

M E M O R A N D U M

TO: Council Members, SSC, and AP

FROM: Jim H. Branson  
Executive Director

DATE: September 13, 1980

SUBJECT: Status of Contracts 77-5, "An Observer Program for the Domestic Groundfish Fishery in the Gulf of Alaska (and in the Bering Sea/Aleutian Islands area)"; 78-4, "The Development and Enhancement of a Computerized Fisheries Information System"; 79-3, "Troll Salmon Tag Recovery Program"; and 80-2, "Keypunching and Analysis of Halibut Fish Tickets".

*ACTION REQUIRED*

*Council approval of final reports.*

BACKGROUND

Contract 77-5: In July, the Council approved the Gulf of Alaska section of the final contract report. The Bering Sea/Aleutian Island section has been sent directly to the SSC for their review in Sitka. Given SSC concurrence, the Council may approve the report.

Contract 78-4: The SSC approved the final report for this contract in Seattle on September 3rd. At this meeting, the Council may approve the report for final payment.

Contract 79-3: ADF&G will be sending a revised report to the SSC for their possible review at this meeting. Given SSC concurrence, the Council may approve this report for final payment.

Contract 80-2: The SSC approved the final report for this contract in Seattle on September 3rd. The Council may approve the final report at this meeting.

CP

Report on the Southern Bering Sea Segment of the  
Observer Program for the Domestic Groundfish Fishery

CONTRACT NO. 77-5

North Pacific Fisheries Management Council

Report Period

January 1, 1980 through September 15, 1980

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## Executive Summary

During January through April 1980 a fishery was conducted upon Pacific cod in the southern Bering Sea winter halibut savings area and regulations were relaxed on an interim basis to allow this fishery on an experimental basis. This is a report of the observer data collected from vessels in that fishery.

During this fishery 80 trips and total landings of 1534.6 m.t. of Pacific cod, 57.5 m.t. of pollock and 88.2 m.t. of rock sole were reported from 10 trawl vessels. The Catch Per Unit Effort (CPUE) was approximately 1.6 m.t. of cod per hour. The incidental catch of prohibited species was estimated to be 26.4 m.t. of halibut (14,965 fish), no king crab, 0.15 m.t. of Tanner crab and 0.83 m.t. of chinook salmon. Approximately 520 to 850 m.t. were discarded, which consisted of all catch except that sold.

Halibut caught averaged 50 cm, chinook salmon averaged 67 cm and Pacific cod averaged 60 cm.

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## ACKNOWLEDGEMENTS

The cooperation of Icicle Seafoods considerably assisted in the execution of this study. They graciously assisted travel to Akutan by coordination with a charter flight and they provided board and room for the observer before and between vessel trips.

The assistance of the skippers and crews of the vessels observed (deliberately unnamed to preserve confidentiality) was essential and was offered without reservation.

## INTRODUCTION

During fall 1979 plans for a substantial domestic trawl fishery in the winter halibut savings area and the Bristol Bay Pot Sanctuary in 1980 were presented to the North Pacific Fisheries Management Council (NPFMC). In an effort not to hinder the development of the U.S. groundfish fishery, regulations were relaxed on an interim basis to allow these fisheries on an experimental basis in 1980. An observer program was deemed essential to monitor the fishery and gather data on the incidental catch rates of prohibited species and other general biological data.

To fund and execute an observer program the NPFMC ammended Contract 77-5 with the Alaska Department of Fish and Game. This is a report of the observer effort expended on that fishery.

The following tasks were established for this work.

Task 1. The Contractor will use biologically acceptable standards for collecting and recording data. The Contractor will estimate (a) total catch for all boats and (b) effort in hours on observed boats.

Task 2. The Contractor will assess the incidental catch of halibut and king and Tanner crab in the developing domestic groundfish fishery.

Task 3. The Contractor will determine catch per unit effort data for vessels observed for primary designated target species.

Task 4. The Contractor will provide an estimate of poundage discarded in direct support of information needed and requested by the North Pacific Fishery Management Council. The estimate of poundage discarded must be by species group, especially but not limited to halibut, Tanner crab and king crab.

