



Mt Cass Wind Farm Pest Plant Guide



Revision 8 – 18 July 2023

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Table of Contents

1	Introduction	1
2	Ecologically Important Invasive Weeds	4
2.1	<i>Burdock (Arctium minus)</i>	4
2.2	<i>Barberry (Berberis glaucocarpa)</i>	5
2.3	<i>Old Man's beard (Clematis vitalba)</i>	6
2.4	<i>Hawthorn (Crataegus monogyna)</i>	7
2.5	<i>Broom (Cytisus scoparius)</i>	8
2.6	<i>Male fern (Dryopteris filix-mas)</i>	9
2.7	<i>Japanese spindle tree (Euonymus japonicus)</i>	10
2.8	<i>Nassella tussock (Nassella trichotoma)</i>	11
2.9	<i>Wilding pines (Pinus sp.)</i>	12
2.10	<i>Common polypody (Polypodium vulgare)</i>	13
2.11	<i>Wild cherry (Prunus avium, Prunus sp.)</i>	14
2.12	<i>Sweet briar (Rosa rubiginosa)</i>	15
2.13	<i>Elderberry (Sambucus nigra)</i>	16
2.14	<i>Stonecrop (Sedum acre)</i>	17
2.15	<i>Gorse (Ulex europaeus)</i>	18
2.16	<i>Spur valerian (Centranthus ruber subsp. ruber)</i>	19
2.17	<i>Pig's ear (Cotyledon orbiculata)</i>	20
	Appendix 1: Mt Cass Wind Farm Site All Recorded Pest Plants	21
	Appendix 2: RPMP Definitions	23

1 Introduction

As part of the mitigation for its Mt Cass wind farm, Mt Cass Wind Farm Ltd (MCWF) is required by conditions of its land use consent (dated 3 February 2012) to undertake a programme of conservation protection and restoration that within 50 years will result in an increase in the overall biodiversity values of the Mt Cass wind farm site and will protect and enhance ca. 127 ha of limestone forest, shrubland and escarpment/boulderfield within the Mt Cass Conservation Management Area.

There are resource consent conditions identifying a number of management actions both during construction and subsequently once the wind farm has been commissioned for the control of pest plants. These actions are contained within the project Environmental Management Plan¹ (EMP). Action 5.13 of the EMP is to produce a field guide to ecologically important weed species present.

Several weed surveys have been undertaken as part of surveillance surveys undertaken by Wai-Ora Landscapes in 2013, 2014, 2015, and 2018. Surveillance surveys included a variety of habitat types, including open grassland, closed canopy forest and shrubland. In addition, further detailed botanical inventories have been undertaken as part of ecological investigations associated with the consenting process. Those reports include details of plant species, abundance, locations, and threats to native species through competition and form the baseline to inform the strategies for weed control at the Mt Cass Wind Farm. A compilation of the survey information recorded by Wai-Ora Landscapes is provided in Figure 1.

The purpose of this guide is to describe the ecologically important invasive weeds on the site, which include species declared as a pest in the Environment Canterbury Regional Pest Management Plan (2018-2038) (RPMP). Users of this guide are assumed to be staff working on the project who are generally not familiar with these species but have a basic knowledge of botany. Descriptions are largely derived from weedbusters.org.nz and are interpreted into common terms where possible.

There are seventeen (17) plant species that are classified as ecologically important invasive weed species known to be present at the Mt Cass site or occurring in the general vicinity, or have been requested by the Department of Conservation to be included in this guide (e.g. common polypody (*Polypodium vulgare*), spur valerian (*Centranthus ruber* subsp. *ruber*) and pig's ear *Cotyledon orbiculata*). With the exception of burdock, all of these weed species have a relatively low presence on site, meaning that existing populations or localised infestations should be effectively suppressed. Ecologically important invasive weed species are provided in Table 1.

A number of other species not necessarily present on the site or even in the general area also have the potential to threaten biodiversity values at the Mt Cass site, and will be included if they are detected on site.

A full list of pest plants, including nuisance exotic grasses and herbs which may outcompete some rare indigenous grasses are listed in Appendix 1 including their relative abundance and Regional Pest Management Plan (RPMP) status.

¹ Mt Cass Wind Farm. Environmental Management Plan. Revision 13 – 26 April 2023.

