

# PART V:

## Research Programme



# 22 RESEARCH PROGRAMME

## 22.1. Introduction

A comprehensive Biosecurity Research Implementation Plan (BRIP) will be developed, which will be implemented through the Council's Biosecurity Annual Operational Plan processes. The BRIP will allow ARC to assess potential pest organisms in order to determine whether they pose a significant risk to the Auckland region; potential pest pathways and vectors; and also alternative recommendable species. The BRIP will set out a standardised process for ARC Biosecurity staff to use when assessing potential pest organisms, and may include (but will not be restricted to) the following matters:

- the nature of the research required for each organism (e.g. research into potential impacts and characteristics; research into varieties, forms or hybrids that do not have significant impacts on biodiversity values; etc.);
- an assessment of how the research should best be undertaken (e.g. examination of existing research; commissioning or undertaking of new research; etc.);
- an assessment of the costs and benefits of different management options for each organism, should initial research indicate that impacts will be significant, including assessment of impacts upon affected parties;
- identification of beneficiaries of any likely ARC programmes and exacerbators of any problem caused by the organism, and identification of affected parties;
- a peer review process;

- a consultation process; and
- timeframes for undertaking/commissioning/ examining such research, cost-benefit assessments, peer review and consultation processes.

Depending on the outcomes of the BRIP for a particular organism, it may either be:

- proposed for inclusion as a pest during the next RPMS review (if the research shows that the organism poses a significant threat to the Auckland region, and cost-benefit analysis shows a net benefit for a management option); or
- dropped from the list of organisms to be researched (if the research shows that the organism does not pose a significant threat to the Auckland region, or if cost-benefit analysis does not show a net benefit for any management option); or
- kept on the list of organisms to be researched in the next RPMS review (if insufficient research has been undertaken during the lifetime of this Strategy to determine whether the organism poses a significant threat to the region and/or to enable a thorough cost-benefit analysis).

The organisms listed in Sections 22.2 and 22.3 below are those **currently** considered to require further research. ARC may, at its discretion, examine, undertake or commission research on any other organism throughout the life of the Strategy.

ARC welcomes contact from any parties (e.g. universities, research organisations, industry bodies, local authorities, etc.) interested in assisting ARC with research on any of the organisms listed in Sections 22.2 and 22.3 below.

## 22.2. Plant Species to be Researched

Further research is considered necessary on the plants listed in Table 22.2a below to determine whether they are considered ‘capable of causing at some time a serious adverse and unintended effect’ in relation to biosecurity values’ (Section 72(1)(c) of the Act). **The organisms listed in this section are not declared pests and there are no Rules or regulations with respect to these organisms.**

Some of the organisms listed in this section are currently being grown commercially and a few form a significant part of the horticultural industry. Inclusion of organisms within this section does not mean that they will be necessarily designated as pests in the future, but indicates that some parties have raised concerns about their potential impacts.

The plants listed in this section are those **currently** considered to require further research. ARC may, at its discretion, undertake or examine research on any other plant throughout the life of the Strategy.

Table 22.2a: Summary of Plant Species to be Researched

Common Name	Scientific Name	Reference
agapanthus (dwarf forms)	<i>Agapanthus</i> spp. & cultivars & hybrids	22.2.1
alder	<i>Alnus glutinosa</i>	22.2.2
bangalow palm	<i>Archontophoenix cunninghamiana</i>	22.2.3
bead tree	<i>Adenantha pavonina</i>	22.2.4
bear’s breeches	<i>Acanthus mollis</i>	22.2.5
Brazilian rattlebox	<i>Sesbania punicea</i>	22.2.6
Camphor laurel	<i>Cinnamomum camphora</i>	22.2.7
century plant	<i>Agave americana</i>	22.2.8
Chilean rhubarb	<i>Gunnera manicata</i>	22.2.9
Chinese fan palm	<i>Trachycarpus fortunei</i>	22.2.10
chocolate vine	<i>Akebia quinata</i>	22.2.11
Cretan brake	<i>Pteris cretica</i>	22.2.12
dally pine	<i>Psoralea pinnata</i>	22.2.13
feral olives	<i>Olea europaeus</i>	22.2.14
Furcraea species	<i>Furcraea</i> spp.	22.2.15
Guava	<i>Psidium guajava</i> & <i>P. cattleianum</i>	22.2.16
Loquat	<i>Eriobotrya japonica</i>	22.2.17
marram grass	<i>Ammophila arenaria</i>	22.2.18
Moreton Bay fig	<i>Ficus macrophylla</i>	22.2.19
porcelain berry	<i>Ampelopsis brevipedunculata</i>	22.2.20
queen of the night	<i>Cestrum nocturnum</i>	22.2.21

