Department of Conservation Strategic Plan for Managing Invasive Weeds

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The purpose and scope of this plan

THE PURPOSE

This weed plan complements the Department of Conservation's (DOC's) national plans for managing threats to protected natural areas from possums, wild goats and Himalayan thar. DOC's Strategic Business Plan identifies a national plan for managing invasive weeds as a key target for managing threats.

This Strategic Plan for Managing Invasive Weeds therefore describes the long term goal, objectives, general principles and means by which DOC will seek to protect native species and natural communities from threats posed by invasive weeds. It is primarily an internal Document and will apply to DOC's:

- management of invasive weed threats to natural areas it administers (including those in land, wetland, and freshwater environments, the coastal marine area, and on both mainland and island sites);
- other statutory roles and responsibilities with regard to invasive weeds and border control, the coastal marine area, freshwater areas, and under the Biosecurity Act 1993 (see Appendix 1); and
- approach to the management of invasive weeds on other lands.

Thus, this Strategic Plan is not intended to be a plan for controlling any or all invasive weeds throughout New Zealand, or within whole regions including on private land. The legal framework for this is provided by the Biosecurity Act 1993. However, DOC recognises that it will need to work in partnership with others to achieve this Plan's objectives (see section 5).

"INVASIVE WEEDS" DEFINED

Invasive weeds are plants that can significantly and adversely affect the long-term survival of native species, the integrity or sustainability of natural communities, or genetic variation within indigenous species (see glossary for further discussion).

WHO IS THIS STRATEGIC PLAN INTENDED FOR?

Most of the standards and actions in this Plan will be implemented by DOC Conservancy technical support units and Area Offices. However, parts of the Plan are relevant to Head Office (CPD, ERD and STIS), Regional Offices, and Conservancy community relations and Kaupapa Atawhai staff.

ISSUES NOT INCLUDED IN THIS PLAN

The following types of weed control are not included in this Plan:

- **Managing plants where they impair visitors' use and enjoyment of tracks, huts and other facilities.** This is carried out under specific plans developed for the maintenance of visitor facilities. DOC's national Visitor Strategy sets out the criteria for identifying and prioritising key sites for visitors.
- **Managing plants where they pose a serious threat to archaeological sites or other historic places administered by DOC.** This is carried out through DOC's Historic Heritage Strategy 1995, which has adopted the standards in the International Council on Monuments and Sites charter for managing historic sites. Conservation plans that DOC develops for historic places may prescribe vegetation management regimes for both introduced and native plants.
- **Managing weeds where they pose no significant threat to important natural values, but which are controlled to minimise impacts on neighbouring land**. DOC's costs and obligations under the Biosecurity Act 1993 to control weeds that adversely affect neighbouring land are established by the government by an Order-in-Council.
- **Standards for operational aspects such as control techniques.** These will be addressed in DOC's weed quality conservation management (QCM) system (see section 4.3.5).

1. Summary

Almost half of all vascular plant species growing wild in New Zealand are introduced. New Zealand has at least 19 000 species of introduced vascular plants (at a conservative estimate), of which about 2 068 are naturalised so far. DOC recognises over 240 species as invasive weeds, and this number continues to increase as we gather more information and new species naturalise.

The impacts of invasive weeds are one of the main risks to the survival of 61 threatened native vascular plant species; have an impact on another 16 species; and threaten the long-term survival of native animals on many sites. Unless controlled, weed invasions will threaten natural areas covering more than 580 000 hectares in the next 10 to 15 years. Failure to manage key weed threats will inevitably lead to local and possibly national extinction of some native species, and the progressive degradation of native communities (see section 3). The most vulnerable community types are freshwater, wetlands, coastal habitats, lowland forest, shrublands and native grasslands, but weeds have invaded nearly all types of native land-based communities.

DOC's weed control occurs within a context of central and local government, community and individual efforts to manage invasive weeds. However, these broader management efforts do not replace the need for DOC to prioritise and manage weed threats in natural areas for which it has statutory responsibility. DOC must also ensure it has the necessary capacity to support its weed management (see section 2 and Appendix 1).

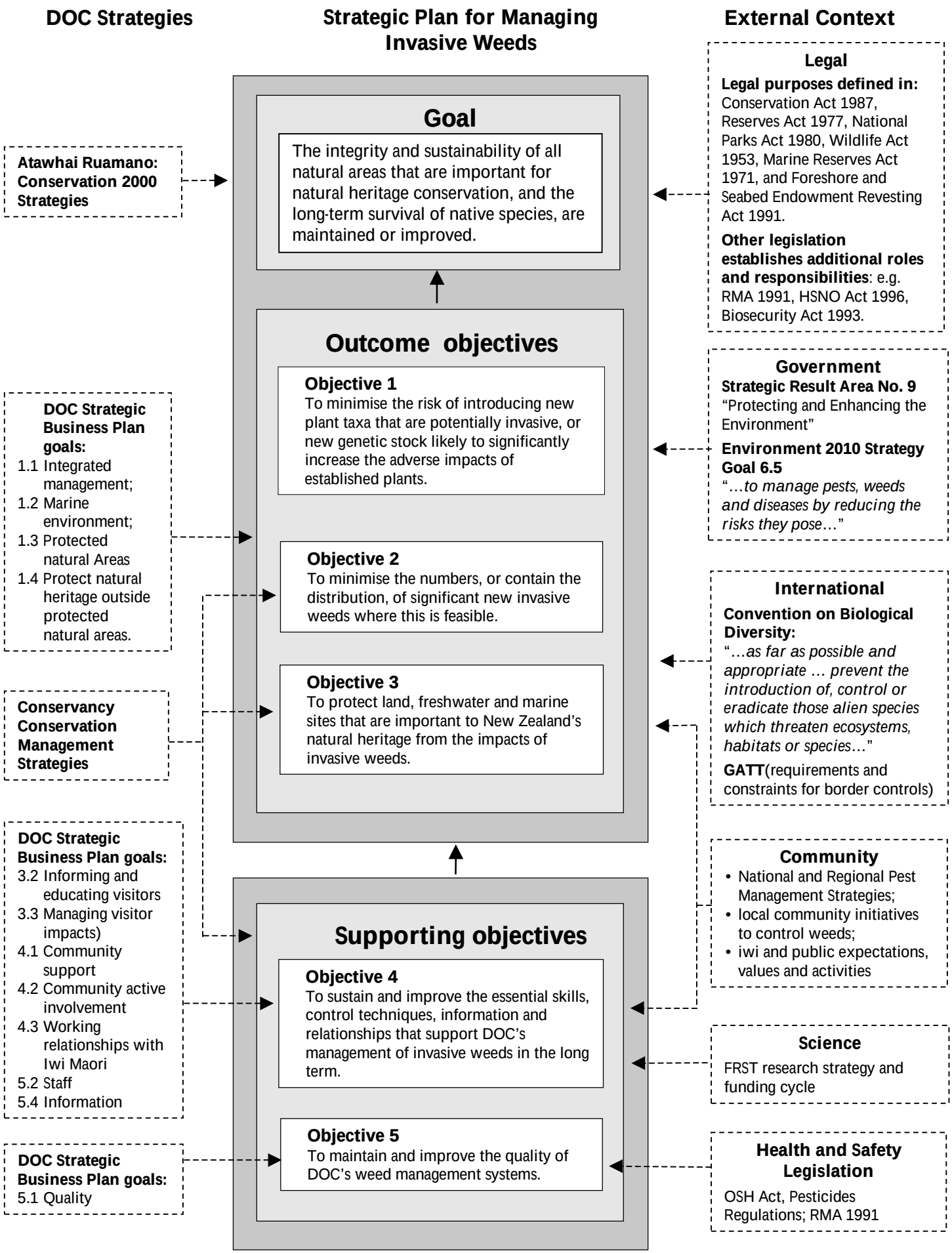
The core of DOC's weed management work, therefore, continues to be protecting priority natural areas it administers from weed impacts. But an essential part of managing weed impacts in the long-term is preventing or controlling potentially significant new weed species before they become an additional threat. Resources invested into such preventative work may produce lower conservation benefits in the short term compared to managing weeds in high value sites, but they are strategic investments that help to minimise future weed impacts and the difficulty and costs of control.

1.1 SUMMARY OF THE GOAL AND OBJECTIVES

The goal for this Strategic Plan is adapted from DOC's Strategic Business Plan: "*The integrity and sustainability of all natural areas that are important for natural heritage conservation, and the long-term survival of native species, are maintained or improved*".

The plan seeks to achieve three *outcome objectives* (see Figure 1). These are to:

- Minimise the risk of introductions of new plant taxa that are potentially invasive, or new genetic stock likely to significantly increase the adverse impacts of established plants.
- Minimise the numbers, or contain the distribution, of significant new invasive weeds where this is feasible ("Weed-led" programmes).


DOC Strategies
Strategic Plan for Managing Invasive Weeds
External Context
Goal
The integrity and sustainability of all natural areas that are important for natural heritage conservation, and the long-term survival of native species, are maintained or improved.
Outcome objectives
Objective 1
To minimise the risk of introducing new plant taxa that are potentially invasive, or new genetic stock likely to significantly increase the adverse impacts of established plants.
Objective 2
To minimise the numbers, or contain the distribution, of significant new invasive weeds where this is feasible.
Objective 3
To protect land, freshwater and marine sites that are important to New Zealand's natural heritage from the impacts of invasive weeds.
Supporting objectives
Objective 4
To sustain and improve the essential skills, control techniques, information and relationships that support DOC's management of invasive weeds in the long term.
Objective 5
To maintain and improve the quality of DOC's weed management systems.
Atawhai Ruamano: Conservation 2000 Strategies
DOC Strategic Business Plan goals:
1.1 Integrated management;
1.2 Marine environment;
1.3 Protected natural Areas
1.4 Protect natural heritage outside protected natural areas.
Conservancy Conservation Management Strategies
DOC Strategic Business Plan goals:
3.2 Informing and educating visitors
3.3 Managing visitor impacts)
4.1 Community support
4.2 Community active involvement
4.3 Working relationships with Iwi Maori
5.2 Staff
5.4 Information
DOC Strategic Business Plan goals:
5.1 Quality
Legal
Legal purposes defined in: Conservation Act 1987, Reserves Act 1977, National Parks Act 1980, Wildlife Act 1953, Marine Reserves Act 1971, and Foreshore and Seabed Endowment Revesting Act 1991.
Other legislation establishes additional roles and responsibilities: e.g. RMA 1991, HSNO Act 1996, Biosecurity Act 1993.
Government
Strategic Result Area No. 9 "Protecting and Enhancing the Environment"
Environment 2010 Strategy Goal 6.5
"…to manage pests, weeds and diseases by reducing the risks they pose…"
International
Convention on Biological Diversity:
"…as far as possible and appropriate … prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species…"
GATT(requirements and constraints for border controls)
Community
• National and Regional Pest Management Strategies;
• local community initiatives to control weeds;
• iwi and public expectations, values and activities
Science
FRST research strategy and funding cycle
Health and Safety Legislation
OSH Act, Pesticides Regulations; RMA 1991

- Protect land, freshwater and marine sites that are important to New Zealand's natural heritage from the impacts of invasive weeds ("Site-led" programmes).

To facilitate these three outcomes, the plan has two *supporting objectives*. These are to:

- Sustain and improve the essential skills, control techniques, information and relationships that support DOC's management of invasive weeds in the long term.
- Maintain and improve the quality of DOC's weed management systems.

1.2 THE STRUCTURE OF THE PLAN

Section 2 describes the legal, strategic and broader community context in which DOC carries out its weed control work, and the seven broad issues which this Plan seeks to address.

Section 3 summarises what is known about the impact of invasive weeds on native plants, animals and community types, and the trends in these impacts and weed numbers and distribution.

Section 4 describes the five objectives, identifies their relative priorities and underlying principles, and sets targets for progressively achieving them during the period 1998–2002. Conservancy technical support units and Area Offices will be accountable for most of the targets.

Section 5 outlines the way in which DOC will seek to develop supportive partnerships with landowners, Regional Councils, research associates, iwi and the general public to achieve the objectives in this plan, and to support broader initiatives to manage invasive weeds.

The **Appendices** describe the legal basis for DOC's weed management activities, and provide processes and criteria for identifying potential weed-led and site-led programmes, evaluating their feasibility, and ranking them. These nationally consistent systems will help DOC to identify and meet its national priorities.

2. Why is this Strategic Plan necessary?

2.1 THE CONTEXT IN WHICH DOC MANAGES INVASIVE WEEDS

2.1.1 At the border

In the past, any plant that was not carrying diseases and which was not a known major agricultural weed could be brought into New Zealand. Today, the Biosecurity Act 1993 and Hazardous Substances and New Organisms Act 1996 (HSNO) provide the framework for border control.

Under these Acts the Ministry of Agriculture and Forestry (MAF) is responsible for maintaining border control measures to minimise the accidental or illegal introduction of unwanted exotic organisms; the Ministry of Fisheries (MFish) has policy and regulatory responsibility for ballast water and hull defouling—the two main sources of seaweeds that could become marine invasive weeds; and the Environmental Risk Management Authority of New Zealand (ERMA) receives and evaluates applications to import new plants into New Zealand

The Department of Conservation (DOC) does not carry out any border control itself other than being responsible for controlling new plant species that visiting vessels may introduce to islands it administers. However, because of its legal responsibilities for protecting natural and historic resources, DOC has an interest in border control that would reduce the threat posed by new invasive weeds. DOC's role in border control is defined by the Biosecurity Act and HSNO Act.

