4. PLANT PEST MANAGEMENT STRATEGY

The plant pests included in the Strategy all cause, or have the potential to cause, adverse impacts on Northland's environmental, economic, cultural and recreational values.

Common Name	Scientific Name	Pest Classification	Page
African feather grass	*Pennisetum macrourum*	Containment	26
Akebia	*Akebia quinata*	Eradication	19
Alligator weed	*Alternanthera philoxeroides*	Suppression	36
Asiatic knotweed	*Fallopia japonica*	Exclusion	13
Bathurst bur	*Xanthium spinosum*	Containment	28
Californian thistle	*Cirsium arvense*	Containment	29
Cape tulip	*Moraea flaccida*	Exclusion	13
Cathedral bells	*Cobaea scandens*	Exclusion	13
Climbing spindle berry	*Celastrus orbiculatus*	Eradication	19
Eel grass	*Vallisneria australis, V. spiralis*	Eradication	19
Entire marshwort	*Nymphoides geminata*	Exclusion	14
Evergreen buckthorn	*Rhamnus alaternus*	Eradication	20
Fringed water lily	*Nymphoides peltata*	Exclusion	14
Giant hogweed	*Heracleum mantegazzianum*	Exclusion	14
Giant knotweed	*Fallopia sachalinensis*	Exclusion	13
Giant reed	*Arundo donax*	Containment	30
Gorse	*Ulex species*	Suppression	36
Gravel groundsel	*Senecio skirrhodon*	Suppression	37
Holly-leaved senecio	*Senecio glastifolius*	Exclusion	15
Houttuynia	*Houttuynia cordata*	Exclusion	15
Hydrilla	*Hydrilla verticillata*	Exclusion	15
Johnson grass	*Sorghum halepense*	Exclusion	16
Lantana	*Lantana camara, all varieties*	Containment	31
Manchurian wild rice	*Zizania latifolia*	Containment	33
Mexican feather grass	*Nassella tenuissima*	Eradication	20
Mickey mouse plant	*Ochna serrulata*	Eradication	20
Mile-a-minute	*Dipogon lignosus*	Eradication	21
Monkey musk	*Mimulus guttatus*	Eradication	21
Nardoo	*Marsilea mutica*	Eradication	21
Nassella tussock	*Nassella trichotoma*	Eradication	25
Nodding thistle	*Carduus nutans*	Containment	29
Old man's beard	*Clematis vitalba*	Eradication	22
Phragmites	*Phragmites australis*	Exclusion	16
Pampas	*Cortaderia jubata and C.selloana*	Suppression	37
Privet	*Ligustrum species*	Suppression	38
Purple loosestrife	*Lythrum salicaria*	Exclusion	16
Pyp grass	*Ehrharta villosa*	Exclusion	17
Ragwort	*Jacobaea vulgaris*	Suppression	39
Royal fern	*Osmunda regalis*	Eradication	22
Salvinia	*Salvinia molesta*	Eradication	22
Senegal tea	*Gymnocoronis spilanthoides*	Eradication	23
Skeleton weed	*Chondrilla juncea*	Exclusion	17
Spartina	*Spartina alterniflora, S. anglica, S. x townsendii*	Eradication	23
Water hyacinth	*Eichhornia crassipes*	Eradication	23
Water poppy	*Hydrocleys nymphoides*	Eradication	24
White bryony	*Bryonia cretica subsp. dioica*	Exclusion	17
Wild ginger	*Hedychium flavescens and H. gardnerianum*	Suppression	40
Yellow flag iris	*Iris pseudacorus*	Eradication	24
CPCA plants		CPCA	41
Risk assessment plants		Risk Assessment	43

4.1 Exclusion Plants

Exclusion plant pests are potential pests which are not known to have established in Northland or that have previously established and all known sites have been eradicated. These plant pests all have the potential to establish in the region, and are capable of causing adverse effects. Many of these plants are listed as unwanted organisms under the Biosecurity Act 1993. The intention of the Strategy is to prevent these plant pests from entering and establishing within Northland over the life of the Strategy.

Objectives, Methods and Rules for Exclusion Plants

The objectives, methods and rules for the exclusion plants apply to all plant species in this category.

Objectives (Five Year)

- To prevent the exclusion plant pests becoming established in Northland.
- To raise public awareness of the economic, biodiversity, social and cultural impacts of plant pests and encourage reports of sightings.
- To prohibit the sale/distribution of the exclusion plant pests.

Pest Management Methods

Surveillance:

- NRC will develop and implement a regional surveillance plan in conjunction with MAFBNZ, stakeholders, and other Crown agencies such as DOC, with a particular focus on pathways, vectors and areas of significance.
- Reported sightings will be investigated and response implemented.

Incursion Response:

- Eradication of infestations of the exclusion plant pests will be attempted by the NRC in conjunction with relevant Crown agencies and stakeholders, where practicable.