Common Name	Scientific Name	Reference
Queensland umbrella tree	<i>Schefflera actinophylla</i>	22.2.22
silky acacia	<i>Albizia julibrissin</i>	22.2.23
Sycamore	<i>Acer psuedoplanatus</i>	22.2.24
Sydney golden wattle	<i>Acacia longifolia</i>	22.2.25
Taiwan cherry	<i>Prunus campanulata</i>	22.2.26
wild tamarind	<i>Leucaena leucocephala</i>	22.2.27
Wongawonga vine	<i>Pandorea pandorana</i>	22.2.28

### 22.2.1 Agapanthus – dwarf forms

(*Agapanthus* spp. & cultivars & hybrids – dwarf forms only)

Dwarf agapanthus forms comprise a significant proportion of those currently sold within the region, and are widely planted in gardens and amenity plantings in the region. Some forms may be self-fertile and/or pollinate other forms or create hybrids, and some may be self-sterile. Of particular research interest is the need to determine the existence of sterile cultivars or forms.

### 22.2.2 Alder (*Alnus glutinosa*)

Alder is a tree native to the British Isles and Europe and is naturalised in New Zealand. It grows in moist or waterlogged sites and along rivers, sometimes forming pure stands. Alder fruits prolifically and its buoyant seed are spread by water.

### 22.2.3 Bangalow palm

(*Archontophoenix cunninghamiana*)

Bangalow palm, a native of eastern Australia, was originally brought to New Zealand by collectors in the late 1800s. Bangalow palm belongs to the same subtribe (*Archontophoenicinae*) as the native nikau palm (*Rhopalostylis sapida*). Bangalow palm is a rainforest species inhabiting gullies, stream banks and swampy areas in its natural range – similar habitats to nikau in New Zealand forests. It is self-fertile, sets large amounts of seed and has the potential to establish in native plant habitats.

### 22.2.4 Bead tree (*Adenantha pavonina*)

Bead tree, native to Southeast Asia, India, and Sri Lanka, is a coastal tree of both disturbed and intact forests. It is not recorded as naturalised or common in New Zealand. Information from other countries, where it is naturalised, suggests that it may be invasive. As a legume it is regarded as a potential weed threat because of its ability to fix nitrogen and affect soil fertility, form persistent seed banks, and produce large quantities of bird-dispersed seed.

### 22.2.5 Bear's breeches (*Acanthus mollis*)

Bear's breeches, a native of south-western Europe, is a herbaceous perennial that can form dense infestations under forest canopy and in dry, sandy conditions, suppressing regeneration of other species. Seed is spread via gravity, water and animals, and the plant can also spread vegetatively from root fragments. It is widespread in gardens and has naturalised in some coastal areas, along roadsides and in riparian areas.

### 22.2.6 Brazilian rattlebox (*Sesbania punicea*)

Brazilian rattlebox is a South American scrambling shrub up to 4m tall that invades saline, riparian, coastal and wetland habitats as well as disturbed sites such as roadsides. It is a serious weed in South Africa and North America where it invades native vegetation forming dense thickets, especially in damp areas. As a legume it produces copious seed numbers and seedlings can produce pods after only one year. Its seeds are highly toxic.

