REGIONAL CATCHMENT STRATEGY

Improving Natural Resource Outcomes in East Gippsland

EAST GIPPSLAND
CATCHMENT
MANAGEMENT
AUTHORITY

Published by the East Gippsland Catchment Management Authority
574 Main Street (PO Box 1012), Bairnsdale Victoria 3875 Australia
Phone: 03 51520600
www.egcma.com.au

ISBN: 978-0-9758164-4-8

National Library of Australia Cataloguing-in-Publication entry

Author: Pearson, John

Title: Regional catchment strategy: improving natural resource outcomes in East Gippsland

Subjects: Natural resources-Management-Victoria-Gippsland.
Conservation of natural resources-Victoria-Gippsland.
Watershed management-Government policy-Victoria-Gippsland.
Waterways-Environmental aspects-Victoria-Gippsland.
Land use-Environmental aspects-Victoria-Gippsland.

Dewey Number: 333.7099456

EAST GIPPSLAND CATCHMENT MANAGEMENT AUTHORITY

Victoria
The Place To Be

REGIONAL CATCHMENT STRATEGY

Improving Natural Resource Outcomes in East Gippsland

John Pearson

Communications Coordinator

East Gippsland Catchment Management Authority

September 2008

FOREWORD

The Regional Catchment Strategy, which was developed following consultation with communities in East Gippsland identifies the priorities, objectives and targets for the management of the natural assets in our region. It is the foundation for Government funding to ensure improved natural resources outcomes.

The implementation of the Regional Catchment Strategy is coordinated by the East Gippsland Catchment Management Authority. Many government agencies, community groups and contractors are involved in works to achieve the outcomes outlined in the Strategy and supporting plans.

During 2007-08, the Authority published weekly full page articles in the East Gippsland News to inform the community about the Regional Catchment Strategy. Four articles were published about each strategic priority in the Strategy following a similar format:

- Introduction to the priority - context, concepts, definitions (Week 1);
- Threats to natural resources (Week 2);
- Works by the Authority and partners to maintain or improve natural resources (Week 3);
- Works by community groups to maintain or improve natural resources (Week 4).

The articles have been edited and are now presented in this booklet in an accessible format. I hope you find the articles interesting and informative, and that they encourage you to do what you can to assist us to maintain and improve the natural resources in our region.

Leo Hamilton
Chairperson, EGCMA

ACKNOWLEDGEMENTS

Many people contributed to the articles published in this booklet.

The articles on the Gippsland Lakes and the Snowy River were written by Lisa Wilson when Communications Coordinator at the EGCMA.

The following people contributed content and/or images used in the articles about the other priorities:
John Ariens (Friends of Beware Reef), Ian Bate (East Gippsland Shire), Prue Bergmeier (DPI), Mick Bramwell (DSE), Maurice Burns (Friends of the Gippsland Lakes), Rex Candy (EGCMA), Kate Charlton (dolphin research), Geoff Claffey, Lucy Clausen (DSE), Ian Clues (Bairnsdale Urban Landcare Group), Rachel Dawkins (DSE), Graeme Dear (EGCMA), Robyn Edwards (Trust for Nature), Rob Eldridge (Raymond Island Landcare Group), Les and Darilyn Goldsmith (Colquhoun North Arm Landcare), Penny Gray (Far East Gippsland Landcare), Barry Hart (Gippsland Lakes Taskforce), Bec Hemming (EGCMA), Carmel Henderson (DSE), Mark Jorgenson (Trust for Nature), Leanne Khan (EGCMA/East Gippsland Shire), Catherine Lennon (Parks Victoria), Chris Lewis (EGCMA), Max James (Trust for Nature), Rose Maher (Southern Farming Systems), Emily May (Gippsland Private Forestry), Will McCutcheon (Parks Victoria), Irene Meadley (Landcare), Brett Mills (Trust for Nature), Reg Morrison (EGCMA), Bridget Moss (Greening Australia), Andrew Murray (DSE), Anthony Nelson (East Gippsland Shire), Leah Newey (DPI), Jenny OSullivan (Future Food & Fibre), Rob Paterson (Parks Victoria), Bill Peel (EGCMA), Sean Phillipson (EGCMA), Julianne Sargant (DPI), Don Shaw (DPI), Jonathan Smith (Tambo Bluff Landcare Group), Tonia Stokes (Fishcare), Neil Stringer, Jeff Weir (Dolphin Research Institute), Tracey West (DSE), Rob Willersdorf (Gippsland Private Forestry).

Their willing assistance is gratefully acknowledged.

John Pearson
Communications Coordinator

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THE EAST GIPPSLAND REGION

The East Gippsland Catchment Management (EGCMA) Region covers 2.2 million hectares of land, lakes, and coastal waters out to 5.5 km, in the eastern-most part of Victoria. It is entirely south of the Great Dividing Range and includes the catchments of streams from the Mitchell River eastwards. The region covers about ten per cent of Victoria.

The region includes most of the East Gippsland Shire, the northern part of the Wellington Shire, and that part of the Alpine Shire south of the Great Dividing Range. It abuts the Wangaratta Shire at The Crosscut Saw and the New South Wales Shires of Snowy River, Bombala, and Eden Valley.

The Victorian Alps and mountains of the Great Dividing Range extend from the west to east across the northern boundary of the region. Foothills, lowland forests and coastal complexes to the south also extend from west to east, while rivers generally run north to south through the region, dissecting these landforms. Some catchments, such as the Mitchell, Tambo, Snowy and Cann River catchments include deep, mid-catchment, mountain basins which have been extensively cleared for dryland agriculture.

Major land uses and industries include conservation, agriculture, tourism, native forestry, plantation forestry and fisheries. About 80% of the land of the region is in public ownership, mainly as State Forests or National Parks.

Most freehold land is used for farming, ranging from large commercial enterprises to small 'rural residential' properties. Cities and towns occupy a small proportion of land in the region.

Some of the important features of East Gippsland are:

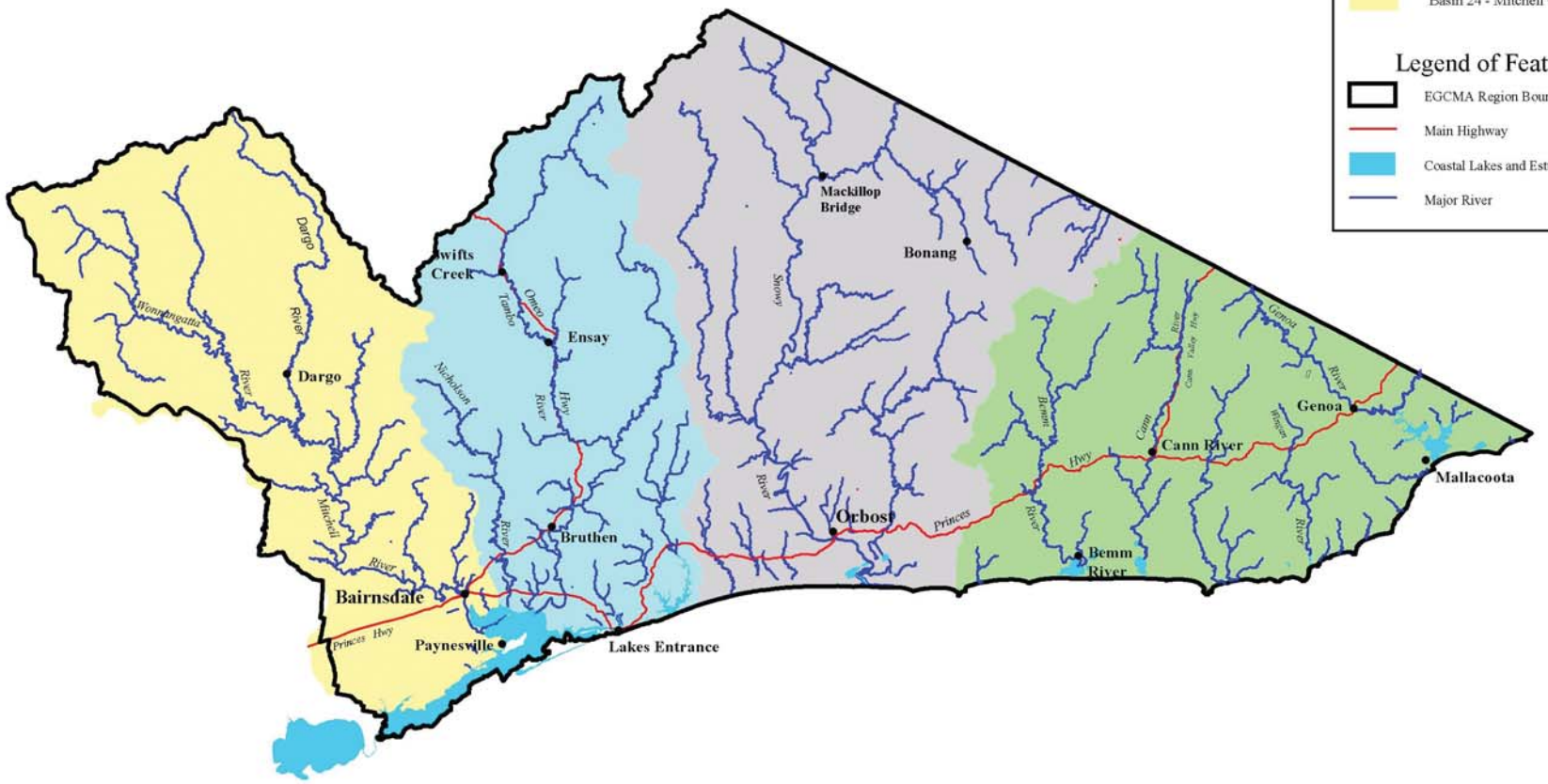
- The Gippsland Lakes, which have significant environmental, social and economic value and are on the Ramsar List of Wetlands of International Importance;
- Its array of streams, especially the wild rivers, including the iconic Snowy River and Victoria's biggest unregulated stream, the Mitchell River;
- Its long coastal reach with undeveloped estuaries, ocean beaches and spectacular headlands;
- Its mountains and forests, which provide great scenery, clean air, clean water, recreational opportunities and forestry products;
- Its scenic and productive farming lands, especially in the river valleys; and
- Its living wealth in the form of native plants and animals, some of which occur only in this region.

The Mitchell, Tambo, and Snowy Rivers have substantial alluvial floodplains in their lower reaches. The alluvial floodplains are the sites of the region's highly productive irrigation areas, including the Lindenow Flats (Mitchell River), Bruthen Flats (Tambo River) and the Snowy River Flats. The areas are used intensively for horticulture, dairying, and cattle production.

The Red Gum Plains are the one major plain within the region. These plains are located in the south-west of the region, and extend from Bairnsdale to the Perry River in the west. The plains were originally covered by Red Gum and native grasses. The area is now used predominantly for dryland agriculture, and is noted for its dwindling areas of high-value remnant Red Gum.

A complex of dunes and coastal vegetation extends along most of the coastline. The region includes the area of ocean out to three nautical miles from the coast. The three nautical mile limit forms the southern boundary of the EGCMA region.

East Gippsland Catchment Management Authority Region Basin Locality Map



EAST GIPPSLAND CATCHMENT MANAGEMENT AUTHORITY

Victoria The Place To Be

GIPPSLAND LAKES

Maintain the health of the Gippsland Lakes, by reducing sediment and nutrient input, re-establishing fringing vegetation and improving the condition of contributing catchments.

Message from the East Gippsland Catchment Management Authority.

Our rivers, our lakes and our catchments are among the most important natural assets in East Gippsland.

This booklet contains information about the priorities in the Regional Cathment Strategy (RCS) and the actions being taken to protect and restore these natural assets. Information about the priority for the Gippsland Lakes is presented first.

Agencies and industry have a large role in managing our catchments and it can sometimes seem the role of individuals is quite small. However, each individual has an impact, positive or negative, on the natural resources of our region.

Every one of us has a role to play and the East Gippsland Regional Catchment Strategy sets out some ways in which this can be achieved.

I hope you find these features informative and take up the personal challenge to assist us in protecting and restoring our environment.

Gippsland Lakes, Jemmy's Point

MESSAGE FROM THE GIPPSLAND LAKES TASKFORCE

The East Gippsland Regional Catchment Strategy (RCS) recognises the Gippsland Lakes as one of Gippsland's and Victoria's major assets.

This recognition was confirmed in a recent community survey where nearly 70% of Gippsland respondents listed the Gippsland Lakes as our most important asset.

The Victorian Government is supporting Gippsland Lakes initiatives with funding of $6 million over the next 3 years through the 'Our Water our Future' and the 'Gippsland Lakes Future Directions and Action Plan' initiatives.

However, Government investment alone will not fully address the health of the Lakes. As the RCS states, each individual can have an impact, positive or negative, on the natural resources of our region, and for this reason each individual has a responsibility to look after the Lakes.

Despite our combined efforts, events such as outbreaks of blue/green algae in the Lakes are still a possibility into the future. Government investment is being directed to reduce this potential, but will not eliminate it.

Here, we will provide information about the work now underway for the Lakes and how everyone can contribute to improving their quality and passing them on to our children in good condition.

Prof. Barry Hart, Chair

THE GIPPSLAND LAKES

The Gippsland Lakes are a system of coastal lagoons separated from the Tasman Sea by the coastal dunes of the Ninety Mile Beach. The largest inland waterway in Australia, they are made up of three lakes and fed by six major river catchments.

The Gippsland Lakes and eastern estuaries are highly valued as places of great beauty. They are a desirable destination for recreation and residential development. Fishing attracts a

GIPPSLAND LAKES

huge number of people to the area and, apart from Port Phillip Bay the Lakes are Victoria's major boating destination. The Gippsland Lakes are not just for the people. The Lakes including Jones Bay and McLeod Morass are home to over 100 bird species. This includes 2 species listed as critically endangered and 5 species listed as endangered in Victoria.

There are also a number of areas protected under agreements with Japan and China for their importance in providing a habitat for migratory birds.

The Gippsland Lakes are recognised internationally as a Ramsar listed wetland and are a vital habitat for native plants and animals. As a major tourist and recreation destination, the Lakes also play a vital role in supporting the regional economy.

In 1998, an environmental audit found that the Gippsland Lakes were at significant risk from increased levels of nutrients and sediments confirmed by a CSIRO study which found that the deteriorating water quality and algal blooms were related to the high level of nutrients entering the Lakes.

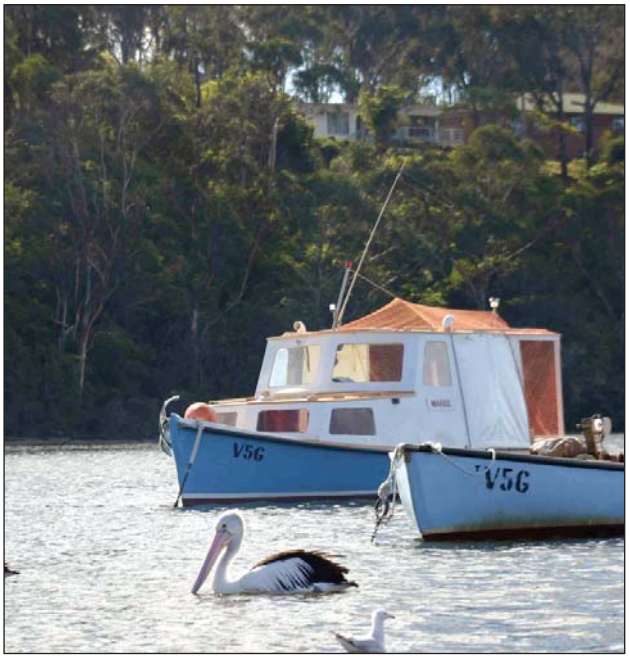
Fresh water enters the lakes from the Latrobe, Thomson-Macalister, Avon, Mitchell, Tambo and Nicholson Rivers, which drain a catchment area of nearly 10% of Victoria. These rivers are the main source of fresh water and provide an important role in flushing the Lakes. This fresh water is also the source of most of the nutrient and sediment inputs to the Lakes. Clearing, fire and land use practices in these catchments can severely influence water quality in the Gippsland Lakes.

Little Tern chick on nest

Other agencies such as East Gippsland Water, Environment Protection Authority, Parks Victoria, Department of Sustainability and Environment, West Gippsland Catchment Management Authority, Gippsland Coastal Board and the Department of Primary Industries are all working with community to reduce the levels of nutrients and sediments entering the lakes system.

There are many things that can be done by all of us to help keep the Gippsland Lakes healthy. Whether you live near the lakes, enjoy fishing or boating on the lakes or spend time at the lakes on holiday there is something you can do such as:

- Use environmentally friendly detergents and washing soaps;
- Dispose of rubbish properly;
- Ensure that defouling of boat hulls is carried out in an environmentally responsible manner;
- Empty boat sewage tanks and porta potty toilets into boat pump out and hopper facilities;
- Adhere to fishing bag limits and size limits to protect fish stocks;
- Adhere to government rules regarding vegetation clearing;
- Don't introduce exotic fish, other animals or plants to waterways;
- Think about potential impacts of your activities on the lakes before acting.



Gippsland Lakes, North Arm

GIPPSLAND LAKES

REDUCING NUTRIENT AND SEDIMENTS

The Lakes are a major asset of the East Gippsland region being a highly desirable destination for residents and visitors. It is not just the lifestyle and recreational activities that makes the Gippsland Lakes so special but the fact that it is home to a diverse range of plant and animal species.

The ongoing health of the Gippsland Lakes is vital for the region. Changes to the way water moves in and out of the Lakes, as well as increased flows of salt, sediment and nutrients have put the system under stress.

Nutrients

The quality of water is threatened by nutrients, causing problems that affect the health of animals and plants.

The main sources of nutrients entering the waterways of East Gippsland are:

* Nutrients attached to sediment being washed into waterways.
* Burnt material, following fires, such as ash, leaves, twigs etc.
* Fertiliser from intensive agriculture.
* Stock traffic in waterways.
* Urban storm water runoff entering the Catchment.

Recreation Pressures

The Gippsland Lakes and associated rivers are extremely popular for recreational boating. Recreational pressures on the lakes, estuaries and wetlands are likely to increase as more boating occurs.

Waste disposal from recreational boating is an important source of pollution. Boat pump out stations have been provided for Paynesville, Metung and Loch Sport and at other sites within the Gippsland Lakes.

Pest Plants and Animals

Lakes, estuaries and wetlands are subject to invasion by pest plants and animals from European Carp and marine pests through to noxious aquatic plant species such as Ricegrass, and Wakame (Japanese) Seaweed. Pest plants invading fringing vegetation include Spiny Rush and Bridal Creeper. The greatest potential for impact of pest plants and animals will come from adjoining State Forests, Parks and freehold land.

Water Extraction for Commercial Purposes

Over using water for commercial and domestic purposes threatens the regions water resources and is not ecologically sustainable over the long term.

The Victorian Government has outlined a number of actions that will help ensure that there is fair allocation of water for commercial and domestic purposes. These include the development of Regional Sustainable Water Strategies and capping of diversion from rivers on the Gippsland Lakes basin. Importantly, further allocations from other East Gippsland streams will be considered only as winter extractions and within sustainable limits.

WHAT IS BEING DONE TO DEAL WITH THESE THREATS?

In 2002 the Victorian Government released the Gippsland Lakes Future Directions and Actions Plan - a vision for restoring the long term health of the Lakes system. The plan describes the threats to the Lakes system and sets out a series of programs designed to alleviate those threats. The Victorian Government has allocated a further $6million to Gippsland

Dungbeetles being released

Aerial picture of burnt areas following bushfires 2007

over three years to underpin the plan. Despite this major initiative, government and the community must work together to understand the threats and help reduce the amount of nutrient entering the Lakes. Some projects being delivered are described below.

Dung Beetle Project

The aim of this project is to increase the population size and species diversity of Dung Beetles in order to naturally consume cattle dung from dry land agricultural pastures and reduce nutrient loads entering the Gippsland Lakes. This will prevent nutrients washing into waterways that flow into the Gippsland Lakes.

Soil Erosion

Erosion is a threat because it reduces water quality through impact of nutrients bound in sediment particles. As soil disintegrates in the water nutrients are released.

In East Gippsland the main source of sediment inputs are from erosion of the beds and banks of rivers and streams (55 percent) especially during floods, and from erosion within gullies (34 percent) and hill slope erosion (12 percent). Due to the recent fires some of East Gippsland's rivers and creeks are seeing significant amounts of soil and ash washed into them following heavy rain.

Rainforest Restoration on the Gippsland Lakes

Community groups, schools, Parks Victoria, Trust for Nature, Landcare, Correctional Services and the East Gippsland Catchment Management Authority have all worked together to restore rainforest to a 17 hectare site on Maringa Creek at Nyerimilang.

Rainforests help to maintain good bank stability and water quality and provide habitat for many plants and animals. Maringa Creek was chosen for restoration due to its locality and potential to reduce nutrients entering the Gippsland Lakes. Situated in the coastal hills that feed into the Lakes system, the restored rainforest will act as a nutrient trap, capturing and retaining nutrients on site.

The site contained significant vegetation remnants which formed the basis for the trials. With funding from Natural Heritage Trust, 170,000 additional plants have been established to help kick start the natural regeneration process. The aim was to restore a self sustaining system requiring minimal ongoing management.

Joint work with Trust for Nature has seen a Rainforest Protected Area Network take shape in the Maringa Creek catchment with several covenants on rainforest now in place.

Revegetation at Nyerimilang Park

The project has become a major research site for rainforest restoration in eastern Australia, with information collected from these trials incorporated into a Rainforest Restoration Manual.

GIPPSLAND LAKES

IMPROVING CATCHMENTS

The ongoing health of the Gippsland Lakes is vital for the environmental, economic and social prosperity of the region. Changes to the way water moves in and out of the Lakes, as well as increased flows of salt, sediment and nutrients have put the system under stress. One key to improving the Gippsland Lakes will be improving catchments that feed the Lakes.

There are many projects that have been undertaken to improve the health of the Gippsland Lakes catchment.

