

PACIFIC HERRING STOCKS AND FISHERIES

IN THE EASTERN BERING SEA:

PRELIMINARY REPORT FOR 1983

A REPORT TO THE NORTH PACIFIC FISHERIES MANAGEMENT COUNCIL

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This report summarizes current information on eastern Bering Sea Pacific Herring stocks and fisheries within Alaskan waters. All 1983 data is preliminary and may be revised upon further analysis. A more detailed account of this information will be available this fall.

COMMERCIAL FISHERIES

A total of 30,931 m.t. of Pacific herring was harvested in eastern Bering Sea Commercial Fishing Districts during 1983 (Figures 1 and 2, Table 1). This was the largest total harvest recorded since these fisheries began in the 1960's. Exploitation of estimated total spawning biomass was 18.5% (Table 2). Wastage of herring, mostly due to weather and vessel mishaps, was estimated to be about 600 m.t. for all Districts combined. Numbers of buyers decreased in Togiak district, but increased in all other Districts (Table 3). Numbers of fishermen increased in Togiak and Norton Sound Districts, but decreased or remained at 1982 levels in the other Districts. Spawn on kelp harvests in Togiak and Norton Sound Districts totaled 147.8 m.t. (Table 4). Value of total herring and spawn on kelp harvests to fishermen was estimated to be \$13.2 million.

SUBSISTENCE FISHERIES

Results of subsistence surveys are not yet available. Questionnaires have been mailed to several Yukon-Kuskokwim villages, and a staff member has collected information from Nelson Island families in the village of Tununak.

STOCK ASSESSMENT

Methods

Aerial surveys were conducted within all Districts, except Cape Romanzof, to estimate relative abundance, distribution and biomass of herring schools. Methods of data collection have previously been described (Barton and Steinhoff 1980; Fried 1983). A total of 209 hours was spent in aerial assessment surveys: 91 hours for Togiak, 24 hours for Security Cove/Goodnews Bay, 5 hours for Nelson Island and 88 hours for Norton Sound. Assessment of Pacific herring within Cape Romanzof District continues to be a problem, since aerial surveys cannot be conducted due to consistently turbid water. Studies are being done to determine whether population size estimates can be made from egg deposition surveys. Taking into consideration harvest size, fishing effort and spawn deposition extent and intensity, we assumed that Cape Romanzof Pacific herring spawning biomass was about 5,000 m.t.

Tonnage data for six herring schools were obtained within Togiak District during 1983 (Table 5). During the season conversion factors of 1.2 (water depth 5 m or less), 2.2 (water depth greater than 5 m) and 3.1 (school very dense and dark in appearance) m.t. per 50 m² school surface area were used in analyses of Togiak District aerial survey data. Conversion factors of 2.4 and 3.0 m.t. per 50 m² school surface area were used for all other Districts.

Test fishing with variable mesh gillnets and sampling of commercial landings were conducted in all Districts to determine age, size and sexual maturity of

Pacific herring. Additionally, chartered purse seine and gillnet vessels were used to collect Pacific herring samples within Togiak District. A total of 12,800 Pacific herring were sampled during 1983 from all Districts.

RESULTS

A total of 179,700 m.t. of Pacific herring was estimated to have been present during the 1983 spawning season (Table 6). Spawning populations were about 40% greater in Togiak and Norton Sound Districts in 1983 than during 1982. Biomass assessments for Security Cove and Goodnews Bay Districts were hindered by poor survey conditions for the second year in a row. Estimates for 1983 were about 30% less in Security Cove and Goodnews Bay Districts than those obtained in 1981. However, spawn occurrence within these two Districts (as determined by areas of milt observed during aerial surveys) was greater in 1983 (27 km) than either 1982 or 1981 (8 and 16 km, respectively). Total spawn sightings for all Districts in 1983 was 154 km of milt: 96 km for Togiak, 27 km for Security Cove/Goodnews Bay and 31 km for Norton Sound. An additional 14 km of milt was observed during surveys of the Nelson/Nunivak Island area. Most spawning occurred 2-19 May in Togiak, 8-14 May in Security Cove and 24 May - 6 June in Norton Sound. In general spawn deposition was extensive and egg density was moderate (i.e. usually not more than four layers thick) in all Districts.

Age composition analysis during the season indicated that five and six year old Pacific herring (1978 and 1977 year classes, respectively) comprised about 60-70% of the total spawning population in all Districts. Four year old

Pacific herring (1979 year class) comprised about 10% of the Togiak and Security Cove/Goodnews Bay population, and about 20% of the Cape Romanzof and Norton Sound populations. Final analysis of age, size and sex composition data will be completed by September 1983.

PRELIMINARY CALCULATION OF OFFSHORE OPTIMUM YIELD

Under the current draft of the North Pacific Fishery Management Council's Bering - Chukchi Sea Herring Fishery Management Plan (FMP) no surplus yield of Pacific herring would be available for an offshore fishery during the winter of 1983-1984. Winter OY is calculated as follows:

Winter OY = ABC - Inshore harvest - Subsistence Adjustment - AIC where

$$\begin{aligned} \text{ABC} &= \frac{1983 \text{ Spawning Biomass}}{\text{MSY Spawning Biomass}} \times \text{Maximum Exploitation Rate} \times 1983 \text{ Spawning biomass} \\ &= \frac{166,200 \text{ m.t.}}{243,560 \text{ m.t.}} \times 0.20 \times 166,200 \text{ m.t.} = 22,682 \text{ m.t.,} \end{aligned}$$

Subsistence Adjustment = 500 m.t., and

AIC = 2,000 m.t. (maximum assumed value).

Since the inshore sac roe harvest (30,750 m.t.) already exceeds ABC, no offshore harvest would be allowed under the draft FMP.

