked changes: Elasmobranchs, roundfish, rockfish, invertebrates, flathead sole, Dover sole, rock sole, cottids, Pacific cod, walleye pollock, and king crab.
Moderate decreases: Flatfish, turbot, halibut, sablefish, and Pacific ocean perch.
Large decreases: Tanner crab.
Moderate increases: Skates and rex sole.
Large increases: None.
Very large increases: None.

b. Yakutat Region

No marked changes: Elasmobranchs, roundfish, rockfish, invertebrates, halibut, flathead sole, Dover sole, rex sole, Pacific cod, walleye pollock, and Tanner crab.
Moderate decreases: Sablefish and Pacific ocean perch.
Large decreases: None.
Very large decreases: None.
Moderate increases: Flatfish, skates, and turbot.
Large increases: None.
Very large increases: None.

c. Prince William Region

No marked changes: Elasmobranchs, flatfish, skates, turbot, halibut, and sablefish.
Moderate decreases: Rockfish and Pacific ocean perch.
Large decreases: None.
Very large decreases: None.
Moderate increases: Flathead sole, Dover sole, rex sole, and cottids.
Large increases: Pacific cod and Tanner crab.
Very large increases: Roundfish, invertebrates, and walleye pollock.

d. Kenai Region

No marked changes: Flatfish, invertebrates, turbot, halibut, sablefish, cottids, and Pacific cod.
Moderate decreases: Rockfish and flathead sole.
Large decreases: Skates and Pacific ocean perch.
Very large decreases: Elasmobranchs and Tanner crab.
Moderate increases: Roundfish.
Large increases: None.
Very large increases: Dover sole, rex sole, and walleye pollock.

Table XII-13.--Ratio of the 1970÷1960 geometric mean CPUE index (kg/hr) for the 101-200 m depth zone by region of the Gulf of Alaska.

Species or Group	REGION						
	Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak
Group							
Elasmobranchs	1.17	1.91	1.11	0.10	0.65	0.66	3.47
Flatfish	0.30	2.29	1.41	1.23	2.07	0.35	3.90
Roundfish	1.40	1.14	18.28	3.01	4.27	3.32	5.22
Rockfish	0.52	1.12	0.41	0.28	0.51	0.50	--
Invertebrates	0.51	1.21	9.30	0.79	0.37	1.30	9.14
Species							
Skates	2.09	2.57	1.40	0.13	0.65	0.60	3.61
Turbot	0.26	2.87	1.53	1.05	1.53	0.43	3.47
Halibut	0.43	0.51	0.57	0.91	0.38	0.12	0.63
Flathead sole	1.17	1.24	2.35	0.31	2.61	0.75	1.45
Dover sole	0.68	1.50	2.34	9.50	3.73	1.16	1.54
Rex sole	2.21	1.83	3.51	7.37	1.99	0.78	4.70
Rock sole	0.95	--	--	--	1.62	0.45	1.20
Sablefish	0.33	0.36	1.07	1.16	1.08	0.62	1.03
Cottids	0.93	--	2.03	1.54	0.43	0.14	0.15
Pacific cod	0.64	0.51	4.83	1.58	4.59	1.70	5.61
Walleye pollock	1.59	1.78	24.80	8.02	32.10	68.49	43.85
Pac. o. perch	0.47	0.34	0.29	0.15	0.36	0.30	--
Tanner crab	0.13	0.90	4.91	0.10	0.50	0.97	1.44
King crab	1.14	--	--	--	0.43	0.49	6.17

e. Kodiak Region

No marked changes: Elasmobranchs, rockfish, skates, turbot, rex sole, rock sole, and sablefish.
Moderate decreases: Invertebrates, halibut, cottids, Tanner crab, king crab, and Pacific ocean perch.
Large decreases: None.
Very large decreases: None.
Moderate increases: Flatfish, flathead sole, and Dover sole.
Large increases: Roundfish and Pacific cod.
Very large increases: Walleye pollock.

f. Chirikof Region

No marked changes: Elasmobranchs, invertebrates, skates, flathead sole, Dover sole, rex sole, sablefish, Pacific cod, and Tanner crab.
Moderate decreases: Flatfish, rockfish, turbot, rock sole, Pacific ocean perch, and king crab.
Large decreases: Cottids.
Very large decreases: Halibut.
Moderate increases: Roundfish.
Large increases: None.
Very large increases: Walleye pollock.

g. Sanak Region

No marked changes; Halibut, flathead sole, Dover sole, rock sole, sablefish, and Tanner crab.
Moderate decreases: None.
Large decreases: Cottids.
Very large decreases: None.
Moderate increases: Elasmobranchs, flatfish, skates, and turbot.
Large increases: Roundfish, rex sole, Pacific cod, and king crab.
Very large increases: Invertebrates and walleye pollock.

3. The Upper Slope (201-400 m) Depth Zone (Table XII-14)

a. Fairweather Region

No marked changes: Elasmobranchs, roundfish, rockfish, skates, flathead sole, Dover sole, and walleye pollock.
Moderate decreases: None.
Large decreases: None.
Very large decreases: Invertebrates and sablefish.
Moderate increases: Flatfish, rex sole, and cottids.
Large increases: Turbot.
Very large increase: None.

b. Yakutat Region

No marked changes: Rockfish, halibut, Pacific cod, and walleye pollock.
Moderate decreases: Invertebrates.
Large decreases: Flathead sole and Tanner crab.
Very large decreases: Pacific ocean perch.
Moderate increases: Flatfish, roundfish, turbot, and sablefish.
Large increases: Elasmobranchs, skates, Dover sole, and rex sole.
Very large increases: None.

Table XII-14.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr) for the 201-400 m depth zone by region of the Gulf of Alaska.

Species or Group	REGION						
	Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak
Group							
Elasmobranchs	0.67	4.37	1.94	0.06	--	0.30	1.15
Flatfish	3.05	2.29	1.52	0.40	4.92	0.55	13.76
Roundfish	0.72	3.94	3.98	0.80	13.71	1.63	9.14
Rockfish	0.54	0.55	0.14	0.06	24.83	0.19	0.78
Invertebrates	0.10	0.31	7.80	0.24	0.11	1.66	--
Species							
Skates	1.02	4.60	2.14	0.07	--	0.31	1.15
Turbot	4.95	2.79	0.39	0.28	1.58	0.44	20.51
Halibut	--	.63	--	1.59	0.19	1.93	0.81
Flathead sole	1.68	0.23	0.51	0.37	0.15	1.99	--
Dover sole	1.18	4.82	6.08	--	--	1.32	4.75
Rex sole	2.16	5.09	9.46	--	--	0.65	7.73
Rock sole	--	--	--	--	1.61	0.92	--
Sablefish	0.06	3.03	1.32	0.30	--	0.50	2.12
Cottids	2.95	--	--	--	7.10	0.39	0.36
Pacific cod	--	1.00	1.74	1.84	0.22	7.65	2.13
Walleye pollock	1.88	0.67	1.51	0.52	--	1.47	35.22
Pac. o. perch	--	0.10	0.03	--	2.79	0.09	0.24
Tanner crab	--	0.21	5.35	0.05	0.24	1.69	--
King crab	--	--	--	--	0.08	0.37	--

c. Prince William Region

No marked changes: Elasmobranchs, flatfish, flathead sole, sablefish, Pacific cod, and walleye pollock.
Moderate decreases: Turbot.
Large decreases: Rockfish
Very large decreases: Pacific ocean perch.
Moderate increases: Roundfish and skates.
Large increases: Invertebrates, Dover sole, and Tanner crab.
Very large increases: Rex sole.

d. Kenai Region

No marked changes: Roundfish, halibut, Pacific cod, and walleye pollock.
Moderate decreases: Flatfish, turbot, flathead sole, and sablefish.
Large decreases: Invertebrates.
Very large decreases: Elasmobranchs, rockfish, skates, and Tanner crab.
Moderate increases: None.
Large increases: None.
Very large increases: None.

e. Kodiak Region

No marked changes: Turbot and rock sole.
Moderate decreases: None.
Large decreases: Halibut, flathead sole, Pacific cod, and Tanner crab.
Very large decreases: Invertebrates and king crab.
Moderate increases: Pacific ocean perch.
Large increases: Flatfish and cottids.
Very large increases: Roundfish and rockfish.

f. Chirikof Region

No marked changes: Flatfish, roundfish, invertebrates, halibut, flathead sole, Dover sole, rex sole, rock sole, walleye pollock, and Tanner crab.
Moderate decreases: Elasmobranchs, skates, turbot, sablefish, cottids, and king crab.
Large decreases: Rockfish.
Very large decreases: Pacific ocean perch.
Moderate increases: None.
Large increases: Pacific cod.
Very large increases: None.

g. Sanak Region

No marked changes: Elasmobranchs, rockfish, skates, and halibut.
Moderate decreases: Cottids.
Large decreases: Pacific ocean perch.
Very large decreases: None.
Moderate increases: Sablefish and Pacific cod.
Large increases: Dover sole and rex sole.
Very large increases: Flatfish, roundfish, turbot, and walleye pollock.

DECADE COMPARISON BY SPECIES GROUP AND SPECIES

1. Species Groups

a. Elasmobranchs (Table XII-15)

The overall CPUE for elasmobranchs showed no marked change from 1960 to 1970 within the Gulf of Alaska. Within the regions, a moderate increase in CPUE occurred in Yakutat and a very large (statistically-significant) decrease in Kenai. No marked changes occurred in any other region or depth zone. A large increase in the CPUE for elasmobranchs occurred in the Yakutat-upper slope. Very large decreases occurred in the Kenai-outer shelf and Kenai-upper slope. Thus, the Kenai region saw a large decline in elasmobranchs from 1960 to 1970.

b. Flatfish (Table XII-16)

No marked change occurred in the overall density of flatfish in the Gulf of Alaska from 1960 to 1970. Within the regions, there were moderate increases in Yakutat, Prince William, and Kodiak; a large (statistically-significant) increase in Sanak; and moderate decreases in Fairweather and Chirikof. A moderate (statistically-significant) increase occurred in the CPUE for flatfish within the inner shelf depth zone, but no marked changes were indicated in the other depth zones. Individual region-depth zones with large or very large increases in the flatfish group from 1960 to 1970 were the Prince William-inner shelf, Kodiak-upper slope, and the Sanak upper slope. The Fairweather-inner shelf had a very large decrease in the flatfish CPUE in the decade from 1960 to 1970.

c. Roundfish (Table XII-17)

The CPUE for the roundfish group within the Gulf of Alaska showed a moderate (statistically-significant) increase from 1960 to 1970. The CPUE increased moderately in the Yakutat, Kenai, Kodiak, and Chirikof Regions; a large increase occurred in Sanak; and a very large (statistically-significant) increase occurred in Prince William. Among the depth zones, a large (statistically-significant) increase occurred in the inner shelf and moderate increases occurred in the outer shelf and upper slope zones. No decreases were indicated in any region or depth zone. The individual region-depth zones with marked increases were the Kodiak-outer shelf and the Sanak-outer shelf with large increases, and the Yakutat-inner shelf, the Prince William-inner shelf, the Prince William-outer shelf, the Kodiak-upper slope, and the Sanak-upper slope with very large increases. A large decrease in CPUE occurred in the Fairweather-inner shelf. Thus, the roundfish group apparently increased throughout much of the Gulf of Alaska from 1960 to 1970 in all regions except the extreme eastern part of the Survey Area.

d. Rockfish (Table XII-18)

The rockfish was the only species group to show a decline in CPUE from 1960 to 1970 in the Gulf of Alaska as a whole (Table XII-1). Within the various regions of the Gulf of Alaska, the CPUE for rockfish did not show a marked

Table XII-15.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for elasmobranchs.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Elasmobranchs	0-100	0	+	+	2/	2/	2/	2/	0
	101-200	0	0	0	---	0	0	+	0
	201-400	0	++	0	---	2/	-	0	0
	Total	0	+	0	---4/	0	0	0	0

Table XII-16.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for flatfish.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Flatfish	0-100	---	0	+++	2/	+	-	+	+3/
	101-200	-	+	0	0	+	-	+	0
	201-400	+	+	0	-	++	0	+++	0
	Total	-	+	+	0	+	-	++3/	0

1/ Code	Ratio	Description
0	0.51-2.00	No marked change, 1960-1970
-	0.26-0.50	Moderate decrease, 1960-1970
--	0.13-0.25	Large decrease, 1960-1970
---	Less than 0.13	Very large decrease, 1960-1970
+	2.01-4.00	Moderate increase, 1960-1970
++	4.01-8.00	Large increase, 1960-1970
+++	Greater than 8.00	Very large increase, 1960-1970

2/ Insufficient data.

3/ Significant increase indicated by confidence interval.

4/ Significant decrease indicated by confidence interval.

Table XII-17.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for roundfish.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Roundfish	0-100	--	+++	+++	2/	+	0	+	++3/
	101-200	0	0	+++	+	++	+	++	+
	201-400	0	+	+	0	+++	0	+++	+
	Total	0	+	+++3/	+	+	+	++	+3/

Table XII-18.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for rockfish.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Rockfish	0-100	0	0	2/	2/	2/	2/	2/	0
	101-200	0	0	-	-	0	-	2/	0
	201-400	0	0	--	---	+++	--	0	-
	Total	0	0	0	--	0	-	0	0

1/

Code	Ratio	Description
0	0.51-2.00	No marked change, 1960-1970
-	0.26-0.50	Moderate decrease, 1960-1970
--	0.13-0.25	Large decrease, 1960-1970
---	Less than 0.13	Very large decrease, 1960-1970
+	2.01-4.00	Moderate increase, 1960-1970
++	4.01-8.00	Large increase, 1960-1970
+++	Greater than 8.00	Very large increase, 1960-1970

2/ Insufficient data.

3/ Significant increase indicated by confidence interval.

Table XII-19.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for invertebrates.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Invertebrates	0-100	0	+	+++	2/	++	0	+	++
	101-200	0	0	+++	0	-	0	+++	+
	201-400	---	-	++	--	---	0	2/	0
	Total	-	0	+++3/	0	0	0	++	+

Table XII-20.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for skates.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Skates	0-100	+	+	+	2/	2/	2/	2/	0
	101-200	+	+	0	--	0	0	+	0
	201-400	0	++	+	---	2/	-	0	0
	Total	+	+	0	---3/	0	0	0	0

1/ Code	Ratio	Description
0	0.50-2.00	No marked change, 1960-1970
-	0.26-0.50	Moderate decrease, 1960-1970
--	0.13-0.25	Large decrease, 1960-1970
---	Less than 0.13	Very large decrease, 1960-1970
+	2.01-4.00	Moderate increase, 1960-1970
++	4.01-8.00	Large increase, 1960-1970
+++	Greater than 8.00	Very large increase, 1960-1970

2/ Insufficient data.

3/ Significant increase indicated by confidence interval.

Table XII-21.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for turbot.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Turbot	0-100	---	0	+++	2/	+	+	++	++3/
	101-200	-	+	0	0	0	-	+	0
	201-400	++	+	-	-	0	-	+++	0
	Total	-	+	+	0	+	0	++3/	0

Table XII-22.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for halibut.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Halibut	0-100	-	+	+	2/	+	--	0	0
	101-200	-	0	0	0	-	---	0	-
	201-400	2/	0	2/	0	--	0	0	0
	Total	-	0	0	0	0	0	0	0

1/

Code	Ratio	Description
0	0.51-2.00	No marked change, 1960-1970
-	0.26-0.50	Moderate decrease, 1960-1970
--	0.13-0.25	Large decrease, 1960-1970
---	Less than 0.13	Very large decrease, 1960-1970
+	2.01-4.00	Moderate increase, 1960-1970
++	4.01-8.00	Large increase, 1960-1970
+++	Greater than 8.00	Very large increase, 1960-1970

2/ Insufficient data.

3/ Significant increase indicated by confidence interval.

change except in Chirikof with a moderate decrease and Kenai with a large decrease. Among the depth zones, there were no marked changes in CPUE in the inner and outer shelf zones and a moderate decrease in the upper slope. Individual region-depth zones with large or very large increases in the rockfish included only the Kodiak-upper slope with a very large increase. Decreases in CPUE occurred in the Prince William-upper slope and Chirikof-upper slope which had large decreases, and a very large decresed occurred in the Kenai-upper slope. Thus, the more dramatic changes in CPUE for rockfish occurred during the decade from 1960 to 1970 in the upper slope depth zone with the Kodiak-upper slope showing sharp increases and adjacent regions showing decreases.

e. Invertebrates (Table XII-19)

A moderate increase occurred in the CPUE index for the invertebrate group from 1960 to 1970 in the Gulf of Alaska. Within the regions, no marked changes were found in the Yakutat, Kenai, Kodiak, and Chirikof Regions, while a moderate decrease occurred in Fairweather, a large increase in Sanak, and a very large (statistically-significant) increase in Prince William. Within the 3 depth zones of the Gulf of Alaska, there was no marked change in the upper slope, a moderate increase in the outer shelf, and a large increase in the inner shelf. Region-depth zones with large or very large changes included a large decrease in the Kenai-upper slope and very large decreases in the Fairweather-upper slope and the Kodiak-upper slope; a large increase in CPUE took place in the Kodiak-inner shelf and the Prince William-upper slope. Very large increases occurred in the 2 shelf zones of the Prince William Region and in the Sanak-outer shelf. Thus, the decade saw dramatic increases in the CPUE indicies for invertebrates in the Prince William and Sannk Regions, and either little change or marked decreases occurred in much of the remainder of the Survey Area.

