

Motu-O-Kura (Bare Island), Hawke's Bay: a little-known Island with a familiar Profile

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INTRODUCTION

Motu-o-Kura, commonly called Bare Island, is a small island on a coastline almost devoid of islands. Its distinctive, weathered, western profile (Figure 1) is well known to Hawke's Bay residents, but its outer side is known to few. In fact, so little was known of the island's natural history that the Department of Conservation, Napier, commissioned DSIR Havelock North to do a resource survey of it. The material presented here is a modified extract from the survey report (Walls et al. 1988).

The island lies 1.5 km east of Te Puku on the Waimarama coast (Figure 2). Only about 800m long and 300 m wide, it rises to a height of 106 m, with a prominent backbone that runs north-east/south-west, and has an area of about 13.5 ha. Composed of layers of mudstone (papa) and limestone, it is the remnant of the eastern portion of an anticline, most of which has weathered away, and owes its rugged character to a series of slumps, earthflows and sea-cut scarps and platforms. Most people see the near-vertical north-western face of exposed crumbling papa, little suspecting that the outer (seaward) side is relatively gentle and covered with greenery (Figure 3). Landing is difficult, because the island is rugged and has surrounding reefs and incessant ocean swells. The island's only fresh water is a single tiny seepage.

Motu-o-Kura is Maori land, owned by Ngati Kahungunu, the main subtribes involved being Ngati Whakaiti and Ngati Kurukuru. Our small survey team, of myself, John McLennan (Ecology Division, DSIR) and Jim Watt (Soil Bureau, DSIR) visited the island in early February 1988 with their permission. We were accompanied by Walter Broadman as their representative.

Ngati Kahungunu association with Motu-o-Kura extends back many generations. There are many oral traditions surrounding it, notably of Kura, a woman who was a splendid swimmer and kept besieged occupants supplied with fresh water gathered at night from an upwelling in the sea south-west of the island. In the past, the island was apparently used both as a defensive retreat and as a fishing base, and was virtually denuded of vegetation. Both Cook in 1769 (Beaglehole 1955) and d'Urville in 1827 (Wright 1950) remarked on this: each recorded an island quite barren of vegetation, but containing houses, terraces, fortifications, people and canoes. Apart from a few references to the names of the island, and some old photographs and sketches (too indistinct to reproduce meaningfully), these are the only historical records of the island. No previous botanical descriptions exist, apart from skeletal notes — nor any of the geology, soils or archaeology. It is remarkable that neither the observant and energetic William Colenso nor the equally exploratory Herbert Guthrie-Smith seem to have been curious enough about the island to visit it or even mention it in their writings. Even the fauna, briefly described by Merton (1961), was hardly known prior to our survey.

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Since European arrival, Maori use of the island has diminished, allowing re-establishment of plants and animals. We found signs of the former Maori occupation: pits, terraces, seashell middens and charcoal in the soil. We also encountered the main animal residents: masses of blue penguins (*Eudyptula minor*) and Norway rats (*Rattus norvegicus*). There are also other breeding seabirds, some small land birds, and a few lizards and invertebrates.

The climate of Motu-o-Kura is warm, dry and coastal, featuring regular summer drought, lack of frost and exposure to wind and salt spray. Today's vegetation and flora have been shaped by the climate, and the activities of past human inhabitants, seabirds and rats.

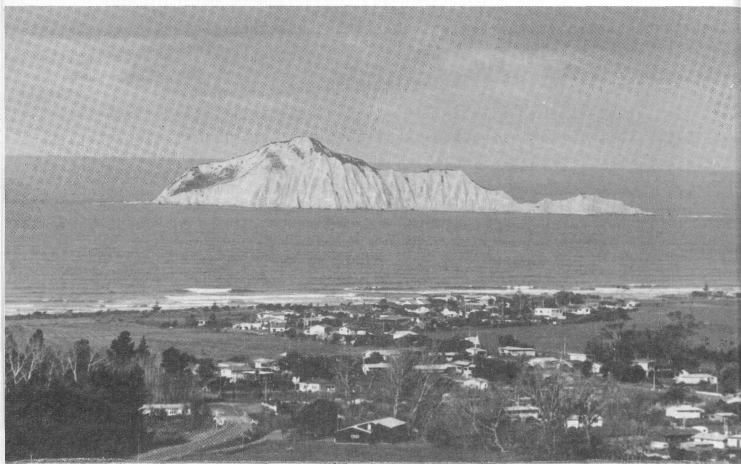


Figure 1. What most people see : the north-western cliffs of Motu-o-Kura from Waimarama, a barren inaccessible-looking visage that belies its biological wealth. Photo G. Walls.