2.1.2 Within New Zealand

Within New Zealand, DOC manages 8 000 000 hectares of protected land, wetland, freshwater and coastal marine sites, on the mainland and on offshore and outlying islands. This is about 30% of New Zealand's land area. Under the Conservation Act 1987, Reserves Act 1977, National Parks Act 1980, Wildlife Act 1953 and Marine Reserves Act 1971, DOC is responsible for preserving and protecting these areas. Among other things, these five Acts set out various requirements and objectives for managing invasive weeds. Conservancy Conservation Management Strategies set out the objectives, approaches and criteria for managing these places.

But these protected natural areas do not exist in isolation. Weeds often invade protected natural areas from nearby places, and can be spread by plants being used in gardens, the dumping of rubbish from gardens or fish tanks, or accidentally through seeds and fragments attached to clothing, cars, trains and boats. In turn, other places privately owned or managed by other agencies may also be important to New Zealand's natural heritage. The Acts DOC administers do not require DOC to manage weeds in these other places. However, DOC may—if it has the permission of the person who owns or controls the land—

control weeds causing damage to any indigenous species or habitat (including land, freshwater or marine areas) (see section 3 in Appendix 1).

DOC's invasive weed work also occurs within a broader context of central and local government, agency, community and individual efforts to manage invasive weeds. National and Regional Pest Management Strategies (NPMSs and RPMSs) under the Biosecurity Act are the most important mechanisms for co-ordinating these efforts (see Appendix 1). As a major land manager, DOC will often be a stakeholder in Pest Management Strategies, but these broader management efforts do not replace the need for DOC to prioritise and manage weed threats to places for which it has statutory responsibility.

DOC also has other legal roles and responsibilities related to managing introduced plants in freshwater systems and the coastal marine area (see sections 4 and 5 in Appendix 1).

2.2 WHY IS THIS PLAN NECESSARY?

This plan addresses seven key issues:

1. **DOC's many legal roles and responsibilities with respect to managing invasive weeds, and its responsibility to ensure its actions are effective and efficient.**

   DOC must meet its legal functions in ways that are effective, efficient and meet its national priorities. Section 53 (2)(e) of the Conservation Act 1987 allows the Director-General of Conservation to prepare or commission the preparation of plans for the conservation, management and control of any natural resource.

   This Strategic Plan will provide a consistent strategic framework to guide DOC in carrying out its roles and responsibilities relevant to managing invasive weeds. See Figure 1, section 4, section 5, and Appendix 1.

2. **Most of DOC's past pest control work has focused on animal pests, but plant pests are a major threat to many native species and community types.**

   It is clear that failure to manage key weed threats will inevitably lead to local and possibly national extinction of native species, and the progressive degradation of native communities, in particular wetlands, native grasslands, lowland forests, and coastal communities (see section 3).

   This Strategic Plan identifies the goal, objectives, general principles and means by which DOC will seek to protect indigenous species and natural communities from threats posed by invasive weeds. See sections 3–5.

3. **New plant taxa entering New Zealand may have the potential to become invasive.**

   Not all new plant taxa will become invasive weeds, but those that do can exacerbate the range or intensity of existing weed impacts, add to the cumulative impact of invasive weeds, and increase the resources required to manage them.

Preventing further introductions of potentially invasive weed species is a more cost effective strategy than controlling their impacts on indigenous species and communities (which is time consuming and expensive). Each new weed species requires an additional investment of effort to determine the degree of threat posed, to identify effective control techniques, and to develop management programmes. Experience also shows that eradicating a species from New Zealand or from a specific site is rarely possible, and control costs are often ongoing. Border control is particularly important for freshwater and marine aquatic plants, as there is often no feasible eradication option once aquatic weeds establish, and any control is usually costly, ongoing and only partially successful.

This Strategic Plan identifies and clarifies DOC's roles and responsibilities in managing weed risks at the border. See objective 1 (section 4.3.1), section 4.5.2 (targets 1 and 2), and Appendix 1.

4. **New invasive weed species continue to naturalise and to spread into new regions.**

   Managing only established weed species will not protect New Zealand's natural heritage in the long term. Species new to a region can exacerbate the range or intensity of weed threats, and therefore the resources required to manage them. An essential part of managing weed impacts will be eradicating or containing potentially significant new species (either at a national level or within a conservancy) before they become widespread and an additional threat to New Zealand's natural heritage.

   In the absence of a national strategic framework for DOC's weed control, conservancies could rarely justify managing new weed species, especially if the populations were not yet affecting significant natural values, and because they often first occurred in places not administered by DOC.

   This Strategic Plan formalises a management approach with prioritising and decision-making systems to address this issue. See objective 2 (section 4.3.2), section 4.4, section 4.5.2 (target 3), and Appendices 2–4.

5. **Without consistent management approaches and prioritisation systems, it is unclear whether DOC's weed control programmes collectively meet national priorities.**

   Until 1996/97, DOC had no nationally consistent framework for identifying, prioritising and managing the adverse impacts of weeds on indigenous species and natural communities. Conservancies took different approaches to managing invasive weeds, and the approaches often varied between the mainland and on islands. Because there was no standard prioritising system, it was unclear what the national priorities were, and whether Conservancies' weed control programmes collectively met them. In 1996/97, DOC developed its "weed-led" and "site-led" approaches for its nationally funded weed control programmes. The weed-led approach was a new initiative for DOC. The site-led approach continued what was conservancies' main focus, but established new and consistent decision-making tools. Conservancies have supported and successfully implemented these approaches.

This Strategic Plan formalises the weed-led and site-led approaches into methods to address objectives 2 and 3 respectively. See objectives 2 and 3 (sections 4.3.2, 4.3.3), section 4.4, section 4.5.2 (targets 3–7), and Appendices 2–5.

6. **DOC must work with others to manage invasive weeds effectively.**

   Supportive partnerships between DOC and Regional Councils, the general public, landowners, iwi and other management and research agencies are essential both to DOC's own weed management work and to broader efforts to manage invasive weeds.

   This Strategic Plan identifies targets for developing supportive partnerships; and the situations in which DOC might seek support for its programmes, or contribute to managing invasive weeds on other lands. See objective 4 (section 4.3.4), section 5, and section 4.5.3 (targets 10–12, 15–19).

7. **Current knowledge and control techniques are inadequate.**

   Information and technology essential for managing invasive weeds are often scant, particularly for new species. Standard and effective operating procedures do not yet exist for controlling all invasive weeds in all situations. Each weed species requires specific control techniques and herbicide formulations, and their response to control often varies with microclimate, season of control and surrounding vegetation. Appropriate control techniques also depend on the community types and natural values of the site in which the weed is growing. Improved information and technology will always be required as new plant species naturalise and established species spread.

   This Strategic Plan identifies targets that will support and improve the management of invasive weeds. See objective 4 (section 4.3.4), section 5.2.4, and section 4.5.3 (targets 9–16).

3. An overview of weed impacts and trends

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[2] NIWA
[3] Museum of New Zealand (Te Papa Tongarewa)

3.1 HOMOGENISING BIODIVERSITY

In New Zealand, animal pests such as possums, stoats, or rats are widely recognised as having severe impacts on native plant and animal communities. In contrast, invasive weeds have been greatly underestimated as a threat to our natural environment.[1]

Introductions of plants by humans is one of the great threats to biodiversity throughout the world. In the USA, for example, experts are increasingly viewing the spread of alien plant and animal species as a threat to native species second only to habitat destruction.[2,3] In Australia, weeds have been recently recognised as one of the most acute threats to conservation—without doubt a principal cause of the decline of native plants.[4] Moreover, invasive weeds blur the unique differences of native plant communities, and global biodiversity diminishes as more places become alike.[5] This "homogenisation" process is now widely recognised.[6]

Almost half of all vascular plant species growing wild in New Zealand are introduced. There are only 2 400 native vascular plant species, and about 2 068 introduced species have so far become naturalised (that is, growing in self-sustaining populations in the wild). At least another 17 000 introduced plant species[7] are in New Zealand private gardens and collections, or being used in agriculture, horticulture or forestry, and many of these are also likely to naturalise in the future.

DOC's weed database currently lists over 240 naturalised plants as actual or potential invasive weeds.[8] These plants come originally from Eurasia-Europe (35%), the America's (24%, mainly South America), Asia (16%), Africa (15%), and Australia (8%).

About three-quarters (74%) of terrestrial invasive weeds were deliberately introduced into New Zealand as ornamental plants, with a further 14% being originally introduced for agriculture, horticulture or forestry. Only 10% were introduced accidentally as contaminants with animals, soil, or other plants.[9,10] Similarly, about half (54%) of the aquatic weed species in the DOC database were introduced as ornamental plants.[11] For example, contorta pine, old man's beard, Japanese honeysuckle, wild ginger, pampas, heather, lagarosiphon and egeria are some of New Zealand's most invasive weeds and all were deliberately brought into New Zealand. There are no known instances of deliberate introductions of seaweeds[12]—all were probably brought into New Zealand accidentally by ships.[13] New plant taxa continue to enter New Zealand, through legal imports, illegally or accidentally.

FIGURE 2: NUMBERS OF NATIVE, INTRODUCED AND NATURALISED PLANTS IN NEW ZEALAND.
(Land plants only include vascular plants. "Freshwater plants" include submerged plants (e.g., low-growing turf and macroalgae), floating and emergent plants, but excludes filamentous green algae and microalgae.[14] "Marine plants" include macroalgae, but not planktonic microalgae.[15,16]

3.2 A WORSENING PROBLEM

The number of known invasive weeds has grown steadily since the 1960s (see Figure 3), as new species naturalise (an average of eight species per year)[17]— some becoming invasive weeds; and as new information identifies already naturalised species as significant threats. Some of today's recognised invasive weeds naturalised long ago, others very recently; for example, gorse naturalised in 1867, broom in 1872, heather 1910, old man's beard and kahili ginger in 1940, hydrilla in 1963, spartina in 1981, and the seaweed *Undaria* in 1987.

This trend of increasing numbers of invasive weeds shows no sign of slowing. In the Auckland region alone, over 615 exotic plant species are known to have naturalised (a figure apparently unmatched by any other city in the world),[18] and four new species naturalise there each year.[19] In the country as a whole, if historical averages continue, about 10% of new naturalised plants will become invasive. For example, one of the more recent species to become naturalised, Christmas berry (a tree which first naturalised in Whangaroa in 1995), invades a broad range of habitats in other countries (from mangroves to pinelands) and excludes the natural understorey. It therefore has the potential to become a major invasive weed in New Zealand.[20]

New invasive weed species often behave differently to existing weed species— colonising a different range of environmental situations, invading new community types, or competing more aggressively with native species.

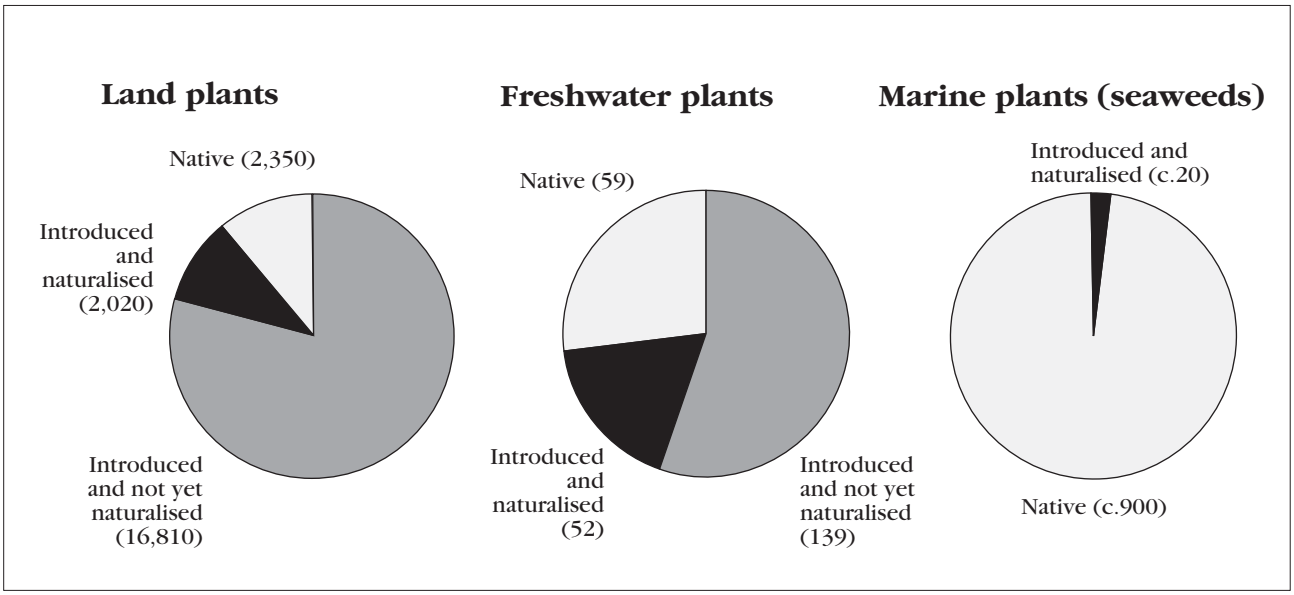


FIGURE 2: NUMBERS OF NATIVE, INTRODUCED AND NATURALISED PLANTS IN NEW ZEALAND.

