Wooloweyah Foreshore Reserve

Vegetation Management Plan

2021

clarence VALLEY COUNCIL

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1. SUMMARY

The Wooloweyah Foreshore Reserve Vegetation Management Plan emphasises the importance and purpose of vegetation management programs relating to the protection of natural and cultural heritage, whilst providing public access to Lake Wooloweyah. The Reserve is Crown Land and was originally part of R967m reserved for “Access to Tidal Waters” in 1883. In March 1982, the R967 was revoked and notified as R95841 for Public Recreation and Preservation of Native Flora. The Reserve is managed by Council as Crown Land Manager.

The management and control of weeds and strengthening foreshore areas through strategic planting and maintaining vegetation buffers to prevent erosion and maintain the suite of vegetation communities are objectives in this plan. The plan also emphasises the importance of maintaining liaison with the local community and Reserve neighbours.

The Plan identifies Management Zones and vegetation management actions necessary in each Zone, particularly regarding weeds. The Plan aims to improve native vegetation condition and management on the Reserve.

There are conflicting land uses in some areas of the Reserve, which impact on native vegetation through introduced plantings from adjoining private properties, garden escapees, unauthorised clearing including mowing. This plan aims to unify non-conforming land uses and restore these areas.

Table 2 provides a summary of the key actions to be undertaken in the Reserve. Other features of the Plan include the community support and on ground assistance in the form of the Wooloweyah Landcare group in accordance with this Plan.

Fire is managed through the Clarence Valley Bush Fire Risk Management Plan and respective Village Protection Strategy, and hence is not considered part of this plan.

In general, the Wooloweyah Foreshore Reserve is in relatively good health through consistent restoration works carried out by the local community and contractors over the last 10 years. Clarence Valley Council recognise this effort as a positive outcome and will be supporting future volunteer groups and contractual works for the maintenance and restoration of the Reserve.

2. AIMS AND OBJECTIVES

The Wooloweyah Reserve is a popular lakeside area providing low key boat access to Lake Wooloweyah. The Reserve also provides foreshore access via an informal, unpaved walking track. As a result it has been degraded through visitation and recreational impacts, excessive mowing, unauthorised tree removal for views, weed infestations, garden waste dumping, and exotic plantings where adjacent landowners have planted ornamental gardens on the Reserve.

The Plan reinforces the importance of maintaining good relationships and liaison with the local community, volunteers and stakeholders interested in restoration and protection of the Reserve's vegetation communities.

The objectives of the Wooloweyah Reserve Vegetation Management Plan are;

- The primary objective is to provide a framework for the management of the Reserve for public recreation and the protection of native flora.
- Manage natural environments and their processes to ensure their care, maintenance, preservation and conservation while providing for sports and passive recreational pursuits;
- Identify those areas that are to be exclusively for passive use
- Identify fragile and sensitive environments
- The provision of practical facilities for public use which recognize the fragility of the area and limited area available
- Encourage revegetation of native flora
- Maintain cooperation between residents and other community users
- Identify future needs, especially in terms of climate change
- Foster community support for the restoration and improvement of natural vegetation.
- Ensure native vegetation cover remains on the foreshore
- Protect the water quality in the Lake for water–reliant ecosystems through maintenance of vegetation.
- Reduce the occurrence and spread of weeds and potential weed species through education, awareness and action.
- Reduce vandalism to foreshore vegetation through education, regulation and law enforcement.
- Identify key elements of the ecology and apply sustainability planning through identifying and protecting threatened species and Threatened Ecological Communities.
- Apply the objectives of the North Coast Regional Strategic Weed Management Plan 2017-2022 to reduce the negative impact of weeds

3. VEGETATION

The Wooloweyah Foreshore Reserve is located 5km south of Yamba, and is a narrow strip of foreshore land, approximately 8.2 ha in area (Figure 1 – Reserve is highlighted in red).

Figure 1: Wooloweyah Foreshore Reserve

The Reserve is Crown Land and was originally part of R967m reserved for “Access to Tidal Waters” in 1883. In March 1982, the R967 was revoked and notified as R95841 for Public Reservation and Preservation of Native Flora. To assist with management of the Reserve, Council had previously established a s.355 Committee under the *Local Government Act* 1993 (The Wooloweyah Parks & Reserves Committee) which both advised Council on, and with approval, carried out maintenance and improvements to the Reserve (after MSC, 1999). This function is now supported through the Wooloweyah Landcare Group. The Reserve is now managed by Council as Crown Land Manager.

The land is zoned RE1 (Public Recreation 35%) and E2 (Environmental Protection 65%) and has native title determination by the Yaegl Traditional Owners Aboriginal Corporation.

This Vegetation Management Plan considers the principles of crown land management in regards to natural assets e.g.;

(a) that environmental protection principles be observed in relation to the management and administration of Crown land, and

(b) that the natural resources of Crown land (including water, soil, flora, fauna and scenic quality) be conserved wherever possible.

4. NSW WEEDS ACTION PROGRAM

The New South Wales (NSW) Weeds Action Program (the program) is a NSW Government initiative to reduce the impact of weeds through implementation of the NSW Invasive Species Plan and the NSW Biosecurity Strategy. The NSW Invasive Species Plan provides a framework for coordinated management of invasive species, including weeds, and complements the NSW Biosecurity Strategy. The NSW Biosecurity Strategy outlines how to identify, minimise, respond to and manage biosecurity risks, including weeds, and the program realises the strategy's vision of: "government, industry and the people of NSW working together to protect the economy, environment and community from the negative impacts of animal and plant pests, diseases and weeds for the benefit of all people in NSW.” Appendix 1 contains a weed list for the Reserve.

The Wooloweyah Landcare group volunteers, Council and contractors have been successful in controlling weeds on the Reserve, however weeds continue to re-emerge on the Reserve and will continue to do so while ever there are weed species present in our environment.

The Reserve is mainly undeveloped, apart from the boat ramp that also allows for parking and picnic tables. The section of the Reserve to the south of the boat ramp contains a rough walking trail, whilst to the north of the ramp, there is a significant area of endangered Swamp Oak Swamp Forest with little to no public access, apart from walking on the Lake’s edge at low tide.

5. VEGETATION COMMUNITIES

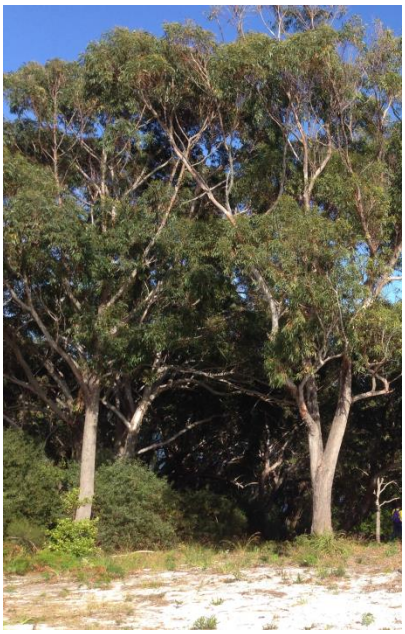
There are two significant vegetation communities recorded on site, both are types of swamp forest which are Threatened Ecological Communities. Interestingly, the swamp mahogany swamp forest (PCT 1230) has a high proportion of large Pink Euodia, *Melicope elleryana*, which forms part of the upper stratum of the vegetation community.

