

5.0 MANAGEMENT PLAN FOR REVEGETATION

One of the primary activities of the project is to facilitate biodiversity conservation by identifying areas critical for linking, enhancing, and rehabilitating and protecting important remnant vegetation and fauna habitat. The following section details the requirements of the focal forest dependant species and threatened ecological communities (as described under the *TSC Act 1995*), which occur in the Bingi area. This information is useful for because it provides a basis for selecting species for revegetation work and arguments for retaining existing native vegetation.

The second part of the management plan specifies select areas for revegetation and provides rational for species, which should be utilised for that purpose. Generic costs associated with each component are given. Final costing and species can not be given until BLG liases with landowners and agrees on the extent of each area to be revegetated and if grazing is intended post canopy development.

5.1 Forest dependant fauna

The Powerful Owl, Glossy Black Cockatoo, Grey-headed Flying Fox (seasonal) and Greater Glider occur in this area and are forest dependant species. The Powerful Owl was previously detected by one of us (see Gaia Research 2001) and probably nests in a large hollow Forest Red Gum on freehold land.

The area has a thin connection to areas of bushland to the north beside Congo Road. The narrow width of the remnant vegetation and species (Swamp Oak) beside Congo Creek are isolating mechanisms for forest dependant fauna. Priority revegetation work should concentrate in the upper catchment of Congo Creek and utilise species of tree suitable for Greater Glider to use for feeding.

There are several portions of Eurobodalla National Park on the coastal strip. These occur near Bingie Point and south of the urban area of Congo. Some of these small portions of reserve require connecting forest (i.e. south of Bingie Point) to other blocks of habitat so that animals can recolonise areas after events such as wildfire or severe population decline from predation (eg Powerful Owl on Greater Glider). One narrow area, which is a choke point for forest dependant fauna, is west of Congo beside the electricity easement. To cater for forest fauna revegetation and fencing (for a period to exclude stock) is required.

The long term viability of many species of forest fauna will require a permanent link to areas to the north and west of Bingie (Figure 7). Portions of freehold land, which are currently cleared, will require revegetating. A strip of land 100m wide (or wider) should be fenced and replanted

with indigenous species. In particular Spotted Gum, Blackbutt and Forest Red Gum should be utilised. The narrowest gap between forested areas is along the ridgeline south of Bergalia.

Greater Glider a surrogate for landscape planning

The Greater Glider *Petauroides volans* is selected as a focal species for forest management in the Bingi area because it is a forest dependant mammal that dens in large hollow-bearing trees. The Greater Glider is a folivore and eats the leaves of many gum species such as Blackbutt, Forest Red Gum and Spotted Gum. The Greater Glider generally appears to have a limited capacity for movement and dispersal, occupying small home ranges of 1-3 hectares (Henry 1984; Kelh and Borsboom 1984, Comport *et al.* 1996, Kavanagh and Whelan 2004). Radio tracking studies conducted by Kavanagh and Whelan (2004) found that logging reduced home ranges to unlogged sections of forest and animals did not disperse into unlogged sections of forest. Greater Gliders used 1-7 (median 3) den trees, ranging in size from 71 to 193 DBH (diameter at breast height) being among the largest in the study area (Kavanagh and Whelan 2004).

These studies indicate that the species can subsist in relatively small patches of remnant eucalypt forest if a suitable number of den trees are retained. However, Greater Glider do show a high degree of fidelity to forest patch and den trees and an apparent poor ability to disperse into adjacent unlogged areas makes this species vulnerable to habitat alteration such as forestry and tree removal for asset protection (Tyndale-Bisco and Smith 1969; Lunney 1987; Macfarlene 1988; Smith and Lindenmayer 1988; Lindenmayer *et al.* 1990; Millage *et al.* 1991, Kavanagh and Bamkin 1995; Kavanagh *et al.* 1995; Goldingay and Daly 1997, Kavanagh and Webb 1998; Kavanagh 2000, Kavanagh and Whelan 2004 and Eyre 2004). Norton and Possingham (1991) predicted that the minimum size of habitat patch required for a sustainable population of Greater Glider was 1000 hectares. However, this is subject to forest productivity (levels of foliar nutrients vis soil nutrient levels) as Eyre (2004) suggested that in southern Queensland Greater Gliders required forest patches up to 16,000 hectares for viable populations.

The main threats to the Greater Glider in the Bingi are inbreeding depression, loss of habitat (particularly hollow-bearing trees), predation from Powerful Owl. The Bingi study area is approximately XX hectares of which 1121 is vegetated. The remnant forest is highly fragmented and the potential area of suitable forest (Spotted Gum, Blackbutt and Forest Red Gum forests) is approximately 767 hectares. The Greater Glider has not been detected in Swamp Oak and Bangalay forest (pers. obs.) and has an aversion to setting foot on the ground (Kavanagh and Whelan 2004). Given these facts the viability of the Bingi population of Greater Glider is tenuous.

Requirements for the Powerful Owl

Large forest owls respond to geomorphology, moisture regime, vegetation structure and consequent site productivity rather than specific floristics (NPWS in prep.). Tree hollows used by owl prey species form in trees greater than 120 years; those used by large forest owls for nesting and roosting form in trees greater than 165 or possibly 250 years old (Mackowski 1984, Millage *et al.* 1991). Large forest owls prefer mid to late successional, mixed age or multi-aged forest greater than 60 years old (Davey 1993).

The Powerful Owl requires old growth forest and in particular hollows in old trees for shelter and/or breeding (Kavanagh 1991). Pairs are monogamous, sedentary and have large (300-1500 hectare) permanent home ranges (NPWS in prep.). Nesting occurs in most years (84%) and eggs are laid mainly in June (mid-May to mid July). The female lays 1-2 eggs per clutch, which take 5 weeks to hatch. The chicks fledge after 2 months and are independent after 6-7 months post fledgling (NPWS in prep.).

Nests are located in trees in unlogged, unburnt gullies within 100m of streams or minor drainage lines. Nests are in trees with hollows greater than 450 mm wide and one metre deep, surrounded by canopy trees or subcanopy or understorey trees (NPWS in prep.). Nest hollow entrances are greater than 6 m above the ground, commonly more than 20 m, in trees of at least 800 mm diameter at breast height. The owl has a high degree of nest site fidelity but may use alternate nest sites in the same gully (McNabb 1996, Kavanagh 1997).

The Powerful Owl is a specialised predator of arboreal mammals, particularly the Greater Glider *Petauroides volans* and Common Ring-tailed Possum *Pseudocheirus peregrinus* (Debus and Chafer 1994, McNabb 1996 and Kavanagh 1997). Other mammals eaten include the Grey-headed Flying Fox *Pteropus poliocephalus* and Sugar Glider *Petaurus breviceps*. Powerful Owls may also eat birds such as Pied Currawongs and large parrots (Debus and Chafer 1994, pers. obs.).

Requirements for Glossy Black Cockatoo

The Glossy Black Cockatoo requires old growth trees, which have suitable hollows for nesting and an abundance of Black She-oak *Allocasuarina littoralis* for food. The diet of this species is very specialised, namely the seeds of several *Allocasuarina* species. Black She-oak seed is the main food source of this species in southern NSW.

Requirements for Grey-headed Flying Fox

The Grey-headed Flying-fox feeds on various species of *Eucalyptus*, *Corymbia* and *Banksia* (pers. obs.). The Grey-headed Flying-fox aggregates in diurnal roost sites (camps), which are

usually in coastal closed forest near creeks. The closest roost is Beashels Trig some three kilometres to the west of the Bingi study area. Given the proximity of this temporary camp the bats would forage on flowering gums in the Bingi area.

5.2 Endangered ecological communities

All vegetation communities listed under the TSC Act (1995) as endangered ecological communities, which occur on freehold land, should be protected (GD has notified the Scientific Committee with respect to the Eurobodalla Forest Red Gum community not falling within the Act). One method to achieve this is for ESC to use the ground-truthed map provided in this report as the basis for property assessments. For larger rural holding conservation incentives could be achieved through Property Management Plans (in accordance with the amended TSC Act 1995/catchment management). All landowners should be informed if endangered ecological communities exist on their land (via rate notices) and photographic evidence taken of these communities existence.

The ground-truthed map of the existing vegetation communities should be used as a basis for selecting species when revegetation areas. For example on the ridge and midridge areas around Coila Lake and Congo Creek there is scope to replant with Forest Red Gum. This could be augmented with secondary plantings of Spotted Gum and Blackbutt.

Under the old TSC Act a s91 Licence is required for bush regeneration works in Endangered Ecological Communities, however there is now also a s132 licence under NPW Act, which can be used for activities that are for research, education or conservation. Most bush regeneration activities will fall into this category so Bushcare groups should be getting a s132 licence not a s91/95. These licences are issued from Wildlife Licensing in Parks and Wildlife Division.

6.0 ACTION PLAN FOR WORK

All actions are dependant on community support. Revegetation of select areas requires the permission of landowners. Select the appropriate people within your group to approach landowners in regard to revegetation. Present your reasons for revegetating select areas i.e. the need to connect fragmented habitat for the Greater Glider and be flexible with options that the owner may agree to. For example in areas where cattle are grazed it is possible to fence off areas of agreed widths for a period of approximately eight years after which the trees have grown to a height that cattle can graze. Fencing can then be partially moved so that a successive within of land is planted out. In this way the farmer only loses a relatively small portion of land for a period. Ultimately he can still graze animals under the forest when it has achieved a suitable height.

The following action plan is presented in order of highest to lowest priorities. However, actions may be undertaken on several areas simultaneously.

6.1 Development of policy to protect existing habitat

It is better to protect what exists than try to recreate forest landscapes. Approximately 500 hectares of forest within the Bingi area is zoned rural residential 1c. Currently a relatively small area has been subdivided. However, the removal of forest for roads and asset protection can clearly be seen on the aerial photograph used in this report. Within the next decade there shall be increasing pressure for landowners to subdivide because of the demographics of our society. If a policy to protect critical habitat components such as hollow dependant trees, fallen logs and a shrub layer then arboreal and ground dwelling species will be compromised. In particular non or weakly volar species shall have reduced habitat and local species extinction is expected.

The focal species of Greater Glider is essential for presenting the argument for protecting existing forest and revegetating select areas. Use the framework of the Broulee Yellow-bellied Glider Policy to formulate one for the Greater Glider. For example define a set of minimum standards for any development or activity occurring on land in the Congo-Bingi area. These may be the retention of all large hollow-bearing trees, except where it can be demonstrated that Greater Gliders do not utilise the hollow bearing trees. All large hollow-bearing trees should be identified and the positions determined by a global positioning system during standard assessments under Section 5A of the Environmental Planning and Assessment (EP and A) Act (1979), as amended by the (amended) *TSC Act (1995)*. This will allow council to determine if breaches of consent have occurred on individual lots.

Clearing of vegetation around the large hollow-bearing trees must not inhibit access of Greater Gliders to these resources and retained vegetation must be configured to allow movement of

individual Greater Gliders across the property and onto habitat on adjoining properties. A total of 100% of small (<16 hectares) multi-aged forest patches on any property must be retained. A total of 60% of large (> 16 hectares) multi-aged forest patches on any property must be retained. The above minimum standards apply for the remaining 40% of the forest. A total of 50% of other suitable habitat on any given property must be retained. The above minimum standards apply for the remaining 50% of the forest. The policy is noted on section 149 certificates on subject land. If possible habitat beside riparian zones could be identified as the habitat corridor and as part of the subdivision this land could come into public ownership.

Daly (in press) has identified some of the problems arising from such a policy. These are given so that the group may carefully consider wording to overcome these shortfalls. For example there are problems in the retention of hollow bearing trees, foliage feed trees and linkages to such trees. In existing subdivisions (of 5-7000 sq metre blocks) that may contain suitable Greater Glider habitat there is an expectation of building a dwelling. In these instances some habitat is retained as a condition of consent where this is appropriate. However, there is often a conflict of interest with conserving large hollow bearing trees and the potential of council being liable if such trees fall on dwellings or other assets.

Asset protection under section 100B of the Bushfire Act is another layer of legislation that is often in direct conflict with protecting habitat. This act has been recently amended and should be cited when developing the policy. Significant amendments to the *TSC Act (1995)* have been drafted and shall be gazetted shortly. Use these amendments when drafting the policy. For example make it mandatory that assessments under Section 5A of the Environmental Planning and Assessment (EP and A) Act (1979) are conducted by registered, certified ecological consultants who utilise standard, systematic survey methods. As part of the amendments to the *TSC Act (1995)* local government have to amend their Local Environmental Plans (LEP). I recommend advancing the adoption of an amended Yellow-bellied Glider/Greater Glider Policy as the easiest method for council to gain certification for their LEP.

For rural land the Catchment Management Authority (CMA) will prepare property vegetation plans for bushland under the Native Vegetation Act (2003) in concert with Department of Environment and Conservation. In particular there will be emphasis put upon mapping vegetation communities and their complement of threatened species, actions to protect and if needed restore the community and a regional biodiversity conservation priority for each vegetation community. Use the information in this report to help the CMA develop appropriate property vegetation plans for bushland within the Congo/Bingi area.

6.2 Fencing and revegetation within the catchments of ICOLLs and riparian areas

Revegetation works in the riparian zone would combine water quality and filtration benefits with improvement to biodiversity and habitat linkages. The estuary vulnerability Table 9 suggests a loose priority for riparian revegetation projects purely for water quality benefit. These potential projects would initially target Meringo Lagoon and Kellys Lake as priority ICOLLs.

Unfortunately there are currently no recommendations for estuaries or ICOLLs. (P. Spurway pers. comm.). Based on water quality protection P. Spurway states that for ICOLLs a minimum of 50metres perimeter buffer and a minimum 30metres riparian buffer to all inflowing streams and 10metres to dry gullies (based on DLWC, 2000). The buffer should extend at least to a 100 year flood level or similar where its bounds are beyond these buffer distances.

The northern portion of Meringo Lagoon has recently come within Eurobodalla National Park (N. Cook pers. comm.) and shall revegetate naturally. If BLG wish to do any revegetation work within the park then liaise with N. Cook (DEC Narooma) and access the Eurobodalla NP revegetation plan for appropriate species (Stone 1997). Much of the southern catchment (and areas beside Meringo Creek) has been cleared for pasture. BLG should liaise with the owners and if possible work out a mutually acceptable area to be fenced and either allowed to naturally rehabilitate or replanted. Swamp Oak grows in thick stands around the edge of the lake. The most efficient method to revegetate cleared areas would be to fence the land off from stock, saw branches off nearby female Swamp Oak that contain seed and lay them onto the ground – pasture. The branches shall provide shade and microclimate for seedling germination and protection and by harvesting nearby plants the genetic integrity is maintained.

