Dactylanthus taylorii recovery plan, 2004–14

THREATENED SPECIES RECOVERY PLAN 56

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Cover: *Dactylanthus taylorii* tuber with a bud, on a plant established from seed in a seeding trial at Waipapa. *Photo: Avi Holzapfel*

Compiled by: G.D. La Cock, S. Holzapfel, D. King, and N. Singers

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ABSTRACT

Dactylanthus taylorii (dactylanthus) is an endemic parasitic flowering plant threatened with extinction. A review of the 1995 *Dactylanthus taylorii* Recovery Plan recommended that the Dactylanthus Recovery Group be maintained, and that a revised plan be produced for the period 2004–14 (this plan). The main objectives of the original plan were survey, protection, advocacy, and research on the propagation, genetics, ecology and protection of dactylanthus. This revised plan reflects the progress made by the group, with the focus shifting to improved management of threats, management of the habitat and ecosystems rather than just dactylanthus and its hosts, and the establishment of new populations or enhancement of existing populations. Long-term goals are identified, and the short-term actions and research needs required to meet these goals are outlined.

Keywords: *Dactylanthus taylorii,* Balanophoraceae, parasitic flowering plant, wood rose, New Zealand

Department of Conservation. 2005: *Dactylanthus taylorii* recovery plan, 2004–14. *Threatened Species recovery plan 56.* 30 p.

1. Introduction

Dactylanthus taylorii Hook f. is the only fully parasitic flowering plant endemic to New Zealand. A member of the mainly tropical family of Balanophoraceae, it lives underground attached to the roots of a number of native tree and shrub species, where it forms a characteristic distortion on the host root in the area of attachment (the 'wood rose'). In late summer to autumn, each plant produces inflorescences filled with nectar which grow just above the forest floor. *Dactylanthus taylorii* is considered dioecious, as it usually produces male and female inflorescences on different individuals. The endemic short-tailed bat (*Mystacina tuberculata*) is so far the only confirmed native pollinator. Kiore (*Rattus exulans*), mice (*Mus musculus*) and introduced ship and Norway rats (*R. rattus* and *R. norvegicus*) have been shown to be introduced pollinators, though rats often destroy flowers rather than pollinating them.

The Department of Conservation (DOC) formed a Recovery Group for *D. taylorii* (Molloy 1993) because of concerns which included: its observed failure to reproduce due to browsing of the inflorescence by introduced animals (possums and all species of rats, including kiore); an apparent decline in distribution over the last 50 years; and ongoing destruction of specimens by wood rose collectors. A recovery plan was published in 1995 (Ecroyd 1995). This plan had a term of 5 years. In accordance with the Standard Operating Procedure for species recovery (Brown & Molloy 1999) a decision was made by the Recovery Group to review the achievements to date to help with recommending further planning requirements (Anon. 1999). This review (Holzapfel in press) recommends that a new recovery plan be prepared for dactylanthus, and that the Recovery Group be maintained. The Recovery Group has accepted 'dactylanthus' as the common name for the species.

The recovery planning process provides opportunities for further consultation between the Department, tangata whenua and others regarding management of this species. Those interested in being more involved in management of dactylanthus or in receiving information should also contact the Recovery Group.

1.1 TERMINOLOGY

Clump(s): Several individual dactylanthus plants attached to roots in close proximity to each other usually manifest themselves as a clump on the surface of the ground. It is virtually impossible to separate individual plants within these clumps, therefore 'clumps' will be used to refer to these aggregations throughout the plan.

Conservancy(ies): For the purposes of this plan 'conservancy' is used in the inclusive sense, and covers work to be done within a conservancy by conservancy and / or area office staff.

2. Ecology and biology of *Dactylanthus taylorii*

Dactylanthus taylorii is a forest root parasite consisting of a round warty tuber up to 40 cm in diameter[1] attached to the root of a host tree or shrub. In response to an infection by dactylanthus, the area of host root at the attachment site enlarges into a finely grooved disk (the wood rose). Dactylanthus obtains its nutrients from the host plant through this attachment. It has no green leaves or roots of its own. Currently it is known to parasitise about 30 species of native trees and shrubs. Many of these host species are seral and found mainly on forest margins or disturbed areas. Mahoe, lemonwood, lancewood, kohuhu, wineberry, broadleaf, fivefinger, pate, karamu and putaputaweta are common hosts (see Appendix 1 for a full list of host species plus their scientific names). It is not known to parasitise non-native species, gymnosperms or monocotyledons. Dactylanthus tolerates a wide range of environmental conditions but its optimal habitat appears to be damp but well-drained sites. Plants are found from near sea level at East Cape to around 1200 m a.s.l. (see Moore 1940; Ecroyd 1996; Holzapfel 2001 for more detail).

