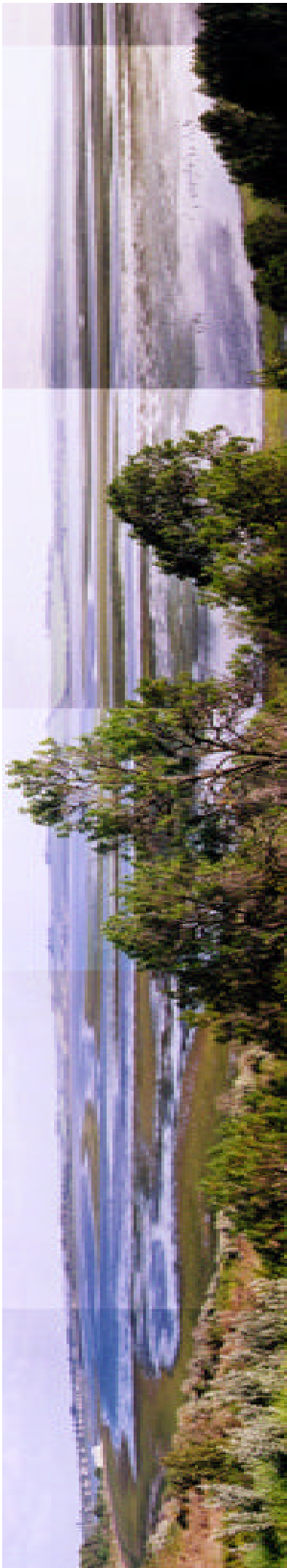


SWAN BAY CATCHMENT ACTION PLAN 2002

Revised April 2002



Swan Bay Integrated
Catchment Management
Committee



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1.0 THE SWAN BAY INTEGRATED CATCHMENT MANAGEMENT PROJECT

This community driven project recognises that all sections of society need to play an active role in caring for the environment. This is best achieved on a catchment-wide basis.

In 1997 a committee was formed with representation from key stakeholders around Swan Bay and its catchment. The Swan Bay Integrated Catchment Management Committee comprises representatives from

- Bellarine Landcare Group
- Friends of Edwards Point
- Friends of Buckley Park
- Swan Bay Environment Association
- Barwon Coast Committee of Management
- City of Greater Geelong
- Borough of Queenscliffe
- Department of Natural Resources - Coast Action /Coastcare & Landcare
- Parks Victoria
- Alcoa of Australia

Other volunteer groups, which are involved in the project, include:

- Friends of Ocean Grove Nature Reserve
- Friends of Begola Wetlands
- Conservation Volunteers Australia
- All 8 catchment schools

One full-time and a part-time position are currently funded under a variety of grants to co-ordinate and run this challenging project and implement the Swan Bay Catchment Action Plan, which addresses 5 key issues.

2.0 SWAN BAY CATCHMENT ACTION PLAN

In 1997, after extensive community consultation, and the identification of many catchment management issues, 5 issues were identified as having the highest priority. The Swan Bay Catchment Action Plan (1997-1999) was developed to address these major issues through combined government, industry and community action.

Priority issues are:

- Water Quality & Storm water
- Remnant Vegetation and Wildlife Corridors
- Pest Plants and Animals
- Sustainable Agricultural Practices
- Community Awareness and Participation.

It is recognized that these issues overlap with each other and can not be treated individually.

Finance for the project is continually being sort. Grants and sponsorship have been received from Corangamite Catchment Management Authority (Healthy Waterways), Coast Action/Coastcare, Natural Heritage Trust (Bushcare), Threatened Species Network, Parks Victoria, Tree Victoria, Green Corps & Conservation Volunteers Australia, Waterwatch, City of Greater Geelong, Borough of Queenscliffe, Alcoa of Australia and local businesses. We thank these grant programs and organisations for their support.

3.0 SUMMARY OF PROGRESS

The scope of activities undertaken over the initial 5 years by the committee reflects the complex and holistic nature of this integrated catchment management project. Listed below are some of the main achievements

- Approximately 54% of the catchment's 56 kilometres of main waterways and drainage lines have been fenced and protected by private landowners. 36% (approx. 23 kilometres) is on-ground works facilitated by the SBICM Project and the former Bellarine Tree Group. These waterway protection works are to exclude stock from creeks and drainage lines, create wildlife corridors and nutrient traps to reduce erosion and nutrient input to Swan Bay. A further 5.5 km of waterways protection projects are organised at the time of update of this plan.
- Waterwatch - various individuals, groups and schools monitor strategic points along all catchment creeks and major stormwater outlets for changes in water quality and streamside habitat. This will assist land managers and community groups to target, develop and evaluate appropriate on-ground actions. From this we know that most rural and urban runoff during peak flow events is degraded.
- Fenced and protected 97.6 Ha remnant vegetation from the impacts of stock including large areas of critical habitat of the endangered Orange-bellied Parrot. A boardwalk was installed to further protect another 33 ha of critical habitat. Approximately a further 27 ha of remnant vegetation protection and enhancement projects and 3.6 Kilometres of wildlife corridor are in the discussion and planning stage at the time of update of this plan. This includes 15 ha of Saltmarsh vegetation on the fringe of Swan Bay, and 4ha of degraded woodland containing "endangered" Bellarine Yellow Gums.
- Developed a local breeding and release project with local schools for the two biological control agents (1) Bridal Creeper Leafhopper and (2) Gorse Spider mite to reduce the spread and establishment of two weed species of national significance; Smilax/ Bridal Creeper and Gorse / Furze.
- Facilitated the removal of pest plants from an estimated 100 Ha of native indigenous vegetation on roadsides (12 Km of Significant Roadside vegetation), coastal dune systems, crown land and private land.
- Facilitated and co-ordinated the propagation of an estimated 50,000 indigenous plants.
- Two whole farm planning courses completed with 27 participants.
- Stenciling stormwater drains with aquatic animals and messages 'This drains to Swan Bay. Keep our waterways clean.' All catchment schools have been involved in this activity
- Development of Stormwater Awareness Education Kits for all catchment schools - 'From the Streets to Swan Bay';
- 'Rural Property Awards -to acknowledge and showcase positive actions taken by landowners to improve environmental sustainability of rural properties benefiting the catchment and Swan Bay, as well as their farming practices.
- Numerous field days/workshops in pest plant and animal control; management of roadside vegetation, weed and native plant identification, sustainable farming practices, best practice in native vegetation establishment, water watch;
- Numerous community awareness-raising activities, e.g. catchment tours, walks, interpretative trails and signage, illustrated talks, displays, media articles.
- Swan Bay Catchment Community Issues and Awareness Survey;

