Emerging Weed Issues for the West Coast Regional Council and Their Prospects for Biocontrol

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Summary

Project and Client

This report on weed issues, especially those relating to emerging weeds, was prepared for the West Coast Regional Council (WCRC) by Landcare Research, in January–April 2007. This information will feed into the pest plant strategy review process and help the council to ensure that its pest plant management strategy has objectives that are able to deliver maximum benefits to the region.

Objective

- To identify and explain the potential 'weediness' of plants that are an agricultural or biodiversity threat, particularly emerging weeds, and to recommend appropriate pest categories.

Main Findings

- The particular characteristics of the West Coast that make it vulnerable to weed invasions and the imperatives for action against them are the wide range of climates and dependence on agriculture and tourism.
- There are many species threatening agriculture and biodiversity and appropriate pest categories ae recommended.
- A summary of the prospects for biocontrol of selected weed species on the West Coast is also provided.

Recommendation

- A Biosecurity Officer should be appointed during the life of the present West Coast Regional Pest Management Strategy in time to become involved in the next one.

1. Introduction

This report on weed issues, especially those relating to emerging weeds, was prepared for the West Coast Regional Council (WCRC) by Landcare Research, in January–April 2007.

The Regional Pest Plant Management Strategy (RPMS) for the West Coast was approved by WCRC and became operative on 9 August 2005. It covers the entire West Coast Region and is effective for a period of 5 years. (This shall be referred to as the WCRPMS hereafter.)

The information the council had at the time of preparing the strategy on new and emerging weed problems was incomplete. The information in this report will feed into the pest plant strategy review process and help WCRC to ensure that its pest plant management strategy has objectives that are able to deliver maximum benefits to the region.

2. Objective

- To identify and explain the potential 'weediness' of plants that are an agricultural or biodiversity threat, particularly emerging weeds, and to recommend appropriate pest categories.

3. Methods and Data Sources

The primary data sources used were:

- Species listed in the West Coast RPMS (2005)
- Species list of naturalised plants on the West Coast provided by Thomas Belton, DOC
- Weediness scores from the DOC Weeds database (Clayson Howell, DOC, Sep. 2006)
- List of species found in all other RPMS in New Zealand up until 2001 (data provided by Ian Popay, DOC)
- Plants on the National Pest Plant Accord (NPPA)
- The number of weed lists the species is on overseas was derived from scanning Randall (2002).

Peter Williams visited the West Coast for 2 days in January 2007 and inspected weed infestations south of Punakaiki with Department of Conservation (DOC) and WCRC staff. In the following two weeks, while on other fieldwork, he made other observations.

This report should be read in close conjunction with ‘Guidelines for determining and naming categories of plants in regional pest management strategies’ Williams (2007) because principles discussed there, such as feasibility of eradication, stages of the Invasion Curve etc., are not repeated here.

The primary data were combined into a spreadsheet. From personal knowledge and the notes provided by Belton, species were classified into three groups:

- Species known to have been present in the wild on the West Coast but which have been eradicated
- Species with very small infestations or infrequent casual infestations considered to be Invasion Curve Stage 2 (See Appendix 1)
- Species with numerous spreading populations beyond Invasion Curve Stage 2

This list was then screened for the worst weeds: (a) that might warrant eradication on a regional scale or (b) that are too widespread to be eradicated but might warrant regionally co-ordinated containment programmes.

Explanation is given in Williams (2007) for suggesting there be three major categories of Pest Plants for RPMSs and one for Potential Pest Plants:

- **Exclusion**, for those species especially threatening the region but not necessarily known to be present in the wild.
- **Eradication,** for those species of sufficiently high risk and yet of low abundance where eradication is considered possible. Control, for likely success, must be the responsibility of the authorities and not merely the property owner.
- **Containment**, for species that are too widespread for eradication but which require control at some scale over all or part of the region.
- **Potential Pests,** for species not yet classified as pests (or unwanted organisms as NPPA species) but which the council wishes to gather more information during the life of the strategy.

As a means of determining the possible candidates for **Eradication** the data were sorted to show whether there are species on the West Coast with *all* of the following:

- known to be on an RPMS elsewhere in New Zealand.
- at their initial invasion stages (i.e. Invasion Curve Stage 2).
- among the worst weeds from an environmental perspective (>25 DOC weed score).
- known to be on many weed lists overseas (>10 lists in Randall (2002)).

As a means of determining species that could be considered candidates for **Containment** to which various rules might apply, the data were sorted according to whether they had *all* of the following:

- known to be on an RPMS elsewhere in New Zealand.
- with expanding or stable populations too great to undertake regional eradication (i.e. Invasion Stage >2).
- among the worst weeds from an environmental perspective (>25 DOC weed score).
- known to be on many weed lists overseas (>10 lists in Randall (2002)).

For the highest ranking of these two groups, or for other specified reasons, a selection of weeds was assessed for biological success and weediness scores (Esler et al. 1993). Well-known weeds such as gorse and ragwort, or those already scored by Esler et al. (1993), were generally excluded from this analysis although their scores may be repeated here.

4. Results and Discussion

4.1 The West Coast RPMS

Plants declared to be pests in the WCRPMS are listed in Table 1 under three categories defined by their respective rules.

1. **Total control** (TC) – pest plants required to be destroyed at any location in the West Coast region.

2. **Boundary control** (BC) – pest plants required to be destroyed within a specified distance of an occupier's property boundary where the neighbouring property margin is free of that pest plant.

3. **Progressive control** (PC) – pest plants required to be destroyed by occupiers of Crown land.

Progressive-control rules are applied to six areas (Table 1). It is expected these rules will be applied in 5 years' time to all occupiers in areas Maruia Valley, Haast, Karamea–Little Wanganui, and Cape Foulwind. No explanation is given as to why two other areas are excluded.

In addition, all plants on the National Pest Plant Accord list are designated as Unwanted Organisms and are banned from sale, propagation and distribution in New Zealand. For a list of these plants see the Ministry of Agriculture and Forestry website (www.biosecurity.govt.nz).

A further category in the WCRPMS to which no rules apply (other than NPPA restrictions, where applicable), is Surveillance Plants, which are those species the council is co-operating on with DOC.

Some categories of rules in the present WCRPMS apply only to some landowners but in 5 years' time many of these are expected to apply to all landowners (WCRPMS, p. 13)

Table 1 Pest Plants in the WCRPMS. Other categories not shown are Surveillance Plants to which no rules are attached, and National Pest Plant Accord plants.

Common name	Scientific name	Effect strategy	Whole region	Map no. and area as defined in the strategy					
				1	2	3	4	5	6
Nodding thistle	*Carduus nutans*	TC[1]	x						
African feather grass	*Pennisetum macrourum*	TC	x						
Spartina	*Spartina spp.*	TC	x						
Broom	a) *Cytisus scoparius*	BC[2]	x						
	b) *Cytisus scoparius*	PC[3]		x	x	x			
Gorse	a)*Ulex* spp.	BC	x						
	b) *Ulex* spp.	PC		x	x				
Ragwort	*Senecio jacobaeae*	BC	x						
Giant buttercup	*Ranunculus acris*	BC	x						
Himalayan honeysuckle	*Leycesteria formosa*	PC				x			
Purple pampas	*Cortaderia jubata*	PC				x			
Giant knotweed	*Reynoutria sachalinensis*	PC				x	x		
Asiatic knotweed	*Fallopia japonica*	PC				x	x		x
Spanish heath	*Erica lusitanica*	PC				x	x	x	
Wild ginger	*Hedychium gardnerianum, H .flavescens*	PC				x	x		x
Chilean rhubarb	*Gunnera tinctoria*	PC				x	x	x	x
Elaeagnus	*Elaeagnus ×reflexa*	PC					x		
Parrot's feather	*Myriophyllum aquaticum*	PC					x		
Old man's beard	*Clematis vitalba*	PC					x		x
Darwins barberry	*Berberis darwinii*	PC							x
German ivy	*Senecio mikanoides*	PC							x
Japanese honeysuckle	*Lonicera japonica*	PC							x
Rhododendron	*Rhododendron ponticum*	PC							x
Tradescantia	*Tradescantia fluminensis*	PC							x
Yellow flag iris	*Iris pseudacorus*	PC							x

1. Maruia Valley (Lewis Pass to Warwick Junction)
2. Haast Valley
3. Runganga to Buller River
4. Karamea to Little Wanganui
5. Cape Foulwind
6. Southwest of Mikonui River

TC[1] Total control
BC[2] Boundary control
PC[3] Progressive control

4.2 West Coast conditions

Some aspects of the West Coast predispose it to weed invasions while others mean it is relatively lightly invaded.

Factors operating to facilitate weed invasions are the extremely wide climatic range from north to south. This means that most species that could be grown in New Zealand could be grown on the Coast; there are bananas at Karamea. Further, the large areas of marginal land

closely juxtaposed with human habitations and their associated gardens facilitate weed invasions, as is amply demonstrated by the spread of wild ginger north of Westport in recent decades. The reduction in sheep and dry stock and recent intensification of dairying in Westland may also have resulted in a change in weed populations.

On the other hand, human population density is low overall, so that the absolute number of opportunities for invasions is relatively low compared with some other areas of New Zealand. This cannot be stressed enough, because it is the main reason many weeds are still only at very low numbers on the West Coast compared with other areas of New Zealand (Fig. 1). But the population decline on the West Coast has ceased, and between the 2001 census and the 2006 census the region grew at between 0.1 and 7.5%, which is about the median for New Zealand as a whole (www.stats.govt.nz). This will result in an increasing number of people and gardens, from whence most environmental weeds originate. Furthermore, the West Coast population is mostly confined to the narrow coastal strip and more to the north of the region than in the south. As a result, the pressures associated with human habitations are still relatively localised. This also can be expected to change as habitations spread along the coast, especially in the milder north. There is a very close association between the weediness of coastal reserves and the number of houses nearby (Sullivan et al. 2005). Education and restrictions on what people can or should plant will be critical to preventing weed invasions.

The pattern of human population, geology, and land use on the West Coast results in gradients of weed distributions that make the West Coast particularly suitable for managing the landscape and weeds on a sub-regional basis. This means that for certain weeds more intensive rules should apply in some regions than in others.