Dactylanthus is considered to be dioecious, with inflorescences containing both male and female flowers being extremely rare. Male plants are significantly more common than females and at some sites the sex ratio can be as high as 20 : 1. There is some indication that newly established plants produce predominantly female flowers (S. (Avi) Holzapfel, DOC, pers. obs.).

The minute flowers are clustered into inflorescences that emerge from the tuber and contain either male or female flowers on several spadices (stalks approximately 2 cm long, covered with flowers). Flowering usually starts in February and extends to May, with the peak in March and April. Male flowers seem to appear before females, and last about 10 days. Female flowers are receptive to pollen for about 10 days. Once pollinated the flowers mature and the spadices gradually elongate. Each inflorescence is capable of producing thousands of seeds with an average of 3600 per inflorescence. Female inflorescence production is variable depending on size. A large female plant is capable of producing over 50 inflorescences in a season. Seed matures over the next 6 months, may remain on the plant for up to 4 years and may be viable for up to 7 years. Seed is small (approximately 1.6×1.1 mm), ovoid to spindle shaped, and enclosed in a hard black endocarp. It has a short-lived, thin but fleshy ectocarp layer which degrades as the seed matures (Ecroyd 1995).

The short-tailed bat is the principal native pollinator but its current range only overlaps with dactylanthus at a few sites. Rats and mice now largely perform this function though lizards and insects may also play a small role. Dactylanthus has features typical of bat-pollinated flowers, e.g. large, dull-coloured, robust, bowl shaped flowers which produce large quantities of musky smelling nectar (Ecroyd 1995).

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[1] This is probably only true for aggregates (clumps). Individual plants will be fist-sized to perhaps soccer-ball sized at most.

Seed distribution is generally limited to small-scale movements aided by water and gravity. However there is potential for larger scale movement. Meys (2003) found worms were able to ingest and excrete intact seed. Rats were also found to ingest and excrete some potentially viable seed intact. Other forest animals that live and feed in the humus layer (e.g. ratites) may also contribute to some dispersal through incidental or secondary ingestion (Meys 2003).

3. Cultural importance

The Maori names for dactylanthus that are currently in use are 'Pua reinga', translated as 'flower of the underworld' and 'wae wae atua', meaning the fingers (foot or toes) of the atua (god).

Dactylanthus is cited as a culinary or medicinal plant in Servant (1973), Brooker et al. (1987) and Riley (1994). However, these claims are considered unlikely, because of confusing use of Latin, Maori, and English names (Holzapfel 2001). Anecdotal evidence exists that dactylanthus was used as a sweetener (nectar) and as a dye (sap). There is a high likelihood that it also has other cultural significance, but this is largely unknown (Melbourne 2001).

The collection of dactylanthus to obtain wood roses for ornamental purposes was a hobby principally of foresters and their families associated with native forestry. Carved wood roses were, historically, often sold in curio or craft shops, and are occasionally still sold. However, the practice of collecting wood roses (and their sale) is actively discouraged and is illegal on land administered by the Department.

4. Past and present distribution

Dactylanthus is currently known from Puketi Forest in Northland to Mount Bruce in the Wairarapa, and from Mount Taranaki in the west, to Te Araroa on the east coast. All North Island conservancies have at least one population within their boundary. It also occurs on Hauturu/Little Barrier Island, the only known natural population of dactylanthus on an offshore island.

Pollen records indicate that, historically, it also occurred throughout South Island (Macphail & Mildenhall 1980), but as yet no plants are known from South Island. Herbarium records from the past 150 years show plants from Hokianga in Northland to Kaitoke near Wellington. The type locality is inland from Wanganui (Springer 1994).

5. Threats and agents of decline

Dactylanthus flowers are a preferred food source for several mammalian and insectivorous pests, and browsing of flowers limits or prevents seed production. Possums have been credited as the primary agent of decline on the mainland and often remove all inflorescences in the bud stage. Rats also feed on dactylanthus, but damage is highly variable and generally occurs close to or during flowering. Rat browse is most often recorded when possums are controlled or excluded. Kiore have been implicated in their decline on Little Barrier Island and may also have contributed on the mainland since their arrival. Pigs are known to uproot plants (Atkins 2004) although are only likely to target them when flowers are abundant once other pests (e.g. possums) are excluded.

Recently, introduced wasps, honey bees, rabbits and hares have been observed damaging flowers (Anon. 2002). Ungulates (deer, goats, cattle) may also be contributing to their decline by selected removal of host species and through directly dislodging exposed clumps.

Limited predation of seed has also been recorded by rats and mice at Pureora Forest Park and Kakaramea (Meys 2003). Damage appeared to be related to the abundance of the particular rodents and was generally isolated to a few individual clumps.

People also collect dactylanthus and the roots of the host tree for the wood roses. This collecting has resulted in severe depletion or devastation of some populations (see also section 3).

