Early detection of invasive weeds on islands

S. M. Timmins and H. Braithwaite

Science and Research Unit, Department of Conservation, P.O. Box 10420, Wellington, New Zealand, E-mail: stimmins@doc.govt.nz

Abstract Early detection of new invasive alien plant species (weeds) allows for early control. This improves the chances of successful eradication and minimises the impact of such weeds on biodiversity. Both are imperative on islands with high conservation values. Searching for new weeds is particularly important where there are roosts of seed-dispersing birds, a history of garden cultivation, or where neighbouring islands are weedy. Success with detection and control of new weeds on New Zealand islands has been variable. Sometimes infestations have been found when there were less than 10 individuals allowing immediate eradication. More commonly, early sightings have not been followed by prompt action, and infestations have become more expensive to control. Where detection has been too late to eradicate the weed, conservation values have been compromised. This paper gives examples of detection and control of weeds on New Zealand islands and anticipates an improvement in both with the development of a systematic approach to weed surveillance.

Keywords Invasive alien plants; early detection; weed surveillance; weed control; weeds; islands.

INTRODUCTION

New Zealand is a weedy place – both on the mainland and on its multitude of islands (Buddenhagen et al. 1998). In a study of the invasive alien plant species (weeds) on over 200 of New Zealand’s islands (176 offshore and 36 outlying islands 5 ha or larger), 63% of the offshore islands and 19% of the more remote “outlying” islands had one or more invasive weed species (Atkinson 1997). The incidence was highest for islands in the northern part of New Zealand (4.3 weeds per island) and lowest for outlying islands (0.9 weeds per island). Some weeds have only a transitory effect but many can modify the structure of natural communities on islands and disrupt succession (Towns et al. 1997). In all, Atkinson (1997) identified 94 species requiring some level of control on the islands in the study and recommended that the most cost-effective way to manage weeds on islands is to detect weeds early and eliminate them before they establish properly. A system to achieve this, both on islands and the mainland, is described in the Weed Surveillance Plan for the New Zealand Department of Conservation (DOC; Braithwaite 2000). The system prompts timely and accurate identification of new populations of invasive weeds (i.e. those that are newly naturalised or established in an area). This weed surveillance system emphasises the importance of finding new weed infestations early, when effective action is still possible and before the cost of control escalates and the weed infestation has compromised natural values (Fig. 1). The system captures weed sightings from deliberate searching and casual observations of both members of the public and reserve managers (Braithwaite and Timmins 1999, 2000). The Surveillance Plan is consistent with the IUCN guidelines for eradication and control of invasive species, viz. early detection and rapid action are the keys to successful, cost-effective eradication of new invasives (IUCN 2000).

Fig. 1 Weed surveillance: the ideal pathway to minimise costs and maximise biodiversity.

Globally, there has been insufficient ongoing monitoring in natural areas to detect infestations early (Mack et al. 2000). This has compromised our ability to eradicate invasive species (Myers et al. 2000). All cases of successful control of invasive plant species were initiated during the early stages of invasion (Macdonald et al. 1989). It seems that usually there is no recall once a species becomes established and begins to spread (Mooney and Drake 1989).

The Weed Surveillance Plan aims explicitly to increase watching for weeds in New Zealand. The Plan recognises the need for different sorts of surveillance for different circumstances. Surveillance may focus on particular species or particular places. Those places may be vulnerable to invasion by weeds or they warrant searching because they are of high conservation value. The surveillance effort may be an active search of a site, but it is also possible to follow-up fortuitous sightings or use existing information (Braithwaite 2000).

Islands deserve weed surveillance attention because of their conservation value and their vulnerability to weeds. Some islands (e.g. the Poor Knights, Three Kings and the Kermadeces (Fig. 2)), support endemic plant species. Others have healthier populations of native species than are found on the mainland (e.g. milk tree (Streblus heterophylla) on Mana, Maud or Stephens Islands). Other islands are the breeding places for threatened fauna. Weeds can directly threaten these valuable assets.