Species	Common name	Form	Relative abundance (ACFOR) ²	RPMP Status ³
<i>Arctium minus</i>	Burdock	Herb	Frequent	Organisms of interest
<i>Berberis glaucocarpa</i>	Barberry	Shrub	Rare	Organisms of interest
<i>Centranthus ruber</i> subsp. <i>ruber</i>	Spur valerian	Herb	Not recorded.	Organisms of interest
<i>Clematis vitalba</i>	Oldman's beard	Vine	Rare	Sustained control
<i>Cotyledon orbiculata</i>	Pig's ear	Succulent	Not recorded.	Organisms of interest
<i>Crataegus monogyna</i>	Hawthorn	Tree	Rare	Organisms of interest
<i>Cytisus scoparius</i>	Broom	Shrub	Rare	Sustained control
<i>Dryopteris filix-mas</i>	Male fern	Fern	Rare	Not listed
<i>Euonymus japonicus</i>	Japanese spindle tree	Tree	Rare	Not listed
<i>Nassella trichotoma</i>	Nassella tussock	Grass	Rare	Sustained control
<i>Pinus sp.</i>	Wilding pines	Tree	Rare	Progressive containment
<i>Polypodium vulgare</i>	Common polypody	Fern	Not recorded.	Organisms of interest
<i>Prunus avium</i> , <i>Prunus sp.</i>	Wild cherry	Tree	Rare	Organisms of interest
<i>Rosa rubiginosa</i>	Sweet briar	Shrub	Rare	Organisms of interest
<i>Sambucus nigra</i>	Elderberry	Tree	Rare	Not listed
<i>Sedum acre</i>	Stonecrop	Succulent	Rare	Not listed
<i>Ulex europaeus</i>	Gorse	Shrub	Rare	Sustained control

[Table 1] Ecologically important invasive weed species present on Mt Cass Wind Farm.

² Relative abundance has been determined by assessing records of distribution and density of weed species at the site and interpreting these accordingly. ACFOR – Abundant, Common, Frequent, Occasional, Rare.

³ RPMS Status definitions are provided in Appendix 2.

3 | Page

2 Ecologically Important Invasive Weeds

2.1 Burdock (*Arctium minus*)

What does it look like? Upright, open- branched, shrubby perennial <1.5m tall. Rosette form in first year. Large, hollow leaves stalked, triangular, <40cm long, green sparsely haired on topside, white & densely haired underneath. Hairy stems. Pink, egg-shaped, thistle-like flowerhead (Jan-Apr) surrounded by hooks.

Are there any similar species? No similar species occur on site.

Why is it weedy? Well-dispersed seeds that hook onto clothes, wool & fur.

What damage does it do? Grows in similar environments to the Threatened limestone wheat grass (*Australopyrum calcis subsp. Optatum*), and threatens this species through competition. Causes animal welfare issues, with burs damaging sheep wool and injuring skin, mouth or eyes.

Which habitats is it likely to invade? Forest margins, scrub, roadsides waste areas. Prefers wet areas and tolerates shade.



[Plate 1] Image source Auckland Council.

2.2 Barberry (*Berberis glaucocarpa*)

What does it look like? Evergreen or semi-deciduous, spiny, yellow-wooded shrub (<4-5 m). Tough, woody stems have yellowish-grey bark and very sharp, hard, single or three pronged spines (<23 mm long) where the leaves meet the stem. Leathery leaves (25-75 x 10-25 mm) with usually serrated edges often turn reddish in autumn. Clusters (<6 cm long) of smelly yellow flowers (5-7 mm, Oct-Nov) are followed by oval, reddish-black berries (7-12 mm) with a dusty white look to them and dark red juice (Mar-May).

Are there any similar species? No similar species occur on site.

Why is it weedy? Long-lived and produces long-lived, well-dispersed seeds. Tolerates hot to cool temperatures, damp to dry conditions, high wind, salt, little shade, damage (not grazed) and many soil types.

Variable production of viable seed, from large amounts to none. Birds and possibly possums eat berries and spread the seeds, which are also spread by soil and water movement. Seed sources include farm hedges, roadsides, old homesteads, and plantation forest.

What damage does it do? Scattered plants (occasionally dense stands), replace native species.

Which habitats is it likely to invade? Disturbed forest and shrubland, short tussockland, and bare and stony land.



[Plate 2] Image source weedbusters.org.nz

2.3 Old Man's beard (*Clematis vitalba*)

What does it look like? Deciduous, climbing, layering vine (<20 m tall) with very long, woody stems with six prominent ribs (appear as furrows in older vines) and pale, easily rubbed-off bark. Leaves are arranged in opposite pairs on the stems and are made up of five (rarely three) widely spaced leaflets that fall in autumn. Thin, papery leaflets are sparsely hairy and have bluntly toothed or smooth edges. Creamy white, fragrant flowers (2-3 cm diameter, Dec-May) are followed by grey, hairy seeds (2-3 mm long) with distinctive white plumes (3-4 cm long) in dense, fluffy clusters persisting over winter (hence the 'old man's beard').

