A colorful child-like drawing of a landscape. At the top, there are several orange flags on poles. Below the flags, there are green trees and a yellow scalloped border. Inside the border, there is some faint Thai text and numbers: "๑๑ พฤศจิกายน ๒๐๑๑ ๐๙.๓๖๓๑๘" and "๐๙.๓๙๕๓๖". In the background, there are two small figures of people, one in a pink shirt and one in a green shirt. The bottom of the drawing shows a blue body of water with green hills and white flowers in the foreground.

The GLOBE Coastal Invertebrate Protocol:

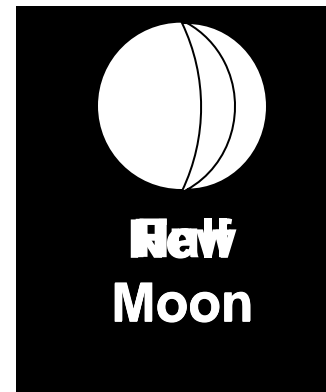
The reincarnation of the Marine Macroinvertebrates Protocol

Sarah May, Martha Conklin, University of California, Merced, U.S.A.

Mullica Jaroensutasinee, Walailak University, Thailand.

Henrietta List, Maine Mathematics and Science Alliance, Maine, U.S.A.

Stephen Zeeman, University of New England, U.S.A.