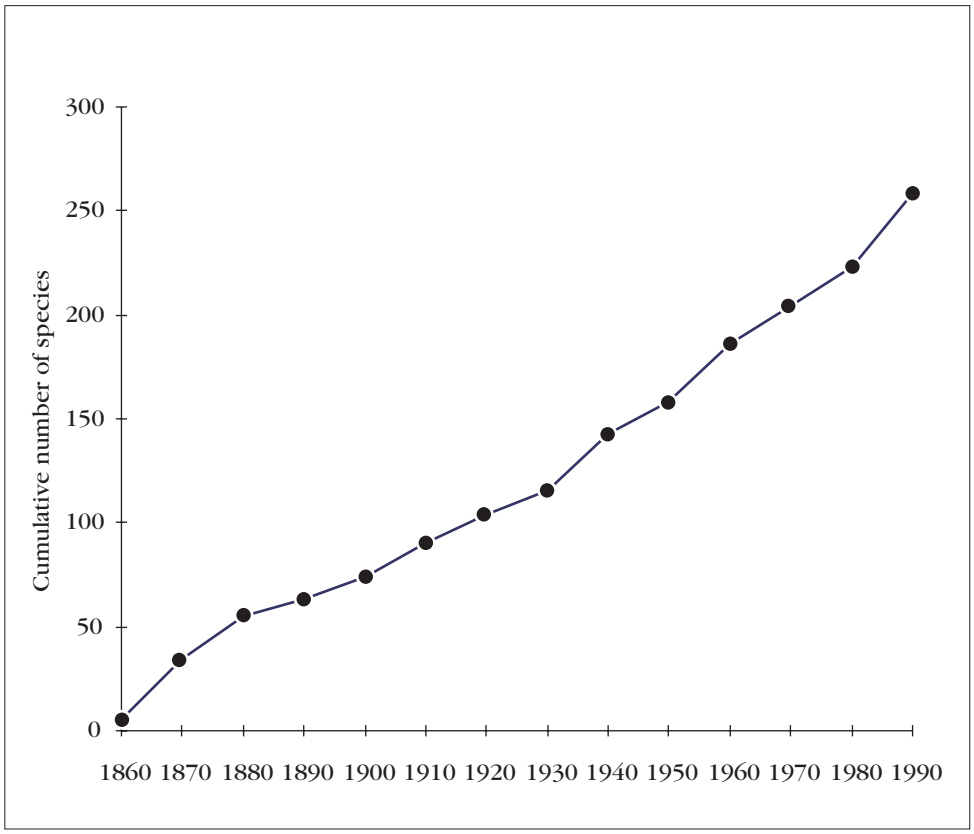


FIGURE 3. RATE OF NATURALISATION OF 258 KNOWN TERRESTRIAL AND AQUATIC WEEDS IN NEW ZEALAND BETWEEN 1860 AND 1990.

FIGURE 3. RATE OF NATURALISATION OF 258 KNOWN TERRESTRIAL AND AQUATIC WEEDS IN NEW ZEALAND BETWEEN 1860 AND 1990.
(Data from the DOC weed database, Owen 1997).

3.3 THREATS TO NATIVE PLANTS

Weed impacts are one of the main current or potential threats to nine native plant species which are very likely to become extinct in the wild in the immediate future: the Chatham Islands toetoe, climbing broom, the Poor Knights spleenwort, a coastal peppercress (*Lepidium banksii*), a spider orchid (*Corybas carsei*), a native bidibid (*Acaena rorida*), a rare wetland grass (*Amphibromus fluitans*), a grass endemic to Marlborough (*Australopyrum calcis* subsp. *calsis*), and a small herb found in dune lakes (*Sebaea ovata*).

More generally, weeds are one of the main risks to the survival of 61 native species, and have an impact on another 16 species[21] (out of 125 threatened native vascular plants that DOC has ranked as a priority for management).[22]

A quarter of these 77 threatened native plants are less than 10 cm tall and are easily smothered or shaded out by competing weeds; the seeds of other species require open ground and/or the seedlings cannot grow through the dense swards or mats that some weeds form. For example, the native climbing broom, giant-flowered broom, Clifford Bay broom, shrubby pohuehue, cypress koromiko, button daisy, and the sedge *Carex inopinata*, are variously threatened by marram grass, pampas, Yorkshire fog, brown top, hawkweeds, stonecrop, wandering Jew and ivy, which compete with adult plants or prevent their regeneration.[23]

Some weed impacts are more indirect, but still threaten the long-term viability of native species, for example by reducing and fragmenting native plant populations to very low levels, causing them to become more genetically homogeneous. Another major, although indirect threat to the survival of some native species is hybridisation with exotic species or with other native species. Examples include:

- The native bidibid *Acaena rorida,* found in the Makirikiri tarns in the north-western Ruahine range, may soon become extinct. It is hybridising with the native bidibid *Acaena novae-zelandiae*, which was introduced to the area;[24] and Yorkshire fog and the mouse-ear hawkweed are reducing its cover, making cross-pollination between plants less likely.
- Genetic studies within the Rotorua lakes has confirmed that the introduced curly pondweed hybridises with the native blunt pondweed.[25]

3.4 THREATS TO NATIVE ANIMALS

Less is known about the impacts of weeds on native animals, but there is no doubt that weeds threaten the long-term survival of some native animals by: influencing the way native and introduced animals behave, degrading the quality or availability of their habitat, or affecting the availability of food and breeding sites. Some examples that illustrate the types of impacts are:

- Native plants provide suitable food sources for native birds. By contrast, although some exotic plants provide food for many birds, they especially favour introduced species.[26,27] For example, native birds avoid barberry and hawthorn, but exotic birds eat their fruit and disperse the seeds[28]—over time this will create large areas of habitat more suitable for exotic birds than for natives.
- When woody weeds such as broom, gorse, and Russell lupin invade braided riverbeds, they destroy the open nesting and feeding sites required by native wading birds such as wrybill plover. These tall weeds also provide cover for introduced predators such as rats, cats, ferrets and stoats.[29]
- The spread of the alien grass browntop has so reduced the cover of native herbs, that few endemic grassland moths (which depend on the full range of native species for food) can survive.[30]
- Native freshwater mussels are almost totally excluded from dense beds of egeria and other submerged invasive weeds.[31]

3.5 NATIVE COMMUNITIES AT RISK

All types of native communities are vulnerable to weed invasion. Weeds have invaded nearly all native land and freshwater community types in New Zealand, and almost the full range of altitude, soil type, rainfall and temperature.[32]

At least 575 000 hectares of high priority protected natural areas would be threatened by weed invasions in the near future if not controlled (Table 1, and Figures 6 and 7). This figure is conservative as it does not include some existing control programmes and new high priority sites identified in recent conservancy inventory work.

TABLE 1. PROTECTED NATURAL AREAS POTENTIALLY THREATENED IN THE NEXT 5–15 YEARS IF WEED INVASIONS ARE NOT CONTROLLED
(Data from DOC site list, as of July 1998)

OMMUNITY TYPE	TOTAL NUMBER OF SITES	HIGH PRIORITY SITES (RANK 10–21)	HIGH PRIORITY AREA UNDER THREAT (ha)	EXAMPLES OF HIGH PRIORITY SITES
Forest and scrub (e.g., lowland, beech, kauri etc.)	136	111	152 800	Waipoua, Puketi, Little Barrier Island, Rangitoto Island
Tussocklands, alpine herbfield, cushionfields, native grasslands	52	51	324 200	Tongariro National Park, Kirkliston Ranges, Remarkables/Hectors Ranges, Blue and Eyre Mtns
Coastal and duneland communities (e.g., foreshore, dune slacks, shrublands)	34	33	35 700	Pouto Peninsula, Kaitorete Spit; Three Sisters
Freshwater aquatic, wetlands and riparian areas	30	24	21 300	Whangamarino, Wahopo/Okarito, Waituna
Coastal wetlands (estuaries and harbours)	23	20	11 400	Parengarenga Harbour, Manawatu Estuary, Wairau Lagoons
Other types: geothermal areas, drylands, salt lakes etc.	13	13	4 400	Rangitaiki frost flats, Te Kopia S.R. (geothermal), Chapman Rd (Otago drylands), Sutton salt lake
Places with a mixture of communities	19	18	26 200	Moehau, Waipapa and Pikiariki, Mana Island
TOTAL	307	271	575 600	

Threatened plants affected by weeds are most likely to occur in alpine seepages, wetlands, rivers and lakes, foreshore habitats, dune lakes and sand-dune communities.[33] Wetlands and coastal habitats are also among the community types most vulnerable to weed invasions, as they are generally low- stature communities and are often small, narrow, disturbed remnants with fertile soils and close to towns.[34] Other particularly vulnerable communities—lowland forest, shrubland and tussock grasslands—also share one or all of these characteristics.

The nature of weed impacts varies widely, depending on interactions between the weed species, the native species, the physical environment, and the nature of the native plant community. Invasive weeds threaten the long-term survival of native communities by displacing native species, altering successional processes, changing the structure and composition of native vegetation, and disturbing the flow of energy and nutrients through ecosystems. The impacts of weed invasions can be far-reaching and unpredictable, as ecosystem and species interactions are complex and linked to productivity, nutrient cycling, landscape water balance and rates of change. Altering one parameter can cause other parameters to change, including the likelihood of future invasions. Erosion, drainage, burning and grazing both promote weed invasions and exacerbate weed impacts.

3.5.1 Forest and shrublands

More than 111 high priority protected natural areas with native forest or shrublands are threatened by invasive weeds. They include some of New Zealand's most important and well known forest, such as Waipapa in Waikato, and Waipoua and Puketi in Northland. Many different forest types are affected by weed invasions, including kauri, beech and podocarp-broadleaf.

Scrub, or damaged forests with large canopy gaps, are susceptible to invasion from a wide range of weeds. Plants that sprawl, creep or climb (such as old man's beard, Japanese honeysuckle, ivy, three passion fruit species), can all smother tall trees and understorey plants, first establishing at the edges or where there are openings. In parts of the Manawatu and Rangitikei, old man's beard has obliterated all but the largest trees. In Taihape Scenic Reserve, old man's beard has caused the local loss of at least four threatened plant species. In other areas, large native canopy trees have collapsed under the weight of the vines.[35]

Intact forests can also be invaded by some shade-tolerant vines (such as climbing spindleberry and climbing asparagus), ground covers and sprawling plants (such as mistflower, selaginella and wandering Jew). Ground sprawling weeds can form dense carpets through which native seedlings cannot grow, preventing the regeneration of forest species.[36] In Puketi Forest, mistflower infests the lower waterways and tracks, smothering native hebes, coprosmas and ferns that grow alongside streams. It currently infests 200 hectares but could spread into 5 000 hectares of the forest—in Northland as a whole, mistflower currently infests over 50 priority areas, about 1 000 hectares in all.

Seedlings of some introduced trees such as sycamore are also shade-tolerant and able to persist in forest. If storms, tree-falls, possum browsing, natural senescence, or slips create openings in the canopy, these persistent species can grow rapidly, overtopping and displacing competing native trees. In the native forest understorey, weeds such as wild ginger, and invading shrubs such as Darwin's barberry, hawthorn and evergreen buckthorn[37] replace native species and destroy the natural character of the forest. These species are invading such places as Moehau in the Waikato, Snowdens Bush in Nelson/Marlborough, and even the margins of Fiordland National Park in many places. Darwin's barberry recently became established in Stewart Island (in Halfmoon Bay)—it is the first weed in Stewart Island that is capable of invading its forests. In the Marlborough Sounds, radiata pine is widely naturalised and is spreading within native early succession forest and shrubland.

In Waipapa, Pureora and Pikiariki in the Waikato, heather, pampas, contorta pine, and grey willow threaten the areas' virgin podocarp forest, forest-mire and forest-shrubland ecotone associations, and New Zealand's largest population of the threatened native wood rose.

3.5.2 Tussock grasslands and alpine herbfields[38]

In native tussock grasslands and alpine herbfields, introduced trees and shrubs are not only visually prominent but also are important invasive weeds. Wilding conifers (contorta pine, Douglas fir, Austrian pine, radiata pine, mountain pine and larch) have spread from plantations and shelter belts into the open mountainous country on the eastern slopes of the Southern Alps and in the

Central North Island. Contorta pine first naturalised in 1957, but in only 40 years has spread to threaten more than 20 of the best examples of subalpine tussock grasslands, herbfields, frostflats and montane shrublands in New Zealand.

In all, wilding conifers would threaten more than 260 000 hectares of tussocklands and alpine areas in the next 10–15 years if left uncontrolled. This would include much of Tongariro National Park, Kaweka Forest Park in the Hawkes Bay, the Clarence in Marlborough, the Kirkliston Ranges and Craigieburn Conservation Area in Canterbury, the Remarkables and Hectors Ranges in Otago, and the Blue and Eyre Mountains in Southland. The Rangitaiki Conservation Area, in Tongariro/Taupo, is the last significant remnant of monoao frostflat shrubland that once covered the entire Kahingaroa Plateau—some places within it had up to 2 400 contorta seedlings per hectare.

In many of these places, wilding infestations are so far comparatively localised, but because the seeds disperse on the wind they are capable of spreading rapidly and extensively. For example, in the Red Hills in Marlborough scattered outlier pines have been controlled, and dense stands of wilding conifers currently cover only about 450 hectares. However, if left, these wildings could rapidly spread into and dominate some 18 000 hectares of the Red Hills, tussocklands and shrublands.

Other trees and woody shrubs that are major threats include heather, broom and gorse. Broom is able to dominate low stature native communities up to altitudes of 1 400 m a.s.l. in Tongariro National Park. In Mt. Cook National Park, Douglas fir, contorta pine, sweet briar and rowan are invading open tussocklands and sub-alpine areas.