2. Species

a. Skates (Table XII-20)

No marked change occurred in the CPUE for skates from the 1960 survey to that of 1970 in the Gulf of Alaska, nor were there marked changes in any of the depth zones. In the various regions, a very large (statistically-significant) decrease was found in the CPUE in the Kenai Region and moderate increases in the Fairweather and Yakutat Regions; the other regions saw no marked changes. Individual region-depth zones with large or very large changes were the Kenai-outer shelf and Kenai-upper slope with decreases and the Yakutat-upper slope with a large increase. Thus, in comparison with 1960, the 1970 distribution of skates appears to have shifted eastward from the Kenai Region toward Yakutat and Fairweather.

b. Turbot (Table XII-21)

No marked change occurred in the CPUE for turbot from 1960 to 1970 in the Gulf of Alaska, and while the upper slope and outer shelf depth zones also saw no marked changes, there was a large (statistically-significant) increase in CPUE in the inner shelf. Among the various regions, a moderate decrease in CPUE occurred in the Fairweather Region; moderate increases in the Yakutat, Prince William, and Kodiak Regions; and a large (statistically-significant) increase in the Sanak Region. Within the region-depth zones a very large decrease was found in the Fairweather-inner shelf, and large or very large increases occurred in the Fairweather-upper slope, Prince William-inner shelf, Sanak-inner shelf, and in the Sanak-upper slope.

c. Halibut (Table XII-22)

Length-frequency information collected from catches of halibut made by otter trawls fished at the relatively slow speeds used during these surveys indicate that the trawl does not proportionally sample the large specimens. The comparison of mean CPUEs from the surveys in 1960 and 1970, therefore, must be made with reservations.

No marked change in the CPUE for halibut was indicated from 1960 to 1970 in the Gulf of Alaska, and two of the depth zones, the inner shelf and upper slope, also saw no marked changes. On the outer shelf, however, there was a moderate decrease in CPUE. Fairweather, with a moderate decrease, was the only region with a marked change in CPUE from 1960 to 1970. Among the region-depth zones with large or very large changes, were the Kodiak-upper slope, the Chirikof-inner shelf, and the Chirikof-outer shelf with marked decreases.

d. Flathead sole (Table XII-23)

The CPUE for flathead sole did not change markedly within the Gulf of Alaska from the 1960 to the 1970 survey, nor did it change in any of the depth zones. Within the various regions, there were no marked changes except for a moderate decrease in Kenai and a moderate increase in Prince William. Among the region-depth zones with large or very large changes in CPUE were the Fairweather-inner shelf, the Yakutat-upper slope, and the Kodiak-upper slope with decreases, and the Prince William-inner shelf with a very large increase.

e. Dover sole (Table XII-24).

During these resource assessment surveys the depth ranges sampled with respect to Dover sole included only the upper part of the normal distribution of the species. Some reservations, therefore, should be attached to conclusions drawn from comparisons of CPUE between survey periods as reflecting real changes in the entire Dover sole population.

A statistically-significant increase in the CPUE index for Dover sole occurred within the Gulf of Alaska from the 1960 to the 1970 survey, and among the depth zones only the upper slope saw a marked change, a large increase. Within the various regions, moderate increases occurred in Yakutat, Prince William, and Kodiak; and a very large increase took place in the Kenai Region. Among region-depth zones with either large or very large changes, increases occurred in the Yakutat-upper slope, the Prince William-upper slope, the Kenai-outer shelf, the Kenai-upper slope, the Kodiak-upper slope, and the Sanak-upper slope. There appeared to be a widespread increase in CPUE for Dover sole throughout most of the Gulf of Alaska from 1960 to 1970.

f. Rex sole (Table XII-25)

A moderate increase occurred in the CPUE for rex sole in the Gulf of Alaska during the decade from the 1960's to the 1970's. Within the three depth zones, the CPUEs for rex sole indicated no marked change in the inner shelf, a moderate increase in the outer shelf, and a large increase in the upper slope. In the regions of the Survey Area, moderate increases occurred in Yakutat, Prince William, and Sanak, and a large increase in Kenai.

Table XII-23.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for flathead sole.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Flathead sole	0-100	---	+	+++	2/	0	+	0	0
	101-200	0	0	+	-	+	0	0	0
	201-400	0	--	0	-	--	0	2/	0
	Total	0	0	+	-	0	0	0	0

Table XII-24.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for Dover sole.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Dover sole	0-100	2/	0	2/	2/	2/	2/	2/	0
	101-200	0	0	+	+++	+	0	0	0
	201-400	0	++	++	+++	+++	0	++	++
	Total	0	+	+	+++	+	0	0	03/

1/

Code	Ratio	Description
0	0.51-2.00	No marked change, 1960-1970
-	0.26-0.50	Moderate decrease, 1960-1970
--	0.13-0.25	Large decrease, 1960-1970
---	Less than 0.13	Very large decrease, 1960-1970
+	2.01-4.00	Moderate increase, 1960-1970
++	4.01-8.00	Large increase, 1960-1970
+++	Greater than 8.00	Very large increase, 1960-1970

2/ Insufficient data.

3/ Significant increase indicated by confidence interval.

Table XII-25.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for rex sole.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Rex sole	0-100	-	0	+	2/	0	0	0	0
	101-200	+	0	+	++	0	0	++	+
	201-400	+	++	+++	2/	+++	0	++	++
	Total	0	+	+	++	0	0	+	+

Table XII-26.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for rock sole.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Rock sole	0-100	-	0	0	2/	++	-	++	0
	101-200	0	2/	2/	2/	0	-	0	0
	201-400	2/	2/	2/	2/	0	0	2/	0
	Total	0	0	0	2/	+	0	+	0

1/

Code	Ratio	Description
0	0.51-2.00	No marked change, 1960-1970
-	0.26-0.50	Moderate decrease, 1960-1970
--	0.13-0.25	Large decrease, 1960-1970
---	Less than 0.13	Very large decrease, 1960-1970
+	2.01-4.00	Moderate increase, 1960-1970
++	4.01-8.00	Large increase, 1960-1970
+++	Greater than 8.00	Very large increase, 1960-1970

2/ Insufficient data.

Within the region-depth zones with large and very large changes in CPUE, there were no decreases, but increases occurred in the Kenai-outer shelf and in the upper slopes in Yakutat, Prince William, Kodiak, and Sanak. Thus, during the decade, there was a general increase in the density of rex sole throughout most of the Survey Area, especially in the upper slope depth zone.

g. Rock sole (Table XII-26)

No marked change was found in the CPUE for rock sole in the Gulf of Alaska from 1960 to 1970, nor was there a marked change in any of the depth zones. Only two of the regions, Kodiak and Sanak, with moderate increases in CPUE, saw any marked changes from 1960 to 1970. Only 2 region-depth zones had large or very large changes, the Kodiak-inner shelf and Sanak-inner shelf, both with large increases. Thus, with the exception of the inner shelf zones of Kodiak and Sanak, there was little change in rock sole over the decade from 1960 to 1970.

h. Sablefish (Table XII-27)

The otter trawl surveys of the 1960's and 1970's covered only the upper portion of the bathymetric distribution of sablefish in the Gulf of Alaska; additionally, an unknown part of the population may be found off bottom above the headrope height of the trawl, and the larger fish may be able to avoid the trawl when it is towed at the speeds used during these surveys. Therefore, any changes in the catch rates of sablefish between 1960 and 1970 should be viewed with reservations because availability rather than abundance may be a factor in the difference.

The CPUE for sablefish in the Gulf of Alaska did not show a marked change from 1960 to 1970, nor did the CPUE in any of the 3 depth zones. Only 2 of the 7 regions saw any marked changes in sablefish CPUE during the decade; a large decrease in Fairweather and a moderate (statistically-significant) increase in Sanak. Within the region-depth zones with either large or very large changes, there were very large decreases in the Fairweather-inner shelf and in the Fairweather-upper slope along with a large increase in the Kodiak-upper slope. Thus, there appears to have been a general decline in the density of sablefish in the easterm part of the Survey Area from 1960 to 1970.

i. Cottids (Table XII-28)

No marked change in the CPUE for cottids was found from 1960 to 1970 within the Gulf of Alaska, in the 3 depth zones, or in 4 of the 7 regions. Two of the regions, Chirikof and Sanak, showed moderate decreases, and in 1 region, Prince William, there was a moderate increase. Among the region-depth zones with either large or very large changes in the CPUE for cottids were the outer shelf zones of Chirikof and Sanak which had large decreases and the upper slopes of Prince William and Kodiak with large increases. Thus, there were general decreases in CPUE for cottids in the western extreme of the Survey Area and some increases in the central part.

Table XII-27.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for sablefish.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Sablefish	0-100	---	0	[2/]	[2/]	[2/]	[2/]	[2/]	0
	101-200	-	-	0	0	0	0	0	0
	201-400	---	+	0	-	[2/]	-	+	0
	Total	--	0	0	0	0	0	+[3/]	0

Table XII-28.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for cottids.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Cottids	0-100	[2/]	0	[2/]	[2/]	0	-	0	0
	101-200	0	[2/]	+	0	-	--	--	0
	201-400	+	[2/]	++	[2/]	++	-	-	0
	Total	0	0	+	0	0	-	-	0

1/

Code		Description
0	0.51-2.00	No marked change, 1960-1970
-	0.26-0.50	Moderate decrease, 1960-1970
--	0.13-0.25	Large decrease, 1960-1970
---	Less than 0.13	Very large decrease, 1960-1970
+	2.01-4.00	Moderate increase, 1960-1970
++	4.01-8.00	Large increase, 1960-1970
+++	Greater than 8.00	Very large increase, 1960-1970

2/ Insufficient data.

3/ Significant increase indicated by confidence interval.

j. Pacific cod (Table XII-29)

Since the Pacific cod is known to be semi-pelagic, a portion of the population may occur off bottom and be unavailable to the otter trawls employed in the 1960 and 1970 surveys. Therefore, some of the differences in CPUE noted between the results of the surveys may be because of changes in availability rather than because of changes in abundance, and these data should be viewed with that reservation.

The CPUE for Pacific cod showed no marked change from the 1960's to the 1970's in the Gulf of Alaska but did indicate a moderate increase in the inner shelf depth zone. Within the regions there was a moderate decrease in CPUE in Fairweather; and moderate increases occurred in Prince William, Kodiak, Chirikof, and Sanak. The region-depth zones with large or very large changes in the CPUE for Pacific cod were as follows: decreases occurred in the Fairweather-inner shelf and the Kodiak-upper slope, and increases occurred in the Yakutat-inner shelf, the Prince William-outer shelf, the Kodiak-inner shelf, the Kodiak outer shelf, the Chirikof-upper slope, and the Sanak-outer shelf.

k. Walleye pollock (Table XII-30)

Walleye pollock are known to be semi-pelagic, and an unknown portion of the population may have been off bottom and unavailable to the otter trawls during the 1960 and 1970 surveys. The differences in mean CPUE between surveys, therefore, may be due in part to differences in availability rather than a reflection of actual differences in relative abundance.

There was a large (statistically-significant) increase in the density index for pollock between the 1960 and 1970 surveys in the Gulf of Alaska. In the depth zones there was a large increase in the CPUE for pollock in the inner shelf, a very large (statistically-significant) increase in the outer shelf, and no marked change in the upper slope. Within the various regions, there were decreases in the CPUE in none; no marked change in Fairweather, moderate increases in Yakutat and Kenai; and very large (statistically-significant) increases in Prince William, Kodiak, and Chirikof. In the Sanak Region the very large increase was not statistically-significant. Among the region-depth zones with large or very large changes, all such changes were increases and occurred in the inner shelf depth zones of Yakutat, Prince William, Kodiak, and Sanak; in the outer shelf depth zones of Prince William, Kenai, Kodiak, Chirikof, and Sanak; and in the upper slope zones of Kodiak and Sanak. Thus, there was a general increase in pollock throughout most of the Gulf of Alaska in the inner and outer shelf depth zones except in the eastern extreme.

l. Pacific ocean perch (Table XII-31)

The Pacific ocean perch is known to be semi-pelagic, and therefore a portion of the population may have been distributed in the water above the headrope of the otter trawl. This species is also known to occur over rough, rocky substrata unsampleable by otter trawls as rigged during these surveys. Therefore, the CPUE estimates made may be minimal and possibly biased so they should be viewed with caution.

Table XII-29.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for Pacific cod.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Pacific cod	0-100	---	++	+	2/	++	0	+	+
	101-200	0	0	++	0	++	0	++	0
	201-400	2/	0	0	0	--	++	+	0
	Total	-	0	+	0	+	+	+	0

Table XII-30.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for walleye pollock.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Walleye pollock	0-100	-	+++	+++	2/	+++	+	++	++
	101-200	0	0	+++	+++	+++	+++	+++	+++3/
	201-400	0	0	0	0	+++	0	+++	0
	Total	0	+	+++3/	+	+++3/	+++3/	+++	++3/

1/

Code	Ratio	Description
0	0.51-2.00	No marked change, 1960-1970
-	0.26-0.50	Moderate decrease, 1960-1970
--	0.13-0.25	Large decrease, 1960-1970
---	Less than 0.13	Very large decrease, 1960-1970
+	2.01-4.00	Moderate increase, 1960-1970
++	4.01-8.00	Large increase, 1960-1970
+++	Greater than 8.00	Very large increase, 1960-1970

2/ Insufficient data.

3/ Significant increase indicated by confidence interval.

Table XII-31.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for Pacific ocean perch.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Pacific ocean perch	0-100	2/	0	2/	2/	2/	2/	2/	0
	101-200	-	-	-	--	-	-	2/	-
	201-400	---	---	---	---	+	---	--	---
	Total	-	-	-	---	0	-	0	-4/

Table XII-32.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for Tanner crab.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
Tanner crab	0-100	-	+	+++	2/	0	0	0	+
	101-200	--	0	++	---	-	0	0	0
	201-400	2/	--	++	---	--	0	2/	-
	Total	--	0	+++	---	-	0	0	0

1/

Code	Ratio	Description
0	0.51-2.00	No marked change, 1960-1970
-	0.26-0.50	Moderate decrease, 1960-1970
--	0.13-0.25	Large decrease, 1960-1970
---	Less than 0.13	Very large decrease, 1960-1970
+	2.01-4.00	Moderate increase, 1960-1970
++	4.01-8.00	Large increase, 1960-1970
+++	Greater than 8.00	Very large increase, 1960-1970

2/ Insufficient data.

4/ Significant decrease indicated by confidence interval.

There was a moderate (statistically-significant) decrease in CPUE for Pacific ocean perch within the Gulf of Alaska as a whole. Among the depth zones there was no marked change in the inner shelf, a moderate decrease in the outer shelf, and a very large (statistically-significant) decrease in the upper slope. Within the regions, there were no marked changes in CPUE for Pacific ocean perch in Sanak and Kodiak; moderate decreases occurred in Fairweather, Yakutat, Prince William, and Chirikof; and a very large decrease occurred in Kenai. Among the region-depth zones with large or very large changes there were decreases in the Kenai-outer shelf and in the upper slope zones of Fairweather, Yakutat, Prince William, Kenai, Chirikof, and Sanak. Thus, the CPUE for Pacific ocean perch generally declined within the Gulf of Alaska from 1960 to 1970.

m. Tanner crab (Table XII-32)

Otter trawls towed at the 2½ - 3 knots speeds utilized during these surveys are apparently more effective at capturing female and small male Tanner crab than at catching large males. Therefore, the comparisons of mean CPUEs for the 1960's and 1970's may be biased with reference to those parts of the stocks which are harvested commercially.

There was no marked change in the CPUE for Tanner crab within the Gulf of Alaska during the decade from 1960 to 1970. Within the three depth zones there was a moderate increase in the inner shelf, and a moderate decrease occurred in the upper slope. Among the 7 regions there were no marked changes in CPUE in Yakutat, Chirikof, and Sanak; a moderate decrease in Kodiak; a large decrease in Fairweather, a very large decrease in Kenai; and a very large increase in Prince William. Region-depth zones with either large or very large changes in the CPUE for Tanner crab are as follows: decreases occurred in the Fairweather-outer shelf, the Yakutat-upper slope, the Kenai-outer shelf, the Kenai-upper slope, and the Kodiak upper slope; increases occurred in all 3 of the Prince William depth zones. Thus, only in the Pronce William region were there marked increases in the CPUE for Tanner crab from 1960 to 1970.

n. King crab (Table XII-33)

Otter trawls towed at the 2½ - 3 knots speeds utilized during these surveys are apparently more effective at the capture of female and small male king crab than at catching large males. Therefore, the comparisons of mean CPUEs for the for the 1960's and 1970's may be biased in estimating catch rates for that part of the population which is fished commercially.

There was no marked change in CPUE for king crab in the decade from 1960 to 1970 in the Gulf of Alaska as a whole. Within the 3 depth zones there were also no marked changes. Among the various regions, there was no marked change from 1960 to 1970 in Fairweather; moderate decreases occurred in Kodiak and Chirikof; and a large increase took place in Sanak. The region-depth zones with large or very large changes in CPUE from 1960 to 1970 were the Kodiak-upper slope and the Chirikof-inner shelf with decreases and the Sanak-inner shelf and the Sanak-outer shelf with increases. A general increase in king crab appears to have occurred in the 2 Sanak shelf zones while all depth zones in the Chirikof Region and the two deeper zones in Kodiak indicated decreases.

Table XII-33.--Ratio of 1970÷1960 geometric mean CPUE index (kg/hr)[1/] for king crab.

