An Examination of Some Commercially Harvested Abalone Populations in the Moresby Island Area

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AN EXAMINATION OF SOME COMMERCIALLY HARVESTED ABALONE POPULATIONS IN THE MORESBY ISLAND AREA

by

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ABSTRACT

Adkins, B. E. 1977. An examination of some commercially harvested abalone populations in the Moresby Island area. Fish. Mar. Serv. MS Rep. 1455: 19 p.

In July 1977, five sites were visited on the east coast of Moresby Island where abalone had recently been commercially harvested. Population density and size structure were determined for each site and these results compared with a similar study done in 1976. Only three of the five sites had abalone densities and size structures indicative of a commercially harvested population. In the remaining two sites, one had a density of an unharvested population and abalone were too small for commercial harvesting in the other site.

Abalone density in the commercially harvested areas was determined to be about one abalone/m^2.

Key words: Population density, size structure, Haliotis.

RÉSUMÉ

Adkins, B. E. 1977. An examination of some commercially harvested abalone populations in the Moresby Island area. Fish. Mar. Serv. MS Rep. 1455: 19 p.

Nous avons visité, en juillet 1977, cinq stations de la côte est de l'île Moresby où l'ormeau avait récemment fait l'objet d'une pêche commerciale. Nous y avons déterminé la densité de population et la répartition des tailles et comparé nos résultats à ceux d'une étude semblable effectuée en 1976. Seulement trois des stations montraient des densités et des répartitions des tailles témoignant d'une pêche commerciale. L'une des deux autres montrait une densité caractéristique d'une population non exploitée et l'autre ne renfermait que des ormeaux trop petits pour la pêche commerciale.

La densité des ormeaux dans les emplacements exploités a été évaluée à environ 1 spécimen/m^2.

Mots clés: Densité de population, répartition des tailles, Haliotis.

INTRODUCTION

During April 1977, intense harvesting of the northern abalone Haliotis kamtschatkana occurred on the east coast of Moresby Island. In the area from Kunga Island south to Skincuttle Inlet approximately 33,000 pounds of abalone were taken. Logs of catches and locations were supplied through the Fisheries and Marine Service by local abalone fishermen in compliance with new abalone regulations. These logs are confidential and therefore no exact locations of harvesting are given. These locations may be obtained through the author for Fisheries and Marine Service purposes.

From July 28, 1977 to July 31, 1977 five commercially harvested sites were examined. Density and size structure of these populations are given as an indication of the impact of commercial harvesting on abalone populations.

METHODS

A total of six dives using SCUBA were made in five sites from Skincuttle Inlet north to Ramsay Island in Juan Perez Sound. At each site abalone density was estimated from the number of abalone found within 1 m^2 quadrats located sequentially along randomly placed vertical transects. The transects were set between the upper and lower limits of abalone distribution.

The size structure of the harvested populations was determined by collecting randomly chosen samples of approximately 50 abalone and measuring shell lengths to the nearest millimeter with a measuring board.

Exposure, algal cover, substrate, and slope were noted for each site. All depths recorded have been corrected to chart datum.

RESULTS

A. SKINCUTTLE INLET

Two sites were examined in a small bay on the south side of Skincuttle Inlet (Fig. 1).

Site 1

This site is exposed to ocean swells coming from the northeast out of Hecate Strait. The substrate is solid, sloping off gradually. The kelp Alaria sp. is the dominant cover to depth of 1 m, where bull kelp Nereocystis luetkeana and the kelps Desmarestia ligulata and Laminaria spp. take over. At a depth of 3 m the kelp disappears and the red sea urchin Strongylocentrotus franciscanus occurs at a density of approximately 5/m^2. S. franciscanus

continues to a depth of 10 m. The encrusting coralline red algae Lithothamnion spp. are the dominant cover in the sea urchin zone.

Abalone occur between the depths of +2 and 4 m. Density was estimated to be 1.7 abalone/m^2 from three randomly placed vertical transects (Table 1). The mean length of 103 mm was calculated from a sample of 74 abalone collected at this site (Fig. 2). Fifty-seven percent of these were of legal size (> 101 mm in length).

