

Dune swale daphne

Pimelea actea Burrows

The loss of dunes



Dune swale daphne fruit. John Barkla, DOC

Quickfacts

Inhabited damp areas in sand dune hollows

These areas are now rare as sand dunes become stabilised by exotic marram grass

The damp areas are invaded by hordes of weeds which out compete the dune swale daphne

Protecting dune swale daphne also protects a number of other endangered plants and insects

The stillness of the dunes

The coast along the south Taranaki Bight is notable for two things: wind, and the extensive sand dune systems extending far inland along the Himatangi coast. The strong winds are caused by westerly winds funnelled between the North Island's volcanoes and the South Island's mountains. This wind picks up some of the considerable quantity of sand being moved along the coast by strong south-flowing currents and spreads it as dunes. These sand dunes form perpendicular to the wind and move inland (as far as 14 km from the coast) as sand blown over the dune crests accumulates on the sheltered inland side. In the flat areas between the parallel dunes lie swales of flat sandy ground that are often wet over the winter and dry in summer. These swales also move slowly inland with the dunes, and this movement creates new bare areas of damp sand. Dune swales all over the world are frequently inhabited by rare plant and invertebrate species that are adapted to this shifting, seasonally wet and dry, low fertility habitat, and in New Zealand there are several endangered plants that inhabit dune swales.

The dune swales at Himatangi (in the south Taranaki Bight between



Whanganui and Levin) are the natural habitat of *Pimelea actea* or dune swale daphne, a small shrub usually about 30 cm tall that has pairs of small oval blueish green leaves and clusters of white furry flowers at the tips of its branches. Small populations of dune swale daphne have also been noted in pockets of damp sand blown onto coastal cliffs near Whanganui. Out of all of New Zealand's daphne species (plants in the genus *Pimelea*), the flowers of dune swale daphne are unique because they have both viable male stamens and viable female styles in the same flower. These flowers develop into translucent white fruit which are eaten by birds and lizards. Once deposited, the seeds quickly germinate and the seedlings grow and begin to flower before they are even one year old. Although dune swale daphne was discovered in the 1960's by Tony Druce and later by Don Ravine, it was not formally named until 2008 when a study of New Zealand's *Pimelea* funded by the Department of Conservation (DOC) was undertaken by Colin Burrows. Prior to 2008 it was known as *Pimelea* "Turakina", in reference to one of the places where it was found. When it was discovered it was already rare, as were several other plants inhabiting the area. Local botanists began investigating why these plants were rare, suspecting it was as a result of the sand dunes along the coast becoming more stable after being planted with exotic marram grass and pine plantations. The reduction in the amount of sand being moved because of the dunes becoming more stable was allowing the swales to be invaded by a number of weeds which swamped the ground that would usually be occupied by native plant species. Further research by Nick Singers, while a student at Massey University, confirmed this. He also showed that removing the weeds allows the rare plants to flourish.

Space to grow

Weed invasion into dune swales has practically wiped out the dune swale daphne and there are very few plants that remain in the wild. Removing the worst of the weeds will be necessary to allow it (and the other native dune swale plants) to flourish again. However, we are only just beginning to learn the best ways to remove weeds from extensive dune systems such as that in the south Taranaki Bight. The recent work by the Department of Conservation (DOC) in removing the exotic marram grass from the sand dunes at Mason Bay, Stewart Island, has shown that removing the dominant weed has a very beneficial impact on the native plants. In the Whanganui region DOC controls other weed species such as pampas grass *Cortaderia selloana* and purple pampas grass *Cortaderia jubata*, pink ragwort *Senecio glastifolius*, pine, gorse and boxthorn *Lycium ferocissimum* to protect the nationally important dune swale wetlands.

Luckily dune swale daphne can be grown in cultivation, but it is not long lived and requires continual replanting. Currently, plants of dune swale daphne are being grown at Otari Native Botanic Garden in Wellington, all of which are descended from a single plant which grew at Castlecliff (near Whanganui).

What next?

The threats to the survival of dune swale daphne are:

1. The immobile sand dunes not creating fresh areas of dune swale.
2. Their habitat being swamped by exotic plants.
3. Very few plants remain.

Successfully protecting the dune swale daphne from these threats must be achieved in order for the conservation programme to succeed. Ideally, this should be done by:

1. Identifying areas of critical habitat.

Dune swale daphne was once present at a range of sites. Although these sites are still present, they are mostly covered by weeds. It is important to identify these critical sites which, if the weeds are removed, offer the best opportunity for replanting dune swale daphne. DOC has already begun this process by identifying critical sites within Tapuarau Conservation Area.

Identifying critical habitats is likely to cost \$6,500.

2. Removing weeds from areas of dune swale daphne critical habitat.

The space that dune swale daphne needs to grow can be provided by removing the weeds from their habitat. This needs to be done on two scales – a duneland-wide scale for larger weed species like pink ragwort, pine, gorse, boxthorn and pampas grass, and on a dune swale-specific scale for smaller weeds. This can be achieved by (information from Champion and Reeves 2009):

- Mechanically removing taller vegetation, leaving a bare surface which can then be recolonised by native plants. The amount of sand waterlogging can also be increased by deepening the scrapes.
- Lightly grazing areas to remove tall vegetation. Grazing may have a role in preventing succession to woody vegetation, as it has been shown elsewhere that removing grazers from ephemeral wetlands led to the loss of some highly endangered plants.
- Using herbicides to remove unwanted weeds using either a non-selective herbicide such as glyphosate when there are no endangered plants present, or a selective herbicide to target a particular weed type (see Champion 1999, Champion and Reeves 2009).