Species or Species Group	Depth Zone (m)	REGION							
		Fairweather	Yakutat	Prince William	Kenai	Kodiak	Chirikof	Sanak	Total
King crab	0-100	2/	2/	2/	2/	0	---	++	0
	101-200	0	2/	2/	2/	-	-	++	0
	201-400	---	2/	2/	2/	---	-	2/	0
	Total	2/	2/	2/	2/	-	-	++	0

1/ Code

0	0.51-2.00	No marked change, 1960-1970
-	0.26-0.50	Moderate decrease, 1960-1970
--	0.13-0.25	Large decrease, 1960-1970
---	Less than 0.13	Very large decrease, 1960-1970
+	2.01-4.00	Moderate increase, 1960-1970
++	4.01-8.00	Large increase, 1960-1970
+++	Greater than 8.00	Very large increase, 1960-1970

2/ Insufficient data.

4/ Significant decrease indicated by confidence interval.

DISTRIBUTION OF BIOMASS BY DEPTH ZONE IN 1960 AND 1970

Within the Survey Area, the mean biomass in the 1960 survey was 8.9 mt/km^2 (Table XI-9) as compared with 10.9 mt/km^2 (Table XI-104) in the 1970 survey, an increase of 22.5 percent. By depth zone the greatest biomass density occurred in the 1960 survey in the upper slope (9.9 mt/km^2) followed by the outer shelf (9.2 mt/km^2) and the inner shelf (8.1 mt/km^2); in the 1970 surveys the outer shelf had the greatest density (12.6 mt/km^2) followed by the inner shelf (9.6 mt/km^2). Thus, the upper slope mean density declined by 12 percent from 1960 to 1970 and changed that zone's ranking from first in 1960 to last in 1970.

DISTRIBUTION OF BIOMASS BY REGION IN 1960 AND 1970

The distribution of biomass in the regions of the Gulf of Alaska varied considerably between the 1960 and 1970 surveys (Table XII-34). The Fairweather Region had the greatest density of any in 1960 (20.4 mt/km^2) and the least in 1970 (5.4 mt/km^2). The biomass density in the Prince William Region increased 4-fold from 2.5 mt/km^2 in 1960 to 10.5 mt/km^2 in 1970. In the Sanak Region the density increased from 6.7 mt/km^2 in 1960 to 18.4 mt/km^2 in 1970--nearly 3-fold. In the Kodiak Region the biomass nearly doubled from 1960 (9.7 mt/km^2) to 1970 (18.6 mt/km^2).

RANKING OF PROMINENT SPECIES WITHIN THE GULF OF ALASKA ON THE BASIS OF CATCH PER UNIT EFFORT IN 1960 AND 1970

In the Survey Area as a whole the rank order of species by CPUE in the 1960 survey and again in 1970 is listed in Table XII-35. The more dramatic changes from 1960 to 1970 include the declines in king crab (72.3 to 18.9 kg/hr), cottids (40.3 to 21.6 kg/hr), Pacific ocean perch (36.8 to 3.9 kg/hr), and sablefish (7.9to 4.2 kg/hr) and the increases in flathead sole (31.0 to 43.7 kg/hr), rock sole (29.2 to 46.9 kg/hr), walleye pollock (15.9 to 320.5 kg/hr), rex sole (4.1 to 19.7 kg/hr), and Dover sole (2.9 to 19.3 kg/hr). Thus, there were general increases in most of the flatfish from 1960 to 1970 accompanied by a 20-fold increase in the walleye pollock, a roundfish. During the same period another roundfish, the sablefish, and a prominent rockfish, the Pacific ocean perch, decreased.

In the 0-100 m depth zone the rankings of species by CPUE in the 1960 survey and in the 1970 survey are shown in Table XII-36. A sharp decrease occurred in the CPUE for king crab (179.6 to 23.3 kg/hr), but there were moderate increases in rock sole (73.0 to 147.2 kg/hr), Pacific cod (30.3 to 81.7 kg/hr), and turbot (21.7 to 43.4 kg/hr), and large increases in walleye pollock (3.0 to 108.9 kg/hr), and skates (1.8 to 10.5 kg/hr).

In the 101-200 m depth zone, the CPUE rankings of the prominent species in 1960 and 1970 are listed in Table XII-37. The decade between the surveys saw decreases in the stock of Tanner crab (64.5 to 35.6 kg/hr), Pacific ocean perch (50.1 to 6.1 kg/hr), cottids (48.1 to 14.0 kg/hr), sablefish (7.3 to 2.1 kg/hr), and shortspine thornyhead (3.2 to 1.1 kg/hr). During this same period the CPUEs for other species were increasing: walleye pollock (23.9 to 528.7 kg/hr), Dover sole (0.8 to 14.2 kg/hr), king crab (14.7 to 23.6 kg/hr), and rex sole (3.4 to 18.7 kg/hr).

Table XII-34.--Estimated biomass in metric tons per square kilometer during the 1960 and 1970 resource assessment surveys in the Gulf of Alaska.

Region	1960		1970	
	mt/km^2	Rank	mt/km^2	Rank
Fairweather	20.4	1	5.4	8
Yakutat	9.0	5	7.5	5
Prince William	2.5	9	10.5	3
Kenai	9.2	4	6.7	6
Kodiak	9.7	3	18.6	1
Shelikof	6.3	7	5.7	7
Chirikof	11.4	2	9.5	4
Shumagin	5.8	8	--	--
Sanak	6.7	6	18.4	2
Total	8.9		10.9	

Table XII-35.--Fifteen most prominent species in the 1960 and 1970 resource assessment surveys in the Gulf of Alaska (all depth zones and regions combined).

1960 (kg/hr)	1970 (kg/hr)
Turbot (91.0)	Walleye pollock (320.5)
King crab (72.3)	Turbot (82.8)
Tanner crab (47.9)	Pacific cod (47.6)
Pacific cod (43.6)	Rock sole (46.9)
Cottids (40.3)	Flathead sole (43.7)
Pacific ocean perch (36.8)	Tanner crab (36.9)
Flathead sole (31.0)	Cottids (21.6)
Rock sole (29.2)	Rex sole (19.7)
Halibut (20.7)	Dover sole (19.3)
Walleye pollock (15.9)	King crab (18.9)
Skates (9.5)	Halibut (18.0)
Sablefish (7.9)	Skates (11.2)
Rex sole (4.1)	Shortspine thornyhead (4.9)
Shortspine thornyhead (3.2)	Sablefish (4.2)
Dover sole (2.9)	Pacific ocean perch (3.9)

Table XII-36.--Fifteen most prominent species in the 0-100 m depth zone in the 1960 and 1970 resource assessment surveys in the Gulf of Alaska (all regions combined).

1960 (kg/hr)	1970 (kg/hr)
King crab (179.6)	Rock sole (147.2)
Rock sole (73.0)	Walleye pollock (108.9)
Cottids (46.4)	Pacific cod (81.7)
Halibut (35.1)	Cottids (49.0)
Tanner crab (32.6)	Turbot (43.4)
Pacific cod (30.3)	Tanner crab (34.1)
Turbot (21.7)	Halibut (28.6)
Flathead sole (10.4)	King crab (23.3)
Walleye pollock (3.0)	Flathead sole (15.4)
Skates (1.8)	Skates (10.5)
Rex sole (1.5)	Rex sole (4.0)
Pacific ocean perch (1.1)	Smelts (0.8)
Sablefish (0.9)	Dover sole (0.5)
Dover sole (0.1)	Shortspine thornyhead (0.5)
Shortspine thornyhead (0.0)	Sablefish (0.4)

Table XII-37.--Fifteen most prominent species in the 101-200 m depth zone in the 1960 and 1970 resource assessment surveys in the Gulf of Alaska (all regions combined).

1960 (kg/hr)	1970 (kg/hr)
Turbot (103.3)	Walleye pollock (528.7)
Pacific cod (65.6)	Turbot (90.9)
Tanner crab (64.5)	Flathead sole (61.2)
Pacific ocean perch (50.1)	Pacific cod (41.2)
Cottids (48.1)	Tanner crab (35.6)
Flathead sole (43.6)	King crab (23.6)
Walleye pollock (23.9)	Rex sole (18.7)
Halibut (15.0)	Dover sole (14.2)
King crab (14.7)	Cottids (14.0)
Skates (11.7)	Skates (12.3)
Sablefish (7.3)	Rock sole (10.8)
Rock sole (6.4)	Halibut (9.9)
Rex sole (3.4)	Pacific ocean perch (6.1)
Dover sole (0.8)	Smelts (2.9)
Shortspine thornyhead (0.8)	Sablefish (2.1)

In the 201-400 m depth zone the most prominent species in terms of catch per unit of effort in 1960 and 1970 are listed in Table XII-38. Between the 2 surveys there were sharp decreases in turbot (206.8 to 119.1 kg/hr), Pacific ocean perch (76.5 to 3.4 kg/hr), sablefish (26.5 to 13.4 kg/hr), and king crab (7.1 to 3.6 kg/hr). Increases occurred in walleye pollock (20.3 to 103.4 kg/hr), Pacific cod (7.4 to 22.4 kg/hr), halibut (6.2 to 23.1 kg/hr), and rock sole (0.4 to 5.1 kg/hr).

XIII

SUMMARY

Included in this report is a description of the Survey Area, a 2,200 kilometer long arc in the Gulf of Alaska from Cape Spencer to Unimak Pass. The area contains 220,000 km^2 of which 36% is in the 0-100 m depth zone, 48% in the 101-200 m depth zone, and 16% in the 201-400 m depth zone.

The fish and invertebrate fauna are described. The fishes include 287 species belonging to 55 families. The invertebrate fauna is less well defined than the fish fauna, but 13 commercially-valuable species from 5 families are included.

Informational sources that have been analyzed for the report include both research reports and the commercial fisheries data. Research sources include exploratory fishing cruises and resource assessment surveys. Commercial fisheries sources include both domestic and foreign catch statistics.

Commercial exploitation of demersal resources in the Gulf of Alaska has been carried out by nationals of the United States, Canada, Japan, the Soviet Union, South Korea, Poland, and Taiwan. The more important fisheries for the Americans have been those for king crab, Tanner (snow) crab, Pandalid shrimp, and scallops. A joint fishery by American and Canadian fishermen for halibut has endured for many years. Japanese and Soviet fishermen have generally pursued fin fishes other than halibut as well as shrimp. Fishing by the Koreans, Poles, and Taiwanese has been relatively minor thus far.

Exploratory fishing cruises were conducted in the Survey Area from 1948 through 1970. Pandalid shrimp surveys to determine their distribution and to estimate stock magnitude took place from 1971 through 1976. Demersal fish resource assessment surveys were made from 1961 to 1962 and from 1973 to 1976. These surveys differed from exploratory fishing operations in that the surveys were designed to provide estimates of the magnitude, distribution, and composition of resources whereas exploratory fishing had as its objective the discovery of locales of favorable fishing conditions.

Comparisons between the results of resource abundance surveys in the Gulf of Alaska during 1961 and those in 1973-1976, indicate a statistically-significant increase in walleye pollock and Dover sole, and a decrease in Pacific ocean perch. Changes in CPUE from the 1960's to the 1970's were noted in each of 7 regions of the Survey Area, 3 depth zones, and 21 region-depth zones. Comparison between the 1960 and 1970 surveys was also made with reference to the distribution of biomass and rank order of prominent species in catch per km^2, both of which varied widely and suggested that dramatic changes have occurred over the years.

Table XII-38.--Fifteen most prominent species in the 201-400 m depth zone in the 1960 and 1970 resource assessment surveys in the Gulf of Alaska (all regions combined).

1960 (kg/hr)	1970 (kg/hr)
Turbot (206.8)	Turbot (119.1)
Pacific ocean perch (75.6)	Walleye pollock (103.4)
Flathead sole (38.9)	Dover sole (52.1)
Tanner crab (32.5)	Tanner crab (42.4)
Sablefish (26.5)	Flathead sole (40.7)
Walleye pollock (20.3)	Rex sole (40.3)
Skates (19.9)	Halibut (23.1)
Shortspine thornyhead (17.5)	Pacific cod (22.4)
Dover sole (15.6)	Shortspine thornyhead (17.8)
Rex sole (13.1)	Sablefish (13.4)
Pacific cod (7.4)	Skates (11.5)
King crab (7.1)	Rock sole (5.1)
Halibut (6.2)	Cottids (4.9)
Cottids (4.0)	King crab (3.6)
Rock sole (0.4)	Pacific ocean perch (3.4)

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XV

APPENDICES

APPENDIX A

GAZETTEER

Table 1.--Latitudes, longitudes and brief descriptions of geographic features mentioned in the text.

Aialik Bay — 59°50'N - 149°43'W

An inlet along the south coast of Kenai peninsula.

Aliulik Peninsula — 56°49'N - 154°00'W

The peninsula which forms the southwest corner of Kodiak Island

Afognak Island — 59°13'N - 152°35'W

A large island immediately northeast of Kodiak Island

Albatross Bank — north: 57°15'N - 151°45'W; middle: 56°40'N - 152°05'W; south: 56°20'N - 153°05'W

A series of three banks south of Kodiak Island

Alitak Bay — 56°55'N - 154°00'W

A bay in southwest Kodiak Island

Amatuli Island — 58°55'N - 152°00'W

One of the Barren Islands at the mouth of Cook Inlet

Beaver Bay — 55°30'N - 160°55'W

An inlet in southern Alaska Peninsula inside of Unga Island

Belkofski Bay — 55°05'N - 162°10'W

A bay in the south coast of southern Alaska Peninsula

Blying Bank — 59°30'N - 148°45'W

A bank south of Kenai peninsula 25 miles southwest of Cape Cleare

Cape Cleare 59°45'N - 147°53'W

The southwest tip of Montague Island

Cape Douglas 58°50'N - 153°15'N

The easternmost point of Alaska Peninsula, mouth of Cook Inlet

Cape Elizabeth 59°10'N - 151°53'W

The southwest tip of Kenai Peninsula, mouth of Cook Inlet

Cape Hinchinbrook 60°14'N - 146°37'W

The southwest tip of Hinchinbrook Island

Cape Kiavak 57°00'N - 153°33'W

A cape on the western shore of Aliulik Peninsula, south Kodiak

Cape Saint Elias 59°88'N - 144°25'W

The southwestern point of Kayak Island, 60 miles southeast of Prince William Sound

Cape Spencer 58°12'N - 136°38'W

A point at the northern entrance to the inside waters of southeast Alaska

Cape Suckling 59°59'N - 143°55'W

A point in the south Alaska coast between Icy Bay and Prince William Sound

Castle Bay 56°10'N - 158°15'W

An inlet in the south coast of Alaska Peinisula

Chignik Bay 56°20'N - 158°20'W

A bay in the south coast of Alaska Peninsula

Chignik Gully 57°30'N - 151°30'W

A depression running southwest from Chiniak Bay, Kodiak Island

Chirikof Island 55°50'N - 155°40'W

An island 70 miles southwest of Kodiak Island

Cook Inlet 60°00'N - 152°00'W

A large inlet in south Alaska between Kenai and Alaska Peninsulas

Day Harbor 59°57'N - 149°10'W

An inlet in the south coast of Kenai Peninsula

Dry Bay 57°38'N - 155°42'W

A bay in the south coast of Alaska Peninsula at the mouth of Shelikof Straits

Hinchinbrook Entrance 60°19'N - 146°50'W

The passage between Hinchinbrook and Montague Islands

Hinchinbrook Gully 59°55'N - 147°05'W

A depression running south from Hinchinbrook Entrance

Hinchinbrook Island 60°25'N - 146°25'W

An island in the mouth of Prince William Sound

Icy Bay 59°55'N - 141°25'W

A bay in the south Alaska coast between Yakutat Bay and Cape Suckling

Ikatan Bay 54°48'N - 163°16'W

A bay between Alaska Peninsula and Unimak Island

Jack Bay 60°02'N - 146°37'W

A thin arm of northeast Prince William Sound

Kachemak Bay 59°35'N - 151°25'W

An arm of lower Cook Inlet in the west shore of Kenai Peninsula

Kayak Island 59°54'N - 144°25'W

A long island offshore of Cape Suckling

Kenai Peninsula 60°00'N - 150°00'W

The major peninsula between Cook Inlet and Prince William Sound

Kiluda Bay 57°19'N - 153°00'W

A bay on the south coast of Kodiak Island

Kodiak Island 57°25'N - 154°15'W

A large island south of Upper Alaska Peninsula

Kuiukta Bay 56°06'N - 158°38'W

A bay in the south coast of Alaska Peninsula

Kujalik Bay 56°37'N - 157°49'W

A bay in the south coast of Alaska Peninsula

Kukak Bay 58°19'N - 154°15'W

An arm of Shelikof Strait extending into Alaska Peninsula

Lituya Bay 58°38'N - 137°34'W

An inlet in the Alaska coast about 45 miles northwest of Cape Spencer

Marmot Bay 58°00'N - 152°20'W

A bay between Kodiak and Afognak Islands

Marmot Gully 58°11'N - 151°20'W

A depression extending east from Marmot Bay

Middleton Island 59°26'N - 146°19'W

An island 60 miles south of Prince William Sound

Mitrofania Bay 55°54'N - 158°58'W

A bay in the south shore of Alaska Peninsula

Mitrofania Gully 55°37'N - 158°55'W

A depression running south from between Mitrofania and Chiach Islands (South Alaska Peninsula)