Macleod Morass

The Gippsland Lakes will benefit from improvements to Macleod Morass thanks to the efforts of East Gippsland Water. A constructed wetland project initiated by East Gippsland Water now discharges high quality treated wastewater to the Morass reducing levels of nutrients entering the lakes system.

Macleod Morass is an internationally recognised wetland that feeds into the Gippsland Lakes. Heavily degraded due to pollution, pest plants and animals and rising salinity levels, the Morass is being steadily restored to improve biodiversity and reduce nutrients entering the wetland.

The constructed wetland project along with treatment plant upgrades are able to remove up to 90 per cent of nutrients from wastewater which were previously discharged into the Morass.

The constructed wetlands are managed to allow the natural wetting and drying cycles of the Morass to be maintained. This has encouraged native vegetation to return to the site and reduce the negative impacts of weeds. Freshwater inflows have also reduced the impact of salt water from the Gippsland Lakes.

Other activities such as carp traps and gross pollutant traps have all benefited the Morass and the Gippsland Lakes. The Friends of Macleod Morass and Parks Victoria have constructed walkways and bird hides to allow the community to enjoy the improved site. There is also a plan for construction of a circuit walkway and bicycle path around the Morass.

Macleod Morass

East Gippsland Water reuses 100% of their wastewater making them a leader in the field of wastewater management. For more information on the Constructed Wetlands Project, please contact East Gippsland Water.

IMPROVED IRRIGATION PRACTICES BENEFIT THE GIPPSLAND LAKES

Since 2000 funding provided through the Victorian Government's Gippsland Lakes Rescue Package has been used to improve farming practices in the Macalister Irrigation District. This funding has greatly reduced the amount of phosphorus leaving the district and entering the Gippsland Lakes.

The Department of Primary Industries has used a three-pronged approach in addressing phosphorus loss from the irrigation area. They have assisted farmers to better target their use of fertilisers, to more effectively manage and recycle their dairy effluent and to improve their irrigation practices and thereby minimise the loss of water and phosphorus to drains.

Improved irrigation management has the potential to drastically reduce phosphorus losses from farms. The Department of Primary Industries helps farmers with the development of irrigation farm plans, with the construction of recycle dams and with conversion of flood irrigated land to spray irrigation.

Tunnel erosion following rain

Tunnel erosion

To date, irrigation farm plans have been completed on 24,500 hectares of the Macalister Irrigation District, 5,300 hectares now run to a recycle dam and 2,260 hectares has been converted to spray irrigation.

It is calculated that these measures retain approximately 11,000 megalitres of water on farm annually and keeps 45 tonnes of phosphorus out of the Gippsland Lakes, a win for both the farming community and for residents and visitors to Gippsland.

Despite the challenging seasons in recent years, farmers have spent millions of dollars upgrading their irrigation and dairy effluent infrastructure to improve efficiency, and dramatic changes are evident to anyone visiting the area.

WHAT'S BENEATH YOUR FEET?

Landholders are being asked the question 'What's beneath your feet?' in a bid to reduce the impact of tunnel erosion on the Gippsland Lakes. The East Gippsland Landcare Network in conjunction with technical support staff from the Department of Primary Industries have developed a soil management program that will rehabilitate areas affected by tunnel erosion.

The program aims to reduce the impact of agricultural practices on water quality entering the Lakes system and improve farm productivity. Eligible landholders have been given incentives and provided with expertise to undertake earthworks, fencing, perennial pasture establishment, indigenous vegetation in the foothills and lakes escarpment areas of the Bairnsdale region.

Twenty-two landholders have rehabilitated 326 hectares of erosion sites and participated in a grazing management course to increase their knowledge of sustainable farming practices.

URBAN CATCHMENTS

Urban areas also need to play a part in reducing nutrient loads to the Gippsland Lakes. There are many things residents and visitors to the area can do to help. Some of these include:

- Conserve water - for example wash the car with a bucket on the lawn or set up systems to reuse grey water;
- Use environmentally friendly detergents and washing sodas - especially low phosphorous or nil phosphorus ones;
- Dispose of rubbish responsibly - for example oils, paints, don't overfill bins and make bins dog-proof and bird-proof.

The East Gippsland Shire Council has installed litter traps and upgraded stormwater facilities.

East Gippsland Water have also upgraded sewerage treatment plants to limit the amount of nitrogen and phosphorous entering waterways that feed the Gippsland Lakes.

GIPPSLAND LAKES

COMMUNITY PROJECTS

The Gippsland Lakes offer so much to residents and visitors but from time to time the Lakes need our help to maintain their health. The Lakes are home to a huge array of plant and animal species and these rely on the health of the Lakes for their survival.

The East Gippsland Regional Catchment Strategy (RCS) recognises the community as key participants to restore the health of the Gippsland Lakes.

Waterwatch

Waterwatch is a community education and volunteer water quality monitoring program and is a high priority in the East Gippsland RCS. Waterwatch is a key program that involves the community, learning about and caring for the Gippsland Lakes.

An excellent example of Waterwatch involving the community is the award winning Gippsland Lakes Relay. This relay linked all primary schools in the Gippsland Lakes catchment from as far as Warragul in the west, Swifts Creek in the north and Lakes Entrance in the east. The relay involved collecting water from the schools local catchment and adding the water to the relay baton until it reached the Gippsland Lakes. The water from the batons was returned to the lake system at Lakes Entrance. The students were able to see how water quality changes from the top of the catchment to the Gippsland Lakes.

Landcare

Landcare involves a broad section of the Gippsland community and in particular small and large scale farmers who are the custodians of a large portion of the agricultural land of the Gippsland Lakes catchment. Many landholders and managers are members of local Landcare Groups that are enthusiastically participating in Landcare activities to ensure their land management techniques assist in improving the quality of run off from their properties. Within the Gippsland Lakes Catchment, more than 1300 landholders and managers (500 East Gippsland and 844 West Gippsland) are active members of Landcare.

Trafalgar Primary School, Gippsland Lakes Relay

In East Gippsland one of the major Landcare projects being undertaken to improve the Health of the Gippsland Lakes is the *What's Beneath Your Feet* management project. This project involves landholders and soil technicians in soil remedial works to prevent sediments from leaving farmland and entering nearby waterways and the Gippsland Lakes. In 2005 - 2006 alone, soil conservation works were carried out across 951 Ha of erosion affected land. This reduced sediment exports an estimated 112,000 cubic meters from entering the Gippsland Lakes.

The Lower Tambo Landcare Group is working hard to reduce levels of locally generated pollutants entering the Gippsland Lakes. With funding from the Australian Governments Community Water Grant Program, the group aims to restore two wetlands into viable nutrient and sediment traps.

The wetlands are located near Metung and drain a catchment area of over 400 square metres. Their close proximity to the Lakes means that nutrients and sediments from the surrounding farm and urban properties are prevented from flowing straight into the Lakes.

The Metung Wetland rehabilitation project will erect stock exclusion fencing, control rabbit invasion and plant native species to allow for natural regeneration of aquatic vegetation. The project will also aim to restore natural water regimes to produce a self-supporting system.

The dedication of the Lower Tambo Landcare Group with support from East Gippsland Water, Department of Sustainability and Environment and the EGCMA will ensure the Gippsland Lakes are passed on to future generations to enjoy.

Lower Tambo Landcare Group

Round Head Project Before Works

TATUNGALUNG PROJECT – REVERSING THE EFFECTS OF EROSION

The Tatungalung Round Head Project is an excellent example of Indigenous community groups and natural resource management agencies working together to deliver significant environmental and cultural outcomes.

The area is situated on Boole Poole Peninsula, forming part of the Ramsar listed Gippsland Lakes and is particularly significant to the Kurnai/Gunai people of East Gippsland.

Important fringing vegetation has been lost due to long term salinity effects. As the erosion scoured away the bank significant artifacts were exposed indicating that this site was used as an Aboriginal burial ground for thousands of years.

In 2004 the Gippsland and East Gippsland Aboriginal Cooperative (GEGAC) successfully applied for Natural Heritage Trust funding to protect the site from further damage. In a partnership arrangement between GEGAC, Department of Sustainability and Environment and the East Gippsland Catchment Management Authority, the Tatungalung Round Head Project aimed to restore fringing vegetation to reduce the impact of erosion and protect the burial ground.

In addition to funding from the Natural Heritage Trust program, GEGAC were able to secure a similar amount of funding from the State Government through the Gippsland Coastal Board. Completed in 2006, the project used a sand bagging technique utilising five large material bags securely anchored into the bed of the lake and then filled and covered with sand pumped from offshore. These bags form a flexible, secure barrier covered with more sand pumped from the same site.

Round Head Project After Works

Once this process was completed the sand was covered with brush (Coast Tea-tree Leptospermum laevigatum) allowing for natural regeneration.

The sand bagging technique has protected the burial ground from further damage and reduced the levels of sediment entering the Gippsland Lakes.

SNOWY RIVER

Improve the health of the Snowy River by restoring environmental flows and in stream and riparian ecosystems.

Message from the East Gippsland Catchment Management Authority

Improving the health of the Snowy River is a high regional priority.

To achieve this, State and Federal Governments have set a target to return 21% of the Snowy's natural flows from Jindabyne Dam by 2011 with supporting funding of $375 million. The Bracks Government committed a further $40 million to help improve the health of the Victorian reach of the Snowy River and other Snowy related investigations.

It is clear that where statewide and regional priorities match, opportunities arise to fund initiatives to meet those goals.

The East Gippsland Regional Catchment Strategy (RCS) and the East Gippsland River Health Strategy (EGRHS) detail these goals and priorities. Both documents can be found at (www.egcma.com.au).

Here we outline the work now underway and work still to be done on the Snowy River and its catchment.

Upper reaches of the Snowy River

OUR ICONIC RIVER

From the slopes of Mount Kosciusko in NSW to the coast at Marlo the Snowy River flows for over 500km through a broad range of landscapes. The Snowy is a highly valued and precious river. The entire Victorian length of the Snowy River has been given Heritage status due to its spectacular gorge, native fish diversity and outstanding botanical values. The Snowy River ensures wonderful canoeing and rafting opportunities from the NSW border to the Buchan River with stunning scenic landscapes.

It flows within traditional lands of the Krowathunkooloong Gunai/Kurnai people. It has several significant Indigenous Cultural Heritage sites and was considered an important route for people gathering food from the sea and from the mountains.

WHY DO WE NEED MORE WATER IN THE SNOWY?

In the 1960s The Snowy Mountains Hydro-Electric Scheme was developed out of a simple concept to trap the snow melt in the upper reaches of the Snowy River and divert it west

through a series of dams and tunnels to the Murray and Murrumbidgee River systems for irrigation. Energy created as the water falls would be used to generate electricity.

Since then the average flow in the Snowy River at Jindabyne is about 1% of the natural flow, causing lower Snowy flows, approximately 53% of what they were before the Snowy River Scheme was developed. The loss of high spring flows associated with snow melt in the mountains has caused the greatest change to the lower Snowy River.

Just like we need water to live, a river needs enough water to sustain its life and the lives of the plants and animals dependent on it. With reduced flows, weeds such as willows and blackberries establish and spread within the river more easily. Fish migration and breeding are interrupted and introduced fish species have better opportunity to flourish in the slower and warmer water as native fish numbers decline.

Further downstream, increased levels of sediment have filled pools and reduced fish habitat. Salt water from the estuary is now found seven to ten kilometres further upstream than in past times. Native riparian vegetation is unable to adjust to the increased levels of salinity which results in exposed banks and erosion.

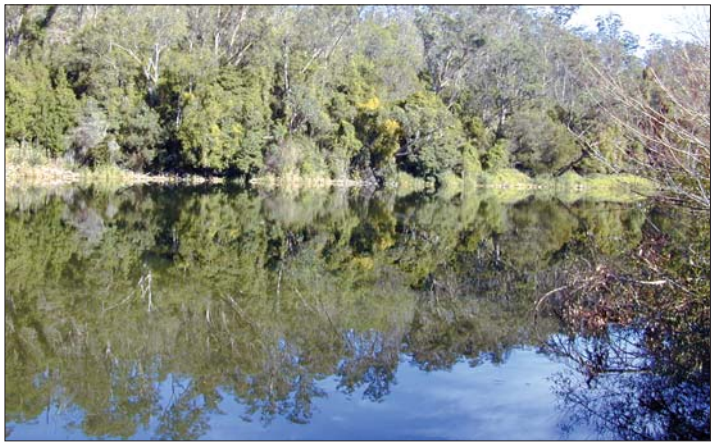
Increased flows, released from Jindabyne in a coordinated way will provide occasional low level flooding in spring and help maintain a diverse stream bed for animals and plants.

Aerial view of the Snowy River at Jarrahmond

Willow infestation in upper catchment

Concept drawing of Jindabyne Dam

SNOWY RIVER



Mature remnant vegetation along the Snowy River

Jacksons Crossing Snowy River

ENVIRONMENTAL FLOWS

Of all the rivers and creeks that make up the Snowy River catchment, 66% are in excellent or good condition and 32% are in moderate to poor condition. Most of the moderate to poor ratings apply to the Snowy River itself, largely due to significantly reduced flows from the upstream diversion of water for the Snowy Hydro-Electric Scheme.

Restoring environmental flows to the Snowy are vital for a healthy, functioning river system. Environmental flows are releases of water aimed to mimic natural seasonal flows.

The concept of the environment being a legitimate user of water and therefore requiring its own allocation is relatively new. As with other users, providing environmental flows is about working out a balance between the needs of communities, existing users and maintaining river health.

MORE WATER FOR THE SNOWY

The environment's share of water is called an Environmental Water Reserve (EWR). It is held by Government as a legal right for the River's share of the water. The EWR is made up of natural flows and in the case of the Snowy some will be held in storage and released into the river periodically.

Environmental flows consist of the following types:

- Minimum habitat flow: Will consistently provide a small flow of water from Jindabyne to improve the temperature of the water, improve triggers for breeding and increase the diversity of habitat available. This will mostly benefit the NSW stretch of the River;
- Channel Maintenance and Flushing Flows: Will be larger and less frequent releases of water intended to re-shape the river channel, improving habitat for animals and reducing the impacts of weeds. These types of flows will also benefit the Victorian stretch of the River.

A healthier Snowy with increased flows will support our range of agricultural pursuits, tourism operations and recreational activities.

HISTORY OF WILLOWS

Following the practice of native vegetation removal along river banks over 150 years ago, willows (a non native species) were introduced mainly for control of river erosion. Willows were selected as they are easily propagated, fast growing, have few predators and have a strong, deep root system considered effective in binding soil. Willows were also planted for the purposes of shelter and ornamental value as well as supplementary stock feed.

Unfortunately at the time, the negative impacts of willows were not well known. In 1999 these negative impacts were formally recognised when willows were listed as one of Australia's worst weeds; a Weed of National Significance, due to their highly invasive nature and impact on the environment.

PROBLEMS WITH WILLOWS

When willows were first planted it was considered that seed production would rarely or never occur and that local spread would only happen due to deliberate plantings. Instead, willows spread out of control, mainly by twigs and branches

Buchan River site prior to willow removal

breaking off, floating downstream and resprouting. It has since been discovered that many types of willows also crossbreed and have spread aggressively by seed.

Willows threaten the native animals and plants of our rivers by providing little food and no shelter over the cold winter months. They cause physical changes to streams with blockages, increased flooding, erosion and channel realignments.

Willows also drop a large number of leaves within a short period of time which robs the river of vital oxygen and also makes them ineffective as shade trees. Before willows drop their leaves they 'suck back' the nutrients which means that the food value of the falling leaves for aquatic fauna is almost nil, unlike native species.

Willows spread their roots into the bed of a watercourse, slowing the flow of water and reducing aeration. They form thickets which in high flows can divert water from the main channel causing flooding and erosion. Willow species are no longer a desirable tool for stream stabilisation.

Most willows spread by fragments of stems or twigs breaking off. They can establish many kilometres downstream. Some willow species can spread by seed such as Grey Sallow and Pussy Willow. Pussy Willow seeds have travelled from the Murray catchment over Mt Hotham to become established in the Mitchell catchment.

Individual willow trees in East Gippsland were planted many years ago. As willows age and are at the end of their useful life they begin to fall over or drop branches. These branches or twigs have the potential to block stream flow in high floods causing the river to change course.

Native vegetation planted following removal of willows on the Riparian and Rainforest Restoration Trial Project

BENEFIT OF WILLOW REPLACEMENT

The taller growing native trees shade much more of the river which keeps it cooler in summer and maintains higher oxygen levels. Native species attract much larger numbers of insects which provide food for fish and birds. Native hardwood trees also provide important and long term habitat for in-stream animals when they die and fall into the rivers. Taller native trees allow smaller trees, shrubs and undergrowth to flourish providing bank stability.

SNOWY RIVER

Lochend Jungle

Lochend Jungle Fishing Platform

SNOWY RIVER REHABILITATION PROJECT

The Snowy River Rehabilitation Project includes a diverse range of projects to be implemented by Government agencies, community groups and landowners. The program is a long term commitment towards rehabilitation of the Snowy River.

BROADER LOWER SNOWY RIPARIAN REVEGETATION

This project aims to revegetate the shores of the Snowy River between the estuary and the Jarrahmond gorge where the river joins the Snowy floodplain. The project will be delivered in stages over several years. Site preparation works began In 2007 below the Princes Highway Bridge on the Lochend Road and along the Jarrahmond and Bete Belong banks above Lynns Gulch.

RIPARIAN AND RAINFOREST RESTORATION TRIALS

Restoring riparian vegetation with rainforest (similar to the Loch End Jungle) on the lower reaches of the Snowy is seen as important to the health of the lower Snowy. Since the early 2000s the EGCMA has steadily reintroduced rainforest along the Marlo Road and at other sites on the Snowy. This trial project has been very successful and the information gained forms the basis for further works on the river in the future. Works will complement areas which have been fenced to exclude grazing stock. The trial works mentioned above have proven the benefits of streamside vegetation for the Snowy.

Log demo site

Fish around large wood structures

IMPROVING IN-STREAM HABITAT IN THE LOWER SNOWY RIVER

Past river management practices, which met the needs at the time, included removal of in-stream vegetation and logs, clearing of banks and straightening of channels. For early settlers large debris (snags) within rivers were considered a nuisance. Snags made navigation within rivers difficult and were thought to block channels and cause flooding at peak flows. For these reasons the snags were removed.

Apart from very large accumulations of wood, there is no evidence that logs and branches have a detrimental effect on flooding or erosion. Rivers will flood whether there are snags in the river or not and the erosion that occurs around them is generally minor. Removal of the snags has been one of the factors that contribute to erosion of river banks. Erosion can cause loss of agricultural and recreational land, as well as damage to infrastructure such as roads and bridges.

Snags are vital for the survival of many native species. They create a natural habitat for many species of animals, fish and aquatic organisms. The leaf litter and fine particles that are trapped by the snags become a food source for the animals living under the water. Snags help scour out deeper pools for fish to shelter.

Lower Snowy rehabilitation will include re-introduction of snags similar to those found at the demonstration site opposite Forest Park in Orbost. Once put in place, the snags will be regularly monitored to ensure they improve the diversity of the river bed, fish habitat and fish migration.

SNOWY RIVER

Red Passion Flower (Passiflora cinnabarina)

Orbost PS students learning about bugs and beasties from Waterwatch

COMMUNITY PROJECTS

There have been several community projects that are contributing to restoring the health of the Snowy River.

Snowy River Thinking - Snowy River Schools Education

This project is aimed at school students. The students monitor changes in the river brought about by local rehabilitation, environmental flow releases and in-stream works.

A Coordinator links Snowy River Schools Cluster students (seven schools) with Snowy River rehabilitation workers, scientists and activities which has proven to be of great benefit to students. It increases the profile of the Snowy River Rehabilitation within schools and provides information, activities and guest speakers for inclusion into the school's curriculum. The project is in year two of a three year funding commitment to the Orbost Schools Cluster. This project works closely with the East Gippsland Waterwatch project and delivers specific Snowy River rehabilitation education. Students from Orbost and district develop a clear understanding of the role of the Rehabilitation project and the effects and benefits this will have on the Snowy River.

EGCMA's Bill Peel talking to community members about rainforests

The remnant rainforest areas on the First and Second Islands in the Snowy estuary were suffering from weed invasion including Wandering Jew and Blue Periwinkle. On Second Island, about one third of the rainforest canopy had died. It was also compounded by a secondary invasion of Cape Ivy and Kikuyu as the canopy collapsed.

Funding was received from the Australian Government's Natural Heritage Trust to assist Moogji Aboriginal Council, Marlo Coast Action/Coast Care and Parks Victoria to complete weed control works ensuring the rainforest areas survived. This cooperative and indeed innovative project has since won wide acclaim with the project winning an East Gippsland Landcare award for excellence. It was also nominated for a State award. Follow up works are planned for this same site next year.

Second Island bush regeneration crew, Nigel Beswick, Johnny Johnston and Paula Martin. © Department of Environment and Water Resources. Photo by John Baker.

Fenced off area for stock exclusion

LOCAL FARMER SEES BENEFIT IN PROTECTING RIVER FRONTAGE

Robert Russell, third generation farmer and his family live on the edge of the Snowy River floodplain. Robert or 'Biddy' as he prefers to be called, has worked hard since moving to this spot around 1985, to support his growing family and maybe even have an impact on what he saw was a growing problem in the Snowy River.

Biddy said, 'When I purchased the farm, surveyors informed me that approximately five to seven acres were actually located on the other side of the river, caused by the changing directions in the river channel over many years. I realised that unless I did something to try and halt this migration of land I would undoubtedly lose more prime river frontage over time.

The Snowy River Trust approached me around this time to see if I would become involved in some river bank restoration on the frontage of my property. I saw this as an opportunity to do some constructive stabilisation works and worked with the Trust to try and stem the river bank erosion. At that time I followed common practice and planted willows to try and stop the erosion of the banks.

The trees failed to do what was required and ended up creating problems especially when minor flood events occurred. I also noticed that cattle caused significant damage to the banks and realised that the cattle had to be kept away from the river's edge.