**22.2.7 Camphor laurel***(Cinnamomum camphora)*

Camphor laurel is a large tree up to 20m tall native to Japan, China, Korea and Taiwan. It has been declared a noxious weed in Queensland and New South Wales where large stands have developed, mainly along waterways, out-competing native forest. Camphor laurel produces profuse amounts of small black berries that are bird-dispersed. In large doses the berries are toxic to humans. It has been observed naturalising in bush in the region.

**22.2.10 Chinese fan palm***(Trachycarpus fortunei)*

Chinese fan palm is an evergreen palm growing to 20m in height. Widely planted as an ornamental species, it appears drought and cold tolerant, and has the potential to pose a threat to native bush and riparian areas. It may compete with some native understorey and edge species. Naturalised plants have been recorded on Little Barrier, Kawau and Waiheke Islands, as well as on the mainland in Manurewa, Epsom, Auckland Domain and near Lake Pupuke.

**22.2.8 Century plant** *(Agave americana)*

Century plant is a stout, succulent, rhizomatous perennial, with leaves in a basal rosette. It can tolerate extreme drought, wind, salt, high temperatures, and low fertility. It readily grows from plantlets set on flowering stems, which can be spread by water, soil movement, dumped vegetation and garden escapes. Century plant can colonise bare sand and replace vulnerable dune species. The sap can cause irritation, rashes and blistering, while spines on the leaves can also cause injury. It has been observed naturalising on coastal cliffs on Waiheke Island and at Scandretts Regional Park.

**22.2.11 Chocolate vine** *(Akebia quinata)*

Chocolate vine is a fast-growing twining vine or vigorous groundcover native to central China, Korea and Japan. It is shade and drought tolerant and can invade many types of habitats. It is naturalised in New Zealand and has been found climbing over indigenous shrubs. Once established, its dense growth prevents seed germination and seedling establishment of native plants. It is considered invasive in the United Kingdom and North America.

**22.2.9 Chilean rhubarb** *(Gunnera manicata)*

There are two species known commonly as Chilean rhubarb – *Gunnera tinctoria* and *Gunnera manicata*. The former is known to be invasive and has been included in this Strategy as a Surveillance species (refer section 8.2 above). The latter may or may not be invasive, however it is similar in appearance to *G. tinctoria*, which makes identification difficult and can sometimes result in *G. tinctoria* being sold and/or distributed with the label *G. manicata*.

**22.2.12 Cretan brake** *(Pteris cretica)*

This fern has a wide native range including Africa, Asia, Europe, and South America. It has been found naturalising in Auckland city, mainly in disturbed and modified sites.

**22.2.13 Dally pine** *(Psoralea pinnata)*

Dally pine (cut-leaved psoralea) is a 2-5 m shrub native to South Africa. It is a member of the legume family and as such produces many, long-lived seeds. It is a nitrogen fixer that thrives in poor soils e.g. gumland scrub, altering soil fertility and modifying the habitat to the detriment of native species. It has naturalised in many Australian states including Victoria, New South Wales, Tasmania and Western Australia. Dally pine has been long naturalised on roadsides and other disturbed areas in Auckland and is widespread on Great Barrier Island.

### 22.2.14 Feral olives (*Olea europaea*)

Feral olives are capable of inhabiting open scrub, forest margins and coastal areas, as well as offshore islands. The seeds of feral olives are bird dispersed. Olive trees are widely cultivated throughout the region, in orchards and as ornamental plantings. Research will focus on the impacts of feral olives and limiting spread of feral olives from cultivated plantings into natural habitats. Feral olives have been observed naturalising within urban areas of Auckland and in the inner Hauraki Gulf Islands.

### 22.2.15 *Furcraea* species

(*Furcraea selloa* and *F. foetida*)

*Furcraea selloa* and *F. foetida* are robust perennials with sword-shaped pliable leaves. The flowerheads of these two species grow to 5 m or 8-10 m respectively. *Furcraea* spreads by bulbils and has been observed naturalising on Kawau and Great Barrier Islands, and in coastal mainland areas.