Task 5. The Contractor will provide catch composition information, length and weight data and other biological information; as time permits.

Task 6. The Contractor will report on the general state of the art of the domestic groundfish fishing industry in the Bering Sea in general terms of gear efficiencies, gear types and mechanics of the fishery including where practical, the impact of high sea delivery of 'cod ends' on the survivability of prohibited species.

## METHODS

The details of sampling procedures are contained in the observer manual appendicized to Blackburn and Rigby (1980). In general, on observed trips, trawl time and location were recorded from every haul, incidental species were enumerated from 72 of 74 hauls and samples for species composition were taken from 48 of 74 hauls. Incidental species were weighed, counted and measured except halibut; the first 20 of which in any haul were measured and all were counted. The lengths were used to estimate weight of halibut and the average weight was used to estimate total weight from the total count. To estimate species composition subsamples were taken and sorted, recorded were count and weight by species. The sample was expanded into total catch for hauls sampled. Length frequencies and samples for length, weight, sex and age structure were taken randomly. No ages have yet been determined.

Note that weights were of two types, measured and estimated, which created discrepancies if numbers are to be compared. All incidental species amounts were measured but total catch and total discard were estimated. Subsamples for species composition were weighed then expanded into the estimated total catch, thus they should be considered as estimates. No estimated weights have been used in calculating catch amounts of prohibited species. The type of figure, measured or estimated is identified in the text.

## RESULTS

### Fishing Activities, State of the Art and Observer Activities in the Southern Bering Sea in Winter and Spring 1980

The fishery in the southern Bering Sea consisted of 80 trips by trawl vessels which sold cod for bait to crab fishermen and sold to Icicle Seafood's floating processor BERING STAR, which was anchored in Akutan Bay (Figure 1). During January through April 1980 there were 1534.6 m.t. of cod sold, 57.5 m.t. of pollock sold and 88.2 m.t. of rock sole sold. A total of 10 trawl vessels landed catch during this time period. No landings of trawl caught fish were reported after April.

One observer, Mr. David Owen, went to Akutan in early February and remained through late March. He observed 8 trips and over 14% of the catch of cod. He measured an estimated 6.3% of the halibut taken by the fishery; measured over 900 cod; obtained length, weight and age structures from 45 cod; obtained estimates of total catch and discard and sampled for species composition (Table 1).

The fishery occurred along the 100 fathom contour north of Unimak Pass until late in the season when the catch rate declined and a different area of concentration was found north of Cape Sarichef.

The state of the art of the bottomfish fishery is essentially unchanged from that reported by Blackburn and Rigby (1980). All vessels were single rig draggers using bottom trawls. Some used roller gear but most skippers soon removed it as it was less efficient. Cod ends were not delivered at sea. Icicle Seafoods insisted that all fish be delivered within 3 days of capture and unloading was relatively rapid so that vessels were able to complete five to nine trips per month.