The estuary is also significant waterbird habitat, being the third most important wader habitat in NSW (CVC 2009). Wooloweyah Lagoon is a nationally important wetland, listed in the Directory of Important Wetlands and preservation and conservation of riparian vegetation is essential to the health of the lagoon.

Table 1 below describes the four main vegetation types found at the Reserve, and the most common species in each of the stratums. A derived form of Paperbark Swamp Forest occurs in the section of the Reserve south of the boat ramp where clearing and mowing has resulted in a lack of understory plants that would usually accompany this vegetation type.

Table 1: Vegetation Types at the Reserve

Vegetation Type	Vegetation Structure	Common Species
Paperbark Swamp Forest of the Coastal Lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion (PCT 1064) ***Listed as an Endangered Ecological Community under the Biodiversity Conservation Act (2016)***	 Low to very tall woodland and forest in which Broad-leaved Paperbark (*Melaleuca quinquenervia*) commonly dominates the overstorey, or occasionally another paperbark (e.g. *M. alternifolia, M. sieberi, M. linariifolia, M. styphelioides*). Associates include Swamp Mahogany (*Eucalyptus robusta)*, Swamp Oak (*Casuarina glauca*) and Swamp Box (*Lophostemon suaveolens*). Understorey and ground layer composition varies with substrate, depth and extent of waterlogging, and water quality and certain grasses.	*Common species in each stratum:* UPPER: *Melaleuca quinquenervia; Melaleuca linariifolia; Melaleuca sieberi; Melaleuca alternifolia; Melaleuca styphelioides; Melaleuca nodosa; Eucalyptus robusta; Callistemon salignus; Lophostemon suaveolens; Eucalyptus tereticornis; Casuarina glauca;* MID: *Leptospermum spp.; Melastoma affine; Parsonsia straminea*; . Feather Plant (*Baloskion tetraphyllum*), tea-tree (e.g. *Leptospermum juniperinum*), bottlebrush (e.g. *Callistemon pachyphyllus)* LOWER: *Blechnum indicum; Gahnia spp.; Hypolepis muelleri; Sawsedges (Gahnia spp.), twig-rushes (Baumea spp.), Carex spp.,* Bungwahl Fern *(Blechnum indicum),* Note: rainforest trees, shrubs and vines such as Cabbage Tree Palm *(Livistona australis*), Cheese Tree (*Glochidion ferdinandi*) and Common Silkpod (*Parsonsia straminea*) can be common.

Vegetation Type	Vegetation Structure	Common Species
Blackbutt - bloodwood Dry Heathy Open Forest on Quaternary sands of the Northern NSW North Coast Bioregion (PCT 682)	 Open forest or woodland. Landscape Position: On deep sands of old dune systems along the coast.	*Common species in each stratum:* *UPPER: Eucalyptus pilularis; Corymbia gummiferaa; Eucalyptus resinifera subsp. Hemilampra* *MID: Acacia ulicifolia; Allocasuarina littoralis; Banksia spp.; Gompholobium pinnatum; Hibbertia vestita; Leptospermum spp.; Leucopogon lanceolatus; Persoonia stradbrokensis; Pimelea linifolia; Pultenaea spp.* *LOWER: Aloskion tetraphyllum; Dianella caerulea; Entolasia stricta; Glycine clandestina; Lepidosperma laterale; Lomandra longifolia; Panicum simile; Pteridium esculentum; Themeda australis;*
Graminoid Clay Heaths of the coastal lowlands of the NSW North Coast Bioregion (PCT 846)	 Open heath up to 2 m tall, or low open banksia or mallee woodland up to 5 m tall with a diverse sclerophyll shrub stratum and variable graminoid groundcover. Landscape Position: Headlands and coastal hills	*Common species in each stratum:* *MID: Allocasuarina littoralis; Banksia oblongifolia; Hakea laevipes; Hakea teretifolia; Mirbelia rubiifolia; Pimelea linifolia;* *LOWER: Aristida warburgii; Gompholobium pinnatum; Lepidosperma laterale; Panicum simile; Patersonia sericea; Ptilothrix deusta; Themeda australis;*

6. CONSERVATION VALUES

The Wooloweyah community and visitors value the Reserve for its natural environment, scenic qualities and recreational opportunities. The local community expect the natural areas of land around Wooloweyah to be managed sustainably for future generations.

6.1 Significant vegetation

Two vegetation communities or Plant Community Types (PCT's) that occur on the Reserve are listed as threatened under the *Biodiversity Conservation Act* 2016; Swamp Sclerophyll Forest and Subtropical Coastal Floodplain Forest. Threatening processes impacting on these communities include human activities such as unauthorised clearing, weed infestations, and erosion.

Active conservation management of coastal vegetation communities on Council Reserves is important to maintain wildlife corridors linking the Lake to Yuraygir National Park.

