ACTIVITY
2i

Activity Title:

Interrelationships – dune animals and plants

Focusing questions

How do different dune animals and plants affect one another?

What interrelationships exist between animals and plants of the dune?

Resources required

- Fact sheet – Interrelationships between dune animals and plants – page 103
- Large sheets of paper and pens OR white board and pens
- Copying: photocopy fact sheets or project a digital image of the fact sheet so they can be read independently

Prior learning

2a Native dune plants – who lives where and why?

2h Introduced dune animals – rabbit case study

Special notes

The three activities (2i, 2j and 2k) fit together well as a study of interrelationships and biological diversity. There are significant learning links between each of these activities and their associated worksheets.

Method

1 The objective of this activity is to explore interrelationships and interdependencies that may exist between dune animals and plants.

2 Independently read the fact sheet **Interrelationships between dune animals and plants**.

3 As a class conduct an inquiry using the discussion questions below. Create a mind map of new learning.

- Do animals and plants exist on the dune in isolation from one another?
- What relationship may exist between the toheroa and pīngao? Would human activity affect the relationship?
- What different roles does pōhuehue or *Muehlenbeckia* play for other animals and plants of the dune?
- What relationship does the Rauparaha Copper butterfly have with dune plants?

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Interrelationships – dune animals and plants

Environmental Education Aspect:

About the environment

Environmental Education Concept:

- Interdependence
- Biodiversity
- Sustainability

Curriculum Links:

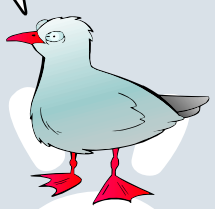
- Science
- Social Science

Suggested Curriculum Level:

Any

SUSTAINABILITY TIP!

Instead of photocopying one for each student, project a digital image of the fact sheet and save paper.



- What relationship exists between pīngao and dotterel?
- Why do you think dotterel might have orange colourings on their chests and backs?
- Are there any possible effects for the rest of the dune community when the population of a species of animal or plant declines or increases substantially as a consequence of human impact?
- How much do you think we know and understand about the different relationships that exist between different animals and plants?
- Explore the concept of “Taihoa koa, ka ora ngā taipū, ka ora hoki tā tau katoa” – Hold on, if the dunes are healthy, then so are we all!

Possible next steps

- 2j Species lost from the beach – exploring species that have been lost from our beach and the possible reasons why.
- 2k Ecosystem relationships – a ‘thinking’ activity involving an investigation into food webs and the potential relationships and interdependencies that might exist between the dunes and other ecosystems.
- 3g Case study – East coast – a practical illustration of the relationship between a dune plant and a bird.
- Discuss ideas for research that could develop knowledge of the interrelationships between dune species.
- Investigate further the New Zealand Dotterel Conservation programme.
- Investigate (using the internet or library) – has any of this research been conducted?

Interrelationships between dune animals and plants

There is much that we don't know and understand about the relationship between dune animals and plants. Slowly we are learning that animals and plants of the dune do not exist in isolation from one another. Observation, research, practical experience, myths and legends are teaching us that sometimes animals and plants of the dune depend on one another in ways we might not have ever imagined.

Taihoa koa, ka ora ngā taipū, ka ora hoki tā tau katoa
Hold on, if the dunes are healthy, then so are we all!

The legendary toheroa and its special friend the pīngao

In some cases we still know little about these relationships. For example, there is a story about a special relationship between toheroa and dune plants that comes from tangata whenua in Northland. The stories tell of baby toheroa (known as toheroa spat) spending time on pīngao plants. Whether it is myth or fact would take some research. If it were fact then what would the presence or absence of pīngao mean for toheroa populations?

The beautiful rauparaha copper butterfly, pōhuehue and ngaio

Pōhuehue or wire vine or *Muehlenbeckia complexa* is a wiry creeping plant that can climb fences, shrubs or act as a ground cover. It is common on the back slope of the foredune. Pōhuehue or *Muehlenbeckia* is a plant seriously underrated plant. Its presence is important to other plants for a number of reasons.

We understand that the rauparaha copper butterfly has a close relationship with pōhuehue. The relationship between this plant and insect is easy to observe. So close is their relationship that you won't find the rauparaha copper butterfly unless there is pōhuehue or *Muehlenbeckia* present. It's harder to imagine however, that this butterfly might be especially important for another dune plant – the ngaio.

Pōhuehue or wire vine or Muehlenbeckia complexa

Ngaio or Myoporum laetum

These rauparaha copper butterflies are very pretty but apart from being nice to look at, we think there may be a link between the period of emergence of the butterfly and the flowering of ngaio. We have observed that when the ngaio is busy flowering there are a lot of these butterflies that emerge from the pupa stage. These butterflies pollinate the ngaio.