Internationally, islands tend to have more invasives than mainland sites of similar area (Lonsdale 1999). Atkinson (1997) identified five major factors influencing the spread of weeds to New Zealand islands: (1) weed infestations on adjacent mainland or neighbouring islands, (2) source of weed propagules close-by, (3) location in the path of pre-
vailing winds and potential weed sources, (4) roosts of the introduced starling (*Sturnus vulgaris*), and (5) history of garden cultivation.

Islands with these features are likely to be vulnerable to weed invasion and thus benefit most from regular weed surveillance. In a general sense, Rejmanek (2000) suggested that even a moderate increase in resources for early detection and eradication of invasive weeds would be a profitable investment. This has been confirmed for New Zealand. The appropriate frequency of such surveillance searches is a function of the biodiversity value of the island and its risk of weed invasion. A model for establishing surveillance frequency has been developed for mainland reserves (Harris *et al.* 2001).

**Challenges**

Finding a weed early is difficult enough on the mainland: islands pose extra challenges. Foremost among these is that islands are often difficult or expensive to get to. As a result, they may be visited infrequently, so that casual observations of new weeds are few. Also, island expeditions are invariably multipurpose and may be mounted in the wrong season for weed spotting. The dissected terrain of some islands also makes spotting and control of weeds difficult. Raoul Island, in the Kermadec group, provides a good example. A concerted effort has been made to control Mysore thorn (*Caesalpinia decapetala*), which is now uncommon there. However, the disturbed cliff sides cannot be safely inspected because they are too steep and dissected (West 2002).

As if the islands themselves don’t provide enough challenges, weed surveillance of islands must also include checking and controlling weeds on adjacent mainland or island sites, particularly at take-off sites which are in line with the prevailing wind or the flight paths of bird-dispersers. For example, weed surveillance on Rangitoto Island (Fig. 2), near Auckland City, is complemented by control of weeds on nearby Motutapu Island, Browns Island, and North Head on the mainland. On Motutapu the species controlled include: barberry (*Berberis glaucocarpa*), boxthorn (*Lycium ferocissimum*), Chinese privet (*Ligustrum sinense*), hawthorn (*Crataegus monogyna*), monkey apple (*Acmena smithii*), Moreton Bay fig (*Ficus macrophylla*) and Port Jackson fig (*F. rubiginosa*), and on Browns Island Japanese spindle tree (*Euonymus europaeus*) is controlled to protect Rangitoto. None of these species are known to be present on Rangitoto (J. Wotherspoon pers. comm.). Another type of preventative action is checking for weeds in the plants brought to islands for restoration work. Plants brought to Mana Island and Matiu Island, near Wellington, are always checked for stowaway weed seeds or plants (Miskelly 1998).

The risk of weed invasions is further compounded by starling roosts or a long history of garden cultivation; both of which are common features of islands. Lighthouse islands have more naturalised plants than their unlit (no lighthouse) island neighbours because lighthouse keepers often established a garden and some of those garden plants escaped and spread. For example, Cuvier Island off Coromandel Peninsula (Fig. 2) has a lighthouse that was continuously staffed for 93 years (1889 to 1982). Today the flora of Cuvier Island is 35% adventive. This compares with Red Mercury Island, its unlit neighbour of similar size, whose flora is only about 12% adventive (J. Roxburgh pers. comm.).

The dilemma when finding an unknown plant species is exacerbated on an island. Is the unknown plant a weed or a threatened species? On an island the latter could well be true; if that proves to be the case, it would be distressing to have pulled it out. But if the plant proves to be a weed, how quickly can you get back to control it? This confusion occurred when white bryony (*Bryonia cretica* subsp. *dioica*) was ‘discovered’ in Makino Reserve near Wanganui (North Island of New Zealand). At first it was thought to be the threatened curcubit *Sicyos australis*. When it flowered and fruited the truth was revealed: it was white bryony, a bird-dispersed weed with massive tubers (C. Ogle pers. comm.). Although it had not been recorded in New Zealand before, the species had probably been in the area, at several locations but unrecognised, for a very long time.