In 1997 the CMA provided assistance for fencing and removal of pest weeds along my frontage. I have done most of the work myself by monitoring the frontage, keeping an eye on flows within the river, planting tree corridors running perpendicular to the river which have provided shade for the cattle and corridors for native fauna.

As much as I can see the benefit of native trees and shrubs as opposed to introduced willow species it would be unrealistic to believe that in a major flood no damage would occur. It is the lesser damage during minor floods, the return of native animals and birds and the improvement in the river's health that inspires me to continue.

We need to try and repair the damage we have done. I think if we get rid of the weeds, fence off the river to stock, the river will probably fix itself. With the assistance of the CMA, works along my property will continue as they do in other areas along this river.

It is rewarding to see the regeneration of the native vegetation and seeing species of birds wading in the waters that I used to see as a kid and haven't seen for a long time.

I am also a member of the local Catchment Advisory Group working with the CMA to provide important local input on issues such as river bank problems, pest plants and animals and other concerns relating to looking after our Snowy catchment'.

HEALTH OF LOWER REACHES OF RIVERS

Improve the health of the lower reaches of the Mitchell, Tambo, Nicholson and Cann Rivers

Message from the East Gippsland Catchment Management Authority

Improving and maintaining the health of the lower Mitchell, Tambo, Nicholson and Cann Rivers is very important for our environment and our people. The East Gippsland Regional Catchment Strategy (RCS) is an important tool in ensuring that these rivers can continue to provide water for drinking and irrigation, support tourism and recreation and also provide habitat for many special plants and animals.

The continuing health of these rivers cannot be taken for granted. Their health relies on a co-operative partnership between community and government land managers and users over the long term.

The RCS and the East Gippsland Regional River Health Strategy (EGRRHS) detail the management goals and priorities for these rivers. Both documents can be found at (www.egcma.com.au). The information presented here describes the work now underway in the lower reaches of the Mitchell, Tambo, Nicholson and Cann Rivers. I hope you find it informative and take up the personal challenge to assist us in protecting and restoring these rivers.

Lower Tambo River

INTRODUCING THE LOWER MITCHELL, TAMBO, NICHOLSON AND CANN RIVERS

These rivers all have significant environmental, economic and social values to East Gippsland and Victoria.

Lower Mitchell River

The Mitchell is a Heritage River. It is the largest unregulated river in Victoria, free of barriers to its natural flows. The lower Mitchell is that portion of the river which flows downstream from the water pumping station at Glenaladale and winds its way through the Lindenow Flats, past Bairnsdale and into the Gippsland Lakes at Lake King via the internationally significant Mitchell Silt Jetties.

The Mitchell supports good populations of the nationally vulnerable Australian Grayling and the habitat provided for the species is one of the reasons for the river's importance.

The Mitchell provides a significant proportion of the freshwater flow into the downstream Gippsland Lakes. The lakes are Ramsar listed for waterbird habitat and support populations of estuarine fish species such as Black Bream.

The Mitchell is the major source of water for the East Gippsland community. The towns supplied from this system are Lindenow, Lindenow South, Bairnsdale, Wy Yung, Lucknow, Paynesville, Eagle Point, Raymond Island, Newlands Arm, Bruthen, Sarsfield, Nicholson, Johnsonville, Swan Reach, Metung, Lakes Entrance, Lake Tyers, Nowa Nowa and Kalimna.

Some threats to the health of the Mitchell include sediment run-off from forests and farms, especially after drought and fires. Weeds such as Willow, Blackberry, Blue Periwinkle and Ragwort need particular emphasis. The control of major weeds gives native vegetation a greater chance to establish which is much better for native plants and animals.

HEALTH OF LOWER REACHES OF RIVERS

Tambo River at Bruthen

Cann River at Gauge Track

Lower Tambo River

The Timbarra and Little Rivers are the largest waterways that flow into the Tambo River. The lower Tambo is that portion of the river that flows from around Ramrod Creek north of Bruthen to where the river enters Lake King in the Gippsland Lakes. The river flows through fertile river flats which support cropping, dairying and beef grazing.

The Tambo River supports very significant populations of the nationally vulnerable Australian Grayling and is renowned as a Black Bream fishery. Both these species are vulnerable to the impacts of low river flows. The estuarine stretch of the river carries a great deal of recreational boat traffic.

Some threats to the health of the Tambo include sediment run-off and introduced weeds such as Willow, Blackberry, and Blue Periwinkle need particular emphasis. Sediment entering the Tambo flows downstream into the Gippsland Lakes and can cause algal blooms. Bank erosion caused by recreational boating and fishing in the estuarine reach is a definite threat to the river.

Lower Nicholson River

The Nicholson flows through mainly vegetated public land until entering the floodplain near Sarsfield. The lower Nicholson is that portion of the river that flows from the Nicholson River Dam to Lake King near the Nicholson township. From Sarsfield downstream the river flows through river flats comprising beef properties and small farmlets.

The Nicholson is a popular river for boating and fishing. East Gippsland Water uses water from the Nicholson River to supplement the Mitchell River supply. Water is stored in a 640 ML on-stream storage upstream of the Great Alpine Road crossing.

Some threats to the health of the Nicholson include sediment run-off and introduced weeds such as Willow and Blackberry. Low flows in dry periods can also reduce oxygen levels in the estuarine reach of the river and have resulted in fish kills. Bank erosion caused by recreational boating, fishing and grazing stock are a definite threat to the river.

Cann River

The Cann River flows through sections of the Coopracambra and Croajingolong National Parks. The forests surrounding the Cann are significant for their unique natural state and diversity.

They contain Victoria's largest stand of Cool Temperate Rainforest. The lower Cann commences where it enters the fertile Cann River floodplain supporting agricultural industries including dairy and beef cattle farms. The Cann River flows into Tamboon inlet, a coastal lagoon that is intermittently open to the ocean.

Some threats to the health of the Cann include introduced weeds such as Willow and Blackberry. The river has also become artificially wide, due to the impacts of vegetation clearing in the past. Lack of native streamside vegetation can cause significant erosion to the banks.

The East Gippsland River Health Strategy establishes management goals and actions for these rivers over the next five years.

These goals will be delivered through the co-operation of community and government agencies. The following pages outline some of these co-operative works in the lower catchments of the Mitchell, Tambo, Nicholson and Cann Rivers.

HEALTH OF LOWER REACHES OF RIVERS

Willows on the lower Mitchell

Unfenced section of waterway on lower Tambo

MITCHELL, TAMBO, NICHOLSON AND CANN RIVERS

The Mitchell River is the largest un-regulated river in Victoria, free of barriers to its natural flows. In the lower reaches, the river winds through intensively farmed alluvial flats on the Lindenow Flats upstream of Bairnsdale and drains into the Gippsland Lakes between the internationally significant Mitchell River Silt Jetties which extend 6 kilometres into Lake King.

The Tambo and Nicholson river flats are used for intensive farming activities including beef cattle grazing, dairying and cropping. These river valleys also contain some significant wetlands and flow into Lake King past the Nicholson and Swan Reach townships.

The fertile Cann River floodplain supports dairying, cattle grazing and some cropping. The small township of Cann River, situated at the southern end of this floodplain is a key starting point for visitors travelling to the Croajingolong National Park.

THREATS TO OUR RIVERS

A threat can be defined as an activity or event which can change the physical condition of a natural asset in such a way as to negatively affect the capacity of the asset to maintain its economic, social or environmental value. Some of these effects can be caused by human interference and others by natural occurrences such as floods and fires.

Native vegetation

Our rivers rely on native vegetation to support the plants and animals that live in our region. Native vegetation can help reduce bank erosion and provide shade and food. Clearing of native vegetation, especially near a river, creates a serious impact on stream habitats and water quality. Poor water quality can significantly affect in-stream plants and animals and consequently have an impact on the health of a river.

Clearing of vegetation increases water runoff and carries nutrients, pollutants and sediment into streams and rivers. Contaminated water also reduces dissolved oxygen levels and affects water quality.

Sediment and Nutrients

Wetlands are low lying areas that are either permanently connected to rivers or fill and dry out periodically. They provide refuge and breeding grounds as well as food for plants and animals. The drainage and filling of wetlands for land development and agriculture can lead to habitat loss for bird, animal and fish species and reduced water quality.

High levels of nutrients caused by run-off and erosion are a direct threat to river health. Rivers can look dirty often as soil and sediment is carried downstream. High levels of nutrients can result in excessive plant, weed or algal growth. Dirty water can cause increased temperatures and low oxygen levels.

HEALTH OF LOWER REACHES OF RIVERS

Burnt timber

Carp caught on Catch a Carp Day

Social values are also affected by dirty water reducing our river's image.

Farm effluent containing animal waste and nutrients can have a serious impact on water quality. Excessive soil run-off from overgrazed pasture creates problems with nutrients and sediment.

Water quality effects on economic values are primarily caused by toxic contamination, high salt levels, algal blooms and large amounts of sediment. These can all make water unfit for human consumption or industrial use. Algal blooms in lakes and waterways also have a detrimental effect on recreational activities such as boating and fishing.

Natural Events

With large areas of forest throughout the region, often in remote and inaccessible areas, bushfires have the capacity to drastically alter the East Gippsland environment. Bushfires are common and can be widespread and intense. In January 2003 areas of the upper reaches of the Mitchell River and Tambo River were affected by wildfire. In the 2007 fires, areas of the upper reaches of the Mitchell, Nicholson and Tambo Rivers were affected.

Bushfires in the high country also have a dramatic effect on the lower reaches of the rivers. Burnt catchments influence river flows as they recover. Rain brings increased erosion of soils and inflow of nutrients affecting water quality. This can affect the survival and distribution of aquatic animals, the drainage of agricultural land and the availability of water for human consumption.

Burnt areas are also prone to weed infestation. Weeds compete with native plants reducing plant diversity and habitat for birds and animals and threatening farm productivity. Weed invasion can increase dramatically after natural events such as floods and fires.

Pests and Weeds

Introduced pests can also cause serious problems in rivers, lakes and estuaries. In some freshwater streams, Carp have displaced native fish and increased water turbidity. Carp also destroy the root systems of plants along the banks. Pest plants such as willows can smother native vegetation, choke water courses and contribute to soil erosion.

Garden escapees such as Wandering Jew, Cape Ivy, Japanese Honeysuckle, English Ivy have found their way along some of our river banks. This is particularly so along the lower reach of the Cann River.

HEALTH OF LOWER REACHES OF RIVERS

Willow infestation

Area ready for revegetation - Lower Mitchell River

WORKS IN THE LOWER MITCHELL, TAMBO, NICHOLSON AND CANN RIVERS

Willows

Willows are an issue along many parts of East Gippsland's rivers including the Mitchell, Tambo, Nicholson and Cann. Work to remove willows has recently been completed on the Mitchell River between Walpa and Lindenow and at Bairnsdale adjacent to Picnic Point, on the Tambo River between Ensay and Tambo Crossing, on the Nicholson River downstream of the dam to the Great Alpine Road bridge, and the Cann River downstream from Cann River township.

In most cases, willows are poisoned using a stem injection method. An axe blade is driven into the trunk and bent back, allowing Roundup to be placed along the cut. In some instances, like in the Cann River below the township the trees are left standing to progressively die away. In other instances, especially where willows are a threat to structures like bridges, they are mechanically removed about 8 weeks after poisoning then stacked and burnt.

After willows have been removed, controlling infestations of blackberries, thistles and other weeds is a priority. When weeds are under control, fencing and revegetation can commence.

Fencing and Revegetation

When weeds have been controlled and areas fenced to prevent stock access, revegetation activities commence. Trees, shrubs, grasses, sedges and tussocks indigenous to the area are planted. Smaller shrubs are planted near the water edge and taller trees placed back from the river bank. These

HEALTH OF LOWER REACHES OF RIVERS

Large wooden structure

Placing rock on river bank

sites are maintained by contractors for the first 12 months with ongoing maintenance provided by the landowner or leaseholder by agreement.

Some areas currently receiving attention are on the Mitchell River at Walpa, the Nicholson River upstream of the Princes Highway bridge, and on the Cann River upstream of the highway bridge.

Bank Stabilisation

Erosion is a problem on the lower Mitchell, Tambo and Nicholson Rivers. There are several causes such as stock access to the water edge, wave action from boats or wind, burrowing by native (e.g., wombats) and feral (e.g., rabbits) animals, and the feeding behaviour of Carp that destroys the root systems of plants along the banks.

In estuarine reaches of rivers prevention measures usually involve placing rock from the toe (or bottom) of the bank to a height of half a metre above the water line. Various sizes of rock are used for better interlocking and stability, and to assist with the establishment of reeds and other water plants.

The rock is usually placed by barge as this method provides better access to the river bank and results in less rock being used. At other times, an excavator on the bank is used to place the rock in position.

Fencing to control stock access is also important. Once the rock has been placed in position, stock must be excluded so that further damage to the bank does not occur. If this is not done, the effectiveness of the protection provided by the rock will be reduced and the establishment of reeds and other aquatic plants will be inhibited.

Work of this nature was carried out in 2007 on the lower Mitchell, lower Nicholson and lower Tambo Rivers.

Instream Structures

Wood in our rivers is a natural process that adds diversity and structure to our river systems. Woody debris provides shelter, feeding and breeding areas for species of fish that are important to the health of our rivers and recreational fishing. Unfortunately, past practices removed much of the wood from our rivers.

Using revenue raised from the sale of Victorian Recreational Fishing Licences, the Authority is putting large wood structures back into the lower Mitchell and Tambo Rivers. These structures are constructed on the banks of rivers and installed using excavators and cranes. In 2007, 20 additional structures were installed to add to the many structures already in place. We intend to continue this work over the coming years as funds become available.

Monitoring previously by the Department of Primary Industries and more recently by the Department of Sustainability and Environment has shown that Black Bream and Luderick, as well as a myriad of small animals often spend more time around these structures compared with other regions of the rivers. Over time, better habitat will lead to increased numbers of fish resulting in improvements in river health and water quality.

HEALTH OF LOWER REACHES OF RIVERS

COMMUNITY PROJECTS

The projects described below help inform members of the community about the work of the EGCMA and other agencies. Other projects demonstrate how co-operative partnerships between members of the community, private land owners and government land managers are vital in maintaining the health of our river systems.

The Water Cycle

The Water Cycle was a community bike ride along the banks of the Mitchell River, starting at the Port of Bairnsdale. At several places along the river, participants gathered information about the river catchment, aquatic life, water treatment, indigenous culture and land management. With

Participants at the Water Cycle

support from the East Gippsland Shire, East Gippsland Water, WaterWatch, Landcare and Fishcare, this interactive bike ride presented information about catchment management issues in an interesting and informative manner. In this way, participants gained a better understanding of river management issues and how they can personally contribute to the health of our rivers.

Waterwatch

East Gippsland Waterwatch delivers a 'hands-on' educational experience to school students, volunteer water monitors and members of the community. These programs raise awareness about water quality, river health and catchment management. Activities in school include macroinvertebrate sampling and identification, physical and chemical testing of water, catchment management and habitat and site surveys.

Checking water samples

In the Waterwatch Water Quality Monitoring Program volunteers sample more than 110 sites across the region to continually check water quality.

Another activity which increases understanding of water quality issues involves school students labelling the covers of roadside stormwater pits with the message 'Drains to the Lakes – When you rubbish our streets, You rubbish our Lakes'. The messages raise awareness that stormwater polluted with detergents, garden fertilisers, car oil and general litter can contaminate rivers and lakes and are a reminder of the importance of reducing pollution before it enters the drainage system. This Waterwatch program is supported by East Gippsland Shire Council which provides the paint used for stencilling the messages on the stormwater covers.

Landcare

Since 1999, members of the Bairnsdale Urban Landcare group have worked to make the Mitchell River precinct a place to

Spraypainting covers on stormwater pits

HEALTH OF LOWER REACHES OF RIVERS

Plantation on the Mitchell River at Bairnsdale

Tree planting on the Nicholson River

P-12 students Cann Valley

enjoy for community members and visitors. Works have included the removal of pest plants such as Ivy and Poplars. Approximately 5.5 kilometres of a leisure and recreational walking track has been constructed. Native vegetation has been planted in plots along the river. Each plot has been adopted and managed by a local community group. Interpretative signs have been placed along the walking track to give visitors an historical understanding of activities undertaken and how these will benefit the area in the future. The East Gippsland Shire and the Authority have keenly supported this project in an area now enjoyed by many in the community.

East Gippsland Landcare Network has had many individual Landcare members and Landcare groups involved in its Revegetation and Restoration Project over eight years. In the past 12 months landholders worked hard fencing and revegetating 16 hectares along the banks of the Mitchell, Nicholson and Tambo Rivers.

East Gippsland Landcare Network has also introduced dung beetles on many properties in the catchments of these rivers. The aim is to reduce nutrients entering these systems and ultimately improve the health of these rivers and the Gippsland Lakes. Approximately 65000 dung beetles have been introduced over several years to aid this process.

The Cann Valley Landcare group has recently fenced off 1.35 kilometres of the Tonghi Creek (a tributary of the Cann River) to exclude stock from five existing crossings. Supported with a grant from the Australian Government Envirofund, the fencing complements previous work by the EGCMA providing for a continuous riparian corridor of almost 4 kilometres. The area will be revegetated with 3000 local plants. This fencing will also protect remnant vegetation and control erosion caused by stock access to the creek.

WATERWAYS IN GOOD CONDITION

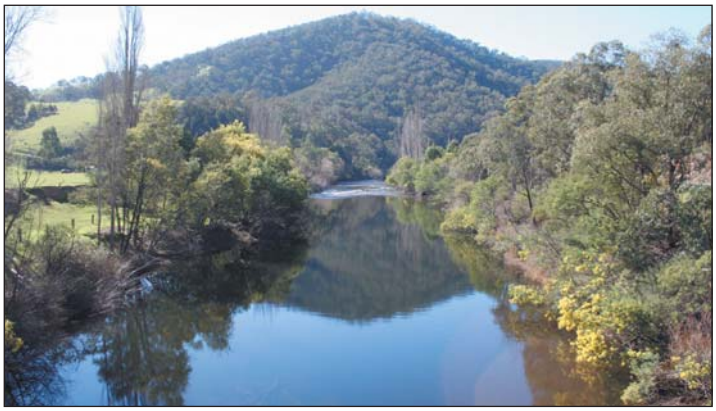
Maintain or, if possible, improve, the condition of the streams and receiving waters that are already in good condition.

Message from the East Gippsland Catchment Management Authority

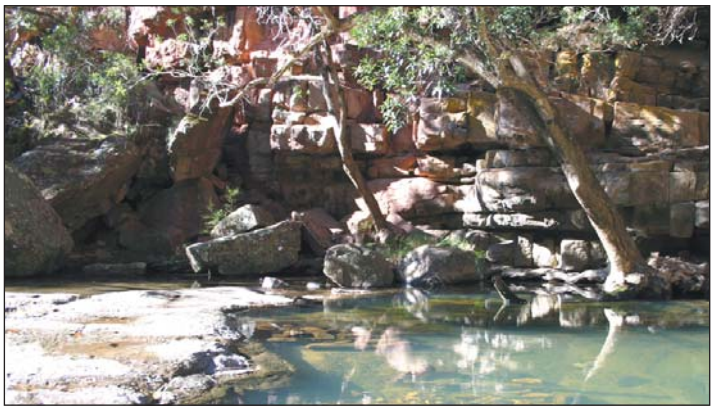
In East Gippsland, we are fortunate that many of our rivers and estuaries are in excellent condition. Sections of the Mitchell, Snowy, Buchan, Suggan Buggan, Berrima, Bemm and Genoa Rivers have heritage river status due to this condition. The Mitchell River has special significance as a heritage river due to high level conservation values, naturalness of flows, intactness of the river system and significance for the Gippsland Lakes. Most of our 'receiving waters' are also in excellent condition, such as the Far East coastal estuaries which have been described as in 'near pristine' condition.

The continuing health of these rivers and estuaries cannot be taken for granted. Maintaining and improving the condition of these streams and receiving waters requires a community effort and is a priority in the Regional Catchment Strategy (RCS).

Information about the management goals and strategies for our rivers and estuaries is presented here.



Wonnangatta River, Mitchell River Basin



Deadcock Den, Mitchell River National Park

RIVER HEALTH

The environmental condition of Victoria's rivers is assessed using the Index of Stream Condition or ISC (www.vicwaterdata.net). The ISC combines information on five aspects of river health - hydrology (stream flows), water quality, bank vegetation, physical form (bed and bank condition and in-stream habitat) and aquatic life. The ISC ratings are Excellent, Good, Moderate, Poor and Very Poor.

ISC ratings from 2004 are generally excellent or good for our rivers. In the Far East, the high proportion of natural forest in the catchment and the absence of controls on stream flows have resulted in this basin having Victoria's highest percentage of river length in 'excellent' (69%) or 'good' condition (30%).

Some of the factors contributing to these ratings were the lack of barriers to flows (dams/weirs), high water quality, minor or no modification of riparian vegetation, limited changes in physical form, limited bank erosion and unrestricted access for fish migration. The essentially untouched condition of many rivers also resulted in healthy populations of aquatic life.

ISC (2004)	Stream condition - Percentage of river length				
Basin	Excellent	Good	Moderate	Poor	Very Poor
Far East	69	30	1	-	-
Snowy	43	23	21	5	5
Tambo	22	36	36	6	-
Mitchell	27	43	25	5	-

The table shows that the Snowy, Tambo and Mitchell river basins also have high percentages of stream length in 'good' or 'excellent' condition. Natural stream flows have been maintained, with the exception of the Nicholson River Dam, and no artificial barriers to impede fish migration have been erected. Extensive forested areas in the upper reaches have helped to maintain the physical form (banks and beds) of rivers. This has contributed to high water quality and diverse aquatic life.

WATERWAYS IN GOOD CONDITION

However, in the lower reaches the percentages of 'moderate' and 'poor' river length are much higher and, in the case of the Snowy basin, 5% was rated as 'very poor'. In general, these sections of river correspond with areas cleared for grazing and cropping. In grazing areas, the clearing of streamside vegetation and the lack of controls on stock access have contributed to erosion along sections of the river banks. Another factor is the extensive willow infestations on many streams.