So it is possible that the ngaio depends on the rauparaha copper butterfly which depends on pōhuehue. Luckily for ngaio and the butterfly, pōhuehue is relatively abundant on our dunes.

There has been so much time lost where the dune plants haven't been present, there is a huge lack of awareness of the relationships between the plants and the insects.

But this isn't the only role that pōhuehue plays for other plants on the dune – it also provides an environment that allows other plants to grow.

Pōhuehue – provider for other plants

Pōhuehue is a prolific producer of organic matter. Coast Care Coordinator says "many people just don't understand the importance of this and we tend to think that where pōhuehue grows (on the crest and across the back slope of the dune) just happens to be where we start finding bigger shrubs and trees. But maybe the bigger shrubs and trees grow here because of the organic matter that pōhuehue produces."

Pōhuehue adds organic matter to the sand marking the beginning of the change of sand to soil. This organic matter is really lacking on the foredunes. Foredune sand is usually so hot that any organic matter is burnt off and can't settle. There is a lot of wind on the foredune as well, so there is no opportunity for organic matter to accumulate on the foredunes. This means it's over to the back slope of the foredune to start accumulating organic matter. Pōhuehue or *Muehlenbeckia* is just the perfect plant for that.

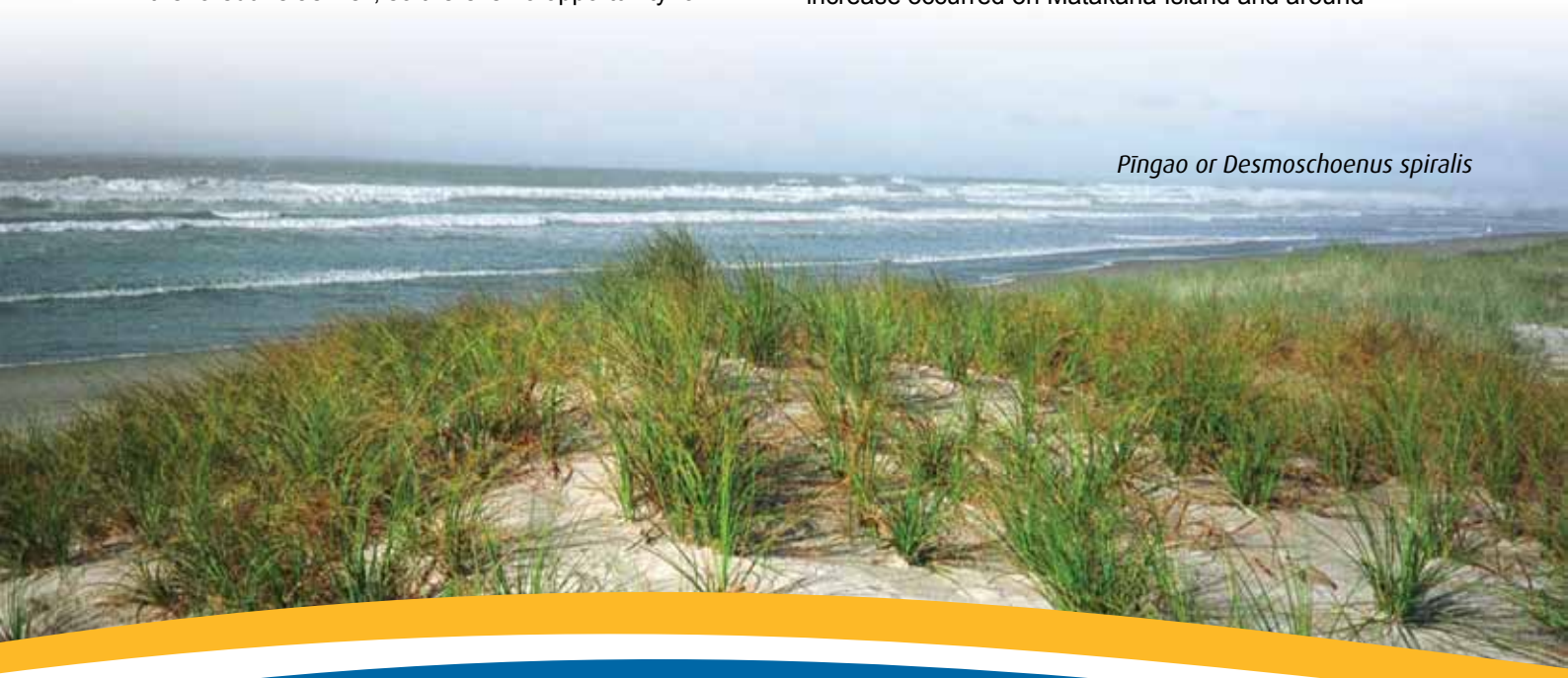
It is said that sometimes where the dune has been eroded away enough to have the sand underneath move and go sliding down the front slope into the sea. The sand is always a different colour to the native sand underneath the parent sand, it's darker and different in colour and texture. The difference is quite dramatic."

