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AGE COMPOSITIONS AND MORTALITIES OF SILVER HAKE IN SUBAREA 5

by

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INTRODUCTION

Age and growth studies recently completed (Nichy, ICNAF Res. Doc. 67/109, 1967), have provided the basic techniques for ageing silver hake. As a result, we have obtained preliminary estimates of age compositions and mortality for the years 1966 and 1967.

The bulk of the United States silver hake landings from Subarea 5 occurred during the third calendar quarter (July-Sept.), and came mainly from sampling areas 1-5 (Figure 1). The landings in the third quarter were 26,800 metric tons in 1966 compared to 22,300 metric tons in 1967. Landings per day for this period was 12.8 metric tons in 1966 and 11.4 metric tons in 1967. Age and length data utilized in this report came entirely from this segment of the fishery.

Length and age (otolith) samples were taken from commercial silver hake landings in Gloucester and Portland. Each length sample contained 100 fish, from which a stratified sub-sample of 20 males and 20 females were selected for ageing. Lengths were recorded in centimeters.

Through a special computer program, length and age frequencies as well as landings were combined by months and sampling area to give a weighted summary of estimated numbers at length and age. Data on landings and effort were obtained through dockside interviews with each vessel operator.

Landings per day by age group and sex for 1966 and 1967 are given in (Table 1). The 1962 and 1963 year classes appear dominant. Males were somewhat more abundant than females in 1966, while in 1967 they appeared to be present in equal numbers. The difference in sex ratios in 1966 and 1967, however, could be a result of sampling error.

Table 1. Third Quarter Landings/Day at Age (No's of Fish) for Silver Hake.

Year	Sex	Age 1	2	3	4	5	6	7	8	No/Day
1966	♂+♀	20	2,864	18,611	27,189	4,222	4,007	1,556	610	59,076
1967	♂+♀	78	2,036	2,956	17,321	20,640	2,578	1,421	1,178	48,209
1966	♂	10	2,360	11,140	15,393	2,201	1,436	341	--	32,881
	♀	10	503	7,471	11,795	2,021	2,571	1,214	609	26,451
1967	♂	67	1,648	1,371	8,457	11,013	1,247	180	102	24,085
	♀	10	386	1,586	8,865	9,627	1,331	1,242	1,076	24,386

Tables 2 and 3 portray per mille length at age distributions. In order to determine which age groups could be utilized in calculating survival rates, a line representing the 50 percent selectivity point, with gear used in the silver hake fishery (2 inch mesh), was drawn between the 28.5 and 30.5 centimeter length classes. Fish in age group III did not appear fully available to the fishery, and therefore age group IV was the initial group used in computing the survival rates. Because of the small percentage in the landings, fish over seven years old were also ignored. The mean survival rate for silver hake from age groups IV to VII was computed to be 0.57 (Table 4).

This was also done for males and females resulting in average survival rates of .47 and .65 respectively. The difference in the ratio for males and females is not completely understood at this time.

In plotting estimated numbers per day at age for each year class in 1966 and 1967 (Figure 2) a comparison of survival for each year class can be made. The 1962 year class seems to be fairly strong, but the small decrease in numbers per day between years (survival = .76) raises some doubt that the age group IV fish were fully available to the fishery.

In 1967 the USSR reported that their Subarea 5 landings of silver hake in 1966 were composed of 17 percent in age group II, 45 percent in group III, 27 percent in group IV, and 4 percent in group V (USSR Research Report, ICNAF Res. Doc. 67/21, 1967). US 1966 silver hake landings were composed of 5 percent twos, 31 percent threes, 46 percent fours, and 7 percent fives. In 1967 the US had 4 percent twos, 6 percent threes, 36 percent fours, and 42 percent fives. The difference in age compositions between the US and USSR may be related to a difference in stocks fished. The USSR fishing effort was concentrated mainly in the southern part of Subarea 5 while US effort was in the North.

In July and August of 1967 the USSR reported silver hake mean lengths for silver hake at 28.8 and 28.4 centimeters. US length frequency data (Figure 3) for this period shows a mean of about 30 centimeters, pointing out further differences in US and USSR catches.

The accumulation of additional data on age and length of silver hake is obviously necessary before acceptable conclusions regarding survival and year class strength can be made. These data therefore, can only be regarded as preliminary investigations into the population dynamics of silver hake in Subarea 5.

Table 2. Per Mille/Per Length of Silver Hake Age Samples (July-September) for Males and Females in 1966.