Mitrofania Island 55°52'N - 158°48'W

A small island off the south coast of Alaska Peninsula

Montague Gully 59°30'N - 148°12'W

A depression extending south from the Montague Straits

Montague Island 60°00'N - 147°26'W

A long island in the mouth of Prince William Sound

Montague Straits 60°07'N - 147°38'W

The waters between Montague Island and Letouche and Knight Islands

Morzhovoi Bay 55°02'N - 163°05'W

A bay in the southern tip of Alaska Peninsula

Nagai Island 55°08'N - 159°58'W

One of the Shumagin Islands, south of Alaska Peninsula

Nagai Straits 55°22'N - 159°44'W

The straits between Nagai, Andronica and Big Koniuji Islands (Shumagin Islands)

Nuka Bay 59°27'N - 150°30'W

A bay in the south coast of Kenai Peninsula

Nuka Passage 59°22'N - 150°45'W

The strait on the west side of Nuka Island (south Kenai)

Ocean Cape 59°32'N - 139°53'W

A point at the mouth of Yakutat Bay

Orca Bay 60°35'N - 146°05'W

An arm of the east side of Prince William Sound

Otter Cove 54°48'N - 163°22'W

A small embayment in the southeast corner of Unimak Island

Pavlof Bay 55°30'N - 161°35'W

A bay in the south end of Alaska Peninsula

Pernosa Bay 58°24'N - 152°15'W

A bay in the northeast corner of Afognak Island

Port Bainbridge 60°05'N - 148°25'W

A bay in the Kenai Peninsula next to the mouth of Prince William Sound

Port Dick 59°16'N - 151°04'W

An inlet in the south coast of Kenai Peninsula

Port Fidalgo 60°48'N - 146°20'W

An arm of eastern Prince William Sound

Port Gravina 60°42'N -146°20'W

An arm of eastern Prince William Sound

Portlock Bank 58°21'N - 150°30'W

A large bank south of Kenai Peninsula and west of Kodiak Island

Port Valdez 61°05'N - 146°39'W

An arm of northeastern Prince William Sound

Prince William Sound 60°38'N - 147°23'W

A large embayment in the south coast of Alaska, east of Kenai Peninsula

Pye Islands 59°26'N - 150°25'W

Three small islands south of Kenai Peninsula

Raspberry Straits 58°05'N - 153°05'W

A narrow channel along the southwest side of Afognak Island

Sanak Gully 54°20'N - 162°24'W

A depression running between Deer and Sanak Islands

Sanak Island 54°25'N - 162°40'W

An island 40 miles south of the tip of Alaska Peninsula

Scotch Cap 54°24'N - 164°44'W

The southwest corner of Unimak Island

Semidi Islands 56°05'N - 156°45'W

A group of islands between Chirikof Island and Alaska Peninsula

Seward Gully 59°25'N - 149°07'W

A depression running southward from Kenai Peninsula

Shelikof Strait 58°00'N - 154°00'W

A group of islands south of Alaska Peninsula

Shumagin Islands 55°10'N - 160°00'W

A group of islands south of Alaska Peninsula

Shuyak Island 58°32'N - 152°30'W

An island northeast of Afognak Island

Sitkalidak Island 57°06'N - 153°10'W

An island off the south coast of Kodiak Island

Sitkinak Island 56°34'N - 154°09'W

An island off the southwest corner of Kodiak Island

Stepovak Bay 55°42'N - 159°45'W

A bay in the south coast of Alaska Peninsula

Tonki Bay 58°19'N - 152°04'W

A bay in the west shore of Afognak Island

Tonki Cape 58°21'N - 151°59'W

A point on the northeast corner of Afognak Island

Trinity Islands 56°33'N - 154°24'W

Two islands off the southwest corner of Kodiak Island

Uganik Bay 57°52'N - 153°34'W

A bay in the north coast of Kodiak Island

Unga Island 55°20'N - 160°44'W

The most westerly of the Shumagin Islands

Unga Strait 55°25'N - 160°34'W

The most westerly of the Shumagin Islands

Unimak Bight 54°34'N - 164°00'W

The wide bay formed by the south coast of Unimak Island

Unimak Pass 54°25'N - 165°15'W

The pass between Unimak Island and the Krenitzen Island group

Ushagat Island 59°07'N - 152°18'W

One of the Barren Islands at the mouth of Cook Inlet

Uyak Bay 57°39'N - 153°56'W

A bay in the north coast of Kodiak Island

Viekoda Bay 57°55'N - 153°20'W

A bay in the north coast of Kodiak Island

Yakutat Bay 59°45'N - 140°00'W

A large bay on the south coast of Alaska between Cape Spencer and Icy Bay

Yakutat Gully $59^{\circ}30'N - 141^{\circ}00'W$

A depression extending southwest from Yakutat Bay

APPENDIX B

Variances of the biomass estimates

by regions, depth zones, and surveys

Table 1.--Variances of the Biomass estimates for the Fairweather region for May-October 1961, Cr 611.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.354253 \times 10^{11}$	$.874543 \times 10^{12}$	$.294161 \times 10^{12}$	$.120412 \times 10^{13}$
Flatfishes	$.293278 \times 10^{14}$	$.276017 \times 10^{16}$	$.160562 \times 10^{14}$	$.280556 \times 10^{16}$
Roundfishes	$.163348 \times 10^{15}$	$.478686 \times 10^{13}$	$.903261 \times 10^{13}$	$.177168 \times 10^{15}$
Rockfishes	$.116858 \times 10^{9}$	$.293174 \times 10^{12}$	$.984767 \times 10^{13}$	$.101409 \times 10^{14}$
Invertebrates	$.549537 \times 10^{12}$	$.318586 \times 10^{16}$	$.649536 \times 10^{14}$	$.325136 \times 10^{16}$
Skates	$.320733 \times 10^{11}$	$.824144 \times 10^{12}$	$.312766 \times 10^{12}$	$.116898 \times 10^{13}$
Turbot	$.334772 \times 10^{14}$	$.250713 \times 10^{15}$	$.150718 \times 10^{13}$	$.285697 \times 10^{15}$
Halibut	$.178589 \times 10^{12}$	$.269128 \times 10^{12}$	0.	$.447718 \times 10^{12}$
Flathead sole	$.222059 \times 10^{14}$	$.282509 \times 10^{14}$	$.123307 \times 10^{14}$	$.516899 \times 10^{14}$
Dover sole	$.386309 \times 10^{9}$	$.100143 \times 10^{12}$	$.382202 \times 10^{13}$	$.392255 \times 10^{13}$
Rex sole	$.845666 \times 10^{11}$	$.916256 \times 10^{11}$	$.102687 \times 10^{13}$	$.120306 \times 10^{13}$
Rock sole	$.110493 \times 10^{12}$	$.666601 \times 10^{11}$	0.	$.177153 \times 10^{12}$
Sablefish	$.737995 \times 10^{11}$	$.275271 \times 10^{13}$	$.860100 \times 10^{13}$	$.114275 \times 10^{14}$
Cottidae	0.	$.731725 \times 10^{11}$	$.177013 \times 10^{9}$	$.733495 \times 10^{11}$
Pacific cod	$.160125 \times 10^{15}$	$.926796 \times 10^{12}$	$.163737 \times 10^{10}$	$.161053 \times 10^{15}$
Walleye pollock	$.742377 \times 10^{10}$	$.123713 \times 10^{11}$	$.158503 \times 10^{11}$	$.356455 \times 10^{11}$
Thornyheads	0.	$.498617 \times 10^{10}$	$.175160 \times 10^{13}$	$.175659 \times 10^{13}$
Pacific ocean perch	0.	$.261071 \times 10^{12}$	$.820791 \times 10^{13}$	$.846898 \times 10^{13}$
Tanner crab	$.566596 \times 10^{11}$	$.472501 \times 10^{14}$	$.610642 \times 10^{11}$	$.473678 \times 10^{14}$
King crab	0.	$.359027 \times 10^{9}$	$.101558 \times 10^{11}$	$.105148 \times 10^{11}$

Table 2.--Variances of the biomass estimates for the Yakutat region for May-October 1961, Cr 611.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.239225 \times 10^{12}$	$.839940 \times 10^{12}$	$.260847 \times 10^{12}$	$.134001 \times 10^{13}$
Flatfishes	$.225766 \times 10^{14}$	$.309605 \times 10^{14}$	$.310893 \times 10^{14}$	$.846265 \times 10^{14}$
Roundfishes	$.242177 \times 10^{13}$	$.391241 \times 10^{13}$	$.536025 \times 10^{12}$	$.687021 \times 10^{13}$
Rockfishes	$.591767 \times 10^{8}$	$.454031 \times 10^{14}$	$.875550 \times 10^{13}$	$.541586 \times 10^{14}$
Invertebrates	$.246621 \times 10^{14}$	$.454019 \times 10^{14}$	$.119348 \times 10^{15}$	$.189412 \times 10^{15}$
Skates	$.357628 \times 10^{11}$	$.171013 \times 10^{12}$	$.265499 \times 10^{12}$	$.472275 \times 10^{12}$
Turbot	$.524319 \times 10^{13}$	$.157634 \times 10^{14}$	$.152100 \times 10^{14}$	$.362167 \times 10^{14}$
Halibut	$.184870 \times 10^{12}$	$.226678 \times 10^{12}$	$.134470 \times 10^{12}$	$.546019 \times 10^{12}$
Flathead sole	$.165360 \times 10^{12}$	$.204696 \times 10^{13}$	$.429999 \times 10^{12}$	$.264232 \times 10^{13}$
Dover sole	$.515490 \times 10^{8}$	$.334524 \times 10^{11}$	$.296193 \times 10^{13}$	$.299543 \times 10^{13}$
Rex sole	$.778910 \times 10^{11}$	$.131029 \times 10^{12}$	$.152655 \times 10^{13}$	$.173547 \times 10^{13}$
Rock sole	$.711872 \times 10^{10}$	$.752981 \times 10^{10}$	0.	$.146485 \times 10^{11}$
Sablefish	$.615759 \times 10^{11}$	$.132435 \times 10^{13}$	$.214482 \times 10^{12}$	$.160041 \times 10^{13}$
Cottidae	$.584279 \times 10^{11}$	0.	$.612446 \times 10^{7}$	$.584341 \times 10^{11}$
Pacific cod	$.138132 \times 10^{13}$	$.739439 \times 10^{12}$	$.610941 \times 10^{11}$	$.218185 \times 10^{13}$
Walleye pollock	$.140297 \times 10^{12}$	$.736373 \times 10^{12}$	$.495125 \times 10^{11}$	$.926183 \times 10^{12}$
Thornyheads	0.	$.347203 \times 10^{12}$	$.159276 \times 10^{13}$	$.193996 \times 10^{13}$
Pacific ocean perch	$.591767 \times 10^{8}$	$.451256 \times 10^{14}$	$.499724 \times 10^{13}$	$.501229 \times 10^{14}$
Tanner crab	$.954359 \times 10^{11}$	$.458255 \times 10^{12}$	$.577467 \times 10^{12}$	$.113115 \times 10^{13}$
King crab	0.	0.	$.137800 \times 10^{10}$	$.137800 \times 10^{10}$

Table 3.--Variances of the biomass estimates for Prince William region for May-October 1961, Cr 052.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.802363 \times 10^{12}$	$.165234 \times 10^{13}$	$.544770 \times 10^{11}$	$.250918 \times 10^{13}$
Flatfishes	$.723787 \times 10^{12}$	$.939985 \times 10^{13}$	$.691968 \times 10^{12}$	$.108156 \times 10^{14}$
Roundfishes	$.175517 \times 10^{13}$	$.110291 \times 10^{13}$	$.444983 \times 10^{10}$	$.286253 \times 10^{13}$
Rockfishes	0.	$.275920 \times 10^{14}$	$.267922 \times 10^{13}$	$.302713 \times 10^{14}$
Invertebrates	$.634283 \times 10^{10}$	$.126447 \times 10^{13}$	$.987757 \times 10^{12}$	$.225857 \times 10^{13}$
Skates				
Turbot	$.783312 \times 10^{10}$	$.738109 \times 10^{13}$	$.937473 \times 10^{12}$	$.832640 \times 10^{13}$
Halibut	$.319206 \times 10^{12}$	$.425383 \times 10^{12}$	$.432014 \times 10^{10}$	$.748910 \times 10^{12}$
Flathead sole	$.708116 \times 10^{10}$	$.301509 \times 10^{12}$	$.334811 \times 10^{11}$	$.342072 \times 10^{12}$
Dover sole	$.729935 \times 10^{8}$	$.117688 \times 10^{10}$	$.432014 \times 10^{10}$	$.557002 \times 10^{10}$
Rex sole	$.212289 \times 10^{10}$	$.905496 \times 10^{10}$	$.415425 \times 10^{10}$	$.153321 \times 10^{11}$
Rock sole	$.598775 \times 10^{11}$	$.826445 \times 10^{8}$	0.	$.599601 \times 10^{11}$
Sablefish	0.	$.153172 \times 10^{11}$	$.254456 \times 10^{11}$	$.407629 \times 10^{11}$
Cottidae	$.437201 \times 10^{8}$	$.520217 \times 10^{9}$	0.	$.563937 \times 10^{9}$
Pacific cod	$.186863 \times 10^{13}$	$.150218 \times 10^{12}$	$.185766 \times 10^{10}$	$.202071 \times 10^{13}$
Walleye pollock	$.316305 \times 10^{9}$	$.588516 \times 10^{12}$	$.140404 \times 10^{11}$	$.602873 \times 10^{12}$
Thornyheads	0.	$.184031 \times 10^{11}$	$.276489 \times 10^{10}$	$.211680 \times 10^{11}$
Pacific ocean perch	0.	$.274896 \times 10^{14}$	$.246356 \times 10^{13}$	$.299532 \times 10^{14}$
Tanner crab	$.129563 \times 10^{10}$	$.996240 \times 10^{12}$	$.998774 \times 10^{12}$	$.199631 \times 10^{13}$
King crab				

Table 4.--Variances of the biomass estimates for the Kenai region for May-October 1961, Cr 052.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	0.	$.973626 \times 10^{13}$	0.	$.973626 \times 10^{13}$
Flatfishes	0.	$.108349 \times 10^{15}$	0.	$.108349 \times 10^{15}$
Roundfishes	0.	$.742632 \times 10^{16}$	0.	$.742632 \times 10^{16}$
Rockfishes	0.	$.357276 \times 10^{15}$	0.	$.357276 \times 10^{15}$
Invertebrates	0.	$.115678 \times 10^{14}$	0.	$.115678 \times 10^{14}$
Skates	0.	$.916046 \times 10^{13}$	0.	$.916048 \times 10^{14}$
Turbot	0.	$.319648 \times 10^{14}$	0.	$.319647 \times 10^{14}$
Halibut	0.	$.279657 \times 10^{13}$	0.	$.279657 \times 10^{13}$
Flathead sole	0.	$.243525 \times 10^{14}$	0.	$.243525 \times 10^{14}$
Dover sole	0.	$.350971 \times 10^{10}$	0.	$.350971 \times 10^{10}$
Rex sole	0.	$.511136 \times 10^{10}$	0.	$.511136 \times 10^{10}$
Sablefish	0.	$.102895 \times 10^{12}$	0.	$.102895 \times 10^{12}$
Cottidae	0.	$.149469 \times 10^{12}$	0.	$.149469 \times 10^{12}$
Pacific cod	0.	$.778664 \times 10^{16}$	0.	$.778664 \times 10^{16}$
Walleye pollock	0.	$.872290 \times 10^{14}$	0.	$.872290 \times 10^{14}$
Pacific ocean perch	0.	$.357958 \times 10^{15}$	0.	$.35798 \times 10^{15}$
Tanner crab	0.	$.115522 \times 10^{14}$	0.	$.115522 \times 10^{14}$

Table 5.--Variances of the biomass estimates for the Kodiak region for May-October 1961, Cr 618.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.853233 \times 10^{11}$	$.114351 \times 10^{12}$	$.205532 \times 10^{7}$	$.199677 \times 10^{12}$
Flatfishes	$.185743 \times 10^{15}$	$.248489 \times 10^{15}$	$.751296 \times 10^{13}$	$.441745 \times 10^{15}$
Roundfishes	$.340374 \times 10^{14}$	$.289124 \times 10^{14}$	$.730083 \times 10^{10}$	$.629572 \times 10^{14}$
Rockfishes	$.901600 \times 10^{12}$	$.25400 \times 10^{13}$	$.127462 \times 10^{11}$	$.345437 \times 10^{13}$
Invertebrates	$.438258 \times 10^{15}$	$.50060 \times 10^{14}$	$.194084 \times 10^{13}$	$.490204 \times 10^{15}$
Skates	$.854365 \times 10^{11}$	$.110925 \times 10^{12}$	$.205532 \times 10^{7}$	$.196364 \times 10^{12}$
Turbot	$.122228 \times 10^{13}$	$.235860 \times 10^{15}$	$.694754 \times 10^{12}$	$.237777 \times 10^{15}$
Halibut	$.633176 \times 10^{13}$	$.118405 \times 10^{13}$	$.114827 \times 10^{13}$	$.866408 \times 10^{13}$
Flathead sole	$.190371 \times 10^{13}$	$.252926 \times 10^{13}$	$.761156 \times 10^{12}$	$.519449 \times 10^{13}$
Dover sole	$.266974 \times 10^{6}$	$.109929 \times 10^{11}$	0.	$.109931 \times 10^{11}$
Rex sole	$.136124 \times 10^{11}$	$.201886 \times 10^{8}$	$.416203 \times 10^{8}$	$.338426 \times 10^{11}$
Rock sole	$.157706 \times 10^{15}$	$.332541 \times 10^{12}$	$.184979 \times 10^{10}$	$.158040 \times 10^{15}$
Sablefish	$.365488 \times 10^{9}$	$.256568 \times 10^{13}$	$.328852 \times 10^{8}$	$.256608 \times 10^{13}$
Cottidae	$.609448 \times 10^{13}$	$.120554 \times 10^{14}$	$.174047 \times 10^{10}$	$.181516 \times 10^{14}$
Pacific cod	$.951930 \times 10^{13}$	$.280698 \times 10^{13}$	$.249146 \times 10^{11}$	$.123512 \times 10^{14}$
Walleye pollock	$.223089 \times 10^{13}$	$.304224 \times 10^{13}$	$.223824 \times 10^{8}$	$.527316 \times 10^{13}$
Thornyheads	0.	0.	0.	0.
Pacific ocean perch	$.863220 \times 10^{12}$	$.254457 \times 10^{13}$	$.703384 \times 10^{10}$	$.341482 \times 10^{13}$
Tanner crab	$.593875 \times 10^{13}$	$.254789 \times 10^{14}$	$.139044 \times 10^{13}$	$.3280814 \times 10^{14}$
King crab	$.439450 \times 10^{15}$	$.240826 \times 10^{14}$	$.357398 \times 10^{12}$	$.463890 \times 10^{15}$

