Poor Knights Islands weed control programme

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Abstract

An evaluation of the current weed control programme on the Poor Knights Islands has highlighted a number factors which will have a bearing on future management of the islands. Principally, the goal of this programme is not eradication of the target species but is sustained control. The difference between these two goals is important and needs to be understood by managers. In addition, the major factor which will prolong the term of the weed control programme on the Poor Knights is the massive seed source on the adjacent mainland. Efforts need to be made to. reduce populations of weed species on the mainland by working with landowners and regional or district councils. A small number of species could be considered for addition to the control programme. Lastly, the current control programme is very soundly based and just a few minor suggestions are made which should improve its effectiveness.

1. Introduction

The Poor Knights Islands are a Nature Reserve with high indigenous biodiversity and, now, no introduced mammals. They are regenerating from past clearance and the presence of pigs (Aorangi only), and are home to a number of threatened and local plant and animal species. These values plus their distance from most mainland impacts render the islands of high conservation significance.

Weed control has been undertaken on the Poor Knights since 1990 and has been organised into 6-monthly weeding expeditions since 1994 (Bowden & Bowden 1996, Sinclair 1997). In September 1996 I joined one of the regular weed eradication trips to the Poor Knights Islands. The purpose of this visit was to observe the effectiveness of the operation on the ground and to evaluate the principles set out in the weed eradication strategy and operational plan for the Poor Knights Islands (Bowden & Bowden 1996). In addition I assisted with weeding, added some species to the vascular plant list (see Appendix), and collected a few specimens of vascular plants to provide voucher specimens. The latter were deposited in the herbarium of the Auckland Institute and Museum.

In the company of Noel Henry (leader) and Glen Coulston (both from Whangarei Field Centre) plus Bill Durham and Sarah Gibbs (volunteers) we arrived at Tawhiti Rahi late in the afternoon of 3 September 1996, aboard the *Lady Jess.* On 4 September we located, searched and weeded all plots north of the campsite at Shag Bay. New weed sites were also located, and a track was flagged along the plateau to keep subsequent parties away from areas of petrel burrowing. On the morning of 5 September the area south of the camp was searched. All previously known sites were relocated, searched and weeded and no new sites were found. That afternoon a new site was found on the

northern side of Shag Bay. On the morning of 6 September we left Tawhiti Rahi and headed for Aorangi. While waiting for the swell to subside at the landing we circumnavigated Aorangi, and some of the party rebaited rat traps placed around the island. Finally, the Aorangi party was landed and I returned to Tutukaka with Bill Durham. Details of the entire trip are provided by Henry (1996).

2. Background

From a list of 41 adventive species compiled from floras of Wright (n.d. a, b) five species of weeds have been targeted for eradication from the Poor Knights Islands (Bowden & Bowden 1996). These species are mist flower (*Ageratina riparia*), Mexican devil (*A. adenophora*), moth plant (*Araujia sericifera*), pampas (*Cortaderia selloana*) and ragwort (*Senecio jacobaea*). All of these species have wind-dispersed seeds.

Twice a year, usually in March and September, the islands are visited and weeded. The September visit is timed to coincide with the onset of flowering of Mexican devil so that the number of plants which might flower and set seed is reduced. The March visit is timed to coincide with the flowering of pampas and to remove any seeding plants of moth plant before all of the seeds are dispersed during the winter months.

All sites where weeds have been found are marked and numbered. The species and numbers of weeds removed from each site are documented and reported on following each trip. Details of the operational procedure and methods are given by Bowden & Bowden (1996)

3. Analysis

3.1 LOCATION OF THE ISLANDS

The Poor Knights Islands lie 20 km east of the North Auckland Peninsula, north of Whangarei at latitude 35° 28' S and longitude 174° 44' E. There are two main islands: Tawhiti Rahi, in the north, is the larger (151.5 ha) and rises to c. 190 m above sea level; Aorangi (101 ha) is separated fromTawhiti Rahi by a narrow channel and rises to 216 m. Both islands are largely cliff-bound, but whereas the major part of Tawhiti Rahi is a plateau with most land above 170 m, Aorangi has a broad north-facing valley which gradually rises from the northern shore to Oneho Hill in the south. A number of much smaller islands and stacks are scattered between the two main islands and around Aorangi.

The mainland opposite the islands is hilly, generally rising to 200 m along the coastal faces. The area is well populated, with a mixture of farms and small

settlements, some of which have a high proportion of holiday homes. Prevailing winds are from the west.

