COASTAL ENVIRONMENT CENTRE

Year 11 BIOLOGY FIELDTRIP

Provided by the **Coastal Environment Centre** starting at the CEC

Biological Diversity and

Ecosystem Dynamics Fieldstudy

Year 11 Module 3 and 4 Biology Student Outcomes

A student:

- designs and evaluates investigations in order to obtain primary and secondary data and information BIO11/12-2
- conducts investigations to collect valid and reliable primary and secondary data and information BIO11/12-3
- analyses ecosystem dynamics and the interrelationships of organisms within the ecosystem BIO11-11

Program:

Arrive at Coastal Environment Centre and meet Educators.
Brief lecture on Rock Platform Ecology, safety and protection.
Walk towards the nearby Narrabeen Rock Platform and enjoy a brief morning tea break on the way.
Divide into smaller field groups if necessary, each class will be led by a CEC Educator with a teacher supervising.
Begin the Rock Platform Ecosystem fieldstudy. If there are large waves, CEC Eds and teachers will discuss options.

For Module 3, students explore the biodiversity and abundance of the rock platform and identify the habitats and trophic levels of more than a dozen organisms. They compare two micro habitats to uncover which will have the greatest species richness. Working in small groups they collect and interpret their first hand data and consider how to improve their reliability and validity. Individually students examine two organisms to discover their structural, physiological and behavioural adaptations.

A Depth Study Option may also be begun by motivated students after Module 3, instead of all or parts of Module 4. We are quite flexible and can help students get started collecting their own primary data for their research.

For Module 4, students will use a transect technique to investigate how the abiotic factors of temperature, depth and salinity will affect the distribution of at least four species. Either during the fieldtrip or after their fieldtrip, students can have the option of graphing their data so they can explain the trends and patterns that they have observed.

Return all CEC equipment and leave rock platform for a lunch break at NN SLSC.
Conclude great fieldtrip and travel back to school.

Students need to bring:

Clipboard, Worksheet, Pens and Pencils
Fieldtrip Planning Group Sheets
Lunch, Morning Tea, **Water**
Hat, Sunscreen and Raincoat (if necessary)
Old Sandshoes (that can get wet)

northern beaches council | Coastal Environment Centre Narrabeen

Managing for biological diversity on the rock platform.

What human activities might put pressure on this ecosystem……

……..

What are would be the consequences if a species was overharvested and becomes locally extinct?.....

……...

What has been done to protect this rock platform and who is responsible for managing this natural resource?

.....

By 2100 sea level is predicted to rise by 0.5 m. How might a 0.5 m sea level rise affect this ecosystem?