Are there any similar species? All native clematis species are evergreen, have 3 leaflets (except the leafless *C. afoliata*), unfurrowed stems, and flower from August to December. All exotic species that are found in the wild are deciduous (flowers Dec-May), except the occasionally weedy, pink-flowered *C. montana* (flowers Oct-Dec).

Why is it weedy? Grows rapidly, forming dense, heavy, masses that dominate canopy of any height. Stems layer profusely, and it produces many long-lived seeds if exposed to frost. Tolerant of cold, moderate shade, damp, wind, salt, most soil types, and damage.

How does it spread? Seed is spread by water or wind, and both seed and stem fragments are spread in dumped vegetation. Common sources are forests, roadsides, hedgerows, vacant land, and willow swamps.

What damage does it do? Smothers and kills all plants to the highest canopy and prevents the establishment of native plant seedlings. Moves readily into established forest over canopy and by layering.

Which habitats is it likely to invade? Disturbed and open forest and forest margins, shrublands, cliffs, bush tracks, fernland, and tussockland.



[Plate 3] Image source weedbusters.org.nz

2.4 Hawthorn (*Crataegus monogyna*)

What does it look like? Deciduous shrub or small tree (<10 m tall) with much-branched stems that are hairless, reddish-brown when young, but become grey when mature and have stiff spines to 12 mm long. Hairless triangular leaves (35-50 x 35-45 mm) with 3-7 deep lobes are solitary on long shoots, clustered on short shoots, and are often chewed by slugs. Dense flat clusters of 6-15 sweet-scented, white (rarely reddish-pink), 5-petalled flowers (10-15 mm diameter, Oct-Nov) are followed by round, shiny, crimson berries (7-11 mm diameter, Dec-Apr) with little flesh around a single stone.

Are there any similar species? Other cultivars, especially *Crataegus laevigata* (usually grown as pink, double flowered cultivars), barberry and boxthorn are similar.

Why is it weedy? Produces many long-lived, well dispersed seeds, is extremely tough and versatile, long-lived, tolerates hot to cold temperatures, damp to dry conditions, salt, wind, heavy damage, most soils, and semi-shade.

How does it spread? Birds, and occasionally soil and water movement. Hedges, poor pastures, roadsides, and waste places are all seed sources.

What damage does it do? Crowds out most other species, forms dense (occasionally pure) thickets, preventing the establishment of native plant seedlings.

Which habitats is it likely to invade? Disturbed forest, shrubland and margins, fernland, wetland margins, short tussockland, other low-growing habitats, and cliffs.



[Plate 4] Image source weedbusters.org.nz

2.5 Broom (*Cytisus scoparius*)

What does it look like? Erect, much branched, almost leafless, deciduous shrub (<2.5 m) with a woody rootstock. Silky-hairy young twigs mature into woody, flexible green stems that are 5-ribbed and hairless. Leaves are divided into three sections (each 5-20 mm) that readily fall off the stems. Single or paired, golden-yellow (occasionally reddish), pea-like flowers (15-25mm, Sep-Apr) are followed by oblong green pods (30-60 mm) that turn black as they mature and eventually disperse seeds explosively, leaving empty coils hanging from the plant.

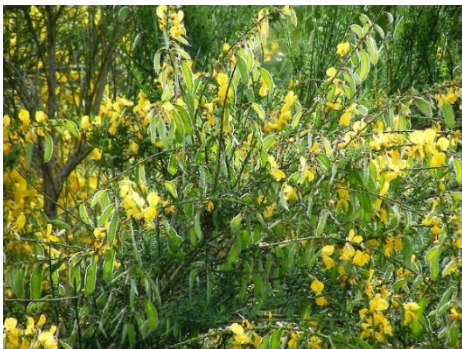
Are there any similar species? Montpellier, Spanish and white broom. Tree lucerne, *Teline stenopetala*, and native *Carmichaelia* species are all similar.

Why is it weedy? Prolific seeder that spreads rapidly, matures quickly, and colonises large areas, forming pure stands that dominate habitats. As it is a legume and can fix nitrogen in the soil, it can change the types of plants which can survive where it has been growing, disturbing the ecology of an area. Particular problem on riverbanks and lakesides, roadsides, forest tracks and firebreak areas. Tolerates warm to very cold temperatures, most well drained soil types, grazing, fire, and high to low rainfall.

How does it spread? Explosive seed mechanism spreads seed 1-5 m from the parent plant, and they are also spread by machinery, soil and water movement, and possibly birds and feral pigs. Common seed sources include quarries, roadsides, forest tracks, metal dumps, fire breaks, exotic forests, skid sites, riverbeds, domestic gardens, and disturbed land.