LITERATURE CITED

BARTON, L.H. and D.L. Steinhoff. 1980. Assessment of spawning herring (Clupea harengus pallasii) stocks at selected coastal areas in the eastern Bering Sea. Alaska Department of Fish and Game Informational Leaflet No. 187. 60 p.

Fried, S.M. 1983. Stock assesment of Pacific herring, Clupea harengus pallasii, in western Alaska using aerial survey techniques, p. 61-66. In K. Buchanan [ed.] Proceedings of the fourth Pacific coast herring workshop, October 7-8, 1981. Can. Manuscr. Rep. Fish. Aquat. Sci. No. 1700: 151 p.

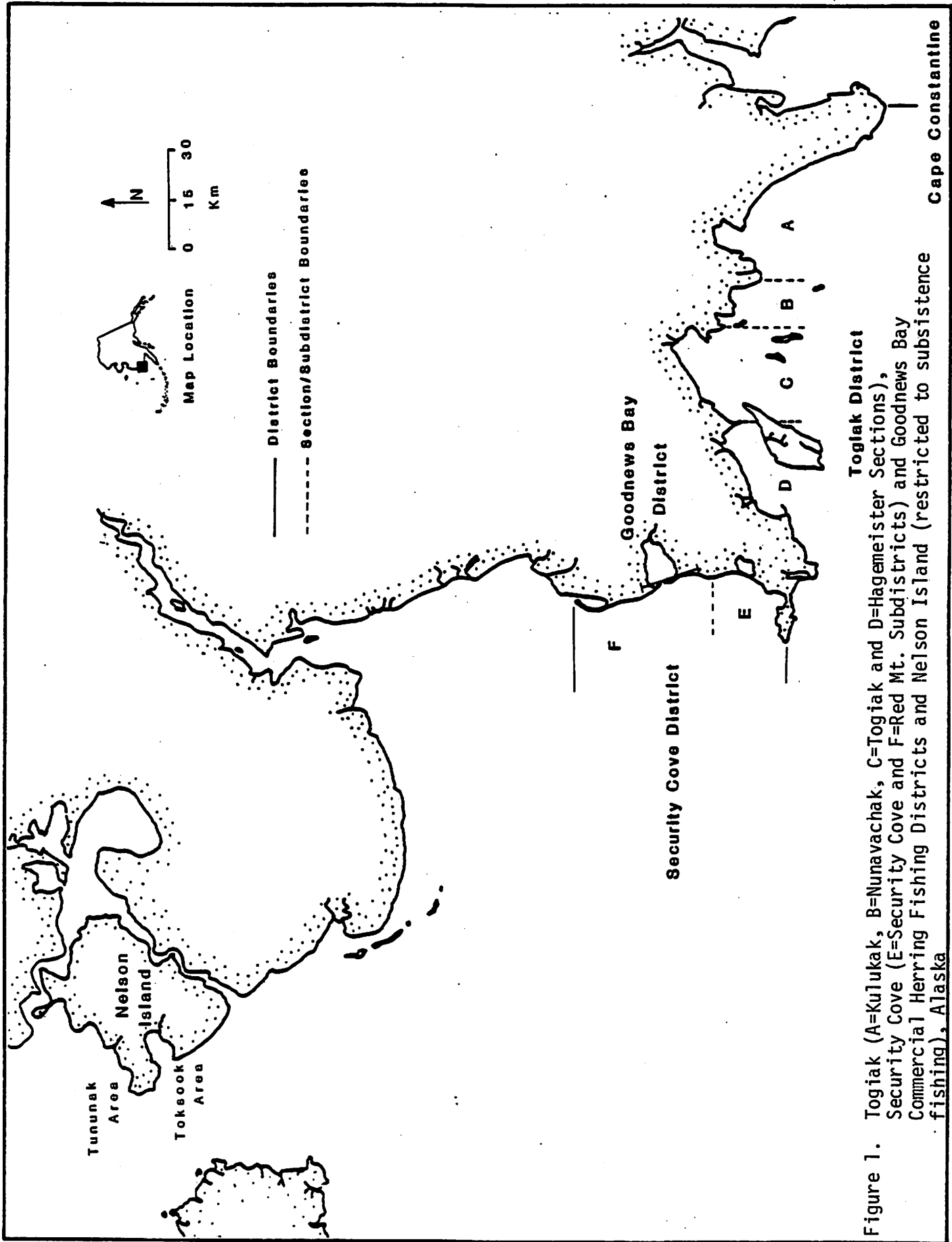


Figure 1. Togiak (A=KuLukak, B=Nunavachak, C=Togiak and D=Hagemeister Sections), Security Cove (E=Security Cove and F=Red Mt. Subdistricts) and Goodnews Bay Commercial Herring Fishing Districts and Nelson Island (restricted to subsistence fishing), Alaska