The majority of Kellys Lake is within Eurobodalla NP. However the upper catchment is on freehold. Again liaise with each landowner and seek to fence off and or revegetate 30 metres beside each portion of the inflowing streams. In the upper catchment Forest Red Gum and Blackbutt can be planted with Kangaroo Grass and Mat Rush as ground layer species. Port Jackson Fig and Native Olive can be planted as a shrub layer species. When mature the fig and olive produce fleshy fruit that shall attract fruit eating birds (Satin Bowerbird and Lewin's Honeyeater).

The northern side of Coila Lake has, in some sections, only a thin band of native vegetation. There is currently some public and private revegetation programs beside the lake. Figure 8 shows priority areas for revegetation for habitat linkage and protection of water quality. This also includes Cudbugga Creek an inflowing stream. Although the recommended buffer areas are given above it will be up to the discretion of the individual landowners if and how much land is devoted to water quality protection.

The unnamed creek near Bingi Rd and the Princes Highway is badly eroded and releasing sediment into Old Man Bed Swamp, a coastal freshwater wetland. An area of between 30 and 50 metres width is required on either side of this creek to be fenced and revegetated. No stock should be permitted into the fenced area as they compact soils and cause erosion. The original canopy would probably have been *E. tereticornis* and the midcanopy Snow in Summer *Melaleuca linariifolia*. Remnant trees north of Bingi Road indicates that Rough Barked Apple *A. floribunda* was a common canopy species

6.3 Linking existing forest habitat

Norton and Possingham (1991) predicted that the minimum size of habitat patch required for a sustainable population of Greater Glider was 1000 hectares. The Bingi study area contains approximately 1121 hectares of native vegetation of which the potential area of suitable forest for Greater Glider (Spotted Gum, Blackbutt and Forest Red Gum forests) is approximately 767 hectares. There is an urgent need to revegetate areas of forest to allow dispersal of Greater Glider so that 1) populations north and south of Congo Creek and 2) populations east and west of the Princes Highway are reconnected. If neither linkage is reinstated then neither the Bingi or Pedro Swamp populations will be viable.

Congo Creek

The priority area for revegetating to establish a north-south linkage of forest is north and south of Congo Creek. The most efficient route for this linkage would be from the portion of Eurobodalla NP, south of the township of Congo through lots 1, 2 and 181 (see Figure 7). This would provide a sufficient area for both populations of Greater Glider to maintain viability. Unfortunately during the ground-truthing component we could not gain access to forest south of Congo creek so an accurate assessment of existing forest type and presence/absence of greater Glider could not be undertaken.

Bergalia Ridge

This is the site that would require the minimal area for revegetation for connectivity of the Bingi forests in an east-west direction. Currently the area that would require revegetating to link remnant trees beside the Princes Highway to forest to the east is in the order of 200 metres (see Figure 7). However, this work needs to be done in conjunction with establishing linkages from the west of the Princes Highway to Moruya State Forest (Beashels trig area). This would require the revegetation of approximately 600 metres of land. The following canopy species are recommended for this area *E. tereticornis*, *E. pilularis* and *C. maculata*. One obstacle to this linkage is the 33 kV power easement that is located to the west of the Princes Highway.

Coila Lake to Bergalia Ridge

Currently there are several landowners within the Bingi area revegetating their own land, this is being done in concert with BLG/ESC or independently. There have been efforts to link existing patches of forest around Coila Lake. This needs to be extended so that a forested link occurs around the entire lake from Eurobodalla NP west towards Bergalia ridge/Beashels trig. The priority should be to plant canopy species. Beside the lake *A. glauca* should be planted for a band width of 10 metres. This should be followed by a band of *E. botryoides/B. integrifolia* for at least 15 metres, followed by *E. tereticornis*, *E. pilularis* and *C. maculata*. The final association can be planted at any width. Shrub and ground cover plants can regenerate/colonise the understorey given time but if cattle are excluded then Port Jackson Fig, Mat Rush and Kangaroo Grass can be planted. If possible seed can be collected of coning Burrawang and hand broadcast over the areas (a large population occurs on J. Woodford's). Areas may be fenced from stock and left fallow so that natural regeneration can occur.

6.4 Weed eradication

The infestation of Cape Ivy on the headland on the Red Gum forest on the northern side of Congo Lake should be removed by hand. This was the only occurrence of this weed in located in the study area and the infestation is currently small. A Green Corps group could be assigned the task of removing this weed. An estimated time budget of 100 hours plus 30 hours follow up work may be sufficient for a team of four workers.

Currently Bitou Bush has small occurrences, especially along the edge of Coila Lake and the dunal areas of Eurobodalla NP. All Bitou should be removed by hand and the plants disposed of in a manner that reduces the risk of seed dispersal.

6.5 Generic budget for revegetation actions

It is essential that BLG/ESC have a costing for various revegetation works to help funding applications. However no specific budgets can at this time be tallied as consent from landowners has not been gained and the width of each area to be revegetated has not been determined. BLG must also establish if the owner wants to graze the corridor in the future as this will influence the necessity of establishing shrub and ground cover species. In the absence of these details the costs detailed below are for items typical of most revegetation works. It is recommended that prior to any application BLG should collect seed of endemic species for revegetation so that the genetic integrity of the plants are consistent with that of the area. In particular seed should be sourced from *Allocasuarina littoralis* that are used as feed trees by Glossy Black Cockatoo as these seeds may contain traits favoured by this parrot. Seed can be sourced from canopy trees removed for subdivisions or asset protection.

Currently Bingi has no Common Wombat, feral deer and few Swamp Wallabies. These mammals cause great destruction to seedling and small trees. To protect plants in the Shoalhaven and Illawarra from browsing requires fabrication of wire tree guards, which is an expensive exercise. Fortunately in the Bingi area these costs are not expected to be incurred in the near future. However, Rabbits do occur in the region and where possible it is recommended to use tree guards to protect seedlings until they reach a minimum of 0.5metres in height.

Planting densities of trees may be as high as 1 per 3 square metre. Planting is best done in late summer/autumn to coincide with mild temperatures and seasonal rain.

Table 14. Breakdown of revegetation budget (estimated costs GST exclusive)

Item	Cost	Comment
Plants	\$1.50/tube	Batemans Bay Botanic Gardens Contact Jenny Liney/Ryan Phone 44712500
Planting	\$2.55/plant	BLG – contractors – Green Corps
Fencing	\$15-20/metre	BLG – contractors – Green Corps (4 strand barb (\$86/500m), star pickets (\$4 each spaced at 4 m intervals), post every 12 m (\$10), stainer post (c. \$22 each)
Maintenance	\$20/hr	One hour per week for 30 weeks per year.
Contributions	\$20/hr	In kind contributions – seed collecting, tools, labour
Weed removal	\$20/hr	In kind contributions – hand sprayer, tools, labour



Numbers 1-7 indicate sites where bird census conducted (site 4 is to the south-west of site 5)

Figure 9. Proposed areas for revegetation work (yellow lines) – habitat corridors (yellow arrows)

6.6 Re-introductions

If the revegetation corridor can be achieved then there is scope to translocate Yellow-bellied Gliders from areas of fragmented bushland and/or those, which are slated for development (i.e. Surfbeach 1c area). This is not a recommendation to facilitate development without regard to the conservation of threatened fauna in "situ". The proposal is given here as an option, which should be explored prior to the removal of habitat in the areas which have been granted consent prior to the TSC Act (1995) or zoned for urban development and the Broulee YBG Policy can not be achieved, or where it can be demonstrated that existing Yellow-bellied Glider populations are already isolated from adjoining family groups and are not viable in the long-term.

No Yellow-bellied Glider should be translocated into the Congo/Bingi area if the forest patch size is of inadequate size to support a viable population. Any reintroduction will require a translocation proposal to be prepared, submitted and passed by DEC (Department of Environment and Heritage) as per NPWS (2001).

NPWS wildlife atlas records indicate that the Green and Golden Bell Frog *Litoria aurea* historically existed in the Bingi area. Coastal freshwater wetlands exist within and adjacent to Eurobodalla NP. If the reason for the local extinction of this species (chytrid fungus) can be arrested then there is scope for tadpoles and metamorphling frogs to be reintroduced into the area. The source population would have to be captive bred animals source from the closest population (Pambula stock managed by P. Johnston).

Mr Daly has been attempting to re-introduce this species to Pambula for approximately six years. The process is costly and arduous, however reintroduction is part of the recovery actions for the species in the Recovery Plan (NPWS 2002).

7.0 DISCUSSION

The Bingi area has three forest dependant species; the Powerful Owl, Glossy Black Cockatoo and Greater Glider that are at risk from localised extinction because the forest is currently fragmented. Rural residential subdivision and associated asset protection zones for bushfire protection are considered the major threats to native vegetation and associated forest dependant fauna in the region. This is unfortunately a common occurrence in NSW.

All of the above species require large hollow bearing trees for either den or nest sites. These trees take approximately 120 years to develop such hollows (Mackowski 1984). So there is a need to conserve existing old growth vegetation and revegetate areas to provide food resources (Casuarina seed for Glossy Black Cockatoo), and potential den and nest sites.

Given this there is an urgent need to develop a policy for the conservation of existing habitat within the area as part of the *Threatened Species Legislation Amendment Act (2004)*. As part of the raft of changes heralded by this Act areas are identified that can be revegetated as offsets to development. These areas shall facilitate the dispersal of Greater Glider so that:

- 1) populations north and south of Congo Creek and
- 2) populations east and west of the Princes Highway are reconnected. If neither linkage is reinstated then neither the Bingi or Pedro Swamp populations will be viable.

Kavanagh (1991) proposed that surrogates such as large forest owls and gliders could be used as guides for the health of a forest. The use of surrogate species (including vegetation communities) is now well established method for forest management. In the Bingi area the Greater Glider could be seen as a keystone species for management. The reasons for selecting the Greater Glider as a surrogate are:

- it is a forest dependant species, requiring old growth components for denning;
- it requires a near contiguous lineage of canopy to disperse;
- it is a food item for the Powerful Owl.

Currently in the Bingi area the forest ecosystems capable of supporting Greater Glider include the Blackbutt – Ironbark Forest and Spotted Gum Forests. These communities total approximately 767 hectares, which is below the threshold for a sustainable population. Greater Gliders occupy an area of approximately 1-3 hectares within a home range. Male home ranges overlap female home ranges but female-female and male-male home ranges are distinct (Kavanagh and Whelan 2004). Greater Gliders do not normally come to the ground and move through the forest by gliding. They can glide up to 100 metres but are poor dispersers. This is important because of the desire to link the Bingi forest to those to the west to re-establish

connectivity and a habitat corridor will require Greater Gliders residing within (or adjacent to) the revegetated forest.

Given these facts there is an urgent need to revegetate areas of forest to allow dispersal of Greater Glider so that populations north and south of Congo Creek and populations east and west of the Princes Highway are reconnected. If neither linkage is reinstated then neither the Bingi or Pedro Swamp populations will be viable.

To facilitate the movement of Greater Glider to the north and west the following canopy species are recommended: Blackbutt, Spotted Gum, Stringybark, Red Bloodwood.

There is also a need to revegetate cleared land beside ICOLLs and their feeder streams to protect and enhance water quality and to provide habitat linkage for fauna. The priority ICOLLs and their feeder streams that require work are Meringo Lagoon and Kellys Lake.

The current survey detected a high species diversity of avifauna. The greatest diversity was in Allocasuarina – Acacia shrubland (site 2). Two factors may account for this high biodiversity; the abundance of Mistletoe in the wattles and the dense ground cover that afforded habitat that was high suitable for small passerines, such as wrens and thornbills. Mistletoe provides nectar and fruit for many species of bird and is a valuable habitat component. The Mistletoebird eats and disperses the seed of mistletoes and was only detected at this site.

The other site that contained a high species of bird was Blackbutt forest (Woodford's). This site had a high habitat complexity in the form of a dense shrublayer (unburnt for many years), abundance of fallen timber and large hollow-bearing trees. The Crested Shrike-tit was only detected at this site and is considered to be an indicator of mature high nutrient forests (pers. obs.).

The current surveys field surveys indicated that the type and distribution of flora communities mapped by NPWS (P5MA layer) and Eco GIS (2001 i.e. from Thomas *et al.* 2000) were inaccurate. Although requests were made to NPWS no plot based data was given that related to the Bingi area. This indicated that previous mapping for the Bingi area was probably based on aerial photographic interpretation (API). In contrast plot and transect data was gathered by Lockwood *et al.* (1997) in Eurobodalla NP. Several of these vegetation communities described and mapped were ecotonal.

Where possible we used standard descriptions as given by Thomas *et al.* (2000) for the vegetation communities in the Bingi area. These descriptions were adopted as the standard

because they apply to the entire south coast region (from Kiama to the NSW – Victoria border) and were based on the most extensive dataset of information gathered from field surveys and API. Where possible we also placed other descriptions (Lockwood *et al.*,1997 and scientific committee determinations) into context with Thomas *et al.* (2000).

The survey strongly indicates that further ground truthing is necessary to correct the existing vegetation maps within the local government area. In particular the distribution and extent of Endangered Ecological Communities (as defined under the TSC Act 1995) needs to be more accurately defined.

8.0 CONCLUSIONS

The populations of the Greater Glider in the Bingi and Pedro Swamp area are considered unviable because fragmentation has reduced the available habitat below the minimum considered necessary for either population to persist in the long-term. The existing national parks do not contain suitable habitat nor are of sufficient size to cater for the long term requirements of a viable population of Greater Glider. To save the populations at Bingi (and Pedro Swamp area) there is an urgent need to develop a policy to conserve existing habitat on freehold land and revegetate areas of bushland so that animals can disperse between these two areas. It is also necessary to revegetate an area so that an east – west linkage is secured towards the Beashels trig area. Monitoring of revegetated areas will be necessary to determine when they are utilised by the various species of possum and in particular the Greater Glider.

Since Greater Glider have comparatively small non-overlapping home ranges, are sensitive to habitat disturbance and have a high fidelity to den trees then all large hollow-bearing trees in the area should be retained.