Pīngao – protector of the threatened dotterel

It is believed that dotterels and pīngao have always depended on each other. Dotterels are native birds that live on the beach. You might have been fortunate enough to see them scurrying around the sand. They nest and lay their eggs in the sand and populations have been severely reduced by human activity (such as vehicles and pedestrian use of beaches) and pests (such as cats, rats and possums).

The Department of Conservation plays a big role in conserving dotterels and carried out a national NZ Dotterel census in October 2004. The entire known range of the endangered species of New Zealand Dotterel was surveyed over two days. The last national census was conducted in 1996 and locally between Waihī Beach and Ōhiwa Harbour 110 NZ Dotterel were counted.

"This year's repeat census included a number of new sites and a total of 145 birds were counted, a 32% increase over the last eight years" said Tauranga Protected Species Officer. A significant population increase occurred on Matakana Island and around



Pīngao or Desmoschoenus spiralis

Tauranga Harbour. Department of Conservation pest control and dotterel monitoring programmes have improved the chances of fledglings surviving on Matakana.

“However there has been a reduction in numbers in some mainland sites, probably as a result of increased human development and predator pressures at unmanaged breeding sites. Maketū has had a small increase while Ōhiwa and the eastern Bay of Plenty has stayed about the same”. Although the Bay of Plenty population is improving, it is feared nationally the total population will have declined. This is reflected in the ‘threat status’ of NZ dotterel being significantly upgraded in three places in recognition of the pressures on the species to “Nationally Vulnerable”. This means that it is now placed in the very top “Acutely Threatened” section.

It is believed that dotterel and pīngao traditionally have a close relationship – except maybe in the last 100 years where pīngao has been removed by grazing and burning. In Northland, dotterels and fairy terns and other coastal birds are nesting low on the beach and their nest areas are being overtopped by spring storms and king tides. There is insufficient sand being accumulated by plants like pīngao, spinifex and other front dune species to help raise the beach level up to where it should be. Normally plants such as pīngao would build up sand and the height of the beach making nests safe from tidal washing because they are high enough above sea level. This is just one reason why pīngao is important to the dotterel – because where the plants aren’t the sand is just being swept to sea and blown away.

The second reason that pīngao is important to dotterel is that it’s harder for aerial predators to see through. Dotterels will hide in pīngao and shelter from the likes of black-backed gulls which are natural predators for the dotterel chicks. So if there is pīngao growing on the beach the dotterel chicks know to run underneath it if there are black-backed gulls circling overhead. In this way pīngao plays a very important role to help preserve these very important threatened bird species.

Papa-tū-ā-nuku te matua ō te tangata.

Mother Earth is the parent of human beings.

New Zealand Dotterel, Charadrius obsurus

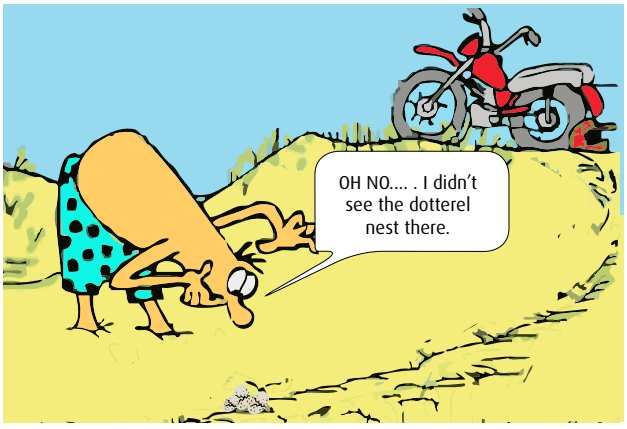
Can you see the New Zealand Dotterel nest in this picture?

Dotterel chicks in their nest

There are baby NZ Dotterel chicks in the eggs in their nest. Do you think you would see the nest of eggs if you were driving along the beach in a quad bike or a four wheel drive?

The parent bird makes the nest on the sandy part of the beach, up near the dune plants. The parents can't protect their chicks and eggs, so they try to make them invisible. Sadly lots of people squash them when they drive on the beach.

Dotterel dead in wheel tracks on beach



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Find out more

If you want more information on Coast Care groups and programmes contact:

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coastcare
Tiaki takutai

Bay of Plenty Regional Council in partnership with Tauranga City Council; Whakatāne, Western Bay of Plenty, and Ōpōtiki District Councils; and the Department of Conservation.