6. Past and current management

Management history has followed a natural progression from the protection of individual plants, through to hand-pollination to increase seed set, control of browsers around uncaged populations, and ultimately the successful sowing of seed under suitable hosts. All of these activities have been backed by detailed research and monitoring.

Initial protection measures involved caging individual clumps (Jones 1995). Cages excluded mammalian browsers, particularly possums, but allowed access for the natural (short-tailed bat) and introduced (rats and mice) pollinators. Large cages have been erected over entire populations where this is feasible.

Recent research on protection mechanisms has focused on possum control through the use of poisons and trapping. This has shown that possums need to be controlled to extremely low levels for seed set to occur (N. Singers, DOC, pers. comm. 3 October 2002).[2] Other projects have targeted multiple pests, e.g.

[2] Also included as appendix 2 in the 2001/02 Dactylanthus Recovery Group meeting minutes.

at Te Araroa (Atkins 2004). Controlling pests rather than caging plants has the advantage of benefiting all plants in a population, and not just those that are caged. Host plants and other components of the ecosystem also benefit.

Pollination does not always occur at each clump. Trials with hand pollination revealed that seed set following hand pollination is greater than seed set following natural pollination (N. Singers, DOC, pers. comm. 3 October 2002)[3]. Hand-pollination is now widely used to increase seed set (N. Singers, DOC, pers. comm. 3 October 2002)[3], with a presumed increased chance of recruitment.

Long-term management options recognise the need for several large populations of dactylanthus throughout its distributional range. This can be achieved by protection and, where necessary, population enhancement or establishment at historical or ecologically suitable sites throughout its range. Initial trials with the sowing of seed under suitable hosts have proved successful (Ecroyd 1995; Anon. 2003). The Recovery Group is confident that maintenance or establishment of large populations is now feasible. The idea of establishing populations on browser-free sites such as islands or mainland islands is now a realistic possibility.

7. Public awareness

The Dactylanthus Recovery Group has always placed a strong emphasis on increasing public awareness of the plight of dactylanthus, due to the tradition of harvesting wood roses as well as its unusual ecology. Numerous articles have appeared in newspapers or popular magazines (see Holzapfel in press), and a 'Friends of dactylanthus' group has been formed.

Some corporations are now beginning to see dactylanthus as a symbol of their conservation effort, and are keen to include it in restoration plantings. Other private organisations have sponsored the production of fact sheets on dactylanthus.

8. Status and species recovery principles

Under the New Zealand threat classification systems applied by DOC (Molloy et al. 2002; de Lange et al. 2004), dactylanthus is classified as being in Serious Decline (Hitchmough 2002; de Lange et al. 2004). It meets the status criterion of having a moderate to large population (> 5000 individuals) and the trend criterion of moderate to large predicted decline (> 30% of total population in

[3] Also included as appendix 2 in the 2001/02 Dactylanthus Recovery Group meeting minutes.

next 10 years). Two qualifiers clarify the Hitchmough (2002) classification: Dactylanthus is conservation dependent (CD) and is suffering from recruitment failure (RF).

Successful recovery will depend on minimising human-induced mortality and maximising recruitment.

9. Options for recovery

9.1 OPTION 1—DO NOTHING

This option relies on dactylanthus surviving in conservation areas and on private land with no physical protection or active management. This option is not recommended.

9.2 OPTION 2—UNDERTAKE NATIONAL PRIORITY WORK

Undertaking national priority work involves using threatened plant recovery tools to co-ordinate required management work and research needs. This is the preferred option.

10. Recovery vision and goals

10.1 VISION

Dactylanthus is secure throughout its natural range. Dactylanthus is locally abundant in self-sustaining populations. Key ecosystem interactions such as those with pollinators, dispersers, consumers and hosts are restored.

10.2 GOALS

These goals are based on New Zealand threat classification systems (Molloy et al. 2002; de Lange et al. 2004).

10.2.1 Long-term goal (50 years)

Dactylanthus is not threatened. There are at least 15 populations throughout its known range of distribution and environments. The abundance in each population is stable or increasing with at least 500 clumps including 100 females.

10.2.2 Short-term goal (10 years)

At least 15 populations are under intensive management, with their condition either being maintained or improved. At least 10 of these populations have increased in number or improved their condition. No populations at the extreme spectrum of geographical and environmental distributional range are lost, and 5 populations each have 500 clumps that include at least 100 female clumps. At least two populations occur in habitat free of human-introduced threats.

11. Implementation of the work plan

To aid with implementation, the work plan has been divided into three themes (management, working with the community and research). Each theme is sub-divided into a number of topics. Each of these topics is further broken down into one or more objectives with associated issue(s) and suggested action(s) to resolve each issue(s).

The work plan section of this recovery plan provides short-term direction for departmental and community group managers by identifying: actions, responsibilities, localities and timeframes.

12. Work plan

12.1 THEME 1: MANAGEMENT

12.1.1 Topic 1: Planning

Objective 1: Priority sites for management are selected throughout the known range of dactylanthus.