There is generally a conflict of interest with current land use and the need to conserve and rehabilitate forest ecosystems. In particular the removal of habitat in association with rural residential subdivision and asset protection (bushfire) is considered the major threatening process.

Fencing and revegetation is also necessary to protect water quality of the areas ICOLLs. Fencing buffer zones from grazing and burning shall allow natural revegetation, which can be augmented by planting additional trees if finances become available and or if considered necessary.

9.0 RECOMMENDATIONS

The following recommendations are given to enable effective conservation management of the forest dependant fauna in the Bingi region:

1. A policy should be drafted and submitted to ESC to protect and enhance the habitat of the Greater Glider in the Bingi area. This should provide provisions for future subdivisions and currently fragmented areas identified in this study as habitat corridors.
2. The primary area considered for revegetation is within the upper catchment of Congo Creek so that eucalypt forest to the north of this creek are linked to those in the Bingi area. This will provide a habitat corridor to forest within the catchment of Pedro Swamp.
3. Previous studies (Gaia Research, 2001; Eco GIS, 2001 and NPWS, 2001) all indicate a linkage along the ridge towards Beashels Trig (see Figure 9) is recommended. This will require negotiations with the various landowners on either side of the Princes Highway. The revegetation of these areas should include species of tree utilised by the local population of Greater Glider for feeding. When trees are of sufficient size nest boxes can be attached to cater for hollow-dependant species of animal (i.e. Greater Glider). These can be purchased from Hollow Log Homes, wildlife boxes, Alan & Stacey Franks. Phone: 07 54723142 Web site: www.hollowloghomes.com.au
4. The revegetation area should be at least 30 metres in width and be fenced from cattle for at least a period of five years. Thereafter the fences may be removed or relocated to provide protection for additional bands of vegetation. The aim is to have corridors with a canopy of approximately 100 metres in width to facilitate the movement of the Greater Glider.
5. If possible once the initial trees are established then extra areas could be revegetated using the prescribed species. These areas have been identified in Figure 9.
6. Revegetation should also occur beside ICOLLs and their feeder streams. Meringo Lagoon and Kelly Creek are priority areas (see Figure 9). Revegetation should also occur within the feeder streams of Old Man Bed Swamp (see Figure 9) as some of these creeks are badly eroded and sediment is being moved into the freshwater wetland.
7. ESC and BLG could work co-operatively to develop education kits for local people with respect to the value of retaining native vegetation and appropriate species to utilise for revegetation work. BLG could apply for grant money to produce an information booklet for a Local Plant Guide for bush regeneration and for use in residential gardens.
8. BLG could conduct monitoring at select sites where revegetation has occurred to document the use to habitat corridors by birds and arboreal mammals. The methods used for such monitoring should be consistent with those described by the southern CRA/Gaia Research (2001). They should also use Photopoints as a visual measure of progress at revegetation sites.

9. BLG/ESC should record date and number of each species planted to quantify success rates. A regular diary of activities, volunteer hours, species used and their source and photos of before during and after are a valuable record of what the group achieves. This can also be very useful in budgeting and gaining future grant money. Monitoring and following up work must occur for a minimum of five years post planting to ensure weeds do not out-compete plants and augment plantings as the forest develops.
10. Weed eradication. The infestation of Cape Ivy on the headland on the Red Gum forest on the northern side of Congo Lake should be removed by hand. This was the only occurrence of this weed in located in the study area and the infestation is currently small. A Green Corps group could be assigned the task of removing this weed.
11. Currently Bitou Bush has small occurrences, especially along the edge of Coila Lake and the dunal areas of Eurobodalla NP. All Bitou should be removed by hand or hand sprayed and the plants disposed of in a manner that reduces the risk of seed dispersal.
12. Natural regeneration. There is no need to manage for the *Allocasuarina* – and *Acacia sophorae* regenerating forest ecosystems. Given time they will regenerate on their own. However *Allocasuarina littoralis* is an important feed tree for the Glossy Black Cockatoo. They tend to feed on specific trees. This is a useful species in revegetation and is found in most vegetation communities in the study site. Propagation of this species should be from specimens that are known to be Glossy Black Cockatoo feeding trees and should be included in replanting.
13. Revegetation should also earmark areas below farm dams (but not on dam walls). This will form a silt barrier for overflow water and reduce the risk of material entering wetlands and Coila Lake and Kellys Lake. As a general guide the favoured species to plant are Blackbutt and Forest Red Gum. Stumps and logs can be dumped in revegetation sites prior to fencing and planting to provide habitat for birds, mammals and reptiles.
14. There is also the opportunity for ESC/BLC to seek funding to hold workshops on bush regeneration/threatened fauna and flora. It is important for BLG to see other revegetation sites with the LGA and liaise with other Landcare groups.
15. Surveys need to be conducted to determine the presence of the Barking Owl in the study site.
16. There is scope for DEC to work with the community group to have an integrated feral animal control programme that targets the Red Fox.
17. Fire should be managed to promote biodiversity of plants and animals, and protect natural and cultural heritage features of the Bingi Landcare Area. Fire destroys the shrub and ground layers, which provide cover and food resources for ground dwelling mammals. Frequent low intensity burns have been demonstrated to reduce biodiversity (Catling 1991).

Table 15 gives a list of actions and their recommended priority in order.

Table 15 Priority list of actions for BLCG and ESC

Actions	Ranking	BLG	ESC
Develop Greater Glider Policy for subregion – lobby ESC to adopt policy as part of the Threatened Species Legislation Amendment Act (2004) via EIP and/or LEP	1	High	High
ESC and BLG use this report to target specific landowners for revegetation programmes – develop budgets and submit applications for funding	1	High	High
ESC provide landowners with notification of (EEC)	2	Low	High
Workshop to disseminate information on EEC/landscape planning	2	High	High
ESC and BLG develop education kits for retaining native vegetation and appropriate species to utilise for revegetation work (based on this and other reports)	3	High	High
BLG collect seed for revegetation works	1	High	High
BLG monitor existing programmes (species lists, photopoints plus plan of works)	2	High	Low
ESC liase with DEC (NPWS) re potential projects and funding	1	High	Low
ESC develop guidelines for habitat protection/restoration as part of subdivision provisions	1	Low	High

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Appendix A. Plants located in the Bingi study area

Family	Species	Common Name
FILICOPSIDA		
Adiantaceae	<i>Adiantum aethiopicum</i>	Common Maidenhair Fern
Blechnaceae	<i>Blechnum cartilagineum</i>	Gristle Fern
	<i>Doodia aspera</i>	Rasp Fern
Dicksoniaceae	<i>Calochlaena dubia</i>	Soft Bracken
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken
Lindsaeaceae	<i>Lindsaea linearis</i>	Screw Fern
	<i>Lindsaea microphylla</i>	Lacy Wedge fern
Sinopteridaceae	<i>Pellaea falcata</i>	Sickle Fern
Sinopteridaceae	<i>Cheilanthes sieberi</i>	
CYCADOPSIDA		
Zamiaceae	<i>Macrozamia communis</i>	Burrawang
MAGNOLIOPSIDA - DICOTYLEDONS		
Acanthaceae	<i>Pseuderanthemum variabile</i>	Pastel Flower
Aizoaceae	<i>Tetragonia tetragonioides</i>	Warrigal Cabbage
Apiaceae	<i>Hydrocotyle peduncularis</i>	Pennywort
	<i>Xanthosia tridentata</i>	Rock Xanthosia
Amaranthaceae	<i>Alternanthera denticulata</i>	Lesser Joyweed
Apocynaceae	<i>Parsonsia straminea</i>	Monkey Rope
Araliaceae	<i>Polyscias sambucifolius</i>	Elderberry Panax
Asclepiadaceae	<i>Marsdenia rostrata</i>	Common Milk Vine
	<i>Tylophora barbata</i>	
Asteraceae	<i>Cassinia aculeata</i>	Dogwood
	<i>Cassinia longifolia</i>	Shiny Cassinia
	<i>Lagenifera stipitata</i>	
	<i>Senecio hispidulus</i>	Rough Groundsel
	<i>Senecio lautus ssp. maritimus</i>	
Bignoniaceae	<i>Pandorea pandorana ssp. pandorana</i>	Wonga-wonga Vine
Casuarinaceae	<i>Allocasuarina littoralis</i>	Black She-Oak
Casuarinaceae	<i>Casuarina glauca</i>	Swamp She-Oak
Cassythaceae	<i>Cassytha pubescens</i>	Common Devils twine
Chenopodiaceae	<i>Einadia hastata</i>	
Chenopodiaceae	<i>Einadia trigonos</i>	
	<i>Rhagodia candolleana</i>	saltbush
	<i>Sarcocornia quinqueflora ssp</i>	Glassworts

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Family	Species	Common Name
	<i>Suaeda australis</i>	Austral Seablite
Clusiaceae	<i>Hypericum gramineum</i>	
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
	<i>Polymeria calycina</i>	Swamp Bindweed
Cunoniaceae	<i>Aphanopetalum resinosum</i>	Gum Vine
Dilleniaceae	<i>Hibbertia aspera.</i>	Rough Guinea Flower
	<i>Hibbertia dentata</i>	Twining Guinea Flower
Dilleniaceae	<i>Hibbertia scandens</i>	Golden Guinea Flower
Elaeocarpaceae	<i>Elaeocarpus reticulatus</i>	Blueberry Ash
Epacridaceae	<i>Lissanthe strigosa</i>	Native Cranberry
Euphorbiaceae	<i>Breynia oblongifolia</i>	Coffee Bush
	<i>Glochidion ferdinandi</i> var. <i>ferdinandi</i>	Cheese Tree
Fabaceae: Mimosoideae	<i>Acacia elongata</i>	
	<i>Acacia floribunda</i>	White Sallow Wattle
	<i>Acacia irrorata</i> ssp <i>irrorata</i>	
	<i>Acacia longifolia</i>	
	<i>Acacia longifolia</i> var. <i>sophorae</i>	
	<i>Acacia maidenii</i>	Maidens Wattle
	<i>Acacia mearnsii</i>	Black Wattle
	<i>Acacia obtusifolia</i>	
	<i>Acacia suaveolens</i>	Sweet Scented Wattle
	<i>Acacia terminalis</i>	Sunshine Wattle
	<i>Acacia ulicifolia</i>	Prickly Moses
Fabaceae Papilionaceae	<i>Bossiaea obcordata</i>	Spiny Bossiaea
	<i>Daviesia ulicifolia</i>	
	<i>Desmodium varians</i>	
	<i>Glycine clandestina</i>	Love Creeper
	<i>Glycine microphylla</i>	
	<i>Hardenbergia violacea</i>	False Sarsaparilla
	<i>Hovea linearis</i>	
	<i>Indigofera australis</i>	
	<i>Kennedia rubicunda</i>	Dusky Coral Pea
	<i>Oxylobium ilicifolium</i>	Native Holly
	<i>Platylobium formosum</i> ssp.	
	<i>Pultenaea linophylla</i>	
	<i>Pultenaea</i>	

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Family	Species	Common Name
Goodeniaceae	<i>Goodenia ovata</i>	Hop Goodenia
Haloragaceae	<i>Gonocarpus micranthus ssp. micranthus</i>	
Lamiaceae	<i>Plectranthus parviflorus</i>	Cockspur Flowers
Lobeliaceae	<i>Pratia purpurascens</i>	White Root
Meliaceae	<i>Synoum glandulosum</i>	False Rosewood
Menispermaceae	<i>Stephania japonica</i>	
Moraceae	<i>Ficus rubiginosa</i>	Port Jackson Fig
Myrsinaceae	<i>Rapanea variabilis</i>	Mutton Wood
Myrtaceae	<i>Angophora costata</i>	Sydney Red Gum
	<i>Angophora floribunda</i>	Rough Barked Apple
	<i>Backhousia myrtifolia</i>	Grey Myrtle
	<i>Corymbia gummifera</i>	Red Bloodwood
	<i>Corymbia maculata</i>	Spotted Gum
	<i>Eucalyptus bosistoana</i>	Coast Grey Box
	<i>Eucalyptus botryoides</i>	Bangalay
	<i>Eucalyptus globoidea</i>	White Stringybark
	<i>Eucalyptus longifolia</i>	Woollybutt
	<i>Eucalyptus paniculata</i>	Iron Bark
	<i>Eucalyptus pilularis</i>	Blackbutt
	<i>Eucalyptus sideroxylon</i>	Red Ironbark, Mugga
	<i>Eucalyptus tereticornis</i>	Forest Red Gum
	<i>Kunzea ambigua</i>	Tick Bush
	<i>Leptospermum juniperinum</i>	Prickly Tea tree
	<i>Melaleuca styphelioides</i>	Prickly-leaved Paperbark
	Oleaceae	<i>Notelaea longifolia</i>
Pittosporaceae	<i>Billardiera scandens</i>	Appleberry
Pittosporaceae	<i>Bursaria spinosa</i>	Blackthorn
	<i>Pittosporum revolutum</i>	Rough Fruit Pittosporum
	<i>Pittosporum undulatum</i>	Sweet Pittosporum
Proteaceae	<i>Banksia integrifolia</i>	
	<i>Banksia spinulosa</i>	Hair-pin Banksia
	<i>Persoonia linearis</i>	Narrow leaved Geebung
Ranunculaceae	<i>Clematis aristata</i>	
Rhamnaceae	<i>Pomaderris lanigera</i>	Woolly Pomaderris
Rosaceae	<i>Rubus parviflorus</i>	Native raspberry
Rubiaceae	<i>Opercularia sp.</i>	Stinkweed