In general, ISC ratings are high in the naturally forested upland reaches. However, ratings are often much lower on cleared floodplains in the lower reaches. Protecting rivers in good condition and making improvements where they are needed on other rivers are both important in maintaining river health and water quality.

RECEIVING WATERS

Gippsland Lakes

The most extensive receiving waters in the region are the Gippsland Lakes. They have environmentally significant landforms (e.g., Mitchell River Silt Jetties), vegetation (Swamp Paperbark) and fauna (waterfowl and seabirds). The Lakes are recognised under the Ramsar Convention and the Japan-Australia and China-Australia Migratory Bird Agreements as important habitat for migratory seabirds.

However, the Lakes also face several threats from a variety of human impacts. In 2001, the CSIRO Gippsland Lakes Environmental Study (www.gcb.vic.gov.au) found that increased levels of pollution from nutrients and sediments as well as reduced water flows and increased salinity had impacted on the water quality and overall health of the Lakes.

To improve the condition of these receiving waters, the State Government released the Gippsland Lakes Future Direction and Action Plan in 2002 (www.gcb.vic.gov.au). The major aims of this plan are to reduce nutrient levels entering the Lakes by 40% by 2022; balance freshwater and salt water flows; maintain wetlands biodiversity; increase community awareness and participation; and continue planning and evaluation of the program's effectiveness.

The delivery of this Action Plan is being overseen by the Gippsland Lakes Taskforce, made up from the leaders of many Government agencies in the Region.

Snowy River, downstream of McKillop's bridge

Other estuaries

Sydenham, Mallacoota and Tamboon Inlets are recognised nationally in the *Directory of Important Wetlands in Australia* (available on the Australian Government Department of the Environment and Water Resources website). Moreover, the Environment Protection Agency in Victoria (www.epa.vic.gov.au) has recognised Lake Tyers, Sydenham Inlet and Tamboon Inlet as 'Largely Unmodified', and many other coastal estuaries including Yeerung, Thurra and Betka Rivers, and Wingin and Mallacoota Inlets as in 'Near Pristine' condition. Descriptions and maps of these, and other estuaries, and outlines of management plans can be found in the 2006 *Gippsland Estuaries Coastal Action Plan* (www.gcb.vic.gov.au).

The good condition of these estuaries results in large part from the good condition of the upper reaches of the rivers which flow into them. Therefore, maintaining and improving the headwaters of rivers has significant environmental benefits over the total length of the river.

ACTIVE MANAGEMENT STRATEGIES

Many rivers and estuaries are in very good condition and it is important to maintain them in this state. Therefore, streams and estuaries need to be monitored to assess risks and, if necessary, remedial actions taken to maintain their condition. In other cases, works to rehabilitate sections of the river can extend the total length of the river in good condition. Active management strategies are necessary to maintain and improve rivers and receiving waters in good condition.

WATERWAYS IN GOOD CONDITION

THREATS TO RIVERS AND ESTUARIES

Potential threats to rivers and receiving waters in good condition in East Gippsland can be grouped in six categories - natural events, physical, riparian, flow, water quality, and biological.

Natural events

Fires. Ash and sediment washing into rivers following heavy rain can have a detrimental effect on water quality. This has been evident in the Mitchell River since the bushfires in 2007.
Floods cause erosion of river banks and scouring of the river bed. The sediment dislodged can cause further problems when deposited downstream.

Physical Threats

Bed instability refers to deepening (incision) or shallowing (aggradation) of the river bed.
Bank erosion involves the wearing away of the river bank, sometimes through undercutting and collapse of sections of the bank into the river.
Loss of in-stream habitat is the loss of the natural environment for aquatic life.

Riparian Threats

Loss of riparian habitat. Trees and other vegetation help to maintain the structure (banks and bed) of the river and prevent soil erosion.
Presence of willows. Willows threaten rivers by out-competing native flora, creating stream instabilities, and affecting in-stream flows.
Presence of other weeds. Weeds such as Alligator Weed, Blackberry, Blue Periwinkle, Bridal Creeper, Cape Ivy, Kikuyu and Wandering Jew smother native plants, resulting in reductions of plant diversity needed as habitat for animals and birds.

Flow Threats

Changes to flow. This refers to the loss of water in the river due to extraction by pumping or storage (e.g., farm dam). This threat is particularly significant on the Snowy River and the lower Mitchell River.
Loss of wetland connectivity. This refers to whether wetlands are flooded more or less frequently than they would be naturally. Connectivity is important to maintain refuge and breeding grounds for plants and animals.

Severely burnt gully

Erosion damage

Weed infestation (Cape Ivy) on stream bank

WATERWAYS IN GOOD CONDITION

Erosion around willow

Water Quality Threats

Changes to water quality. High levels of phosphorus, acidity and turbidity have a detrimental affect on water quality.
Algal blooms. Excessive blue-green algal levels ('blooms') reduce available oxygen for aquatic animals. Some types of algae are toxic.

Biological Threats

Fish passage. In-stream structures (such as dams, weirs and culverts) can affect the movement of aquatic animals (particularly fish) along the river system.
Presence of Carp. Carp are exotic fish which compete with native aquatic species for food and habitat. They also harm river banks and create water turbidity.
Presence of Trout. Brown and Rainbow Trout prey aggressively on in-stream aquatic life, including threatened species.

Most of our rivers are in very good condition. This is largely due to the high proportion of natural forests in the catchments. This helps to maintain the physical form (banks and beds) of the river, protecting the river banks from erosion and minimising problems associated with sedimentation further downstream. The natural state of the river environment is important in maintaining water quality.

MONITORING RIVER CONDITIONS

Maintaining the condition of rivers and receiving waters also involves monitoring sites where threats do not currently occur.

Algae, Genoa River

Bastion Point, Mallacoota Inlet

For instance, the Betka River and smaller streams flowing into Croajingolong National Park, and some reaches of the Wallagaraugh River which flows into Mallacoota Inlet are free of willows and weeds so preventing their spread from surrounding areas is a priority.

Maintaining their condition can also be done by identifying reaches where small investments in river management may lead to improvements in downstream reaches or extension of the length of ecologically healthy rivers.

WATERWAYS IN GOOD CONDITION

PROJECTS

When rated using the Index of Stream Condition (ISC), substantial sections of our rivers are in Excellent or Good condition. In the Far East Basin, 99% of river reaches are in Excellent or Good condition, and in the Snowy Basin (66%), Tambo Basin (58%) and Mitchell Basin (70%) the percentages are also high. Maintaining the condition of these rivers is a high priority.

While natural events such as fires and floods are important threats, willows and other weed infestations are the major focus of the Authority's works programme for rivers in good condition.

This involves monitoring for the presence of these threats. Physical inspections of the river banks are undertaken and the locations of willows and other weeds are recorded. Actions to control these pest plants can then be included in the annual works plans.

Physical inspections are also important to confirm that pest plants have not encroached in reaches where they have not previously been recorded. For instance, some sections of the Betka River and smaller streams flowing into the Croajingolong National Park, as well as some sections of the Wallagaraugh River are free of willows and other weeds, so preventing their spread from surrounding areas is a high priority.

The accompanying map shows the works for the 2006-2007 year on particular reaches of rivers in the Far East Basin. In the main, these works involved willow and other pest plant control, revegetation and fencing. Extensive lengths of the Thurra (90 km), Genoa (46 km), Wallagaraugh (11 km), Wingan (62 km), Cann (14 km), Bemm (19km), and Yerrung (9 km) Rivers, and the remote coastal streams between the Wingan River and Mallacoota Inlet (32 km) received attention.

Similar works were completed on the Buchan River (22 km) and Cabbage Tree Creek (3 km) in the Snowy River Basin; the Timbarra River in the Tambo River Basin; and the Dargo and Wentworth Rivers in the Mitchell River Basins.

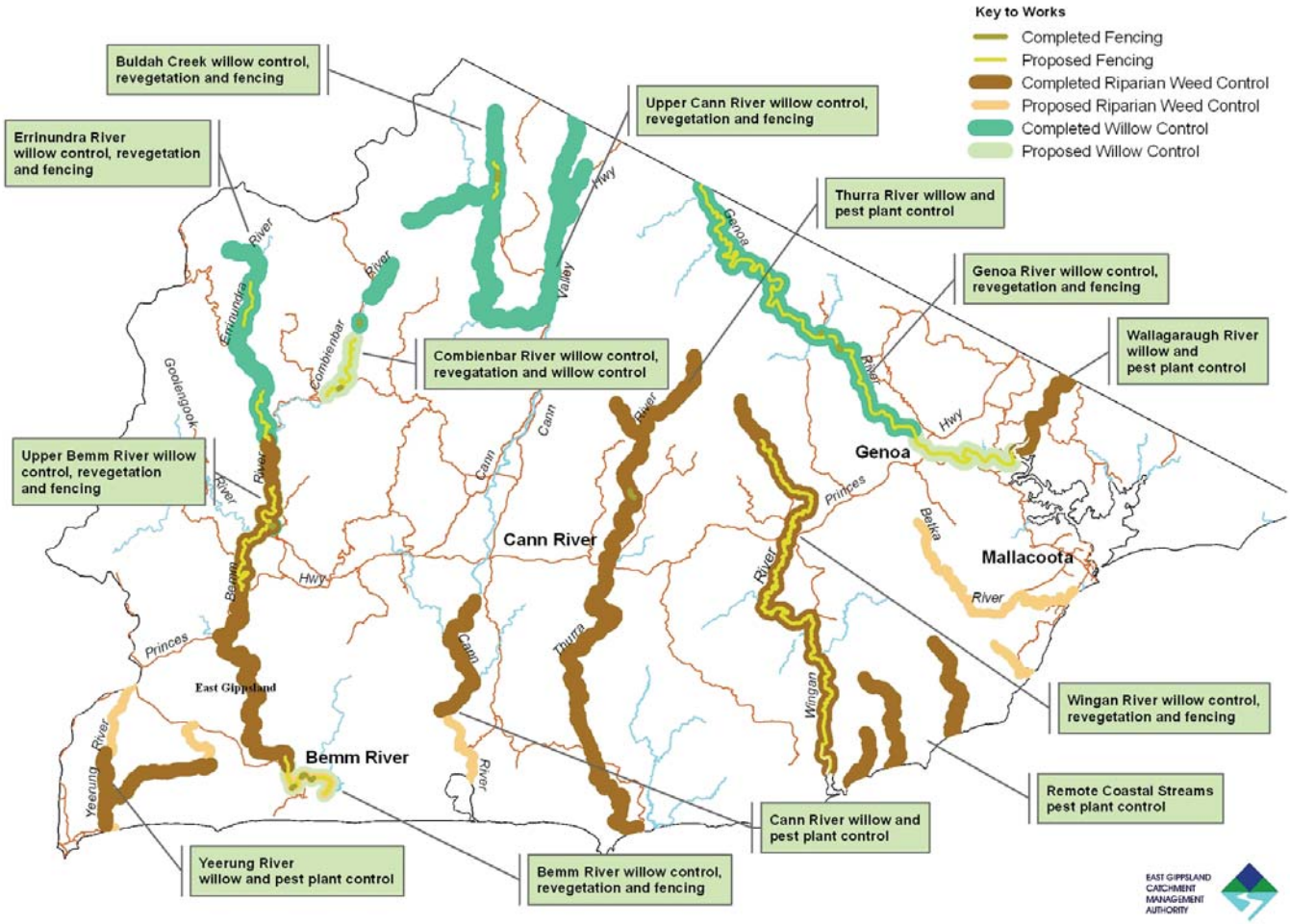
As well as maintaining the rivers in good condition, the Authority also looks for opportunities to improve these rivers. One way is to improve the condition of river reaches which have healthy reaches upstream (and, in some cases downstream). By improving the health of these targeted reaches, we can extend the total length of the river in a healthy condition.

Examples of this approach can be found in the Far East Basin. On the Thurra River, re-fencing and revegetation on targeted reaches are designed to improve river health ratings in the long term.

Fenced river bank, Snowy River

Thurra River

WATERWAYS IN GOOD CONDITION



Snowy River at Orbost - 2007

WATERWAYS IN GOOD CONDITION

COMMUNITY PROJECTS

The projects outlined below demonstrate how actions by community groups, often in partnerships with private land holders and government land managers can make an important contribution to maintaining and improving our rivers and estuaries.

Devlins Gully, Mallacoota

A rainforest restoration project is underway at Devlins Gully, Mallacoota. The work is being undertaken by the Friends of Mallacoota and is funded by CoastAction / CoastCare and the Department of Sustainability and Environment.

The long-term project consists mainly of hand-removal of weeds, and propagating and planting of local native species, monitored for the past 12 months to try and ensure that causes and not just symptoms of degradation are treated.

Devlins Gully is special as it includes most of the 20 known 'Mallacoota Gums', (Eucalyptus globulus subsp.globulus x. E. cypellocarpa), which are regarded as State Significant due to their rarity. The Gully includes a rainforest community which has Warm Temperate and Littoral Rainforest sub-communities, which are also regarded as State Significant.

Devlins Gully is suffering from urbanisation related impacts, including storm-water; sand, gravel and silt deposition; gully erosion; track creation; domestic animal roaming and weed invasion. Dominant weeds are Asparagus Fern in the Lowland Forest and Arrum Lily along the creekline, with occasional Blackberry, Honeysuckle, Tobacco Tree, Bridal Creeper, Passion-fruit, Buttercup and Nasturtium.

Weeding team, Devlins Gully, Mallacoota

The Gully flows through an estuarine wetland to Mallacoota Inlet. This Inlet is listed in the JAMBA Treaty, which imposes international obligations to maintain and improve the habitat for migratory birds. The Gully also provides a habitat refuge for native fauna and rare native flora, such as Greenhood Orchids.

Members of the group meet every Friday morning from 9 to 12 to weed at Devlins Gully. Additional volunteers to help with this restoration project are welcome.

GRILCO

The Genoa River Interstate Liaison Committee (GRILCO) is a partnership between industry, the Victorian and NSW Governments and private landholders, focused on weed management in the Genoa, Wallagaraugh Rivers and Mallacoota Lake catchments. Funding was received through the Commonwealth Government 'Defeating the Weeds Menace Program'.

GRILCO has focused on blackberry control works on private lands at Nungatta, Rockton and Timbillica, addressing severe infestations in the Genoa and Wallagaraugh River catchments. Mapping indicates that the total area of land affected by blackberries in the Nungatta Valley is around 1680 hectares, or 26% of the valley. Blackberries dominate most wetlands and gullies.

GRILCO members including Parks Vic, East Gippsland CMA, DSE and Forests NSW have provided funding for control of an additional 65 kilometres of riparian blackberries and willows on the Genoa River, Bondi and Wangarabell Creeks, and 90 hectares at Howe Flats and Lake View.

Control of blackberries commenced in late 2006 and has involved chemical spraying and biological control through the release of leaf-rust fungus strains that cause defoliation of the blackberry plants.

Landcare

Landcare groups in the Far East have been active on several natural resource projects.

WATERWAYS IN GOOD CONDITION

Degraded bank on Genoa River

Wangarabell Landcare Group

The aims of a project by the Wangarabell Landcare Group were to improve water quality in the Genoa River and its tributaries by erecting fencing to exclude livestock to create a buffer zone between grazed areas and the river bank. With funding from a Community Water Grant, this project involved 4.1 kilometres of fencing to exclude stock from Jones and Wangarabell Creeks; the installation of two troughs and 1000 metres of piping to provide off stream watering for stock. Vic Roads also provided offsets to erect 300 metres of fencing on the Genoa River for stock exclusion.

With funding provided by Envirofund, the Cann Valley Landcare Group erected 1.35 kilometres of fencing to prevent stock access to Tonghi Creek and revegetated the area with 3000 plants. This complemented past fencing to ensure a continuous protected riparian corridor of almost four kilometres. To provide stock water on the river flats, a large dam was built, seven troughs were installed and over 1000 metres of pipe were laid.

A similar Envirofund project has been completed by members of the Marlo Plains Landcare Group who erected fencing on private land to exclude stock from current watering points on the river and installed troughs and piping to provide stock water. This enhanced previous work by the landholders, establishing a continuous four kilometre corridor on their properties along Cabbage Tree Creek. Since this work was completed, the Authority has fenced the creek on the opposite bank to completely exclude stock from this section of the river.

Other groups

Many local groups have an interest in natural resource management, including our rivers and estuaries.

Friends of the Gippsland Lakes (FOGL) undertake projects to enhance the environment, amenity and facilities within the Gippsland Lakes Coastal Park, Lakes National Park, Blond Bay Reserve, Gippsland Lakes Reserve and crown land frontages abutting the Gippsland Lakes. (www.ogl.org.au)

Habitat Network East Gippsland - a network of East Gippsland groups with an interest in environmental issues. (www.hneg.org.au)

East Gippsland Rainforest Conservation Management Network - a group of people with a common interest in rainforest and associated vegetation types in East Gippsland. (www.egrainforest.org.au)

Landcare - a national voluntary community movement of around 4,000 groups that contribute to the improvement of natural resource management practices. (www.eastgippsland.landcarevic.net.au)

Australian Government Envirofund

The Australian Government Envirofund helps community groups and individuals undertake small projects aimed at conserving biodiversity and promoting sustainable natural resource use. Grants of up to $50,000 can be obtained. The Envirofund website (www.nht.gov.au) shows that funding has been obtained by many East Gippsland groups to undertake natural resource projects which make an important contribution to maintaining the health of our rivers and estuaries.

TERRESTRIAL ECOSYSTEMS

Maintain or, if possible, improve, the condition of terrestrial ecosystems that are already in good condition, on both publicand private land.

Floodplain reed bed, Brodribb River

Riparian scrubland, Buchan River

Message from the East Gippsland Catchment Management Authority

Terrestrial Ecosystems are land based plants and animals that rely on each other for survival. In East Gippsland there is a great complexity and diversity of these systems because of the good condition of our public and private land.

Terrestrial Ecosystems in East Gippsland are mostly in excellent condition, due mainly to the large tracts of land held by the Crown. We have a living wealth of native plants and animals, many of which only occur in this region. We are also custodians of many animal and plant communities that are rare in Victoria and Australia.

For these reasons, maintaining and improving the condition of our plant and animal communities is a high priority in the Regional Catchment Strategy. The Regional Catchment Strategy (RCS) recognises that while much of the region is in very good condition, there are both localised and widespread threats that require active management (www.egcma.com.au).

In this section, we provide examples of our Terrestrial Ecosystems and the management activities underway to maintain them in good condition.

Jane Rowe, Chair

TERRESTRIAL ECOSYSTEMS

Terrestrial Ecosystems are very complex and hard to describe. Other terms used like Biodiversity and Native Vegetation (described below) all make up a terrestrial ecosystem. An example of the complexity and importance of East Gippsland is that nearly 3000 species of native plants can be found in East Gippsland. Of these, approximately 200 species are designated as Endangered or Vulnerable and 400 Rare in Victoria. In other words we are the jewel of biodiversity in the State Crown.

All ecosystems, whether land (terrestrial) based or water (aquatic) based rely on one another to stay healthy. For example, the life cycle of the dragonfly is initially aquatic but the remainder of its life is spent on land. Another example occurs when trees growing on the bank fall into the river, creating new habitat for aquatic animals. Because of the inter-relationships between terrestrial and aquatic ecosystems, the land close to rivers (riparian land) is particularly important in maintaining river health and water quality.

Ecosystems in 'good condition' contain healthy and diverse native plant and animal communities (biodiversity or biological diversity). Ecosystems in good condition not only provide habitat for native plants and animals but also food and water for human consumption. For instance, healthy alpine forests are an important source of high quality water for domestic consumption.

TERRESTRIAL ECOSYSTEMS

Rainforest, Wallagaraugh River

Swamp Scrub, Raymond Island

Native vegetation refers to trees, shrubs, herbs and grasses that grew naturally in Victoria before the arrival of Europeans. Native vegetation is important in maintaining healthy ecosystems. It provides things like habitat for plants and animals, and preserves water quality.

BIODIVERSITY

Public land

Many areas of public land have been set aside to preserve biodiversity in the region. State forests play an important role in minimising soil erosion and maintaining river condition to safeguard water quality and quantity, while also being used for timber harvesting, apiaries, recreation, and grazing.

National Parks also preserve our biodiversity. Some examples in East Gippsland are the Mitchell River, Alpine, Snowy River, Errinundra, Coopracambra, Cape Conran, Alfred, and Croajingalong National Parks. Information about the vegetation, fauna and heritage values of these parks, as well as advice about visiting these areas can be found at the Parks Victoria (www.parkweb.vic.gov.au) and Gippsland Coastal Board (www.gcb.vic.gov.au) websites.

Private land

The RCS also recognises the importance of maintaining and improving the condition of terrestrial ecosystems on private land; that is, freehold land. Remnants of the natural environment have survived on many areas of private land. These remnants are also important locations for threatened species of plants and animals. Careful management of these areas is important in maintaining biodiversity.

NATIVE VEGETATION

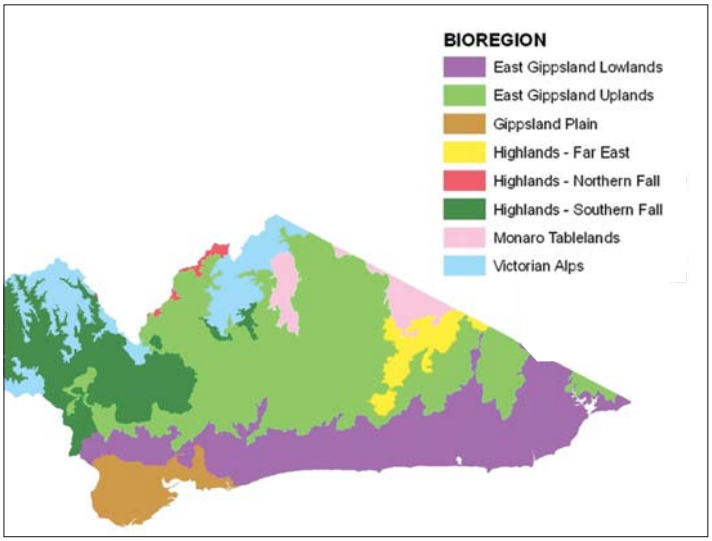
The method used to categorise native vegetation and biodiversity in Victoria is the Ecological Vegetation Classes (EVCs). Each EVC comprises plant and animal species that occur in a geographical area described as a bioregion. There are 8 bioregions wholly or partly within our region.