Heather is the most widespread and invasive weed in Tongariro National Park World Heritage Area, the largest and most diverse alpine ecosystem in the North Island. Heather creates a micro-environment suitable for its own seedlings but not one for native alpine herb and tussock species;[39] this has dramatically reduced native plant cover in tussocklands, alpine herbfields, frostflats and high water table sites. It has also reduced the diversity of native insects, with some insect species in danger of becoming locally extinct. The heather problem is worsening as heather invades far beyond Tongariro National Park. It is spreading at rates of up to 7 km a year, into the Moawhango Ecological Region, the Kaimanawa Range, Tongariro Forest, and to land north, west and east of Lake Taupo.

Hawkweeds are a major weed problem in the South Island hill country, particularly in areas where grazing by sheep and rabbits has degraded the native grassland communities, and form dense single species swards at many sites.[40] Hawkweeds are less of a problem on ungrazed protected natural areas in the South Island, but, together with heather and wilding conifers, are also invading the otherwise unmodified frostflat, sub-alpine and tussockland communities in the North Island's central plateau.

3.5.3 Coastal and duneland communities

Weed invasions are especially threatening to coastal communities already stressed and fragmented by human development. More than 30 priority places covering 35 000 hectares are threatened by weed invasions in the next 10–15 years, including Pouto Peninsula in Northland, Kaitorete Spit in Canterbury, and the Three Sisters in Southland.

A range of coastal community types are at risk, including cliffs, dune slacks, ephemeral dune wetlands, dune shrublands, rocky foreshore communities, and coastal forest. Some native coastal plants (such as pingao, shore spurge, sand daphne and sand bidibid) are in danger of extinction from the combined effects of human settlement, the clearing of coastal vegetation, and the encroachment of invasive weeds.

The main coastal weeds include marram grass, boxthorn, bone-seed, Kikuyu grass, pampas grass, evergreen buckthorn, and pink ragwort. Maritime pine can also be an aggressive invader in coastal sites (or other open warm sites such as geothermal areas). Marram grass is widespread on coastal dunes. Originally planted to stabilise dunes, marram also out-competes and smothers native species, particularly native sand binders such as pingao and spinifex. By stabilising mobile sand, it also allows woody weeds such as gorse and tree lupin to invade.

Kaitorete Spit (south of Banks Peninsula) contains one of New Zealand's best pingao populations, rare and uncommon plant species, moths and plants that are endemic to the spit, and extensive habitat for an unusual range of skink species. These are threatened by grazing stock and invasions of marram, boxthorn, boneseed, gorse and wilding pines.

3.5.4 Wetlands: freshwater and estuaries

Over 90% of New Zealand's freshwater wetlands have been lost and invasive weeds have modified all those remaining,[41] including wetlands of international importance such as Whangamarino in the Waikato, Wahopo/Okarito in the West Coast, and Waituna in Southland.

Crack and grey willow have major impacts in freshwater wetlands by choking water bodies, lowering water levels and shading out other species.[42] Whangamarino is one of the largest wetland systems in New Zealand. Willow invasions and changes to the natural water regime are destroying the area's native sedgelands—reduced from over 2 800 hectares in the 1940s, to 26 hectares in 1993. In Wanganui National Park, crack willow and Japanese walnut are capable of invading the length of the Wanganui River and its tributaries.

Other important wetland weeds include shrubs such as broom and gorse, herbs such as lotus, adventive rushes (e.g., heath rush),[43] grasses (e.g., tall fescue, pampas, browntop, mercer grass, and creeping bent), hornwort and reed sweetgrass. In the Hikurangi Wetland in Northland, for example, wandering Jew forms a dense ground cover through which seedlings of the native heart-leaved kohukohu cannot grow.[44]

Spartina threatens more than 20 important estuaries and harbours in New Zealand. It forms dense continuous stands on open mudflats, thereby destroying the habitat for many estuarine invertebrates, and the feeding and roosting areas on which wading seabirds depend. It can also displace mangrove forest and increase flooding and siltation.[45]

Threatened areas include Parengarenga and Rangaunu Harbours in Northland, the Maketu Estuary in the Bay of Plenty, the Manawatu Estuary in Wanganui, the Waimea Estuary, Wairau Lagoons and Farewell Spit intertidal zone in Nelson/Marlborough, and the New River Estuary in Southland. In 1997, spartina

totally covered or threatened about 145 hectares—about three-quarters—of the Manawatu Estuary's mudflats, an important wading bird habitat on the North Island's west coast. DOC began controlling spartina on the Estuary after the New Zealand Ornithological Society raised concerns.

3.5.5 Freshwater aquatic communities

Introduced plants have spread throughout most of New Zealand's rivers and lakes.[46] There are few remaining water bodies that are pristine and support a wholly native flora, and these are usually isolated e.g., the Kai Iwi lakes and Lake Waikareiti in the North Island and Lake Lochnagar in the South Island. Introduced aquatic species tend to be taller and grow more vigorously than native species. Aquatic weeds either eliminate native species or, more commonly, severely limit their distribution by displacing them to deeper, light-limited sites or shallower, more exposed sites. The spread of aquatic weeds threatens several endangered native plants and may be a major cause of the decline of the native stout water milfoil and a native bladderwort (*Utricularia protrusa*).

The most widespread or invasive introduced submerged plants (elodea, egeria, lagarosiphon,[47] hydrilla and hornwort) belong to plant groups that do not occur in the native flora. These weed species can form dense monocultures, often over five metres tall, that reduce oxygen levels, and smother, exclude and replace native aquatic plants to which many native invertebrates are adapted.[48] For example, at different times, dense stands of egeria have dominated the shallow Omapere, Waahi and Waikare Lakes in the northern North Island. These stands collapsed, and the lakes have now lost all submerged vegetation, are turbid and dominated by algae, and many native invertebrates (including molluscs, chironimids and crustacea) have disappeared.

Hydrilla is so far confined to one farm pond and Lakes Tutira, Opouahi and Waikopiro, all in the Hawkes Bay. If it escaped into the Waikaremoana or Rotorua Lake systems there is little chance of preventing it from spreading widely through these waterways. Lagarosiphon has replaced native plant communities in Lake Aratiatia near Taupo.

Some aquatic weeds (such as hornwort) can grow in clear water of up to 10 m deep (e.g., Lake Tarawera). If uprooted by storms, these weed beds can completely fill the water column for up to 80 m from shore, and their subsequent decomposition can cause dramatic changes in near shore biota, including cyclical loss of native rushes and sedges (as happened in the southern sector of Lake Rotorua).

The large free-floating introduced salvinia and water hyacinth can displace all native aquatic life in shallow sheltered waterbodies. They form thick floating masses that block all light, and their roots and decomposing litter reduce oxygen levels in the water below. In larger more exposed water bodies these species can shade-out and displace the diverse native turf communities. In a similar way the waterlily-type plants including water poppy, marshwort and yellow waterlily can completely dominate shallow margins of water bodies to a depth of up to 3 m by forming a dense floating canopy of leaves.

In wetlands and in the margins of waterbodies, the tall, dense growth of Manchurian wild rice and the bamboo-like phragmites out-compete other native

emergent vegetation. Yellow flag displaces native species by producing a dense floating mat of rhizomes. Sprawling marginal mats of parrot's feather, alligator weed and Mercer grass can likewise displace all native plants.

Many aquatic species (including elodea, egeria, lagarosiphon, hydrilla, alligator weed, water poppy and parrots feather) do not produce seed in New Zealand. However, deliberate ornamental plantings, or plant fragments caught on water craft, trailers, fishing nets or drainage equipment, readily spread these species to new water bodies and from catchment to catchment. The fragments take root on bare areas or in gaps in native vegetation.

Several recently introduced aquatic plants do produce seed, however, which allows then to spread even more rapidly. Fringed waterlily has floating seed with hairy margins that stick to ducks' feet and beaks. An introduced bladderwort (*Utricularia gibba*) flowers and seeds prolifically and is rapidly spreading in the northern Auckland Region. Three sagittaria species—arrowhead (*Sagittaria montevidensis), S. platyphylla* and *S. subulata*—are also new to the naturalised flora and are prolific seeders.

3.5.6 Marine communities

Only 20 species of naturalised seaweeds have been identified so far, but there have been no systematic surveys. There have also been very few studies on the impact of introduced seaweeds on native species or ecosystems.

Once an exotic seaweed is established in New Zealand, it is difficult to stop it spreading. However, most introduced seaweeds identified so far probably pose little risk to natural marine communities, as they are either very small, disperse very poorly, or are limited by environmental conditions. As ships, fishing vessels, pleasure craft, and marine farming equipment help spread exotic seaweeds, ports, harbours and other areas visited or modified by people are most at risk from exotic seaweeds.

Only *Undaria* has so far been identified as posing a significant risk. It grows up to 1.7 m tall in dense stands, and can invade rocky shores from low intertidal to waters up to 5 m deep. It entered New Zealand via ballast water, probably several times, and was originally confined to harbours and boat moorings.[49,50] Since it was discovered in Wellington Harbour[51] in 1987, *Undaria* has spread to the harbours of Lyttelton, Timaru, Oamaru, Picton, Porirua, Otago, Port Chalmers and Napier.

In rocky reef communities in Wellington Harbour where *Undaria* is common, the native brown algae *Carpophyllum flexuosum* is rare; at sites where *Undaria* is less abundant, *Carpophyllum* occurs in much higher densities. The benthic community also changes under *Undaria* stands, from coralline algal-dominated to ascidian-dominated.[52] The most recent discovery of *Undaria* is in Big Glory Bay, Stewart Island, where control measures are underway as it may pose a threat to the unique coastal marine communities of Stewart Island, Fiordland and the subantarctic islands.

The seaweed *Codium fragile* subsp. *tomentosoides* is known to be an aggressive invader of sheltered rocky shores in parts of Europe and north-eastern North America. It was discovered in Auckland Harbour in 1975, but has so far not spread beyond Auckland and Northland or had significant impacts.[53]

3.5.7 Islands

A 1997 review[54] evaluated only 60% of all New Zealand islands but, of these, identified 111 offshore and seven outlying islands with invasive weeds. Less than a quarter of offshore islands were free of weed problems.

Although there are fewer weed species on isolated offshore islands compared to mainland sites, both the number of weed species and their impacts are steadily increasing on offshore islands in northern and central New Zealand.[55] Some offshore islands have community types vulnerable to invasion, and some weeds are invading intact island communities. Events such as storms can also open up the vegetation and provide the opportunity for weeds to establish. Weeds are invading important wildlife refuges (such as Mana, Kapiti and the Poor Knights islands), and unique islands such as Raoul, Rangitoto and Little Barrier Islands.

- Raoul, in the far north, has a unique forest type with 21 endemic species which is being invaded by weeds such as Mysore thorn, Brazilian buttercup, and Madeira vine.[56]
- Rangitoto Island has unique assemblages of native plants and is internationally known for its succession from barren lava rock to forest cover. Over 20 weed species are invading from nearby islands and the mainland, (including evergreen huckthorn, pampas, moth plant and smilax).[57]
- Little Barrier Island (Hauturu) covers over 2 800 hectares and is one of New Zealand's most valuable offshore island wildlife refuges. It also contains endemic species, and 21 different forest types. Between 1978 and 1990, climbing asparagus had spread to be present in 100 hectares, extending at least 2 km from the first observed small infestation. Climbing asparagus strangles trees, and is capable of invading and killing out the entire understorey in most if not all of the island's lower forests.[58] Other weeds, notably smilax and moth plant, have also reached the island in the past few years.

4. The Strategy: goal, principles, objectives and priorities

4.1 THE VISION AND GOAL

DOC's vision

New Zealand's natural and historic heritage is protected; people enjoy it and are involved with DOC in its conservation.

Goal

The integrity and sustainability of all natural areas that are important for natural heritage conservation, and the long-term survival of native species, are maintained or improved.

This vision and goal are adapted from "*Restoring the Dawn Chorus: Department of Conservation Strategic Business Plan 1998–2002*" (see page 9 and Objective 1.1.1 in the Strategic Business Plan.).

4.2 PRINCIPLES FOR MANAGING INVASIVE WEEDS

The following seven principles guide DOC's actions to achieve the goal and objectives.

Principle 1: Managing invasive weeds is essential to ensure the long-term survival of New Zealand's native species and natural communities.

Principle 2: The first and best "line of defence" for managing weed threats is at the border.

Not all new plant taxa that are introduced to New Zealand will become invasive weeds, but the risks of new introductions should be properly assessed before they occur, and appropriately managed with full regard to their potential impacts on native species and natural communities.

Principle 3: Early management of potential invasive weed species minimises both the future control costs and the possible degradation and loss of New Zealand's natural heritage. This in turn requires timely and accurate information.

This principle applies both to controlling new invasive weeds that are either just beginning to become established, or are just beginning to invade a specific site that is important to New Zealand's natural heritage.

Principle 4: Effectively managing weeds requires a precautionary approach.

Where there is a shortage of knowledge or understanding about the potential for serious or irreversible impacts on indigenous

species and communities, this shortage of full information should not be used as a reason to postpone adopting appropriate measures.

Principle 5: In New Zealand, landowners or managers have the primary responsibility for plants and animals on their own land, and can make decisions on when and how to manage them.

Principle 6: Successfully managing weed threats in the long term requires the cooperation, expertise, and sometimes co-ordinated action of central and local government, landowners, research agencies, iwi and the general public.

Principle 7: DOC has a responsibility to ensure that its activities are effective and efficient, and do not adversely affect the health and safety of staff, contractors or the public.

This "quality" approach applies to all weed management activities, including both control operations, and support activities (such as surveillance, inventory and threat assessment, research, weed public awareness programmes etc.)

4.3 THE FIVE OBJECTIVES

4.3.1 Objective 1 (Border control)

To minimise the risk of introductions of new plant taxa that are potentially invasive, or new genetic stock likely to significantly increase the adverse impacts of established plants.

