

CRUISE RESULTS
Soviet R/V GISSAR, Cruise No. **GIS861/GIS862**
Gulf of Alaska, Pollock Echo Sounder Survey
19 March - 18 April 1986

INTRODUCTION

As part of U.S. - U.S.S.R. cooperative fisheries research, a pollock echo sounder trawl survey was conducted in the Gulf of Alaska aboard the Soviet Fisheries Research vessel GISSAR, a 93 m East German built **catcher/processor**. The survey took place on the shelf and upper slope area between Kodiak Island and Yakutat during March 19-29, 1986 (Fig. 1).

The survey was undertaken to provide information on the distribution and biological composition of off-bottom pollock, with particular emphasis on obtaining data on the location, relative size and maturity of adult pollock concentrations.

Also included in this report are results from trawl sampling that was done opportunistically during an ichthyoplankton survey of the above mentioned area, as well as the area between Kodiak Island and Unimak Pass. This survey was conducted by the GISSAR during March 29 - April 18, 1986. The echosounder and ichthyoplankton surveys are referred to herein as surveys 1 and 2, respectively.

The time period of survey 1 coincided with the annual NMFS hydroacoustic survey of spawning pollock stocks in the Shelikof Strait area. The Shelikof survey was carried out aboard the NOAA R/V MILLER FREEMAN.

METHODS

This section describes the methodology employed during surveys 1 and 2. The trawl gear and catch sampling procedures used during these surveys were the same.

ACOUSTIC EQUIPMENT AND TRAWL GEAR

The echo survey was conducted using a 25 KHz echo sounder which had a hull mounted transducer. Echo signatures were displayed on a paper recorder and a color scope. The vessel's cable netsounder system was used during trawl hauls to monitor the **net's** position in the water column.

Midwater echo sign was fished with a rope trawl (RT/TM 118) which had a vertical opening of 60 m with mesh sizes ranging from 80 cm forward to 3 cm in the **codend**. Two 500 kg toe end weights were used at each corner of the **footrope** to hold the net open during deployment and towing. Fish located near and on bottom were sampled with a bottom trawl, which had a vertical opening of 9 m and mesh sizes ranging from 70 cm in the wings, to 2 cm in the belly and **codend**. Both trawls were used with 3.5 m oval steel doors. Average towing speeds were about 4.0 and 3.0 knots for the **midwater** and bottom trawls, respectively.

SURVEY PROCEDURES

During survey 1, echo sounder records were monitored 24 hours per day and estimates of relative densities along the transects were made. The trackline pattern consisted of parallel transects that covered the area between the 50 and 750 m isobaths (Fig. 1). The distance between adjacent transects was usually about 18 km and the average vessel speed was 11 knots.

During survey 2, the GISSAR'S primary purpose was to carry out an ichthyoplankton survey of the Gulf from Yakutat to Unimak Pass. The trackline pattern consisted of parallel transects about 18 km apart, between the 50 and 750 m isobaths. Plankton sampling stations were located approximately every 10 km along transects.

Midwater trawl hauls were made to identify echo sign and provide biological data on pollock and other species. Bottom trawl hauls were made at selected locations to sample near bottom echo sign that could not be fished with the **midwater** trawl. The duration of each haul depended on the density of echo sign and the time necessary to capture an adequate biological sample.

The processing of trawl catches for species composition and biological data (length, sex, weight, age and maturity) followed standardized procedures used by NWAFC. During survey 2, the only biological data obtained were pollock length frequencies (Table 2).

By sampling selected **midwater** aggregations that were observed on the echograms during survey 1, we were able to qualitatively classify the **midwater** abundance into three separate levels. This was done by measuring the vertical and horizontal extent of the echo sign and categorizing it as follows; low (1), medium (2) and high (3). Examples of echograms representative of each level are presented in Fig. 2. The area that was represented by these different densities was then defined (Fig. 1).

During survey 2, monitoring of echo sounder records and trawl sampling was performed as a secondary purpose during transit between plankton stations. Because of the limited echo sound- coverage during this survey, no relative density estimates of pollock were made.

