4. References


Australia ICOMOS 1999. The Burra Charter. Burwood, Australia ICOMOS.


Additional reading


WWW sites: US National Park Service documents can be found at http://www.cr.nps.gov/
Glossary

Adventive. Naturally arrived at a place, not deliberately planted.

Arable. Land able to be ploughed.

Bioturbation. All the physical biological processes at work in soil horizons which cause the soil components to move about, including worms, burrowing animals, tree throw.

Bole. The lower trunk of the tree, often straight and free of branches.

Conservation plan. A document which describes and analyses the condition and values of a place. It also sets out the policies, plans and intentions of the authority which manages that place.

Ecotype. A species which is long lived in a particular locality and well adapted to the conditions there.

Fine, fines. Small particles.

Floor, living floor, working floor. Thin stratigraphic layer where people have lived or walked about.

Gallery forest. Forest with widely spaced boles, allowing visibility of the ground surface, and a closed canopy.

Midden. Accumulation of decaying or decayed food refuse.

pH. A measure of acidity. Acid soils (low pH) suit native plants or plantation forest. Neutral (pH 7) or high pH soils suit production grasses such as ryegrass.

Revetted, revetting. The practice of placing stones against a bank to stabilise it and to enable it to retain a steeper angle.

Root plate. The full extent of roots formed in the soil and which may be torn up when a tree is blown over.

Rotational grazing. Putting stock into a small paddock for a short period of time, allowing them to graze the grass down and then removing them. Requires careful planning and installation of fencing.

Rūnanga. Tribal government (New Zealand usage).

Seral. Stage of growth in an ecological succession.

Set grazing. Permanent grazing, keeping animals on the same piece of land with the natural increase in spring and decrease in autumn. For archaeological sites, requires careful planning and installation of fencing.

Slash. Branch debris lying on the ground from plantation trees that have been pruned.

Stratigraphy. The layers of an archaeological site, the practice of recording them.

Stumpman. Responsible for felling a tree and for safety in the vicinity at time of felling.

S.u./ha. Stock units per hectare. One stock unit is a 54 kg live weight of a breeding ewe, so a yearling cattle at about 250 kg is about 5 s.u. No more than 10 s.u./ha is recommended as a stocking rate for archaeological sites.

Tag. Dead grass built up when there is no grazing or mowing.
Appendices
Appendix 1

TYPES OF ARCHAEOLOGICAL SITE IN NEW ZEALAND

The list of categories of site given below cannot be comprehensive. A site with features on the surface will almost always have a structure of underground layers.

A1.1 Surface-visible sites

Pre-European period
Earthworks such as pā are readily recognised on the New Zealand landscape. This category may also include:

- ditches and banks, dug for defence across ridges or enclosing cliff edges
- scarps, created by cut-and-fill methods to steepen slopes for defence
- terraces, created by cut and fill methods to make flat areas for gardening or house sites
- pits, usually dug for the storage of horticultural crops, but sometimes quarry pits
- drains, ditches associated with housefloors, pits or gardening.

Also from the pre-European period:

- middens
- stone quarry floors and outcrops; places where stone for adzes or other purposes has been extracted
- stone revetted (i.e. stone-faced) earthworks such as earth mounds, or terrace-edges
- stone alignments, single placed-stone rows, stone heaps, stones placed to enclose a hearth
- surviving wooden features, such as palisade posts, or trees from which bark has been removed or on which the bark has been carved
- artworks either engraved into or painted on to rock surfaces
- semi-cultivated vegetation which survives next to sites, e.g. karaka or ti (cabbage trees).

European period
The range of surface features includes:

- earthworks, such as ditch and bank fences, terraces, pits, ring ditches, ditches, including stone-revetted earthworks such as water races
- plough or other cultivation marks from old fields
- foundations in stone or concrete, often in unstable ground conditions
- ruined stone or concrete walls (i.e. upright but without a capping or roof)
- stone fences or stone clearance mounds
- other structures in a ruinous state, for example, stone fireplaces
- structural metal or portable metal artefacts, including engines, vehicles, fully exposed or partly buried
• *rubbish dumps*, for example on eroding slopes below the site of now-disappeared buildings

• *asphalt, stone or brick paving* or other artificial flat surfaces, such as hardened earth floors within ruined walls; gravelled surfaces

• *historic tree plantings, orchards or formal gardens.*

Unless erosion and infilling have been very marked, the earthworks or stone sites are often visible on modern ground surfaces. The other types of surface-visible sites are often very fragile, and may warrant quite specialised conservation attention including *in situ* stabilisation and re-vegetation.

