

EXECUTIVE SUMMARY

A review of previous fauna and flora studies within the Bingi area indicated that the habitat supports a wide range of species and vegetation communities. The species of fauna that are currently listed on the *Threatened Species Conservation (TSC) Act (1995)* that have been detected in the area include the Greater Broad-nosed Bat *Scoteanax ruppellii*, Grey-headed Flying Fox, Glossy Black Cockatoo *Calyptorhynchus lathami*, Powerful Owl *Ninox strenua* and Masked Owl *Tyto novaehollandiae*. Records indicate that the Green and Golden Bell Frog *Litoria aurea* previously existed in the area.

The vegetation communities described by Thomas *et al.* (2000) as occurring in the area include Lowland Red Bloodwood-Turpentine Dry Shrub Forest, Coastal Lowlands Spotted Gum-Burrawang Cycad Dry Shrub Dry Forest, Southern Coastal Lowlands White Stringybark-Woollybutt Shrub-Grass Dry Forest, Southern Coastal Hind Dune/Headland Scrub & Beach Strand Grassland, Coastal Swamp Oak- Swamp Melaleuca Wet Heath Swamp Forest, South Coast Swamp Oak Forest Complex, Ecotonal Coastal Hind Dune Swamp Oak-Bangalay Shrub Forest, Coastal Sands Bangalay-Old Man Banksia Grassy Bracken Shrub Forest, Coastal Forest Red Gum Shrub/Grass Forest.

Those communities listed under the TSC Act (1995) as endangered ecological communities (EEC) that occur in the area are Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions, River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions and Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions. Although EcoGIS identified Coastal Forest Red Gum Shrub/Grass Forest as a threatened ecological community is not currently listed under the TSC Act (1995).

Field surveys to ground-truth the vegetation communities described by Thomas *et al.* (2000) indicated a huge discrepancy with respect to distribution and descriptions of vegetation communities. Several additional communities are described. The Scientific Committee has been informed by Mr Daly that Coastal Forest Red Gum Shrub/Grass Forest within the Eurobodalla is not within the existing Bega Valley (EEC) listing as this forest type should be listed as also occurring within the Eurobodalla local government area.

Based on the review of environmental surveys and zoning within the study area a strategic plan was formulated. The priority action is to conserve and enhance the habitat for the Greater Glider by way of policy. The policy would focus on retaining critical habitat resources such a large hollow-bearing trees and adequate habitat linkages to cater for the

movement of these animals across the landscape. In this instance the Greater Glider is taken as a surrogate for forest dependant fauna. The Bingi Landcare Group (BLG) should then lobby Eurobodalla Shire Council (ESC) to adopt this policy as part of an environmental planning instrument (EPI) or amended local environmental plan (LEP) in relation to the *Threatened Species Legislation Amendment Act (2004)*. This is considered the most important action as approximately 500 hectares of forest within the Bingi area is zoned rural 1c and without such a provision critical habitat components such as hollow-bearing trees will be lost. Revegetation of select areas will also be necessary to offset losses from development and to form habitat linkages to the north and west to facilitate connectivity of forest so that a viable population of Greater Glider can persist.

The second order of priority actions relates to on ground work to protect and enhance water quality. Revegetation of areas within the catchment of ICOLLS – (intermittently closed or open (to the sea) lake or lagoon) will be necessary to provide a buffer to reduce sediment and excessive nutrients from entering these waterbodies. This will require fencing and revegetation/regeneration beside coastal lagoons, lakes and their feeder streams. Revegetation associated with protection of ICOLLS can also enhance habitat linkages for fauna.

Revegetation for habitat linkages and protection of water quality can only be done on freehold land with the consent of the owners. To determine the sites and areas for revegetation BLG must liase and negotiate with landowners to determine areas for fencing and revegetation so that estimated cost and quantities can be calculated. A summary of rates and charges is given so that budgets can be calculated after agreements on the scope of works have been made.

1.0 BACKGROUND

1.1 Purpose and scope of capacity planning project

Bingie Landcare aims to educate and engage the local community in sustainable natural resource management on both public and private land, and to help rehabilitate degraded areas across the landscape and to preserve biodiversity within the Bingi Landcare Project Area.

This project will complete a number of primary activities to facilitate biodiversity conservation by:

- 1.) identifying areas critical for linking, enhancing, rehabilitating and protecting important remnant vegetation and fauna habitat (including conserving vulnerable ecosystems such as ICOLLs - intermittently closed or open (to the sea) lake or lagoon);
- 2.) developing environmental rehabilitation and restoration programs for the Bingi Landcare Project Area.

The project will foster capacity building by providing data and resources to support community involvement and implementation of measures to better manage the environment of the project area.

The project will add to the existing Eurobodalla Coastal Environmental Capacity Planning Project by using the data from that program to formulate a management plan to direct on-ground actions in the project area. This Management Plan seeks to engage stakeholders to strengthen networks to deliver an integrated approach to natural resource management, including consultation with Aboriginal people to protect indigenous sites.

The project will direct and prioritise efforts of the Bingi Landcare volunteers to become strategic and provide efficacy in management of natural resources. The outcomes will provide technical advice and recommend a priority of actions to yield the best results for the environment. This action plan will target activities into discrete projects of defined cost. Landholders will be presented with clearly defined reasons why and how to manage their natural resources. They shall be encouraged to participate in rehabilitation works to link the fragment landscape.

The objects of the study are to:

- Prepare a literature review of environmental studies and reports relevant to Landcare activities in the Bingi Landcare Project Area;
- Review available GIS data for the Bingi Landcare Project Area;
- Analyse the data;

- Provide a management plan and maps on natural resource conservation within the economic and social constraints of the Bingi Landcare Project Area, including an action plan to guide existing Landcare works and identify future works areas.

1.2 Description of study site

1.2.1 General description

The Bingi study area (Latitude 36° 00', Longitude 150° 08') is located about 10 kilometres south-east of Moruya on the NSW South Coast. The *Bingi Landcare Project Area*, as identified on the location map (Figure 1), is located between Coila Lake, Congo and the Princes Highway on the South Coast of NSW and covers approximately 1140 hectares. The natural features of the landscape are varied but include sandy beaches and associated coastal lakes (ICOLLS) to forested, rural and rural residential areas. The general landscape has gently rolling hills, which have been partially cleared for agriculture land use. The altitude of the study area ranges from 0-70 m AHD.

1.2.2 Overview of vegetation communities

The Bingi area is floristically diverse and the approximate area of 1121 hectares of native vegetation has several vegetation communities (Figure 2). At the southern end of the study area there are significant stands of Swamp Oak *Casuarina glauca* fringing Coila Lake. The area behind Bingi Beach has sandy soils of marine origin. The vegetation that grows in this area is primarily Bangalay *E. botryoides* forest. On the lower flats Forest Red Gum *Eucalyptus tereticornis* woodland occurs in almost pure stands. More frequently Forest Red Gum is associated with minor stands of Woollybutt *E. longifolia*, Rough Barked Apple *Angophora floribunda* and Spotted Gum *Corymbia maculata*. Spotted Gum forest is also present and is associated with small occurrences of Grey Ironbark *E. paniculata* and Stringybark *E. globoidea*. Blackbutt *E. pilularis*/Ironbark/Stringybark forest is the most widespread vegetation community and occurs along the Meringo Road. There are small occurrences of Red Gum *Angophora costata*, Sweet Myrtle *Backhousia myrtifolia*, Coastal Grey Box *E. bosistoana* and Red Ironbark *E. sideroxylon*. The undulating farmland in the northern portion of the study area has remnant *A. floribunda*.

Forest Oak *Allocasuarina littoralis* often formed dense stands along the roads and in areas, which had been disturbed from previous fires. The understorey varied with forest type. In the open forests (Forest Red Gum and Spotted Gum) the understorey was sparse and consisted of grasses. In more mesic areas the understorey was dense and contained ferns and sedges.

1.2.3 Soils

The soils of Bingi are varied and include those of marine and volcanic origins (Figure 3). A very brief description of the soils is given so that the distribution of vegetation communities (and cleared land) can be put into context of soil type/fertility. Sandy soils occur near the coast near Coila Lake derived from marine origin. Soils derived from granite occur west of Bingi Point and Mullimburra Point and as a band beside the Princes Highway. The other main soil is derived from basalt and claystone, siltstone and sandstone. Beside most of the coastline (see Figure 3) the exposed rocks and brown soils are metamorphic in origin.