Length Class	Age 0	1	2	3	4	5	6	7	8	9	10	11	12	Total	
16.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
18.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
20.50	0.	0.	1.000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
22.50	0.	0.508	0.492	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.000	
24.50	0.	0.	0.918	0.082	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.000	
26.50	0.	0.	0.583	0.250	0.100	0.067	0.	0.	0.	0.	0.	0.	0.	1.000	
28.50	0.	0.	0.090	0.575	0.326	0.008	0.	0.	0.	0.	0.	0.	0.	1.000	
30.50	0.	0.	0.	0.349	0.574	0.058	0.020	0.	0.	0.	0.	0.	0.	1.000	50% Selectivity
32.50	0.	0.	0.	0.155	0.663	0.099	0.067	0.016	0.	0.	0.	0.	0.	1.000	
34.50	0.	0.	0.	0.039	0.460	0.221	0.240	0.036	0.	0.004	0.	0.	0.	1.000	
36.50	0.	0.	0.	0.022	0.179	0.206	0.424	0.120	0.022	0.027	0.	0.	0.	1.000	
38.50	0.	0.	0.	0.010	0.051	0.281	0.306	0.265	0.077	0.010	0.	0.	0.	1.000	
40.50	0.	0.	0.	0.	0.	0.091	0.500	0.182	0.136	0.045	0.045	0.	0.	1.000	
42.50	0.	0.	0.	0.	0.062	0.062	0.187	0.375	0.187	0.125	0.	0.	0.	1.000	
44.50	0.	0.	0.	0.	0.	0.062	0.375	0.375	0.062	0.062	0.	0.062	0.	1.000	
46.50	0.	0.	0.	0.	0.	0.	0.214	0.500	0.286	0.	0.	0.	0.	1.000	
48.50	0.	0.	0.	0.	0.	0.	0.312	0.312	0.062	0.062	0.250	0.	0.	1.000	
50.50	0.	0.	0.	0.	0.	0.	0.437	0.187	0.187	0.062	0.	0.125	0.	1.000	
52.50	0.	0.	0.	0.	0.	0.	0.267	0.333	0.133	0.133	0.067	0.067	0.	1.000	
54.50	0.	0.	0.	0.	0.	0.	0.111	0.222	0.444	0.111	0.	0.111	0.	1.000	
56.50	0.	0.	0.	0.	0.	0.	0.222	0.444	0.222	0.111	0.	0.	0.	1.000	
58.50	0.	0.	0.	0.	0.	0.	0.	0.	0.400	0.200	0.200	0.200	0.	1.000	
60.50	0.	0.	0.	0.	0.	0.	0.	0.	0.600	0.200	0.	0.200	0.	1.000	
62.50	0.	0.	0.	0.	0.	0.	0.	0.	0.400	0.200	0.400	0.	0.	1.000	
64.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
66.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
68.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
70.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
72.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
74.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
Per Mil	0.	.00[illegible]	.048	.312	.456	.071	.067	.026	.010	.005	.002	.002	0.		
Avg. Len.		22.500	27.178	29.702	31.024	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					

Table 3. Per Mille Per Length of Silver Hake Age Samples (July-September) for Males and Females in 1967.

Length Class	Age 0	1	2	3	4	5	6	7	8	9	10	11	12	Total	
16.40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
18.50	0.	1.000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.000	
20.50	0.	1.000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.000	
22.50	0.	0.308	0.692	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.000	
24.50	0.	0.	1.000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.000	
26.50	0.	0.	1.000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.000	
28.50	0.	0.	0.369	0.187	0.364	0.081	0.	0.	0.	0.	0.	0.	0.	1.000	50% Selectivity
30.50	0.	0.	0.006	0.077	0.440	0.455	0.022	0.	0.	0.	0.	0.	0.	1.000	
32.50	0.	0.	0.	0.039	0.418	0.480	0.063	0.	0.	0.	0.	0.	0.	1.000	
34.50	0.	0.	0.	0.056	0.294	0.503	0.074	0.062	0.011	0.	0.	0.	0.	1.000	
36.50	0.	0.	0.	0.	0.	0.599	0.135	0.135	0.089	0.042	0.	0.	0.	1.000	
38.50	0.	0.	0.	0.	0.	0.194	0.194	0.258	0.290	0.032	0.032	0.	0.	1.000	
40.50	0.	0.	0.	0.	0.	0.	0.200	0.333	0.267	0.067	0.133	0.	0.	1.000	
42.50	0.	0.	0.	0.	0.	0.	0.	0.286	0.429	0.	0.	0.286	0.	1.000	
44.50	0.	0.	0.	0.	0.	0.	0.111	0.111	0.556	0.111	0.	0.111	0.	1.000	
46.50	0.	0.	0.	0.	0.	0.062	0.062	0.250	0.375	0.125	0.125	0.	0.	1.000	
48.50	0.	0.	0.	0.	0.	0.	0.	0.286	0.714	0.	0.	0.	0.	1.000	
50.50	0.	0.	0.	0.	0.	0.	0.	0.200	0.600	0.200	0.	0.	0.	1.000	
52.50	0.	0.	0.	0.	0.	0.	0.	0.429	0.	0.429	0.143	0.	0.	1.000	
54.50	0.	0.	0.	0.	0.	0.	0.	0.200	0.400	0.400	0.	0.	0.	1.000	
56.50	0.	0.	0.	0.	0.	0.	0.200	0.	0.400	0.200	0.200	0.	0.	1.000	
58.50	0.	0.	0.	0.	0.	0.	0.	0.333	0.167	0.167	0.	0.333	0.	1.000	
60.50	0.	0.	0.	0.	0.	0.	0.	0.	0.500	0.	0.	0.500	0.	1.000	
62.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.500	0.500	0.	1.000	
64.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
66.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
68.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
70.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
72.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
74.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
Per Mil	0.	0.002	0.042	0.061	0.355	0.423	0.053	0.029	0.024	0.006	0.003	0.002	0.		
Avg. Len.	0.	21.376	27.743	31.104	31.700	32.465	34.170	38.573	41.984	44.418	45.918	50.771	0		