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Family	Species	Common Name
	<i>Pomax umbellata</i>	Pomax
Rutaceae	<i>Zieria smithii</i>	Sandfly Zieria
Santalaceae	<i>Exocarpus cupressiformis</i>	Cherry Ballart
	<i>Santalum obtusifolium</i>	
Sapindaceae	<i>Dodonaea triquetra</i>	Hop Bush
Scrophulariaceae	<i>Veronica plebeia</i>	Speedwells
Solanaceae	<i>Solanum aviculare</i>	Kangaroo Apple
	<i>Solanum pungetium</i>	Eastern nightshade
	<i>Solanum stelligerum</i>	Devil's needles
Stackhousiaceae	<i>Stackhousia spathulata</i>	
Sterculiaceae	<i>Brachychiton populneus ssp. populneus</i>	Kurrajong
Stylidiaceae	<i>Stylidium graminifolium</i>	Trigger Plant
Thymeliaceae	<i>Pimelea linifolia</i> subsp <i>linifolia</i>	Rice Flower
Ulmaceae	<i>Trema tomentosa</i>	Native Peach
Urticaceae	<i>Urtica incisor</i>	
Violaceae	<i>Viola hederacea</i>	Native Violet
Vitaceae	<i>Cissus hypoglauca</i>	Native Grape
MAGNOLIOPSIDA	MONOCOTYLEDONS	
Commelinaceae	<i>Commelina cyanea</i>	
Cyperaceae	<i>Carex</i> sp.	
	<i>Gahnia microstachya</i>	Cutty Grass
	<i>Gahnia clarkei</i> .	
	<i>Isolepis inundata</i>	
	<i>Lepidosperma concavuum</i>	
	<i>Lepidosperma laterale</i> .	
	<i>Lepidosperma urophorum</i>	Sedge
Iridaceae	<i>Patersonia sericea</i>	Silky Purple flag
Juncaceae	<i>Juncus kraussii australiens</i>	Sea Rush
Liliaceae	<i>Dianella caerulea</i> ssp.	Blue flax Lily
Liliaceae	<i>Stypandra glauca</i>	Nodding Blue Lily
Lomandraceae	<i>Lomandra confertifolia</i> ssp.	
Lomandraceae	<i>Lomandra longifolia</i>	Mat Rush
	<i>Lomandra multiflora</i>	
	<i>Xanthorrhoea</i> sp.	Grass Tree
Orchidaceae	<i>Acianthus</i> sp.	
	<i>Cymbidium suave</i>	Snake Flower

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Family	Species	Common Name
Orchidaceae	<i>Cryptostylis sp.</i>	
	<i>Dendrobium teretifolium</i>	Ratstail Orchid
	<i>Pterostylis concinna</i>	Trim Greenhood
Philesiaceae	<i>Eustrephus latifolius</i>	Wombat Berry
Poaceae	<i>Aristida vagans</i>	
Poaceae	<i>Echinopogon caespitosus</i>	
	<i>Entolasia stricta</i>	
	<i>Imperata cylindrica</i>	Blady Grass
	<i>Microlaena stipoides</i>	
	<i>Oplismenus imbecillus</i>	Basket Grass
	<i>Panicum simile</i>	
	<i>Poa meionectes.</i>	Tussock
	<i>Themeda australis</i>	Kangaroo Grass
Smilacaceae	<i>Smilax australis</i>	
Xanthorrhoeaceae	<i>Xanthorrhoea resinifera</i>	Grass Tree

Appendix B. Profiles of select CRA vegetation communities (from Thomas *et al.* 2000)

The following are profiles of the vegetation communities found within the Bingi study area. The profiles are from (Thomas *et al.* 2000). However, the current survey suggests caution should be exercised in regard to the species composition and distribution within the Bingi area.

Ecosystem number	Name of community (Thomas <i>et al.</i> 2000)
2	Lowland Red Bloodwood-Turpentine Dry Shrub Forest
9	Coastal Lowlands Spotted Gum-Burrawang Cycad Dry Shrub Dry Forest
10	Southern Coastal Lowlands White Stringybark-Woollybutt Shrub-Grass Dry Forest
22/23	Southern Coastal Hind Dune/Headland Scrub & Beach Strand Grassland
24	Coastal Swamp Oak- Swamp Melaleuca Wet Heath Swamp Forest
25	South Coast Swamp Oak Forest Complex
27	Ecotonal Coastal Hind Dune Swamp Oak-Bangalay Shrub Forest
28	Coastal Sands Bangalay-Old Man Banksia Grassy Bracken Shrub Forest
54	Coastal Forest Red Gum Shrub/Grass Forest
170	Southern Coastal Hinterland Backhousia Dry Gully Rainforest
187	Coastal Headland Shrublands
188	Sand dune wetlands
189	Coastal alluvial valley floor wetlands

Forest ecosystem 2: Lowland Dry Shrub Forest - *Corymbia gummifera* / *Syncarpia glomulifera*

Lowland Dry Shrub Forest is a medium forest over 20 metres height dominated by *Corymbia gummifera*, sometimes with *E. globoidea*, *E. consideniensis*, and *Syncarpia glomulifera* and *E. piperita* in the Clyde and Shoalhaven catchments. It has a diverse dry shrub understorey, including *Persoonia linearis*, *Banksia spinulosa*, *Acacia obtusifolia*, *Tetratheca thymifolia*, *Leucopogon lanceolatus*, *Lomatia ilicifolia*, *Acacia terminalis*, *Platysace lanceolata*, *Bossia obcordata*, and *Gompholobium latifolium*. The ground cover contains grasses *Entolasia stricta*, and herbs *Patersonia glabrata*, *Dianella caerulea var caerulea*, and *Gonocarpus teucroides*.

Lowland Dry Shrub Forest occurs on shallow sandy soils on low lying ridges and moderately dry slopes in the foothills and on ridges and benches on the tops of the northern sandstone plateau areas. Austin (1978) refers to a similar type in his study of the South Coast. This forest ecosystem is equivalent to a similar type, unit 46B: Lowland Dry Shrub Forest, which is found in the Eden CRA Region (Keith and Bedward 1999).

Diagnostic Plant Species

Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Persoonia linearis</i>	2	0.843	1	0.170	positive
<i>Entolasia stricta</i>	2	0.814	2	0.137	positive
<i>Corymbia gummifera</i>	3	0.771	3	0.038	positive
<i>Acacia obtusifolia</i>	2	0.700	2	0.079	positive
<i>Banksia spinulosa var spinulosa</i>	2	0.700	2	0.042	positive
<i>Tetratheca thymifolia</i>	2	0.671	1	0.045	positive
<i>Pteridium esculentum</i>	2	0.614	2	0.303	positive
<i>Patersonia glabrata</i>	2	0.500	1	0.034	positive
<i>Dianella caerulea var caerulea</i>	1	0.743	1	0.154	uninformative
<i>Lomatia ilicifolia</i>	1	0.586	1	0.034	uninformative
<i>Leucopogon lanceolatus var lanceolatus</i>	1	0.543	1	0.163	uninformative
<i>Billardiera scandens var scandens</i>	1	0.500	1	0.129	uninformative
<i>Lepidosperma urophorum</i>	2	0.486	2	0.068	uninformative
<i>Gonocarpus teucroides</i>	2	0.471	2	0.087	uninformative
<i>Lomandra obliqua</i>	2	0.457	1	0.027	uninformative
<i>Syncarpia glomulifera</i>	3	0.443	3	0.015	uninformative
<i>Acacia terminalis</i>	1	0.414	1	0.037	uninformative
<i>Allocasuarina littoralis</i>	2	0.386	2	0.097	uninformative
<i>Eucalyptus globoidea</i>	2	0.386	2	0.075	uninformative
<i>Eucalyptus piperita</i>	3	0.386	3	0.014	uninformative
<i>Phyllanthus hirtellus</i>	1	0.386	1	0.034	uninformative
<i>Oxylobium ilicifolium</i>	2	0.371	2	0.071	uninformative
<i>Pomax umbellata</i>	1	0.371	1	0.060	uninformative
<i>Bossiaea obcordata</i>	2	0.343	2	0.020	uninformative
<i>Gompholobium latifolium</i>	2	0.343	2	0.007	uninformative
<i>Pimelea linifolia ssp linifolia</i>	1	0.329	1	0.054	uninformative
<i>Eucalyptus consideniensis</i>	3	0.314	3	0.011	uninformative
<i>Marsdenia suaveolens</i>	1	0.314	1	0.017	uninformative
<i>Macrozamia communis</i>	1	0.300	2	0.059	uninformative
<i>Amperea xiphioclada var xiphioclada</i>	1	0.286	1	0.032	uninformative
<i>Imperata cylindrica var major</i>	2	0.286	2	0.058	uninformative
<i>Hibbertia empetrifolia</i>	2	0.271	1	0.020	uninformative
<i>Patersonia sericea</i>	2	0.271	1	0.027	uninformative
<i>Eucalyptus sieberi</i>	3	0.257	3	0.107	uninformative

Extant area (ha): 86310

Pre-1750 area (ha): 103568

Geographic range: South Coast and small patch within eastern edge of Northern subregion

How much conserved in reserves (ha): 0 in Northern subregion, 24046 in South Coast subregion

Vulnerability: 4(C) in South Coast

Reliability: 3

Forest ecosystem 9: Coastal Lowlands Cycad Dry Shrub Dry Forest - *Corymbia maculata* / *Macrozamia communis*

Coastal Lowlands Cycad Dry Shrub Dry Forest is a medium to tall forest 25 –30 metres in height, dominated by *Corymbia maculata*, with *Eucalyptus paniculata ssp paniculata* and *E. muelleriana* as occasional co-dominants. The shrub layer comprises the cycad *Macrozamia communis* with patches of *Allocasuarina littoralis*, *Breynia oblongifolia*, and *Persoonia linearis*. The smaller shrub layer contains *Hibbertia aspera*, *Oxylobium ilicifolium*, *Platysace lanceolatus*, *Hardenbergia violacea*, and *Leucopogon lanceolatus*. The ground layer comprises grasses *Entolasia stricta*, *Imperata cylindrica*, and *Microlaena stipoides* intermixed with herbs and twiners *Desmodium varians*, *Dianella caerulea var caerulea*, *Glycine clandestina*, and *Schelhammera undulata*, along with sedges *Lepidosperma laterale*, *Lomandra longifolia* and *Lomandra multiflora ssp multiflora*.

Location

This forest ecosystem occurs at elevations between 25 and 300 metres on undulating ridges and slopes in the coastal foothills on Ordovician and granitic sediments. It is found in fairly large patches between Termeil and Tilba Tilba.

Diagnostic Plant Species

Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Macrozamia communis</i>	3	0.937	1	0.048	positive
<i>Corymbia maculata</i>	3	0.873	3	0.030	positive
<i>Entolasia stricta</i>	2	0.841	2	0.138	positive
<i>Hibbertia aspera</i>	2	0.810	2	0.059	positive
<i>Imperata cylindrica var major</i>	2	0.698	2	0.051	positive
<i>Lepidosperma laterale</i>	2	0.698	1	0.165	positive
<i>Microlaena stipoides var stipoides</i>	2	0.651	2	0.266	positive
<i>Desmodium varians</i>	2	0.635	1	0.163	positive
<i>Platysace lanceolata</i>	2	0.587	2	0.114	positive
<i>Hibbertia saligna</i>	1	0.016	0	0.000	positive
<i>Poaceae Unknown</i>	3	0.016	0	0.000	positive
<i>Pterostylis alveata</i>	1	0.016	0	0.000	positive
<i>Senna aciphylla</i>	4	0.016	0	0.000	positive
<i>Dianella caerulea var caerulea</i>	1	0.810	1	0.154	uninformative
<i>Glycine clandestina</i>	1	0.794	1	0.292	uninformative
<i>Hardenbergia violacea</i>	1	0.746	1	0.150	uninformative
<i>Lomandra longifolia</i>	1	0.651	2	0.413	uninformative
<i>Lomandra multiflora ssp multiflora</i>	1	0.619	1	0.137	uninformative
<i>Persoonia linearis</i>	1	0.587	1	0.176	uninformative
<i>Billardiera scandens var scandens</i>	1	0.571	1	0.129	uninformative
<i>Schelhammera undulata</i>	1	0.571	1	0.076	uninformative
<i>Leucopogon lanceolatus var lanceolatus</i>	1	0.556	1	0.163	uninformative
<i>Pratia purpurascens</i>	1	0.556	1	0.096	uninformative
<i>Eustrephus latifolius</i>	1	0.540	1	0.139	uninformative
<i>Lagenifera stipitata</i>	1	0.524	1	0.161	uninformative
<i>Eucalyptus paniculata ssp paniculata</i>	3	0.492	2	0.025	uninformative
<i>Allocasuarina littoralis</i>	2	0.476	2	0.096	uninformative
<i>Dichondra repens</i>	1	0.429	2	0.203	uninformative
<i>Tylophora barbata</i>	1	0.429	2	0.101	uninformative
<i>Breynia oblongifolia</i>	1	0.413	1	0.082	uninformative
<i>Geitonoplesium cymosum</i>	1	0.413	2	0.110	uninformative
<i>Poa meioneetes</i>	2	0.413	2	0.137	uninformative
<i>Notelaea venosa</i>	2	0.397	2	0.123	uninformative
<i>Pandorea pandorana</i>	1	0.349	2	0.145	uninformative
<i>Eucalyptus globoidea</i>	1	0.333	2	0.077	uninformative
<i>Clematis aristata</i>	1	0.318	1	0.268	uninformative
<i>Gonocarpus teucroides</i>	1	0.318	2	0.091	uninformative
<i>Kennedia rubicunda</i>	1	0.318	1	0.033	uninformative
<i>Oxylobium ilicifolium</i>	1	0.318	2	0.073	uninformative
<i>Phyllanthus hirtellus</i>	1	0.318	1	0.036	uninformative

