



# **Conservation Action Plan for the Victorian Volcanic Plain**

**Summary Report**

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**Abbreviations**

CAP	Conservation Action Planning
CMA	Catchment Management Authority
DELWP	Department of Environment, Land Water and Planning
EPBC	Environment and Biodiversity Conservation Act 1999 (Commonwealth Government)
GIS	Geographic Information System
INFFER	Investment Framework for Environmental Resources
VVP	Victorian Volcanic Plain

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## 1. BACKGROUND

### 1.1 Introduction

Greening Australia is undertaking strategic, landscape conservation planning processes using the Open Standards framework across all of our priority landscapes in Australia, including the Victorian Volcanic Plain. Trust for Nature has undertaken a strategic, statewide private land focused conservation planning process (Trust for Nature's Statewide Conservation Plan) which has identified significant landscapes and conservation values across the state that require an increased focus due to their lower level of protection to achieve targets set within the National Reserve System Strategy. This plan has identified significant natural resource assets within the Victorian Volcanic Plains and like Greening Australia, Trust for Nature sees Conservation Action Planning as providing a key tool by which to create a shared vision and conservation goals across catchments within the Victorian Volcanic Plain as well as providing a shared strategy to implementing and capturing the wide range of actions that are required under Recovery Plans and Regional Catchment Strategies. To support this Trust for Nature has also developed expertise in workshop facilitation and conservation planning using the Open Standards framework and are co-leading the planning process.

Extensive consultation with major stakeholders working on the Victorian Volcanic Plain (Table 1) indicated that most parties were supportive of initiating a collaborative planning process for the region with a view to developing a shared vision of conservation for the region and pooling resources and capacity to secure conservation outcomes. It was noted however that extensive planning and consultation has already taken place through existing plans and strategies. To address this concern, efforts are being made to incorporate recent plans and associated information into the process, particularly Waterway Health Strategies and the National Recovery Plan for the Natural Temperate Grassland of the Victorian Volcanic Plain and the Grassy Eucalypt Woodland of the Victorian Volcanic Plain (referred to hereafter as the national Recovery Plan; not yet published). The development of a working group for the VVP should enable more effective implementation of these plans because priorities for action are reviewed on a regular basis and actions can be more effectively shared among partner organisations.

## 1.2 Project Scope

The geographic scope of the project is based on the Victorian Volcanic Plain, shown in Figure 1.1. The thematic scope of the plan is currently confined to biodiversity conservation values. However, it is recognised that the region has outstanding cultural values (as well as other values) which overlap the biodiversity assets identified in this plan. Strategic planning for cultural values may be undertaken at a later stage.

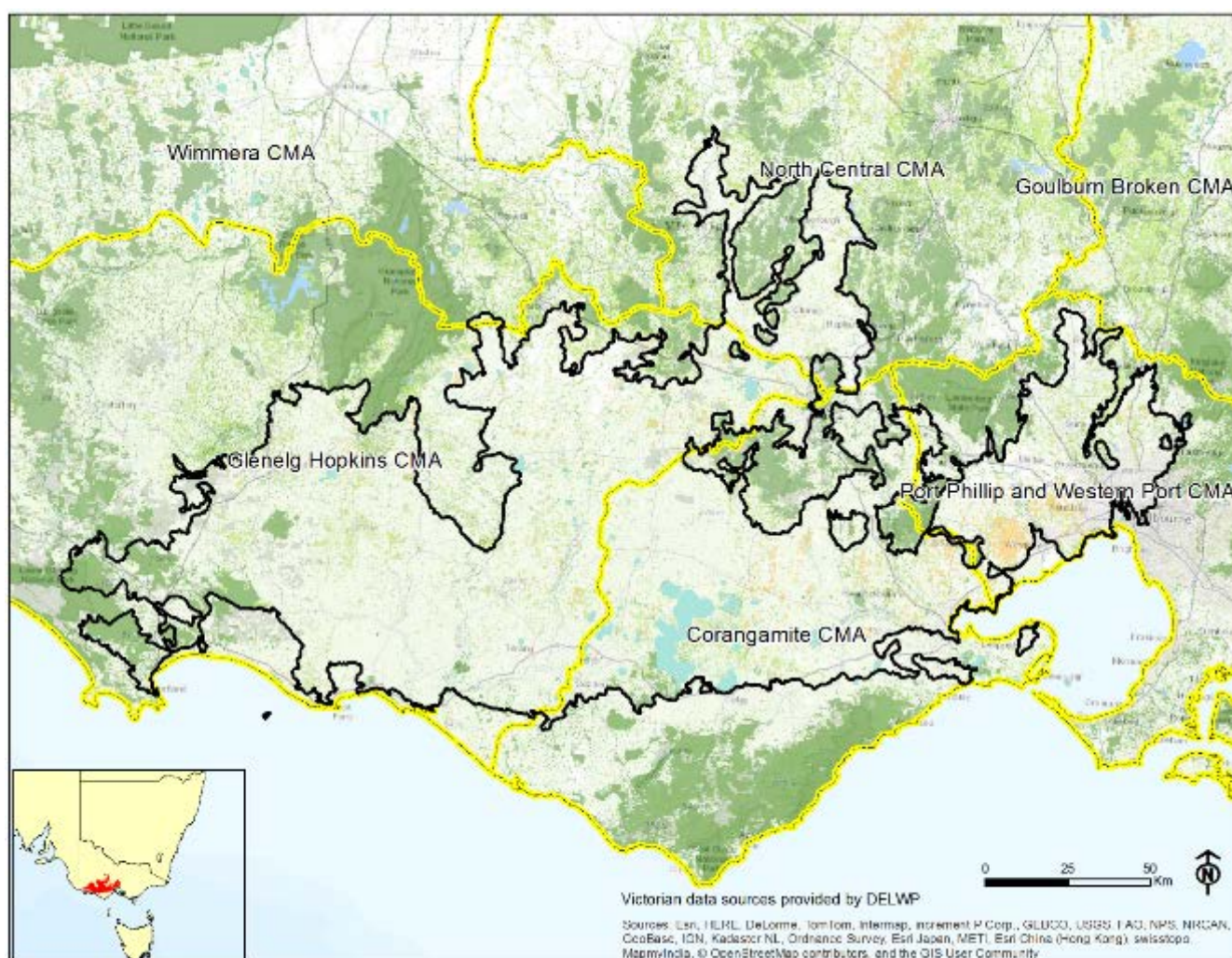


Figure 1.1. The project area showing Victorian Volcanic Plain IBRA subregion (red outline) and Catchment Management Authority regions (black outline).

### 1.3 Overview of the Open Standards Conservation Planning Framework

Often-cited problems associated with the Natural Resource Management industry are a lack of transparency and accountability in decision-making about how funds are invested, a lack of follow-up monitoring and evaluation of project outcomes and the short-term nature of conservation projects. These problems are closely linked to the short term nature of funding cycles and shifting priorities and policies at a state and federal government level. An additional problem is the distinct gap between science and practice and a lack of collaboration between organisations working towards similar goals. Practitioners delivering on-ground projects rarely engage in meaningful dialogue with the ecologists who are studying threatened species and thinking about priorities for conservation more broadly. These problems substantially compromise the effectiveness and success of many conservation projects.

The problems are not unique to Australia and there is now a global movement called the Conservation Coaches Network (led by some of the big international conservation NGOs such as The Nature Conservancy and World Wide Fund for Nature) dedicated to addressing them. They do this by promoting an adaptive management framework with free tools and guidance for conservation projects, supported by a network of workshop facilitators trained in their application. There is also growing recognition in the Australian NRM community of the need to combine desktop analysis with collaborative, workshop-style planning that engages people in an ongoing dialogue of planning and action and encourages the development of measurable medium and long term goals for conservation. This process tends to result in greater understanding and ownership of priorities identified in the plan, increased collaboration between organisations and greater adoption of results-based management. Viewed in this context, planning is seen as an iterative process that builds knowledge over time rather than a fixed process to be repeated at regular intervals. Workshops start by leading participants through a strategic planning framework and then move into a work planning phase so that the project planning team evolves into a working group whose role is to put the plan into action.

There are a range of tools available to conservation practitioners to help plan and prioritise conservation programs. These include a number of broad conservation planning frameworks, a large range of technical resources (e.g. databases, vegetation / habitat mapping, threatened species records) and ecological modelling software products (refer Wintle 2008 for a review of the available tools).