Actions:

1. Provide advice as appropriate to the Minister for Biosecurity and the Biosecurity Council, on risks to indigenous flora and fauna from new plant taxa or genetic stock.
2. Identify and declare as "unwanted organisms" (under the Biosecurity Act) new plant taxa and genetic stock that would pose a significant risk to native species or communities.
3. Identify as "risk goods" (under the HSNO Act) those species already present in New Zealand for which introducing new genetic stock could significantly increase risks to native species and natural communities.
4. Advise ERMA on applications to import, develop, field test or release new plant organisms that have the potential to be invasive weeds or exacerbate weed risks of existing plants.
5. Provide advice to MAF on import health standards (IHSs) for goods which have the potential to harbour unwanted plants; and recommend IHSs where appropriate.
6. Consult with MAF on policies and standards to prevent the establishment of new plant pests of indigenous forests (in line with established protocols).
7. Consult with MFish with regard to managing unwanted plant organisms in the marine environment, including risk assessment, research, surveillance, and emergency responses (in line with established protocols).

8. Manage the weed risks associated with vessels visiting islands administered by DOC.

(Note that "new genetic stock" includes complementary genders of dioecious species, or new sub-species, varieties, cultivars or genetically modified versions of species that are already present in New Zealand)

Explanation

Border control is the first line of defence for minimising the future diversity, intensity and extent of weed threats to native species and natural communities. DOC's role in border control is defined by the Biosecurity Act and the HSNO Act. This role is primarily one of providing advice on potential risks to indigenous flora and fauna, but DOC can identify plants as unwanted organisms or risk species, recommend import health standards, or propose a national pest management strategy for a plant that affects DOC's area of responsibility. DOC is also notified of all applications to ERMA, and ERMA must have particular regard to any submissions DOC makes. MAF must also give notice and consult with DOC on new import health standards or significant changes to existing import health standards, involving species of interest to DOC. (See section 1 in Appendix 1 for further details on DOC's roles and responsibilities)

Criteria for evaluating risk

DOC will take the following factors into account when evaluating and providing advice on risks from new taxa or new genetic stock:

1. the plant's likely impacts based on the plant's life form, growth habits, dispersal mechanisms, environmental limitations, and niche it is likely to occupy in the wild;
2. the plant's history of invasiveness in other countries;
3. whether the plant has close relatives that are known to be invasive;
4. whether there are particular native habitats vulnerable to invasion from that plant;
5. whether the plant is likely to hybridise with threatened native plant taxa;
6. the difficulty and cost of management should the plant become invasive; and
7. whether the invasiveness, impact, or difficulty of control of existing introduced plant species would be increased.

Other factors may also be relevant in specific circumstances.

4.3.2 Objective 2 (Minimising future problems)

To minimise the numbers, or contain the distribution, of significant new invasive weeds where this is feasible.

Actions:

Eradicating or containing emerging potential invasive weeds, at a national, conservancy or sub-conservancy level, before the species becomes a major problem (weed-led control programmes).

The Department will:

1. encourage Area staff to identify and manage newly emerging weed problems at an early stage;
2. use a precautionary approach if it is unclear what type and degree of impacts a plant species will have (see number 1 in Appendix 3);
3. fully evaluate the feasibility and risks for a proposed weed-led programme before it begins, and only attempt a weed-led programme if it meets all the criteria outlined in Appendix 3, and the eradication or containment criteria in Appendix 2;
4. regularly review progress and the feasibility of a programme's objectives using internal and independent expertise; and
5. ensure Area staff have the necessary skills and knowledge (see section 4.3.4).

Explanation

Based on the historical rate that weeds have established, about two new plant species will naturalise every year that have the potential to become significant invasive weeds. In addition, many significant invasive weed species that are already naturalised, still have limited national distributions, or may be just starting to invade a conservancy. Controlling these new species is strategically important over the long term, but control at this stage can easily be ignored because it often seems to have little immediate conservation benefit (see section 2, issue 3).

Conservancy Conservation Management Strategies (CMSs) tend to focus on managing weed threats to specific high value sites (see objective 3). The weed-led approach provides a mechanism for Conservancies to identify situations where a new plant species is a significant potential threat to the Conservancy's protected natural areas, and it is feasible to remove it or control its spread at this early stage.

Characteristics of weed-led control programmes

The term "weed-led" is used because the programme is defined by what is needed to manage the spread of a specified weed species. Planning these programmes involves identifying the species to be controlled and then determining what control or other activities are required to meet the programme's objectives. The characteristics of weed-led control programmes are:

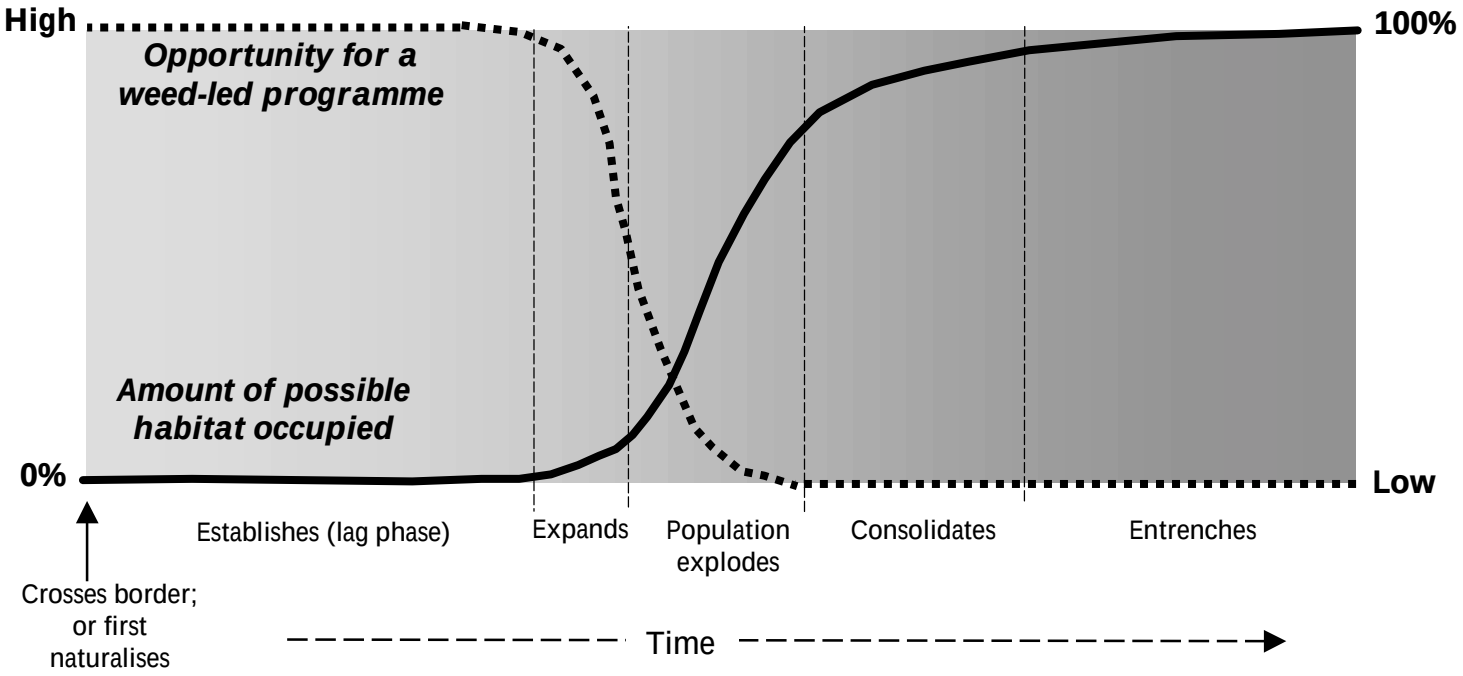
1. **Purpose**: To prevent new invasive weed species invading a conservancy or spreading beyond a limited distribution.
2. **Objective**: Success is measured by the presence and/or distribution of the weed species rather than by the response of native species or natural communities. The operational objectives of weed-led control are **eradication** (the permanent removal of all individuals of a species with little or no risk of reinvasion), or **containment** (ongoing control to prevent spread beyond a defined distribution, including preventing invasion). (see Appendix 2).
3. **Scale**: The scale of weed-led programmes is generally larger than that of site-led programmes (see objective 3). Although the specific control sites themselves may amount to only a comparatively small area, the area to which the eradication or containment objective applies might be national,

conservancy, or a defined large part of the conservancy (sub-conservancy). A weed-led programme on a widespread species in only part of its conservancy range (i.e., at the scale of a "sub-conservancy") is usually only possible where there are physical barriers to dispersal, such as in discreet freshwater catchment systems.

4. **Sites**: Control and/or monitoring must be carried out on all sites necessary to achieve the programme's eradication or containment objective (see objective and scale above). These sites can be of any type or quality, and might be privately owned or managed by another agency.
5. **Species**: Weed-led programmes focus on species with a limited distribution and/or low numbers within the programme's defined area (see "scale" above), but which have the potential to greatly increase their numbers, distribution and level of impact. That is, including plant species that:
   - are present in New Zealand but are not yet naturalised;
   - have only recently naturalised and are only just starting to spread;
   - have an isolated distribution, or one confined by environmental requirements; or
   - are established in adjacent regions but are only just beginning to invade a conservancy.

The scale and species characteristics are critical elements of a successful programme. Once a species has become well established and relatively widespread, eradication or containment is rarely feasible (see Figure 4). Appendix 3 outlines the criteria to determine whether a proposed weed-led programme is feasible. Figure 5 shows weed-led programmes in 1998.

FIGURE 4. THE RELATIONSHIP BETWEEN THE SPREAD OF A WEED, AND THE FEASIBILITY OF A WEED-LED PROGRAMME.
(Adapted from Williams 1997)


High
100%
Opportunity for a weed-led programme
Amount of possible habitat occupied
0%
Low
Establishes (lag phase)
Expands
Population explodes
Consolidates
Entrenches
Crosses border; or first naturalises
Time

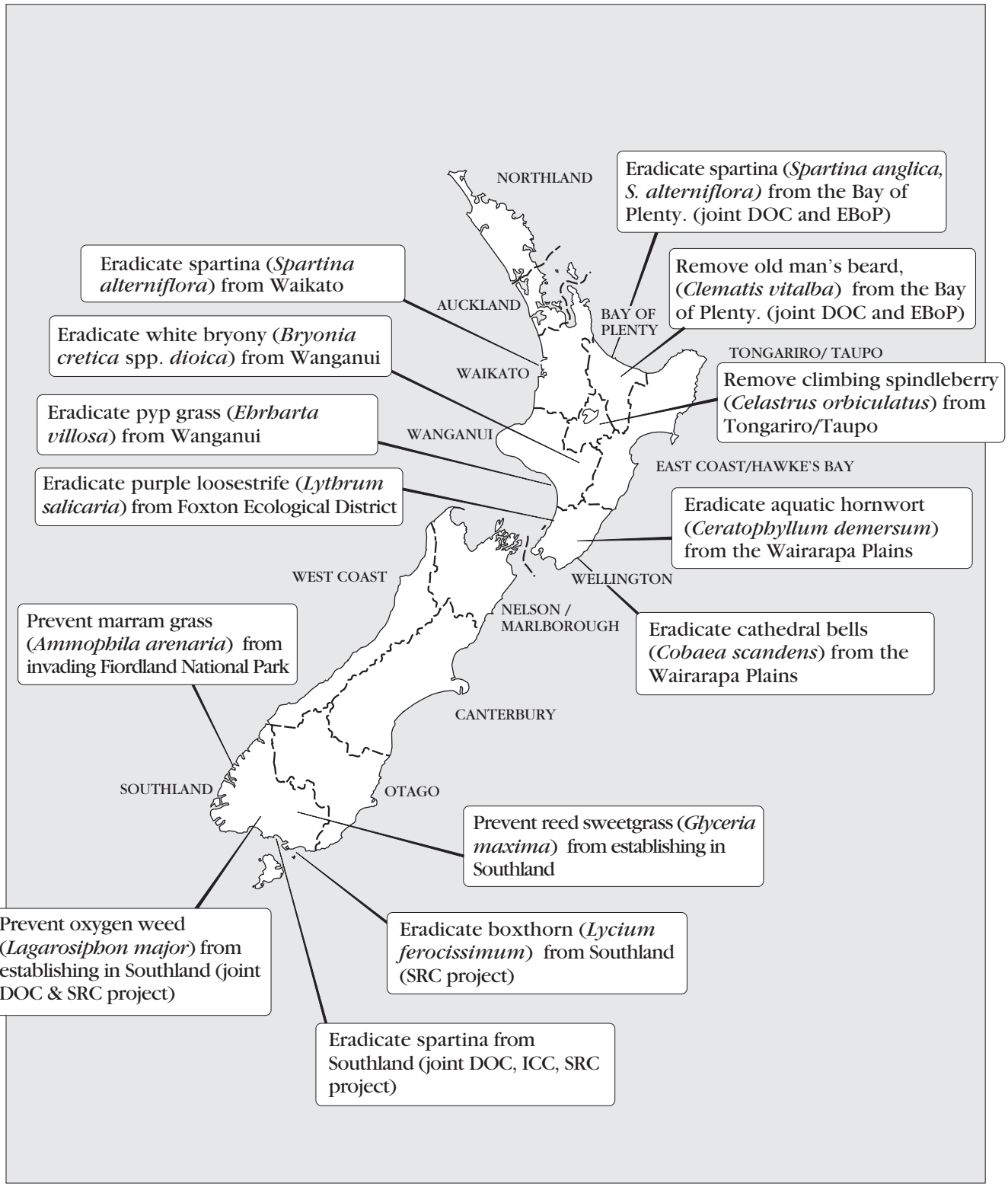


FIGURE 5. WEED-LED PROGRAMMES IDENTIFIED IN 1998.