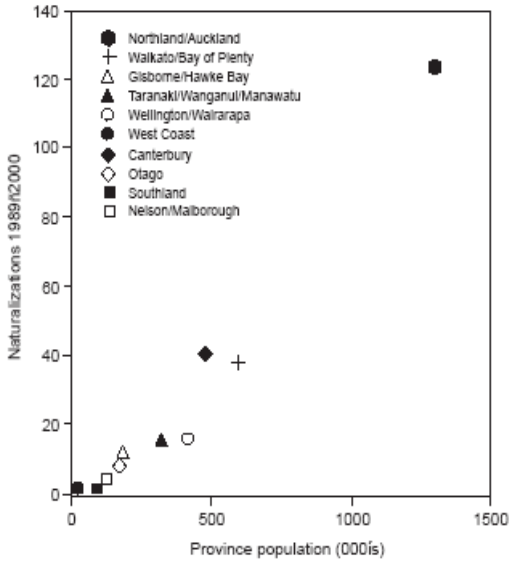

Fig. 1 Number of first naturalisations recorded from each of 10 provinces in New Zealand, and their human populations, for 1989–2000. From Williams & Cameron (2005).

The West Coast has very large areas of land in a relatively unmodified state, much of which is managed by DOC. Consequently, the West Coast is very dependent on tourism, with three times the national proportion of businesses in the accommodation, cafes and restaurants industry, a higher proportion of businesses than any other region in New Zealand (http://www.stats.govt.nz).

In summary, as a consequence of these interacting factors, the West Coast has a large number of environmental weeds, but many of these are at only the earliest stages of invasion. Many can be expected to become more widespread as human influences increase, unless they are stopped now. The imperative for doing so is that the West Coast economy is highly dependent on the ecosystems these weeds are invading.

Because of the large involvement of DOC on the West Coast there is a great need for co-operation between WCRC and DOC in weed control. It is not appropriate here to recommend the apportionment of responsibility for control between the council and DOC. Therefore it should be understood that a recommendation for Council involvement does not indicate the council should be responsible on its own, for the recommended level of control, but that control programmes may be developed in conjunction with DOC, and other agencies, where appropriate.

4.3 Eradication candidates

Table 2 shows that five species satisfying the criteria for potential eradication have previously been eradicated as small populations, including bushy asparagus, smilax, spartina, tree privet, and nodding thistle. Woolly nightshade was included here, for although its DOC weed score is 24 (one less than the cut-off), it is a very well recognised pest elsewhere, and is listed in the WCRPMS as a Surveillance species. Having shown their capacity to establish, and there being no certainty they are not still in cultivation (spartina excepted), they should be considered for inclusion in the Exclusion category unless they in fact still exist in the wild. In this case they would revert to Eradication. Any future WCRPMS should also obligate the authorities to control them should they reappear in the wild. Spartina already satisfies part of this category in being a Total Control plant.

While nodding thistle is known from only one site, there is a high probability of reintroduction through contaminated stock food. A critical aspect of an eradication programme is that the species must have a low probability of reinvading the area. In this case, the more appropriate category is probably Containment, with strict rules, including those requiring notification of all infestations. Such a rule is lacking in the present WCRPMS.

Two other weeds, African feather grass and coltsfoot, are also under the Total Control category, while Darwin's barberry is under Progressive Control. These three plants are all very high risk, and if they are as uncommon as suggested, then they should be considered for Eradication. It is worth noting, however, that eradication has not been successful for African feather grass and coltsfoot in any other RPMS. More detailed information on their abundance (which may exist) would be required.

The remaining plants in Table 2 are Cape ivy, dense oxygen weed, heather, lantana, cathedral bells, and white-edged nightshade. Apart from the first two, all the others are NPPA plants, with widely varying risks and potential for co-ordinated control.

Cape ivy is a particularly rampant climber with potential to occupy many marginal habitats on the West Coast. Its low abundance should be taken as an opportunity to eradicate it. As it is not an NPPA plant (mainly because it is not actually widely sold) it should be given at least similar status in a future WCRPMS (i.e. banned from sale etc.), although this would apply automatically if it was in the WCRPMS as a Pest Plant in an Eradication programme. Currently it is listed only as a Surveillance Plant with no restrictions.

Table 2 Species at the initial Invasion Stages (i.e. 1 or 2) on the West Coast that are listed in RPMSs elsewhere in New Zealand, are among the worst weeds from an environmental perspective (>25 DOC weed score), and on many weed lists overseas (>10 lists in Randall (2005)), or are included for other reasons as discussed in the text.

Common name	Latin name	Invasion stage [1]	WC RPMS status
African feather grass	*Pennisetum macrourum*	2	TC[2]
Bushy asparagus	*Asparagus densiflorus*	1	NPPA
Cape ivy	*Senecio angulatus*	2	absent
Cathedral bells	*Cobaea scandens*	2	NPPA
Coltsfoot	*Tussilago farfara*	2	TC
Darwin's barberry	*Berberis darwinii*	2	PC
Dense oxygen weed	*Egeria densa*	2	NPPA
Heather	*Calluna vulgaris*	2	NPPA
Lantana	*Lantana camara*	2	NPPA
Nodding thistle	*Carduus nutans*	1	TC
Smilax	*Asparagus asparagoides*	1	NPPA
Spartina	*Spartina* spp.	1	TC
Tree privet	*Ligustrum lucidum*	1	NPPA
White-edged nightshade	*Solanum marginatum*	2	NPPA
Woolly nightshade	*Solanum mauritianum*	1	NPPA

[1] See Appendix 1.
[2] Abbreviations as in Table 1. NPPA = National Pest Plant Accord plant.

Heather is a major weed of the central North Island volcanic plateau but it should be remembered that this infestation resulted from widespread sowing of seed. Heather rarely naturalises on the West Coast. This is probably a function mostly of its low abundance in horticulture and, while it should remain as an NPPA plant, other species are higher priority for co-ordinated control.

Lantana is similarly very uncommon on the West Coast and although it has been controlled by DOC it appears not to be highly invasive. However, it should be closely watched and certainly the restrictions applying to NPPA plants adhered to.

Dense oxygen weed poses a serious threat to much of the West Coast and a careful analysis should be made of the possibility of eradication. Four localities are given for the species in the WCRPMS, although there may be more than one infestation at each locality given.

White-edged nightshade is less of a threat to the environment than to agriculture, but in view of its low abundance, mentioned in the WCRPMS and Appendix 2, it should be eradicated.

4.4 Containment candidates

Table 3 shows there are at least 28 species that are well-known weeds both in New Zealand and overseas. There are also additional species already in the WCRPMS (Table 1) that are not listed in the table because they fail to reach the threshold on one or more criteria.

Table 3 Species that have reached Invasion Stages greater than 2 on the West Coast that are listed in RPMSs elsewhere in New Zealand, are among the worst weeds from an environmental perspective (>25 DOC weed score), and on >10 weed lists overseas (Randall 2002).

Common name	Scientific name	WC RPMS status[1]
Banana passionfruit	*Passiflora tarminiana*	NPPA
Barberry	*Berberis glaucocarpa*	absent
Blue morning glory	*Ipomoea indica*	NPPA
Buddleia	*Buddleja davidii*	absent
Cotoneaster	*Cotoneaster simonsii*	NPPA
Elaeagnus	*Elaeagnus ×reflexa*	PC
German ivy	*Senecio mikanioides*	PC
Giant reed	*Arundo donax*	NPPA
Gorse	*Ulex europaeus*	BC
Hawkweed	*Hieracium ×stoloniflorum*	NPPA
Hawthorn	*Crataegus monogyna*	absent
Holly	*Ilex aquifolium*	absent
Japanese honeysuckle	*Lonicera japonica*	PC
King devil	*Hieracium praealtum*	NPPA
Lagarosiphon	*Lagarosiphon major*	NPPA
Lodgepole pine	*Pinus contorta*	NPPA
Lupin (Russell)	*Lupinus polyphyllus*	absent
Lupin (tree)	*Lupinus arboreus*	absent
Old man's beard	*Clematis vitalba*	PC
Orange hawkweed	*Hieracium aurantiacum*	NPPA
Pampas	*Cortaderia selloana*	NPPA
Purple loosestrife	*Lythrum salicaria*	NPPA
Purple pampas	*Cortaderia jubata*	PC
Red cestrum	*Cestrum elegans*	absent
Reed sweet grass	*Glyceria maxima*	absent
Silver wattle	*Acacia dealbata*	absent
Sycamore	*Acer pseudoplatanus*	absent
Tutsan	*Hypericum androsaemum*	NPPA

[1] Abbreviations and area to which it applies as in Table 1.

Several of these are agricultural, forestry, or multi-sector weeds where Boundary Control rules apply (i.e. broom, gorse, giant buttercup, ragwort). Although they are already widespread they have potentially high impact and neighbours need to be protected from infestation on adjacent land and so the classification seems appropriate.

Of these (Table 1), giant buttercup is a major weed of dairy pastures and has become resistant to phenoxy herbicides in some parts of New Zealand. For this reason alone it was removed from the Tasman District Council RPMS. There are large areas of the West Coast still free of this weed but which are highly suitable for it. Much more attention needs to be given to this weed and, particularly, efforts made to educate farmers.

Another weed of primarily agricultural concern that lacks any attention is reed sweet grass (Table 3). This dense tall grass can already be seen restricting water flow in the streams around Kokatahi and in the Waitaha Valley. Yet, because it appears to be largely confined to these localities, there is the opportunity for co-ordinated control and education to prevent further spread.

Others are in the WCRPMS for primarily environmental reasons as Progressive Control plants in one part of the region or another, i.e. Asiatic knotweed, Chilean rhubarb, elaeagnus, giant knotweed, Himalayan honeysuckle, parrot's feather, rhododendron, tradescantia, wild ginger (both species), and yellow flag iris (Table 1).

Given the large list of other potential candidates shown in Table 3, and the suggestions (above) that a greater number of species be targeted for eradication, the question arises as to whether the appropriate species are being targeted for Containment and in the appropriate regions. This is particularly important in view of the stated intention of WCRC to have all landowners bound by the rules in the future. Regardless of *where* they might be controlled, for we do not have a detailed knowledge of the West Coast, one species in the above group might not warrant being included in the WCRPMS in our opinion.

Himalayan honeysuckle is a short-lived soft-woody shrub that occupies a wide range of open sites in moist areas where it tends to replace native early-successional species such as native tutu (*Coriaria* spp.*)*. However, it is very short lived, and in forest environments is soon replaced by other native species. It produces small fruits containing the tiniest of seeds, and unlike many species which originated in horticulture and are still spread primarily by humans, this species is spread very widely by birds, and potentially by possums. Consequently, Himalayan honeysuckle is now almost ubiquitous in wetter areas of the South Island apart, so it seems, from certain areas in the WCRPMS area. However, in view of its wide habitat range and rapid spread, which makes finding outliers very unlikely, it is doubtful whether effort put in to control will be effective in the long run. Nevertheless, it may be worthwhile to continue containing its spread to the northern parts of the West Coast.