Education:

- NRC will provide training to relevant NRC staff and stakeholders in the identification of plant pests to assist in surveillance.
- NRC will provide advice, and attend community meetings and field days.
- NRC will run publicity campaigns to educate the wider public about plant pests.

Research:

- NRC will work cooperatively with other agencies where further research is needed to identify management measures, potential impacts, pathways and/or behaviours.

Rules

1. No person shall sell, offer for sale, propagate, breed or multiply any exclusion plant pest within the Northland region.
2. No person shall knowingly possess, distribute, transport or release any exclusion plant pest (including any seeds or live vegetation) within the Northland region.
3. Every person who sees any exclusion plant pest, or suspects the presence of any exclusion plant pest, shall immediately report the sighting to the NRC or MAFBNZ.

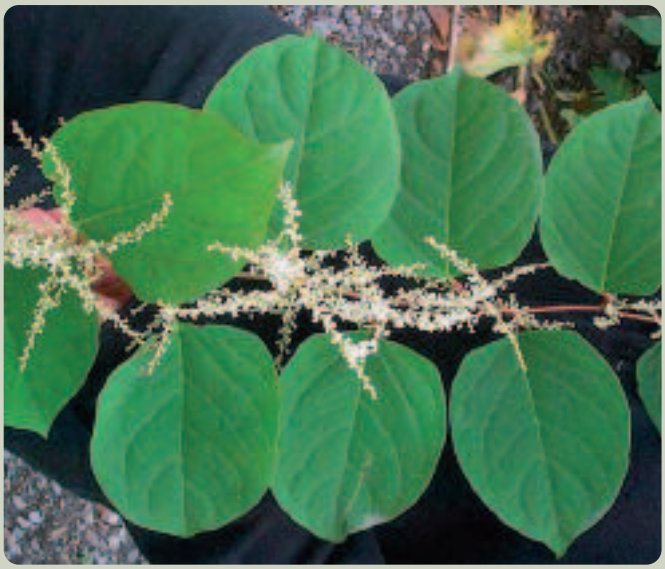
A breach of these rules, without reasonable excuse, is an offence under Section 154(r) of the Act.

ASIATIC KNOTWEED
GIANT KNOTWEED

(Fallopia japonica, F. sachalinensis)

Asiatic knotweed is an upright, shrublike herbaceous perennial that can rapidly grow to 3m in height. It has red-purple shoots which appear early in spring but, as the canes grow, the leaves unfurl and the plant turns green. The mature canes are hollow and have a characteristic pattern of purple speckles. The leaves are long, triangular-oval (15 x 10cm) and pointed at the tip, with a flattened leaf base. In late summer it produces masses of creamy white flowers.

Giant knotweed is similar to Asiatic knotweed but is taller. Both species grow in shrubland and riparian areas. Once established, both species can form dense stands that shade and crowd out all other vegetation, displacing native flora and fauna.



Bradley Kriekhaus, USDA Forest Service, Bugwood.org

Asiatic knotweed

CAPE TULIP

(Moraea flaccida)

Cape tulip is a perennial herb in the iris family. It produces shoots annually in winter, and dies back to an underground corm in early summer. Plants grow to 90cm tall, with a single strap-like leaf and a branched flower stalk. Flowers are six-petalled, usually salmon pink with a band of deeper colour near the base of the petals, with or without a yellow centre. Flowers are usually 5cm across. The seeds are produced in narrow, green capsules, up to 5cm long.

All parts of Cape tulip are poisonous (even when dead and dried). Symptoms of poisoning include gastroenteritis, thirst, paralysis, blindness and heart and kidney failure. Cape tulip has the potential to establish dense colonies over wide areas of pasture, and could have a serious economic impact on agriculture if it became widely established.

Andrew Massyn

CATHEDRAL BELLS

(Cobaea scandens)

Also known as: cup and saucer vine

Cathedral bells is a fast-growing perennial vine. It has bell-shaped flowers that are green when young but turn purple once pollen is shed. Capsules are hard, oval and usually 5.5-8.5cm long. They split into sections to release numerous flat, winged seeds. Cathedral bells grows in forest margins, roadsides, riverbanks, gardens and open areas, and grows in a wide range of soils and climates. The vines can grow over trees and shrubs, forming a dense canopy and smothering desirable plants.

Jonathan Boow, ARC

ENTIRE MARSHWORT

(Nymphoides geminata)

Also known as: marshwort, floating heart

Entire marshwort is a bottom-rooted, perennial, water lily-like plant. It has branched running stems, several metres long. The stems lie just beneath the water surface, producing groups of leaves, roots and flowers. The leaves are 30-80mm long, broadly ovate and smaller than the leaves of other water lilies. Entire marshwort has bright-yellow flowers with five petals and hair-like margins, which sit above the water surface on long stalks that grow in pairs. Flowers are produced from November through to April. Entire marshwort rapidly colonises shallow water, forming dense mats which block waterways and smother other aquatic plants.

