

SIZE AND ITS RELATION TO THE SPATIAL
DISTANCE BETWEEN NEIGHBORING
STROMBUS GIGAS IN GREATER
LAMESHUR BAY, ST. JOHN, USVI.

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ABSTRACT

The purpose of this study is to examine the relationship between the size of Strombus gigas and their distribution in accordance to spatial distance from the nearest neighbor. No such correlation was evident but there are indicators that specific areas of Greater Lameshur Bay are low in S. gigas populations.

INTRODUCTION

Strombus gigas, commonly known as the Queen Conch, is the largest gastropod living in Caribbean water. (Warmke and Abbott, 1961) It is commonly found along the southern coast of ~~Central and South America~~ the Gulf of Mexico, the northern coasts of Central and South America including Bermuda and in the waters surrounding the Caribbean Islands. (Brownell and Stuebel, 1981). Queen Conch are

generally found on sandy bottoms where sea grass beds and epiphytic algae upon which Strombus gigas feed are plentiful. S. gigas lives in water as deep as 76 m but because of the availability of sunlight, rarely go beyond 30 m in depth.

For many years, the Queen Conch has been valued for its beautiful shell and tasty meat.

In the 1970's, the U.S. began importing a dramatic amount of Queen Conch from the Caribbean. (Brownell and Stevely, 1981) As a result of the overharvesting of this economically important resource, the S. gigas population has rapidly declined. Regulatory management currently includes size limits, catch quotas, and closed systems. (Conway and Morrow, 1986)

However, further research into the population the population of Strombus gigas is necessary to make these management techniques more effective. Presently, St John's National Park Service has placed a five year moratorium on the harvesting of Queen Conch in Park waters in an attempt to stabilize the declining population of S. gigas to a level above sustainable yield.

Several studies have already been done on S. gigas by SFS students in St. John. Such studies include ^{examining} the age distribution and density patterns of S. gigas. (Conway and Morrow, 1986). Jamie Holmes in 1988 studied the relationship of Strombus gigas

length to weight to depth in Greater Lameshur Bay. In her study, Harvey has observed a decline in conch population for Spring of 1989. The purpose of this study is to examine the relationship relationship between the length of Strombus gigas and its spatial distribution. The following ⁰H has been addressed: There is no correlation between the length of S. gigas and its distance from the nearest neighbor.

Methods and Materials

All observations were made over a period of 10 days using SCUBA in Greater Lameshur Bay, St. John, USVI. The dives were made in 20 ft deep water, west of Donkey Bight Coral Gardens. Sites were chosen by the diver descending in random grassbed areas. A total of 10 sites were obtained over a period of 10 days. The research was conducted by swimming along the sea floor bottom in search of S. gigas. Once S. gigas was ~~found~~ located, its length was measured with a measuring tape from tip of the spire to the end of the operature opening. This was done for every conch found. The author then began her search for the conch's closet neighbor. The distance between these two conch ~~was~~ was measured from the operature opening of the first conch to the operature opening of

the second conch using a 50 m transect. This process was repeated for each consecutive neighbor. Both length and distance measurements were recorded onto a slate. The optimal sample size was ten conch in each site. However, in certain sites the population density was so low that the optimal sample could not be obtained. The available data was arranged into graphs and tables. The average length and distance for each site was calculated as well as the overall mean for all 10 sites combined.

RESULTS

No trends were seen between the size of S. gigas and the distance between each S. gigas. Table 1 shows random spacing between different lengths of Strombus gigas. Several sites were observed to have low population densities. (Table 1) Only one conch in Area 4 was found. The observed length of conch in this study ranged from 8.9 cm to 26 cm in all 10 sites. The spatial distance between nearest neighbor ranged from .05 m to 21.8 m.

Table 2 shows the mean length & distances in each of the 10 sites. No trends between lengths and average distances were noted. The overall average length for all ten sites was 14.1 cm. The average distance between two S. gigas was 3.5 m.