Over 300 EVCs have been identified and described in Victoria of which 84 exist in East Gippsland. Some examples - such as rainforest, scrubland and grasslands - are shown in the photographs. Other quite rare EVCs include gallery rainforest in the East Gippsland Lowlands, dry rainforests on the East Gippsland Uplands, and riparian scrubland, damp forests and grassy woodland on the Gippsland Plains.

We are fortunate that East Gippsland has extensive natural forests and high percentages of stream length in excellent and good condition. It is because much of the native vegetation is intact that maintaining and improving the condition of terrestrial ecosystems that are already in good condition, on both public and private land is a priority in the Authority's Regional Catchment Strategy (RCS). Ensuring this vegetation remains in good condition, and rehabilitating remnant areas of vegetation that have been damaged, is vital for river health and water quality.

TERRESTRIAL ECOSYSTEMS

Wonnangatta River



Bioregions in Victoria

VEGETATION IN EAST GIPPSLAND

There are over 300 Ecological Vegetation Classes (EVCs) which have been identified in Victoria, of which 84 exist in East Gippsland. Each EVC comprises plant species that occur in a geographical area called a bioregion.

Bioregions in East Gippsland

The table on page 39 shows higher proportions of Endangered and Vulnerable EVCs in the Gippsland Plains than in the Lowlands and Uplands. The Gippsland Plains have been extensively cleared for agriculture with considerable loss of pre-European vegetation. Therefore, preserving and, if possible extending areas of remnant vegetation is particularly important to maintain biodiversity throughout the Plains.

Threats

Natural events such as bushfires can have a devastating impact on native vegetation. In severely burnt areas, the loss of topsoil and the spread of weeds can also inhibit the regeneration of plant species after the fires.

Human impacts are also important, although not always as noticeable as the sudden destruction of vegetation due to fires. Since European settlement, native vegetation has been gradually removed. In some cases adjacent areas of native vegetation are also degraded by the unmanaged grazing of stock. On river banks, unrestricted stock access can impact on riparian vegetation, often leading to problems such as erosion of the bank and sedimentation downstream, particularly during flood events.

Clearing for timber production in catchment areas, the gradual reduction of trees which die and are not replaced, and decline from impacts of weeds such as blackberries all lead to the loss of biodiversity. Small, isolated patches of native vegetation are particularly vulnerable to damage from weed infestations, disease or insect attacks.

The loss of native vegetation along rivers (riparian vegetation) and other waterways has other subtle effects. Before land

Well protected stream flowing into the Genoa River

Vegetation loss increases the risk of flood damage

The conservation status of EVCs can be classified as shown in the following table.

STATUS	SYMBOL	CRITERIA
Presumed extinct	X	Probably no longer in the region
Endangered	E	Less than 10% pre-European vegetation remains
Vulnerable	V	10% - 30% pre-European vegetation remains
Depleted	D	30% - 50% pre-European vegetation remains
Rare	R	Rare, but not currently threatened
Least Concern	LC	More than 50% pre-European vegetation remains

Many EVC's in the East Gippsland Lowlands, East Gippsland Uplands and Gippsland Plains bioregions are Endangered, Vulnerable or Depleted.

BIOREGION	Endangered E	Vulnerable V	Depleted D	Rare R	Least Concern
East Gippsland Lowlands	9	8	7	9	13
East Gippsland Uplands	6	7	2	13	22
Gippsland Plains	21	12	2	1	5

clearing along the river bank, large trees would occasionally fall into the river. These provided essential habitat for fish and aquatic animals. The loss of riparian vegetation can also increase nutrients in the river that contributes to the growth of algae. These algae can impact on marine ecosystems in estuaries and wetlands.

Fine-grained sediments are also more readily released into rivers when riparian vegetation is degraded. This sediment adds to water turbidity (cloudiness due to suspended particles), which has an effect on water quality and the treatment of water for domestic consumption.

Freehold Land

On freehold land used for agriculture, ecosystems are threatened by agricultural practices. For instance, on the Red Gum Plains – EVCs surrounding major towns like Bairnsdale, Johnsonville and Paynesville - includes Grassy Woodland, Plains Grasslands, Lowland Forest and Swamp Scrub. All remnant native vegetation here is of state or national significance and is under imminent threat from habitat loss, fragmentation, weed invasion and disease.

Degraded bank, Toms Creek

National and State Parks

National and State Parks are particularly important in maintaining biodiversity but erosion, pest plants (particularly willows and blackberries), and pest animals (such as wild dogs, foxes, cats, rabbits, goats, deer and pigs) pose major threats. Summer bushfires can severely damage native vegetation, and create other problems such as loss of topsoil following heavy rain and erosion during flood events.

Native Vegetation Management

Victoria's *Native Vegetation Management - A Framework for Action* was released in 2002. Its goal is: A reversal, across the entire landscape, of the long term decline in the extent and quality of native vegetation, leading to a net gain (www.dse.vic.gov.au/nativevegetation). The notion of 'net gain' is to reduce losses and achieve increases in the extent and quality of native vegetation.

Working Together

While the Authority acts as broker for many projects designed to manage and rehabilitate native vegetation, a particular operational concern is riparian vegetation; that is, native vegetation along the banks of rivers, streams and other waterways. Caring for, and rehabilitating riparian vegetation can be done best when landholders and the Authority work together to fence off the river from stock, re-establish native vegetation and keep the bank free of blackberries and other weeds.

TERRESTRIAL ECOSYSTEMS

Diamond Firetail finch (Vulnerable)

Typical landscape in the Bairnsdale Foothills

BAIRNSDALE FOOTHILLS LANDSCAPE PLAN

An example of co-operative planning and implementation to maintain terrestrial ecosystems is the Biodiversity Action Plan for the Bairnsdale Foothills, funded by the Federal Government and developed by the Department of Sustainability and Environment.

The Bairnsdale Foothills is an area described in the Regional Catchment Strategy as about 53,000 hectares of land in the foothills north of Bairnsdale and spreads from Glenaladale to just east of Bruthen. It has a total of 720 native flora species and 309 native fauna species. Of these, 50 flora and 18 fauna species are considered to be rare or threatened.

The major threats to biodiversity in the area include existence of pest plants (weeds) and animals, extensive land clearing for stock grazing, altered fire regimes and the fragmentation of remnant vegetation reducing habitat for animals and plants.

Some actions to reduce these threats include retaining existing trees and fencing off remnant vegetation to allow natural regeneration, revegetation to create links between native vegetation areas, reducing grazing pressure in sensitive areas, controlling weeds and pest animals such as rabbits and foxes, and monitoring fire wood collection.

Maintaining and improving habitat condition in the Bairnsdale Foothills is important particularly along our rivers (riparian vegetation). Major rivers such as the Mitchell, Tambo and Nicholson flow through the Bairnsdale Foothills before entering the Gippsland Lakes. Terrestrial ecosystems in good condition are vital for high quality water for domestic and irrigation purposes and in maintaining the condition of estuaries such as the Gippsland Lakes.

TRUST FOR NATURE

Trust for Nature Regional Manager Robyn Edwards says, 'we focus on safeguarding bush on private land. Although there is a large proportion of forest remaining on public land in East Gippsland, two thirds of the freehold land has been cleared. This has reduced areas of native vegetation, and many Ecological Vegetation Classes (EVCs) on private land in the region are considered to be Endangered (less than 10% pre-European vegetation remains), Vulnerable (10-30% remaining) or Depleted (30-50% remaining).'

Although reduced in area, many of these threatened vegetation types are in good condition. The Trust for Nature Biodiversity Protection and Restoration Programs are designed to legally protect, maintain and improve the quality of these sites.

Landholders are increasingly aware of the importance of native vegetation not just as habitat for rare native species but also as an important farm asset. Trees provide shade and shelter on farms, and prevent land degradation such as erosion and salinity. In the process, native vegetation helps to maintain the long-term productive capacity of the land.

Trust for Nature covenanted protected Plains Grassy Woodland

Naturally Regenerated Grassy Plains Woodland

Trust for Nature maintains and enhances the conservation values of remnant vegetation through Conservation Covenants, which are voluntarily negotiated agreements with landowners. When placed on the property title, these legally binding agreements ensure that native bushland on the property is secured, especially when the property changes ownership. When a Conservation Covenant is in place, the Trust for Nature provides a management plan and advice through the Stewardship Program on the health of remnant vegetation and the ways that threats can be addressed.

The Plains Grassy Woodland shown in the picture is being restored and regenerated under a Trust for Nature covenant. The property owners are Lionel and Astrid Rose at Fernbank.

The area under covenant is about 30 hectares and the rest of the property is farmland.

Trust for Nature has supported the development of Conservation Management Networks as a model of conservation. Locally, two groups have been formed, the Gippsland Plains Conservation Management Network and the East Gippsland Rainforest Conservation Management Network (www.egrainforest.org.au).

Further information about the role of Trust for Nature in maintaining and improving biodiversity through private nature conservation can be found at www.trustfornature.org.au.

Trust for Nature covenanted property at Fernbank

TERRESTRIAL ECOSYSTEMS

Harvesting native grass seed

Revegetated Grassy Plains Woodland

MITCHELL RIVER NATIONAL PARK ADDITIONS

This project involves the rehabilitation of indigenous vegetation - particularly Grassy Woodlands and Dry Forests - on about 2400 hectares of land along the Mitchell River previously managed by Southern Rural Water and the Department of Sustainability and Environment, the farming property known as Mitchelldale, and other private landholdings. It includes the area at the confluence of the Mitchell and Wentworth Rivers. These properties were acquired in 2002, reinstated as Crown Land and added to the Mitchell River National Park.

Approximately 68% of the area is forested. The Grassy Woodlands are in good condition, providing areas from which natural regeneration can occur on previously cleared land. Grassy Woodlands are a top priority for conservation because they provide habitat for many indigenous species of plants and animals.

Release of Horehound Plume Moth

The project aims to encourage natural regeneration of about 40 hectares of land by controlling exotic grasses, weeds, and rabbits. Replanting and direct seeding from native seed collected on the property is also used. To ensure replanting was successful, cattle and goats were removed from the property. Pest plants including Blackberries, Ragwort, Blue Periwinkle, Cape Ivy, Boxthorn and Horehound also have to be managed. Biological control in the form of the Horehound Plume Moth (Pterophorus spilodactylus) has been used to manage infestations of Horehound.

The land has an extensive frontage (about 17 kilometers) to the Mitchell River. Since it was acquired, willows growing along the river have been controlled and the river banks revegetated. River crossings have also been rehabilitated, leading to reductions in erosion and sedimentation at these sites and downstream.

Further information about visiting the Mitchell River National Park is available on the Parks Victoria website (www.parkweb.vic.gov.au).

THE RED GUM PLAINS RECOVERY PROJECT

The East Gippsland Plains, like most other Grassy Woodlands in Australia, have been extensively cleared for grazing and agriculture. Native vegetation has been removed and remnant patches are now confined to small, fragmented areas.

The Red Gum Plains Recovery Project, which commenced in 1998, is focused on restoring the environmental health of the East Gippsland Plains. Funded through the National Heritage Trust and the National Landcare program, the project is being implemented by the East Gippsland Landcare Network. It aims

Grassland identification course, Greening Australia

Galah in Red Gum hollow

to maintain and enhance remnant vegetation and significant sites, restore biodiversity on the plains, reduce the effects of erosion and salinity, and improve stream health and water quality.

To meet these aims, the project provides species selection advice to landholders, a fencing rebate to fence off remnant vegetation, water ways, wetlands and newly revegetated areas, and seedlings to enhance protected remnant vegetation.

Over the last 10 years on the Red Gum Plains, Landcare members have erected over 252 kilometres of fencing around native bushland and revegetation sites and planted 390,000 native seedlings on 530 individual sites (1,603 hectares) on private land. Further information about the work of Landcare in East Gippsland including the Red Gum Plains can be found at www.eastgippsland.landcarevic.net.au or via the Authority's website at www.egcma.com.au.

SCATTERED TREES PROJECT

Only small areas remain of the Plains Grassy Woodlands which once covered vast areas of Gippsland. Only 3% (1,627 hectares) remains in East Gippsland - 522 hectares in conservation reserves and the remainder on private land. Plains Grassy Woodland is classified as endangered; that is, less than 10% of its area before European settlement remains today.

The Plains Grassy Woodlands were among the first areas to be cleared for farming, and only isolated areas remain in many areas. However, research indicates that remnants of once dominant species have a number of important functions. For farmers, scattered trees in paddocks provide shade and shelter for stock. Ecologically, these trees are important as genetic resources for regeneration, providing habitat for native birds, reptiles, insects and mammals, and linkages for wildlife movement between patches of native vegetation.

Over 83 large trees have been fenced off as part of the Scattered Tree Project. The restriction of stock access is designed to encourage regeneration of native plant species, thereby providing habitat for native animals. Landholders interested in protecting large old paddock trees can contact the Scattered Trees Project Officer on 51523 099.

REVEGETATION AND GRASSLAND SUPPORT OFFICER

This position supports large scale revegetation works using direct seeding with native grass (Themeda triandra), and offers advice to landholders on revegetation and rehabilitation works. The project promotes the importance of native grasses in improving habitat for dependent species of birds and animals, promoting biodiversity in grassland regions.

Six year old direct seeded and revegetated creek banks

COASTAL AND MARINE ECOSYSTEMS

Maintain or, if possible improve the condition of the coastal and marine ecosystems that are in good condition.

Message from the East Gippsland Catchment Management Authority

East Gippsland's coastline is in excellent condition, largely because most of the coastal land is held by the Crown. In East Gippsland, our rivers and estuaries are also in good condition and these support our healthy coastal and marine environments. Our coast supports a wealth of different species of terrestrial and aquatic plants and animals, many of which are rare in Australia.

For these reasons, maintaining the condition of our coast is a high priority in the Regional Catchment Strategy (RCS). The RCS (www.egcma.com.au) recognises that while our coastal and marine environments are in excellent condition, there are both localised and widespread threats that require active management.

Examples of our Coastal and Marine Ecosystems and the management activities needed to maintain them are presented here.

Rocky coast, Cape Conran

COASTAL AND MARINE ECOSYSTEMS

In East Gippsland, we have an extraordinary coastal and marine environment. It is made up of sandy dunes, mudflats, wetlands and estuaries. In the marine environments, we have rocky reefs, seagrass beds and the seas of Bass Strait. Around 90% of the marine species in Australia are found only in southern Australian waters, many of which are in East Gippsland.

Ecosystems in 'good condition' contain healthy and diverse native plant and animal communities. They not only provide habitat for native plants and animals but also support human activities such as commercial and recreational fishing.

Coastal and marine environments differ greatly. For instance, the ecosystems of the rocky shores east of Cape Conran are covered by the tide for only part of the day, thus are very different to the ecosystems in open oceans. Changes in temperature, salinity, tides and other physical conditions support different plants and animals.

Marine environments also differ from those on land. The vegetation which exists along the coastal dunes or on the estuary mudflats does not exist in marine environments. Instead, algae ranging from microscopic plankton to giant kelps predominate. Land and sea animals also differ. Insects are dominant on land, whereas molluscs and crustaceans inhabit marine environments.

Despite the different plants and animals, terrestrial (land based) and aquatic (water based) ecosystems depend on one another to stay healthy. For instance, our rivers carry nutrient-rich sediments out to sea to sustain marine organisms, whilst their estuaries provide places for ocean and estuary fish to spawn. These environments and the species they support are an essential part of the food chain.

The Coast. Coastal ecosystems are shaped by the effects of wind and salt air. Grasses and succulents colonise the fore dunes of ocean beaches like the Ninety Mile Beach. Behind these dunes, Coastal Scrub becomes established in more protected areas. The coastal dunes provide habitat and nesting sites for birds such as the Little Tern and penguins as well as providing food sources for marsupials such as bandicoots and potaroos.

Rocky Shores. These ecosystems (like Cape Conran) exist where rock is exposed at low tides along the shoreline (inter-

Bastion Point, Mallacoota Inlet

Floodplain reedbed

tidal zone). To survive, animals and plants have to deal with stormy seas, extreme temperatures, and predation by birds. Despite these conditions, the inter-tidal zone abounds with aquatic organisms such as snails, mussels and barnacles, as well as many species of birds which feed on these animals as the tide goes out.

Rocky Reefs. These reefs (like Beware Reef) are extensions of rocky shores or exist as isolated offshore reefs. These shallow reefs are often dominated by kelps and other seaweeds that support reef fish, octopus, lobsters, and abalone. Deeper reefs support sponges, corals and other invertebrates as well as fish.

Seagrass Beds. Seagrasses cover the ocean floor as well as many bays and estuaries, including the Gippsland Lakes. They provide important habitat and food sources for fish and other small invertebrates, worms, crustaceans, snails and molluscs.

Open oceans. The open oceans also support diverse communities of plants and animals. They range from tiny plants (phytoplankton) and animals (zooplankton) to jellyfish, eels and larger swimming animals such as dolphins and whales.

Beaches and Soft Sediments. Areas of sand and mud exist along the coastline and also in bays and estuaries. They form distinctive habitats which support many of the more familiar marine birds and animals such as silver gulls, crabs and fish.

Coastal Wetlands

Wetlands are often adjacent to, and form part of coastal areas. Wetlands are also part of marine and coastal

Coastal scrub, Kalimna (Reeves Channel)

ecosystems that form a singular system. Wetlands located in coastal areas vary in water depth, frequency of inundation, salinity and vegetation. Some are saline for most of the year, while other wetlands are permanently saline, especially where they are part of the inter-tidal zone.

Coastal wetlands support migratory birds and water fowl. The Gippsland Lakes are listed as wetlands of international importance under the Convention on Wetlands (Ramsar Convention). Other examples of important wetlands are Macleod Morass (Bairnsdale), lower Tambo River, Lake Tyers, lower Snowy River, Mallacoota Inlet, Sydenham Inlet and Tamboon Inlet.

The marine and coastal ecosystems in our region support healthy native plant and animal communities. Because they are in good condition, they play a vital role in maintaining biodiversity and help to conserve threatened and endangered species. They also have important commercial and recreational uses such as diving, fishing, boating, bird watching and related activities.

COASTAL AND MARINE ECOSYSTEMS

Foxes threaten native animals. Photo: Dean Kleinitz

PRESENT THREATS

East Gippsland's coastal and marine environments are mostly in excellent condition. The extent of National and Coastal Parks, and the limited development along the coastal strip have ensured that most of the coast has remained in natural condition. In the Far East in particular, the quality of water entering estuarine and marine environments is high, due to the extensive coverage of native vegetation in the area.

Despite their near-natural condition, our coastal and marine environments face threats such as natural events like fire and flood, habitat loss, pest plants and animals, alterations to natural flows, excess nutrients and coastal development. Potential threats may also result from coastal subsistence and climate change.

Fires in the river catchments destroy native vegetation and leave topsoil unprotected. Ash and sediment washed into rivers following heavy rain is carried downstream where it is deposited in coastal estuaries, or taken out to sea as occurred during the floods in July 2007. This sediment can affect habitat and food sources for fish and other marine creatures, as well as contribute to the growth of blue-green algae in inlets and estuaries.

Habitat loss can also impact on coastal and marine ecosystems. Coastal plants and animals are adapted to cope with a harsh environment which is dominated by salt air, strong winds and sandy soils. While most of the coast is managed within state parks and reserves, poorly planned development can lead to wind and water erosion, damage of coastal vegetation and disturbance of wildlife. Recreational activities can also damage coastal vegetation and expose coastal dunes to wind erosion.

Pest plants and animals also pose a significant threat to coastal biodiversity. For instance, foxes prey on the eggs and chicks of birds such as Little Terns that nest on the beach. Rabbits destroy native vegetation which stabilises sandy dunes and prevents erosion. New pest species like the Pacific Sea Star could cause significant damage to our marine environment. Monitoring for the emergence of these types of pests is very important to maintain a healthy coast.

Pest plants can also be a problem. An example is Boneseed, a Weed of National Significance which grows in most soil types and can withstand salt spray. It can form dense thickets and smother native plants, displacing food sources for native birds and animals. Infestations of Boneseed are currently receiving attention by the East Gippsland Shire in the coastal dunes at Lakes Entrance. Other examples of problem weeds in coastal areas in our region are Boxthorn and Bridal Creeper.

Alterations to natural river flows, such as extraction of water for irrigation purposes also pose threats. Variable river flows are important as they trigger breeding of marine species like Bream and Bass. Natural flows also provide passages for fish species passing between fresh and marine waters. Alterations to natural flows pose a threat to the species.

Gippsland Lakes

While inlets and estuaries along the coast are in excellent condition, the Gippsland Lakes are a special case. In 2001, the CSIRO *Gippsland Lakes Environmental Study* (www.gcb.vic.gov.au) found that increased levels of pollution from nutrients and sediments as well as reduced water flows

Southern Brown Bandicoot, Cape Conran

and increased salinity had impacted on the water quality and overall health of the Lakes.

To address this problem, the State Government released the *Gippsland Lakes Future Direction and Action Plan* in 2002 (www.gcb.vic.gov.au). The major aims of this plan are to reduce nutrient levels entering the Lakes by 40% by 2022; balance freshwater and salt water flows; maintain wetlands biodiversity; increase community awareness and participation; and continue planning and evaluation of the program's effectiveness.

The delivery of this Action Plan is being overseen by the Gippsland Lakes Taskforce, made up from the leaders of many Government agencies in the region. The Gippsland Lakes are precious, one of the most important natural assets in East Gippsland. They are the foundation for tourism, property development and the supporting service industries such as building and health. For these reasons we must ensure the Lakes are passed on to future generations in good health.