Issue: Many sites are now known, but many of the populations are small (a single clump in some cases), or the sites are insecure or impractical to manage.

Action 1.1

Establish a ranking system and rank all known existing populations using criteria such as population size, presence of female plants, area, presence of bats, habitats, threats, range and historic significance, by December 2005.

Priority: HIGH.

Accountability: Conservancies to provide data and Recovery Group to rank.

Action 1.2

Establish and implement a standardised national site prioritisation process for all known populations to identify populations of national importance by December 2005. A preliminary list of priority sites for management (as at 2003) is provided in Appendix 2.

Priority: HIGH.

Accountability: Recovery Group.

Objective 2: Information on dactylanthus management is more accessible.

Issue: A lot of knowledge about dactylanthus management is fragmented and not accessible.

Action 2.1

Produce a best practice guide for dactylanthus management by December 2005.

Priority: HIGH.

Accountability: Recovery Group.

Objective 3: Management plans are in place for all populations of national importance.

Issue: Current management at important sites may not be able to achieve the overall short- and long-term goals identified in this plan.

Action 3.1

Amend existing or develop new management plans to address short- and long-term goals of this recovery plan at a local level by July 2006.

Priority: HIGH.

Accountability: Conservancies. Recovery Group to provide template by September 2005.

12.1.2 Topic 2: Survey

Objective 1: Improve knowledge of the range and distribution of naturally occurring dactylanthus.

Issue: Historical, anecdotal and pollen information suggests that the actual range and distribution of dactylanthus is greater than is currently known.

Action 1.1

Continue to survey sites with historic, anecdotal or pollen evidence, particularly in northwest Nelson and the West Coast (South Island); and Wellington, Auckland and Northland.

Priority: MEDIUM.

Accountability: Conservancies.

12.1.3 Topic 3: Legal protection and other legal matters

Objective 1: All dactylanthus populations of national importance are legally protected.

Issue: Threatened plants, including dactylanthus, outside covenants are not legally protected on private land. Plants are not necessarily protected on public land managed by agencies other than DOC, e.g. Transit New Zealand, Ministry of Defence, Land Information New Zealand (LINZ), and local authorities.

Action 1.1

Advocate for and assist in the legal protection of dactylanthus and its habitat, at least for the populations of national importance, for the duration of the recovery plan.

Priority: LOW.

Accountability: Conservancies.

Objective 2: Adequate legislation is in place to protect threatened plants on private land.

Issue: Threatened plants, including dactylanthus, are not legally protected on uncovenanted private land.

Action 2.1

Advocate for adequate legislation to protect threatened plants throughout New Zealand, for the duration of the recovery plan.

Priority: LOW.

Accountability: Recovery Group.

Objective 3: Penalties are adequate, and the Department has compliance and law enforcement capability, to deter the destruction of dactylanthus on all land.

Issue: Where legal protection does occur, penalties and the Department's compliance and law enforcement capability may not be adequate to deter collection.

Action 3.1

Continue to advocate for the reassessment of the penalty structure and the Department's compliance and law enforcement capability with regard to the protection of dactylanthus.

Priority: LOW.

Accountability: Recovery Group.

12.1.4 Topic 4: Threat management

Objective 1: All populations of national importance are under sustained and adequate protection, resulting in seed production and an increase in number of clumps in each population. All other populations are managed as well as local circumstances allow.

Issue: Despite management, dactylanthus is still declining in some populations and, overall, as a species. Simply protecting clumps of dactylanthus is no longer considered sufficient; the ecosystem also needs to be considered, i.e. pollinators, seed distributors and hosts. The impact of pigs is still poorly understood.

Action 1.1

Local threat management, as identified in the management plans, is implemented for the duration of the Recovery Plan.

Priority: HIGH.

Accountability: Conservancies.

Action 1.2

Local management plans are reviewed in 2008/09 to ensure that at least five of the populations of national importance are on track to attain 500 clumps with at least 100 females by July 2014.

Priority: HIGH.

Accountability: Recovery Group.

Action 1.3

Where appropriate, establish new populations or enhance existing populations through broadcasting seed and actively managing components of the ecosystem that are vital to the health of dactylanthus, e.g. hosts and pollinators, for the duration of the plan.

Priority: MEDIUM.

Accountability: Conservancies.

Action 1.4

Establish at least two self-sustaining populations of dactylanthus at sites free of browsers, by July 2014.

Priority: HIGH.

Accountability: Recovery Group and conservancies.

12.1.5 Topic 5: Monitoring

Objective 1: A time series analysis that provides information on seed production and clump sex ratio from all populations of national importance is undertaken.

Issue: Information is needed to assess the adequacy of protection regarding seed production and clump sex ratio.

Action 1.1

Undertake annual seed monitoring in each population of national importance.

Priority: HIGH.