Site 2

This area is exposed to ocean swells coming from the northeast out of Hecate Strait.

The substrate is solid, sloping gradually to 4 m where it changes to cobbles and boulders. Giant kelp Macrocystis integrifolia is the dominant cover occurring to a depth of 8 m. A light cover of D. ligulata and Laminaria spp. forms the understory.

Abalone are found at depths between +2 and 4 m but are most abundant on the cobble/boulder substrate at depths between 0 and 4 m. Density was calculated to the 1.8 abalone/m^2 from three randomly placed vertical transects (Table 1). The mean length of a sample of 39 abalone was 105 mm, 56% were of legal size (Fig. 2).

B. HUXLEY ISLAND

Huxley Island is located in the south end of Juan Perez Sound. Two sites were examined here (Fig. 1).

Site 3

This site is exposed to ocean swells coming from the northwest out of Juan Perez Sound. The substrate is solid, sloping gradually and changing to boulders at a depth of 6-8 m. A dense canopy of Macrocystis beginning at a depth of 3 m and continuing down to 8 m extends along most of this area. Desmarestia spp. and Laminaria spp. form a light understory.

Four randomly placed vertical transects were set in this area and from these a density of 0.9 abalone/m^2 was calculated (Table 2). The mean length of 92 mm was determined from a sample of 62 abalone of which 53% were of legal size (Fig. 2).

Site 4

This site is directly exposed to most ocean swells coming out of Hecate Strait and is the most exposed site examined.

The substrate is solid, sloping steeply to 3 m where cobbles and boulders begin and the slope becomes more gradual.

Algal cover is very light. Alaria sp. is the dominant cover to a depth of 3 m and Lithothamnion spp. are dominant below. S. franciscanus begin at a depth of 3 m at a density > 5/m^2. The sea urchins appear to be mainly in early year-classes although a number of year-classes are present.

Abalone are found between 0 and 4 m and are generally small. A density of 1.1 abalone/m^2 was determined from three randomly placed vertical transects (Table 2). The mean length of 65 mm was calculated from a sample of 64 abalone collected within the area. Only 5% of these were of legal size (Fig. 3).

C. RAMSAY ISLAND

Ramsay Island is located in the northern portion of Juan Perez Sound. This is the most heavily harvested area of the five examined. Only one site was examined in this area (Fig. 1).

Site 5

This site is exposed to ocean swells from the west and northwest coming out of Juan Perez Sound and from the southeast out of Hecate Strait. It marks the boundary of an area closed to the commercial harvesting of abalone.

The substrate is solid sloping gradually to 5 m where it becomes boulders. A dense canopy of Macrocystis and Nereocystis is continuous along the area. The kelps Alaria sp., Cymathere triplicata, and Laminaria spp. form a dense understory to a depth of 3 m. At this depth S. franciscanus begins, occurring at densities > 10/m^2. Small sea urchins in the first 2 or 3 year-classes are abundant. Abalone are also abundant at this site, beginning at 0 m and continuing down to 4 m.

The density of abalone at this site was determined to be 4.4 abalone/m^2 from five randomly placed vertical transects (Table 3). The mean length of 91 mm was calculated from a sample of 38 abalone, (Fig. 3), of these 55% were of legal size.

DISCUSSION

Abalone populations were examined at five sites. Three sites were similar in abalone density, mean length, and population size structure. The remaining two sites differed from these either in density or mean length of abalone and in population size structure (Table 4).

Sites 1, 2, and 3 have population densities which indicate harvesting has occurred, 1.7, 1.8, and 0.9 abalone/m^2, respectively. In 1976, areas which had been harvested were found to have densities of about 1 abalone/m^2 while unharvested areas had densities between 5 and 10 abalone/m^2 (Adkins and Stefanson 1977).