RESULTS

During survey 1, 12 **midwater** and 4 bottom trawl hauls were completed (Table 1), with approximately 3,600 km of trackline distance surveyed. Total area surveyed during survey 1 was approximately 101,000 sq km (Fig. 1). During survey 2, 9 **midwater** and 3 bottom trawls were completed in the area East of **Portlock** Bank (Table 1). In the area between **Portlock** Bank and Unimak Island, only a few significant signs of pollock were observed and only 5 trawl hauls were completed (Hauls 29 - 31, Table 1).

For the area East of **Portlock** Bank, results were divided into three separate geographical areas; (Portlock Bank - **Amatuli** Trench, Southwest of Middleton Island and East of Cape St. **Elias**), based on the occurrence of echo sign that was found to contain pollock.

PORTLOCK BANK - AMATULI TRENCH

The most numerous aggregations of pollock were found in this area with the largest aggregation covering approximately 1,000 sq km. Because the **midwater** net was not available for sampling in the beginning of the **survey**, no trawl hauls were made although **midwater** echo sign was **observed** (Fig. 1). Based on trawl hauls made in this area during survey 2 and by comparing echo sign records, this area was later classified as level 1 (low density).

The majority of the pollock sampled from **midwater** trawl hauls 1, 5, 23 and 28 were juvenile fish, ages 1 and 2. Length frequency distributions from these hauls were bimodal with lengths between 8-13 cm and 18-29 cm (Figs. 3 and 4). Only 2 trawl hauls (24 and 25) contained pollock that were aged as older than 2 years.

SOUTHWEST OF MIDDLETON ISLAND

The only spawning aggregation of pollock (>age 3) was found in this area, near the location of haul 7 (Fig. 1). This aggregation was high density (level 3) and confined to a single 30-50 m **midwater** layer. The area covered by this echo sign was approximately 310 sq km occurring over bottom depths ranging from 110-140 m. **All** of the pollock sampled from haul 7 were in near spawning stages. The length frequency distribution of these fish was unimodal and lengths ranged between 42-56 cm (Fig. 3).

E. OF CAPE ST. ELIAS

Catch data from bottom trawl hauls 12, 15 and 16 (Table 1) indicate that the echo sign from this area was principally rockfish, Sebastes aleutianus (rougheye rockfish) and S. alutus (Pacific ocean perch). The pollock that were found intermixed with the rockfish from these hauls were all juveniles (ages 1 and 2).

All echo sign observed in this area was classified as medium density (level 2). Unlike other areas where the classification was based only on **midwater** pollock echo sign, this area was classified as a combination of rockfish and juvenile pollock (length range 11-25 cm; Fig. 3)

DISCUSSION

Although qualitative in nature, these surveys have provided useful information on the distribution of pollock in the Gulf of Alaska. Significant aggregations of spawning fish (age 3 and greater) were not observed during the GISSAR surveys. The absence of older fish in the survey area supports the possibility that most pollock spawning took place in Shelikof Strait in 1986.

More detailed (and quantitative) hydroacoustic surveys of the Gulf of Alaska may be appropriate, especially if questions regarding the relationship between fish observed in Shelikof Strait and those encountered elsewhere in the Gulf of Alaska are to be investigated.

Table 1.--Station and catch data for midwater and b
R/V Gissar surveys in the Gulf of Alaska.

