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90461

NZQA
NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 2 Biology, 2007

90461 Describe concepts and processes relating to ecology

Credits: Three
2.00 pm Tuesday 27 November 2007

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should answer ALL the questions in this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–8 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

For Assessor's use only	**Achievement Criteria**		
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Describe biological concepts and processes relating to ecology.	Explain biological concepts and processes relating to ecology.	Discuss biological concepts and processes relating to ecology.
Overall Level of Performance		

You are advised to spend 40 minutes answering the questions in this booklet.

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QUESTION ONE

Read the information below to help you answer the questions:

The Little Blue Penguin (Kororā) forages at sea between dawn and dusk. It can dive up to a depth of 30 m.
In water, a penguin propels itself with its flippers and steers with its tail and rear feet. A Little Blue Penguin rests on the water's surface by stretching its flippers for stability.
The feathers of the penguin are small and densely-layered, providing insulation against the cold ocean. Oil released from a gland at the base of the tail is spread over the feathers, providing a waterproof coating. Moulting takes place in late summer and autumn, and lasts for between 15 and 20 days. During this time, the penguin's feathers are not waterproof, and the bird must remain out of the water.
Breeding pairs do not appear to meet at sea, yet they successfully synchronise their occasional visits to burrows prior to breeding.

Image source: http://upload.wikimedia.org/wikipedia/commons/a/a7/Little_Penguin.jpg

(a) Describe the penguin's **ecological niche**.

The Little Blue Penguin has many adaptations to help its survival. There are **structural, behavioural** and **physiological adaptations**.

(b) Use the information provided above to describe an example of a structural adaptation and a behavioural adaptation. (An example of a physiological adaptation has been provided for you.)

Structural adaptation	Behavioural adaptation	Physiological adaptation
		Oil which is secreted by the gland at the base of the tail.

(c) Explain **how** the secretion of oil from the tail gland **aids** the survival of the penguin in the water.

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QUESTION TWO

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A Southern Ocean Food-Web

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http://www.coolantarctica.com/Antarctica%20fact%20file/wildlife/whales/foodweb.gif

(a) From the diagram above, describe how **energy** enters this food web.

(b) Explain why the food chain leading to the baleen whale is more **energy efficient** than the food chains that lead to the toothed whales.

(c) Krill are small animals that feed on phytoplankton. There are about 600 000 billion krill in the Southern Ocean weighing 500 million tonnes.

Humans currently harvest about 100 000 tonnes of krill per year, mostly in the same locations used by seals and penguins. Dried krill consist of nearly 50% protein and are rich in vitamins, so this harvest can be expected to increase.

Discuss the importance of the **krill** to the other organisms in the food web, including the likely impacts of over-fishing of krill by humans.

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QUESTION THREE

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Honeydew excreted by phloem-sap-sucking scale insects (*Ultracoelostoma* sp.) living on the bark of beech (*Nothofagus*) trees plays an important role in ecosystem processes in native New Zealand beech forests. The only part of the insect normally visible is a long white hair, ending with a drop of honeydew obtained from the phloem. This provides food for honeyeaters such as bellbird, tui, stitchbird, and kaka. Last century, the German wasp *Vespa germanica* was accidentally introduced to New Zealand. The wasp thrived on the honeydew of the beech forests. The German wasp has since been joined by an even more aggressive species – the common wasp *Vespa vulgaris*.

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http://www.airborne.co.nz/images/technical/hdew5.jpg

(a) Name and describe each of the following relationships:

(i) The relationship between the scale insect and the beech tree.

Name of relationship: _____

Description: _____

_____

(ii) The relationship between the wasp and the scale insect.

Name of relationship: _____

Description: _____

_____

(b) Discuss the **effect** the arrival of the wasps could have on the **native biodiversity** in the beech forest.

_____

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(c) Explain the role of trees (such as those in the beech forest) in the carbon cycle.
You may use a diagram if you wish.

Extra paper for continuation of answers if required.
Clearly number the question.

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Question number	