Site 5 has a density of 4.4 abalone/m^2 and is located on the boundary between a harvested area and an area closed to the commercial harvesting of abalone. Due to the high density of abalone remaining at Site 5, and its close proximity to the closure area it is possible that this site was not within the harvested area.

Site 4 has a density similar to Sites 1, 2, and 3 but abalone are too small for commercial harvesting. This area had only 5% legal-sized abalone compared to 57, 56, 53, and 55% legal-sized abalone in all the other areas examined (Table 4). It is not likely that commercial harvesting has reduced the number of legal-sized abalone to this level but rather this is a factor of site exposure. In 1976 we found that smaller abalone occur in the more exposed sites. Site 4 is the most exposed site visited during this study. This site, therefore, probably has not been harvested.

The data collected from the three sites located within commercially harvested areas indicates that abalone density after harvesting is reduced to about 1 abalone/m^2.

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REFERENCES

Adkins, B. E., and A. P. Stefanson. 1977. An examination of harvested and unharvested abalone populations in the Moresby Island area. Fish. Res. Board MS Rep. 1435: 23 p.

Table 1. Abalone density observed in 1 m^2 sequential quadrats along randomly placed vertical transects at Sites 1 and 2. Depths are in meters below chart datum.

Transect					
1		2		3	
Depth	No. abalone	Depth	No. abalone	Depth	no. abalone
			Site 1		
+2	1	+1	1	+2	3
	3		1		2
	3		2		1
	5		1		3
	0	4	0		2
	1				1
2	0				0
	2				3
4	0				0
					1
					1
					7
					5
					0
				3	0

Table 1 (cont'd)

Transect					
1		2		3	
Depth	No. abalone	Depth	No. abalone	Depth	No. abalone
			Site 2		
1	1	+1	6	+1	1
	1		3		0
	2		7		1
	1		3		4
	1		4		0
	0		2	+1	0
	0		2		
	1		1		
	0		2		
	2		1		
	3		1		
	1		2		
	1	1	1		
2	1				

Table 2. Abalone density observed in 1 m^2 sequential quadrats along randomly placed vertical transects at Sites 3 and 4. Depths are in meters below chart datum.

Transect							
1		2		3		4	
Depth	No. abalone	Depth	No. abalone	Depth	No. abalone	Depth	No. abalone
			Site 3				
0	0	0	4	0	0	0	0
	0		1		0		2
	0		2		3		1
	0		2		2		5
	0		0		1		0
	0	2	0	2	3		0
	1		0		5		1
	0		0		1		3
	1		1		0		0
3	0	3	0	3	2		0
					0	5	0
					0		

Table 2 (cont'd)

Transect					
1		2		3	
Depth	No. abalone	Depth	No. abalone	Depth	No. abalone
			Site 4		
0	2	3	0	0	1
	0		1		0
	0		0		1
	0		0		4
	2		1		0
	0		0		0
	0		0		0
	4	4	0		2
	0				1
	2				2
	0				0
	0				5
2	1			4	2
	3				
	0				
	4				
	3				
	0				
4	1				

Table 3. Abalone density observed in 1 m^2 sequential quadrats along randomly placed vertical transects at Site 5. Depths are in meters below chart datum.

Transect					
1		2		3	
Depth	No. abalone	Depth	No. abalone	Depth	No. abalone
3	8	3	8	3	2
	3		3		3
	0		2		5
	6		0		2
	14		5		3
	8		0		4
	5	3	5		7
4	14			3	4

Table 3 (cont'd)

Transect			
4		5	
Depth	No. abalone	Depth	No. abalone
3	2	3	14
	2		6
	0		12
	0		5
	1		6
	1	3	3
	0		
3	0		

Table 4. Summary table of density mean length and size composition of the populations sampled.