### 22.2.16 Guava

(*Psidium cattleianum* & *P. guajava*)

Guava refers to two small prolifically-fruited trees up to 6 m in height. Originally from South America, both were brought to New Zealand as fruit trees. Aggressive weeds in other parts of the Pacific, including Raoul and Norfolk Islands, they have already naturalised in parts of the region. Guava can form thickets with dense mats of roots that make it difficult for other species to coexist.

### 22.2.17 Loquat (*Eriobotrya japonica*)

Loquat is a common garden planting, popular for its fruit. It has been observed naturalising in urban bushland and regional parks throughout the region. Loquat seeds are spread by kereru or through human-discarded fruit. Seedlings are moderately shade tolerant.

### 22.2.18 Marram grass (*Ammophila arenaria*)

Marram grass is a coarse perennial grass that has been widely distributed in New Zealand for the purpose of sand stabilisation. Its ability to accumulate sand effectively means that it gives rise to higher, steeper dunes than native sand dune vegetation. Its main impact on the environment is to reduce the availability of foredune habitat and coastal habitat between the high tide and frontal dune. However it is acknowledged that the species has considerable value in some situations, particularly inland dunes planted with pasture or plantation forest, where it is useful in preventing or ameliorating erosion.

### 22.2.19 Moreton Bay fig (*Ficus macrophylla*)

Moreton Bay fig, a native of Moreton Bay in Australia, starts life as an epiphyte, ultimately strangling the host tree. Trees can also establish on the ground or in cracks in rocks. They have been planted in northern parts of New Zealand as specimen trees, some of which are now huge. Morton Bay fig's pollinating wasp arrived in New Zealand during the 1990s, and fruit and viable seeds are now being produced. Naturalised seedlings have been recorded, some of which have been epiphytic in native trees in intact native forest. Many individual large Moreton Bay fig trees have significant cultural value.

### 22.2.20 Porcelain berry

(*Ampelopsis brevipedunculata*)

Porcelain berry is a deciduous woody vine native to China, Japan, Korea, and far eastern Russia. It invades riparian habitats, bush edges, and other open or partially shaded disturbed areas. The vine covers and shades out native shrubs and young trees. It spreads very quickly due to the seeds being eaten and dispersed by birds and has become a serious invader of the eastern United States. Porcelain berry is an ornamental plant in New Zealand but is not known to have naturalised.

**22.2.21 Queen of the night***(Cestrum nocturnum)*

Queen of the night is a shrub which reaches 1.5 m to 2.5 m in height. Originally from the West Indies and Central America, it was introduced to New Zealand as an ornamental species and has been widely planted. It produces pale green to greenish-white, very fragrant flowers from November to March and small, elliptic, white, glossy fruit. All parts of queen of the night are poisonous; both when fresh and dry. The plant has been recorded as naturalised in disturbed native bush in northern New Zealand.

**22.2.22 Queensland umbrella tree***(Schefflera actinophylla)*

Umbrella tree grows to 8 m tall and is native to northern Queensland. A prolific seeder, it is recorded as a weed elsewhere in Australia, Hawaii, Fiji, and Florida where, as a shade tolerant plant, it is capable of invading remnant bushland and undisturbed forests. It is commonly cultivated and has recently naturalised in the region.

**22.2.23 Silky acacia** *(Albizia julibrissin)*

Silky acacia is a 6-10 m tall tree native to the middle East and Asia. It prefers disturbed areas and is very drought tolerant. Silky acacia seeds have impermeable seed coats that allow them to remain dormant for many years. It is invasive in the US particularly in riparian areas where its buoyant legume seedpods are spread by water. Silky acacia is already naturalised in New Zealand and has been found in the region isolated from adult plants in disturbed areas.

**22.2.24 Sycamore** *(Acer pseudoplanatus)*

Sycamore is a deciduous tree up to 20 m in height, with smooth grey bark. Sycamore is monoecious and spreads by windblown seed. Sycamore has naturalised throughout New Zealand, particularly in modified or partially modified habitats.

