Rainforest in the East Gippsland coastal townships of Lakes Entrance, Metung and Nungurner, Marlo, Mallacoota, and Lake Tyers.

EAST GIPPSLAND RAINFOREST CONSERVATION MANAGEMENT NETWORK

2007

Acknowledgements:

Authorised by the East Gippsland Conservation Management Network.

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2007

Contact the EGRCMN via the website on www.egrainforest.org.au

EXECUTIVE SUMMARY

Introduction

This Paper was prepared by the East Gippsland Rainforests Conservation Management Network.

East Gippsland retains some of the most significant stands of rainforest left in Victoria that have both state and national significance.

All of the rainforests in the East Gippsland coastal areas are threatened, and many provide habitat for both Environmental Protection and Biodiversity Conservation Act (1999)-listed plants and Flora and Fauna Guarantee Act (2988)-listed plants and animals.

Much of this rainforest estate has been cleared and all of the rainforest vegetation is either listed as threatened under State's Flora and Fauna Guarantee Act (1988) (the Warm Temperate Rainforest floristic communities) or is in the final stages of the nomination process (the Littoral Rainforest floristic communities) under the Federal Environmental Protection and Biodiversity and Conservation Act (1999).

The East Gippsland Council and the community has obligations under these acts of Parliament to conserve these threatened rainforest communities as well as their threatened plants and animals.

In Victoria, rainforests conserve 4% of the states plant diversity (30% of which are rare and threatened species), despite occupying less than 0.14% of the State's land area.

- Rainforests are excellent water processors and have been proven locally to strip up to 70% of the phosphorous from surface storm water and 88% from ground water. This works best in streams of up to third order (which matches all of the stream orders of the gully systems in the EG area);
- Rainforests are fire retardant and so their presence in the urban environment is a benefit in this regard;
- Rainforests consist of species that are restricted in the landscape that can only be conserved by protecting rainforests and their fringing ecotones;
- Rainforest on or adjacent to properties is a major selling point for real estate;
- Rainforests enable urban kids to experience the bush with relative safety near to home;
- Rainforests enhance recreational opportunities (picnicking, nature study, bird-watching, bush walking etc.); and
- Rainforests contribute to improved landscape amenity.

Background

This paper formed the basis to the Rainforest Network's submission to the East Gippsland Shire in response to its Urban Design Framework developed for the region in 2006. The submission identifies how the Shire can use the information contained within it to assist the planning for the future development of the region.

The Rainforest Network notes that the EG Shire UDF records rainforest in the region as well as existing Council overlays and policies that protect significant and threatened landscapes, vegetation and flora and fauna. The submission aims to enhance and advance the Council's vegetation values, and makes recommendations to support the regeneration and rehabilitation of rainforests in the region in a meaningful way.

The Rainforest Network made a number of general and specific recommendations, which would bring substantial benefit to the community, to local development and to the forests and threatened species.

The Rainforest Network notes that any effort to protect and rehabilitate threatened forests will attract state and federal funding for both public and private land.

Issues

Constraints imposed by the conservation status of rainforest

All of the Warm Temperate Rainforest and Littoral Rainforest communities of East Gippsland are protected by the NVP regulations. All of the Warm Temperate Rainforest floristic communities within the towns' urban areas are threatened. None of the rainforests in the coastal areas will survive without concerted local government and community actions that include zoning to protect existing rainforest remnants and their ecotones and zoning to conserve currently cleared habitat to ensure planning and subsequent development ensure recovery of the rainforests in their past habitat.

Benefits of conserving existing stands of rainforest and the currently cleared habitat of rainforest

The following benefits will accrue if planning measures to conserve these areas of the landscape are adopted, including:

- Protecting high tunnel and gully erosion-risk areas which will reduce erosion risks to infrastructure and housing;
- Meeting obligations under the Federal Environmental Protection and Biodiversity Conservation Act (1999) and State Flora and Fauna Guarantee Act (1999);
- Conserving Nationally and State-listed rainforest vegetation as well as their cargo of rare and threatened plants and animals;
- Facilitating storm water treatment through the restoration of rainforests to gully systems in the Lakes Entrance area;
- Nutrient stripping (particularly phosphorous), removing up to 70% of phosphorous and if this is combined with the reinstatement of wetlands at the mouths of rainforest gullies, nitrogen sequestration is enhanced as well;
- Improving urban and landscape amenity and conserving the environment.

Recommendations on Actions for the Future

Conservation and maintenance of EG rainforest requires both the preservation of existing stands and the rehabilitation and restoration of a significant proportion of the degraded or previously cleared rainforest habitat.

There are significant synergies available across the coastal areas between sustainable planning overlays that deal with land not suitable for development, erosion risk and storm water management and nutrient processing whilst maintaining or restoring the rainforests.

These synergies fall into the following groupings:

1. Gully systems with land too steep for development and the conservation and restoration of two Flora and Fauna Guarantee listed floristic communities of Rainforest;
2. Marginal bluffs and steep valley sides for example in Lakes Entrance between Maringa Creek-North Arm and along the marginal bluff escarpments between Whiters Street and Lake Bunga and the Lake Bunga valley sides themselves. These areas if reserved for erosion protection could also be used to ensure the conservation of threatened newly described Littoral Rainforests (currently in the nomination process under the Environmental Protection and Biodiversity Conservation Act 1999). The same opportunities exist for all towns considered in this submission.
3. Storm water and nutrient processing along gully systems through the conservation and restoration of listed Rainforest communities that have been locally proven to strip 70% of floodwater phosphorous and 88% of ground water phosphorous (Ref: Peel).
4. Supporting regional development through tourism and the establishment of eco-businesses in the area.

If as a community we choose to conserve and restore these rainforest habitats then we have taken the biggest step towards conserving the cargo of rare and threatened species they contain.

RECOMMENDATIONS FOR THE EAST GIPPSLAND COASTAL REGION

The East Gippsland Rainforest Conservation Management Network recommends:

1. That the EG Shire Council adopt the general policy of rehabilitating rainforest in gully systems with land too steep for development, and seek funding from state and/or federal government for rainforest restoration.

2. That the EG Shire Council adopt the general policy of rehabilitating rainforest in marginal bluffs and steep valley sides, reserving this land for erosion protection, and seek funding from state and/or federal government for the restoration of rainforest.

3. That the EG Shire Council adopt the general policy of conservation and restoration of listed rainforest communities in storm water gully systems for nutrient processing, and seek funding from state and/or federal governments for this purpose.

4. That the EG Shire Council actively promote restoration and conservation of rainforest in urban areas such as the Club Spit opposite Number 1 on the Esplanade in Lakes Entrance, to enhance the local character of the towns and their attractiveness. These would assist local wild bird life to breed and stay in the area, as well as restore significant vegetation sites. The Council would seek funding from state and/or federal governments for this purpose.

5. That the EG Shire update its record of rainforest in Lakes Entrance to list Warm Temperate Rainforest and Littoral Rainforest, with their six distinct floristic communities.

6. That the Colquhoun Development Policy of the EG Shire includes Lakes Entrance.

7. That the proposed 'sculptural skywalk' to the waters edge in the Lakes Entrance be reviewed in light of the need to conserve and restore rainforest.

8. That adequate investigation of the requirements for rainforest protection in the area south of Hunters Lane and north of Albatross Road in Lakes Entrance be undertaken

9. That the Council's records about rainforest in Metung and Nungurner include the two rainforest EVCs in the areas (Warm Temperate Rainforest and Littoral rainforest) with the five distinct floristic communities and threatened species.

10. That the EG Shire Council provide maximum protection of the sensitive environmental sites along the Northern shore of Lake King (Tambo Bay) between Mairburn Road and Tambo Bluff lakeshore slopes of Chinaman's Creek, Bancroft Bay, as well as the Archibald Drive gully system, Chinaman's Creek gully systems, Box's Creek and Nungurner Hills gully systems.

11. That the Shire's records relating to Dry Rainforest in Marlo ensure the information contains references to the rainforest in the area being Damp Sands Littoral Rainforest and recognising their contribution to the flora and fauna values of Marlo.

12. That the EG Shire's records on rainforest in coastal areas includes the largest stand of rainforest in the town area of Mallacoota and the Warm Temperate Rainforests in the gully systems.

13. That the EG Shire's records on coastal rainforest include Lake Tyers' very large and significant stands of native vegetation (mostly Littoral Rainforests). These stands are on the east facing marginal bluff between Fisherman's Landing Arm and Mill Point Arm. There are two rainforest ECVs in the area (Warm Temperate Rainforest and Littoral Rainforest) with two distinct floristic communities and threatened species.

EAST GIPPSLAND RAINFOREST CONSERVATION MANAGEMENT NETWORK

About the Rainforest Network

The EGRCMN is a group of rainforest land managers formed in 2006, and incorporated in January 2007. It consists of government agencies such as East Gippsland Catchment Management Authority, non government organisations such as Trust for Nature, the EG Shire and private land holders. In time we hope to involve the full range of public and private rainforest land managers in East Gippsland. East Gippsland is defined as east of, and including, the Mitchell River Catchment

There are many conservation covenanted properties in coastal East Gippsland that specifically protect rainforest and its fringing vegetation. Many other land holders in the Rainforest Network manage their rainforest for conservation, and are yet to apply permanent covenanted protection to their properties.

The primary aim of the Rainforest Network is to better manage and conserve rainforest. This is done through promotion of the benefits of rainforest, the exchange of information and improving the management skills of rainforest land managers so as to improve the protection and conservation outcomes for the rainforests of East Gippsland.

Network Aims

- To increase the amount of rainforest and associated vegetation types subject to restoration, conservation and permanent protection in East Gippsland.

Network Objectives

- The establishment and maintenance of an active network of people who share a common interest in rainforest and associated vegetation types in East Gippsland.

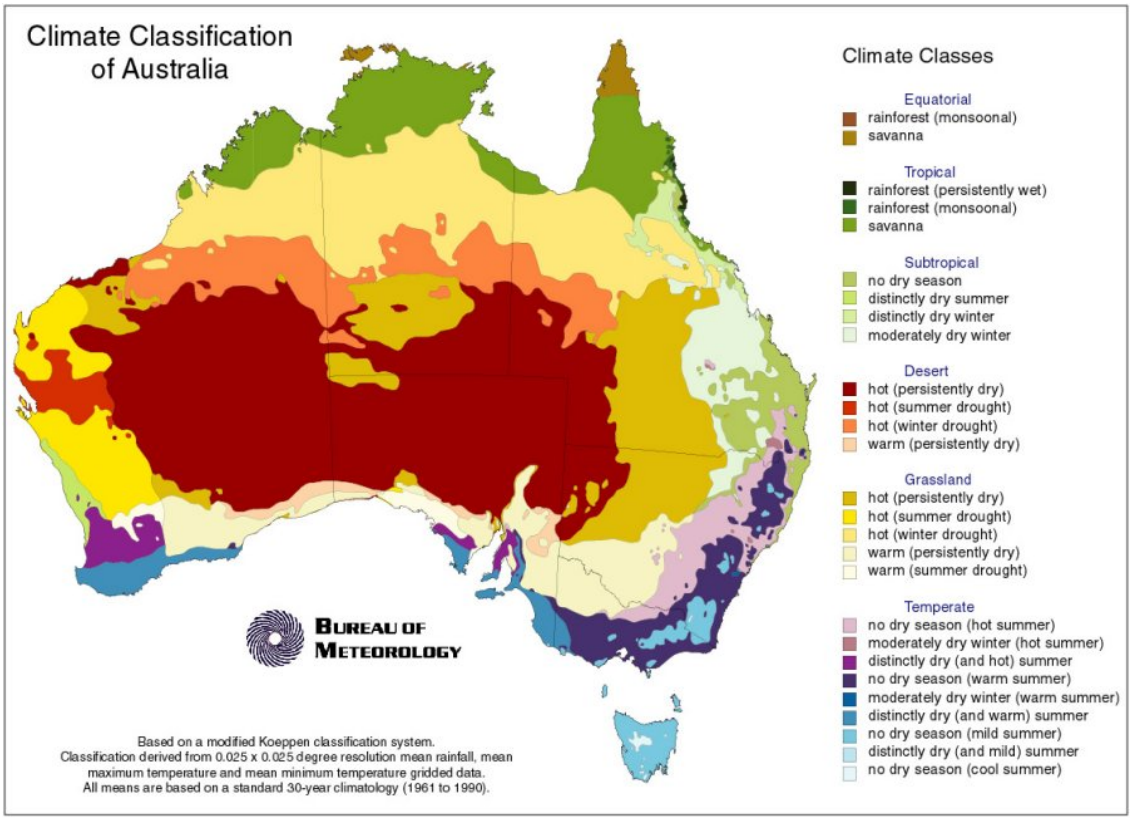
- Promotion of community and government awareness to the unique and important contribution that rainforests and associated vegetation types make to the regions biodiversity;
  - flora and fauna,
  - provision of habitat, especially to threatened and migratory species,
  - cultural values,
  - water quality,
  - stream health,
  - intercepting nutrient pollution,
  - landscape amenity, and,
  - tourism.

- To increase the number and area of rainforest sites that are permanently protected and actively managed through a range of mechanisms including;
  - Covenanting,
  - property acquisition,
  - revolving funds,
  - section 173 agreements,
  - land management agreements, and
  - site management plans

- Facilitation of information sharing and educational opportunities to enhance network participants and community understanding of rainforests ecosystems and their management.

- Development of projects to restore, maintain and manage rainforests ecosystems. (This includes all aspects of project management including funding acquisition, project identification, planning, and implementation and monitoring.)

- To broaden membership of the Network to include all private and public land managers.


Climate Classification of Australia
Climate Classes
Equatorial
rainforest (monsoonal)
savanna
Tropical
rainforest (persistently wet)
rainforest (monsoonal)
savanna
Subtropical
no dry season
distinctly dry summer
distinctly dry winter
moderately dry winter
Desert
hot (persistently dry)
hot (summer drought)
hot (winter drought)
warm (persistently dry)
Grassland
hot (persistently dry)
hot (summer drought)
hot (winter drought)
warm (persistently dry)
warm (summer drought)
Temperate
no dry season (hot summer)
moderately dry winter (hot summer)
distinctly dry (and hot) summer
no dry season (warm summer)
moderately dry winter (warm summer)
distinctly dry (and warm) summer
no dry season (mild summer)
distinctly dry (and mild) summer
no dry season (cool summer)
Bureau of Meteorology
Based on a modified Koeppen classification system.
Classification derived from 0.025 x 0.025 degree resolution mean rainfall, mean maximum temperature and mean minimum temperature gridded data.
All means are based on a standard 30-year climatology (1961 to 1990).

LAKES ENTRANCE

EAST GIPPSLAND RAINFOREST CONSERVATION MANAGEMENT NETWORK Inc.

Chapter 2

CONTENTS

SUMMARY OF LAKES ENTRANCE RAINFOREST COMMUNITY

Lakes Entrance retains some of the most significant stands of rainforest left in Victoria that have both national and state significance, including:

- A major portion of a nationally significant aggregation of Littoral Rainforest stands (the largest in south eastern Australia) that used to once stretch along the northern shore of the Gippsland Lakes from the mouth of the Mitchell River into the North Arm. This includes four threatened floristic communities of Littoral Rainforest (Table 1):
    - *East Gippsland Deltaic* Littoral Rainforest;
    - *Limestone* Littoral Rainforest;
    - *Bung Yarnda* Littoral Rainforest; and
    - *Infilling Estuaries* Littoral Rainforest.
- Two Flora and Fauna Guarantee Act (1988)-listed floristic communities of Warm Temperate Rainforest (Table 2):
    - *Alluvial Terraces* Warm Temperate Rainforest; and
    - *East Gippsland Coastal* Warm Temperate Rainforest.
- One nationally threatened and Environmental Protection and Biodiversity Conservation Act (1999)-listed species (Tables 3 and 4);
    - Limestone Blue Wattle Vv *Acacia caerulescens*; Swift Parrot and Grey-headed Flying Fox
- One Rare or Threatened Australian Plant (ROTAP):
    - Limestone Pomaderris *P. oraria* ssp. *calcicola*.
- Two listed Flora and Fauna Guarantee Act (1988)-listed plants (Table 3):
    - Limestone Blue Wattle Vv *Acacia caerulescens* and Maidens Wattle e *A. maidenii and*.
- Fifteen rare/threatened and /or listed fauna (Table 4):
    - 4 EPBC Act-listed species, 8 FFG Act listed species and 4 rare or threatened (unlisted) species.

All of the rainforests of the Lakes Entrance area are threatened, many provide habitat for both *Environmental Protection and Biodiversity Conservation Act* (1999)-listed plants and *Flora and Fauna Guarantee Act* (1988)-listed plants and animals.

Much of this rainforest estate has been cleared and all of the rainforest vegetation is either listed as threatened under State's *Flora and Fauna Guarantee Act* (1988) (the Warm Temperate Rainforest floristic communities) or is in the final stages of the nomination process (the Littoral Rainforest floristic communities) under the Federal *Environmental Protection and Biodiversity and Conservation Act* (1999).

The Council (and by extension the community that it represents) has obligations under these acts of Parliament to conserve these threatened rainforest communities as well as their threatened plants and animals.

Conservation and maintenance of these values requires rainforest conservation both through the preservation of existing stands and the rehabilitation and restoration of a significant proportion of the degraded or previously cleared rainforest habitat in the area. If as a community we choose to conserve and restore these rainforest habitats then we have taken the biggest step towards conserving the cargo of rare and threatened species they contain.

Fortunately there are significant synergies available across the area between sensible planning overlays that deal with land not suitable for development, management of erosion risk and treatment of storm water and nutrient processing whilst maintaining or restoring rainforests in Lakes Entrance area. These synergies fall into the following groupings:

1. Gully systems with land too steep for development (Natural Systems Analysis Plan 1) and the conservation and restoration of two Flora and Fauna Guarantee listed floristic communities of Warm Temperate Rainforest;
2. Marginal bluffs and steep valley sides (Natural Systems Analysis Plan 1) between Maringa Creek-North Arm and along the marginal bluff escarpments between Whiters Street and Lake Bunga and the Lake Bunga valley sides themselves. These areas (if reserved/managed for erosion protection), could also be used to ensure the conservation of threatened and newly described Littoral Rainforests (currently in the nomination process under the Environmental Protection and Biodiversity Conservation Act 1999);

3. Storm water and nutrient processing along gully systems through the conservation and restoration of listed Warm Temperate Rainforest communities that have been locally proven to strip 70% of floodwater phosphorous and 88% of ground water phosphorous (Peel in prep. a).

Conservation status of rainforest in the Lakes Entrance Urban Area

There are two ecological vegetation classes of rainforest present in the area (Warm Temperate Rainforest and Littoral Rainforest) with six distinct floristic communities represented (Table 1.). The rainforest is a significant feature of the area in the following terms:

- Landscape
- Remnant vegetation

Unfortunately local Council records do not list the following: the floristic communities (Table 1), their conservation status and the threats to them (Table 2) and their threatened species [Table 3 (plants) and Table 4 (animals)].

Rainforest values to the environment and the community at large

In Victoria rainforests conserve 4% of the states plant diversity (30% of which are rare and threatened species a proportion that will increase with the application of International Union for the Conservation of Nature (IUCN) criteria currently being applied by DSE), despite occupying less than 0.14% of the State's land area.
They have the following beneficial features and attributes:

- Rainforests are excellent water processors and have been proven locally to strip up to 70% of the phosphorous from surface storm water and 88% from ground water. This works best in streams of up to third order (which matches all of the stream orders of the gully systems in the area);
- Rainforests are fire retardant and so their presence in the urban environment is a benefit in this regard;
- Rainforests consist of species that are restricted in the landscape that can only be conserved by protecting rainforests and their fringing ecotones;
- Rainforest on or adjacent to properties is a major selling point for real estate in the town; and
- Rainforests enable urban kids to experience the bush with relative safety near to home.