Purple loosestrife, in contrast, is a species that appears only on the NPPA list, to which it was only recently added. This is an erect perennial herb with a woody stem and whorled leaves. It has the ability to reproduce prolifically by both seed dispersal and vegetative propagation and invades a wide range of wetlands and other herbaceous communities (Appendix 3). It is currently in very low abundance on the West Coast (Appendix 2) and greater emphasis should be placed on preventing further spread by discouraging gardeners from cultivating it, and controlling all wild populations. Attempts are being made by Environment Canterbury in its RPMS to eradicate it from the vicinity of Christchurch City.

In addition, DOC in its submission to the Council's WCRPMS provided a list of 32 species (which included some of the above) that they would like to see categorised as Pests with rules similar to those of the NPPA category. Ten of these have since been added to the WCRPMS or else to the latest NPPA (www.biosecurity.govt.nz), leaving 22 others.

Banning plants from propagation and so on, as the only tactic for control, will slow their spread only if they are in fact cultivated. Although we have no detailed knowledge of gardening practices on the West Coast, one species in particular amongst these 22 warrants comment in addition to the points made by DOC in its submission to the WCRPMS review.

Akebia (or chocolate vine) is a climber that is occasionally found on the West Coast. It has recently established and is spreading in parts of the Tasman District area. It is a typical forest-edge and scrub climber, with a twining woody vine that grows quickly and, if left unmanaged, can cover and kill existing ground-level herbs and seedlings, understorey shrubs and young trees. Once established, its dense growth prevents seed germination and establishment of seedlings of native plants. It seldom seeds in New Zealand and is spread largely by humans in dumped rubbish. However, the West Coast is climatically very suitable for akebia. As it is not on the NPPA list it should have similar restrictions applied to it in the WCRPMS. There are plenty of less invasive substitute vines that can be grown instead.

The only reason Chilean rhubarb is absent from Table 3 is because it is not a common weed in other countries, a criterion for inclusion. However, this is a very serious environmental weed in other parts of New Zealand. While it is still only at the early stages of invasion it has increased dramatically on the West Coast in the last 20 years. It occupies a wide range of damp sites and could potentially cover large areas on the West Coast, including extensive linear habitats like road cuttings and stream margins.

5. Conclusions

This brief review of some of the weed problems on the West Coast has revealed some very serious issues. Good information exists on DOC files about the distribution of many species, particularly environmental weeds. Less complete information is available as to the true extent of weeds such as giant buttercup and reed sweet grass, which are primarily agricultural weeds. Collecting and storing such information is more appropriately the responsibility of the WCRC. But information alone does not control weeds. An active field and community approach is required. At times, this may involve the need to enter private property and to serve notices for those not complying with the RPMS. Non-compliance will probably become an issue if the step is taken to have all landowners bound by rules in the next RPMS as stated in the current RPMS. DOC staff and contractors, who currently undertake most weed control on the West Coast, cannot do this. There is a need for the WCRC to share the burden of weed control on the West Coast with DOC, particularly with regard to agricultural and multi-sector weeds. There is also a need to raise awareness among the West Coast general public of the seriousness of weeds, and how they can be prevented, through initiatives such as Weedbusters (see www.weedbusters.org.nz).

6. Recommendations

- A Biosecurity Officer should be appointed by WCRC during the life of the present RPMS in time to become involved in the next RPMS, in order to action some of the weed issues outlined here.
- There is no barrier for the WCRC joining the National Biocontrol Collective, which would enable it to most efficiently access the opportunities for biocontrol on the West Coast (see Appendix 4).

7. Acknowledgements

Thanks to Simon Moran (West Coast Regional Council) for discussions and Tom Belton (DOC) for information. This project was instigated by Simon Moran for Environment Southland and funded by the Foundation for Research, Science and Technology through an Envirolink advice grant.

Peter Williams is indebted to Thomas Belton, DOC, for providing him with his evidence on behalf of the Director General of Conservation to the proposed Regional Pest Management Strategy for the West Coast, and Clayson Howell, DOC, for the weed scores from the DOC database.

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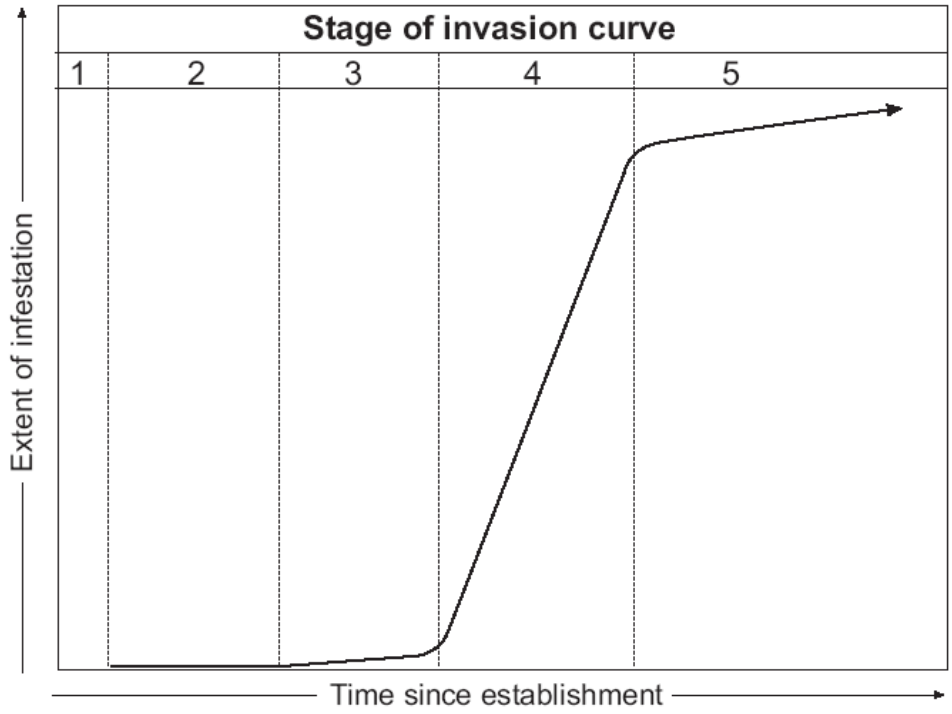
Appendix 1 Descriptors of stages in the invasion curve



Stage no.	Shape of invasion curve	Distribution	Regional number of wild infestations and total area infested[1]
1	Absent	Outside the region or only	None
2	Flat	Local	1–2, <100 ha.
3	Starting upwards	Local	3–20, <1000 ha.
4	Rising steeply	Region-wide	20+, >1000 ha
5	Levelling off	Region-wide	Innumerable, >10 000 ha

[1] Defined as total area requiring surveillance delimited by the total extent of all known plants and their probable potential dispersal distance

Appendix 2. Naturalised plants on the West Coast and parameters indicating their weediness

Common name	Botanical name	Other RPMS[1] 1998–2001	NP PA[2]	DOC[3]	No.[4]	Comments [5]
Weeds of Invasion Stage 1 that have previously been considered eradicated and mostly environmental weeds						
Privet (tree)	*Ligustrum lucidum*	x	x	32	>10	Only two trees ever found on West Coast, at Waimangaroa, both controlled.
Smilax	*Asparagus asparagoides*	x	x	30	>10	One tiny site found and controlled.
Spartina	*Spartina* spp.	x	x	25	>10	One small infestation in Oparara Estuary eradicated.
Bushy asparagus	*Asparagus densiflorus*	x	x	25	>10	One tiny site found and controlled.
Woolly nightshade	*Solanum mauritianum*	x	x	24	>10	Rare. A few plants known from Reedys Road near Westport have been controlled.
Weeds of Invasion Stage 2 and mostly considered DOC weeds						
Burdock	*Arctium minus*			18	>10	Localised to Fox River near Punakaiki.
Darwin's barberry	*Berberis darwinii*	x	x	26	>10	Several small sites currently under a weed-led control plan.
Heather	*Calluna vulgaris*	x	x	27	>10	Rarely naturalised.
Campsis vine	*Campsis x tagliabuana*			n.a	1	Localised infestation in riparian forest at Karamea.
Giant lily	*Cardiocrinum giganteum*		x	n.a	0	Occasional garden escape.
Korean old man's beard	*Clematis maximowicziana*			29	0	Uncommon, a few naturalised plants around Westport.
Cathedral bells	*Cobaea scandens*	x	x	30	>10	Only a few very small sites.
Dense oxygen weed	*Egeria densa*	x	x	24	>10	Only a few very small sites, mostly garden ponds, major threat to aquatic sites and hydro, etc.
Paritaniwha	*Elatostema rugosum*		n.a.	n.a	0	One small site at Punakaiki. Outside natural range. Doesn't seem to be going far.
Fig	*Ficus carica*			23	>10	Occasional discard, probably only propagating from cuttings.
Shrub balsam	*Impatiens sodenii*			19	3	Occasional in gardens near Karamea but barely naturalised.
Jasmine	*Jasminum polyanthum*	x		27	8	Rarely naturalised. One site at Punakaiki.
Lantana	*Lantana camara*	x	x	28	>10	Uncommon. Controlled at one site.

