Department of Sustainability and Environment

Action Statement

Flora and Fauna Guarantee Act 1988 No. 183

Degradation of native riparian vegetation along Victorian rivers and streams

Description

The Victorian River Health Strategy (NRE 2002)defines riparian land as the area of land that adjoins, regularly influences or is influenced by a river. It consists of vegetation along floodplains, banks and verges that adjoins rivers and streams. River and stream ecosystems (or riverine ecosystems) refer to the whole system from headwaters to the mouth, and so include the channel, the riparian vegetation, any associated floodplain systems and also the estuary or terminal lake.

Intact areas of native riparian vegetation are an important component of both terrestrial and aquatic ecosystems. In a terrestrial sense, riparian vegetation:

- supports a highly diverse flora and fauna, being on the edge of an aquatic and terrestrial system;
- acts as a drought refuge, as in droughts it may be the only place where plants may have new growth, flowers or are producing seed – hence it can be an important source of food;
- provides breeding habitat for waterbirds and other species;
- is often the only reasonably healthy native vegetation remnant in catchments which have been largely cleared, giving it special importance to biodiversity; and,
- acts as a wildlife corridor, linking habitats, though its value depends on it s size and structure.

Riparian vegetation is also vitally important to the health of rivers and streams because it provides:

- organic matter to a river – a major food source for instream biota;
- a supply of woody debris within the river that forms essential habitat areas for many fish and invertebrates and influences the river shape and substrate;
- a source of shade that can influence water temperature and light penetration, therefore regulating instream primary production;
- stability to banks, minimising erosion in many areas; and
- a buffer between adjoining land and the river, filtering nutrients, sediment and pesticides from catchment runoff.

The capacity for areas of native riparian vegetation to perform the ecological functions outlined above will depend on its width, connectivity, and the quality, quantity and structure of the vegetation present. There are many threats facing native riparian vegetation including; clearing, erosion, uncontrolled stock access, recreational use, weed invasion, salinity and changes to flow regimes. Despite these threats, the importance of what remains, for both nature conservation and the provision of environmental services is undisputed (OCE 1988, OCE 1991, McMahon *et al.* 1994, Askey-Doran *et al.* 1999).

The protection of native riparian vegetation along Victorian rivers and streams is likely to have complementary benefits for the protection of Aboriginal cultural heritage values (places, sites and objects) which commonly occur in areas associated with freshwater resources and remnant native vegetation.

Within the rural landscape, the retention of Crown ownership over water frontages and the sporadic

practice of leaving vegetation along watercourses to protect stream morphology have resulted in the conservation of some riparian vegetation. Apart from their intrinsic value, these remnants are exceedingly valuable, as they are representative of pre-European plant communities and harbour species and gene pools which may otherwise be lost (Cabena 1983). Riparian vegetation in areas cleared for agriculture is often sparse, fragmented and weed-infested (OCE 1991). As such, relatively intact native riparian vegetation is of importance wherever it occurs (Frood and Calder 1987).

Clearing and Grazing

Over-clearance of riparian vegetation and degradation by poorly managed grazing are primary causes of poor river health in Australia (Askey-Doran *et al.* 1999). Much of the remaining riparian vegetation in lowland Victoria is subject to grazing by domestic and other introduced animals. Unrestricted stock access to areas of riparian vegetation changes the floristic composition through trampling and selective grazing (Wilson and Harrington 1984). Grazing also affects the structure and function of plant communities by reducing regeneration. In addition, reduction of riparian cover through grazing can cause stream bank slumping leading to accelerated stream bank erosion. Grazing and the consequent impacts on stream morphology have led to the depletion of specific habitats such as sedge rich and herbaceous communities of lowland drainage lines (Frood and Calder 1987). Managing stock on stream frontages is considered essential for restoration and protection of riparian vegetation (DCFL 1987, DCE 1992, Wager and Jackson 1993). Strategies include fencing and provision of off-stream watering points (NRE 2002a).

Among the problems arising from the grazing of stock on riparian land are:

- suppression of regeneration and recruitment, and the reduction of floristic and structural diversity of the native vegetation;
- streambank erosion, including pugging of the soils around the waterway, bank collapse as a result of stock movement towards or along the stream edge, stock trails in the riparian zone, and trampling;
- reduction in water quality, such as increased turbidity, increased nutrient levels, foul smells, poor-tasting water, increased algal growth (filamentous and/or blue–green algae) and increased growth of aquatic weeds;
- damage to riparian vegetation through browsing (groundcovers and palatable shrub and tree species) and breaking stems and branches;
- high levels of weed infestation;
- a change in the number or types of fish usually present in the waterway; and
- a change in the number or composition of other fauna groups such as birds, platypus or insects.