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Haul No.	Date	Start position		Dura- tion (h)	Average depth (fm) (footrope/ bottom)	lb)					
		Lat.(N)	Long.(W)			Pollock	Eulachon	Herring	Capelin	Other species	
Survey 1 (March 19-29)											
1	3/21	58°39'	150°38'	0.25	96/118	127 ^a	3		T ^b	T	0
2	3/21	59°04'	150°08'	1.00	55/99	0	0		0	0	0
3	3/22	57°42'	149°43'	1.00	128/478	0	0		0	0	0
4 ^c	3/22	58°45'	149°38'	1.00	28/100	T ^a	0		30,800	0	35
5	3/23	58°57'	149°02'	1.00	72/112	627 ^a	T		5	2	1,716
6	3/24	59°17'	147°08'	1.00	72/111	0	344		13,327	344	58
7 ^c	3/25	59°11'	147°04'	0.83	115/341	6,250	0		0	0	376
8	3/25	59°12'	146°47'	0.25	133/365	0	0		0	0	233
9	3/25	59°19'	146°01'	0.50	133/472	0	37		0	0	26
10	3/25	59°17'	145°27'	0.50	45/750	0	0		0	0	0
11	3/26	59°25'	144°54'	0.50	159/763	0	0		0	0	0
12 ^d	3/27	59°28'	142°00'	0.50	102/102	6 ^a	6		0	0	259
13 ^d	3/27	59°25'	141°58'	1.00	106/106	0	47		51	2	3,104
14	3/27	59°15'	142°00'	0.50	125/347	0	0		0	0	0
15 ^d	3/28	58°42'	140°29'	0.05	111/111	3 ^a	0		0	0	525
16 ^d	3/28	58°55'	140°30'	0.27	100/100	5 ^a	7		2	0	383
Survey 2 (March 29-April 18)											
17 ^c	3/30	58°30'	139°27'	1.00	61/100	0	0		11,539	0	121
18	3/31	59°34'	143°33'	0.50	50/122	0	0		0	0	15
19 ^c	4/02	59°20'	146°25'	0.25	63/66	0	0		11,000	0	11
20	4/03	59°20'	147°08'	0.27	66/108	0	0		59	11	0
21	4/04	58°45'	148°21'	0.25	27/149	0	0		0	66	0
22	4/04	59°00'	148°19'	0.55	77/121	0	275		224	672	766
23	4/05	59°40'	148°54'	0.67	60/98	464 ^a	8		26	37	195
24 ^d	4/05	59°20'	149°01'	0.50	105/105	52	0		0	0	219
25	4/07	59°01'	149°46'	0.50	99/126	564	589		0	0	116
26 ^d	4/08	58°26'	149°46'	0.50	81/81	2 ^a	0		0	0	72
27 ^d	4/08	58°07'	149°37'	0.50	127/127	24	2		0	T	166
28	4/08	58°04'	149°39'	0.50	66/107	1,973 ^a	24		0	1,565	103
29 ^c	4/12	55°40'	156°04'	0.50	19/140	11,750 ^a	843		0	7	555
30	4/14	55°19'	156°06'	0.17	148/169	938	0		0	0	12
31	4/15	55°14'	158°54'	0.33	104/109	2 ^a	0		0	0	12
32	4/18	53°41'	165°24'	0.08	38/158	71	0		0	0	0
33 ^c	4/18	53°43'	165°06'	1.00	90/274	6,600	0		0	0	5

^aPrimarily juvenile fish (ages 1 and 2).

^bT: Catch <1 lb.

^cFor these hauls, catch weights are factory estimates.

^dIndicates bottom trawl haul.

Table 2.--Numbers of biological samples/measurements of pollock collected by trawl haul, during R/V GISSAR surveys 1 and 2.