……

……

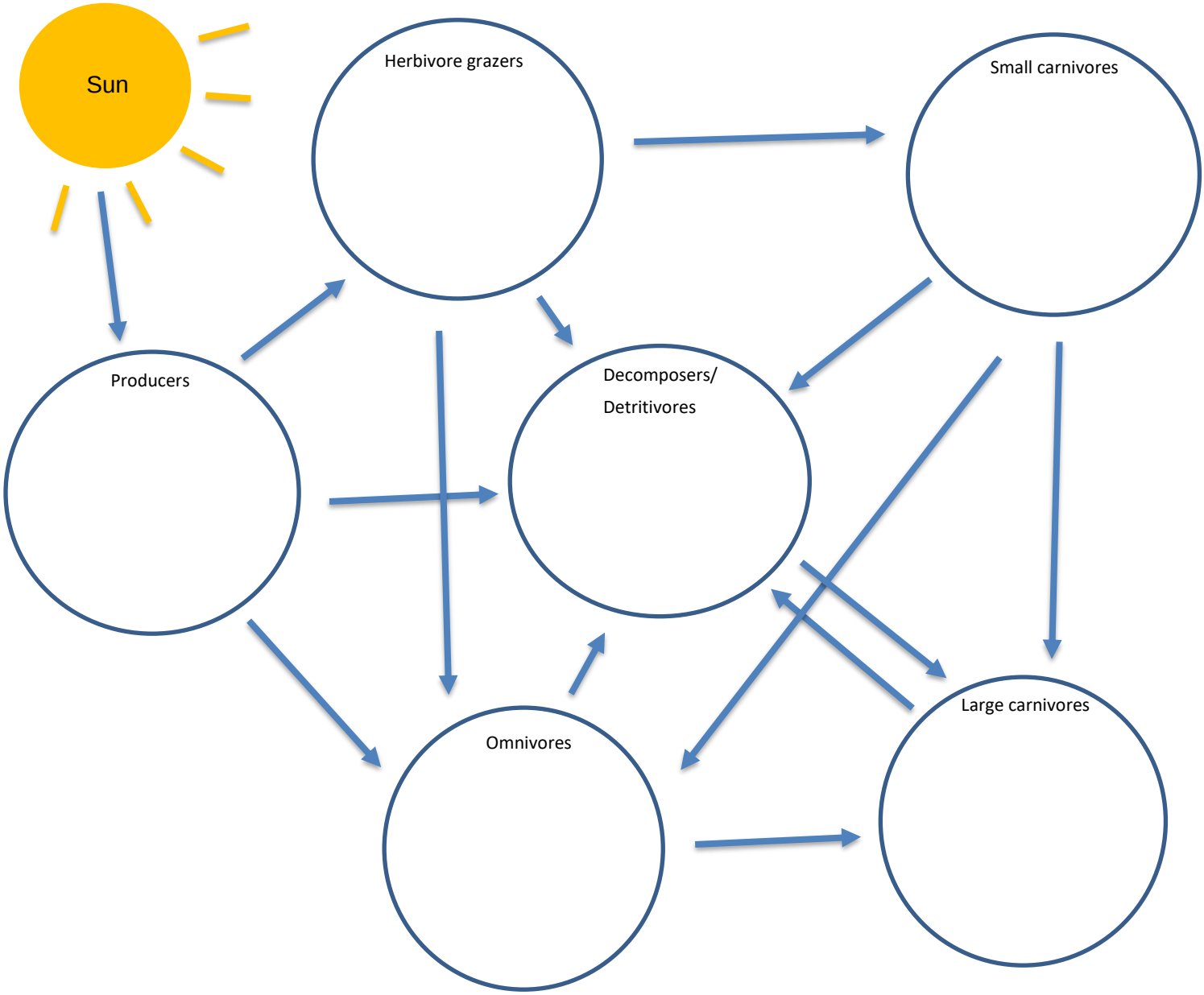
Selection pressure of different micro-habitats in an intertidal environment

Selection pressure refers to factors that influence an individual's chance of survival. These include both biotic and abiotic pressures. Organisms with certain adaptations have an advantage when it comes to survival and reproduction.

Find an example of each of the following micro-habitats. Lay your quadrat down and measure the species richness of animals within area. Discuss and record the selection pressure that these organisms are exposed to.

Micro-habitat	Selection pressures	Species richness
High dry rock	**1.** …… **2.** …… **3.** ……	
Shallow rock pool <20cm	**1.** …… **2.** …… **3.** ……	
Deep rock pool >20cm	**1.** …… **2.** …… **3.** ……	
Low tide	**1.** …… **2.** …… **3.** ……	

From your observations, record at least two organisms from each of the trophic levels represented below.



What do the blue arrows represent?……

……

What does this food web tell ***YOU*** about this ecosystem?……

……

……

Name at least 4 **abiotic** factors that determine the **distribution** and **abundance** of organisms in this harsh environment.

…… ……

…… ……

…… ……

Module 3 Adaptations increase an organism's ability to survive. 4

All animals must find enough food to survive and reproduce, while avoid being eaten themselves. The environment is dynamic with temperature, depth, salinity and exposure constantly changing. In order to survive these incredibly harsh conditions, intertidal organisms have developed ingenious ways to cope:

- **Structural adaptations** include an organism's physical features such as its colour, shape and body covering
- **Behavioural adaptations** can be instinctive or learned behaviour in order to survive.
- **Physiological adaptations** refer to the general functioning of an organism's body, either internal and/or cellular.

The way an animal digests food or the performing of certain biochemistry reactions such as making venom, secreting slime and being able to keep a constant body temperature are all adaptations that help them survive in a particular habitat.

Choose any two of the following organisms that you have observed today.

Choose and examine your focus organism carefully. You may use your phone to take a photo or video. Draw a scientific sketch with a scale and label its structure. List the adaptations that increase its ability to survive here. Ask for the CEC "Adaptation Resource" as an additional reference to help you describe the adaptations.