Accountability: Conservancies.

Action 1.2

Assess the sex ratio in each dactylanthus population of national importance in 2005, 2010, and 2014, at least.

Priority: HIGH.

Accountability: Conservancies.

Action 1.3

Assess the sex ratio in any new population.

Priority: HIGH.

Accountability: Conservancies.

Objective 2: Change in abundance of clumps in all populations of national importance is quantified.

Issue: Specific methods for measuring recruitment and changes in abundance are currently not available and are, therefore, a focus for research.

Action 2.1

Develop and test a method, by July 2014, to quantify accurately any change in abundance of clumps.

Priority: HIGH.

Accountability: Recovery Group.

Objective 3: Dactylanthus flowering is advocated as a precise outcome measure for animal pest control operations.

Issue: Animal pest management staff are not always aware of the benefits to be derived from monitoring dactylanthus flowering.

Action 3.1

The opportunity to use dactylanthus as a monitoring tool is made clear to animal pest control monitoring staff.

Priority: LOW.

Accountability: Conservancies.

12.1.6 Topic 6: Translocation

Objective 1: Dactylanthus is established in suitable pest-free or pest-managed habitats by 2014.

Issue 1: The current ability of dactylanthus to colonise new areas is restricted by limited seed dispersal and isolated populations, therefore natural establishment of new sites is expected to be low.

Action 1.1

A best practice guide is developed for translocation of dactylanthus by December 2005, to assist staff and private groups.

Priority: HIGH.

Accountability: Recovery Group.

Action 1.2

Criteria are developed for the selection of suitable sites for translocation of dactylanthus by December 2005.

Priority: HIGH.

Accountability: Recovery Group.

Action 1.3

Translocate dactylanthus to at least 10 new sites by July 2014 and monitor for establishment and seed set.

Priority: HIGH.

Accountability: Recovery Group and conservancies.

Issue 2: There is a high level of interest in incorporating dactylanthus in restoration programmes from departmental and community groups.

Action 1.4

Provide consistent advice and / or assistance to restoration groups wanting to introduce dactylanthus (see 12.1.6 Theme 1, Topic 6, Issue 1, Action 1.1, above).

Priority: LOW.

Accountability: Conservancies.

12.1.7 Topic 7: *Ex-situ* cultivation

Objective 1: Dactylanthus is established in at least one professional or advocacy institution by July 2014.

Issue: Dactylanthus is currently not in cultivation at any scale, therefore there is currently no opportunity for advocacy and research on live plants outside wild populations.

Action 1.1

Consider and assess proposals for *ex-situ* cultivation of dactylanthus for research purposes.

Priority: MEDIUM.

Accountability: Recovery Group.

Action 1.2

Investigate suitable advocacy sites and discuss interest in taking dactylanthus into cultivation for advocacy purposes.

Priority: MEDIUM.

Accountability: Recovery Group and conservancies.

Action 1.3

Establish dactylanthus in at least one of these sites by July 2014.

Priority: HIGH.

Accountability: Recovery Group and conservancies

Objective 2: Dactylanthus does not become a commercially available species for the duration of the recovery plan.

Issue: Commercial production of dactylanthus and establishment of a market for sale will increase demand and place natural populations at further risk from harvest.

Action 2.1

Commercial cultivation of dactylanthus is discouraged by the Department if the subject arises.

Priority: LOW.

Accountability: Recovery Group, conservancies, External Relations Division.

12.1.8 Topic 8: Experimental management techniques

Objective 1: The requirements for successful pest control that protect dactylanthus are understood.

Issue: The success of protection through pest control varies due to population size of dactylanthus, local pest abundance, pollinator impacts etc.

Action 1.1

Continue to monitor pest control operations at sites with dactylanthus (result and outcome monitoring), analyse information to facilitate continuous improvement of operations, and enter information into the Bioweb database Pestlink.

Priority: HIGH.

Accountability: Conservancies.

12.2 THEME 2: WORKING WITH THE COMMUNITY

12.2.1 Topic 1: Tangata whenua

Objective 1: The Recovery Group is aware of, and considers, tangata whenua issues in recovery planning and local management.

Issue: Management of dactylanthus is based primarily on European values, despite at least some iwi / hapu having known cultural associations with the species and with many more such associations assumed. There is a risk of alienating and overlooking opportunities with tangata whenua in the management of dactylanthus.

Action 1.1

Investigate tangata whenua perspectives on dactylanthus and incorporate these into management, as appropriate.

Priority: MEDIUM.

Accountability: Conservancies.

Action 1.2

Involve tangata whenua in local management of dactylanthus.

Priority: MEDIUM.

Accountability: Conservancies.

12.2.2 Topic 2: The community

Objective 1: Opportunities to involve the public and local authorities in management of dactylanthus are recognised and realised.