What damage does it do? Forms pure stands in many habitat types. Dominates low canopy habitats, preventing the seedlings of native species from establishing. Increased nitrogen in gumlands and other impoverished soil types may result in changing habitats and plant species being present to the detriment of specialised plants e.g. orchids, ferns, herbs, kauri, or can lead to further weed invasion.

Which habitats is it likely to invade? Shrublands, forest margins, low canopy habitats, tussockland, fernland, wetland, regenerating and disturbed forest, and bare land.



[Plate 5] Image source weedbusters.org.nz

2.6 Male fern (*Dryopteris filix-mas*)

What does it look like? Stout rhizomatous fern. Laminae bipinnate up to 125 x 30 cm, dark green above, paler green below. Primary pinnae in 25-50 pairs, secondary pinnae in 15-30 pairs. Sori round, 1-5 pairs on each secondary pinnae.

Are there any similar species? *Dryopteris* is closely related to *Polystichum* and *Lastreopsis*, but distinguished from *Polystichum* by the kidney-shaped indusia, and from *Lastreopsis* by its abundance of stipe-scales and absence of hairs.

Why is it weedy? It outcompetes native ferns.

Which habitats is it likely to invade? Male fern is found in diverse habitats with a preference for sheltered sites with more southerly than northerly aspects. Male fern is mostly associated with stream sides, degraded sites and sites of past disturbance.



[Plate 6] Image source nzpcn.org.nz

2.7 Japanese spindle tree (*Euonymus japonicus*)

What does it look like? Much branched evergreen shrub or small tree up to 7m high; twigs green, smooth, often wrinkled when dry; leaves opposite 2.5-7cm long; buds greenish; petals green; fruit capsule pink, 6-10mm diameter, exposes orange to deep red seed appendages after opening.

Are there any similar species? *Euonymus europaeus* is similar. Many native species are similar, but none have fine-toothed leaf margins or pink seed capsules.

Why is it weedy? Produces many, well dispersed seeds. Tolerates shade, wind, salt, poor soils, hot to cool temperatures, and high to moderate rainfall. Forms dense stands in open or shade, preventing the establishment of native plant seedlings.

Which habitats is it likely to invade? Disturbed bush and shrubland, coastal shrub and bare land, inshore islands, pohutukawa forest, forest margins, and cliffs.



[Plate 7] Image source weedbusters.org.nz

2.8 Nassella tussock (*Nassella trichotoma*)

What does it look like? Perennial tussock grass with erect or drooping leaves, which grows up to 70 cm high and 80cm wide and forms dense clumps. Stem is swollen just above ground level – like a shallot. Light green or yellowish-green leaves are thin and tightly rolled; they do not break when pulled. When fingers are run down the leaf, they feel needle-like and very tough. Leaf sheaths are white to light brown. Ligule is short (1 – 2 mm), white, hairless and obvious when the blade is pulled from a younger leaf. Plants usually flower between October and early summer when they have a purplish tinge. Flowering stems can be up to 1 m tall. Flowerheads are open, with a branched seed head 25 – 95 cm long and produced between November and January. Ripe seeds are purplish with a 3cm long bristle. Roots are deep, matted and fibrous. They have been found growing 1.7 m below the soil surface.

Are there any similar species? Other similar looking tussocks have purplish colouration at their leaf bases. Similar looking tussocks have no ligule (a thin outgrowth at the junction of leaf and leafstalk) or a ligule with hairs.

Why is it weedy? *Nassella* tussock can be seriously invasive, completely dominating low-producing grassland. Prevalent in North Canterbury and Marlborough, where it can form dense stands which are difficult to manage.

How does it spread? Seeds are spread by the wind and can travel as far as 16 km. Seeds are also transferred to other properties by livestock, machinery, clothing and on milled plantation logs.

What damage does it do? Pasture carrying capacity can be significantly reduced because the leaves are unpalatable and indigestible.

Which habitats is it likely to invade? Grows well on steep, dry, rugged sunny slopes, ridges and knobs. Establishes well on overgrazed, dry bare land.



[Plate 8] Image source agpest.co.nz

2.9 Wilding pines (*Pinus sp.*)

What does it look like? Wilding pines are sourced from a number of species. Typically, resinous, evergreen trees <25m tall. Bark rough & often fissured. Bunches of green, needle-like leaves. Cones produced with many seeds.

Are there any similar species? No, a distinctive family with bunches of green, needle-like leaves.

Why is it weedy? Pines can dominate and exclude other vegetation. The older trees become canopy trees in forest.

How does it spread? Seeds are spread by the wind and can travel as far as 50 km.

What damage does it do? They change soil acidity, precluding some native species, and can dominate the landscape.