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Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Pteridium esculentum</i>	2	0.318	2	0.308	uninformative
<i>Themeda australis</i>	2	0.318	2	0.199	uninformative
<i>Vernonia cinerea var cinerea</i>	1	0.318	1	0.024	uninformative
<i>Ozothamnus diosmifolius</i>	1	0.302	1	0.048	uninformative
<i>Pomax umbellata</i>	1	0.302	1	0.062	uninformative
<i>Acacia longifolia</i>	1	0.270	2	0.039	uninformative
<i>Chionochloa pallida</i>	2	0.270	2	0.121	uninformative
<i>Oplismenus imbecillis</i>	1	0.270	2	0.119	uninformative
<i>Viola hederacea</i>	1	0.270	1	0.197	uninformative
<i>Pittosporum revolutum</i>	1	0.254	2	0.070	uninformative
<i>Arthropodium milleflorum</i>	1	0.238	1	0.077	uninformative
<i>Eucalyptus pilularis</i>	3	0.238	3	0.026	uninformative
<i>Exocarpos strictus</i>	1	0.238	1	0.093	uninformative
<i>Indigofera australis</i>	1	0.238	1	0.079	uninformative
<i>Eucalyptus muelleriana</i>	3	0.222	3	0.052	uninformative
<i>Marsdenia rostrata</i>	1	0.222	2	0.122	uninformative
<i>Pseuderanthemum variabile</i>	1	0.222	2	0.062	uninformative
<i>Acacia implexa</i>	1	0.206	1	0.042	uninformative
<i>Cymbopogon refractus</i>	1	0.206	1	0.012	uninformative
<i>Lepidosperma urophorum</i>	1	0.206	2	0.073	uninformative
<i>Lomandra confertifolia ssp rubiginosa</i>	2	0.206	1	0.034	uninformative
<i>Lomandra filiformis ssp filiformis</i>	2	0.206	1	0.123	uninformative
<i>Patersonia glabrata</i>	2	0.206	2	0.039	uninformative
<i>Pittosporum undulatum</i>	2	0.206	2	0.090	uninformative
<i>Plectranthus parviflorus</i>	1	0.206	2	0.060	uninformative
<i>Acacia obtusifolia</i>	2	0.191	2	0.089	uninformative
<i>Aristida vagans</i>	1	0.191	1	0.017	uninformative
<i>Correa reflexa var reflexa</i>	1	0.191	1	0.038	uninformative
<i>Dichelachne micrantha</i>	1	0.191	1	0.080	uninformative
<i>Hypericum gramineum</i>	1	0.191	1	0.172	uninformative
<i>Pyrosia rupestris</i>	1	0.191	2	0.078	uninformative
<i>Tetratea thymifolia</i>	1	0.191	2	0.054	uninformative
<i>Acacia irrorata ssp irrorata</i>	2	0.175	2	0.022	uninformative
<i>Danthonia longifolia</i>	1	0.175	2	0.031	uninformative
<i>Entolasia marginata</i>	1	0.175	2	0.051	uninformative
<i>Sigesbeckia orientalis ssp orientalis</i>	1	0.175	1	0.064	uninformative
<i>Wahlenbergia gracilis</i>	1	0.175	1	0.045	uninformative
<i>Acacia mabellae</i>	2	0.159	2	0.024	uninformative
<i>Gahnia sieberiana</i>	2	0.159	2	0.018	uninformative
<i>Hibbertia dentata</i>	2	0.159	1	0.057	uninformative
<i>Hibbertia diffusa</i>	1	0.159	1	0.007	uninformative
<i>Dianella revoluta var revoluta</i>	1	0.143	1	0.138	uninformative
<i>Marsdenia suaveolens</i>	1	0.143	1	0.020	uninformative
<i>Opercularia aspera</i>	1	0.143	1	0.035	uninformative
<i>Opercularia hispida</i>	1	0.143	1	0.025	uninformative
<i>Panicum simile</i>	1	0.143	1	0.012	uninformative
<i>Acacia ulicifolia</i>	1	0.127	1	0.029	uninformative
<i>Banksia spinulosa var spinulosa</i>	1	0.127	2	0.053	uninformative
<i>Bossiaea obcordata</i>	2	0.127	2	0.025	uninformative
<i>Echinopogon ovatus</i>	1	0.127	1	0.110	uninformative
<i>Exocarpos cupressiformis</i>	1	0.127	1	0.051	uninformative
<i>Goodenia ovata</i>	1	0.127	2	0.049	uninformative
<i>Leucopogon juniperinus</i>	2	0.127	1	0.024	uninformative
<i>Pimelea linifolia ssp linifolia</i>	1	0.127	1	0.058	uninformative
<i>Poa labillardieri</i>	3	0.127	2	0.094	uninformative
<i>Solanum pungetium</i>	1	0.127	1	0.054	uninformative
<i>Acacia mearnsii</i>	2	0.111	2	0.059	uninformative
<i>Angophora floribunda</i>	1	0.111	1	0.073	uninformative
<i>Echinopogon caespitosus var caespitosus</i>	1	0.111	1	0.024	uninformative
<i>Logania pusilla</i>	1	0.111	1	0.008	uninformative
<i>Notelaea longifolia forma longifolia</i>	1	0.111	1	0.025	uninformative
<i>Ozothamnus argophyllus</i>	1	0.111	1	0.032	uninformative
<i>Polyscias sambucifolia ssp C</i>	1	0.111	1	0.008	uninformative
<i>Senecio species E</i>	1	0.111	1	0.106	uninformative
<i>Solanum prinophyllum</i>	1	0.111	1	0.017	uninformative

Extant area (ha): 55497

Pre-1750 area (ha): 64512

Geographic range: South Coast

How much conserved in reserves (ha): 1769

Vulnerability: 3(L/C)

Reliability: 2

Forest ecosystem 10: Southern Coastal Lowlands Shrub/Grass Dry Forest - *E. globoidea* / *E. longifolia*

Southern Coastal Lowlands Shrub/Grass Dry Forest has a variable tree layer about 25 metres in height comprising *E. globoidea* and *E. longifolia*. The tall shrub layer comprises *Allocasuarina littoralis* and *Persoonia littoralis*, *Notelaea venosa*, and *Acacia irrorata ssp irrorata*. The low shrub layer comprises *Ozothamnus argophyllus*, *Ozothamnus diosmifolius*, *Hibbertia aspera* and *Senecio lautus ssp dissectifolius*. The ground cover contains grasses *Entolasia stricta*, *Microlaena stipoides*, and *Poa meionectes* intertwined with sedges *Lepidosperma urophorum*, *Dianella caerulea var caerulea*, *Lepidosperma laterale*.

Southern Coastal Lowlands Shrub/Grass Dry Forest is distributed from the lower Clyde catchment, down through Moruya and to the lower Tuross catchment west of Gulaga. It is found mainly on Ordovician sediments on undulating slopes and ridges in the foothills of the South Coast.

Diagnostic Plant Species

Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Entolasia stricta</i>	2	0.739	2	0.146	positive
<i>Allocasuarina littoralis</i>	2	0.609	2	0.100	positive
<i>Lepidosperma urophorum</i>	2	0.565	2	0.072	positive
<i>Eucalyptus longifolia</i>	3	0.522	2	0.023	positive
<i>Ozothamnus argophyllus</i>	2	0.522	1	0.031	positive
<i>Dendrobium aemulum</i>	1	0.130	0	0.000	positive
<i>Angophora subvelutina</i>	3	0.043	0	0.000	positive
<i>Deyeuxia mckiei</i>	1	0.043	0	0.000	positive
<i>Dianella caerulea var caerulea</i>	1	0.652	1	0.162	uninformative
<i>Lepidosperma laterale</i>	1	0.652	1	0.171	uninformative
<i>Eucalyptus globoidea</i>	1	0.609	2	0.078	uninformative
<i>Ozothamnus diosmifolius</i>	1	0.609	1	0.049	uninformative
<i>Persoonia linearis</i>	1	0.609	1	0.180	uninformative
<i>Hibbertia aspera</i>	1	0.565	2	0.069	uninformative
<i>Lomandra longifolia</i>	1	0.565	2	0.416	uninformative
<i>Microlaena stipoides var stipoides</i>	1	0.522	2	0.271	uninformative
<i>Notelaea venosa</i>	1	0.522	2	0.125	uninformative
<i>Acacia irrorata ssp irrorata</i>	2	0.478	2	0.022	uninformative
<i>Billardiera scandens var scandens</i>	1	0.478	1	0.134	uninformative
<i>Gonocarpus teucroides</i>	1	0.478	2	0.092	uninformative
<i>Leucopogon lanceolatus var lanceolatus</i>	1	0.478	1	0.168	uninformative
<i>Poa meionectes</i>	2	0.478	2	0.139	uninformative
<i>Schelhammera undulata</i>	1	0.478	1	0.082	uninformative
<i>Backhousia myrtifolia</i>	5	0.435	4	0.055	uninformative
<i>Oplismenus imbecillis</i>	1	0.435	2	0.120	uninformative
<i>Pittosporum revolutum</i>	1	0.435	2	0.070	uninformative
<i>Corymbia maculata</i>	2	0.391	3	0.042	uninformative
<i>Eustrephus latifolius</i>	1	0.391	1	0.144	uninformative
<i>Gahnia melanocarpa</i>	1	0.391	1	0.047	uninformative
<i>Hardenbergia violacea</i>	1	0.391	1	0.158	uninformative
<i>Lomandra multiflora ssp multiflora</i>	1	0.391	1	0.143	uninformative
<i>Macrozamia communis</i>	1	0.391	2	0.061	uninformative
<i>Angophora floribunda</i>	2	0.348	1	0.072	uninformative
<i>Chionochoa pallida</i>	2	0.348	2	0.122	uninformative
<i>Elaeocarpus reticulatus</i>	1	0.348	1	0.103	uninformative
<i>Goodenia ovata</i>	1	0.348	2	0.048	uninformative
<i>Leucopogon juniperinus</i>	1	0.348	1	0.023	uninformative
<i>Platysace lanceolata</i>	2	0.348	2	0.121	uninformative
<i>Pteridium esculentum</i>	1	0.348	2	0.308	uninformative
<i>Doodia aspera</i>	2	0.304	2	0.106	uninformative
<i>Eucalyptus cypellocarpa</i>	1	0.304	2	0.051	uninformative
<i>Eucalyptus muelleriana</i>	3	0.304	3	0.054	uninformative
<i>Eucalyptus paniculata ssp paniculata</i>	3	0.304	2	0.031	uninformative
<i>Geitonoplesium cymosum</i>	1	0.304	1	0.114	uninformative
<i>Oxylobium ilicifolium</i>	1	0.304	2	0.076	uninformative
<i>Acacia mearnsii</i>	1	0.261	2	0.059	uninformative
<i>Adiantum aethiopicum</i>	1	0.261	1	0.052	uninformative
<i>Calochlaena dubia</i>	1	0.261	2	0.060	uninformative
<i>Exocarpos cupressiformis</i>	1	0.261	1	0.051	uninformative
<i>Lomandra confertifolia ssp similis</i>	1	0.261	2	0.040	uninformative
<i>Pandorea pandorana</i>	1	0.261	2	0.148	uninformative
<i>Pratia purpurascens</i>	1	0.261	1	0.103	uninformative
<i>Acacia implexa</i>	1	0.217	1	0.044	uninformative
<i>Banksia spinulosa var spinulosa</i>	1	0.217	2	0.053	uninformative
<i>Bursaria lasiophylla var lasiophylla</i>	1	0.217	1	0.036	uninformative
<i>Cassytha pubescens</i>	1	0.217	1	0.035	uninformative
<i>Clematis glycinoides var glycinoides</i>	1	0.217	1	0.048	uninformative
<i>Glycine clandestina</i>	1	0.217	1	0.301	uninformative
<i>Imperata cylindrica var major</i>	1	0.217	2	0.061	uninformative
<i>Pittosporum undulatum</i>	1	0.217	2	0.091	uninformative

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Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Viola hederacea</i>	1	0.217	1	0.198	uninformative
<i>Zieria smithii</i> ssp A (<i>ssp smithii</i>)	1	0.217	1	0.017	uninformative
<i>Acacia falciformis</i>	1	0.174	2	0.093	uninformative
<i>Acacia longifolia</i>	3	0.174	2	0.042	uninformative
<i>Acacia terminalis</i>	1	0.174	1	0.043	uninformative
<i>Babingtonia virgata</i>	2	0.174	1	0.008	uninformative
<i>Breyenia oblongifolia</i>	1	0.174	1	0.087	uninformative
<i>Cassinia trinerva</i>	1	0.174	1	0.027	uninformative
<i>Dichelachne rara</i>	1	0.174	1	0.068	uninformative
<i>Dodonaea triquetra</i>	1	0.174	2	0.018	uninformative
<i>Helichrysum elatum</i>	1	0.174	1	0.013	uninformative
<i>Hibbertia dentata</i>	1	0.174	1	0.058	uninformative
<i>Lagenifera stipitata</i>	1	0.174	1	0.167	uninformative
<i>Leptospermum polygalifolium</i> ssp <i>polygalifolium</i>	2	0.174	2	0.026	uninformative
<i>Notelaea longifolia</i> forma <i>longifolia</i>	1	0.174	1	0.025	uninformative
<i>Opercularia aspera</i>	1	0.174	1	0.036	uninformative
<i>Parsonsia straminea</i>	1	0.174	2	0.064	uninformative
<i>Prostanthera incisa</i>	3	0.174	2	0.012	uninformative
<i>Acacia obtusifolia</i>	1	0.130	2	0.091	uninformative
<i>Beyeria lasiocarpa</i>	1	0.130	2	0.016	uninformative
<i>Cassinia aculeata</i>	1	0.130	1	0.096	uninformative
<i>Cheilanthes sieberi</i> ssp <i>sieberi</i>	1	0.130	1	0.073	uninformative
<i>Cissus hypoglauca</i>	1	0.130	2	0.105	uninformative
<i>Correa reflexa</i> var <i>reflexa</i>	1	0.130	1	0.040	uninformative
<i>Danthonia longifolia</i>	2	0.130	2	0.033	uninformative
<i>Daviesia mimosoides</i> ssp <i>mimosoides</i>	1	0.130	3	0.067	uninformative
<i>Daviesia ulicifolia</i>	1	0.130	2	0.092	uninformative
<i>Dichondra repens</i>	1	0.130	2	0.208	uninformative
<i>Entolasia marginata</i>	1	0.130	2	0.053	uninformative
<i>Epacris impressa</i>	1	0.130	2	0.011	uninformative
<i>Eucalyptus angophoroides</i>	1	0.130	2	0.005	uninformative
<i>Eucalyptus fibrosa</i>	1	0.130	1	0.008	uninformative
<i>Eucalyptus radiata</i> ssp <i>radiata</i>	3	0.130	3	0.066	uninformative
<i>Gahnia radula</i>	2	0.130	2	0.006	uninformative
<i>Indigofera australis</i>	1	0.130	1	0.082	uninformative
<i>Kennedia rubicunda</i>	1	0.130	1	0.038	uninformative
<i>Lepidosperma gunnii</i>	1	0.130	1	0.031	uninformative
<i>Lindsaea microphylla</i>	1	0.130	1	0.021	uninformative
<i>Melaleuca ericifolia</i>	1	0.130	3	0.006	uninformative
<i>Morinda jasminoides</i>	1	0.130	3	0.097	uninformative
<i>Poa labillardieri</i>	1	0.130	2	0.094	uninformative
<i>Polyscias sambucifolia</i> ssp C	1	0.130	1	0.009	uninformative
<i>Poranthera microphylla</i>	1	0.130	1	0.180	uninformative
<i>Smilax glycyphylla</i>	1	0.130	1	0.033	uninformative
<i>Solanum pungetium</i>	1	0.130	1	0.055	uninformative
<i>Themeda australis</i>	2	0.130	2	0.201	uninformative
<i>Wahlenbergia gracilis</i>	1	0.130	1	0.047	uninformative

Extant area (ha): 17629

Pre-1750 area (ha): 19440

Geographic range: South Coast

How much conserved in reserves (ha): 148

Vulnerability: 3(L/C)

Reliability: 4

Non-forest ecosystem 22: Southern Coastal Hind Dune/Headland Scrub

Southern Coastal Hind Dune/Headland Scrub is a shrubland dominated by *Banksia integrifolia*, together with a sparse cover of *Acacia sophorae*. A sparse lower shrub layer of bracken *Pteridium esculentum*, *Lomandra longifolia* and shrubs *Leucopogon parviflorus* and *Monotoca elliptica* is interwoven with a low sparse ground cover of grasses *Poa meionectes* and *Entolasia stricta*, together with herbs *Oxalis perrinans*, *Pratia purpurescens*, and *Glycine clandestina*.