Some buildings and other structures in a ruinous state, for example the foundations of a dam, no longer capable of use or refurbishment, may also be regarded as archaeological sites. Architectural, engineering and archaeological techniques may be relevant to their conservation.

### A1.2 Sub-surface sites

Stratified archaeological layers will usually be detected either by accidental exposure in the course of earthmoving, deliberate test-pitting in the course of an archaeological survey, controlled excavation over wider areas, or by the examination of unvegetated scarps such as road cuttings or those created by erosion. Since they are often concealed beneath more recent soils, this important class of site can often be neglected when the management or use of an area is first considered.

This class of site includes the following:

• *layers of debris, occupation floors,* with wooden materials preserved in the anaerobic conditions of a swamp

• *quarries* for stone or sand

• *living or working floors,* surfaces modified by the debris of tool-making, house construction, fires and other activities, and which have been subsequently sealed by infilling, and other soil processes.

• *middens,* refuse from food preparation and consumption, typically shell and bone

• *beartbs,* concentrations of charcoal and burnt earth with or without enclosing stones

• *ovens,* concentrations of charcoal and burnt stones and earth in scooped hollows

• *graves*

• *earthwork fill,* disturbed and mixed earth sometimes sealing earlier soils and layers

• *soils* that have developed on a site and may have subsequently been buried;

• *boles, pits, postholes or palisade lines,* filled with soil wash or deliberately infilled

• *drains*

• *modified garden soils,* soils that have been cultivated and/or had gravel, sand, shell or charcoal added and mixed into them.
Appendix 2

SPECIMEN WORK PLANS

The following specimen work plans are modified from Andropogon Associates
Petersburg National Battlefield Action Plan (Virginia USA).

A2.1 Sowing and oversowing grassed site

Description
The sowing or oversowing of bare areas or thinly grassed areas to repair existing
turf.

Staff needed
Conservation officer, archaeologist or historic resources specialist plus volunteers.

Equipment
Transport, rakes, spades, plastic bags, site plans, recording equipment, safety
equipment as identified in OSH plans.

Work considerations
- Identification of seed source sites for the required native grasses, e.g.
  *Microlaena stipoides*, *Rytidosperma* spp., *Poa aniceps*
- Manual seed collecting. It will be necessary to observe the intended harvest area at
  least weekly, to ensure seed is collected when it is mature and before it drops.
  (Timing: November to January)
- Assemble commercial seed lines of e.g. *Festuca rubra* and *Lotus
  pedunculatus*
- Store seed for use 3–6 months later. Seed should be stored away from mice in
  paper bags, cartons or sacks, not plastic. Hand threshing is not necessary
  when sowing will occur during favourable periods for germination and
  establishment
- Prepare planting plan, including evaluation of zones of soil fertility and shade
  factors
- Prepare site (Timing: March)
  — Do initial soil test
  — Apply herbicide (if necessary)
  — Clear ground with line trimmer (if necessary)
  — Apply basal fertiliser
  — Identify planting zones (Timing: March and April)
  — Establishment of seed
  — Weigh seed lots
  — Construct exclusion fence
- Establishment of vegetative material (Timing: late April to July)
Identify local sources of *Oplismenus imbecillus*, *Paesia scaberula*, *Blechnum penna-marina* and *Metrosideros perforata*

- Plant grass seed (Timing: April to July: depends on local knowledge)
  - Lightly rake surface areas
  - Add soil to make grade or repairs
  - Spread seed at recommended rate OR
  - Oversow and rake in seed of: *Microlaena stipoides*, *Rytidosperma* spp., *Festuca rubra* and *Lotus pedunculatus*
  - Protect seed against pests and birds
  - Mulch area with chopped straw or hay
  - Water if necessary
- Plant cuttings (Timing: April to July)
- Winter and spring maintenance (Timing: July to October)
  - Urea application
- First summer maintenance (Timing: December to May)
  - Water if needed
  - Do not mow or line trim until grass is well established
- Later summer maintenance phases
  - Allow grass to flower and set seed
  - Do not mow until February or later
- Monitor and record results annually.

### A2.2 Mowing

#### Description

The mowing and line trimming of earthworks of archaeological with walk-behind or small ride-on mowers.

#### Staff needed

Staff operator and/or contractor.

#### Equipment

Mowers, line trimmers, transport, tractor with rotary slasher, safety equipment as identified in OSH plans.