Beach



Coast

Bay

Coast

Headlands



Low
Wave
Energy

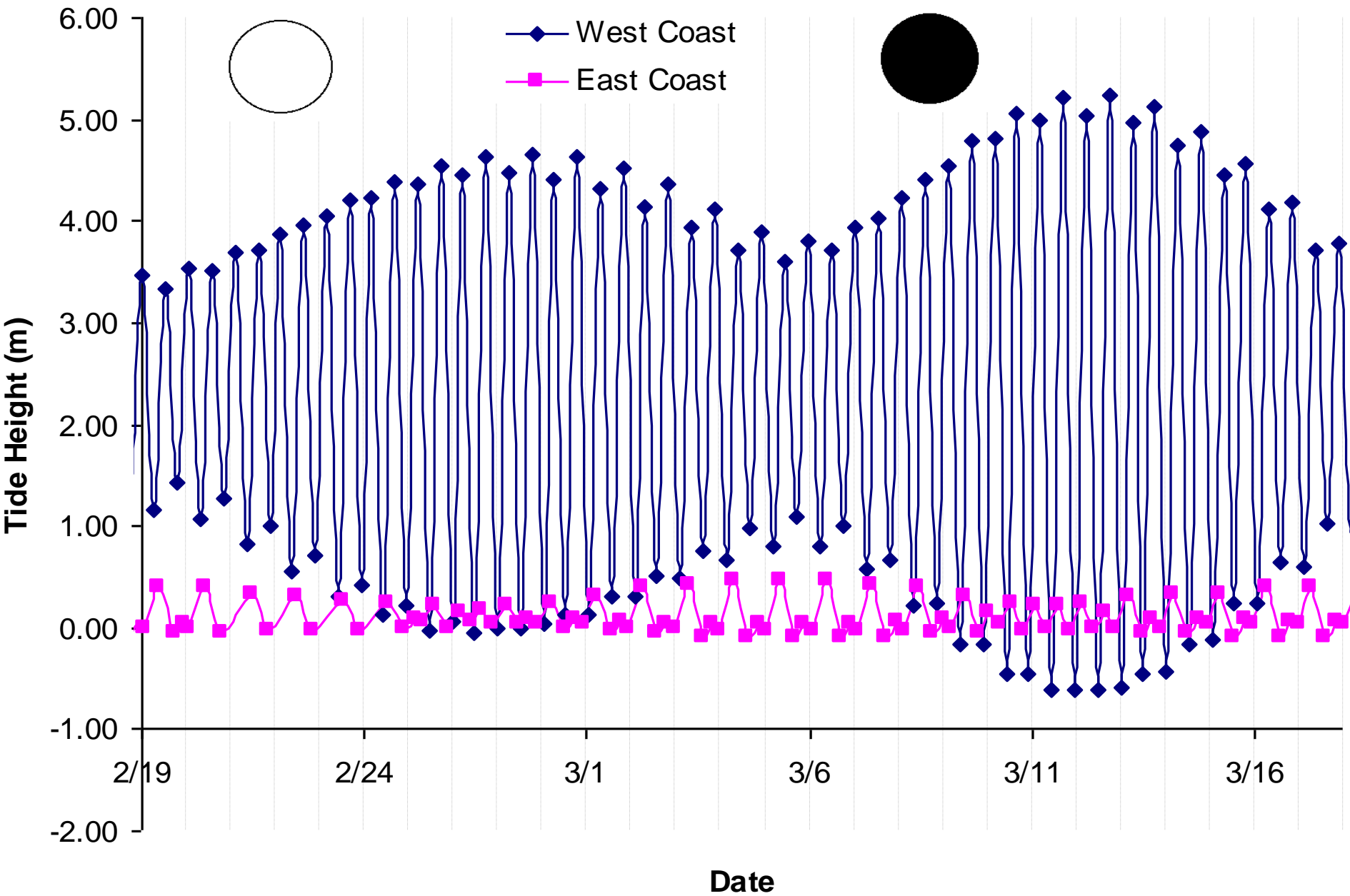
Low-Mid
Wave
Energy

High
Wave
Energy

Mid
Wave
Energy

High
Wave
Energy

Panama



Splash
Zone

High
Intertidal

Middle
Intertidal

Low
Intertidal

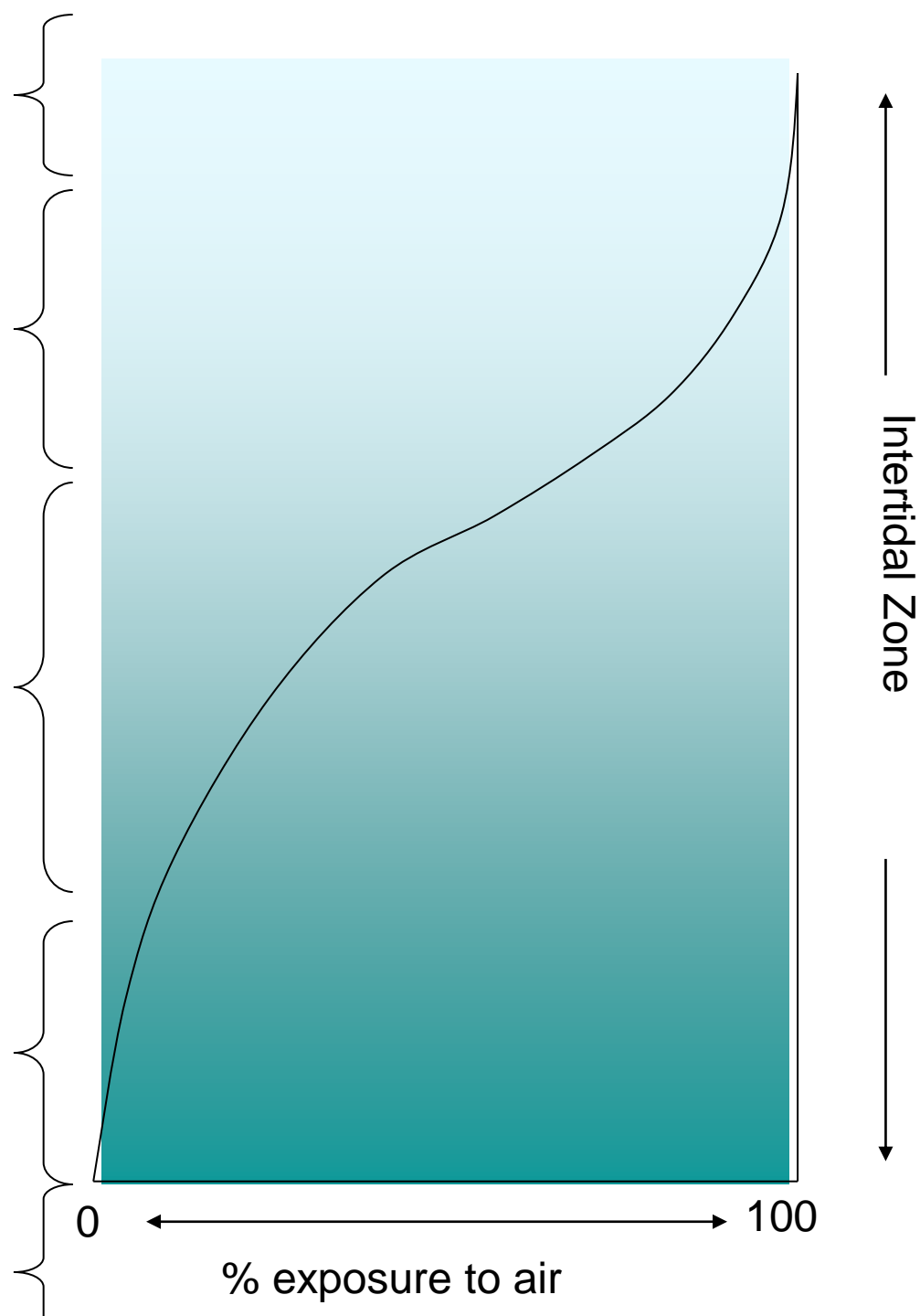
Subtidal

0

100

% exposure to air

Intertidal Zone



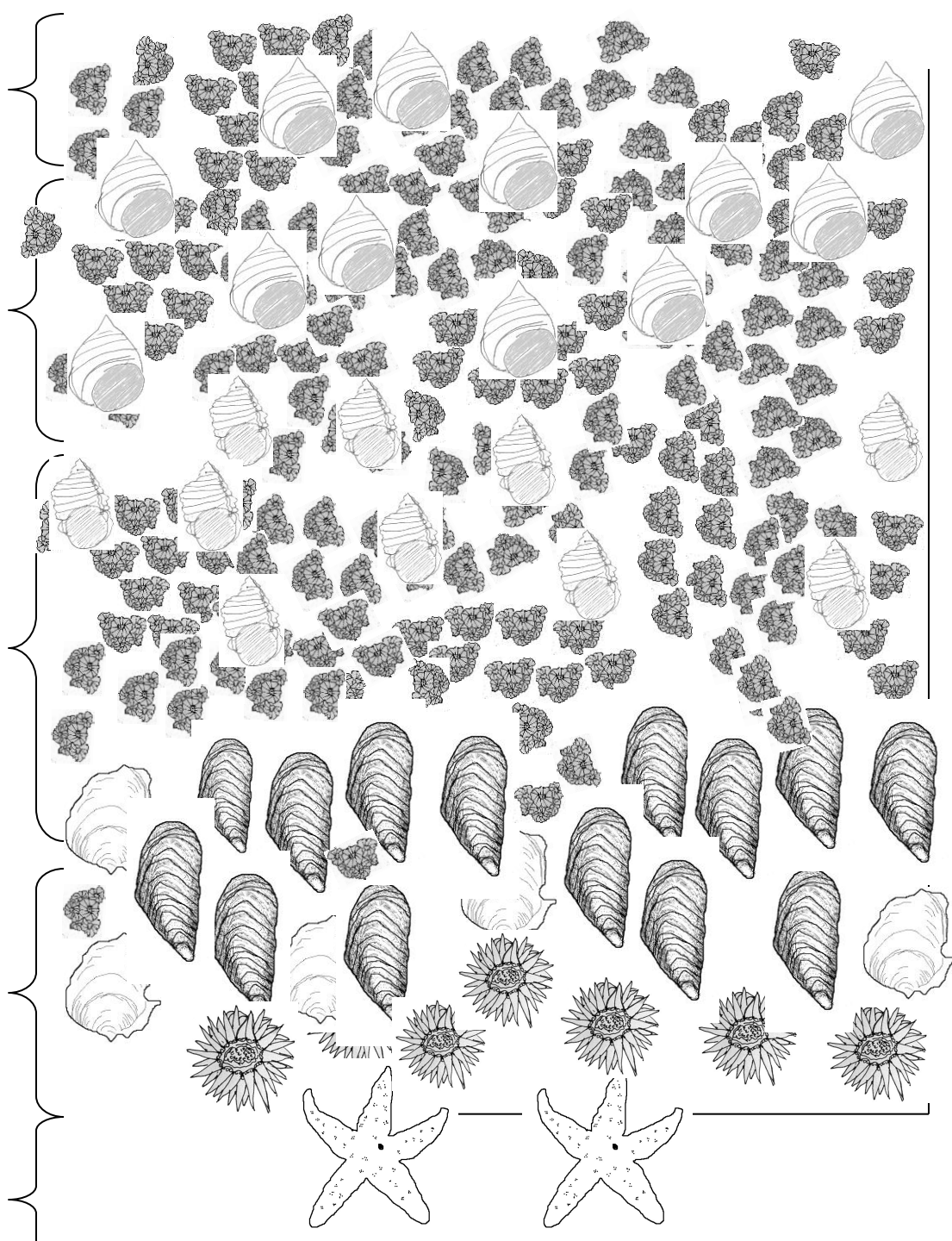
Splash
Zone

High
Intertidal

Middle
Intertidal

Low
Intertidal

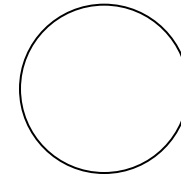
Subtidal



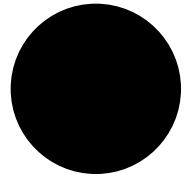
Intertidal Zone

To Characterize the Coastal Environment

- Accurately determine the time of high and low tide
- Accurately map the entire intertidal zone