4.0 ABBREVIATIONS

BC	Barwon Coast
BLG	Bellarine Landcare Group
BSC	Bellarine Secondary College
BW	Barwon Water
CA/CC	Coast Action /Coastcare Program
CCMA	Corangamite Catchment Management Authority
COGG	City of Greater Geelong
CVA	Conservation Volunteers Australia
CW	Corangamite Waterwatch Program
DNRE	Department of Natural Resources and Environment
EPA	Environment Protection Authority
FoEP	Friends of Edwards Point
FoBP	Friends of Buckley Park
FoOGRN	Friends of the Ocean Grove Nature Reserve
FoBW	Friends of Begola Wetlands
KTRI	Keith Turnbull Research Institute
MAFRI	Marine and Freshwater Resources Institute
PV	Parks Victoria
QBC	Queenscliffe Borough Council
QNH	Queenscliffe & District Neighbourhood House
SBEA	Swan Bay Environment Association
SBICMC	Swan Bay Integrated Catchment Management Committee

5.0 SWAN BAY - A WETLAND OF INTERNATIONAL IMPORTANCE

Located north of Queenscliff, Victoria, Swan Bay is one of the most intact areas of wetland and marine ecosystems within Port Phillip Bay, covering an area of approximately 3,000 hectares. Swan Bay has regional, state, national and international significance.

Swan Bay forms part of the Harold Holt Fisheries Reserve, is listed on the Register of the National Estate and is designated as part of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site.

Swan Bay forms part of the proposed Port Phillip Heads Marine National Park.

Two international treaties, the Japan-Australia Migratory Birds Agreement and the China-Australia Migratory Birds Agreement cover Swan Bay.

Swan Bay's values include a rich diversity of habitat -marine, Seagrass meadows, foreshore dunes, mudflats, Saltmarsh and remnant woodlands, as well as significant geological and geomorphological sites.

The area provides important, and in some cases, critical habitat for a number of endangered or rare migratory and resident bird species including the Orange-bellied Parrot and Hooded Plover and at least 37 bird species listed under international treaties.

The mud flats are prime feeding zones for internationally significant wader bird and many local bird species.

Saltmarsh vegetation fringes almost the entire shoreline of Swan Bay, providing a diversity of vegetation and habitat for wildlife. The fragile saltmarsh plant communities are critical for the survival of the Orange-bellied Parrot. Swan Bay is one of three significant over-wintering mainland sites for this endangered species.

Saltmarsh forms an important interface between land and sea, filtering substances carried rapidly into the interface by creeks, or gradually by surface or ground water movement. Saltmarsh recycles dead organisms back into the marine and terrestrial food chains.

Vast underwater seagrass meadows provide essential nursery areas for fish, including the commercially important King George Whiting and Yellow-eyed Mullet, and important habitat for crustaceans and molluscs. Seagrass is the main food source for resident Black Swans. Anecdotal evidence indicated that about 90% of the sub-tidal Seagrass meadows had disappeared in the last 15 years.





Swan Bay supports the most diverse range of wader bird species in Port Phillip Bay due to the extent and variety of feeding and roosting areas available. Hundreds of hectares of mudflats are exposed at low tide, providing rich feeding grounds for large numbers of resident and migratory waders. Thousands of migratory waders such as the Curlew Sandpiper, photographed opposite, travel from breeding grounds in Central Asia, Siberia and Alaska to spend the summer months at Swan Bay.

6.0 THE SWAN BAY CATCHMENT

The Swan Bay catchment is approximately 170 km² (17,000 hectares) and is largely rural with growing urban areas. Swan Bay's catchment includes hills, remnant woodlands, dunes, rural, residential and industrial land. Creeks, lakes and wetlands link these areas to Swan Bay. The Ocean Grove township is one of the fastest growing urban areas in Victoria.

European settlers reported that around the early 1800's, the vegetation inland from St Leonard's and Indented Head consisted of a sparse gum woodland with a rich thick understorey of Kangaroo Grass. This is all but gone. Historically, over 95% of the catchment has been extensively cleared of indigenous vegetation for a range of intensive agricultural uses and increasing urban settlement. Today approximately 8% of the catchment has remnant vegetation of varying quality. Most is degraded from either agriculture (grazing), urban development, weed invasion or rabbits. Most of the vegetation on roadsides has naturally regenerated since it was cleared in the mid 20th century.

The distribution of the current remnant vegetation is shown in appendix two.

The catchment contains plant species which are highly significant due to their now limited distribution at both the Statewide and Regional level.

Common Name	Botanical name	Conservation Status	
		State wide	Geelong Region*
Bellarine Yellow Gum	<i>Eucalyptus leucoxylon ssp bellarinensis</i>	endangered	endangered
Rare Bitter-bush	<i>Adriana quadripartata (glabrous form)</i>	endangered	vulnerable
Coast Bitter-bush	<i>Adriana quadripartata (pubescent form)</i>	endangered	vulnerable
Black Sheoak	<i>Allocasuarina littoralis</i>		rare
Small Grass-tree	<i>Xanthorrhoea minor ssp. lutea</i>		endangered ?
Marsh Saltbush	<i>Atriplex paludosa</i>		rare
Golden Spray	<i>Viminaria juncea</i>		endangered
Salt Lawrencia	<i>Lawrencia spicata</i>	rare	vulnerable
Wirilda	<i>Acacia retinodes var. retinodes</i>	rare	rare
Coast Wirilda	<i>Acacia retinodes var. uncifolia</i>		rare
White Mangrove	<i>Avicennia marina ssp. australasica</i>	rare	rare

*Carr et al (2002) City of Greater Geelong Biodiversity Management Strategy - Draft report for public consultation, City of Greater Geelong.