The present document follows the Open Standards for the Practice of Conservation

(<https://www.conservationgateway.org/ConservationPlanning/ActionPlanning/CAPOpenStandards/P>

[ages/cap-and-open-standards.aspx](#)) in conjunction with Miradi conservation planning and project management software ([www.miradi.org](http://www.miradi.org)) as an internationally recognised and widely adopted framework for natural resource management planning and also integrates elements of the INFFER process (Panell et al. 2013) as well as Natureprint (DELWP) spatial prioritisation products (see: [http://www.depi.vic.gov.au/\\_data/assets/pdf\\_file/0013/220405/RCS-guidelines-16122011.pdf](http://www.depi.vic.gov.au/_data/assets/pdf_file/0013/220405/RCS-guidelines-16122011.pdf)) and other data products.

Many organisations within Australia (including The Nature Conservancy, Bush Heritage Australia, Greening Australia, Northern Territory NRM, Parks Victoria and Trust for Nature) use the Open Standards framework for natural resource management planning. The framework has also proven to be an effective engagement tool used by traditional owners to facilitate community based planning for the management of Indigenous Protected Areas in northern and arid Australia (referred to as Healthy Country Planning in this context).

Whilst built on scientific principles, the approach recognises that there are often large gaps in ecological knowledge and data sets, hence a strong on-going adaptive management ethic is implied throughout the process. Further input from local knowledge and additional research to address data gaps are envisaged to refine this plan in the future.

The major steps in the process, as outlined in this document, are:

- the identification of conservation assets and nested assets (i.e. ecosystems, communities and species);
- an analysis of the viability (i.e. health) of the conservation assets;
- a ranking of major threats to the conservation assets;
- the development of actions and measurable objectives to achieve the long-term conservation of the assets (objectives have not yet been developed as part of this synthesis);
- the identification of practical monitoring indicators to support a robust monitoring, evaluation and adaptive management framework (indicators have not yet been developed).

The present document provides a desktop summary of existing knowledge and strategies in line with this framework while recognising that further input and locally based knowledge are required to advance the planning.





Figure 1.3. Diagram showing the cyclical nature of planning based on the principles of adaptive management (above).

## 2. DESCRIPTION OF CONSERVATION ASSETS

### 2.1 Methodology for Identifying Assets

The first step in the conservation action planning process involves the identification of a small number of focal conservation assets (i.e. ecosystems, communities or species) that collectively represent the biodiversity of a region. The explicit assumption within this process is that by conserving representative examples of broad-scale communities and ecosystems, the majority of species will also be conserved. The list of focal conservation assets therefore need not be long and exhaustive; rather, it should be short and representative. In general, the CAP methodology recommends that no more than eight conservation assets are selected to be the focus of a landscape conservation program.

The asset selection process begins by identifying the coarse-scale ecosystems and communities for conservation. The issue of whether to lump individual ecosystems and communities together or split into individual conservation assets is often a difficult one. In general, ecosystems and communities are lumped together if they:

- co-occur across the landscape;
- share similar ecological processes;
- share similar threats.

The next step is to screen for species and communities occurring at smaller scales that are not well “nested” within the broader set of ecosystems or communities; that is, those species and communities whose conservation requirements are not met through the conservation of the coarse-scale assets (as suggested by Noss et al. 1999; Margules and Pressey 2000; MacNally et al. 2002). This approach is known as the coarse filter – fine filter approach (Groves 2003). Examples of species often not captured by coarse-scale assets include:

- rare, threatened and endemic species;
- species with highly disjunct (spatially separate) populations or restricted distributions;
- keystone or highly interactive species (those that have a disproportionate influence on the structure and ecological function of the community);
- wide-ranging species.

Species and communities that fall into the above categories may be captured by threatened species recovery programs or may need to be considered as separate conservation assets.

## 2.2 Description of Assets

Tables 2.1 and Figure 2.2 present the list of conservation assets and list important “nested assets”, or species and communities of conservation significance that are considered to be “captured” by the broader ecosystem. The list of nested assets is used to ensure that the requirements of threatened species are considered when ranking threats and developing conservation strategies for each ecosystem.

Plains Grassland on private land was split from Plains Grassland on public land in order to highlight differences in threatening processes associated with different land tenures.

**Table 2.1.** Focal conservation assets of the Victorian Volcanic Plain. The list of assets is intended to collectively represent all of the biodiversity in the region, with finer-scale conservation assets such as threatened species considered to be “captured” as “nested assets” in one or more coarse-scale assets (not exhaustive).

ASSET	DESCRIPTION	NESTED ASSETS*
<b>1.Plains Grassland (public land)</b>	Grassland dominated by one or more tussock-forming native grasses (particularly <i>Themeda triandra</i> ) on heavy clay soils in association with a rich variety of native grasses, herbs and wildflowers. Shrubs are sparse or absent. Grassland on public land occurs on roadsides, railways and reserves and includes much of the remaining relatively intact areas. Most of the region’s nationally threatened flora populations occur in these areas. EPBC-listed community.	<b>THREATENED FLORA:</b> Fragrant Leek-orchid (EN), Small Purple Pea (EN), Button Wrinklewort (EN), Basalt Greenhood (EN), Sunshine Diuris (EN), Small Golden Moths (EN), Gorae Leek-orchid (EN), Maroon Leek-orchid (EN), Large-fruit Groundsel (EN), Spiny Riceflower (EN), Hoary Sunray (EN), Small Scurf-pea (EN), Tough Scurf-pea (EN), Basalt Peppercross (EN), Trailing Hop-bush (VU), Monaro Golden Daisy (VU), Dense leek-orchid (VU) <b>BIRDS:</b> Plains Wanderer (VU, cr), Painted Button-quail, Red-chested Button-quail (v), Diamond Firetail (nt)
<b>2.Plains Grassland (private land)</b>	Plains grassland on private land is usually grazed by stock and includes a mixture of exotic and native grasses, hence it usually occurs in a derived state and has specialised management requirements. It nevertheless provides important habitat for species such as Golden Sun Moth. EPBC-listed community (where condition threshold is met).	<b>GROUND-DWELLING MAMMALS:</b> Eastern Barred Bandicoot (EN), Southern Bettong (EX), Eastern Quoll (EN), Spotted Quoll (EN) <b>REPTILES:</b> Striped Legless Lizard (VU), Grassland Earless Dragon (EN, rx), Bearded Dragon (v), Glossy Grass Skink (v) <b>INVERTEBRATES:</b> Golden Sun Moth (CR)
<b>3. Plains Grassy Woodland</b>	An open, eucalypt woodland typically dominated by River Red Gum <i>E. camaldulensis</i> and associated with poorly drained, fertile soils on flat or gently undulating plains. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer. EPBC-Listed community.	<b>THREATENED FLORA:</b> Large-fruit Groundsel (EN), Spiny Riceflower (EN), Hoary Sunray (EN), Small Scurf-pea (EN), Tough Scurf-pea (EN), Trailing Hop-bush (VU), Matted Flax-lily (EN), Clover Glycine (VU) <b>BIRDS:</b> Swift Parrot (EN), Diamond Firetail (nt), Diamond Dove (nt), Crested Bellbird (nt), Painted Button-quail, Brown Treecreeper (SE subspecies, nt),