Full
Moon



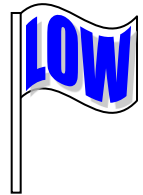
New
Moon



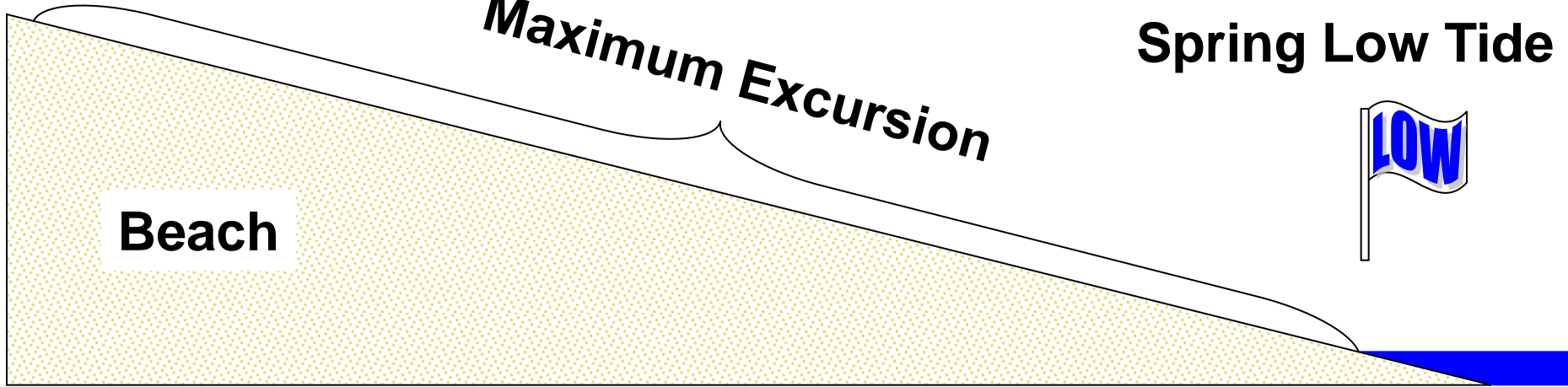
Spring High Tide

Maximum Excursion

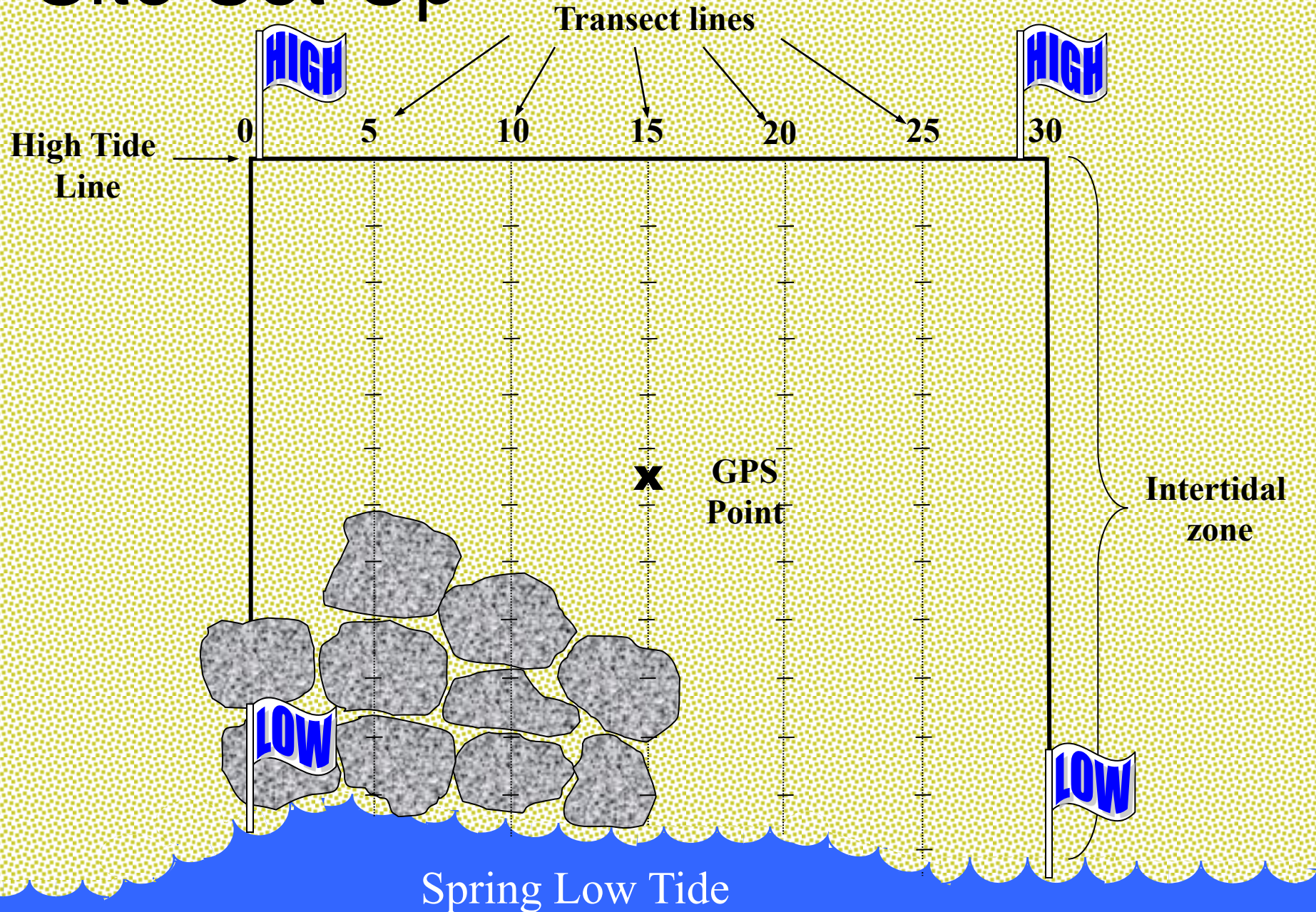
Spring Low Tide



Beach

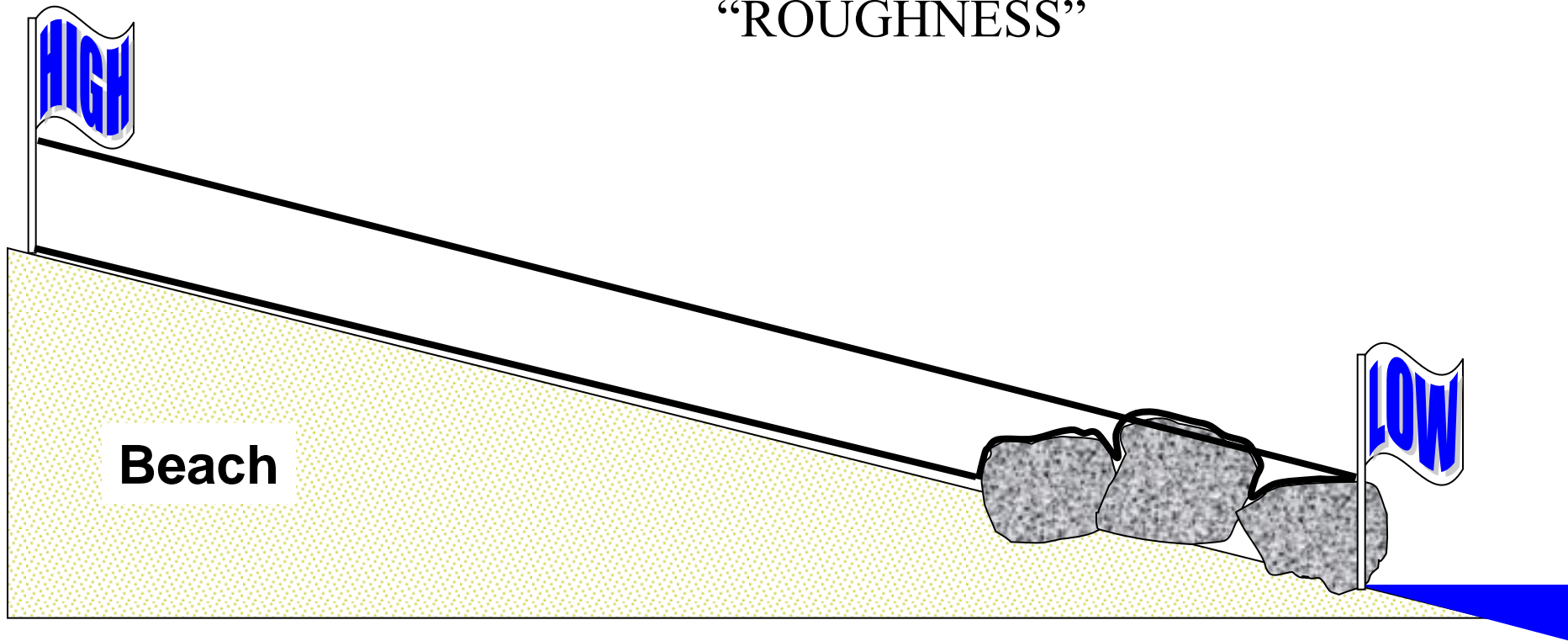


Site Set-Up



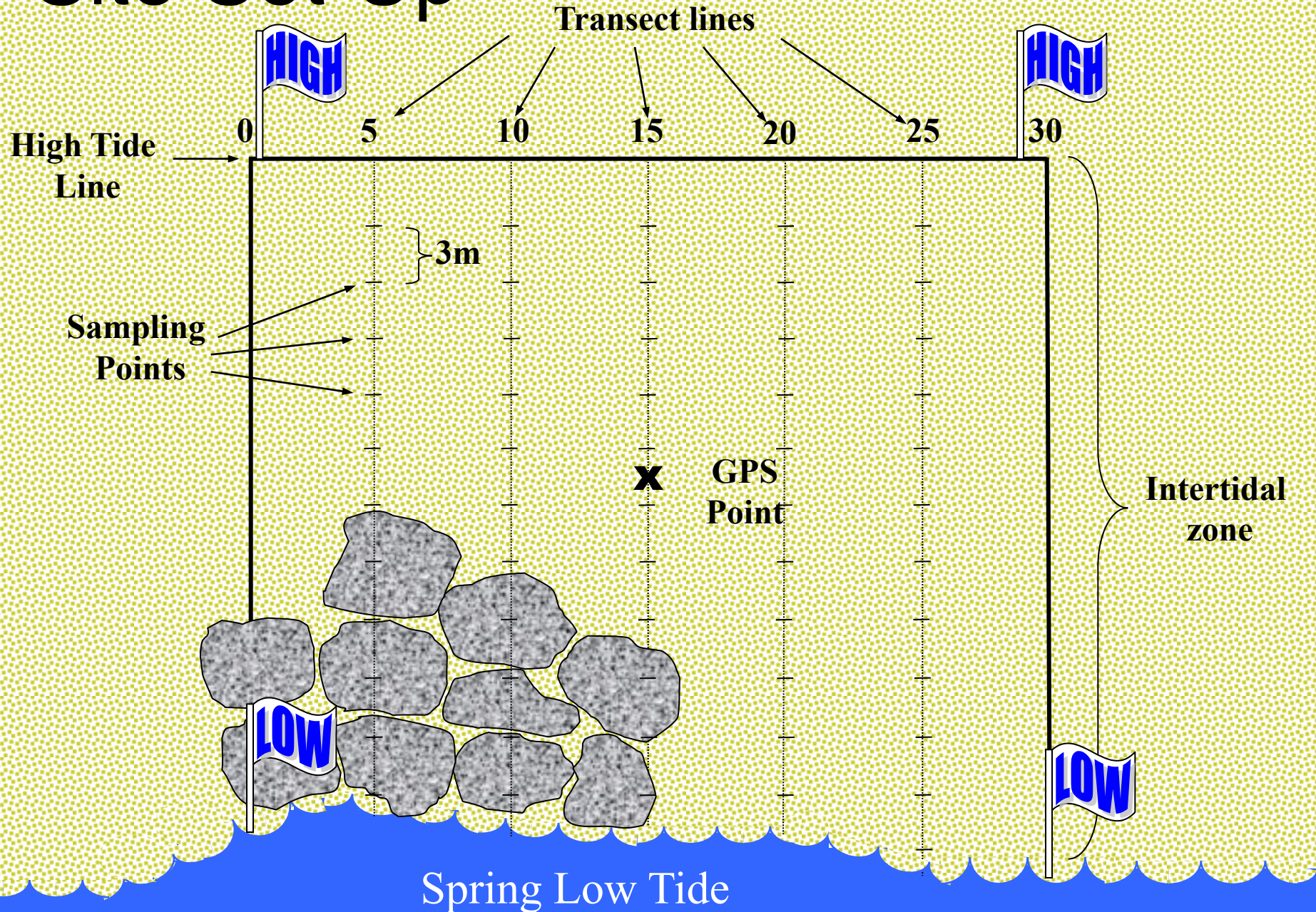
Site Set-Up - Beach profile description

1. Measure Straight Intertidal Length
SLOPE
2. Measure Substrate Intertidal Length
“ROUGHNESS”



Spring Low Tide

Site Set-Up



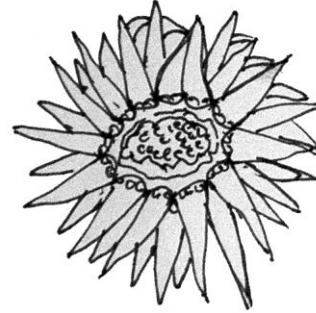
Coastal Invertebrates

- Invertebrate Censusing
- Coastal Biodiversity

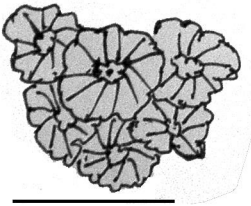
