STAGE 2 OUTDOOR EDUCATION

ASSESSMENT TYPE 1: FOLIO

Dune study

Introduction

A xerophyte is a plant which is able to survive in an ecosystem with little available water or moisture. The plants Pigface and Marram are both xerophytes as they have adaptations which allow them to live in harsh conditions. Conditions include lack of fresh water because rainfall drains quickly through the sand. Strong winds, which could cause a high rate of transpiration and salt water reaching the roots, making uptake of water difficult. Transpiration is the process which water absorbed by plants roots is evaporated into the atmosphere from the leaves so plants in these areas have features which help minimize transpiration.

Figure 1:
Pigface

The scientific name for Pigface is Carpobrotus. Carpobrotus is a succulent plant which spreads flatly across the ground and has purple daisy like flowers. Pigface is found growing around the sand dunes at Somerton. The plant is able to cope with harsh conditions for example high heat and little water. Pigface has a thick waxy coating around its leaves called "cuticle". This reduces the amount of water loss by transpiration from the leaf surface. Since the amount of surface area exposed to thermosphere affects evaporation, pigface's leaf size and thickness are other adaptations, with thicker and smaller leaves being more resistant to water loss. Although the plant's leaves are small, they also have a small surface area because it is triangle shaped, which means that less of the leaf is exposed to the sun. The plant also has physically stiff leaves and stems which enable the plants to tolerate the abrasion by salt laden winds and sands.

Marram

Marram is the type of plant which can help provide structure to the soil and make the habitat more stable. This helps other organisms colonise the area. Marram is one of the first plants to colonise a dune because it can survive in some of the poorest and most arid soils.

Marram grass seeds are spread around by waves and they can germinate in harsh open conditions. Once they have germinated, the plants can survive the extreme hot and dry conditions. They have adaptations such as thick, waxy cuticles on the leaves and an extensive root system. The root system allows the plant to be anchored into the sand and then more sand is trapped around it and the plant holds the mound of sand together. As Marram grows, more sand gets trapped making the dune get bigger. Marram stabilises the dunes and stops it from blowing away. Its roots, rhizomes and old buried stems become the skeleton of the dune. The roots form dense mats that help retain soil moisture. The roots are really rhizomes or underground stems that spread rapidly growing from the base of the plants and the plant can also reproduce from them.

Grass leaves like the spiky leaves of Marram contain a lot of silica which makes them stiff and rigid. This is an adaptation because sand dunes are exposed to strong coastal winds it means that the leaves do not easily break off. The leaves are also good at flexing because they are made up of parallel ribs. These start from the base and go straight upwards. These ribs allow the leaves to curl inwards to save water in a drought. But when it rains the leaves uncurl and spread out allowing it to collect more water and also photosynthesis to occur at a much faster rate. Because of the shape of the plant and the ribs on the leaves rain runs down the ribs towards the roots.

Fauna and food chains

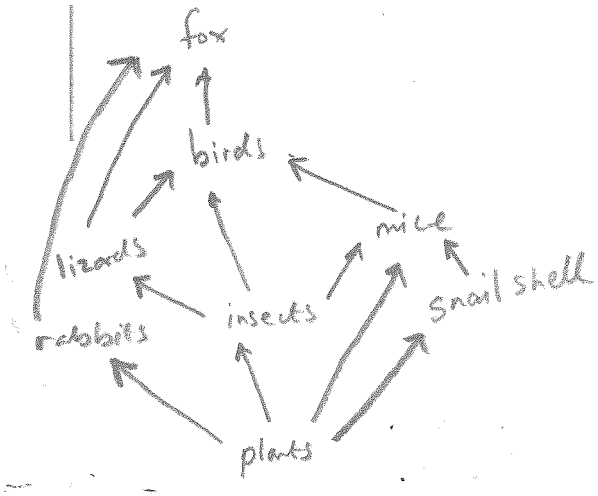
A food chain shows how energy is passed on from one organism to another in an ecosystem. The first organism found in a food chain is known as the producer. Producers are plants that use the sun, nutrients, water and carbon dioxide to produce glucose which can be stored as energy in their cells (photosynthesis). When a consumer eats another consumer or a producer not all of energy is passed on. This is because it loses up to 90% each time due to heat. First level consumers are described as herbivores because they only eat producers which are green plants. Decomposers are known to be the final level of consumers because they decompose all dead consumers even the ones top of the food chain.

This picture of a snail shell is an example of fauna in the dune system. While it was alive, the snail fed (lst consumer) on a plant (Producer). The snail was either killed and eaten by carnivores such as a group of ants or it simply died of age and the body decomposed by

bacteria and the shell is left behind as evidence.