POSSIBLE FUTURE THREATS

Coastal subsistence

The extraction of water, oil, and natural gas from underground aquifers could result in a lowering of the land surface. In Gippsland, there is a risk that groundwater pumping from the Latrobe aquifer for off-shore oil and gas extraction, and irrigation in the Yarram area, may result in subsistence of the coast line. The mining of brown coal in the Latrobe Valley may also be a contributing factor.
Subsistence could lead to the breaching of sand dunes along the coast between the Gippsland Lakes and Bass Strait. If this occurred, flooding could have a serious impact on coastal towns, dune and estuary environments and recreational facilities.

An information sheet about coastal subsistence is available on the Gippsland Coastal Board website (www.gcb.vic.gov.au).

Climate change

Increases in temperature and greenhouse gases in the atmosphere, such as carbon dioxide, methane and nitrous oxide could result in changes in rainfall, wind patterns, and the frequency and severity of extreme weather events.

In our region, changes could impact on coastal areas in the form of rising sea levels, increased temperatures, and changed storm events. Estuaries, coastal dunes, wetlands and reefs may have difficulty in adapting to climate change, and may become increasingly vulnerable (www.greenhouse.vic.gov.au).

The dunes along the eastern coastline of Victoria could be vulnerable to the effects of climate change due to high wave activity from the southeast, greater erosion due to increasing sea levels, and possibly more extreme storm surges. Low lying wetlands could also be vulnerable to more frequent inundation due to sea level rise, storm surges, wave events and possibly more extreme run-off events.

In August 2007, the Victorian Government announced a project called *Future Coasts* to further assess the vulnerability of coastal areas to climate change (www.greenhouse.vic.gov.au).

A detailed report about the effects of climate change on coastal wind and weather patterns, storm surges, and extreme sea levels on the Gippsland Lakes can be found on the Gippsland Coastal Board website (www.gcb.vic.gov.au).

COASTAL AND MARINE ECOSYSTEMS

Point Hicks Marine National Park

MARINE RESERVES, NATIONAL PARKS and SANCTUARIES

In all, there are 13 Marine National Parks and 11 smaller Marine Sanctuaries along the Victorian coastline. Marine National Parks and Sanctuaries have been set aside to protect areas of significant habitat. These parks and sanctuaries, established by the Victorian Parliament in June 2002, now cover 5.3% of Victoria's coastal waters, safeguarding marine habitats and species, natural features, cultural heritage and aesthetic values.

Three of these parks are in our region - Beware Reef Marine Sanctuary, Point Hicks Marine National Park and Cape Howe Marine National Park.

Beware Reef Marine Sanctuary (220 hectares) is located southeast of Cape Conran. It is 5 kilometres offshore and supports a wealth of marine life, including various types of seaweeds and forests of bull kelp, Fur Seals, Maori Octopuses and more than 20 species of reef fish including the Long-Snouted Boarfish. This marine sanctuary is complemented by Cape Conran Coastal Park (11,700 hectares) on the mainland near Marlo.

Point Hicks Marine National Park is a 4000 hectare park adjacent to Croajingolong National Park about 25 kilometres southeast of Cann River. Point Hicks is a warm marine environment. Many animals living here cannot survive in the cooler waters further west. Point Hicks contains rich marine fauna including intertidal invertebrates, colourful and diverse sessile (attached) invertebrates living on subtidal reefs, kelps, small algae and reef fish.

Cape Howe Marine National Park is situated off the far eastern tip of Victoria. This 4,050 hectare park provides habitat for a mixture of cool water southern marine species and warmer water species more common in the north. It contains habitat like sandy beaches, tidal rocky reefs, and areas of soft sediment seafloor. Offshore, reefs at a depth of 50 metres support diverse fish populations. Humpback whales pass in the vicinity of the park on their annual migration between the tropics and Antarctic waters. Little Penguins are common on Gabo Island.

Other areas have also been set aside to maintain coastal areas in the region.

The Lakes National Park is a bush land retreat adjoining the Gippsland Lakes between Lake Victoria and Lake Reeve. The Park occupies 2,390 hectares of low-lying woodland and coastal heath. It includes Sperm Whale Head peninsula, Rotamah Island and Little Rotamah Islands. More than 190 species of birds have been recorded in the park, including the rare White Bellied Sea Eagle and the endangered Little Tern.

The **Gippsland Lakes Coastal Park** is a coastal reserve covering 17,584 hectares along the Ninety Mile Beach from Seaspray to Lakes Entrance. The park also includes Lake Reeve, several islands and the Boole Poole Peninsula. Lake Reeve is listed under the Ramsar Convention on Wetlands of International Importance, especially as waterfowl habitat.

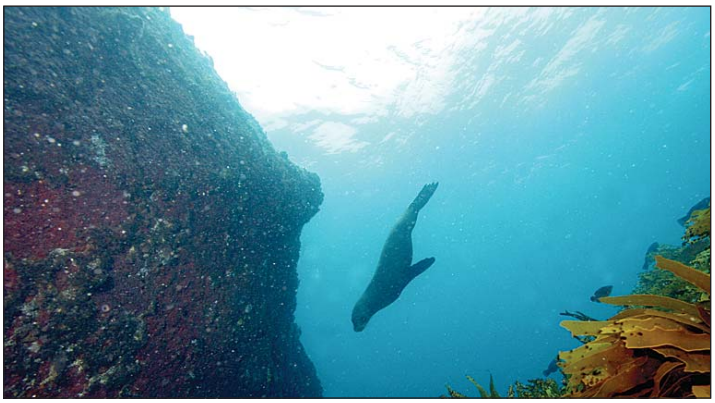
The **Croajingolong National Park** is also important in maintaining biodiversity along the coast. This national park covers 87,500 hectares and extends for 100 kilometers along the wilderness coast. The remote beaches, tall forests, heathlands, rainforests, estuaries and granite peaks provide a range of habitats linking coastal areas with the hinterland.

Further information about the Marine and Coastal Parks in our region can be found on the Parks Victoria website (www.parkweb.vic.gov.au).

ESTUARIES

Other significant coastal areas in the region are estuaries on the Snowy River (Brodribb River, Lake Curlip, Cabbage Tree Creek Lagoon, Lake Corringle, and Lake Wat Wat), Yeerung River, Sydenham Inlet (Bemm River), Tamboon Inlet (Cann

Fairy Terns



Whale Rock Seal, Point Hicks Marine National Park

River), Thurra River, Mueller River, Wingan River, Betka River and Mallacoota Inlet.

In these estuaries, wetlands, saltmarshes, mangroves, seagrass beds, sandy banks and intertidal flats provide food sources which support diverse populations of terrestrial and aquatic animals. They also have a vital role in life cycle events such as fish migration and waterbird breeding.

Estuaries are dynamic environments subject to natural events. For instance, the volume of water flowing into the estuary affects the opening to the ocean and the natural migration of fish. The quality of water entering the estuary is influenced by the general condition of the catchment. Hence, maintaining river catchments in good condition is also a vital component in maintaining coastal and marine ecosystems in good condition. Information about the work of the Authority in maintaining river health can be found at www.egcma.com.au.

COMMONWEALTH GOVERNMENT MARINE RESERVE

In the ocean waters to the south east of the Gippsland coast, the Commonwealth Government has recently (June 2007) proclaimed an extensive area of the ocean floor as the South East Commonwealth Marine Reserve Network. This reserve extends from the south coast of New South Wales, around Tasmania and Victoria and west to Kangaroo Island off South Australia. It includes the East Gippsland Reserve, which covers 4,137 square kilometres of the ocean floor and contains an extensive network of canyons in depths up to 4,000 metres. This Reserve includes both warm and temperate waters supporting free-floating and microscopic plants (phytoplankton).

A more detailed description about the Reserve can be found on the Department of the Environment and Water Resources website at www.environment.gov.au/coasts.

COASTAL AND MARINE ECOSYSTEMS

Boneseed plant

Bottlenose dolphin calves, Gippsland Lakes

BONESEED CONTROL PROGRAM

The East Gippsland Shire is undertaking a project at Lakes Entrance to control infestations of Boneseed. The project is funded through the Department of Sustainability and Environment's Good Neighbour program.

Boneseed is a South African shrub which grows to 2-3 metres high. Since its introduction as a garden plant over 100 years ago, it has spread to bushland in many areas of Victoria. It reproduces from seeds distributed by birds and animals or in fresh and salt water. Boneseed is highly adaptable, very hardy and can tolerate salt spray. It is a declared noxious weed in Victoria.

Infestations of Boneseed have been found in the coastal dunes between Eastern Beach and the Entrance. They are being controlled by hand-pulling as small plants are shallow-rooted. Larger plants are cut and the stumps poisoned.

Weeds like Boneseed are a major threat to biodiversity. They smother native vegetation, displacing the food plants of native birds and animals. They can also affect recreational and tourism activities by restricting access to beaches and walking trails.

DOLPHIN RESEARCH

Researchers from the Dolphin Research Institute and Monash University have been investigating bottlenose dolphins (*Tursiops sp.*) in the Gippsland Lakes for the past three years. Bottlenose dolphins have been increasing in numbers especially during winter, suggesting that there are 'resident' and 'transient' populations in the Gippsland Lakes. But very little is known about their numbers, structure or movement patterns. Researchers, led by PhD student Kate Charlton, have been visiting the Lakes several times each year to gain further information about these 'resident' and 'transient' populations of dolphins.

The research so far indicates that these dolphins, and those found in Port Phillip Bay are unique, and may represent a new species requiring formal classification. The research is also investigating the toxicology of the dolphins, tracking toxicants (poisons) through the food-web and identifying environmental or health issues which may impact on the dolphin population.

Dolphins that have died are also being examined. Because dolphins spend most of their time underwater, information that can be gathered from deceased dolphins is vital for further research. Measurements, photographs and post-mortems are taken on these animals to determine the cause of death and to build up scientific information about this potential new species.

FRIENDS OF THE GIPPSLAND LAKES, PARKS & RESERVES (FOGL)

FOGL provides an avenue for interested persons to participate in projects and activities that enhance the environment and facilities in the Gippsland Lakes Coastal Park, Lakes National Park, Blond Bay Reserve, Gippsland Lakes Reserve and crown land frontages abutting the Gippsland Lakes.

Yellow Zoanthids, Beware Reef

Giant Cuttlefish, Beware Reef

Recent activities have included planting native trees and weed control along the Mitchell River Silt Jetties, and the fitting of radio collars and trapping of feral pigs on Boole Poole Peninsula. Upcoming works include design and production of signage and notes for a walking track in the Lakes Coastal Park. Recent and forthcoming educational activities include a talk on littoral rainforests by botanist Bill Peel, a spotlight walk at Burnt Bridge in the Lake Tyers Forest Park, and a bird observation canoe excursion on the Macleod Morass near Bairnsdale. More information on FOGL's aims and activities can be found at http://fogl.org.au

FRIENDS OF BEWARE REEF

Beware Reef is situated five kilometres off Cape Conran. The Reef is exposed above the high tide mark and has no vegetation other than kelp and seaweed. Australian Fur Seals use it as a resting place.

The vertical walls of the reef extend 27 metres to the ocean floor. They are covered in yellow Zoanthids, an endemic (native) anemone on this reef.

The reef is distinctive because of the unique combination of currents. Here, the Eastern Australian current that runs from north to south meets currents that leave Bass Strait in a west to east direction. These currents bring nutrients that support abundant marine life, such as fish, giant cuttlefish, sponges, anemones and sea mosses.

Local scuba divers have been diving on Beware Reef for 30 years and have observed the reef in different seasons and weather conditions. During this period, no changes have been observed. This indicates that the reef has remained in pristine condition, supporting marine life of which over 90 per cent is native to our south facing coast.

EASTERN BRISTLEBIRD

The endangered Eastern Bristlebird once inhabited coastal areas from Mallacoota to Cape Conran but is now restricted to wetland scrub at Howe Flat east of Mallacoota. Recent research by Department of Sustainability and Environment staff have determined that there are about 80 pairs of Bristlebirds on Howe Flat in habitat known as Riparian Scrub. These birds are not linked to other populations of Bristlebirds in New South Wales so developing conservation plans and minimising threats from wildfires are extremely important.

TAMBO BLUFF LANDCARE GROUP

Tambo Bluff on the eastern shore of Lake King contains barrier lagoon wetlands, remnant rainforest, coastal grey box, and geologically significant cliffs which are remnants of the former sea coast. In recent years, the Tambo Bluff Landcare Group has undertaken a number of activities to care for these public areas. Several thousand trees have been planted to revegetate wetlands and over 30 nesting boxes have been erected. Weed control programs are now in place and, in the past year, five feral cats have been trapped. A current project is a walking track with habitat plantings. New members to assist with these projects would be warmly welcomed.

NATIVE VEGETATION

Re-establish native vegetation in modified landscapes to a level consistent with primary land use

Message from the East Gippsland Catchment Management Authority

We are fortunate to live in a region where there are large areas of native vegetation. As a result, most of our forests, grasslands, rivers, and wetlands have remained in good condition. These areas provide habitats that support diverse communities of plants and animals, many of which are rare in Victoria and Australia.

However, there are areas in East Gippsland where large amounts of native vegetation have been cleared. In some cases this cleared country has significantly reduced certain types of vegetation to the point where they are now rare or threatened.

The Regional Catchment Strategy (RCS) outlines a range of actions to maintain our native vegetation in good condition and increase the extent of rare or threatened vegetation on freehold land.

The information presented here, outlines some of the threats to native vegetation in our region and the cooperative efforts being made to re-establish it in areas previously cleared for agriculture.

DESCRIBING NATIVE VEGETATION

Some special terms are used to describe native vegetation. These are explained below.

Ecological Vegetation Class (EVC)

Over 300 EVCs have been identified in Victoria of which 84 exist in East Gippsland. They all have names and numbers which define the range of plants and the type of environment in which they occur. For instance, EVC 32 is Warm Temperate Rainforest. This consists of plant species growing in gullies and slopes with southerly or easterly aspects from sea level to the foothills, where annual rainfall is in excess of 700mm. Warm Temperate Rainforest often develops on river flats and examples can be found from Metung east to the lower Snowy River and around the Marlo Estuary.

Bioregions

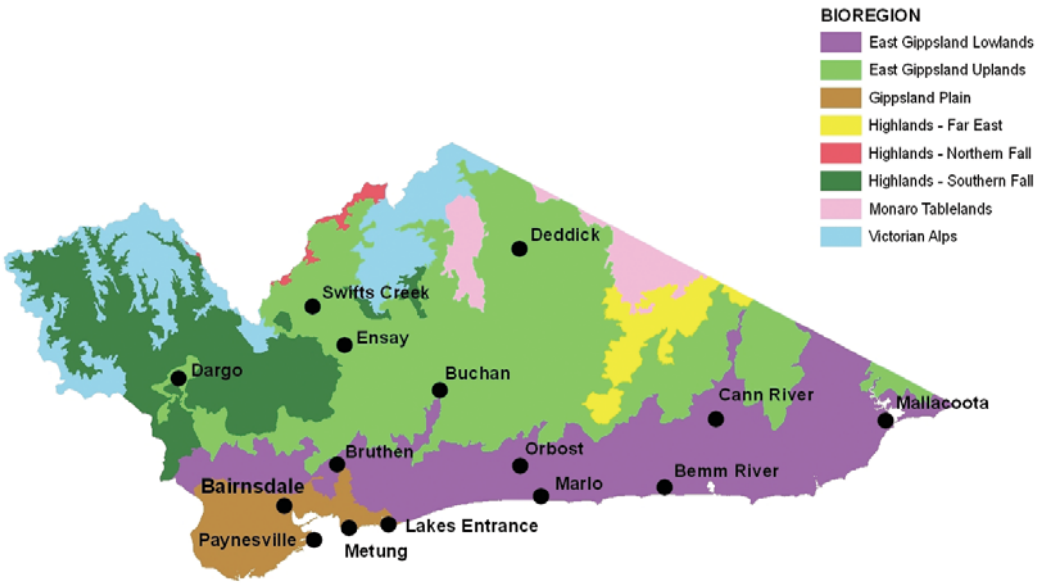
Bioregions describe a geographic area where various similar vegetation types are generally found. These bioregions capture the characteristics of the landscape and the underlying environmental features such as climate, soils, landforms and vegetation.

East Gippsland has eight bioregions wholly or partially within it. As Table 1 shows, very high proportions of the vegetation

Warm Temperate Rainforest, Cann River

Bioregion	Native vegetation remaining (%)
East Gippsland Uplands	90
East Gippsland Lowlands	87
Highlands - Southern Fall	98
Victorian Alps	99
Gippsland Plains	10
Monaro Tablelands	71
Highlands - Far East	99
Highlands - Northern Fall	96

Table 1: Native vegetation remaining in East Gippsland bioregions



BIOREGION	Endangered EVCs (less than 10% remains)	Vulnerable EVCs (10 - 30% remains)	Depleted EVCs (30 - 50% remains)	Rare EVCs	Least Concern (over 50% remains)
East Gippsland Lowlands	9	8	7	9	13
East Gippsland Uplands	6	7	2	13	22
Gippsland Plains	21	12	2	1	5

Table 2: Conservation status in selected East Gippsland bioregions

which existed prior to European settlement remain in most bioregions, except in the Gippsland Plains and Monaro Tablelands. These are the areas we have changed the most. While large areas of native vegetation are important in maintaining biodiversity, this does not necessarily mean that all EVCs are protected. Other factors need to be considered to determine the conservation status of particular species.

Conservation Status

Although East Gippsland has extensive areas of native vegetation, some EVCs throughout the region are not well represented. For instance, land selection for agriculture and townships concentrated on fertile areas, such as the Gippsland Plains and the floodplains of rivers. These areas originally contained vegetation types not found elsewhere. On the Gippsland Plains, only 3% of tree cover remains on private land and now many species in this remnant vegetation are threatened (see Table 2).

In the three bioregions of most concern, many EVCs are classified as Endangered, Vulnerable and Depleted. As a result, these bioregions have been the focus of plans to re-establish their native vegetation.

For instance, in the Gippsland Plains bioregion, the total area of Warm Temperate Rainforest (EVC 32) is only 128 hectares of which 95% is on private land. Dry Valley Forest (EVC 169) comprises only 40 hectares, with 85% on private land.

While we have extensive forested areas in our region, there are many Endangered and Vulnerable EVCs particularly on the Gippsland Plains, East Gippsland Lowlands and East Gippsland Uplands. Since many of the remaining remnants are on private land, co-operation between Government agencies and landholders is essential to ensure that we maintain and improve the surviving native vegetation.

NATIVE VEGETATION

Clearing native vegetation

Remnants of native vegetation, Gippsland Plains

THREATS TO NATIVE VEGETATION

Some native vegetation threats are as follows.

Permanent clearing

Land is cleared for many purposes including grazing, cropping, timber plantations, road construction, housing estates and infrastructure projects such as pipelines and electricity transmission lines.

Weed invasion

Weeds compete with native vegetation for space, nutrients and sunlight. Major infestations can completely smother native vegetation and crowd it out.

Altered fire regimes

Native plants require appropriate fire management to meet their ecological needs. Most communities of native plants have adapted to, and evolved with fire and now rely on periodic burning to maintain their composition and structure. With European settlement, the timing and frequency of fires has changed which can in some cases adversely influence plant and animal abundance.

Stock access

Unfenced areas of native vegetation in farming areas are subject to damage by grazing animals such as cattle and sheep. Further damage such as soil erosion can occur when native vegetation is heavily grazed or trampled, especially along the banks of rivers and streams.

Permanent clearing, weed infestations, altered fire regimes and unrestricted stock access are some of the direct threats to native vegetation on private land. However, there are other less obvious processes which are also significant.

Fragmentation

As land clearing occurs, the remaining patches of native vegetation become more isolated. These remnants become increasingly vulnerable to further decline.

Dieback and incremental vegetation decline.

The gradual decline of trees and other plants is a particular problem on the Red Gum Plains. In some places, the only native vegetation remaining is along the roadside verges and on disused government roads. Contributing factors include leaf-eating insects, fertiliser use, drought and salinity. Grazing from stock and introduced pests prevents regeneration of new trees, leading to a gradual loss of native vegetation over time.

Climate change

East Gippsland's climate is expected to become warmer and possibly drier in the future. Extreme events such as high temperatures and severe droughts are expected to increase,

Stressed trees, Gippsland Plains

Enhanced remnant at Johnsonville

resulting in more frequent and intense fire events. The effects of these changes on native vegetation could be dramatic. Alpine plants could come under increasing pressure if the climate warms and rainfall declines. Warm Temperate Rainforest species could be threatened if rainfall declines and fires become more widespread and severe.

REVERSING DECLINING NATIVE VEGETATION

Victoria's policy on native vegetation, Victoria's Native Vegetation Management - A Framework for Action has the primary goal of 'a reversal, across Victoria of the long term decline in the extent and quality of native vegetation, or net gain'.

In modified landscapes - land which has been partially or totally cleared - gains can be achieved by careful management of existing native vegetation and by planting new trees. Various actions can be taken to achieve a 'net gain'. The condition of sites of native vegetation can be enhanced by:

- excluding stock which graze or trample vegetation, damaging the habitat which supports plants and animals;
- retaining large old trees in woodlands and forests. These trees are important because over 400 species of animals depend on hollows in trees for shelter and breeding;
- retaining vegetation on the forest floor. One study of 300 farms found that remnants of native vegetation with shrubs and other plants on the forest floor had 33 percent more woodland-dependent bird species than areas without these ground plants. Logs, fallen branches and leaf litter on the forest floor are also important in maintaining habitat for plants and animals;
- controlling weeds. Invasive weeds such as Blackberries and Bridal Creeper smother native shrubs and grasses which are important in maintaining the habitat for animals and other plants;
- enhancing existing areas of native vegetation with additional plantings. Healthy young plants ensure that the natural recruitment of species will be maintained;
- controlling pest animals such as rabbits and deer that feed on new shoots and seedlings and place native plants under stress.

The viability of patches of remnant vegetation is also important. The factors that need to be considered are the size of the patch and the links between patches:

- In general, the bigger the patch the better. For instance, larger remnants contain more bird species which help to control insects in forests and woodlands;
- Links to, and number of neighbouring patches of vegetation. For example, more bird species are found in remnants that are within 1000 metres of other remnants.