Coastal Invertebrates – Censusing



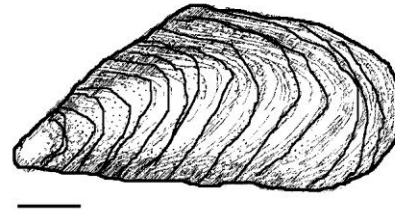
Snail



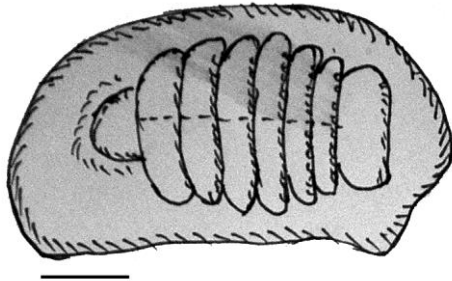
Anemone



Barnacle



Mussel



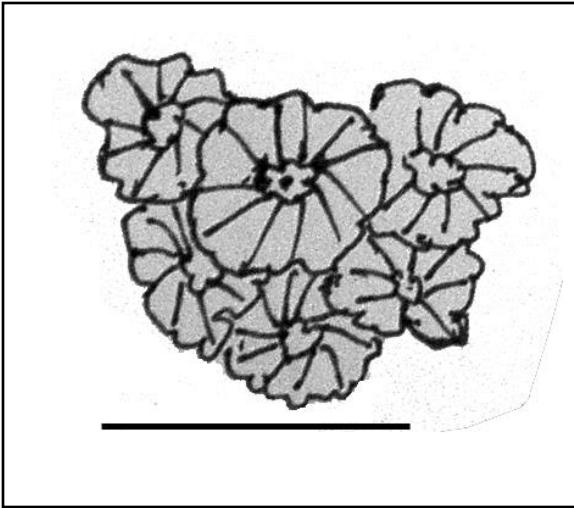
Chiton

Coastal Invertebrates – Censusing

Coastal Marine Invertebrates Prevalent Taxa Data Sheet

Taxon 1

Scientific Name: Chthamalus fissus



Common Name: the small acorn barnacle

Substrate Found: ROCK

Phylum: Arthropoda

Class: Crustacea

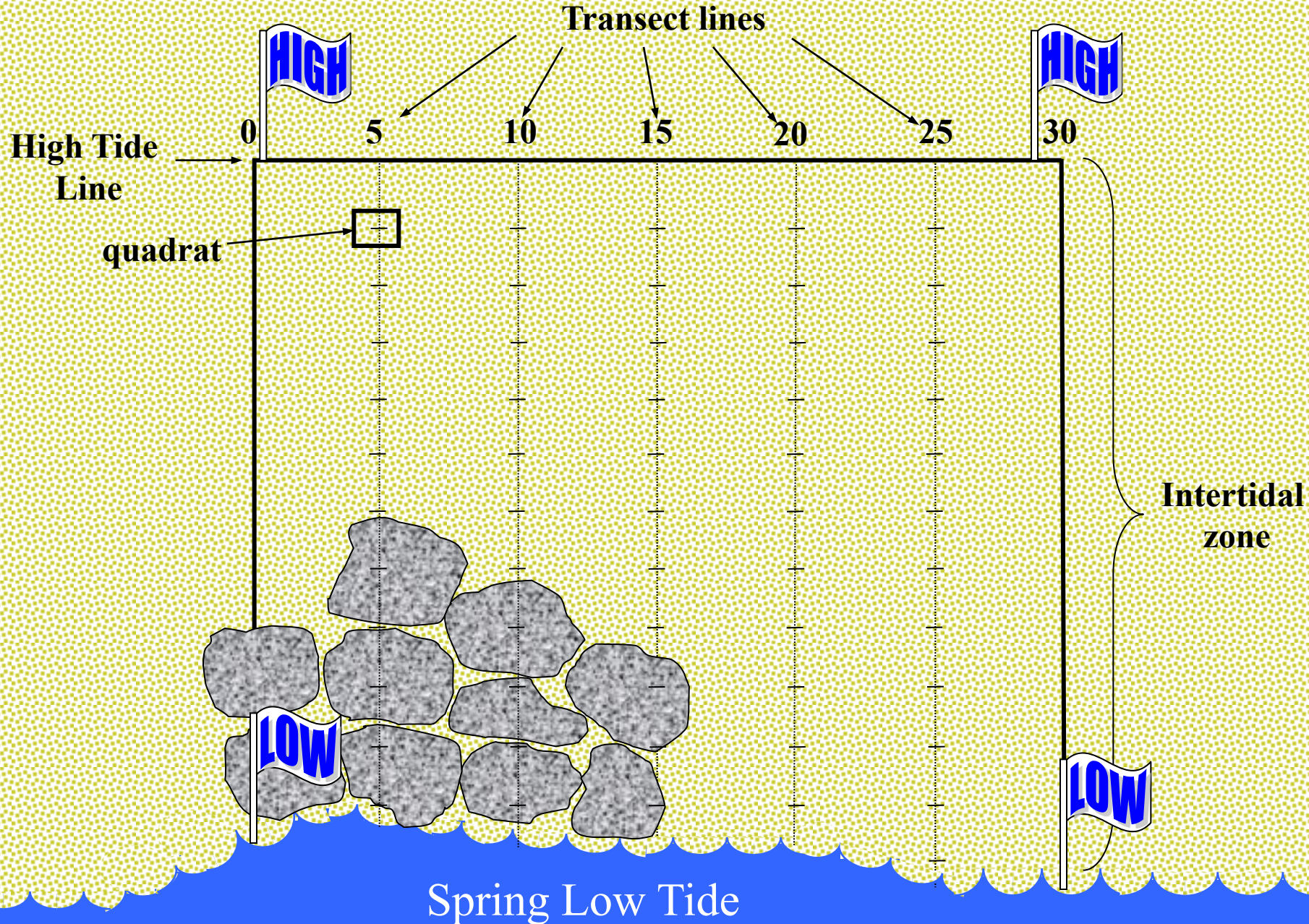
Order: Thoracica

Family: Chthamalidae

Reference: Brusca, R.C. 1973. A handbook to the common intertidal invertebrates of the Gulf of California. U. of Arizona Press. Pp.427.