Figure 2:
Snail shell

Below is a possible food web:



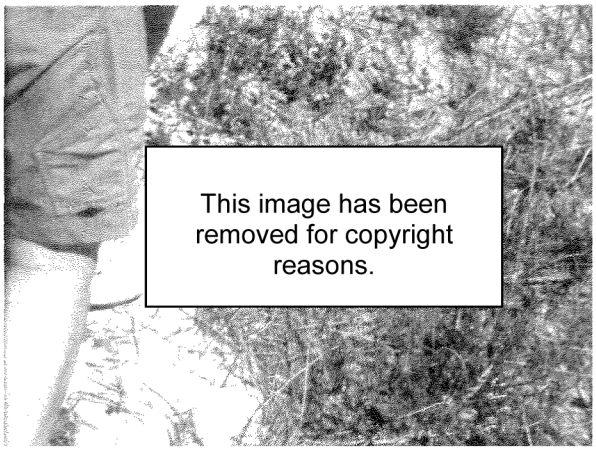
Destructive Human Impacts

Litter is a destructive influence that humans have brought to the coastlines. This makes a negative impression and makes the environment look untidy and unnatural. This will take years to break down and can be eaten by an animal on shore or blown into the sea and eaten by an animal in the sea causing the animals to choke. This path is destructive to the dune system but it allows the impact to be centralized as people are channeled on one path. Sacrificing one part of the dune allows other parts of the dune to be untouched by humans. The vegetation in these parts can then grow and animals that use this vegetation for food or habitat have a better chance of surviving.

Investigation and Critical Analysis
Well-considered investigation and thoughtful analysis of environmental issues and experiences.

Some people don't stick to the paths and they trample on the delicate vegetation and destroy it. This destroys habitat and food sources which puts greater pressure on the biodiversity of the area.

Figure 3: Trampled plants and litter.



Communication

Comprehensive and effective recording of observations using photographs.

The houses and development close to the dunes are a major destructive influence by humans. As the houses get closer to the beach they destroy ecosystems. To build houses on the dune area builders must clear out all vegetation and move a sand to flatten out the ground. This reduces the size of the ecosystem and destroys habitats and food sources. Brining humans closer to these areas increases noise, pollution, and interaction with animals which will cause an even greater reduction in the number and variety of the species in the area.

Figure 4: Houses close to dunes

Strategies for sustainable use

Investigation and Critical Analysis Thoughtful critical analysis of activities and effective strategies for the sustainable management of natural environments.

Many people affect the environment due to their impact of recreation use on natural environment. Here bushwalking can contribute to the damage on the natural environment for example littering and people walking around everywhere causing erosion. In this photo here we see the constructive management strategy called "Zoning". Zoning sets out areas with defined functions. Within the dune system, limited tracks are in place to channel people onto the beach from the car park. Once they are on the beach, people are free to go anywhere and carry out different recreational activities. Because the dunes are a fragile environment, the path is only there to link the car park to the beach.

Careful design and restriction has been done here to allow people to sit down and look around using the smallest amount of area possible causing minimum erosion. Bench space is limited to discourage lots of people and the bench is close to the defined track to minimize erosion and trampling. A bin is located close by to encourage people to dispose of their litter responsibly.

Figure 6: bench and bin

These fences are good constructive influences as they are aiding the structure of the sand dune by trapping sand. This reduces the movement of the dune and reduces the amount of sand blowing away. As sand increases, it reduces the effects of the harsh wind and the salt spray giving the vegetation and better chance of survival.

Figure 7: fence and sign.

Bibliography

Encyclo online encyclopedia

http://www.encyclo.co.uk/define/xerophyte

Accessed June, 2009

How does vegetation play a role in the formation of embryo dunes?

http://uk.answers.yahoo.com/question/index?qid=20090728220443AAF95nx

Accessed June, 2009

Surviving Sand and Wind

Museum of Natural History

Nova Scotia

http://museum.gov.ns.ca/mnh/nature/sableisland/english_en/nature_na/surviving_su/marram_su.htm

Accessed June, 2009

Nature Notes – Spinifex

Alice Springs Desert Park

http://www.alicespringsdesertpark.com.au/kids/nature/plants/spinifex.shtml

Accessed June 2009

Additional comments

A review of the students' response provides evidence of:

- sophisticated expression of ideas, opinions, and information in a variety of forms, using appropriate language (**Communication**)
- fluent and logical structure and presentation of investigative report (**Communication**)
- comprehensive and effective recording of observations.