Prior to the publication of the Weed Surveillance Plan, visitors to islands occasionally detected and reported new
weed incursions. Sometimes the sightings were made by reserve managers doing weed work; sometimes by other staff such as those eradicating animal pests or translocating a threatened species. Some of these sightings were promptly acted upon; others were not. This paper reports examples of the mixed history of surveillance and action on islands in recent years, including both success stories as well as failures. For the most part we have collected our examples by talking with reserve managers working on islands.

SUCCESS STORIES: EARLY DETECTION AND PROMPT ACTION

Pampas grass (*Cortaderia selloana*) seed was introduced to Raoul Island (Fig. 2) when a retaining wall was built there. When pampas plants were spotted on the wall, they were promptly pulled out, as were a handful of adults in successive years (West 1996). The aim is to keep pampas grass off Raoul because it would readily colonise the open coastal faces and displace native plants.

Ragwort (*Senecio jacobaea*) on Raoul Island has a similar story. In 1980 a single plant was found near Mahoe Hut; perhaps seed came in with building materials for the hut. It too was pulled out at once and although the site has been checked regularly since, no further ragwort plants have been seen. On Raoul, ragwort could flower year round and thus it could have readily colonised the coastal slopes (West 1996). In both instances prompt action averted these exotic colonists establishing on Raoul’s coastal cliffs (Fig. 3). In 1998, a sharp-eyed weeder on Raoul Island found selaginella (*Selaginella kraussiana*) (West 2002). It was sprayed soon after it was positively identified, but it keeps emerging at the same site. The site now has a new alerting the presence of selaginella and any visitors are required to clean their boots in hot soapy water after visiting the site to prevent further spread of selaginella on Raoul (A. Warren pers. comm.).

On the subantarctic Campbell Island (Fig. 2), Colin Meurk spotted lotus (*Lotus pedunculatus*) around the old meteorological station in Tucker Valley. It was sprayed, and regular checks (1976–1996) have not detected it since (e.g. Meurk 1989). Another success story comes from the Hen and Chickens Islands south of Whangarei (Fig. 2). A small infestation of needlebush (*Hakea sericea*) was found in 1996 and the plants were pulled out immediately. They had already set seed, so it took a further two seasons of pulling out seedlings to eradicate it (G. Coulston pers. comm.). Banana passionfruit (*Passiflora mollissima*) on Kapiti Island, near Wellington is a similar story. When found seven years ago it was controlled promptly, so now there are no adult plants of this weed left on the island. A few juveniles grow each year from a seedbank that is likely to exist for some time but they too are promptly pulled (Russell et al. 2001). Mist flower (*Ageratina riparia*) was first recorded on the Poor Knights in 1991 and control started in 1994. Prompt action meant that this species was eradicated (G. Coulston pers. comm.).

In 1999, climbing dock (*Rumex sagittatus*) was found at one bay on Maud Island in the Marlborough Sounds (Fig. 2). The spotter was a member of the team managing the endangered kakapo (*Strigops habroptilus*). The infestation is now under control with a good chance of containment — a situation made possible by reporting a casual observation of a plant that looked a bit different (M. Newfield pers. comm.).

Two stories from Stewart Island (Fig. 2) are not such clear-cut successes. German ivy (*Senecio mikanioides*) was found in September of one year and treated the following summer — now all that is required is yearly checking and control of any regrowth at that site, but a further site has been found. When a reserve manager found selaginella, not previously known on Stewart Island, the first step was an advertising campaign, including talking to the next local Garden Group meeting. This identified several more infestations, also all on private property. One site was treated the following summer but more control, and a full survey, is needed to meet the aim of eradicating selaginella from Stewart Island (C. Wickes pers. comm.).

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Fig. 3 Raoul Island – regular weed surveillance is essential to keep the coastal cliffs free of new weed colonists (Photo: Rachael Barker).
FAILURES: TARDY DETECTION AND INEFFECTIVE CONTROL

Prior to the release of the Weed Surveillance Plan, detection of weeds was more ad hoc and prompt control did not always follow detection. There were, and are, several stumbling blocks to effective surveillance. The most fundamental is not detecting the new weed incursion – because searching is too infrequent, in the wrong season to spot the weed, or the terrain obscures the searcher’s vision. Even when a new incursion is spotted, sometimes the species is not recognised as a weed and thus not reported; or the incursion is reported but there are insufficient resources to attack it immediately; or the incursion is larger than first thought. Perhaps most frustrating is when a new incursion is spotted and eliminated, but the species continues to re-invade. The following examples illustrate some of the costs of delayed detection and/or control of invasive weeds.