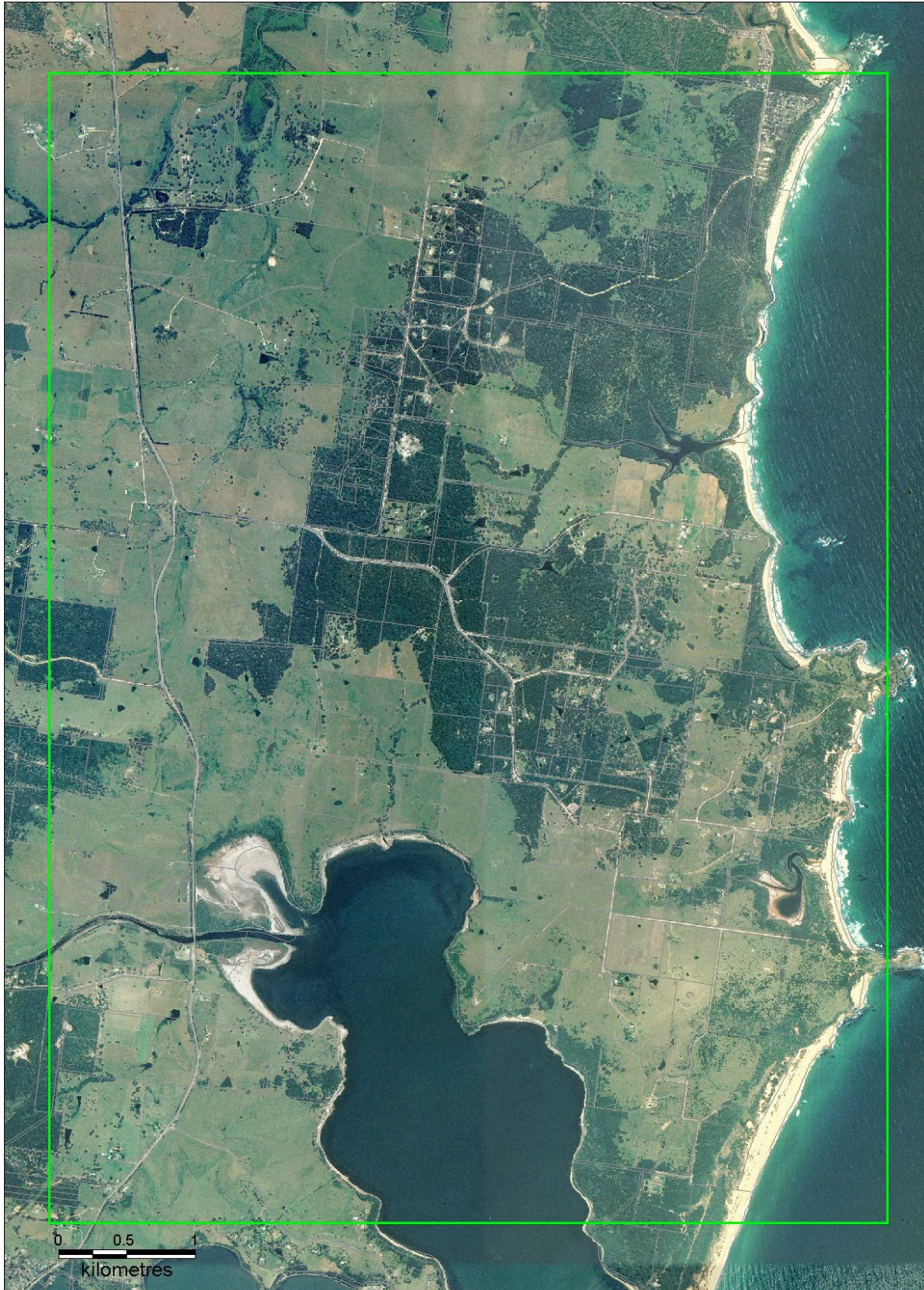
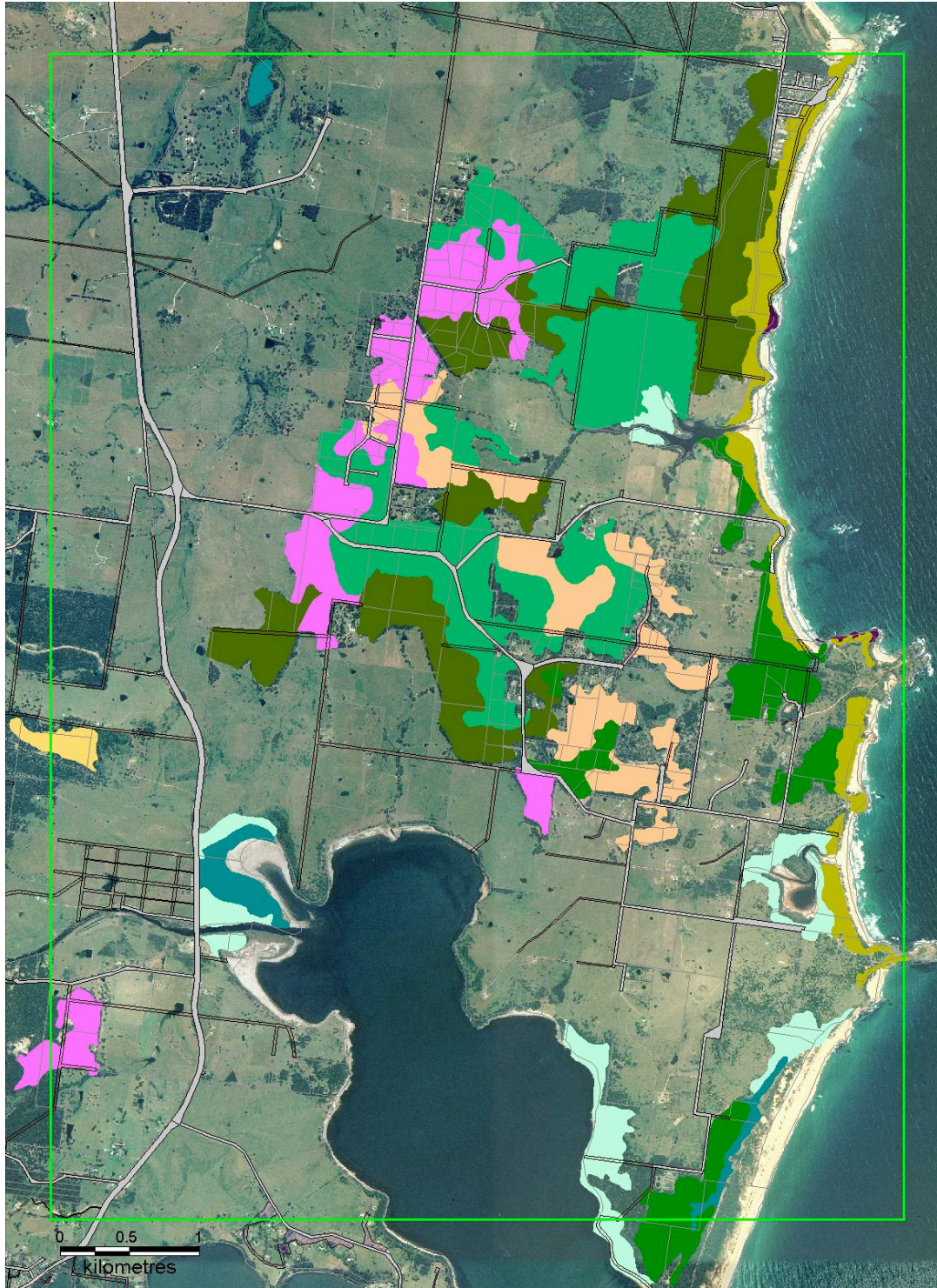


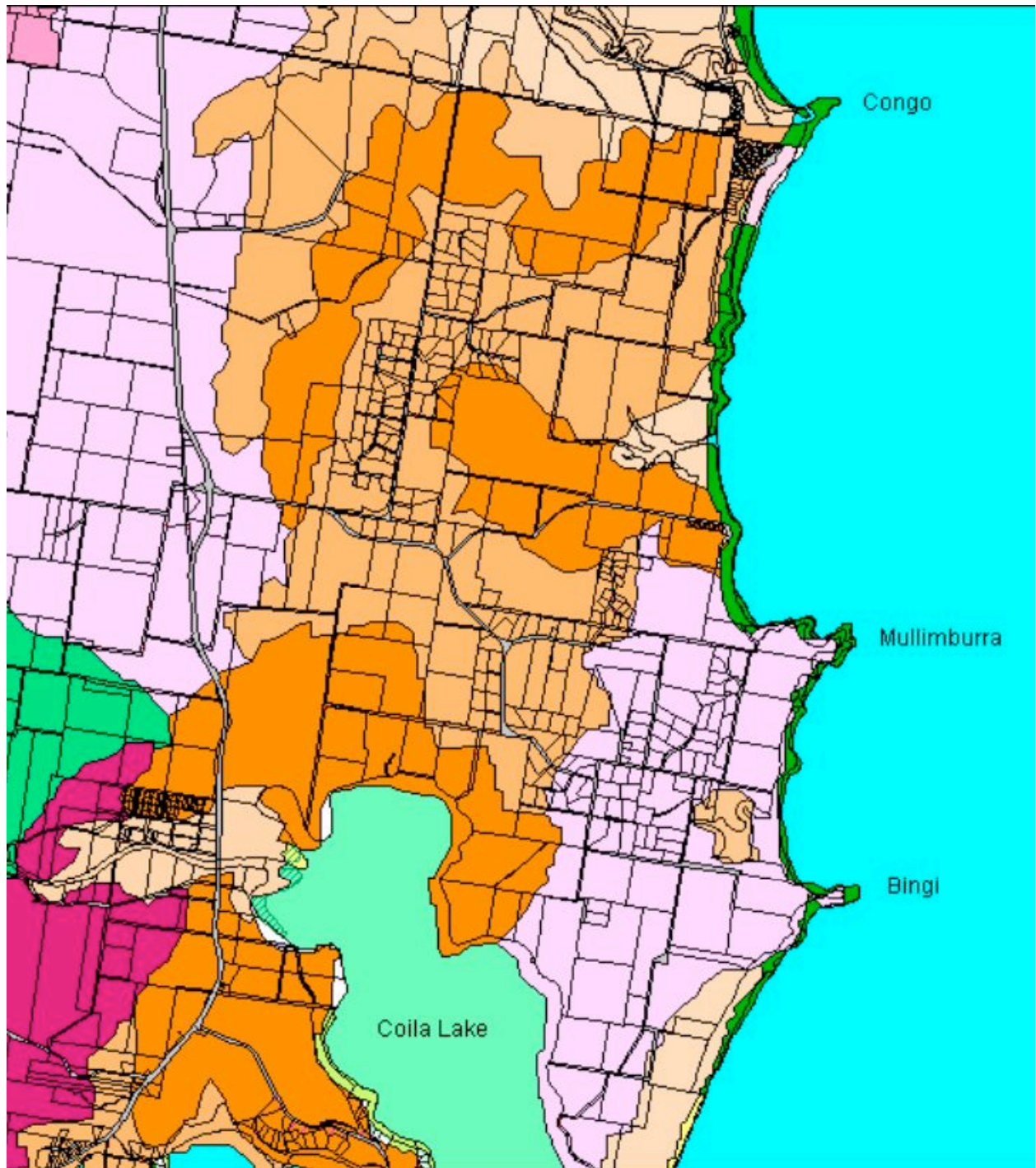
Figure 1. Bingi study area. Map courtesy Eurobodalla Shire Council.



Vegetation Ecosystems

- Coastal Forest Red Gum Shrub/Grass Forest
- Coastal Headland Shrublands
- Coastal Lowlands Spotted Gum-Burrawang Cycad Dry Shrub Dry Forest
- Coastal Swamp Oak- Swamp Melaleuca Wet Heath Swamp Forest
- Ecotonal Coastal Hind Dune Swamp Oak-Bangalay Shrub Forest
- Lowland Red Bloodwood-Turpentine Dry Shrub Forest
- South Coast Swamp Oak Forest Complex
- Southern Coastal Hind Dune/Headland Scrub & Beach Strand Grassland
- Southern Coastal Hinterland Backhousia Dry Gully Rain Forest
- Southern Coastal Lowlands White Stringybark-Woollybutt Shrub-Grass Dry Forest

Figure 2. CRA vegetation communities within the Bingi study area. Map courtesy Eurobodalla Shire Council.



Key: brown = brown soils on basalt
light brown = brown soils on claystone/siltstone
light purple = massive earths/duplex soils on granite
light pastel = sandy soils of marine origin, green = gravely soils on metamorphic rock

Figure 3. Soil types in the Bingi - Congo area. Map courtesy ESC.