Table 6.--Variances of the biomass estimates for the Shelikof region for May-October, 1961 Cruise 618.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	0.	$.980368 \times 10^{11}$	$.973404 \times 10^{10}$	$.107770 \times 10^{12}$
Flatfishes	0.	$.207888 \times 10^{14}$	$.386901 \times 10^{13}$	$.246578 \times 10^{14}$
Roundfishes	0.	$.337207 \times 10^{13}$	$.812938 \times 10^{12}$	$.418500 \times 10^{13}$
Rockfishes	0.	$.832804 \times 10^{10}$	$.219543 \times 10^{12}$	$.227871 \times 10^{12}$
Invertebrates	0.	$.641507 \times 10^{13}$	$.119758 \times 10^{13}$	$.761265 \times 10^{13}$
Skates	0.	$.980368 \times 10^{11}$	$.757673 \times 10^{8}$	$.981126 \times 10^{11}$
Turbot	0.	$.100807 \times 10^{13}$	$.341266 \times 10^{11}$	$.104220 \times 10^{13}$
Halibut	0.	$.597788 \times 10^{11}$	$.454427 \times 10^{9}$	$.602322 \times 10^{11}$
Flathead sole	0.	$.204082 \times 10^{14}$	$.766527 \times 10^{10}$	$.204159 \times 10^{14}$
Dover sole	0.	$.103812 \times 10^{10}$	$.387317 \times 10^{7}$	$.104199 \times 10^{10}$
Rex sole	0.	$.190581 \times 10^{10}$	$.635169 \times 10^{6}$	$.190644 \times 10^{10}$
Rock sole	0.	$.152788 \times 10^{8}$	$.716885 \times 10^{5}$	$.151094 \times 10^{8}$
Sablefish	0.	$.516209 \times 10^{11}$	$.357904 \times 10^{8}$	$.516567 \times 10^{11}$
Cottidae	0.	$.122771 \times 10^{12}$	$.295559 \times 10^{9}$	$.123066 \times 10^{12}$
Pacific cod	0.	$.183426 \times 10^{13}$	$.352077 \times 10^{10}$	$.183778 \times 10^{13}$
Walleye pollock	0.	$.112505 \times 10^{13}$	$.769104 \times 10^{9}$	$.112582 \times 10^{13}$
Thornyheads	-	-	-	-
Pacific ocean perch	0.	$.787761 \times 10^{10}$	$.217440 \times 10^{10}$	$.100520 \times 10^{11}$
Tanner crab	0.	$.554971 \times 10^{13}$	$.123555 \times 10^{11}$	$.556206 \times 10^{13}$
King crab	0.	$.254353 \times 10^{12}$	$.336286 \times 10^{9}$	$.254689 \times 10^{12}$
Scallop	0.	0.	0.	0.

Table 7.--Variances of the biomass estimates for the Chirikof region for May-October 1961, Cr 618.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.191753 \times 10^{10}$	$.404363 \times 10^{11}$	$.141707 \times 10^{13}$	$.145942 \times 10^{13}$
Flatfishes	$.554530 \times 10^{14}$	$.247482 \times 10^{14}$	$.307677 \times 10^{14}$	$.110968 \times 10^{15}$
Roundfishes	$.851685 \times 10^{13}$	$.109182 \times 10^{15}$	$.171168 \times 10^{13}$	$.119410 \times 10^{15}$
Rockfishes	$.182101 \times 10^{7}$	$.217922 \times 10^{15}$	$.890534 \times 10^{13}$	$.226828 \times 10^{15}$
Invertebrates	$.598479 \times 10^{16}$	$.226720 \times 10^{14}$	$.149139 \times 10^{13}$	$.600895 \times 10^{16}$
Skates	$.191753 \times 10^{10}$	$.407874 \times 10^{11}$	$.142201 \times 10^{13}$	$.146472 \times 10^{13}$
Turbot	$.738327 \times 10^{12}$	$.531872 \times 10^{13}$	$.364037 \times 10^{14}$	$.424607 \times 10^{14}$
Halibut	$.118633 \times 10^{14}$	$.298503 \times 10^{13}$	$.105658 \times 10^{12}$	$.149540 \times 10^{14}$
Flathead sole	$.989245 \times 10^{11}$	$.315174 \times 10^{13}$	$.872503 \times 10^{12}$	$.412316 \times 10^{13}$
Dover sole	$.408468 \times 10^{7}$	$.617563 \times 10^{10}$	$.220576 \times 10^{12}$	$.226755 \times 10^{12}$
Rex sole	$.164266 \times 10^{10}$	$.101957 \times 10^{13}$	$.103582 \times 10^{13}$	$.205703 \times 10^{13}$
Rock sole	$.342815 \times 10^{14}$	$.301705 \times 10^{13}$	$.396987 \times 10^{11}$	$.373383 \times 10^{14}$
Sablefish	$.102117 \times 10^{7}$	$.191243 \times 10^{12}$	$.810374 \times 10^{11}$	$.272281 \times 10^{12}$
Cottidae	$.709719 \times 10^{13}$	$.110334 \times 10^{15}$	$.824606 \times 10^{11}$	$.117513 \times 10^{15}$
Pacific cod	$.606314 \times 10^{12}$	$.135927 \times 10^{12}$	$.206356 \times 10^{11}$	$.762877 \times 10^{12}$
Walleye pollock	$.161436 \times 10^{9}$	$.706053 \times 10^{13}$	$.129718 \times 10^{13}$	$.835787 \times 10^{13}$
Thornyheads	0.	0.	$.126317 \times 10^{13}$	$.126317 \times 10^{13}$
Pacific ocean perch	$.196064 \times 10^{7}$	$.218035 \times 10^{15}$	$.601344 \times 10^{13}$	$.224049 \times 10^{15}$
Tanner crab	$.546354 \times 10^{14}$	$.135043 \times 10^{14}$	$.106097 \times 10^{13}$	$.692007 \times 10^{14}$
King crab	$.647729 \times 10^{16}$	$.320151 \times 10^{13}$	$.112326 \times 10^{12}$	$.648060 \times 10^{16}$

Table 8.--Variances of the biomass estimates for the Shumagin region for May-October 1961, Cr 618.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	0.	$.277124 \times 10^{11}$	$.113566 \times 10^{11}$	$.390691 \times 10^{11}$
Flatfishes	$.178117 \times 10^{14}$	$.165222 \times 10^{14}$	$.137570 \times 10^{15}$	$.171904 \times 10^{15}$
Roundfishes	$.485914 \times 10^{13}$	$.151871 \times 10^{14}$	$.276322 \times 10^{14}$	$.476785 \times 10^{14}$
Rockfishes	0.	$.304454 \times 10^{14}$	$.321507 \times 10^{14}$	$.625962 \times 10^{14}$
Invertebrates	$.284507 \times 10^{14}$	$.144385 \times 10^{14}$	$.745583 \times 10^{11}$	$.429638 \times 10^{14}$
Skates	0.	$.268042 \times 10^{11}$	$.113566 \times 10^{11}$	$.381609 \times 10^{11}$
Turbot	$.334555 \times 10^{12}$	$.928011 \times 10^{13}$	$.137950 \times 10^{15}$	$.147565 \times 10^{15}$
Halibut	$.717522 \times 10^{12}$	$.184944 \times 10^{12}$	$.191952 \times 10^{10}$	$.904386 \times 10^{12}$
Flathead sole	$.537587 \times 10^{12}$	$.176692 \times 10^{13}$	$.308050 \times 10^{13}$	$.538501 \times 10^{13}$
Dover sole	$.600366 \times 10^{9}$	$.932577 \times 10^{8}$	$.290941 \times 10^{10}$	$.360303 \times 10^{10}$
Rex sole	$.502386 \times 10^{8}$	$.966891 \times 10^{10}$	$.172533 \times 10^{11}$	$.269725 \times 10^{11}$
Rock sole	$.399426 \times 10^{13}$	$.713983 \times 10^{11}$	0.	$.406566 \times 10^{13}$
Sablefish	$.345811 \times 10^{8}$	$.148320 \times 10^{11}$	$.196440 \times 10^{14}$	$.196589 \times 10^{14}$
Cottidae	$.351392 \times 10^{13}$	$.515840 \times 10^{13}$	$.695787 \times 10^{10}$	$.867928 \times 10^{13}$
Pacific cod	$.793900 \times 10^{12}$	$.581662 \times 10^{11}$	$.422927 \times 10^{12}$	$.120499 \times 10^{13}$
Walleye pollock	$.473228 \times 10^{10}$	$.409146 \times 10^{13}$	$.199810 \times 10^{13}$	$.609429 \times 10^{13}$
Thornyheads	0.	$.465145 \times 10^{9}$	$.545732 \times 10^{11}$	$.550383 \times 10^{11}$
Pacific ocean perch	0.	$.302385 \times 10^{14}$	$.334149 \times 10^{14}$	$.636534 \times 10^{14}$
Tanner crab	$.119771 \times 10^{14}$	$.991640 \times 10^{13}$	$.754882 \times 10^{11}$	$.219690 \times 10^{14}$
King crab	$.950756 \times 10^{13}$	$.313285 \times 10^{13}$	0.	$.126404 \times 10^{14}$
Scallop	$.240146 \times 10^{10}$	0.	0.	$.240146 \times 10^{10}$

Table 9.--Variances of the biomass estimates for the Sanak region for May-October 1961, Cr 618.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.154241 \times 10^{10}$	$.225950 \times 10^{11}$	$.109903 \times 10^{11}$	$.351278 \times 10^{11}$
Flatfishes	$.890591 \times 10^{13}$	$.552864 \times 10^{13}$	$.360072 \times 10^{12}$	$.147946 \times 10^{14}$
Roundfishes	$.353098 \times 10^{14}$	$.176505 \times 10^{14}$	$.496258 \times 10^{12}$	$.534566 \times 10^{14}$
Rockfishes	$.286774 \times 10^{9}$	$.127938 \times 10^{13}$	$.449795 \times 10^{13}$	$.577763 \times 10^{13}$
Invertebrates	$.572513 \times 10^{15}$	$.177618 \times 10^{14}$	0.	$.590275 \times 10^{15}$
Skates	$.154241 \times 10^{10}$	$.226213 \times 10^{11}$	$.109903 \times 10^{11}$	$.351541 \times 10^{11}$
Turbot	$.139849 \times 10^{12}$	$.411894 \times 10^{12}$	$.721256 \times 10^{11}$	$.623869 \times 10^{12}$
Halibut	$.806370 \times 10^{12}$	$.283555 \times 10^{12}$	$.302940 \times 10^{9}$	$.109022 \times 10^{13}$
Flathead sole	$.189532 \times 10^{12}$	$.817655 \times 10^{12}$	0.	$.100718 \times 10^{13}$
Dover sole	$.438731 \times 10^{9}$	$.675307 \times 10^{8}$	$.298167 \times 10^{8}$	$.536078 \times 10^{9}$
Rex sole	$.512597 \times 10^{10}$	$.154919 \times 10^{10}$	$.343511 \times 10^{12}$	$.350186 \times 10^{12}$
Rock sole	$.548184 \times 10^{13}$	$.381601 \times 10^{13}$	0.	$.929786 \times 10^{13}$
Sablefish	$.109682 \times 10^{7}$	$.134017 \times 10^{11}$	$.724608 \times 10^{10}$	$.206489 \times 10^{11}$
Cottidae	$.268335 \times 10^{14}$	$.111036 \times 10^{14}$	$.610369 \times 10^{10}$	$.379432 \times 10^{14}$
Pacific cod	$.110381 \times 10^{13}$	$.286920 \times 10^{13}$	$.354248 \times 10^{11}$	$.400844 \times 10^{13}$
Walleye pollock	$.686819 \times 10^{11}$	$.141165 \times 10^{13}$	$.448861 \times 10^{11}$	$.152522 \times 10^{13}$
Thornyheads	0.	0.	$.153816 \times 10^{11}$	$.153816 \times 10^{11}$
Pacific ocean perch	$.286774 \times 10^{9}$	$.127809 \times 10^{13}$	$.460891 \times 10^{13}$	$.588729 \times 10^{13}$
Tanner crab	$.350745 \times 10^{14}$	$.174116 \times 10^{14}$	0.	$.524862 \times 10^{14}$
King crab	$.554638 \times 10^{15}$	$.243505 \times 10^{11}$	0.	$.554662 \times 10^{15}$

Table 10.--Variance of the biomass estimates for the Kodiak region for September-November 1961, Cr 619.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.142397 \times 10^{13}$	$.472186 \times 10^{10}$	$.957384 \times 10^{10}$	$.143827 \times 10^{13}$
Flatfish	$.186883 \times 10^{15}$	$.964336 \times 10^{14}$	$.801065 \times 10^{12}$	$.284118 \times 10^{15}$
Roundfish	$.169634 \times 10^{15}$	$.106654 \times 10^{15}$	$.819259 \times 10^{12}$	$.277107 \times 10^{15}$
Rockfish	$.122080 \times 10^{10}$	$.298898 \times 10^{13}$	$.154869 \times 10^{10}$	$.299175 \times 10^{13}$
Invertebrates	$.322376 \times 10^{15}$	$.155850 \times 10^{16}$	$.158769 \times 10^{14}$	$.189676 \times 10^{16}$
Skates	$.142397 \times 10^{13}$	$.433657 \times 10^{10}$	$.957384 \times 10^{10}$	$.143788 \times 10^{13}$
Turbot	$.917099 \times 10^{12}$	$.397070 \times 10^{14}$	$.559562 \times 10^{11}$	$.406800 \times 10^{14}$
Halibut	$.309415 \times 10^{13}$	$.475428 \times 10^{13}$	$.607341 \times 10^{11}$	$.790916 \times 10^{13}$
Flathead	$.166883 \times 10^{12}$	$.170675 \times 10^{14}$	$.175846 \times 10^{12}$	$.174103 \times 10^{14}$
Dover	$.706121 \times 10^{9}$	$.467827 \times 10^{9}$	$.374583 \times 10^{7}$	$.117769 \times 10^{10}$
Rex	$.851216 \times 10^{10}$	$.200865 \times 10^{13}$	$.739916 \times 10^{6}$	$.201717 \times 10^{13}$
Rock	$.1708515 \times 10^{15}$	$.151903 \times 10^{13}$	$.566499 \times 10^{8}$	$.172370 \times 10^{15}$
Sablefish	0.	$.137006 \times 10^{12}$	$.104050 \times 10^{12}$	$.241057 \times 10^{12}$
Cottidae	$.109530 \times 10^{15}$	$.374881 \times 10^{14}$	$.206668 \times 10^{12}$	$.147225 \times 10^{15}$
Pacific cod	$.513903 \times 10^{13}$	$.109223 \times 10^{14}$	$.266370 \times 10^{10}$	$.160640 \times 10^{14}$
Walleye pollock	$.764389 \times 10^{10}$	$.439062 \times 10^{14}$	$.145023 \times 10^{9}$	$.439140 \times 10^{14}$
Thornyhead	-	-	-	-
Pacific ocean perch	$.125532 \times 10^{10}$	$.300074 \times 10^{13}$	$.240399 \times 10^{10}$	$.300440 \times 10^{13}$
Dungeness crab	$.837543 \times 10^{13}$	$.154577 \times 10^{13}$	0.	$.992121 \times 10^{13}$
Tanner crab	$.268759 \times 10^{15}$	$.140487 \times 10^{15}$	$.873046 \times 10^{13}$	$.417977 \times 10^{15}$
King crab	$.166531 \times 10^{15}$	$.159133 \times 10^{16}$	$.752922 \times 10^{12}$	$.175861 \times 10^{16}$