**22.2.25 Sydney golden wattle***(Acacia longifolia)*

Sydney golden wattle is a perennial shrub or small tree with a spike of pale to golden yellow flowers. This species tolerates frost, extended dry periods and salt spray, and can inhabit shrubland, coastal areas, dry banks and river beds. Huge quantities of seeds are produced, which are dispersed locally by wind and gravity. Seeds may remain viable for up to 50 years. This species has been observed naturalising over large areas of coastal Northland and on Great Barrier Island.

**22.2.26 Taiwan cherry** *(Prunus campanulata)*

Taiwan cherry is a small deciduous tree, growing to 8m, which is common in gardens and as street amenity plantings, mainly in hybrid form. The plant can be spread through bird dispersed seed or vegetatively via suckering. It is able to colonise bush margins, canopy gaps and clearings, where it competes with regenerating native plants.

**22.2.27 Wild tamarind***(Leucaena leucocephala)*

Wild tamarind (also known as lead tree) is a tree legume native to Mexico and Central America. It has been reported as a weed in more than 20 countries across all continents except Europe and Antarctica. It is a weed of open, often coastal or riparian habitats, shrubland and other disturbed sites. It forms dense thickets and may replace native forest.

**22.2.28 Wongawonga vine***(Pandorea pandorana)*

Wongawonga vine is a woody climber with tubular white flowers, native to Australia. It is quick growing and can reach the canopy as well as layer on the ground preventing the establishment of native plant seedlings. It has been recorded as mainly spreading by vegetative means, and rarely by seeds. It naturalises in disturbed shrubland.

## 22.3. Animal Species to be Researched

Further research is considered necessary on the animals listed in Table 22.3a below to determine whether they are considered 'capable of causing at some time a serious adverse and unintended effect' in relation to biosecurity values' (Section 72(1)(c) of the Act). Further research may also be needed in order to clearly determine the most effective means of control, appropriate management regimes, and to allow for more consultation with all affected parties, if the animal is considered to be a significant threat to the region.

The organisms listed in this section are not declared pests and there are no Rules or regulations with respect to these organisms.

Some of the animals in this section are currently being sold in the region and some form a significant part of the pet industry. Inclusion of organisms within this section does not necessarily mean that they will be designated as pests in the future, but indicates that some parties have raised concerns about their potential impacts.

The animals listed in this section are those **currently** considered to require further research. ARC may, at its discretion, undertake or examine research on any other animal throughout the life of the Strategy.

Table 22.3b Summary of Animals to be Researched

Common Name	Scientific Name	Reference
Darwin's ant	<i>Doleromyrma darwiniana</i>	22.3.1
exotic reptile species:		
rainbow skink	<i>Lampropholis delicata</i>	22.3.2(i)
red-eared slider turtle	<i>Trachemys scripta elegans</i>	22.3.2(ii)
bearded dragon	<i>Amphibolurus barbatus</i> syn. <i>Pogona barbata</i>	22.3.2(ii)
eastern water dragon	<i>Physignathus lesueurii lesueurii</i>	22.3.2(ii)
shingleback lizard	<i>Trachydosaurus rugosus</i> syn. <i>Tiliqua rugosa</i>	22.3.2(ii)
feral peafowl	<i>Pavo cristatus</i>	22.3.3
galah	<i>Cacatua roseicapilla</i>	22.3.4
hare	<i>Lepus europaeus</i>	22.3.5
tree frog	<i>Litoria</i> species	22.3.6

### 22.3.1 Darwin's ant

*(Doleromyrma darwiniana)*

Darwin's ants are small brown ants similar in appearance and some behaviour to Argentine ants, to which they are closely related. Darwin's ants were first found in New Zealand in Penrose in the 1950s, where they were quickly eradicated. In New Zealand, Darwin's ants occur in enormous numbers and early observations suggest they displace other ant species in the area. They are omnivorous and feed on sweet substances, such as nectar, honeydew, ripe fruit, and protein (mostly in the form of other insects). There is a risk they will have significant environmental impacts through displacement of native ant species, predation on insects, and competition for resources.