Table 4. Ratios of Year Class Survival Between 1966 and 1967.

	Ages							
R	$^{2}/_{1}$	$^{3}/_{2}$	$^{4}/_{3}$	$^{5}/_{4}$	$^{6}/_{5}$	$^{7}/_{6}$	$^{8}/_{7}$	$\overline{R}$ of 4-7
$\frac{1967}{1966}$	102	1.03	.93	.76	.61	.35	.76	.57
♂ $\frac{1967}{1966}$		.58	.76	.71	.57	.13	.29	.47
♀ $\frac{1967}{1966}$		1.17	1.19	.81	.66	.48	.88	.65

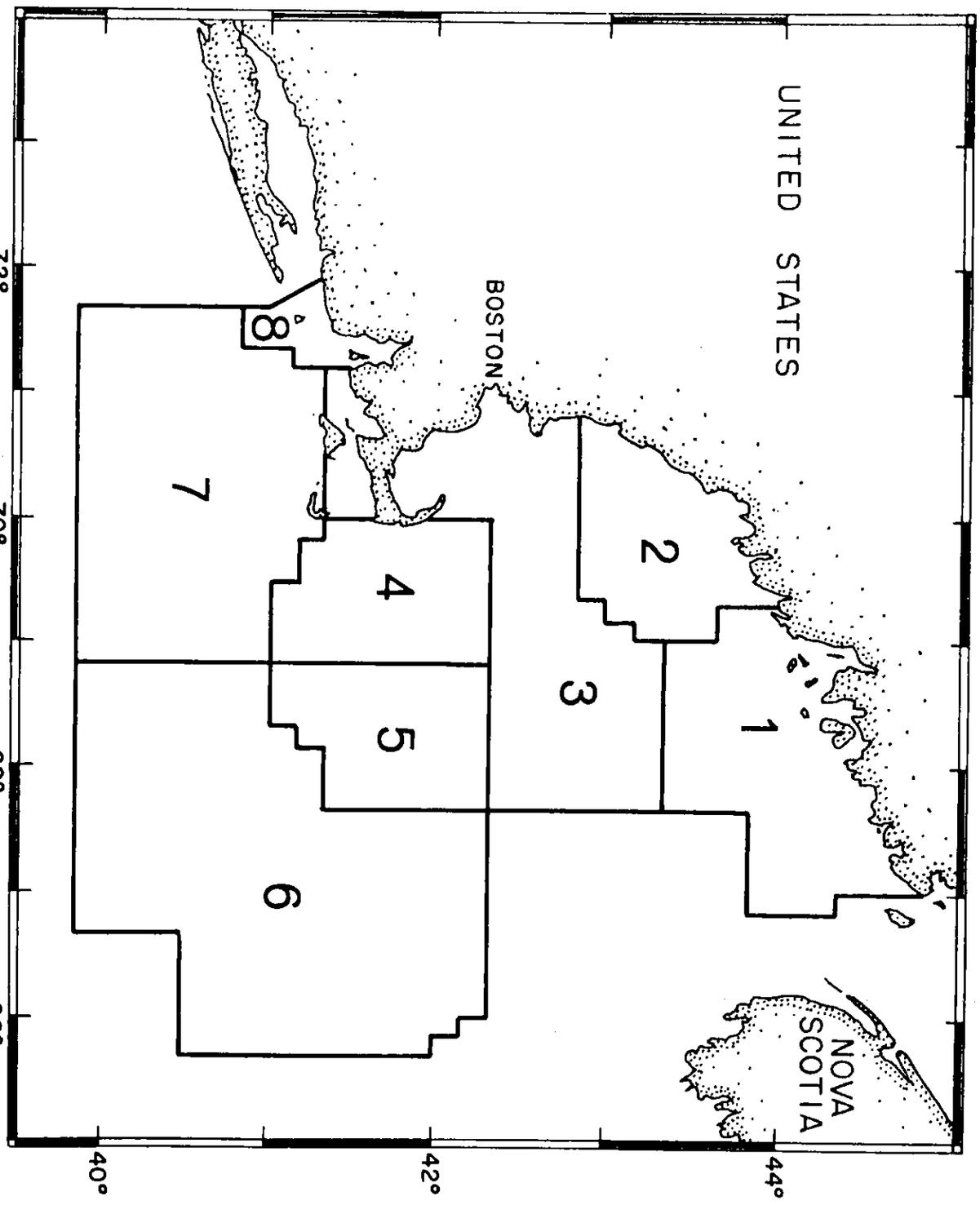

Figure 1. Silv[illegible] hake sampling areas in Subarea 5.