		<p>Hooded Robin (nt), Jacky Winter, Barking Owl (e), Masked Owl (e), Black-eared Cuckoo (nt)</p> <p><b>GROUND-DWELLING MAMMALS:</b> Eastern Barred Bandicoot (EN) , Southern Bettong (EX), Eastern Quoll (EN), Spotted Quoll (EN)</p> <p><b>REPTILES:</b> Bearded Dragon (VU), Striped Legless Lizard (EN), Growling Grass Frog (VU), Glossy Grass Skink (v)</p>
<p><b>4. Stony Rises Woodland and associated wetlands</b></p>	<p>Eucalypt woodland typically dominated by Manna Gum <i>E. viminalis</i> or Swamp Gum <i>E. ovata</i> to 15 m tall on stony rises (highly irregular terrain on recent basalt flows). Soils are fertile and well-drained but shallow or skeletal. Limited soil development outside of rock-cracks and dry summers promote annuals and deep-rooted perennials.</p>	<p><b>THREATENED FLORA:</b> Limestone Spider-orchid (VU)</p> <p><b>BIRDS:</b> Grey Goshawk (v), Black-chinned Honeyeater (nt), Powerful Owl (v)</p> <p><b>REPTILES:</b> Corangamite Water Skink (CR)</p> <p><b>ARBOREAL MAMMALS:</b> Common Bent-wing Bat (southern subspecies; CR)</p> <p><b>GROUND-DWELLING MAMMALS:</b> Spot-tailed Quoll (EN), Eastern Quoll (rx), Common Dunnart</p>
<p><b>5. Non-eucalypt Woodlands (Sheoak, Buloke, Silver Banksia)</b></p>	<p>Low open woodland or shrubland variously dominated by Sheoak, Silver Banksia, Sweet Bursaria or Buloke over a diverse ground layer of grasses and herbs. The low shrub component is usually sparse. It occurs on sites with moderate fertility on a range of geologies, including low basalt stony rises and escarpments.</p>	<p><b>REGIONALLY THREATENED FLORA:</b> Sheoak <i>Allocasuarina verticillata</i>, Silver Banksia <i>Banksia marginata</i>, Sweet Bursaria <i>Bursaria spinosa</i> or Buloke <i>Allocasuarina leuhmanii</i></p> <p><b>REPTILES:</b> Corangamite Water Skink (CR)</p>
<p><b>6. Creeks and riparian vegetation</b></p>	<p>The region includes a large number of creeks with varied geomorphology, many of which have been extensively modified since European settlement. Riparian zones often include important remnants of grasslands and grassy woodlands. Important examples include: Darlot Creek, Mt Emu Creek, Eumeralla River, Little River, Spring Creek and Moyne River.</p>	<p><b>FROGS:</b> Brown Toadlet (e)</p> <p><b>FISH:</b> Dwarf Galaxias (VU), Yarra Pygmy Perch (VU), Variegated Pygmy Perch (VU), Australian Grayling (VU), Murray Hardyhead (VU), Murray Cod (VU), Australian Mudfish (cr), Freshwater Catfish (e)</p> <p><b>REPTILES:</b> Common Long-necked Turtle (dd)</p> <p><b>BIRDS:</b> Azure Kingfisher (nt), Magpie Goose (nt), Australasian Shoveller (v), Pied Cormorant (nt), Eastern Great Egret (v), Intermediate Egret (en), Little Egret (v), Spotted Harrier (nt), Glossy Ibis (nt), Lewin's Rail (v)</p>
<p><b>7. Freshwater Wetlands</b></p>	<p>Ephemeral to semi-permanent wetlands encompassing a variety of different Ecological Vegetation Classes from wooded brackish swamps to freshwater meadows, typically occurring in lowland areas of flat or gently undulating plains, often in association with grassy ecosystems. Includes the EPBC-listed Seasonally Inundated Herbaceous Wetlands.</p>	<p><b>THREATENED FLORA:</b> Curly Sedge (EN), Adamson's Blown-grass (EN), White Sunray (e), Swamp Everlasting (v)</p> <p><b>BIRDS:</b> Australasian Bittern (EN), Little Bittern (e), Brolga (v), Royal Spoonbill (nt), Fairy Tern (VU), Gull-billed Tern (e), Whiskered Tern (nt), Blue-billed Duck (e), Musk Duck (v), Hardhead (v), Magpie Goose (nt), Australasian Shoveller (v), Pied Cormorant (nt), Black-faced Cormorant (nt), Eastern Great Egret (v),</p>

		<p>Intermediate Egret (en), Little Egret (v), Spotted Harrier (nt), Glossy Ibis (nt), Lewin’s Rail (v), Baillon’s Crake (v)</p> <p><b>AMPHIBIANS:</b> Growling Grass Frog (VU), Brown Toadlet (e)</p> <p><b>FISH:</b> Dwarf Galaxias (VU)</p> <p><b>REPTILES:</b> Corangamite Water Skink (CR), Common Long-necked Turtle (dd)</p>
<p><b>8. Permanent Lakes</b></p>	<p>The region includes an extensive and diverse range of lake systems with varied geomorphology. Ecosystems range from deep freshwater, steep-sided lakes to shallow hypersaline lakes in relatively flat areas.</p>	<p><b>THREATENED FLORA:</b> Salt-lake Tussock-grass (EN), Spiny Peppergrass (EN)</p> <p><b>BIRDS:</b> Orange-bellied Parrot (CR), Australian Painted Snipe (VU, cr), Australasian Shoveler (v), Banded Stilt, Blue-billed Duck (e), Freckled Duck (e), Pied Cormorant (nt), Pacific Gull (nt), Hoary-headed Grebe, Pink-eared Duck, Red-capped Plover, Red-necked Avocet, Straw-necked Ibis, Sharp-tailed Sandpiper, Pectoral Sandpiper (nt), Common Sandpiper (v), Marsh Sandpiper (v), Curlew Sandpiper (e), Latham’s Snipe (nt), Common Greenshank (v), Black-tailed Godwit (v), Grey-tailed Tattler (cr), Grey Plover (e), Lesser Sand Plover (cr), Eastern Great Egret (e), Little Egret (e), Black Falcon (v), Spotted Harrier (nt), Nankeen Night Heron (nt), Inland Dotterel (v)</p> <p><b>FISH:</b> Dwarf Galaxias (VU), Yarra Pygmy Perch (VU)</p> <p><b>REPTILES:</b> Four-toed Skink (nt)</p>

\*Threatened species ratings include nationally (EPBC) listed species (CR= Critically Endangered, EN=Endangered, VU=Vulnerable) and state listed species (rx=regionally extinct, cr=critically endangered, e=endangered, v=vulnerable, nt=near threatened, r=rare, dd=data deficient, k=poorly known).

## 2.2 Distribution of Conservation Assets

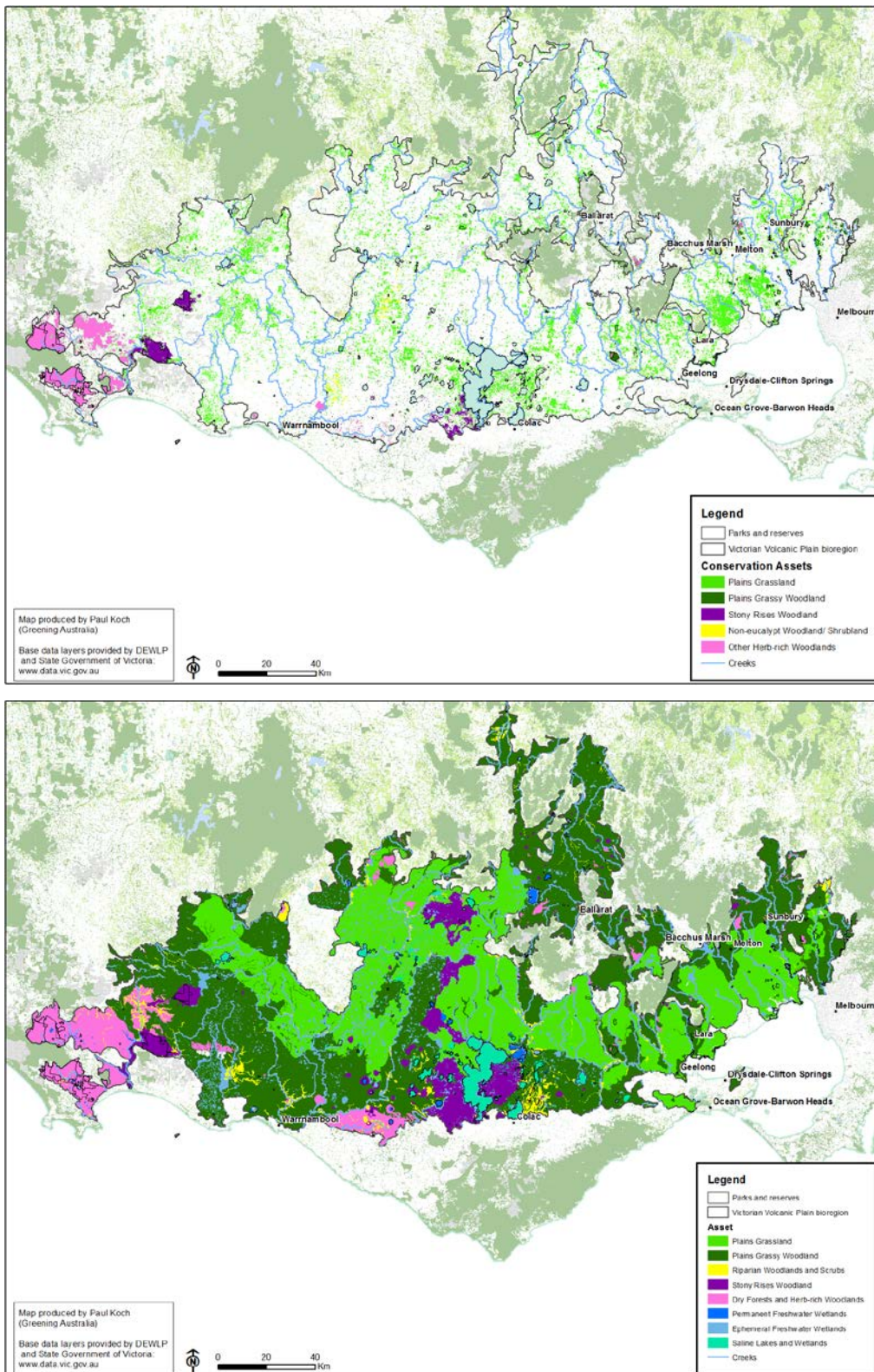


Figure 2.2. Current (above) and pre-European distribution of conservation assets for the Victorian Volcanic Plain region.