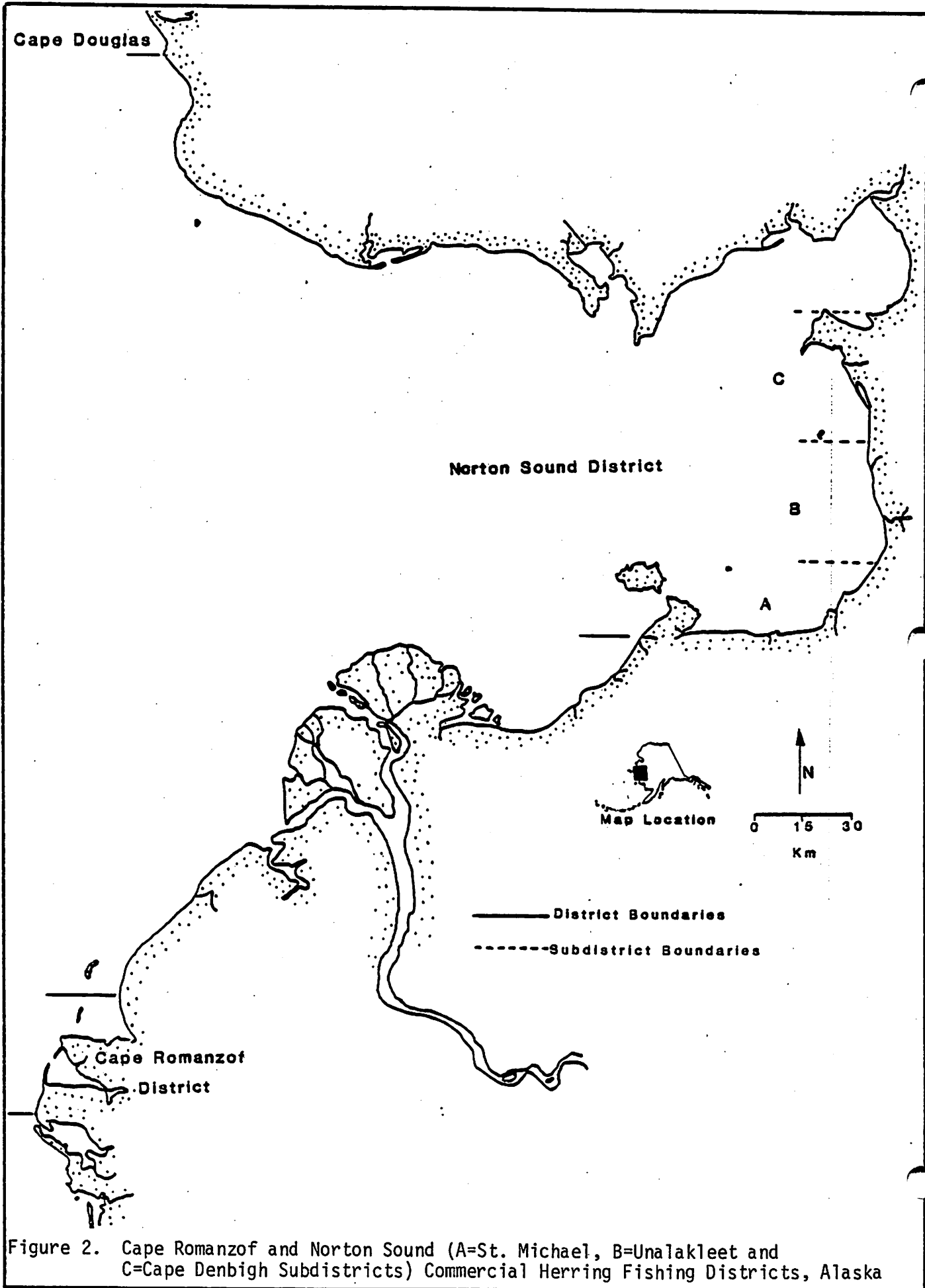


Table 1. Herring and herring spawn on kelp harvests in metric tons by U.S. commercial fishermen in the eastern Bering Sea, Alaska 1909-1983.

Year	Herring 1/					Herring Spawn on Kelp			
	Unalaska Island	Bristol Bay	Security Cove/ Goodnews Bay	Cape Romanzof	Norton Sound	Total	Bristol Bay	Norton Sound	Total
1909-1916	-	-	-	-	2/	2/	-	-	-
1916-1928	-	-	-	-	1,705.6	1,705.6 3/	-	-	-
1929	1,141.9	-	-	-	151.3	1,293.2	-	-	-
1930	1,738.2	-	-	-	399.7	2,137.9	-	-	-
1931	957.9	-	-	-	78.2	1,036.1	-	-	-
1932	2,726.9	-	-	-	480.0	2,756.9	-	-	-
1933	1,438.2	-	-	-	27.8	1,466.0	-	-	-
1934	1,390.9	-	-	-	3.5	1,394.4	-	-	-
1935	2,188.0	-	-	-	14.1	2,202.1	-	-	-
1936	1,251.1	-	-	-	-	1,251.1	-	-	-
1937	525.4	-	-	-	5.0	530.4	-	-	-
1938	465.5	-	-	-	9.0	474.5	-	-	-
1939	-	-	-	-	5.0	5.0	-	-	-
1940	-	-	-	-	12.7	12.7	-	-	-
1941	-	-	-	-	3.4	3.4	-	-	-
1942-1944	-	-	-	-	-	-	-	-	-
1945	68.0	-	-	-	-	68.0	-	-	-
1946	-	-	-	-	-	-	-	-	-
1947-1963	-	No Commercial Operations Reported				-	-	-	-
1964	-	-	-	-	18.1	18.1	-	-	-
1965	-	No Commercial Operations Reported				-	-	-	-
1966	-	-	-	-	10.8	10.8	-	-	-
1967	-	122.0	-	-	-	122.0	-	-	-
1968	-	82.4	-	-	-	82.4	24.8	-	24.8
1969	-	42.8	-	-	2.0	44.8	4.6	-	4.6
1970	-	25.0	-	-	7.3	32.3	17.6	-	17.6
1971	-	-	-	-	17.7	17.7	23.5	-	23.5
1972	-	73.7	-	-	15.3	89.0	29.1	-	29.1
1973	-	46.3	-	-	32.3	78.6	5.3	-	5.3
1974	-	111.7	-	-	2.4	114.1	57.0	-	57.0
1975	-	50.4	-	-	-	50.4	50.4	-	50.4
1976	-	-	-	-	7.7	7.7	134.1	-	134.1
1977	-	2,534.9	-	-	9.5	2,545.4	125.1	Trace	125.1
1978	-	7,030.4	259.0	-	13.6	7,303.0	149.6	3.4	153.0
1979	-	10,115.3	466.0	-	1,173.0	11,754.3	188.0	11.8	199.8
1980	-	17,774.0 4/	1,039.0	554.0	2,215.4	21,603.3	86.0	22.2	108.2
1981	639	11,374.3	1,660.2	653.2	3,964.5	18,291.2	171.9	37.2 5/	209.1
1982	3,234	19,556.0	1,178.0	596.0	3,567.0	28,131.0	106.5	34.9	141.4
1983	6/	24,486.0 7/	1,368.0	740.0	4,156.0	30,750.0	122.8	25.0 8/	147.8

1/ Prior to 1964 majority of herring catch was taken in summer and fall for food market; since 1964 majority of herring catch was taken in spring primarily for marketing of roe.