Table 1 The conservation status of plant species under threat within the Swan Bay Catchment

The Coastal Moonah Woodland Communities within the catchment are also classed as ***threatened*** under the Victorian Flora and Fauna Guarantee Act 1988.

All vegetation is locally significant due to its limited quantity and distribution (Carr et al, 2002).

Some species, which are common elsewhere, are nearly locally extinct within the catchment, Hop Goodenea (*Goodenia ovata*) and Heath Tea-tree (*Leptospermum myrsinoides*) are examples (Smithyman, Pers. com.)

Only a few pairs of "vulnerable" Hooded Plovers nest at the foot of the primary sand dunes between Pt Lonsdale and Collendina.

Many catchment related issues have the potential to adversely affect Swan Bay. Major factors potentially affecting the health of the bay include siltation, nutrient run-off, excessive algal growth and loss of seagrass.

7.0 COMMUNITY AWARENESS AND PARTICIPATION

Background

The need to achieve community support for any strategy for land management is well acknowledged. The success of initiatives in areas of environmental protection, reversal of threatening processes, or the restoration of degraded land depends markedly on the level of involvement by not only the directly affected landowner or manager but also by the wider community. The degree to which works are maintained after completion also relies on achieving a sense of community ownership in the project. Many actions needed to enhance the environment and improve water quality are unlikely to occur unless promoted or implemented by people living or working in the area.

As one of the initial actions of the SBICMC, a 'base line' community survey of 500 randomly selected catchment residents was conducted in 1998. The aim was to gauge levels of awareness about environmental issues in the Swan Bay catchment and extent of community involvement. Guided by the survey results the Committee developed a community awareness and participation program of relevance to the Swan Bay catchment community. Program actions undertaken since 1998 include: raising general community awareness about environmental values and catchment issues through a variety of mediums; targeting specific groups on particular issues; empowerment and provision of direct support or assistance to individuals or groups wishing to carry out particular projects; seeking community support in specific action areas; encouraging schools involvement in catchment issues and on-ground projects.

Community education is an essential component of all key areas of the Swan Bay Catchment Action Plan. Most actions listed in this section are therefore ongoing. More specific actions that encourage opportunities for participation are listed in other sections of the Swan Bay Catchment Action Plan.

Strategic Actions

	Action	Key Participants	Priority	Status
7.1	Seek funding to implement the actions in this section.	SBICMC	high	ongoing
7.2	Prepare regular articles for local newspapers on a range of topics addressing key environmental issues in Swan Bay Catchment.	SBICMC	high	ongoing
7.3	Prepare media releases publicising Project activities and community involvement.	SBICMC	high	ongoing
7.4	Organise community workshops/ demonstrations/ field days/ walks/ talks/ presentations/ displays.	SBICMC	high	ongoing
7.5	Assist local environment/landcare groups with planning and development of on-ground projects and activities.	SBICMC local groups	high	ongoing
7.6	Develop and promote on-ground demonstration sites for providing practical examples of protecting and enhancing the natural environment.	SBICMC	high	ongoing
7.7	Develop or join local, regional, and state networks linking similar groups and information sources.	SBICMC networks	high	ongoing
7.8	Assist local councils with the development of long term environmental protection strategies and support implementation through the Municipal Planning Schemes.	SBICMC local councils	high	ongoing
7.9	Encourage catchment schools and Geelong tertiary institutions to include catchment issues in their curriculum.	SBICMC local schools, TAFE	high	ongoing
7.10	Assist catchment schools to participate in on-ground projects in the catchment. E.g. 'Adopt a wetland/ dune' projects; stormwater drain stenciling.	SBICMC local schools	high	ongoing
7.11	Encourage the active involvement of schools in environmental research e.g. biocontrol projects.	SBICMC BC KTRI, BSC	high	ongoing
7.12	Dune Ambassadors project: Involve catchment schools in the preparation and distribution of a dunes awareness /protection brochure. Seek sponsorship from Coast Action/Coastcare Program, coastal land managers -BC, COGG, QBC.	SBICMC local schools (Years 5-8) CA/CC coastal land managers	high	new
7.13	Develop interpretive and education programs for Swan Bay.	SBICMC MAFRI, QNH	medium	ongoing
7.14	Create database to help assess project success: no. and range of activities; no. of participants; funding received.	SBICMC	medium	ongoing
7.15	Prepare information sheets/ brochures for the general community on a range of topics. Distribute through local and regional outlets.	SBICMC	medium	ongoing
7.16	Develop interpretive signs highlighting environmental values at appropriate locations. e.g. Swan Bay, coastal dunes, catchment wetlands.	SBICMC, land managers	medium	ongoing

	Action	Key Participants	Priority	Status
7.17	Facilitate the formation of new 'Friends of' groups, e.g. Friends of Lake Victoria & environs / Remnant Roadside vegetation.	SBICMC	medium	ongoing
7.18	Prepare Swan Bay catchment care kits -rural and urban audiences.	SBICMC	medium	in preparation
7.19	Provide advice for community-based environmental activities.	SBICMC groups	medium	ongoing
7.20	Collect reference material for Swan Bay library (housed at MAFRI).	SBICMC, SBEA, MAFRI	low	ongoing
7.21	Participate in community festivals and exhibitions for promotion of the natural environment.	SBICMC	low	ongoing
7.22	Invite community and service organisations to participate in environmental activities and promote their involvement.	SBICMC organisation	low	ongoing
7.23	Organise a combined group market stall.	SBICMC local environment groups	low	new
7.24	Organise events that link city communities with Swan Bay Catchment.	SBICMC	low	new
7.25	Develop and promote local awards and competitions for good environmental practice and innovation.	SBICMC	low	ongoing
7.26	Establish an indigenous garden as an example of the types of indigenous plants available for planting.	SBICMC local council	low	new
7.27	Involve local nurseries in the distribution of educational information about indigenous plants and environmental weeds.	SBICMC local nurseries	low	ongoing

8.0 PEST PLANTS AND ANIMALS

Background

The catchment suffers significant weed problems particularly in woodlands on the coastal sand dunes and fringing Swan Bay. Weeds are one of the major factors involved in the reduction of local bio-diversity and continued threat of local plant species extinction.