THE VEGETATION

From the mainland at Waimarama, Motu-o-Kura looks as devoid of vegetation as the names given to it by Cook in 1769 (Bare Island) and d'Urville in 1827 (L'Isle Sterile) suggest. However, they were referring not to its inner face, which was probably much as it is now, but to its outer slopes. Those slopes, on which were terraces, defences and dwellings of the Maori occupants two centuries ago, are now almost entirely covered in dense vegetation.

The following descriptions are of the terrestrial vegetation of the island, with the exception of the brief section which deals with the intertidal and marine communities.

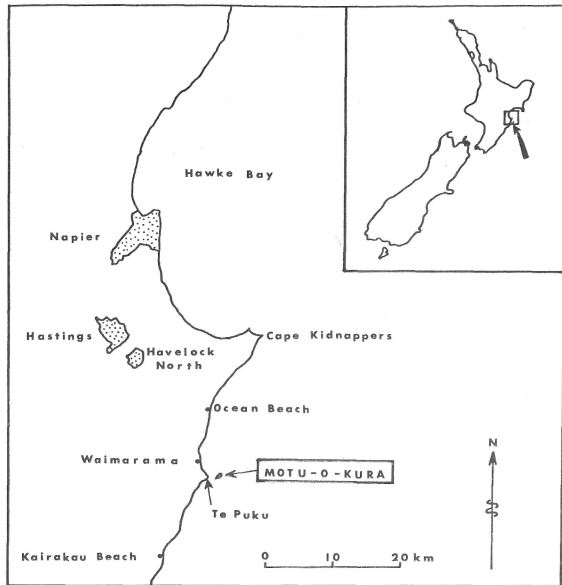


Figure 2. Location map, Motu-o-Kura.

Existing plant communities

During the survey, seven main plant communities were recognised on the island. Each is described, and the vegetation map (Figure 4) is based on them. Some of the communities are quite discrete, but there are places where they intermingle or overlap. Most of the vegetation types are visible in Figure 3.

1. Wharariki flaxland

This is a dense cover of close-growing wharariki or coastal flax (*Phormium cookianum*)* up to 2 m tall. It occupies much of the south-east side of the island, and is by far the most extensive vegetation type. Some of the flaxes are possibly hybrids between *P. cookianum* and *P. tenax*. Beneath the flaxes is little except myriad penguin tracks, and some small ferns, grasses and herbs including sea celery, fathen, cocksfoot, maidenhair fern, spleenwort ferns, *Pteris* spp., hound's tongue and *Senecio banksii*. In places there are a few shrubs of taupata, *Pittosporum ralphii* and karamu. In gaps, around edges and on newly-exposed erosion surfaces, is dense regeneration of small flaxes (from seeds). The wharariki were flowering and seeding profusely at the time of our visit.

* Plant names are listed in Appendix 1.

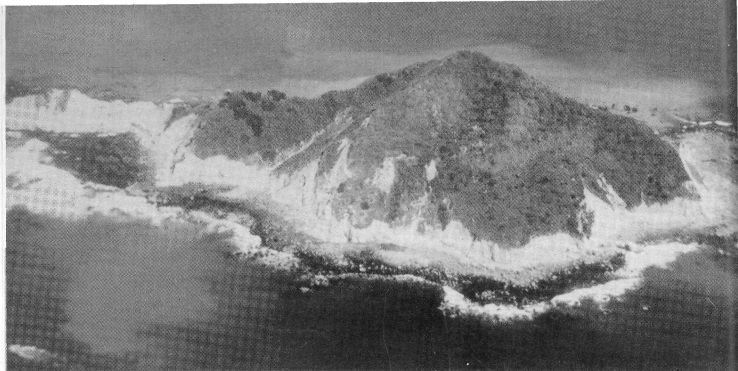


Figure 3. Oblique aerial view of the rarely seen seaward side of Motu-o-Kura. Slumps, scarps and coastal platform show clearly, as do the vegetation patterns of flaxland and shrubs. December 1985. Photo G. Walls.

2. Tree-shrubland in wharariki flaxland

In slump hollows on the eastern flank of the island are limestone outcrops. Here there are small trees of taupata, rangiora, *Pittosporum ralphii* and karamu, with the occasional cabbage tree, in a sea of wharariki. Ferns such as shield fern, shining spleenwort, hound's tongue and leather-leaf fern are also growing here. Figure 5 is a view of part of this eastern flank of Motu-o-Kura, showing both vegetation types 1 and 2.