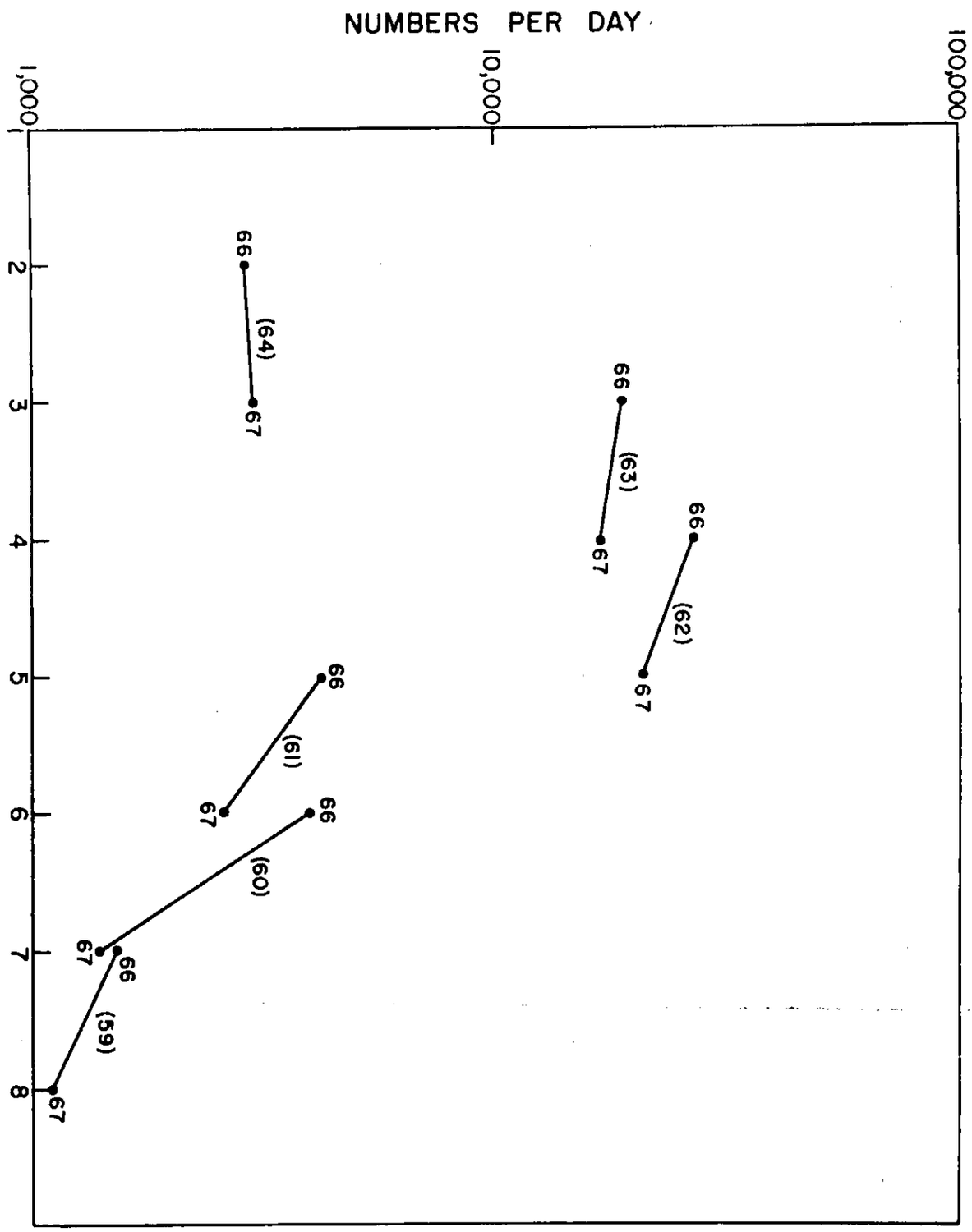

Figure 2. Year class abundance for silver hake in 1966 and 1967