Environmental weeds invade areas of native vegetation and aggressively displace or prevent the flourishing of indigenous plants, which provide habitat for native fauna. They include plants outside their natural range within Australia and many exotic plants introduced from overseas. Many are vigorous colonisers of disturbed ground and prevent the natural regeneration of indigenous species. In areas of remnant vegetation this may result in an eventual loss of individual species.

The Swan Bay Catchment has a wide diversity of weeds. Appendix One lists the species, general distribution and relative abundance.

The coastal woodland vegetation is under particular threat from a wide diversity of weed species. Of particular concern (priority) are Bridal Creeper (*Asparagus asparagoides*), Myrtle-leaf Milkwort (*Polygala myrtifolia*), Italian Buckthorn (*Rhamnus alternus*), and Boxthorn (*Lycium ferocissimum*). ***It is not wise to just target a few weed species in undertaking remnant vegetation protection works, you need to tackle all the species in each area of remnant vegetation together.***

Agricultural weeds (including noxious weeds) greatly reduce farm productivity and are nuisance plants in revegetation projects. They include some, which dominate pasture, others, which invade crops reducing yield or contaminating, produce, and yet others, which are poisonous or create skin irritation or fleece contamination in animals.

Serrated Tussock (*Nassella trichotoma*) the priority noxious weed for the Department of Natural Resources and Environment (Geelong Office) is starting to spread into the catchment with approximately 15 small infestations being discovered and removed. This weed poses a serious threat to grazing enterprises within the catchment. Other weeds such as; Patersons Curse, Wild Garlic, St Johns Wort and Cape Tulip are sporadically, controlled on roadsides by the Department of Natural Resources and Environment.

Gorse/Furze and Flax-leaf Broom are the other serious threats to agricultural areas and the catchment's remnant vegetation and hence priorities. Wild Watsonia is a serious and spreading roadside weed, it is impacting on native vegetation on roadsides. The emerging Chilean Needle grass has spread along a few roadsides in the northern end of the catchment and is on a few rural properties.

Pest animals include "wild" pest species such as rabbits and foxes. Fox predation on a wide range of local and international bird species that use the fringes of Swan Bay is of particular concern. Especially fox predation and impact on the Orange-bellied parrot and Hooded Plovers.

Other pest animals in the broadest sense include roaming or dumped domestic dogs and cats, which can become nocturnal predators on native fauna and small or young farm stock. Cats, domestic and feral, are of particular concern due to the close proximity of the Ramsar wetland and habitat for the Orange-bellied Parrot and Hooded Plover to urban development.

Programs designed to control rabbits and foxes, and to promote responsible pet ownership will all contribute to the safety and well-being of native animals, migratory bird life and stock.

Strategic Actions

	Action	Key Participants	Priority	Status
8.1	Seek funding to implement the actions in this section.	SBICMC	high	ongoing
8.2	Encourage and assist local councils and land managers in the control of weed species in remnant vegetation.	SBICMC PV, BC, DNRE COGG, QBC	high	ongoing
8.3	Involve community groups in controlling weeds around Swan Bay.	SBICMC community groups	high	ongoing
8.4	Assist catchment schools to participate in on-ground projects in the catchment. e.g. 'Adopt a dune' projects - weed issues; weed ID and removal; roaming pet issues and solutions.	SBICMC local schools	high	ongoing
8.5	Encourage the active involvement of Bellarine Secondary College students in environmental research e.g. biocontrol of environmental weeds, Gorse and Bridal Creeper through breeding of Gorse spider-mites, Bridal Creeper leafhoppers and Rust Fungus.	SBICMC BSC BC KTRI	high	ongoing
8.6	Assist local councils with the development of long term environmental protection strategies and support implementation through the Municipal Planning Schemes.	SBICMC local councils	high	ongoing
8.7	Conduct Weed Workshops/ Weedbuster Stalls in urban areas of the catchment.	SBICMC urban residents	high	ongoing
8.8	Organise weed awareness walks / talks.	SBICMC	high	ongoing
8.9	Prepare articles for local newspapers on pest plant and animal issues in the Swan Bay catchment.	SBICMC	high	ongoing
8.10	Encourage local councils to adopt a policy against the planting of environmental weed species on municipal land.	SBICMC COGG QBC	high	new
8.11	Assist QBC implement a weed management and revegetation program in Coastal Moonah Woodland in The Narrows dune system.	SBICMC QBC, ACV local schools & community	high	new
8.12	Prepare and mount weed displays in urban areas focusing on: the damage caused by garden escapes in remnant vegetation; weed ID; weed control.	SBICMC	medium	ongoing
8.13	Prepare a weed leaflet for Queenscliff/Pt. Lonsdale area in conjunction with QBC Environment Advisory Committee.	SBICMC QBC	medium	in preparat -ion
8.14	Encourage authorities and private landholders to remove potential environmental weeds planted previously and to replace them with appropriate indigenous species.	SBICMC authorities, landowners	medium	ongoing