Which habitats is it likely to invade? Open places, coastal areas, slopes, shrubland. Common near plantations & shelterbelts.



[Plate 9] Image source Auckland Council

2.10 Common polypody (*Polypodium vulgare*)

What does it look like? The common polypody is a fern developing in isolation from along a horizontal rhizome. The fronds with triangular leaflets measure 10 to 50 centimetres (3.9 to 19.7 in). They are divided all the way back to the central stem in 10 to 18 pairs of segments or leaflets. The leaflets become much shorter at the end of the frond. The leaflets are generally whole or slightly denticulated and somewhat wider at their base, where they often touch each other. They have an alternating arrangement, those on one side being slightly offset from those on the other side. The petioles have no scales.

The sori are found on the lower side of the fronds and range in colour from bright yellow to orange. They become dark grey at maturity.

Are there any similar species? No other similar species on site.

Why is it weedy? It outcompetes native ferns.

Which habitats is it likely to invade? This fern is found in shaded and semi-shaded locations. It is a lithophyte (grows on rocks), and is found growing in the moss on cliffs, cracks in rocks, and in rocky undergrowth; also as an epiphyte on mossy trees.



[Plate 10] Image source nzpcn.org.nz

2.11 Wild cherry (*Prunus avium*, *Prunus sp.*)

What does it look like? Deciduous, spreading, suckering tree (<5-12m tall) with tall trunk. Thin, oval leaves (30-150 x 25-70 mm) with toothed edges are hairless above, and undersides are hairy when leaves are young, becoming hairless as they mature. White, occasionally double, flowers (11-19 x 8-17 mm) aren't fragrant, and are in clusters of 2-4 (Sept-Nov). Cherry fruit (8-17 mm diameter, 30 mm in cultivation) develops Nov-Feb, is dark red, usually sweet but can be bitter.

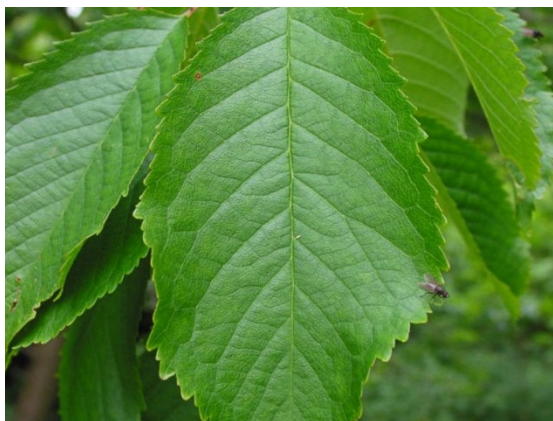
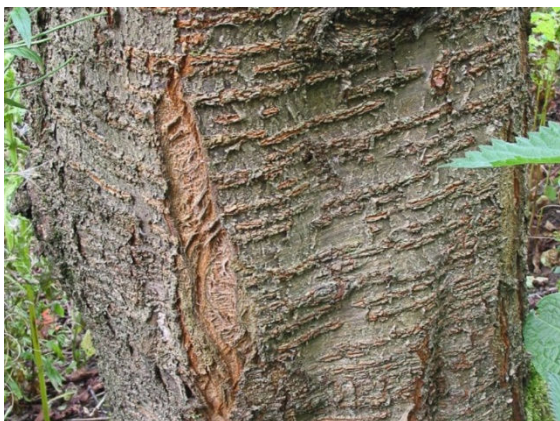
Are there any similar species? Other cherry (*Prunus*) species, especially *P. campanulata*, *P. serrulata*, *P. laurocerasus*, *P. lusitanica*.

Why is it weedy? Tolerant of cold, low rainfall, mod shade. Suckers, long-lived, forms dense stands, tall. Seeds long-lived, widely dispersed.

How does it spread? Birds carry seed medium distances, and suckers locally. Soil movement.

What damage does it do? Impacts on native plants. Forms dense stands in open and disturbed habitats, prevents native plant germination and growth.

Which habitats is it likely to invade? Disturbed forest and shrubland.



[Plate 11] Image source weedbusters.org.nz

2.12 Sweet briar (*Rosa rubiginosa*)

What does it look like? Deciduous, erect, occasionally dense, woody shrub to 3 m (occasionally 5 m) tall with stout branched roots that often sucker. Many arching stems grow from the base, with few to many, unequal, flattened, downward-pointing, curved thorns. Apple-smelling leaves are hairless dull green above, hairy below, and divided into 5-9 narrow-oval leaflets (12-40 x 8-28 mm). Clusters of 1-3 pink (or bright pink with whitish base) rose-like, 5-petalled flowers (25-40 mm diameter) appear from November to January, followed by prominent, egg-shaped, shiny red or orange-red rose hips (12-22 x 10-18 mm) from February to May.