Trevor James, AgResearch

FRINGED WATER LILY

(Nymphoides peltata)

Also known as: entire marshwort, yellow floating heart

Fringed water lily is very similar to marshwort, but its leaves are frequently purple underneath and have scalloped margins. The flowers are golden-yellow, 3-4cm across with five petals, and are held above the water surface on long stalks. The flower edges are distinctively fringed and solid. It also produces fruit, which is a capsule up to 2.5cm long containing numerous seeds. These seeds are flat, oval and about 3.5mm long, with hairy edges. Fringed water lily has the potential to colonise waterways, forming dense mats, impeding drainage and restricting water activities.

Trevor James, AgResearch

GIANT HOGWEED

(Heracleum mantegazzianum)

Also known as: wild rhubarb, cartwheel flower, wild parsnip, cow parsnip

Giant hogweed is a perennial that grows 4-6m in height. It has stout dark-reddish-purple stems, and spotted leaf stalks with sturdy bristles which contain a toxic sap. The stems and stalks are hollow and the stems are 5-10cm in diameter. Giant hogweed has extremely large leaves (up to 1.5m) and tuberous root stalks. When the plant is two to three years old it produces large umbrella-like clusters of greenish-white flowers. It usually grows on the banks of rivers or creeks.

Giant hogweed is poisonous to humans. Touching it, or exposure to dust from weed-eating, can irritate skin and cause blisters and swelling. The toxin actually causes photosensitisation so that the skin reacts badly to sunlight. It also outcompetes and replaces native plants.

Terry English, USDA APHIS PPQ, Bugwood.org

HOLLY-LEAVED SENECIO

(Senecio glastifolius)

Also known as: pink ragwort

Holly-leaved senecio is an erect perennial herb which grows up to 1m high. It has oval leaves, which are coarsely toothed and holly-like. The flowers are purple, mauve or pink and occur in clusters. Young plants develop into a small rosette then into a 'cabbage' type growth form. Holly-leaved senecio occurs mainly on partially stabilised sand dunes and other coastal sites. It reproduces by seed from flowers produced over a short period in October. A few plants have a second, smaller burst of flowering in January/February which set seed in March. It is an aggressive invader that can become dominant cover, reducing land productivity. It is a threat to dune and coastal sites.

DOC

HOUTTUYNIA

(Houttuynia cordata)

Also known as: chameleon plant, ground ivy

Houttuynia is a perennial groundcover that spreads rapidly via stolons. The leaves are heart-shaped and are usually variegated cream, bronze, scarlet and green, but may be plain green. They have an unpleasant, peppery scent when crushed. Houttuynia has small white flowers which are densely clustered on short spikes. Houttuynia grows rapidly, forms dense colonies and replaces native vegetation. It can reproduce from tiny fragments and can seed in the absence of male plants. It can grow in both soil and water. Houttuynia has been found in Northland, but is thought to have been eradicated.

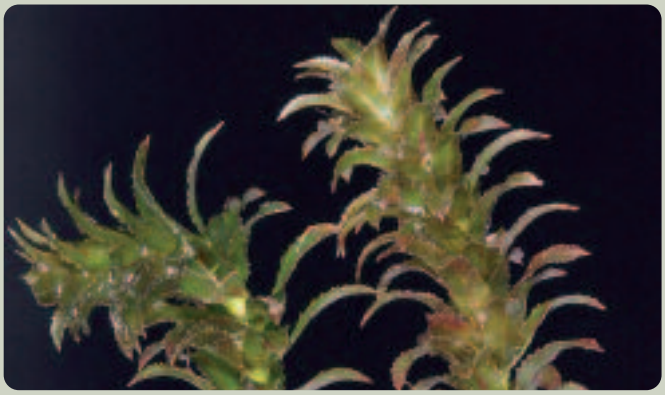
Antonie van den Bos, for ayeronto.com

HYDRILLA

(Hydrilla verticillata)

Hydrilla is a submerged perennial aquatic oxygen weed that can grow up to 9m tall in still or slow-flowing fresh water. The bottom-rooted plant forms underground tubers. Its thin many-branched stems are produced in whorls of three to eight with obvious toothed edges. Leaves are generally green, but often have small reddish-brown spots and stripes. It forms very dense stands, crowding out native aquatic plant species, restricting light and depleting oxygen.

Hydrilla is one of the world's worst submerged waterweeds. It out-competes other aquatic plants and can remain dormant in sediments for up to ten years waiting for the right conditions to grow. Hydrilla forms dense mats which are a nuisance to lake users such as bathers, anglers and boat users. Plant material washed ashore rots, reducing the aesthetic value of lakes, and restricting access to water. It may also clog hydroelectric dams and block water intakes. Hydrilla is spread easily through stem fragments.