These actions are not all hard to implement and Government has many opportunities available for landholders to seek assistance and help, both through grants and professional advice.

NATIVE VEGETATION

Revegetation site, lower Snowy River

SNOWY RIVER

The Snowy River is one of Victoria's Heritage Rivers. The East Gippsland Catchment Management Authority has been undertaking vegetation works on the lower Snowy River since early 2000, building on previous works by the Snowy Improvement Trust. The works, outlined in the Snowy Plan of Works (www.egcma.com.au) are part of the State Government's commitment to improve the health of the Snowy River.

In the last seven years, Warm Temperate Rainforest (Endangered EVC), Gallery Rainforest (Rare EVC) and Riparian Scrubland (Rare EVC) has been steadily reintroduced along the Marlo Road.

By 2012, the Authority aims to return the banks of the Snowy River between Jarrahmond gorge and the estuary, consistent with what was in place before European settlement.

The works so far have included seed collection, plant propagation, direct seeding, and the planting of native trees, scrubs and grasses. As this vegetation becomes established willows have been progressively removed.

Most areas along the lower Snowy now have stock exclusion fencing in place, based on agreements with DSE and the landholders. The exclusion of stock grazing is vital to the success of the project and to protect the significant Government investment.

These ongoing works will ensure existing public access points to the river are maintained for general access, fishing and swimming, and for pumping of domestic and irrigation water.

GENOA RIVER

Another long term project by the Authority (and the earlier River Trust) has been to control sedimentation on the lower reaches of the Genoa River.

Sand deposition on the lower reaches of the Genoa and Wallagaraugh Rivers as well as Mallacoota Inlet has been a major concern to the Authority, as well as landowners, fishermen and natural resource managers for many years. The sand originated from many sources including stream bank erosion, gully erosion, and forestry and agricultural practices, assisted by natural events such as fires and floods.

Expert reports in 1992 and 2001 recommended the use of vegetation-based sand trapping structures such as timber piles, the exclusion of stock from waterways, revegetation along river banks, and the control of pest plants and animals to protect riparian vegetation and minimise erosion.

The effectiveness of these works can be seen by comparing the accompanying photographs using the power pole on the left side of the photograph as a guide. The location is about 2 kilometres downstream of the Princes Highway. The photograph taken in 1986 shows an eroded section of river bank that was vulnerable to damage by stock. The second photograph shows the same section of river bank in 2000. Notice the wood structures along the river bank which have been effective in trapping the sand and providing a base for new vegetation to become established. The third photograph, taken in September 2007 shows that vegetation is now fully established along this section of the river. These 'before' and 'after' photographs show how effective rehabilitation work can be in restoring the river corridor and minimising further damage.

MITCHELL RIVER

Erosion has been a serious problem along the Mitchell River and sections of the river banks still require rehabilitation works. In areas around Lindenow and Walpa, a major contributing factor has been infestations of willows, planted many years

NATIVE VEGETATION

Phragmites, Mitchell River at Walpa

Lower Genoa River in 1986, 2000 and 2007

ago in an effort to stabilise the banks after native vegetation had been cleared. However, problems with blockages, increased flooding, erosion and channel realignments have become evident in recent years. Willows also threaten native animals and plants that are vital to maintaining river health and water quality. Stock access to the water edge has been another factor in bank erosion.

On the estuarine reaches of the river, wave action from boats and wind, and the impacts of salty water also contribute to bank erosion. This results in undercutting and eventually 'slumping' of sections of the bank. During floods, the damaged bank is swept away, potentially causing problems further downstream.

Rehabilitation of the river banks along the lower Mitchell has involved a range of works depending on the site conditions.

Willows have been removed where infestations have reduced the capacity of the river to handle water flows. Quarry rock has been placed along the banks where undercutting and slumping has occurred. On private property, the river banks have been fenced off to stock access, preventing further erosion and damage to remnant vegetation which can help to stabilise the river bank.

Other works have utilised native vegetation to provide defences against further damage once the river banks have been fenced off from stock. Phragmites (a native species of freshwater reed) planted amongst the rock, provides protection at the waterline against wave action and undercutting of the bank. Indigenous trees and shrubs further stabilise the banks, preventing erosion especially during major flood events.

Phragmites, indigenous trees and shrubs are important in the biodiversity of river systems. They provide shelter, feeding and breeding areas for species of fish that are vital to the health of our rivers and the quality of the water on which we all depend.

NATIVE VEGETATION

EAST GIPPSLAND GRASSLAND SUPPORT PROJECT

Greening Australia (Vic) has received National Heritage Trust (NHT) funds to help landholders conserve native grasslands on the Gippsland Plains. The project also involves the collection of native grass seed for use at revegetation sites.

Landholders who choose to become a part of this project receive advice and support in the development of a property management plan. These plans build on the landholder's local knowledge of their property and also include techniques to maintain seed production and plant health.

The seed produced is harvested by Greening Australia. The landholder can then choose to:

- keep the seed for revegetation on their own property and pay a fee for the harvest;
- share in the harvest with Greening Australia on a 50/50 basis - that is, for every two bales collected, the landholder keeps one for their own use and Greening Australia takes one to use on other revegetation projects;
- receive a royalty from Greening Australia for each bale harvested.

In promoting the value of native grasses in this project, Greening Australia aims to open up opportunities for East Gippsland landholders to diversify their farm income and provide incentives to retain their areas of native grass for seed harvesting and grazing.

MAGEE'S GULLY

Magee's Gully is an urban stream in West Bairnsdale, flowing south from the Main Road to the railway line before eventually emptying into Macleod Morass. It collects rainwater runoff from streets and other paved areas over a large 'catchment' that often results in high stream flows after heavy rain.

Harvesting Weeping Grass (Microleana Stipoides) seeds

Magee's Gully Bairnsdale

Austrodanthonia (Wallaby Grass at Goon Nure)

Plantation on the Mitchell River walking track

NATIVE VEGETATION

Since 2004, the East Gippsland Shire has undertaken a project to rehabilitate the stream from Main Road to the railway bridge. This section of stream was regarded as an 'eye sore' - heavily overgrown with willows and other weeds and used on some occasions as a dump for car bodies and household garbage.

The project has involved the removal of all willows, the control of annual weeds like Capeweed and Thistles, and the reintroduction of native shrubs (Blackwood and Woody Tea Tree) and grasses *(Carrex appressa)*.

The works completed have turned the area into an attractive and easily maintained urban park and improved the quality of water entering the Morass and, eventually the Gippsland Lakes.

MITCHELL RIVER BAIRNSDALE

The Bairnsdale Urban Landcare Group (BULG) has undertaken landscape improvements along the Mitchell River since the development of a concept plan for the area in 1998.

The first area to receive attention was on the township side of the river (from The Cut to Scott's place). Then, in 2000 attention shifted to the eastern side of the river, from the Lind Bridge to the Princes Highway. On this section of the river bank, Poplars and Ivy were removed and the area revegetated with native trees and shrubs appropriate to the site. These plantings were completed with the help of Greencorp volunteers.

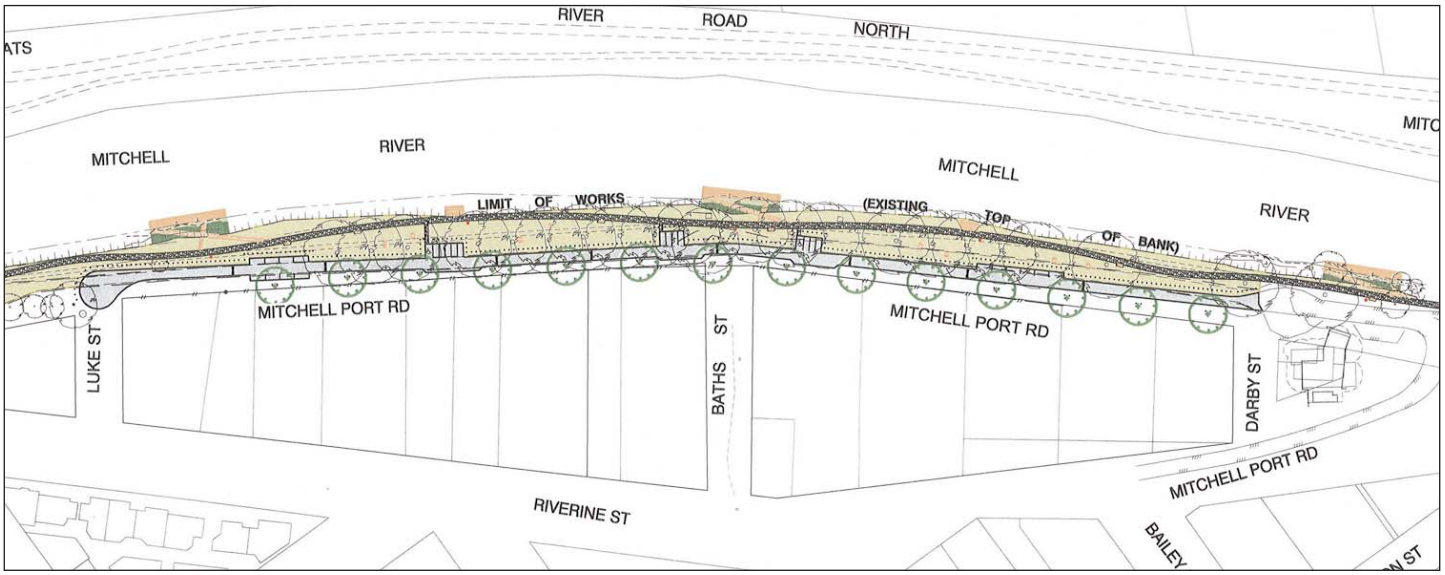
Sections of the replanted areas have been adopted and maintained by schools, community groups and individuals. Interpretative signs have also been placed along the walking track to provide information on historical sites.

Further plans to develop the Mitchell River Walk on the township side of the river have been announced. These will involve the removal of dead vegetation, Wattles, Willows, Poplars, Ivy, Chestnuts and Rhagodia (Seaberry Saltbush). The access road will be improved and lined with trees on both sides.

A walking track will be constructed along the river and interpretative signs erected to highlight features along the track. Suitable areas will be replanted with native species of trees and shrubs with high habitat values, and seats and tables constructed to encourage people to visit the river bank.

Decking will be erected at several places to provide access to the water. The lower deck at water level will cater for recreational fishing and the launching and retrieval of kayaks. The upper seating deck will provide recreational sites with views of the river.

To encourage visitors to the area, pedestrian access to the river walk from the central business area of Bairnsdale will be provided via pedestrian paths off Riverine Street at Baths and Luke Streets. By connecting the CBD with the river park in this way, the community will be able to use an attractive riverbank precinct for recreational purposes.



COMMUNITY ASSISTANCE

Assist the community to improve their management of the region's natural resources

Message from the East Gippsland Catchment Management Authority

The natural resources of East Gippsland are all used for some form of production. It may be land for horticulture such as on the Lindenow Flats, or land for conservation such as the Croajingolong National Park to preserve natural ecosystems in forested and coastal areas.

Whilst used for differing purposes, each resource (or asset) is the foundation for our region's economic well-being, recreational activities and the lifestyle we enjoy.

All of us in this community, locals and visitors alike, have the capacity to either help improve or destroy our natural assets. Improvement could be planting trees or picking up litter. Destruction could be inappropriate clearing or tipping oil down the drain.

The informtion presented about this proirity describes activities designed to assist the community in improving the management of our natural resources. I hope you find these articles interesting and informative and take up the personal challenge to do what you can to help.

W Tree Creek Falls

Intensive horticulture

OUR NATURAL RESOURCE ASSETS

East Gippsland is a geographically and biologically diverse region. Major land uses and industries include conservation, agriculture, tourism, forestry and fisheries. About 80 per cent of the land in our region is in public ownership, mainly as State Forests or National Parks. Some important features are:

- The Gippsland Lakes, which is the largest coastal lagoon system in Australia and Ramsar listed as Wetlands of International Importance;
- Its array of streams, especially the wild rivers, including the iconic Snowy River and the Mitchell River, Victoria's biggest unregulated river;
- Its long coastal strip with undeveloped estuaries, ocean beaches and spectacular headlands;
- Its mountains and forests, which provide great scenery, clean air, clean water, recreational opportunities and forestry products;
- Its scenic and productive farming lands, especially in the river valleys; and
- Its living wealth in the form of native plants and animals, some of which occur only in this region.

Our natural resource assets can be divided broadly into productive and environmental assets.

COMMUNITY ASSISTANCE

Production assets are land for agriculture, forests for timber production and water for irrigation and industry. Environmental assets are land and water reserved for the conservation of natural ecosystems, and coastal areas preserved in their natural state and managed as parks.

The rich alluvial floodplains on the lower reaches of some of our major rivers are amongst our most important production assets. These are the highly productive irrigation areas on the Lindenow floodplain (Mitchell River), Bruthen floodplain (Tambo River) and the Snowy River floodplain. These are used extensively for horticulture, dairying and cattle production.

Another productive area is the Red Gum Plains, extending from Bairnsdale to the Perry River in the west. These plains, originally covered by Red Gum trees and native grasses, are now mainly used for dryland agriculture and cropping.

Our environmental assets include marine and coastal parks such as Point Hicks Marine National Park and the Gippsland Lakes Coastal Park, and extensive forested areas such as the Mitchell River, Alpine and Croajingolong National Parks.

Many of our natural resource assets serve both productive and environmental purposes. For instance, coastal areas are used for tourism and for the preservation of the marine and coastal habitats, whilst rivers are used to harvest water for domestic purposes as well as to support aquatic ecosystems.

BENEFITS OF NATURAL RESOURCE ASSETS

Assets provide economic, social or environmental benefits (value). For instance, economic benefits include the products made or the crops harvested, processed and sold and generate significant employment opportunities.

The benefits of natural ecosystems and other environmental assets are not always as easy to value. The valuations often tend to be associated with the rarity of a species or an ecosystem.

For example, the Mitchell River is Victoria's largest unregulated river and is highly valued because of its comparative lack of disturbance and good ecological condition. The Gippsland Lakes provide natural or near-natural habitat for migratory waterfowl and have been recognised as Ramsar Wetlands of International Importance.

Sometimes the benefits of our environmental assets are derived from recreational values - canoeing on rivers, hiking in the Alps and boating on the lakes and estuaries.

The benefits we derive from assets depend on their physical condition. Failure to recognise their capability can lead to overuse and loss of their condition. For example, revegetating river banks where native vegetation has been removed contributes to improvements in river health by reducing erosion and sedimentation. This in turn results in better water quality both for the environment and our use.

Similarly, improving or increasing plots of native vegetation on private land provides habitat for birds and animals, but can also prevent potential salinity impacts on pasture.

Timber production

Canoeists, Lake Tyers

COMMUNITY ASSISTANCE

Water Watch volunteer Lorelee Cockerill, Goongerah Creek

Fishcare volunteer Stan Dumbleton measuring fish

LOOKING AFTER OUR ENVIRONMENT

All of us have a different role in looking after our environment. People who own and manage natural resources, including state agencies and local industries, are encouraged to ensure their activities are ecologically sustainable.

Volunteer groups participate in environmental projects, many of which contribute to strategic needs on a much larger scale, both regionally (say Gippsland Lakes health) and nationally (significant sites for migratory birds).

One of the ways for members of the community to increase their involvement in natural resource management is through existing groups. Here we describe the work of some of these groups and provide contact information for readers who might be interested in contributing to their work.

Waterwatch

East Gippsland Waterwatch is a community education program for students in primary schools, secondary schools and TAFE colleges, volunteer water monitors and members of the community. Educational events are also held as part of Summer by the Sea, the Water Cycle and key community events.

These educational programs broaden understandings of aquatic animals, water quality issues and the importance of river health.

In the water monitoring program, 109 sites are monitored for water quality in the region. During 2006/2007, 539 water samples were collected, analysed and recorded. These data help to inform Government agencies of changes in water quality and stream condition.

Water Watch volunteer Julia Buchanan, Mitchell River

Educational Program

The water monitoring program provides opportunities for volunteering in an established and well known organisation. In undertaking periodic monitoring of water quality, community members are able to gain an understanding of natural resource management issues and add to the data available about the quality of the region's natural resources.

Information about participating in Waterwatch can be obtained from www.vic.waterwatch.org.au or by contacting the Waterwatch Co-ordinator on 5152 0600.

Fishcare

Fishcare is a community based volunteer program with the motto 'We Fish, We Care'. The program aims to educate recreational anglers about responsible fishing behaviours and care of the aquatic environment.

Fishcare delivers an extensive fishing education and participation program across East Gippsland with a Primary School Program, Get Hooked...it's fun to fish program, Fish Right holiday workshops, fishing excursions, seminars, field trips and conferences.

Fishcare also works with other natural resource programs such as Waterwatch and Coastcare and provides displays at shows and community events.

Volunteers provide information and distribute educational material to recreational anglers about fishing regulations, fish monitoring programs and angling techniques, collect recreational fish catch data and visit schools and angling clubs. These activities provide opportunities for volunteers to gain an understanding of natural resource management issues and to actively contribute to the delivery of natural resource management programs.

Further information about volunteering can be found on the Fishcare Victoria website (www.fishcare.org.au).

Green Corps

Green Corps is an Australian Government youth development programme which provides opportunities for 17 to 20 year old volunteers to work on environmental and cultural heritage projects. Unlike other programs, participants are paid for the work they do, and learn skills which are transferable to other employment situations.

CVGT Green Corps has managed several programs in the region including the East Gippsland Community Conservation Project. In association with the East Gippsland Landcare Network, Parks Victoria and the Department of Sustainability and Environment, participants will complete a range of works including native seed collection, weed control, revegetation, walking track maintenance, fencing and surveys of threatened plant species.

In this project, volunteers work on public and private land, focusing on improvements to the health of local waterways and the management of native vegetation.

Young people interested in joining Green Corps can find further information at www.cvgt.com.au

Fishcare volunteers

Green Corps volunteers

COMMUNITY ASSISTANCE

Land for Wildlife

This is a voluntary scheme which assists private landholders to provide habitats for wildlife on their property.

Land for Wildlife properties contribute to native biodiversity conservation by retaining and enhancing remnant vegetation, fencing areas to allow for natural revegetation, protecting dead trees with hollows and controlling pets, weeds and pest animals.

In East Gippsland there are about 280 properties (7230 hectares) maintaining original vegetation or restoring degraded areas. Properties involved in the program range from small lifestyle blocks to fully operational farming properties.

Land for Wildlife provides many opportunities for volunteer involvement. Individual landholders maintain or restore habitats on their own land. Other volunteers support local extension officers with specific projects or promote the work of Land for Wildlife through events such as field days. Volunteers can also work directly with landholders to maintain and improve habitat.

For further information about volunteering opportunities with Land for Wildlife, go to the website www.dse.vic.gov.au and search using the keywords 'land for wildlife volunteer'.

Landcare

Landcare encourages rural and urban community groups and private landholders to work collaboratively to deal with land degradation problems such as soil erosion, soil acidity and introduced weeds that threaten natural biodiversity and reduce agricultural production and profitability.

Collective action to deal with common problems is encouraged since problems are rarely confined to a single property. Group approaches achieve better results than individual landowners trying to solve problems by working alone.

Landcare groups are involved in a diverse range of programs that provide many opportunities for volunteers to contribute to the management of our natural forests and agricultural land. Groups are active in both rural and urban landscapes.

A project by the **Raymond Island Landcare Group** aims to restore an area of degraded Manna Gum woodland which has been subjected to heavy grazing pressure by koalas. This is being done through controlled burning to encourage natural regeneration, re-seeding, and fencing to prevent grazing of new seedlings by wildlife and vermin.

The **Colquhoun / North Arm Landcare Group** operates in the area between the Colquhoun Forest and the Gippsland Lakes. The group has a diverse membership, reflecting a broad range of interests in improving the environment.

A significant focus in recent years has been the restoration and enhancement of rainforest remnants on a number of properties with gullies leading into the Gippsland Lakes. Key biodiversity outcomes achieved have been the creation of habitat for the vulnerable Grey Headed Flying Fox, and improved water quality resulting from the containment of

Land for Wildlife property at Nowa Nowa

Land for Wildlife volunteers studying plants in a salt marsh near Meerlieu

Controlled burn on Raymond Island

sediment and nutrients in the restored rainforest gullies. The focus of the group's annual Action Plan is on field activities as distinct from meetings. The group's activities also include weed management, exclusion fencing and vegetation restoration and tree planting. Members of the group spend a couple of hours one Sunday a month working together on major tasks like tackling infestations of Blackberry and Boxthorn.

As well as being part of the East Gippsland Regional Landcare Network, the Colquhoun / North Arm Landcare Group maintains strong links with Trust for Nature and the East Gippsland Rainforest Conservation Management Network. These links help with the overall achievement of local and regional biodiversity objectives.

Activities planned for the future include member property site visits, weed management and further rainforest restoration. The group is keen to expand its membership and welcomes interest from the local community.

For information on how you can get involved in Landcare in the East Gippsland Region, please contact the Regional Landcare Coordinator at the Authority's Bairnsdale office on 5150 3577.

Coast Action / Coastcare

Coast Action / Coastcare supports coastal and marine based volunteer groups and their activities. Typical projects include revegetating coastal areas, building and maintaining tracks, monitoring native birds and animals, protecting cultural sites and presenting education and community events.

Training programs provide opportunities for community members to increase their knowledge and skills in areas such as revegetation, weed control techniques and dune stabilisation methods.

Coast Action / Coastcare helps organise community events that focus attention on coastal and marine environments. One of these events is the 'Summer by the Sea' program held in the first two weeks in January. This encourages understanding and responsible use of coastal and marine environments by all members of the community.

For further information, contact the Department of Sustainability and Environment (DSE) website at www.dse.vic.gov.au and click on the link 'Coasts & Marine', or contact the DSE office in Bairnsdale on 5152 0439.

Tree planting, Colquhoun / North Arm Landcare Group

Waterwatch display during 'Summer by the Sea'

COMMUNITY ASSISTANCE

East Gippsland Rainforest Conservation Management Network (EGRCMN)

East Gippsland retains some of the most significant areas of rainforest in Victoria. These provide habitat for unique plants and animals. Many of these rainforests are threatened.