6.2 Significant fauna

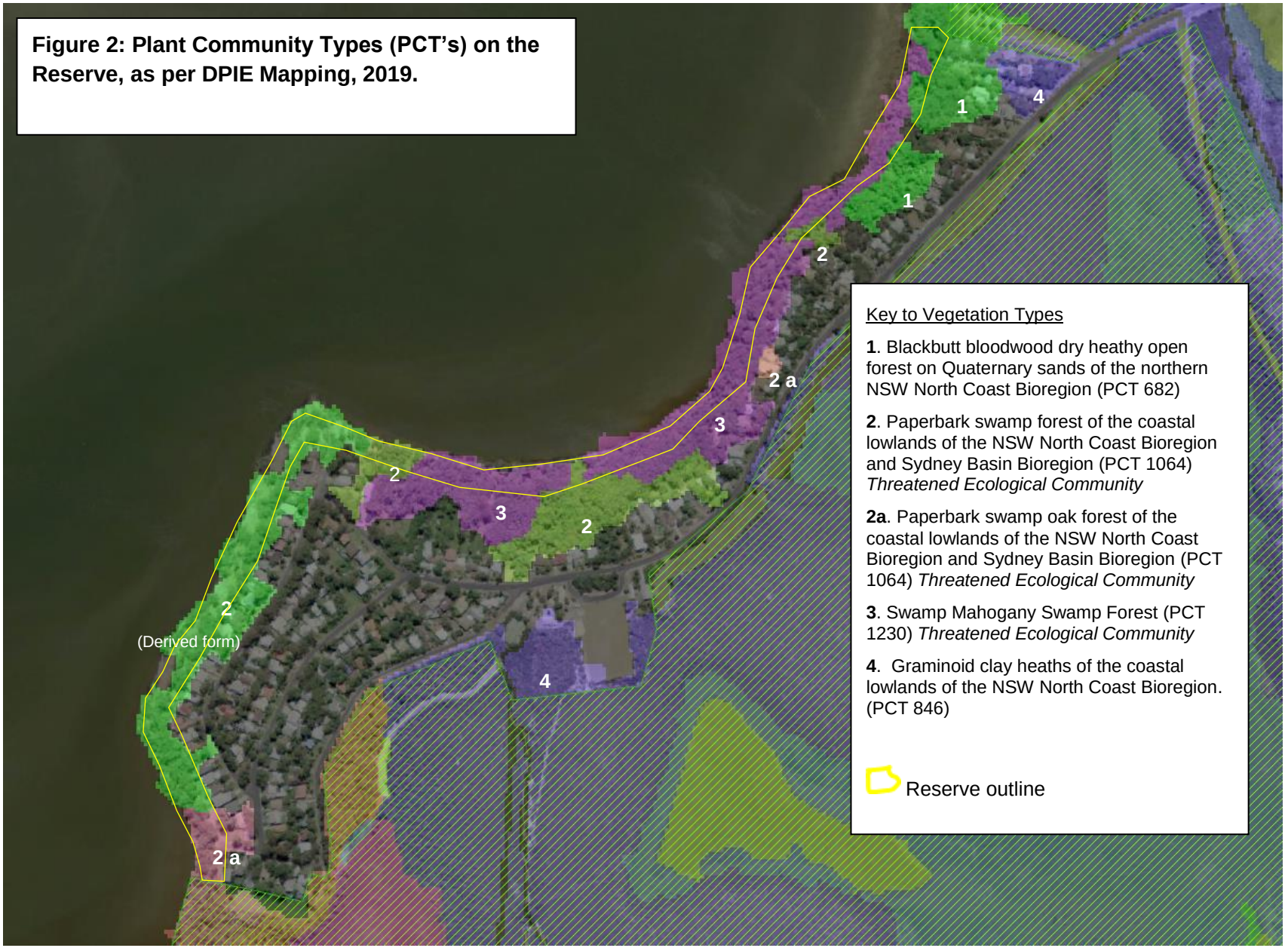
Significant and threatened fauna that depend on healthy vegetation at the Reserve may include the Squirrel Glider, Powerful Owl and Common Planigale, various bats such as the Common Blossom Bat, Hoary Wattle Bat, Little Bent Wing Bat, Yellow Bellied Sheath Tail Bat and Grey-headed Flying-fox.

Foreshore and migratory species that frequent Lake Wooloweyah include the White-Bellied Sea Eagle, Eastern Curlew, Red Necked Stint, Oyster Catchers, Sandpipers, White-eared Monarch, Rufous Fantail, Wompoo Pigeon, Rose-crowned Fruit-Dove, Eastern Osprey, Glossy Black-Cockatoo, and the Little Lorikeet.

6.3 Fire Management

Fire is managed through the Clarence Valley Bush Fire Risk Management Plan and respective Village Protection Strategy, and hence is not considered part of this plan.

Figure 2: Plant Community Types (PCT's) on the Reserve, as per DPIE Mapping, 2019.



7. MANAGEMENT ISSUES

There are several recurrent issues on the Reserve that impact existing native vegetation, and the recovery of vegetation on the foreshore areas.

7.1 Landscaping

Residents planting gardens on the Reserve has been an ongoing issue. Exotic plants, and even native plants not naturally occurring in the area, introduce weed seeds and change the vegetation composition of what is highly significant vegetation. It is proposed that;

1. No further encroachments of gardens
2. Mowing is confined to identified areas
3. No garden refuse is dumped on the Reserve
4. No fires are to be lit in the Reserve
5. No collection of wood - fallen timber is to stay in-situ to provide habitat for native fauna.

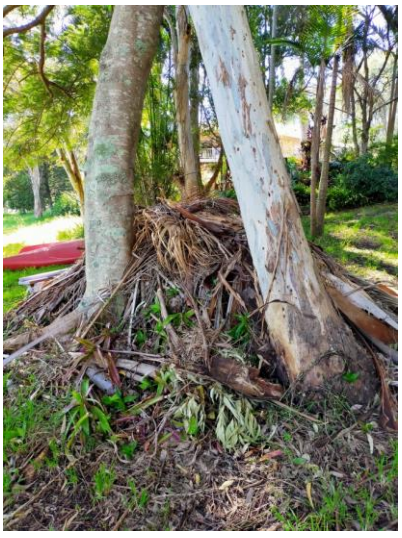
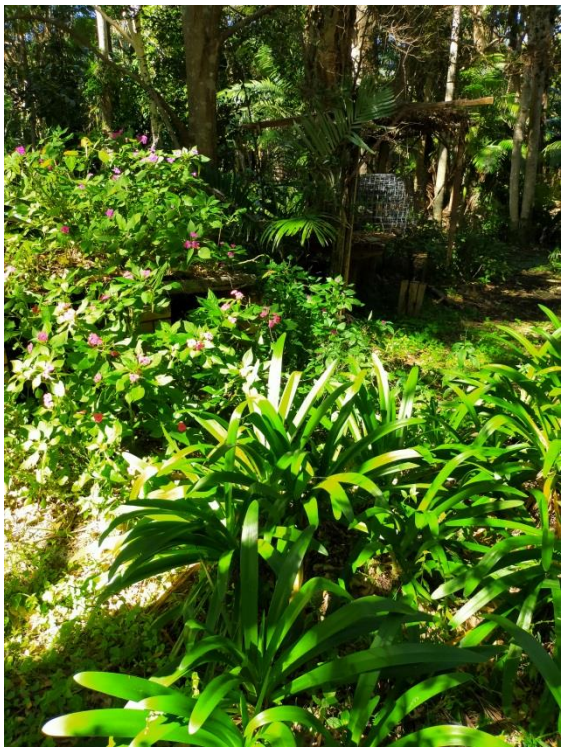
Figure 3 Over clearing and mowing has removed important understory species	Figure 4: Dumping of garden waste
	

Figure 5: Garden plantings on the Reserve threaten the native vegetation	Figure 6: Garden escapees
	

7.2 Dry boat storage

There is evidence of residents using the foreshore for dry boat storage. Formalising this process or providing areas where residents can store boats may reduce the risk of erosion and damage to native vegetation.

Figure 7: Dry boat storage is an issue in some areas of the Reserve	Figure 8: Dry boat storage can damage native vegetation
	

7.3 Illegal clearing

There are several sections on the Reserve where illegal clearing is evident. Council will investigate all incidences of illegal clearing with the view to prosecute and replace damaged or removed vegetation at a ratio of 10:1.