2.0 REVIEW OF PREVIOUS DATA

2.1 Fauna

There have been several assessments of the fauna in the Bingi area. These include spotlight surveys conducted by Gaia Research (2001) as part of an assessment of habitat linkages in select areas within the Eurobodalla Shire. Surveys of amphibians were conducted within the catchment of Coila Lake (Gaia Research 2002) and targeted searches for the Green and Golden Bell Frog *Litoria aurea* (Daly and Senior 2001) have been conducted in the Bingi area (See Appendices D). A fauna and flora assessment for the subdivision of Lot 20 DP 253507 Bingi Road – Spring Place had been conducted (Spurway 2002).

2.1.1 Foot-based spotlighting

Spotlighting was conducted for arboreal mammals for 40 min for transects 1-4 and 20 minutes for transects 5 and 6. The length of transects were approximately 0.8 km and 0.4 km for the 40 and 20 minute surveys respectively. Binoculars were used to aid in the identification of possums. Other species detected during spotlighting such as frogs and owls were also recorded.

Table 1 provides data on summarises survey effort and location of spotlight transects.

Table 1. Location and description of spotlighting survey sites

Site	Map	Easting	Northing	Alt. m AHD	Search effort min.	Description of site
1	Moruya	239800	6013600	50	40	Forest Red Gum/Spotted Gum/Woollybutt
2	Moruya	239500	6012850	50	40	Spotted Gum/Stringybark/Grey Ironbark
3	Moruya	240800	6013000	50	40	Blackbutt/Stringybark/Rough-barked Apple
4	Moruya	240600	6015500	30	40	Blackbutt/Stringybark
5	Moruya	241300	6012700	50	20	Blackbutt/Stringybark/Grey Ironbark
6	Moruya	241000	6013600	40	20	Blackbutt/Stringybark/Grey Ironbark

T-1 to 6 refers to spotlighting transects, see Tables 1 and 2 for details

Figure 4. Previous surveys of arboreal mammals conducted in the Bingi area (Gaia Research 2001)

Table 2. Animals detected during spotlight surveys

o = observed, h = heard call.

Species	Spotlight transects						Total
	1	2	3	4	5	6	
Greater Glider		1o		3o	1o	1o	6
Sugar Glider			3h		2o		5
Common Brushtail Possum	3o						3
Eastern Grey Kangaroo	1o						1
Swamp Wallaby		1o					1
Powerful Owl	1h	1h					2
Jervis Bay Tree Frog			2h	1h		3h	6
Verreaux's Tree Frog	1h	1h		3h	1h		6
Common Eastern Froglet		1h	1h	5h	2h		9
Bibron's Toadlet					2h		2

2.1.2 Amphibian surveys

Fifteen sites were surveyed for frogs within the catchment of Coila Lake from the 16 to 17 January 2002. This included daytime searches for basking Green and Golden Bell Frogs *Litoria aurea* and nocturnal searches for frogs using 50 watt/12 volt spotlights. During searches pre-recorded calls of *L. aurea* were broadcast via a walkman. The survey was conducted during weather conditions that were conducive for frogs to be active, i.e. on still, warm (21^o C) nights after rain. Bingi had received between 45 and 70 millimetres of rain the two days prior to the survey.

The survey effort totalled approximately 16 hours. A total of 81 frogs from nine species were detected. The species detected were the Common Eastern Froglet *Crinia signifera*, Striped Marsh Frog *Limnodynastes peroni*, Spotted Grass Frog *Limnodynastes tasmaniensis*, Tyler's Toadlet *Uperoleia tyleri*, Lesueur's Tree Frog *Litoria lesueuri*, Peron's Tree Frog *Litoria peroni* and the Leaf Green Tree Frog *Litoria nudidigitus* (Table 3). The Leaf Green Tree Frog and Lesueur's Tree Frog were only found beside streams in the upper catchment. The exotic Plague Minnow *Gambusia holbrooki* was observed in several semi-saline pools and drainage lines close to Coila Lake.

Targeted searches had also been conducted in the Bingi area during February 2001 (Gaia Research 2001). All data from amphibian surveys is tabulated in Appendix E.

Table 3. Numbers of amphibians detected at survey sites

Litoria dentata = Ld, *Litoria verreauxii* = Le, *Litoria lesueuri* = Ll, *Litoria nudidigitus* = Ln, *Litoria peroni* = Lp, *Crinia signifera* = Cs, *Limnodynastes peronii* = Lm, *Limnodynastes tasmaniensis* = Lt, *Uperoleia tyleri* = Ut,

Site	Site Name	Easting	Northing	Ld	Le	Ll	Ln	Lp	Cs	Lm	Lt	Ut	Total species
1	E. and W. Simes	239600	6010100						2				1
2	E. and W. Simes	239400	6010200		4			1	2				3
3	Princes Hgy/Coila Ck Rd	239000	6010600						3				1
4	Coila Creek Road	238000	6010600	5	1			2	4				4
5	Princes Highway	239000	6011650						4	3			2
6	Bingi Fire Station	241300	6012100	1	5				2		1		4
7	Cudbugga Creek	240450	6011700		2				2	1			3
8	Bingi STP	242300	6009100							1			1
9	Tuross Head Golf Course	241900	6006400					2	2				2
10	Council land	241400	6006700	5				2	3	2			4
11	Coila Creek 1	235400	6009900										0
12	Coila Creek 2	234300	6010600	3	1	1	1	2	1				6
13	Dam Old Mill Rd	238300	6009050		1			1	3	2		3	5
14	Farm Dam	240700	6012300										0
15	Bingi Beach swamp	242700	6008900										0
	Total Number of frogs			14	14	1	1	10	28	9	1	3	

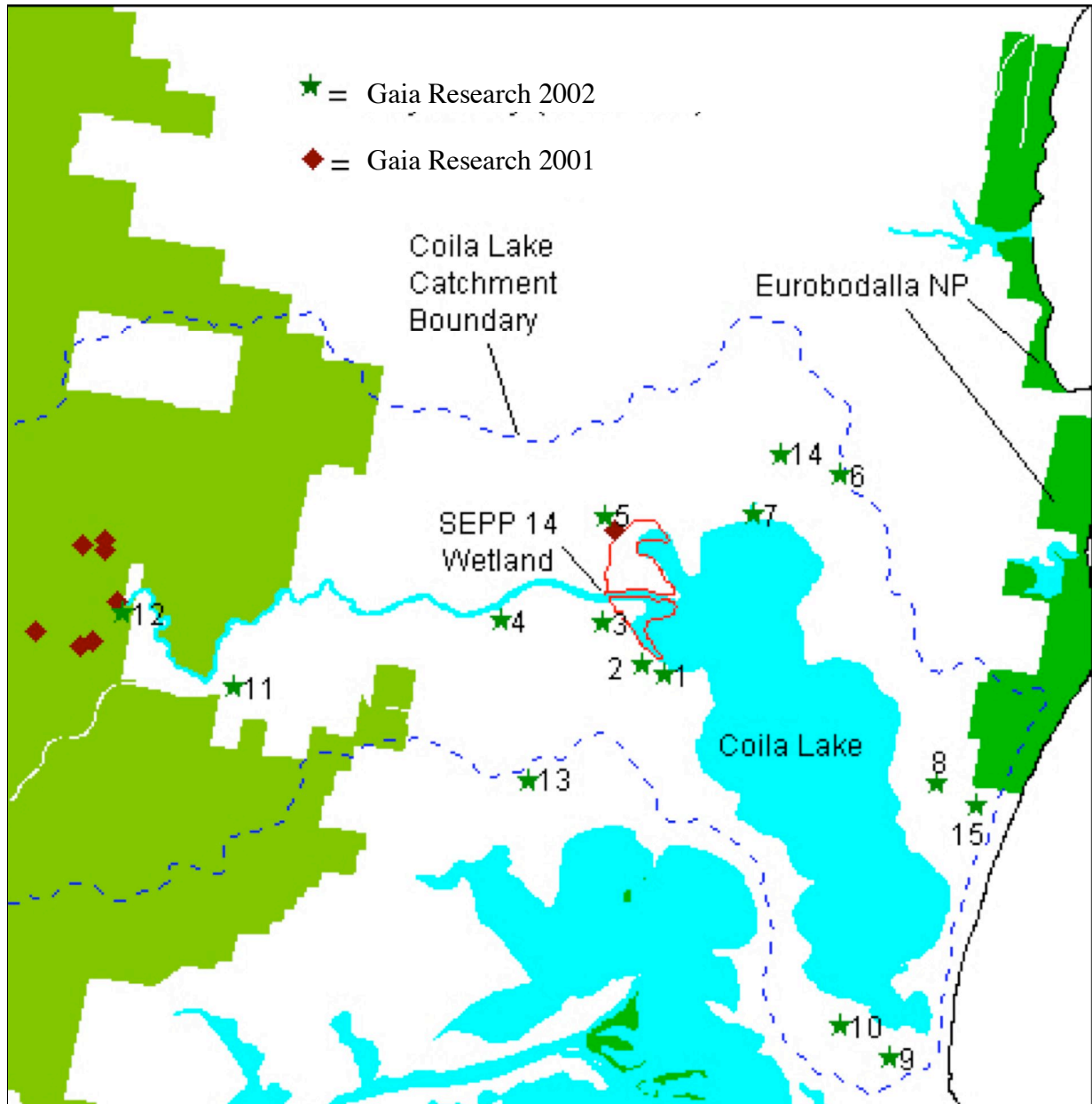


Figure 5. Previous surveys of amphibians conducted in the Bingi area. Figure courtesy P. Spurway and Associates.

2.1.3 Targeted surveys

Searches were made for Yellow-bellied Glider incised trees by way of drive transects. The Yellow-bellied Glider feeds on the sap of specific trees. To obtain the sap they incise the trunks of certain trees. These incisions are typically v shaped and their presence indicates that the Yellow-bellied Glider resides in the area. In the Eurobodalla Shire the Yellow-bellied Glider primarily feeds on Spotted Gum and Red Bloodwood. No trees incised by Yellow-bellied Gliders have been located in the Bingi area.

Targeted surveys were conducted for the Glossy Black Cockatoo by searching under Black She-oaks for cracked cones (signs). The diet of the Glossy Black Cockatoo's diet is highly specialised, consisting almost exclusively of seeds from certain *Allocasuarina* species. On the south coast of NSW the principle feed-tree species is Black She-oak *A. littoralis*, which occurs throughout the Bingi area. Signs of Glossy Black Cockatoo and sightings of animals have previously been recorded.