Site	Density (no. abalone/m^2)	$\bar{X}$ length (mm)	% legal
1	1.7	103	57
2	1.8	105	56
3	0.9	94	53
4	1.1	65	5
5	4.4	91	55

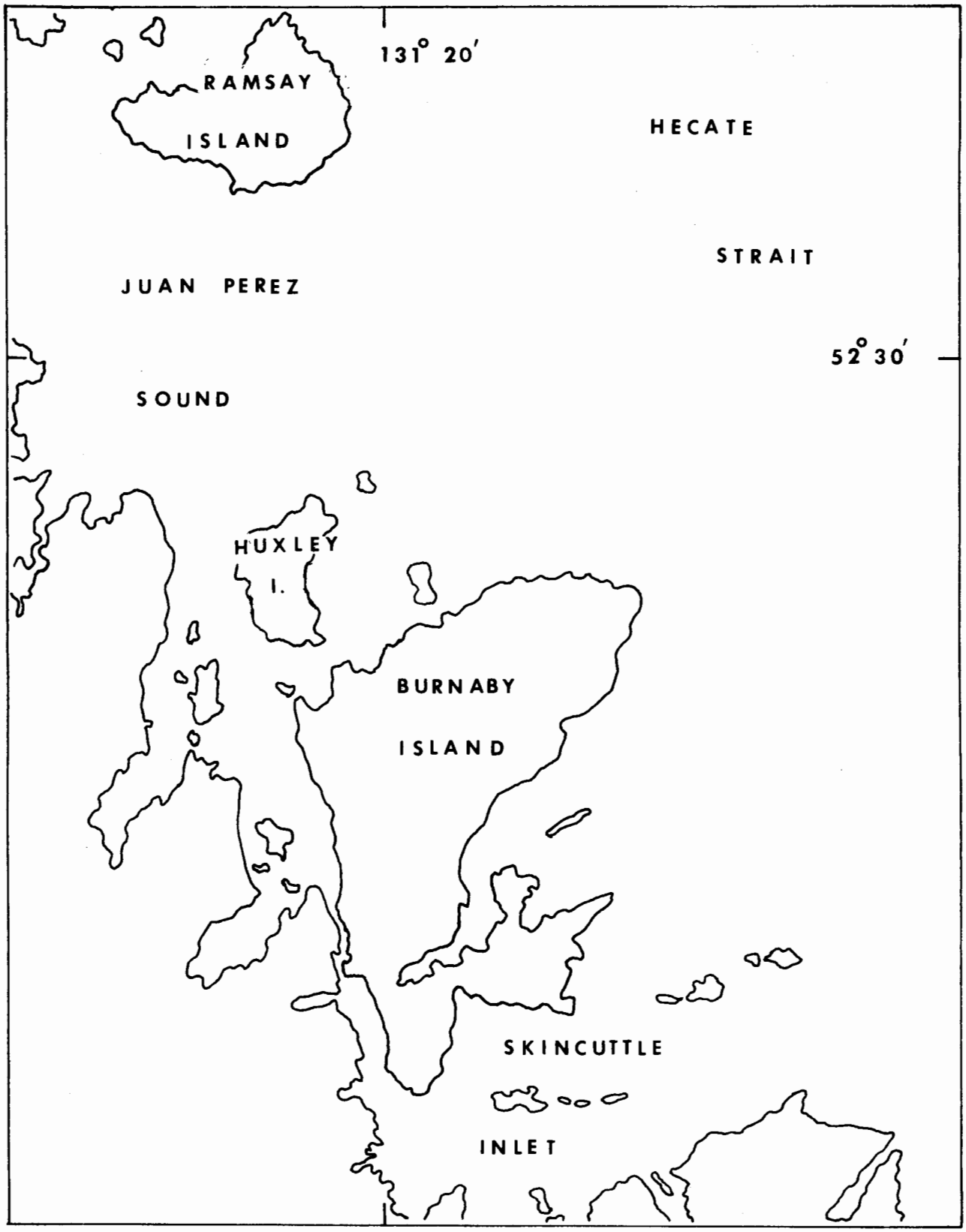

Fig. 1. The general area of the survey.