Graph 1 shows an abundance of S. gigas between the range of 0m-6m. The greatest number of S. gigas was found between 0-2m from one another. S. gigas was not found between 12m-14m or 16-18m. Of the data collected, the greatest number of S. gigas fell between the length of 10-11cm and 17-18cm. (see Graph 2). In this study, 79 S. gigas were counted.

DISCUSSION

While the author did not seek to address the quantitative factors of S. gigas abundance, the lack of available conch can have a significant effect on the outcome of future experiments. For 5 of the authors ten sites, a sample size of 10 could not be obtained. Experiments on S. gigas will be greatly effected if there is not enough S. gigas to create a good ~~size~~ sample size. Lack of S. gigas in these sites may be the result of human induced activities, natural stress and biological reasons. It may also have been the authors oversight if the conch are well hidden in the sea grass beds. Man's destruction of the sea grass beds results in the loss of Strombus gigas habitat. Sea grasses, upon which S. gigas feeds, may also be destroyed by natural disasters such as hurricanes. ^{For} Biological reasons, a adult

Conch have been shown to migrate to deeper water. (Hesse, 1979)

It is interesting to note that the author only found one S. gigas in Area Four. She specifically remembers this as a sandy area abundant in milk conch.

Interspecific competition between Queen conch and Milk Conch may play a role in the Queen Conch's distribution. (Bredenberg, 1988)

Choice of substrate may also explain the lack of S. gigas in particular sites. (Fig 1)

There is evidence that juvenile conch prefer areas rich in Thalassia while adults prefer areas high in macroalgae and Syringodium. (Polychronakis, 1989)

It was also observed that the average length of S. gigas in this study was 14.1 cm.

This would classify most conch in this study as juvenile since adult conch do not reach sexual maturity until the age of 3.5 and a greater length of 18.8 cm (Brownell and Stevely)

This average may be the result of a high frequency of juveniles ranging from 10-11 cm and a high frequency of young conch ranging from 17-18 cm. Smaller conch may be more frequent in this study as larger conch migrate to deeper water and juveniles tend to live in shallower water. (Holmes, 1988)

An abundance of S. gigas was observed to between the range of 0m-2m from each other. (Graph 1) The reasons for this

are unclear. Social congregation may be one possible explanation. Further studies on the spatial distribution of S. gigas are needed.

There were many factors that may have affected the validity of this paper. The author had no statistical or computer background. Statistical tests and additional graphs would have strengthened this paper. Several of her methods and data collection could have been improved. The methods used by the author left room for error. The author would obtain greater insight into her study if substrate preference was recorded as well.