3.2 SEED DISPERSAL

Wind

All of the target weed species on the Poor Knights are most likely to have been dispersed from the mainland by the wind. Once established on the islands, the major seed source will be local, but dispersal from the mainland will continue unless considerable effort is put into control of these species there. Two examples to illustrate these points are:

1. A large population of pampas grass was reported from the coastal margin of the landing on the north side of Aorangi in 1984 (Wright & Cameron 1990) but control was not commenced until 1990. During that time pampas will have seeded freely to Tawhiti Rahi and adjacent locations on Aorangi as well as the islets nearby. Note that Wright (n.d. a, b) recorded pampas from Aorangi only (see Appendix).

2. In 1996 Peter de Lange and Ewen Cameron visited Aorangi, adding 16 new adventive species to the flora. Although some of these species may have been present for a number of years and been overlooked by earlier investigators, many of their additions are windblown species, principally from the daisy family, and some may have established only recently, e.g. *Senecio elegans,* which was a single flowering plant (de Lange & Cameron in prep.).

It is the topography of the islands and the adjacent mainland which have enabled these species to disperse to the Poor Knights. The adjacent mainland has coastal ridges up to 250 m altitude and Tawhiti Rahi and Aorangi both rise to c. 200 m. Wind-dispersed species generally have a seed rain shadow where the majority of seeds fall near to the parent plant and a small proportion is dispersed for long distances. The distance that most seeds travel is usually dependent upon the height of release as well as atmospheric conditions (e.g., warm uplift currents and steady breeze). The height of coastal ridges on the mainland greatly increases the height of seed release across the sea. Similarly, the height of the Poor Knights creates greater catching area for dispersing seeds. The islands themselves may have a modifying effect on wind movement which could aid wind dispersal of seeds with pappuses.

Animal

Some of the adventive plants on Aorangi and Tawhiti Rahi are primarily bird dispersed, e.g. the fleshy-fruited inkweed and black nightshade. Others, particularly the grasses, have most probably reached the islands with humans, attached to clothing or included in equipment, e.g. prairie grass (*Bromus willdenowii*) is known only from the camp site on Tawhiti Rahi and de Lange & Cameron (in prep.) record sand brome (*Bromus arenarius*) only from the edge of a path below the campsite at Crater Bay, Aorangi. In addition, some

species have arrived via the transport used by humans, e.g. the new record of wild carrot (*Daucus carota*) is from the helicopter landing pad near the lighthouse on Tawhiti Rahi (see Appendix).

There is increasing evidence that burrowing petrels are also dispersing weed seeds. Peter de Lange (pers. comm.) recorded *Bromus willdenowii, B. diandrus* and *Stellaria media* from Fanal Island, Mokohinau group, presumed to be dispersed to the island by petrels. *Dipogon lignosus* (mile-a-minute) probably ingested from the sea surface by petrels (see Tennyson 1995) has been recorded from some inner Hauraki Gulf islands (P de Lange, pers. comm.). As the ambient populations of weeds and weed seeds increase, it is inevitable that incidental dispersal by bird species will increase.

I recorded two seedlings of nikau (*Rhopalostylis baueri*) for the first time on Tawhiti Rahi and these are most likely to have germinated from seeds dispersed by kukupa (*Hemiphaga novaeseelandiae*) which have been recorded as visitors to the island in the last few years (pers. obs., R. Pierce, pers. comm.). There are many fleshy-fruited exotic species on the mainland, some large-seeded, which could be dispersed to the Poor Knights by kukupa (see Pierce & Graham 1995 - app. 3; de Lange & Cameron in prep.).

Some of the examples given above highlight the need for stricter adherence to the standard quarantine procedures of ensuring that all equipment taken to the islands, including the transport used and clothing, is thoroughly cleaned of dirt and loose vegetation before being transported. The adventive flora of the Poor Knights Islands now totals 59 species for both main islands: 49 species on Aorangi and 27 species on Tawhiti Rahi (Appendix), a considerable increase in recent years upon the 41 species listed by Wright (n.d. a, b) and used as the basis for target weed selection by Bowden & Bowden (1996).

Dispersal by more than one agent

It should be noted that seeds which are primarily dispersed by one agent, e.g., wind, water, animals, gravity can also be dispersed by other agents. For example, pampas seeds are primarily wind-dispersed but they can also be dispersed by animals in mud on their feet or caught up in fur, feathers or clothing. Nesting bids can also collect and relocate the fluffy seeds as nesting material. In addition the seeds remain buoyant in water for some time and can be dispersed down streams.