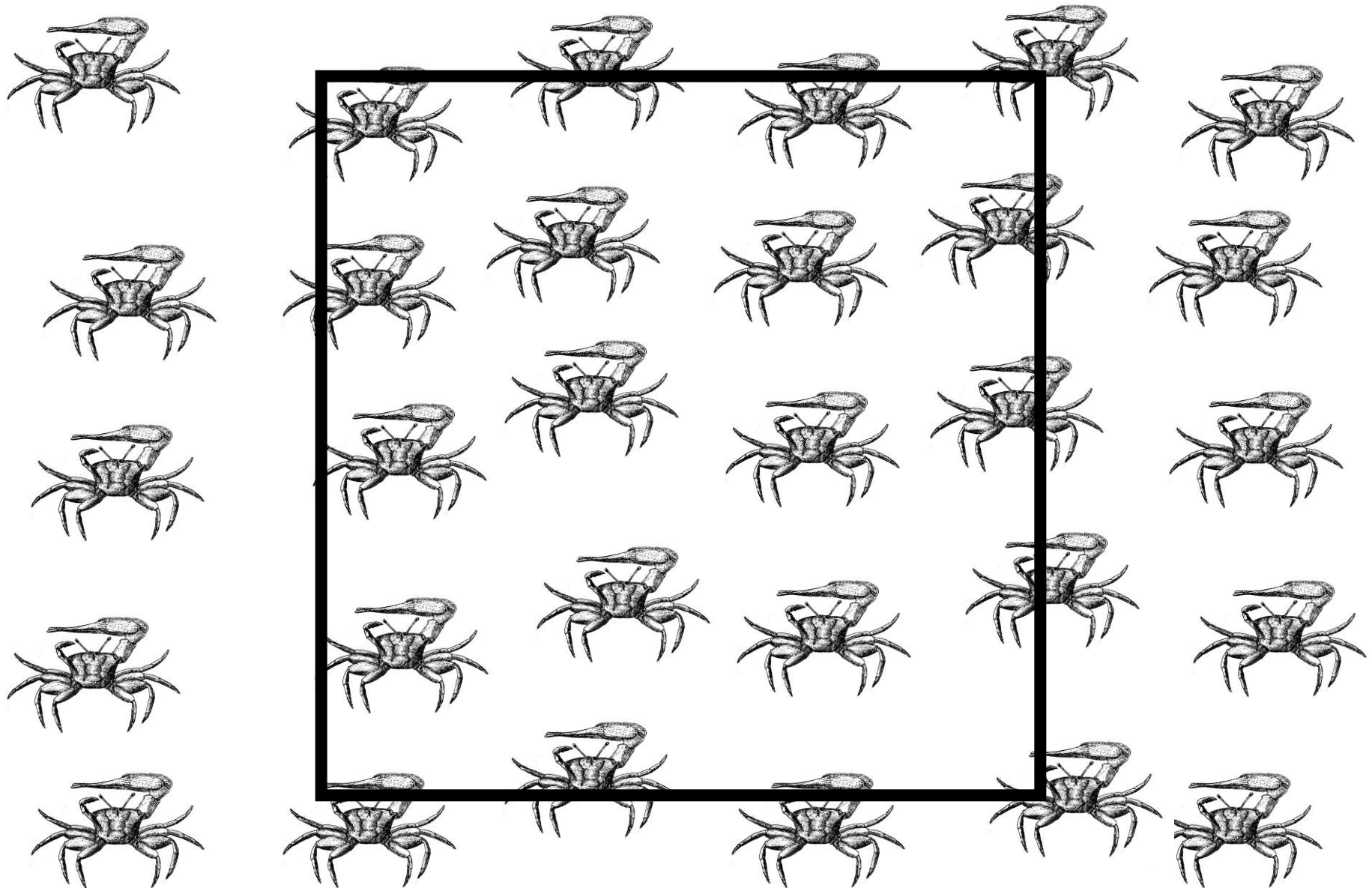
Notes: Really small barnacle - need to subsample