Increasing salinity

Increasingly, saline watertables, soils and streams, a consequence of irrigation and inappropriate catchment management, are important factors affecting the integrity of remaining riparian vegetation in rural Victoria. Generally, the effect of rising saline watertables is most severe in areas of low lying topography such as streamsides, floodplains and wetlands - making these areas particularly vulnerable. Of the 17,101ha of severely degraded remnant riparian vegetation of the river Murray, degradation to some 53% of the area was attributable to salinisation (Smith *et al* 1990).

Weed invasion

Riparian vegetation is by its nature a potential sink for weed colonisation (OCE 1988). The invasion and persistence of environmental weeds in riparian habitats is facilitated by a combination of factors. These include periodic flooding, excessive grazing, inputs of nutrients and weed propagules from agricultural land, roads and other disturbed sites, an exaggerated edge effect (high perimeter to area ratio), and the availability of moisture (Carr 1993). Carr *et al*. (1992) has identified some 252 species of environmental weeds actively invading riparian vegetation formations in Victoria. Exotic plants compete with native species for resources like space, light, nutrients and moisture. Weeds can out-compete the native species (Askey-Doran *et al.* 1999).

Changes to flow regimes

River regulation (the construction of weirs, dams, or diversions for the supply of water for irrigation and domestic purposes) or the modification of stream channels for 'improved' local drainage may also adversely effect riparian plant communities. Recruitment, establishment and survival of riparian trees are thought to be closely linked to the hydrological regime (Askey-Doran *et al.* 1999). In general, vegetation changes associated with river regulation result in the expansion of some communities and species at the expense of others (Smith *et al.* 1990). Chesterfield (1986) documents considerable changes to the composition and structure of riverine plant communities of the Barmah Forest since river regulation and Pillman (1980) suggests that weir construction has precipitated changes to the prevalence of semi-aquatic flora in the Murray. More obvious changes have resulted from impounding large bodies of water (such as Hume weir, Lake Mokoan and Lake

Mulwala), with the subsequent loss of extensive areas of riparian and floodplain vegetation.

Other causes of the degradation of riparian vegetation include cultivation, roading, river management works, and recreational pressures (OCE 1988, LCC 1991, DCE 1992, Askey-Doran 1993).

Status of threat

A large proportion of native riparian vegetation has already been cleared for agriculture and that which remains is threatened by a variety of processes. The condition of riparian land was assessed as part of the 1999 – 2000 statewide benchmarking of stream condition (NRE 2002a). It showed that less than 10% was in good to excellent condition, around 40% in reasonable to good condition, and over 50% in poor to very poor condition (NRE 2002).

The degradation of native riparian vegetation along Victorian rivers and streams is listed as a potentially threatening process under the **Flora and Fauna Guarantee Act 1988**.

In its final recommendation the Scientific Advisory Committee (SAC 1996) has determined that the degradation of native riparian vegetation to Victorian rivers and streams is a potentially threatening process, as in the absence of appropriate management it:

- poses a significant threat to the survival of a range of flora and fauna;
- poses a significant threat to the survival of two or more taxa; and
- poses a significant threat to the survival of a community.

Degradation of riparian vegetation detrimentally affects flora and fauna that is dependent on riparian influences. The removal and modification of riparian vegetation can adversely influence all aspects of stream habitat, and has been identified as a major cause for the decline of Victoria's native freshwater fish (Koehn and O'Connor 1990).

Many species of flora and fauna are wholly dependent on riparian habitats or rely on them at some stage in their lives for breeding, feeding or roosting. Many taxa and communities listed as threatened under the **Flora and Fauna Guarantee Act 1988** are threatened by the loss of riparian vegetation. Threatened communities include the Sedge-rich *Eucalyptus camphora* Swamp Community, Red Gum Swamp Community No. 1, Warm Temperate Rainforest (East Gippsland Alluvial Terraces) Community, Warm Temperate Rainforest (Coastal East Gippsland) Community, Warm Temperate Rainforest Cool Temperate Rainforest Overlap, Howe Range) Community and Warm Temperate Rainforest (Far East Gippsland) Community.

Management Issues

Impacts on waterways are often the result of a number of threats, so it is often the case that addressing a single threat will not restore the health of the ecosystem. To achieve Victoria's objective of healthy waterways as identified in the Victorian River Health Strategy (NRE 2002), integrated action and identification of priorities is required. The mechanism for delivering this is the Regional River Health Strategies. These Strategies will describe priorities for threat management at a regional and local level. The catchment management authorities and Melbourne Water will use an risk-based approach to assist in identifying priority management actions, as described in Victorian River Health Strategy.