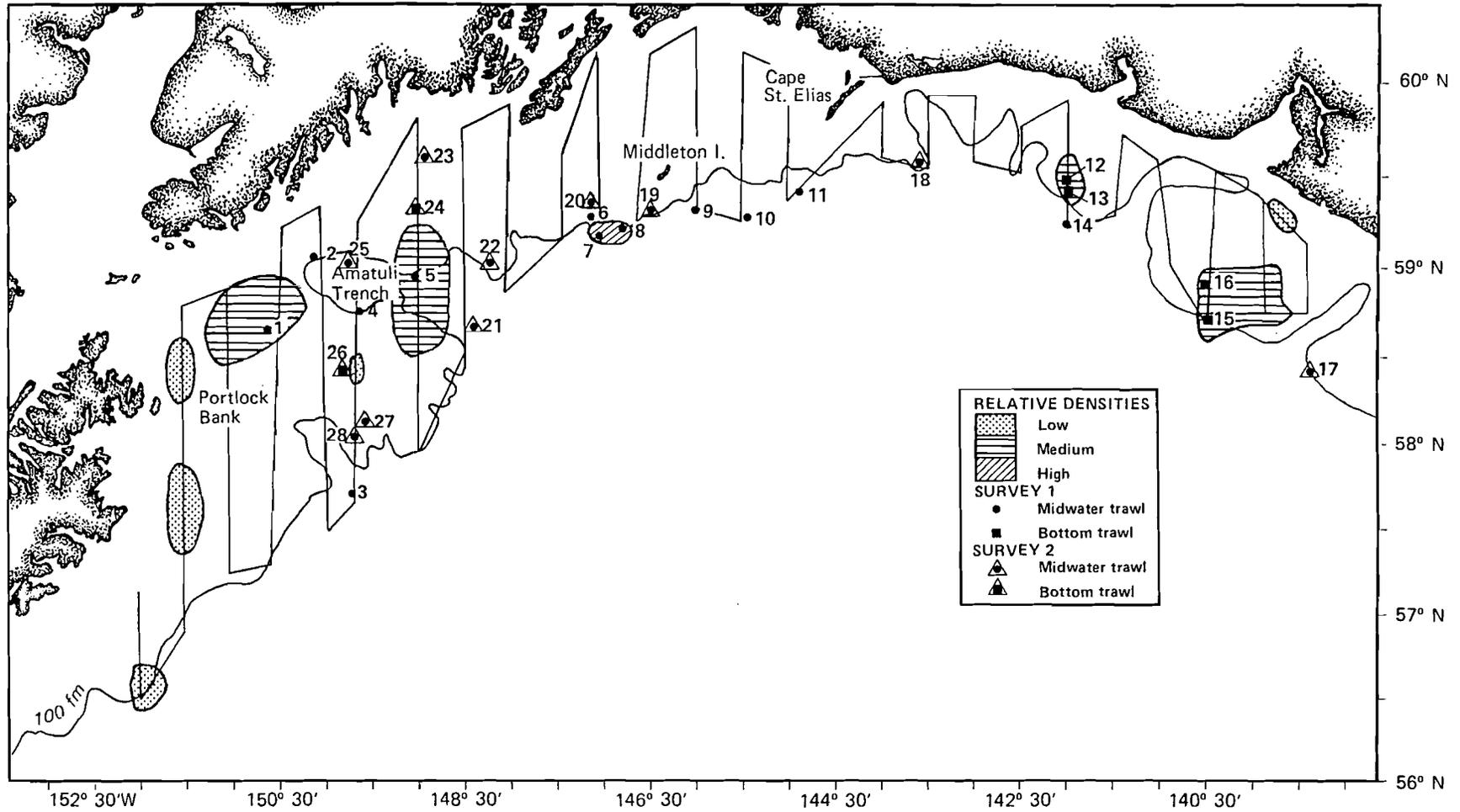
SURVEY 1					
<u>Haul #</u>	<u>Trawl type</u>	<u>Length</u>	<u>Weights</u>	<u>Otoliths</u>	<u>Maturity</u>
1	M	222	50	50	50
2	M	-		-	-
3	M				
4	M				-
5	M	316	100	50	100
6	M	-			-
7	M	324	100	100	100
8	M	-	-	-	-
9	M	-	-	-	-
10	M				
11	M			-	-
12	B	69	34	34	34
13	B	-		-	-
14	M			-	
15	B	13	13	13	13
16	B	56	56	56	56
Totals		1,000	353	303	353

SURVEY 2					
17	M				-
18	M				-
19	M	-	-	-	-
20	M	-	-	-	-
21	M				-
22	M	-		-	-
23	M	137	-	-	-
24	B	58	-		-
25	M	144			-
26	B	55			-
27	B		-	-	-
28	M	217	-	-	-
29	M	217			-
30	M	134			-
31	M		-		-
32	M	106	39	39	39
33	M	21	21	21	21
Totals		1,089	60	60	60

M = Midwater

B = Bottom

FIGURE 1



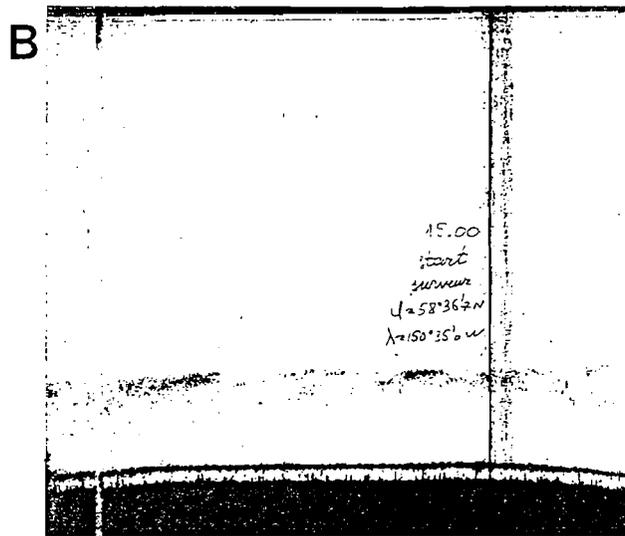


Figure 2.-- Examples of echo sign
 representative of each density
 level. A.- low B.-medium
 C.- high.