Coastal Invertebrate - Censusing



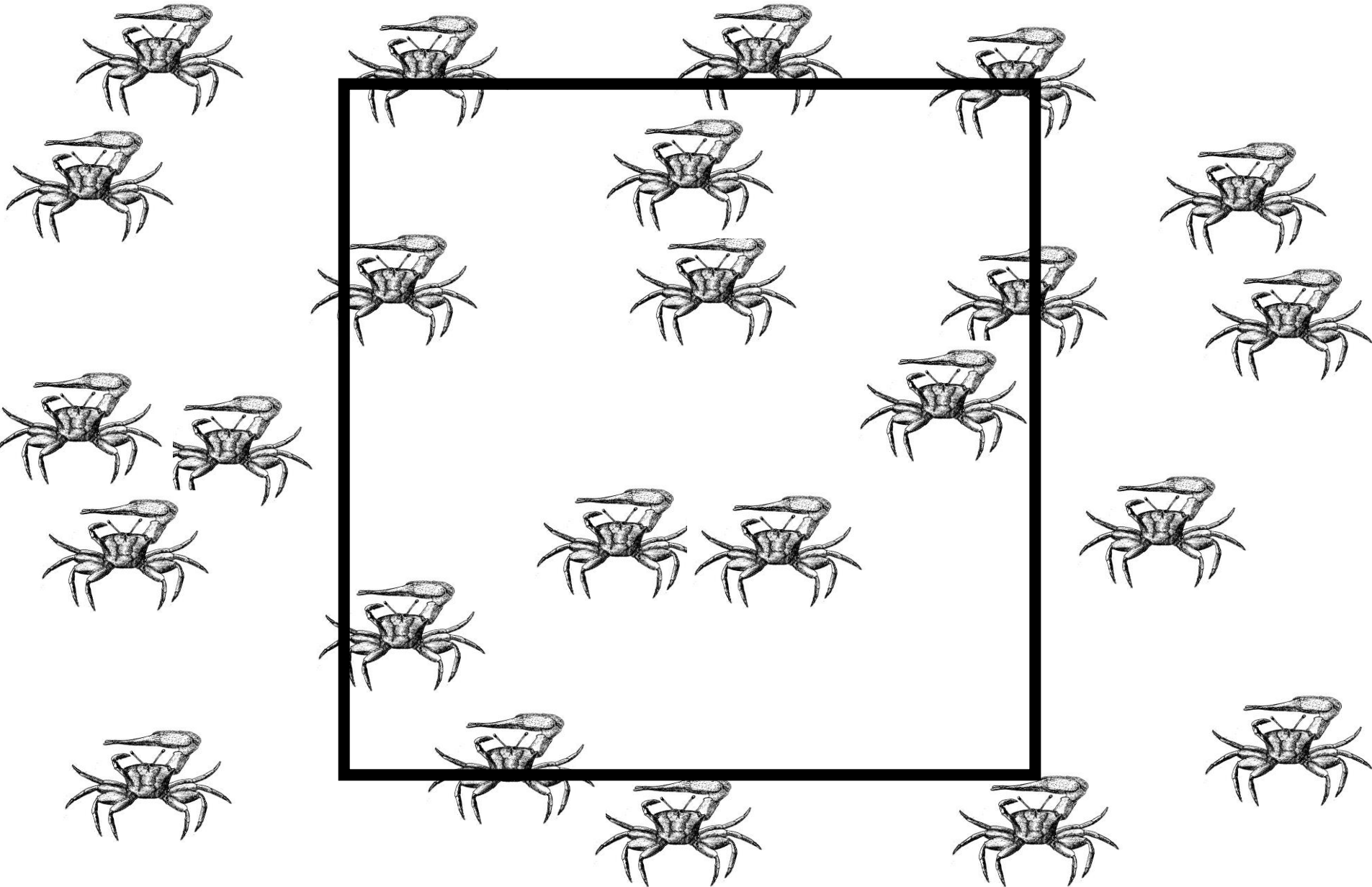
Coastal Invertebrates – Censusing

Even Distribution



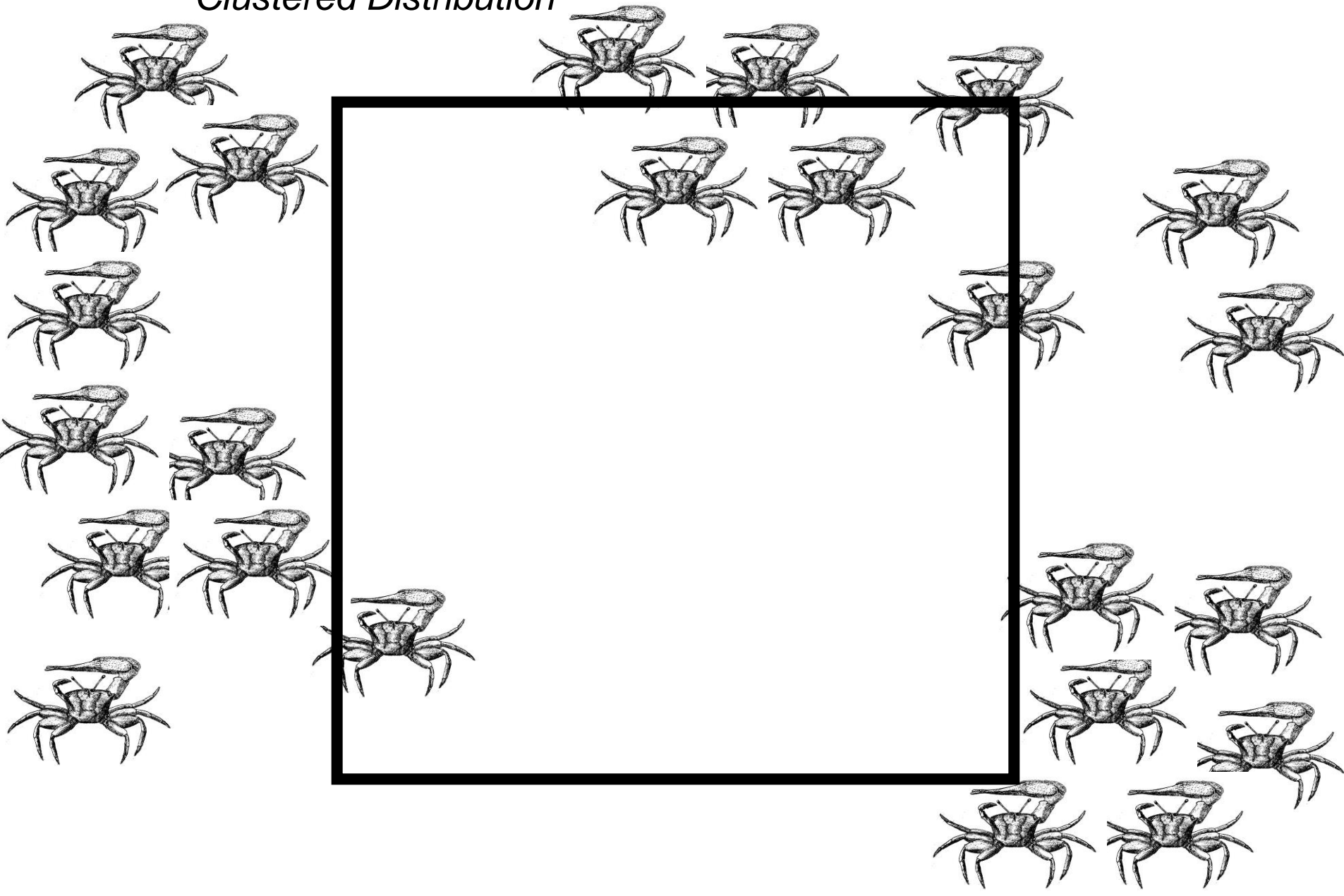
Coastal Invertebrates – Censusing

Random Distribution



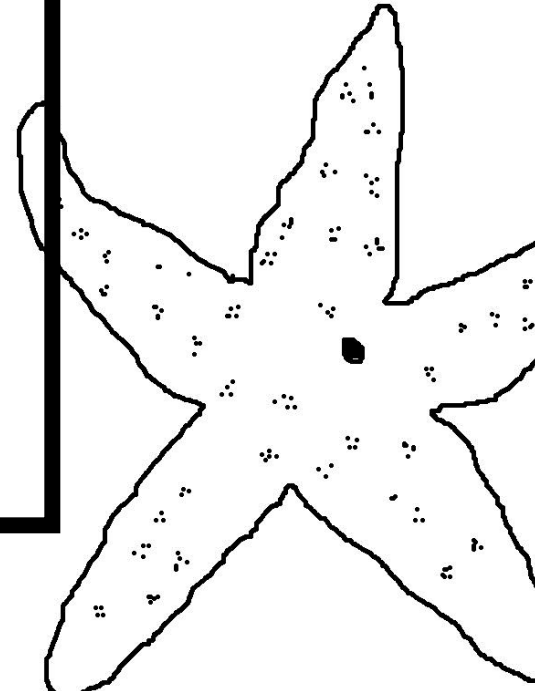
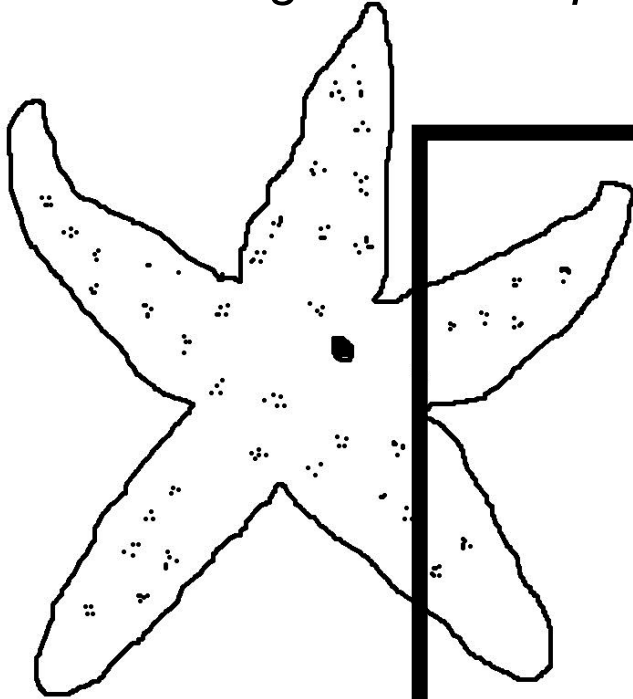
Coastal Invertebrates – Maximum Density