Common name	Botanical name	Other RPMS[1] 1998–2001	NP PA[2]	DOC[3]	No.[4]	Comments [5]
African feather grass	*Pennisetum macrourum*	x	x	31	>10	Westport, Punakaiki, small localised infestations. Total control in WCRPMS.
Curly pond weed	*Potamogeton crispus*			27	>10	Known from one site only at Barrytown.
Blackberry	*Rubus fruticosus* agg.	x		31	>10	There are only two blackberry bushes on the West Coast (both continuous either side of the main road)!
Cape ivy	*Senecio angulatus*	x		29	>10	Known from one localised site at Hector.
Potato vine	*Solanum jasminoides*	x		32	10	Rare. One small infestation in a forest margin at Paroa.
White-edged nightshade	*Solanum marginatum*	x	x	n.a	>10	Localised infestation near Little Wanganui, mostly on private land.
Coltsfoot	*Tussilago farfara*	x	x	26	>10	Known from one site only at Rocky Creek Scenic Reserve and possibly eradicated from there. Total control in WCRPMS.
Weeds of invasion stage > 2 and mostly considered DOC weeds						
Silver wattle	*Acacia dealbata*	x		27	>10	So far not much of a problem on the West Coast.
Sydney golden wattle	*Acacia longifolia*			26	>10	So far not much of a problem on the West Coast.
Tasmanian blackwood	*Acacia melanoxylon*			27	>10	Some seeding and suckering around existing plantations.
Sycamore	*Acer pseudoplatanus*	x		27	>10	Fairly common around old mining settlements particularly in the Grey Valley beech forests margins.
Yarrow	*Achillea millefolium*			n/a	>10	Common in pasture.
Kiwifruit	*Actinidia deliciosa*	x		27	2	Occasional seedling plants found near settlements…pretty rare so far.
Agapanthus	*Agapanthus praecox*	x		17	6	Common in gardens, still planted, also beginning to naturalise at some sites.
Creeping bent	*Agrostis stolonifera*			n/a	>10	Common in pastures and open areas.
Chocolate vine	*Akebia quinata*			24	10	Occasional, mostly at sites where garden rubbish has been dumped, smothering.
Three cornered garlic	*Allium triquetrum*			20	>10	Localised/common on roadsides and riverbanks mostly near original plantings.
Alder	*Alnus glutinosa*			26	>10	Rarely naturalised.

Common name	Botanical name	Other RPMS[1] 1998–2001	NP PA[2]	DOC[3]	No.[4]	Comments[5]
Marram	*Ammophila arenaria*			32	>10	Common on coastal dunes from Karamea to Haast.
Stinking mayweed	*Anthemis cotula*			n/a	>10	Occasional on roadsides, riverbeds and open sites. Not having much impact.
Cape pondweed	*Aponogeton distachyos*			n/a	>10	Widespread in Mahinapua Creek and localised at a few other sites.
Giant reed	*Arundo donax*	x	x	29	>10	A few sites where plants have been dumped.
Ferny azolla	*Azolla pinnata*			n/a	>10	Common in many of the dredge ponds in the Grey Valley and less elsewhere.
Barberry	*Berberis glaucocarpa*	x		26	>10	Very common in the Grey Valley and Maruia, Karamea. Rare south of Hokitika.
Beggars'ticks	*Bidens tripartita*			n/a	>10	Fairly common in wet farmland and wetlands from Karamea to Harihari.
Wild turnip	*Brassica rapa*			n/a	>10	Localised on roadsides. Not doing much.
Quaking grass	*Briza maxima*			n/a	>10	Localised on roadsides. Not doing much.
Angels trumpet	*Brugmansia candida*	x		n/a	9	Mainly Buller area. Occasional wild plants near gardens.
Buddleia	*Buddleja davidii*	x		26	>10	Locally common particularly in creek beds.
Buddleia	*Buddleja globosa*			n/a	3	Rare garden escape.
Greater bindweed	*Calystegia silvatica*			n/a	>10	Fairly common, particularly at dumping sites.
Iceplant	*Carpobrotus edulis*		x	28	>10	Occasional in coastal areas.
Red cestrum	*Cestrum elegans*	x		28	>10	Localised infestations from Karamea to Hokitika
Californian thistle	*Cirsium arvense*	x		18	>10	Common pasture/ riverflat weed.
Marsh thistle	*Cirsium palustre*			18	>10	Common in wet pasture, roadsides and disturbed wetlands.
Scotch thistle	*Cirsium vulgare*			18	>10	Common on disturbed ground throughout.
Old man's beard	*Clematis vitalba*	x	x	34	>10	Fairly widely distributed in the Buller Gorge but fairly well controlled, also a few other small sites.
Hemlock	*Conium maculatum*	x		n/a	>10	Occasional, mostly roadsides and waste ground.
Purple pampas	*Cortaderia jubata*	x	x	28	>10	Occasional wild, still planted in gardens and on farms.
Pampas	*Cortaderia selloana*	x	x	28	>10	Occasional wild, still planted in gardens and on farms.
Cotoneaster	*Cotoneaster bullatus*	x		n/a	4	Locally naturalised on hillsides around Reefton.

Common name	Botanical name	Other RPMS[1] 1998–2001	NP PA[2]	DOC[3]	No.[4]	Comments[5]
Cotoneaster	*Cotoneaster franchetii*	x		24	>10	Locally common around settlements.
Cotoneaster	*Cotoneaster glaucophyllus*	x		25	>10	Locally common around settlements.
Cotoneaster	*Cotoneaster microphyllus*	x		n/a	9	Fairly uncommon naturalised.
Cotoneaster	*Cotoneaster simonsii*	x	x	26	>10	Locally common around settlements, particularly old mine settlements.
Hawthorn	*Crataegus monogyna*	x		31	>10	Locally scattered, mainly around scrubby areas of farmland. Fairly uncommon.
Montbretia	*Crocosmia ×crocosmiiflora*	x		22	>10	Widespread. Roadsides, riparian sites, gardens, historic sites, etc.
Broom	*Cytisus scoparius*	x		25	>10	Ranging from abundant in some catchments (Inangahua, Buller, Taramakau, etc.) to rare/absent in others.
Foxglove	*Digitalis purpurea*			n/a	>10	Common on farmland and disturbed sites.
Vipers bugloss	*Echium vulgare*			21	>10	Occasional plants in riverbeds and gravelly sites.
Elaeagnus	*Elaeagnus × reflexa*	x		31	>10	Localised sites from Karamea to Hokitika, mostly single plants/patches.
Canadian pondweed	*Elodea canadensis*			24	>10	Common in West Coast lakes and waterways. Not having major impacts and too widespread to control.
Field horsetail	*Equisetum arvense*			21	>10	Common in Mokihinui catchment and a few other sites in Buller and Greymouth areas. Hard to control.
Spanish heath	*Erica lusitanica*	x		23	>10	Common particularly in areas where burning has occurred in the past. Rare south of Hokitika.
Mexican daisy	*Erigeron karvinskianus*	x	x	25	>10	Only known naturalised from one site in the Buller Gorge. Common in gardens.
Escallonia	*Escallonia rubra*			n/a	>10	Occasional localised sites. Becoming common on Cape Foulwind cliffs.
Japanese aralia	*Fatsia japonica*			22	2	Occasional bird-dispersed garden escape.
Fuchsia	*Fuchsia magellanica*			n/a	>10	Common around historic sites, but not doing much harm.
Aluminium plant	*Galeobdolon luteum*		x	23	5	Common in gardens and well established at some riparian sites from Karamea to Fox Glacier.
Cleavers	*Galium aparine*			n/a	>10	Occasional roadside/rank-grassland weed. Not much of a threat.
Marsh bedstraw	*Galium palustre*			n/a	10	Fairly common in wetland areas.

Common name	Botanical name	Other RPMS[1] 1998–2001	NP PA[2]	DOC[3]	No.[4]	Comments[5]
Floating sweet grass	*Glyceria fluitans*			28	>10	Fairly common along drains, spring-fed creeks, etc.
Reed sweet grass	*Glyceria maxima*	x		28	>10	Localised infestations from Hector to Waitaha River, particularly bad near Kokatahi. Pasture, spring-fed creeks, etc.
Gunnera / Chilean rhubarb	*Gunnera tinctoria*	x	x	30	9	Common in gardens from Karamea to Haast and naturalising at many sites, only in the early stages of colonisation.
Ivy	*Hedera helix*	x		25	>10	Common in gardens and naturalised at a number of sites.
Ginger (Kahili)	*Hedychium gardnerianum*	x	x	24	>10	Fairly common in mild sites from Karamea to Haast, but most common from Ross northwards.
Day lily	*Hemerocallis fulva*			n/a	1	Occasional garden discard and persistent relic at historic sites.
Orange hawkweed	*Hieracium aurantiacum*	x	x	32	>10	Localised in Buller Gorge on roadsides.
Tussock hawkweed	*Hieracium lepidulum*		x	27	>10	Common in alpine grasslands.
Mouse-eared hawkweed	*Hieracium pilosella*		x	32	>10	Common in alpine grasslands.
King devil	*Hieracium praealtum*	x	x	30	>10	Common in alpine grasslands.
Hawkweed	*Hieracium ×stoloniflorum*	x	x	32	>10	Common in alpine grasslands.
Hops	*Humulus lupulus*			21	>10	Occasional naturalised from Karamea to Hokitika.
Hydrangea	*Hydrangea macrophylla*			19	6	Occasional naturalised from Karamea to Haast. Large infestations around Punakaiki.
Tutsan	*Hypericum androsaemum*	x	x	27	>10	Scattered infestations throughout West Coast.
Hypericum	*Hypericum henryi*			n/a	0	Localised mostly around old planting sites near Franz Josef.
Hypericum	*Hypericum kouytchense*			n/a	0	Fairly common near Karamea, and numerous sites in South Westland (Paringa, Haast, Franz, etc.).
St Johns Wort	*Hypericum perforatum*			17	>10	Localised infestations mainly on roadsides.
Holly	*Ilex aquifolium*	x		28	>10	Localised infestations mostly near old settlements. Very hard to control, spread by birds.
Himalayan balsam	*Impatiens glandulifera*			n/a	>10	Locally common near Lake Brunner and Franz Josef, etc.
Blue morning glory	*Ipomoea indica*	x	x	30	>10	Uncommon, a few naturalised plants around Westport and Punakaiki.