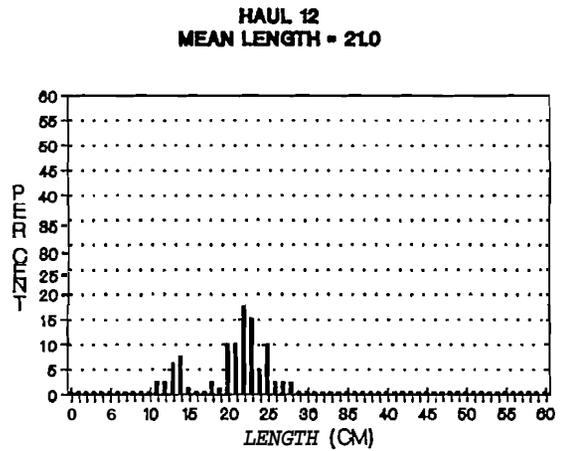
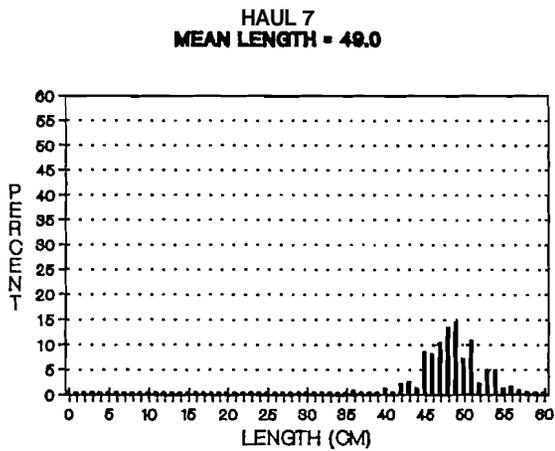
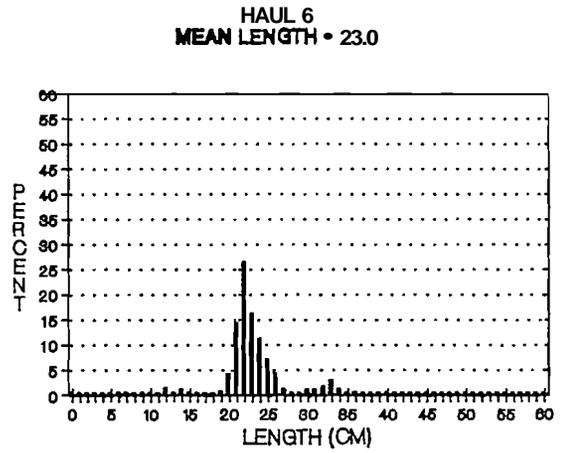
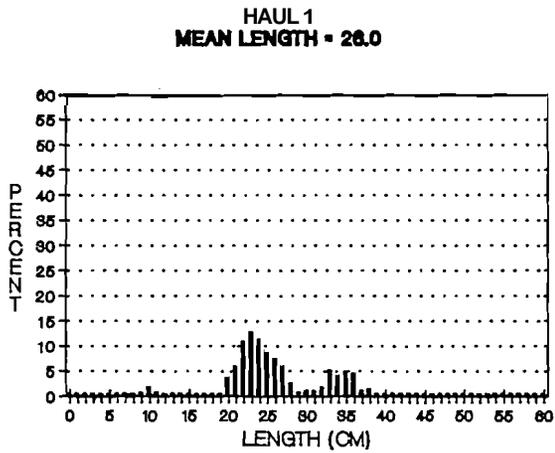
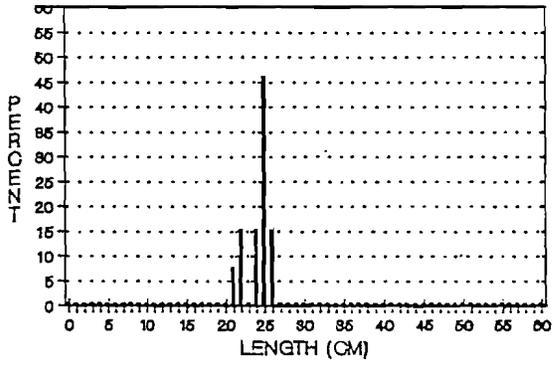


Figure 3.--Pollock length frequency distributions taken from hauls during GISSAR cruise GIS861, Survey 1.