3. Taupata shrubland and low forest

Particularly towards the south of the island are clumps and patches of taupata trees and shrubs. The largest trees are 5 m tall with trunks a surprising 0.5m in diameter at their bases, but all are sculpted and appressed by wind and salt spray. Beneath the taupata are grasses and small herbs such as cocksfoot, fathen, black nightshade and sea celery, and bare soil in places where there is sooty shearwater activity. The taupata were in full fruit at the time of our visit.

4. *Pittosporum ralphii* shrubland or low forest

East of the summit are small patches of *P. ralphii* trees and shrubs, with a few taupata, karamu and rangiora. Beneath are the grasses and small herbs mentioned in 3.

5. Grassland — herbfield

On exposed places not too steep to support vegetation, but not yet taken over by wharariki, rank grasses are dominant. Cocksfoot, Yorkshire fog, perennial ryegrass and tall fescue are most common, although the native *Poa anceps* is abundant in places. There are many adventive herbs such as fathen, variegated thistle, oxtongue, sow thistle, black medick and hedge mustard, and some native herbs such as *Senecio banksii*, iceplant and sea celery. Many of these communities are growing on recent erosion slopes, but some could simply be remnants of the island's cover before wharariki became dominant.

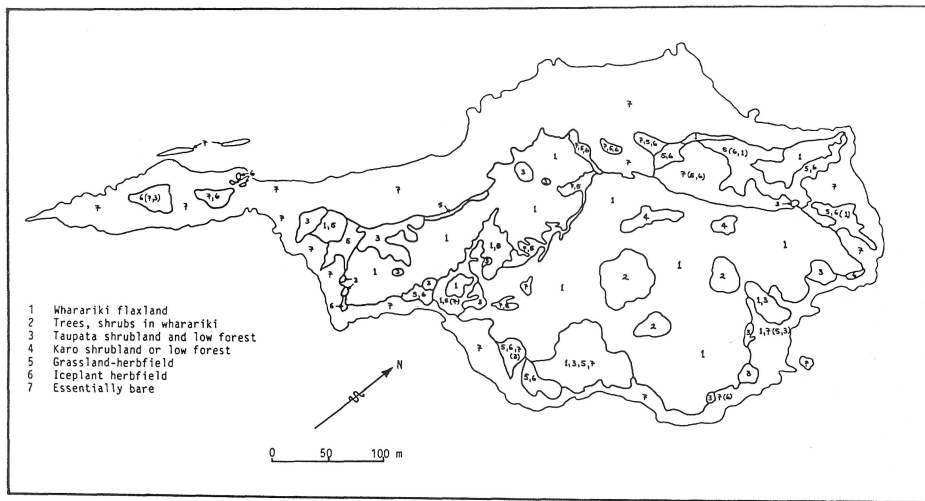


Figure 4. Vegetation map of Motu-o-Kura, based on the latest aerial photograph (September 1980).

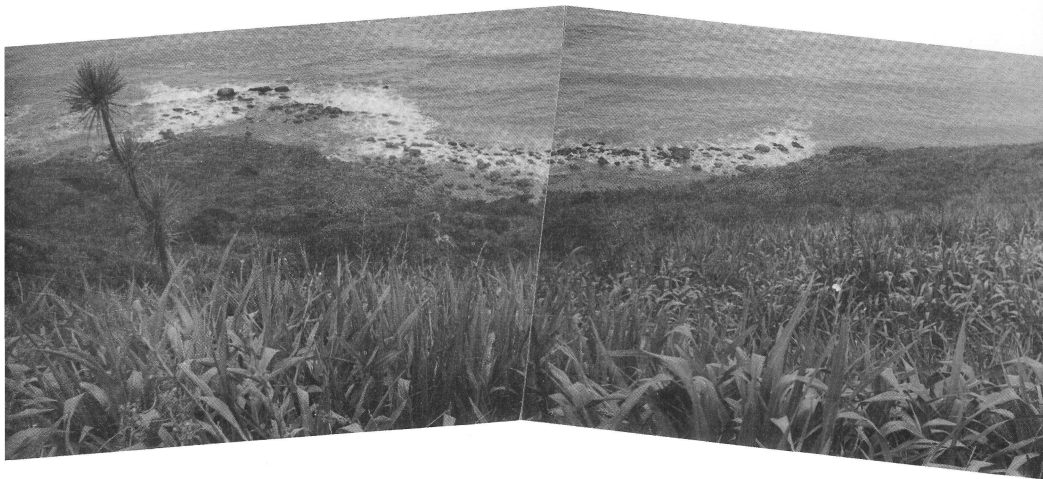


Fig. 5. View from the summit of part of the eastern flank of Motu-o-Kura, showing the predominant wharariki flaxland, with shrubs and small trees of taupata, karamu, *Pittosporum ralphii*, rangiora and cabbage tree. February 1988. Photo J Watt.