Performance standards for Stage 2 Outdoor Education

	Practical Knowledge and Skills	Investigation and Critical Analysis	Reflection and Evaluation	Communication
A	Proactive and focused use of highly proficient outdoor skills with sustained and astute risk and safety management in complex situations. Significant initiative, self-reliance, and leadership, and a consistently high level of responsibility in self-reliant and group activities. Consistent and constructive application of the most appropriate strategies to ensure the sustainable use of natural environments. Comprehensive and insightful planning for a self-reliant expedition, and/or contribution to planning an outdoor journey.	Discerning critical analysis of activities and effective strategies for the sustainable management of natural environments. Insightful investigation and perceptive analysis of environmental issues and experiences. Perceptive explanation of the technical, interpersonal, and risk and safety management skills needed for a self-reliant expedition and/or outdoor journey.	Insightful reflection on emotional and cognitive responses to a self-reliant expedition and/or outdoor journey. Meaningful evaluation of the student's knowledge and understanding of, and relationship with, natural environments. Highly sophisticated evaluation of personal and group risk and safety management practices.	Sophisticated expression of ideas, opinions, and information in a variety of forms, using appropriate language. Fluent and logical structure and presentation of investigative report. Comprehensive and effective recording of relevant planning, data, and observations.
B	Active and well-considered use of proficient outdoor skills with consistent and effective risk and safety management practices in various situations. Sound initiative, self-reliance, and leadership, and a mostly high level of responsibility displayed in self-reliant and group activities. Well-considered application of appropriate strategies to ensure the sustainable use of natural environments. Detailed and thoughtful planning for a self-reliant expedition, and/or contribution to planning an outdoor journey.	Thoughtful critical analysis of activities and effective strategies for the sustainable management of natural environments. Well-considered investigation and thoughtful analysis of environmental issues and experiences. Thoughtful explanation of the technical, interpersonal, and risk and safety management skills needed for outdoor journeys.	Thoughtful reflection on emotional and cognitive responses to a self-reliant expedition and/or outdoor journey. Logical evaluation of the student's knowledge and understanding of, and relationship with, natural environments. Detailed evaluation of personal and group risk and safety management practices.	Detailed expression of ideas, opinions, and information in a variety of forms, mostly using appropriate language. Well-structured and clear presentation of investigative report. Detailed recording of relevant planning, data, and observations.
C	Some active and considered use of outdoor skills, with competent and appropriate risk and safety management. Appropriate initiative, self-reliance, and responsibility, and some leadership in self-reliant and group activities. Competent application of appropriate strategies to ensure the sustainable use of natural environments. Generally organised and appropriate planning for a self-reliant expedition, and/or contribution to planning an outdoor journey.	Competent critical analysis of activities and strategies for the sustainable management of natural environments. Informed investigation and considered analysis of environmental issues and experiences. Considered explanation of the technical, interpersonal, and risk and safety management skills needed for a self-reliant expedition and/or outdoor journey.	Competent reflection on emotional or personal and some cognitive responses to a self-reliant expedition and/or outdoor journey. Generally thoughtful evaluation of the student's knowledge and understanding of, and relationship with, natural environments. Considered evaluation of personal and group risk and safety management practices.	Usually appropriate expression of ideas, opinions, and information in a variety of forms, generally using appropriate language. Mostly organised and clear presentation of investigative report. Mostly clear recording of relevant planning, data, and observations.

	Practical Knowledge and Skills	Investigation and Critical Analysis	Reflection and Evaluation	Communication
D	Basic outdoor skills with aspects of risk and safety management. Some initiative or responsibility displayed in self-reliant or group activities. Restricted application of one or more strategies to ensure the sustainable use of natural environments. Some endeavour to appropriately plan for a self-reliant expedition, and/or to contribute to planning an outdoor journey.	Some description of activities and strategies for the sustainable management of natural environments. Some identification and analysis of environmental issues and experiences with some relevance. Restricted explanation of the technical, interpersonal, and risk and safety management skills needed for a self-reliant expedition and/or outdoor journey.	Basic reflection on emotional and personal responses to a self-reliant expedition and/or outdoor journey. Superficial reflection on the student's knowledge and understanding of, and relationship with, natural environments. Some identification and discussion of personal and group risk and safety management practices.	Some appropriate expression of ideas, opinions, and information, occasionally using appropriate language. Presentation of the elements of an investigative report. Some recording of planning, data, and observations.
E	Limited outdoor skills with restricted risk or safety management. Limited responsibility during self-reliant or group tasks. Attempted application of one or more strategies to ensure the sustainable use of natural environments. Emerging skills in planning a self-reliant expedition, and/or in contributing to planning an outdoor journey.	Limited description of an activity or strategy for sustainable management of natural environments. Attempted identification or description of environmental issues or experiences. Undeveloped identification of the technical, interpersonal, and risk and safety management skills needed for a self-reliant expedition and/or outdoor journey.	Brief communication of personal responses to a self-reliant expedition and/or outdoor journey. Some description of the student's knowledge and understanding of, and relationship with, natural environments. Attempted description of personal or group risk and safety management practices.	Expression of some emerging ideas, opinions, or information, with some attempted use of appropriate language. Emerging presentation skills. Limited recording of planning, data, and observations.