Southern Coastal Hind Dune/Headland Scrub is found in coastal hind dunes. No sites of this vegetation map were sampled within the Southern CRA Region. It was mapped in the Southern CRA Region in conjunction with ecosystem number 23. An equivalent map unit 61 is found in the Eden CRA Region (Keith and Bedward 1999).

Diagnostic Plant Species

Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Banksia integrifolia ssp integrifolia</i>	2	1.000	2	0.008	positive
<i>Muehlenbeckia adpressa</i>	1	0.222	0	0.000	positive
<i>Alyxia buxifolia</i>	1	0.111	0	0.000	positive
<i>Austrostipa flavescens</i>	1	0.111	0	0.000	positive
<i>Correa alba</i>	3	0.111	0	0.000	positive
<i>Olearia axillaris</i>	1	0.111	0	0.000	positive
<i>Oxalis perennans</i>	1	0.889	1	0.081	uninformative
<i>Acacia sophorae</i>	1	0.778	2	0.005	uninformative
<i>Pteridium esculentum</i>	1	0.778	2	0.307	uninformative
<i>Leucopogon parviflorus</i>	1	0.667	2	0.001	uninformative
<i>Lomandra longifolia</i>	1	0.667	2	0.416	uninformative
<i>Monotoca elliptica</i>	1	0.667	1	0.013	uninformative
<i>Dichondra repens</i>	1	0.556	2	0.206	uninformative
<i>Carpobrotus glaucescens</i>	1	0.444	3	0.001	uninformative
<i>Correa reflexa var reflexa</i>	1	0.444	1	0.039	uninformative
<i>Hibbertia obtusifolia</i>	1	0.444	1	0.212	uninformative
<i>Isolepis nodosa</i>	1	0.444	2	0.006	uninformative
<i>Kennedia rubicunda</i>	1	0.444	1	0.037	uninformative
<i>Lepidosperma laterale</i>	1	0.444	1	0.173	uninformative
<i>Poa meionectes</i>	1	0.444	2	0.140	uninformative
<i>Pratia purpurascens</i>	1	0.444	1	0.103	uninformative
<i>Dichelachne crinita</i>	1	0.333	1	0.027	uninformative
<i>Entolasia stricta</i>	1	0.333	2	0.149	uninformative
<i>Glycine clandestina</i>	1	0.333	1	0.300	uninformative
<i>Imperata cylindrica var major</i>	3	0.333	2	0.061	uninformative
<i>Melaleuca armillaris</i>	4	0.333	2	0.002	uninformative
<i>Poa poiformis</i>	3	0.333	2	0.011	uninformative
<i>Rhagodia candolleana ssp candolleana</i>	1	0.333	2	0.004	uninformative
<i>Senecio lautus ssp maritimus</i>	1	0.333	2	0.000	uninformative
<i>Zoysia macrantha</i>	1	0.333	2	0.001	uninformative
<i>Actites megalocarpa</i>	1	0.222	2	0.001	uninformative
<i>Arrhenechthites mixta</i>	1	0.222	1	0.020	uninformative
<i>Brachyloma daphnoides</i>	1	0.222	1	0.097	uninformative
<i>Dianella caerulea var caerulea</i>	1	0.222	1	0.165	uninformative
<i>Eucalyptus botryoides</i>	2	0.222	3	0.027	uninformative
<i>Gahnia radula</i>	1	0.222	2	0.006	uninformative
<i>Juncus continuus</i>	1	0.222	1	0.003	uninformative
<i>Macrozamia communis</i>	2	0.222	2	0.063	uninformative
<i>Opercularia aspera</i>	1	0.222	1	0.037	uninformative
<i>Pelargonium australe</i>	1	0.222	1	0.004	uninformative
<i>Spinifex sericeus</i>	1	0.222	3	0.001	uninformative
<i>Themeda australis</i>	1	0.222	2	0.201	uninformative
<i>Wahlenbergia gracilis</i>	1	0.222	1	0.047	uninformative
<i>Acacia terminalis</i>	1	0.111	1	0.044	uninformative
<i>Acaena novae-zelandiae</i>	1	0.111	1	0.189	uninformative
<i>Astroloma pinifolium</i>	1	0.111	1	0.001	uninformative
<i>Banksia serrata</i>	3	0.111	3	0.017	uninformative
<i>Breynia oblongifolia</i>	1	0.111	1	0.087	uninformative
<i>Calyptegia soldanella</i>	1	0.111	2	0.001	uninformative
<i>Cassutha pubescens</i>	1	0.111	1	0.036	uninformative
<i>Clematis glycinoides var glycinoides</i>	1	0.111	1	0.049	uninformative
<i>Corymbia maculata</i>	2	0.111	3	0.044	uninformative
<i>Cynoglossum australe</i>	1	0.111	1	0.034	uninformative

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Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Elaeocarpus reticulatus</i>	1	0.111	1	0.104	uninformative
<i>Exocarpos cupressiformis</i>	1	0.111	1	0.052	uninformative
<i>Galium propinquum</i>	1	0.111	1	0.043	uninformative
<i>Geranium homeanum</i>	1	0.111	2	0.019	uninformative
<i>Gonocarpus teucroides</i>	1	0.111	2	0.095	uninformative
<i>Hibbertia acicularis</i>	1	0.111	1	0.001	uninformative
<i>Lepidosperma concavum</i>	2	0.111	3	0.011	uninformative
<i>Phyllanthus hirtellus</i>	1	0.111	1	0.041	uninformative
<i>Scaevola calendulacea</i>	4	0.111	3	0.000	uninformative
<i>Schelhamera undulata</i>	1	0.111	1	0.084	uninformative
<i>Viola hederacea</i>	1	0.111	1	0.199	uninformative

Extant area (ha): 1897 (forest ecosystems 22 and 23 combined)

Pre-1750 area (ha): 2676

Geographic range: South Coast

How much conserved in reserves (ha): 583

Vulnerability: 3(C/R)

Reliability: 1

Non-forest ecosystem 23: Southern Coastal Dune Scrub complex

Southern Coastal Dune Scrub complex has a variable shrub and grass layer, made up of *Acacia sophoraea*, *Spinifex sericeus*, and *Banksia integrifolia*. The patchy ground cover includes *Isolepis nodosa*, *Carex longebrachiata*, *Desmodium varians* and *Carpobrotus glaucescens*.

It occurs from south of Kiama down to Wallaga Lake in moister dunes than forest ecosystem number 22.

Diagnostic Plant Species

Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Spinifex sericeus</i>	3	1.000	1	0.001	positive
<i>Acacia sophorae</i>	5	0.750	2	0.006	positive
<i>Actites megalocarpa</i>	2	0.500	1	0.001	positive
<i>Austrofestuca littoralis</i>	2	0.500	2	0.003	positive
<i>Calystegia soldanella</i>	2	0.500	1	0.000	positive
<i>Isolepis nodosa</i>	3	0.500	2	0.006	positive
<i>Leucopogon parviflorus</i>	2	0.500	1	0.002	positive
<i>Zoysia macrantha</i>	2	0.500	2	0.001	positive
<i>Banksia integrifolia ssp integrifolia</i>	2	0.250	2	0.010	uninformative
<i>Carex longebrachiata</i>	2	0.250	2	0.025	uninformative
<i>Carpobrotus glaucescens</i>	3	0.250	1	0.001	uninformative
<i>Desmodium varians</i>	1	0.250	1	0.171	uninformative
<i>Dianella longifolia var longifolia</i>	1	0.250	1	0.017	uninformative
<i>Dichelachne crinita</i>	2	0.250	1	0.028	uninformative
<i>Dichondra repens</i>	2	0.250	2	0.207	uninformative
<i>Monotoca elliptica</i>	1	0.250	1	0.015	uninformative
<i>Oxalis exilis</i>	2	0.250	1	0.036	uninformative
<i>Rhagodia candolleana ssp candolleana</i>	1	0.250	2	0.005	uninformative
<i>Viola hederacea</i>	1	0.250	1	0.198	uninformative

Extant area (ha): 2348 (forest ecosystems 23 and 26 combined)

Pre-1750 area (ha): 3166

Geographic range: South Coast

How much conserved in reserves (ha): 711

Vulnerability: 4(R)

Reliability: 1

Forest ecosystem 24: Coastal Wet Heath Swamp Forest - *Casuarina glauca* / *Melaleuca ericifolia*

Coastal Wet Heath Swamp Forest is a low-medium forest up to 10 metres tall, dominated by *Casuarina glauca*. In the intermediate shrub layer *Melaleuca ericifolia* occurs along with *Myoporum acuminatum*, *Acacia longifolia* var *longifolia* and *Parsonsia straminea*. The ground cover is variable and includes cutting grass *Gahnia clarkei*, along with sedges *Baumea juncea*, and herbs *Viola hederacea*.

Coastal Wet Heath Swamp Forest is restricted to acid sulphate soils above semi saline flats along the edges and low lying tributaries of coastal lagoons. It occurs between Seven Mile Beach and Bermagui. Further to the south in the Eden CRA Region, Map Unit 63 (Keith and Bedward 1999) replaces this ecosystem.

Diagnostic Plant Species

Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Gahnia clarkei</i>	4	1.000	2	0.019	positive
<i>Casuarina glauca</i>	3	0.833	3	0.007	positive
<i>Viola hederacea</i>	2	0.833	1	0.197	positive
<i>Melaleuca ericifolia</i>	4	0.667	3	0.006	positive
<i>Myoporum acuminatum</i>	3	0.667	0	0.000	positive
<i>Parsonsia straminea</i>	2	0.667	2	0.064	positive
<i>Acacia longifolia</i>	2	0.500	2	0.042	positive
<i>Baumea juncea</i>	4	0.500	3	0.001	positive
<i>Lobelia alata</i>	2	0.500	1	0.003	positive
<i>Cladium procerum</i>	5	0.167	0	0.000	positive
<i>Ottelia ovalifolia</i>	1	0.167	0	0.000	positive
<i>Persicaria lapathifolia</i>	1	0.167	0	0.000	positive
<i>Stephania japonica</i> var <i>discolor</i>	1	0.833	1	0.048	uninformative
<i>Lomandra longifolia</i>	1	0.500	2	0.417	uninformative
<i>Juncus kraussii</i> ssp <i>australiensis</i>	5	0.333	1	0.001	uninformative
<i>Marsdenia rostrata</i>	3	0.333	2	0.123	uninformative
<i>Pteridium esculentum</i>	3	0.333	2	0.308	uninformative
<i>Baumea articulata</i>	1	0.167	2	0.001	uninformative
<i>Carex appressa</i>	1	0.167	1	0.074	uninformative
<i>Cassine australis</i> var <i>australis</i>	3	0.167	2	0.005	uninformative
<i>Centella asiatica</i>	2	0.167	2	0.013	uninformative
<i>Claoxylon australe</i>	3	0.167	3	0.036	uninformative
<i>Cyathea cooperi</i>	3	0.167	2	0.001	uninformative
<i>Desmodium brachypodium</i>	1	0.167	1	0.017	uninformative
<i>Eleocharis acuta</i>	1	0.167	1	0.003	uninformative
<i>Eucalyptus botryoides</i>	5	0.167	3	0.027	uninformative
<i>Eustrephus latifolius</i>	1	0.167	1	0.145	uninformative
<i>Ficus coronata</i>	4	0.167	3	0.044	uninformative
<i>Geitonoplesium cymosum</i>	1	0.167	1	0.115	uninformative
<i>Glochidion ferdinandi</i> var <i>ferdinandi</i>	5	0.167	1	0.006	uninformative
<i>Glycine clandestina</i>	1	0.167	1	0.300	uninformative
<i>Goodenia heterophylla</i> ssp <i>eglandulosa</i>	2	0.167	1	0.003	uninformative
<i>Hemarthria uncinata</i> var <i>uncinata</i>	5	0.167	1	0.006	uninformative

Extant area (ha): 6241

Pre-1750 area (ha): 13293

Geographic range: South Coast

How much conserved in reserves (ha): 792

Vulnerability: 2(C/U)

Reliability: 2

Forest ecosystem 25: South Coast Swamp Forest complex- *Casuarina glauca*

South Coast Swamp Forest complex- *Casuarina glauca* is a medium dense forest up to 15 metres tall, dominated by *Casuarina glauca*, with *Acacia sophorae* and *Avicennia marina*. The ground cover is sparse with herbs and graminoids including *Commersonia cyanea*, *Pratia purpureascens*, and *Rhagodia candolleana ssp. candolleana*.

South Coast Swamp Forest complex occurs in less wet situations than vegetation type 24, in the upper reaches of major river estuaries and tributaries between Seven Mile Beach and Wallaga Lake.