Common name	Botanical name	Other RPMS[1] 1998–2001	NP PA[2]	DOC[3]	No.[4]	Comments[5]
Stinking iris	*Iris foetidissima*			25	>10	Uncommon, a few naturalised plants around Greymouth.
Yellow flag iris	*Iris pseudacorus*	x	x	21	>10	Fairly common in gardens from Karamea to Haast, and naturalised at a number of wetland/riparian sites.
Sharp rush	*Juncus acutus*			24	>10	Fairly common rush.
Jointed rush	*Juncus articulatus*			27	>10	Common in wet hollows, etc.
Bulbous rush	*Juncus bulbosus*			27	>10	Fairly common rush.
Leafless rush	*Juncus effusus*			23	>10	Common rush of pasture.
Heath rush	*Juncus squarrosus*			27	>10	Common on Buller Coal Plateau, and localised at a few other sites south to Ross.
Track rush	*Juncus tenuis*			n/a	>10	Common along tracks and well-trodden sites.
Lagarosiphon	*Lagarosiphon major*	x	x	27	>10	Localised infestations in garden ponds and wetlands but so far absent from significant-sized lakes.
Himalayan honeysuckle	*Leycesteria formosa*	x		22	>10	Common in central Westland and Buller. Rare in Karamea and localised infestations south of Fox.
Privet	*Ligustrum ovalifolium*	x		23	>10	Common hedge plant and garden shrub, and wild near settlements.
Privet (Chinese)	*Ligustrum sinense*	x		25	>10	Common hedge plant and garden shrub, and wild near settlements.
Tiger lily	*Lilium tigrinum*			21	5	Occasional on roadsides, common around Otira.
Japanese honeysuckle	*Lonicera japonica*	x	x	31	>10	Common from Ross to Karamea, invading forest and scrub areas. Rare south of Ross.
Common honeysuckle	*Lonicera periclymenum*			n/a	>10	Occasional in gardens and around old settlements. Not very invasive.
Lotus	*Lotus pedunculatus*			24	>10	Common throughout.
Lupin (tree)	*Lupinus arboreus*	x		27	>10	Scattered infestations throughout West Coast. Not a major problem anywhere.
Lupin (Russell)	*Lupinus polyphyllus*	x		27	>10	Localised infestations near Otira and Lewis Pass in riverbeds, fairly light infestations so far. Common in gardens.
Ragged Robin	*Lychnis flos-cuculi*			n/a	>10	Common in wet pastures, most common near Haast and Arawhata.
Gypsywort	*Lycopus europaeus*			n/a	9	Occasional around ephemeral/distrurbed margins of wetlands, and in wet pasture. Westport to Haast, most common in south.

Common name	Botanical name	Other RPMS[1] 1998–2001	NP PA[2]	DOC[3]	No.[4]	Comments[5]
Creeping Jenny	*Lysimachia nummularia*			n/a	>10	Occasional around estuaries, mostly near Westport.
Yellow loosestrife	*Lysimachia vulgaris*			n/a	2	Occasional along farm drains and wet pasture at Okuru River (Haast).
Rose loosestrife	*Lythrum junceum*			n/a	>10	Fairly common in wet areas, tracksides and riverbeds around Fox River and Punakaiki.
Purple loosestrife	*Lythrum salicaria*	x	x	31	>10	Occasional in gardens, rare in the wild, but likely to spread to wetlands if not kept in check.
Apple	*Malus × domestica*			n/a	5	Occasional on roadsides, etc., from discarded fruit. Common in Haast Valley.
Cape honey flower	*Melianthus major*	x		25	>10	Occasional patches near settlements from Westport to Hokitika.
Pohutakawa	*Meterosideros excelsa*		n.a	29	n.a	Common planted in gardens and roadsides/rest areas. Spreading by seed in coastal areas.
Monkey musk	*Mimulus guttatus*			21	>10	Localised infestations in roadside drains, seepages and wet banks throughout West Coast.
Musk	*Mimulus moschatus*			n/a	>10	Less common than monkey musk, similar habitats and distribution.
Himalayan fairly grass	*Miscanthus nepalensis*			27	4	Occasional in cultivation. Rarely naturalised to date.
Chinese fairy grass	*Miscanthus sinensis*	x	x	n/a	>10	Occasional in cultivation and naturaralised on roadsides, etc.
Water forget-me-not	*Myosotis* spp.			n/a	>10	Common in disturbed wetland and riparian areas.
Parrot's feather	*Myriophyllum aquaticum*		x	26	>10	Localised infestations in farm drains, Karamea and Greymouth. Also in garden ponds.
White water lily	*Nymphaea alba*			27	>10	Localised infestations from Karamea to Haast, common in Lake Mahinapua.
American horsebane	*Oenanthe sarmentosa*			n/a	4	Common in estuarine margins around Greymouth.
Evening primrose	*Oenothera glazioviana*			n/a	>10	Occasional in gardens and in gravelly roadside areas.
Tarweed	*Parentucellia viscosa*			n/a	>10	Common in pasture.
Shamrock pea	*Parochetus communis*			n/a	2	Common in forest margins around Fox and Franz glacier valleys.
Banana passionfruit	*Passiflora tarminiana*	x	x	27	>10	Locally common around Karamea and Punakaiki. Localised minor infestations as far south as Ross.
Kikuyu grass	*Pennisetum*		x	29	>10	Common in coastal areas from Westport north. Localised infestation at

Common name	Botanical name	Other RPMS[1] 1998–2001	NP PA[2]	DOC[3]	No.[4]	Comments[5]
	clandestinum					Punakaiki.
Winter heliotrope	*Petasites fragrans*			n/a	>10	Occasional in roadside forest margins around Punakaiki.
Lodgepole pine	*Pinus contorta*	x	x	30	>10	Occasional wilding trees near planted specimens, but West Coast not ideal habitat for wilding pines.
Radiata pine	*Pinus radiata*			27	>10	Occasional wilding trees near planted specimens, but West Coast not ideal habitat for wilding pines.
Plectranthus	*Plectranthus ciliatus*		x	22	>10	Locally common in forest margins near settlements from Karamea to Hokitika.
Blue spur flower	*Plectranthus grandis*			20	3	Rare garden escape. Near Karamea.
Bamboo (variegated)	*Pleioblastus variegatus*			n/a	4	Uncommon garden relic.
Selfheal	*Prunella vulgaris*			n/a	>10	Common in pasture and disturbed forest margins, particularly where grazing has occurred.
Sweet cherry	*Prunus avium*			20	>10	Common around Westport estuary margins. Localised infestations elsewhwhere.
Cherry laurel	*Prunus laurocerasus*			23	>10	Common in old gardens and occasional in forest near settlements and historic sites.
Bamboo (Japanese)	*Pseudosasa japonica*			29	6	Several localised infestations throughout West Coast, particularly invasive in sandy soils.
Douglas-fir	*Pseudotsuga menziesii*			29	10	Occasional localised wilding populations. Worst at Caves Stream, Maruia.
Wattle	*Racosperma* spp.			25	>10	Occasional seedlings near gardens and planted specimens. So far no wattle species are causing problems on the West Coast.
Buttercup (giant)	*Ranunculus acris*	x		n/a	>10	Locally common on farmland around Karamea. Also found in small infestations as far south as Harihari, and inland to Maruia.
Spearwort	*Ranunculus flammula*			n/a	>10	Fairly common along creeks, drains and waterways.
Buttercup (creeping)	*Ranunculus repens*	x		n/a	>10	Abundant throughout. Mostly a weed of pasture.
Asiatic knotweed	*Reynoutria japonica*	x		25	>10	Absent from Karamea, and south of Harihari. Locally common in between, particularly a problem in riverbeds.
Giant knotweed	*Reynoutria sachalinensis*	x	x	25	9	Localised in areas around Buller, Greymouth and Hokitika.
Rhododendron	*Rhododendron ponticum*			30	1	Occasional from Buller to Franz Josef. Spreading at some sites, particularly

Common name	Botanical name	Other RPMS[1] 1998–2001	NP PA[2]	DOC[3]	No.[4]	Comments [5]
						beech forests and manuka stands.
Flowering currant	*Ribes sanguineum*			25	>10	Occasional garden remnant at historic sites (esp. Waiuta).
Watercress	*Rorippa nasturtium-aquaticum*			n/a	>10	Common in roadside ditches, and spring-fed creeks, etc.
Sweet briar	*Rosa rubiginosa*			28	>10	Rare. A few plants known from Landsborough Station and nearby.
Rambler rose	*Rosa* spp.			n/a	>10	Occasional wild rambling roses near roadsides and settlements.
Raspberry	*Rubus idaeus*			n/a	10	Localised roadside patches near Maruia and Lewis Pass.
Blackberry (cut leaved)	*Rubus laciniatus*	x		n/a	2	Locally common, esp. at Waiuta.
Japanese wineberry	*Rubus phoenicolasius*			n/a	>10	Localised infestations near Karamea and Maruia Valley.
Willow (grey)	*Salix cinerea*			32	>10	Occasional around wetland areas, roadsides and farms.
Willow (bitter)	*Salix elaeagnos*			n/a	2	Occasional in riverbeds around Harihari and Whataroa.
Willow (crack)	*Salix fragilis*			28	>10	Common throughout the West Coast, esp. wet areas and riparian sites.
Elder	*Sambucus nigra*	x		22	>10	Localised small infestions near Cobden (Greymouth) and Maruia.
Kaffir lily	*Schizostylis coccinea*			n/a	5	Locally common in disturbed wetland areas and roadsides. Abundant in Buller and less common South to Haast.
Selaginella	*Selaginella kraussiana*	x	x	23	>10	Spreading in forested areas particularlt riparian sites. Challenging to control effectively.
Ragwort	*Senecio jacobaea*	x		23	>10	Common on farmland, riverbeds, etc.
German ivy	*Senecio mikanioides*	x		26	>10	Fairly common in forest margins from Karamea to Ross, rare further south.
Blue eyed grass	*Sisyrinchium* "blue"			n/a	5	Occasional on roadside verges near Karamea.
Velvety nightshade	*Solanum chenopodioides*			n/a	>10	Common in forest margins and scrub throughout.
Rowan	*Sorbus aucuparia*			25	>10	Locally common mostly near settlements in the Grey and Maruia valleys. Spreading into beech forests.
Hedge stachys	*Stachys sylvatica*			n/a	6	Localised dense patches in riparian areas and roadsides throughout.
Rice paper plant	*Tetrapanax papyriferus*			n/a	6	Occasional garden escapes in forest magins around Punakaiki.
Tradescantia	*Tradescantia*	x	x	25	>10	Common in forest margins and riparian forest, and in gardens from Karamea

Common name	Botanical name	Other RPMS[1] 1998–2001	NP PA[2]	DOC[3]	No.[4]	Comments[5]
	fluminensis					to Hokitika. Localised further south to Haast.
Nasturtium	*Tropaeolum majus*			19	>10	Fairly common in roadside scrub and garden dumping areas.
Gorse	*Ulex europaeus*	x		28	>10	Common on disturbed land throughout the West Coast. Rare in Haast Valley and Maruia catchment.
Bladderwort	*Utricularia geminiscapa*	x		n/a	0	Occasional in wetlands, only discovered in the last few years.
Greater periwinkle	*Vinca major*			22	>10	Localised infestations around settlements and roadsides.
Lesser periwinkle	*Vinca minor*	x		n/a	>10	Uncommon. Occasionally found at historic sites.
Arum lily	*Zantedeschia aethiopica*	x	x	22	>10	Common in gardens, and weedy at a few sites, particularly round Punakaiki.
Arum lily 'Green Goddess'	*Zantedeschia aethiopica* cv. Green Goddess	x	x	22	n.d	Common in gardens, and going wild at a few sites, probably going to be more weedy than the parent species, but not been around so long. The taxonomy of this species is uncertain (P. Heenan, pers. comm.),

[1] Presence or absence of species on all New Zealand RPMSs, from list compiled by Ian Popay (DOC).
[2] National Pest Plant Accord list.
[3] DOC weediness score provided by Clayson Howell, DOC, Wellington, Sept. 06.
[4] No weed lists the species appears on from Randall (2002).
[5] List and comments provided by Thomas Belton, DOC.