In 1998 a large infestation of moth plant (Araujia sericifera) was found on Cuvier Island. It was removed, but the next year an extraordinarily thick carpet of seedlings appeared. Despite five re-treatments of the dense seedling mat, seeds still continue to germinate. It will be hard to eradicate moth plant from the island because it was already well established when it was found (J. Roxburgh pers. comm.). Similarly, moth plant was not recorded on Hen and Chickens Islands until 1996 but by then the main infestation was already 0.2 ha (G. Coulston pers. comm.). Delayed detection, plus continual re-invasion from the mainland, means eradication is unlikely.

By contrast, on Lady Alice Island delays in taking management action against Mexican devil (Ageratina adenophora), mist flower and pampas grass make it unlikely that these can now be eradicated (G. Coulston pers. comm.). Mexican devil at least has been known on this island for some years (Cameron 1984). For holly-leaved senecio (Senecio glastifolius) on Mana Island near Wellington, the stumbling block was frequency of surveillance. Although the weed was found and pulled out during a botanical survey of Mana Island in the 1980s, subsequent searching for this species on the island has been too infrequent so now the weed is quite widespread (Sawyer pers. comm.; Timmins et al. 1987). Conducting surveillance often enough is even more difficult for remote islands.

Sometimes new weed incursions have been found in good time but control has been tardy or sporadic. Evergreen buckthorn (Rhamnus alaternus) was first recorded on Rangitoto Island, on the summit, in the 1920s (J. Wotherspoon pers. comm.). It would have been much easier to control that single infestation than the now-dense coastal fringe of evergreen buckthorn that displaces native coastal shrubs and herbs. Similarly, mile-a-minute (Dipogon lignonius) was found on Rangitoto Island in 1990, but not controlled, so now there are several persistent patches of this weed on Rangitoto. A similar tale can be told for two grasses on other islands. Veld grass (Ehrharta erecta) was reported on Kapiti Island in 1982 (Ogle 1988). No action was taken so now this grass, which is shade tolerant, is widespread along Kapiti’s coast and also spreading into the forest (Colbourne pers. comm.). It forms mats that overwhelm low-growing native plants and outcompete tree seedlings (Ogle 1988). It would be difficult to eradicate as it produces abundant seed for much of the year. Pampas grass was found on Cuvier Island in 1993 but not until 1998 were there resources to start control. By then it was firmly established and the chance to keep the cliffs free of pampas grass had probably been lost (J. Roxburgh pers. comm.).

Mouse-ear hawkweed (Hieracium pilosella) has been managed sporadically on Codfish Island off Stewart Island for many years. Because it has not been regularly treated, nor the area thoroughly searched for hawkweed, the infestation is now quite large and hard to eliminate—it would have been easier if it had been treated systematically earlier (C. Wickes pers. comm.).

Sometimes a weed species has been detected on an island, and perhaps even some control work initiated, but because there was no systematic follow-up surveillance and control, the species has established. For example, Atkinson (1984) first noted evergreen buckthorn on Motuhoropapa Island, in the Noises group off Auckland. He removed several plants. In 1993 the Auckland Botanical Society also removed several plants from there, and in 1994 a single plant was uprooted on another island in the group, Otaia Island. The New Zealand School of Outdoor Studies were encouraged to control evergreen buckthorn when they visited these islands and they have removed 147 individuals over three visits to Motuhoropapa Island. Despite the best efforts of the various groups in the last few years, the population has expanded and is beyond easy control on the latter island at least (G. Wilson pers. comm.). Perhaps systematic action in the early 1990s would have prevented this population expansion. Fortunately current control has prevented it taking hold on Otaia. A rather similar story can be told for bone-seed (Chrysanthemoides monilifera subsp. monilifera) on Red Mercury Island, first recorded in 1993 as about 50 plants, mostly so small that they could have been hand pulled. It was left to spread quietly until 1998 when the control effort had to include some abseiling to the infestations. Fortunately, further control efforts appear to have reduced the infestation to occasional plants (J. Roxburgh pers. comm.).