### 3. VIABILITY ASSESSMENT

#### 3.1 Methodology for Assessing Viability

The second step in the conservation action planning process is an assessment of the viability (or overall health) of the conservation assets. This is a four step process.

**Step 1** Identification of a small number (3 - 5) of key ecological attributes for each conservation asset.

Key ecological attributes represent the critical factors required for the long term viability of the conservation assets. These factors relate to the size, condition and landscape context of the assets (refer to Figure X).

**Step 2** Identification of appropriate indicators for each key ecological attribute.

Indicators are easily measurable factors closely related to the status of the key ecological attributes. For example, the frequency of annual flood events may be an appropriate indicator for hydrological regimes.

**Step 3** Development of criteria for rating the current status of each indicator.

The development of criteria for rating the status of each indicator is an iterative process that typically starts as a simplified qualitative assessment (e.g. lots, some, few) and is progressively developed into more refined, numeric value ranges (e.g. 1,000 megalitres of water for 3 months during late spring).

**Step 4** Ranking the current status of each indicator to determine the overall viability of the conservation assets.

The final step in assessing the viability of the conservation assets is to rank the current status of each indicator based on the criteria for poor, fair, good and very good (described below).

**POOR** - allowing the factor to remain in this condition for an extended period of time will make restoration or preventing extirpation practically impossible.

**FAIR** – the factor is outside its range of acceptable variation and requires human intervention. If unchecked, the asset will be vulnerable to serious degradation.

**GOOD** – the factor is functioning within its range of acceptable variation; it may require some human intervention.

**VERY GOOD** – the factor is functioning at an ecologically desirable status, and requires little human intervention.

### 3.2 Viability Assessment Results

Table 3.1 presents a summary of viability assessments conducted as part of the Conservation Action Planning process. The table highlights the generally poor state of grassy ecosystems across all key ecological attributes. It was noted that the critical issue affecting Permanent Lakes was altered hydrological regime is the main driver for impacts on several other key attributes such as water quality, fauna composition, vegetation structure and composition.

**Table 3.1.** Summary viability table for assets of the Victorian Volcanic Plain (ratings values against key attributes). Ratings are mostly subjective assessments based on expert assessment, with the intention of refining them over time using databases such as AVIRA, Index of Wetland Condition, Index of Stream Condition, spatial data on native vegetation quality etc.

ASSET	Amount remaining (% of pre1750 extent)	Fauna composition	Vegetation structure and composition	Connectivity between systems	Patch size and connectivity	Disturbance regime (fire or grazing)	Aquatic instream habitat integrity	Hydrological regime	Water Quality
Plains Grassland (public land)	Poor	Poor	Poor	Poor	Poor	Poor			
Plains Grassland (private land)	Poor	Poor	Poor	Poor	Poor	Poor			
Plains Grassy Woodland	Poor	Poor	Poor	Poor	Poor	Poor			
Stoney Rises Woodland and associated wetlands	Fair	Fair	Fair	Fair	Fair	Fair			
Non-eucalypt Woodlands (Sheoak, Buloke, Silver Banksia)	Fair	Fair	Good	Fair	Good	Fair			
Creeks and riparian vegetation	Fair	Fair	Good	Fair	Fair	Fair			
Freshwater Wetlands	Fair	Good	Fair	Good	Good	Fair			
Permanent Lakes	Good	Poor	Poor	Poor	Fair			Poor	Poor



## 4. THREAT RANKING

### 4.1 Methodology for Ranking Threats

The third step in the conservation action planning process involves the identification of high priority threats to the conservation assets. This assessment considers and rolls up a ranking against the following criteria:

- **severity of damage where it occurs** i.e. what level of damage can reasonably be expected within 10 years under current circumstances (Very High - destroys or eliminates the conservation asset, High - seriously degrades, Medium - moderately degrades, Low - slightly impairs);
- **scope of the damage** i.e. what is the geographic scope of impact on the conservation asset that can be reasonably expected within 10 years under current circumstances (Very High - very widespread, High - widespread, Medium - localised, Low - very localised).
- **irreversibility of the damage** (Very High - not reversible, High - reversible, but not practically affordable, Medium - reversible with reasonable commitment of resources, Low - easily reversible at low cost).

A summary rating for each threat is generated by the Conservation Action Planning (CAP) software. This results in the threats summary table (refer table 4.1).



## 4.2 Threat Assessment Results

Threat rating summary tables are given for aquatic ecosystems in Table 4.1 and terrestrial ecosystems in Table 4.2. Invasive aquatic predators were high across all aquatic assets. Water regime alterations were the highest ranked threat for any one aquatic asset (Permanent Lakes). Historical clearing and fragmentation and uncontrolled stock grazing are also major threats for aquatic assets.

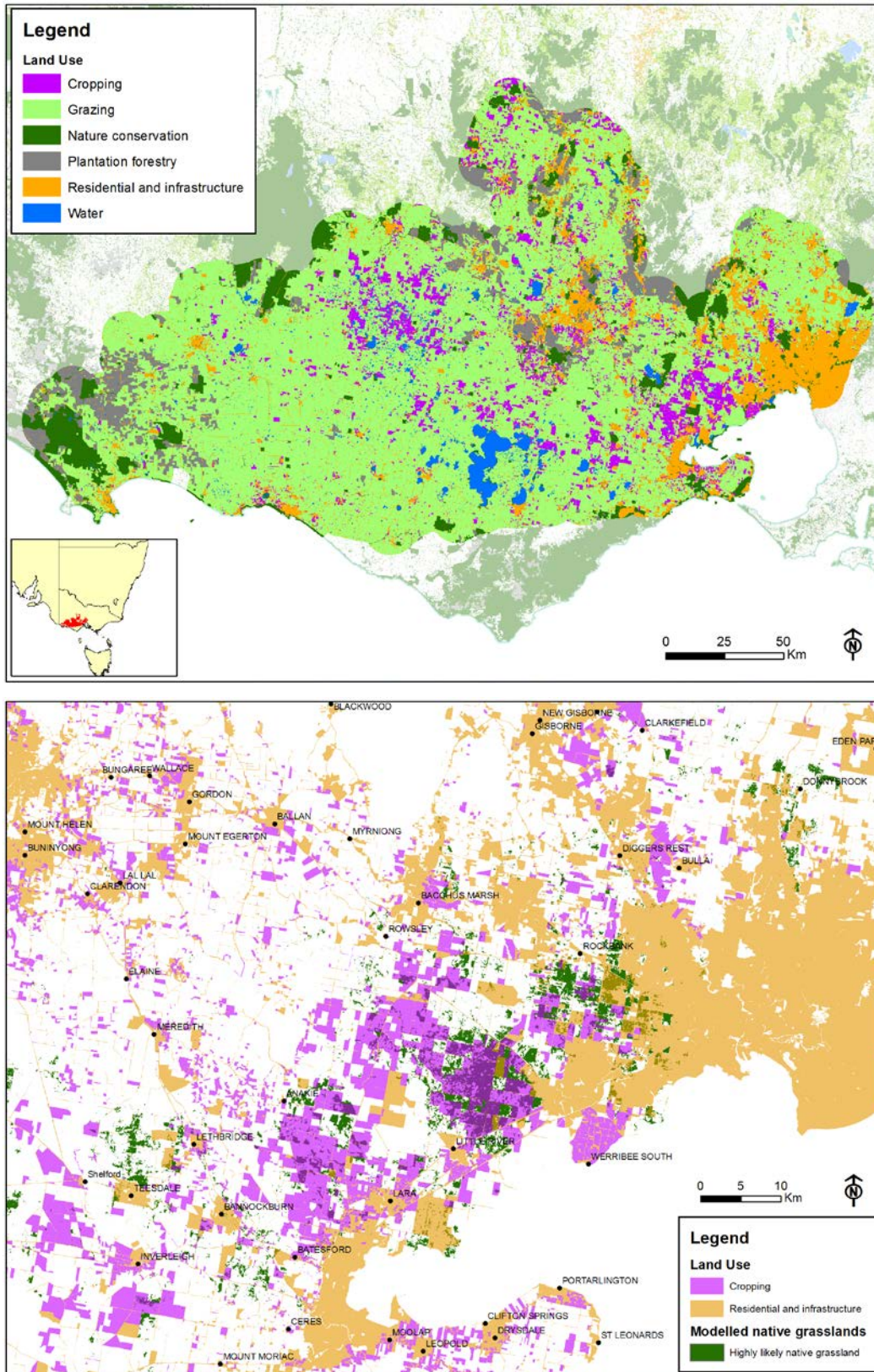
**Table 4.1.** Threat summary ratings for aquatic ecosystems.