2/ Fishery occurred some years, but harvests unavailable.

3/ Total catch for all years.

4/ There was an additional estimated 5,200 m.t. of wastage.

5/ Does not include 5 m.t. dumped (unmarketable or no market when harvested).

6/ 1983 quota set at 3,200 m.t.

7/ Does not include 544 m.t. of wastage.

8/ Does not include 1-5 m.t. of wastage.

Table 2. Estimated biomass and commercial harvest of Pacific herring in eastern Bering Sea fishing Districts, Alaska, 1978-1983.

District	Biomass (m.t.)	Harvest (m.t.)	Roe %	Estimated Value (dollars)	% Biomass Harvested
<u>1983</u>					
Togiak	127,000	24,486 2/	8.8	10,517,300	19.3
Security Cove	5,800	973	9.4	450,000	16.8
Goodnews Bay	2,900	395	9.4	180,000	13.6
Cape Romanzof	5,000	740	9.0	330,000	14.8
Norton Sound	25,500	4,156	8.6	1,378,000	16.3
Total	166,200	30,750	8.8	12,855,300	18.5
<u>1982</u>					
Togiak	88,800	19,556	8.8	6,174,300	22.0
Security Cove	4,600	737	9.3	271,000	16.0
Goodnews Bay	2,400	441	9.5	187,900	18.4
Cape Romanzof	4,400	596	9.3	221,700	13.6
Norton Sound	15,800	3,567	8.8	1,046,200	22.6
Total	116,000	24,897	8.9	7,630,100	21.5
<u>1981</u>					
Togiak	143,900	11,374	9.1	3,988,000	7.9
Security Cove	7,500	1,064	8.1	347,070	14.2
Goodnews Bay	3,900	596	7.7	196,170	15.3
Cape Romanzof	4,400	653	8.0	211,260	15.0
Norton Sound	22,800	3,965	8.8	1,500,000	17.3
Total	182,500	17,652	8.9	6,242,500	9.7
<u>1980</u>					
Togiak	62,300	17,774 1/	9.2	3,205,000	28.5
Security Cove	1,100	632	8.2	151,000	57.4
Goodnews Bay	1,100	406	9.5	97,000	36.9
Cape Romanzof	2,700	554	9.8	132,000	20.5
Norton Sound	7,600	2,224	8.1	500,500	29.3
Total	74,800	21,590	8.8	4,085,500	28.9
<u>1979</u>					
Togiak	216,800	10,115	8.6	6,700,000	4.7
Security Cove	19,500	385	8.5	327,000	2.0
Goodnews Bay	6,700	82	4.7	38,500	1.2
Cape Romanzof	2,700	0	-	-	0.0
Norton Sound	7,000	1,172	7.0	628,200	16.7
Total	252,700	12,406	8.0	7,694,000	4.9
<u>1978</u>					
Togiak	172,600	7,033	8.2	2,300,000	4.1
Security Cove	1,200	259	-	-	21.6
Goodnews Bay	400	0	-	-	0.0
Cape Romanzof	2,700	0	-	-	0.0
Norton Sound	4,800	13	-	-	0.3
Totals	181,700	7,305	8.2	2,300,000	4.0

1/ Does not include an estimated 5,200 m.t. of waste.
 2/ Does not include an estimated 544 m.t. of waste.

Table 3. Numbers of buyers and fishermen participating in eastern Bering Sea Pacific herring fisheries, Alaska, 1978-1983.

District	Number of Buyers	Number of Fishermen 1/	
		Gillnet	Purse Seine
<u>1983</u>			
Togiak	23	250	150
Security Cove	6	94	*
Goodnews Bay	4	83	*
Cape Romanzof	3	63	*
Norton Sound	9	276	*
<u>1982</u>			
Togiak	33	200	135
Security Cove	3	107	*
Goodnews Bay	3	84	*
Cape Romanzof	2	75	*
Norton Sound	7	237	*
<u>1981</u>			
Togiak	28	106	83
Security Cove	7	113	*
Goodnews Bay	5	175	*
Cape Romanzof	4	111	*
Norton Sound	13	332	*
<u>1980</u>			
Togiak	27	363	140
Security Cove	8	175	*
Goodnews Bay	4	165	*
Cape Romanzof	2	69	*
Norton Sound	8	294	*
<u>1979</u>			
Togiak	33	350	175
Security Cove	2	61	*
Goodnews Bay	1	41	*
Cape Romanzof		No Fishery Conducted	
Norton Sound	7	50	17
<u>1978</u>			
Togiak	16	40	25
Security Cove	3	-	-
Norton Sound	1	11	-

** Purse seine gear prohibited.

1/ Refers to # of vessels in Togiak District.

Table 4. Commercial harvest of Pacific herring spawn on rockweed kelp in eastern Bering Sea Fishing District, Alaska, 1978-1983.