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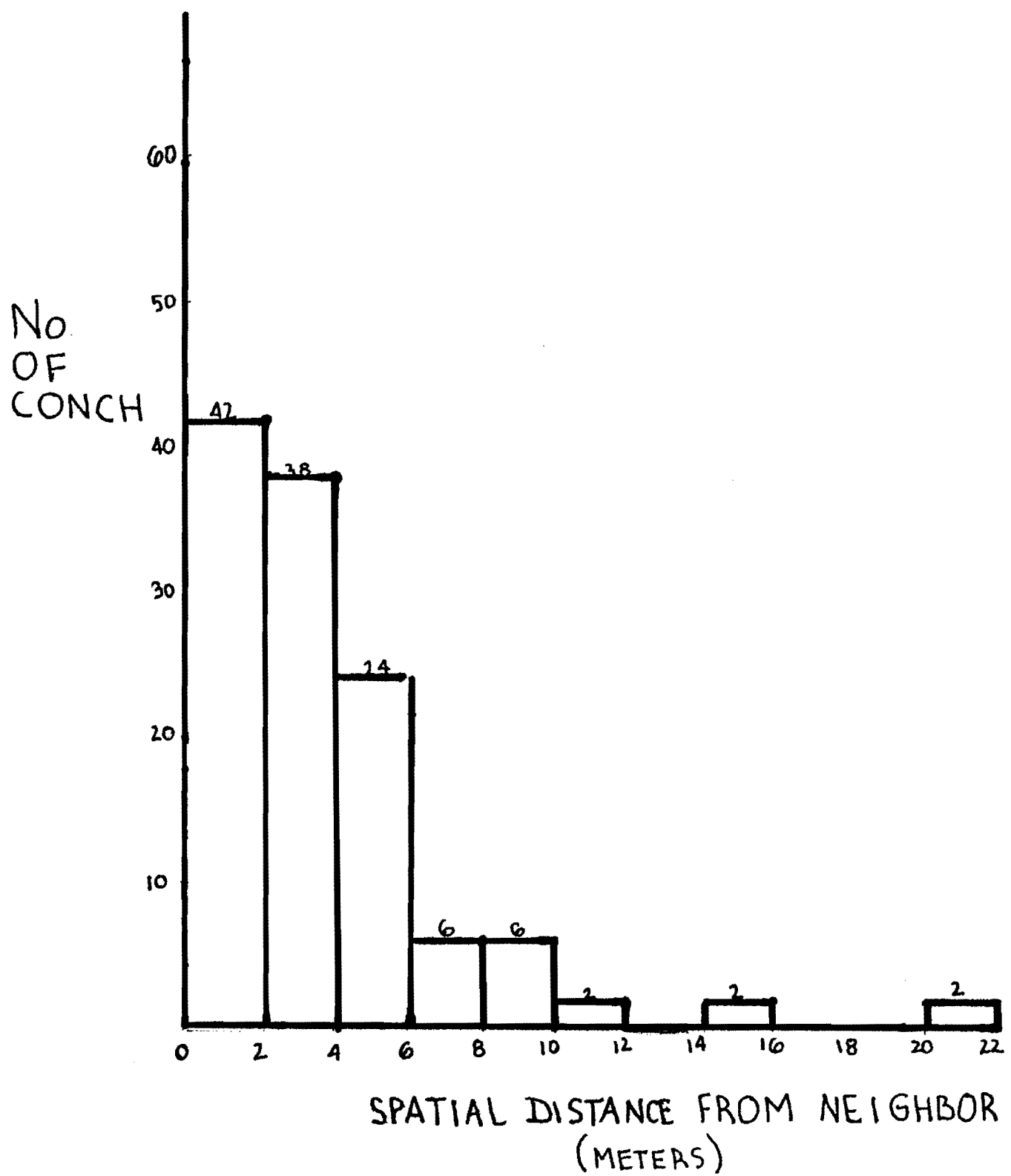
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TABLE 1
SPREAD SHEET

CONCH	Area 1		Area 2		Area 3		Area 4		Area 5		Area 6		Area 7		Area 8		Area 9		Area 10	
	(cm) LENGTH	(M) DIST.	L(cm)	D(M)	L(cm)	D(M)	L(cm)	D(M)	L(cm)	D(M)	L(cm)	D(M)	L(cm)	D(M)	L(cm)	D(M)	L(cm)	D(M)	L(cm)	D(M)
1	19.2	1.3	24.6	1.2	20.4	3.9	23.0	—	9.1	5.8	13.8	1.3	20.0	7.6	18	4.3	10	1.2	23	4.5
2	15.3	3.9	15.6	4.1	23.0	5.3	—	—	8.9	4.4	24.1	8.1	17.0	1.5	10	1.6	13	1.3	16	2.7
3	17.1	1.2	23.6	4.2	16.3	3.5	—	—	9.9	10.9	16.1	1.6	15.1	1.9	17	5.3	12	2.0	17	2.6
4	15.2	1.6	20.6	3.4	21.1	4.9	—	—	13.8	—	18.2	3.8	13.2	2.2	12	1.8	11	1.8	17	2.5
5	9.9	3.8	16.2	1.6	22.2	8.5	—	—	—	—	15.0	9.7	13.0	2.5	10	5.3	14	3.1	17	.05
6	17.3	1.5	16.8	3.5	18.2	2.9	—	—	—	—	18.1	21.8	20.0	5.7	10	6.8	14	5.1	20	5.6
7	10.6	2.1	9.1	1.1	18.8	14.7	—	—	—	—	10.2	4.5	22.0	—	15	2.0	10	1.1	17	1.6
8	15.9	2.2	10.6	.9	26.0	11.	—	—	—	—	19.6	—	—	—	11	1.6	11	1.2	11	7.5
9	21.3	3.6	9.3	2.3	11.0	—	—	—	—	—	—	—	—	—	10	3.3	8	.2	14	1.0
10	20.2	—	11.8	—	—	—	—	—	—	—	—	—	—	—	11	—	12	—	19	—