	Action	Key Participants	Priority	Status
8.15	Encourage local councils to introduce and enforce a Cat Curfew and specific areas for the restrained and unrestrained walking of dogs.	SBICMC COGG QBC	medium	ongoing
8.16	Encourage and assist local councils to develop and implement a Pest Plant Local Law for priority weed species.	SBICMC	medium	new
8.17	Work with municipalities, landholders and relevant agencies to develop a weed management strategy over the whole catchment that would be implemented in cooperation with all land managers and which identifies priority weeds and areas for control.	SBICMC COGG, QBC BC, PV, DNRE landholders	medium	new
8.18	Document weed infestations as they are identified.	SBICMC	low	ongoing
8.19	Prepare and collect reference material on pest plants and animals.	SBICMC	low	ongoing
8.20	Investigate subsidies for the supply of materials and services for pest plant control.	SBICMC	low	new
8.21	Involve local nurseries in the distribution of educational information about environmental weeds.	SBICMC local nurseries	low	new
8.22	Negotiate with local nurseries and market stall holders to achieve the removal from sale of environmental weed species.	SBICMC local nurseries	low	new
8.23	Approach Real Estate Agents to distribute pest plant information to purchasers.	SBICMC Real Estate Agents	low	new
8.24	Develop a display on responsible pet ownership for the welfare of companion animals and the protection of indigenous flora and fauna.	SBICMC	low	new

9.0 REMNANT VEGETATION AND WILDLIFE CORRIDORS

Background

Remnant vegetation in the catchment includes areas of habitat which support the continued existence of many species of fauna. A number of these such as roosting migratory bird species and endangered species such as the Orange-bellied Parrot are under extreme environmental pressures. Continued removal or degradation of this indigenous vegetation may lead not only to the extinction or rarity of the plants in this region but to the total extinction of the fauna which depend on the habitat.

Only about 10% of the remnant vegetation remains in the catchment. All vegetation is locally significant due to the limited quantity remaining in the catchment. Many small isolated patches of degraded remnant vegetation occur on private land. The protection, regeneration and linking of these is essential in the protection of local bio-diversity and habitat. Some of the only remaining stands of the Endangered Bellarine Yellow Gum (*Eucalyptus leucoxylon ssp. bellarinensis*) in the catchment occur on private property. Grazing is degrading most. Remnant vegetation also provides natural wildlife corridors to assist in the migration and breeding of many species of fauna.

A significant amount of remnant vegetation occurs on Catchment roadsides. The City of Greater Geelong has signed these as "Significant Roadside Vegetation". In many cases these contain the last patches of some species within the catchment including: Hop Goodenia (*Goodenia ovata*), Giant Hop-bush (*Dodonaea viscosa*), Small Grass-tree (*Xanthorrhoea minor*), Golden Spray (*Viminaria juncea*), the vulnerable pubescent Coast Bitter-bush (*Adriana quadripartata*) and the endangered glabrous Rare Bitter-bush (*Adriana quadripartata*).

The coastal fringe contains Coastal Moonah Woodland Communities, which are listed as "threatened" under the Flora and Fauna Guarantee Act 1988. The lower catchment and fringes of Swan Bay Fisheries Reserve have important saltmarsh complexes, which are "critical habitat" for the "endangered" Orange-bellied Parrot. We have fence off approximately 7 kilometres of saltmarsh vegetation along the foreshore of Swan Bay to protect this habitat. Other areas on private property still require protection from grazing.

Vegetation type	Area
Coastal Saltmarsh Complex	590 ha
Coastal Moonah Woodland Community	91 ha
Coastal Dune Complex & Coast Tea-tree woodland	411 ha
Drooping Sheoak Woodland	218 ha
Coast Manna Gum Woodland	49 ha
Swamp Gum Woodland	7 ha
Bellarine Yellow Gum Woodland	18 ha
River Red Gum Wetland	4 ha

Table 2. Areas of remnant vegetation associations within the Swan Bay Catchment.

It is essential for the maintenance of Australia's bio-diversity that links between larger areas of indigenous native vegetation are maintained, strengthened and when necessary restored. Existing areas need to be protected from grazing by stock to enable natural regeneration. They also need protection from; unauthorised, incidental or unnecessary removal through such processes as firewood collection, clearance for urban development or farming expansion, excessive fire precautions or public utility and road construction and maintenance, weed invasion, and need replanting and reinforcement where suffering die-back or previous damage.

Other values are derived from remnant vegetation including agricultural benefits as shelter belts, aesthetic values as landscape features and significant benefits on ecological and land management grounds. The latter benefits include land stabilisation and erosion control, salinity control and reduction and water quality improvement.

In this section a number of complementary actions are proposed. They overlap actions proposed in other sections and include proposals for direct project action, community awareness and information, and liaison and cooperation with owners and other land managers.

Strategic Actions

	Action	Key Participants	Priority	Status
9.1	Seek funding to implement the actions in this section.	SBICMC	high	ongoing
9.2	Actively promote and support the long term protection and correct ongoing management of remnant vegetation of private and public land and the linking of isolated stands with wildlife corridors.	SBICMC, CoGG, BoQ,	high	ongoing
9.3	Map the native vegetation within the catchment showing: best examples-top priority for management/ fencing; natural regeneration- blocks, corridors, nodes; revegetation - blocks, corridors, nodes; threatened/ locally significant species; wetland and riparian.	SBICMC	high	Complete
9.4	Support & promote "Land for Wildlife" scheme especially between neighboring properties, through field days, one-to-one communications, the media, displays etc.	SBICMC	high	ongoing
9.5	Support & promote the "Trust for Nature" land covenant scheme to protect remnant vegetation through field days, property visits, one-to-one communications, the media, displays etc.	SBICMC	high	ongoing
9.6	Assist catchment schools to participate in on-ground projects in the catchment. e.g. 'Adopt a dune/wetland/' projects - remnant vegetation issues; revegetation; creation of wildlife corridors; indigenous plant propagation.	SBICMC local schools land managers	high	ongoing
9.7	Facilitate, promote and conduct indigenous plant propagation and seed collection workshops.	SBICMC community	high	ongoing
9.8	Advise and support the efforts of community nursery volunteers.	SBICMC nursery volunteers	high	ongoing
9.9	Organise local flora walks.	SBICMC	high	ongoing
9.10	Assist local councils with the development of long term environmental protection strategies and support implementation through the Municipal Planning Schemes.	SBICMC local councils	high	ongoing
9.11	Assist QBC implement a weed management and revegetation program in Coastal Moonah Woodland in The Narrows dune system.	SBICMC QBC, CVA local schools & community	high	new
9.12	Prepare articles for local newspapers highlighting protection of remnant vegetation communities.	SBICMC	high	ongoing
9.13	Prepare and mount displays highlighting protection of remnant vegetation communities.	SBICMC	medium	ongoing
9.14	Prepare information sheets on the different vegetation communities in the Swan Bay Catchment: values, threats, protection.	SBICMC	medium	in preparation