Ecological issues

Apart from the intrinsic conservation value of riparian flora, many ecological issues result from the loss or degradation of riparian vegetation.

Terrestrial Fauna

Birds, mammals, reptiles, amphibians and invertebrates occupy dynamic roles in streamside communities throughout Victoria. Terrestrial vertebrate and invertebrate fauna display extensive and complex interrelations with the plants and animals occurring within and along streams (LCC 1991, Hynes 1972). The vegetation both along banks and in streams has major functional significance as resting, roosting, nesting and hawking sites for insectivorous and piscivorous birds and mammals, as basking and hunting sites for reptiles, as calling and feeding sites for amphibians, as shelter sites for terrestrial insects, and as habitat for many other organisms (spiders, leeches, mites, etc). Vegetation loss may therefore result in gross changes to the abundance and diversity of these vertebrate and invertebrate populations, and affect the wider riparian biotic community.

As a result of their dependence on aquatic and riparian systems, it follows that certain vertebrate wildlife species (eg. Water-rat, Gippsland Water Dragon, Azure Kingfisher, Large-footed Myotis, Brown Gerygone, Black-faced Monarch, Eastern Water-skink) may be expected to decline in areas where riparian vegetation has been grossly or extensively disturbed or even totally removed.

Riparian vegetation is an invaluable source of food, shelter, refuge and breeding sites for terrestrial fauna, providing fertile habitats with high moisture levels. Riparian habitats have characteristically rich and diverse faunas, frequently supporting

species that do not occur in adjacent environments (Bennett 1990, Waterwatch Victoria 1994). Riparian (and other) corridors, from which animals may move out to forage in adjacent habitats, are a source of environmental and biotic influence upon the surrounding landscape (Bennett 1990, Williams *et al* 1993).

Continuous zones of riparian vegetation provide natural linkages through the environment. They are important, not only as habitat for resident fauna but as corridors for the movement of wildlife through an otherwise unfavourable landscape (Bennett 1990). They also allow recolonisation after human-induced catastrophes (DCE 1990, LCC 1991, Hodges 1994). Many may contain the only remnants of native vegetation in areas that are now extensively cleared, and so can be critical for the survival of native species (DCE 1990, LCC 1991).

Temperature

Native riparian vegetation can shade rivers and streams, decreasing the amount of direct and diffuse sunlight reaching the water surface (Bunn *et al.* 1999). Riparian vegetation also influences water temperature through shading. Increasing the amount of light and heat reaching waterways may favour the growth of nuisance algae and weeds. Increasing the growth of algae can cause algal blooms. These blooms reduce dissolved oxygen levels that can damage fish and invertebrates. Algae are an important natural component of aquatic ecosystems, but they can cause serious water quality problems when blooms occur. Some algal species produce toxins which affect drinking water supplies, are fatal to cattle and may cause gastroenteric problems and skin irritations in humans.

Adequate riparian vegetation buffers stream water against high temperatures by shading. Each plant or animal species has a specific temperature tolerance level and no species can survive in water temperatures above the lethal critical limit. For example, the lethal critical temperatures for several native fishes is around 27˚C to 29˚C (Harasymiw 1983, Koehn and O'Connor 1990). They do not survive above these temperatures. Mortality be a direct impact of the temperature, or may be an indirect effect through the reduction in dissolved oxygen in warmer waters. High temperatures may be more common in summer in reaches of streams without shading vegetation (especially when combined with reduced water flow due to diversions).

In-stream woody debris

Riparian vegetation is the natural source of woody debris in streams. Many plant and animal species require woody debris for spawning sites, protection from strong currents, shelter from predators and vantage points to help capture prey. Reducing the amount of woody debris entering the river channel reduces the amount of habitat available to organisms that use rivers for all or part of their lifecycle.

Organic matter from riparian sources forms the primary source of carbon and nutrients for the aquatic food chain. Terrestrial invertebrates, originating from riparian vegetation, form an additional food source for fish and other aquatic or semi-aquatic vertebrates.

Buffers

Riparian vegetation provides a buffer between agricultural or urban land and the river, assisting in filtering out sediment, nutrients and pesticides before they reach streams and rivers. Riparian vegetation may also act as a sink for additional nutrients before they enter the stream.