Robert Vidéki, Doronicum Kft., Bugwood.org

Hydrilla is not known to be in Northland. It is currently found in four lakes in the Hawke's Bay region, and MAFBNZ has an eradication programme underway.

JOHNSON GRASS

(Sorghum halepense)

Johnson grass is a robust, aggressive, perennial, summer grass capable of forming dense thickets that exclude most other plants. Seedlings are very similar to young maize plants both in habit and growth pattern. Mature plants vary in height from 50-300cm. Leaf blades are flat, alternate, up to 900mm long and 2-5cm wide. The midrib on the underside is whitish. Leaf sheaths are ribbed and often hairy on the inside of the junction with the blade.

Johnson grass is considered to be one of the world's worst weeds and one of the five worst weeds in New Zealand. It could have a major economic impact on New Zealand agriculture should it become widely established. Johnson grass forms dense spreading patches that compete vigorously with other plants often out-competing grasses and crops. Pieces of rhizome and seed may contaminate cultivation and harvesting equipment and be transported to new sites.

Barry Rice, sarracenia.com, Bugwood.org

PHRAGMITES

(Phragmites australis)

Also known as: common reed

Phragmites is a perennial grass that grows up to 3m tall on water margins. It has bamboo-like stems which carry long, wide, flat leaves that taper to a point. It has large, fluffy, purplish-brown flower heads, and seed grain which is covered in silky hairs. It is similar to giant reed *(Arundo donax)*, but Phragmites is smaller and the stems are narrower in proportion to the leaves. Phragmites reproduces asexually by rhizomes.

In its native range, Phragmites forms dense patches on the edges of waterways. It is expected to invade waterways in New Zealand if it becomes more widespread however this is unlikely unless it is distributed by people who spread rhizome fragments.

NIWA

PURPLE LOOSESTRIFE

(Lythrum salicaria)

Also known as: bouquet-violet

Purple loosestrife is an erect, summer-green perennial herb which grows 1-2m tall. It has narrow leaves which are usually paired and heart-shaped at the base. From December to February a showy dense flower spike (20-25cm long) is produced, made up of purple-magenta flowers with five to six petals which are followed by blackish seed capsules (3-5mm long). Purple loosestrife is a highly aggressive invader of damp ground, wetlands and shallow water. It overtops native species with dense bushy growth, is long-lived and produces millions of long-lived, highly viable seeds from an early age. It tolerates hot or cold conditions and a wide range of nutrient levels in the water, but is intolerant of salt water.

NIWA

PYP GRASS

(Ehrharta villosa)

Pyp grass is a perennial grass which grows from long, creeping rhizomes. The jointed stems are robust and are usually 90-200cm tall. Leaves are bluish-green and short in proportion to the stems, about 1.5-13cm long. The leaves may be absent. The flower head is a panicle up to 25cm long, narrow and rather lax.

Pyp grass has a limited distribution in New Zealand, being known from three sites where it has invaded sand dunes. Pyp grass is a serious agricultural weed in South Australia. It commonly grows as a dense sward displacing most other species, in some cases even scrambling over shrubs up to 2-3m in height. Pyp grass is a significant threat to sand dune systems throughout New Zealand. It is expected to invade dunes and contribute to the degradation of sand dune habitats.

Dr Kerry C Harrington, Massey University

SKELETON WEED

(Chondrilla juncea)

Skeleton weed is a perennial herb with erect, branched stems up to 90cm tall. It has small yellow flower heads (December – March) and the flowering stems are almost leafless. Seeds have a group of white, downy hairs at one end and a 'tooth' with hooks that help dispersal. Skeleton weed is a wiry weed which obstructs crops, and causes loss of production and blockage of machinery. It poses a significant threat to kumara, maize and other crop growers and market gardeners. It also competes strongly with pasture species for moisture and nutrients, especially in spring.

Gary L. Piper, Washington State University, Bugwood.org

WHITE BRYONY

(Bryonia cretica subsp. dioica)

White bryony is a soft green cucumber-like vine that climbs up to 6m by means of its curled tendrils. It produces clusters of small cream white flowers in spring/summer, with male and female flowers on separate plants. On female plants these are followed by 8mm berries, in bunches of three to eight that ripen to light red from January to April. The shoots die back in autumn to a persistent perennial tuber.

White bryony smothers and shades out whatever it grows on. It is dispersed by birds and its tubers are hard to find. The fruit and tubers contain toxic alkaloids, which may be poisonous if consumed in quantity. White bryony is of very limited distribution in the wild in New Zealand

V. Reid, ARC

4.2 Eradication Plants

Eradication plant pests are pests that are present in low numbers or a limited distribution within the Northland region, and have the potential to have serious negative impacts on the community or the environment. The intention is to remove all individuals of these pests from the region, and eliminate the possibility of any further reproduction or propagation within the region. Eradication is only likely to be possible if the infestation is found when the populations are very small and the distribution is limited.