	Action	Key Participants	Priority	Status
9.15	Hold a Field Day for rural landholders, Councils, CFA and Powercor on 'Management of Roadside Vegetation', looking at maintaining species diversity and low fire risk together.	SBICMC	Medium	ongoing
9.16	Promote among community and local councils the planting of indigenous vegetation in urban areas to restore links and enhance remnant vegetation.	SBICMC	medium	ongoing
9.17	Organise an indigenous gardens tour in St. Leonards, Ocean Grove, Queenscliffe.	SBICMC environment groups individuals	medium	new

10.0 WATER QUALITY

Background

The surface drainage pattern of the Swan Bay catchment comprises intermittent creeks and drainage lines descending from the upper north-west area towards Swan Bay. Yarram Creek, the largest creek, drains much of the western part of the catchment. The southern part of the Swan Bay catchment contains swampy, low-lying areas with a number of lakes and wetlands, the largest of which is Lake Victoria. The lakes and wetlands are connected by surface drainage and/ or sub-surface aquifers. Stormwater drains from eastern Ocean Grove along constructed channels through the lakes and wetlands to Swan Bay. Stormwater from parts of Pt. Lonsdale and Queenscliff also drains to Swan Bay.

In rural areas of the catchment the clearing of a significant proportion of vegetation, past and present agricultural practices and altered drainage regimes have contributed to accelerated run-off and increased sediment load and level of nutrients entering Swan Bay.

In urban areas of the catchment the clearing of land and increase in hard, impermeable surfaces and stormwater drainage systems, has decreased water infiltration rates. Much of the incidental detritus of present day living will find its way through the stormwater drainage systems into Swan Bay. The nutrients present in detergents, garden fertilisers and dog faeces, together with litter dropped in the streets and oils and other substances falling on roadways adds to the burden placed on Swan Bay. The aesthetic values of catchment wetlands and Swan Bay are reduced by water borne litter from urban stormwater drains. Fauna, particularly water birds, may be injured or killed by entanglement or ingestion of litter items.

Water quality is potentially the biggest single determinant in the health of Swan Bay. Excess nutrients in Swan Bay have the potential to increase algal growth, decreasing sunlight available to seagrasses, resulting in seagrass loss. Similarly sediment loads from the catchment may smother seagrass or increase water turbidity resulting in decreased sunlight available to seagrass and consequent seagrass loss.

In 1997 a community water quality-monitoring program was established by the Swan Bay Integrated Catchment Management Committee to determine 'base line' levels of catchment water quality. Results from five years of monitoring indicate that in times of peak flow excessive amounts of nutrients and sediments enter Swan Bay from both rural and urban areas of the catchment. Ongoing monitoring enables SBICMC and land managers to target, develop and evaluate appropriate on-ground actions. A variety of waterways protection projects have been undertaken and completed since 1998. Many actions are ongoing.

The following actions have been separated into two categories: 'Stormwater' and 'Streamside Protection'. Some actions attempt to treat the problem at source; others propose means of reducing the effect of nutrients and contaminants before they enter Swan Bay.

Appendix 4 outlines the locations of waterways designated as a high priority for waterway protection works. While all the waterways within the catchment are considered to be of high priority to our committee, those in the northern part of the catchment (priority A - pink) are of slightly higher priority than those in the south (priority B - red) based on the criteria listed below.

1. The ecological and conservation importance of the waterway's receiving waters (Swan Bay Fisheries Reserve - a Ramsar wetland of international importance). According to Blake and Bulls (2001) seagrass mapping work, the majority of sea grass is in the northern section of Swan Bay
2. The current levels of nutrients during peak flow events, which are washed along the waterways into Swan Bay. Our monitoring between 1996 and 2000 show that the

majority of the waterways are classed as degraded for nutrients during normal flow and peak flow events. This information is available from Barwon Water Waterwatch database. Nutrients and sediments are involved in the degradation of the Sea Grass in Swan Bay.

3. The direct-ness of the water flow into Swan Bay. Some waterways have a natural series of wetlands along them, which help slow the water and enhance natural nutrient reduction process.
4. The potential impacts of fencing and revegetation work in improving in stream and receiving water quality.
5. The current quantity and potential for erosion (gully, bed & banks) in waterways and their potential impact on the in stream and receiving waters. Many of the waterways in the Swan Bay Catchment are suffering erosion. In many locations the subsoils appear relatively dispersible, allowing gully erosion. This is very obvious after the rain events over the last 2 years