6. Iceplant herbfield

Mats of appressed iceplant are typical of the exposed edges of other vegetation communities, usually nearest the sea. They also include some native herbs and grasses (sea celery, pigweed, *Senecio banksii* and *Poa anceps*) and adventive herbs and grasses (fathen, buck's-horn plantain and perennial ryegrass in particular).

7. Scattered herbs and grasses on otherwise bare faces

Most of the island's very steep faces of mudstone (papa) and limestone are constantly crumbling as they are gnawed at by the sea. They are virtually bare of any vegetation, but occasional herbs (such as *Senecio banksii*, fathen and iceplant) and grasses (such as *Poa anceps* and perennial ryegrass) maintain a precarious existence.

Flora

Thirty-six species of native (indigenous) plants were found on the island during the survey: 9 trees and shrubs, 2 lianes (climbers), 11 ferns, 2 grasses, 1 sedge and 11 herbs. That the total number of plant species is as low as 36 is a reflection of the smallness of the island and its past denudation. There were no real surprises except perhaps the presence of akepiro (*Olearia furfuracea*): all others are typical plants of coastal Hawke's Bay.

Thirty-one species of adventive (introduced) plants were recorded: 7 grasses and 24 herbs. These probably got to the island as seeds, either wind-blown or carried incidentally by birds or people. The only plant that may have been deliberately planted is pampas grass.

Appendix 1 lists the plants found on Motu-o-Kura, giving their scientific names, common names (if any) and an abundance rating for each.

Vegetation patterns and processes

The current patterns of the vegetation of Motu-o-Kura depend on the following things:

(a) Slope stability

Soil stability and vegetation cover are greatest on the gentler slopes and vice versa: on the cliffs, it is simply too steep and rapidly eroding to sustain much vegetation.

(b) Aspect

On the north-west side of the island, vegetation is probably exposed most to the effects of dryness, whereas it is perhaps a little damper and more sheltered on the south-east side and therefore more favourable for plants.

(c) Rock type and weathering

Soil depth, soil movement (slumps and other erosion) and whether limestone or mudstone is dominant determine conditions for plants: the most stable and fertile conditions obviously favour plants most.

(d) Human impact

The effects of clearance of the original vegetation and earthworks by Maori occupants is still affecting the vegetation composition. Latter-day activities of people are relatively minor.

(e) Seabirds

Blue penguins are so numerous that their tracks and burrows are a major feature on all parts of the island except the steepest cliffs. They are no doubt responsible for trampling many seedlings and causing minor erosion. The burrowing activity of sooty shearwaters is far less damaging, being confined to a few localities on the axial ridge, but it does have local impacts on the vegetation. Gulls, terns and shags also use the island. All of these seabirds bring nutrients from the sea, which both enrich the soil and cause local vegetation damage. Shags are causing dieback of taupata from the effects of their excreta where they roost and nest at the south-west end of the island.

(f) Rats

Norway rats are omnivorous, and eat plants frequently. It is likely that they browse off and kill many of the seedlings that become established on the island, and consume seeds before they germinate.

(g) Salt

During storms, sea salt drenches the island in spray, or is driven as finer particles by wind. Both test the tolerance of plants to such exposure.

The island, like the Hawke's Bay coast in general, is characterised by soft rocks and rapid erosion. Vegetation soon colonises newly established slump surfaces, as long as they are stable. Wharariki (coastal flax), and adventive grasses and herbs are usually the first and most successful arrivals, and provide an initial cover for plant succession to proceed. However, where the wet/dry effect on the steep mudstone slopes is greatest, there is a constant trickle down of material, by gravity, greatly accentuated by every shower of rain. Plants simply cannot get a toe-hold there.