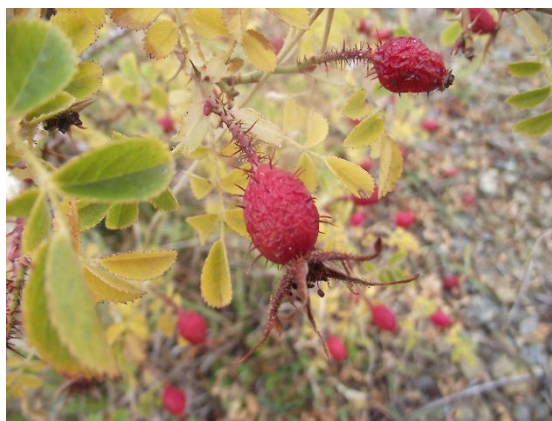
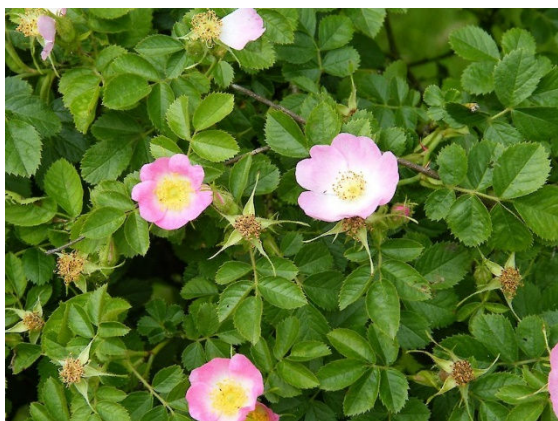
Are there any similar species? Dog rose (*Rosa canina*) has even-sized thorns and is also weedy, especially in damp areas.

Why is it weedy? Long-lived seed is occasionally well dispersed and spread is also by suckers. Tolerates drought, hot to very cold temperatures, wind, low fertility, most well-drained soils and damage (little grazed). Can dominate the canopy.

How does it spread? Mostly via suckers and also by bird-dispersed seed. Abandoned gardens, poor and drought-prone pasture, roadsides, and river flats are all common sources.

What damage does it do? Forms dense, long-lived stands in tough, open habitats, inhibiting or preventing the seedlings of native species from establishing. Can alter riverbeds, causing flooding. Requires moderate to high light levels, and invades only open sites or badly degraded forest.

Which habitats is it likely to invade? Tall and short tussockland, shrubland, stabilised screes, steep open slopes, well drained sites, dunes, and bare land, mainly in drier eastern areas.



[Plate 12] Image source weedbusters.org.nz

2.13 Elderberry (*Sambucus nigra*)

What does it look like? Deciduous shrub or small tree (<6 m tall). Stems are grey-fawn with white pith and many small and corky lumps (glands). Leaves comprise of 5-7 leaflets that are purple when very young, becoming green. Leaflet at the tip is broadly oval (4.5-11 cm long, 3.5-6 cm wide), hairless or hairy on veins beneath and on midrib above, serrated except towards base, and has a pointed tip. Other leaflets are smaller and narrower. Flowers and fruit form in a flat umbrella-shaped cluster (10-20 cm diameter). Dull white, pungent flowers (2-3 mm long, Nov-Jan) are on stalks that usually turn red-purple when fruit develop. Berry-like, round fruits (4-9 mm diameter) mature to shining black, occasionally remaining green.

Are there any similar species? *Sambucus pubens* has pyramid shaped flower and fruit clusters and brown stem pith.

Why is it weedy? Produces many well-dispersed seeds. Leaves are toxic so it is not grazed. It tolerates sun, shade and dry soils.

How does it spread? Seed is dispersed by birds.

What damage does it do? It invades disturbed habitats, forming moderately dense stands that inhibit regeneration of native species.

Which habitats is it likely to invade? Scrub, shrubland, fernland, disturbed forest, forest margins, modified plant communities, roadsides in coastal and lowland habitats on medium to high fertility soils.



[Plate 13] Image source weedbusters.org.nz

2.14 Stonecrop (*Sedum acre*)

What does it look like? Low-growing, succulent, evergreen, mat-forming herb (<10cm high) with fibrous roots and fleshy, round, creeping stems that take root at nodes and many short erect sterile and flowering stems. Ovalish, yellowish, hairless leaves (5 x 3 mm) are very fleshy and acrid to taste. Bright yellow star-like flowers (12 mm diameter, Nov-Mar) have five sharp petals and are followed by many seeds in dry, splitting follicles.

Are there any similar species? No similar species occur on site.