#### Planning precautions

Areas designated for carefully controlled mowing are the most significant recognisable parts of archaeological surface features or other historic structures which should be maintained with a minimum of inadvertent damage. A conservation plan will have specified the key areas to be mown and any modifications (such as new tracks) needed for effective safe mowing.

#### Work considerations

- Work to a mowing plan
- Do not mow or line trim until new grass is well established
- In later summer visits, allow grass to flower and set seed: do not mow until February or later
• Inspect cutting blades and all aspects of equipment
• Check for impediments in taller grass
• Set mowers to 7–10 cm for level ground and 10–12 cm for edges and the tops of banks; do not cut more than 2/3 of the grass height
• Do not scalp banks
• Sweep or clear grass clippings from use areas, otherwise allow it to form mulch where it lays
• Advise site managers of any significant weed control problems observed
• Line trimming can be used on small areas, on depressions, or on larger areas of grassed banks; do not cut closer than 10–12 cm
• Any weeds which survive mowing to this height (such as gorse) will need to be controlled with a suitable spray
• A rotary slasher may be used initially and according to mowing plan if the objective is to remove low woody cover that cannot be dealt with by line trimmer
• Area office must check work of new contractors after mowing
• Annual monitoring of mown areas is part of monitoring plan.

A2.3 Tree felling/removal

Description
• Removal of trees which are causing a problem or potential problem for site stability
• Includes both clearance of all trees (e.g. harvesting *Pinus radiata*) or selective removal of problem trees, or selective removal of branches.

Staff needs
• Reserve manager or heritage management specialist
• Experienced stumper (the person at the base of the tree operating chainsaw and who signals all other workers on site) and another experienced timber worker
• Labourers.

Equipment
• Transport, chainsaws, winches, ropes, extension ladder, safety equipment as identified in OSH plans), spray paint, tape, signs to warn public, exclusion tape or barriers.

Planning precautions
• All work to be done following a detailed conservation plan review
• Trees to be selected in discussion between Reserve manager, heritage management specialist and stumpman
• Neighbours notified
• Public signs warning of no access to the reserve for duration or work
• Review weather on the day.
Work considerations

- Avoid felling trees across site features such as ditches and banks
- Use natural lean and wedging of initial cut for directional felling; sequence of felling is the key to successful protection of the site
- Fell smaller ‘sacrificial’ trees on or near the areas to be protected, or install corduroy
- Fell along the line of existing depressions, e.g. ditches
- Winch trees to ensure direction of felling
- Fell on to a mat or corduroy of logs, or smaller trees felled to form a protective cover
- Avoid damage to trees that will eventually form a new canopy
- Skidders and bulldozers should not be used on sites
- In most instances trees will be felled to waste
- Where both archaeological site values and wood values are high, helicopter removal of fallen trees may be needed to avoid damage from hauling logs through the site
- Slash should not be moved but cut finely so that it is on the ground and rots quickly
- Some trees or shrubs will sucker and cut stumps need immediate swab with a brushweed killer (Tordon)
- Plant key areas of site with ground cover plants or selected canopy-replacement seedlings.
## Appendix 3