Mexican devil was present on the Poor Knight Islands, Northland from about the 1970s but control did not start until 1994, when several thousand plants were controlled on each visit. Eradication may still be possible, despite the risk of low-level re-infestation from the mainland 20 km away. Success would have been far more likely had control started sooner (G. Coulson pers. comm.).

Old man’s beard (Clematis vitalba) has been known from Maud Island for more than 20 years. Back in the 1980s there were just a few widely separated plants that were pulled out when found (Department of Lands and Survey...
1981). Since then control has been opportunistic and the old man’s beard vines have probably been more difficult to spot in the increasingly dense scrub. Not until 2001 was any formal effort made to control old man’s beard and now it is a huge task (M. Newfield pers. comm.). Similarly, a 1980 species list for Maud Island mentions tree mallow (Lavatera arborea) as present as one plant on a cliff (Department of Lands and Survey 1981). This weed, that overtops the native coastal cliff vegetation of nearby Brothers Islands, is now common around the house and main farm areas – too common for eradication to be considered (M. Newfield pers. comm.). So too, for Darwin’s barberry (Berberis darwinii) on Stewart Island. Wilson (1982) reported it as an aggressive weed but only recently has a control programme started. Now eradication will be difficult – probably impossible – because Darwin’s barberry has been used as a hedging plant on Stewart Island for years (C. Wickes pers. comm.).

Sometimes, even with the best programme of surveillance, our eradication efforts are stymied by re-invasion. For example, regular surveillance and control of boxthorn on the Sugar Loaf Islands, offshore from New Plymouth, prevents boxthorn reproducing or becoming large enough to ensnare birds. However, eradication is unobtainable because the starving roost there ensures continual re-invasion so surveillance and control must be ongoing (B. Williams pers. comm.).

DISCUSSION

The basic principles for surveillance apply to islands as they do for the rest of New Zealand (Braithwaite 2000). In particular, islands with high conservation value or those that are vulnerable to new weed incursions are our highest priority for island weed surveillance. Taking the first point, separation from the mainland means many islands have suffered less human interference than their mainland counterparts. This physical separation and lack of disturbance makes many islands potential refuges for preservation of threatened species, thus further increasing their conservation value.

As the above examples tell, weed surveillance on islands has often been sub-optimal, allowing small weed incursions to spread and become huge infestations. In part, this is due to the several factors that increase the vulnerability of islands to new weed invasions. Visitors increase the risk of new weeds. This has been shown for mainland reserves (e.g. Macdonald et al. 1989) and holds true even when the effect of reserve size and species richness is taken into account (Lonsdale 1999). It has also been shown for islands, for example, on the French subantarctic islands (Frenot et al. 2001). On these islands, the main vectors of alien species are the routine supply ships. The risk of new weed introductions increases with the number of visitors, the frequency of visits, and varies with the type of visitor. Even people doing weed control can pose a risk. They must be particularly vigilant to ensure they don’t transport weed propagules from control sites to clean sites. While more visitors can mean more weeds, the converse is that visitors improve the chances of a new weed incursion being spotted early. It is anticipated that the advent of a systematic approach to surveillance, including good follow-up, will change the balance in favour of a net reduction in weed problems.

Islands that have been or are occupied, are more likely to get weeds. If gardens have been established then the risk is greater (Sullivan et al. 2001). Similarly, islands are more vulnerable to weed invasion if they are down-wind from a source of wind-borne seeds, or are visited by birds from areas with bird-dispersed seeds. Often it is natural disturbance such as erosion or slips that make it possible for these weed propagules to establish. Historically, boat owners have accidentally brought weeds to islands or even deliberately planted trees or other exotic plants on islands. Although many islands have restrictions on access, these can be difficult to enforce. For example, people on vessels visiting Little Barrier Island are required to obtain a permit before landing, but visitors without permits occasionally land and spend time on the island before being asked to leave (Braithwaite 2000).