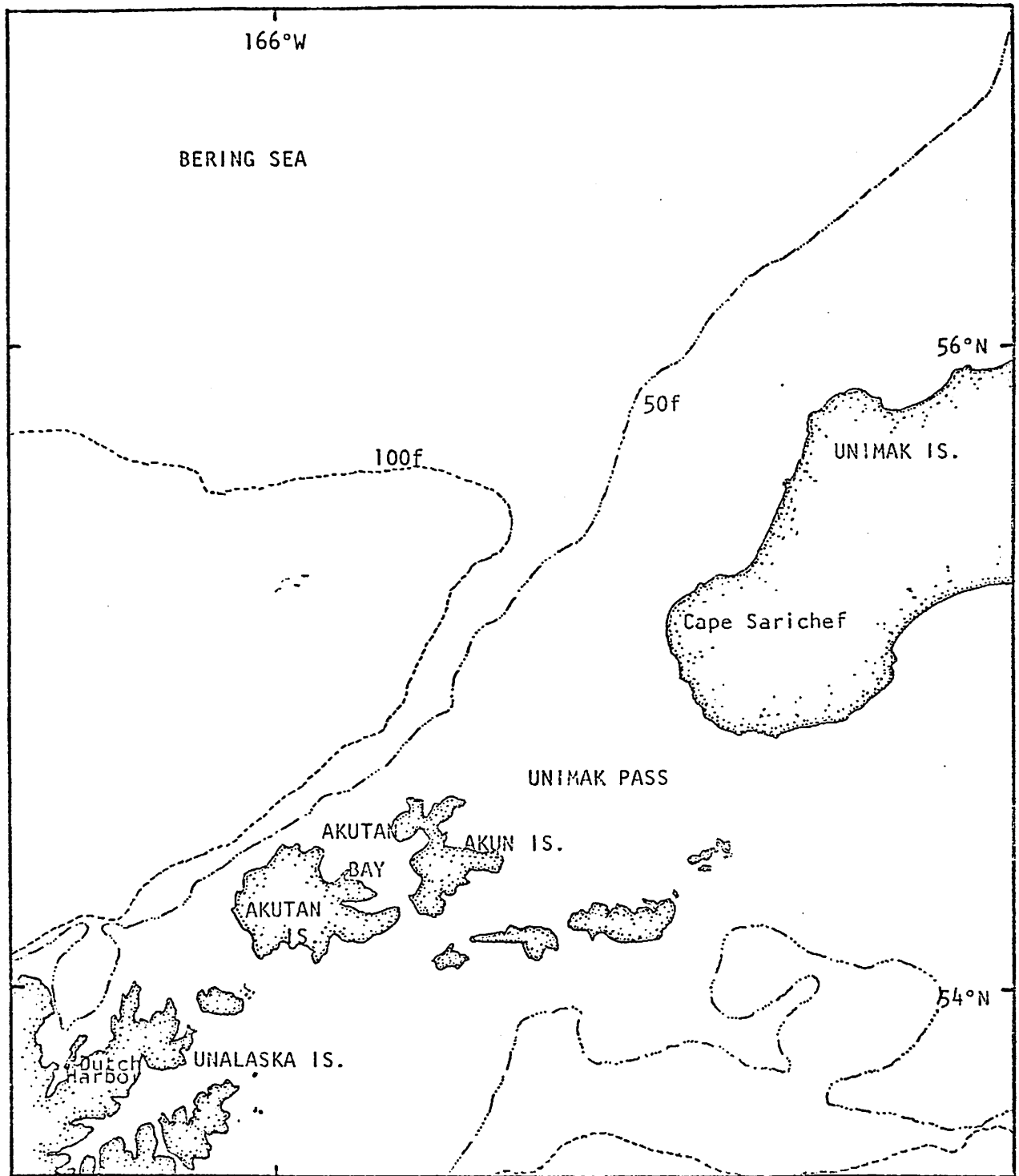


Figure 1. Region of the southern Bering Sea where the 1980 fishery for Pacific cod was conducted. Most fishing was conducted along the 100 fathom contour north of Akutan and Unimak Pass.

Table 1. List of observer trips with a summary of effort, catch and incidental species catch from the southern Bering Sea in 1980.

	Cruise							
	314	315	316	317	318	319	320	321
Date Start	2-10	2-14	2-21	2-27	2-29	3-3	3-7	3-16
Hauls	8	12	8	5	11	12	15	3
Hours	14.9	23.2	18.8	7.5	24.9	21.7	28.8	6.2
Catch, m.t.*	37.7	64.3	62.2	29.1	64.0	36.5	43.1	18.1
Discard, m.t.*	3.6	7.3	17.2	8.8	6.8	12.3	28.5	0.6
Halibut, Kg	450	1109	550	204	750	199	129	71
King crab, Kg	0	0	0	0	0	0	0	0
Tanner crab, Kg	0	6	0	0	0	9	1	0
Chinook salmon, Kg	6	11	8	0	3	29	13	12

\*Catch and discard are observer estimates.

#### Catch Per Unit Effort

The catches of cod per hour trawled (catch sold divided by hours trawled) for the eight observed trips were, in chronological order, 1864, 2103, 2493, 2281, 1588, 1026, 677 and 2782 Kg/hr. This indicates a distinct building to a maximum of 2500 in late February, deterioration to a low in early March then high again in mid-March as the fleet found fish on new grounds as mentioned earlier.