HAUL 15
MEAN LENGTH = 24.0



HAUL 18
MEAN LENGTH = 14.0

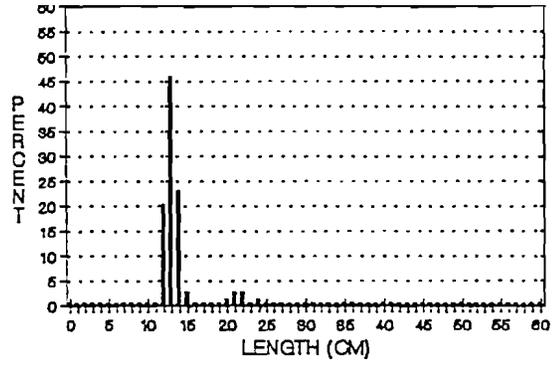


Figure 3.--Continued.

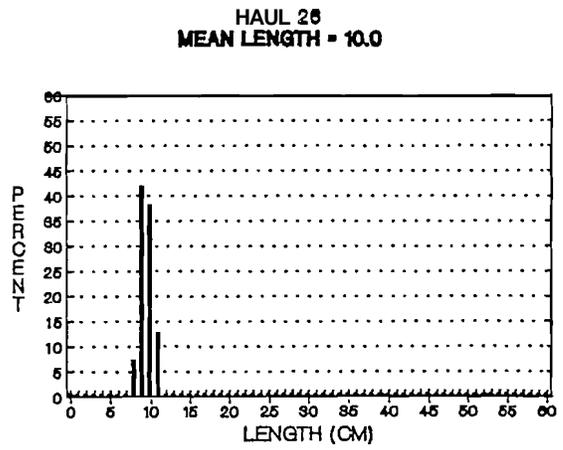
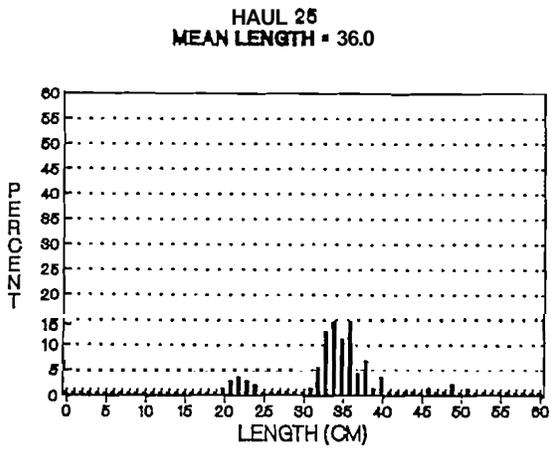
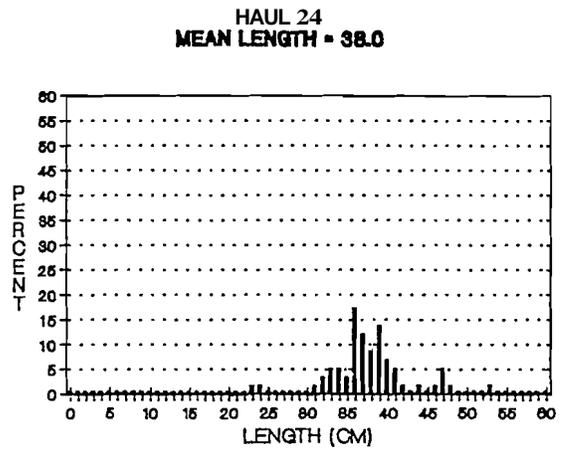
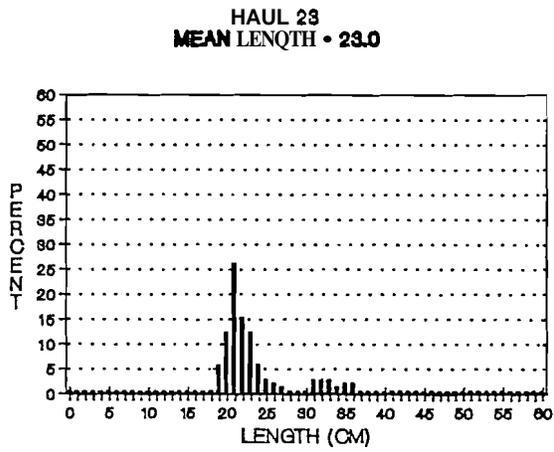
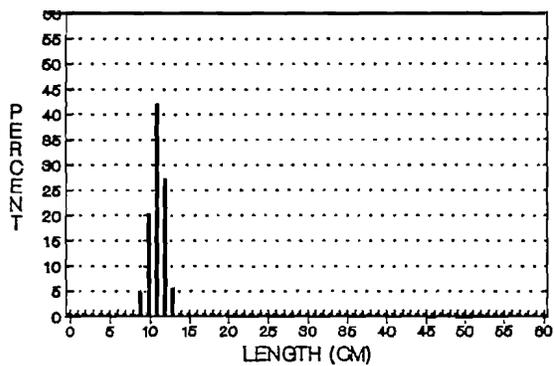
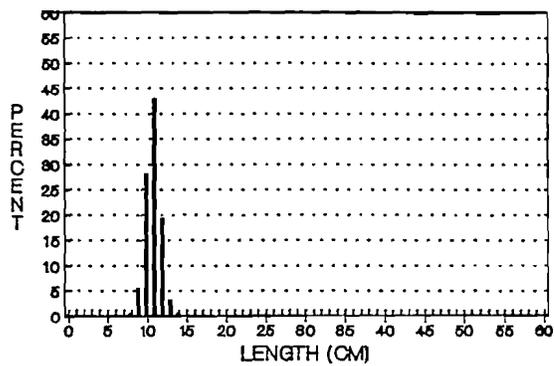