Table 11.--Variances of the biomass estimates for the Shelikof region for September-November 1961, Cr 619.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	0.	$.457885 \times 10^{12}$	$.193906 \times 10^{11}$	$.477276 \times 10^{12}$
Flatfish	0.	$.201293 \times 10^{14}$	$.116848 \times 10^{14}$	$.318141 \times 10^{14}$
Roundfish	0.	$.198077 \times 10^{13}$	$.120425 \times 10^{13}$	$.318503 \times 10^{13}$
Rockfish	0.	$.160827 \times 10^{11}$	$.486642 \times 10^{12}$	$.502725 \times 10^{12}$
Invertebrates	0.	$.299158 \times 10^{13}$	$.830563 \times 10^{13}$	$.112972 \times 10^{14}$
Skates	0.	$.884043 \times 10^{11}$	$.189976 \times 10^{11}$	$.107401 \times 10^{12}$
Turbot	0.	$.454572 \times 10^{13}$	$.424937 \times 10^{13}$	$.879510 \times 10^{13}$
Halibut	0.	$.672813 \times 10^{12}$	$.183782 \times 10^{11}$	$.691191 \times 10^{12}$
Flathead	0.	$.606940 \times 10^{13}$	$.351662 \times 10^{13}$	$.958603 \times 10^{13}$
Dover	0.	$.150021 \times 10^{9}$	$.166529 \times 10^{10}$	$.181531 \times 10^{10}$
Rex	0.	$.283513 \times 10^{9}$	$.782450 \times 10^{6}$	$.284295 \times 10^{9}$
Rock	0.	$.121420 \times 10^{9}$	$.612320 \times 10^{7}$	$.127543 \times 10^{9}$
Sablefish	0.	$.134193 \times 10^{12}$	$.157899 \times 10^{11}$	$.149983 \times 10^{12}$
Cottidae	0.	$.182669 \times 10^{12}$	$.756741 \times 10^{10}$	$.190236 \times 10^{12}$
Pacific cod	0.	$.286137 \times 10^{11}$	$.176379 \times 10^{12}$	$.204992 \times 10^{12}$
Walleye pollock	0.	$.927527 \times 10^{12}$	$.776923 \times 10^{12}$	$.170445 \times 10^{13}$
Thornyhead		-	-	-
Pacific ocean perch	0.	$.121966 \times 10^{11}$	$.486036 \times 10^{12}$	$.498232 \times 10^{12}$
Dungeness crab	0.	$.300023 \times 10^{12}$	0.	$.300023 \times 10^{12}$
Tanner crab	0.	$.295854 \times 10^{13}$	$.930997 \times 10^{12}$	$.388954 \times 10^{13}$
King crab	0.	$.164250 \times 10^{12}$	$.503192 \times 10^{13}$	$.519617 \times 10^{13}$

Table 12.--Variances of the biomass estimates for the Chirikof region for May-October 1961, Cr 619.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.260173 \times 10^{12}$	$.333889 \times 10^{10}$	$.904359 \times 10^{11}$	$.353948 \times 10^{12}$
Flatfishes	$.761557 \times 10^{14}$	$.383442 \times 10^{15}$	$.516942 \times 10^{14}$	$.511292 \times 10^{15}$
Roundfishes	$.158822 \times 10^{14}$	$.803867 \times 10^{14}$	$.745720 \times 10^{14}$	$.170840 \times 10^{15}$
Rockfishes	0.	$.314818 \times 10^{14}$	$.146948 \times 10^{14}$	$.461767 \times 10^{14}$
Invertebrates	$.668480 \times 10^{16}$	$.121439 \times 10^{16}$	$.796366 \times 10^{14}$	$.797884 \times 10^{16}$
Skates	$.176719 \times 10^{12}$	$.333889 \times 10^{10}$	$.904359 \times 10^{11}$	$.270494 \times 10^{12}$
Turbot	$.876166 \times 10^{12}$	$.181794 \times 10^{15}$	$.268424 \times 10^{14}$	$.209513 \times 10^{15}$
Halibut	$.755218 \times 10^{14}$	$.184229 \times 10^{13}$	$.443744 \times 10^{12}$	$.778078 \times 10^{14}$
Flathead Sole	$.126877 \times 10^{13}$	$.658588 \times 10^{14}$	$.601849 \times 10^{13}$	$.731461 \times 10^{14}$
Dover sole	0.	$.455551 \times 10^{11}$	$.342993 \times 10^{12}$	$.388548 \times 10^{12}$
Rex sole	$.480150 \times 10^{9}$	$.138778 \times 10^{13}$	$.441850 \times 10^{12}$	$.183011 \times 10^{13}$
Rock sole	$.373660 \times 10^{13}$	$.357487 \times 10^{14}$	$.556286 \times 10^{7}$	$.394853 \times 10^{14}$
Sablefish	$.175203 \times 10^{11}$	$.105187 \times 10^{13}$	$.436159 \times 10^{12}$	$.150555 \times 10^{13}$
Cottidae	$.160787 \times 10^{14}$	$.167763 \times 10^{14}$	$.113645 \times 10^{11}$	$.328664 \times 10^{14}$
Pacific cod	$.682833 \times 10^{9}$	$.250143 \times 10^{13}$	$.852199 \times 10^{11}$	$.258733 \times 10^{13}$
Walleye pollock	$.603809 \times 10^{11}$	$.815023 \times 10^{14}$	$.707497 \times 10^{14}$	$.152312 \times 10^{15}$
Thornyheads	0.	0.	$.129883 \times 10^{12}$	$.129883 \times 10^{12}$
Pacific ocean perch	0.	$.315046 \times 10^{14}$	$.126493 \times 10^{14}$	$.441540 \times 10^{14}$
Dungeness crab	$.532614 \times 10^{10}$	$.325408 \times 10^{12}$	0.	$.330734 \times 10^{12}$
Tanner crab	$.835222 \times 10^{14}$	$.333873 \times 10^{15}$	$.130612 \times 10^{14}$	$.430457 \times 10^{15}$
King crab	$.653028 \times 10^{16}$	$.102460 \times 10^{16}$	$.413749 \times 10^{14}$	$.759626 \times 10^{16}$

Table 13.--Varinaces of the biomass estimates for the Shumagin region for September-November 1961, Cr 619.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	0.	$.273902 \times 10^{11}$	$.826448 \times 10^{8}$	$.274728 \times 10^{11}$
Flatfish	$.134995 \times 10^{14}$	$.221405 \times 10^{14}$	$.251028 \times 10^{13}$	$.381503 \times 10^{14}$
Roundfish	$.132063 \times 10^{13}$	$.255286 \times 10^{14}$	$.547212 \times 10^{13}$	$.323214 \times 10^{14}$
Rockfish	$.165476 \times 10^{7}$	$.649259 \times 10^{11}$	$.405190 \times 10^{14}$	$.405840 \times 10^{14}$
Invertebrates	$.152639 \times 10^{15}$	$.457400 \times 10^{14}$	$.248565 \times 10^{11}$	$.198404 \times 10^{15}$
Skates	0.	$.273902 \times 10^{11}$	$.826448 \times 10^{8}$	$.274728 \times 10^{11}$
Turbot	$.111490 \times 10^{12}$	$.121949 \times 10^{14}$	$.139693 \times 10^{13}$	$.137033 \times 10^{14}$
Halibut	$.468917 \times 10^{13}$	$.318108 \times 10^{12}$	$.587933 \times 10^{10}$	$.501316 \times 10^{13}$
Flathead	$.156480 \times 10^{8}$	$.177881 \times 10^{13}$	$.314918 \times 10^{12}$	$.209375 \times 10^{13}$
Dover	$.184650 \times 10^{8}$	$.571932 \times 10^{8}$	$.435118 \times 10^{8}$	$.119170 \times 10^{9}$
Rex	$.212869 \times 10^{8}$	$.259980 \times 10^{10}$	$.116087 \times 10^{10}$	$.378196 \times 10^{10}$
Rock	$.117238 \times 10^{14}$	$.115985 \times 10^{12}$	$.681408 \times 10^{8}$	$.118399 \times 10^{14}$
Sablefish	0.	$.195032 \times 10^{11}$	$.485092 \times 10^{11}$	$.680124 \times 10^{11}$
Cottidae	$.129466 \times 10^{13}$	$.132507 \times 10^{14}$	$.237475 \times 10^{11}$	$.145691 \times 10^{14}$
Pacific cod	$.933051 \times 10^{10}$	$.210540 \times 10^{12}$	$.195209 \times 10^{13}$	$.217196 \times 10^{13}$
Walleye pollock	$.661904 \times 10^{7}$	$.975512 \times 10^{13}$	$.820188 \times 10^{13}$	$.179570 \times 10^{14}$
Thornyhead	0.	$.312478 \times 10^{10}$	0.	$.312478 \times 10^{10}$
Pacific ocean perch	$.165476 \times 10^{7}$	$.355050 \times 10^{10}$	$.405190 \times 10^{14}$	$.405226 \times 10^{14}$
Dungeness crab	$.132557 \times 10^{14}$	$.741987 \times 10^{11}$	0.	$.133299 \times 10^{14}$
Tanner crab	$.114114 \times 10^{15}$	$.342685 \times 10^{14}$	$.257314 \times 10^{11}$	$.148408 \times 10^{15}$
King crab	$.264761 \times 10^{12}$	$.275004 \times 10^{13}$	0.	$.301480 \times 10^{13}$

Table 14.--Variances of the biomass estimates for the Sanak region for September-November 1961, Cr 619.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.188769 \times 10^{11}$	$.372751 \times 10^{11}$	0.	$.561521 \times 10^{11}$
Flatfish	$.392575 \times 10^{14}$	$.114657 \times 10^{14}$	0.	$.507232 \times 10^{14}$
Roundfish	$.102598 \times 10^{15}$	$.144943 \times 10^{14}$	0.	$.117092 \times 10^{15}$
Rockfish	$.202591 \times 10^{8}$	$.156035 \times 10^{12}$	0.	$.156044 \times 10^{12}$
Invertebrates	$.915436 \times 10^{15}$	$.711604 \times 10^{15}$	0.	$.162704 \times 10^{16}$
Skates	$.184571 \times 10^{11}$	$.372751 \times 10^{11}$	0.	$.557323 \times 10^{11}$
Turbot	$.225402 \times 10^{13}$	$.303822 \times 10^{13}$	0.	$.529225 \times 10^{13}$
Halibut	$.688612 \times 10^{12}$	$.734582 \times 10^{11}$	0.	$.762071 \times 10^{12}$
Flathead	$.179334 \times 10^{12}$	$.188886 \times 10^{13}$	0.	$.206820 \times 10^{13}$
Dover	0.	$.342461 \times 10^{11}$	0.	$.342460 \times 10^{11}$
Rex	$.180746 \times 10^{11}$	$.144907 \times 10^{12}$	0.	$.162971 \times 10^{12}$
Rock	$.231546 \times 10^{14}$	$.388017 \times 10^{13}$	0.	$.270348 \times 10^{14}$
Sablefish	$.342218 \times 10^{10}$	$.104934 \times 10^{10}$	0.	$.446996 \times 10^{10}$
Cottidae	$.658412 \times 10^{14}$	$.103284 \times 10^{14}$	0.	$.761697 \times 10^{14}$
Pacific cod	$.495430 \times 10^{13}$	$.230510 \times 10^{13}$	0.	$.725941 \times 10^{13}$
Walleye pollock	$.147462 \times 10^{11}$	$.828684 \times 10^{11}$	0.	$.976130 \times 10^{11}$
Thornyhead	0.	$.772784 \times 10^{11}$	0.	$.772784 \times 10^{11}$
Pacific ocean perch	$.667359 \times 10^{7}$	$.356602 \times 10^{11}$	0.	$.356560 \times 10^{11}$
Dungeness crab	$.416458 \times 10^{13}$	$.145111 \times 10^{11}$	0.	$.417909 \times 10^{13}$
Tanner crab	$.868630 \times 10^{15}$	$.632831 \times 10^{15}$	0.	$.150146 \times 10^{16}$
King crab	$.142755 \times 10^{14}$	$.177240 \times 10^{14}$	0.	$.319995 \times 10^{14}$

Table 16.--Variances of the biomass estimates for the Yakutat region for June-August 1962, Cr 628.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.115873 \times 10^{12}$	$.334935 \times 10^{12}$	$.870225 \times 10^{11}$	$.537831 \times 10^{12}$
Flatfish	$.131605 \times 10^{14}$	$.233193 \times 10^{14}$	$.233193 \times 10^{14}$	$.898771 \times 10^{14}$
Roundfish	$.127682 \times 10^{13}$	$.404385 \times 10^{12}$	$.197217 \times 10^{13}$	$.365338 \times 10^{13}$
Rockfish	0.	$.613854 \times 10^{14}$	$.241949 \times 10^{13}$	$.638049 \times 10^{14}$
Invertebrates	$.101669 \times 10^{14}$	$.946594 \times 10^{13}$	$.135273 \times 10^{13}$	$.209856 \times 10^{13}$
Skates	$.240915 \times 10^{11}$	$.302509 \times 10^{12}$	$.925100 \times 10^{11}$	$.419111 \times 10^{12}$
Turbot	$.359974 \times 10^{13}$	$.350571 \times 10^{14}$	$.939179 \times 10^{13}$	$.480486 \times 10^{14}$
Halibut	$.181133 \times 10^{12}$	$.266450 \times 10^{12}$	$.111618 \times 10^{10}$	$.448699 \times 10^{12}$
Flathead	$.220415 \times 10^{12}$	$.366898 \times 10^{13}$	$.168939 \times 10^{13}$	$.557879 \times 10^{13}$
Dover	$.139205 \times 10^{8}$	$.539367 \times 10^{11}$	$.989892 \times 10^{12}$	$.104384 \times 10^{13}$
Rex	$.511467 \times 10^{11}$	$.395837 \times 10^{11}$	$.597012 \times 10^{12}$	$.687743 \times 10^{12}$
Rock	$.780647 \times 10^{9}$	$.525845 \times 10^{8}$	0.	$.833232 \times 10^{9}$
Sablefish	$.141899 \times 10^{10}$	$.616723 \times 10^{11}$	$.362338 \times 10^{11}$	$.993252 \times 10^{11}$
Cottidae	0.	$.191690 \times 10^{10}$	$.430894 \times 10^{10}$	$.622584 \times 10^{10}$
Pacific cod	$.698289 \times 10^{11}$	$.173109 \times 10^{11}$	$.275635 \times 10^{11}$	$.114703 \times 10^{12}$
Walleye pollock	$.691862 \times 10^{12}$	$.161336 \times 10^{12}$	$.127485 \times 10^{13}$	$.212805 \times 10^{13}$
Thornyhead	0.	$.883358 \times 10^{10}$	$.665143 \times 10^{12}$	$.673977 \times 10^{12}$
Pacific ocean perch	0.	$.614729 \times 10^{14}$	$.329419 \times 10^{13}$	$.647671 \times 10^{14}$
Tanner crab	$.214015 \times 10^{12}$	$.500971 \times 10^{12}$	$.135273 \times 10^{13}$	$.206771 \times 10^{13}$
Scallop	$.122593 \times 10^{14}$	$.757709 \times 10^{13}$	0.	$.198364 \times 10^{14}$

Table 17.--Varinaces of the biomass estimates for the Prince William region for June-August 1962, Cr 628.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.194404 \times 10^{13}$	$.289738 \times 10^{12}$	$.148075 \times 10^{11}$	$.224858 \times 10^{13}$
Flatfish	$.136759 \times 10^{14}$	$.741606 \times 10^{14}$	$.430371 \times 10^{13}$	$.921403 \times 10^{14}$
Roundfish	$.293107 \times 10^{12}$	$.482412 \times 10^{13}$	$.122206 \times 10^{12}$	$.523943 \times 10^{13}$
Rockfish	$.121387 \times 10^{10}$	$.929667 \times 10^{13}$	$.416388 \times 10^{13}$	$.134617 \times 10^{14}$
Invertebrates	$.313617 \times 10^{14}$	$.114084 \times 10^{13}$	$.125407 \times 10^{12}$	$.326279 \times 10^{14}$
Skates	$.162987 \times 10^{13}$	$.282015 \times 10^{12}$	$.118333 \times 10^{11}$	$.192372 \times 10^{13}$
Turbot	$.250197 \times 10^{13}$	$.313702 \times 10^{14}$	$.285135 \times 10^{13}$	$.367236 \times 10^{14}$
Halibut	$.394024 \times 10^{12}$	$.204704 \times 10^{12}$	$.225488 \times 10^{9}$	$.598955 \times 10^{12}$
Flathead	$.452828 \times 10^{12}$	$.131737 \times 10^{14}$	$.394659 \times 10^{12}$	$.140212 \times 10^{14}$
Dover	$.163366 \times 10^{10}$	$.135199 \times 10^{12}$	$.900943 \times 10^{11}$	$.226927 \times 10^{12}$
Rex	$.101754 \times 10^{12}$	$.729798 \times 10^{11}$	$.625899 \times 10^{11}$	$.237324 \times 10^{12}$
Rock	$.520156 \times 10^{11}$	$.163432 \times 10^{7}$	0.	$.520172 \times 10^{11}$
Sablefish	$.114868 \times 10^{11}$	$.498541 \times 10^{11}$	$.184301 \times 10^{11}$	$.797712 \times 10^{11}$
Cottidae	$.189963 \times 10^{9}$	$.344263 \times 10^{11}$	$.193461 \times 10^{10}$	$.365509 \times 10^{11}$
Pacific cod	$.353767 \times 10^{11}$	$.455175 \times 10^{11}$	$.104680 \times 10^{11}$	$.913624 \times 10^{11}$
Walleye pollock	$.717889 \times 10^{10}$	$.418807 \times 10^{13}$	$.139031 \times 10^{12}$	$.433428 \times 10^{13}$
Thornyhead	0.	$.344861 \times 10^{11}$	$.725416 \times 10^{11}$	$.107027 \times 10^{12}$
Pacific ocean perch	$.122051 \times 10^{10}$	$.892822 \times 10^{13}$	$.398842 \times 10^{13}$	$.129178 \times 10^{14}$
Tanner crab	$.219095 \times 10^{12}$	$.104395 \times 10^{13}$	$.125470 \times 10^{12}$	$.138851 \times 10^{13}$
Scallop	$.993523 \times 10^{8}$	$.136548 \times 10^{12}$	0.	$.136648 \times 10^{12}$