Native plants such as wivi *Ficinia nodosa* and pohuehue *Muehlenbeckia complexa* should

be planted to provide a buffer between the dune swale and surrounding weeded areas. Doing this work would also help other endangered dune swale plants and insects.

Removing weeds from critical habitat is being undertaken by DOC and costs \$40,000 per year. Further weed control will be necessary at other areas of critical habitat and is likely to cost an additional \$20,000 per year.

3. Increasing the number of dune swale daphne in cultivation as a source for replanting.

Maintaining a cultivated population of dune swale daphne is critical to prevent its extinction. It is also important to maintain (and ideally increase) the genetic diversity of plants currently being grown in cultivation, by exchanging plants between different growers (but keeping plants from the Whanganui and Manawatu populations separate). The number of plants produced can be quickly increased to supply a replanting programme.

Increasing the number of cultivated plants is likely to cost \$47,000 over five years, but \$44,000 is the cost of labour which would likely be donated by the plant growers. The \$3,000 remainder is for purchasing cultivation materials and exchanging plants.

4. Replanting dune swale daphne in critical habitat areas.

The dune swale daphne should be returned to its natural habitat by planting cultivated plants in the critical habitat areas. Plants should be in fruit and planted in multiple areas on the margins of the dune swale wetlands in order to provide the best chance of establishing a population. Local community groups and Iwi should be involved in this programme whenever possible.

Replanting dune swale daphne into dune swales is likely to cost \$10,800 over three years.

5. Replanting cliff habitats.

Sand pockets on cliff ledges are another habitat where dune swale daphne could be replanted. These sites are small and will need some weed control, but in general are less prone to weeds than dune swales. Plants should be in fruit and planted in several areas where there are a number of sand pockets in order to provide the best chance of establishing a population. Local community groups and Iwi should be involved in this

programme whenever possible.

Replanting dune swale daphne into sand pockets is likely to cost \$10,800 over three years.

6. Remobilising surrounding sand dunes by removing exotic marram grass.

The creation of fresh dune swale resulting from dune movement is an important element in the ecology of species like dune swale daphne. The movement of dunes will occur naturally once the stabilising exotic marram grass is removed. This marram grass removal will need to be of sufficient scale to affect change over several sand dunes, and needs to extend to the seaward dunes. It should only be attempted in areas where there are no agricultural or forestry activities occurring in the downwind area.

It is not known how much it will cost to remobilise the sand dunes.

More information

Website: New Zealand Plant Conservation Network – *Pimelea actea*. [Link](#)

Website: Dune Restoration Trust of New Zealand. [Link](#)

Website: Landcare Research – Dune slacks factsheet. [Link](#)

Website: DOC – Rangitikei River mouth coastal reserves. [Link](#)

Website: Otari Native Plant Garden. [Link](#)

Teacher's resource: Dunelands (for Tawhirihoe Scientific Reserve, but could be used for other Taranaki dunelands). [PDF](#)

Report: Weed control options for coastal sand dunes – a review. By David Bergin. www.scionresearch.com. [PDF](#)

Report: Factors causing dune ephemeral wetlands to be vulnerable to weed invasion. By P.D. Champion & P.N. Reeves. DOC Research and Development Series No. 310. Department of Conservation, Wellington, 2009. [PDF](#)

Scientific paper: Genus *Pimelea* (Thymelaeaceae) in New Zealand 1. The taxonomic treatment of seven endemic, glabrous-leaved species. By Colin J. Burrows. New Zealand Journal of Botany Vol. 45, pages 127-176, 2008.

Scientific paper: Plant succession and dune dynamics on actively prograding dunes, Whatipu Beach, northern New Zealand. By A.P.M. Pegman & G.L. Rapson. New Zealand Journal of Botany Vol. 43, pages 223-244, 2005. [PDF](#)

Report: Ephemeral wetlands and their turfs in New Zealand. By P.N. Johnson & G.M. Rogers. Science for Conservation No. 230. Department of Conservation, Wellington, 2003. [PDF](#)

Report: Characterising *Pimelea* "Turakina". By Colin Burrows. Conservation Science



Newsletter 40/41, pages 10-11.

Scientific paper: Selective control of weeds in New Zealand wetlands. By P.D. Champion. Proceedings of 51st New Zealand Plant Protection Conference, 1998. [PDF](#)

Report: Rare plant conservation at the Tangimoana dunelands. By N. Singers. Conservation Advisory Science Notes No. 199. Department of Conservation, Wellington, 1998. [PDF](#)

Thesis: The dynamics of temporary wetlands in dune slacks at Tangimoana, Manawatu, New Zealand with special reference to the endangered sand spiked sedge, *Eleocharis neozelandica* Kirk (Cyperaceae): a thesis submitted in partial fulfillment of the requirements for the degree of Masters of Science in Ecology at Massey University. By Nicholas Singers. Massey University, Palmerston North, 1997. [Link](#)

Photos



Cultivated dune swale daphne plant. Mike Thorsen



Flower head (male stage) of dune swale daphne. Mike Thorsen

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