Strategic Actions

	Action	Key Participants	Priority	Status
10A.1	Seek funding to implement the actions in this section.	SBICMC	high	ongoing
10A.2	Implement and maintain Swan Bay Catchment Waterwatch Program.	SBICMC, community volunteers, schools, CW	high	ongoing
10A.3	Develop and implement projects to re-establish indigenous vegetation along and in waterways carrying urban stormwater.	SBICMC land managers	high	ongoing
10A.4	Assist catchment schools to participate in on-ground projects in the catchment. e.g. 'Adopt a wetland' projects: wetland filters -revegetation of wetlands / stormwater channels; indigenous plant propagation.	SBICMC local schools land managers	high	ongoing
10A.5	Conduct stormwater education and drain stenciling activities in urban areas of the catchment.	SBICMC schools CVA, community	high	ongoing
10A.6	Assist local councils with the development of long term environmental protection strategies and support implementation through the Municipal Planning Schemes.	SBICMC COGG QBC	high	ongoing
10A.7	Negotiate with Councils to achieve retention of existing indigenous vegetation along waterways and to avoid inappropriate straightening, widening and excavation of natural watercourses and wetlands.	SBICMC COGG QBC	high	ongoing
10A.8	Promote with Councils the installation of drainage pit traps and nutrient filters on targeted main drains.	SBICMC COGG QBC	high	ongoing
10A.9	Prepare articles for local newspapers highlighting stormwater issues and management strategies.	SBICMC	high	ongoing
10A.10	Prepare and mount stormwater education displays in urban areas of the catchment.	SBICMC	medium	ongoing
10A.11	Liaise with authorities to identify pollutants and the sources of pollution in stormwater and watercourses.	SBICMC EPA, BW, COGG QBC	low	ongoing
10A.12	Encourage Councils and Barwon Water to identify and eliminate any leakage of sewage effluent into the stormwater system.	SBICMC COGG QBC EPA	low	ongoing
10A.13	Develop with Councils a strategy to minimise the entry of animal faeces into urban area stormwater.	SBICMC COGG QBC	low	new

	Action	Key Participants	Priority	Status
10A.14	Establish a community reporting system for observed pollution.	SBICMC	low	new
10A.15	Implement a public awareness program detailing the advantages of using No Phosphorus washing and cleaning products.	SBICMC	low	new
10A.16	Pursue with Councils the possibilities for radical changes to stormwater collection and disposal from new subdivisions including reduction in the area of impervious hard surfaces, the use of urban wetlands within open space areas, the installation of local litter traps on drains, the planting of reed filter beds upstream of points of discharge to watercourses.	SBICMC COGG QBC	low	new
10A.17	Examine with Barwon Water and Councils a pilot program to install domestic rainwater tanks reducing urban run-off and stormwater drain loadings.	SBICMC BW COGG QBC	low	new

4B. Water Quality -Streamside Protection: Strategic Actions

	Action	Key Participants	Priority	Status
10B.1	Seek funding to implement the actions in this section.	SBICMC	high	ongoing
10B.2	Implement and maintain Swan Bay Catchment Waterwatch Program.	SBICMC, community volunteers, schools, CW	high	ongoing
10B.3	Assist MAFRI with Swan Bay Nutrient Monitoring Program: steering committee; catchment water quality data; monthly collection of silicate samples.	SBICMC, MAFRI SBEA, agencies	high	2001- 2002
10B.4	Raise awareness, implement and maintain a streamside fencing and revegetation program along catchment waterways and drainage lines.	SBICMC CCMA private landowners	high	ongoing
10B.5	Assist catchment schools to participate in on-ground projects in the catchment. e.g. 'Adopt a waterway' projects: revegetation of waterways; indigenous plant propagation.	SBICMC local schools land managers	high	ongoing
10B.6	Assist local councils with the development of long term environmental protection strategies and support implementation through the Municipal Planning Schemes.	SBICMC COGG QBC	high	ongoing
10B.7	Raise awareness and seek funding to implement an erosion control program along catchment waterways and drainage lines.	SBICMC CCMA private landowners	high	new
10B.8	Encourage MAFRI to establish a long term monitoring program (water quality, siltation and sand movement) within Swan Bay and relate this information to structure and health of seagrass communities.	SBICMC MAFRI PV	medium	ongoing

11.0 SUSTAINABLE AGRICULTURAL PRACTICES

Background

Sustainable management of the natural resources of land and water in the catchment is essential to ensure the continued viability of farming activities and protection of the local natural resources.

The size of individual properties within the Catchment is gradually becoming smaller due to sub-divisions and the movement of new land owners into the area. There is increasing diversity of enterprises.

The Whole Farm Planning concept ensures a balanced approach towards managing the multiple issues in modern farming. In this concept the natural values of the land are respected and the land capability is paramount.

Past efforts have focused on undertaking one-on-one extension, workshops, field days, catchment tours and whole farm planning courses. The catchment contains a property that is model example of whole farm planning. This is promoted widely.

Land management issues including water quality, remnant vegetation, groundwater and salinity are taken into account and handled in conjunction with economic and farming techniques. Previous methods, which exploited the land and water resources in other parts of Australia to maximise short-term gains, were not sustainable and historically led to the worst land degradation this country has seen. In more recent times and particularly with the influence of the Land care movement the long-term benefits of managing a farming business in harmony with the natural environment have been well demonstrated.

The actions included in this section work in various ways to ensure long-term sustainability of rural enterprises, to achieve sensitive usage of productive rural land in accordance with sound environmental principles and to avoid land degradation for the benefit of future generations.

Strategic Actions

	Action	Key Participants	Priority	Status
11.1	Seek funding to implement the actions in this section.	SBICMC	high	ongoing
11.2	Promote the adoption and implementation of Whole Farm Planning principles within the catchment through courses, displays and public awareness raising activities.	SBICMC, BLG, CoGG	high	ongoing
11.3	Prepare articles for local newspapers highlighting Sustainable agricultural issues.	SBICMC	high	ongoing
11.4	Implement a 'Best Practice' Scheme to reward landowners for improved management practices and highlight their work to others.	SBICMC, BLG	high	complete
11.5	Conduct field days on issues such as whole farm planning, small property management, economic benefits of conservation, pest plant and animal control, indigenous plant identification, erosion control, pasture management, salinity & perennial cropping.	SBICMC, BLG	high	ongoing
11.6	Produce rural landowner booklet (Catchment information kit) to send to all landowners in district with advice on natural resource management issues.	SBICMC	high	In-preparation
11.7	Promote on-ground works to address soil erosion and siltation,	SBICMC	high	ongoing
11.8	Promote participation of landholders in the Bellarine Landcare Group.	SBICMC, BLG	high	ongoing
11.9	Promote the benefits of a holistic approach to farm management linking the productivity and conservation benefits of actions such as planting indigenous trees to provide shelterbelts and habitat corridors.	SBICMC	high	ongoing
11.10	Promote with local government the possibility of encouraging Whole Farm Planning and sustainable land management and active management of remnant vegetation by incentives through the municipal rating system.	SBICMC, CoGG	medium	new
11.11	Provide direct and specific assistance to rural landholders in applications for grant funding for rural land conservation and with the development of management plans for their properties.	SBICMC	high	ongoing

12.0 REFERENCES

- Carr et al (2002) **City of Greater Geelong Biodiversity Management Strategy - Draft report for public consultation**, City of Greater Geelong.
- Mark Trengove (2001) **The Narrows, Queenscliffe Vegetation Management Guidelines**. Borough of Queenscliffe
- Blake, S and Bull, D. (2001). **Victorian Marine Database: Seagrass Mapping of Port Phillip Bay. Geospatial Systems Section, Marine and Freshwater Resources Institute Report No. 39.** Marine and Freshwater Resources Institute: Queenscliff .