Constraints imposed by the conservation status of rainforest

All of the Warm Temperate Rainforest and Littoral Rainforest communities of East Gippsland are protected by the NVP regulations. All of the Warm Temperate Rainforest and Littoral Rainforest floristic communities within the Lakes Entrance urban area are threatened. None of the rainforests in the area will survive without concerted local government and community actions that include zoning to protect existing rainforest remnants and their ecotones and zoning to conserve currently cleared habitat to ensure planning and subsequent development allow recovery of the rainforests in their past habitat.

Very large and significant stands of Littoral and Warm Temperate Rainforests have not been recorded from various plans in the Council documents including the marginal bluff from Maringa Creek to Clara Street on the North Arm, North Arm, Lake Bunga and its lakeshore slopes and gully systems John St. drainage reserve, Kinkuna escarpment (see recommendations attached).

Table 1. Rainforests of the Lakes Entrance Urban Area.

Ecological vegetation class Habitat features	Floristic community	Habitat Localities in the urban area
Warm Temperate Rainforest Habitat features: • Moist localities; • Fire protected	*East Gippsland Alluvial Terraces* Warm Temperate Rainforest	Habitat: alluvial soils on creek flats and gully floors of all of the major gully systems Localities: Maringa Creek and associated gullies, North Arm and associated gullies
	East Gippsland Coastal Warm Temperate Rainforest	Habitat: gully sides on limestone or outwash alluviums Localities: all of the steeper-sided gully systems of the area from Maringa Creek to Lake Bunga
Littoral Rainforest Habitat features: • Exposed sites • Saline influence (wind, water, water tables or geology); • Fire protected	*East Gippsland Deltaic* Littoral Rainforest*	Habitat: alluvial flats along estuaries subject to either saline water tables or saline inundation. Localities: gully mouths at Kalimna Jetty, Maringa Creek, North Arm and Lake Bunga.
	Limestone Littoral Rainforest**	Habitat: steep slopes of limestone with north or west aspects. Localities: eastern Shores of North Arm and Lake Bunga
	Bung Yarnda Littoral Rainforest***	Habitat: The marginal bluffs and subtending sand flats around the Gippsland Lakes, Lake Bunga and Lake Tyers. Localities: from Maringa Creek to Jemmys Point and Kalimna, along the western shore of North Arm and Lake Bunga
	*Infilling Estuaries Littoral Rainforest****	Habitat: The infilled landward margin of former Swamp Scrubs at the mouths of gullies and along the estuarine reaches of rivers. Localities: Formerly Maringa Creek, Kalimna Gully, Arran Dene Gully, Frenchmans Gully, Eastern Creek and the margins of the Lakes Entrance sand isthmus including the southern shore of the North Arm and both shores of Cunninghame Arm.

*See Attachment 1.
** See Attachment 2.
*** See Attachment 3.
**** See Attachment 4.

Table 2. Conservation status of rainforests that occur in the Lakes Entrance UDF study area and the threats to them.

Floristic community	Conservation status	Threats
East Gippsland Alluvial Terraces Warm Temperate Rainforest	Threatened Flora and Fauna Guarantee-listed	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (subdivision of cleared habitat, weed invasion) Global warming (increased fire frequency and intensity, rising sea levels)
East Gippsland Coastal Warm Temperate Rainforest	Threatened Flora and Fauna Guarantee-listed	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (subdivision of cleared habitat, weed invasion) Global warming (increased fire frequency and intensity)
East Gippsland Deltaic Littoral Rainforest	Threatened: currently under consideration in the nomination process under the Federal Environmental Protection and Biodiversity Conservation Act (1999).	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (weed invasion) Coastal recreation and associated infrastructure Global warming (increased fire frequency and intensity)
Limestone Littoral Rainforest	Threatened: currently under consideration in the nomination process under the Federal Environmental Protection and Biodiversity Conservation Act (1999).	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (subdivision of cleared habitat, weed invasion) Global warming (increased fire frequency and intensity)
Bung Yarnda Littoral Rainforest	Threatened: currently under consideration in the nomination process under the Federal Environmental Protection and Biodiversity Conservation Act (1999).	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (subdivision of cleared habitat, weed invasion) Coastal recreation and associated infrastructure Global warming (increased fire frequency and intensity)
Infilling Estuaries Littoral Rainforest	Threatened: currently under consideration in the nomination process under the Federal Environmental Protection and Biodiversity Conservation Act (1999).	

Table 3. Rare or threatened plants that occur in the rainforests of the Lakes Entrance UDF study area.

Name	IUCN	EPBC	AROTS	VROTS	FFG	Action Statement	Rainforest type
Limestone Blue Wattle *Acacia caerulescens*		V	V	v			*Limestone* LRf
Maidens Wattle *Acacia maidenii*				e	L	A	*Bung Yarnda* LRf
Yellowwood *Acronychia oblongifolia*	e			r			*East Gippsland Deltaic* LRf; *Bung Yarnda* LRf;
Wallaby-bush *Beyeria lasiocarpa*				r			*East Gippsland Coastal* WTRf
Pinkwood *Beyeria viscosa*				r			*East Gippsland Coastal* WTRf
Coast Grey Box *Eucalyptus bosistoana*				r			*Limestone* LRf
Maidens Gum *Eucalyptus globulus* subsp. *maidenii*				r			*Bung Yarnda* LRf; East *Gippsland Coastal* WTRf
Bolwarra *Eupomatia laurina*				r			
Jointed Mistletoe *Korthalsella rubra* subsp. *rubra*				v			*East Gippsland Deltaic* LRf; *Alluvial Terraces*
Yellow Loosestrife *Lysimachia japonica*	e			v			*East Gippsland Coastal* WTRf; *Alluvial Terraces*
Yellow Milkvine *Marsdenia flavescens*				r			*East Gippsland Coastal* WTRf; *Alluvial Terraces*
Viscid Daisy-bush *Olearia viscosa*				v			*Limestone* LRf
Spicy Everlasting *Ozothamnus argophyllus*				r			*East Gippsland Deltaic* LRf; *Bung Yarnda* LRf; *Limestone* LRf
Limestone Pomaderris *P. oraria* subsp. *calcicola*				r			*Limestone* LRf
Star Cucumbr *Sicyos australis*				v			*East Gippsland Coastal* WTRf
Sandfly Zieria *Z. smithii* subsp. *smithii*				r			*East Gippsland Coastal* WTRf, *Bung Yarnda* LRf

Table 4. Rare or threatened animals*, which occur (have been recorded) in the rainforests of the Lakes Entrance Urban Design Framework study area.

Name	Division Name	ESP	AROTS	VROTS	FFG	TR	CAMBA/ JAMBA	Notes
Azure Kingfisher *Alcedo azurea*	Birds			n				Nests in LRf/WTRf
Chlorinda Hairstreak *Pseudalmenus chlorinda fisheri*	Invertebrates			v				Recorded in WTRf
Diamond Python *Morelia spilota spilota*	Reptiles			e	L			Credible record in district
Great Egret *Ardea alba*	Birds			v	L	1	1/1	Roosts in LRf
Grey Goshawk *Accipiter novaehollandiae*	Birds			v				Nests and hunts: WTRf
Grey-headed Flying-fox *Pteropus poliocephalus*	Mammals	VU		v	L			Food: LRF/WTRf, roosts: WTRf
Long-nosed Potoroo *Potorous tridactylus*	Mammals	VU		e	L			LRf
Pied Cormorant *Phalacrocorax varius*	Birds			n				Roosts in LRf
Powerful Owl *Ninox strenua*	Birds			v	L			Hunts and roosts: WTRf
Sooty Owl *Tyto tenebricosa*	Birds			v	L			Hunts and roosts: WTRf
Spot-tailed Quoll *Dasyurus maculatus*	Mammals	VU		e	L			Recorded: WTRf
Swift Parrot *Lathamus discolor*	Birds	EN	E	e	L			Feeds: LRf/WTRf
Tree Goanna *Varanus varius*	Reptiles			v				Inhabits WTRf
White-bellied Sea-Eagle *Haliaeetus leucogaster*	Birds			v	L	1	1/-	Nests: WTRf
Yellow-spot Jewel *Hypochrysops byzos hecalis*	Invertebrat			d				Food: LRf/WTRf

*Bold are rainforest dependant in the district; underlined are those that breed in rainforests of the district.

Benefits of conserving existing stands of rainforest and the currently cleared habitat of rainforest

The following benefits will accrue if the Council adopts planning measures to conserve these areas of the landscape:

- High tunnel and gully erosion-risk areas will be protected and risks to infrastructure and housing will abate;
- Once established, rainforests represent a low cost maintenance alternative to continual mowing and/or weedi control;
- Obligations under the Federal Environmental Protection and Biodiversity Conservation Act (1999) and State Flora and Fauna Guarantee Act (1999) will be met;
- Nationally and State-listed rainforest vegetation as well as their cargo of rare and threatened plants and animals will be conserved;
- Storm water treatment is facilitated by the restoration of rainforests to gully systems in the Lakes Entrance area;
- Nutrient stripping (particularly phosphorous) will remove up to 70% of phosphorous and if combined with the reinstatement of wetlands at the mouths of rainforest gullies nitrogen sequestration is enhanced as well;
- Urban and landscape amenity is improved and the environment is conserved.

Depletion through land clearing, coastal recreation, urbanisation, grazing and weed invasion

One of the major concerns for the CMN relates to habitat loss for rainforests in the Lakes Entrance area. This habitat loss and the ongoing threats that continue to degrade and erode the remaining areas of rainforest in the district are directly related to urban development, coastal recreation and ongoing grazing and weed invasion. Drawing the EG Council's attention to this on a site by site basis should enable planning schemes to be amended to accommodate both the urban development and conservation needs of rainforests in the area.

Depletion by locality

The causes of depletion of rainforests in the Lakes Entrance area, the planning solutions and benefits are listed in Table 5.

Tunnel erosion

This is a very real and serious threat to existing urban areas in Lakes Entrance and the mistakes of the past (allowing development on high risk areas) should not be repeated in the future urban developments. Tunnel erosion occurs where sodic clay soils dissolve and are transported down slope. Over time huge cavities are created and the overlying soils collapse creating gully erosion. This represents a serious threat to infrastructure including roads and housing.

Casual observations over many years indicate that actual tunnel erosion and the risk of tunnel erosion is extensive throughout the steeper areas of the Lakes Entrance area. Actually observed areas of tunnel erosion include the marginal bluff systems of the north Arm, Golf Links Road escarpments and Lake Bunga. Actual sites are known from at least four localities, many of which threaten existing housing and/or infrastructure [Jemmy's Point (the Princes Highway parking areas and footpaths), Kalimna (roading and housing on Seaview Parade, Clara Close, areas north of Albatross Road (west) and the eastern end of Creighton Street and Widdis Road)], John Street, Merrangbaur roading and housing in areas south of Ocean View Parade). Many more are likely to exist, but have not been actively investigated by the author.

The occurrence of tunnel erosion shows a strong correlation between land clearing, sodic soils and steep topography. The areas of greatest risk roughly align with the steep areas shown in the Natural Systems Analysis Plan 1.

Suggested solutions

The Council should prevent the subdivision of steep areas and these should be reserved to:

- Maintain geological stability;
- Ensure erosion protection;
- Maintain urban amenity;
- Enhance landscape values; and
- Provide for the conservation of rainforest vegetation and its cargo of rare or threatened plants and animals.

This action would conserve much of the existing rainforest as well as preserving much of its former habitat that has been cleared in the past so that it may be restored in the future.

Benefits of this course of action

- Housing and infrastructure is not put at risk by tunnel erosion;
- The rate of tunnel erosion is slowed; and
- Remedial measures to deal with tunnel erosion (if required) will have a minimal impact on the built environment.

Drainage Reserves

Drainage reserves along gullies are being reserved as residential areas are being developed. The Council and community are undertaking joint rainforest restoration projects in two of these reserves (John Street and Merrangbaur Estate). This treatment of drainage reserves has the following benefits (as apposed to leaving them grassed):

- Maintenance costs are significantly reduced (no ongoing mowing required);
- Fire risks are reduced (rainforest is fire-retardant);
- Erosion risks are reduced;
- Nutrients are trapped and processed;
- Phosphorous loads on the Gippsland Lakes are reduced and so helping to reduce severity of algal blooms;
- Urban amenity is improved;
- Recreational opportunities are enhanced and diversified (picnicking, nature study, bird-watching, bush walking etc.);
- Landscape amenity is improved; and
- Real estate values are consequently increased.

Nutrient sequestration and storm water treatment

Revegetating all gully systems within the area with rainforest will significantly aid in the sequestration of phosphorous (a major source of nutrients that leads to algal blooms in the Gippsland Lakes).

Foreshores

As mentioned earlier, the isthmus of Lakes Entrance once hosted Littoral Rainforest. Obviously this has all been cleared in the past. Recent dredging (dating from the 1970s) has had Littoral Rainforest develop upon it. These areas should be conserved to allow the Littoral Rainforest to continue to develop and to show the people of Lakes Entrance what their town once looked like. These areas are:

- The Club Spit opposite Number 1 on the Esplanade;
- The connecting area between the North Arm Bridge and the Club Spit (between the Highway and the Fishing Club clubrooms south to Bullock Island Road should be maintained as natural bush to facilitate the continued development of Littoral Rainforest on the Club Spit. That is Council should resist the temptation to turn these areas into grassed areas with trees; and
- The Jemmys Point sand flat between the North Arm Bridge and the Narrows under Jemmys Point.

Preservation of these areas of foreshores in their natural state will ensure the continued development of the oldest stands of Littoral Rainforest (on sand) along the Entrance Walk along the southern shore of Cunninghame Arm (that stalled with the clearing of the Lakes Entrance isthmus).

Marginal bluffs and steep valley sides

The most extensive (around 85ha) and some of the oldest Littoral Rainforest in Victoria occurs around the Gippsland Lakes. Part of this nationally significant rainforest complex occurs in the Lakes Entrance area on the marginal bluff from the mouth of Maringa Creek through to the end of Creighton Street in Kalimna and up the North Arm (Attachment 5).

Table 5. Depletion of rainforest and planning solutions and benefits

Locality	Causes of depletion	Ongoing threats	Planning solution and benefits
Littoral Rainforests and Warm Temperate Rainforests: Kalimna Jetty Gully mouth	Habitat loss due to car parking, toilet block	Wind exposure, weeds, habitat loss	Planning solution: Formalise car park including frontline planting of lakeshore wind barrier and rainforest species to provide shade within the car park. Benefits: Improved landscape amenity, reduced sediment and nutrient pollution into Gippsland Lakes.
Littoral Rainforests: Marginal Bluffs between Maringa Creek mouth and end of Clara Street	Tunnel erosion due to land clearing and uncontrolled (?illegal) disposal of storm water, roading infrastructure, vegetation destruction for views, weed invasion, garden rubbish dumping	Uncontrolled (?illegal) disposal of storm water, roading infrastructure, vegetation destruction for views, weed invasion, garden rubbish dumping	Planning solution: Classify existing stands in the environmental significance overlay; amend the planning scheme to reserve undeveloped sites for erosion control and rainforest conservation. Benefits: risk of tunnel and gully erosion to roading and housing reduced; rainforest conservation enhanced; landscape amenity improved.
Littoral Rainforests: North Arm valley slopes	Land clearing, grazing,tunnel erosion	isthmus Grazing	Planning solution: Ensure subdivision setbacks to establish/maintain lakeshore reserves. Benefits: risk of tunnel and gully erosion to roading and housing reduced; rainforest conservation enhanced; landscape amenity (particularly from the lake) improved.
Littoral Rainforests: Lakes Entrance sand	Land clearing, urban development, foreshore development	Clearing for views, weeds	Planning solution: Conserve Club Spit and the Jemmys Point sand flat, retain and manage the connecting bush between the Spit and the North Arm Bridge for conservation. Benefits: Provides variation in the foreshore landscape, conserves young Littoral Rainforest types lost to urban development on the towns' sandy isthmus, brings wildlife into town area, and provides opportunities for passive recreation.
Littoral Rainforests: Entrance Walk	Loss of the Lakes Entrance sand isthmus stands that connected the Entrance walk stands to seed sources on the isthmus and at Kalimna, weed invasion	Weed invasion, potential loss of linking stands on the Club spit, the Skateboard Park and Jemmys Point sand flat	Planning solution: Conserve connecting vegetation on the Lakes Entrance sand isthmus. Benefits: this will renew past links to rainforest that were lost when the town's sandy isthmus was cleared for urban development; passive recreation.

Table 5 cont'd. Depletion of rainforest and planning solutions and benefits

Locality	Causes of depletion	Ongoing threats	Planning solution and benefits
Littoral Rainforests: Lakes Entrance Golf Links	Clearing, weed invasion	Weed invasion	Planning solution: Conserve existing native bush and manage weeds, restore degraded areas (already happening). Benefits: Golf Links maintained, landscape Planning solution: Wherever possible if not built on already, rezone as high erosion risk, if already built on: revegetate wherever possible rainforest. Benefits: Reduces fire risks, slows tunnel erosion, improves landscape amamenity maintained and passive recreation.
Littoral Rainforests: Marginal Bluffs east of Whiters Street, north of Golf Links Road (Merrangbaur Hill) to Lake Bunga	Tunnel erosion due to land clearing and uncontrolled (?illegal) disposal of storm water, urban subdivision and housing, roading infrastructure, vegetation destruction for views, weed invasion, garden rubbish	Tunnel erosion due to land clearing and uncontrolled (?illegal) disposal of storm water, urban subdivision and housing, roading infrastructure, vegetation destruction for views, weed invasion, garden rubbish	Planning solution: Wherever possible if not built on already, rezone as high erosion risk, if already built on: revegetate wherever possible rainforest. Benefits: Reduces fire risks, slows tunnel erosion, improves landscape
Littoral Rainforests: Lake Bunga valley sides	Clearing Grazing	Weed invasion, clearing for views	Planning solution: Ensure subdivision setbacks to establish/maintain lakeshore reserves. Benefits: risk of tunnel and gully erosion to roading and housing reduced; rainforest conservation enhanced; landscape amenity (particularly from the lake) improved.
Warm Temperate Rainforests: Gully systems including: Maringa Creek, Kalimna Jetty Gully, Jemmys Point turning circle gully, Stan's (Kalimna Gully), Arran Dene Gully, gullies north of Hunters Lane, Harrison's Track Gully, Frenchmans Gully, gully system north of Capes Road, John Street Drainage Reserve, Myer St-Whiters Street Gully, Palmers Road Gully, Merrangbaur (Stirling Road Estate) gully system, Lake Bunga gully system, Bunga Creek gully system	Clearing, grazing, urban subdivision, tunnel erosion due to land clearing and uncontrolled disposal of storm water	Grazing, urban subdivision, tunnel erosion	Planning solution: These steep areas are unsuitable for development and should be reserved for conservation and as drainage reserves. Further subdivision of these gullies should be stopped and the reserves consolidated at the point of development or through covenanting. Benefits: Improved health of Gippsland Lakes through nutrient processing (phosphorous and nitrogen sequestration); reduced risk of tunnel erosion and gully erosion, improved landscape amenity, passive recreation, improved fire protection.

East Gippsland Deltaic Littoral Rainforest
Group 1

East Gippsland Deltaic Littoral Rainforest
Group 1

Etymology
This floristic community is named for the predominant landform and its origins upon which the community grows.

Distribution
Victoria: (extinct on the Mitchell and Tambo Rivers) but still present on the lower Nicholson, Snowy, Brodribb Bemm and Genoa Rivers. Estuaries include: Gippsland Lakes (Lake King and North Arm), Lake Tyers, Lake Bunga, Marlo, Sydenham Inlet and Mallacoota Inlet (Top Lake).

Landscape Context
Group 1 occurs on estuarine deltaic deposits on the lower estuarine reaches of rivers or their equivalent (but smaller landforms) such as the mouths of gullies. Fire protection is afforded by the open water of larger rivers, islands, occasionally riverine cliffs and fire-retardant vegetation that includes: Estuarine Swamp Scrub, Estuarine Wetlands and Saltmarsh.