Table 19.--Varinaces of the biomass estimates for the Fairweather region for May-October 1962, Cr 629.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.612021 \times 10^{12}$	$.113970 \times 10^{13}$	$.163204 \times 10^{13}$	$.338376 \times 10^{13}$
Flatfish	$.242970 \times 10^{14}$	$.156153 \times 10^{15}$	$.623247 \times 10^{13}$	$.186682 \times 10^{15}$
Roundfish	$.107701 \times 10^{11}$	$.831458 \times 10^{13}$	$.241084 \times 10^{13}$	$.107361 \times 10^{14}$
Rockfish	0.	$.408196 \times 10^{12}$	$.396999 \times 10^{13}$	$.437818 \times 10^{13}$
Invertebrates	$.176630 \times 10^{13}$	$.58703 \times 10^{13}$	$.133228 \times 10^{12}$	$.777036 \times 10^{13}$
Skates	$.472105 \times 10^{11}$	$.994228 \times 10^{12}$	$.661511 \times 10^{12}$	$.170294 \times 10^{13}$
Turbot	$.289699 \times 10^{12}$	$.781212 \times 10^{14}$	$.125056 \times 10^{12}$	$.785359 \times 10^{14}$
Halibut	$.947467 \times 10^{11}$	$.129230 \times 10^{13}$	0.	$.138704 \times 10^{13}$
Flathead	$.290806 \times 10^{11}$	$.627567 \times 10^{13}$	$.446734 \times 10^{13}$	$.107720 \times 10^{14}$
Dover	$.423511 \times 10^{10}$	$.932059 \times 10^{12}$	$.331260 \times 10^{12}$	$.126755 \times 10^{13}$
Rex	$.383866 \times 10^{12}$	$.245166 \times 10^{13}$	$.305477 \times 10^{11}$	$.286607 \times 10^{13}$
Rock	$.207333 \times 10^{9}$	$.342350 \times 10^{9}$	0.	$.549684 \times 10^{9}$
Sablefish	$.147662 \times 10^{9}$	$.576687 \times 10^{13}$	$.447613 \times 10^{12}$	$.621463 \times 10^{13}$
Cottidae	$.742099 \times 10^{7}$	$.108355 \times 10^{10}$	0.	$.109097 \times 10^{10}$
Pacific cod	$.667889 \times 10^{10}$	$.799801 \times 10^{11}$	0.	$.866590 \times 10^{11}$
Walleye pollock	$.250799 \times 10^{9}$	$.288982 \times 10^{13}$	$.358953 \times 10^{12}$	$.324903 \times 10^{13}$
Thornyhead	0.	$.173626 \times 10^{12}$	$.370737 \times 10^{12}$	$.544364 \times 10^{12}$
Pacific ocean perch	0.	$.265708 \times 10^{12}$	$.495777 \times 10^{13}$	$.522347 \times 10^{13}$
Tanner crab	$.514926 \times 10^{9}$	$.553613 \times 10^{13}$	$.133228 \times 10^{12}$	$.566988 \times 10^{13}$
Scallop	$.140540 \times 10^{13}$	$.116402 \times 10^{13}$	0.	$.256942 \times 10^{13}$

Table 20.--Varinaces of the biomass estimates for the Yakutat region for May-October 1962, Cr 629.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.599104 \times 10^{12}$	$.114166 \times 10^{13}$	$.468772 \times 10^{12}$	$.220953 \times 10^{13}$
Flatfish	$.125631 \times 10^{12}$	$.125631 \times 10^{14}$	$.515395 \times 10^{11}$	$.133939 \times 10^{14}$
Roundfish	$.142001 \times 10^{11}$	$.184630 \times 10^{13}$	$.161842 \times 10^{12}$	$.202234 \times 10^{13}$
Rockfish	$.394165 \times 10^{9}$	$.628028 \times 10^{13}$	$.234546 \times 10^{13}$	$.862614 \times 10^{13}$
Invertebrates	$.680391 \times 10^{11}$	$.151146 \times 10^{13}$	$.401375 \times 10^{12}$	$.198088 \times 10^{13}$
Skates	$.863282 \times 10^{12}$	$.994448 \times 10^{12}$	$.434645 \times 10^{12}$	$.229237 \times 10^{13}$
Turbot	$.134714 \times 10^{11}$	$.383561 \times 10^{13}$	$.221859 \times 10^{12}$	$.407094 \times 10^{13}$
Halibut	$.419986 \times 10^{12}$	$.560669 \times 10^{12}$	$.361453 \times 10^{12}$	$.638813 \times 10^{13}$
Flathead	$.798310 \times 10^{8}$	$.965004 \times 10^{11}$	$.452556 \times 10^{11}$	$.141833 \times 10^{12}$
Dover	0.	0.	$.172689 \times 10^{9}$	$.172689 \times 10^{9}$
Rex	$.536364 \times 10^{10}$	$.187235 \times 10^{11}$	$.180516 \times 10^{11}$	$.421388 \times 10^{11}$
Sablefish	0.	$.994434 \times 10^{9}$	0.	$.994434 \times 10^{9}$
Cottidae	$.162156 \times 10^{8}$	$.257740 \times 10^{11}$	0.	$.257902 \times 10^{11}$
Pacific cod	$.179619 \times 10^{11}$	$.139769 \times 10^{13}$	$.420777 \times 10^{11}$	$.145773 \times 10^{13}$
Walleye pollock	0.	$.805532 \times 10^{11}$	$.134960 \times 10^{12}$	$.215513 \times 10^{12}$
Thornyhead	$.611206 \times 10^{8}$	$.284509 \times 10^{13}$	$.328735 \times 10^{12}$	$.137389 \times 10^{13}$
Pacific ocean perch	$.210803 \times 10^{9}$	$.809638 \times 10^{11}$	$.269684 \times 10^{13}$	$.277801 \times 10^{13}$
Dungeness crab	$.916427 \times 10^{10}$	0.	0.	$.916427 \times 10^{10}$
Tanner crab	$.587512 \times 10^{9}$	$.245272 \times 10^{12}$	$.387470 \times 10^{12}$	$.633329 \times 10^{12}$
Scallop	$.779600 \times 10^{11}$	$.997811 \times 10^{10}$	$.137800 \times 10^{10}$	$.891160 \times 10^{11}$

Table 21.--Variances of the biomass estimates for the Prince William region for May-October 1962, Cr 629.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.116894 \times 10^{14}$	$.388744 \times 10^{12}$	$.111560 \times 10^{12}$	$.121897 \times 10^{14}$
Flatfish	$.658560 \times 10^{13}$	$.611509 \times 10^{13}$	$.350976 \times 10^{13}$	$.162104 \times 10^{14}$
Roundfish	$.132960 \times 10^{11}$	$.390956 \times 10^{12}$	$.807056 \times 10^{13}$	$.847481 \times 10^{13}$
Rockfish	$.597102 \times 10^{10}$	$.561879 \times 10^{12}$	$.244236 \times 10^{12}$	$.812086 \times 10^{12}$
Invertebrates	$.951309 \times 10^{13}$	$.154593 \times 10^{13}$	$.138168 \times 10^{12}$	$.111971 \times 10^{14}$
Skates	$.978347 \times 10^{13}$	$.293034 \times 10^{12}$	$.569374 \times 10^{11}$	$.101334 \times 10^{14}$
Turbot	$.243570 \times 10^{13}$	$.215814 \times 10^{13}$	$.178611 \times 10^{13}$	$.637997 \times 10^{13}$
Halibut	$.279191 \times 10^{12}$	$.728913 \times 10^{11}$	$.130335 \times 10^{11}$	$.365116 \times 10^{12}$
Flathead	$.222688 \times 10^{12}$	$.140691 \times 10^{13}$	$.120916 \times 10^{12}$	$.175051 \times 10^{13}$
Dover	$.128071 \times 10^{9}$	$.126897 \times 10^{10}$	$.204457 \times 10^{12}$	$.205854 \times 10^{12}$
Rex	$.805824 \times 10^{11}$	$.152045 \times 10^{11}$	$.151304 \times 10^{11}$	$.110917 \times 10^{12}$
Sablefish	$.119809 \times 10^{11}$	$.447797 \times 10^{10}$	$.968006 \times 10^{11}$	$.113259 \times 10^{12}$
Cottidae	$.619215 \times 10^{9}$	$.144026 \times 10^{11}$	$.736245 \times 10^{10}$	$.223843 \times 10^{11}$
Pacific cod	$.743950 \times 10^{10}$	$.236157 \times 10^{12}$	$.264498 \times 10^{11}$	$.246241 \times 10^{12}$
Walleye pollock	$.877246 \times 10^{9}$	$.110871 \times 10^{12}$	$.584023 \times 10^{13}$	$.595198 \times 10^{13}$
Thorynheads	0.	$.120420 \times 10^{10}$	$.158254 \times 10^{11}$	$.170296 \times 10^{11}$
Pacific ocean perch	$.597102 \times 10^{10}$	$.519510 \times 10^{12}$	$.110626 \times 10^{12}$	$.636108 \times 10^{12}$
Dungeness crab	$.676940 \times 10^{13}$	0.	0.	$.676940 \times 10^{13}$
Tanner crab	$.245773 \times 10^{13}$	$.155866 \times 10^{13}$	$.135517 \times 10^{12}$	$.415191 \times 10^{13}$
Scallop	$.639491 \times 10^{9}$	$.652066 \times 10^{11}$	0.	$.658461 \times 10^{11}$

Table 22.--Variances of the biomass estimates for the Fairweather region for April-October 1976, Cr 762.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs				
Flatfishes	$.185809 \times 10^{14}$	$.157430 \times 10^{14}$	$.299974 \times 10^{14}$	$.106521 \times 10^{15}$
Roundfishes	$.145938 \times 10^{12}$	$.105203 \times 10^{13}$	$.391656 \times 10^{12}$	$.158962 \times 10^{13}$
Rockfishes	$.149777 \times 10^{9}$	$.545059 \times 10^{12}$	$.542085 \times 10^{12}$	$.108729 \times 10^{13}$
Invertebrates	$.146832 \times 10^{13}$	$.347985 \times 10^{15}$	$.272176 \times 10^{11}$	$.349481 \times 10^{15}$
Skates	$.676770 \times 10^{11}$	$.197853 \times 10^{13}$	$.140587 \times 10^{12}$	$.218679 \times 10^{13}$
Turbot	$.332172 \times 10^{11}$	$.993813 \times 10^{13}$	$.717802 \times 10^{13}$	$.171493 \times 10^{14}$
Halibut	$.102336 \times 10^{12}$	$.246800 \times 10^{12}$	0.	$.349137 \times 10^{12}$
Flathead sole	$.199703 \times 10^{9}$	$.260944 \times 10^{14}$	$.177499 \times 10^{14}$	$.438446 \times 10^{14}$
Dover sole	$.599108 \times 10^{7}$	$.817498 \times 10^{9}$	$.428314 \times 10^{12}$	$.429137 \times 10^{12}$
Rex sole	$.393459 \times 10^{10}$	$.983563 \times 10^{12}$	$.446347 \times 10^{12}$	$.143384 \times 10^{13}$
Rock sole	$.576919 \times 10^{9}$	$.104497 \times 10^{10}$	0.	$.162189 \times 10^{10}$
Sablefish	0.	$.104497 \times 10^{10}$	$.743601 \times 10^{9}$	$.178857 \times 10^{10}$
Cottidae	0.	$.537842 \times 10^{10}$	$.390855 \times 10^{11}$	$.444639 \times 10^{11}$
Pacific cod	$.128209 \times 10^{12}$	$.211054 \times 10^{12}$	0.	$.339263 \times 10^{12}$
Walleye pollock	$.405619 \times 10^{9}$	$.953059 \times 10^{11}$	$.281306 \times 10^{12}$	$.377017 \times 10^{12}$
Smelt	$.416047 \times 10^{9}$	$.576057 \times 10^{12}$	$.562348 \times 10^{10}$	$.582097 \times 10^{12}$
Thornyhead	0.	$.128610 \times 10^{12}$	$.582983 \times 10^{12}$	$.711593 \times 10^{12}$
Pacific ocean perch	0.	$.212599 \times 10^{12}$	0.	$.212599 \times 10^{12}$
Tanner crab	$.909757 \times 10^{9}$	$.447624 \times 10^{12}$	0.	$.448534 \times 10^{12}$
King Crab	0.	$.307948 \times 10^{11}$	0.	$.307948 \times 10^{11}$
Scallop	$.156092 \times 10^{13}$	$.340079 \times 10^{9}$	0.	$.156126 \times 10^{13}$

Table 23.--Variances of the biomass estimates for the Yakutat region for April-October 1975, Cr 751.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.561359 \times 10^{12}$	$.180138 \times 10^{12}$	$.172185 \times 10^{12}$	$.913684 \times 10^{12}$
Flatfishes	$.207721 \times 10^{15}$	$.398728 \times 10^{14}$	$.328370 \times 10^{14}$	$.280430 \times 10^{15}$
Roundfishes	$.486011 \times 10^{13}$	$.339674 \times 10^{13}$	$.946315 \times 10^{12}$	$.920318 \times 10^{13}$
Rockfishes	$.201795 \times 10^{8}$	$.263311 \times 10^{12}$	$.365432 \times 10^{12}$	$.628764 \times 10^{12}$
Invertebrates	$.989152 \times 10^{12}$	$.120873 \times 10^{13}$	$.105632 \times 10^{14}$	$.127611 \times 10^{14}$
Skates	0.	0.	0.	0.
Turbot	$.10257 \times 10^{13}$	$.205291 \times 10^{14}$	$.870712 \times 10^{13}$	$.302619 \times 10^{14}$
Halibut	$.321934 \times 10^{12}$	$.294272 \times 10^{12}$	$.203578 \times 10^{9}$	$.616410 \times 10^{12}$
Flathead sole	$.288359 \times 10^{12}$	$.407353 \times 10^{13}$	$.372564 \times 10^{9}$	$.436226 \times 10^{13}$
Dover sole	$.112132 \times 10^{10}$	$.970744 \times 10^{10}$	$.825569 \times 10^{13}$	$.826652 \times 10^{13}$
Rex sole	$.141153 \times 10^{12}$	$.683446 \times 10^{11}$	$.171484 \times 10^{13}$	$.192434 \times 10^{13}$
Rock sole	$.883190 \times 10^{10}$	0.	0.	$.883190 \times 10^{10}$
Sablefish	$.339286 \times 10^{9}$	$.342228 \times 10^{10}$	$.103675 \times 10^{13}$	$.104051 \times 10^{13}$
Cottidae	$.958701 \times 10^{8}$	$.288144 \times 10^{10}$	$.919050 \times 10^{10}$	$.121678 \times 10^{11}$
Pacific cod	$.106054 \times 10^{13}$	$.114916 \times 10^{13}$	$.126322 \times 10^{10}$	$.221097 \times 10^{13}$
Walleye pollock	$.583911 \times 10^{13}$	$.127594 \times 10^{13}$	$.939732 \times 10^{9}$	$.711600 \times 10^{13}$
Smelt	$.448236 \times 10^{9}$	$.118766 \times 10^{11}$	$.445247 \times 10^{9}$	$.127701 \times 10^{11}$
Thornyhead	$.151115 \times 10^{7}$	$.568935 \times 10^{11}$	$.338163 \times 10^{12}$	$.395059 \times 10^{12}$
Pacific ocean perch	$.192748 \times 10^{8}$	$.451822 \times 10^{11}$	$.537817 \times 10^{11}$	$.989833 \times 10^{11}$
Tanner crab	$.376603 \times 10^{12}$	$.260483 \times 10^{11}$	$.592752 \times 10^{10}$	$.408579 \times 10^{12}$
King crab	0.	0.	0.	0.
Scallop	$.104483 \times 10^{12}$	$.728068 \times 10^{11}$	$.168246 \times 10^{7}$	$.177292 \times 10^{12}$

Table 24.--Variances of the biomass estimates for the Prince William region for April-October 1975, Cr 751.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.257134 \times 10^{13}$	$.147940 \times 10^{12}$	$.442941 \times 10^{11}$	$.276357 \times 10^{13}$
Flatfishes	$.598772 \times 10^{13}$	$.322910 \times 10^{13}$	$.241521 \times 10^{13}$	$.116320 \times 10^{14}$
Roundfishes	$.126374 \times 10^{14}$	$.341623 \times 10^{14}$	$.300159 \times 10^{13}$	$.488013 \times 10^{14}$
Rockfishes	$.870550 \times 10^{11}$	$.857077 \times 10^{12}$	$.481841 \times 10^{12}$	$.142597 \times 10^{13}$
Invertebrates	$.216665 \times 10^{14}$	$.623150 \times 10^{13}$	$.616628 \times 10^{13}$	$.340643 \times 10^{14}$
Skates	$.257246 \times 10^{13}$	$.144033 \times 10^{12}$	$.421121 \times 10^{11}$	$.275860 \times 10^{13}$
Turbot	$.154851 \times 10^{13}$	$.128420 \times 10^{13}$	$.237860 \times 10^{12}$	$.307057 \times 10^{13}$
Halibut	$.290441 \times 10^{12}$	$.144620 \times 10^{12}$	0.	$.435061 \times 10^{12}$
Flathead sole	$.107711 \times 10^{13}$	$.464005 \times 10^{13}$	$.330475 \times 10^{13}$	$.484587 \times 10^{13}$
Dover sole	$.744365 \times 10^{10}$	$.139773 \times 10^{12}$	$.533023 \times 10^{12}$	$.680241 \times 10^{12}$
Rex sole	$.522793 \times 10^{11}$	$.950094 \times 10^{11}$	$.284215 \times 10^{12}$	$.431504 \times 10^{12}$
Rock sole	$.389153 \times 10^{11}$	$.256887 \times 10^{8}$	0.	$.389410 \times 10^{11}$
Sablefish	$.541492 \times 10^{10}$	$.464443 \times 10^{10}$	$.700793 \times 10^{11}$	$.801387 \times 10^{11}$
Cottidae	$.222495 \times 10^{11}$	$.571009 \times 10^{10}$	$.355506 \times 10^{11}$	$.635102 \times 10^{11}$
Pacific cod	$.275425 \times 10^{12}$	$.495514 \times 10^{12}$	$.147043 \times 10^{12}$	$.917983 \times 10^{12}$
Walleye pollock	$.115916 \times 10^{14}$	$.320574 \times 10^{14}$	$.254875 \times 10^{13}$	$.461979 \times 10^{14}$
Smelt	$.212185 \times 10^{11}$	$.585966 \times 10^{9}$	$.238715 \times 10^{12}$	$.260519 \times 10^{12}$
Thornyhead	$.868187 \times 10^{11}$	$.597248 \times 10^{11}$	$.386586 \times 10^{12}$	$.533130 \times 10^{12}$
Pacific ocean perch	0.	$.748742 \times 10^{12}$	$.201250 \times 10^{12}$	$.750755 \times 10^{12}$
Tanner crab	$.856260 \times 10^{13}$	$.561713 \times 10^{13}$	$.653283 \times 10^{13}$	$.207125 \times 10^{14}$
Scallop	$.289677 \times 10^{11}$	$.276885 \times 10^{9}$	$.164062 \times 10^{8}$	$.292610 \times 10^{10}$