Clustered Distribution



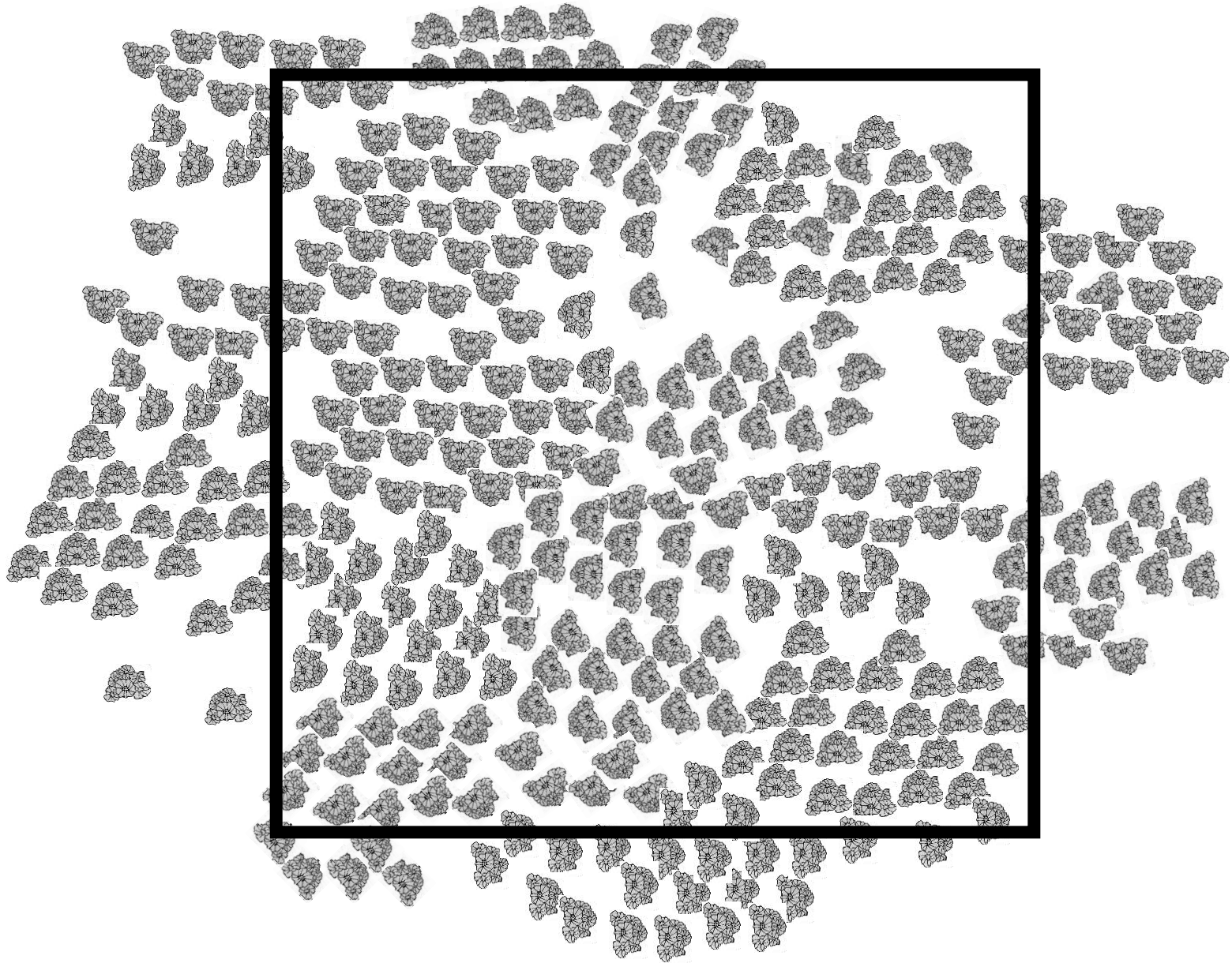
Coastal Invertebrates – Total Counts

Large and Conspicuous



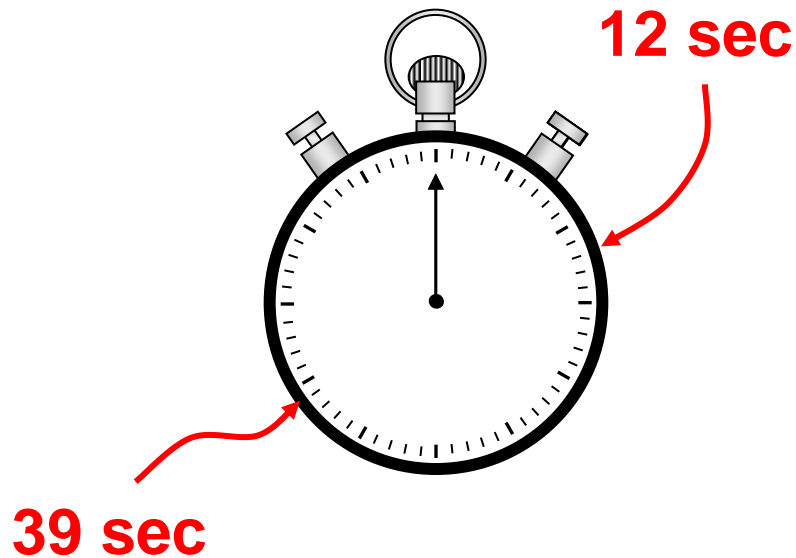
Coastal Invertebrates – Subsampling

Small and Numerous



Coastal Invertebrates - Subsampling

1. Look at your stop watch & read seconds



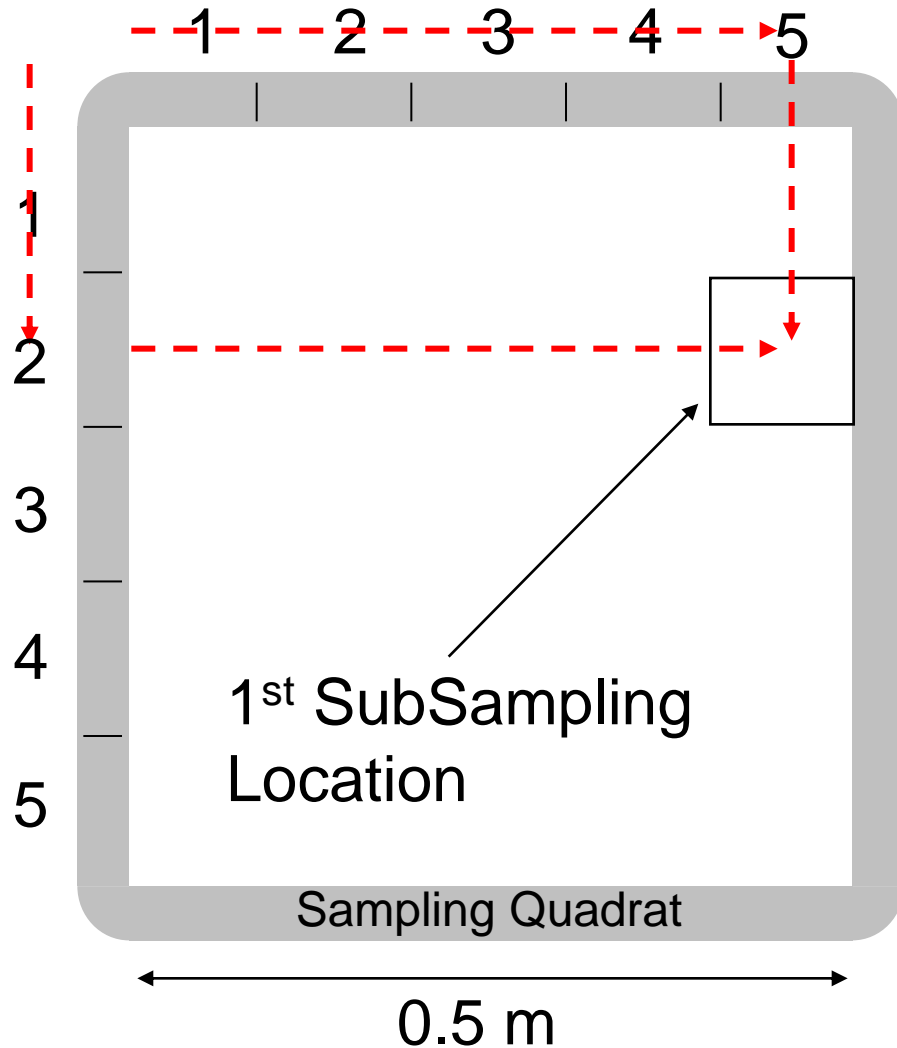
2. Use random number table to determine transect location

	0	1	2	3	4	5
0	2	1	3	3	1	3
1	4	5	5	1	4	4
2	5	2	1	3	3	2
3	2	5	5	4	2	3
4	4	1	2	3	4	5
5	5	4	4	5	2	1
6	3	2	2	3	3	4
7	1	2	4	2	1	5
8	4	5	1	1	5	3
9	1	3	2	5	4	1

Coastal Invertebrates - Subsampling

First random
Number = 5

Second random
Number = 2



Coastal Invertebrates - Censusing

Coastal Marine Invertebrates Sampling Data Sheet

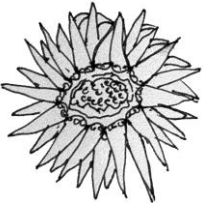
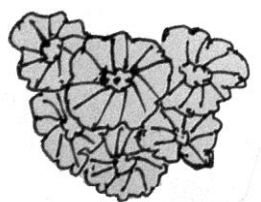
[illegible]