Habitat and Ecology
East Gippsland Deltaic Littoral Rainforest occurs on estuarine deltaic deposits where there is a saline water table and the risk of intermittent saline inundation or the elevation of saline water tables into the root zone during periods of estuary bar closure. Soils are primarily silts or sandy loams rich in organic matter. These deltaic deposits occur on the lower reaches of rivers (low-lying levees, deltas or estuarine islands formed as the result of deltaic (rather than) coastal processes.
Such landforms are low-lying, and to saline influence the water table (not through exposure as has been classically described for Littoral Rainforests to date). Consequently their species are a mix between the classical *Alluvial Terraces* Warm Temperate Rainforest flora (Lilly Pilly, Muttonwood, Prickly Currant-bush, Jasmine Morinda, Tall Sedge etc.) and the coastal species of estuaries (Common Boobialla, Swamp Paperbark, Common Reed, New Zealand Spinach etc.). Group 1 consequently merges into *Alluvial Terraces* Warm Temperate Rainforest further upstream in the freshwater reaches of rivers or on higher levees where salt cannot percolate upwards into the root zone of the rainforest. Group 1 consequently lacks the freshwater and moisture dependant ferns of *Alluvial Terraces* Warm Temperate Rainforest. It is likely that the hinterland rainforest species present in Group 1 sites are salt-adapted ecotypes of the same species found further upstream. The lack of eucalypts as characteristic species reflects both the high degree of fire protection and the stability of the landform (being in the low flood energy zones of the riverine plain-estuary interface). Southern Mahogany however may occasionally be present. *East Gippsland Deltaic* Littoral Rainforest is one of 3 related floristic communities (Groups 17 and 18) that occur in the same habitat in the SEC bioregion, but each is floristically distinct because of latitudinal sifting.

CHARACTERISTIC SPECIES

Emergent Trees: Blackwood *Acacia melanoxylon*.

Canopy Trees: Lilly Pilly *Acmena smithii*, Yellowwood *Acronychia oblongifolia*, Swamp Paperbark *Melaleuca ericifolia*, Common Boobialla *Myoporum insulare*, Sweet Pittosporum *P. undulatum* and Muttonwood *Rapanea howittiana*.

Shrubs: Prickly Currant-bush *Coprosma quadrifida*, Tree Violet *Hymenanthera dentata*, Sticky Daisy-bush *Olearia viscosa*, Kangaroo Apple *Solanum avicualre.*

Vines: Staff Climber *Celastrus australis*, Forest Clematis *Clematis glycinoides*, Wombat Berry *Eustrephus latifolius*, Scrambling Lily *Geitonoplesium cymosum*, Jasmine Morinda Morinda jasminoides, Seaberry Saltbush *Rhagodia candolleana*, Austral Sarsaparilla *Smilax australis* Bower Spinach Tetragonia implexicoma and Bearded Tylophora *Tylophora barbata.*

Forbs: Bidgee-widgee *Acaena novae-zelandiae*, Sea Celery *Apium prostratum*, Kidney Weed *Dichondra repens*, Maori Bedstraw *Galium propinquum*, Northern Cranesbill *Geranium homeanum*, Grassland Wood-sorrel *Oxalis perennans*, Slender Dock *Rumex brownii*, White Elderberry *Sambucus gaudichaudiana*, Shrubby Fireweed *Senecio minimus*, Forest Starwort *Stellaria flaccida*, New Zealand Spinach *Tetragonia tetragonioides* and Scrub Nettle *Urtica incisa*.

Graminoids: Tall Sedge *Carex appressa*, Bergalia Tussock *Carex longebrachiata*, Hedge-hog Grass *Echinopogon ovatus,* Weeping Grass *Microlaena stipoides*, Basket-grass *Oplismenus hirtellus* *Common Reed Phragmites australis*, Sword Tussock-grass *Poa ensiformis* and Common Tussock-grass *P. labillardierei*.

Ferns: Sickle Fern *Pellaea falcata* Bracken *Pteridium esculentum* and Tender Brake *Pteris tremula*.

Epiphytes/lithophytes: None.

Mistletoes/aerial parasites: None.

Bung Yarnda Littoral Rainforest
Group 2

Bung Yarnda Littoral Rainforest
Group 2

Etymololgy
This floristic community is named for the local Gunai/Kurnai name for the estuaries around which it grows: the meaning being 'big water'.

Distribution
Victoria: between the Tambo River and the lower Snowy River (including the intervening estuaries: Lake King, North Arm, Lake Bunga and Lake Tyers.

Landscape context
Bung Yarnda Littoral Rainforest obtains fire protection from occupying the sides of flooded valley estuaries and along the northern shores of the Gippsland Lakes between North Arm or alternatively, on the marginal bluffs with further fire protection afforded by estuaries, beaches or wetlands at their bases. Less commonly (perhaps because of land clearing) it also occurs on fire-protected valley sides of lowland rivers. Aspects are generally southerly and easterly which reduces pH in contrast with Grp 3.

Habitat and ecology
Bung Yarnda Littoral Rainforest largely occurs on Tertiary geologies that include outwash silts and clays (55%) as well as limestone geology (27%) with occasional sites on Recent lacustrine sandy loams derived from these geologies (10%). The overriding determinant appears to be the exposed position in and around estuaries. Fire protection is derived from steep south and east aspects and the open water of estuaries or estuarine reaches of rivers. Although *Bung Yarnda* Littoral Rainforest can occur on limestone, it does so on sheltered aspects that remain moister longer and this leaches them of their limestones which inturn are built up by organic matter. This leads to the soils of *Bung Yarnda* Littoral Rainforest having acid pH. *Bung Yarnda* Littoral Rainforest occupies relatively infertile geologies, on steep water-shedding topography. As a consequence, the taxa that constitute this floristic community are all drought-tolerant species.

CHARASTIC SPECIES

Emergent Trees: Blackwood *Acacia melanoxylon*, Coast Banksia *Banksia integrifolia* Blue Box *Eucalyptus baueriana* and Eurabbie *Eucalyptus globulus* ssp. *bicostata*.

Canopy Trees: Black Wattle *A. mearnsii*, Lilly Pilly *Acmena smithii*, Yellowwood e *Acronychia oblongifolia*, Cherry Ballart *Exocapos cupressiformis*, Swamp Paperbark *Melaleuca ericifolia*, Common Boobialla *Myoporum insulare*, Sweet Pittosporum *Pittosporum undulatum* Hazel Pomaderris *P. aspera* and Muttonwood *Rapanea howittiana*.

Shrubs: Prickly Currant-bush *Coprosma quadrifda*, Hops Goodenia *G. ovata*, Tree Violet *Hymenanthera dentata*, Coast Beard-heath *Leucopogon parviflorus*, Large Mock Olive *Notelaea venosa*, Snowy Daisy-bush *Olearia lirata*, Sticky Daisy-bush *O. viscosa*, Tree Everlasting *Helichrysum ferrugineus* and Bootlace Bush *Pimelea axiflora*.

Vines: Rusty Dodder-laurel *Cassytha phaeolasia*, Staff Climber *Celastrus australis*, Forest Clematis *Clematis glycinoides*, Wombat Berry *Eustrephus latifolius*, Scrambling Lily *Geitonoplesium cymosum*, Twining Glycine *Glycine clandestina*, White Milk-vine *Marsdenia rostrata*, Wonga Vine *Pandorea pandorana*, Seaberry Saltbush *Rhagodia candolleana*, Austral Sarsaparilla *Smilax australis*, Bower Spinach *Tetragonia implexicoma* and Bearded Tylophora *Tylophora barbata.*

Forbs: Kidney Weed *Dichondra repens*, Southern Tick-trefoil Desmodium gunnii, Euchiton gymnocephalus, Maori Bedstraw *Galium propinquum*, Northern Cranesbill *Geranium homeanum*, Yellow Pennywort *Hydrocotyle foeveolata*, Hairy Pennywort *H. hirta*, Stinking Pennywort *H. laxiflora*, Grassland Wood-sorrel *Oxalis perennans*, Shade Plantain *Plantago debilis*, Slender Dock *Rumex brownii*, White Elderberry *Sambucus gaudichaudiana*, Jagged Fireweed *Senecio biserratus*, Shrubby Fireweed *S. minimus*, Slender Fireweed *S. tenuiflorus*, Forest Starwort *Stellaria flaccida*, Prickly Starwort *S. pungens*, Scrub Nettle *Urtica incisa*, Trailing Speedwell *Veronica plebia* Ivy-leaf Violet *Viola hederacea* and Sprawling Bluebell *Wahlenbergia gracilis*.

Graminoids: Stiped Wallaby-grass *Austrodanthonia racemosa*, Common Grass-sedge *Carex breviculumis*, Bergalia Tussock *Carex longebrachiata*, Tasman Flax-lily *Dianella tasmanica,* Hedge-hog Grass *Echinopogon ovatus,* Black-fruit Saw-sedge *Gahnia melanocarpa*, Knobby Club-rush *Isolepis nodosa*, Variable Sword-sedge *Lepidosperma laterale*, Spiny-headed Mat-rush *Lomandra longifolia*, Common Woodrush *Luzula meridionalis*, Weeping Grass *Microlaena stipoides*, Basket-grass *Oplismenus hirtellus,* Sword Tussock-grass *Poa ensiformis,* Common Tussock-grass *Poa labillaridierei,* and Grey Tussock-grass *P. sieberiana*.

Ferns: Necklace Fern *Asplenium flabellifolium*, Sickle Fern *Pellaea falcata* and Tender Brake *Pteris tremula*.

Epiphytes/lithophytes: are uncommon, but are usual for rainforest in the area (Kangaroo Fern *Microsorium pustulatum*).

Mistletoes/aerial parasites: are uncommon, but include: Coast Mistletoe r *Muellerina celastroides* (on Coast Banksia) and rarely (though difficult to observe): Jointed Mistletoe *Korthalsella rubra* (on Lilly Pilly and Yellowwood *Acronychia oblongifolia*).

Limestone Littoral Rainforest
Group 3

Limestone Littoral Rainforest
Group 3

Etymology
This floristic community is named for the Tertiary limestone upon which it grows.

Distribution
Victoria: between the Tambo River and Lake Tyers (including the intervening estuaries: Lake King, North Arm, Lake Bunga. Effectively extinct on the lower Mitchell, Nicholson and largely so on the Tambo River.

Landscape Context
Limestone Littoral Rainforest obtains fire protection from occupying the sides of flooded valley estuaries and along the northern shores of the Gippsland Lakes between North Arm or alternatively on the riverine cliffs. Less commonly (perhaps because of land clearing) it also occurs on fire-protected valley sides of lowland rivers downstream of Lindenow and on the Snowy River downstream of Bete Belong. Aspects are more exposed (generally east, west or north) in contrast to *Bung Yarnda* Littoral Rainforest.

Habitat and ecology
Limestone Littoral Rainforest occurs on more exposed aspects on limestones where the pH of the soils is maintained in its alkaline state like the parent geology. This leads to a very distinctive floristic community when compared to the species composition of *Bung Yarnda* Littoral Rainforest that may be growing only tens of metres away on the same estuary system (but on more sheltered aspects). The distinctiveness of this flora is in part due to the presence of a number of conspicuous and abundant limestone-loving species including: Limestone Blue Wattle, Giant Hop-bush, Sticky Daisy-bush, Limestone Pomaderris, Crested Spear-grass and Wandering Bedstraw. The species diversity is also much less (46 species) compared to *Bung Yarnda* Littoral Rainforest (93 species).

CHARACTERISTIC SPECIES

Emergent Trees: Limestone Blue Wattle Vv *Acacia caerulescens*, Blackwood *Acacia melanoxylon*, Coast Grey Box *Eucalyptus bosistoana*, Eurabbie *Eucalyptus globulus* subsp. *bicostata* and Red Ironbark *Eucalyptus tricarpa*.

Canopy Trees: Blanket-leaf *Bedfordia arborescens*, , Cherry Ballart *Exocarpos cupressiformis*, Swamp Paperbark *Melaleuca ericifolia*, Common Boobialla *Myoporum insulare*, Sweet Pittosporum *P. undulatum* and Muttonwood *Rapanea howittiana*

Shrubs: Giant Hop-bush *Dodonaea viscosa* ssp *angustifolia*, Hops Goodenia *G. ovata*, Coast Beard-heath *Leucopogon parviflorus*, Snowy Daisy-bush *Olearia lirata*, Sticky Daisy-bush v *O. viscosa*, Bootlace Bush *Pimelea axiflora* ssp *axiflora* and Limestone Pomaderris Rr *P. oraria* ssp. *calcicola*.

Vines: Staff Climber *Celastrus australis*, Forest Clematis *C. glycinoides* var *glycinoides*, Wombat Berry *Eustrephus latifolius*, Scrambling Lily *Geitonoplesium cymosum*, White Milk-vine *Marsdenia rostrata* Wonga Vine *Pandorea pandorana*, Seaberry Saltbush *Rhagodia candolleana* ssp *candolleana*, Bower Spinach *Tetragonia implexicoma*, Bearded Tylophora *T. barbata*.

Forbs: Sea Celery *Apium prostratum*, Kidney Weed *Dichondra repens* Rough Bedstraw *Galium gaudichaudii*, Wandering Bedstraw *Galium migrans*, Shade Plantain *Plantago debilis* and Shiny Swamp-mat *Selliera radicans.*

Graminoids: Stiped Wallaby-grass *Austrodanthonia racemosa* var *racemosa*, Crested Spear-grass *Austrostipa blackii*, Common Hedge-hog Grass Echinopogon ovatus, Black-fruit Saw-sedge *Gahnia melanocarpa*, Common Blown-grass *Lachnagrostis filiformis*, Variable Sword-sedge *Lepidosperma laterale*, Weeping Grass *Microlaena stipoides* var *stipoides*, Sword Tussock-grass *Poa ensiformis*, Common Tussock-grass *P. labillardierei* var *labillardierei* and Grey Tussock-grass *Poa sieberiana* var *sieberiana*.

Ferns: Necklace Fern *Asplenium flabellifolium* and Bracken *Pteridium esculentum*

Epiphytes/lithophytes: None.

Mistletoes/aerial parasites: Rusty Dodder-laurel *Cassytha phaeolasia*

Threats: habitat loss, weeds
Historic depletion: land clearing along rivers and the northern shores of the Gippsland Lakes

Ongoing loss of habitat: Urbanisation and weeds

Deer: Sambar Deer, Hog Deer

Incremental development: subdivision, urbanisation

Limestone Littoral Rainforest
Group 3

Weed Invasion: Significant as the result of human access and urbanisation

Weed threats: Blue Periwinkle, Bridal Creeper, Cape Ivy, Cotoneaster, English Ivy, Kikuyu, Privet, and Wandering Jew.

Accessible stands: Tambo River Cliffs (viewed from across the river), eastern shore of Maringa Creek (viewed across its mouth from Bell Point at Nyerimilang), the west-facing slopes of Kalimna Gully and opposite Mill Point Boat Ramp on Lake Tyers (viewed across the Arm).

Infilling Estuaries Littoral Rainforest
Group 9

Etymology
This floristic community is named for the vegetation whose previous habitat (that once infilled by the accumulation of peat); it now occupies.

Distribution
Victoria: around the eastern edge of the Gippsland Lakes (on the former Reeves River, extinct from Lakes Entrance sand isthmus (but preserved along its eastern extension at the Warm Holes).

Landscape Context
Infilling Estuaries Littoral Rainforest is restricted to the Warm Holes between Lakes Entrance and Lake Bunga and the upper Wingan Inlet. Fire protection is afforded by the sea, beaches, estuaries and old growth Saline Swamp Scrubs. All sites are immediately above the Saline Swamp Scrubs on deltaic deposits. The saline influence is provided by the water table of the nearby estuary.

Habitat and ecology
Infilling Estuaries Littoral Rainforest occupies peat rich soils derived from the depositions laid down by Saline Swamp Scrub on the deltaic deposits of the eastern Gippsland Lakes and Wingan Inlet. Although clearly rainforest in composition and structure; the swampy nature and salinity of the water table and occasional saline inundation are attested to by the presence of the following species (common in Saline Swamp Scrub): Swamp Paperbark *Melaleuca ericifolia*, Saltbush *Rhagodia candolleana*, Creeping Brookweed *Samolus repens*, Shiny Swamp-mat *Selliera radicans*, Bare Twig-sedge *Baumea juncea*, Coast Blown Grass *Lachnagrostis billardieri* and Prickly Couch *Zoysia macrantha.*
The community contains several rare or threatened plants including Coast Mistletoe *Muellerina celastroides* that grows primarily on Coast Banksia *B. integrifolia*, but may also occur on other coastal shrub and rainforest species as well as the very restricted vulnerable Climbing Bent-grass v *Deyeuxia nudiflora* (restricted to the Wingan Inlet stands).
Infilling Estuaries Littoral Rainforest was once probably widespread around the eastern end of the Gippsland Lakes (especially on and around the Lakes Entrance sand isthmus) and the eastern end of what was once Reeves River (today known as Cunninghame Arm and its segmented eastern end (now called the Warm Holes). The Warm Holes stands are the best remaining examples on the Gippsland Lakes.

CHARACTERISTIC SPECIES

Emergent Trees: Coast Banksia *Banksia integrifolia,* Oyster Bay Pine *Callitris rhomboidea* (WIngan Inlet only), Coast Manna Gum *Eucalyptus pryoriana* (Warm Holes only), Manna Gum *Eucalyptus viminalis (Wingan Inlet only)*.

Canopy Trees: Black Wattle *Acacia mearnsii*, Blackwood *Acacia melanoxylon*, Lilly Pilly *Acmena smithii*, Blue Oliveberry *Elaeocarpus reticulatus,* Cherry Ballart *Exocarpos cupressiformis*, Swamp Paperbark *Melaleuca ericifolia*, Common Boobialla *Myoporum insulare*, Sweet Pittosporum *P. undulatum*, Hazel Pomaderris *P. aspera* and Muttonwood *Rapanea howittiana*.

Shrubs: Sallow Wattle *Acacia longifolia* ssp. *longifolia*, Sweet Bursaria *B. spinosa*, Prickly Currant-bush *Coprosma quadrifida*, Hops Goodenia *G. ovata*, Large Mock Olive *Notelaea venosa*, Snowy Daisy-bush *Olearia lirata* and Bootlace Bush *Pimelea axiflora*.

Vines: Staff Climber *Celastrus australis*, Forest Clematis *Clematis glycinoides*, Wombat Berry *Eustrephus latifolius*, Scrambling Lily *Geitonoplesium cymosum*, White Milkvine *Marsdenia rostrata*, Wonga Vine *Pandorea pandorana*, Saltbush *Rhagodia candolleana* and Bearded Tylophora *T. barbata.*

Forbs: Kidney Weed *Dichondra repens*, Annual Cudweed *Euchiton sphaericus*, Germander Raspwort *Gonocarpus teucrioides*, HairyPennywort *H. hirta*, Angled Lobelia *L. anceps*, Broad-leaved Stinkweed *Opercularia ovata*, Creeping Brookweed *Samolus repens*, Shiny Swamp-mat *Selliera radicans*, Fireweed Groundsel *S. linearifolius*, Shrubby Fireweed *S. minimus*, Forest Starwort *Stellaria flaccida* and Trailing Speedwell *Veronica plebia*.