Figure 9: There are endangered vegetation communities on the Reserve	Figure 10: Illegal clearing destroys native plant communities and removes habitat for native fauna
	

7.4 Areas for replanting with appropriate native vegetation

Specific areas for replanting will be delineated by CVC in conjunction with the Wooloweyah Landcare Group, and the Landcare/Dunecare liaison group. Consultation with the Open Spaces unit of Council will also occur prior to planting, to ensure the objectives of this Plan are met.

8. MANAGEMENT ZONES AND PRIORITIES

Management Zones are used for strategic coordination of works into smaller manageable units. These zones are also used to communicate between stakeholders a history of works that have been conducted in particular areas and for planning for future works. The priorities for works in these Zones will depend on the severity of weed infestations in each zone. As a rule, priority weeds will be initially targeted across the Reserve.

Figure 11: Wooloweyah Foreshore Reserve Vegetation Management Zones

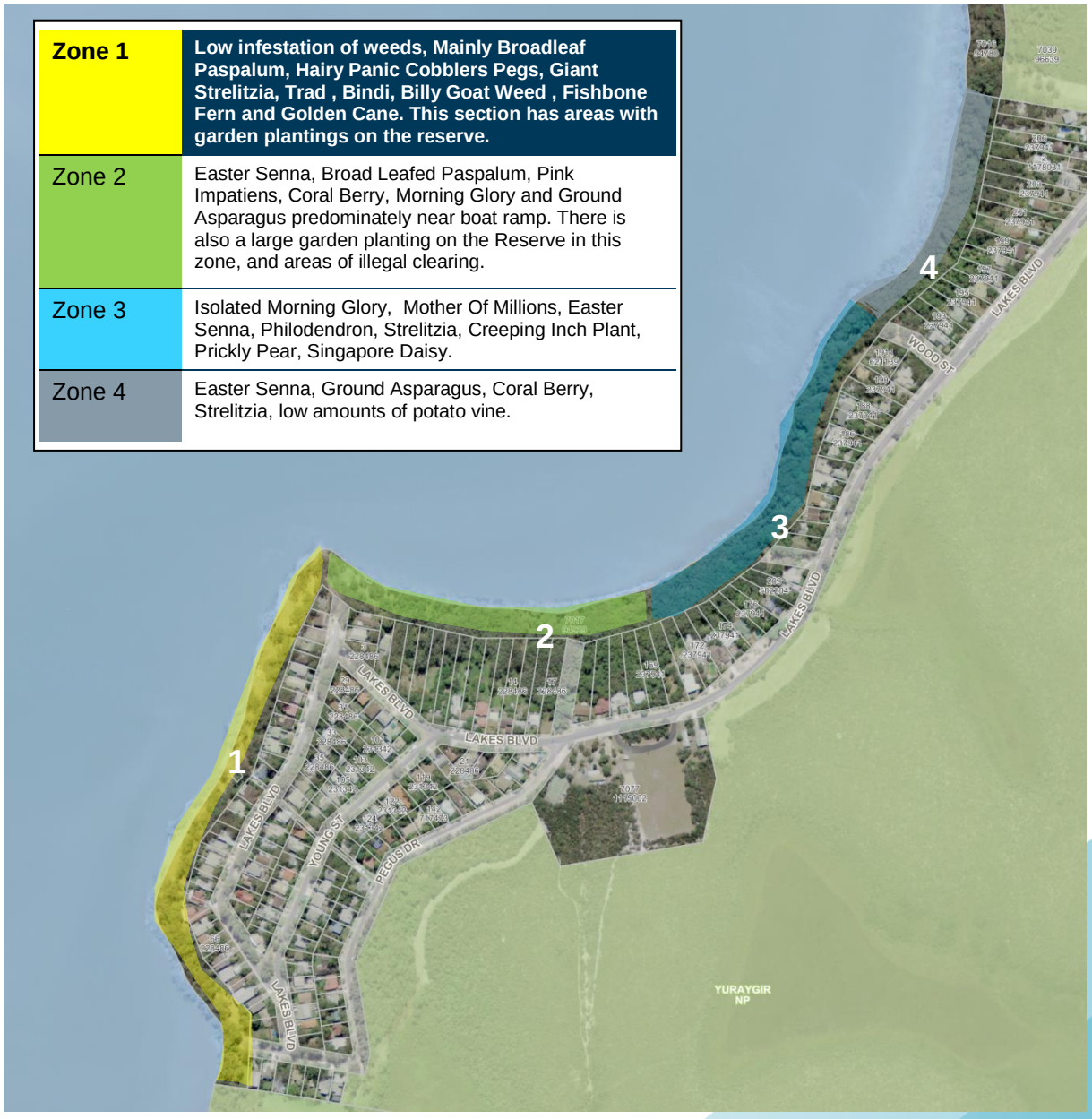


Table 2: Management Goals and Actions

	Action	Responsibility	Priority
Community	Facilitate volunteers to plan and carryout restoration work on the Reserves. Encourage the involvement of the Wooloweyah community in active Reserve management.	CVC Natural Resource Management and Clarence Landcare Inc	High Ongoing
Education	Develop an educational program to progress the importance of the vegetation	CVC Natural Resource Management	High Ongoing
Assessment	Site induction and environmental assessment will be undertaken in each Zone prior to restoration works for WH&S and threatened communities and species	CVC Natural Resource Management	High Ongoing

Table 3: Management Zones and Actions – Refer to Figure 2 for Zone Location

Zone		Action	Responsibility	Priority
Zone 1 (Includes the area around the boat ramp) The native vegetation is a derived form of PCT 1230, Swamp Mahogany Swamp Forest, with forest red gums, paperbarks and casuarinas forming the dominant species in the upper stratum at the southern most end. The area is mown by Council, and there is incursion of garden plants from neighbouring residences, including the maintenance of the reserve by residents. There is a lack of understory plants that would usually accompany this vegetation type.	**1**	Spray hand/pull identified weeds to maintenance of healthy foreshore vegetation. Council to notify nearby residents prior to undertaking spraying.	Landcare and CVC	High
	2	Undertake follow up weed control and control encroachment of private gardens on the Reserve and replant with endemic native species.	Landcare and CVC	High
	3	Maintain foreshore vegetation. Leave fallen timber in situ as habitat for fauna.	CVC and residents	Medium
	4	Establish areas where dry storage of boats is appropriate	Landcare	High
	5	Reduce mowing to designated areas and clean mowing equipment prior to entering Reserve	CVC Open Spaces and residents	Medium
		Develop ongoing works program for Wooloweyah	Landcare and CVC, Open	High and ongoing

Zone		Action	Responsibility	Priority
Currently Zone 1 has a low infestation of weeds, mainly Broadleaf paspalum, Hairy panic, Cobblers pegs, Giant Strelitzia, Trad, Bindi, Billy goat weed, fishbone fern, and golden cane. There is morning glory and ground asparagus predominately near boat ramp.	**6**	Landcare with support from bush regeneration team with long term control options.	Spaces	