### 22.3.2 Exotic reptile species:

#### (i) Rainbow skink

*(Lampropholis delicata)*

Rainbow skinks are originally from eastern Australia, with a natural range that extends from Queensland to Tasmania. Probably accidentally introduced to New Zealand in the 1960s, they now appear to be naturalised in Auckland, the Waikato, Coromandel, and the Bay of Plenty. Recent research has indicated that there may be competition, both direct and indirect, between rainbow skinks and native skink species.

At present, rainbow skinks are protected by default under the Wildlife Act 1953, and therefore cannot be declared pests within an RPMS. However, it is likely that in the future rainbow skinks will be added to the exemption list (Schedule 5 of the Wildlife Act 1953) as this list is currently being revised by DoC, or be declared an Unwanted Organism. This would then allow it to be declared as a pest in an RPMS. It is therefore considered appropriate that the ARC undertake research into its potential impacts and possible control measures.

#### (ii) Bearded dragon

*(Amphibolurus barbatus syn. Pogona barbata)*

#### Eastern water dragon

*(Physignathus lesueurii lesueurii)*

#### Red-eared slider turtle

*(Trachemys scripta elegans)*

#### Shingleback lizard

*(Trachydosaurus rugosus syn. Tiliqua rugosa)*

The four exotic reptile taxa listed above form part of a pet trade in New Zealand that has grown in popularity over recent years. There is potential for some of these species to adversely impact on New Zealand's ecology if they escape from containment, as discussed in section 10.3.4 of this Strategy. In that section, they are declared as pests **only** where they are not held in secure containment.

The four taxa are also contained within this section of the RPMS, to indicate that ARC will undertake further research on the potential impacts of the species and the likelihood of establishment in the wild. It is noted that the Rules in section 10.3.4 do not currently affect the ability of persons to keep these species as pets or to trade, sell, breed or distribute these species.

### 22.3.3 Feral peafowl *(Pavo cristatus)*

Peafowl (peacocks and peahens) has established feral populations in a number of places around the world, generally in forests and cultivated areas adjacent to human settlements. There are several feral populations in the Auckland region. Feral peafowl eat grain, insects, small reptiles, and small mammals. Populations can reach large numbers, however their impacts on native species and primary production are not known.

### 22.3.4 Galah (*Cacatua roseicapilla*)

Introduced from Australia as cage birds, galahs have escaped containment and established in South Auckland and the northern Waikato, as well as on some islands in the inner Hauraki Gulf. They are gregarious and believed to be breeding in the wild in New Zealand. A flock of up to 35 birds has been reported. Information about their diet and longevity in New Zealand is lacking but in Australia they feed mainly on the ground. Potentially, galahs could compete with native bird species for food and nesting sites, and impact upon primary production.

### 22.3.5 Hare (*Lepus europaeus*)

Hares (*Lepus europaeus occidentalis*) are easily distinguished from their close relative, the rabbit, by their much greater size, long black tipped ears and larger muscular hindquarters. Hares can cause damage to new tree plantings and horticultural crops, amenity plantings and shelterbelts, by nipping out the tops of the seedlings.

### 22.3.6 Tree frog (*Litoria* spp.)

The genus *Litoria* comprises frogs native to Australia, Bismarck Archipelago, Lesser Sunday Islands, Moluccan Islands, New Guinea, Solomon Islands and Timor. Several *Litoria* species have been introduced to New Zealand, including the green and golden bell frog (*Litoria aurea*), southern bell frog (*Litoria raniformis*) and brown tree frog (*Litoria ewingii*). The bell frogs are not considered to compete to any great extent with the native frog species, however the brown tree frog does occupy a similar ecological niche. Although established populations of tree frogs are known, more research is needed into their effects on native species. It is noted that *L. aurea* and *L. raniformis* are almost extinct in their native Australia; therefore New Zealand has obligations under the 1993 International Convention on Biological Diversity.