Graminoids: Bare Twig-sedge *Baumea juncea*, Tasman Flax-lily *Dianella tasmanica*, Margined Panic *Entolasia marginata*, Tall Saw-sedge *G. clarkei*, Black-fruit Saw-sedge *Gahnia melanocarpa*, Blady-grass *Imperata cylindrica*, Common Blown-grass *Lachnagrostis filiformis*, Coast Blown Grass *Lachnagrostis billardieri*, Spiny-headed Mat-rush *Lomandra longifolia*, Weeping Grass *Microlaena stipoides*, Long-leaf Wallaby-grass *Notodanthonia longifolia*, Basket Grass *Oplismenus hirtellus*, Sword Tussock-grass *Poa ensiformis*, Common Tussock-grass *P. labillardierei* var. *labillardierei*, Fine-leaf Tussock-grass *Poa meionectes*, and Prickly Couch *Zoysia macrantha*.
Ferns: Bracken *Pteridium esculentum*.

Epiphytes/lithophytes:

Mistletoes/aerial parasites: Rusty Dodder-laurel *Cassytha phaeolasia,* Coast Mistletoe r *Muellerina celastroides* on Coast Banksia.

Threats: urbanisation, land clearing for views, weeds, deer.

Historic depletion: land clearing for residential land and views (Lakes Entrance) and golfing (Lakes Entrance Golf Links).

Ongoing loss of habitat: Urbanisation and weeds

Infilling Estuaries Littoral Rainforest
Group 9

Deer: Sambar Deer, Hog Deer.

Incremental development: urban subdivision, clearing for views.

Weed invasion: Significant as the result of human access and urbanisation.

Weed threats: Bridal Creeper, other Asparagaceous weeds, Cape Ivy, Dolichos Pea, English Ivy, Kikuyu, Mirror-bush, Panic Veldt-grass and Rambling (Turkey) Dock.

Accessible stands: Warm Holes at the western end of the Lake Bunga Foreshore Reserve.

LAKES ENTRANCE RAINFOREST AND LIKELY PAST RAINFOREST SITES (MAP)

METUNG AND NUNGURNER

EAST GIPPSLAND RAINFOREST CONSERVATION MANAGEMENT NETWORK.

Chapter 2

CONTENTS

SUMMARY

Metung and Nungurner retains some of the most significant stands of rainforest left in Victoria that have both state and national significance, including:

- A major portion of a nationally significant aggregation of Littoral Rainforest stands' habitat (the largest in south eastern Australia) that used to once stretch along the northern shore of the Gippsland Lakes from the mouth of the Mitchell River into the North Arm. This includes three threatened floristic communities of Littoral Rainforest:
    - *East Gippsland Deltaic* Littoral Rainforest;
    - *Bung Yarnda* Littoral Rainforest; and
- Two Flora and Fauna Guarantee Act (1988)-listed floristic communities of Warm Temperate Rainforest:
    - *Alluvial Terraces* Warm Temperate Rainforest; and
    - *East Gippsland Coastal* Warm Temperate Rainforest.
- Two nationally threatened and Environmental Protection and Biodiversity Conservation Act (1999)-listed species;
    - Swift Parrot and Grey-headed Flying Fox

All of the rainforests of the Metung and Nungurner area are threatened, many provide habitat for both Environmental Protection and Biodiversity Conservation Act (1999)-listed animals. Much of this rainforest estate has been cleared and all of the rainforest vegetation is either listed as threatened under State's Flora and Fauna Guarantee Act (1988) (the Warm Temperate Rainforest floristic communities) or is in the final stages of the nomination process (the Littoral Rainforest floristic communities) under the Federal Environmental Protection and Biodiversity and Conservation Act (1999).

The EG Council and the community has obligations under these acts of Parliament to conserve these threatened rainforest communities as well as their threatened plants and animals. Conservation and maintenance of these values requires rainforest conservation both through the preservation of existing stands and the rehabilitation and restoration of a significant proportion of the degraded or previously cleared rainforest habitat. If as a community we choose to conserve and restore these rainforest habitats then we have taken the biggest step towards conserving the cargo of rare and threatened species they contain.

Fortunately there are significant synergies available between sensible planning overlays that deal with land not suitable for development, erosion risk and storm water management and nutrient processing whilst maintaining or restoring rainforests in Metung and Nungurner area.

These synergies fall into the following groupings:

1. Gully systems with land too steep for development and the conservation and restoration of two Flora and Fauna Guarantee listed floristic communities of Warm Temperate Rainforest;
2. Marginal bluffs and steep valley sides (Natural Systems Analysis Plan 1) between Mairburn Road and Tambo Bluff and the gully systems associated with Chinamans Creek, Archibald Drive, Box's Creek and Nungurner Hills gully systems. Some of these areas if reserved for erosion protection, could also be used to ensure the conservation of threatened of newly described Littoral Rainforests (currently in the nomination process under the Environmental Protection and Biodiversity Conservation Act 1999);
3. Storm water and nutrient processing along gully systems through the conservation and restoration of listed Warm Temperate Rainforest communities that have been locally proven to strip 70% of floodwater phosphorous and 88% of ground water phosphorous (Peel in prep. a).

Conservation status of rainforest in the Metung and Nungurner Urban Area

The following floristic communities (Table 1), their conservation status and the threats to them (Table 2) and their threatened species [Table 3 (plants) and Table 4 (animals)] and their depletion by locality (Table 5), need to be recognised by the Council and community.

- There are two ecological vegetation classes of rainforest present in the area (Warm Temperate Rainforest and Littoral Rainforest) with five distinct floristic communities represented (Table 1.).

Rainforest values to the environment and the community at large

In Victoria rainforests conserve 4% of the states plant diversity (30% of which are rare and threatened species), despite occupying less than 0.14% of the State's land area.

- Rainforests are excellent water processors and have been proven locally to strip up to 70% of the phosphorous from surface storm water and 88% from ground water. This works best in streams of up to third order (which matches all of the stream orders of the gully systems in the area);
- Rainforests are fire retardant and so their presence in the urban environment is a benefit in this regard;
- Rainforests consist of species that are restricted in the landscape that can only be conserved by protecting rainforests and their fringing ecotones;
- Rainforest on or adjacent to properties is a major selling point for real estate; and
- Rainforests enable urban kids to experience the bush with relative safety near to home.

Constraints imposed by the conservation status of rainforest

All of the Warm Temperate Rainforest and Littoral Rainforest communities of East Gippsland are protected by the NVP regulations. All of the Warm Temperate Rainforest and Littoral Rainforest floristic communities within the Metung and Nungurner urban area are threatened.

None of the rainforests in the area will survive without concerted local government and community actions that include zoning to protect existing rainforest remnants and their ecotones and zoning to conserve currently cleared habitat to ensure planning and subsequent development allow recovery of the rainforests in their past habitat.

Significant stands of native vegetation (both Littoral and Warm Temperate Rainforests) have not been recorded in local Council documents. These strands occur on the northern shore of Lake King (Tambo Bay) between Mairburn Road and Tambo Bluff (Littoral Rainforests) and the Warm Temperate Rainforests of the gully systems associated with Chinamans Creek.

The lack of reference to rainforest has meant that its significance is overlooked.

Benefits of conserving existing stands of rainforest and the currently cleared habitat of rainforest

The following benefits will accrue if the Council adopts planning measures to conserve these areas of the landscape:

- High tunnel and gully erosion-risk areas will be protected and erosion risks to infrastructure and housing will be reduced;
- Obligations under the Federal Environmental Protection and Biodiversity Conservation Act (1999) and State Flora and Fauna Guarantee Act (1999) will be met;
- Nationally and State-listed rainforest vegetation as well as their cargo of rare and threatened plants and animals will be conserved;
- Storm water treatment is facilitated by the restoration of rainforests to gully systems in the Metung and Nungurner area;
- Nutrient stripping (particularly phosphorous) will remove up to 70% of phosphorous and if combined with the reinstatement of wetlands at the mouths of rainforest gullies nitrogen sequestration is enhanced as well;
- Urban and landscape amenity is improved and the environment is conserved.

Table 1. Rainforests of the Metung and Nungurner Urban Area.

Ecological vegetation class Habitat features	Floristic community	Habitat Localities in the urban area
Warm Temperate Rainforest Habitat features: • Moist localities; • Fire protected	*East Gippsland Alluvial Terraces* Warm Temperate Rainforest	Habitat: alluvial soils on creek flats and gully floors of all of the major gully systems Localities: gullies of Chinamans Creek
	East Coastal Warm Temperate Rainforest	Habitat: gully sides on limestone or outwash alluviums Localities: Gullies of Chinamans Creek
Littoral Rainforest Habitat features: • Exposed sites • Saline influence (wind, water, water tables or geology); • Fire protected	*East Gippsland Deltaic* Littoral Rainforest	Habitat: Deltaic deposits around estuaries Localities: the flat foreshore areas from Archibald Drive westward towards Kings Cove
	Limestone Littoral Rainforest	Habitat: steep slopes of limestone with north or west aspects. Localities: on steep escarpments between Fishermans Landing Arm and Mill Point Arm
	Bung Yarnda Littoral Rainforest	Habitat: The marginal bluffs and subtending sand flats around Lake Tyers. Localities: on marginal bluffs along Shelly Beach and the steep escarpments between Fishermans Landing Arm and Mill Point Arm

*See Attachment 1.

Table 2. Conservation status of rainforests that occur in the Metung and Nungurner UDF study area and the threats to them..

Floristic community	Conservation status	Threats
East Gippsland Alluvial Terraces Warm Temperate Rainforest	Threatened Flora and Fauna Guarantee-listed	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (subdivision of cleared habitat, weed invasion) Global warming (increased fire frequency and intensity, rising sea levels)
East Gippsland Coastal Warm Temperate Rainforest	Threatened Flora and Fauna Guarantee-listed	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (subdivision of cleared habitat, weed invasion) Global warming (increased fire frequency and intensity, rising sea levels)
Bung Yarnda Littoral Rainforest	Threatened: currently under consideration in the nomination process under the Federal Environmental Protection and Biodiversity Conservation Act (1999).	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (weed invasion) Coastal recreation and associated infrastructure Global warming (increased fire frequency and intensity)
Limestone Littoral Rainforest	Threatened: currently under consideration in the nomination process under the Federal Environmental Protection and Biodiversity Conservation Act (1999).	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (weed invasion) Coastal recreation and associated infrastructure Global warming (increased fire frequency and intensity))

Table 3. Rare or threatened plants that occur in the rainforests of the Metung and Nungurner UDF study area.

Name	IUCN	EPBC	AROTS	VROTS	FFG	Action Statement	**Rainforest type**
Yellowwood *Acronychia oblongifolia*	e			r			*East Gippsland Deltaic* LRf; *Bung Yarnda* LRf; East *East Gippsland Coastal* WTRf; *Alluvial Terraces*
Coast Grey Box *Eucalyptus bosistoana*				r			*Limestone* LRf
Viscid Daisy-bush *Olearia viscosa*				v			*Limestone* LRf
Spicy Everlasting *Ozothamnus argophyllus*				r			*East Gippsland Deltaic* LRf; *Bung Yarnda* LRf; *Limestone* LRf

Table 4. Rare or threatened animals*, which occur (have been recorded) in the rainforests of the Metung and Nungurner Urban Design Framework study area.

Name	**Division Name**	**ESP**	**AROTS**	**VROTS**	**FFG**	**TR**	**CAMBA/ JAMBA**	**Notes**
Azure Kingfisher *Alcedo azurea*	Birds			n	L			Nests in LRf/WTRf
Grey-headed Flying-fox *Pteropus poliocephalus*	Mammals	VU	V	v	L			Food: LRF/WTRf, roosts: WTRf
Powerful Owl *Ninox strenua*	Birds			v	L			Hunts and roosts: WTRf
Swift Parrot *Lathamus discolor*	Birds	EN	E	e	L			Feeds: LRf/WTRf
White-bellied Sea-Eagle *Haliaeetus leucogaster*	Birds			v	L	1	1/-	Nests: WTRf

*Bold are rainforest dependant in the district; underlined are those that breed in rainforests of the district.

Depletion through land clearing, coastal recreation, urbanisation, grazing and weed invasion

One of the major reasons for the Network submission relates to habitat loss for rainforests in the Metung and Nungurner area. This habitat loss and the ongoing threats that continue to degrade and erode the remaining areas of rainforest in the district are directly related to urban development, coastal recreation and ongoing grazing and weed invasion. Drawing the Council's attention to this on a site by site basis should enable planning to accommodate both the urban development and conservation needs of rainforests in the area.

Depletion by locality

The causes of depletion of rainforests in the Metung and Nungurner area, the planning solutions and benefits are listed in Table 5.

Tunnel erosion

This is a very real and serious threat to existing urban areas in Metung and Nungurner and the mistakes of the past (allowing development on high risk areas) should not be repeated in the future urban developments.

Tunnel erosion occurs where sodic clay soils dissolve and are transported down slope. Over time huge cavities are created and the overlying soils collapse creating gully erosion. This represents a serious threat to infrastructure including roads and housing.

The occurrence of tunnel erosion shows a strong correlation between land clearing, sodic soils and steep topography. The areas of greatest risk roughly align with the steep areas shown in the Natural Systems Analysis Plan 1.

Suggested solution: the council should prevent the subdivision of steep areas and these should be reserved to:

- Maintain geological stability;
- Ensure erosion protection;
- Maintain urban amenity;
- Enhance landscape values; and
- Provide for the conservation of rainforest vegetation and its cargo of rare or threatened plants and animals.

This action would conserve much of the existing rainforest as well as preserving much of its former habitat that has been cleared in the past so that it may be restored in the future.

Benefits of this course of action:

- Housing and infrastructure is not put at risk by tunnel erosion;
- The rate of tunnel erosion is slowed; and
- Remedial measures to deal with tunnel erosion (if required) will have a minimal impact on the built environment.

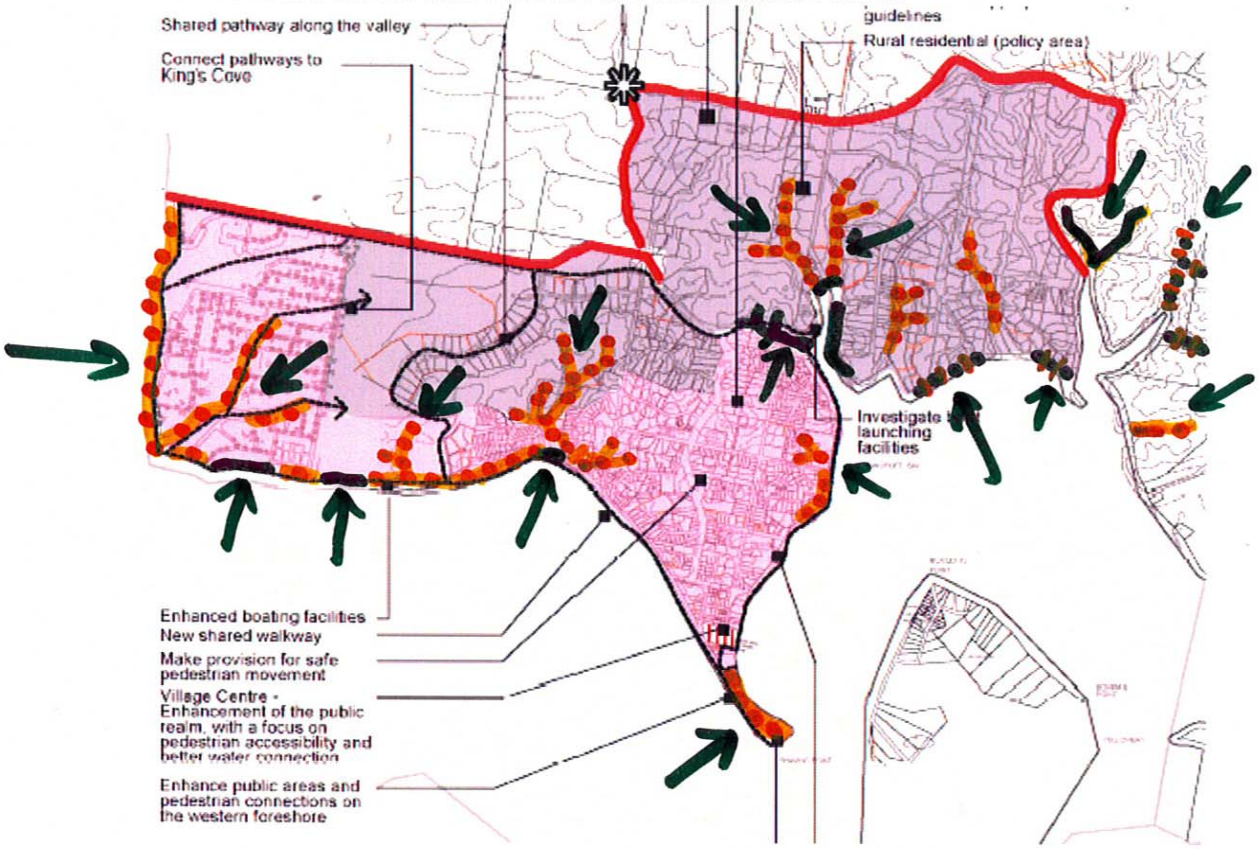
Table 5. Depletion of rainforest and planning solutions and benefits

Locality	Causes of depletion	Ongoing threats	Planning solution and benefits
Littoral Rainforests: Northern shore of Lake King (Tambo Bay) between Mairburn Road and Tambo Bluff (lakeshore flats and lakeshore cliffs), lakeshore slopes of Chinaman's Creek Bancroft Bay	Past clearing originally for agriculture but more recently for urban development and coastal recreation infrastructure	Weed invasion, further lakeshore development (recreation and/or development)	Planning solution: Ensure subdivision setbacks to establish/maintain lakeshore reserves. Benefits: risk of tunnel and gully erosion to roading and housing reduced; rainforest conservation enhanced; landscape amenity (particularly from the lake) improved.
Warm Temperate Rainforests: Archibald Drive gully system, Chinaman's Creek gully systems, Box's Creek and Nungurner Hills gully systems	Past clearing originally for agriculture but more recently for urban development and coastal recreation infrastructure	Grazing, subdivision	Planning solution: These steep areas are unsuitable for development and should be reserved for conservation and as drainage reserves. Further subdivision of these gullies should be stopped and the reserves consolidated at the point of development or through covenanting. Benefits: Improved health of Gippsland Lakes through nutrient processing (phosphorous and nitrogen sequestration); reduced risk of tunnel erosion and gully erosion, improved landscape amenity, passive recreation, improved fire

References

Peel, B. (in prep. a). Rainforest Restoration Manual for south eastern Australia. The how to book on what we have learnt so that you can do it. Includes: Cool Temperate Rainforests, Warm Temperate Rainforests, Subtropical Rainforests, Gallery Rainforests, Dry Rainforests and Littoral Rainforests. C.S.I.R.O.
Peel, B. (in prep. b). Littoral Rainforests of south eastern Australia: composition, ecology and management.