Appendix 3. Selected species ratings using the scoring system of Esler et al. (1993) where the maximum potential score is 24 for Biological Success and Environmental Impact Rating, and 24 for Esler's Index of Weediness. Species presented in alphabetical order of common name.

Species
BUSHY ASPARAGUS (*ASPARAGUS DENSIFLORA*) AND SMILAX (*ASPARAGUS ASPARAGOIDES)*.
These two have similar ecology and so are treated together.
Family
Liliaceae
Origin
Europe, Africa
Weed
Widespread weeds in Australia and USA.
Form
Much-branched climbers.
Ecology
Both grow in a wide range of marginal habitats, heathland, coastal cliffs, etc., smothering lower-growing species. Shade tolerant to a certain extent so there is the potential to invade forest understoreys. Also drought tolerant.
Ratings
Biological Success and Environmental Impact (0–3)

2	**Versatility** Tolerate a range of soil conditions including partly saline.
2	**Maturation rate** Can produce fruit in their first year.
2	**Seeding ability** Produce abundant very small seeds.
2	**Dispersal and establishment** Seeds are spread by birds, particularly silvereyes.
2	**Cloning** Do not clone as such, but spread by small detached portions of rhizome and by humans via garden dumping.
2	**Recovery** Recovers rapidly from damage.
2	**Competitive ability** Competitive only in open situations.
14	**Biological Success and Environmental Impact Rating**

Weed status assessment (0–3)

1	**Obstruction** Form thickets.
2	**Suppression** Threat to lower-growing plants and seedling establishment.
0	**Health impairment**
1	**Quality impairment** Mildly hindering travelling through native vegetation because of the entanglement.
2	**Damage to natural areas** Potential to invade open areas, forest margins, coastal cliffs and headlands, track-sides.
0	**Other** None

Opportunity

3	**Extent of suitable habitat** Large areas of the West Coast suitable.
2	**Resistance to management practices** Grubbing or spraying, but recovers from grubbing unless this is done very carefully.
11	**Esler's Index of Weediness**

Species
CAPE IVY (*SENECIO ANGULATUS*)
Family
Asteraceae
Origin
South Africa
Weed
Widespread weed on several continents.
Form
Perrenial climber or large spreading shrub up to 5 m tall with fleshy leaves.
Ecology
Grows in a range of marginal habitats, regenerating scrub, forest margins, cliffs, and banks. May be frost tender to a certain extent and found mostly near the coast.
Ratings
Biological Success and Environmental Impact (0–3)

1	**Versatility** Tolerates a range of soil conditions.
2	**Maturation rate** Can produce fruit in its first year. Lifespan unknown.
3	**Seeding ability** Seeds produced in abundance.
2	**Dispersal and establishment** Seeds wind dispersed and no special germination requirements. Commonly spread by garden waste dumping.
3	**Cloning** Spread by fragments and layering, commonly in garden rubbish.
2	**Recovery** Grows from small pieces after manual treatment.
2	**Competitive ability** Competitive only in open situations and on the margins of other vegetation. Not shade tolerant.
15	**Biological Success and Environmental Impact Rating**

Weed status assessment (0–3)

1	**Obstruction** Forms dense thickets on margins.
2	**Suppression** No threat to agriculture. Smothers native regeneration.
0	**Health impairment** None known.
1	**Quality impairment** Not a notice detraction visually.
2	**Damage to natural areas** Potential to invade bush margins, regenerating scrub and native shrublands, banks, cliffs where it outcompetes early-successional native species such as mahoe. In stable situations it is overtaken by further native species.
0	**Other** None

Opportunity

2	**Extent of suitable habitat** Large areas of the West Coast are suitable, particularly in the milder northern sector.
2	**Resistance to management practices** Grubbing or spraying is effective but regrowth frequent from layered portions.
10	**Esler's Index of Weediness**

Species
CATHEDRAL BELLS (*COBAEAE SCANDENS*)
Family
Polemoniaceae
Origin
South America
Weed
Weed on Australia
Form
A vigorous and fast-growing perennial climber up to 10 m forming a dense mat of vegetation.
Ecology
Grows in a wide range of marginal habitats, regenerating scrub, forest margins, cliffs, banks, shelterbelts, and even wetland margins. Frost tender to a certain extent.
Ratings
Biological Success and Environmental Impact (0–3)

1	**Versatility** Tolerates a range of soil conditions.
2	**Maturation rate** This is unknown but appears to produce fruit within a couple of years. Lifespan is unknown.
3	**Seeding ability** Seeds produced in abundance within large capsules.
2	**Dispersal and establishment** Seeds wind dispersed. Needs open conditions to establish.
3	**Cloning** Spread by fragments and layering.
2	**Recovery** Grows from small pieces after manual treatment and spraying.
2	**Competitive ability** Competitive only in open situations and on the margins of other vegetation. Not shade tolerant.
15	**Biological Success and Environmental Impact Rating**

Weed status assessment (0-3)

1	**Obstruction** Forms dense thickets on margins.
2	**Suppression** No threat to agriculture. Smothers native regeneration and also hedgerows and shelterbelts.
0	**Health impairment** None known**.**
1	**Quality impairment** Not a noticeable detraction visually.
2	**Damage to natural areas** Potential to invade bush margins, regenerating scrub and native shrublands, banks, cliffs where it outcompetes early-successional native species such as mahoe.
0	**Other** None

Opportunity

2	**Extent of suitable habitat** Large areas of the northern West Coast are suitable,
2	**Resistance to management practices** Grubbing or spraying is effective but regrowth frequent from layered portions.
10	**Esler's Index of Weediness**

Species
DARWIN'S BARBERRY (*BERBERIS DARWINII*)
Family
Berberaceae
Origin
South America
Weed
Widespread weed on several continents.
Form
Spreading armed shrub to small tree up to 4 m.
Ecology
Grows in a wide range of marginal habitats, regenerating scrub, forest margins, plantation edges in the lowlands. Frost resistant
Ratings
Biological Success and Environmental Impact (0–3)

1	**Versatility** Tolerates a range of soil conditions.
2	**Maturation rate** Produce fruit relatively slowly but can live for at least 10 years.
3	**Seeding ability** Seeds produced in fleshy fruit
2	**Dispersal and establishment** Fruit eaten by a wide variety of birds. Seedlings are relatively shade tolerant
0	**Cloning** None
2	**Recovery** Grows from stumps.
2	**Competitive ability** Not a highly competitive plant in a farming sense, but can dominate early-successional vegetation.
12	**Biological Success and Environmental Impact Rating**

Weed status assessment (0–3)

1	**Obstruction** Forms dense thickets that are difficult to push through.
2	**Suppression** Threatens regenerating scrub and damaged forest understoreys, particularly on lighter soil.
0	**Health impairment** Possibly poisonous.
1	**Quality impairment** Yellow flowers are in marked contrast to native vegetation.
2	**Damage to natural areas** Potential to invade bush margins, regenerating scrub and native shrublands where it outcompetes native species such as mahoe. However, in time it is likely to be overtaken by further native species.
0	**Other** None

Opportunity

2	**Extent of suitable habitat** Large areas of the northern West Coast are suitable.
2	**Resistance to management practices** Grubbing or spraying is effective. Not a management problem on good farmland. More difficult to control when in dense scrub such as gorse scrub.
10	**Esler's Index of Weediness**

Species
DENSE OXYGEN WEED (*EGERIA DENSA*)
Family
Hydrocharitaceae
Origin
South America
Weed
Widespread weed on several continents.
Form
Egeria densa, commonly known as Brazilian elodea, is a submersed, much-branched, slightly stoloniferous freshwater perennial herb with stems up to 1.5 m long that forms dense monospecific stands. It can root in a range of substrates and also form free-floating stands.
Ecology
Thrives in turbid to fresh water in mild to freshwater ponds, lakes, reservoirs etc., across a wide range of climates.

Ratings
Biological Success and Environmental Impact (0–3)
3 **Versatility** Tolerates a wide range of water conditions including water close to freezing.
3 **Maturation rate** No sexual maturity, but fragments in autumn, which produce buds that sprout the following spring.
0 **Seeding ability** Seeds not produced.
2 **Dispersal and establishment** Spread by fragments.
3 **Cloning** Specialised 'double nodal regions' are located every 6–12 nodes along the stem. Stem fragments containing such nodes need be only 7.5 mm long to grow.
3 **Recovery** Shows recovery from spraying and totally resistant to cutting.
3 **Competitive ability** Can dominate over *Lagarosiphon* in the North Island.
17 **Biological Success and Environmental Impact Rating**

Weed status assessment (0-3)
3 **Obstruction** Seriously retards water flow affecting hydroelectricity generation and irrigation.
3 **Suppression** Very effective up to depths of 8 m because of mass monoculture.
1 **Health impairment** A risk from drowning with entanglement.
2 **Quality impairment** Surface beds detract from aesthetic appeal.
3 **Damage to natural areas** Replaces native plant communities and disrupts animal communities.
0 **Other** None
Opportunity
3 **Extent of suitable habitat** Large areas of the West Coast waterways are vulnerable.
3 **Resistance to management practices** Resistant to physical treatments and recovers from chemical control in less than a year.
18 **Esler's Index of Weediness**

Species
HEATHER (*CALLUNA VULGARIS*)
Family
Epacridaceae
Origin
Eurasia
Weed
Widespread weed on several continents.
Form
Much-branched perennial shrub.
Ecology
Grows in a wide range of marginal habitats and waste land over a wide altitude and rainfall range, but particularly on poorly drained or sour soils, which abound on the West Coast.
Ratings
Biological Success and Environmental Impact (0–3)

2	**Versatility** Tolerates a range of soil conditions but prefers poorly drained and acidic soils.
2	**Maturation rate** Can produce fruit in its second year.
2	**Seeding ability** Produces abundant very small seeds.
2	**Dispersal and establishment** Seeds are spread by wind, contamination of clothing and by sheet flooding. Seedlings are light demanding.
1	**Cloning** Does not clone as such, but spreads by suckering to form large patches.
3	**Recovery** Recovers rapidly damage and seedlings germinate after fire.
1	**Competitive ability** Not a highly competitive plant among woody vegetation but shades out small native species in places such as open herbfield.
13	**Biological Success and Environmental Impact Rating**