Already the Plan has served to increase weed surveillance activity on islands. This is especially so for some islands in the Hauraki Gulf (Fig. 2); Great Barrier, Mokohinau, Rangitoto and Tiritiri Matangi Islands were searched in early 2001. Banksia (Banksia integrifolia) was discovered on Rangitoto and the bidibid (Acena agritapa) and Senma sp. were found on Tiritiri Matangi Island (G. Wilson pers. comm.).

The efficacy of weed surveillance on islands is improved by having a search image. Weed Surveillance Lists have been prepared: lists of species to watch out for in particular geographical areas, with accompanying species information sheets and illustrations (Newfield 2001). A list comprises species that are not recorded in that area, or have very limited distribution, yet have the potential to become invasive weeds there. Often the species will be weeds in an adjacent area. The lists are not comprehensive but usually focus on species that are the most damaging or the most likely to appear. An example of a special list for islands is given in Table 1. Weed surveillance on islands is greatly enhanced by having a full plant list for each island, kept up to date by a botanist who is responsible for identifying specimens and giving advice on the status of any plant species found on the island. This situation applies to some New Zealand islands such as Raoul Island (A. Warren pers. comm.).

Despite the increase in purposeful surveillance, many reports of weeds on islands will still come, as in the past, from fortuitous finds by members of the public (Braithwaite and Timmins 2000). For example, members of the Auckland Botanical Society found evergreen buckthorn in the Noises as described above. Similarly, on Mana Island, members of Wellington Botanical Society found some brush wattle (Parasenianthes lophantha) and hacked them out (Timmins et al. 1987). Alerted to its presence, the re-
These species have not been recorded, or are of very limited distribution, on islands in the Hauraki Area. They have the potential to become invasive weeds on Hauraki islands (i.e. those islands in the jurisdiction of the Department of Conservation’s Hauraki Area Office).