Objectives, Methods and Rules for Eradication Plants

The objectives, methods and rules for the eradication plant pests apply to all species in this category, except nassella tussock *(Nassella trichotoma)*.

Objectives (Five Year)

- To remove all individuals of the eradication plant pests from Northland.
- To raise public awareness of the economic, biodiversity, social and cultural impacts of plant pests, and encourage reports of sightings.
- To prohibit the sale/distribution of the eradication plant pests.

Pest Management Methods

Surveillance:

- NRC will develop and implement a regional surveillance plan in conjunction with MAFBNZ, stakeholders, and other Crown agencies such as DOC, with a particular focus on pathways, vectors and areas of significance.
- Reported sightings will be investigated and response implemented.

NRC Response:

- Eradication of infestations of the eradication plant pests will be attempted by the NRC and their contractors or, with agreement, by other agencies if practicable.

Incursion Response (for salvinia and water hyacinth only):

- MAFBNZ is the lead agency for salvinia and water hyacinth and the NRC will provide support as needed during eradication of infestations.

Education:

- NRC will provide training to relevant NRC staff and stakeholders in the identification of plant pests to assist in surveillance.
- NRC will provide advice, and attend community meetings and field days.
- NRC will run publicity campaigns to educate the wider public about plant pests.

Research:

- NRC will work cooperatively with other agencies where further research is needed to identify management measures, potential impacts, pathways and/or behaviours.

Rules

1. No person shall sell, offer for sale, propagate, breed or multiply any eradication plant pest within the Northland region.
2. No person shall knowingly possess, distribute, transport or release any eradication plant pest (including any seeds or live vegetation) within the Northland region.
3. Every person who sees any eradication plant pest, or suspects the presence of any eradication plant pest, shall immediately report the sighting to the NRC.

A breach of these rules, without reasonable excuse, is an offence under Section 154(r) of the Act.

AKEBIA

(Akebia quinata)

Also known as: chocolate vine, five-leaved akebia, Rajania quinata

Akebia currently has a limited distribution in Northland. It is a twining vine or ground cover, with leaves of five oval-shaped leaflets (3cm) which meet at a central juncture. It has chocolate-purple coloured flowers, which have an odour that is similar to chocolate or vanilla, and appear from August to October in New Zealand.

Akebia can form dense patches which out-compete and kill ground cover and shrubs/young trees. Birds can spread the seeds, but mostly this plant is spread by human activity.

Liz Sherwood, DOC

CLIMBING SPINDLE BERRY

(Celastrus orbiculatus)

Also known as: Oriental bittersweet

Climbing spindle berry currently has a limited distribution in Northland. It is a perennial climbing woody vine with greyish-brown branches growing up to 12m high. The young branches are green, often with sharp 1-2mm spines. The serrated leaves are 5-10cm long, tapered, alternately spaced, and turn yellow in autumn. It has bright orange fruit with a scarlet centre.

Climbing spindle berry is a vigorous vine that prefers sunny spots but is also shade-tolerant. Once established, it can "wait" for a disturbance in forest canopy and then compete with native species for resources.

David Smith, www.delawarewildflowers.org

EEL GRASS

(Vallisneria australis and V. spiralis)

Also known as: Vallisneria gigantea

Eel grass "Lake Pupuke variety" *(V.australis)* is a submerged perennial freshwater plant which can grow up to 5.5m tall. It is bottom-rooting, and produces long, ribbon-like, light-green leaves from nodes at regular intervals. Only male plants are known in New Zealand, with large pollen sacs produced at the base of mature plants.

Eel grass "Meola creek variety" *(V. spiralis)* is also a submerged perennial freshwater plant, and occurs at one site in Northland. The leaves are generally narrower than *V.australis.* Only male plants are known in New Zealand, which produce inconspicuous flowers on the end of a long spiral stem.

Eel grass forms dense beds of vegetation which out-compete and displace native plants. The dense beds can block dams and waterways, impede drainage, obstruct water out-takes and affect recreational activities. No seeds are produced, and eel grass is generally spread through intentional planting.

Paul Champion, NIWA

EVERGREEN BUCKTHORN

(Rhamnus alaternus)

Also known as: rhamnus, Italian buckthorn

Evergreen buckthorn is known to be present at one site in Northland, at Matakohe. It is an evergreen shrub that grows to 2-3m tall, and has ovalish leathery leaves (15-60 x 10-30mm) which are glossy and slightly toothed. It has small green petal-less fragrant flowers (3-4mm in diameter) which are produced from May to November. Flowers are followed by showy, glossy berries (5-7mm long) which ripen from dark-red to black from December to January. Evergreen buckthorn is commonly mistaken for a native plant.

Evergreen buckthorn forms dense stands and prevents the establishment of native plant seedlings. It establishes readily in coastal areas and barren sites, and on the edges of streams and forests. It can completely dominate coastal cliff habitats, altering the form and structure of the ecosystem.