3.3 ERADICATION OR CONTROL

Given that, in the absence of control on the mainland, the target weed species will continue to disperse to the Poor Knights, it is not feasible to consider eradication of these species. Eradication should only be the goal of an operation when the chances of reinvasion are extremely low. Instead, the focus of the operation really is sustained control. The programme of work as it is set out (Bowden & Bowden 1996) goes a long way towards achieving this goal.

3.4 SELECTION OF WEED SPECIES FOR CONTROL

An analysis of the adventive flora currently known from the two main islands of the Poor Knights group (Appendix) indicates that four of the five species targeted for control are definitely those which are most likely to affect the structure and functioning of the indigenous communities on the islands. The exception is ragwort, but this species is included to fulfil statutory weed control obligations.

Inkweed (*Phytolacca octandra*) is often found in open, recently disturbed sites on both main islands. Although it does not appear to interfere with natural succession it is bird-dispersed and is of sufficient stature (small shrub) to detract significantly from the natural character of the islands. Atkinson (1997) does not regard Inkweed as a problem weed but he cites this species as an example of the difficulty of deciding which weeds are problems and should be controlled and which aren't. Inkweed is widespread in the Poor Knights and is present on all the minor islands, usually being found in heavily burrowed areas (K. Hawkins pers. comm.). Given its widespread distribution and its common association on petrel-burrowed islands with rare plants such as *Rorippa divaricata, Lepidium oleraceum* and *Sicyos australis* (P de Lange pers. comm.), conventional chemical control or hand removal is out of the question. Investigations of possible biological control agents could be a useful line to pursue, however.

Lotus pedunculatus has been recorded from Tawhiti Rahi only, and I have no details as to where it is located on the island. It is the only introduced legume recorded for the islands and should be eradicated, if possible. Legumes are very persistent once established, as they have very long-lived seeds and they also change the soil nutrient status because of their ability to fix atmospheric nitrogen. Changing the soil nutrient status can improve conditions for other weed species. (Eradication is a possible goal for this species if it is not widespread because the chance of the species being reintroduced is very low.)

The prairie grass sward found at the Shag Bay camp site, Tawhiti Rahi, during the September 1996 trip was partially removed. As this species is known only from this site, all subsequent expeditions should undertake to search for and remove any plants found. This species often grows as a dense, tall sward and can outcompete smaller herbaceous native species, e.g. *Dichondra repens* which was growing adjacent to the sward. Weeding staff should become familiar with the vegetative appearance of both prairie grass and lotus so that a better understanding of their distribution can be gained before a decision on control is made.

3.5 WEED SEARCHES

Two types of search, or surveillance, are required to undertake the weed control programme effectively. The first is targeted on known sites and the second is to search for any new infestations.

Known sites

All known weed infestation sites should be visited on every trip to both islands. Because the length of time that seeds of the target species can remain viable in the soil is unknown, it is better to err on the side of caution. Therefore, I would recommend that sites which have been clear of weeds for two consecutive visits should be visited twice a year for a minimum of two more years from the date of the second clear visit. If a site remains clear of weeds for three consecutive years, the frequency of visits could be reduced to one visit per annum for the next three years, unless a dense canopy of native species has developed in the meantime and changed the conditions for weed establishment. In the latter instance, annual checks should not be necessary.

Justification for a timescale such as this is provided by our experience of pampas on Raoul Island, Kermadec Islands group. In 1984, Bill Sykes found and destroyed a solitary group of pampas plants, at least one of which had flowered. Six years later, in 1990, he removed five or six plants from the same site. Again, one plant had flowered. In 1991, three plants were removed from the site and in 1993 a single juvenile plant was located and destroyed (West 1996). Thus, seeds of pampas can remain viable in the soil for at least three years but maybe even longer.

None of the Poor Knights target weed species have seeds which appear to be adapted for long seed viability and it would be reasonable to assume that seed longevity will be less than five years.

The weed site, itself, must also be assessed. The target weed species all establish in open, disturbed areas in response to high light levels and possibly increased soil nutrient levels. Sites which are continually disturbed (e.g. by petrel burrowing or windthrow of trees and shrubs) will continue to provide suitable habitat for incoming weed seeds. These should be checked annually once an infestation has been clear for three years, in perpetuity or until the mainland seed sources are substantially reduced. Many disturbed sites, however, will regenerate with a dense canopy, thereby reducing the opportunity for establishment of the target species. These sites can be discontinued from annual checks unless they are subsequently opened up by another event (e.g. windfall).