APPENDIX 1 WEEDS IN THE SWAN BAY CATCHMENT

Abundant	Abundant throughout wide areas of the catchment
Common	Common throughout wide areas of the catchment
Scattered	Scattered infestations in limited areas of the catchment
Occasional	Occasional small infestations in limited areas
Few	Few individuals.

Priority weed species for control are underlined.

denotes weeds that are primarily coastal weeds in the Swan Bay Catchment

denotes weeds that are primarily catchment weeds in the Swan Bay Catchment

Weed Status	Common Name	Botanical Name	Abundance
Regionally Prohibited Weed	<u>Serrated Tussock</u>	<u><i>Nassella trichotoma</i></u>	Occasional
	Cape Tulips	<i>Maraea Spp.</i>	Occasional
	Wild Garlic	<i>Allium vineale</i>	Occasional
	St John's Wort	<i>Hypericum perforatum</i>	Occasional
Regionally Controlled Weed	<u>Boxthorn</u>	<u><i>Lycium ferocissimum</i></u>	Scattered
	<u>Gorse/Furse</u>	<u><i>Ulex europaeus</i></u>	Common
	Boneseed	<i>Chrysanthemoides monilifera</i>	Occasional
	Apple of Sodom	<i>Solanum sodon</i>	# Occasional
	<u>Spiny Rush</u>	<u><i>Juncus acutus</i></u>	# Occasional
	<u>Wild Watsonia</u>	<u><i>Watsonia merianna</i></u>	Scattered
	Patersons Curse	<i>Echium vulgare</i>	Scattered
	<u>Flax-leaf Broom</u>	<u><i>Genista linifolia</i></u>	Common
	<u>Fennel</u>	<u><i>Foeniculum vulgare</i></u>	Scattered
	Blackberry	<i>Rubus fruticosus</i>	Few
	Sweet Briar	<i>Rosa rubiginosa</i>	Few
	Artichoke Thistle	<i>Cynara cardunculus</i>	# Few
	Hore Hound	<i>Marrubium vulgare</i>	Few
	Onion Weed	<i>Asphodelus fistulosus</i>	Occasional
Great Mullen	<i>Verbascum thapsus</i>	# Occasional	
Emerging weeds	Chilean Needle Grass	<i>Nassella neesiana</i>	Occasional
	Texas Needle Grass	<i>Nassella leucotricha</i>	Occasional
Environmental	<u>Bridal Creeper</u>	<u><i>Asparagus asparagoides</i></u>	# Common
	<u>Italian Buckthorn</u>	<u><i>Rhamnus alternus</i></u>	Common
	<u>New-Zealand Mirror -bush</u>	<u><i>Coprosma repens</i></u>	# Scattered
	<u>Pampas Grass</u>	<u><i>Cortaderia selloana</i></u>	# Occasional
	Kikuyu	<i>Pennisetum clandestinum</i>	Common
	Buffalo Grass	<i>Stenotaphrum secundatum</i>	Common
	<u>Golden Wreath Wattle</u>	<u><i>Acacia saligna</i></u>	# Scattered
	Monterey Pine	<i>Pinus radiata</i>	Scattered
	<u>Myrtle-leaf Milkwort</u>	<u><i>Polygala myrtifolia</i></u>	# Common
	<u>Sweet Pittosporum</u>	<u><i>Pittosporum undulatum</i></u>	# Scattered
	Angled Onion	<i>Allium triquetrum</i>	# Scattered
Gazania	<i>Gazania linearis</i>	Occasional	

Weed Status	Common Name	Botanical Name	Abundance
Environmental Cont....	<u>Cape Wattle</u>	<i>Paraserianthes lophanta</i>	Occasional
	<u>Dolichos Pea</u>	<i>Dipogon lignosus</i>	# Scattered
	<u>Cotoneaster</u>	<i>Cotoneaster sp.</i>	# Scattered
	Blue		
	Periwinkle	<i>Vinca major</i>	# Occasional
	English Ivy	<i>Hedera helix</i>	# Occasional
	Cape Ivy	<i>Delairea odorata</i>	# Occasional
	Agapanthus	<i>Agapanthus praecox</i>	Scattered
	Sallow Wattle	<i>Acacia longifolia var.</i>	
	.	<i>longifolia</i>	# Scattered?
	Giant Honey		
	Myrtle	<i>Melaleuca armillaris</i>	Scattered
	Montbretia	<i>Crocsmia x</i>	
	.	<i>crocsmiiflora</i>	Few
	Phalaris	<i>Phalaris aquatica</i>	Common
	Perennial		
	Veldgrass	<i>Ehrharta calycina</i>	Scattered
Coast Tea-tree	<i>Leptospermum laevigatum</i>	Scattered	
Olive	<i>Olea europaea ssp</i>	# Occasional	
	<i>europaea</i>		
Onion Grass	<i>Romulea rosea var.</i>	# Occasional	
	<i>australis</i>		
Climbing Groundsel	<i>Senecio angulatus</i>	# Occasional	
Tall Wheat Grass	<i>Tradescantia fluminis</i>	Occasional	
Arum Lilly	<i>Zantedeschia aethiopia</i>	Few	