District	Harvest (m.t.)	Number of Buyers	Number of Pickers	Estimated Value (Dollars)
<u>1983</u>				
Togiak	122.8	4	125	284,400
Norton Sound	25.0 3/	1	35	38,500
				<u>322,900</u>
<u>1982</u>				
Togiak	106.5	8	214	176,193
Norton Sound	34.9	1	74	57,585
Total	141.4			<u>233,778</u>
<u>1981</u>				
Togiak	171.9	7	108	250,000
Norton Sound	37.2 1/	4	22	45,000 2/
Total	209.1			<u>295,000</u>
<u>1980</u>				
Togiak	86.0	21	78	94,600
Norton Sound	22.2	1	20	73,000
Total	108.2			<u>167,600</u>
<u>1979</u>				
Togiak	188.0	16	100	248,160
Norton Sound	11.8	1	19	15,576
Total	199.8			<u>263,736</u>
<u>1978</u>				
Togiak	149.6	11	160	119,800
Norton Sound	3.4	1	0	2,723
Total	153.0			<u>122,523</u>

1/ Does not include 5 m.t. dumped.

2/ Only 14 m.t. marketed, rest lost during tender accident.

3/ Does not include 1.5 m.t. wastage.

Table 5. Conversion estimates (metric tons of Pacific herring per 50 m school surface area) obtained from test purse seine fishing, Togiak District, Alaska, 1978-1983.

Year	Water Depth (m)	Biomass per RAI unit	(m.t./50 m)
1981	2	1.1	Catch Landed
1980	3	1.2	Catch Landed
1983	3	1.0	Catch Estimated in Net
1983	3	1.8	Catch Estimated in Net
1983	4	1.1	Catch Estimated in Net
1983	4	1.7	Catch Estimated in Net
1983	4	2.2	Catch Estimated in Net
1980	5	1.1	Catch Landed
1980	5	1.2	Catch Estimated in Net
1979	6	2.4	Catch Landed
1980	6	3.0	Catch Estimated in Net
1980	6	2.6	Catch Estimated in Net
1981	6	1.7	Catch Landed
1980	8	1.6	Catch Estimated in Net
1981	8	4.0	Catch Landed
1982	8	1.9	Catch Estimated in Net
1983	8	1.5	Catch Estimated in Net
1978	?	6.7	Catch Estimated in Net
1978	?	11.0	Catch Estimated in Net

Table 6. Relative abundance index (RAI) and estimated biomass of eastern Bering Sea herring, Alaska, 1978-1983.

District	1978	1979	1980	1981	1982	1983
Relative Abundance Index (RAI) 1/						
Togiak	43,050	137,630	15,249	79,352	49,998	88,806
Security Cove	246	2,912	435	2,228	486 3/	1,602
Goodnews Bay	241	3,729	3/	1,593	3/	815
Nelson Island	1,079	3/	3/	1,072	3/	4,515
Cape Romanzof	539	3/	3/	4/	4/	4/
Norton Sound	1,277	1,860	2,242	6,516	4,548	6,796
Total	46,432	146,131+	17,926+	90,761+	55,032+	102,534
Estimated Biomass in m.t. 2/						
Togiak	172,600	216,800	62,300	143,900	88,800	127,000
Security Cove	1,200	19,500	1,100	7,500	4,600 3/	5,800
Goodnews Bay	400	6,700 3/	1,100 3/	3,900	2,400 3/	2,900
Nelson Island	5,400	5,400 3/	5,400 3/	3,600	3,600 3/	13,500
Cape Romanzof	2,700	2,700 3/	2,700 3/	4,400 4/	4,400 4/	5,000
Norton Sound	4,800	7,000	7,600	20,800	15,800	25,500
Total	187,100	258,100	80,200	186,100	119,600	179,700

- 1/ Number of fish schools equivalent to 50 m surface area, unadjusted for presence of non-herring pelagic species.
- 2/ Adjusted for presence of non-herring pelagic species. Estimates for 1978 and 1979 represent low end of estimate ranges from Barton and Steinhoff (1980), 1980 estimates from Kingsbury (1980).
- 3/ Incomplete data due to inclement weather and/or turbid waters, biomass estimates are questionable and are based on 1978, 1979 or 1981 data.
- 4/ No aerial surveys made, 1981 and 1983 estimates based upon assumption that commercial harvest represented 15 percent of total biomass; 1981 estimate used for 1982.

ALASKA DEPARTMENT OF FISH AND GAME

DOMESTIC FISHERIES REPORT

Bering/Chukchi Herring

The Bering/Chukchi coastal herring fishery harvested 30,750 mt during the spring 1983 season. A complete summary of the fishery can be found in Attachment 1. Preliminary results of the fishery are as follows:

<u>Area</u>	<u>Biomass Estimate (mt)</u>	<u>Harvest (mt)</u>	<u>Exploitation Rate (%)</u>
Togiak	127,000	24,486	19.3
Goodnews Bay	2,900	395	13.6
Security Cove	5,800	973	16.8
Cape Romanzof	5,000	740	14.8
Norton Sound	25,500	4,156	16.3
Totals	166,200	30,750	18.5

Southeast Sablefish

The total Southeast Alaska sablefish harvest to date is approximately 1,900 mt. Some 30 vessels are currently participating in the fishery. The FCZ fishery in the Southeastern and Eastern Yakutat areas will likely achieve the upper end of the guideline 2,500 mt level by mid-August and will be closed by emergency/field order.

The Bering Sea and Gulf of Alaska domestic groundfish catches through June can be found in Attachment 2.