Why is it weedy? Succulent leaf and stem fragments root, giving it a creeping habit. Quick maturing; produces very many, relatively long-lived and well-dispersed seeds. Tolerates wind, salt, very hot to hard frost, drought, poorest soils. Intolerant of poor drainage, wet sites.

How does it spread? Seed, stem and leaf fragments spread by soil and occasionally water, road graders, traffic and gravity (cliff areas) and also by deliberate movement and plantings. Sources include waste places, rail tracks, walls and banks, roadsides.

What damage does it do? Forms dense mats, excluding almost all other species. Threatens rare native low-growing cliff and shingle species.

Which habitats is it likely to invade? Tall and short tussockland, bare land, limestone cliffs, rocky, stony, gravelly areas from sea level to 1500 m.



[Plate 14] Image source weedbusters.org.nz

2.15 Gorse (*Ulex europaeus*)

What does it look like? Sharply spiny shrub (<2-3 m tall) with woody erect or spreading stems which are many-branched in younger plants but become bare at the base as the plant gets older. Leaves are reduced to spines, new leaves less so. Spines are deeply furrowed. Pea-like yellow flowers (13-20 mm long, May-Nov, sometimes all year) are followed by hairy seed pods (13-25 mm long) which turn black when mature and explode to release seeds.

Why is it weedy? Produces massive numbers of long-lived seeds, matures and grows rapidly, and is versatile about habitat. Tolerates hot to cold temperatures, high to low rainfall, wind, salt, damage and grazing, and all soil types.

How does it spread? Explosion of seed pods spreads seed up to 5 m from the parent plant, and seed is also spread by soil movement and road graders, contaminated machinery, animals, boots, stock food and lime. Hedges, roadsides, waste land, farms, quarries, forest tracks, metal dumps, fire breaks, exotic forests, skid sites, and riverbeds are all common seed sources.

What damage does it do? Forms pure associations temporarily in many habitats, inhibiting the establishment of native plant seedlings. Increased nitrogen in poor soil types changes native species able to grow there. Can be a nursery crop for native species, dying back when overtopped, but less likely on dry sites.

Which habitats is it likely to invade? Shrublands, forest margins, coastline, tussockland, fernland, wetland, consolidated sand dunes, gumlands, cliffs, disturbed forest, exotic plantations, poor pasture, and bare land.



[Plate15] Image source weedbusters.org.nz

2.16 Spur valerian (*Centranthus ruber* subsp. *ruber*)

What does it look like? Perennial plant up to 80 cm tall, with a woody base and tap root. Leaves are green or blue/green. Flower heads are deep pink, red or white and are made up of many small flowers. In full flower from October to December but can flower until June.

Are there any similar species? No similar species occur on site.

Why is it weedy? Spur valerian can quickly form dense stands shading out other plants.

How does it spread? Spur valerian produces lots of wind spread seeds and roadsides are common seed sources.

What damage does it do? It outcompetes and inhibits the establishment of native plant seedlings. It is a serious threat to rare native plants which are found on rocky outcrops and cliffs.

Which habitats is it likely to invade? Spur valerian is usually found in rocky coastal areas but can also be found growing inland. In Canterbury it is spreading along roadsides.



[Plate 16] Image source nzpcn.co.nz

2.17 Pig's ear (*Cotyledon orbiculata*)

What does it look like? Succulent (<1.3m tall) with powdery-looking, grey-green opposite leaves (<13 x 6 cm) with red margins. In summer clusters of orange, bell-shaped, drooping flowers (2.5cm) form on stalks (60cm) from the centre of leaf rosette.

Why is it weedy? Fast growing, outcompetes native species.

How does it spread? Seed spreads by wind and gravity.

What damage does it do? It outcompetes and inhibits the establishment of native plant seedlings. It is a serious threat to rare native plants which are found on rocky outcrops and cliffs.

Which habitats is it likely to invade? Coastal slopes and beaches, often on steep banks, rocky outcrops, cliff faces and bare ledges, sometimes in low scrub and dry depleted grassland. Coastal cliffs, rocky bluffs.