Coastal Invertebrates – Censusing soft substrates

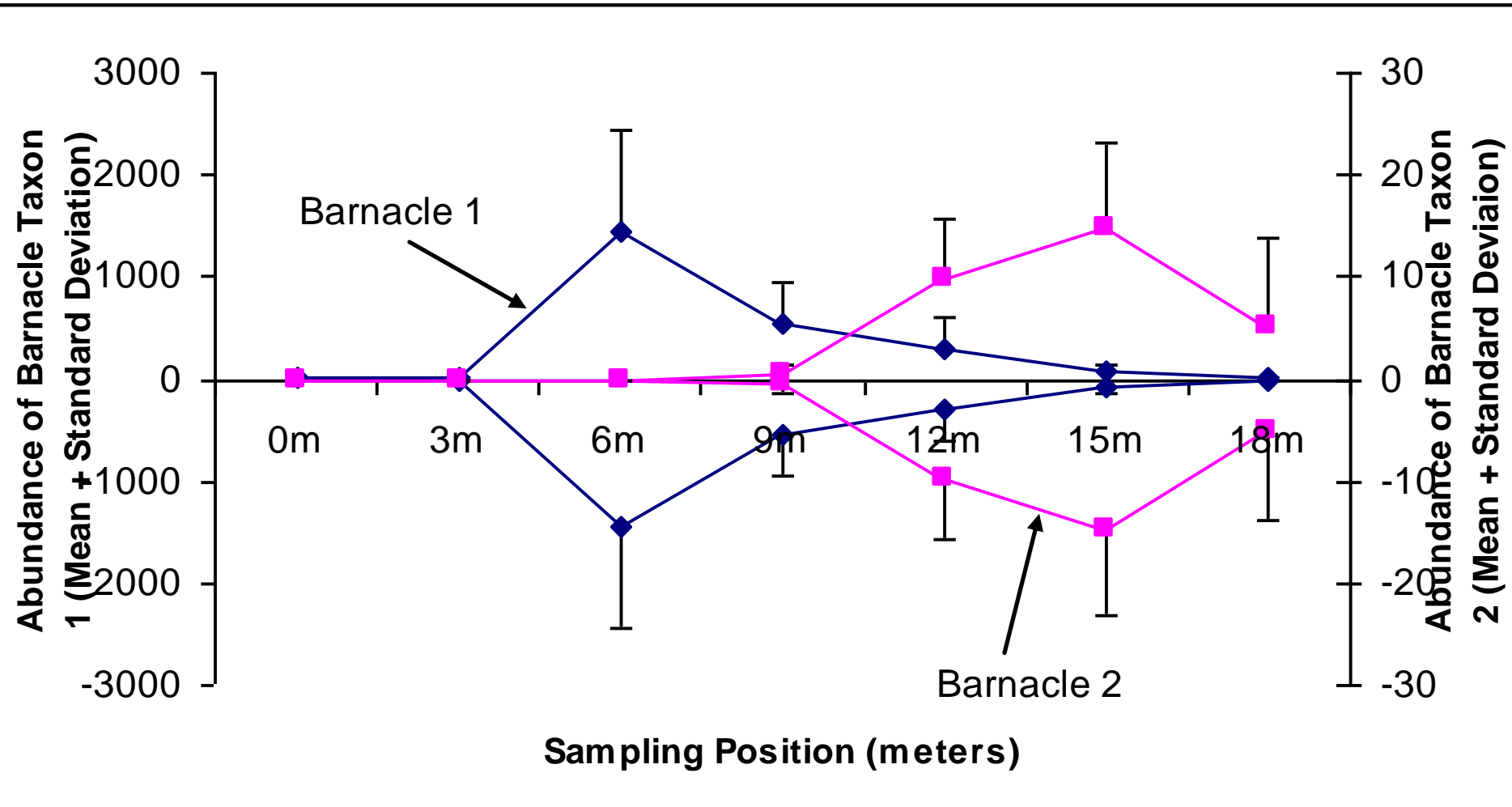
- If substrate is sandy, students dig out quadrat area down to 10 cm and pass through a 2mm sieve
- If substrate is muddy – *To be determined*

Coastal Invertebrates- Biodiversity

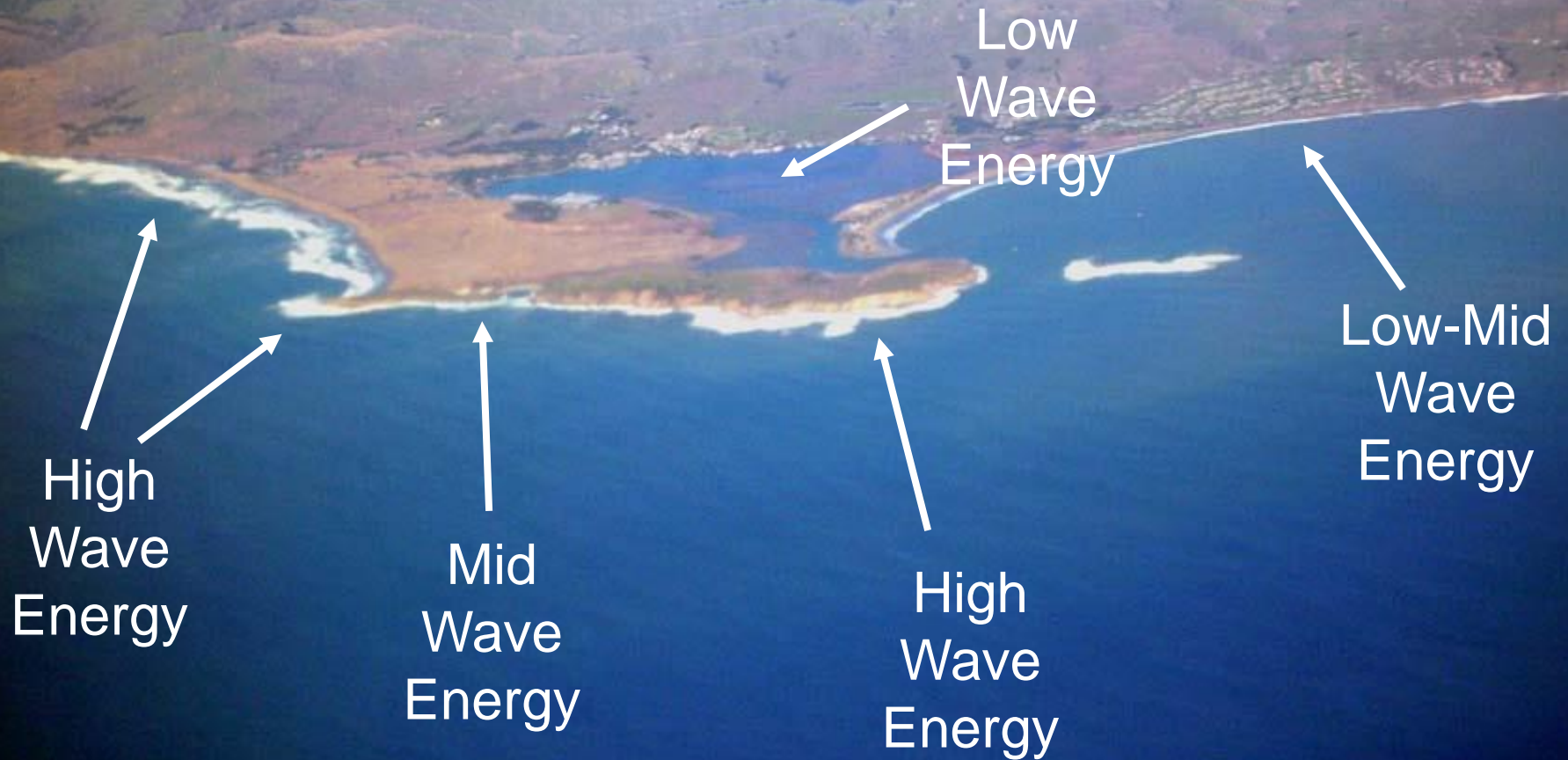
Coastal Marine Invertebrates Biodiversity Checklist Data Sheet - Example

Taxonomic Group	Found in:						Description
	Hard Substrates	Soft Substrate (sand)	Soft Substrate (mud)	Marsh	Mangrove	TidePools	
 Anemone							Phylum Cnidaria which includes corals and jellyfish. They are found within the lower intertidal or in tide pools since the cannot withstand desiccation well.
 Acorn barnacle							Phylum Arthropoda which includes spiders, crabs and shrimps. Can be very small and numerous on hard substrates. Found throughout the intertidal –can stand desiccation well.
Organisms of Local Interest (List)							

Coastal Invertebrates – Looking at the Data



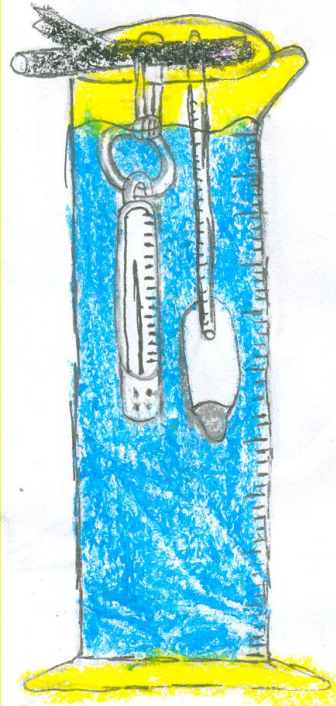
Coastal Invertebrates – Looking at the Data - biodiversity



Thanks!

Questions

smay@ucmerced.edu



คุณสมบัติ (34 ค) 1.025 , 1.025 , 1.025

เขียนตารางไว้ 39.1 ppt