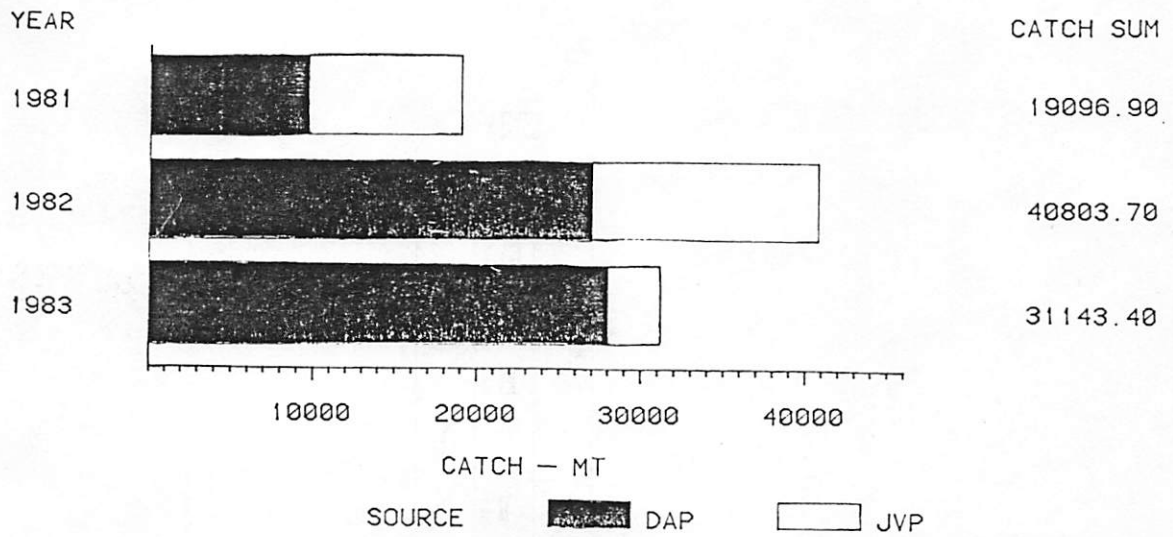
Tanner Crab

Statewide, all Tanner crab fisheries are closed except for the C. opilio in the northern portion of the Bering Sea. This fishery will be closed by State regulation August 1. Under Federal regulations the C. opilio fishery remains open unless closed by field order. The Statewide preliminary Tanner crab catches are as follows:

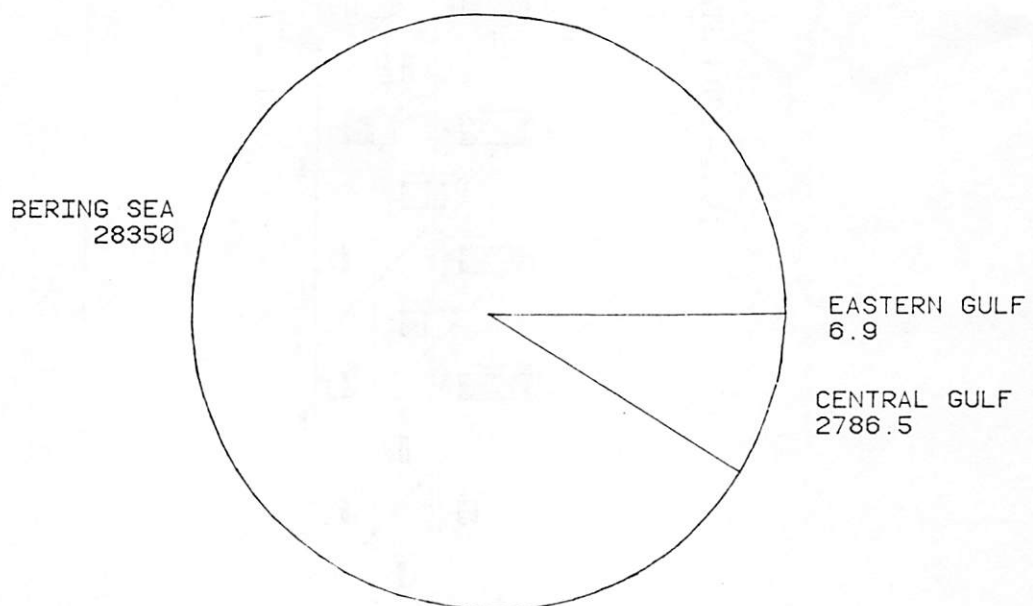
<u>Area</u>	<u>Millions of Pounds</u>
Southeast/Yakutat	1.1
Prince William Sound	1.4
Cook Inlet	3.0
Kodiak	18.9
South Peninsula	2.8
Chignik	3.4
Eastern Aleutians	.5
Western Aleutians	.5
<u>C. bairdi</u>	2.8
<u>C. opilio</u>	22.9
Totals	<u>59.7</u>

The preliminary 1983 Statewide shellfish catches can be found in Attachment 3.