On Aorangi, de Lange & Cameron (1997) recorded extensive destruction of shoreline vegetation in Crater Bay. The damage sustained by the vegetation, and the amount of bare ground created indicate that this site will be a prime one for establishment of some of the target weed species, and thorough checks will need to be made as the site regenerates.

New infestations

It is most important to search for new infestations on each trip to the islands because undetected infestations can become significant local seed sources very rapidly. Ground-based searches should be conducted twice a year and searches from the sea or air should be done at least annually and timed to coincide with maximum visibility of the target species. It is important that

both types of search be undertaken, as neither is sufficiently comprehensive on its own.

Ground-based searches

Some vegetation types are more susceptible to weed invasion than others. For example, on Tawhiti Rahi, coastal scrub at the southern and northern ends of the island is more open, because of windfalls and/or steep topography and recovery from past modification than the pohutukawa-dominated forest on the plateau, and that is where most of the known weed sites are. It is necessary, therefore, to search the susceptible vegetation types. Grid searching, as suggested by Bowden & Bowden (1996) is the best approach. Often, though, the topography does not allow for this so, for steep coastal faces, it is recommended that faces be scanned with binoculars. As with aerial or sea-based surveillance the target plants will be more easily seen at certain times of the year. However, with a good pair of binoculars, non-flowering plants of the target species should be detected.

Searches in less susceptible vegetation types should focus on obvious light gaps that are there because of steep topography (e.g. bluffs) or recent windfalls. Given that considerable areas of the islands are riddled with petrel burrows, grid searching on a frequent basis is not recommended. Instead, weeders should be alert for any obvious light gaps that can be seen from the route that they are on. These light gaps should be investigated.

Aerial and sea-based searches

All of the islands and islets should be searched from the air and the sea each year when the target species are in flower as this is when they are most obvious from a distance. The coastal faces provide ideal habitat for establishment of pampas, in particular, and can be observed most easily from the sea or air.

Aerial surveillance will be particularly useful for locating vines of moth plant which may be very difficult to detect from the ground. Also, any new canopy openings can be detected more easily from the air. These can be noted and subsequently checked for weed invasion by the regular weeding teams.

3.6 ACCESS TO WEED SITES

There are now tracks marked on both islands to enable access to weed sites. The tracks have been installed for three reasons: firstly, to limit the routes used by people and therefore reduce the amount of damage to petrel burrows; secondly to enable faster progression through the forest as time does not need to be spent looking for the easiest or best route; and thirdly, to provide a reference point for weed searches and site location. These tracks should be retained and used at all times for access to known weed sites. The exception to this is when grid searches are being undertaken in weed-susceptible sites.

Sinclair (1997) recommends relocating the N-S track along the plateau on Tawhiti Rahi and the reason that he gives is valid. However, this should be done only if petrel burrowing areas are not significantly affected.

3.7 LOCATING WEED SITES

Although all known weed sites are marked in an estimated position on maps of Tawhiti Rahi and Aorangi, the most effective way of relocating them is by local knowledge. Good notes on access are also essential, as even those with good local knowledge can be confused by windfalls or slips. Thus, for the most efficient use of time, at least one experienced Poor Knights' weeder should be in every weeding team.

3.8 MARKING WEED SITES

An excellent site numbering and marking protocol is outlined by Sinclair (1997) and the only change to that protocol that should be made is that pampas sites should also be numbered. It is not clear why it was recommended that pampas sites not be numbered, but it could be because there are relatively few sites of this species known (7 on Tawhiti Rahi and 4 on Aorangi). However, this is not sufficient reason, because the number of sites of this species have increased in the past year, with three new sites being located on Tawhiti Rahi in September 1996 (Henry 1996).

3.9 REPORTING AND REVIEWING

One of the problems involved with tracking or evaluating the progress of weed control programmes is the lack of consistency, accuracy, or detail of the written reports. It is often impossible to know which of two (or more) conflicting reports is correct. Two examples of this problem, encountered while writing this report, are given:

1. The area of Tawhiti Rahi was given as 151 ha by Beever (1991) and as 129 ha by Bowden & Bowden (1996). The correct figure (151.5 ha) was obtained from Northland Conservancy's land register, in this instance.