Threats	Major Waterways	Freshwater Wetlands	Permanent Lakes
Invasive aquatic predators (Redfin, Trout etc.)	High	High	High
Historical clearing and fragmentation	High	High	Low
Uncontrolled stock grazing & pugging	High	Medium	High
Agricultural runoff	Medium	Medium	Medium
Introduced predators - foxes and cats	Low	Medium	High
Ongoing clearing and conversion	Low	Medium	Low
Water regime alterations (incl. surface water diversion and groundwater extraction)	High	Medium	Very High
Invasive environmental weeds - terrestrial	Medium	Low	Low
Other invasive aquatic pest animals	High	Low	Low
Waterways - instream barriers	High		
Invasive weeds aquatic			
<b>Summary threat rating (by asset)</b>	<b>Very High</b>	<b>High</b>	<b>Very High</b>

For terrestrial assets, invasive environmental weeds were by the far the greatest threat. The analysis also highlighted the high threat status of plains grassland habitat occurring on public land (roadsides, small reserves etc.) where threats associated with adjacent land use activities and inappropriate management of biomass and other roadside maintenance activities combine to seriously threaten remnant grasslands.

**Table 4.2.** Threat summary ratings for terrestrial ecosystems (non-eucalypt woodlands has not yet been rated).

Threats	Plains Grassland - public land	Plains Grassland - private land	Plains Grassy Woodland	Stony Rises Woodland	Non-eucalypt Woodlands (Sheoak, Banksia, Tree Violet etc.)
Invasive environmental weeds - terrestrial	Very High	Very High	Very High	High	Very High
Historical clearing and fragmentation	High	Medium	High	Medium	Very High
Agricultural runoff	High	Medium	Medium	Medium	Medium
Inappropriate biomass removal regime (fire, grazing etc.)	High	Medium	Medium	Low	High
Lack of pollination	High	Low	Medium	Medium	Very High
Inappropriate herbicide use	High	Medium	Medium	Low	Medium
Small population size, inbreeding etc.	High	Low	Medium	Medium	High
Introduced herbivores: rabbits	High	Medium	Medium	Medium	High
Public land maintenance activities	High	Low	Low	Low	Medium
Uncontrolled stock grazing & pugging	Medium	Medium	Medium	Medium	High
Climate Change - hotter and drier	Medium	Medium	Medium	Medium	High
Introduced predators - foxes and cats	Medium	Medium	Medium	Medium	Low
Introduced invertebrate pests	Medium	Low	Medium	Low	Medium
Changing agricultural practices - ploughing & cropping	Medium	Medium	Medium	Medium	Medium
Rock removal or crushing	Low	Medium	Medium	High	Medium
Residential development	Low	Medium	Medium	Low	Low
Ongoing clearing and conversion	Low	Low	Low	Low	Low
<b>Summary threat rating (by asset)</b>	<b>Very High</b>	<b>High</b>	<b>Very High</b>	<b>High</b>	<b>Very High</b>



**Figure 4.1.** Land use mapping for the region (updated in 2014), derived from Australian Collaborative Land Use and Management Program (ACLUMP). The top map shows an overview of land uses for the region. The lower map shows substantial loss of native grasslands due to land use change to cropping and encroaching residential and infrastructure development.

## 5. SITUATION ANALYSIS

Figures 5.1 and 5.2 show the results of situation analyses focussing on terrestrial and aquatic ecosystems, respectively. The situation analysis process involves a facilitated discussion about key drivers of particular threats and opportunities for intervention. The process considers which groups of people are associated with a particular threat (this could include private landholders, policy-makers, public land management authorities etc.), what is motivating them to act in a certain way and what can be done to influence them. The discussion also covers feasibility issues associated with particular actions normally taken to address problems (eg. the short-term nature of funding cycles where problems require ongoing management).

For terrestrial systems, in-depth discussions were had about problems with managing invasive weeds (particularly on private land where knowledge of broad-scale weed control techniques is limited) and problems with current biomass management of grasslands on roadsides (burning, slashing etc.). These discussions led to the development of actions to improve knowledge of weed control techniques for private landholders and additional training, support and accreditation for Country Fire Authority personnel (targeting Vegetation Management Officers) to undertake specialised management of grasslands in high value areas. In addition, the critical infrastructure requirements for undertaking high quality grassland restoration were discussed and the need to change current policies around offset requirements. This analysis highlights the complexity of conservation strategies and the need to consider supporting actions beyond on-ground activities (specific actions are detailed in section 6).