Considering this variability, the value of a single value for CPUE is dubious; however, the total catch of cod landed by observed boats, divided by hours fished, is 1637 Kg/hr. This catch rate is different from that in Table 2, because the table is based on observer estimated catch, which consists of a subsample of the total number of hauls in observed trips and some of the small cod caught were discarded.

Table 2. Composition of catches sampled in the southern Bering Sea domestic trawl fishery, February and March 1980. Figures are based upon estimated catch weights and weighed subsamples.

Taxon	Kg/Hr.	% of Catch
Pacific cod	2216	80.8
Walleye pollock	274	10.0
Sculpins	83	3.0
Rock sole	68	2.5
Atka mackerel	60	2.2
Pacific halibut	24	0.9
Arrowtooth flounder	6.7	0.2
Octopus	3.2	0.1
Starry skate	1.9	0.1
Korean hair crab	1.6	0.1
Dusky rockfish	0.9	T
Smooth lumpsucker	0.8	T
Chinook salmon	0.6	T
Sea urchin	0.6	T
Snail	0.4	T
Flathead sole	0.3	T
Rex sole	0.3	T
Sea poacher	0.3	T
Sea anemone	0.3	T
Searcher	0.2	T
Starfish	0.2	T
Pacific Ocean perch	0.1	T
Tanner crab	0.1	T
Sturgeon sea poacher	0.1	T
Skate egg case	0.1	T
Hermit crab	T	T
Total	2744	100.0

T=Trace, less than 0.05

#### Incidental Catch

The incidental catch of prohibited species was 26.4 m.t. (14,965 fish) of halibut, no king crab, 0.15 m.t. of Tanner crab and 0.83 m.t. of chinook salmon (Table 3).

The catch of halibut per trip was highly correlated with the catch of Pacific cod per trip (correlation coefficient,  $r = 0.91$ ) which dictates that the best estimation procedure is using the ratio of halibut to cod catch.

The catch of halibut may have decreased later in the season. Lower catches of halibut later in the season were observed by several vessel skippers and appear in the data as a lower proportion of halibut on the last three trips. No statistical validity can be attached to this, however, it is an observation which should be retained for comparison with future observations to build understanding of seasonal movement.

Table 3. Estimate of incidental catch of prohibited species taken by the domestic bottomfish trawl fleet delivering to U.S. processors in the southern Bering Sea during January through May 1980.

Species	Estimated Catch and 90% Confidence Limits
Halibut <sup>1</sup>	26.4 m.t. ± 13.9 m.t. 14,965 fish
King crab	0
Tanner crab <sup>2</sup>	0.15 m.t. ± 0.17 m.t.
Chinook salmon <sup>2</sup>	0.83 m.t. ± 0.47 m.t.

<sup>1</sup> Halibut catch was highly correlated with catch of Pacific cod. The estimate is based on a proportion of cod landed. The confidence interval is approximate and is based on variability of catch per trip.

<sup>2</sup> Catch was not related to catch of cod. Both the estimate and confidence interval are based on catch per trip.

#### Catch Composition

The catch was composed of 80% Pacific cod, 10% walleye pollock, 3% sculpins, 2.5% rock sole, 2.2% Atka mackerel, 0.9% Pacific halibut and 0.2% arrowtooth flounder. All other items comprised 0.1% of the catch or less (Table 2). Due to the small subsamples taken, catch amounts and rank of abundance of the infrequent and unimportant taxa are subject to considerable variability. For example octopus and dusky rockfish only occurred one time each, yet they rank 8 and 11 in abundance. Although the procedure is statistically sound, the chance of occurrence for the infrequent species affects the results, especially when that chance is on the order of 1, 2 or 3 occurrences in the 48 hauls subsampled.

## Discard

All catch not sold is collectively termed discard. Most of the Pacific cod caught were sold, however, small ones were discarded. Part of the catch of pollock and rocksole was sold but most was discarded. Everything else was discarded, including incidentally caught prohibited species.

Total discard was estimated informally for every haul, usually by making estimates of the total, such as on hauls where no species composition samples were taken. When species composition samples were taken the discard could be estimated by multiplying the estimated total catch by the estimated proportion retained. However, part of the discard occurred at the processor and this could not be well predicted.