The need for planning vs. a rapid response

Successful weed-led programmes require early identification of emerging problems and a rapid response. How much planning is required depends on the circumstances. Some new weed species might be controlled effectively by quick, informal action—if there is an effective control method and they are in very small, isolated and discreet infestations with no seed-bank.

However, in order to be effective, other potential weed-led programmes may require more planning, particularly if:

1. the infestations are larger or difficult to control; or
2. the programme would require control, monitoring or surveillance on sites on other lands; or
3. the programme would require significant activities other than control, including:
   - species-specific public awareness programmes and weed hygiene controls to manage human activities that introduce or spread the species;
   - controls on the sale and distribution of the species if this is a major risk of introduction or spread;
   - surveillance programmes to detect new potential invasive weed threats; and
   - research, including research-by-management, into more effective control techniques.

Unless these programmes are carefully chosen and planned, they can quickly become both expensive and ineffective.

(See also sections 4.3.4 (carrying out surveillance) and 5.2.1).

Other sections of this Strategic Plan particularly relevant to weed-led programmes:

Section 5.2.1: Gaining support to ensure successlul weed-led and site-led programmes
Appendix 2: Criteria for evaluating the feasibility of eradication and containment
Appendix 3: Criteria to determine the feasibility of a weed-led programme
Appendix 4: Ranking weed-led programmes

4.3.3 Objective 3 (Protecting specific high value sites)

To protect land, freshwater and marine sites that are important to New Zealand's natural heritage from the impacts of invasive weeds.

Actions:

1. Programmes protecting the natural values of specific priority areas administered by DOC from existing or potential threats from invasive weeds ("Site-led" programmes).
2. Preventing invasion into relatively weed-free priority places administered by DOC (site-led surveillance and control programmes).
3. Co-operating with landowners, to help protect other places that are important to New Zealand's natural heritage (see section 5.2.2).

The Department will:

1. identify and rank site-led programmes using the systems in Appendix 5;

2. seek to prevent the introduction of plants that have the potential to be invasive weeds, into freshwater and marine systems where they do not already occur.

Explanation

Distinguishing between weed-led and site-led programmes keeps our attention focused on *why* we are spending time and effort to manage weeds. A weed-led programme is a proactive strategy to minimise future risks—it focuses not on the needs of a specific place, but rather on what is required to eradicate or contain a specific weed species in the region. In contrast, site-led programmes always focus on a specific place and what is required to protect the values of that place.

The term "site-led" is used because a programme is defined by what is needed to protect the values of a specific high priority place. Planning a programme involves first identifying places with high natural values that are threatened by invasive weeds; then identifying and carrying out all the control or other activities necessary to protect these values.

Under the Conservation, Reserves, Marine Reserves and National Parks Acts, DOC is responsible for preserving and protecting the natural resources it administers (see section 2 in Appendix 1). Thus site-led programmes in places DOC administers will always be the focus of most of DOC's weed management activities. Figures 6 and 7 show high priority site-led programmes identified in 1998.

Characteristics of site-led programmes

1. **Purpose:** A site-led programme aims to protect the quality or integrity of the natural values within a particular place. Its focus is a management unit with high natural values. This management unit may be an entire protected area, a small collection of reserves close to each other (and of a similar community type), or a subset of a larger protected natural area (such as a national park) that is too big to manage as a whole.
2. **Objective:** The success of a site-led programme is evaluated by monitoring changes in the quality or integrity of the management unit's natural values.
3. **Scale:** The scale of a site-led programme depends on the area required to encompass the management unit, buffers, sources of propagules and corridors for invasion.
4. **Sites:** A single management unit programme may include control of infestations within the management unit, and on sites that act as buffers or seed sources for (re)infestations; or corridors for invasion (e.g., roadsides and embankments, railways, and walking tracks). These buffers, seed sources and corridors might occur on private land.
5. **Species:** Site-led programmes usually involve widespread weed species, but can include species within or about to invade the management unit, which have the potential to significantly affect the management unit's values.

The level of control or other activities required for a given programme depends on the programme's objectives and what is required to protect the natural values of the management unit.

Activities other than control

To be successful, a site-led programme may require activities other than weed control, which may include:

- monitoring both the effectiveness of the control techniques. and whether the control has achieved the desired response within the indigenous species or community;
- managing animal pests or other disturbance factors that promote weed invasions (managing disturbance factors may sometimes control weeds more effectively than controlling the weeds themselves; and there are strong linkages between controlling weeds and controling animal pests, depending on the community type and the weed/animal pest combinations present);
- site-specific public awareness programmes (for example, if visitors or the dumping of garden rubbish are important sources of re-infestations) (see section 5.2.6);
- weed hygiene controls for managing human activities that introduce or spread weeds—e.g., preventing dumping of garden waste; quarantine controls for visitors to priority islands;
- surveillance programmes for detecting new potential weed threats (see section 4.3.4); and
- research into more effective ways of managing the target weed species in the conditions present (see section 4.3.4).

Any control or surveillance on private land requires the support of the relevant landowners or land managers. Weed hygiene controls may require access to mechanisms under the Resource Management Act or Biosecurity Act (see section 5.2.1).

For example, a site-led programme to protect an island ecosystem may require:

- managing invasive weeds on the island itself;
- controlling some weed species growing in coastal strips or peninsulas on the adjacent mainland, that have propagules capable of being carried to the island by wind, water, or birds;
- actions to prevent visitors to the islands introducing weeds;
- actions to increase public awareness of the threat posed to the island's ecology by weeds; and
- a surveillance programme to detect any accidental introductions of weeds.

Managing deliberate introductions of aquatic weeds

The characteristics of site-led programmes apply equally to site-led programmes on land, and in freshwater and marine environments. In freshwater and coastal-marine systems, however, DOC also has statutory roles and responsibilities with respect to the deliberate introduction of plants into areas where they do not already occur (see Appendix 1). In brief, DOC:

- comments on proposed resource consents under the Resource Management Act;
- approves proposals to transfer and release (if the release area is the bed of a lake or river, or part of an estuary or coastal lagoon); and
- authorises introductions into areas it administers.

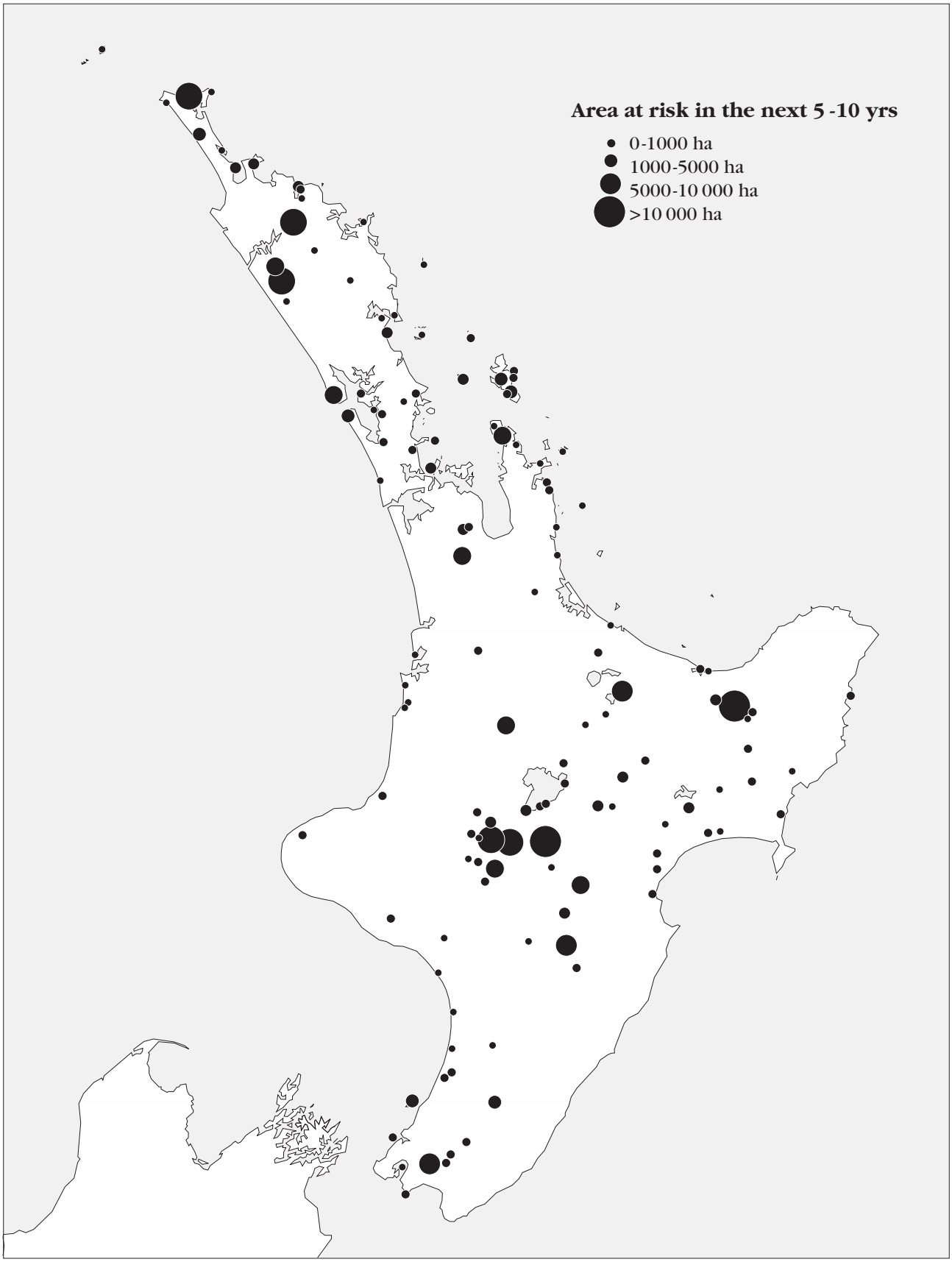


FIGURE 6. HIGH PRIORITY SITE-LED PROGRAMMES IDENTIFIED IN THE NORTH ISLAND. (As at June 1998. "High priority" sites are sites with a total ranking score of 10–21).

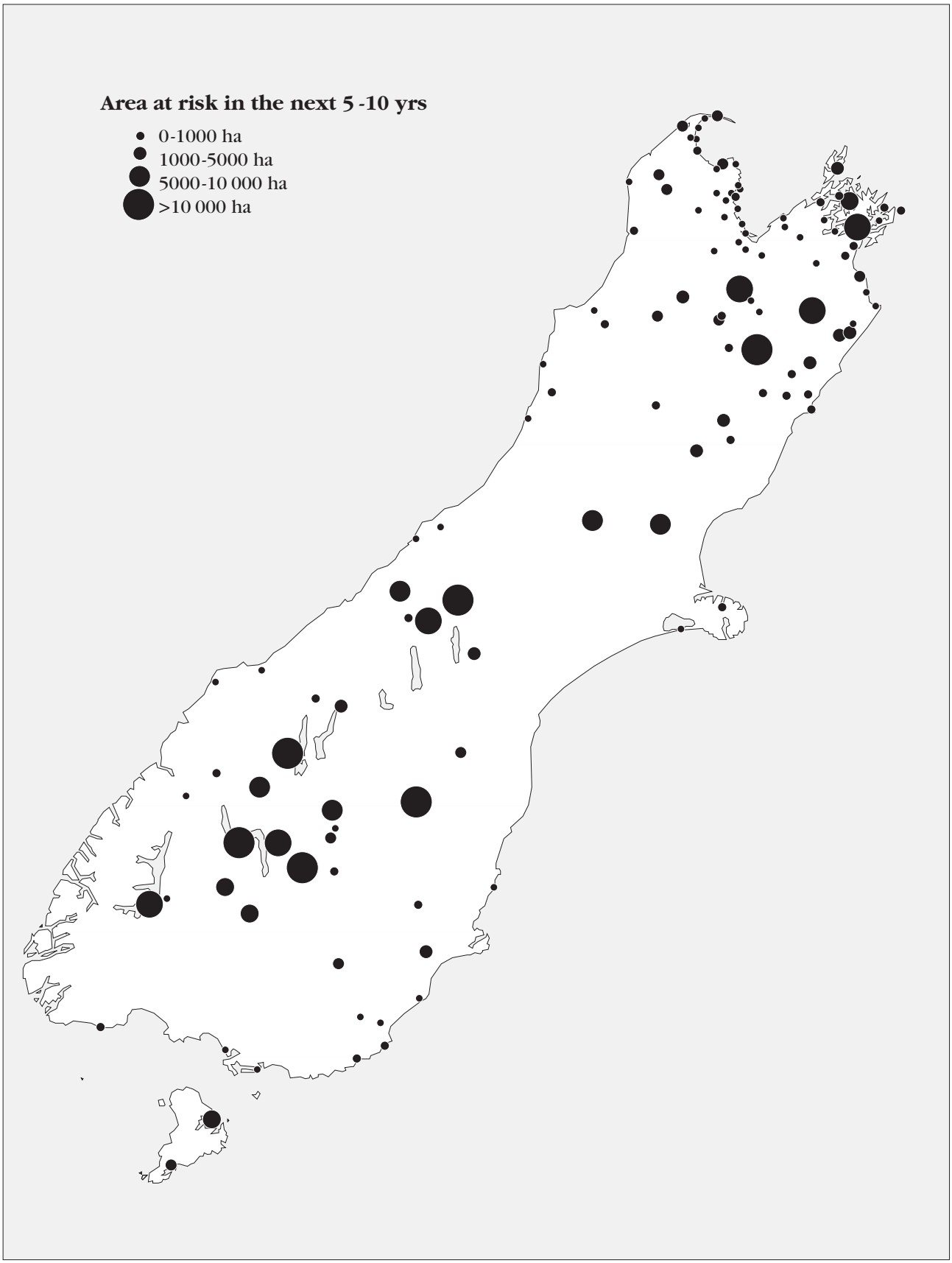


FIGURE 7. HIGH PRIORITY SITE-LED PROGRAMMES IDENTIFIED IN THE SOUTH ISLAND. (As at June 1998. "High priority" sites are sites with a total ranking score of 10–21).