Diagnostic Plant Species

Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Casuarina glauca</i>	4	1.000	2	0.007	positive
<i>Acacia sophorae</i>	2	0.600	2	0.006	positive
<i>Avicennia marina var australasica</i>	3	0.400	0	0.000	positive
<i>Apium prostratum ssp prostratum var prostratum</i>	2	0.200	0	0.000	positive
<i>Enchylaena tomentosa</i>	2	0.200	0	0.000	positive
<i>Lyperanthus suaveolens</i>	1	0.200	0	0.000	positive
<i>Solanum pungetium</i>	1	0.600	1	0.055	uninformative
<i>Commelina cyanea</i>	2	0.400	1	0.012	uninformative
<i>Dendrobium teretifolium</i>	2	0.400	2	0.000	uninformative
<i>Dichondra repens</i>	2	0.400	2	0.207	uninformative
<i>Pratia purpurascens</i>	2	0.400	1	0.103	uninformative
<i>Rhagodia candolleana ssp candolleana</i>	3	0.400	2	0.004	uninformative
<i>Samolus repens</i>	2	0.400	1	0.001	uninformative
<i>Sarcocornia quinqueflora ssp quinqueflora</i>	2	0.400	2	0.001	uninformative
<i>Suaeda australis</i>	3	0.400	2	0.000	uninformative
<i>Tetragonia tetragonoides</i>	2	0.400	2	0.001	uninformative
<i>Acacia mearnsii</i>	1	0.200	2	0.060	uninformative
<i>Acacia myrtifolia</i>	1	0.200	2	0.004	uninformative
<i>Acrotriche serrulata</i>	1	0.200	1	0.073	uninformative
<i>Allocasuarina verticillata</i>	3	0.200	2	0.004	uninformative
<i>Banksia integrifolia ssp integrifolia</i>	4	0.200	2	0.010	uninformative
<i>Banksia spinulosa var spinulosa</i>	2	0.200	2	0.054	uninformative
<i>Boronia polygalifolia</i>	2	0.200	2	0.001	uninformative
<i>Brachycome spathulata</i>	1	0.200	1	0.066	uninformative
<i>Breynia oblongifolia</i>	2	0.200	1	0.087	uninformative
<i>Cassyltha glabella forma glabella</i>	2	0.200	1	0.025	uninformative
<i>Cheilanthes sieberi ssp sieberi</i>	2	0.200	1	0.073	uninformative
<i>Cryptostylis subulata</i>	1	0.200	1	0.004	uninformative
<i>Desmodium varians</i>	2	0.200	1	0.171	uninformative
<i>Einadia trigonos ssp trigonos</i>	4	0.200	1	0.002	uninformative
<i>Entolasia stricta</i>	1	0.200	2	0.149	uninformative
<i>Eucalyptus amplifolia ssp amplifolia</i>	3	0.200	3	0.001	uninformative
<i>Geitonoplesium cymosum</i>	1	0.200	1	0.115	uninformative
<i>Glycine clandestina</i>	1	0.200	1	0.300	uninformative
<i>Gonocarpus teucrioides</i>	1	0.200	2	0.095	uninformative
<i>Goodenia ovata</i>	1	0.200	2	0.050	uninformative
<i>Hibbertia aspera</i>	3	0.200	2	0.071	uninformative
<i>Hybanthus monopetalus</i>	1	0.200	1	0.006	uninformative
<i>Hypericum gramineum</i>	1	0.200	1	0.172	uninformative
<i>Hypoxis hygrometrica var hygrometrica</i>	1	0.200	1	0.010	uninformative
<i>Isolepis nodosa</i>	2	0.200	2	0.006	uninformative
<i>Juncus kraussii ssp australiensis</i>	1	0.200	3	0.001	uninformative
<i>Leptospermum continentale</i>	1	0.200	2	0.012	uninformative
<i>Lindsaea linearis</i>	2	0.200	1	0.020	uninformative
<i>Lobelia alata</i>	1	0.200	1	0.004	uninformative
<i>Lomandra longifolia</i>	3	0.200	2	0.417	uninformative
<i>Marsdenia rostrata</i>	1	0.200	2	0.123	uninformative
<i>Morinda jasminoides</i>	2	0.200	3	0.097	uninformative
<i>Oplismenus imbecillis</i>	2	0.200	2	0.122	uninformative
<i>Oxalis rubens</i>	1	0.200	1	0.003	uninformative
<i>Oxylobium scandens var scandens</i>	2	0.200	2	0.002	uninformative
<i>Panicum simile</i>	1	0.200	1	0.014	uninformative
<i>Passiflora herbertiana ssp herbertiana</i>	1	0.200	1	0.005	uninformative
<i>Pellaea falcata var falcata</i>	2	0.200	2	0.102	uninformative
<i>Phyllanthus hirtellus</i>	2	0.200	1	0.041	uninformative
<i>Plectranthus parviflorus</i>	1	0.200	2	0.062	uninformative
<i>Poa meioneetes</i>	2	0.200	2	0.141	uninformative
<i>Poranthera microphylla</i>	2	0.200	1	0.179	uninformative

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Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Schoenus brevifolius</i>	1	0.200	4	0.002	uninformative
<i>Selliera radicans</i>	1	0.200	2	0.002	uninformative
<i>Senecio minimus</i>	1	0.200	1	0.013	uninformative
<i>Sporobolus virginicus</i>	1	0.200	3	0.001	uninformative
<i>Stephania japonica var discolor</i>	1	0.200	1	0.049	uninformative
<i>Themeda australis</i>	5	0.200	2	0.201	uninformative
<i>Tricoryne elatior</i>	1	0.200	1	0.020	uninformative
<i>Tylophora barbata</i>	2	0.200	2	0.106	uninformative
<i>Veronica plebeia</i>	1	0.200	1	0.047	uninformative
<i>Wahlenbergia communis</i>	1	0.200	1	0.027	uninformative
<i>Westringia fruticosa</i>	1	0.200	2	0.001	uninformative

Extant area (ha): 3909

Pre-1750 area (ha): 18194

Geographic range: South Coast

How much conserved in reserves (ha): 648

Vulnerability: 1(C/W)

Reliability: 2

Forest ecosystem 27: Ecotonal Coastal Swamp Forest - *Casuarina glauca* / *E. botryoides*

Ecotonal Coastal Swamp Forest is a medium forest up to 20 metres tall, dominated by *Casuarina glauca*, with *E. botryoides*. The tall shrub layer is a variable mixture of *Banksia integrifolia* and *Acacia longifolia*. The ground cover is an open cover of sedges *Lomandra longifolia*, *Carex longibrachiata* and *Isolepis nodosa*, grasses *Oplismenus imbecillus*, *Echinopogon ovaus*, and *Imperata cylindrica*, and *Commelina cyanea*, as well as herbs *Dichondra repens*, *Desmodium varians* and *Glycine clandestina*.

This ecosystem is found on periodically inundated gley soils in hind-dune environments.

Diagnostic Plant Species

Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Entolasia marginata</i>	2	0.824	2	0.050	positive
<i>Lomandra longifolia</i>	2	0.824	2	0.415	positive
<i>Oplismenus imbecillus</i>	2	0.824	2	0.119	positive
<i>Casuarina glauca</i>	3	0.706	3	0.006	positive
<i>Dichondra repens</i>	2	0.647	2	0.205	positive
<i>Echinopogon ovatus</i>	2	0.647	1	0.108	positive
<i>Banksia integrifolia ssp integrifolia</i>	2	0.588	2	0.008	positive
<i>Carex longibrachiata</i>	2	0.588	2	0.023	positive
<i>Desmodium varians</i>	2	0.588	1	0.170	positive
<i>Imperata cylindrica var major</i>	2	0.588	2	0.060	positive
<i>Acacia longifolia</i>	2	0.529	2	0.041	positive
<i>Breynia oblongifolia</i>	2	0.529	1	0.085	positive
<i>Commelina cyanea</i>	2	0.529	1	0.010	positive
<i>Glycine clandestina</i>	2	0.529	1	0.299	positive
<i>Isolepis nodosa</i>	2	0.529	2	0.004	positive
<i>Microlaena stipoides var stipoides</i>	2	0.529	2	0.272	positive
<i>Apium prostratum ssp prostratum var filiforme</i>	3	0.059	0	0.000	positive
<i>Dianella crinoides</i>	2	0.059	0	0.000	positive
<i>Myriophyllum simulans</i>	5	0.059	0	0.000	positive
<i>Parsonsia straminea</i>	1	0.588	2	0.063	uninformative
<i>Geranium potentilloides var potentilloides</i>	2	0.471	2	0.068	uninformative
<i>Pteridium esculentum</i>	2	0.471	2	0.308	uninformative
<i>Solanum pungetium</i>	1	0.471	1	0.053	uninformative
<i>Viola hederacea</i>	2	0.471	1	0.197	uninformative
<i>Dianella caerulea var caerulea</i>	1	0.412	1	0.164	uninformative
<i>Eucalyptus botryoides</i>	4	0.412	2	0.025	uninformative
<i>Marsdenia rostrata</i>	1	0.412	2	0.122	uninformative
<i>Pittosporum undulatum</i>	2	0.412	2	0.090	uninformative
<i>Pratia purpurascens</i>	2	0.412	1	0.102	uninformative
<i>Rubus parvifolius</i>	2	0.412	1	0.111	uninformative
<i>Stellaria flaccida</i>	2	0.412	2	0.099	uninformative
<i>Eustrephus latifolius</i>	1	0.353	1	0.145	uninformative
<i>Kennedia rubicunda</i>	2	0.353	1	0.037	uninformative
<i>Pittosporum revolutum</i>	2	0.353	1	0.071	uninformative
<i>Senecio linearifolius</i>	1	0.353	1	0.075	uninformative
<i>Themeda australis</i>	2	0.353	2	0.200	uninformative
<i>Melaleuca ericifolia</i>	4	0.294	3	0.006	uninformative
<i>Monotoca elliptica</i>	1	0.294	1	0.014	uninformative
<i>Oxalis exilis</i>	2	0.294	1	0.035	uninformative
<i>Solanum stelligerum</i>	2	0.294	1	0.005	uninformative
<i>Stephania japonica var discolor</i>	2	0.294	1	0.048	uninformative
<i>Acacia sophorae</i>	2	0.235	2	0.006	uninformative
<i>Centella asiatica</i>	2	0.235	2	0.012	uninformative
<i>Cynodon dactylon</i>	2	0.235	2	0.009	uninformative
<i>Entolasia stricta</i>	2	0.235	2	0.149	uninformative
<i>Eucalyptus tereticornis</i>	3	0.235	3	0.020	uninformative
<i>Geitonoplesium cymosum</i>	2	0.235	1	0.115	uninformative
<i>Hibbertia aspera</i>	2	0.235	2	0.071	uninformative
<i>Hibbertia scandens</i>	2	0.235	1	0.031	uninformative
<i>Rhagodia candolleana ssp candolleana</i>	2	0.235	2	0.004	uninformative
<i>Acacia mearnsii</i>	1	0.177	2	0.060	uninformative
<i>Acaena novae-zelandiae</i>	1	0.177	1	0.189	uninformative
<i>Adiantum aethiopicum</i>	2	0.177	1	0.052	uninformative
<i>Clematis aristata</i>	1	0.177	1	0.269	uninformative
<i>Dianella longifolia var longifolia</i>	1	0.177	1	0.017	uninformative
<i>Euchiton gymnocephalus</i>	1	0.177	1	0.116	uninformative
<i>Exocarpos cupressiformis</i>	3	0.177	1	0.051	uninformative
<i>Goodenia ovata</i>	1	0.177	2	0.050	uninformative
<i>Hydrocotyle peduncularis</i>	2	0.177	2	0.027	uninformative

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Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Lagenifera stipitata</i>	1	0.177	1	0.167	uninformative
<i>Leucopogon juniperinus</i>	2	0.177	1	0.025	uninformative
<i>Macrozamia communis</i>	2	0.177	2	0.063	uninformative
<i>Oxalis rubens</i>	2	0.177	1	0.002	uninformative
<i>Plantago debilis</i>	2	0.177	1	0.030	uninformative
<i>Plectranthus parviflorus</i>	2	0.177	2	0.062	uninformative
<i>Poa labillardieri</i>	2	0.177	2	0.094	uninformative
<i>Poa poiformis</i>	2	0.177	2	0.011	uninformative
<i>Veronica plebeia</i>	2	0.177	1	0.047	uninformative

Extant area (ha): 343

Pre-1750 area (ha): 9841

Geographic range: South Coast

How much conserved in reserves (ha): 20

Vulnerability: 1(C)

Reliability: 3

Forest Ecosystem 28: Coastal Sands Shrub/Fern Forest - *E. botryoides* / *Banksia serrata*

Coastal Sands Shrub/Fern Forest is a medium to tall forest dominated by *E. botryoides*. It has a shrub understorey of *Banksia serrata*, *Monotoca elliptica*, *Allocasuarina littoralis*, *Breynia oblongifolia*, and *Acacia longifolia*. The ground cover is predominantly bracken *Pteridium esculentum* and graminoids, *Imperata cylindrica* and *Lomandra longifolia*, intermixed with herbs and twiners, such as *Gonocarpus teucrioides*, *Glycine clandestina* and *Viola hederacea*.

This forest ecosystem is mainly confined to sandy soils adjoining bays, estuaries, and lagoons in Jervis Bay, Clyde, and Moruya areas.