Zone		Action	Responsibility	Priority
Zone 2 The majority of weeds are Easter Senna, Broad Leafed Paspalum, Pink Impatiens, Coral Berry, Morning Glory and Ground Asparagus predominately near boat ramp. There is also a large garden planting on the Reserve, and areas of illegal clearing There is a low to medium weed infestation	7	Illegal clearing to be investigated	CVC	High
	8	Spray hand/pull identified weeds. Council to notify nearby residents prior to undertaking spraying.	Landcare & CVC	Medium
	9	Undertake follow up weed control and control encroachment of private gardens on the Reserve and replant with endemic native species	Landcare & CVC	Medium
	7	Maintain foreshore vegetation. Leave fallen timber in situ as habitat for fauna.	Residents	High
Zone 3 Isolated Morning Glory, Mother Of Millions, Easter Senna, Philodendron, Strelitzia, Creeping Inch Plant, Prickly Pear, Singapore Daisy There are low amounts of weeds in this section.	8	Control garden escapes as part of a weeding program to reduce the impact of weeds on the threatened vegetation community	Landcare & CVC	Medium

Zone		Action	Responsibility	Priority
Zone 4 Zone 4: Easter Senna, Ground Asparagus, Coral Berry, Strelitzia, low amounts of potato vine.	9	There are low amounts of weeds in this section to be controlled	CVC to undertake weed control as this section of the Reserve is difficult to access	High
	10	Control garden escapes as part of weeding program to reduce the impact	CVC	High

8. REFERENCES

Maclean Shire Council, 1999. Wooloweyah Foreshore Reserve. Smyth, Maher & Associates, Yamba.

Clarence Valley Council 2009. Draft Coastal Zone Management Plan for Wooloweyah Lagoon, CVC.

9. APPENDIX 1 – SPECIES LIST FOR WOOLOWEYAH RESERVE

Species List - Wooloweyah Foreshore and some adjacent properties	
Scientific name	**Common Name**
Acacia melanoxylon	Blackwood Wattle
Acmena smithii	Lillypilly
Acronychia imperforata	Beach Acronychia
Alphitonia excelsa	Red Ash
Archontophoenix cunninghamian	Bangalow Palm
Livistona australis	Cabbage tree Palm
Banksia integrifolia subsp. Integrifolia	Coast Banksia
Melicope elleryana	Pink Euodia
Commersonia tomentosum	Hairy Clerodendrum
Commersonia bartromia	Brown Kurrajong
Cryptocaria triplinervis	Three-veined Cryptocarya
Cupaniopsis anarcardioides	Tuckeroo
Elaeocarpus obovatus	Hard Quandong
Elaeocarpus retuiculatus	Blueberry Ash
Ficus coronata	Sandpaper Fig
Breynia oblongifolia	Coffee Bush
Ficus obliqua	Small-leaved Fig

Species List - Wooloweyah Foreshore and some adjacent properties	
Glochidion ferdinandi var. ferdinandi	Umbrella Cheese Tree
Glochidion sumatranum	Cheese Tree
Mallotus discolor	Yellow Kamala
Melia azadarach	White Cedar
Notelea longifolia	Large Mock-Olive
Pittosporum undulatum	Sweet Pittosporum
Polyscias elegans	Celerywood
Syzygium australe	Brush Cherry
Syzygium oleosum	Blue Lilypilly
Trema tormentosa var. aspera	Native Peach
Hibiscus diversifolius	Swamp Hibiscus
Cordyline stricta	Slender Palm Lily
Wikstroemia indica	White Cedar
Aspenium australasicum	Birds Nest Fern
Platycerium bifurcatum	Elkhon
Cayratia clematidea	Slender Grape
Cissus antarctica	Water Vine
Cissus hypoglauca	Five-leaf Water Vine
Geitonoplesium cymosum	Scrambling Lily
Hibbertia scandens	Climbing Guinea Flower
Maclura cochinchinensis	Cockspur Thorn
Gynochthodes jasminoides	Native Jasmine
Pandorea panorana	Wonga Wonga Vine
Parsonsia stramina	Monkey Rope
Smilax australis	Austral sarsparilla
Kennedia rubicunda	Dusky Coral Pea
Stephania japonica	Snake Vine
Alocasia brisbanensis	Cunjevoi
Commelina diffusa	Native Wandering Jew
Dianella caerulea	Blue Flax Lily
Gahnia aspera	Saw Sedge
Hypolepis muelleri	Harsh Ground Fern

Species List - Wooloweyah Foreshore and some adjacent properties	
Lomandra longifolia	Spiny-head Mat-rush
Oplismenus impecillis	Beard Grass
Ottocloa gracillima	Graceful Grass
Pteridium esculentum	Bracken Fern
Todea barbara	King Fern
Melatoma affine	Blue tongue
Dicksonia antarctica	Soft Tree Fern
Dodonea triquetra	Common Hop Bush
Eucalyptus robusta	Swamp Mahogany
Eucalyptus tereticornis	Forest Red Gum
Corymbia intermedia	Pink Bloodwood
Endiandra siberi	Hard Corkwood
Melaleuca quinquenervia	Broad-leaved Paperbark
Casuarina glauca	Swamp She-Oak
Restio tetrapyylus	Feather Rush
Crinum pedunculatum	Spider Lily
Blechnum indicum	Swamp Water Fern
Viola hederaceae	Native Violet
Eucalyptus siderophloia	Grey Ironbark
Allocasuarina anarcardiodes	Black She-oak
Persoonia cornifolia	Geebung
Asplenium australasicum	Birds Nest Fern
Wilkiea hugeliana	Veiny Wilkiea
Marsdenia rostrata	Common Milkvine
Olea paniculata	Native Olive
Dampiera stricta	Blue Dampiera
Avicennia marina	Grey Mangrove
Rhizophora mangle	Red Mangrove

Species List - Wooloweyah Foreshore and some adjacent properties	
WEEDS	
Senna pendula var. glabrata	Easter Senna
Asparagus aethiopicus	Asparagus Fern
Lantana camara	Lantana
Chrysanthemoides monilifera subsp rotundata	Bitou Bush
Sporobolus fertilis	Broad-leaved Parramatta Grass
Ipomea carica	Coastal Morning Glory
Anredera cordifolia	Madeira Vine
Acetosa sagittata	Turkey Rhubarb
Callisia repens	Creeping Inch Plant
Passiflora subpeltata	White Passionflower
Ardisia crenata	Coral Berry
Passiflora suberosa	Corky Passionflower
Panicum effusum	Hairy Panic
Nephrolepis corifolia	Fishbone Fern
Bryophyllum pinnatum	Resurrection Plant
Bryophyllum delagoense	Mother-of-millions
Solanum seaforthianum	Brazilian Nightshade
Schefflera actinophylla	Umbrella Tree
Cinnamomum camphora	Camphor Laurel
Macaranga tanarius	Heart leaf
Syagrus romanzoffianum	Cocos Palm

10. APPENDIX 2 - GENERAL VEGETATION RESTORATION MANAGEMENT

10.1. Restoration Aims

1. To maintain and improve biodiversity through restoring vegetation communities to their natural state and protecting threatened species and communities through the reduction of weed species and promotion of native vegetation in all Zones.
2. Provide community education regarding the conservation values, and environmental impacts from garden waste dumping, tree poisoning and lopping for views
3. To rationalise access and restore endemic vegetation on areas used inconsistently with the Wooloweyah Reserve Vegetation Management plan.
4. Establish a vegetated buffer of up to15m in Zone 3 and part Zone 4 to strengthen the dune system in the event of storms and high wave action.
5. Control vegetation through slashing in adopted strategic bushfire Asset Protection Zones to promote adequate bushfire protection within the built environment.