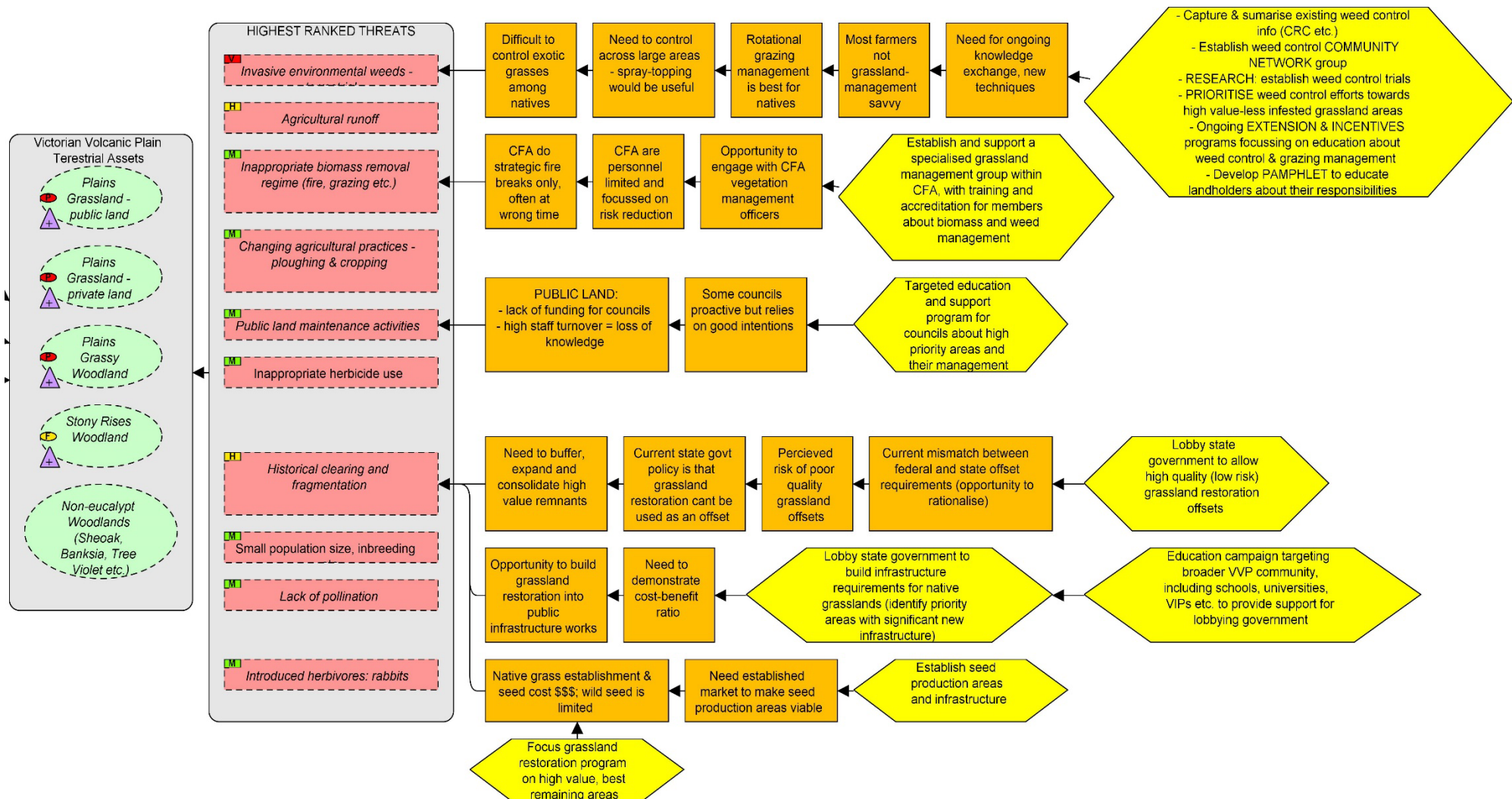
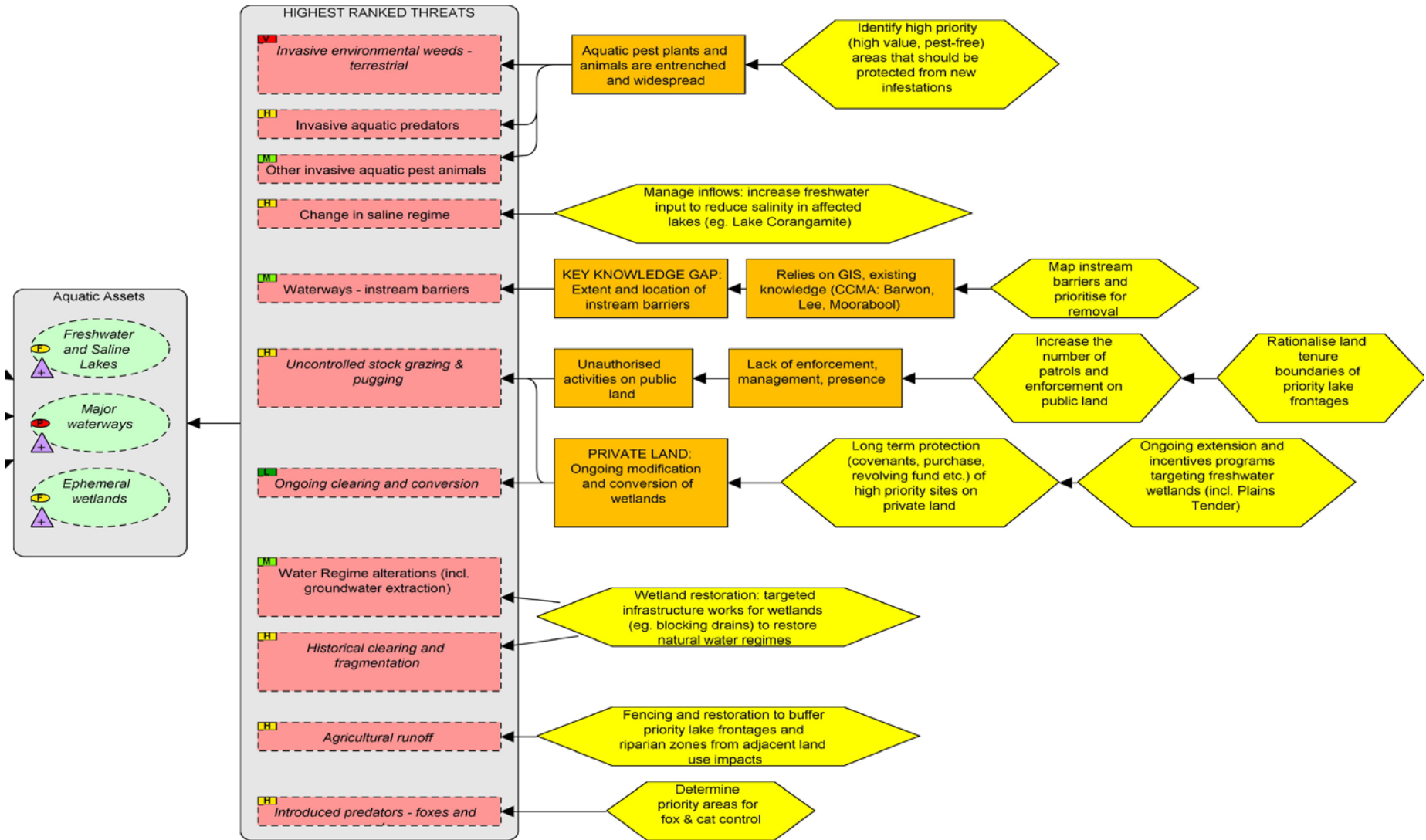


Figure 5.1. Situation analysis diagram for terrestrial ecosystems showing conservation assets (green ellipses), key threats (pink rectangles), contributing factors (orange boxes) and strategies (yellow hexagons).



**Figure 5.2.** Situational analysis diagram for aquatic ecosystems showing conservation assets (green ellipses), key threats (pink rectangles), contributing factors (orange boxes) and strategies (yellow hexagons).

## 6. OBJECTIVES, ACTIONS & PRIORITY AREAS

### 6.1. Grassy Ecosystem Core Habitat Protection Restoration Program

**Table 6.1.** Area of plains grassland on public and private land, including areas mapped both as Ecological Vegetation Classes and classified as “highly likely native grasslands” in the NV\_extent layer produced by DELWP from remote sensing data.

	Parks and reserves (ha)	Other public land (ha)	Private land (ha)	TOTAL (ha)	Pre1750 ha	% of pre1750 extent
<b>Plains Grassland (all)</b>	2385	2679	65669	<b>70733</b>	735953	9.6
Plains Grassland - mapped EVC	1068	772	6712	8552	735953	1.2
Plains Grassland - modelled	1317	1907	58957	62181	735953	8.4
<b>Plains Grassy Woodland</b>	1691	2436	14965	<b>19093</b>	1079919	1.8

#### Overarching Objective

*By 2030, at least five “viable” and connected habitat areas are in place with an effective patch size of at least 10000 ha of Plains Grassland and/or Plains Grassy Woodland including at least 2000ha in “good” condition per project area, with active management of threats and documented recovery and reintroduction of threatened species.*

#### Sub-objectives

*High quality restoration using established grassy groundcover direct seeding method (to at least 4 star SERA standard) of at least 5000ha of Plains Grassland and 5000ha of Plains Grassy Woodland by 2030 (protected to IUCN Category V), initially focussed in 5 priority project areas to maximise benefits for threatened flora and fauna.*

*Increase the area of grassland represented in the reserve system (protected to IUCN Category V) from to 5000 ha, initially focussed in 5 priority project areas to maximise benefits for threatened flora and fauna.*

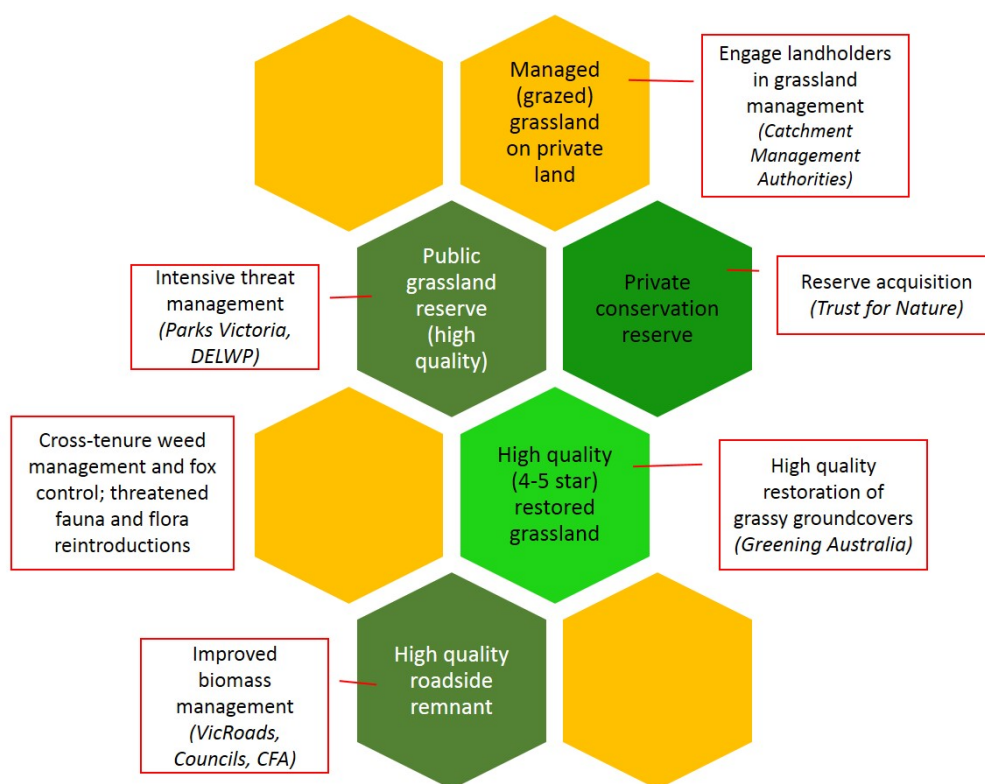
*Increase the area of grassland on private land managed under a sustainable use framework (IUCN Category VI to at least 30,000 ha) by 2030.*