<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>monkey apple</td>
<td>Acmena smithii</td>
<td>Tree. Scented shiny green leaves, white flowers, large white berries.</td>
</tr>
<tr>
<td>century plant</td>
<td>Agave americana</td>
<td>Huge succulent with rosette of thick, pointed leaves. Tall flower stalk with yellow flowers.</td>
</tr>
<tr>
<td>Mexican devil</td>
<td>Ageratina adenophora</td>
<td>Sprawling shrub, red stems, triangular leaves with sticky hairs, white flowers.</td>
</tr>
<tr>
<td>mist flower</td>
<td>Ageratina riparia</td>
<td>Similar to Mexican devil, but with longer, narrower leaves.</td>
</tr>
<tr>
<td>bangalow palm</td>
<td>Archontophoenix cunninghamiana</td>
<td>Like the native nikau palm, but with long straight crownshaft (not goblet-shaped), leaves Y-shaped when young.</td>
</tr>
<tr>
<td>moth plant</td>
<td>Araujia sericifera</td>
<td>Vine with stark white flowers, large green pods, and sticky milky sap.</td>
</tr>
<tr>
<td>climbing asparagus</td>
<td>Asparagus scandens</td>
<td>Climber, wiry stems, fine foliage, orange berries, underground tubers.</td>
</tr>
<tr>
<td>Darwin’s barberry</td>
<td>Berberis darwinii</td>
<td>Shrub. Small, dark green holly-like leaves and small orange flowers.</td>
</tr>
<tr>
<td>climbing spindleberry</td>
<td>Celastrus orbiculatus</td>
<td>Deciduous vine, foliage yellow in autumn, fruit with “spindle” splits when ripe, red seed inside yellow capsule.</td>
</tr>
<tr>
<td>bone-seed</td>
<td>Chrysanthemoides monilifera</td>
<td>Bushy shrub. Yellow daisy-like flowers. Orange berries with hard black seed.</td>
</tr>
<tr>
<td>subsp. monilifera</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pampas grass</td>
<td>Cortaderia selloana</td>
<td>Large clump-forming grass to 3 m tall. Fluffy seed heads on tall straight stems.</td>
</tr>
<tr>
<td>cotoneaster</td>
<td>Cotoneaster spp.</td>
<td>Spreading evergreen shrub, smooth leaves, small scarlet berries.</td>
</tr>
<tr>
<td>fairy crassula</td>
<td>Crassula multicava</td>
<td>Creeping succulent. Small, red-spotted leaves. Delicate pink flowers, plantlets.</td>
</tr>
<tr>
<td>needlebush</td>
<td>Hakea sericea</td>
<td>Large spreading shrub, leaves spiny, beaked woody fruit.</td>
</tr>
<tr>
<td>lantana</td>
<td>Lantana camara</td>
<td>Scented shrub covered in small prickles, with mixed-coloured flowers: cream and pink, yellow and dark orange.</td>
</tr>
<tr>
<td>boxthorn</td>
<td>Lycium ferocissimum</td>
<td>Dense, very spiny evergreen shrub, orange fruit.</td>
</tr>
<tr>
<td>drooping prickly pear</td>
<td>Opuntia vulgaris</td>
<td>Huge cactus, flat oval stems, long spines, yellow flowers, brownish-red fruit.</td>
</tr>
<tr>
<td>saltwater paspalum</td>
<td>Paspalum vaginatum</td>
<td>Stoloniferous grass growing in intertidal areas.</td>
</tr>
<tr>
<td>black passionfruit</td>
<td>Passiflora edulis</td>
<td>Vine with white passion-flower, large black fruit.</td>
</tr>
<tr>
<td>banana passionfruit</td>
<td>Passiflora mollisima, P. mixta</td>
<td>Vines with pink passion-flower, long yellow fruit.</td>
</tr>
<tr>
<td>Phoenix palm</td>
<td>Phoenix canariensis</td>
<td>Large palm with spines and massive basal stem.</td>
</tr>
<tr>
<td>cherry or plum</td>
<td>Prunus spp.</td>
<td>Deciduous small trees, crimson drupes.</td>
</tr>
<tr>
<td>evergreen buckthorn</td>
<td>Rhamnus alaternus</td>
<td>Thorny shrub with glossy, toothed leaves, green flowers, berry black with three seeds.</td>
</tr>
<tr>
<td>woolly nightshade</td>
<td>Solanum mauritianum</td>
<td>Smelly shrub, large soft leaves, purple flowers, clusters of large yellow berries.</td>
</tr>
<tr>
<td>brush cherry</td>
<td>Syzygium australe</td>
<td>Tree, scented shiny red-tipped leaves, white flowers and oval pink berries.</td>
</tr>
<tr>
<td>windmill palm</td>
<td>Trachycarpus fortunei</td>
<td>Tall palm, matted fibres cover stem, fan-shaped leaves, bluish-black berries.</td>
</tr>
</tbody>
</table>

These species are not the only possible new weeds. If you find any of the above plant species, or a plant that is unfamiliar or seems out of place, contact weed staff at the Department of Conservation Hauraki Area Office or Environment Waikato. Summary sheets with information and an illustration are available for each species.

List supplied by David Stephens, Waikato Conservancy, Department of Conservation, Hamilton.

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serve managers removed the other enclaves of brush wattle found over successive years, so now Mana is free of adult plants of this weed (J. Sawyer unpub. data). This stream of casual weed reports will be enhanced by increasing public awareness of weeds through talks, newspaper items and signs, and from encouraging groups such as botanical societies to report their fortuitous finds (Timmins and Blood in press).

CONCLUSION

Weed surveillance favours the early detection and control of weeds: it improves our chances of eradication and minimizes ecological damage. This weed wisdom is imperative on islands with high conservation values, difficult access and infrequent visitors. The alternative to active surveillance is to wait until an infestation is found by chance; a risky approach on islands with high conservation values and/or vulnerability to weed invasion. New Zealand’s track record for weed surveillance on islands is variable, but it is anticipated that chances of success will improve with the recent development of the Department of Conservation’s Weed Surveillance Plan. Our chances of finding new weed incursions increase by searching in vulnerable places such as track edges, boat ramps, slip faces, bush margins, coastal fringes and under starling roosts. Weed surveillance on islands is greatly enhanced by having a list of weed species to watch out for on each island. We want all visitors to islands to be alert for new weeds – those on the list as well as the unexpected – and to report any plant that seems out of place.

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REFERENCES