Figure 4.--Pollock length frequency distributions taken from hauls during GISSAR cruise GIS862, Survey 2.

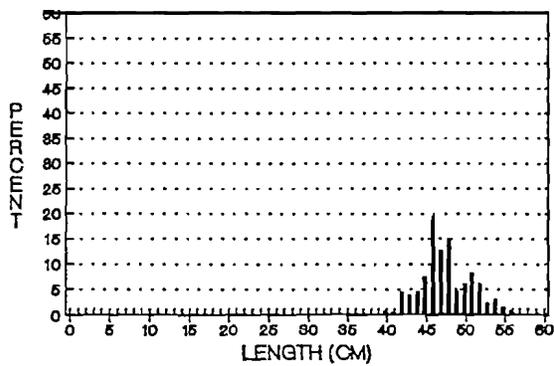
HAUL 28
MEAN LENGTH 11.0



HAUL 29
MEAN LENGTH = 11.0



HAUL 30
MEAN LENGTH = 48.0



HAUL 32
MEAN LENGTH = 51.0

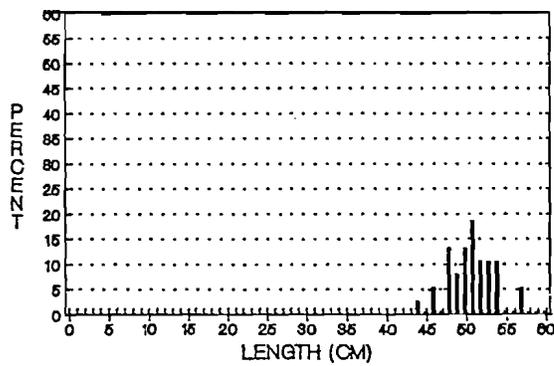


Figure 4.--Continued.

HAUL 33
MEAN LENGTH = 49.0

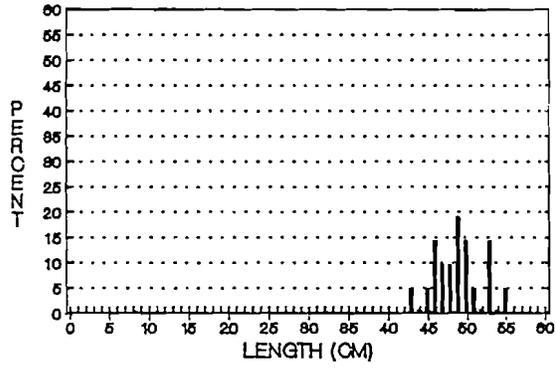


Figure 4.--Continued.