The estimated total weight discarded by the fishery ranges from 520 mt to 850 mt, depending on method of estimation.

Estimates of total discard by species were presented above for the prohibited species (Table 3).

## Biological Information

The length frequency of halibut (Figure 2) illustrates that 90% were between 39 and 71 cm, with a strong mode at 40 to 55 cm and an average size of 50 cm. The mode is at the size of age 4 and 5 halibut which are reported to be 42 cm and 53 cm, respectively, on the Polaris grounds (Southward, 1967).

Of the halibut captured and returned to the sea, 58% were judged to be in excellent condition, 32% were in good condition and 9% appeared to be dead. Excellent condition consisted of vigorous body movements before or after release, the fish could close the operculum tightly and any injuries were minor and external. Good condition consisted of feeble body movement, they could close the operculum tightly and any injuries were minor. Dead consisted of fish displaying no body or opercular movement.

A total of 19 chinook salmon were measured and these ranged from 49 to 106 cm, with a mode at about 65 cm and a mean of 67 cm. One was judged to be in excellent condition and the rest were dead.

The size frequency of Pacific cod was fairly even from 40 to 80 cm, 8% were larger than 80 cm and 1% were larger than 100 cm with the largest fish 110 cm (Figure 2). The mean size was 60 cm.

The length weight relation of 45 cod was calculated to be:

$$\text{weight (Kg)} = 1.0147 \times 10^{-6} \text{ Length (cm)}^{3.5839}$$

Using this relation and the length frequency it was calculated that the total fishery took about 522,000 Pacific cod which averaged 3.2 kg each, assuming the fish below 49 cm in length were discarded.

#### CONCLUSIONS

1. The domestic fishermen have the capacity and the knowledge to effectively harvest bottomfish in the southern Bering Sea.
2. The incidental catch of halibut could be substantial and the fishery should be monitored further.
3. The biological and fishery information collected by the observers is irreplaceable and is much less expensive than any other data source.

#### RECOMMENDATIONS

1. The onboard observer program should be continued and should be expanded as the fishery expands.
2. Means of decreasing halibut incidence should be studied.