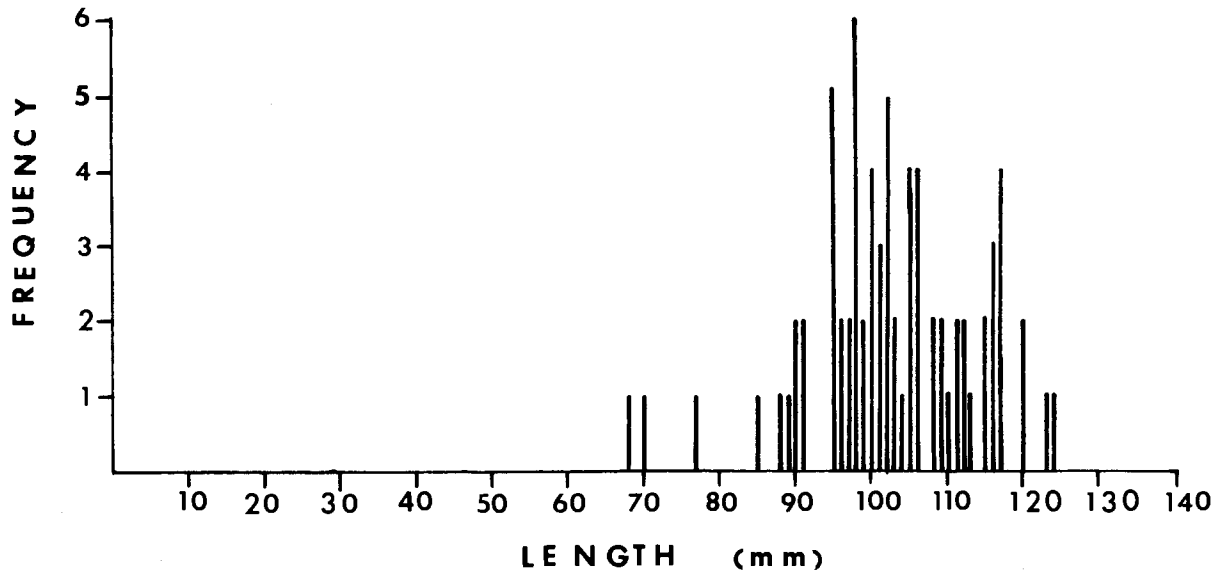

Fig. 2. Length frequencies of abalone from Site 1. N = 74.