<table>
<thead>
<tr>
<th>NATIVE COVERS FOR ARCHAEOLOGICAL SITES</th>
</tr>
</thead>
<tbody>
<tr>
<td>— WHAT PLANT, WHERE?</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>NAME</th>
<th>FORM AND SPECIAL FEATURES</th>
<th>HABITAT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FERNS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Blechnum fluviatile</em>—Kiwakiwa</td>
<td>Medium-sized rosette of many leaves—3.0 cm</td>
<td>Shaded places. Semi to full sun. Needs moist, light soil</td>
</tr>
<tr>
<td><em>Blechnum penna-martini</em>—little hard fern</td>
<td>Spreading ground cover. Very hardy. Can form dense mass</td>
<td>Lowland to high country, moist. open to shaded</td>
</tr>
<tr>
<td><em>Platycodium esculentum</em>—bracken fern, ranahi, aruhe (rhizome)</td>
<td>Spreading underground stems produce dense growth of 1 m tall fronds. Can be invasive.</td>
<td>Very hardy, diverse open habitats, especially grassland. Sun to part shade</td>
</tr>
<tr>
<td><strong>MONOCOTYLEDON</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Phormium cotanesis</em>—flax, harakeke</td>
<td>Fibre plant, tuft drink near 1 m × 1 m</td>
<td>Windy, cold or exposed sites. Cress of banks, slopes too steep/inaccessible to mow</td>
</tr>
<tr>
<td><em>Cortaderia richardii</em>—tooeoe</td>
<td>Large ‘tussock’ grass with plume seed-heads, kākaho stems used in tukutuku panels. Useful to retain steep banks</td>
<td>Species varies with region. Open wetlands, streamsides. Colonisers</td>
</tr>
<tr>
<td><em>C. gigantea</em>—kākaho</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Carex spp.</em>—<em>C. virgata, C. testacea, C. coriacea</em> ( tuatahi), <em>C. echinata, C. flagellifera</em> 30 - 50 cm. <em>C. comans</em> 30 cm (maurea) coastal; <em>Uncinia</em> spp. (hookgrasses)</td>
<td>Grassy clumps. Throughout most of NZ but sometimes local. Hardy. Useful in areas subject to pedestrian wear. Grow by subdividing clump. Numerous other local species</td>
<td>Mostly moist soil. Open sunny grasslands, wetlands, to partly shaded forest margins</td>
</tr>
<tr>
<td><em>Poa clara</em> (ex <em>P. laevis</em>)—silver tussock, wi</td>
<td>Single tussock produces offspring by dividing tillers. Short tussock</td>
<td>Lowland to upland grassland, gravel soils. Sun. Tolerates clay, dry soil</td>
</tr>
<tr>
<td><em>Poa morea</em>—broad-leaved poa</td>
<td>Spreading, leafy carpet. Broad leaved grass to 60 cm. Tall feathery flower spikes</td>
<td>Shaded slopes, bluffs, streamsides. Sun. Good coloniser</td>
</tr>
<tr>
<td><em>M. stipoides</em>—pātiti— meadow rice grass</td>
<td>Spreading tufted carpet Vigorous growth</td>
<td>Drought tolerant, forest to open sites</td>
</tr>
<tr>
<td><em>Elymus solandri</em> (ex <em>Agropyron scabra</em>—blue wheat grass)</td>
<td>Atractive open tussock form</td>
<td>Dry soils, open sites, tolerates some shade</td>
</tr>
<tr>
<td><em>Dichroaceae crinita</em>—plume grass, pātiti</td>
<td>Attractive open small tussock form, 30 cm</td>
<td>Coasal to inland open, rocky, or dry sites</td>
</tr>
<tr>
<td><em>Optisetum imbecilis</em></td>
<td>Spreading grass, ground cover</td>
<td>Deep-shaded areas, North Island</td>
</tr>
<tr>
<td><em>Kunzea ericoides</em>—kānuka</td>
<td>Dense thickers of slender, aromatic trees. Quick growing, 6 m. Hardy</td>
<td>Sunny, alluvial and hill slopes. Tolerates clay, drought, poor soils, grass</td>
</tr>
</tbody>
</table>
### Appendix 3  continued.