2.1.4 Habitat linkages

The National Parks and Wildlife Service (NPWS) were commissioned by ESC to investigate key habitats and habitat linkages as part of the Eurobodalla Coastal Environment Capacity Planning Project (NPWS 2001). Data used in the analysis was predictive, based on vegetation and fauna assemblages. The report concluded that significant habitat for fauna exists in the Congo – Bingi area but the linkages are discontinuous.

2.1.5 Summary of fauna data

The Bingi area supports a wide range of fauna. Threatened species known to occur in the area include the Greater Broad-nosed Bat *Scoteanax ruppellii*, Grey-headed Flying Fox, Glossy Black Cockatoo *Calyptorhynchus lathami*, Powerful Owl *Ninox strenua* and Masked Owl *Tyto novaehollandiae*. Records indicate that the Green and Golden Bell Frog *Litoria aurea* existed in the area prior to declines in the late 1970's early 1980's (NPWS wildlife Atlas – see Daly and Senior 2001).

Table 4. Terrestrial threatened species recorded from the Bingi area

List from on NPWS/ESC and author's databases

Common Name	Scientific Name	Locality
Glossy Black Cockatoo	<i>Calyptorhynchus lathami</i>	Bingi
Powerful Owl	<i>Ninox strenua</i>	Bingi and west of highway
Masked Owl	<i>Tyto novaehollandiae</i>	West of Bergalia & North of Moruya River
Greater Broad-nosed Bat	<i>Scoteanax ruppellii</i>	Anabat record from National Park at Meringo & at Bingi

2.2 Flora

2.2.1 Assessment of vegetation communities

Surveys of flora were conducted in Eurobodalla National Park (NP) by Lockwood *et al.* (1997) by sampling 20 x 20 metre quadrat surveys. Within the area between Congo Creek and Coila Lake a total of 15 plots were sampled twice (Figure 6). The detail species lists for these sites are presented in Appendix (E). The surveys also conducted two transects in each vegetation community to augment species not located within quadrats. The vegetation communities mapped by Thomas (1997) was used as base maps. Thirteen native vegetation communities were described for the Congo – Bingi area (Table 5) in addition Bitou shrubland was described as occurring near Congo Creek.

Table 5. Plot surveys of native vegetation within the Congo-Bingi area (from Lockwood *et al.* 1997)

Plot Numbers	Community name	Closest CRA equivalent	Significant species
6, 47	Coastal low woodland	Southern Coastal Lowlands White Stringybark- Woollybutt Shrub-Grass Dry Forest	Oxylobium scandens – southern limit Polymeria calycina – southern limit
8, 53	Melaleuca closed forest	Coastal wet heath swamp forest	
1, 4	Banksia woodland	Southern Coastal Hind Dune/headland scrub	Polymeria calycina
37, 38, 39, 40	Low open woodland/grassland	Southern coastal hind-dune forest?	
5, 40	Coastal woodland complex	Ecotonal Coastal Swamp Oak-Bangalay Swamp Forest	Commelina cyanea – southern limit Narooma
7	Dune complex	Southern Coastal Dune Scrub complex	None
3, 33	Casuarina	Coastal wet heath swamp forest	Solanum stelligerum
None	Casuarina mangrove woodland	No equivalent	
2	Spotted Gum forest	Coastal Lowlands Spotted Gum-Burrawang Cycad Dry Shrub Dry Forest	Polymeria calycina Commelina cyanea
34, 35, 36, 46	Coastal forest	Coastal Shrub/Grass Dry Forest (11)	
55	Coastal forest with Bitou	As above	
9, 51, 52	Blackbutt forest	Coastal sands shrub/fern forest	Polymeria calycina

Figure 6. Location of vegetation plots surveyed in Eurobodalla NP (from Lockwood *et al.* 1997)

Eco GIS (2001) assessed the vegetation associations within the Eurobodalla Shire based on data collected during the Comprehensive Regional Assessments (CRA) of forests in New South Wales (Thomas *et al.* 2000). Eco GIS found that Eurobodalla Shire has an area of 343,000 hectares, of which 252,000 ha is National Park or State Forest (73%). Within the Shire some 37,000 ha of land (11%) has been cleared of vegetation. This equates to 41% of all private land (90,500 ha) being cleared (Eco GIS, 2001). While these figures indicate a large established reserve network in the Shire, they also show that vegetation on private land on the coastal strip is under significant pressure from historic land clearing and more recent development pressure (Eco GIS 2001).

Analysis of the Bingi area indicates that currently approximately 494 hectares of native vegetation exists in the subregion zoned for rural 1C development, which is about 43% of the total area (1140 ha). A breakdown of the various vegetation communities within the Bingi area based on the southern CRA data (aerial photograph interpretation) is given in Table 5.

A more contemporary assessment of the vegetation of the Sydney Basin (MP5) covered a portion of the Bingi area (within the Batemans Bay 1:100,000 map sheet). However, the typing of the forests was not considered as accurate as the CRA mapping. Hence the P5MA data was rejected and the CRA utilised for the capacity planning exercise.

Much of the mapping of native vegetation is done by interpretation of API coupled with standard quadrat (20 x 20 metre) sampling. The CRA nomenclature of vegetation communities was also based on species that occurred in the shrub and ground layers. As a result a particular patch of bush may be assigned to a community, yet one of the canopy species may not occur (or is replaced) within that patch.

In the Bingi area community number 2, Lowland Red Bloodwood-Turpentine Dry Shrub Forest is mapped as occurring (Eco GIS 2001). However, Turpentine *Syncarpia glomulifera* does not occur further south of Murramarang NP (Williams, Harden and McDonald (1984). The authors doubt that ecosystem number 170 Southern Coastal Hinterland Backhousia Dry Gully Rainforest, exists in the Bingi area. Ground truthing was done to verify that all stated vegetation communities exist in the Bingi area.

Table 6. Native vegetation communities within the Bingi study and areas within the Eurobodalla shire (from Eco GIS 2001)

S=highly dysfunctional ecosystems; R = moderately dysfunctional; M = somewhat functional; I = functional.

Code	Name of Forest Ecosystem	Ecosystem Function Index	Pre-1750 Area (ha)	Extant Area (ha)	% Cleared
2	Lowland Red Bloodwood-Turpentine Dry Shrub Forest	I	9626	8788	9%
9	Coastal Lowlands Spotted Gum-Burrawang Cycad Dry Shrub Dry Forest	I	48189	38819	19%
10	Southern Coastal Lowlands White Stringybark-Woollybutt Shrub-Grass Dry Forest	I	16550	15838	4%
22/23	Southern Coastal Hind Dune/Headland Scrub & Beach Strand Grassland	R	1083	966	11%
24	Coastal Swamp Oak- Swamp Melaleuca Wet Heath Swamp Forest	R	1907	1278	33%
25	South Coast Swamp Oak Forest Complex	R	4711	932	80%
27	Ecotonal Coastal Hind Dune Swamp Oak-Bangalay Shrub Forest	S	1513	544	64%
28	Coastal Sands Bangalay-Old Man Banksia Grassy Bracken Shrub Forest	M	1793	1315	27%
54	Coastal Forest Red Gum Shrub/Grass Forest	S	12451	1464	88%
170	Southern Coastal Hinterland Backhousia Dry Gully Rainforest	I	5156	5156	0%
187	Coastal Headland Shrublands	R	261	248	5%

2.2.2 Threatened ecological communities

Eco GIS (2001) states that the Bingi area has some 140 hectares of forest ecosystems that are considered vulnerable. They are:

- 24 Coastal Swamp Oak- Swamp Melaleuca Wet Heath Swamp Forest
- 25 South Coast Swamp Oak Forest Complex
- 27 Ecotonal Coastal Swamp Oak-Bangalay Swamp Forest
- 28 Coastal Sands Bangalay-Old Man Banksia Shrub-Fern Forest
- 54 Coastal Forest Red Gum Shrub/Grass Forest

Eco GIS (2001) assessment of vulnerable ecosystems was fairly consistent with the following endangered ecological communities listed under the TSC Act (1995):

- Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions. In the Comprehensive Regional Assessment of southern New South Wales (Thomas *et al.* 2000), this community includes 'Coastal Wet Heath

Swamp Forest' (forest ecosystem 24), 'South Coast Swamp Forest' complex (forest ecosystem 25) and those parts of 'Ecotonal Coastal Swamp Forest' (forest ecosystem 27) dominated by *Casuarina glauca*.

- River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions. This community includes those parts of 'Ecotonal Coastal Swamp Forest' (forest ecosystem 27) of Thomas *et al.* (2000) dominated by eucalypts, those parts of 'Coastal Lowlands Riparian Herb/Grass Forest' (forest ecosystem 48) and 'Southern Hinterland Shrub/Herb/Grass Riparian Forest' (forest ecosystem 49) of Thomas *et al.* (2000) mapped on alluvial soils. It is an anomaly that the Scientific Community states that the composition of the tree stratum varies considerably the most widespread and abundant dominant trees include *Eucalyptus tereticornis* and yet make no mention of forest ecosystem 54.
- Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions. Thomas *et al.* (2000), describes this community as 'Coastal alluvial valley floor wetlands' (map unit 189).

The various communities have been given different names by authorities. It is imperative that a table is constructed that co-ordinates the communities named under the southern CRA / MP5 and the TSC Act (1995) to achieve consistency of nomenclature.

2.2.3 Summary of landuse within the Bingi area

A summary of landuse for the Congo-Bingi area is given in Table 7 and Figure 7. The Congo –Bingi block covers some 6280 hectares of which approximately 3159 hectares supports native vegetation. Within the Bingi study area there is approximately 1189 hectares of native vegetation of which 1121 is forest. However, some of this area has been underscrubbed and or selectively cleared.