EGRCMN comprises people interested in the restoration, conservation and protection of the rainforests of East Gippsland. The activities of the group are focused on promoting community and government awareness of rainforest values, facilitating information sharing and educational opportunities, and planning and implementing projects to restore and maintain rainforest ecosystems.

Field days addressing rainforest assessment and erosion management have also been held. Funding for a rainforest restoration and indigenous training project has recently been received and the project commenced in 2008.

Further information can be obtained from www.egrainforest.org.au. Members of the community interested in rainforests are encouraged to join the EGRCMN.

Friends of Mallacoota

A rainforest restoration project has been underway at Devlin's Gully, Mallacoota for some time. The gully, which flows into the estuary near Bastion Point, has suffered from a number of environmental and human impacts including stormwater runoff, silt deposition, invasion by garden plants dumped in the area, track creation and weeds.

The project consists mainly of the hand removal of weeds including garden escapees, and the propagating and planting of local native species of trees and shrubs.

Devlin's Gully is important because it includes most of the 20 known 'Mallacoota Gums' which are regarded as State Significant due to their rarity. The Gully also includes important sub-communities of Warm Temperate and Littoral Rainforest.

Volunteers meet every week to weed new areas and maintain previously weeded areas. New volunteers to help with this restoration project would be made very welcome.

Greening Australia (GA)

GA is a national environmental organisation dealing with issues like salinity, declining water quality, soil degradation, and climate change and biodiversity loss in remote, regional and metropolitan locations.

An example of a local project is the East Gippsland Revegetation and Grassland Support. This is a volunteer program for landholders which promotes large scale, low cost revegetation works such as direct seeding and offers advice on revegetation and restoration works.

Erosion Workshop

Native grassland field day

It also aims to improve the management of native grasslands and the collection and trialling of the main grassland species as an alternative income stream for landholders. The project also promotes the importance of native provenance seed and aims to encourage organisations to work together to meet the needs of the region.

GA provides opportunities for volunteering such as community tree planting events, community nurseries and administrative support around the country. To find out more, visit the GA website at http://www.greeningaustralia.org.au.

Trust for Nature

The aim of Trust for Nature is to protect and improve biodiversity through private nature conservation. The Trust uses Conservation Covenants, voluntary but legally-binding agreements between landholders and Trust for Nature to permanently protect the natural heritage of a property. There are currently 90 covenanted properties in the East Gippsland region.

To support landholders, Trust for Nature provides a Stewardship Program. This program develops a management plan for the site, provides expert advice to help covenantors achieve best land management practice, and assistance to obtain funding for works and possible rate and tax rebates.

Trust for Nature also purchases properties of high conservation significance which are either retained by the Trust and managed with the support of a voluntary friends' group, or sold again with a Conservation Covenant in place.

Covenanting is a voluntary program through which landholders become actively involved in helping to manage our region's natural resources.

Non-landholders can also support Trust for Nature with events and restoration works by joining a friends' group. For details, contact www.trustfornature.org.au and click on 'Volunteer', or the Bairnsdale office on 5153 0457.

Victorian Environment Friends Network (VEFN)

The Friends Network promotes environmental volunteering in coastal areas, bush sites, grasslands, watercourses or wetlands. Friends groups typically operate in conjunction with the relevant management authority, usually Parks Victoria, a municipal Council, or some other organisation such as Trust for Nature.

Further information about groups operating in the Gippsland region is listed on the VEFN website (http://home.vicnet.net.au/~friends).

Volunteers assisting with plant identification on covenanted land at Meerlieu

Grass identification workshop

INCREASE WEALTH

Where possible, increase the generation of wealth from the use of the region's natural resources, while maintaining its environmental and social values.

Message from the East Gippsland Catchment Management Authority

This region's natural resources are used to generate wealth in many ways. For instance, the major river floodplains are used for intensive horticulture, the alpine areas for recreational activities, and the foothills for grazing and timber plantations.

The Regional Catchment Strategy identifies priorities for the beneficial management of East Gippsland's natural resources.

One of its major focuses is on improving, where possible the productive and sustainable use of our natural resources, whether privately or publicly owned.

The information presented here about this priority outlines some of the activities that utilise these natural resources in sustainable ways. We hope you find the articles interesting and informative.

The challenge for all in the community is to work together to maintain and improve our abundant natural resources now and into the future.

OUR NATURAL RESOURCE ASSETS

Our natural resource assets can be divided broadly into productive and environmental assets. Production assets include land for agriculture, timber production and intensive horticulture. Environmental assets include the land and water reserved for the conservation of natural ecosystems along with coastal areas preserved in their natural state as parks.

About 20 per cent of the land (377,000 hectares) in the region is privately owned, and is used mainly for agricultural production. The main agricultural activities of this area are the production of cereals, wool, meat (sheep and beef), dairy and horticulture.

Whilst cereal, wool and meat production occur mainly on the dryland areas of the region, the intensive industries such as dairying and vegetable growing are in the main associated with the river floodplains or areas that have access to abundant water for irrigation.

Small pockets of specialised horticulture such as vegetable seed production, fruit crops and viticulture are undertaken in areas where water and suitable soils are available.

Privately owned timber plantations are another form of production that contribute to the wealth of the region. These plantation areas have been increasing in size in recent years.

Another source of wealth in our community is off-shore commercial fishing operating from Lakes Entrance. According to the Seafood Industry Victoria (www.siv.com.au), fish landings at Lakes Entrance vary from 5,000 to 9,000 tonnes annually and represent a value to the Victorian community in the order of $150 million.

INCREASE WEALTH

Our environmental assets provide opportunities to generate employment and wealth through tourism. For instance, our rivers, estuaries and lakes can be used for recreational fishing and boating whilst our alpine areas support businesses based on skiing and hiking.

The unspoilt natural landscapes and seascapes of the region's coasts and marine environments provide many opportunities for sightseeing and beach activities. In 2005, there were an estimated 4,136 tourism related businesses in the Gippsland region providing 4,552 jobs. Total visitor expenditure was estimated at $569 million.

Many of our natural resource assets serve both productive and environmental purposes. For instance, estuaries are used for recreational fishing and for the conservation of terrestrial and marine ecosystems. Rivers are used to harvest water for domestic purposes as well as to support aquatic ecosystems.

SUSTAINABLE USE OF NATURAL RESOURCES

Creating wealth from our natural resources involves a careful assessment of what is sustainable over the long term. Short term gains must be balanced against the long term environmental impacts that productive industries can have on our natural resources. To be ecologically sustainable, production assets must be used efficiently and the environmental impacts of production need to be minimised.

Today, the need for ecologically sustainable production is widely recognised. Within the framework of Government legislation, resource owners and managers are adopting practices that not only increase production but also make better use of our natural resources.

For instance, the Victorian Government's *Our Water Our Future* policy (www.dse.vic.gov.au) ensures that water is available for agriculture and other productive industries as well as our rivers and waterways. In doing so, the policy recognises that the long term health of our environment is a necessary condition for economically viable production.

Many owners and managers have already adopted practices that make better, more sustainable use of our natural resources. New irrigation systems, for instance make more efficient use of water, reducing costs while increasing production. On agricultural land, cropping techniques are being modified to increase productivity and improve soil health.

Native vegetation policy is another Government initiative to encourage sustainable production. Victoria's *Native Vegetation Management - A Framework for Action* (www.dse.vic.gov.au) has the primary goal of 'a reversal, across Victoria of the long term decline in the extent and quality of native vegetation, or net gain'.

Implementing the 'net gain' principle involves avoiding or minimising the removal of native vegetation or, if removal is considered to be necessary, providing offsets such as restoring and revegetating areas to compensate for the loss of native vegetation.

A 'net gain' can also be achieved by excluding stock that graze or trample vegetation, controlling pest plants and animals and enhancing existing native vegetation areas with additional plantings.

Native vegetation is important in maintaining land and water quality. Along our rivers, native vegetation helps to stabilise banks and minimise erosion. It also helps to minimise sediment and nutrients entering our rivers.

There are many avenues available for landholders to gain professional advice and financial assistance about the use of ecologically sustainable methods to improve farm production.

INCREASE WEALTH

Emu Park trail site

Weighing sheep before grazing trials

REDGUM PLAINS SUSTAINABLE STOCKING RATE AND PASTURE MANAGEMENT TRIAL

This trial aims to demonstrate to producers how stocking rates 2-3 times the district average can be maintained in a sustainable way. A demonstration site has been divided into six hectare lots of perennial pasture and various 'treatments' to do with soil fertility, stocking rate, and paddock rotation. Fertiliser applications have been applied to each lot.

The preliminary results indicate large differences in carrying capacity between the different management systems being evaluated. The trial is already showing producers that, through the use of perennial pastures and better grazing and fertiliser practices, there are opportunities for them to improve both the productivity and sustainability of their farming systems

The trial also aims to help producers successfully implement appropriate pasture management practices on their own properties. It is supported by the East Gippsland branch of the Grasslands Society of Southern Australia, Bairnsdale BESTWOOL/BESTLAMB and the Tom's Creek Landcare Group.

RECYCLING NUTRIENTS & MAXIMISING WATER REUSE ON EAST GIPPSLAND DAIRY FARMS

The aim of the project is to assist dairy farmers in the Bairnsdale and Orbost areas to develop management plans to make more effective use of nutrients on their properties.

Using the Dairy Self Assessment Tool (Dairy SAT), farmers assess their current approaches and consider how improvements could be made to their handling of nutrients such as dairy shed effluent, paddock manure, applied fertilizers, pasture feed, and hay/silage.

On completion of the self assessment, each farmer is provided with technical and operational support to implement their highest priority action to manage nutrients and maximise their reuse.

In this way, better use can be made of waste water to grow more pasture. This improves the environmental health of the farm as well as business profitability.

This project is being managed by East Gippsland Landcare Network in association with the Department of Primary Industries, and supported by Environment Protection Agency, East Gippsland Catchment Management Authority, United Dairy Farmers, GippsDairy, and local Landcare groups and dairy companies including Murray Goulburn, Dairy Farmers Ltd and BEGA Cheese.

IMPROVED WATER USE EFFICIENCY FOR THE EAST GIPPSLAND HORTICULTURAL INDUSTRY

This project is designed to enhance the knowledge and skills of land managers in the horticultural industry and promote the implementation of best management practices for sustainable water use and soil health.

One of the aims of the project is to reduce the off-site impacts of irrigation methods along the Mitchell River. One of the impacts is the eutrophication of the Mitchell River (a heritage listed river) and the Gippsland Lakes (Ramsar listed wetlands).

Eutrophication is the process by which a river or lake becomes rich in dissolved nutrients from fertilisers or sewage. These nutrients promote the growth of plants such as blue-green algae which, when they die and decompose, deplete the water of oxygen. This can lead to fish kills and harm other aquatic animals.

In this project, farmers are developing and demonstrating practical solutions for the local horticultural industry. Traditional methods of irrigation have been compared with local solutions such as drip irrigation.

As well as improved environmental outcomes, more efficient water use is expected to lead to improved farm profitability. The more uniform application of water should lead to increased yields while a reduction in the amount of water used will reduce production costs. Improvements in the size and quality of produce, as well as reductions in the amount of fertiliser needed are also anticipated benefits.

Drip irrigation, Lindenow

SUSTAINABLE AND PROFITABLE FARMING ON THE RED GUM PLAINS

This project is focused on enhancing the knowledge and skills of land managers about sustainable production techniques such as crop selection and rotations, stubble management, row spacing and grazing management of cereal crops on the Red Gum Plains. The project will assist farmers to handle the dry conditions experienced in recent years.

The soils of the Red Gum Plains are particularly prone to wind and rill erosion which can impact on soil structure, acidity and erosion. Other impacts of erosion in the area include eutrophication (nutrient enrichment) of Toms Creek and Forge Creek, the Mitchell River and the Gippsland Lakes.

Initial soil tests revealed that chemical and organic elements were not necessarily balanced. Each test had specific recommendations to improve soil fertility and productivity. The recommendations looked at cultivation methods, fertilizer use, green manure crops, fallowing and crop rotations to maintain soil fertility and productivity now and into the future.

Twenty-five farmers are currently involved in this project which is being coordinated by the Gippsland branch of Southern Farming Systems and is supported by Hans Schoof, an independent specialist soil agronomist. Southern Farming Systems is a farmer managed non-profit organization focusing on sustainable and profitable farming through the use of cereal and forage crops. The Healthy Soils Project is funded through the National Landcare Program. Further information: 5149 8379.

Fenced off farm tracks to control nutrient runoff

INCREASE WEALTH

FUTURE FOOD AND FIBRE

Future Food and Fibre is a one year (2007-08) project investigating sustainable primary production in Gippsland. The project considers the strategies farmers in the meat, dairy, wool, fishing, horticulture and wine industries could be adopting to improve profitable and sustainable farming and fishing practices in the region.

Regional field days have been held to encourage Gippsland's primary producers to adopt sustainable farming practices. A recent field day at Meerlieu, hosted by the management team of Woodcote Pty Ltd (winner of the 2007 Landcare Sustainable Farming Award in West Gippsland), attracted representatives from the Department of Primary Industries, catchment management authorities, seed companies, wool buyers and banks.

At the field day, the Woodcote management team (David and Ruth Read, and Ruth's sister Jen Ribolli), described how they have moved from conventional, high-input farming, to a lower-input, more holistic approach to beef and medium-fine merino wool production. This approach allows them to balance the environmental, productivity, family and lifestyle goals set out in their mission statement, while also providing income to support their families.

The aim has been to restore the health and fertility of the property by encouraging biodiversity on the farm and biological activity in the soil. A key management strategy is cell grazing. The carrying capacity of each paddock is calculated monthly using rainfall data, and the stocking rate is adjusted to always be 5% below carrying capacity. An important part of the strategy involves resting pasture for extended periods to allow the soils to rejuvenate naturally.

Woodcote Field Day

An integral part of the Woodcote enterprise is an environmental management system. The EMS allows the team to identify and manage environmental risks, and continually improve their natural resource management.

As well as productivity benefits, the Woodcote EMS helps with 'value-adding' to increase income. This enables the business to supply meat to Gippsland Natural for sale under the Enviromeat banner, and wool into The Merino Company's Carbon Neutral wool pool. Both companies pay producers a premium for these products.

Another Future Food and Fibre field day was recently held on the property of Forge Creek farmers Ian and Neil Stringer. Their property fronts directly on to the Gippsland Lakes, and Ian and Neil fully appreciate the social and environmental values associated with its location.

As a result, they have adopted a 'tread carefully' approach to the production of wool and lamb, and have implemented an Environmental Management System (EMS) to identify and manage their environmental risks such as weeds, erosion, sediment and nutrient run off. Actions taken have involved fencing off the riparian areas, constructing sediment traps in drainage areas, revegetating exposed slopes and taking care when applying fertiliser to avoid run-off. They also rotationally graze, aiming to give each paddock at least 21 days rest.

Ian and Neil run a profitable farm, but are keen to see their environmental management initiatives rewarded via a premium for their wool and lamb. A particular interest is Enviromeat (Gippsland's Natural EMS-produced, free range and chemical-free beef), and the prices which can be obtained for organic meat and produce.

The field day explored the commercial opportunities for EMS produced wool and lamb. Representatives from The Merino Company discussed how Australian wool producers could benefit from the growing global demand for eco-wool, and other speakers talked about the links between profitability, sustainability and good pasture management.

The Future Food and Farming project is funded by the Australian Government's Natural Heritage Trust and supported by East and West Gippsland, and Port Phillip and Westernport

Catchment Management Authorities. Many financial opportunities are available to farmers who conduct sustainable (or regenerative) land management practices. Further information can be obtained from these organisations.

TOURISM

The good condition of the Gippsland Lakes and other waterways in the region is a key factor in their appeal as areas for recreational boating and fishing. Commercial operations based on tourism are also dependent on the health of our waterways to attract visitors to the area.

To keep our lakes and rivers in good condition, we need to ensure that what we do is sustainable in the long term. There are many actions which users can take to minimize the impact they have on our waterways.

'Pump It . . . Don't Dump It' is a campaign to minimise damage from boat sewage on the Gippsland Lakes. The direct disposal of raw sewage from boats into the water contributes to the build-up of nutrients and increases the potential of blue-green algae blooms. Pollution of this type also looks unsightly.

In recent years, boat owners and operators have been encouraged to install on-board sewage holding tanks. Sewage pump-out and sewage hopper facilities have now been placed at several locations on the Gippsland Lakes. The use of these facilities minimises the impacts of boating on the Gippsland Lakes and helps to maintain recreational boating as an enjoyable experience.

Revegetation site, Stringer property, Forge Creek

Boat operators can also help to maintain our waterways by observing boat speed restrictions on the lower reaches of our rivers. Boat wash (waves) have a major impact on the banks of rivers, leading to under-cutting and slumping of the bank. Boat wake can also contribute to erosion of the shoreline around our lakes and estuaries.

To minimise damage boat operators should limit their boat speed and travel in the middle of the river. They should also observe local regulations and conditions that are usually published on notices beside boat launching ramps.

Recreational fishing is a popular pastime for members of the local community and tourists. Healthy fish populations are also important to river health and water quality.

A responsible approach to fishing is necessary to maintain fish numbers. This can be done by respecting fish bag limits, letting the big fish go to breed and handling fish to be released with wet hands or wet cloth.

Boat wash can damage river banks

Lakes Entrance

INCREASE WEALTH

TUNNEL EROSION REHABILITATION IN THE BAIRNSDALE FOOTHILLS

Tunnel erosion significantly affects a farmer's ability to make good use of their land. It is a form of water erosion that results in underground passages (tunnels) developing in sub-surface soils. It has been estimated that 4,688 hectares of land in the Bairnsdale region is affected by tunnel erosion which contributes 6486 cubic metres, or about 300 semi trailer loads of nutrients and sediment into the Gippsland Lakes each year.

In the last three years, 324 hectares of tunnel erosion affected agricultural land have been rehabilitated, 303 kilometres of protective fencing have been constructed, 300 hectares of perennial pasture have been established and 9500 trees have been planted. In all, 24 landholders have been involved in the project.

In 2007/2008, more funding was provided to continue the on-ground works for tunnel erosion rehabilitation. These works were concentrated in the Glenaladale, Clifton Creek and Wiseleigh areas.

The Department of Primary Industries is providing management services and technical advice for this project. Key partners are the East Gippsland Landcare Network, Glenaladale Landcare Group, Riley Earthmoving and individual landholders who have adopted new approaches and funded and implemented half of the on-ground works.

EVERGRAZE

EverGraze is a project that aims to increase farm productivity and reduce farming impacts on our natural resources (www.evergraze.com.au). A particular focus is to encourage cattle and sheep producers to adopt grazing systems that are more profitable and sustainable over time.

This is particularly important in the high rainfall areas of Australia, where new perennial-based grazing systems can improve farm profitability and improve natural resource outcomes compared with traditional farming activities. In East Gippsland, several sites have recently been selected to conduct local trials.

At Marlo, a recently purchased property of 90 hectares with no internal fencing will be divided into 20 paddocks and 100 cows managed on a rotational grazing system. The present pasture on the property is unimproved annual grasses and some perennial native grasses. The trial will investigate the use of more suitable pasture species including dryland lucerne varieties for coastal conditions.

On the Red Gum Plains at Bengworden, trials are planned for a 4 hectare site on the use of salt bush to control wind erosion and provide shelter for lambing ewes. The salt bush will also provide additional forage for grazing stock.

At Genoa, a rotational grazing system will be implemented using fencing based on the topography of the farm ('land class' fencing). This form of grazing is designed to improve current pasture composition, improve soil composition and reduce weeds. These measures are expected to lead to more profitable outcomes while maintaining sustainable land management practices.

PRIVATE FORESTRY

Private forestry is commercial tree growing on private land. Examples are larger scale plantations, farm forestry woodlots, agroforestry (involving the cultivation of farm crops and trees) and shelterbelt type plantings that may have some commercial timber production potential.

Well designed and managed farm plantations can generate a mix of economic and environmental benefits.

Rick Robertson has a cropping and grazing property on the Red Gum Plains at Bengworden. In the last 10 years, he has established several woodlots on his property using a variety of native timber species such as Yellow Stringybark, Southern Mahogany and Spotted Gum which are suited to the heavy clay and sandy soils in the area.

His aim is to produce high quality saw logs for milling. Lower grade timbers will also be sold, or used on the farm as poles, posts or firewood.

Farm forestry has many benefits. As trees can be planted on areas of the property such as sandy ridges that are the least

Tunnel erosion on cleared land

Robertson property, Bengworden

suitable for cropping and grazing, commercial timber production leads to better utilisation of the available land. Sales of timber also provide opportunities to diversify farm income.

Plantations also provide other on-farm benefits such as increased productivity through shade and shelter for stock, particularly after shearing and during extreme weather conditions.

Plantations can also lead to better control of dry land salinity. They can also slow runoff, particularly on bare slopes leading to improved soil conservation and healthier rivers.

Another local farm forestry operation is located at Brownlow's property on Forge Creek Road. Trials on an eight hectare site with several Gippsland tree species including local Red Gum commenced in 2003. Today, all species are growing well, demonstrating the potential of farm forestry on the Red Gum Plains.

Like traditional farming enterprises such as grazing and cropping, growing trees requires specialist skills. Knowledge about the types of trees best suited to particular soil types, and management skills such as pruning and weed control need to be acquired.

Further information about the ways tree production can be integrated with traditional farming activities can be obtained from Gippsland Private Forestry (www.gpf.com.au).

Repairing erosion at Glenaladale

Brownlow's plantation, Forge Creek Road

CONCLUSION

The Regional Catchment Strategy (RCS) is about the management and, where possible the improvement of the region's natural resources for the benefit of present and future generations. It sets out the priorities to maintain and improve our natural resources, and the practical methods being taken to achieve them.

We hope you have found the information in this booklet interesting and informative, and that you are now familiar with what farming, business and industry groups are doing to utilise our natural assets in sustainable ways, and with what land management agencies and community groups are doing to look after the natural resources in our region.