Holly Cox, ARC

MEXICAN FEATHER GRASS

(Nassella tenuissima)

Also known as: fine-stemmed needle grass, Stipa tenuissima

Mexican feather grass has been eradicated from all known sites in Northland, but there is a possibility of undiscovered outliers. It is a perennial, drought-resistant tussock grass with fine wiry leaves <70cm high. It flowers between October and December, and the feathery flower-head is erect when young and weeping over when mature. Each plant has huge numbers of rough-coated seed (<120,000) with tufted hair at the base.

Mexican feather grass is very closely related to nassella tussock. It has the same invasive characteristics and is unpalatable to stock. If stock eat it, they get indigestible balls in their stomachs, leading to weight loss and starvation. Mexican feather grass crowds out pasture species and reduces productivity. It also replaces native species in open and coastal areas.

MICKEY MOUSE PLANT

(Ochna serrulata)

Also known as: ochna, bird's eye bush, small-leaved plane

Mickey Mouse plant is present in Northland but currently has a limited distribution. It is a small shrub of 1-2m in height. It produces spherical, black, berry-like fruits attached to red sepals, which resemble the face of Mickey Mouse. Mickey Mouse plant has elliptic leaves which are 13-50mm long with toothed leaf margins, and fragrant yellow blossoms about 20mm in diameter which precede the black fruit. The young spring foliage starts as pinkish-bronze and matures to glossy green.

Mickey Mouse plant is easily dispersed, and could spread and naturalise in the wild. It has recently naturalised in New Zealand and is regarded as a weed in Australia. It can form a dense monoculture that prevents regeneration of native species.

Gina Williams, DOC

MILE-A-MINUTE

(Dipogon lignosus)

Also known as: Dolichos capensis, D. gibbosus, D. lignosus, Verdcourtia lignosa

Mile-a-minute currently has a limited distribution in Northland. It is an evergreen climbing vine. Stems are rounded and moderately hairy. The leaves are green above and pale below, and made up of three heart-shaped leaflets (25-55mm long). It has pea-like white, lavender and white, or pink to reddish-purple flowers (10-15mm long) from July to January. Flowers are followed by sickle-shaped seed pods (30-40mm long).

Mile-a-minute is a fast-growing vine, it smothers and kills most plants from ground level to medium canopy and prevents the establishment of native plant seedlings. It thrives in bare sites and increases nitrogen in impoverished soil types, potentially changing the species that can grow there.

Tony Rodd

MONKEY MUSK

(Mimulus guttatus)

Monkey musk is present in Northland but currently has a limited distribution. It is an erect perennial bog herb that grows up to 60cm tall. It has thick, stiff stems that are occasionally branched. The oval leaves are opposite, up to 12cm long, usually hairless, bright green and tooth-edged. Monkey musk has yellow flowers with red spots on the bearded lower lip. Seed capsules are 1cm long, with many patterned seeds. This is a highly variable plant, taking many forms. Both annual and perennial forms occur throughout the species' range. It is sometimes aquatic, its herbage floating in small bodies of water.

Monkey musk can significantly alter the structure of riparian plant communities. It has the potential to choke channels and impede drainage.

Liz Sherwood, DOC

NARDOO

(Marsilea mutica)

Also known as: water clover

Nardoo has been eradicated from all known sites in Northland, but there is a possibility of undiscovered outliers. Nardoo looks like a member of the clover family, but is actually a freshwater fern. It has flat, floating leaves and resembles a large four-leaf clover. The leaves float on the surface of the water on stalks up to 1m long. The roots form dense, floating masses. It doesn't flower, spore or set seeds in New Zealand, but grows from stem and root fragments. Nardoo grows in freshwater less than 1m deep, mainly in swamps, dams and garden ponds.

Nardoo can form dense beds of vegetation which can block dams and waterways, impede drainage and disrupt recreational activities. It out-competes native species, and is also highly toxic to stock.

OLD MAN'S BEARD

(Clematis vitalba)


Jolie Hazley, DOC

Old man's beard has been eradicated from all known sites in Northland. It is a deciduous climbing vine that grows to 20m tall. It has very long, woody stems with six prominent ribs, and pale, easily rubbed-off bark. Leaves are arranged in opposite pairs on the stems, and are made up of five leaflets. The thin leaflets are sparsely hairy and have bluntly toothed or smooth edges. Fragrant, creamy-white flowers are produced from December to May. Flowers are followed by grey, hairy seeds with white plumes in dense, fluffy clusters.

Old man's beard smothers and kills all plants to the highest canopy, and prevents the establishment of native plant seedlings. It moves into established forest over the canopy by layering. Seeds are spread by wind, water and soil movement.

