

# HEATHER

## 1. Description of the problem

(a) *Location of the case-study*

Tongariro National Park World Heritage Area, North Island, New Zealand.

(b) *History (origin, pathway and dates, including time-period between initial entry/first detection of alien species and development of impacts) of introduction(s)*

The plant was first introduced to New Zealand in the 1860s. Then, between 1912 and the early 1920s, an early park warden seeking to create grouse hunting habitat, imported seed from Britain, Ireland and France and liberally sprinkled it through western parts of the then tussock land in Tongariro National Park.

Heather can now be found in a number of locations throughout New Zealand. It began to be considered a pest weed species in the 1980s, but the only substantial infestation is in the central North Island.

(c) *Description of the alien species concerned: biology of the alien species (the scientific name of species should be indicated if possible) and ecology of the invasion(s) (type of and potential or actual impacts on biological diversity and ecosystem(s) invaded or threatened, and stakeholders involved)*

The pest plant is *Calluna vulgaris* (L.), known as 'ling' in England but its accepted common name in New Zealand is 'heather.'

*Calluna vulgaris* is the most widespread exotic weed in Tongariro National Park. It can out-compete the vegetation it invades, causing significant biomass losses of indigenous plants and threats to indigenous biodiversity. Its invasion is a particular concern in grassland sites above the tree line. More recently it is also causing concern in wetlands with evidence that it has evolved to become able to survive in areas with elevated water tables.

Heather also has the potential to cause major problems in other parts of the country (such as the South Island high country) but to date it is only in the Central North Island that is a serious ecological concern. It has been spreading at rates of up to seven kilometres a year along roads. This is through seeds being spread by road machinery, bee keepers' trucks and, possibly, people picking the much-admired blooms.

Ongoing invasion both within the national park and far beyond its boundary is a worsening ecological problem as red tussock lands are turned into heathland.

The problems with heather include:

- Huge reductions in indigenous species biomass;
- It is a threat to areas of high natural value, including sites of rare plants and those that are hosts to endemic insects;

- It interferes with natural processes of succession;
- Loss of natural landscape value of tussocklands; and
- Invasion of an exotic plant into a World Heritage National Park.

(d) *Vector(s) of invasion(s) (e.g. of deliberate importation, contamination of imported goods, ballast water, hull-fouling and spread from adjacent area. It should be specified, if known, whether entry was deliberate and legal, deliberate and illegal, accidental, or natural.)*

*Calluna vulgaris* was deliberately and legally introduced to Tongariro National Park. Its seed was spread over tussock land. The heather took hold but the grouse, for which it was meant to provide habitat, failed to thrive.

(e) *Assessment and monitoring activities conducted and methods applied, including difficulties encountered (e.g. uncertainties due to missing taxonomic knowledge)*

Various vegetation monitoring has been put in place since the 1960s. These include monitoring presence/absence, vegetation cover (to  $\pm 20\%$ ) and height/structure. There is occasionally some confusion in the public eye with *Erica lusitanica* (Spanish heath) and other species of *Erica* which are also sometimes referred to as heathers.

## 2. Options considered to address the problem

(a) *Description of the decision-making process (stakeholders involved, consultation processes used, etc.)*

The Department of Conservation (DOC) has developed a management plan to help in its control efforts of *Calluna vulgaris*. The plant is also found on lands managed by the New Zealand Army, which is also taking active steps manage the plant pest.

Input into options for managing heather has come from a variety of other agencies, including:

- Universities
- Private ecological consultants
- Independent conservation organisations
- Chemical companies
- Landcare Research NZ
- Regional councils

(b) *Type of measures (research and monitoring; training of specialists; prevention, early detection, eradication, control/containment measures, habitat and/or natural community restoration; legal provisions; public education and awareness)*

Heather's rapid rate of spread means it has been an especially difficult weed to manage. Of necessity, efforts have been targeted to key conservation areas; in others the heather is left to grow.