DOC will authorise introductions of exotic plants, and/or recommend to Regional Councils that a resource consent be granted, only if the species is not likely to:

- be significantly invasive and spread widely from the original site; or
- adversely affect any weed-led or site-led programmes in that conservancy; or

affect natural areas with high biodiversity value—in the coastal marine area, these areas will include those specified in Policy 1.1.2 of the New Zealand Coastal Policy Statement 1994.

Any proposal to introduce plants into a DOC-administered area must also be consistent with: the legal status of the place, the conservancy CMS, and any relevant management plans.

Other sections of this Strategic Plan particularly relevant to site-led control
Section 5.2.1: Gaining support to ensure successful weed-led and site-led programmes
Section 5.2.2: Helping to protect important places on other land
Appendix 2: Criteria for evaluating the feasibility of eradication and containment
Appendix 5: Ranking site-led programmes

4.3.4 Objective 4 (Developing and maintaining capacity)

To sustain and improve the essential skills, control techniques, information and relationships that support DOC's management of invasive weeds in the long term.

Actions:

- Developing and maintaining supportive partnerships, and improving public awareness (see section 5).
- Improving control techniques and general management approaches that DOC uses to manage invasive weeds.
- Developing and implementing a invasive weed surveillance plan for DOC.
- Ensuring all relevant staff have the necessary skills and knowledge.

Explanation

DOC cannot effectively protect the places it manages from weed threats on its own. Because of the importance of developing supportive relationships, this is discussed in more detail in section 5.

Improving management and information

DOC will develop its information and management capacity by:

1. ensuring that research needs are met, following the priorities identified in DOC's Environmental Weeds Research Plan 1997–2006 (see box)—although some of this research can be done within DOC, other research is more appropriately carried out by other research providers;
2. improving the transfer of information and technology into and within DOC; and
3. developing user-friendly information systems such as a weeds database that allows information to be collected and evaluated at local, conservancy and national scales.

DOC PRIORITIES FOR WEED RESEARCH

The following lists summarise topics for which more information is needed to enable weeds to be managed effectively. The information is needed, ideally, within five years. Topics are not in priority order. For details, see DOC's "*Environmental Weeds Research Plan 1997–2006*" (Timmins, 1997).

Impacts on native communities and native species

1. Identifying the native animals, vascular plants and native communities that are threatened by weeds (this includes lichen and moss communities, and invertebrate species); developing research priorities.
2. Modelling the short and long term impacts of weeds on the species composition, structure and functioning of native communities (and on threatened native communities in particular).
3. Predicting the composition and distribution of weed species in New Zealand in 100 years time.
4. Quantifying and forecasting the relationships between weediness and management practices such as wild animal control, grazing, drainage, flooding, fire, and recreational facilities and pursuits in native communities. Developing a predictive model of weed response to animal control.
5. Identifying attributes and processes which make particular native communities vulnerable to weed invasion.

Weed species ecology

1. Determining which weed species will spread where.
2. Developing early warning diagnostics to recognise potential weed species.
3. Determining weed species for which further information is required for effective management, including distribution, spread, dispersal mechanisms, reproductive ecology, seed bank existence and longevity, impacts on native communities, and weed behaviour at the invasion front.

Weed control methods

1. Identifying which environmental weed species have no suitable, or only suboptimal, control methods.
2. Developing the best control methods for priority species identified in (1) above.
3. Developing a robust, simple protocol for weed control trials.
4. Investigating the post-control response of problematic weed species (e.g., willow species, lantana).
5. Developing criteria for working out when active weed control is not appropriate.
6. Reviewing biological control from a conservation perspective, that is, factors like agent host specificity, potential for interbreeding with native organisms, and effectiveness. Developing criteria for evaluating potential biological control agents and programmes.
7. Identifying which weed species are priorities for biological control programmes.
8. Developing management models that integrate weed control with other management practices.
9. Investigating the specific effects of weed control chemicals on non-target native plants and animals.
10. Investigating weed control strategies for specific weed species and situations, e.g., ecotones.
11. Investigating the potential of active management techniques for improving the long-term viability of lowland forest fragments invaded by weeds (e.g., managing grazing, flooding and exotic birds).
12. Investigating the efficacy of non-chemical methods (e.g., steam, loppers) for DOC's weed control.

Public perceptions and actions

1. Investigating the public's understanding and perception of the threat posed by weeds to conservation values.
2. Establishing the impact of human activity on weed distribution and density in high value natural areas.
3. Investigating the basis of people's negative perceptions of chemicals.
4. Assessing the effectiveness of advocacy campaigns.

Improved knowledge and technology will be ongoing needs as species continue to naturalise and spread, and will be particularly important for weed-led programmes (because these will often focus on new species or those with limited distributions). See also section 5.2.4).

Carrying out surveillance

Getting timely and accurate identification of new populations of invasive weeds, especially those that disperse and establish rapidly, is essential for:

- identifying new invasions into comparatively pristine protected natural areas at an early stage (including on islands);
- detecting populations of new invasive weed species at a stage when eradication or containment in a weed-led programme is still possible; or
- evaluating the spread and impacts of existing invasive weeds.

Early detection may be difficult where the species is not well known or difficult to observe (e.g., seaweeds). Potential new weed problems can also arise anywhere, including on land privately owned or managed by other agencies. Early detection therefore requires:

- formal surveillance programmes, including DOC's own programmes and co-ordinated surveillance programmes with other agencies;
- DOC field staff informally noting new or unusual species during their field work;
- interested members of the public being encouraged to bring unusual new plants to the attention of DOC or other management agencies; and
- timely information sharing between botanists and weed management staff in DOC and other agencies.

The Department will:

1. develop a surveillance plan to address these needs, establish nationally consistent approaches for DOC's surveillance programmes, and identify priority high risk areas for surveillance;
2. liaise and co-ordinate with MAF, Regional Councils, other Local Authorities, and other research and management agencies in this work wherever possible and appropriate.

Ensuring staff have necessary skills

All staff involved in managing invasive weeds will be trained :

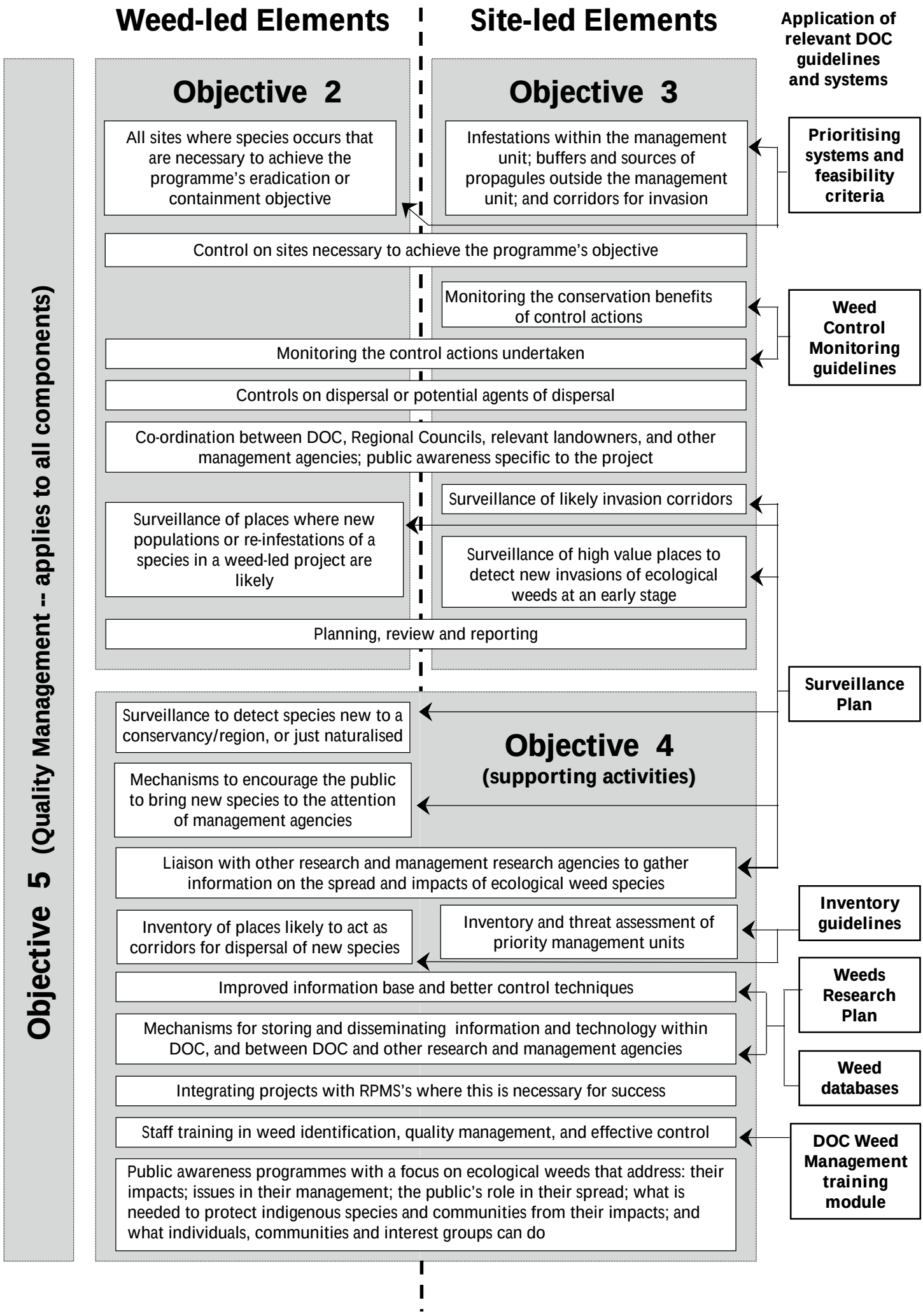
- to identify weed species appropriate to their conservancy, to support the conservancy's weed control and surveillance programmes;
- in principles of managing weeds effectively and efficiently including: vectors of weed spread, "weediness" factors, the ecological implications of weed spread, and new successional processes that weeds create;
- in effective and safe control techniques; and
- in the objectives, procedures, standards and accountabilities for planning, conducting and reporting projects (see Objective 5)

4.3.5 Objective 5 (Quality management)

To maintain and improve the quality of DOC's weed management systems.

Actions

1. Develop the strategic and operational resources that will support and inform quality management, including this Strategic Plan, Surveillance Plan, monitoring guidelines, inventory guidelines, databases, identification and control manuals, and training systems etc (see Figure 8).
2. Develop and implement a nationally consistent weed quality conservation management (QCM) system that Documents the objectives, procedures, standards and accountabilities for planning, conducting and reporting projects. This QCM system will apply to all DOC's invasive weed management activities.
3. Continuously review and improve the weed QCM system, with formal review every 3–5 years.
4. Maintain the capacity of staff to enact quality systems, through adequate and timely training (see section 4.3.4).


Weed-led Elements
Site-led Elements
Application of relevant DOC guidelines and systems
Objective 5 (Quality Management -- applies to all components)
Objective 2
Objective 3
All sites where species occurs that are necessary to achieve the programme's eradication or containment objective
Infestations within the management unit; buffers and sources of propagules outside the management unit; and corridors for invasion
Prioritising systems and feasibility criteria
Control on sites necessary to achieve the programme's objective
Monitoring the conservation benefits of control actions
Monitoring the control actions undertaken
Weed Control Monitoring guidelines
Controls on dispersal or potential agents of dispersal
Co-ordination between DOC, Regional Councils, relevant landowners, and other management agencies; public awareness specific to the project
Surveillance of likely invasion corridors
Surveillance of places where new populations or re-infestations of a species in a weed-led project are likely
Surveillance of high value places to detect new invasions of ecological weeds at an early stage
Planning, review and reporting
Surveillance Plan
Surveillance to detect species new to a conservancy/region, or just naturalised
Objective 4
(supporting activities)
Mechanisms to encourage the public to bring new species to the attention of management agencies
Liaison with other research and management research agencies to gather information on the spread and impacts of ecological weed species
Inventory guidelines
Inventory of places likely to act as corridors for dispersal of new species
Inventory and threat assessment of priority management units
Improved information base and better control techniques
Weeds Research Plan
Mechanisms for storing and disseminating information and technology within DOC, and between DOC and other research and management agencies
Weed databases
Integrating projects with RPMS's where this is necessary for success
Staff training in weed identification, quality management, and effective control
DOC Weed Management training module
Public awareness programmes with a focus on ecological weeds that address: their impacts; issues in their management; the public's role in their spread; what is needed to protect indigenous species and communities from their impacts; and what individuals, communities and interest groups can do

Explanation

Managing weed threats well requires that:

1. staff involved have the skills and knowledge required;
2. there is appropriate inventory and monitoring to determine priorities for action;
3. priority work is done;
4. programmes are planned thoroughly (including non-control components of a programme);
5. management is sustained when required;
6. data is recorded in such a way that success or failure can be determined;
7. progress is monitored and reviewed against objectives;
8. best practice is identified and followed; and
9. work does not adversely affect the health and safety of staff, contractors or the public.