GRAPH 1

FREQUENCY OF CONCH PER SPATIAL DISTANCE



GRAPH 2

FREQUENCY OF CONCH IN RELATION TO LENGTH

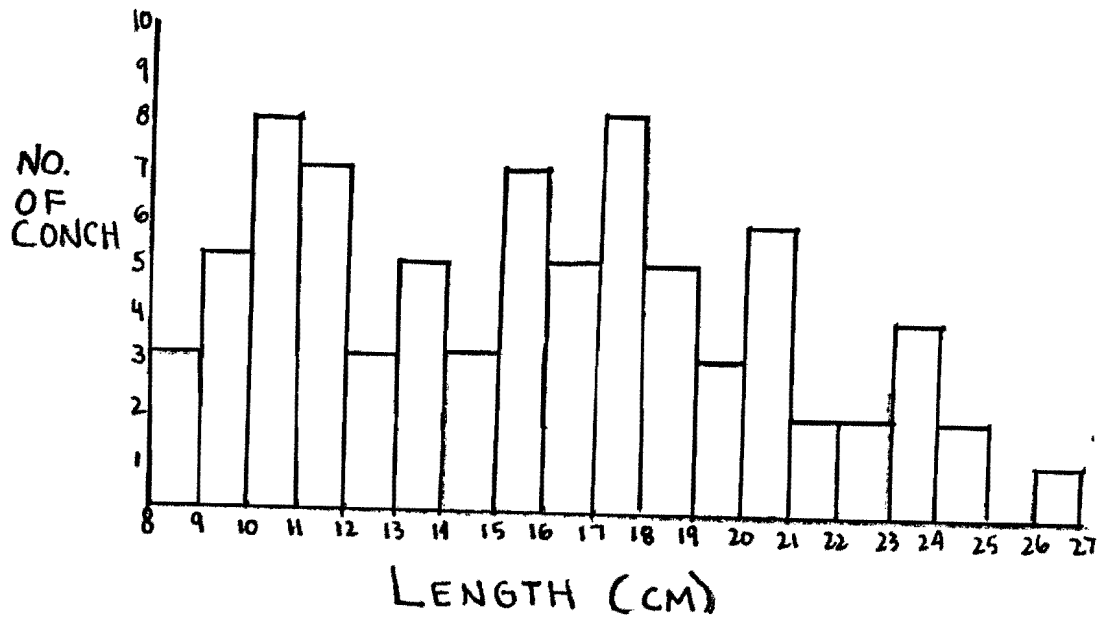


TABLE 2

AREA	MEAN LENGTH (CM)	MEAN DISTANCE (M)
1	16.2	2.4
2	14.7	2.5
3	19.6	5.6
4	23.0	0.0
5	10.4	4.6
6	16.9	7.3
7	17.3	3.6
8	12.5	3.6
9	10.2	1.9
10	17.1	3.1