Heather's spread could only be controlled by repeated use of herbicides. However, heather is not always easy to detect and is not easy to kill using

herbicides so repeat visits and spraying are necessary. The repeated use of herbicides is both undesirable and prohibitively expensive in all but very limited areas at the edge of infestation.

Hand pulling and grubbing plants is not effective except on the very edges of the infestation. And grazing, fertilising and fire are inappropriate in Tongariro National Park.

These factors have made heather an especially difficult weed for DOC, the Army and others to manage.

(c) *Options selected, time-frame and reasons for selecting the options*

The issues outlined in 2(c) mean biocontrol is the only option for the cost-effective control of heather.

From 1990 to 1996 research was carried out on potential biocontrol using the heather beetle (*Lochmaea suturalis*). The main requirement was to ensure the host plant range was limited to heather. Tens of indigenous and valued exotic plant species were tested using the standard test protocol. Two environmental assessment processes were carried out including consideration of options and submissions were obtained from the public and concerned agencies. This concluded that the beetle would be safe to introduce into the New Zealand environment.

Between 1996 and 1999, the beetle was deliberately released in 17 selected areas in and around the national park. Some releases were on sites of previous vegetation monitoring, while others had new monitoring established.

Partial browsing by the beetle leads to plant death by evapotranspiration. *Lochmaea suturalis* is common in Europe and is known to feed only on heather plants. This means its range will be restricted to places where heather grows and poses no threat to indigenous plants. (Ironically, back in its Scottish home the tables are turned – there the plant is at risk and the naturally occurring beetle is the pest.)

(d) *Institutions responsible for decisions and actions*

The releases were a joint effort between the Department of Conservation (DOC), the New Zealand Army and Landcare, in the hope it would control heather.

### **3. Implementation of measures, including assessment of effectiveness**

(a) *Ways and means set in place for implementation*

Several years of careful research by Landcare Research lead to an environmental impact assessment with DOC. This public assessment process concluded that the beetle would be safe to release and would not affect indigenous plants or the

wider New Zealand environment. The Minister of Conservation gave his approval to release the beetle in January 1996.

The decision was made before the Hazardous Substances and New Organisms Act (HSNO) 1996 came into effect. This Act provides a process for evaluating new species before they are brought into New Zealand.

- (b) *Achievements (specify whether the action was fully successful, partially successful, or unsuccessful), including any adverse effects of the actions taken on the conservation and sustainable use of biodiversity*

Annual monitoring in 1999 by university and Landcare Research staff confirmed for the first time that the beetle has established in at least one site. Monitoring during November 2000 has confirmed that a dense patch of heather in that site is in fact dead or dying as a consequence of a *Lochmaea* outbreak, in particular a high biomass of larvae in December 2000-January 2001. No native plants were affected, (unlike when herbicides are used) but DOC will continue to monitor the site. An estimated 14,000 beetles were present in November 2000 and 500 beetles including gravid females have been collected and released at 16 further sites.

A visit by a DOC scientist to view the impact of the beetle on heather fields in the Netherlands suggests the insect will provide ecological constraints on the Tongariro heather problem but will not eliminate the plant.

It will be several years yet before the success of the biocontrol is known.

- (c) *Costs of action*

Biocontrol had direct costs of NZ\$136,000 from 1996 - 2000.

However, it was cheaper than the option of long-term control using herbicides. Two sites covering about 10,000 hectares cost NZ\$250,000 - \$450,000 from 1996 - 2000. To do large-scale herbicide control over most of Tongariro National Park would cost up to NZ\$1 million each year.

#### **4. Lessons learned from the operation and other conclusions**

- (a) *Further measures needed, including transboundary, regional and multilateral co-operation*

If the heather beetle continues to multiply and spread, it is hoped it will become an effective tool for helping DOC, the New Zealand Army and possibly Regional Councils control heather.

- (b) *Replicability for other regions, ecosystems or groups of organisms*

- (c) *Information compilation and dissemination needed*

Prior research and public environmental assessment processes are very important for biocontrol. Many people do not understand that biocontrol works at ecological timeframes not human ones.