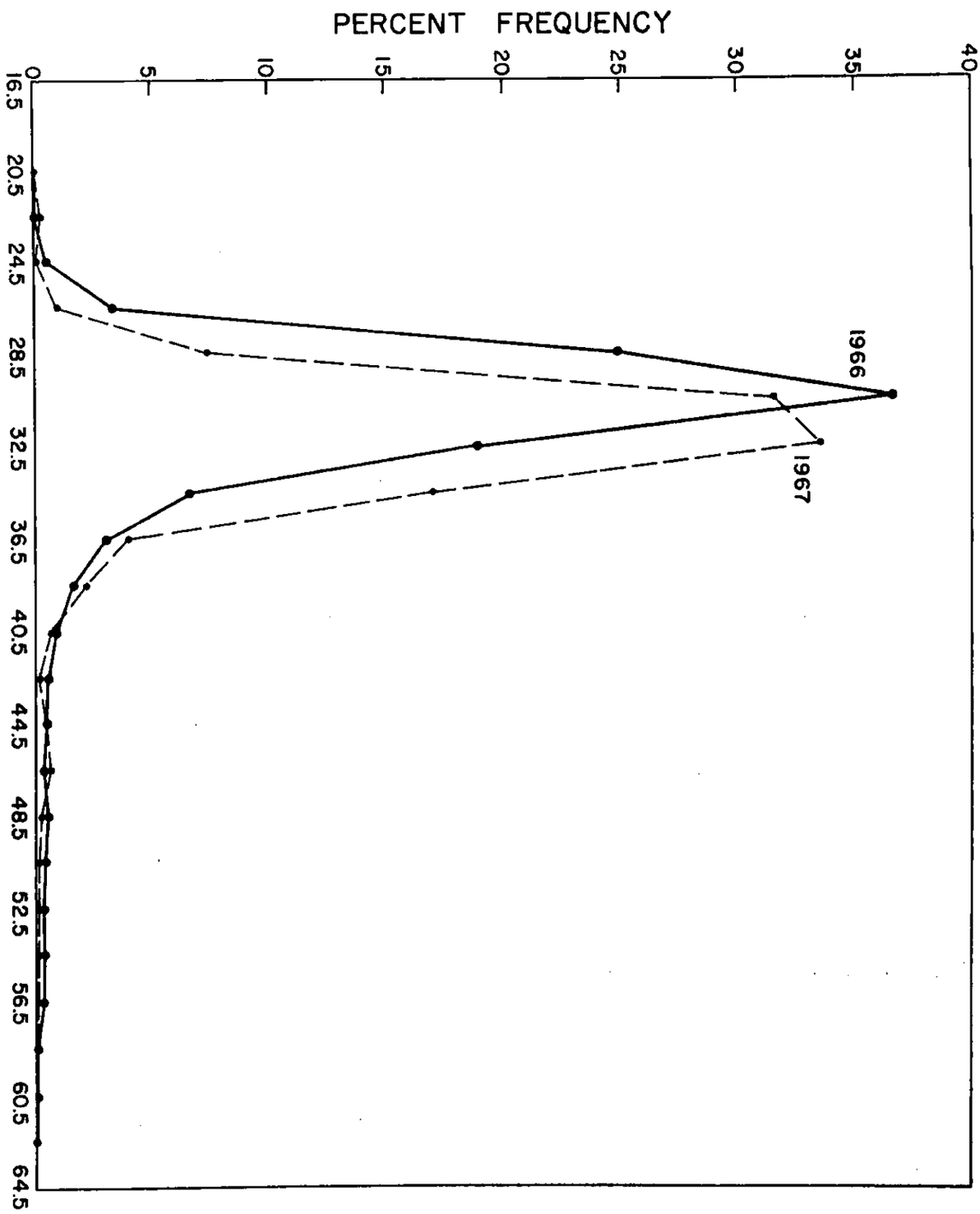

Figure 3. Silver hake length frequencies for 1966 and 1967 (Jul.-Sept.).