1981-1983 STATEWIDE DOMESTIC PACIFIC COD

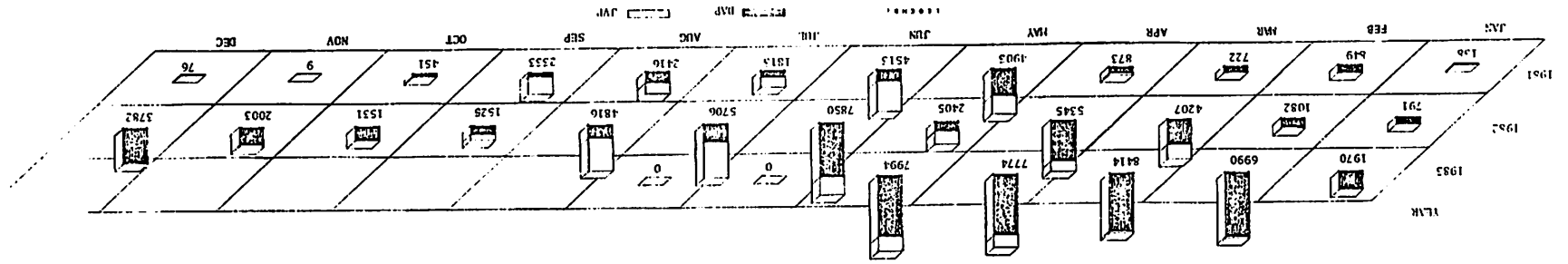


1983 CATCH RECORDED THROUGH JUNE 1, 1983



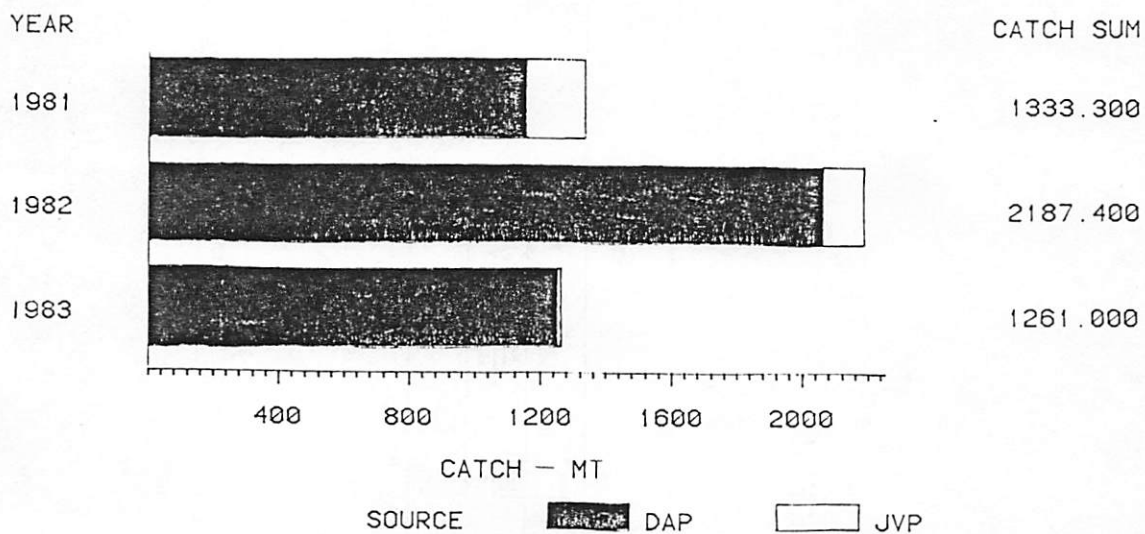
1983 CATCH BY AREA
CATCH IN METRIC TONS

CATCH IN METRIC TONS

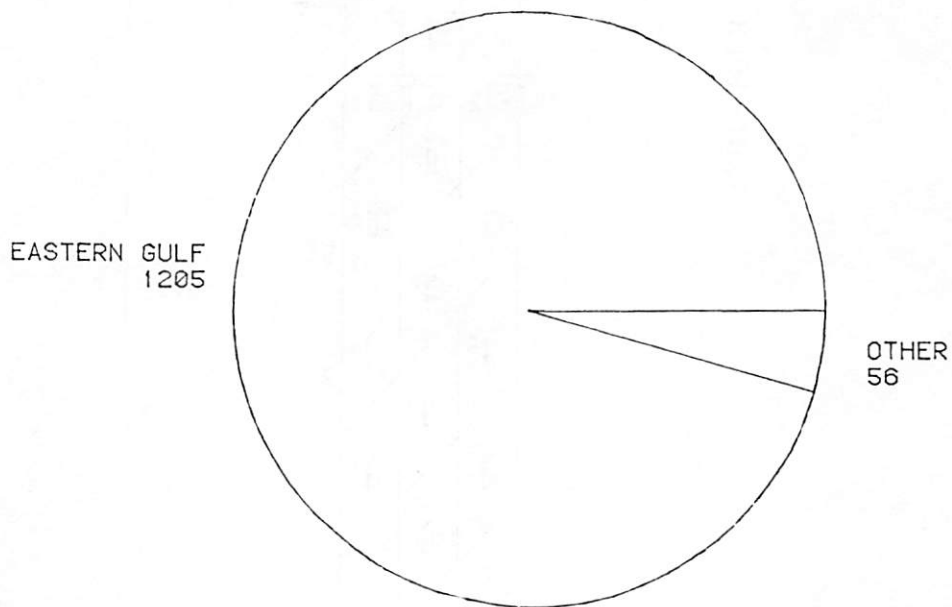


1981-1983 STATEWIDE DOMESTIC PACIFIC COD

1981-1983 STATEWIDE DOMESTIC SABLEFISH

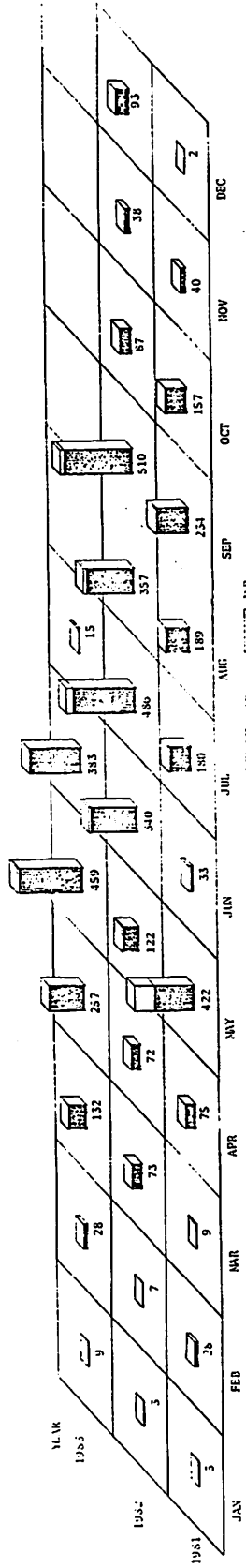


1983 CATCH RECORDED THROUGH JULY 1, 1983