Sedimentation

Destabilised stream banks may result in erosion of the channel, increasing the amount of sediment entering the river. Higher than normal levels of suspended sediment have been found to cause direct fatality, reduced growth rates, reduced feeding, altered diet, increased stress, increased incidence of disease and altered behaviour and displacement of fish (Lloyd 1987). Other potential or reported effects include a reduction in oxygen uptake by the coating or clogging of gills by fine particles and a reduction in feeding efficiency for visual predators (DWR 1989). Increased deposited sediments have been shown to reduce in growth and development of tadpoles of at least one native lotic frog species presumably by reduction in feeding efficiency (Gillespie 2002). Native Australian fish species are likely to also display these effects (ENRC 1994).

Wider conservation issues

The Victorian Government recognises the importance of improving land management in catchment areas for a range of ecological, economic and social reasons. Protection, maintenance and enhancement of the natural resource is seen as a key requirement for economic and social health of the community. The primary goal is to protect the biodiversity, soil and water resource through State programs and national programs such as the National Action Plan for Salinity and Water Quality and the Natural Heritage Trust. It is through such programs that the objectives of this Action Statement will be realised.

Management of this threatening process will have an influence on the success of managing a number of other threatening processes listed under the **Flora and Fauna Guarantee Act 1988**, specifically:

- Loss of hollow bearing trees from Victorian native forests (Nomination no. **100**);
- Removal of wood debris from rivers and streams (Nomination no. **118**);
- Increase in sediment input to rivers and streams due to human activities (Nomination no. **181**);
- Alteration to the natural temperature regimes of rivers and streams (Nomination no. **230**);
- Input of toxic substances into Victorian rivers and streams (Nomination no. **263**);
- Invasion of native vegetation by 'environmental weeds' (Nomination no. **360**);
- Habitat fragmentation as a threatening process for fauna in Victoria (Nomination no. **377**).

Management of this threatening process is an integral part of achieving quality catchment management and ecologically sustainable development.

Previous Management Action

Catchment Management Authorities have been established under the **Catchment and Land Management Act 1994**, replacing the Catchment and Land Protection Boards (Catchment Management Structures Working Party 1997). The role of the catchment management authorities is to ensure the sustainable development of natural resource based industries, the protection of land and water resources and the conservation of natural and cultural heritage.

Catchment management authorities, other than Port Phillip and Westernport Catchment Management Authority, are responsible for waterway management (including heritage rivers outside national parks), water quality management, floodplain management, rural drainage management. Melbourne Water has waterway management responsibilities in the greater Melbourne area. Catchment Management Authorities co-ordinate the development of Regional Catchment Strategies, which detail action plans and priorities for land and water resource management, including riparian vegetation.

Under the Victorian River Health Strategy (NRE 2002a), the catchment management authorities and Melbourne Water have been established as the caretakers for riparian land. They have responsibility for the overall oversight and co-ordination for riparian protection and restoration, regardless of riparian land tenure.

The policy framework for protection and management of riparian vegetation is set out in the Victorian River Health Strategy and Victoria's Native Vegetation Management – A Framework for Action (NRE 2002b).

The Victorian River Health Strategy sets out five prerequisites for developing a management framework for riparian land:

1. A clear set of goals and objectives for river systems, with clear priorities, tools to provide guidance and measurement of progress towards objectives, and targets for riparian protection and restoration;
2. An acknowledged partnership approach between all riparian land managers;
3. A clearly established caretaker of riparian condition;
4. Mechanisms in place which encourage and facilitate riparian land managers to manage their land in accordance with the goals and objectives; and
5. Common understanding in the community of the importance of riparian land.

The Victorian River Health Strategy sets the context for development of Regional River Health Plans, which describe regional priorities and actions for protection and restoration of riparian land. These are developed within the Regional Catchment Strategy planning process.

Victoria's Native Vegetation Management – A Framework for Action (NRE 2002) provides mechanisms for protecting riparian vegetation by aiming for a reversal in the decline of native vegetation across the landscape. The Framework is translated to a local level in Regional Vegetation Plans, developed within the Regional Catchment Strategy planning process.

A range of additional mechanisms is in place to protect existing native riparian vegetation. These include:

- Management plans for land within Victoria's parks and reserves system where these include riparian land;
- Native Vegetation Retention controls administered by local government through every municipal planning scheme. These control the removal, destruction or lopping of native vegetation. Applications to clear native vegetation need to consider factors including proximity to streams;
- The **Flora and Fauna Guarantee Act 1988** prevents the taking of protected flora on public land without authorisation;

- The Code of Forest Practice for Timber Production 1996 provides for the protection of riparian zones in both State and private forests through management of buffer and filter strips along waterways; and,
- A comprehensive forest management plan framework, which includes Regional Forest Agreements and Forest Management Plans. This provides for ecologically sustainable management of Victoria's forest resources.