What a QCM system will address

Targets under Objective 4 of this Plan are designed to develop the resources, guidelines and systems required to support and inform quality management (see targets 7, 9, 10, 12–16 in section 4.5).

Figure 8 shows the relationships between these resources, guidelines and systems, a weed QCM system, the elements required for successful weed-led and site-led control programmes, and objectives; 2, 3, 4 and 5.

The weed QCM system comprises procedures under the following seven headings: strategic phase, pre-planning phase, prepare project/programme plan, pre-operational phase, operational phase, post-operational phase, and reporting. The strategic phase of the weed QCM system will be based on DOC's strategic Documents, including the Strategic Business Plan and this Strategic Plan for Managing Invasive Weeds. A generic business planning system will address the "prepare project/programme plan" phase. A generic process will also be used to review and improve the weed QCM system.

As part of its planning and operational phases, the weed QCM system will include procedures and standards for:

1. integrating weed management where required with:
   - the management of other threats and disturbance factors (e.g., animal pest control);
   - DOC's Historic heritage Strategy;
   - the management of visitors and visitor facilities under DOC's Visitor Strategy, for example: situations where invasive weeds disperse along tracks, or are accidentally carried by visitors on clothing or on boats;
2. identifying and addressing issues of concern to tangata whenua;
3. identifying and avoiding, remedying or mitigating impacts on the historic, cultural or recreational values of sites, including:
   - non-target impacts of control, for example, plants being incorrectly identified (e.g., taro mistaken for arum lily); non-target impacts of control methods (e.g., overspray);
   - situations where the target weeds in a control programme also have historic, cultural, landscape, botanical or genetic value.

4.4 SETTING PRIORITIES

Note: The systems described below may be subject to change following DOC's review of its prioritising systems.

4.4.1 Prioritising weed-led programmes

Potential weed-led control programmes must first be evaluated as to their feasibility (see Appendix 2 and 3). If all the feasibility criteria are met, weed-led programmes will be carried out wherever possible. If weed-led programmes need to be prioritised, this is done by assessing:

- the species "weediness"—incorporating the species' impacts on natural systems, and the rate and success with which it establishes and spreads; and
- the practicality of control—i.e., the ease, speed and cost of eradicating or containing the species within the specified scope of the programme. (see Appendix 4 for details)

4.4.2 Prioritising site-led programmes

When prioritising site-led programmes, DOC will consider the following factors:

1. The programme's total ranking score (max. score = 21, see Appendix 5), based on:
   - the botanical or wildlife values of the core management unit; and
   - the urgency of control—this is the degree of risk posed to the management unit's values by invasive weeds, e.g., local extinctions.
2. The need to prevent invasions or stop them at an early stage, wherever possible. The advantages of preventing invasions, or stopping them at an early stage include:
   - maintaining places in pristine or near-pristine condition;
   - maintaining the place's resilience to further weed invasions;
   - minimising weed impacts, and any disturbance caused by control, which allows a place to recover faster; and
   - minimising the costs and difficulty of control.

   (Note that the urgency score 2.5 in the site-led ranking system (see Appendix 5) applies to "areas little affected by weeds so far, but at risk of major impacts in the near future", so relates to control at an early stage.)
3. Ensuring programmes are complementary—that is, they reflect the diversity of community types being affected by weeds. It is better to protect a range of community types than to concentrate effort on similar types
4. The need to integrate weed control with the management of other threats where this is possible. An area where weeds are the main threat, or where other threats are already being managed, is a higher priority than one where natural values are being significantly affected by other threats and these are not being managed. For example, weed control may be necessary where the removal of browsing mammals allows weeds to proliferate.
5. Ensuring management of invasive weeds in existing high priority programmes is adequate to protect the values of those places before starting new programmes.

See also section 5, in particular:
section 5.2.2 Helping to protect important places on other lands
section 5.2.5 Working with Iwi

4.4.3 Relative priorities

While there is no strict order for priorities between border control, weed-led programmes and site-led programmes, DOC will apply the following relative priorities to its management of invasive weeds (see Figure 9):

1. Contributing, as appropriate, to effective border control for new invasive weeds.
2. Weed-led programmes, to the extent that they are not incompatible with Conservancy CMSs.
3. Site-led programmes on areas administered by DOC.
4. Site-led programmes on other areas (see section 5.2).

FIGURE 9. RELATIVE PRIORITIES BETWEEN AND WITHIN OBJECTIVES 1,2 AND 3.
Site-led ranks range from 1-21 (see Appendix 5). Weed-led ranks are based on weediness (groups A-D) and practicality of control (score 3-10); highest score = A10 (see Appendix 4).

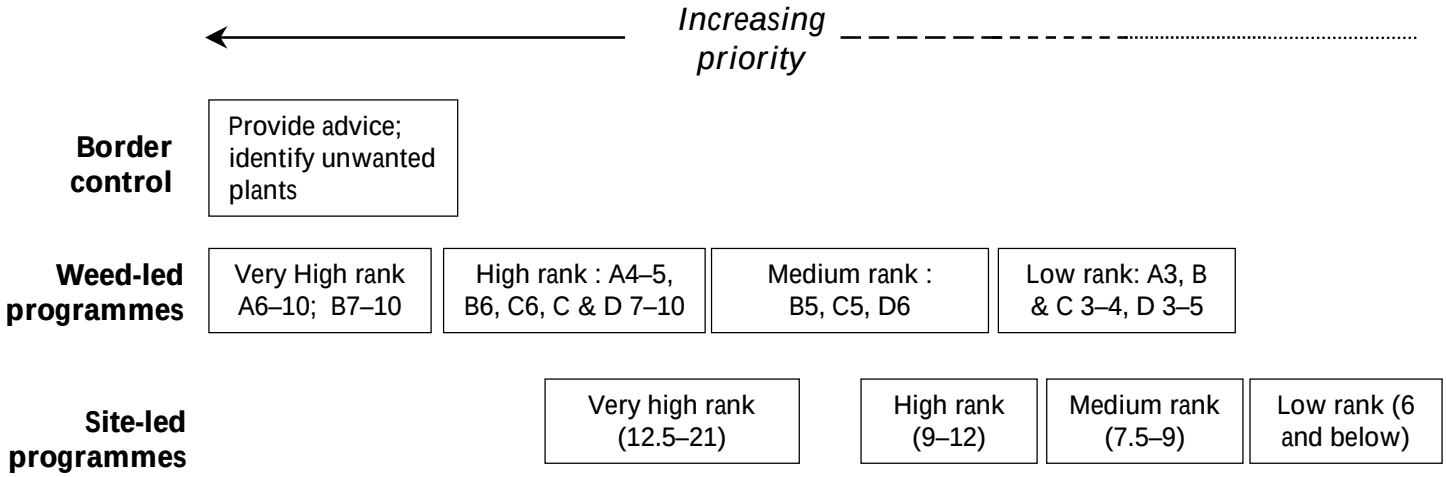
4.5 TARGETS

The following targets are the key outcomes required to implement this Strategic Plan.

4.5.1 Monitoring the success of this Strategic Plan

In September each year, Conservancies and relevant Head Office Divisions will provide a brief report to Regional Offices on their performance against this plan for the prior financial year, their predictions for the current and following financial year, and any possible risks in achieving relevant targets.

In September 2002, the Director-General will evaluate the success of this Strategic Plan in meeting the targets.


Increasing priority
Border control
Provide advice; identify unwanted plants
Weed-led programmes
Very High rank A6–10; B7–10
High rank : A4–5, B6, C6, C & D 7–10
Medium rank : B5, C5, D6
Low rank: A3, B & C 3–4, D 3–5
Site-led programmes
Very high rank (12.5–21)
High rank (9–12)
Medium rank (7.5–9)
Low rank (6 and below)

4.5.2 Weed management targets (to achieve objectives 1–3)

	WEED MANAGEMENT TARGETS AND RELEVANT OBJECTIVES	BY WHEN	BY WHOM	RELEVANT TEXT
Obj. 1	1. DOC has identified plants not yet in New Zealand that pose a significant risk to indigenous species and communities, and these have been included on MAF's register of unwanted organisms.	July 1999; annual update	BRU, (CPD, SRU)	Section 4.3.1
Obj. 1	2. There are surveillance and contingency response plans for the priority islands identified in the Surveillance Plan, to manage invasive weed species new to New Zealand that establish on islands administered by DOC.	By 2002	Consy, Area	Section 4.3.4
Obj. 2	3. Potentially significant new weeds in conservancies have been identified at an early stage of their establishment, and are being managed in weed-led programmes where these are feasible.	By 2002	Consy, Area (RO)	Sections 4.3.2, 4.4, Appendix 4
Obj. 3	4. All site-led programmes of ranking 12.5 and above have programmes that manage the significant existing and potential weed threats.	By 2002	Consy, Area (RO)	Sections 4.3.3, 4.4, Appendix 5

4.5.3 Supporting targets (to achieve Objectives 4 and 5)

	SUPPORTING TARGETS AND RELEVANT OBJECTIVES	BY WHEN	BY WHOM	RELEVANT TEXT
	PLANNING AND STAFF			
Obj. 2, 3, 4	5. The method for assessing priorities has been reviewed, and all weed-led and site-led programme priorities re-evaluated accordingly.	By 2002	CPD, Consy	Section 4.4, Appendix 4, 5
Obj. 4	6. The national weed-led and site-led programmes lists have been revised to include all core funded programmes and programmes identified by inventory work.	June 1999	Consy	Sections 4.3.2, 4.3.3
Obj. 4	7. All conservancies have a Conservancy Weed Strategy that addresses the objectives, standards and actions established in this Strategic Plan for Managing Invasive Weeds.	June 2000	Consy	Sections 4, 5
Obj. 5	8. DOC has established and implemented a nationally consistent weed QCM system. (Sponsor: Southern Regional Office)	June 2001	QCM, Csy, Area	Section 4.3.5
Obj. 4, 5	9. All key Conservancy and Area staff involved in managing weeds have received appropriate training in the principles of managing invasive weeds, weed identification, safe and effective management practices, and quality management systems (including the objectives, procedures, standards and accountabilities for planning, conducting, reviewing and reporting projects).	Annual review	Consy, Area (HR)	Sections 4.3.4, 4.3.5
	INFORMATION GATHERING, STORAGE AND DISSEMINATION			
Obj. 4	10. DOC has developed a Weed Surveillance Plan. (Sponsor: Southern Regional Office)	June 1999	SRU	Section 4.3.4
Obj. 4	11. The priority activities and surveillance programmes identified in DOC's Surveillance Plan have been established.	June 2000	Consy, Area (RO)	Section 4.3.4

	SUPPORTING TARGETS AND RELEVANT OBJECTIVES	BY WHEN	BY WHOM	RELEVANT TEXT
Obj. 4	12. All Conservancies, through their advocacy programmes and working with regional councils and other agencies and organisations, will have developed or be contributing to mechanisms to facilitate the public's role in identifying new species.	June 2001	Consy	Sections 4.3.4, 5.2.6
Obj. 4	13. The highest priority items in DOC's Environmental Weeds Research Plan 1996–2006 have been met, either by DOC itself, or by encouraging and supporting other agencies.	2002	SRU, Consy	Sections 4.3.4, 5.2.4
Obj. 4	14. National guidelines for operational and performance monitoring have been developed, incorporated into a QCM protocol, and implemented by all conservancies. (Sponsor: Southern Regional Office)	June 1999	SRU, Area (QCM)	Section 4.3.5
Obj. 4	15. A weed database has been developed and is on line within DOC. (Sponsor: Southern Regional Office)	June 1999	SRU, (IMU)	Sections 4.3.4, 5.2.4
Obj. 4	16. All conservancies have consulted with their Regional Council, and other relevant management agencies and research agencies, and have developed systems for regularly sharing information and technology.	June 2000	SRU, Consy	Sections 4.3.4, 5.2.4
	EXTERNAL RELATIONS			
Obj. 4	17. All Conservancies have included issues relevant to managing invasive weeds into the management of their relationships with local iwi.	June 1999	Consy	Sections 4.3.5, 5.2.5
Obj. 4	18. There are common approaches and standards between DOC and MAF, MFish and ERMA, for evaluating risks posed to indigenous species and communities from new plants at the border.	June 2000	CPD, BRU	Section 4.3.1
Obj. 4	19. There are common approaches and standards between DOC and Regional Councils for evaluating (i) risks posed to indigenous species and communities from invasive weeds; and (ii) public and environmental risks from weed control methods.	June 2000	CPD, (SRU)	Sections 5.2.1, 5.2.
Obj. 4	20. Public awareness of weed impacts, and support for what is required to manage them, has improved.	June 2002	Consy, ERD	Sections 4.3.4, 5.2.6
Obj. 4	21. All conservancies have a specific invasive weeds focus within their public awareness programmes.	June 2000	Consy	Sections 4.3.4, 5.2.6

Abbreviations used:

X, (Y)	"X" takes the lead in implementing this target; "Y" provides advice and support
Area	Conservancy Area managers
BRU	Head Office Biodiversity Recovery Unit in the Science, Technology and Information Services Division (STIS)
Consy	Conservancy office
CPD	Head Office Conservation Policy Division
ERD	Head Office External Relations Division
HR	Human Resources in regional offices and head office
IMU	Head Office Information Management Unit (in STIS)
QCM	The QCM Unit (in STIS)
SRU	Head Office Science and Research Unit (in STIS)

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