Photo: Carolyn Lewis



Photo: Carolyn Lewis



Photo: Carolyn Lewis



Photo: Carolyn Lewis

[Plate 17] Image source weedbusters.org.nz

Appendix 1: Mt Cass Wind Farm Site All Recorded Pest Plants

Species	Common name	Form	Relative abundance (ACFOR) ⁴	RPMP status
<i>Arctium minus</i>	Burdock	Herb	Frequent	Organisms of interest
<i>Berberis glaucocarpa</i>	Barberry	Shrub	Not recorded	Organism of Interest
<i>Bromus diandrus</i>	Ripgut brome	Grass	Common	Not listed
<i>Bromus hordeaceus</i>	Soft brome	Grass	Common	Not listed
<i>Cerastium fontanum</i>	Mouse-ear chickweed	Herb	Occasional	Not listed
<i>Crataegus monogyna</i>	Hawthorn	Tree	Rare	Organism of Interest
<i>Critesion</i> spp.	Barley grass	Grass	Frequent	Not listed
<i>Cytisus scoparius</i>	Broom	Shrub	Rare	Sustained control
<i>Dactylis glomerata</i>	Cocksfoot	Grass	Abundant	Not listed
<i>Dryopteris filix-mas</i>	Male fern	Fern	Rare	Not listed
<i>Euonymus japonicus</i>	Japanese spindleberry	Tree	Rare	Not listed
<i>Festuca rubra</i> var. <i>rubra</i>	Red fescue	Grass	Abundant	Not listed
<i>Geranium robertianum</i>	Herb robert	Herb	Occasional	Not listed
<i>Holcus lanatus</i>	Yorkshire lanatus	Grass	Common	Not listed
<i>Hypochaeris radicata</i>	Cat's ear	Herb	Common	Not listed
<i>Jacobaea vulgaris</i>	Ragwort	Herb	Rare	Organism of Interest
<i>Lolium perenne</i>	Perennial ryegrass	Grass	Common	Not listed
<i>Medicago lupulina</i>	Black medic	Herb	Unknown	Not listed
<i>Mycelis muralis</i>	Wall lettuce	Herb	Frequent	Not listed
<i>Orobancha minor</i>	Broom rape	Parasite	Occasional	Not listed
<i>Pilosella officinarum</i>	Mouse-ear hawkweed	Herb	Common	Not listed
<i>Pinus</i> sp.	Pine	Tree	Rare	Progressive Containment
<i>Plantago lanceolata</i>	Ribwort plantain	Herb	Common	Not listed
<i>Prunus</i> sp.	Wild cherry	Tree	Rare	Organism of Interest
<i>Rosa rubiginosa</i>	Sweet briar	Shrub	Rare	Organism of Interest
<i>Rytidosperma penicilatum</i>	Wallaby grass	Grass	Unknown	Not listed
<i>Sambucus nigra</i>	Elderberry	Tree	Rare	Not listed
<i>Sedum acre</i>	Stonecrop	Succulent	Rare	Not listed
<i>Sherardia arvensis</i>	Field madder	Herb	Unknown	Not listed
<i>Solanum nigra</i>	Black nightshade	Herb	Rare	Not listed
<i>Tragopogon porrifolius</i>	Salsify	Herb	Rare	Not listed
<i>Trifolium repens</i>	White clover	Herb	Common	Not listed
<i>Ulex europaeus</i>	Gorse	Shrub	Rare	Sustained control
<i>Verbascum thapsus</i>	Woolly mullein	Herb	Occasional	Not listed

⁴ Relative abundance has been determined by assessing records of distribution and density of weed species at the site and interpreting these accordingly. ACFOR – Abundant, Common, Frequent, Occasional, Rare.

Species	Common name	Form	Relative abundance (ACFOR) ⁴	RPMP status
<i>Vicia sativa</i>	Vetch	Herb	Occasional	Not listed

For further detail on weed species see <https://www.nzpcn.org.nz/>

Appendix 2: RPMP Definitions

One or more types of pest management programme in the Regional Pest Management Strategy (RPMP) may be used to control each pest covered by this guide. The following text has been adopted from the RPMP.

The types are defined by the National Policy Direction for Pest Management 2015 and reflect outcomes in keeping with the extent of the pest's invasion within the region, and whether it is possible to achieve the desired control levels. The outcomes of programmes in the RPMP are described below.

1. Exclusion Programme: to prevent the establishment of the subject, or an organism being spread by the subject, that is present in New Zealand but not yet established in an area.
2. Eradication Programme: to reduce the infestation level of the subject, or an organism being spread by the subject, to zero levels in an area in the short to medium term.
3. Progressive Containment Programme: to contain or reduce the geographic distribution of the subject, or an organism being spread by the subject, to an area over time.
4. Sustained Control Programme: to provide for ongoing control of the subject, or an organism being spread by the subject, to reduce its impacts on values and spread to other properties.
5. Protecting Values in Places (Site-led) Programme: that the subject, or an organism being spread by the subject, that is capable of causing damage to a place, is excluded or eradicated from that place, or is contained, reduced, or controlled within the place to an extent that protects the values of that place.
6. Organisms of Interest: These organisms are not declared pests under the RPMP and occupiers or other persons will not be subject to any obligations under the RPMP.