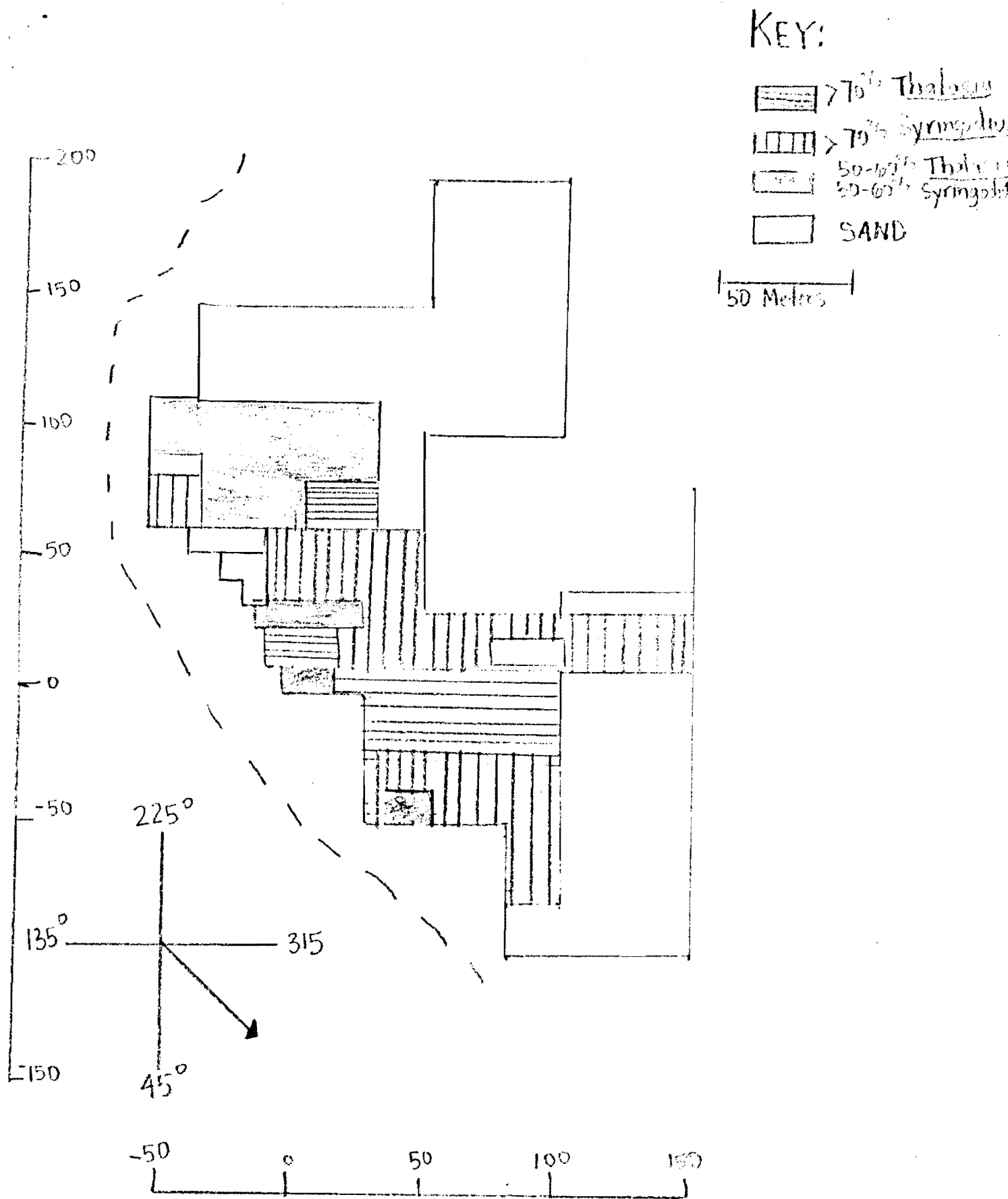


FIG 1. Condensed version of substrate composition of substrates in Greater Lamesa Bay, St. John, USVI (Adapted from Hicks, April 1983).