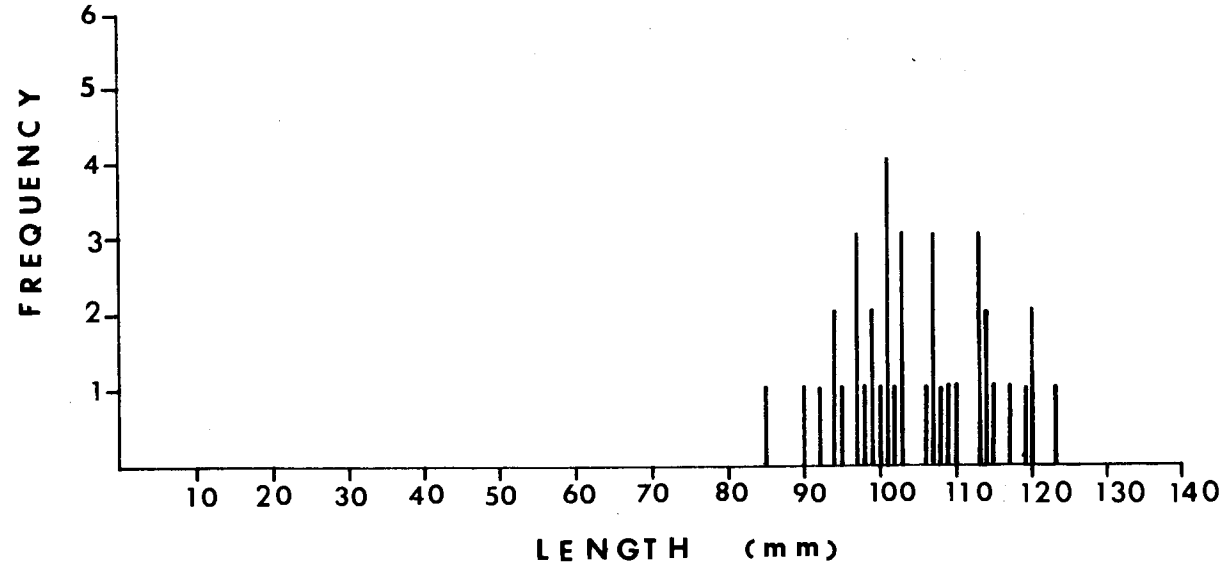

Fig. 3. Length frequencies of abalone from Site 2. N = 39.

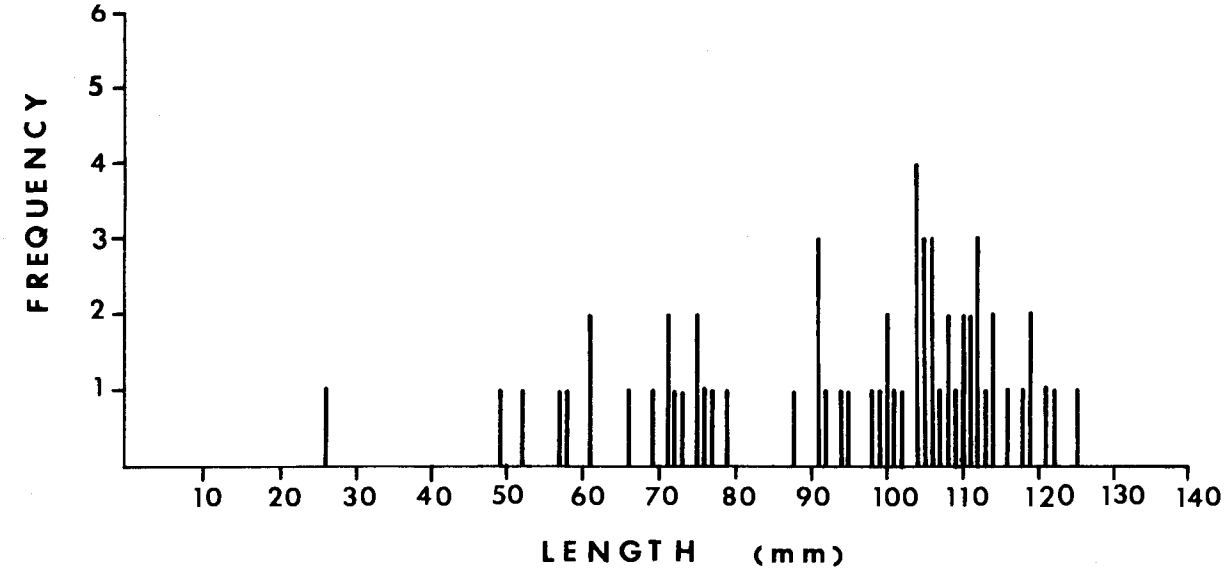

Fig. 4. Length frequencies of abalone from Site 3. N = 62.