ROYAL FERN

(Osmunda regalis)


ARC

Royal fern is present in Northland but currently has a distribution limited mainly to sites on the Poutō Peninsula. Royal fern is a deciduous fern whose rhizomes form a short woody trunk up to 1.5m high. It has large fronds up to 3m long and 75cm wide. The fronds are feather-like, subdivided twice, yellow-green and tough. Its spores are produced in brown, fertile fronds resembling tiny bunches of grapes. Plants die back to the woody trunk in winter.

Royal fern can naturalise and form dense colonies in a range of wetland habitats, especially in disturbed areas and under the shade of willows or manuka. The plants displace other small native wetland plants.

SALVINIA

(Salvinia molesta)

Also known as: kariba weed


Deborah Isocrono

Salvinia appears to have been eradicated from all known sites in Northland, but there is a possibility of undiscovered outliers. Salvinia is a small, free-floating aquatic fern which forms large, dense mats. It has branched, horizontal stems that lie just below the water surface. Plants are usually up to 30cm long, and have green to bronze spongy leaves that occur in pairs. Leaf shape varies with the age and environment of the plant. The upper surface of the leaf is water repellent and covered with distinct white hairs with an egg beater-like tip. Salvinia has no true roots but has a root-like structure underneath each leaf pair.

Salvinia quickly forms extensive mats, completely smothering waterways and badly affecting water quality. It can double in area within 10 days. The mats kill off native plants, block dams and waterways, impede drainage and disrupt recreational activities. The mats also create a drowning risk for people and animals.

SENEGAL TEA

(Gymnocoronis spilanthoides)

Also known as: temple plant, costata

Senegal tea is known in only a few sites in Northland, but there is a possibility of undiscovered outliers. It is a hardy, semi-aquatic, perennial herb which grows up to 1.5m high and forms floating mats in and above the water. It has dark green, opposing leaves that are shiny and hairless. It flowers November to April and produces distinctive, white, clover-like flowers. It looks like alligator weed or willow weed, except that the margins of its leaves are bluntly serrated. Senegal tea lives in marshy soils, still or flowing water including wetlands and streams. It prefers a warm, fertile climate and tolerates frost.

Senegal tea grows very quickly, and is known to rapidly cover water bodies with a floating mat, displacing and out-competing native plants. The effects of flooding are made much worse because infestations block drainage channels. Recreational activities and irrigation may also be affected.

ARC

SPARTINA

(Spartina alterniflora, S. anglica, S. x townsendii)

Also known as: cord grass, salt grass

There are two types of spartina found in Northland – *S. alterniflora* and *S. anglica. S. x townsendii* is a rare hybrid plant, rarely found north of the Kaipara Harbour. Spartina is present in many Northland harbours and estuaries. The control programme is progressing, with most sites at either zero density or less than five percent of original density.

Spartina is an erect saltwater grass growing up to 1.5m high, and is the only plant that can grow in intertidal areas of estuaries, along with mangroves. It has wide, ribbed, alternating leaves, and flowers in a head of short, flattened spikelets. *S. alterniflora* is the most common in Northland, and is the more robust of the two, with stems over 8mm in diameter and forming open clumps. *S. anglica* is smaller, with stems of up to 5mm in diameter. It forms denser clumps and tends to form a dense mat.

Spartina forms dense mats, taking over coastal marine areas and leading to a loss of habitat for birds, recreational fisheries and seafood. The mats trap sediments and can severely modify the marine mud flat ecosystem, and restrict access to estuarine areas. Extensive areas of the plant can cause surface flooding on adjacent land.

WATER HYACINTH

(Eichhornia crassipes)

Water hyacinth appears to have been eradicated from all known sites in Northland, but there is a possibility of undiscovered outliers. Water hyacinth is a free-floating aquatic perennial. It has a rosette of shiny, rounded leaves with long, feathery roots. The leaves are glossy and green with swollen bases and thick runners. The flowers are mauve-blue, with a yellow spot in the centre. It has been released from garden and ornamental ponds and lives in still or slow-moving freshwater such as ponds, streams, swamps and dams.

Water hyacinth forms dense mats, completely smothering waterways and badly affecting water quality. The mats kill native plants, block dams and waterways, impede drainage and disrupt recreational activities. The mats also create a drowning risk for people and animals.

Katherine Parys, Louisiana State University, Bugwood.org

WATER POPPY

(Hydrocleys nymphoides)

Water poppy appears to have been eradicated from all known sites in Northland, but there is a possibility of undiscovered outliers. Water poppy is a water lily-like perennial plant. The leaves are thick and shiny and float on the surface, with each shoot connected by a network of elastic creeping stems that form a dense mat. It has a distinctive three-petalled solitary pale-yellow flower with a dark purple centre. Flowers are up to 8cm across. Water poppy lives in still or slow-flowing water less than 2m deep, especially if the water is nutrient-rich. It is often found in ponds, dams and swampland.

Water poppy quickly forms mats blocking waterways and drains, causing flooding. It is a particular threat to native species that cannot compete with its aggressive growth.