Name: ……	**Structural:** 1 ……... 2 ……...
	Behavioural: ……...
	Physiological: ……...
Scale	
Name: ……	**Structural:** 1 …… 2 ……...
	Behavioural: ……...
	Physiological: ……...
Scale	

Find and record an example of the different types of relationships that occur between living things

Mutualism (both benefit):……..

Commensalism (one benefits, one unaffected)……..

Parasitism (one benefits, one impacted)……

Competition (both impacted)…… ……..

Stratified Random Sampling

Species richness* is simply the number of species in a particular area.** Species diversity is more complex, and includes a measure of the number of species in a community ***and a measure of the abundance of each species.

Stratified random sampling is a sampling technique that reliably represents a population that is not evenly distributed throughout the sample area. Here, most species are clustered within the different rock pools and crevices. We will compare the species richness of two different micro-habitats found in this intertidal environment.

After finding a suitable sample area for the micro-habitat types (below), **carefully** throw the object, your educator gives you, backwards over your shoulder. This simple method removes bias and randomises the sample area selected.

Quadrat	Habitat	Species richness	Description
1	High dry rock		
2	High dry rock		
3	High dry rock		
4	High dry rock		
5	High dry rock		
6	Shallow pool		
7	Shallow pool		
8	Shallow pool		
9	Shallow pool		
10	Shallow pool		

Formulate a scientific question and hypothesis that this data would address:

Question:…….....

Hypothesis:……

Did you identify any trends within your dataset?.....

……..

What limitations does this sampling method have?.....

……..

How could you change this study to address the following:

Reliability (for stable and representative results)……

……..

Validity (to answer question or address aims)……

……..

A**ccuracy** (for correct measurements)……

……..

Module 4 Ecosystem Dynamics – Population dynamics 6

Use a transect technique to investigate how abiotic factors will affect populations.


Periwinkles


Conniwink


Zebra Snail


Mulberry Whelk


Limpet

A transect is a line across a site. At regular intervals a quadrat is placed along the tape for detailed examination.

Your group will be given four species: 1 **P**eriwinkle 2_____ 3_____ 4 _____
Working together you need to record the numbers of animals and the abiotic conditions in each quadrat.

Record as much detail as possible in the quadrat description column. This qualitative data is important in understanding the complexities of ecological relationships.

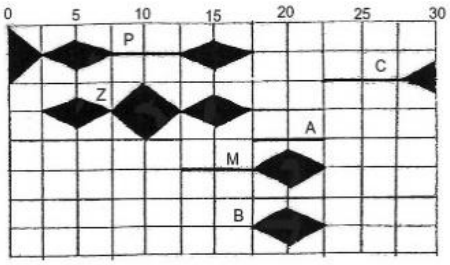
Quadrat distance	N° Animals	Algae %	Temp.	Depth	Salinity	Quadrat Description
0 m Splash zone	P = = = =	A = %	°C	cm	ppth	Sp. Richness:
5 m Upper Littoral	P = =					Sp. Richness:
10 m Upper Littoral	P = =					Sp. Richness:
15 m Mid Littoral	P = =					Sp. Richness:
20 m Mid Littoral	P= =					Sp. Richness:
25 m Lower Littoral	P= =					Sp. Richness:
30 m Lower Littoral	P= =					Sp. Richness:

List any trends that you observed…….....

……..……

What did this method of sampling tell you about this ecosystem?……

……..

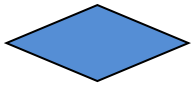


1. Collate your group's data. Use this page to graph and communicate your results.

2. Draw a kite diagram to show the distribution and abundance of the four animals.

3. Below this, construct a line graph to represent the abiotic variables you measured.

Select an appropriate kite for the abundance of each of you animals at each quadrat along the transect

1-5 animals **6-20 animals**  **>20 animals** 

	0m	5m	10m	15m	20m	25m	30m
Periwinkle							

Temp °C	Depth cm												Salinity ppt
24°	.....												40
22°	.....												36
20°	.....												32
18°	.....												28
16°													24
Quadrat		**0m**		**5m**		**10m**		**15m**		**20m**		**25m**	**30m**

Graph with different colours and symbols Depth ✕------✕; Temp O-------O; Salinity ❋-------❋;

Look for trends or patterns and explain why these animals were found here. Relate your findings to the abiotic factors.

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Additional Notes