The earliest aerial photograph of Motu-o-Kura was taken in March 1952. Comparison with the most recent available, September 1980, shows that little large-scale slumping has taken place on the island between those times. Slump surfaces on the south-east side, exposed and bare in 1952, had become fully vegetated by 1980. Our visit confirmed that it was almost exclusively wharariki that had re clothed these sites. It is a plant that produces prolific seeds that can be dispersed either by strong winds or in bird feathers, it is tolerant of great moisture extremes, and it can withstand salt damage and physical battering. So it is not surprising that the whole south-east side of the island, once quite bare of vegetation, has now been re clothed in this vigorous plant.

However, it is unlikely that wharariki will remain dominant on the island in times to come. In the more sheltered and gently-sloping places at least, the wharariki, having provided an initial plant cover, will gradually be overtopped and supplanted by woody species. These would include taupata, *Pittosporum ralphii*, karamu, rangiora and cabbage tree, and possibly also tutu, akepiro, ngaio (*Myoporum laetum*), and karaka (*Corynocarpus laevigatus*). The two last-named species are present on the adjacent mainland. The result would be a shrubland or low forest on this side of the island. The regeneration process is held back by the effects of penguin tracking and rat browsing, and during the survey very few tree and shrub seedlings were seen.

Pre-human vegetation cover

Before human arrival, anything up to twelve hundred years ago, Motu-o-Kura was probably larger, and cloaked in a mantle of coastal forest, shrubland and herbfield. Since then, clearance of that vegetation (probably by burning) has

presumably accelerated the rate of natural erosion, and a significant part of both the living and inanimate features of the island must have disappeared.

A reconstruction of the pre-human vegetation relies on intuitive guesswork based on remnants of the original vegetation, both on the island itself and on the adjacent mainland. The precipitous cliffs must always have been relatively bare, but it is possible that they were less eroded and had more vegetation such as wharariki (coastal flax), iceplant and native grasses and small herbs. The gentler south-east slopes, where there is now a sea of wharariki, probably supported the tallest and woodiest vegetation: low forest and shrubland of taupata, ngaio, *Pittosporum ralphii*, karaka, karamu, koromiko, cabbage tree, titoki (*Alectryon excelsum*), raurekau (*Coprosma grandifolia*), rangiora, fivefinger (*Pseudopanax arboreus*), mapou (*Myrsine australis*), puka (*Griselinia lucida*), tauhinu and *Olearia solandri*. Beneath the canopy would probably have been many ferns, small herbs and grasses, but the ground would have been kept somewhat bare by numerous burrowing seabirds that would have bred on the island. Climbers such as pohuehue, clematis, supplejack, New Zealand jasmine (*Parsonsia* spp) and New Zealand passion flower (*Passiflora tetrandra*) may have festooned the trees and shrubs.

This combination of plants would have provided a resilient vegetative clothing for the island, with far more variety and suitability for native birds and invertebrates than that which now exists. An exciting option is that of an assisted return to something resembling the former vegetation.

Intertidal and marine vegetation

During the survey, both lack of time and inclement weather prevented anything but a cursory glance at the vegetation of the marine wave-cut platform and associated reefs around the island. The intertidal fringe contains a rich variety of seaweeds (marine algae). The main brown algae are flapjack (*Carpophyllum maschalocarpum*), *C. plumosum*, *Ecklonia radiata*, *Cystophora torulosa*, *C. retroflexa*, Neptune's necklace (*Hormosira banksii*) and bull kelp (*Durvillea antarctica*). There are also many smaller brown algae, red algae (including karengo, *Porphyra columbina*, and agar seaweed *Pterocladia lucida*) and green algae such as sea lettuce (*Ulva lactuca*).

These intertidal communities of plants, and the deeper ones, provide habitat and food for numerous sea creatures, of which crayfish, pua, kina, limpets, whelks and catseye snails are but a visible few.

CONCLUSION

Motu-o-Kura is a somewhat overlooked gem in the eastern North Island coastline. It is a place where land and sea are entwined, where the past is apparent, and where there is a vivid interplay of life, death, growth and erosion.

Although the risk of damage by fire is an ever-present one, there are two more urgent management issues:

1. the need to eliminate pampas grass before it becomes a major competitor with the native vegetation;
2. the need to eliminate rats to allow a revival of native birds, reptiles, invertebrates and plants.

Small, fragile and modified though it is, Motu-o-Kura could, with sensitive encouragement, become one of Hawke's Bay's prime sites for the conservation of archaeological remnants and indigenous flora and fauna.