Table 25.--Variances of the biomass estimates for the Kenai region for April - October, 1976 Cruise 762.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	0.	$.950106 \times 10^{10}$	$.149052 \times 10^{11}$	$.244063 \times 10^{11}$
Flatfishes	0.	$.273772 \times 10^{15}$	$.100768 \times 10^{14}$	$.283849 \times 10^{15}$
Roundfishes	0.	$.311069 \times 10^{15}$	$.155790 \times 10^{14}$	$.326648 \times 10^{15}$
Rockfishes	0.	$.847467 \times 10^{12}$	$.320720 \times 10^{11}$	$.879539 \times 10^{12}$
Invertebrates	0.	$.568068 \times 10^{14}$	$.162612 \times 10^{13}$	$.584329 \times 10^{14}$
Skates	0.	$.940983 \times 10^{10}$	$.140255 \times 10^{11}$	$.234353 \times 10^{11}$
Turbot	0.	$.928049 \times 10^{14}$	$.374973 \times 10^{13}$	$.965547 \times 10^{14}$
Halibut	0.	$.144763 \times 10^{13}$	$.181551 \times 10^{13}$	$.326314 \times 10^{13}$
Flathead sole	0.	$.150026 \times 10^{14}$	$.126628 \times 10^{13}$	$.162725 \times 10^{14}$
Dover sole	0.	$.212255 \times 10^{14}$	$.633208 \times 10^{11}$	$.212888 \times 10^{14}$
Rex sole	0.	$.104686 \times 10^{13}$	$.492619 \times 10^{11}$	$.109613 \times 10^{13}$
Rock sole	0.	$.310661 \times 10^{9}$	0.	$.310661 \times 10^{9}$
Sablefish	0.	$.102906 \times 10^{12}$	$.183488 \times 10^{12}$	$.286394 \times 10^{12}$
Cottidae	0.	$.234735 \times 10^{12}$	$.332087 \times 10^{10}$	$.238056 \times 10^{12}$
Pacific cod	0.	$.266\ 41 \times 10^{13}$	$.150675 \times 10^{13}$	$.417116 \times 10^{13}$
Walleye pollock	0.	$.282708 \times 10^{15}$	$.822004 \times 10^{13}$	$.290928 \times 10^{15}$
Smelt	0.	$.333247 \times 10^{11}$	$.556254 \times 10^{9}$	$.338809 \times 10^{11}$
Thornyhead	0.	$.192434 \times 10^{11}$	$.357948 \times 10^{11}$	$.550382 \times 10^{11}$
Pacific ocean perch	0.	$.178902 \times 10^{12}$	0.	$.178902 \times 10^{12}$
Tanner crab	0.	$.463897 \times 10^{12}$	$.807488 \times 10^{11}$	$.544645 \times 10^{12}$
King crab	0.	$.180890 \times 10^{13}$	$.137376 \times 10^{13}$	$.318267 \times 10^{13}$

Table 26.--Variances of the biomass estimates for the Kodiak region for April-October 1973, Cr 734.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	0.	$.135880 \times 10^{11}$	$.34140 \times 10^{8}$	$.136222 \times 10^{11}$
Flatfishes	$.208195 \times 10^{15}$	$.860323 \times 10^{14}$	$.491708 \times 10^{14}$	$.343398 \times 10^{15}$
Roundfishes	$.107199 \times 10^{16}$	$.168042 \times 10^{16}$	$.231432 \times 10^{15}$	$.298384 \times 10^{16}$
Rockfishes	$.468853 \times 10^{9}$	$.361801 \times 10^{11}$	$.111764 \times 10^{14}$	$.112130 \times 10^{14}$
Invertebrates	$.290709 \times 10^{15}$	$.194703 \times 10^{15}$	$.956232 \times 10^{13}$	$.494974 \times 10^{15}$
Skates	0.	$.135880 \times 10^{11}$	$.341401 \times 10^{8}$	$.136222 \times 10^{11}$
Turbot	$.250352 \times 10^{12}$	$.358737 \times 10^{13}$	$.381263 \times 10^{13}$	$.765036 \times 10^{13}$
Halibut	$.643642 \times 10^{13}$	$.173811 \times 10^{12}$	$.425940 \times 10^{11}$	$.665282 \times 10^{13}$
Flathead sole	$.194864 \times 10^{13}$	$.179000 \times 10^{14}$	$.182089 \times 10^{13}$	$.216696 \times 10^{14}$
Dover sole	$.468853 \times 10^{7}$	$.573317 \times 10^{13}$	$.372869 \times 10^{14}$	$.430201 \times 10^{14}$
Rex sole	$.382584 \times 10^{11}$	$.171761 \times 10^{14}$	$.137376 \times 10^{14}$	$.154935 \times 10^{14}$
Rock sole	$.189442 \times 10^{15}$	$.362160 \times 10^{13}$	$.729535 \times 10^{13}$	$.200359 \times 10^{15}$
Sablefish	0.	$.166551 \times 10^{12}$	$.354764 \times 10^{12}$	$.521315 \times 10^{12}$
Cottidae	$.422254 \times 10^{14}$	$.212313 \times 10^{13}$	$.152126 \times 10^{12}$	$.445006 \times 10^{14}$
Pacific cod	$.523537 \times 10^{15}$	$.435510 \times 10^{14}$	$.572535 \times 10^{11}$	$.567145 \times 10^{15}$
Walleye pollock	$.456427 \times 10^{14}$	$.144797 \times 10^{16}$	$.244770 \times 10^{15}$	$.173838 \times 10^{16}$
Smelt	0.	$.578708 \times 10^{8}$	0.	$.578708 \times 10^{8}$
Thornyhead	0.	0.	$.342208 \times 10^{12}$	$.342208 \times 10^{12}$
Pacific ocean perch	$.468853 \times 10^{9}$	$.369752 \times 10^{11}$	$.130730 \times 10^{12}$	$.168174 \times 10^{12}$
Tanner crab	$.977559 \times 10^{12}$	$.186201 \times 10^{14}$	$.848482 \times 10^{13}$	$.280825 \times 10^{14}$
King crab	$.823540 \times 10^{13}$	$.122720 \times 10^{15}$	$.665433 \times 10^{11}$	$.131022 \times 10^{15}$
Scallop	$.144461 \times 10^{13}$	0.	0.	$.144461 \times 10^{13}$

Table 27.--Variances of the biomass estimates for the Shelikof region for April-October 1973, Cr 733.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	$.614624 \times 10^{8}$	$.423051 \times 10^{9}$	$.408186 \times 10^{11}$	$.413031 \times 10^{11}$
Flatfishes	$.546531 \times 10^{11}$	$.478030 \times 10^{13}$	$.475071 \times 10^{13}$	$.958567 \times 10^{13}$
Roundfishes	$.211419 \times 10^{11}$	$.165747 \times 10^{14}$	$.844474 \times 10^{13}$	$.250406 \times 10^{14}$
Rockfishes	0.	$.121944 \times 10^{10}$	$.656991 \times 10^{10}$	$.778936 \times 10^{10}$
Invertebrates	$.914371 \times 10^{11}$	$.248319 \times 10^{13}$	$.212474 \times 10^{14}$	$.238220 \times 10^{14}$
Skates	0.	$.423051 \times 10^{9}$	$.408186 \times 10^{11}$	$.412416 \times 10^{11}$
Turbot	$.345726 \times 10^{6}$	$.337415 \times 10^{11}$	$.131337 \times 10^{12}$	$.165078 \times 10^{12}$
Halibut	$.266478 \times 10^{11}$	$.539432 \times 10^{12}$	$.230154 \times 10^{13}$	$.286762 \times 10^{13}$
Flathead sole	$.153656 \times 10^{8}$	$.369163 \times 10^{13}$	$.339840 \times 10^{13}$	$.709005 \times 10^{13}$
Dover sole	0.	$.296136 \times 10^{8}$	$.191014 \times 10^{11}$	$.191310 \times 10^{11}$
Rex sole	0.	$.281752 \times 10^{8}$	$.456244 \times 10^{8}$	$.737996 \times 10^{8}$
Rock sole	$.499382 \times 10^{8}$	$.423051 \times 10^{7}$	$.712958 \times 10^{9}$	$.767126 \times 10^{9}$
Sablefish	-	-	-	-
Cottidae	$.349567 \times 10^{9}$	$.537339 \times 10^{11}$	$.644934 \times 10^{11}$	$.118576 \times 10^{12}$
Pacific cod	$.960351 \times 10^{6}$	$.253707 \times 10^{12}$	$.619945 \times 10^{12}$	$.873653 \times 10^{12}$
Walleye pollock	$.297593 \times 10^{11}$	$.179953 \times 10^{14}$	$.441407 \times 10^{13}$	$.224391 \times 10^{14}$
Smelt	$.147957 \times 10^{11}$	$.170079 \times 10^{10}$	$.238037 \times 10^{10}$	$.188768 \times 10^{11}$
Thornyhead	-	-	-	-
Pacific ocean perch	0.	$.337383 \times 10^{9}$	$.656991 \times 10^{10}$	$.690730 \times 10^{10}$
Tanner crab	$.743351 \times 10^{11}$	$.234810 \times 10^{12}$	$.131613 \times 10^{14}$	$.134705 \times 10^{14}$
King crab	$.256901 \times 10^{12}$	$.700573 \times 10^{10}$	0.	$.263907 \times 10^{12}$

Table 28.--Variances of the biomass estimates for the Chirikof region for April-October 1975, Cr 753.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	0.	$.633658 \times 10^{11}$	$.279793 \times 10^{12}$	$.343159 \times 10^{12}$
Flatfishes	$.636401 \times 10^{13}$	$.967328 \times 10^{13}$	$.276740 \times 10^{14}$	$.437113 \times 10^{14}$
Roundfishes	$.224924 \times 10^{14}$	$.100949 \times 10^{17}$	$.110185 \times 10^{14}$	$.101284 \times 10^{17}$
Rockfishes	$.165263 \times 10^{8}$	$.303525 \times 10^{13}$	$.172313 \times 10^{11}$	$.305249 \times 10^{13}$
Invertebrates	$.266577 \times 10^{14}$	$.356429 \times 10^{13}$	$.191469 \times 10^{13}$	$.321377 \times 10^{14}$
Skates	0.	$.633658 \times 10^{11}$	$.279793 \times 10^{12}$	$.343159 \times 10^{12}$
Turbot	$.225781 \times 10^{12}$	$.287602 \times 10^{13}$	$.152952 \times 10^{14}$	$.183970 \times 10^{14}$
Halibut	$.232164 \times 10^{13}$	$.490772 \times 10^{10}$	$.254544 \times 10^{13}$	$.487199 \times 10^{13}$
Flathead sole	$.181231 \times 10^{13}$	$.210940 \times 10^{13}$	$.204643 \times 10^{13}$	$.596814 \times 10^{13}$
Dover sole	$.734505 \times 10^{9}$	$.170885 \times 10^{11}$	$.180971 \times 10^{12}$	$.198794 \times 10^{12}$
Rex sole	$.712863 \times 10^{10}$	$.136831 \times 10^{12}$	$.129051 \times 10^{12}$	$.273010 \times 10^{12}$
Rock sole	$.624014 \times 10^{12}$	$.887214 \times 10^{12}$	$.222144 \times 10^{9}$	$.151145 \times 10^{13}$
Sablefish	$.734505 \times 10^{9}$	$.574080 \times 10^{9}$	$.763269 \times 10^{11}$	$.776355 \times 10^{11}$
Cottidae	$.927338 \times 10^{12}$	$.998009 \times 10^{12}$	$.302735 \times 10^{11}$	$.195562 \times 10^{13}$
Pacific cod	$.555862 \times 10^{11}$	$.132034 \times 10^{13}$	$.516274 \times 10^{13}$	$.653867 \times 10^{13}$
Walleye pollock	$.194309 \times 10^{14}$	$.116507 \times 10^{17}$	$.793793 \times 10^{12}$	$.116710 \times 10^{17}$
Smelt	0.	$.103167 \times 10^{9}$	$.921251 \times 10^{9}$	$.102441 \times 10^{10}$
Thornyhead	0.	0.	$.409357 \times 10^{8}$	$.409357 \times 10^{8}$
Pacific ocean perch	0.	$.335215 \times 10^{13}$	$.459390 \times 10^{9}$	$.335261 \times 10^{13}$
Tanner crab	$.483514 \times 10^{12}$	$.147442 \times 10^{13}$	$.609987 \times 10^{11}$	$.201893 \times 10^{13}$
King crab	$.182125 \times 10^{14}$	$.300593 \times 10^{12}$	$.785193 \times 10^{11}$	$.185916 \times 10^{14}$
Scallop	$.459066 \times 10^{8}$	0.	0.	$.459066 \times 10^{8}$

Table 29.--Variances of the biomass estimates for the Sanak region for April-October 1974, Cr 744.

Species	Depth Zones (m) 0-100	101-200	201-400	Total
Elasmobranchs	0.	$.211434 \times 10^{13}$	$.108611 \times 10^{11}$	$.212520 \times 10^{13}$
Flatfishes	$.183311 \times 10^{15}$	$.669666 \times 10^{14}$	$.108633 \times 10^{14}$	$.261141 \times 10^{15}$
Roundfishes	$.449676 \times 10^{15}$	$.827767 \times 10^{16}$	$.171556 \times 10^{14}$	$.874450 \times 10^{16}$
Rockfishes	0.	0.	$.106859 \times 10^{13}$	$.106859 \times 10^{13}$
Invertebrates	$.269603 \times 10^{14}$	$.150797 \times 10^{14}$	$.109866 \times 10^{14}$	$.530268 \times 10^{14}$
Skates	0.	$.211434 \times 10^{13}$	$.108611 \times 10^{11}$	$.212520 \times 10^{13}$
Turbot	$.195209 \times 10^{14}$	$.233838 \times 10^{14}$	$.115626 \times 10^{14}$	$.544674 \times 10^{14}$
Halibut	$.599668 \times 10^{12}$	$.289815 \times 10^{12}$	$.356968 \times 10^{9}$	$.889840 \times 10^{12}$
Flathead sole	$.509291 \times 10^{12}$	$.297302 \times 10^{14}$	$.413776 \times 10^{11}$	$.302809 \times 10^{14}$
Dover sole	0.	$.147159 \times 10^{12}$	$.110541 \times 10^{12}$	$.257700 \times 10^{12}$
Rex sole	$.386653 \times 10^{11}$	$.320905 \times 10^{14}$	$.750892 \times 10^{11}$	$.322043 \times 10^{14}$
Rock sole	$.120489 \times 10^{15}$	$.198191 \times 10^{14}$	$.356968 \times 10^{7}$	$.140308 \times 10^{15}$
Sablefish	0.	$.279819 \times 10^{10}$	$.520239 \times 10^{11}$	$.548221 \times 10^{11}$
Cottidae	$.171498 \times 10^{14}$	$.279836 \times 10^{13}$	$.514035 \times 10^{8}$	$.199482 \times 10^{14}$
Pacific cod	$.151804 \times 10^{15}$	$.273378 \times 10^{14}$	$.539772 \times 10^{11}$	$.179195 \times 10^{15}$
Walleye pollock	$.499554 \times 10^{15}$	$.855920 \times 10^{16}$	$.165474 \times 10^{14}$	$.907530 \times 10^{16}$
Smelt	$.415118 \times 10^{7}$	$.168660 \times 10^{12}$	0.	$.168664 \times 10^{12}$
Thornyhead	0.	0.	$.353421 \times 10^{12}$	$.353421 \times 10^{12}$
Pacific ocean perch	0.	0.	$.273706 \times 10^{12}$	$.273706 \times 10^{12}$
Tanner crab	$.580597 \times 10^{13}$	$.314039 \times 10^{13}$	0.	$.894636 \times 10^{13}$
King crab	$.116574 \times 10^{14}$	$.815599 \times 10^{13}$	0.	$.198134 \times 10^{14}$
Scallop	0.	$.188318 \times 10^{11}$	0.	$.188318 \times 10^{11}$