Diagnostic Plant Species

Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Pteridium esculentum</i>	3	0.933	2	0.306	positive
<i>Lomandra longifolia</i>	3	0.867	2	0.415	positive
<i>Eucalyptus botryoides</i>	4	0.800	2	0.024	positive
<i>Banksia serrata</i>	3	0.667	3	0.015	positive
<i>Imperata cylindrica</i> var <i>major</i>	2	0.667	2	0.060	positive
<i>Monotoca elliptica</i>	2	0.600	1	0.013	positive
<i>Allocasuarina littoralis</i>	3	0.533	2	0.101	positive
<i>Banksia integrifolia</i> ssp <i>integrifolia</i>	3	0.533	2	0.008	positive
<i>Marsdenia rostrata</i>	2	0.533	2	0.122	positive
<i>Cyperus laevigatus</i>	2	0.133	0	0.000	positive
<i>Pterostylis curta</i>	1	0.067	0	0.000	positive
<i>Pterostylis grandiflora</i>	1	0.067	0	0.000	positive
<i>Gonocarpus teucrioides</i>	1	0.533	2	0.093	uninformative
<i>Acacia longifolia</i>	2	0.467	2	0.041	uninformative
<i>Glycine clandestina</i>	1	0.467	1	0.299	uninformative
<i>Stephania japonica</i> var <i>discolor</i>	1	0.467	1	0.048	uninformative
<i>Breynia oblongifolia</i>	1	0.400	1	0.086	uninformative
<i>Hibbertia scandens</i>	2	0.400	1	0.030	uninformative
<i>Lagenifera stipitata</i>	1	0.400	1	0.166	uninformative
<i>Lepidosperma concavum</i>	4	0.400	2	0.009	uninformative
<i>Themeda australis</i>	1	0.400	2	0.200	uninformative
<i>Viola hederacea</i>	2	0.400	1	0.198	uninformative
<i>Desmodium varians</i>	2	0.333	1	0.171	uninformative
<i>Eucalyptus pilularis</i>	3	0.333	3	0.029	uninformative
<i>Hibbertia obtusifolia</i>	1	0.333	1	0.212	uninformative
<i>Macrozamia communis</i>	3	0.333	2	0.062	uninformative
<i>Pratia purpurascens</i>	1	0.333	1	0.103	uninformative
<i>Schelhammera undulata</i>	1	0.333	1	0.083	uninformative
<i>Desmodium brachypodium</i>	1	0.267	1	0.016	uninformative
<i>Dianella caerulea</i> var <i>caerulea</i>	1	0.267	1	0.165	uninformative
<i>Dichondra repens</i>	1	0.267	2	0.207	uninformative
<i>Echinopogon caespitosus</i> var <i>caespitosus</i>	1	0.267	1	0.024	uninformative
<i>Microlaena stipoides</i> var <i>stipoides</i>	2	0.267	2	0.273	uninformative
<i>Oplismenus imbecillis</i>	2	0.267	2	0.121	uninformative
<i>Pittosporum undulatum</i>	2	0.267	2	0.091	uninformative
<i>Synoum glandulosum</i>	4	0.267	2	0.080	uninformative
<i>Acacia maidenii</i>	2	0.200	1	0.010	uninformative
<i>Acacia ulicifolia</i>	1	0.200	1	0.030	uninformative
<i>Acianthus fornicatus</i>	1	0.200	2	0.006	uninformative
<i>Cissus hypoglauca</i>	3	0.200	2	0.105	uninformative
<i>Eustrephus latifolius</i>	1	0.200	1	0.145	uninformative
<i>Hibbertia aspera</i>	1	0.200	2	0.071	uninformative
<i>Isolepis nodosa</i>	1	0.200	2	0.006	uninformative
<i>Acacia sophorae</i>	3	0.133	2	0.006	uninformative
<i>Entolasia marginata</i>	1	0.133	2	0.053	uninformative
<i>Entolasia stricta</i>	2	0.133	2	0.150	uninformative
<i>Gahnia clarkei</i>	3	0.133	2	0.020	uninformative
<i>Geranium potentilloides</i> var <i>potentilloides</i>	1	0.133	2	0.070	uninformative
<i>Hibbertia linearis</i>	1	0.133	1	0.005	uninformative
<i>Hybanthus monopetalus</i>	1	0.133	1	0.006	uninformative
<i>Leptospermum laevigatum</i>	3	0.133	2	0.002	uninformative
<i>Parsonia straminea</i>	3	0.133	2	0.065	uninformative
<i>Patersonia glabrata</i>	1	0.133	2	0.042	uninformative
<i>Persoonia linearis</i>	1	0.133	1	0.183	uninformative
<i>Poa poiformis</i>	1	0.133	2	0.012	uninformative
<i>Veronica plebeia</i>	1	0.133	1	0.047	uninformative

Extant area (ha): 3117

Pre-1750 area (ha): 3568

Geographic range: South Coast

How much conserved in reserves (ha): 244

Vulnerability: 3(C/R)

Reliability: 3

Forest ecosystem 54: Far Southern Grass/Herb Dry Forest/Woodland - *E. globoidea* / *E. tereticornis*

Far Southern Grass/Herb Dry Forest/Woodland is an open medium to tall forest, dominated by *Eucalyptus tereticornis*, with *E. globoidea* and *Angophora floribunda*. *Acacia mearnsii* occasionally occurs as a small tree layer up to 9 metres tall. The lower shrub understorey includes *Bursaria spinosa*, *Dodonaea viscosa ssp viscosa*. The grassy ground cover is dominated by *Themeda australis*, *Echinopogon ovatus*, and *Microlaena stipoides*, with forbs including *Dichondra repens*, *Hydrocotyle laxiflora*, *Glycine clandestina*, and the fern *Cheilanthes sieberi* (Keith and Bedward 1999).

Bega Valley Shrub/grass forest occurs on undulating terrain in the Cobargo-Bega-Candelo area and in the Towamba Valley mainly on granites and on Ordovician sediments. It has not been mapped as it occurs outside the Southern CRA Region, within the Eden CRA Region.

Diagnostic Plant Species

Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Dichondra repens</i>	2	1.000	2	0.195	positive
<i>Microlaena stipoides var stipoides</i>	3	0.964	2	0.262	positive
<i>Themeda australis</i>	3	0.946	2	0.190	positive
<i>Hydrocotyle laxiflora</i>	2	0.804	2	0.220	positive
<i>Eragrostis leptostachya</i>	2	0.786	1	0.007	positive
<i>Eucalyptus globoidea</i>	3	0.661	2	0.072	positive
<i>Angophora floribunda</i>	3	0.643	1	0.065	positive
<i>Bursaria spinosa</i>	2	0.625	2	0.068	positive
<i>Echinopogon ovatus</i>	2	0.625	1	0.103	positive
<i>Eucalyptus tereticornis</i>	3	0.607	3	0.012	positive
<i>Scleria mackaviensis</i>	1	0.036	0	0.000	positive
<i>Chloris ventricosa</i>	2	0.018	0	0.000	positive
<i>Glycine clandestina</i>	1	0.875	1	0.291	uninformative
<i>Desmodium varians</i>	1	0.804	1	0.162	uninformative
<i>Acacia mearnsii</i>	1	0.643	2	0.051	uninformative
<i>Cheilanthes sieberi ssp sieberi</i>	1	0.589	1	0.065	uninformative
<i>Hypericum gramineum</i>	1	0.571	1	0.166	uninformative
<i>Lomandra longifolia</i>	1	0.554	2	0.415	uninformative
<i>Euchiton gymnocephalus</i>	1	0.536	1	0.109	uninformative
<i>Galium propinquum</i>	1	0.536	1	0.036	uninformative
<i>Dichelachne micrantha</i>	1	0.518	1	0.075	uninformative
<i>Glycine tabacina</i>	1	0.518	1	0.020	uninformative
<i>Wahlenbergia gracilis</i>	1	0.518	1	0.040	uninformative
<i>Geranium solanderi var solanderi</i>	1	0.500	1	0.127	uninformative
<i>Rubus parvifolius</i>	1	0.500	1	0.107	uninformative
<i>Lomandra multiflora ssp multiflora</i>	1	0.482	1	0.140	uninformative
<i>Oxalis perennans</i>	1	0.464	1	0.078	uninformative
<i>Poa labillardieri</i>	2	0.464	2	0.089	uninformative
<i>Austrostipa rudis ssp nervosa</i>	2	0.429	1	0.023	uninformative
<i>Danthonia racemosa var racemosa</i>	2	0.429	2	0.078	uninformative
<i>Ozothamnus diosmifolius</i>	1	0.393	1	0.048	uninformative
<i>Cassinia longifolia</i>	1	0.375	1	0.118	uninformative
<i>Elymus scaber var scaber</i>	1	0.375	1	0.154	uninformative
<i>Panicum effusum</i>	1	0.375	1	0.021	uninformative
<i>Acaena echinata</i>	1	0.357	1	0.050	uninformative
<i>Dianella revoluta var revoluta</i>	1	0.357	1	0.135	uninformative
<i>Clematis glycinoides var glycinoides</i>	1	0.339	1	0.044	uninformative
<i>Desmodium brachypodium</i>	1	0.339	2	0.012	uninformative
<i>Hardenbergia violacea</i>	1	0.339	1	0.157	uninformative
<i>Arthropodium milleflorum</i>	1	0.321	1	0.076	uninformative
<i>Cassinia trinerva</i>	1	0.321	1	0.024	uninformative
<i>Cymbopogon refractus</i>	1	0.321	1	0.010	uninformative
<i>Opercularia varia</i>	1	0.321	1	0.020	uninformative
<i>Allocasuarina littoralis</i>	1	0.304	2	0.100	uninformative
<i>Carex inversa</i>	1	0.304	1	0.052	uninformative
<i>Echinopogon caespitosus var caespitosus</i>	2	0.304	1	0.021	uninformative
<i>Hymenantha dentata</i>	1	0.304	1	0.050	uninformative
<i>Solanum pungetium</i>	1	0.304	1	0.052	uninformative
<i>Acacia implexa</i>	1	0.286	1	0.041	uninformative
<i>Opercularia aspera</i>	1	0.286	1	0.033	uninformative
<i>Pellaea falcata var falcata</i>	1	0.286	2	0.099	uninformative
<i>Scleranthus biflorus</i>	1	0.286	1	0.055	uninformative
<i>Exocarpos cupressiformis</i>	1	0.268	1	0.049	uninformative
<i>Lepidosperma laterale</i>	1	0.268	1	0.172	uninformative
<i>Danthonia longifolia</i>	1	0.250	2	0.030	uninformative
<i>Danthonia pilosa var pilosa</i>	1	0.250	2	0.066	uninformative
<i>Einadia nutans ssp nutans</i>	1	0.250	1	0.010	uninformative
<i>Poa meionectes</i>	1	0.250	2	0.140	uninformative
<i>Asperula conferta</i>	1	0.232	1	0.067	uninformative

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Species	Group cover	Group freq	Non-group cover	Non-group freq	Fidelity class
<i>Carex breviculmis</i>	1	0.232	2	0.048	uninformative
<i>Eucalyptus melliodora</i>	1	0.232	3	0.047	uninformative
<i>Imperata cylindrica var major</i>	1	0.232	2	0.059	uninformative
<i>Oplismenus imbecillis</i>	2	0.232	2	0.120	uninformative
<i>Pratia purpurascens</i>	2	0.232	1	0.102	uninformative
<i>Pteridium esculentum</i>	1	0.232	2	0.309	uninformative
<i>Vernonia cinerea var cinerea</i>	1	0.232	1	0.026	uninformative
<i>Veronica plebeia</i>	1	0.232	1	0.045	uninformative
<i>Aristida vagans</i>	1	0.214	1	0.017	uninformative
<i>Cassinia aculeata</i>	1	0.214	1	0.094	uninformative
<i>Digitaria ramularis</i>	1	0.214	1	0.001	uninformative
<i>Epilobium billardierianum ssp cinereum</i>	1	0.214	1	0.058	uninformative
<i>Rumex brownii</i>	1	0.214	1	0.062	uninformative
<i>Sporobolus creber</i>	1	0.214	1	0.002	uninformative
<i>Dichanthium sericeum ssp sericeum</i>	1	0.196	1	0.002	uninformative
<i>Senecio hispidulus var hispidulus</i>	1	0.196	1	0.025	uninformative
<i>Sigesbeckia orientalis ssp orientalis</i>	1	0.196	1	0.064	uninformative
<i>Einadia hastata</i>	1	0.179	1	0.005	uninformative
<i>Ajuga australis</i>	1	0.161	1	0.052	uninformative
<i>Bossiaea buxifolia</i>	1	0.161	1	0.036	uninformative
<i>Dichelachne rara</i>	1	0.143	1	0.068	uninformative
<i>Digitaria parviflora</i>	1	0.143	1	0.002	uninformative
<i>Ozothamnus argophyllus</i>	1	0.143	1	0.032	uninformative
<i>Wahlenbergia communis</i>	1	0.143	1	0.026	uninformative
<i>Cynoglossum australe</i>	1	0.125	1	0.033	uninformative
<i>Lepidosperma gunnii</i>	1	0.125	1	0.030	uninformative
<i>Oxalis radicata</i>	1	0.125	1	0.004	uninformative
<i>Entolasia marginata</i>	2	0.107	2	0.052	uninformative
<i>Eucalyptus bosistoana</i>	3	0.107	1	0.015	uninformative
<i>Galium gaudichaudii</i>	1	0.107	1	0.074	uninformative

Extant area (ha):

Pre-1750 area (ha):

Geographic range: (not mapped - Eden)

How much conserved in reserves (ha):

Vulnerability:

Reliability:

Non forest ecosystem 188: Sand Dune Wetlands

Sand Dune Wetlands occur in the hind dune systems of the South Coast and contain a range of wetland ecosystems.

Two typical examples of such wetlands are behind Seven Mile Beach and north of Congo township.

Extant area (ha): 373

Pre-1750 area (ha): 604

Geographic range: South Coast subregion

How much conserved in reserves (ha): 111

Vulnerability: 2C/U

Reliability: 1

Non forest ecosystem 189: Coastal Alluvial Valley Floor Wetlands

Coastal alluvial valley floor wetlands are lagoons and closed parts of former estuaries adjoining coastal lakes and estuaries on the South Coast. No vegetation samples have been taken in this type. Further sampling of these wetlands is required to determine the aquatic and terrestrial vegetation growing in and around them.

Extant area (ha): 143

Pre-1750 area (ha): 195

Geographic range: South Coast subregion

How much conserved in reserves (ha): 0

Vulnerability: 1C/W/G

Reliability: 1

Appendix C. Hollow-bearing /significant trees of the Bingi area

Those marked with * were considered large enough to cater for the nesting requirements of large forest owls and/or Glossy Black Cockatoo.

Hollows: l = large (> 200mm diameter), m = medium (circa 200 mm diameter), s = small (< 200 mm diameter). Data for the first eight trees were taken from Peter Spurway (2002).

Label	Species	Easting	Northing	DP	Height	DBH	Hollows	Note
119	Stag	241515	6012316	253507				
120	Not given	241473	6012343	253507				
121	Not given	241494	6012356	253507				
122	Not given	241579	6012685	253507				
125	<i>C. gummifera</i>	241365	6012473	253507				
126	Stag	241439	6012399	253507				
127	Not given	241408	6012361	253507				
128	Not given	241376	6012394	253507				
	<i>Angophora costata</i>	240100	6013053					
	<i>Angophora costata</i>	240086	6013018					
	<i>Angophora costata</i>	239930	6013010					
	<i>Angophora costata</i>	241347	6012367					
	<i>Eucalyptus bosistoana</i>	239785	6011130		35	1.0		Eagles nest
	<i>Ficus rubiginosa</i>	239870	6011283		5	0.5		
	<i>Eucalyptus sideroxylon</i>	2411234	6015577		15	0.3		

Appendix D. Photographs of vegetation communities in the Bingi area



Acacia sophorae shrubland



Bangalay – Backhousia myrtifolia coastal forest



Casuarina glauca forest



Saltmarsh (in SEPP wetland 164a)*



Forest Red Gum forest



Allocasuarina – Acacia shrubland



Southern coastal Blackbutt - Ironbark forest