Holly Cox, ARC

YELLOW FLAG IRIS

(Iris pseudacorus)

Yellow flag iris is present in Northland but currently has a limited distribution. Yellow flag iris is an aquatic perennial growing in leafy clumps up to 2m tall, and arising from dense rhizomes (up to 3cm in diameter). Sword-like leaves emerge in fans from a reddish base. From October to December it produces pale-yellow to golden-orange flowers (up to 12cm in diameter), followed by seed capsules containing many brown, flattened, three-sided, disc-like seeds.

Yellow flag iris is poisonous to humans and animals. Rhizomes form dense floating mats, and the plant over-tops native species that grow on margins of water bodies, including estuarine areas. It can also invade flood-prone pasture.

Paul Champion, NIWA

NASSELLA TUSSOCK

(Nassella trichotoma)

Also known as: serrated tussock, Stipa trichotoma

Nassella is found in dry farmland along the east coast of Northland, and numbers of plants are very low due to the ongoing eradication programme. The main infestations are at Taupo Bay, Whananaki, Matapōuri, Urquharts Bay, Topuni, Tahere and Mangapai. Nassella tussock is a perennial grass with fine-bladed wiry leaves. It grows up to 1m high and 1m across. It will grow almost anywhere but is commonly found in dry sunny areas.

Small plants are very similar in appearance to some native grasses which makes identification difficult. Nassella invades pasture areas, reducing productivity. Each mature plant can produce up to 100,000 seeds per year. It is unpalatable to stock, and the prolific seeding and relatively long seed life make it difficult to eradicate. Nassella also invades sensitive indigenous habitats reducing their ecological value.

Objectives (Five Year)

- To eradicate nassella from Northland.
- To raise public awareness of the economic, biodiversity, social and cultural impacts of nassella and encourage reports of sightings.
- To prohibit the sale/distribution of nassella.

Pest Management Methods

Surveillance:

- NRC will develop and implement a regional surveillance plan in conjunction with MAFBNZ, stakeholders, and other Crown agencies such as DOC, with a particular focus on pathways, vectors and areas of significance.
- Reported sightings will be investigated and response implemented.

NRC Response:

- Eradication of infestations of nassella will be attempted by the NRC and their contractors or, with agreement, by other agencies if practicable.
- The owners of infested properties will be charged a proportion of the actual and reasonable costs of the inspection and control service provided (as provided for in section 135 of the BSA).
- The NRC will maintain a database recording all infestations, and areas affected. All sites will be inspected at least once between October and December each year, and the information updated.

Education:

- NRC will provide training to relevant NRC staff and stakeholders in the identification of plant pests to assist in surveillance.
- NRC will provide advice, and attend community meetings and field days.
- NRC will run publicity campaigns to educate the wider public about plant pests.

Research:

- NRC will work cooperatively with other agencies where further research is needed to identify management measures, potential impacts, pathways and/or behaviours.

Rules

1. No person shall sell, offer for sale, propagate, breed or multiply any nassella within the Northland region.
2. No person shall knowingly possess, distribute, transport or release any nassella (including any seeds or live vegetation) within the Northland region.
3. Every person who sees any nassella, or suspects the presence of any nassella, shall immediately report the sighting to the NRC.
4. The NRC may recover costs by direct charge to the occupier concerned, as provided for in section 135 of the Biosecurity Act 1993. The proportion of the cost recovered will be determined by the degree of difficulty in finding nassella seedlings, as affected by the vegetative cover on the land and in accordance with the NRC charging policy.

Nassella-infested areas are assigned to cost recovery categories as follows:

- **Category I** – surveillance sites, that is sites found free of nassella for the preceding three or more years. ***No cost recovery.***
- **Category II** – sites where nassella is still being found but which have been permanently retired from grazing and on which there is a full canopy cover of indigenous scrub or forest, or such a cover is being actively encouraged. ***No cost recovery.*** A plan to retire the land must be in accordance with a management plan and a Memorandum of Understanding agreed to by the land occupier and the Biosecurity Senior Programme Manager of the NRC. Any such agreement must be entered into before the annual programme.
- **Category III** – sites where nassella is still being found but which are being managed to encourage a dense, well grazed pasture with easy access and no obstructions which prevent plants being seen. ***20% cost recovery.***
- **Category IV** – sites where nassella is still being found, which have obstructions to access and visibility. Typically non- or lightly-grazed pasture with less than 10% scrub or scrubby weeds. ***40% cost recovery.***
- **Category V** – sites where nassella is still being found, which have major access problems and obstructions to visibility. Typically reverted pasture with greater than 10% cover of gorse or scrub, unpruned pine forest with long grass or scrub under storey or pine forest with heavy pruning and/or thinning slash. ***60% cost recovery.***

A breach of these rules, without reasonable excuse, is an offence under Section 154(r) of the Act.