Table 7. Landuse patterns in the Congo/Bingi area

Landuse	Area (ha)
Cleared land	3121
Freehold (vegetated)	2319
National Park (separate portions)	840
Voluntary Conservation Agreement	30
Ten year management agreement	12

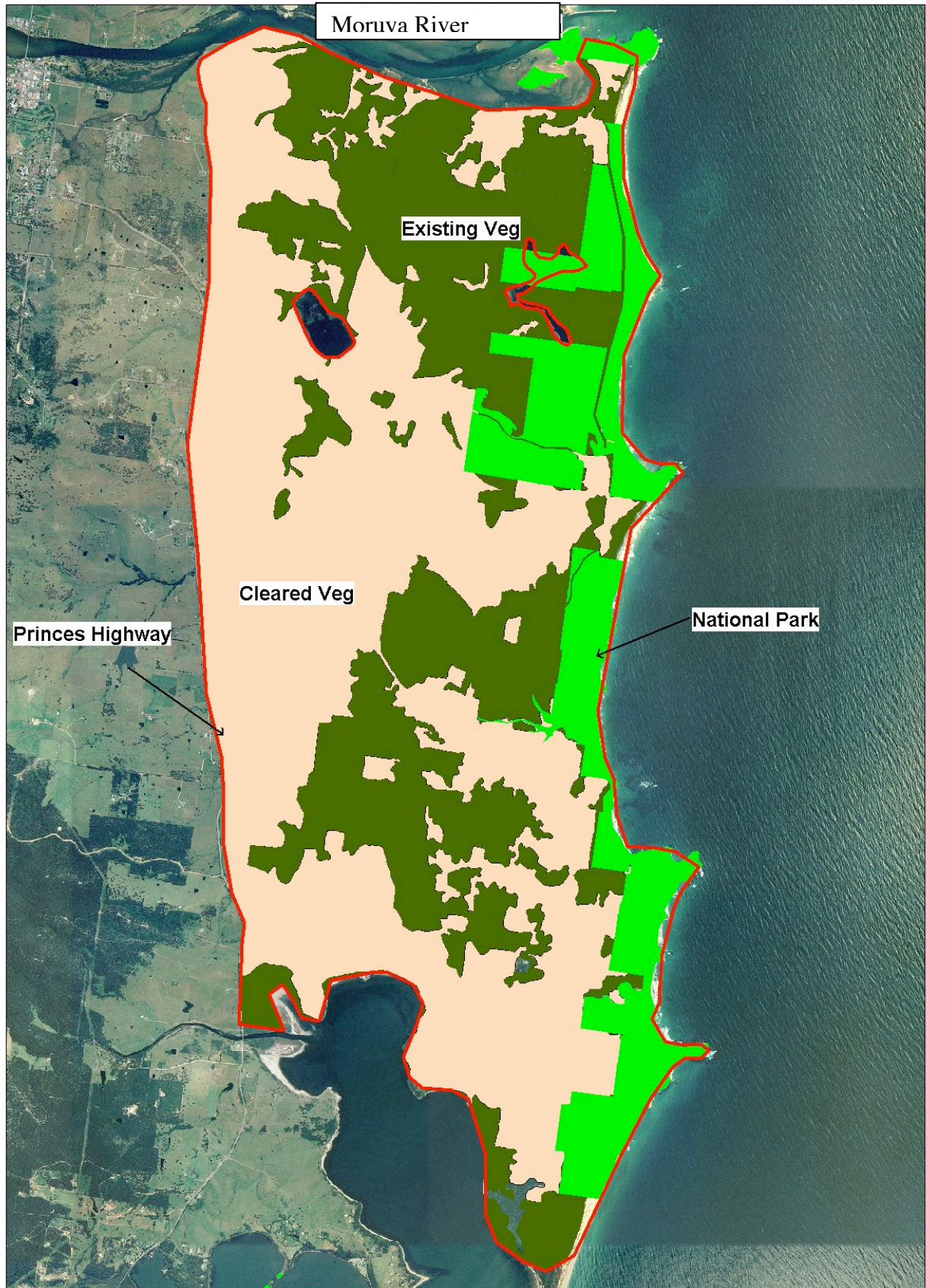


Figure 7. Broad landuse patterns in the Congo - Bingi area. Figure courtesy ESC.

2.3 Estuaries and coastal wetlands

The Bingi study area is fortunate to contain a number of estuaries along its coastline. These are barrier estuaries formed by a sand barrier. All are termed Intermittently Opening and Closing Lakes and Lagoons (ICOLLS). ICOLLS have intermittently open entrances to the ocean, with breaching experienced after rainfall. The frequency of entrance opening is dependant on the surface area of the lagoon and the catchment area. The degree of exposure to ocean wave energy is also a factor, with exposed locations generally having a higher foredune barrier and therefore requiring a higher lagoon water level to breach. The ICOLLS in the Bingi study area are detailed in Table 8.

Table 8. Estuaries in the Bingi area

Estuary	Water Surface Area (ha)	Catchment Area (ha)
Coila Lake	700	6012
Kellys Lake	6.4	220
Grey Rocks Lagoon	0.2	43
Mullimburra ('Stinky') Creek	0.7	300
Meringo Lagoon	7.1	528

ICOLLS are vulnerable to catchment inputs such as suspended solids and nutrients. All pollutants can settle in the lake or lagoon system while closed to the ocean. Nutrients in particular can provide food for algae and resultant algal blooms in warmer months can result. Additional sources of nutrients can be seaweed wrack, which is known to wash over the entrance bar and deposit into the mouth of Mullimburra Creek.

Some of these pollutants can be flushed out of the ICOLL when open to the ocean. The extent of flushing is more efficient for linear lagoons such as Grey Rocks and Mullimburra Creek. In larger lagoons such as Kellys Lake and Coila Lake nutrients can collect in sediments in the main lake basin. These can be released in summer months if the oxygen level near the bed drops due to stratification. This can be the cause of fish stress and algal blooms that have been experienced in other estuaries within the local government area such as Wallaga Lake and Corunna Lake.

The degree of robustness of an ICOLL is a complex combination of catchment inputs, estuary volume, flushing capability, the degree of exposure and the frequency of opening. Landuse changes such as land clearing can mobilise sediment and nutrients in the catchment.

Management of the riparian zone by revegetation and erosion control can reverse these tendencies and provide filtering of these pollutants before they reach a waterway.

Based on the above considerations, DIPNR have produced a ranking of vulnerability for the estuaries of the Eurobodalla Shire (DLWC, 2000; Table 9). Within the Bingi study area this ranking included Meringo Lagoon and Coila Lake. The remainder of estuaries in the Bingi study area were added to the following vulnerability priority table, based on local knowledge (P. Spurway pers. comm.).

Table 9. Vulnerability ranking of estuaries within the Bingi area

Vulnerability	ICOLL
High	Meringo Lagoon
Moderately High	Kellys Lake
Medium	Grey Rocks Creek
Medium	Mullimburra Creek
Moderately Low	Coila Lake

3.0 METHODS

The following methods were adopted to capture the maximum amount of information on the regions fauna and flora via standard systematic surveys. The prime objective for fauna was to detect forest dependant species within and adjacent to the Bingi area to provide evidence for linking patches of forest via habitat corridors. The second objective was to survey the flora to ascertain if the southern CRA vegetation mapping was accurate and provide an inventory of species that could be used for revegetating select areas.

3.1 Fauna surveys

The methods are based on those determined by the New South Wales National Parks and Wildlife Service (NPWS) Southern Comprehensive Regional Assessment (CRA) unit. The objective was to survey vertebrates in a systematic manner utilising methods compatible with those utilised by previous studies. The methods include standard site-based and targeted surveys and incidental records.

The standard site-based and targeted survey methods are summarised in Table 10. Site locations are determined by GPS when vertical error is 10 metres or less. Site attributes should be taken as per standard CRA sheet.

Table 10. Systematic survey methods for fauna

Method	Standard effort
Diurnal bird census	2 ha (100 x 200 m) searched for 20 minutes.
Nocturnal call playback	Listen for 10 min, play tape and then listen for 10 minutes at site prior to spotlighting
Foot based spotlighting	40 minute spotlight survey along the transect & road verge within 100 m of the site.

3.1.1 Diurnal bird census

Diurnal birds will be surveyed for a period of 20 minutes within a 2 hectare area. Birds detected outside the 2 hectare plot were also recorded. Bird surveys were conducted in various vegetation communities so that relationships could be inferred from canopy and shrub layers and species occurrence. The location of bird surveys and corresponding vegetation community is given in Table 11.

Table 11. Location of systematic bird surveys and vegetation community

Site	Community	Easting	Northing
Bingi-05-1	Coastal Lowlands Spotted Gum Forest	241261	6025602
Bingi-05-2	Allocasuarina - Acacia Shrubland	241760	6015636
Bingi-05-3	Southern Coastal Blackbutt Ironbark forest	240633	6013160
Bingi-05-4	South Coast Swamp Oak Forest Complex	239050	6010950
Bingi-05-5	South Coast Swamp Oak Forest Complex/Forest Red Gum	239783	6011233
Bingi-05-6	Coastal Forest Red Gum Shrub/Grass Forest	242800	6012600
Bingi-05-7	Southern Coastal Blackbutt Ironbark forest	240944	6012356

3.1.2 Nocturnal call playback

In order call playback will be given for the Barking Owl *N. connivens* at one site where the species had previously been heard calling (K. Peck pers. comm.).

No spotlights are operated during the playback but the immediate area is spotlit after the cessation of the tape and again after the final listening period. A ten-minute listening interval will be taken prior to and immediately after the playing of the tape.

3.1.3 Foot based spotlighting

Spotlighting was conducted for arboreal mammals for 40 minutes beside the northern edge of Pedro Swamp and then along the track to the north of the wetland (see Figure 7).

3.1.4 Incidental observations

Additional observations of animals made outside periods of systematic and/or targeted surveys will be recorded as incidental observations. These records will be tabulated in excel format in a form compatible the with NPWS wildlife atlas.

3.2 Flora surveys

Plant identifications were made according to nomenclature used in Harden (1990, 1991, 1992 and 1993). The vegetation surveys consisted of several components, one provided an inventory of species for the entire area, the second provided species lists as a diagnostic guide to the various vegetation communities and the third was to determine the distribution of various communities. The species inventory for each general area was gained by search methods outlined by York, Binns and Shields (1991).

4.0 RESULTS

4.1 Fauna surveys

4.1.1 Diurnal bird census

Thirty five species of bird were detected during the diurnal surveys (Table 12). No exotic species were records.

Table 12. Birds detected during the systematic survey

Numbers on column indicate survey site (see Figure 7). See Appendix E for details.