Weed status assessment (0–3)

2	**Obstruction** Forms dense thickets.
2	**Suppression** Threats to pasture on marginal land and to short native vegetation.
0	**Health impairment**
0	**Quality impairment** Flower colour is foreign to NZ landscapes.
2	**Damage to natural areas** Potential to invade cutover forest, pakihi, wetalnds, and above treeline.
0	**Other** None

Opportunity

3	**Extent of suitable habitat** Large areas of the West Coast suitable.
2	**Resistance to management practices** Grubbing or spraying, but recovers from grubbing unless this is done very carefully.
11	**Esler's Index of Weediness**

Species
PURPLE LOOSESTRIFE (*LYTHRUM SALICARIA*)
Family
Malvaceae
Origin
Eurasia
Weed
Widespread weed on several continents, and among the worst water weeds in the USA.
Form
A hairy, erect, perennial herb 1–2 m tall with bright purple flowers.
Ecology
Grows in a wide range of wetland habitats.
Ratings
Biological Success and Environmental Impact (0–3)

2	**Versatility** Tolerates a range of soil conditions provided they are wet to moist.
2	**Maturation rate** Can produce fruit in its second year.
2	**Seeding ability** Produces abundant very small seeds.
2	**Dispersal and establishment** Seeds are spread by wind, contamination of clothing and by sheet flooding. Seedlings are light demanding.
2	**Cloning** Does not clone as such, but spreads by small pieces breaking off, including during control operations.
3	**Recovery** Recovers rapidly from damage and seedlings germinate after disturbance from a long-lived seed bank.
2	**Competitive ability** Not a highly competitive plant among woody vegetation but shades out native species of similar or shorter structure.
15	**Biological Success and Environmental Impact Rating**

Weed status assessment (0–3)

2	**Obstruction** Forms dense thickets in wetlands, which can obstruct recreational use and reduce water flow.
2	**Suppression** Suppresses shorter or equal-height native vegetation species.
0	**Health impairment**
0	**Quality impairment** Flower colour is foreign to NZ landscapes.
2	**Damage to natural areas** Potential to invade a wide range of wetlands on the West Coast, outcompeting native species.
0	**Other** None

Opportunity

3	**Extent of suitable habitat** Large areas of the West Coast suitable.
2	**Resistance to management practices** Grubbing or spraying, but recovers from grubbing unless this is done very carefully.
11	**Esler's Index of Weediness**

Species
WHITE-EDGED NIGHTSHADE (*SOLANUM MARGINATUM*)
Family
Solanaceae
Origin
South America
Weed
Widespread weed on several continents.
Form
Much-branched perrenial shrub to small tree with prickles up to 1.5 cm long and hairs on stems and leaves.
Ecology
Grows in a wide range of marginal habitats and wasteland over a wide altitude and rainfall range.
Ratings
Biological Success and Environmental Impact (0–3)

2	**Versatility** Tolerates a range of soil conditions but prefers coastal areas of lighter soil.
2	**Maturation rate** Can produce fruit in its second year.
2	**Seeding ability** Seeds produced in fleshy fruit.
2	**Dispersal and establishment** Fruit does not appear to be favoured by either birds or animals and dispersal by seed is probably rather limited. The fruit tend to be round and they can also be dispersed in water. Seedlings are light demanding.
0	**Cloning** None
1	**Recovery** Minimal recovery from damage and no great resurgence from seed banks.
1	**Competitive ability** Not a highly competitive plant in a farming sense, but shades out small native species in places such as sand dunes.
10	**Biological Success and Environmental Impact Rating**

Weed status assessment (0–3)

3	**Obstruction** Forms dense prickly thickets in pastures.
2	**Suppression** Threats to pasture on marginal land.
1	**Health impairment** Very sharp spines on leaves and stems.
0	**Quality impairment** Nil
2	**Damage to natural areas** Potential to invade bush margins, sand dunes, open areas.
0	**Other** None

Opportunity

3	**Extent of suitable habitat** Large areas of the West Coast suitable.
2	**Resistance to management practices** Grubbing or spraying. Hairy leaves means spraying may be done paying special attention to mixture.
13	**Esler's Index of Weediness**

Species
WOOLLY NIGHTSHADE (*SOLANUM MAURITIANUM*)
Family
Solanaceae
Origin
South America
Weed
Widespread weed on several continents.
Form
Small, open branched shrub or tree up to 10 m, with large pale leaves that make it very conspicuous.
Ecology
Grows in a wide range of marginal habitats, regenerating scrub, forest margins, plantation edges in the lowlands.
Ratings
Biological Success and Environmental Impact (0–3)

1	**Versatility** Tolerates a range of soil conditions.
3	**Maturation rate** Produces fruit a few months after germination and can live for up to 20 years.
3	**Seeding ability** Abundant seeds produced in fleshy fruit
2	**Dispersal and establishment** Fruit eaten by a wide variety of birds. Seedlings are relatively shade tolerant
0	**Cloning** None
2	**Recovery** Grows from stumps.
2	**Competitive ability** Not a highly competitive plant in a farming sense, but can dominate early-successional vegetation.
13	**Biological Success and Environmental Impact Rating**

Weed status assessment (0–3)

1	**Obstruction** Forms dense thickets initially that are difficult to push through, but as it ages, become more open and is not difficult to push through.
2	**Suppression** Threatens regenerating scrub by initially suppressing the native woody species.
2	**Health impairment** Possibly poisonous to stock and causes nausea and skin irritation in people.
1	**Quality impairment** The pale leaves, in marked contrast to native vegetation, are very conspicuous and unattractive to some.
2	**Damage to natural areas** Potential to invade bush margins, regenerating scrub and native shrublands where it outcompetes native species such as mahoe. However, in time it is likely to be overtaken by further native species.
0	**Other** None

Opportunity

2	**Extent of suitable habitat** Very large areas of the northern West Coast are suitable.
2	**Resistance to management practices** Grubbing or spraying is effective. Not a management problem on good farmland. More difficult to control when in dense scrub such as gorse scrub.
12	**Esler's Index of Weediness**

Appendix 4. Biological control prospects for weeds on the West Coast

Weeds tend to be plants that are not native to New Zealand, and one of the reasons that introduced plants become weeds is that they don't have any natural enemies here. Landcare Research develops biological control strategies for weeds aimed at restoring the natural balance between these weeds and the environment by reuniting them with some of their traditional natural enemies, usually insects or fungi. Many years of careful research goes into finding suitable biocontrol agents and thoroughly testing them to ensure they will not attack other desirable plants. Permission must be granted by the Environmental Risk Management Authority before any new biocontrol agents are introduced to New Zealand. All new introductions spend some time in a containment facility to ensure they are free of disease and parasites. Because we are able to free biocontrol agents of their own natural enemies they have the potential to be even more damaging in New Zealand than in their homelands.

Because substantial long-term (5–10 years) funding is required to develop and implement biological control programmes, large organisations, rather than individuals, have been asked to contribute to the task. The National Biocontrol Collective, which includes all regional councils and unitary authorities (except the West Coast Regional Council) plus the Department of Conservation, funds most current and new biocontrol programmes. Collective decision-making is undertaken annually to decide which weeds to target and how best to progress current projects. There would be no barrier to the West Coast Regional Council joining the National Biocontrol Collective, if it so desired, provided it could contribute some funding. A number of biocontrol programmes are also funded by community groups through MAF Sustainable Farming Fund Grants, such as the one the West Coast Regional Council has been involved with against ragwort.

There is no guarantee that any biocontrol agent will establish in New Zealand, but our current success rate is high. Many of the agents being used in New Zealand have never before been released outside of their native range, so we cannot easily predict beforehand how much damage they will cause to their target plants. Even agents that have been used in other countries may behave differently here. Also the impact of any one agent is likely to vary throughout New Zealand, and from year to year, so as a rule several control agents are usually required to have a significant impact on a weed. If successful, biological control can provide long-term environmentally friendly suppression of weeds.

Biological control is not appropriate in all situations:

- Biocontrol may be an option when you do not need to eradicate a weed. Biocontrol agents do not eliminate weeds, because they can never find or utilise every plant. Rather, a successful biological control attack may reduce the vigour and abundance of a weed so that it stops spreading and it may reduce existing infestations to a level that we can live with or eliminate effectively and economically by other means. If biocontrol is successful, plants become increasingly rare and the agent population reduces accordingly, so a new equilibrium forms between the abundance of agents and their host plants. Where a weed needs to be eradicated biocontrol may be a stepping stone towards achieving that goal. However, for low incidence plants conventional weed control techniques may be more appropriate because of the costs and time frames involved in developing biocontrol and the uncertainty about how successful it might be.
- Biocontrol may be an option when you do not need to control a weed immediately, because it takes time to find, test and import suitable control agents, and then build up

damaging populations in the field. An advantage of removing weeds gradually is that large areas of soil are not exposed to erosion, and invasion by other undesirable species is limited.

- Biocontrol may also be an option when weeds are difficult to control by chemical means, or conventional control methods are not physically possible or economically viable. Biocontrol is often the only practical method of tackling widespread intractable weeds.
- Biological control may be an option when it is important that you only harm the target weed – a result that can be difficult to achieve by mechanical or chemical means. Also none of the biocontrol agents in New Zealand pose health risks to handlers or the public.

Mycoherbicides

Plant pathogens can be used to control weeds in a similar way to chemical herbicides. The term mycoherbicide is used for a herbicide in which the active ingredient is a plant pathogenic fungus. Fungi used in mycoherbicides are usually found naturally in the area in which they are used, and are not always highly host specific. Under natural conditions fungal disease epidemics occur and damage plants from time to time, but the potential of these fungi is usually limited in some way, e.g. the environment is not always conducive to good disease development or the fungus may be limited in its dispersal ability. By developing the fungus into a mycoherbicide these constraints can be overcome. Mycoherbicides can be applied in many ways, e.g. as aerial sprays, through 'cut and paste application' or in a powder applied to the soil. They are not likely to be cheaper than chemical herbicides and, like chemicals, offer knockdown rather than permanent suppression. However, they may be more selective and are kinder to the environment.

The following are many of the weeds mentioned in the body of this report and their prospects for biocontrol.