Principal Action	High priority project sites*	Key Threatened Species at sites
<ul style="list-style-type: none"> <li>Targeted habitat protection, weed control, biomass management of grasslands &amp; grassy woodlands</li> <li>High quality restoration to expand and consolidate remnant grasslands</li> <li>Sustainable management of grassland areas on private land (grazing and weed control)</li> <li>Implementation of threatened species recovery actions</li> </ul>	<p>Grasslands: Cressy-Shelford Rd Area, Lethbridge-Teesdale Area, Crossroads-stoneleigh, <b>Dundonnell</b>, Mooramong</p> <p>Grassy woodlands: Glenthompson, <b>Dunkeld</b></p>	<p>Fragrant Leek-orchid, Basalt Rustyhood, Spiny Riceflower, Small Golden Moths, Eastern Barred Bandicoot, Southern Bettong, Eastern Quoll, Spotted Quoll, Striped Legless Lizard, Golden Sun Moth, Large-fruit Groundsel, Button Wrinklewort, Spiny Rice Flower, Hoary Sunray, Adamson's Blown-grass, Gorae Leek-orchid and Clover Glycine</p>
<p>Implement state government offsets program</p>	<p>Werribee Plains (Including <b>Mount Rothwell</b>), Whitelea Plains</p>	<p>Matted Flax-lily, Curly Sedge, Spiny Riceflower, Small Golden Moths, Eastern Barred Bandicoot, Southern Bettong, Eastern Quoll, Spotted Quoll, Striped Legless Lizard, Golden Sun Moth, Large-fruit Groundsel, Button Wrinklewort and others</p>

\*Highest priority sites for threat mitigation are ranked in Italics. Prioritisation is based on Steps 1 and 2 of the INFFER process (see Panell et al. 2012; [www.inffer.com.au](http://www.inffer.com.au))

\*\* Highest priority sites for threatened species reintroductions are ranked in Bold. Prioritisation is based on demonstrated success in threatened species reintroduction programs.

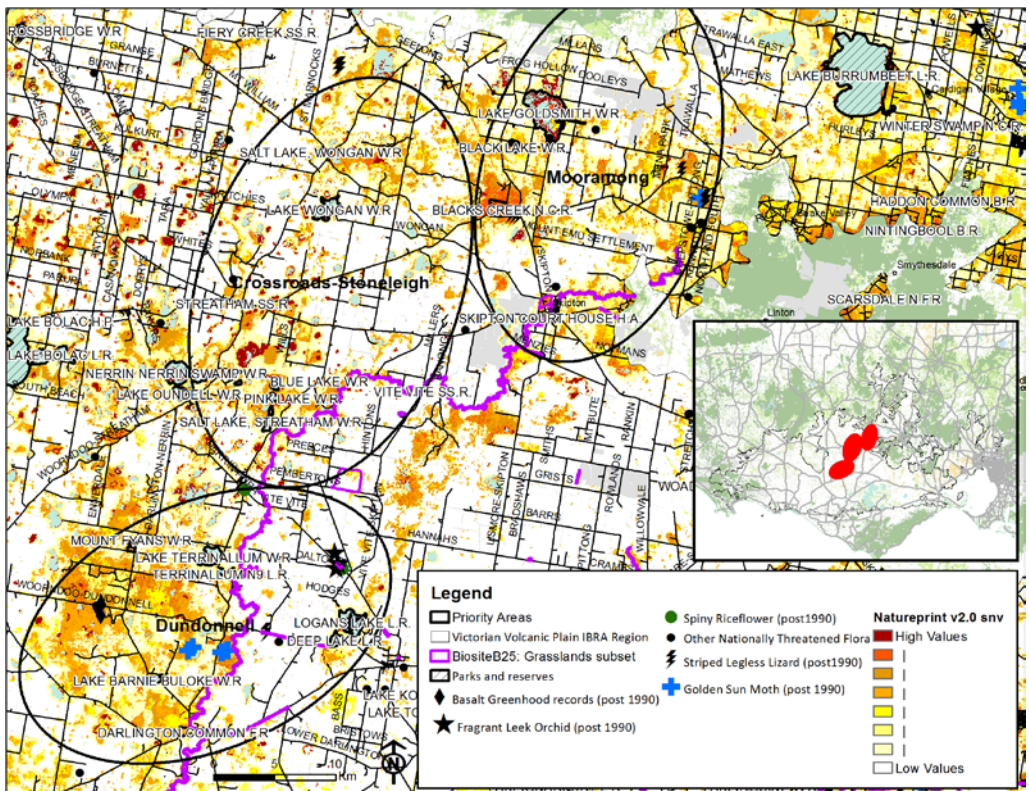
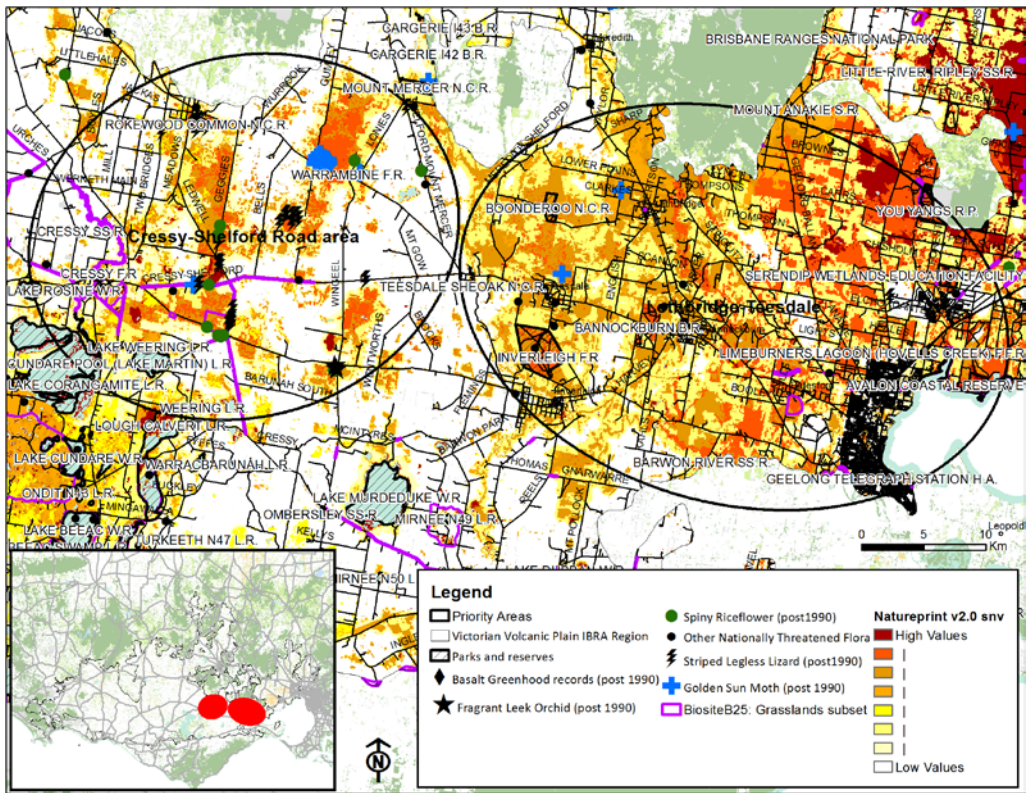