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ACKNOWLEDGEMENTS

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APPENDIX 1: TERRESTRIAL PLANTS RECORDED ON MOTU-O-KURA, 3-6 FEBRUARY 1988

Scientific name in left column, common name (if any) in right column
Abundance ratings : m = much s = some u = uncommon

1. INDIGENOUS (NATIVE) PLANTS

Trees and shrubs

<i>Brachyglottis repanda</i>	rangiora	s
<i>Cassinia leptophylla</i>	tauhinu	u
<i>Coprosma repens</i>	taupata	m
<i>C. robusta</i>	karamu	s
<i>Cordyline australis</i>	cabbage tree, ti kouka	s
<i>Coriaria arborea</i>	tutu	s
<i>Hebe stricta</i>	koromiko	u
<i>Olearia furfuracea</i>	akepiro	u
<i>Pittosporum ralphii</i>		s

Lianes (climbers)

<i>Clematis forsteri</i>	clematis	u
<i>Muehlenbeckia australis</i>	pohuehue	s

Ferns

<i>Adiantum cunninghamii</i>	maidenhair fern	s
<i>Asplenium flaccidum</i>	hanging spleenwort	u
<i>A. gracillimum</i>	hen and chickens fern	u
<i>A. oblongifolium</i>	shining spleenwort	u
<i>Pellaea rotundifolia</i> s.s.		u
<i>Phymatosorus diversifolius</i>	hound's tongue	u
<i>Polystichum richardii</i>	shield fern	u
<i>Pteridium esculentum</i>	bracken	u
<i>Pteris macilenta</i> auct. NZ		s
<i>P. tremula</i>		s
<i>Pyrrosia serpens</i>	leather-leaf fern	u

Grasses

<i>Cortaderia fulvida</i>	toetoe	s
<i>Poa anceps</i>		m

Sedge		
<i>Isolepis nodosa</i>	knotted sedge	u
Monocotyledonous herbs (other than grasses and sedges)		
<i>Phormium cookianum</i>	wharariki, coastal flax	m
<i>P. cookianum</i> × <i>P. tenax</i>	coastal flax — lowland flax hybrid	s?
Dicotyledonous herbs		
<i>Apium prostratum</i>	sea celery	m
<i>Crassula moschata</i>		u
<i>Disphyma australe</i>	iceplant	m
<i>Einadia triandra</i>	pigweed	s
<i>Haloragis erecta</i>	toatoa	u
<i>Pseudognaphalium</i> sp. (<i>P. luteo-album</i> agg.)	cudweed	u
<i>Senecio banksii</i>		s
<i>Samolus repens</i>	sea primrose	s
<i>Scandia rosifolia</i>		u

2. ADVENTIVE (INTRODUCED) PLANTS

Grasses		
<i>Bromus willdenowii</i>	prairie grass	s
<i>Cortaderia seloana</i>	pampas grass	s
<i>Dactylis glomerata</i>	cocksfoot	s
<i>Festuca arundinacea</i>	tall fescue	m
<i>Holcus lanatus</i>	Yorkshire fog	m
<i>Hordeum marinum</i>	salt barley grass	u
<i>Lolium perenne</i>	perennial ryegrass	m
Herbs		
<i>Amaranthus</i> sp.	redroot	s
<i>Anagallis arvensis</i>	scarlet pimpernel	u
<i>Brassica napus</i>	rape	u
<i>Centaureum erythraea</i>	centaury	s
<i>Chenopodium album</i> agg.	fathen	s
<i>Cirsium arvense</i>	Californian thistle	s
<i>C. vulgare</i>	Scotch thistle	s
<i>Conyza</i> sp.	fleabane	s
<i>Geranium molle</i>	dove's foot	u
<i>Lotus pedunculatus</i>	lotus	s
<i>Medicago lupulina</i>	black medick	m
<i>M. polymorpha</i>	bur medick	s
<i>Melilotus indica</i>	King Island melilot	s
<i>Picris echinoides</i>	oxtongue	m
<i>Plantago coronopus</i>	buck's horn plantain	s
<i>Polycarpon tetraphyllum</i>	allseed	u
<i>Silybum marianum</i>	variegated thistle	s
<i>Sisymbrium officinale</i>	hedge mustard	s
<i>Solanum nigrum</i>	black nightshade	s
<i>Sonchus oleraceus</i>	sow thistle	s
<i>Spergularia arvensis</i>	spurrey	u
<i>Stellaria media</i>	chickweed	u
<i>Trifolium dubium</i>	suckling cover	u
<i>T. pratense</i>	red clover	u