On site o = observed, h = heard call, Off site H = heard and O - observed

Species	1	2	3	4	5	6	7
Spur-wing Plover				h2			
Rainbow Lorikeet	o8	o12					
Crimson Rosella	o6	H1	h1				h2
Eastern Rosella					o2		
Fan-tailed Cuckoo						h1	
Laughing Kookaburra					h1		
Noisy Friarbird		o3	H1				
Red Wattlebird	o3	o3			H1	H2	h1
Little Wattlebird							
Eastern Spinebill	h1	o2					h1
Lewin's Honeyeater			h1				
Yellow-faced Honeyeater	H1	o1			h1	h1	
Yellow Thornbill		o2					
Striated Thornbill			h2			h1	o1
Brown Thornbill		o2				o5	
Brown Gerygone			h1		h1		
White-browed Scrubwren							o1
White-throated Treecreeper		H1	H1				h1
Crested Shrike-tit							H1
Grey Fantail		h1				o2	o1
Jacky Winter					o1		
Scarlet Robin							h1
Eastern Yellow Robin							o1
Golden Whistler			h1	h1		h1	h1
Grey-shrike Thrush				h1			
Superb Fairy-wren		h1	o3		h2		o6
Spotted Pardalote		H1					h1
Eastern Whipbird	H1				H1		h1
Black-faced Cuckoo-shrike					o1		
Silveryeye		o1			o10	h2	
Mistletoebird		h1					
Australian Raven		o1					H1
Australian Magpie		h1			h2		
Laughing Kookaburra		h1					
Grey Butcherbird					H1		
Species Total	6	17	8	3	12	8	15

4.1.2 Nocturnal call playback

No animals responded to the broadcast of the Barking Owl call.

4.1.3 Foot based spotlighting

The Common Ringtail Possum (N = 4), Feathertail Glider (N = 2) and Greater Glider (N = 1) were observed during a 40 minutes spotlight survey near Pedro Swamp.

4.1.4 Incidental observations

Targeted spotlight survey near a flowering Spotted Gum near Congo (AMG 241660 6015636) revealed the presence of one Sugar Glider and one Feathertail Glider.

Frogs heard calling from Pedro Swamp during the spotlight survey included Verreaux's Tree Frog (N = 2), Jervis Bay Tree Frog *Litoria jervisiensis* (N = 2), Common Eastern Toadlet (N = 40), Haswell's Frog (N = 10) and Striped Marsh Frog (N = 10).

A number of species of bird were detected at sites after the nominated 20 minute survey period and while travelling to and from sites. These were recoded in Appendix E.

4.2 Flora surveys

Summary of communities

A total of twelve (excluding those formed from human disturbance) vegetation communities were located during the survey. Those communities that fell within the descriptions given by Thomas *et al* (2000) include:

Coastal Lowlands Spotted Gum-Burrawang Cycad Dry Shrub Dry Forest (9),

Southern Coastal Hind Dune/Headland Scrub (22)

Southern Coastal Dune Scrub complex (23)

South Coast Swamp Oak Forest Complex (25)

Ecotonal Coastal Swamp Forest - *Casuarina glauca* / *E. botryoides* (27)

Coastal Sands Bangalay-Old Man Banksia Grassy Bracken Shrub Forest (28),

Coastal Forest Red Gum Shrub/Grass Forest (54),

Saltmarsh (186) and

Freshwater Wetlands on Coastal Floodplains (189).

In addition several vegetation communities were found that were not comparable to any of the forest ecosystems described by Thompson *et al.* (2000) or NPWS (2002). This included Southern Coastal Blackbutt Ironbark forest, Southern Coastal Bangalay – Myrtle forest, Southern Coastal Red Bloodwood Forest, Southern Coastal Allocasuarina-Black Wattle

forest and Southern Coastal wattle *Acacia sophorae* shrubland. The latter two communities were artefacts from previous clearing. The former forest type was widespread in the Bingi area and had several associations with secondary canopy species. The Southern Coastal Bangalay – Myrtle forest was unusual and a result of deep moist soils occurring near a coastal area. All communities are described below and the floristic summary is given as an aid for species to select for revegetating specific communities. The extent of the communities is given in Figure 8 and the size of each community within the Bingi area is given in Table 13.

Table 13. Size of vegetation communities within the Bingi study area

Community	Size (hectares)
Southern Coastal Bangalay – Myrtle Forest	6
Southern Coastal <i>Acacia sophorae</i> shrubland	23
Southern Coastal Red Bloodwood Forest	12
Southern Coastal Allocasuarina-Black Wattle	28
Coastal Sands Bangalay-Old Man Banksia Forest	154
Southern Coastal Blackbutt Ironbark forest	532
Coastal Banksia	31
Coastal Forest Red Gum Shrub/Grass Forest	122
Saltmarsh	17
Coastal Lowlands Spotted Gum-Burrawang Dry Forest	113
South Coast Swamp Oak Forest Complex	151
Total	1189

Distribution of communities with respect to biophysical factors

There was a general trend with respect to the location of various vegetation communities based on altitude and moisture content of the soil. Beside the mud/sand flats of Coila Lake there was saltmarsh. At slightly higher altitude South Coast Swamp Oak Forest was present, followed by Bangalay forest or on coastal sands Bangalay-Old Man Banksia forest. In near coastal areas, which had previously been cleared Coastal wattle *Acacia sophorae* formed thick shrub.

At slightly higher altitude Forest Red Gum Forest was common, this graded into Spotted Gum or Blackbutt forest. On the highest ridge Red Bloodwood *Corymbia gummifera* forest was present.

4.2.1 Coastal Lowlands Spotted Gum-Burrawang Cycad Dry Shrub Dry Forest

This community is present on the midslope areas particularly on the edge of Eurobodalla NP on the Bingi/Congo Road. The forest is open with a grassy understorey. Burrawangs are uncommon or absent from many areas. The canopy also includes *E. paniculata*, *E. globoidea* and *E. pilularis*. Grey Ironbark *E. paniculata* is very common and in some areas a dominant species in the upper canopy. The most common shrubs are *Lissanthe strigosa*, *Hibbertia aspera* and *Acacia* species. The understorey is dominated by sedges *Lepidosperma* species and grasses *Themeda australis*.

Diagnostic species located at site Bingi-05-1

Family	Species	Common Name
FILICOPSIDA		
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken
CYCADOPSIDA		
Zamiaceae	<i>Macrozamia communis</i>	Burrawang
MAGNOLIOPSIDA - DICOTYLEDONS		
Apocynaceae	<i>Parsonsia straminea</i>	Monkey Rope
Asteraceae	<i>Cassinia aculeata</i>	Dogwood
Casuarinaceae	<i>Allocasuarina littoralis</i>	Black She-Oak
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
Dilleniaceae	<i>Hibbertia aspera.</i>	Rough Guinea Flower
Epacridaceae	<i>Lissanthe strigosa</i>	Native Cranberry
Fabaceae: Mimosoideae	<i>Acacia longifolia</i>	
	<i>Acacia obtusifolia</i>	
	<i>Acacia mearnsii</i>	Black Wattle
	<i>Acacia ulicifolia</i>	Prickly Moses
Fabaceae Papilionaceae	<i>Bossiaea obcordata</i>	Spiny Bossiaea
	<i>Glycine clandestina</i>	Love Creeper
	<i>Indigofera australis</i>	
	<i>Hardenbergia violacea</i>	False Sarsaparilla
	<i>Pultenaea linophylla</i>	
Haloragaceae	<i>Gonocarpus micranthus ssp. micranthus</i>	
Lobeliaceae	<i>Pratia purpurascens</i>	White Root
Myrtaceae	<i>Backhousia myrtifolia</i>	Grey Myrtle
	<i>Corymbia gummifera</i>	Red Bloodwood
	<i>Corymbia maculata</i>	Spotted Gum
	<i>Eucalyptus globoidea</i>	White Stringybark

Family	Species	Common Name
	<i>Eucalyptus longifolia</i>	Woollybutt
	<i>Eucalyptus paniculata</i>	Iron Bark
	<i>Eucalyptus pilularis</i>	Blackbutt
	<i>Eucalyptus sideroxylon</i>	Red Ironbark, Mugga
	<i>Kunzea ambigua</i>	Tick Bush
Oleaceae	<i>Notelaea longifolia</i>	Mock Olive
Pittosporaceae	<i>Bursaria spinosa</i>	Blackthorn
	<i>Pittosporum undulatum</i>	Sweet Pittosporum
Proteaceae	<i>Persoonia linearis</i>	Narrow leaved Geebung
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
MAGNOLIOPSIDA	MONOCOTYLEDONS	
Cyperaceae	<i>Carex sp.</i>	
	<i>Gahnia sp.</i>	
	<i>Lepidosperma concavum</i>	
	<i>Lepidosperma laterale</i>	
	<i>Lepidosperma urophorum</i>	Sedge
Liliaceae	<i>Dianella caerulea ssp.</i>	Blue flax Lily
Lomandraceae	<i>Lomandra confertifolia ssp.</i>	
	<i>Lomandra longifolia</i>	Mat Rush
	<i>Lomandra multiflora</i>	
Philesiaceae	<i>Eustrephus latifolius</i>	Wombat Berry
Poaceae	<i>Echinopogon caespitosus</i>	
	<i>Entolasia stricta</i>	
	<i>Imperata cylindrica</i>	Blady Grass
	<i>Microlaena stipoides</i>	
	<i>Panicum simile</i>	
	<i>Themeda australis</i>	Kangaroo Grass

4.2.2 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 parvifolius* 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*.

In the study site this community exists primarily on protected land (Eurobodalla National Park) and hence was not given detailed assessment. *Banksia integrifolia* is the key species for use in revegetation activities. Southern Coastal Hind Dune/Headland Scrub may be invaded by Bitou and as such was listed by Lockwood (1997) as Bitou shrubland.

4.2.3 Southern Coastal Dune Scrub complex/ Southern Coastal wattle forest

Southern Coastal Dune Scrub complex has a variable shrub and grass layer, made up of *Acacia sophorae*, *Spinifex sericeus*, and *Banksia integrifolia*. The patchy ground cover includes *Isolepis nodosa*, *Carex longibrachiata*, *Desmodium varians*, and *Carpobrotus glaucescens*. In the Bingi area on the Southern Coastal wattle forest occurred on granite derived soils on the ridge south of “Bingi Farm”. The community consisted almost entirely of *Acacia sophorae* and may have been a result of previous grazing activities. A solitary Port Jackson Fig was present on a rocky outcrop. This community may develop into Southern Coastal Dune Scrub in time.

This community primarily occurs within the existing reservation system and hence was not given detailed assessment.

4.2.4 Ecotonal Coastal Swamp Forest - *Casuarina glauca* / *E. botryoides*

Ecotonal Coastal Swamp Forest is an open forest 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 consists of: sedges *Lomandra longifolia*, *Carex sp.* and *Isolepis nodosa*, grasses *Entolasia stricta*, *Echinopogon ovatus*, and *Imperata cylindrica*, and *Commelina cyanea*, as well as herbs *Dichondra repens*, *Desmodium varians*, and *Glycine clandestina*.