Issue: Significant populations of dactylanthus occur on private land. Effective management of dactylanthus requires the involvement of local / national interest groups and individuals.

Action 1.1

Continue and increase the number of dactylanthus management projects that involve the public (volunteers, interest groups, individuals, local authorities). Examples include Oropi volunteer workdays (Bay of Plenty), survey through volunteers at Mount Pirongia (Waikato), school group visits at Te Araroa (East Coast) and caging in the Tongariro–Taupo Conservancy with the Tongariro Natural History Society.

Priority: HIGH.

Accountability: Recovery Group and conservancies.

Action 1.2

Seek financial assistance from local and national sources (e.g. grants, sponsorship) for dactylanthus recovery outside the Department.

Priority: MEDIUM.

Accountability: Recovery Group and conservancies.

Objective 2: Information is shared between and amongst DOC staff and the public.

Issue: Information on the distribution and collection of dactylanthus held by members of the public is often unavailable to the Department. This information needs to be more accessible to dactylanthus managers. Dactylanthus also has a high profile amongst the public, and their interest needs to be maintained.

Action 2.1

Maintain and strengthen the 'Friends of dactylanthus' network.

Priority: HIGH.

Accountability: Volunteer from the Recovery Group.[4]

Action 2.2

Develop and promote a dactylanthus web page on the DOC website and the New Zealand Plant Conservation Network website by December 2005; and contribute to other websites and DOC publications when the opportunity arises.

Priority: HIGH.

Accountability: Recovery Group.

Action 1.3

Continue to use media opportunities to raise awareness of dactylanthus' situation and management.

Priority: HIGH.

Accountability: Recovery Group and conservancies.

Action 1. 4

Continue to advocate for dactylanthus internally through DOC intranet stories, sharing of records, etc.

Priority: MEDIUM.

Accountability: Recovery Group and conservancies.

Objective 3: Collection of dactylanthus at managed sites no longer occurs, and instances of collection at other sites decrease.

Issue: The continued collection of dactylanthus for wood roses threatens the survival of dactylanthus.

Action 3.1

Undertake proactive and reactive advocacy to deter collection of dactylanthus.

Priority: HIGH.

Accountability: Recovery Group and conservancies.

Action 3.2

Undertake compliance and law enforcement (or advocacy) visits where sale of wood roses can occur, or has occurred.

Priority: HIGH.

Accountability: Conservancies.

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[4] In 2005 this position was held by Bec Stanley (Auckland Conservancy, DOC).

12.2.3 Topic 3: Private landowners and land managers

Objective 1: Populations of dactylanthus, particularly those of national importance, are protected on private land.

Issue: Some populations of dactylanthus, including ones of national importance, occur on private land. The Department needs a special relationship with landowners and managers that allows for effective protection of these populations.

Action 1.1

Maintain the close relationships with landowners of the Kakanui Block (Te Araroa) and the Parapara (Wanganui) site to ensure that protection is ongoing and adequate for their status as populations of national importance.

Priority: HIGH.

Accountability: East Coast/Hawke's Bay and Wanganui Conservancies.

Action 1.2

Opportunities are identified (e.g. Forest Stewardship Council accreditation) where they occur; and advocacy and technical assistance for the protection and management of dactylanthus on private land is undertaken.

Priority: MEDIUM.

Accountability: Conservancies.

12.3 THEME 3: RESEARCH

12.3.1 Topic 1: Agents of decline

Objective 1: The understanding of the impact of pigs on the survival of dactylanthus is improved.

Issue: With the exception of pigs, the level of knowledge about most agents of decline is currently assessed as being adequate for management purposes.

Action 1.1

Carry out, or promote, research on the impacts of pigs on dactylanthus, by July 2009.

Priority: HIGH.

Accountability: Recovery Group and East Coast/Hawke's Bay Conservancy.

Objective 2: The impact of galvanised and / or small-sized mesh cages on the survival of dactylanthus is known, by July 2009.

Issue: On Little Barrier Island significantly more clumps have died inside small-sized galvanised mesh cages than outside them. It is not clear whether the cages are causing this higher mortality rate.

Action 2.1

Carry out, or promote, a literature review on the impact of galvanised metal on plants, by July 2006.

Priority: MEDIUM.

Accountability: Recovery Group.

Action 2.2

Carry out, or promote, research into the microclimatic effects of small-sized mesh cages on dactylanthus and the host trees, by July 2009.

Priority: MEDIUM.

Accountability: Recovery Group.

12.3.2 Topic 2: Taxonomy and genetics

Objective 1: The genetic variation of dactylanthus across its entire range is understood.

Issue: Our understanding of the genetic variation in dactylanthus has been advanced through RAPD analysis (Faville et. al. 2000; Holzapfel et al. 2002), but recently discovered outliers (Northland, Wairarapa, Coromandel) were not included in this analysis. Current understanding is not sufficient to guide management.