METUNG RAINFOREST AND LIKELY PAST RAINFOREST SITES



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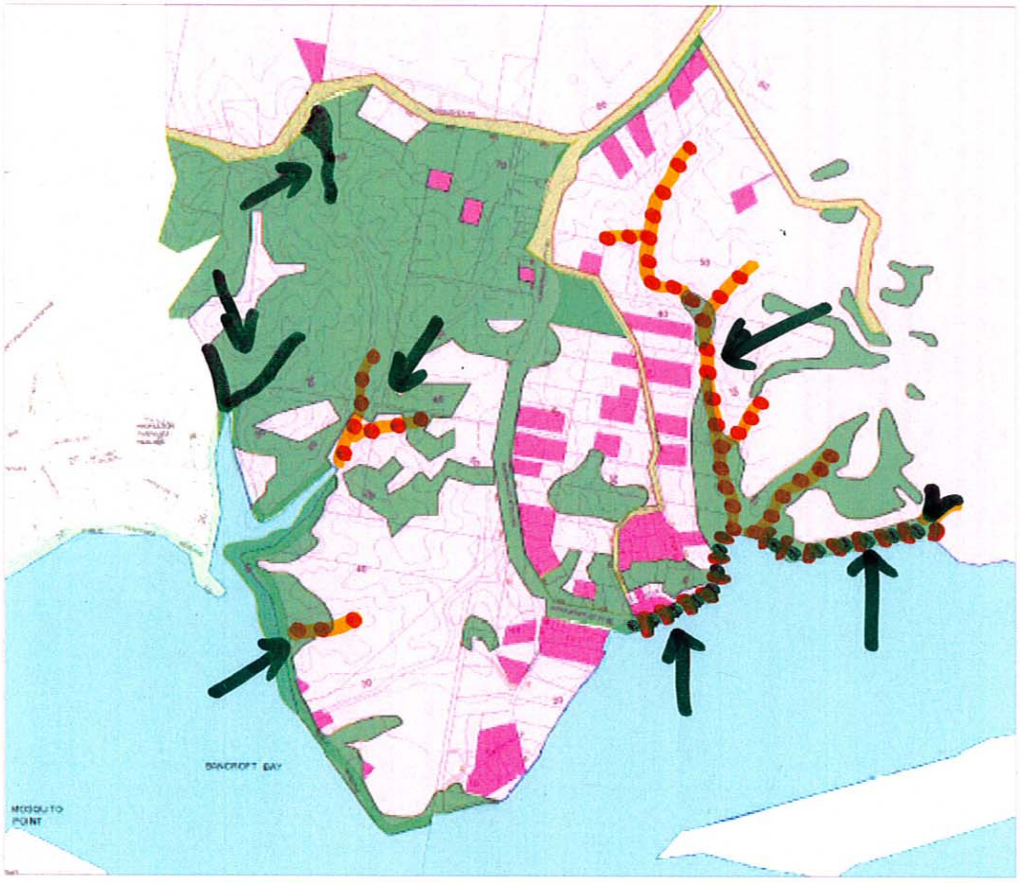
LIKELY BUT NOT FIELD CHECKED

PAST HABITAT (NOW CLEARED)

NUNGURNER RAINFOREST AND LIKELY PAST RAINFOREST SITES



LEGEND

KNOWN SITES

LIKELY BUT NOT FIELD CHECKED

PAST HABITAT (NOW CLEARED)

LAKE TYERS

EAST GIPPSLAND RAINFOREST CONSERVATION MANAGEMENT NETWORK.

Chapter 2

CONTENTS

SUMMARY

Lake Tyers area retains some significant stands of rainforest including:

- *Limestone* Littoral Rainforest;
- *Bung Yarnda* Littoral Rainforest; and

- Two Flora and Fauna Guarantee Act (1988)-listed floristic communities of Warm Temperate Rainforest (once present, but now extinct in the area):
  - *Alluvial Terraces* Warm Temperate Rainforest; and
  - *East Gippsland Coastal* Warm Temperate Rainforest.
- Rare or threatened species including one Flora and Fauna Guarantee Act listed species (Table 3):
  - Four rare or threatened plant species with many more likely to have been present before clearing
- Several nationally threatened and Environmental Protection and Biodiversity Conservation Act (1999)-listed species (Table 4);
  - Swift Parrot and Grey-headed Flying Fox

All of the rainforests of the Lake Tyers area are threatened, many provide habitat for both Environmental Protection and Biodiversity Conservation Act (1999)-listed plants and Flora and Fauna Guarantee Act (2988)-listed plants and animals.

Much of this rainforest estate has been cleared and all of the rainforest vegetation is either listed as threatened under State's Flora and Fauna Guarantee Act (1988) (the Warm Temperate Rainforest floristic communities) or is in the final stages of the nomination process (the Littoral Rainforest floristic communities) under the Federal Environmental Protection and Biodiversity and Conservation Act (1999).

The EG Council and the community has obligations under these acts of Parliament to conserve these threatened rainforest communities as well as their threatened plants and animals. Conservation and maintenance of these values requires rainforest conservation both through the preservation of existing stands and the rehabilitation and restoration of a significant proportion of the degraded or previously cleared rainforest habitat in the area. If as a community we choose to conserve and restore these rainforest habitats then we have taken the biggest step towards conserving the cargo of rare and threatened species they contain.

Fortunately there are significant synergies available across the area between sensible planning overlays that deal with land not suitable for development, erosion risk and storm water management and nutrient processing whilst maintaining or restoring rainforests in Lake Tyers area.

These synergies fall into the following groupings:

1. Marginal bluffs occur along the lakeshore and the Ninety Mile Beach. These areas are subject to landslip and tunnel erosion. This provides habitat to Littoral Rainforest and should be left vegetated;
2. Storm water and nutrient processing along gully systems through the conservation and restoration of listed Warm Temperate Rainforest communities that have been locally proven to strip 70% of floodwater phosphorous and 88% of ground water phosphorous (Peel in prep. a).

Very large and significant stands of native vegetation (mostly Littoral Rainforests) have not been recorded in various EG Council plans. These omissions occur on the east facing marginal bluff of Lake Tyers between Fishermans Landing Arm and Mill Point Arm. They include the following: the floristic communities (Table 1), their conservation status and the threats to them (Table 2) and their threatened species [Table 3 (plants) and Table 4 (animals)] and rainforest depletion by locality (Table 5).

Conservation status of rainforest in the Lake Tyers Urban Area

- There are two ecological vegetation classes of rainforest present in the area (Warm Temperate Rainforest and Littoral Rainforest) with two distinct floristic communities represented (Table 1.).

Rainforest values to the environment and the community at large

In Victoria rainforests conserve 4% of the states plant diversity (30% of which are rare and threatened species), despite occupying less than 0.14% of the State's land area.

- Rainforests are excellent water processors and have been proven locally to strip up to 70% of the phosphorous from surface storm water and 88% from ground water. This works best in streams of up to third order (which matches all of the stream orders of the gully systems in the area);
- Rainforests are fire retardant and so their presence in the urban environment is a benefit in this regard;
- Rainforests consist of species that are restricted in the landscape that can only be conserved by protecting rainforests and their fringing ecotones;
- Rainforest on or adjacent to properties is a major selling point for real estate; and
- Rainforests enable urban kids to experience the bush with relative safety near to home.

Constraints imposed by the conservation status of rainforest

All of the Warm Temperate Rainforest and Littoral Rainforest communities of East Gippsland are protected by the NVP regulations. All of the Warm Temperate Rainforest and Littoral Rainforest floristic communities within the Lake Tyers urban area are threatened. None of the rainforests in the area will survive without concerted local government and community actions that include zoning to protect existing rainforest remnants and their ecotones and zoning to conserve currently cleared habitat to ensure planning and subsequent development allow recovery of the rainforests in their past habitat.

Benefits of conserving existing stands of rainforest and the currently cleared habitat of rainforest

The following benefits will accrue if the Council adopts planning measures to conserve these areas of the landscape:

- High tunnel and gully erosion-risk areas will be protected and erosion risks to infrastructure and housing will be reduced;
- Obligations under the Federal Environmental Protection and Biodiversity Conservation Act (1999) and State Flora and Fauna Guarantee Act (1999) will be met;
- Nationally and State-listed rainforest vegetation as well as their cargo of rare and threatened plants and animals will be conserved;
- Storm water treatment is facilitated by the restoration of rainforests to gully systems in the Lake Tyers area;
- Nutrient stripping (particularly phosphorous) will remove up to 70% of phosphorous and if combined with the reinstatement of wetlands at the mouths of rainforest gullies nitrogen sequestration is enhanced as well;
- Urban and landscape amenity is improved and the environment is conserved.

Table 1. Rainforests of the Lake Tyers Urban Area.

Ecological vegetation class Habitat features	Floristic community	Habitat Localities in the urban area
Warm Temperate Rainforest Habitat features: • Moist localities; Fire protected	*East Gippsland Alluvial Terraces* Warm Temperate Rainforest	Habitat: alluvial soils on creek flats and gully floors of all of the major gully systems Localities: gully floors of gully systems feeding Fishermans Landing Arm
	East Coastal Warm Temperate Rainforest	Habitat: gully sides on limestone or outwash alluviums Localities: all of the steeper-sided gully systems feeding Fishermans Landing Arm
Littoral Rainforest Habitat features: • Exposed sites • Saline influence (wind, water, water tables or geology); • Fire protected	*Limestone* Littoral Rainforest	Habitat: steep slopes of limestone with north or west aspects. Localities: on steep escarpments between Fishermans Landing Arm and Mill Point Arm
	Bung Yarnda Littoral Rainforest	Habitat: The marginal bluffs and subtending sand flats around Lake Tyers. Localities: on marginal bluffs along Shelly Beach and the steep escarpments between Fishermans Landing Arm and Mill Point Arm

*See Attachment 1.

Table 2. Conservation status of rainforests that occur in the Lake Tyers area and the threats to them.

Floristic community	Conservation status	Threats
East Gippsland Alluvial Terraces Warm Temperate Rainforest	Threatened Flora and Fauna Guarantee-listed	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (subdivision of cleared habitat, weed invasion) Global warming (increased fire frequency and intensity, rising sea levels)
East Gippsland Coastal Warm Temperate Rainforest	Threatened Flora and Fauna Guarantee-listed	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (subdivision of cleared habitat, weed invasion) Global warming (increased fire frequency and intensity, rising sea levels)
Bung Yarnda Littoral Rainforest	Threatened: currently under consideration in the nomination process under the Federal Environmental Protection and Biodiversity Conservation Act (1999).	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (weed invasion) Coastal recreation and associated infrastructure Global warming (increased fire frequency and intensity)
Limestone Littoral Rainforest	Threatened: currently under consideration in the nomination process under the Federal Environmental Protection and Biodiversity Conservation Act (1999).	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (weed invasion) Coastal recreation and associated infrastructure Global warming (increased fire frequency and intensity))

Table 3. Rare or threatened plants that occur in the rainforests of the Lake Tyers area.

Name	IUCN	EPBC	AROTS	VROTS	FFG	Action Statement	**Rainforest type**
Maidens Wattle *Acacia maidenii*				e	L	A	*Bung Yarnda* LRf
Yellowwood *Acronychia oblongifolia*	e			r			*East Gippsland Deltaic* LRf; *Bung Yarnda* LRf; East *East Gippsland Coastal* WTRf; *Alluvial Terraces* WTRf
Wallaby-bush *Beyeria lasiocarpa*				r			*East Gippsland Coastal* WTRf
Pinkwood *Beyeria viscosa*				r			*East Gippsland Coastal* WTRf
Coast Grey Box *Eucalyptus bosistoana*				r			*Limestone* LRf
Maidens Gum *Eucalyptus globulus* subsp. *maidenii*				r			*Bung Yarnda* LRf; East *Gippsland Coastal* WTRf
Bolwarra *Eupomatia laurina*				r			
Jointed Mistletoe *Korthalsella rubra* subsp. *rubra*				v			*East Gippsland Deltaic* LRf; *Alluvial Terraces* WTRf
Yellow Loosestrife *Lysimachia japonica*	e			v			*East Gippsland Coastal* WTRf; *Alluvial Terraces* WTRf
Yellow Milkvine *Marsdenia flavescens*				r			*East Gippsland Coastal* WTRf; *Alluvial Terraces* WTRf
Viscid Daisy-bush *Olearia viscosa*				v			*Limestone* LRf
Spicy Everlasting *Ozothamnus argophyllus*				r			*East Gippsland Deltaic* LRf; *Bung Yarnda* LRf; *Limestone* LRf
Limestone Pomaderris *P. oraria* subsp. *calcicola*				r			*Limestone* LRf
Star Cucumbr *Sicyos australis*				v			*East Gippsland Coastal* WTRf
Sandfly Zieria *Z. smithii* subsp. *smithii*				r			*East Gippsland Coastal* WTRf, *Bung Yarnda* LRf

NOTE: Species in red are likely to have been present in areas now cleared (ie are present in the uncleared habitats of these vegetation communities nearest to Lake

Table 4. Rare or threatened animals*, which occur (have been recorded) in the rainforests of the Lake Tyers area.

Name	Division Name	ESP	ARO TS	VRO TS	FFG	TR	CAMBA/ JAMBA	Notes
Azure Kingfisher *Alcedo azurea*	Birds			n	L			Nests in LRf/WTRf
Diamond Python *Morelia spilota spilota*	Reptiles			e				Credible record in district
Grey Goshawk *Accipiter novaehollandiae*	Birds			v	L			Nests and hunts: WTRf
Grey-headed Flying-fox *Pteropus poliocephalus*	Mammals	VU	V	v	L			Food: LRF/WTRf, roosts: WTRf
Long-nosed Potoroo *Potorous tridactylus*	Mammals	VU	V	e	L			LRf
Powerful Owl *Ninox strenua*	Birds			v	L			Hunts and roosts: WTRf
Sooty Owl *Tyto tenebricosa*	Birds			v	L			Hunts and roosts: WTRf
Swift Parrot *Lathamus discolor*	Birds	EN	E	e	L			Feeds: LRf/WTRf
Tree Goanna *Varanus varius*	Reptiles			v				Inhabits WTRf
White-bellied Sea-Eagle *Haliaeetus leucogaster*	Birds			v	L	1	1/-	Nests: WTRf

*Bold are rainforest dependant in the district; underlined are those that breed in rainforests of the district.

Depletion through land clearing, coastal recreation, urbanisation, grazing and weed invasion

One of the major reasons for the CMN's concern relates to habitat loss for rainforests in the Lake Tyers area. This habitat loss and the ongoing threats that continue to degrade and erode the remaining areas of rainforest in the district are directly related to urban development, coastal recreation and ongoing grazing and weed invasion. Drawing the EG Council's attention to this on a site by site basis should enable planning to accommodate both the urban development and conservation needs of rainforests in the area.

Depletion by locality

The causes of depletion of rainforests in the Lake Tyers area, the planning solutions and benefits are listed in Table 5.

Tunnel erosion

This is a very real and serious threat to existing urban areas in Lake Tyers and the mistakes of the past (allowing development on high risk areas such as have occurred in Lakes Entrance) have on the whole in Lake Tyers been avoided through good planning. Tunnel erosion occurs where sodic clay soils dissolve and are transported down slope. Over time huge cavities are created and the overlying soils collapse creating gully erosion.

However, this represents a serious threat to infrastructure including roads and housing on the marginal bluff behind Shelly Beach where many residents have cleared the native vegetation along the top of the escarpment to illegally obtain ocean views. This action puts their own properties at considerable risk of tunnel erosion and landslip.

Suggested solution: the EG Council should prevent further cliff-top clearing and should reinstate vegetation in order to:

- Maintain geological stability;
- Ensure erosion protection;
- Maintain landscape amenity (from Shelly Beach);
- Enhance landscape values; and
- Provide for the conservation of rainforest vegetation and its cargo of rare or threatened plants and animals.

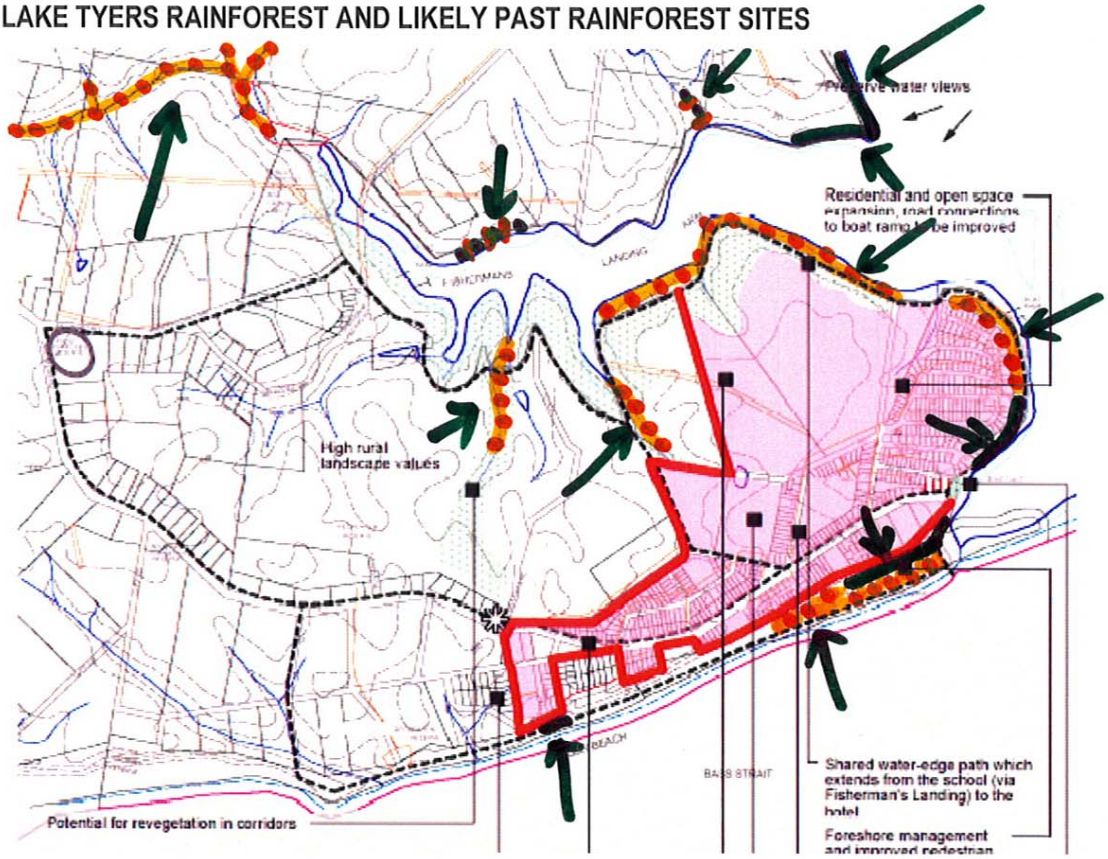
Benefits of this course of action:

- Housing and infrastructure is put at a reduced risk by tunnel erosion or landslip; and
- The rate of tunnel erosion is slowed.

Table 5. Depletion of rainforest and planning solutions and benefits

Locality	Causes of depletion	Ongoing threats	Planning solution and benefits
Littoral Rainforests: Shelly Beach and Lake Tyers escarpments	Clearing of cliff-top and slope vegetation	Illegal clearing for views, fire, weed invasion	Planning solution: Ensure illegal clearing is controlled, reinstate damaged or cleared native vegetation; minimise cliff top to bottom access trails to currently formed tracks, close off other tracks. Benefits: Improved landscape amenity, reduced risks of tunnel erosion and landslip.
Warm Temperate Rainforests: Gully systems feeding into Fisherman's Landing Arm	Land clearing	Grazing, weed invasion, urban subdivision	Planning solution: These steep areas are unsuitable for development and should be reserved for conservation and as drainage reserves. Further subdivision of these gullies should be stopped and the reserves consolidated at the point of development or through covenanting. Benefits: Improved health of Lake Tyers through nutrient processing (phosphorous and nitrogen sequestration); reduced risk of tunnel erosion and gully erosion, improved landscape amenity, passive recreation, improved fire protection.

LAKE TYERS RAINFOREST AND LIKELY PAST RAINFOREST SITES



LEGEND

KNOWN SITES

LIKELY BUT NOT FIELD CHECKED

PAST HABITAT (NOW CLEARED)

MARLO

EAST GIPPSLAND RAINFOREST CONSERVATION MANAGEMENT NETWORK.

Chapter 2

CONTENTS

SUMMARY

Marlo retains some of the most significant stands of rainforest left in Victoria that have both state and national significance, including:

- The largest and best developed stands of *Damp Sands* Littoral Rainforest stands occur within the Marlo area (with relatively little occurring further east along French's Narrows) This includes the threatened floristic community of *Damp Sands* Littoral Rainforest:
- Two nationally threatened and Environmental Protection and Biodiversity Conservation Act (1999)-listed species;
    - Swift Parrot and Grey-headed Flying Fox

All of the rainforests of the Marlo area are in the final stages of the nomination process (the Littoral Rainforest floristic communities) under the Federal Environmental Protection and Biodiversity and Conservation Act (1999).