Diagnostic species located near the Bingi STP (grid reference 242000 6009200)

Family	Species	Common Name
FILICOPSIDA		
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken
Sinopteridaceae	<i>Pellaea falcata</i>	Sickle Fern
Sinopteridaceae	<i>Cheilanthes sieberi</i>	
MAGNOLIOPSIDA - DICOTYLEDONS		
Aizoaceae	<i>Tetragonia tetragonioides</i>	Warrigal Cabbage

Family	Species	Common Name
Apocynaceae	<i>Parsonsia straminea</i>	Monkey Rope
Casuarinaceae	<i>Allocasuarina littoralis</i>	Black She-Oak
Casuarinaceae	<i>Casuarina glauca</i>	Swamp She-Oak
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
Dilleniaceae	<i>Hibbertia scandens</i>	Golden Guinea Flower
Epacridaceae	<i>Lissanthe strigosa</i>	Native Cranberry
Fabaceae: Mimosoideae	<i>Acacia mearnsii</i>	Black Wattle
	<i>Acacia longifolia</i> var. <i>sophorae</i>	Coastal wattle
Lamiaceae	<i>Plectranthus parviflorus</i>	Cockspur Flowers
Lobeliaceae	<i>Pratia purpurascens</i>	White Root
Moraceae	<i>Ficus rubiginosa</i>	Port Jackson Fig
Myrtaceae	<i>Eucalyptus botryoides</i>	Bangalay
Pittosporaceae	<i>Bursaria spinosa</i>	Blackthorn
	<i>Pittosporum revolutum</i>	Rough Fruit Pittosporum
Solanaceae	<i>Solanum stelligerum</i>	Devil's needles
Ulmaceae	<i>Trema aspera</i>	Native Peach
Vitaceae	<i>Cissus hypoglauca</i>	Native Grape
MAGNOLIOPSIDA	MONOCOTYLEDONS	
Commelinaceae	<i>Commelina cyanea</i>	
Cyperaceae	<i>Carex</i> sp	
	<i>Lepidosperma laterale</i>	
Liliaceae	<i>Stypandra glauca</i>	Nodding Blue Lily
Lomandraceae	<i>Lomandra longifolia</i>	Mat Rush
Poaceae	<i>Echinopogon caespitosus</i>	
	<i>Entolasia stricta</i>	
	<i>Imperata cylindrica</i>	Blady Grass
	<i>Microlaena stipoides</i>	Weeping Rice Grass
	<i>Oplismenus imbecillis</i>	Basket Grass

4.2.5 South Coast Swamp Oak Forest Complex

This community was highly associated with margins of ICOLLs including Coila Lake, Kellys Lake, Meringo Lake/Creek and Congo Creek. The community consisted of dense stands of Swamp Oak *Casuarina glauca*, which had a grassy understorey. On the northern edge of Coila Lake there were isolated occurrences of Port Jackson Fig *Ficus rubiginosa* growing on fallen trees and rock outcrops. Many of these plants were small suggesting that the species might become more abundant in this location. *Bursaria spinosa* and *Acacia* species are common species in the shrublayer beside the northern edge of Coila Lake. These species are

regenerating after previous disturbance. *Eucalyptus botryoides* is also present in the canopy and *Eucalyptus tereticornis* is present on the midslope inland from the waters edge.

Diagnostic species located at site Bingi-05-5 and near the Bingi STP

Family	Species	Common Name
FILICOPSIDA		
Dicksoniaceae	<i>Calochlaena dubia</i>	Soft Bracken
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken
Lindsaeaceae	<i>Lindsaea linearis</i>	Screw Fern
Sinopteridaceae	<i>Pellaea falcata</i>	Sickle Fern
MAGNOLIOPSIDA - DICOTYLEDONS		
Aizoaceae	<i>Tetragonia tetragonioides</i>	Warrigal Cabbage
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
Asteraceae	<i>Lagenifera stipitata</i>	
	<i>Senecio hispidulus</i>	Rough Groundsel
Bignoniaceae	<i>Pandorea pandorana ssp. pandorana</i>	Wonga-wonga Vine
Casuarinaceae	<i>Casuarina glauca</i>	Swamp She-Oak
Chenopodiaceae	<i>Einadia hastata</i>	
	<i>Rhagodia candolleana</i>	Saltbush
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
	<i>Polymeria calycina</i>	Swamp Bindweed
Cunoniaceae	<i>Aphanopetalum resinsum</i>	Gum Vine
Euphorbiaceae	<i>Breynia oblongifolia</i>	Coffee Bush
Fabaceae: Mimosoideae	<i>Acacia longifolia</i>	
	<i>Acacia longifolia var. sophorae</i>	Coastal Wattle
	<i>Acacia mearnsii</i>	Black Wattle
Fabaceae Papilionaceae	<i>Indigofera australis</i>	
Lamiaceae	<i>Plectranthus parviflorus</i>	Cockspur Flowers
Lobeliaceae	<i>Pratia purpurascens</i>	White Root
Menispermaceae	<i>Stephania japonica</i>	
Moraceae	<i>Ficus rubiginosa</i>	Port Jackson Fig
Myrtaceae	<i>Eucalyptus botryoides</i>	Bangalay
	<i>Eucalyptus bosistoana</i>	Coast Grey Box
	<i>Eucalyptus pilularis</i>	Blackbutt
	<i>Eucalyptus tereticornis</i>	Forest Red Gum

Family	Species	Common Name
Pittosporaceae	<i>Bursaria spinosa</i>	Blackthorn
	<i>Pittosporum undulatum</i>	Sweet Pittosporum
Rosaceae	<i>Rubus parviflorus</i>	Native raspberry
Rubiaceae	<i>Opercularia sp.</i>	Stinkweed
Santalaceae	<i>Exocarpus cupressiformis</i>	Cherry Ballart
Sterculiaceae	<i>Brachychiton populneus ssp. populneus</i>	Kurrajong
Urticaceae	<i>Urtica incisor</i>	
MAGNOLIOPSIDA	MONOCOTYLEDONS	
Commelinaceae	<i>Commelina cyanea</i>	
Cyperaceae	<i>Carex sp.</i>	
Cyperaceae	<i>Lepidosperma concavuum.</i>	
Juncaceae	<i>Juncus kraussii ssp. australiens</i>	Sea Rush
Liliaceae	<i>Stypandra glauca</i>	Nodding Blue Lily
Lomandraceae	<i>Lomandra longifolia</i>	Mat Rush
Orchidaceae	<i>Dendrobium teretifolium</i>	Ratstail orchid
Philesiaceae	<i>Eustrephus latifolius</i>	Wombat Berry
Poaceae	<i>Imperata cylindrica</i>	Blady Grass
	<i>Entolasia stricta</i>	
	<i>Panicum simile</i>	
Smilacaceae	<i>Smilax australis</i>	

4.2.6 Coastal Sands Bangalay-Old Man Banksia Grassy Bracken Shrub Forest (28)

This community primarily occurs within Eurobodalla National Park and hence was not assessed during the survey.

4.2.7 Coastal Forest Red Gum Shrub/Grass Forest (54)

This community has been extensively cleared within the study area. Remnant forest occurred at low altitude as a band adjacent to cleared farmland north of the road to Congo. This band was adjacent to Spotted Gum and Blackbutt forest in this area. There is a small occurrence within the village of Congo and on the elevated portions beside Mullimbarra Point Road. Much of the remaining areas of Coastal Forest Red Gum forest are grazed.

Coastal Forest Red Gum forest is an open medium to tall forest, dominated by *Eucalyptus tereticornis*, with *E. botryoides* and *Angophora floribunda*. *Acacia mearnsii*, *Allocasuarina littoralis*, *Casuarina glauca*, *Exocarpus cupressiformis* and *Pittosporum undulatum* occasionally occur as small trees to 9 metres tall. The lower shrub understorey includes *Acacia longifolia var. sophorae* and *Bursaria spinosa*. The ground cover is dominated by

Imperata cylindrica and *Lomandra spp*, with forbs including *Dichondra repens*, *Glycine clandestina*, and the fern *Cheilanthes sp. (sieberi?)*.

Diagnostic species located at site Bingi-05-6

Family	Species	Common Name
FILICOPSIDA		
Sinopteridaceae	<i>Cheilanthes sp.</i>	
MAGNOLIOPSIDA - DICOTYLEDONS		
Apocynaceae	<i>Parsonsia straminea</i>	Monkey Rope
Asteraceae	<i>Cassinia aculeata</i>	Dogwood
Casuarinaceae	<i>Casuarina glauca</i>	Swamp She-Oak
	<i>Allocasuarina littoralis</i>	Black She-Oak
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
Dilleniaceae	<i>Hibbertia aspera</i>	Rough Guinea Flower
	<i>Hibbertia scandens</i>	Golden Guinea Flower
Epacridaceae	<i>Lissanthe strigosa</i>	Native Cranberry
Fabaceae: Mimosoideae	<i>Acacia mearnsii</i>	Black Wattle
	<i>Acacia longifolia var. sophorae</i>	
Fabaceae Papilionaceae	<i>Glycine clandestina</i>	Love Creeper
	<i>Desmodium varians</i>	
Lamiaceae	<i>Plectranthus parviflorus</i>	Cockspur Flowers
Myrtaceae	<i>Angophora floribunda</i>	Rough Barked Apple
	<i>Eucalyptus botryoides</i>	Bangalay
	<i>Eucalyptus tereticornis</i>	Forest Red Gum
Pittosporaceae	<i>Pittosporum undulatum</i>	Sweet Pittosporum
Santalaceae	<i>Exocarpus cupressiformis</i>	Cherry Ballart
Ulmaceae	<i>Trema aspera</i>	Native Peach
MAGNOLIOPSIDA MONOCOTYLEDONS		
Lomandraceae	<i>Lomandra longifolia</i>	Mat Rush
	<i>Lomandra multiflora</i>	
Poaceae	<i>Imperata cylindrica</i>	Blady Grass
	<i>Entolasia stricta</i>	
	<i>Panicum simile</i>	

4.2.8 Saltmarsh (186)

This community was present beside Coila Lake. It was widespread to the south of the study area in SEPP wetland 164a. However, a small portion of this community may exist on Portion

82. The community consist of *Sarcocornia quinqueflora ssp Suaeda australis* and *Juncus kraussii ssp. australiens*.

Diagnostic species located beside Coila Lake (Grid reference 239500 6010800)

Family	Species	Common Name
MAGNOLIOPSIDA - DICOTYLEDONS		
Aizoaceae	<i>Tetragonia tetragonioides</i>	Warrigal Cabbage
Chenopodiaceae	<i>Rhagodia candolleana</i>	Saltbush
	<i>Sarcocornia quinqueflora</i>	Glassworts
	<i>Suaeda australis</i>	Austral Seablite
Juncaceae	<i>Juncus kraussii ssp. australiens</i>	Sea Rush

4.2.9 Freshwater wetlands on coastal floodplains (189)

Several freshwater wetlands exist within Eurobodalla NP. There is also an unnamed freshwater wetland south of Congo Creek. The latter is on freehold land and was not surveyed during this assessment but the catchment is grazed. These wetlands are ephemeral and are important for amphibians and waterbirds.