10.2. Restoration Objectives

Vegetation restoration at the Reserve has the ability to;

1. Slow storm water runoff to reduce soil erosion and improve storm water quality entering the Lake.
2. Reduce weed infestations impacting on native vegetation, threatened species and Ecological Endangered Communities on the Reserve.
3. Provide healthy wildlife habitat links, connecting with the surrounding Yuraygir National Park.
4. Maintain visual aesthetics and amenity of the Reserve for suitably passive recreational pursuits.
5. Reduce the potential or severity of slumping and mass movement of sand on steep slopes and escarpments.

10.3. Recording and Monitoring

- Monitoring is a useful tool for recording the history of a regeneration site over time. This also helps in analysis to improve methods for future projects.
- Fixed Site before and after photographs
- Record keeping of plantings; plant species location and numbers
- Plant survival rates.
- Annual plant growth
- Watering and fertiliser regimes
- Weed control activities and chemical application record sheets

10.4. Bushland Regeneration Principles

Two types of restoration approaches apply to native vegetation management -

1. Natural Regeneration (would not effectively stabilise dunes within a short time frame)
2. Assisted Regeneration (rapidly stabilise the dunes removing weeds and planting local gene pool native stock)

Both Natural and Assisted Regeneration apply to Reserve depending on the condition of the site. Assisted regeneration is particularly useful for those sites that are in poor condition with low numbers of naturally regenerating native species.

10.5. Local Gene Pool Species

The use of local indigenous species grown from local seed compliments other native plants and animals in the area and promotes genetic and ecological sustainability in the local vegetation.

Seed collection should continue throughout the life of a restoration project for seasonal availability and replacement plantings. Importantly species planted, in a specific area, should correlate with the vegetation types described in Table 1.

10.6. Seed Collection

- Local gene pool seed collection from the site is important to maintain a local diversity.
- Seed collection to be no more than 10% quantity from any one plant

- Maintain record of seed type, location and quantity collected.
- Label seedling trays with collection locations.

10.7. Propagation and Planting

- Propagation by seed, cuttings or division from local gene pool plant stock.
- Standard planting techniques include mulching and use of water crystals when planting.
- Install hessian or jute mesh in areas prone to slippage or slump.
- Generous initial watering of tube stock with use of water crystals.
- Use bags if follow up spraying is necessary to protect seedlings from being sprayed. Bags are better suited to cool seasons, as extreme heat will cause a high percentage to burn off and die.
- Survival rate for plantings will increase during early spring and late summer.
- Limit the use of fertilizers on native species to promote better root spread and depth. Heath plants require low phosphate fertilizers.

10.8. Maintenance

Maintenance of a site is necessary until plants are established and the ecosystem can support itself. Maintenance works include:

1. Water plants only when needed. Test soil moistures with test kit.
2. In hot weather check soil moisture each week until plants are established.
3. Water plants early in morning or evening to minimise evaporation.
4. Less frequent deep soaking is better than frequent light watering. This encourages deep root systems rather than shallow root systems vulnerable to surface soil drying.
5. Tree guards can be used in high wind areas. However, they can cause leaf burn from high temperatures in hind dune areas.
6. A silt fence is recommended to lower wind velocities and promote sand trap at the seaward side or front of the dune.
7. Fertilise plants after they are well established with strong root systems preventing shallow rooting and tree fall.
8. Follow up weed controls regularly to minimise competition with natives. Hand pull weeds where possible to reduce chemical use and to prevent spray drift.
9. A 10% replenishment of failed plantings may be necessary after 2 months particularly if conditions are dry and hot, or in harsh dune environments.

Avoid removing, or breaking tops, of trees that could result in disease and dieback

10.9. Site Assessment, Risk Analysis

Prior to commencement of restoration works at a work site, an assessment is carried out to identify safety aspects for the application of a Risk Analysis in order to meet the requirements of the NSW Occupational Health and Safety Act. All potential risks are identified and a High, Medium or Low value is applied.

The site is generally considered a lesser risk, however, must be assessed in relation to specific regeneration activities conducted on each project site, particularly persons using chainsaws, tools and herbicide. The necessary qualifications to lead a restoration team on the Reserve are mandatory.

A work activity analysis and risk assessment must be carried out on any work site prior to commencement of any project works undertaken by CVC Staff, volunteers, residents, contractors or project leaders.

All restoration, planting or work activities on the Reserve are to be Council approved and must comply with adopted safe work methods and legislative requirements prior to commencement of any works. All works undertaken on the Reserve must be in accordance with this plan.

Removal of native vegetation on the Reserve without authorisation will incur severe penalties under the *Biodiversity Conservation Act* 2016**.**

11. APPENDIX 3 WEED CONTROL TECHNIQUES

Before undertaking any weed removal, it is important to be able to identify the significant weeds in the remnant or planting area and the effects of their removal on fauna habitat. Assistance on local weeds is available from Landcare members, professional bush regenerators and state government agencies. The following guidelines will help in planning and carrying out a weed removal program.

Undertake weed control work systematically. Work thoroughly through an area before starting work in a new area. Aim to link these worked areas together;

Do not weed a larger area than you can maintain on a regular basis to avoid allowing later weed growth to destroy the values of earlier work. Some weed control can take years to maintain. Consider the fauna habitat that weeds provide, for example, removal of all the Lantana or all the Camphor Laurel in one attempt could displace fauna.

Existing weeds can be utilised in regeneration. Some weeds such as Tobacco Bush can be useful for short periods by providing shade, humidity and leaf litter for the establishment of rainforest seedlings. Lantana can be useful for protecting native seedlings from frost, wallabies and excess sunlight. Bitou strips along the foredune is also used to block sea spray and onshore winds burning off planted hind dune seedlings. Other weeds can have different benefits, especially less invasive weeds that provide to competition to more serious weeds.