Action 1.1

Update genetic analysis of dactylanthus through RAPD analysis to include recent significant finds, by July 2007; and include other significant finds within 3 years.

Priority: MEDIUM.

Accountability: Recovery Group.

Action 1.2

Carry out, or promote, an investigation into the genetic variation of dactylanthus at a finer scale for specific population aggregates, e.g. along an east / west demarcation line in the central population, by July 2011.

Priority: LOW.

Accountability: Recovery Group.

Action 1.3

Support other genetic work on dactylanthus when the opportunity arises.

Priority: LOW.

Accountability: Recovery Group and conservancies.

12.3.3 Topic 3: Autecology and population dynamics

Objective 1: All aspects of the biology and autecology of dactylanthus necessary for successful management are understood.

Issue: Despite a good understanding of the biology and autecology of dactylanthus, some questions with potentially large implications for management have not been answered.

Action 1.1

Continue to carry out, or promote, research on dactylanthus, in particular on recruitment, life-history, sex determination, translocation methodology, dispersal agents, host specificity, pollination and seed bank, effects of parasitism on host health / longevity, and host resistance.

Priority: HIGH.

Accountability: Recovery Group and conservancies.

Action 1.2

Compile and publish a bibliography of dactylanthus by July 2006 which will be updated every 5 years.

Priority: MEDIUM.

Accountability: Recovery Group.

12.3.4 Topic 4: Ecosystem

Objective 1: The natural role and importance of dactylanthus in its ecosystem is understood.

Issue: We do not fully understand the role that dactylanthus plays in its ecosystem at natural levels of abundance and ecosystem composition (pollinators, browsers, dispersal, hosts, etc.). This role may be substantial given the amount of nectar produced and the assumed high natural abundance of dactylanthus throughout its range.

Action 1.1

Investigate the synecology of dactylanthus, e.g. at Little Barrier Island 3 years after removal of kiore (*Rattus exulans*).

Priority: HIGH.

Accountability: Conservancies, particularly Auckland Conservancy.

Action 1.2

Establish a research population of dactylanthus on Little Barrier Island.

Priority: HIGH.

Accountability: Auckland Conservancy.

Action 1.3

Investigate the level of nectar production and utilisation of dactylanthus throughout its entire range, assuming pre-human abundance levels, by July 2010.

Priority: MEDIUM.

Accountability: Recovery Group.

12.3.5 Topic 5: Social

Objective 1: Eliminate the collection and sale / trade of wood roses.

Issue: Collection of dactylanthus is ongoing despite advocacy. Collecting dactylanthus is a 'traditional' pastime often associated with forestry communities. There appears to be demand for wood roses and some people are willing to fill or enhance this demand. This puts pressure on existing populations of dactylanthus.

Action 1.1

Carry out, or promote, research into the motivation(s) of collectors and buyers of wood roses, and assess how a conservation message can be effectively communicated.

Priority: MEDIUM.

Accountability: Recovery Group.

13. Plan term and review date

The term of this plan is 10 years from July 2004. It will be reviewed after 10 years, or sooner if new information leads to proposals for a significant change in direction. The current plan will remain operative until a reviewed plan is in place. The proposed review date of this recovery plan is July 2014.

14. Acknowledgements

Thanks to all the members of the Dactylanthus Recovery Group who contributed so constructively to the completion of this plan, and to the smooth running of the group. Thanks also to members of the conservation boards and other interested individuals who have commented on the plan; and to Andrew Townsend for editing the plan during the 2004 Recovery Group meeting.

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Appendix 1

PUTATIVE HOSTS FOR DACTYLANTHUS

BOTANICAL NAME	COMMON NAME
Aristotelia serrata	Wineberry / makamako
Beilschmiedia tawa	Tawa
Brachyglottis repanda	Rangiora / bushman's friend
Carpodetus serratus	Putaputaweta / marble leaf
Coprosma arborea	Mamangi
Coprosma grandifolia	Kanono
Coprosma tayloriae	Small-leaved coprosma
Coprosma tenuifolia	Wavy-leaved coprosma
Coriaria arborea	Tutu
Geniostoma rupestre var. *ligustrifolium*	Hangehange
Hebe stricta	Koromiko
Hedycarpa arborea	Pigeonwood / porokaiwhiri
Melicytus ramiflorus	Mahoe / whiteywood
Myrsine australis	Mapou / red matipo
Myrsine salicina	Toro
Nothofagus spp.	Beech spp.*
Pittosporum ellipticum	
Pittosporum eugenioides	Lemonwood / tarata
Pittosporum ralphii	
Pittosporum tenuifolium	Kohuhu / black matipo
Pseudopanax anomalus	
Pseudopanax arboreus	Fivefinger / puahou
Pseudopanax colensoi	Mountain fivefinger / orihou
Pseudopanax crassifolius	Lancewood / horoeka
Pseudopanax edgerleyi	Raukawa
Pseudopanax simplex	Haumakaroa
Pseudowintera colorata	Mountain horopito / pepper tree
Quintinia serrata	Tawheowheo
Schefflera digitata	Pate / seven finger
Streblus heterophyllus	Turepo / milk tree
Weinmannia racemosa	Kamahi

* Cheeseman (1914), but no gymnosperm has been confirmed as a host.