The EG Council and the community has obligations under these acts of Parliament to conserve these threatened rainforest communities as well as their threatened plants and animals. Conservation and maintenance of these values requires rainforest conservation both through the preservation of existing stands and the rehabilitation and restoration of a significant proportion of the degraded or previously cleared rainforest habitat in the UDF study area. If as a community we choose to conserve and restore these rainforest habitats then we have taken the biggest step towards conserving the cargo of rare and threatened species they contain.

Fortunately there are significant synergies available across the area between sensible planning overlays that deal with land not suitable for development, erosion risk and storm water management and nutrient processing whilst maintaining or restoring rainforests in Marlo area.

These synergies fall into the following groupings:

1. Marginal bluffs and steep valley sides if protected could be used to ensure the conservation of newly described Littoral Rainforests (currently in the nomination process under the Environmental Protection and Biodiversity Conservation Act 1999);
2. Storm water and nutrient processing in the short steep gully systems of the marginal bluff systems through the conservation and restoration of the Littoral Rainforest that have been locally proven to strip 70% of floodwater phosphorous and 88% of ground water phosphorous (Peel in prep. a).

The EG Shire records the rainforest in the area as Dry Rainforest. It is in fact Littoral Rainforests (Peel in prep. b). Also unfortunately the following is not listed: the floristic community (Table 1), its conservation status and the threats to it (Table 2) and their threatened species [Table 3 (plants) and Table 4 (animals)].

Conservation status of rainforest in the Marlo Urban Area

- There is one ecological vegetation class of rainforest present in the study area (Littoral Rainforest) with one distinct floristic community represented (Table 1.).

Rainforest values to the environment and the community at large

In Victoria rainforests conserve 4% of the states plant diversity (30% of which are rare and threatened species), despite occupying less than 0.14% of the State's land area.

- Rainforests are excellent water processors and have been proven locally to strip up to 70% of the phosphorous from surface storm water and 88% from ground water. This works best in streams of up to third order (which matches all of the stream orders of the gully systems in the area);
- Rainforests are fire retardant and so their presence in the urban environment is a benefit in this regard;
- Rainforests consist of species that are restricted in the landscape that can only be conserved by protecting rainforests and their fringing ecotones;
- Rainforest on or adjacent to properties is a major selling point for real estate; and
- Rainforests enable urban kids to experience the bush with relative safety near to home.

Constraints imposed by the conservation status of rainforest

All of the Warm Temperate Rainforest and Littoral Rainforest communities of East Gippsland are protected by the NVP regulations. All of the Littoral Rainforest floristic communities within the Marlo urban area are threatened. None of the rainforests in the area will survive without concerted local government and community actions that include zoning to protect existing rainforest remnants and their ecotones and zoning to conserve currently cleared habitat to ensure planning and subsequent development allow recovery of the rainforests in their past habitat.

Benefits of conserving existing stands of rainforest and the currently cleared habitat of rainforest

The following benefits will accrue if the council adopts planning measures to conserve these areas of the landscape:

- High tunnel and gully erosion-risk areas will be protected and erosion risks to infrastructure and housing will be reduced;
- Obligations under the Federal Environmental Protection and Biodiversity Conservation Act (1999) and State Flora and Fauna Guarantee Act (1999) will be met;
- Nationally and State-listed rainforest vegetation as well as their cargo of rare and threatened plants and animals will be conserved;
- Storm water treatment is facilitated by the restoration of rainforests to gully systems in the Marlo area;
- Nutrient stripping (particularly phosphorous) will remove up to 70% of phosphorous and if combined with the reinstatement of wetlands at the mouths of rainforest gullies nitrogen sequestration is enhanced as well;
- Urban and landscape amenity is improved and the environment is conserved.

Table 1. Rainforests of the Marlo Urban Area.

Ecological vegetation class Habitat features	Floristic community	Habitat Localities in the urban area
Littoral Rainforest Habitat features: • Exposed sites • Saline influence (wind, water, water tables or geology); • Fire protected	*Damp Sands* Littoral Rainforest*	Habitat: Marginal bluffs of laterized Pleistocene sands. Localities: the full length of the Marlo Foreshore (in more or less continuous stands) from the yacht club east to French's Narrows, including MOTS Beach.

*See Attachment 1.

Table 2. Conservation status of rainforests that occur in the Marlo UDF study area and the threats to them.

Floristic community	Conservation status	Threats
Damp Sands Littoral Rainforest	Threatened: currently under consideration in the nomination process under the Federal Environmental Protection and Biodiversity Conservation Act (1999).	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (weed invasion) Coastal recreation and associated infrastructure Global warming (increased fire frequency and intensity)

Table 3. Rare or threatened plants that occur in the rainforests of the Marlo UDF study area.

Name	IUCN	EPBC	AROTS	VROTS	FFG	Action Statement	Rainforest type
Upright Panic *Entolasia stricta*				k			*Damp Sands* LRf
Spicy Everlasting *Ozothamnus argophyllus*				r			*Damp Sands* LRf

Table 4. Rare or threatened animals*, which occur (have been recorded) in the rainforests of the Marlo Urban Design Framework study area.

Name	Division Name	ESP	AROTS	VROTS	FFG	TR	CAMBA/ JAMBA	Notes
Azure Kingfisher *Alcedo azurea*	Birds			n				Nests in LRf/WTRf
Grey-headed Flying-fox *Pteropus poliocephalus*	Mammals	VU	V	v	L			Food: LRF/WTRf, roosts: WTRf
Long-nosed Potoroo *Potorous tridactylus*	Mammals	VU	V	e	L			LRf
Swift Parrot *Lathamus discolor*	Birds	EN	E	e	L			Feeds: LRf/WTRf
Tree Goanna *Varanus varius*	Reptiles			v				Inhabits WTRf
White-bellied Sea-Eagle *Haliaeetus leucogaster*	Birds			v	L	1	1/-	Nests: WTRf

*Bold are rainforest dependant in the district; underlined are those that breed in rainforests of the district.

Depletion through land clearing, coastal recreation, urbanisation, grazing and weed invasion

One of the major reasons for the CMN's concerns relates to habitat loss for rainforests in the Marlo area. This habitat loss and the ongoing threats that continue to degrade and erode the remaining areas of rainforest in the district are directly related to urban development, coastal recreation and ongoing grazing and weed invasion. Drawing the Council's attention to this on a site by site basis should enable planning to accommodate both the urban development and conservation needs of rainforests in the area.

Depletion by locality

The causes of depletion of rainforests in the Marlo area, the planning solutions and benefits are listed in Table 5.

References

Peel, B. (in prep. a). Rainforest Restoration Manual for south eastern Australia. The how to book on what we have learnt so that you can do it. Includes: Cool Temperate Rainforests, Warm Temperate Rainforests, Subtropical Rainforests, Gallery Rainforests, Dry Rainforests and Littoral Rainforests. C.S.I.R.O.

Peel, B. (in prep. b). Littoral Rainforests of south eastern Australia: composition, ecology and management.

Table 5. Depletion of rainforest and planning solutions and benefits

Locality	Causes of depletion	Ongoing threats	Planning solution and benefits
The full length of the Marlo Foreshore from the yacht club east to French's Narrows, including MOTS Beach	Illegal clearing for views, garden rubbish dumping, environmental weeds, clearing for urban and coastal infrastructure and housing sites	Illegal clearing for views, garden rubbish dumping, environmental weeds, clearing for urban and coastal infrastructure and housing sites	Planning solution: Ensure preservation of lakeshore reserves, maintain gully vegetation. Benefits: risk of gully erosion to roading and housing reduced; rainforest conservation enhanced; landscape amenity (particularly from the lake) improved.

Attachment: 1 *Damp Sands* Littoral Rainforest floristic community description.

Etymology
This floristic community is named for the:

Distribution: Victoria: mostly around the Marlo Estruary, French's Narrows and Sudenham Inlet including the estuarine reaches of the Bemm River (downstream of Dolly's Garden).

Landscape Context
Damp Sands Littoral Rainforest occurs mostly on Pleistocene sands, with two sites on Recent aeolian sands and two others on silts along the estuarine reaches of the Bemm River. All are damp sites as the result of springs (Pleistocene dunes) or estuary inundation (aeolian cheniers). The salts are delivered either through coastal exposure through estuary inundation or elevated water tables during estuary bar blockages. Fire protection is afforded by the sea, beaches, open water (estuaries, estuarine river reaches) and/or marginal bluffs.

Habitat and ecology
Damp Sands Littoral Rainforest occurs on a diverse range of landforms that include Aeolian chenier, estuarine deltaic deposits and old laterised Pleistocene sand dunes that have formed as marginal bluffs at the back of younger dunes or estuaries.
The best developed stands occur along the Marlo Foreshore, where past erosion has produced a tall marginal bluff of laterised sand. Springs seep out of these cliffs, and along with the fire protection afforded by the cliffs and estuary provide a habitat ideal for the development of Littoral Rainforest.

Damp Sands Littoral Rainforest occurs in a narrow geographic area where there is both saline exposure (via salt haze and the resulting atmospheric accession and/or high estuary stand levels that affects the water table). This combination produces a Littoral Rainforest floristic community that is a mixture of coastal species and moisture-dependant rainforest species. Species indicative of moisture-dependence include: Lilly Pilly, Prickly Currant-bush, Tree Violet, Bidgee-widgee, Angled Lobelia, Fireweed Groundsel, Forest Starwort, Ivy-leaf Violet, Bare Twig-sedge, Tall Saw-sedge, Basket-grass, Common Reed, Forest Wire-grass and Rough Tree-fern. Damp Sands Littoral Rainforest is a little unusual in that it has a very low diversity of vines (only 3 species). Ferns are diverse in composition, but irregular in occurrence and so few are listed characteristic species.

CHARACTERIC SPECIES

Emergent Trees: Blackwood *Acacia melanoxylon*, Coast Banksia *Banksia integrifolia,* and Southern Mahogany *Eucalyptus botryoides*.

Canopy Trees: Lilly Pilly *Acmena smithii*, Blue Oliveberry *Elaeocarpus reticulatus*, Coast Tea-tree *Leptospermum laevigatum*, Swamp Paperbark *Melaleuca ericifolia*, Tree Broom-heath *Monotoca elliptica*, Sweet Pittosporum *Pittosporum undulatum* Hazel Pomaderris *P. aspera* and Muttonwood *Rapanea howittiana*.

Shrubs: Sallow Wattle *Acacia longifolia* ssp. *longifolia*, Coast Sallow Wattle *Acacia longifolia* ssp. *sophorae*, Prickly Currant-bush *Coprosma quadrifida*, Hops Goodenia *G. ovata*, Tree Violet *Hymenanthera dentata* and Tree Everlasting *Ozothamnus ferrugineus*.

Vines: Forest Clematis *Clematis glycinoides*, Wombat Berry *Eustrephus latifolius*, and Saltbush *Rhagodia candolleana.*

Forbs: Bidgee-widgee *Acaena novae-zelandiae*, Kidney Weed *Dichondra repens*, *Euchiton gymnocephalum*, Maori Bedstraw *G. propinquum*, Northern Cranesbill *Geranium homeanum*, Hairy Pennywort *H. hirta*, Angled Lobelia *L. anceps*, Grassland Wood-sorrel *Oxalis perennans*, Shade Plantain *Plantago debilis*, Jagged Fireweed *Senecio biserratus*, Fireweed Groundsel *S. linearifolius*, Shrubby Fireweed *S. minimus*, Slender Fireweed *S. tenuiflorus*, Prickly Starwort *Stellaria pungens*, New Zealand Spinach *Tetragonia tetragonioides*, Trailing Speedwell *Veronica plebia* and Ivy-leaf Violet *Viola hederacea*.

Graminoids: Bare Twig-sedge *Baumea juncea*, Tall Sedge *Carex appressa*, Paroo Lily *Dianella caerulea* var. *caerulea*, Tasman Flax-lily *Dianella tasmanica*, Hedge-hog Grass *Echinopogon ovatus,* Tall Saw-sedge *G. clarkei*, Knobby Club-rush *Isolepis nodosa*, Pale Rush *Juncus pallidus*, Variable Sword-sedge *Lepidosperma laterale*, Spiny-headed Mat-rush *Lomandra longifolia*, Weeping Grass *Microlaena stipoides*, Basket Grass *Oplismenus hirtellus*, Common Reed *Phragmites australis*, Sword Tussock-grass *Poa ensiformis*, Common Tussock-grass *P. labillardierei* var. *labillardierei* and Forest Wire-grass *Tetrarrhena juncea*.

Ferns: Necklace Fern *Asplenium flabellifolium*, Rough Tree-fern *Cyathea australis*, Bracken *Pteridium esculentum*.

Epiphytes/lithophytes: Coast Mistletoe *Muellerina celastroides* (in 20% of sites) on Coast Banksia and Prickly Currant-bush.

Mistletoes/aerial parasites: Rusty Dodder-laurel *Cassytha phaeolasia*.

Threats: urbanisation, land clearing for views, weeds, deer.

Historic depletion: land clearing for residential land and views (in Marlo).

Ongoing loss of habitat: Urbanisation, land clearing for views, weeds, deer.

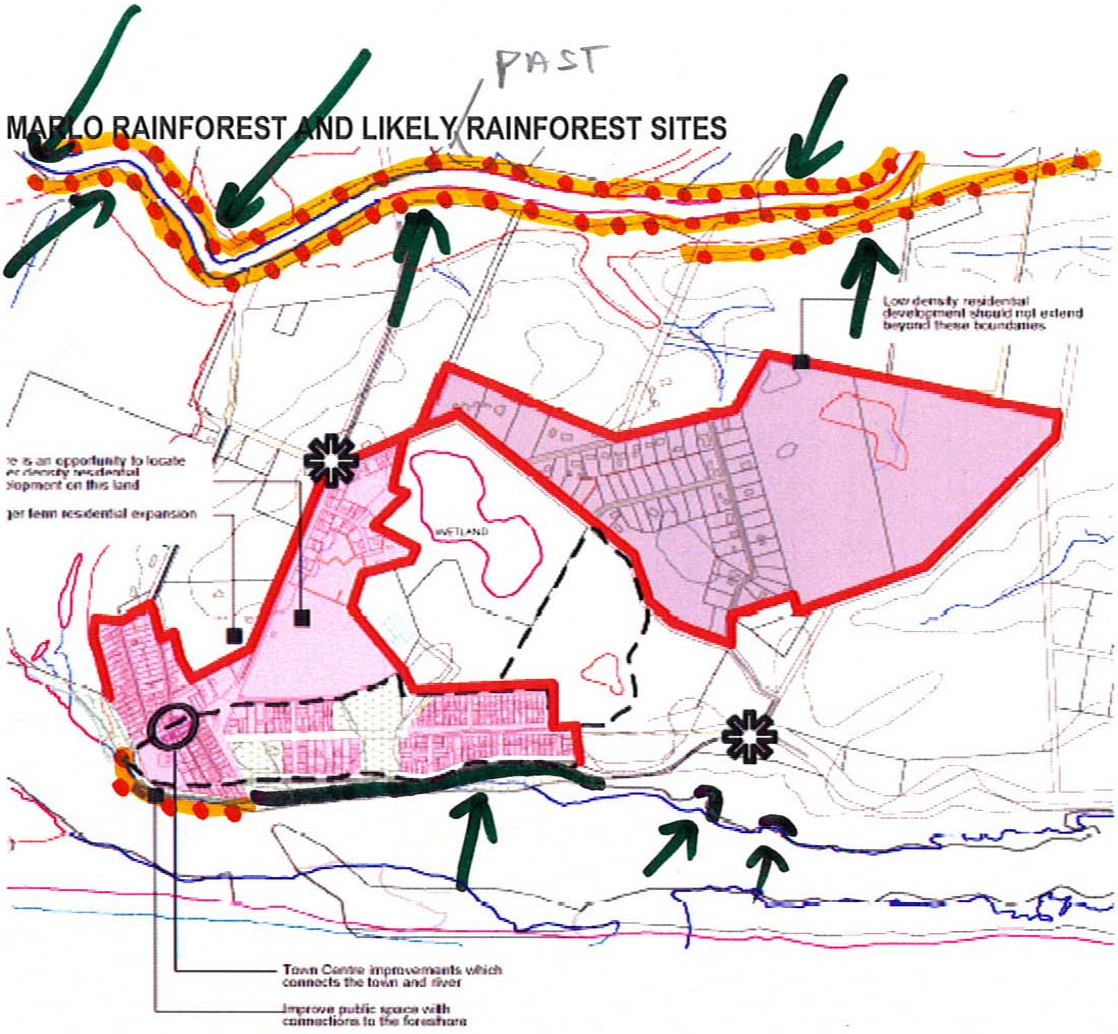
Deer: Sambar Deer, Hog Deer.

Incremental development: urban subdivision, clearing for views.

Weed invasion: Significant as the result of human access and urbanisation.

Weed threats: Blue Periwinkle, Bridal Creeper, other Asparagaceous weeds, Cape Ivy, Dolichos Pea, English Ivy, Garden Ginger, Indian Hawthorn, Kikuyu, Mirror-bush, Panic Veldt-grass, Rambling (Turkey) Dock, Wandering Jew, and White Arum-lily.

Accessible stands: Marlo Foreshore and Mots Beach.



KNOWN SITES

PAST HABITAT (NOW CLEARED)

MALLACOOTA

EAST GIPPSLAND RAINFOREST CONSERVATION MANAGEMENT NETWORK.

CONTENTS

SUMMARY

Mallacoota retains some of the most significant stands of rainforest left in Victoria that have both state and national significance, including:

- A major portion of a nationally significant but (as yet) unnamed floristic community of Littoral Rainforest (Peel in prep b.):
- Good examples of Warm Temperate Rainforest in Shady Gully and in the gully system behind the Oval:
- Nationally threatened Environmental Protection and Biodiversity Conservation Act (1999)-listed species;
    - Grey-headed Flying Fox
- Seven listed Flora and Fauna Guarantee Act (1988)-listed animals that use rainforests:
    - Black Bittern, Diamond Python, Grey-headed Flying Fox, Powerful Owl, Sooty Owl, Sooty Owl and White-bellied Sea Eagle.

All of the Littoral Rainforests of the Mallacoota area are threatened, many provide habitat for both Environmental Protection and Biodiversity Conservation Act (1999)-listed animals and an array of rare plants. Much of this rainforest estate has been cleared and all of the rainforest vegetation is either listed as rare (the Warm Temperate Rainforest floristic communities) or is in the final stages of the nomination process (the Littoral Rainforest floristic community) under the Federal Environmental Protection and Biodiversity and Conservation Act (1999).

The EG Shire and the community has obligations to conserve these threatened rainforest communities as well as their threatened plants and animals that rely upon them for habitat. Conservation and maintenance of these values requires rainforest conservation both through the preservation of existing stands and the rehabilitation and restoration of a significant proportion of the degraded or previously cleared rainforest habitat in the area. If as a community we choose to conserve and restore these rainforest habitats then we have taken the biggest step towards conserving the cargo of rare and threatened species they contain.

Fortunately there are significant synergies available across the area between sensible planning overlays that deal with land not suitable for development, erosion risk and storm water management and nutrient processing whilst maintaining or restoring rainforests in Mallacoota area.

These synergies fall into the following groupings:

1. Gully systems with land too steep for development will allow for the protection and rehabilitation of Warm Temperate Rainforest;
2. Marginal bluffs would if managed appropriately, could ensure the conservation of threatened of newly described (but as yet un-named floristic community) of Littoral Rainforest (currently in the nomination process under the Environmental Protection and Biodiversity Conservation Act 1999);
3. Storm water and nutrient processing along gully systems through the conservation and restoration of listed Warm Temperate Rainforest communities that have been locally proven to strip 70% of floodwater phosphorous and 88% of ground water phosphorous (Peel in prep. a).

Conservation status of rainforest in the Mallacoota Urban Area

- There are two ecological vegetation classes of rainforest present in the coastal area (Warm Temperate Rainforest and Littoral Rainforest) with two distinct floristic communities represented (Table 1.).