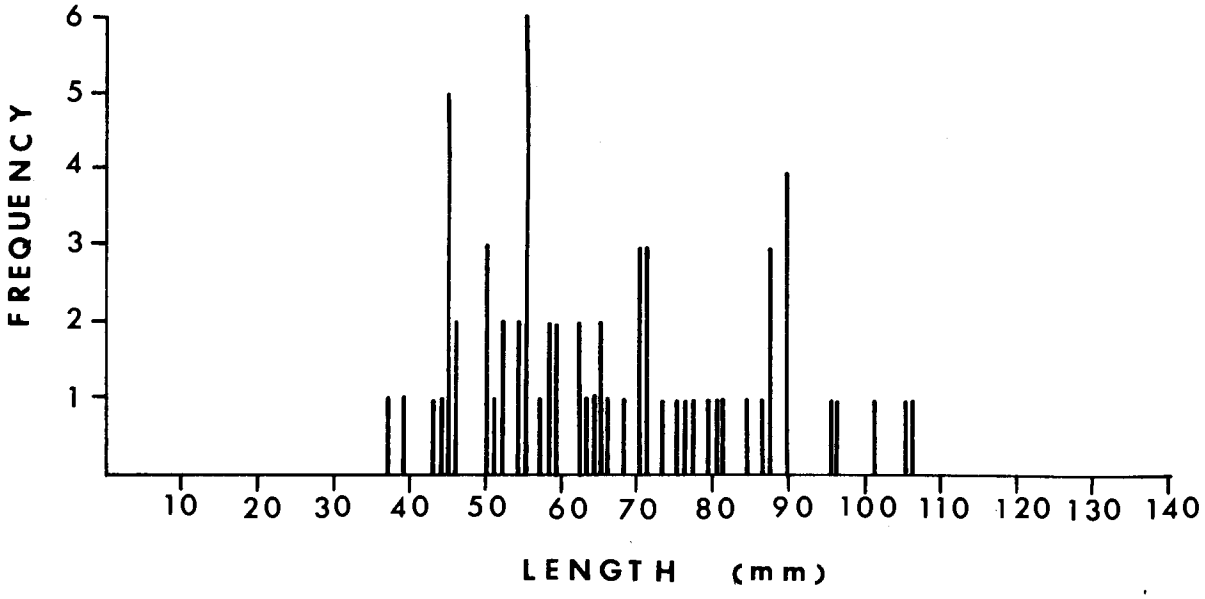

Fig. 5. Length frequencies of abalone from Site 4. N = 64.

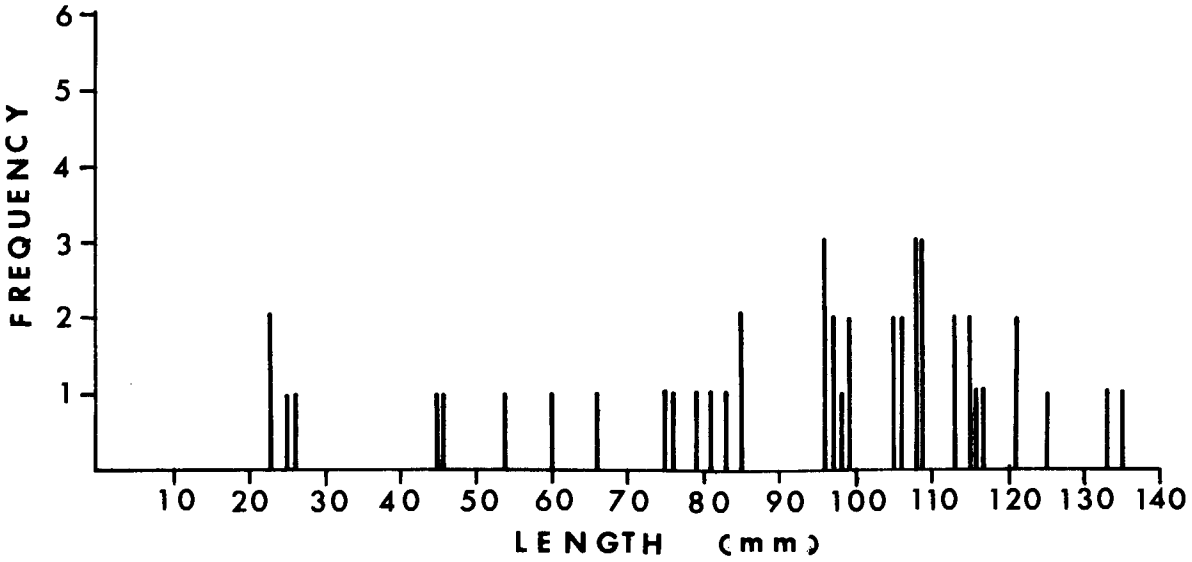

Fig. 6. Length frequencies of abalone from Site 5. N = 38.