It is usually better to remove the ground weeds before removing canopy weeds such as Camphor Laurels. The shade of canopy trees suppresses other weeds. Once removed the once suppressed weeds grow rapidly due to increased light, moisture and nutrients and can quickly out compete any existing native seedlings on the site;

Remain flexible in your approach. Consistently monitor results and try different methods if need be. Keep informed about “best practice” methods. Above all, keep maintaining the site on a regular basis.

11.1. Chemical Rates Used

Glyphosate is the main chemical used by bush-regenerators and Landcare groups due to its relative safety. All users are required by law to read the instructions and rates on the label before spraying.

The two main rates of spraying are 1:100, 1 part glyphosate to 100 parts water. That is 10 mls of glyphosate per litre of water or 100 mm of glyphosate to 10 litres of water. This is mainly used on easy to kill plants such as grasses, Mist Weed, Blue Billygoat Weed, Farmers Friends, small Lantana and Coral Berry.

The other main rate is 1:50 or 20 mls of glyphosate to 1 litre of water or 200 mm to 10 litres of water. This is the strongest dose rate and is used for plants such as Wandering Jew, Morning Glory, Madeira Vine and Asparagus Fern.

Some of these weeds are very hard to kill and the addition of Brush-off ® (Metasulfuron) to glyphosate solutions is allowed as they are compatible. This is very effective on Glory Lilly. Brush-off ® is used at 1.5 grams to 10 litres. Read the instructions on the label before use.

Some weeds that Brush-off ® could be used on are : Canna Lilly, Ochna, Madeira Vine, Morning Glory, Wandering Jew, Cats Claw Creeper, Glory Lilly, Mother-in-laws Tongue, Kudzu, White Glycine, Syngonium, Coral Tree suckers, Guava, Brazilian Cherry and Hairy Commelina, as well as other succulent weed plant species.

In addition to these two chemicals, a surfactant needs to be added. This will help the chemical stick to the leaves, is rain-fast within minutes and helps spread the chemical evenly over the plant. Oils are used for this purpose. Brush-off will not work properly without a surfactant.

Marker-dye can also be used. This comes in different forms such as Spraymate ®, which is a hot pink colour, and in liquid form. There is White Lightening ®, a white coloured powder that is mixed in the backpack with the other ingredients. Marker-dyes are very useful because you can see clearly where you have sprayed. This saves chemical by not spraying the same area twice and identifies any accidental spraying of non-target species.

Always wear proper safety equipment while mixing chemicals and read all the safety directions before mixing. Do not spray on windy days and/or if there is chance of rain.

11.2. Weed Removal Techniques

Below is a list of weed removal techniques. Some methods are more useful in particular situations. It is site-dependent as to which method should be used at a particular site. Slow and steady progress will achieve the most significant results over time.

1. Cut-scrape-paint method (C.S.P.):

This method applies to most woody weeds with the base of the trunk up to approx. 100 mm diameter. These include Camphor Laurel, Large and Small-leaved Privet, Lantana, Senna, Tobacco Bush and Bitou Bush.

(a) Clean around the base of the plant for access and to expose any roots.

(b) Cut the plant low to the ground using secateurs, loppers or a hand saw.

Apply glyphosate to the stump immediately after cutting with a paint brush approx. 15 mm wide at a rate of 1 glyphosate to 1 water, 1:1

Note: Do not let the paintbrush touch the soil as this could deactivate or lessen the effect. The faster you apply the chemical to the cut the better the effect.

(d) Scrape the sides of the stump with a knife to expose the cambium and sap wood layers. Apply chemical as above.

(e) Scrape any exposed roots and apply chemical as above.

(f) The plant top can be disposed of in many ways. It can be placed in a fork of a tree to dry out, chopped up into small pieces and used as mulch or removed from the site.

2. Scrape-paint method (S.P.):

This applies to some woody weed seedlings up to approx. 100 mm diameter that can have the ability to survive the C.S.P method, such as: Guava, Brazilian Cherry and Ochna. It is also used on Madeira Vine.

Woody Weeds

Remove small side branches and twiggy bits for approximately two thirds of the height of the plant or up to head height starting at the base.

Hold the top of the plant and scrape one side of the trunk from the base to at least 60 cm.

Apply undiluted glyphosate with a paintbrush immediately.

Scrape and paint at least two more times.

Note: Make sure that each scrape does not touch another, as this will only ringbark the plant and will not be effective. There must be some foliage on the plant to help transport the chemical around the plant.

Vines

Find the base of the vine and any other shoots. Remove any aerial tubers on the stems to head height and bag for disposal. Proceed to scrape the vines carefully with a knife, (same as for woody weeds.) Apply undiluted glyphosate with a paintbrush.

Repeat the process and scrape up to 3-4 sides of the vine depending on how thick it is.

Note: When removing any tubers or leaves from the stems do not let these fall onto the ground (they will re-shoot). It is best to bag these and remove from the site.

3. Tree Injection:

This is used on many woody trees and large shrubs that are over 100 mm diameter , such as Camphor Laurel, Small and Large-leaved Privet, Celtis, African Tulip Tree and Coral Trees.

Clear around the base of the plant for access and expose any roots.

With the tomahawk , make a cut the width of the blade at a slight angle into the trunk as close to the ground as possible. It is important to make deep cuts to get to the white sap wood. Apply glyphosate to the cut immediately with a tree injector or injecting device at a rate of 1 part glyphosate to 1 part water 1:1 for trunk diameters up to 25cm and use undiluted glyphosate for trunks over 25cm.

Note: For Coral Trees the rate is undiluted for any size trunk.

Repeat the cuts approx. 100 mm apart in a brick like pattern for at least 3 rows around the entire trunk (it will not work if you leave any longitudinal gaps.

Treat any exposed roots by chopping or scraping the roots and applying chemical.

Note: It is wise to fill up the cuts at least 3 times slowly to make sure the chemical is being taken up by the plant. Do not allow the chemical to spill from the sides of the cuts, if possible.

4. Tree Injection- Drill

Same as the tomahawk method but using a cordless drill or chainsaw fence borer with 3/4bit. Drill into trunk at least 50 - 80mm deep. Fill up the holes with chemical at least 3 times 1:1rate.

5. Spraying

This is generally carried out using a 15 litre back pack spray unit but can be used by other spraying equipment. There are different application methods for different situations.

Spot Spraying. This method is used when there is native seedlings in amongst the weeds. Wandering Jew in the shade under rainforest canopy is one example of where spot spraying should be used.

Before spraying locate native seedlings and hand weed around each one at least 100 mm. If only a few native seedlings are present these can also be tagged using brightly coloured flagging tape.

Spray the weeds being careful not to spray any natives. Use low pressure to spray the weeds.

If you have accidentally spayed a native, wash the plant with water immediately. You should always carry a water atomiser at all times when spraying for this purpose. You could also cut off the sprayed section of the plant.

Note: Be careful not to spray near any ferns as they are highly susceptible to chemical spray drift. It is best to hand weed around all ferns.