Unfortunately, EG Shire records fail to list the following: the floristic communities (Table 1), their conservation status and the threats to them (Table 2) and their threatened species [Table 3 (plants) and Table 4 (animals)].

Rainforest values to the environment and the community at large

In Victoria rainforests conserve 4% of the states plant diversity (30% of which are rare and threatened species), despite occupying less than 0.14% of the State's land area.

- Rainforests are excellent water processors and have been proven locally to strip up to 70% of the phosphorous from surface storm water and 88% from ground water. This works best in streams of up to third order (which matches all of the stream orders of the gully systems in the area);
- Rainforests are fire retardant and so their presence in the urban environment is a benefit in this regard;
- Rainforests consist of species that are restricted in the landscape that can only be conserved by protecting rainforests and their fringing ecotones;
- Rainforest on or adjacent to properties is a major selling point for real estate; and

- Rainforests enable urban kids to experience the bush with relative safety near to home.

Constraints imposed by the conservation status of rainforest

All of the Warm Temperate Rainforest and Littoral Rainforest communities of East Gippsland are protected by the NVP regulations. All of the Warm Temperate Rainforest and Littoral Rainforest floristic communities within the Mallacoota urban area are threatened. None of the rainforests in the area will survive without concerted local government and community actions that include zoning to protect existing rainforest remnants and their ecotones and zoning to conserve currently cleared habitat to ensure planning and subsequent development allow recovery of the rainforests in their past habitat.

The largest stand of Littoral Rainforest in the town area (on the northern shore of Devlin's Inlet) is not noted in EG Shire documentation, nor are Warm Temperate Rainforests in the gully systems.

Benefits of conserving existing stands of rainforest and the currently cleared habitat of rainforest

The following benefits will accrue if the council adopts planning measures to conserve these areas of the landscape:

- Obligations under the Federal Environmental Protection and Biodiversity Conservation Act (1999) and State Flora and Fauna Guarantee Act (1999) will be met;
- Nationally and State-listed rainforest vegetation as well as their cargo of rare and threatened plants and animals will be conserved;
- Storm water treatment is facilitated by the restoration of rainforests to gully systems in the Mallacoota area;
- Nutrient stripping (particularly phosphorous) will remove up to 70% of phosphorous and if combined with the reinstatement of wetlands at the mouths of rainforest gullies nitrogen sequestration is enhanced as well;
- Urban and landscape amenity is improved and the environment is conserved.

Table 1. Rainforests of the Mallacoota Urban Area.

Ecological vegetation class Habitat features	Floristic community	Habitat Localities in the urban area
Warm Temperate Rainforest Habitat features: • Moist localities; • Fire protected	Undefined floristic community of Warm Temperate Rainforest	Habitat: alluvial soils and gully sides of all of the major gully systems Localities: Shady Creek and gully system behind the oval
Littoral Rainforest Habitat features: • Exposed sites • Saline influence (wind, water, water tables or geology); • Fire protected	As yet un-named floristic community of Littoral Rainforest	Habitat: marginal bluffs and steep slopes around the estuary. Localities: relatively intact and large stand (not noted in the UDF) but present along the northern shore of Devlin' s Inlet and would have been present along the western shore from Captains Point (in the Municipal Caravan Park) northwards to Karbethong and Mirrabooka.

Table 2. Conservation status of rainforests that occur in the Mallacoota area and the threats to them.

Floristic community	Conservation status	Threats
Warm Temperate Rainforest	Rare	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (subdivision of cleared habitat, weed invasion) Global warming (increased fire frequency and intensity, rising sea levels)
As yet un-named floristic community of Littoral Rainforest	Threatened: currently under consideration in the nomination process under the Federal Environmental Protection and Biodiversity Conservation Act (1999).	Habitat loss (land clearing) Grazing by domestic stock Feral Deer Weed invasions Urban development (weed invasion) Coastal recreation and associated infrastructure Global warming (increased fire frequency and intensity)

Table 3. Rare or threatened plants that occur in the rainforests of the Mallacoota UDF study area.

Name	IUCN	EPBC	AROTS	VROTS	FFG	Action Statement	**Rainforest type**
Rough-barked Apple*Angophora floribunda*				r			LRf; WTRf
Oyster Bay Pine *Callitris rhomboidea*							Regionally significant in LRf
Bolwarra *Eupomatia laurina*				r			WTRf
Trailing Guinea-flower *Hibbertia dentata*				r			WTRf
Creeping Shield-fern *Lastreopsis microsora* subsp.				r			WTRf
Branching Grass-flag *Libertia paniculata*				r			LRf; WTRf
Whiteroot *Lobelia purpurascens*				r			LRf
Giant Honey-myrtle *Melaleuca armillaris* subsp. *armillaris*				r			LRf
Coast Mistletoe *Muellerina celastroides*				r			LRf
Golden Mistletoe *Notothixos subaureus*				r			LRf
Rough-fruit Pittosporum *P. revolutum*				r			WTRf
Lilac Lily *Schelhammera undulata*				r			LRf

Table 4. Rare or threatened animals*, which occur (have been recorded) in the rainforests of the Mallacoota Urban Design Framework study area

Name	Division Name	ESP	AROTS	VROTS	FFG	TR	CAMBA/ JAMBA	Notes
Azure Kingfisher *Alcedo azurea*	Birds			n	L			Nests in LRf/WTRf
Black Bittern *Ixobrychus flavicollis australis*				v	L			Uses rainforest near water
Diamond Python *Morelia spilota spilota*	Reptiles			e	L			WTRf/LRf
Grey Goshawk *Accipiter novaehollandiae*	Birds			v	L			Nests and hunts: WTRf
Grey-headed Flying-fox *Pteropus poliocephalus*	Mammals	VU	V	v	L			Food: LRF/WTRf, roosts: WTRf
Powerful Owl *Ninox strenua*	Birds			v	L			Hunts and roosts: WTRf
Sooty Owl *Tyto tenebricosa*	Birds			v	L			Hunts and roosts: WTRf
Tree Goanna *Varanus varius*	Reptiles			v				Inhabits WTRf
White-bellied Sea-Eagle *Haliaeetus leucogaster*	Birds			v	L	1	1/-	Nests: WTRf

*Bold are rainforest dependant in the district; underlined are those that breed in rainforests of the district.

Depletion through land clearing, coastal recreation, urbanisation, grazing and weed invasion

One of the major reasons for the CMN submission relates to habitat loss for rainforests in the Mallacoota area. This habitat loss and the ongoing threats that continue to degrade and erode the remaining areas of rainforest in the district are directly related to urban development, coastal recreation and ongoing weed invasion. Drawing the EG Council's attention to this on a site by site basis should enable planning to accommodate both the urban development and conservation needs of rainforests in the area.

Depletion by locality

The causes of depletion of rainforests in the Mallacoota UDF study area, the planning solutions and benefits are listed in Table 5.

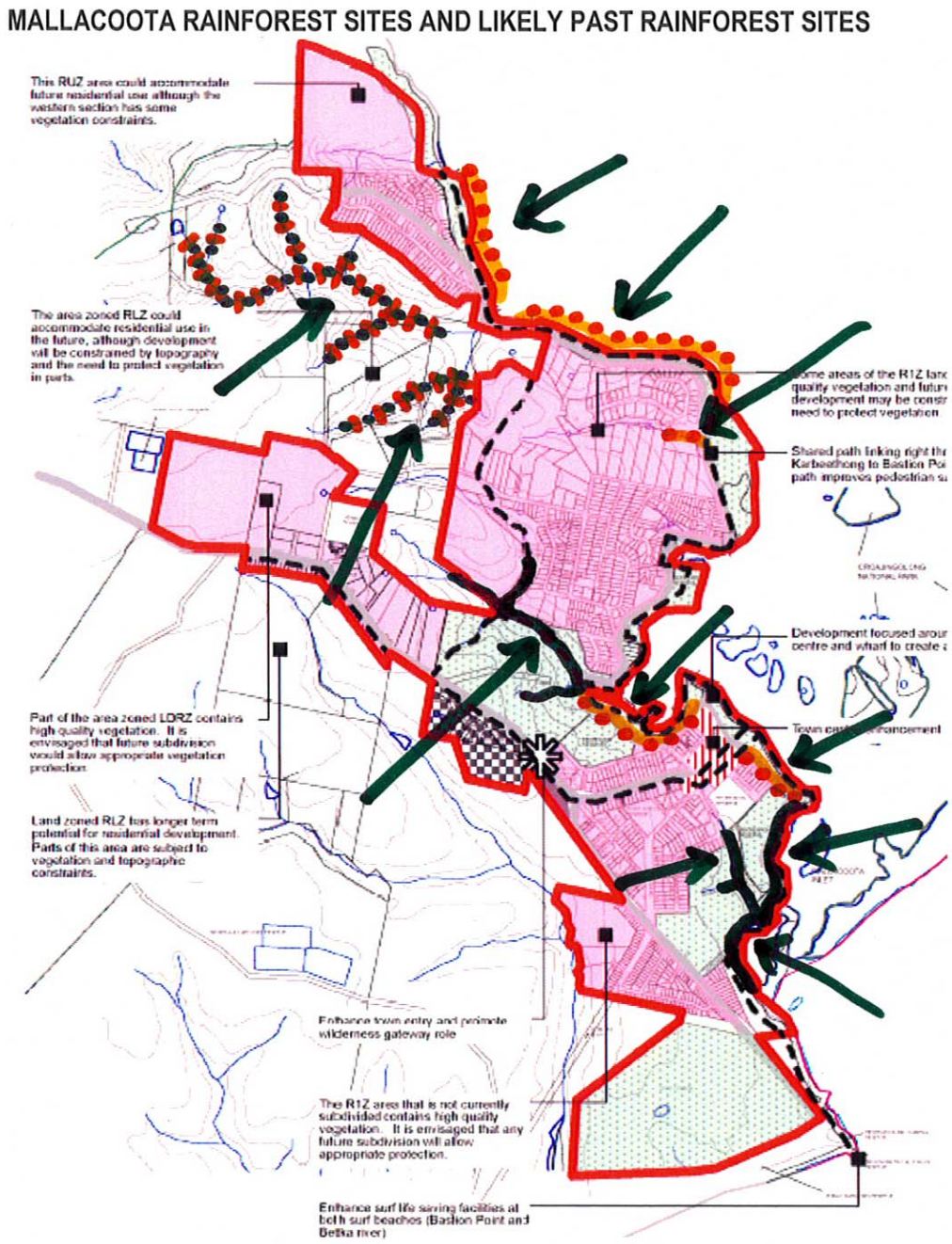
Table 5. Depletion of rainforest and planning solutions and benefits

Locality	Causes of depletion	Ongoing threats	Planning solution and benefits
Littoral Rainforests: Western shore of Mallacoota Inlet along the Mirabooka, Karbethong and township areas to Captains Point	Past clearing originally for agriculture but more recently for urban development and coastal recreation infrastructure	Weed invasion, further lakeshore development (recreation and/or development)	Planning solution: recognise its significance, reserve its habitat, protect existing stands, restore past habitat which has been cleared. Benefits: improved landscape amenity, opportunities for passive recreation, prevention of erosion, improvement in water quality along lakeshores, provision of habitat for rare, threatened and listed plants and animals.
Warm Temperate Rainforests: Mullet Creek, Two Mile Creek, Shady Gully, Jungle Gully and gully behind the Oval	Clearing for agriculture and grazing, grazing, weed invasion	Clearing of fringing ecotone vegetation, urbanisation, weed invasion	Planning solution: These steep areas are unsuitable for development and should be reserved for conservation and as drainage reserves. Further subdivision of these gullies should be stopped and the reserves consolidated at the point of development or through covenanting. Benefits: Improved health of the Inlet through nutrient processing (phosphorous and nitrogen sequestration); reduced risk of tunnel erosion and gully erosion, improved landscape amenity, passive recreation, improved fire protection.

References

Peel, B. (in prep. a). Rainforest Restoration Manual for south eastern Australia. The how to book on what we have learnt so that you can do it. Includes: Cool Temperate Rainforests, Warm Temperate Rainforests, Subtropical Rainforests, Gallery Rainforests, Dry Rainforests and Littoral Rainforests. C.S.I.R.O.

Peel, B. (in prep. b). Littoral Rainforests of south eastern Australia: composition, ecology and management.


MALLACOOTA RAINFOREST SITES AND LIKELY PAST RAINFOREST SITES
This RUZ area could accommodate future residential use although the western section has some vegetation constraints.
The area zoned RLZ could accommodate residential use in the future, although development will be constrained by topography and the need to protect vegetation in parts.
Part of the area zoned LDRZ contains high quality vegetation. It is envisaged that future subdivision would allow appropriate vegetation protection.
Land zoned RLZ has longer term potential for residential development. Parts of this area are subject to vegetation and topographic constraints.
Enhance town entry and primate wilderness gateway role
The R1Z area that is not currently subdivided contains high quality vegetation. It is envisaged that any future subdivision will allow appropriate protection.
Enhance surf life saving facilities at both surf beaches (Bastion Point and Betka river)
Development focused arou centre and wharf to create
LEGEND
KNOWN STANDS
LIKELY BUT NOT FIELD CHECKED
PAST HABITAT (NOW CLEARED)

CHAPTER 3

Recommendations to the East Gippsland Shire's Urban Design Framework for the Coastal townships of:

- **LAKES ENTRANCE**
- **METUNG AND NUNGURNER**
- **MARLO**
- **MALLACOOTA AND**
- **LAKE TYERS**

The East Gippsland Rainforest Conservation Management Network made a formal submission to the EG Shire Urban Design Framework 2006. The Submission is able to be viewed on the Rainforest Network's website (egrainforest.org.au). Its recommendations, issues and opportunities are included in this Paper as a useful summary document.

Chapter 3

ISSUES AND OPPORTUNITIES FOR LAKES ENTRANCE

The following recommendations accord with the stated aims in the Issues and Opportunities of the UDF (section 7.1.1: Environment; section 7.1.2: Policy and Strategic Issues. The section of the Vision (8.1) relating to "The protection and enhancement of the environmental and landscape values will be a key priority) is particularly relevant to the East Gippsland Rainforests Conservation Management Network (the Network) submission. These are listed alongside the relevant headings below.

Drainage Reserves (7.1.1; 7.1.2; 8.1)

Drainage reserves along gullies are being reserved as residential areas are being developed. The Council and community are undertaking joint rainforest/wetland restoration projects in two of these reserves (John Street and Merrangbaur Estate). This treatment of drainage reserves has the following benefits (as apposed to leaving them grassed or in a degraded state):

- Maintenance costs are significantly reduced (no ongoing mowing required);
- Fire risks are reduced (rainforest is fire-retardant compared to long grass);
- Erosion risks are reduced;
- Nutrients are trapped and processed;
- Phosphorous loads on the Gippsland Lakes are reduced and so help to reduce severity of algal blooms;
- Urban amenity is improved;
- Recreational opportunities are enhanced and diversified (picnicking, nature study, bird-watching, bush walking etc.);
- Landscape amenity is improved;
- Resident's pride in their reserves increases and friends of groups often arise where the Council is seen to be showing a strong management presences; and
- Real estate values are consequently increased.

Nutrient sequestration and storm water treatment (7.1.1; 7.1.2; 8.1)

Revegetating all gully systems within the Urban Design Framework study area with rainforest will significantly aid in the sequestration of phosphorous (a major source of nutrients that leads to algal blooms in the Gippsland Lakes).

Foreshores (7.1.1; 8.1)

As mentioned earlier, the isthmus of Lakes Entrance once hosted Littoral Rainforest. Obviously this has all been cleared in the past. Recent dredging (dating from the 1970s) to form the Club Spit has had Littoral Rainforest develop upon it and this site is subject to ongoing scientific research (Peel in prep. b). These areas should be conserved to allow the Littoral Rainforest to continue to develop and to show the people of Lakes Entrance what their town once looked like. These areas are:

- The Club Spit opposite Number 1 on the Esplanade;
- The connecting area between the North Arm Bridge and the Club Spit (between the Highway and the Fishing Club clubrooms south to Bullock Island Road should be maintained as natural bush to facilitate the continued development of Littoral Rainforest on the Club Spit. That is Council should resist the temptation to turn these areas into grassed areas with trees; and
- The Jemmys Point sand flat between the North Arm Bridge and the Narrows under Jemmys Point.

Preservation of these areas of foreshores in their natural state will ensure the continued development of the oldest stands of Littoral Rainforest (on sand) along the Entrance Walk along the southern shore of Cunninghame Arm (that stalled with the clearing of the Lakes Entrance isthmus).

From the recreation and activity perspective, these 'wild' areas provide bushland recreation within minutes of a dense urban environment and other high quality recreation experiences including nature study, bushwalking and bird watching.

Marginal bluffs and steep valley sides (7.1.1; 8.1)

The most extensive (around 85ha) and some of the oldest Littoral Rainforest in Victoria occurs around the Gippsland Lakes. Part of this nationally significant rainforest complex occurs in the Lakes Entrance UDF study area on the

marginal bluff from the mouth of Maringa Creek through to the end of Creighton Street in Kalimna and up the North Arm.

Suggested Amendments to the Lakes Entrance UDF

Sec. 3.2.4 Natural Resources (p.10)

Flora & Fauna Values

The UDF correctly identifies rainforest as a significant feature of the area study in terms of landscape and remnant vegetation. However there are two rainforest EVCs that the UDF does not list. They are Warm Temperate Rainforest and Littoral Rainforest, with six distinct floristic communities represented. Therefore their conservation status and threats, and their threatened species are not listed.

The Council (and by extension the community that it represents) has statutory obligations to conserve these threatened rainforest communities as well as their threatened plants and animals. Conservation and maintenance of these values requires rainforest conservation both through the preservation of existing stands and the rehabilitation and restoration of a significant proportion of the degraded or previously cleared rainforest habitat in the UDF study area.

The supporting ecological studies to the UDF therefore need the data to describe the rainforest EVCs and should be amended to incorporate the data provided in this submission. (The EGRCMN are happy to provide additional supporting information if required.)

Consequently, the UDF should also be amended as appropriate to reflect the significance of these EVCs and their contribution to the flora and fauna values of Lakes Entrance.

It is suggested that the following statement be included in Section 3.2.4:

> 'Lakes Entrance retains some of the most significant stands of rainforest left in Victoria that have both state and national significance, including a major portion of a nationally significant aggregation of Littoral Rainforest stands (the largest in south eastern Australia) that used to once stretch along the northern shore of the Gippsland Lakes from the mouth of the Mitchell River into the North Arm.'
> Habitat loss and the ongoing threats that continue to degrade and erode the remaining areas of rainforest in the Lakes Entrance UDF study area are directly related to urban development, coastal recreation and ongoing grazing and weed invasion.'

Natural Systems

The UDF would provide more guidance if it reflected the significance of natural systems constraints on urban development within the Lakes Entrance UDF study area. Specific reference should be made to topographic limitations, erosion risk, (including tunnel erosion), drainage and storm water management, and the beneficial role of revegetated gullies in nutrient processing.

Sec. 4.2.2 Local Policies (p.18)

There is no mention of the Colquhoun Development Policy, which provides significant environmental policy direction in areas included in the UDF Study Area.

Sec. 8.2 Key Objectives and Strategies (p. 44)

Objective 1: To enhance the Esplanade / Foreshore precinct

The isthmus of Lakes Entrance once hosted Littoral Rainforest. This has all been cleared in the past, however recent dredging (dating from the 1970s) has had Littoral Rainforest develop upon it. The cost of maintaining these cleared areas is high. Should the original vegetation be supported to regenerate, then funding would be available for this purpose; the ongoing maintenance of the area would be significantly reduced; and the ambience of the town would

reflect its natural environment and heritage. Local community and tourists could enjoy the rainforest for its beauty and usefulness, through walkways and picnic areas.