4.2.10 Southern coastal Blackbutt - Ironbark forest

This is a widespread community, which has a number of subdominant species, which include Grey Ironbark, Red Ironbark, Stringybark, Red Bloodwood, and Spotted Gum. The midcanopy is also variable with Black Oak *A. littoralis*, *Acacia mearnsii* and *Bursaria spinosa* being abundant in some areas due to previous fire events. The shrub layer may be dense with Burrawang being abundant at one site (J. Woodford’s AMG 240944 6012356) and sedges such as Sawsedge *Gahnia clarkei* being common in wetter areas.

Southern Coastal Blackbutt Ironbark forest occurs on soils derived from basalt and claystone, siltstone and sandstone. Hence, there was variation in co-dominant species and understorey.

Diagnostic species located at site Bingi-05-7

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
Sinopteridaceae	<i>Pellaea falcata</i>	Sickle Fern
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken
Dicksoniaceae	<i>Calochlaena dubia</i>	Soft Bracken

Bingi Landcare Strategic Landscape Planning Project

Family	Species	Common Name
Sinopteridaceae	<i>Pellaea falcata</i>	Sickle Fern
CYCADOPSIDA		
Zamiaceae	<i>Macrozamia communis</i>	Burrawang
MAGNOLIOPSIDA - DICOTYLEDONS		
Acanthaceae	<i>Pseuderanthemum variabile</i>	Pastel Flower
Apocynaceae	<i>Parsonsia straminea</i>	Monkey Rope
Asclepiadaceae	<i>Tylophora barbata</i>	
Casuarinaceae	<i>Allocasuarina littoralis</i>	Black She-Oak
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
Dilleniaceae	<i>Hibbertia aspera.</i>	Rough Guinea Flower
	<i>Hibbertia dentata</i>	Twining Guinea Flower
	<i>Hibbertia scandens</i>	Golden Guinea Flower
Epacridaceae	<i>Lissanthe strigosa</i>	Native Cranberry
Euphorbiaceae	<i>Breynia oblongifolia</i>	Coffee Bush
Fabaceae	<i>Acacia longifolia</i>	
	<i>Acacia mearnsii</i>	Black Wattle
Fabaceae	<i>Desmodium varians</i>	
	<i>Glycine clandestina</i>	Love Creeper
	<i>Hardenbergia violacea</i>	False Sarsaparilla
	<i>Indigofera australis</i>	
Lobeliaceae	<i>Pratia purpurascens</i>	White Root
Meliaceae	<i>Synoum glandulosum</i>	False Rosewood
Menispermaceae	<i>Stephania japonica</i>	
Myrsinaceae	<i>Rapanea variabilis</i>	Mutton Wood
Myrtaceae	<i>Angophora floribunda</i>	Rough Barked Apple
	<i>Corymbia gummifera</i>	Red Bloodwood
	<i>Eucalyptus globoidea</i>	Stringy Bark
	<i>Eucalyptus longifolia</i>	Woolly Butt
	<i>Eucalyptus paniculata</i>	Iron Bark
	<i>Eucalyptus pilularis</i>	Blackbutt
Oleaceae	<i>Notelaea longifolia</i>	Mock Olive
Pittosporaceae	<i>Billardiera scandens</i>	Appleberry
Pittosporaceae	<i>Bursaria spinosa</i>	Blackthorn
Proteaceae	<i>Banksia spinulosa</i>	Hair-pin Banksia
Ranunculaceae	<i>Clematis aristata</i>	
Rosaceae	<i>Rubus parviflorus</i>	Native raspberry
Rutaceae	<i>Zieria smithii</i>	Sandfly Zieria
Scrophulariaceae	<i>Veronica plebeia</i>	Speedwells
Solanaceae	<i>Solanum stelligerum</i>	Devil's needles

Family	Species	Common Name
Stackhousiaceae	<i>Stackhousia spathulata</i>	
Violaceae	<i>Viola hederacea</i>	Native Violet
Vitaceae	<i>Cissus hypoglauca</i>	Native Grape
MAGNOLIOPSIDA	MONOCOTYLEDONS	
Cyperaceae	<i>Carex sp.</i>	
	<i>Gahnia clarkei.</i>	
	<i>Lepidosperma concavuum</i>	
	<i>Lepidosperma laterale</i>	
Liliaceae	<i>Dianella caerulea ssp.</i>	Blue flax Lily
Lomandraceae	<i>Lomandra longifolia</i>	Mat Rush
Orchidaceae	<i>Acianthus sp</i>	
	<i>Cymbidium suave</i>	Snake Flower
Philesiaceae	<i>Eustrephus latifolius</i>	Wombat Berry
Poaceae	<i>Echinopogon caespitosus</i>	
	<i>Entolasia stricta</i>	
	<i>Imperata cylindrica</i>	Blady Grass
	<i>Microlaena stipoides</i>	Weeping Rice Grass
	<i>Oplismenus imbecillus</i>	
	<i>Panicum simile</i>	

4.2.11 Southern coastal Bangalay – Myrtle forest

Within Eurobodalla NP near the Bingi Sewerage Treatment Plant there is a small occurrence of Bangalay forest, which has a midcanopy of Sweet Myrtle *Backhousia myrtifolia*. This community occurs behind the coastal zone, which has sandy soils. The soils supporting the community are depositional being dark and moist.

4.2.12 Southern coastal Red Bloodwood forest

This forest type had a limited distribution being restricted to the highest altitude of the study area. The forest was dominated by Red Bloodwood to 30 metres but had minor occurrences of Blackbutt, Grey Ironbark and Stringybark. It has similarities with Thomas *et al.* (2000) Forest ecosystem 2: Lowland Dry Shrub Forest.

This community has been heavily impacted on by rural subdivision in the study area. We were unable to gain access to this community as it occurred on privately owned land and hence a diagnostic species list was not prepared. The forest viewed from Spring Place was highly disturbed with much of the shrub layer removed. Some of the lots had been mowed so that the ground layer was also highly modified. Clearing to provide for Asset Protection Zones (APZ) is rapidly diminishing this community.

Although most of the midcanopy has been removed from this community the common remnants were *Allocasuarina littoralis* and *Lissanthe strigosa*. *Exocarpus cupressiformis* is also sporadically present.

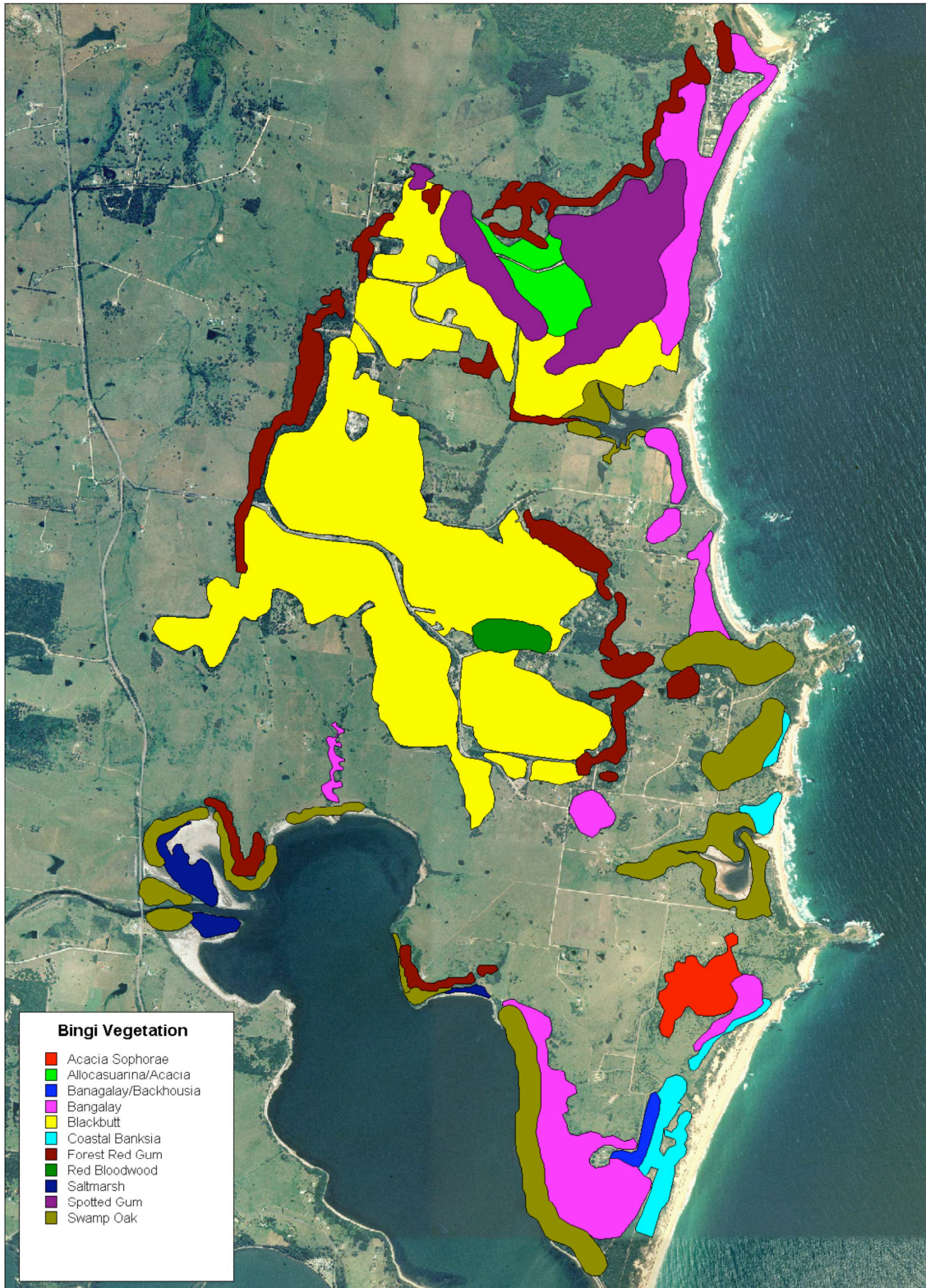


Figure 8. Revised distribution of vegetation communities within the Bingi area