<table>
<thead>
<tr>
<th>NAME</th>
<th>FORM AND SPECIAL FEATURES</th>
<th>HABITAT</th>
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</thead>
<tbody>
<tr>
<td><strong>VINES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metrosideros diffusa—Climbing rata. <em>M. perforata</em></td>
<td>White/flowers in spring when vine reaches canopy</td>
<td>Diverse moist habitats and dry soil. Tolerates very shaded conditions</td>
</tr>
<tr>
<td>Muehlenbeckia complexa, pōhutukawa</td>
<td>Dense twining low vine; can be deciduous, fast-growing, excellent for covering banks and difficult areas. Suppresses weeds</td>
<td>Dry areas, coastal to inland sand dunes. Partly deciduous in colder areas</td>
</tr>
<tr>
<td>Parsonia capsularis, <em>P. betiphylia</em>—NZ jasmine, akakiore</td>
<td>Slender vine. Vigorous, handy, versatile</td>
<td>Lowland forest and shrubland; mainly dry areas. Sun to part shade. Coastal</td>
</tr>
<tr>
<td>Rubus spp. (<em>R. australis, R. cissoides, R. schmidelioiides</em> depending on habitat)—bush lawyer, tatarama</td>
<td>Prickly scrambling vine, becoming large forest liane</td>
<td>Shrubland, young forest. Sun to part shade</td>
</tr>
<tr>
<td><strong>SHRUBS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pittosporum eugenioides</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brachyglottis repanda—rangiora</td>
<td>Large leaves with white underside 3 m x 1.5 m</td>
<td>Tolerates coastal conditions, or moist forest understore. Requires good drainage; Sun or shade</td>
</tr>
<tr>
<td>Coprosma repens—taupata</td>
<td>Glossy, fleshy leaves 2-4 m</td>
<td>Coastal, mainly N.I. Frost tender. Prefers dry soil</td>
</tr>
<tr>
<td>Coprosma bauwera</td>
<td>Sprawling coastal plant with dense foliage</td>
<td>Tolerates moist and dry, sun and shade, clay</td>
</tr>
<tr>
<td>Coprosma propinqua—mingimini</td>
<td>Divaricating, twiggy shrub 3 m x 1.5 m</td>
<td>Coastal to montane, wetland to dry hillsides. Sun - shade</td>
</tr>
<tr>
<td>Hebe stricla (N.I. and northern S.I.); Hebe saticifolia (S.I.)—koromiko</td>
<td>1-2 m. Useful as a nurse plant when revegetating large areas</td>
<td>Open ground to bush margins. Sun - semi-shade. Quick growing</td>
</tr>
<tr>
<td>Solanum lacinatum—poroporo</td>
<td>Very rapid growth, short-lived shrub to 2 m.</td>
<td>Open ground in disturbed places. Sun to part-shade. Tolerates clay but not wind</td>
</tr>
<tr>
<td>Lepidospermum scoparium—mānuka</td>
<td>Dense thickets or spreading bushes, honey producer</td>
<td>Wet, infertile soils in open areas. Excellent seed bed for forest species. Tolerates drought, swamp, frost</td>
</tr>
<tr>
<td>Macropiper excelsum—kawakawa</td>
<td>Medicinal shrub. 2 m x 1 m. Hardy. Orange fruit spikes attractive to native birds</td>
<td>Coastal, or lowland forest understore, south to Banks Peninsula. Sun and shade. Frost tender</td>
</tr>
<tr>
<td>Olearia arborescens</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Olearia solandri, coastal shrub daisy</td>
<td>Rapid growth, heath-like shrub. 3 m x 1 m</td>
<td>Wet and dry coastal soil, to lat. 42°. Estuary margins. Sun. Tolerates clay</td>
</tr>
<tr>
<td>Haloragis erecta—toataou</td>
<td>Spreading bushy herb 40 cm to 1 m tall. Purple foliage</td>
<td>Forest margins, open disturbed ground. Sun. Tolerates clay</td>
</tr>
</tbody>
</table>
Appendix 3  continued.

<table>
<thead>
<tr>
<th>NAME</th>
<th>FORM AND SPECIAL FEATURES</th>
<th>HABITAT</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Muehlenbeckia axillaris, complexa</em>, Pohuehue</td>
<td>Hardy. Open mat, grows from cuttings/rooted pieces. Up to 1 m across</td>
<td>South of Lat. 38°, open ground. Grows well in harsh places</td>
</tr>
</tbody>
</table>

**OTHER GROUND-HUGGING PLANTS**

<table>
<thead>
<tr>
<th>NAME</th>
<th>FORM AND SPECIAL FEATURES</th>
<th>HABITAT</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Pimelea prostrata</em>—pinātoro. N.Z. daphne</td>
<td>Spreading patches to small shrubs. Hangs over banks</td>
<td>Diverse habitats, but local varieties. Sunny dry places best</td>
</tr>
<tr>
<td><em>Acaena anserinifolia, A. inermis</em>—‘bidibid’, piripiri</td>
<td>Creeping patches. Hardy</td>
<td>Open, grassy places. Tolerates semi-shade and wind</td>
</tr>
<tr>
<td><em>Dichondra repens</em>—Mercury Bay weed</td>
<td>Carpet forming or open patches</td>
<td>Open, moist areas. Tolerates clay. Sun-shade</td>
</tr>
<tr>
<td><em>Pratia angulata</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Arthropodium cirratum</em> (Kenga renga lily)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Mazus spp.</em></td>
<td>Small herbs, often prostrate and/or creeping, belonging to the foxglove (Scrophulariaceae) family</td>
<td></td>
</tr>
<tr>
<td><em>Hydrocotyle novae-zealandiae, H. moschata, H. betermeria</em></td>
<td>Patches or open ground-cover</td>
<td>Moist open to semi-shaded places, coastal to lowland</td>
</tr>
</tbody>
</table>

Appendix 4

NATIVE GRASSES AND OTHER GROUND-HUGGING COVERS

For a site in northern temperate areas, recommended species, sowing and planting rates are listed below. Listing is by aspect.