2. Henry (1996) states that of the 8 known sites of Mexican devil, 6 sites contained plants of that species in September 1996 and no new sites of that species were located. Sinclair (1997), reporting on the next weed ing trip to the island, gives the number of known (or existing) Mexican devil sites as 9. Of these, 8 were visited and 6 had weeds present. No new sites were found. Comparing the maps provided by each of these reporters shows that Henry (1996) regarded sites 5a and 5b as one site whereas Sinclair has relabelled site 5b (I presume, as my copy of Sinclair's report does not include appendix C - the updated database) as site 16 and counted them separately. This accounts for the discrepancy but this sort of detective work should not be necessary. The de-

tails of the work should be clearly stated by each reporter. Sinclair's protocol (1997) is a good attempt to achieve the uniformity required.

Reviews of the year's weeding activities are undertaken at the end of each year (e.g. appendix 9 in Bowden & Bowden 1996). These are an excellent feature of the weed control programme and should be continued.

4. Discussion

The weed control programme currently undertaken on the Poor Knights islands is very well managed and is achieving the basic goal of weed detection and removal. The success of the operation to date is primarily a result of two factors.

The first is the recognition of the need for, and the use of, experienced personnel to undertake the work. The calibre of the staff used is illustrated by the following example. In August 1996, three very experienced and observant botanists visited Aorangi to conduct a range of botanical investigations and removed 534 Mexican devil seedlings and mature plants from 7 known sites for this weed. They did not find any new sites for this species, nor did they locate any plants of the other four target species (de Lange et al. 1996). Just one month later the weeding team located and removed 800 Mexican devil plants from 36 sites, 312 mist flower plants from 5 sites, and 722 moth plants from 15 sites (Henry 1996). Thus, a team which is focused on searching for a small number of species has a much greater likelihood of success.

The second factor is the regular reviews of the programme and updating of procedures. Many of the points raised in this report have been highlighted in these reviews, and the purpose of reiterating them here is to indicate their importance. Examples include the need for experienced staff, the importance of regular aerial and sea-based surveillance, timing of weeding trips, marking of sites, and the importance of strict quarantine measures.

The Poor Knights Islands will continue to receive seed rain from the mainland until weed populations are substantially reduced there. A goal of this weed control programme should be to use the value of these islands as a national treasure as leverage to work with land managers on the mainland to reduce weed populations there. There are sufficient data on weed invasion of these islands already available to make the case. Atkinson (1997) covers this issue well in his general analysis of problem weeds on islands. Whilst it is acknowledged that the mainland source of seed for all target species is enormous, a public awareness campaign should be mounted to encourage voluntary reduction of weed infestations by landowners. Open sites are the ones most likely to have effective seed dispersal. Dense mist flower and Mexican devil infestations beneath an intact forest canopy are less likely to release abundant seed into the atmosphere, as most will be trapped by understorey and canopy foliage. Thus, forest edges, canopy gaps, roadside cuttings and open shrublands should be targeted for control of these two species on the

mainland. Pampas is susceptible to browsing by stock, so a combination of chemical control and confined grazing by stock should be advocated. As a first step, the removal of flowerheads of pampas will eliminate the problem for the Poor Knights. Moth plant and ragwort will be more difficult to target but key take-off sites should be determined and targeted.

Investigations of biological control for mist flower and Mexican devil are under way and these should continue to be supported by the Conservancy and regional government. Biocontol agents may already be in use for ragwort in Northland. Research on effective biocontrol agents for moth plant needs to be instigated. For pampas, effective biocontrol is not an option because it is a member of the very large grass family and there appear to be very few species-specific predators of grasses.

In the meantime, sustained control of the target species on these islands will have to be a regular part of the work programme for many years to come. It is salutary to note that the weed eradication programme on Raoul Island has been going for 25 years now and it is predicted that it will run for another 20 years (West 1996). The main differences between the two programmes are: some of the target species on Raoul Island have long-lived seeds, the chances of reintroduction of the target species are virtually zero, and Raoul Island is c. 3000 ha. Thus, for the Poor Knights the major exacerbating factor is proximity to the mainland and exposure to a constant seed rain from there.

Like de Lange et al. (1996), I congratulate the Conservancy and the staff concerned for their excellent work to date and urge that the effort be continued until it is no longer necessary.

5. Recommendations

1. That the term eradication be replaced by sustained control when describing the weed removal operations on the Poor Knights Islands.