In addition to the Regional Catchment Strategy planning framework, the following are all examples of important programs, activities and guidelines currently operating which can also effectively assist riparian vegetation management:

- Draft Heritage River Management Plans;
- Local Conservation Strategies (e.g. Cardinia Shire Sites of Significance Program);
- NRE Sustainable Agriculture Program;
- Special Area Plans under the **Catchment and Land Protection Act 1994**;
- Corridors of Green;
- Tree planting programs;
- Tree Victoria Action Plan;
- Land for Wildlife;
- Whole Farm and Property Management Planning Program;
- Melbourne Water's stream frontage management program.

Major Conservation Objectives

Long term objectives:

1. To establish and protect continuous corridors of native riparian vegetation, of suitable width, structure and composition to ensure maintenance of ecological processes, along all Victorian rivers and streams;
2. To reverse a decline in the conservation status of individual species or ecological communities that are at risk from changes to riparian vegetation along Victorian rivers and streams.

Short term objectives:

1. To develop priorities for restoration of riparian vegetation through regional river health and regional vegetation planning processes, regardless of land tenure;
2. To actively manage and restore healthy native riparian vegetation in priority areas;
3. To protect remnant stands of native riparian vegetation through existing statutory and planning processes.

Intended Management Action

The intended management actions listed below are further elaborated in DSE's Priority Actions Information System. Detailed information about the actions and locations, including priorities, is held in this system and will be provided annually to land managers and other authorities.

Planning and Co-ordination

1. Develop regional riparian vegetation programs as part of Regional Catchment Strategy, Regional River Health Strategies and Regional Native Vegetation Plans. Ensure they are incorporated into business plans, strategies and work plans produced by land and water managers.

   Responsibility: DSE (Regions), Catchment Management Authorities, Melbourne Water

2. Ensure that all authorities with land or water management responsibilities include, as part of their business plans, strategies and work programs, objectives and targets to protect and restore riparian vegetation.

   Responsibility: DSE (Catchment and Water Services, Biodiversity & Natural Resources Division, Regions), DPI (Fisheries Victoria), Catchment Management Authorities, Water Authorities

3. Increase the use of incentive schemes to encourage private riparian land managers to participate in the restoration of riparian land.

   Responsibility: DSE (Biodiversity & Natural Resources Division, Regions), Catchment Management Authorities, Melbourne Water, DPI (Agriculture Victoria)

4. Encourage involvement of local Aboriginal people in riparian vegetation management, consistent with the commitment of the Indigenous Partnership Strategy to recognise the fundamental role Aboriginal indigenous communities have in natural resource management.

   Responsibility: Catchment Management Authorities and Melbourne Water

Production of guidelines, legislation

5. Develop detailed guidelines for best practice riparian management and restoration based on principles in the Victorian River Health Strategy (NRE 2002), and guidelines in Lovett and Price (2002).

   Responsibility: DSE (Catchment and Water Services, Biodiversity & Natural Resources Division)

6. Develop a protocol for issues which arise as a result of fencing out frontages (such as

alternative stock watering provisions and cost sharing)

Responsibility : DSE (Catchment and Water Services), Catchment Management Authorities and Melbourne Water

7. Produce statewide guidelines for occasional or controlled grazing in riparian land

Responsibility : DSE (Catchment and Water Services), Catchment Management Authorities and Melbourne Water

Education and extension

8. Promote best practice riparian vegetation management by landholders through such programs as Landcare, Farm Management Planning and Land for Wildlife.

Responsibility: DSE (Parks, Flora and Fauna Division), Catchment Management Authorities, Melbourne Water

9. Identify and promote best practice examples of riparian vegetation management to waterway management bodies, and other relevant agencies.

Responsibility: DSE & DPI (Catchment and Water Division, Biodiversity & Natural Resources Division, Regions), Catchment Management Authorities, Melbourne Water

Resource assessment and monitoring

10. Develop appropriate performance indicators for this threatening process to assist land and water management authorities in environmental audit and condition of catchment requirements.

Responsibility: DSE (Catchment and Water Division, Biodiversity & Natural Resources Division)

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Further information can be obtained from Department of Sustainability and Environment Customer Service Centre on 136 186.

Flora and Fauna Guarantee Action Statements are available from the Department of Sustainability and Environment website: http://www.dse.vic.gov.au

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