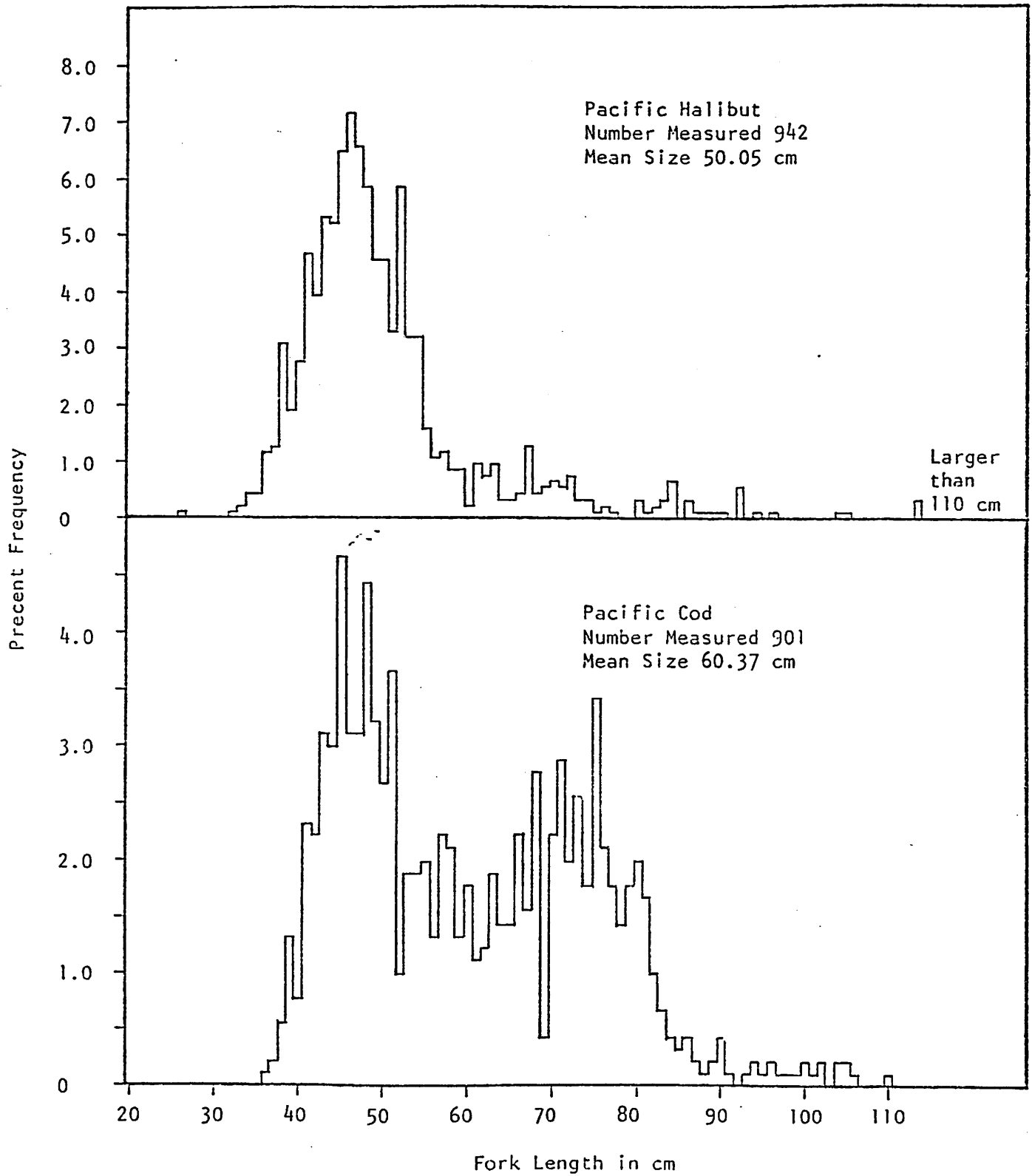


Figure 2. Length frequencies of Pacific halibut and Pacific cod taken as random samples of the catch of domestic trawl vessels fishing in the southern Bering Sea during February and March 1980.

## LITERATURE CITED

Blackburn, J. and P. Rigby. 1980. An observer program for the domestic groundfish fishery in the Gulf of Alaska. Final Report on Contract 77-5 to the North Pacific Fishery Management Council. Alaska Dept. of Fish and Game, Box 686, Kodiak, Alaska.

Southward, M.G. 1967. Growth of Pacific halibut. Report of the International Pacific Halibut Commission, Number 43.



APPENDIX II

Estimate of Total Halibut Incidence in the  
Kodiak and Chirikof INPFC Areas During 1978  
and 1979 in the Domestic Bottomfish Fishery

Table. 1. Estimate of halibut catch incidental to the bottomfish fishery in the Kodiak and Chirikof INPFC areas in 1978 and 1979 with total trawl effort and landings in metric tons.

	Kodiak		Chirikof	
	1978	1979	1978	1979
Halibut (m.t.)	11.2	34.8	4.0	5.7
Effort in Trips	79	88	41	17
Total Landings (m.t.)	1,002	2,305	179	284

The estimates do not include landings to Cook Inlet, Seward, Cordova or Southeast Alaska which in 1979 totaled 77 mt from the Kodiak INPFC area and 167 mt from the Yakutat INPFC area. The portion of these landings that were trawl is not available at this time. If it were all trawl, the total halibut catch would be about 1 mt in the Kodiak INPFC area and 2.5 mt in the Yakutat INPFC area (assuming 1.5 percent halibut). This is inconsequential and an overestimate. In Southeast Alaska there were 3,663 mt of bottomfish landed in 1979, of which perhaps 852 mt (pollock and starry flounder) were trawl caught. Based on the very limited observer effort there, approximately 1.5 mt of halibut may have been caught. Thus, in addition to the catches in Table 1 there were probably about 1 mt of halibut caught in the Kodiak area, 2.5 mt in the Yakutat area and 1.5 mt in the Southeast area in 1979.