6. Over spraying

This method should be used for large open areas of weeds such as Lantana or Bitou patches, grass areas or areas where there are little or no natives or non-target species.

7. Gouge-paint

This is mainly used on Madeira Vine and Climbing Asparagus. These have a fleshy root systems called tubers in Madeira vine and rhizomes in Asparagus. The gouge-paint method is very useful because there is less disturbance to the soil and surrounding areas than if you where to dig the whole

tuber or rhizome out by hand. With Madeira Vine, it is nearly impossible to dig the entire tuber system out of the ground without leaving small pieces behind.

Clean around the base of the plant and check the extent of the tuber or rhizome system using a knife. Gouge out a section of the tuber or rhizome with a knife.

Apply glyphosate undiluted with a paintbrush to the cut area. If it is possible, gouge a hole, then carefully pour a small amount of chemical into the hole.

Note: Make sure that all parts of Madeira Vine are removed carefully from the site.

8. Crowning

This method is used on plants that have underground growing points such as corms, bulbs, rhizomes, clumping or fibrous root systems. These include plant species such as Asparagus ferns, Fishbone ferns, Madeira Vine and grasses.

Hold the leaves or stems of the plant up and expose the base of the plant.

Insert a sharp knife close to the base of the plant near the growing point.

Cut through the roots all round the base of the plant pulling up the plant as you cut.

Remove the plant. Make sure that the entire growing point of the plant is removed.

9. Bagging

This term is used for bagging or collecting seed, tubers, flowers or any weed propagules, and removing these from the site. It is especially useful in preventing re-infestations of weeds. This can be done before you commence CSP or during spray preparation or anytime that weed seeds are seen. Common species that this has been used on include Winter and Smooth Senna, Privets, Madeira Vine tubers, Ochna seeds and weedy Passionfruits

10. Hand-weeding

This method is very useful for small areas of weed infestations. It is best done while the ground is moist as it is easier to pull out deep-rooted weeds. This method should be used around all fern species, as they are very susceptible to chemical sprays. It is also to be used in areas that have a high number of native seedlings in a small area. Always wear gloves and grab the weed by the base as close to the ground as possible, get a firm hold and pull the plant out. Do not leave any part of the weed on the ground as it may re-shoot.

Plants unsuitable for hand weeding, due to their long taproot, are Ochna, Brazilian Cherry, Silver-leaved Desmodium and Cats Claw Creeper. Other weeds with brittle stems including Wandering Jew and Hairy Commelina are difficult to completely control by hand in large areas, so additional spot-spraying may be required.

Table 4: Weed Control Methods for Wooloweyah Foreshore Reserve

Bitou bush *Chrysanthemoides monilifera*	Pulse, near Kangaroo Grass. Brushoff is used near Kangaroo grasses when controlling bitou. Brushoff does not control grasses. Control in Winter at 250:1 Roundup Hand weed or sprah (1:250) Glyphosate or 1gm to 10 L of Brushoff+
Lantana *Lantana camara*	Folia spray 10gm -100lts Brushoff & Pulse Hand weed or Cut, Scrape and Paint 1:1.5 Roundup larger stems
Winter Senna *Senna pendula*	CSP Glyphosate 1:1.5
Gloriosa Lilly *Gloriosa superba*	50:1 Roundup + Brushoff 1gm/10lts + 1% Pulse. Control 2 times per summer season December and February
Painted spurge *Euphorbia cyathophora*	Hand removal before seeding, spray 1gm – 10lts Brushoff + Pulse large areas.
Groundsel bush *Baccharis halimifolia*	Low CSP 1:1.5 Roundup or spray Amicide 500 Lo 40mls to 10lts
Ground asparagus fern *Protasparagus aethiopicus*	Crown out corms with a knife leaving water tubers and leaves on site. Remove corms from site in a bag and dispose in certified garden wast dump. Spray with Brushoff 1gm : 10lt + pulse when over 40% ground cover.
Morning Glory Ipomoea cairica	Cut scrape vines glyphosate, pull runners and roll up vines and hang.
Ochna *Ochna serrulata*	Basal bark Diesel Starane 20:1, CSP and paint on Diesel and Starane. Or CSP Roundup 1: 1.5
Madeira Vine *Anredera cordifolia*	Spray 1:50 Glyphosate. Scrape-paint vines with Glyphosate 1:1, do not cut vines as they need to translocate Roundup to tree canopy height to reach potato tubers. Bag any tubers and remove from site to certified garden wast dump.
Wandering Jew *Tradescantia fluminensis*	Spray glyphosate 1:50 with Pulse follow up regularly

Coral tree *Erythrina X sykesii* Camphor laural Umbrella tree *Schefflera actinophylla*	Drill and inject roundup 1:1 or hatchet trunk circumference of tree stem and pour on Roundup 1:1.5 with spray pack nozzle. Remove Umbrella tree parts from site. Follow up within 3 months. Most trees will cut stump, scrape and paint with Roundup 1:1.5
Fishbone fern *Nephrolepis cordifolia*	Hand pull and stack or spray Brushoff 1g: 10Lt
Mothers of millions *Bryophyllum delogoensis*	Hand remove or spray large infestations 1gm : 10lts Brushoff + Pulse. Bag up and remove from site to certified garden waste dump.
Brazilian Cherry *Eugeniauniflora*	CSP stems with 1:1.5 Glyphosate Tree inject larger plants with 1:1.5 Glyphosate.
Golden wattle *Acacia saligna*	CSP stems with 1:1.5 Glyphosate Tree inject larger plants with 1:1.5 Glyphosate.
Turkey Rhubarb *Acetosa sagittata*	Spray 100:1 Roundup with 1gm:10lts Brushoff + Pulse
Cobblers peg *Bidens pilosa*	Hand pull plants
Gazania *Gazania rigens*	Remove by hand or Back pack spray Brushoff + Pulse
Coastal Tea Tree *Leptospermum laevigatum*	Cut down tree to stump level no poison needed. Use smaller branches for brush for dune stabilization
Siratro *Macroptilium atropurpureum*	Follow vine to tuber and dig out or cut tuber and paint on Roundup 1:1. Does not spray well, will always sprout from tuber unless tuber is treated directly with herbicide.
Buffalo grass	Spray out grass with Roundup 1: 100 + Pulse. Follow up and Plant out with natives Same as Paspalum spp. And other unwanted weed grasses including Guinea Grass *Panicum maximum*
Singapore daisy *Wedelia trilobata*	Spray vine with 1gm to 100lts Brushoff with Pulse as a surfactant, follow up regularly.

Mother in Law Tongue *Sansevieria trifasciata*	Hand pull plants and remove from site to an approved waste depot. Backpack spray with 1gm : 10lts Brushoff + Pulse.
Other weeds include:	Castor oil, Ross River burr, Banana Tree, Mango, mulberry and P. Lucerne.