These areas should be conserved to allow the Littoral Rainforest to continue to develop and to show the people of Lakes Entrance what their town once looked like. These areas are:

- The Club Spit opposite Number 1 on the Esplanade;
- The connecting area between the North Arm Bridge and the Club Spit (between the Highway and the Fishing Club clubrooms south to Bullock Island Road should be maintained as natural bush to facilitate the continued development of Littoral Rainforest on the Club Spit.
- The Jemmy's Point sand flat between the North Arm Bridge and the Narrows under Jemmy's Point.
- The Entrance Walk

Preservation of these areas of foreshores in their natural state will ensure the continued development of the oldest stands of Littoral Rainforest (on sand) along the southern and northern shores of Cunninghame Arm. The benefits of conserving these areas are a variation in the foreshore landscape, conservation of young Littoral Rainforest types lost to urban development on the towns' sandy isthmus, brings wildlife into the town area, and, provides opportunities for passive recreation.

It is suggested that an appropriate strategy be included under this objective to reflect the above.

Objective 3: To manage urban growth in relation to regional demands

Strategy 3.3 should be expanded to reflect the stated commitment to the environment in the Vision. The investigation and protection of vegetated areas of significance must be conducted as a priority for the study area and not as part of the subdivision process. This will ensure that areas of significance are identified and adequately protected, whilst also clearly identifying natural constraints to development. It is noted that this submission contains a number of locations where protection is required. (Refer Table 5) It is also noted that the UDF clearly indicates areas of remnant native vegetation of high quality on plans attached to the UDF, however, no strategies or Planning Scheme Amendments are suggested to protect these areas.

Sec. 9.2 Master Plans (p.48)

Town Centre and Foreshore

1C New waterway and town beach
- Not supported because of detrimental impact on rainforest vegetation

Town Entry Treatment

The proposed 'sculptural skywalk' to the waters edge is not supported because of the detrimental impact on rainforest vegetation.

An additional item should be added for the Kalimna Jetty car park. It is suggested that the car park be formalised to incorporate frontline planting of a lakeshore wind barrier and rainforest species to provide shade within the car park. The benefits of this action include improved landscape amenity, reduced sediment and nutrient pollution capture.

Sec. 9.3 Planning Scheme Provisions (p. 55)

It is strongly recommended that Table 5 of this submission, (containing a list of locations where rainforests are depleted, the causes of that depletion, and recommended planning solutions and benefits), be considered under both existing Planning Scheme Provisions, and proposed Planning Scheme Amendments, so as to ensure that these highly sensitive environmental sites are afforded maximum protection.

Sec. 9.3.2 Zones (*proposed amendments*) (p. 56)

The UDF proposes a Planning Scheme Amendment to re-zone the land south of Hunters Lane and North of Albatross Road to 'Residential'. (Subject to demand and / or further investigation).

It is suggested that no Amendment be considered until the issues identified in this submission have been adequately addressed.

Sec. 9.3.4 Other Planning Scheme Actions (p. 57)

Reference is made to conservation covenanted land in *'Sec. 4.2.4 Environmental Significance Overlay 96 (ESO 96) Conservation Covenanted Land (p21)'*

The UDF states that;

> *'The covenants have been placed over certain areas of private land with the owners' consent. It should be noted that not all covenanted properties are included in the overlay, due to the fact that there has been no recent amendment to include recent covenants.*'

It is suggested that the UDF provides an appropriate opportunity to remedy this situation through its proposed Planning Scheme Amendments.

Lakes Entrance Design Guidelines (Appendix F – Design Guidelines)

These guidelines should reflect the suggestions and recommendations offered above as appropriate.

References

Peel, B. (in prep. a). Rainforest Restoration Manual for south eastern Australia. The how to book on what we have learnt so that you can do it. Includes: Cool Temperate Rainforests, Warm Temperate Rainforests, Subtropical Rainforests, Gallery Rainforests, Dry Rainforests and Littoral Rainforests. C.S.I.R.O.
Peel, B. (in prep. b). Littoral Rainforests of south eastern Australia: composition, ecology and management.

ISSUES AND OPPORTUNITIES FOR METUNG AND NUNGURNER

Drainage Reserves/ wildlife corridors

Drainage reserves along gullies are being reserved as residential areas are being developed. The Council and community are undertaking joint rainforest/wetland restoration projects in other similar areas in the East Gippsland Shire, (John Street and Merrangbaur Estate Lakes Entrance). This treatment of drainage reserves has the following benefits (as apposed to leaving them grassed or in a degraded state):

- Maintenance costs are significantly reduced (no ongoing mowing required);
- Fire risks are reduced (rainforest is fire-retardant compared to long grass);
- Erosion risks are reduced;
- Nutrients are trapped and processed;
- Phosphorous loads on the Gippsland Lakes are reduced and so help to reduce severity of algal blooms;
- Urban amenity is improved;
- Recreational opportunities are enhanced and diversified (picnicking, nature study, bird-watching, bush walking etc.);
- Landscape amenity is improved;
- Resident's pride in their reserves increases and friends of groups often arise where the Council is seen to be showing a strong management presences; and
- Real estate values are consequently increased.

Nutrient sequestration and storm water treatment

Revegetating all gully systems within the Urban Design Framework study area with rainforest will significantly aid in the sequestration of phosphorous (a major source of nutrients that leads to algal blooms in the Gippsland Lakes).

Foreshores

Preservation of these areas of foreshores in their natural state will ensure the continued development of the oldest stands of Littoral Rainforest (Peel in prep. b) and allow for the colonisation of currently cleared areas of foreshore. The low stature of many of these species should in most cases permit views to be maintained or enhanced whilst reinstating rainforests where appropriate.

From the recreation and activity perspective, these 'wild' areas provide bushland recreation within minutes of a dense urban environment and other high quality recreation experiences including nature study, bushwalking and bird watching.

Marginal bluffs and steep valley sides

Marginal bluffs require protection because of erosion risks. If illegal clearing, restoration and weed control are implemented, much of the existing Littoral Rainforest will recover and past vegetation can be reinstated.

Suggested Amendments to the Metung UDF and the Nungurner UDF

Sec. 3.2.4 Natural Resources

Flora & Fauna Values

The UDF should be expanded to recognise all the significant stands of native vegetation occurring in the study areas. These strands occur on the northern shore of Lake King (Tambo Bay) between the Mairburn Road and Tambo Bluff (Littoral Rainforests) and the Warm Temperate Rainforests of the gully systems associated with Chinaman's Creek and the Nungurner hills.

The lack of reference to rainforest EVCs has meant that its significance has been overlooked.
The UDF does not list the two rainforest EVCs, (Warm Temperate Rainforest and Littoral Rainforest), with five distinct floristic communities represented, their conservation status and threats, and their threatened species.

The Council (and by extension the community that it represents) has statutory obligations to conserve these threatened rainforest communities as well as their threatened plants and animals. Conservation and maintenance of these values requires rainforest conservation both through the preservation of existing stands and the rehabilitation and restoration of a significant proportion of the degraded or previously cleared rainforest habitat in the UDF study area.

The supporting ecological studies to the UDF are deficient in not recognising the rainforest EVCs and should be amended to incorporate the data provided in this submission. (The EGRCMN are happy to provide additional supporting information if required.)

Consequently, the UDF should also be amended to reflect the significance of these EVCs and their contribution to the flora and fauna values of Nungurner and Metung.

It is suggested that the following statement be included in this section of the UDF:

> 'Metung / Nungurner retains some of the most significant stands of rainforest left in Victoria that have both state and national significance, including a major portion of a nationally significant aggregation of Littoral Rainforest stands (the largest in south eastern Australia) that used to once stretch along the northern shore of the Gippsland Lakes from the mouth of the Mitchell River into the North Arm.'
> Habitat loss and the ongoing threats that continue to degrade and erode the remaining areas of rainforest in the 'Metung / Nungurner UDF study area are directly related to urban development, coastal recreation and ongoing grazing and weed invasion.'

Natural Systems

The UDF should reflect the significance of natural systems constraints on urban development within the Nungurner and Metung UDF study areas. Specific reference should be made to topographic limitations, erosion risk, (including tunnel erosion), drainage and storm water management, and the beneficial role of revegetated gullies in nutrient processing.

Sec. 9.3 Planning Scheme Provisions

It is strongly suggested that the following sensitive environmental sites are afforded maximum protection under existing or proposed Planning Scheme Provisions.

- Northern shore of Lake King (Tambo Bay) between Mairburn Road and Tambo Bluff (lakeshore flats and lakeshore cliffs), lakeshore slopes of Chinamans Creek, Bancroft Bay. (Littoral Rainforests)
    - Ensure subdivision setbacks to establish and or maintain lakeshore reserves

- Archibald Drive gully system, Chinaman's Creek gully systems, Box's Creek and Nungurner Hills gully systems. (Warm Temperate Rainforests)
    - These steep areas are unsuitable for development and should be reserved for conservation and as drainage reserves. Further subdivision of these gullies should be stopped and the reserves consolidated at the point of development or through covenanting

Nungurner Design Guidelines (Appendix F – Design Guidelines)
Metung Design Guidelines (Appendix F – Design Guidelines)

These guidelines should reflect the suggestions offered above as appropriate.

ISSUES AND OPPORTUNITIES FOR MARLO

Foreshores

Preservation of these areas of foreshores in their natural state will ensure the continued development of the oldest stands of Littoral Rainforest (Peel in prep. b) and allow for the colonisation of currently cleared areas of foreshore. The low stature of many of these species should in most cases permit views to be maintained or enhanced whilst reinstating rainforests where appropriate.

From the recreation and activity perspective, these 'wild' areas provide bushland recreation within minutes of a dense urban environment and other high quality recreation experiences including nature study, bushwalking and bird watching.

Marginal bluffs

Marginal bluffs require protection because of erosion risks. If illegal clearing, restoration and weed control are implemented, much of the existing Littoral Rainforest will recover and past vegetation can be reinstated.

Suggested Amendments to the Marlo UDF

Sec. 3.2.4 Natural Resources

Flora & Fauna Values

Marlo retains some of the most significant stands of rainforest left in Victoria that have both state and national significance, including the largest and best developed stands of *Damp Sands* Littoral Rainforest. (It is noted that the UDF incorrectly identifies the rainforest in the study area as Dry Rainforest.) These stands occur within the Marlo UDF study area (with relatively little occurring further east along French's Narrows)

The incorrect reference to Dry Rainforests results in the UDF failing to list the *Damp Sands* Littoral Rainforest floristic community, its conservation status and the threats to it, and their threatened species.

The supporting ecological studies to the Marlo UDF should therefore be amended to incorporate the data provided in this submission. (The EGRCMN are happy to provide additional supporting information if required.)

The Council (and by extension the community that it represents) has statutory obligations to conserve these threatened rainforest communities as well as their threatened plants and animals. Conservation and maintenance of these values requires rainforest conservation both through the preservation of existing stands and the rehabilitation and restoration of a significant proportion of the degraded or previously cleared rainforest habitat in the UDF study area.

The UDF should be amended to reflect the significance of these EVC's and their contribution to the flora and fauna values of Marlo.

Sec. 9.3 Planning Scheme Provisions

It is strongly recommended that Table 5 of this submission, (detailing a list of locations where rainforests are depleted, the causes of that depletion, and recommended planning solutions and benefits), be considered under both existing Planning Scheme Provisions, and proposed Planning Scheme Amendments, so as to ensure that these highly sensitive environmental sites are afforded maximum protection.

Marlo Design Guidelines (Appendix F – Design Guidelines)

These guidelines should reflect the suggestions offered above as appropriate.

ISSUES AND OPPORTUNITIES FOR MALLACOOTA

The conservation of rainforests within the town precincts offers considerable opportunities for good town planning, land and water management as well as the protection of rare and threatened rainforest vegetation.

Drainage Reserves

Drainage reserves along gullies are being reserved as residential areas are being developed. Friends of Mallacoota are already undertaking joint rainforest restoration projects in two reserves that contain rainforest (Shady Gully and associated gullies, as well as in the gully behind the Oval. This treatment of drainage reserves has the following benefits (as apposed to leaving them grassed or in a degraded state):

- Maintenance costs are significantly reduced (no ongoing mowing required);
- Fire risks are reduced (rainforest is fire-retardant compared to long grass);
- Erosion risks are reduced;
- Nutrients are trapped and processed;
- Phosphorous loads on Mallacoota is reduced and so help to reduce severity of algal blooms;
- Urban amenity is improved;
- Recreational opportunities are enhanced and diversified (picnicking, nature study, bird-watching, bush walking etc.);
- Landscape amenity is improved;
- Resident's pride in their reserves increases and friends of groups often arise where the Council is seen to be showing a strong management presences; and
- Real estate values are consequently increased.

Nutrient sequestration and storm water treatment

Revegetating all gully systems within the Urban Design Framework study area with rainforest will significantly aid in the sequestration of phosphorous (a major source of nutrients that leads degradation of water quality in Mallacoota Inlet).

Foreshores

The foreshores of Mallacoota host some of the most significant stands of rainforest within the town area (especially around Devlin Inlet), however much of the previous areas of Littoral Rainforest have been degraded originally by clearing for grazing and more recently by weed invasion and development (eg the Municipal Caravan Park's lakeshore escarpment (Peel in prep. b).

Preservation of these areas of foreshores in their natural state will ensure the continued development of the oldest stands of Littoral Rainforest.

From the recreation and activity perspective, these 'wild' areas provide bushland recreation within minutes of a dense urban environment and other high quality recreation experiences including nature study, bushwalking and bird watching.

Marginal bluffs steep lakeshores and lacustrine flats

The most extensive (around 15ha) and some of the best examples of *Mallacoota Inlet* Littoral Rainforest in Victoria (and Australia: hence its national significance) occur on the marginal bluffs of Devlin Inlet. Large areas of lakeshore have been cleared of their original rainforests including steeper lakeshore margins and the lacustrine flats.

Suggested Amendments to the UDF

Sec. 3.2.4 Natural Resources

Flora & Fauna Values

Mallacoota retains some of the most significant stands of rainforest left in Victoria that have both state and national significance, including a major portion of a nationally significant but (as yet) unnamed floristic community of Littoral Rainforest, and good examples of Warm Temperate Rainforest in Shady Gully and in the gully system behind the Oval:

The foreshores of Mallacoota host some of the most significant stands of rainforest within the town area, especially around Devlin's Inlet.

It is noted that the largest stand in the town area, (around 15ha), was not recognised by the UDF. Consequently the value of this rainforest has been neglected by the UDF. Warm Temperate Rainforests in the gully systems were also not mentioned in the UDF

The Council (and by extension the community that it represents) has statutory obligations to conserve these threatened rainforest communities as well as their threatened plants and animals. Conservation and maintenance of these values requires rainforest conservation both through the preservation of existing stands and the rehabilitation and restoration of a significant proportion of the degraded or previously cleared rainforest habitat in the UDF study area.

The supporting ecological studies to the UDF are deficient in not recognising the significance of the rainforest EVCs and should be amended to incorporate the data provided in this submission. (The EGRCMN are happy to provide additional supporting information if required.)

Consequently, the UDF should also be amended to reflect the significance of these EVCs and their contribution to the flora and fauna values of Mallacoota.

Sec. 9.3 Planning Scheme Provisions

It is strongly recommended that Table 5 of this submission, (detailing a list of locations where rainforests are depleted, the causes of that depletion, and recommended planning solutions and benefits), be considered under both existing Planning Scheme Provisions, and proposed Planning Scheme Amendments, so as to ensure that these highly sensitive environmental sites are afforded maximum protection.

Marlo Design Guidelines (Appendix F – Design Guidelines)

These guidelines should reflect the suggestions offered above as appropriate.

ISSUES AND OPPORTUNITIES FOR LAKE TYERS

Drainage Reserves/ wildlife corridors

Drainage reserves along gullies are being reserved as residential areas are being developed. The Council and community are undertaking joint rainforest/wetland restoration projects in other similar areas in the East Gippsland Shire, (John Street and Merrangbaur Estate Lakes Entrance). This treatment of drainage reserves has the following benefits (as apposed to leaving them grassed or in a degraded state):

- Maintenance costs are significantly reduced (no ongoing mowing required);
- Fire risks are reduced (rainforest is fire-retardant compared to long grass);
- Erosion risks are reduced;
- Nutrients are trapped and processed;
- Phosphorous loads on Lake Tyers are reduced and so help to reduce severity of algal blooms;
- Urban amenity is improved;
- Recreational opportunities are enhanced and diversified (picnicking, nature study, bird-watching, bush walking etc.);
- Landscape amenity is improved;
- Resident's pride in their reserves increases and friends of groups often arise where the Council is seen to be showing a strong management presences; and
- Real estate values are consequently increased.

Nutrient sequestration and storm water treatment

Revegetating all gully systems within the Urban Design Framework study area with rainforest will significantly aid in the sequestration of phosphorous (a major source of nutrients that leads to algal blooms in the Gippsland Lakes).

Foreshores

Preservation of these areas of foreshores in their natural state will ensure the continued development of the oldest stands of Littoral Rainforest (Peel in prep. b) and allow for the colonisation of currently cleared areas of foreshore. The low stature of many of these species should in most cases permit views to be maintained or enhanced whilst reinstating rainforests where appropriate.

From the recreation and activity perspective, these 'wild' areas provide bushland recreation within minutes of a dense urban environment and other high quality recreation experiences including nature study, bushwalking and bird watching.

Marginal bluffs and steep valley sides

Marginal bluffs require protection because of erosion risks. If illegal clearing, restoration and weed control are implemented, much of the existing Littoral Rainforest will recover and past vegetation can be reinstated.

Suggested Amendments to the Lake Tyers UDF

Sec. 3.2.4 Natural Resources

Flora & Fauna Values

The UDF does not recognise the very large and significant stands of native vegetation (mostly Littoral Rainforests) occurring in the study area. These omissions occur on the east facing marginal bluff of Lake Tyers between Fishermans Landing Arm and Mill Point Arm. The lack of reference to rainforest EVCs has meant that its significance has been overlooked. There are two rainforest EVCs present in the study area (Warm Temperate Rainforest and Littoral Rainforest) with two distinct floristic communities represented as well as threatened species.

The Council (and by extension the community that it represents) has statutory obligations to conserve these threatened rainforest communities as well as their threatened plants and animals. Conservation and maintenance of these values requires rainforest conservation both through the preservation of existing stands and the rehabilitation and restoration of a significant proportion of the degraded or previously cleared rainforest habitat in the UDF study area.

The supporting ecological studies to the do not recognise the rainforest EVCs and should be amended to incorporate the data provided in this submission. (The EGRCMN are happy to provide additional supporting information if required.)

Consequently, the UDF should also be amended to reflect the significance of these EVCs and their contribution to the flora and fauna values of Lake Tyers.

It is suggested that the following statement be included in this section of the UDF:

> 'The Lake Tyers study area retains some large and significant stands of rainforest that have both state and national significance.
> Habitat loss and the ongoing threats that continue to degrade and erode the remaining areas of rainforest in the Lakes Tyers UDF study area are directly related to urban development, coastal recreation and ongoing grazing and weed invasion.'

Sec. 9.3 Planning Scheme Provisions

It is strongly recommended that Table 5 of this submission, (containing a list of locations where rainforests are depleted, the causes of that depletion, and recommended planning solutions and benefits), be considered under both existing Planning Scheme Provisions, and proposed Planning Scheme Amendments, so as to ensure that these highly sensitive environmental sites are afforded maximum protection.

Lake Tyers Design Guidelines (Appendix F – Design Guidelines)

These guidelines should reflect the suggestions offered above as appropriate.

References

Peel, B. (in prep. a). Rainforest Restoration Manual for south eastern Australia. The how to book on what we have learnt so that you can do it. Includes: Cool Temperate Rainforests, Warm Temperate Rainforests, Subtropical Rainforests, Gallery Rainforests, Dry Rainforests and Littoral Rainforests. C.S.I.R.O.
Peel, B. (in prep. b). Littoral Rainforests of south eastern Australia: composition, ecology and management.