Appendix 2

SITES OF NATIONAL IMPORTANCE FOR DACTYLANTHUS

(As identified by the Dactylanthus Recovery Group at its 2003 meeting.)

Puketi
Little Barrier Island
Mount Pirongia
Pikiariki
Te Araroa
Oropi
Waione
Te Kopia
Waikaremoana
Mahia
Kakaramea–Pihanga
100 Acre Bush
Tongariro Forest
Parapara site
Wairarapa
Egmont

This list includes: sites at the north, south, east, and west of the known range, the type locality, and populations that have the potential to meet the long term goal of this recovery plan. These were the priorities at the time of writing, and may change with new discoveries.

Recovery plans

This is one of a series of recovery plans produced by the Department of Conservation. Recovery plans are statements of the Department's intentions for the conservation of particular plants and animals for a defined period. In focusing on goals and objectives for management, recovery plans serve to guide the Department in its allocation of resources and to promote discussion amongst a wider section of the interested public.

After preparing a technical report which was refined by scientists and managers both within and outside the Department, a draft of this plan was sent to relevant Conservation Boards for comment. After further refinement, this plan was formally approved by the General Manager Operations (Northern) in August 2005. A review of this plan is due after 10 years (2014), or sooner if new information leads to proposals for a significant change in direction. This plan will remain operative until a reviewed plan is in place.

The Department acknowledges the need to take account of the views of the tangata whenua and the application of their values in the conservation of natural resources. While the expression of these values may vary, the recovery planning process provides opportunities for consultation between the Department and the tangata whenua. Departmental Conservancy Kaupapa Atawhai Managers are available to facilitate this dialogue.

A Recovery Group has been established for *Dactylanthus taylorii*. This group consists of people with knowledge of the ecology and management needs of the species. The role of the Recovery Group is to achieve recovery of the species it represents through generation and provision of high quality technical advice. The Recovery Group prepared this plan in conjunction with people interested in, or affected by, this plan; or with an expert knowledge of the species. Comments and suggestions regarding conservation of *Dactylanthus taylorii* are welcome and should be directed to the Dactylanthus Recovery Group via any office of the Department or to the Terrestrial Conservation Unit (Threatened Species Science Section).

Threatened Species Recovery Plans

NO.	SPECIES	YEAR APPROVED
55	New Zealand large galaxiid recovery plan	2005
54	Hihi/stichbird (*Notiomystis cincta*) recovery plan	2004
53	New Zealand non-migratory galaxiid fishes	2004
52	Grassy plants of fertile sites	2004
51	Mudfish (*Neochanna* spp.)	2003
50	Kiwi (*Apteryx* sp.)	2003
49	*Powelliphanta* land snails	2003
48	North Island *Oligosoma* spp. skink	2002
47	Tuatara	2001
46	Chatham Island fantail, Chatham Island tomtit and Chatham Island warbler	2001
45	Forbes' parakeet and Chatham Island red-crowned parakeet	2001
44	New Zealand shore plover	2001
43	Chatham Island shag and Pitt Island shag	2001
42	Chatham Island mollymawk, northern royal albatross, Pacific mollymawk	2001
41	Chatham Island tui	2001
40	Black robin	2001
39	Parea	2001
38	Chatham Island oystercatcher	2001
37	Chatham petrel	2001
36	Chatham Island taiko	2001
35	Hoiho	2001
34	Pygmy button daisy	2001
33	*Hebe cupressoides*	2000
32*	Inland Lepidium	2000
31*	Muehlenbeckia astonii	2000
30*	North Island kokako	1999
29*	Weka	1999
28*	Pittosporum patulum	1999
27	Cyclodina skinks	1999
26	Coastal cresses	1999
25*	Threatened weta	1998
24*	Striped skink	1998
23*	Fairy tern	1997
22*	Blue duck	1997
21	Kakapo	1996
20	Stitchbird	1996
19*	Brown teal	1996
18*	Native frogs	1996
17*	New Zealand (Hooker's) sea lion	1995
16*	Dactylanthus taylorii	1995
15*	Bat (peka peka)	1995
14	Otago and grand skinks	1995

All *Threatened Species Recovery Plans* from No.25 (1998 and later) are available on the DOC website: www.doc.govt.nz > Publications > Science and Research > Biodiversity Recovery Unit

* Out of print.

In-print issues are available free of charge from:
Science & Technical Publishing,
(Research Development & Improvement Division),
Department of Conservation, PO Box 10-420, Wellington, New Zealand.