2. That considerable effort be put into reducing weed populations on the mainland adjacent to the Poor Knights with the priority area for weed reduction in the block from Cape Brett to Bream Head and bounded in the west by State Highway 1.

3. That consideration be given to including prairie grass and *Lotus pedunculatus,* on Tawhiti Rahi, in the control programme.

4. That biological control investigations continue to be supported for mist flower and Mexican devil and that research on finding control agents be promoted for moth plant and inkweed.

5. That all known weed sites be visited on each twice yearly weeding trip to the islands, until they have been clear of weeds for three consecutive years, at which point checks should be annual for a further three years.

6. That aerial and sea-based searches of the islands be done annually, at least, and timed to coincide with maximum visibility of the target species.

7. That standard quarantine procedures for visitors to the islands be re-emphasised.

8. That the current tracks be used unless relocation of the main north-south track on Tawhiti Rahi will not result in significant destruction of petrel burrows. The only detours from the tracks should be for access to known weed sites or during the ground-based weed searches.

9. That it is imperative to employ at least one staff member with experience of the weed plot locations and weeding procedure in this programme on each weeding trip to each island.

10. That pampas sites should be numbered in the same fashion as all other sites.

11. That annual reviews of the weed control programme on the Poor Knights Islands be continued.

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8. Appendix

Adventive species known, to date, from Aorangi (A) and Tawhiti Rahi (T) in the Poor Knights group. The list is based on Wright (n.d. a, b) with additions and corrections for Aorangi from de Lange & Cameron (in prep.) indicated by # and for Tawhiti Rahi from personal observations indicated by *. Those species currently targeted for control are highlighted in bold typeface.

Scientific name	Common name	Location	
Ageratina adenophora	**Mexican devil**	**A**	**T**
A. riparia	**mist flower**	**A**	
Aira caryophyllea	silvery hair grass	A	T
A. praecox		A#	
Anagallis arvensis	scarlet pimpernel	A	T
Anthoxanthum odoratum	sweet vernal		T
Araujia sericifera	**moth plant**	**A**	
Aster subulatus	sea aster	A	
Bidens pilosa	beggar's ticks	A#	
Blackstonia perfoliata	yellow wort	A#	
Brassica oleracea	wild cabbage		T

Bromus arenarius	sand brome	A#	
B. diandrus	ripgut brome	A#	
B. litbobius		A#	
B. willdenowii	prairie grass	A	T
Callitricbe stagnalis	starwort	A*	
Cardamine birsuta	bitter cress		T
Centaurium erythraea	centaury	A	T
Cerastium glomeratum	annual mouse-ear chickweed	A	T
Cirsium vulgare	Scotch thistle	A	T
Conyza albida	broad-leaved fleabane	A	T
Conyza bilboana	Canadian fleabane	A	
Cortaderia selloana	pampas	A	T*
Crepis capillaris	hawksbeard		T
Daucus carota	wild carrot		T*
Digitaria ciliaris	summer grass	A	
Gnapbalium coarctatum	purple cudweed	A	T
G. simplicicaule		A#	
Hordeum murinum	barley grass	A#	
Hypocboeris radicata	catsear	A	T
Leontodon taraxacoides	hawkbit	A	
Lolium perenne	perennial ryegrass	A	
Lotus pedunculatus	lotus		T
Oenotbera stricta	sand primrose	A	
Orobancbe minor	broomrape		T
Parapbolis incurva	sickle grass	A	
Paspatum ditatatum	paspalum	A	T
Pbytolacca octandra	inkweed	A	T
Plantago australis	swamp plantain	A	
P, lanceolata	narrow-leaved plantain	A#	
Plantago major	broad leaved plantain	A	
Poa annua	annual poa	A	
Sagina apetala	pearlwort		T
Sagina procumbens	procumbent pearlwort		T
Senecio bipinnatisectus	Australian fireweed	A	T
S. diascbides		A#	
S. elegans		A#	
S. jacobaea	ragwort	A	
S. vulgaris	groundsel	A#	
Sigesbeckia orientalis		A#	
Silybum marianum	variegated thistle		T
Solanum nigrum	black nightshade	A	
Soncbus asper	puha/prickly sow thistle	A#	
S. oleraceus	puha/sow thistle	A	T
Sporobolus africanus	ratstail	A	T
Stellaria media	chickweed	A	T
Taraxacum officinale	dandelion	A#	
Velleropbyton dealbatum		A#	
Vulpia bromoides	Vulpia hair grass	A	