Species	**Biocontrol Prospects**
Acacia dealbata Silver wattle	No biocontrol programme has been attempted anywhere.
Acer pseudoplatanus Sycamore	No biocontrol programme has been attempted anywhere.
Arundo donax Giant reed	Researchers in the USA are researching the possibility of developing a biocontrol programme for this target.
Berberis glaucocarpa Barberry	Feasibility of biocontrol for this weed in NZ has been investigated. There is no reason not to proceed but the National Biocontrol Collective has agreed that Darwin's barberry (*Berberis darwinii*) should be tackled first.
Buddleja davidii Buddleia	A foliage-feeding weevil (*Cleopus japonicus*) has recently been released at sites in the North Island – establishment has not yet been confirmed. Efforts should be made to establish this weevil on the Coast.
Cestrum elegans Red cestrum	No biocontrol programme has been attempted anywhere.
Cirsium arvense Californian thistle	A biocontrol programme has been underway in NZ for some years but none of the agents released to date have been effective. An application to release two new insect agents (*Ceratapion onopordi, Cassida rubiginosa*) is currently with ERMA. These insects are expected to attack a range of thistles and if approval to release them is granted then efforts should be made to establish them on the Coast.
Cirsium palustre Marsh thistle	Nodding thistle crown weevil (*Trichosirocalus* sp.) will attack marsh thistle. A release of the weevil at Rotomanu failed to establish but it may be worth making another attempt. See also above – marsh thistle is likely to be attacked by the two new insect agents for Californian thistle.
Cirsium vulgare	A biocontrol programme has been underway in NZ for some years. A gall fly

Scotch thistle	(*Urophora stylata*) has established well elsewhere in NZ and efforts should be made to establish it on the Coast. Nodding thistle crown weevil (*Trichosirocalus* sp.) will attack Scotch thistle, and efforts should be made to establish them on the Coast too. Scotch thistle is also likely to be attacked by the two new insect agents for Californian thistle.
Clematis vitalba Old man's beard	A biological control programme is underway in NZ. Two agents are established on the Coast, a leaf miner (*Phytomyza clematadi*) and a leaf fungus (*Phoma clematidina*). A sawfly (*Monophadnus spinolae*) has been released throughout NZ (but not on the Coast) but establishment has not yet been confirmed. If the sawfly does establish efforts should be made to establish it on the Coast. Other agents are being investigated and if they become available efforts should be made to establish them on the Coast too.
Conium maculatum Hemlock	A moth (*Agonopterix alstromeriana*) has self-introduced to NZ and causes severe damage to hemlock at times. It is likely to be present on the Coast.
Cortaderia jubata Purple pampas	No biocontrol programme has been attempted anywhere. The feasibility of biocontrol for this weed in NZ has been investigated. It is thought to be a difficult target because of closely-related native toe toe and the lack of known enemies. However, a pathogen has since been found here causing dieback and will be studied further.
Cortaderia selloana Pampas	See above.
Cotoneaster simonsii Cotoneaster	No biocontrol programme has been attempted anywhere.
Crataegus monogyna Hawthorn	No biocontrol programme has been attempted anywhere.
Cytisus scoparius Broom	A biological control programme is underway in NZ. Broom twig miner (*Leucoptera spartifoliella*), broom seed beetle (*Bruchidius villosus*), and broom psyllid (*Arytainilla spartiophila*) are established and becoming widespread on the Coast. Efforts should also be made to establish the broom leaf beetle (*Gonioctena olivacea*), broom shoot moth (*Agonopterix assimilella*) and the broom gall mite (*Aceria genistae*) as releases of these new agents become available.
Elaeagnus x reflexa Elaeagnus	No biocontrol programme has been attempted anywhere.
Erica lusitanica Spanish heath	No biocontrol programme attempted anywhere.
Fallopia japonica Asiatic knotweed	A biological control programme is under development in the UK for Europe and the USA. Promising agents have been found and are currently being tested.
Glyceria maxima Reed Sweet Grass	No biocontrol programme has been attempted anywhere.
Gunnera tinctoria Chilean rhubarb	No biocontrol programme has been attempted anywhere. Damaging natural enemies have been seen on this plant in Brazil during surveys for agents for tradescantia.
Hedychium gardnerianum, H. flavescens Wild ginger	A biocontrol programme has recently been implemented in NZ, but is still at the stage of seeking suitable agents.
Hieracium aurantiacum Orange hawkweed	A biological control programme is underway in NZ against a range of *Hieracium* species. No agents have been released on the Coast. A gall wasp (*Aulacidea subterminalis*) and a gall midge (*Macrolabis pilosellae*) have established well throughout NZ and efforts should be made to establish them on the Coast. The establishment of a plume moth (*Oxyptilus pilosellae*), a root hover fly (*Cheilosia urbana*) and a crown hover fly (*Cheilosia psilophthalma*) have not yet been confirmed, but if they do establish efforts should be made to establish these three agents on the Coast too. All of these agents except the plume moth will attack orange hawkweed.
Hieracium lepidulum Tussock hawkweed	See above. The plume moth (*Oxyptilus pilosellae*), root hover fly (*Cheilosia urbana*) and crown hover fly (*Cheilosia psilophthalma*) will attack tussock hawkweed.
Hieracium pilosella	See above. All five of the insect agents will attack mouse-eared hawkweed. A self-

Mouse-eared hawkweed	introduced rust fungus (*Puccinia hieracii* var. *piloselloidarum*) commonly attacks this species and is likely to be present on the Coast. It does not cause sufficient damage alone to control this plant.
Hieracium praealtum King devil	See above. It is likely all the insect agents except the gall wasp will attack king devil hawkweed.
Hieracium x stoloniflorum Hawkweed	See above. It is likely all the insect agents will attack this species.
Hypericum androsaemum Tutsan	A beetle (*Chrysolina hyperici*) released to attack St John's wort (*Hypericum perforatum*) will also attack this species to some extent. A rust (*Melampsora hypericorum*) released to attack the plant in Australia is present in NZ but infection levels are highly variable. There is currently some interest from North Island councils in exploring the possibility of developing a more effective biocontrol programme for this species.
Hypericum perforatum St John's Wort	A biological programme was initiated many years ago and has resulted in a good level of control of this weed. A leaf-feeding beetle (*Chrysolina hyperici*) is known to have established on the Coast, but it is unknown whether the other leaf-feeding beetle (*C. quadrigemina*) and the gall midge (*Zeuxidiplosis giardi*) are established on the Coast.
Ilex aquifolium Holly	No biocontrol programme attempted anywhere.
Ipomoea indica Blue morning glory	The feasibility of biocontrol for this weed in NZ has been investigated. There is no reason not to proceed, but it does not appear to currently be a high enough priority.
Iris pseudacorus Yellow flag iris	No biocontrol programme has been attempted anywhere.
Lagarosiphon major Lagarosiphon	The feasibility of biocontrol in NZ has been investigated. Lagarosiphon was mentioned at the last meeting of the National Biocontrol Collective as a species which should be considered further as a target.
Leycesteria formosa Himalayan honeysuckle	No biocontrol programme has been attempted anywhere.
Lonicera japonica Japanese honeysuckle	A biocontrol programme has recently been implemented in NZ, but is still at the stage of seeking suitable agents.
Lupinus arboreus Lupin (tree)	No biocontrol programme has been attempted anywhere. The native kowhai moth (*Uresiphita polygonalis*) and a fungus (*Colletotrichum gloeosporioides*) can at times heavily attack this plant.
Lupinus polyphyllus Lupin (Russell)	No biocontrol programme has been attempted anywhere.
Lythrum salicaria Purple loosestrife	No biological control programme has been attempted in NZ but a highly successful programme has been undertaken in the USA.
Myriophyllum aquaticum Parrots feather	A biocontrol programme is underway in South Africa involving a beetle (*Lysathia* sp.) which contributes to control of this weed. A stem-boring weevil (*Listronotus marginicollis)* is currently being assessed for its suitability. Other natural enemies have been recorded attacking the plant in both its native and introduced ranges. Damage to this weed has been seen recently in the Bay of Plenty. It seems to be caused by a combination of a shoot-boring moth (*Prolithona fugitivana*), which is endemic and feeds on native *Myriophyllum*, and a species of powdery mildew.
Passiflora tarminiana Banana passionfruit	A biocontrol programme is underway in NZ. No agents are available yet, but if they do become available then efforts should be made to release them on the Coast.
Pinus contorta Lodgepole pine	The feasibility of biocontrol in NZ has been investigated but is unlikely to go ahead in the near future because of concerns about the effectiveness of potential control agents and their potential to act as vectors for tree diseases.
Ranunculus acris Giant buttercup	AgResearch are attempting to develop a mycoherbicide, based on the fungus *Sclerotinia sclerotiorum,* which may be available for purchase commercially in the future.
Reynoutria sachalinensis Giant knotweed	No biocontrol programme has been attempted anywhere.
Rhododendron ponticum Rhododendron	Researchers in Europe are exploring the possibilities of developing a mycoherbicide, based on the fungus *Chondrostereum purpureum*, which is also currently being explored in NZ as a mycoherbicide for other woody targets.
Blackberry (cut leaved)	The self-introduced blackberry rust (*Phragmidium violaceum*) is widespread and

Rubus laciniatus	attacks this species. Other strains of this rust currently being released in Australia are likely to also arrive here in due course and attack this species also.
Senecio jacobaeae Ragwort	A biological control programme is underway in NZ. The ragwort flea beetle (*Longitarsus jacobaeae*) is established on the Coast but is unable to provide effective control. Efforts have also been made to establish the cinnabar moth (*Tyria jacobaeae*) on the Coast with limited success, so efforts are now being made to establish the ragwort plume moth (*Platyptilia isodactyla*) and ragwort crown-boring moth (*Cochylia atricapitana*).
Senecio mikanioides German ivy	No biocontrol programme has been attempted anywhere.
Tradescantia fluminensis Tradescantia	A biocontrol programme has recently been implemented in NZ, but is still at the stage of seeking suitable agents. Prospects look promising.
Ulex europaeus Gorse	A biological control programme is underway in NZ. The gorse seed weevil (*Exapion ulicis*), gorse pod moth (*Cydia ulicetana*), gorse spider mite (*Tetranychus lintearius*), gorse thrips (*Sericothrips staphylinus*) and gorse soft shoot moth (*Agonopterix ulicetella*) are all established to varying degrees on the Coast. Efforts to establish the gorse colonial hard shoot moth (*Pempelia genistella*) should also be made.