North, west and east-facing aspects, sunny with minimal shading, well drained
- Meadow rice grass (*Microlaena stipoides*) local ecotype, 50 g seed/m²
- Chewings fescue (*Festuca rubra*) ‘Enjoy’, 25 g seed/m²
- Danthonia (*Rytidosperma* spp.) local ecotype, 25 g seed/m²
- *Lotus pedunculatus* ‘Maku’, 10 g seed/m²
- Fern (*Paesia scaberula*) local ecotype, 20 cuttings/m²
- Fern (*Blechnum nigra*) local ecotype, 20 cuttings/m²
- Clinging rata (*Metrosideros perforata*) local ecotype, 20 cuttings/m²

South-facing shady aspect, well drained slopes
- Meadow rice grass (*Microlaena stipoides*) local ecotype, 50 g seed/m²
- Fern (*Blechnum nigra*) local ecotype, 20 cuttings/m²
- Clinging rata (*Metrosideros perforata*) local ecotype, 20 cuttings/m²

Wet, poorly drained, heavily shaded areas, and areas prone to short-term saturation
- *Oplismenus imbecillus* local ecotype, 20 cuttings/m²
- *Lotus pedunculatus* ‘Maku’, 10 g seed/m²
- Fern (*Blechnum nigra*) local ecotype, 20 cuttings/m²
- Fern (*Blechnum penna-marina*) local ecotype, 20 cuttings/m²

Heavily tracked areas
- Dwarf perennial ryegrass (*Lolium perenne*), 30 g seed/m²
- New Zealand browntop (*Agrostis tenuis*), 50 g seed/m²
- Chewings fescue (*Festuca rubra*) ‘Enjoy’, 25 g seed/m²

Woods (1999) has provided details of some of these species as follows.

**Meadow rice grass**
- Common name: Meadow rice grass
- Species name: *Microlaena stipoides*
- Fineness: Relatively fine
- Leaf colour: Light green during summer, dark green during winter
- Growth habit: Compact rhizome system giving rise to slow-spreading clumps
Establishment: Seed
Habitats: Low-fertility summer-dry soils. Shaded environments. Often found in open shade under trees in ryegrass and clover paddocks
Productivity: Main growth during warmer seasons. Relatively little growth during winter
Cultivars: None at present

**Poa aniceps**
Common name: Broad-leaved poa
Species name: *Poa aniceps*
Finess: Very coarse
Growth habit: Rhizome system, spreading clumps; leaves up to 15 cm long
Establishment: Seed or division of clumps
Habitats: Low-fertility summer-dry soils. Stony banks. Lightly shaded environments
Productivity: Main growth during warmer seasons
Cultivars: None at present

**Oplismenus imbecillus**
Common name: —
Species name: *Oplismenus imbecillus*
Finess: Fine small leaves under mowing
Leaf colour: Dark green throughout the year in shade. Yellows and browns in full sun or with frost
Growth habit: Low-growing stoloniferous grass with short broad leaves
Establishment: Seed or stolon cuttings
Habitats: Shaded environments
Productivity: Most growth occurs during warmer months. Dormant during winter
Cultivars: None

**Zoysia**
Common name: *Zoysia grass*
Species names: *Zoysia minima, Zoysia pauciflora, Zoysia planifolia*
Finess: *Z. minima* extremely fine. Other species quite fine
Leaf colour: Green throughout the year. Damaged by frost
Growth habit: Rhizomatous grass. Plants generally less than 10 cm high
Establishment: Seed or stolons. Scarify seeds
Habitats: Sand and gravel environments
Productivity: Slow growing. Active during summer. Winter dormant
Cultivars: Other species used extensively in U.S.A., Japan, Korea and China. Primarily *Zoysia japonica*
**Silvery sand grass**

Common name: Silvery sand grass  
Species name: *Spinifex sericeus*  
Origin: New Zealand and Australia  
Finness: Coarse and sparsely tillered  
Leaf colour: Silvery blue green throughout the year. Damaged by wind and frost during winter  
Growth habit: Extensive rhizomatous grass  
Plants generally up to 60 cm high  
Establishment: Seed or rhizomes. Dioecious, separate male and female plants. Seeds germinate readily when covered with sand  
Habitats: Fore dunes and sand environments  
Productivity: Active during spring and early summer. Relatively winter dormant. Responds to fertilisers  
Cultivars: None known. Other species used extensively in Australia for dune restoration and coastal protection work.