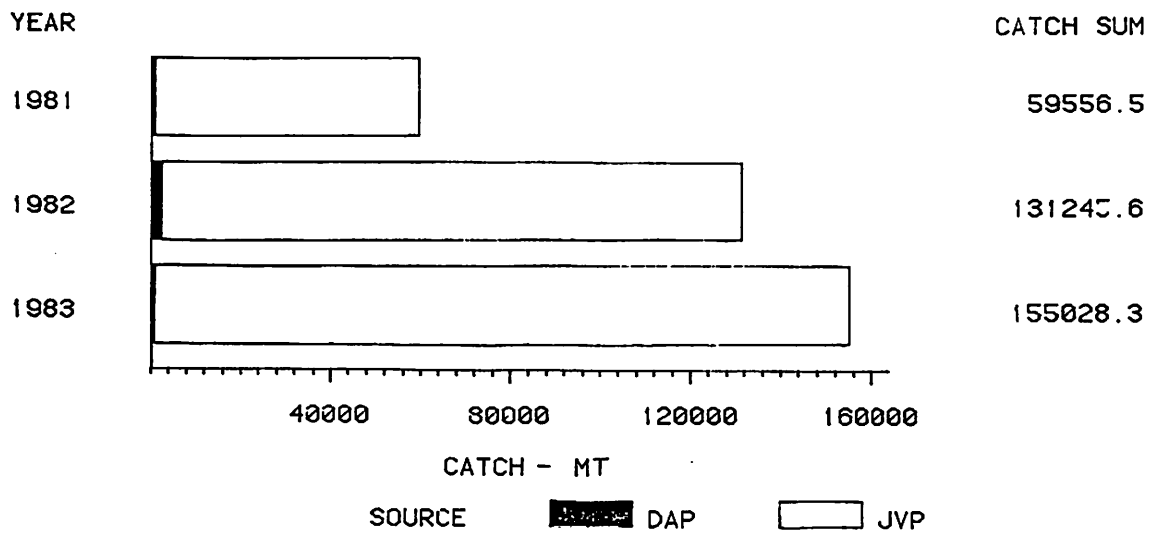
1983 CATCH BY AREA
CATCH IN DRESSED METRIC TONS

1981-1983 STATEWIDE DOMESTIC SABLEFISH

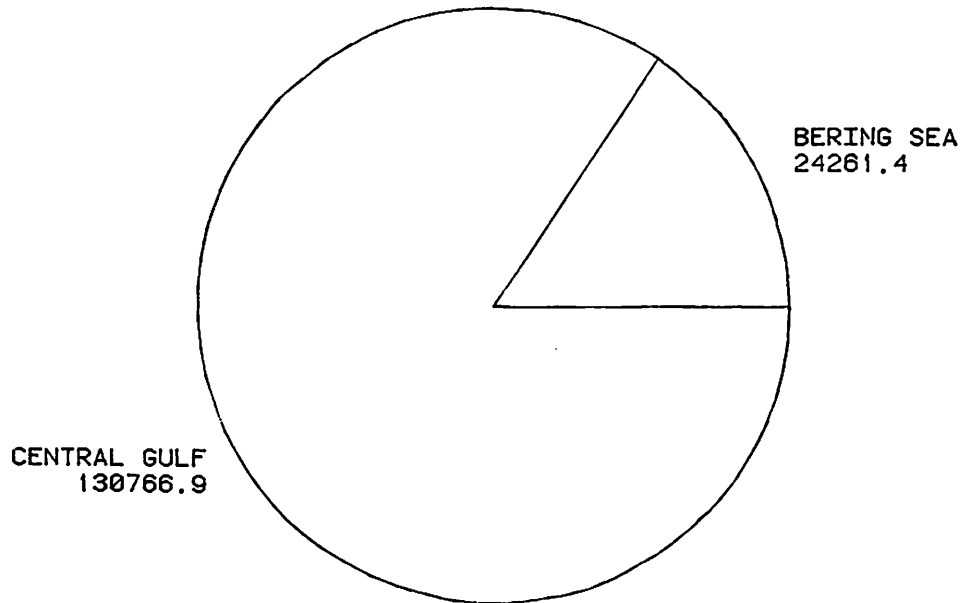


CATCH IN DRESSED METRIC TONS

1981-1983 STATEWIDE DOMESTIC POLLOCK

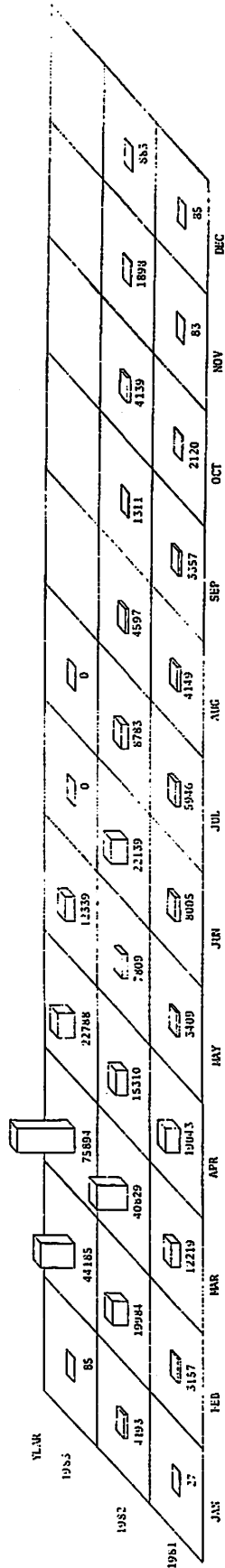


1983 CATCH RECORDED THROUGH JUNE 1, 1983



1983 CATCH BY AREA
CATCH IN METRIC TONS

1981-1983 STATEWIDE DOMESTIC POLLOCK



CATCH IN METRIC TONS