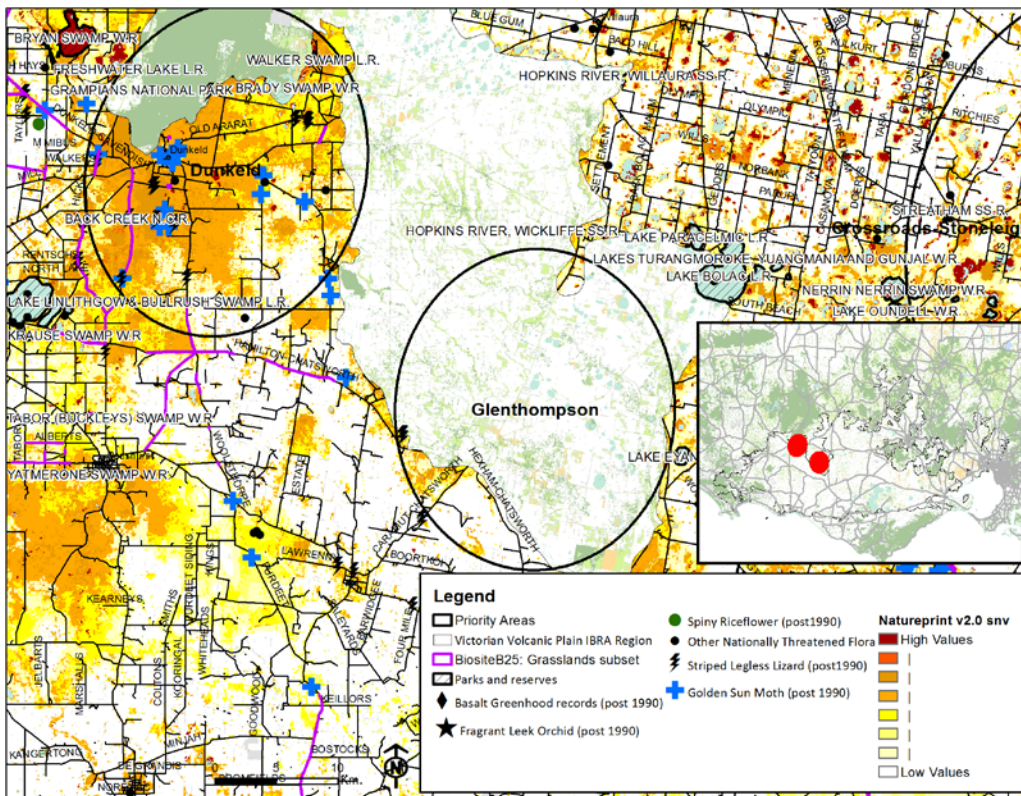
**Figure 6.1.** Diagram illustrating an holistic, collaborative and targeted approach to the management and restoration of grasslands and grassy woodlands (to be implemented in high priority project areas).

## Supporting Actions

- 6.1.1** Summarise best management practices for weed control in grassland areas in pamphlet for distribution to landholders
- 6.1.2** Identify key knowledge gaps associated with weed control in grassland areas and establish scientific trials to address them
- 6.1.3** Establish community network groups in priority areas with an emphasis on developing and sharing knowledge about weed control techniques such as spray-topping
- 6.1.4** Employ at least one full-time facilitator to oversee and engage agencies, landholders and community network groups
- 6.1.5** Establish and support a specialised grassland management group within the CFA, with training and accreditation for members trained in native grassland biomass and weed management techniques
- 6.1.6** Engage wind farm companies to assist in funding priority conservation actions and sites
- 6.1.7** Lobby state government to allow high quality grassland restoration sites as offsets
- 6.1.8** Lobby state government to build requirements for restored native grasslands into new infrastructure projects. Conduct education campaign targeting regional community including schools, universities etc. to support these ideas.
- 6.1.9** Establish seed production areas and infrastructure to meet critical requirements for grassland restoration projects.
- 6.1.10** Focus grassland restoration, long term protection and weed control program on high value, best remaining areas. Facilitate an ongoing collaborative, partnership approach to implementing projects in identified priority areas.
- 6.1.11** Develop States and Transitions Model for grasslands to support identification of best practice management strategies
- 6.1.12** Implement additional actions identified in the Recovery Plan and integrate recommendations from threatened species recovery plans into on-ground works programs for each priority project area

The following series of maps (Figure 6.1) shows the location of priority project areas and highlights some of the values associated with each area. Details of the prioritisation process are included in Appendix 1.





**Figure 6.1.** High priority project areas for focussing conservation efforts on grassy ecosystems (Glenthompson is just outside the VVP so data is currently missing for this area).



Frank Carland (from Vicroads) at a grassland restoration site near Wickliffe (direct seeding by Greening Australia).

## 6.2. Non-eucalypt Woodland Habitat Protection and Restoration Program

### Objectives

*By 2030, a “viable” network of stony knoll shrublands is in place with formal protection (IUCN Category and management of X000 ha of core habitat areas and a minimum effective habitat area (20000 ha?) sufficient to support increasing populations of Corangamite Water Skink.*

*By 2030, at least three priority sites (one for each species) containing important populations of Sweet Bursaria, Drooping Sheoak and Silver Banksia have been formally protected and the average distance between populations of greater than 10 individuals of Silver Banksia, within the VVP, is less than 20km.*

Principal Action	High priority project areas*
Targeted management and revegetation to enhance, expand and consolidate stony rises shrublands and increase habitat for the Corangamite Water Skink	Stoney knoll shrublands (west of Lake Corangamite)
Targeted management and revegetation to enhance, expand and consolidate priority non-eucalypt woodlands	Moutajoup, Minhamite
Target restoration to restore landscape connectivity and reduce isolation of Silver Banksia	Region wide

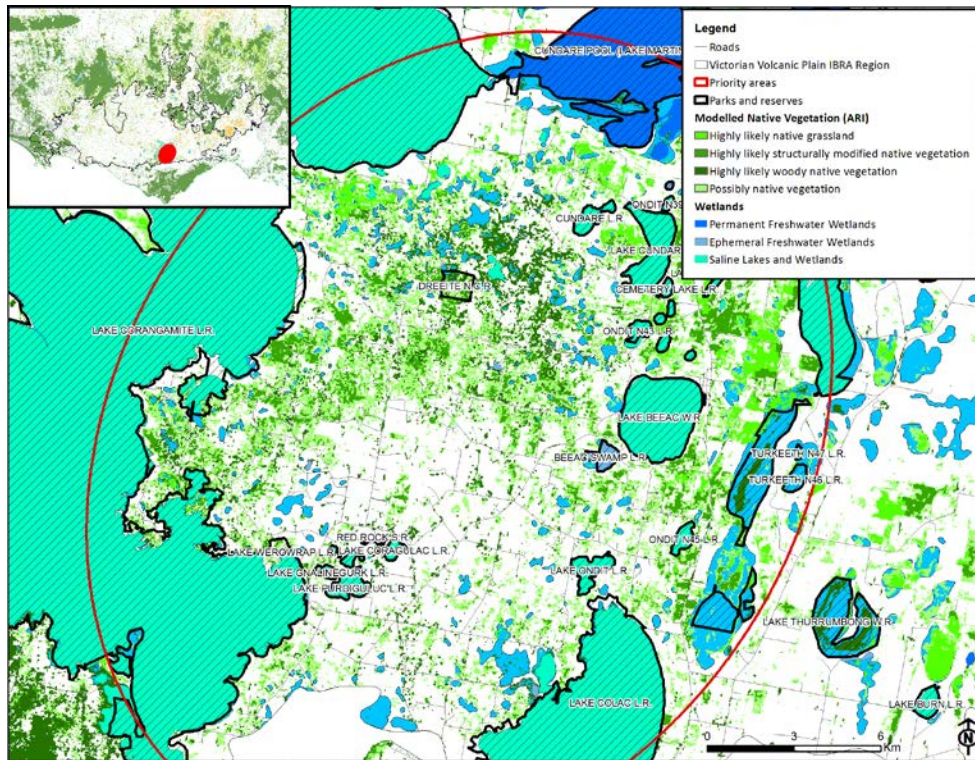
\*Prioritisation is based on Steps 1 and 2 of the INFFER process (see Panell et al. 2012)

### Supporting Actions

- 6.2.1** Identify, map and prioritise key populations of non-eucalypt woodlands for protection and expansion
- 6.2.2** Investigate additional opportunities on road (Victrack) and rail (ARTC) corridors for protecting and expanding populations of non-eucalypt woodlands
- 6.2.3** Support local community efforts to enhance and expand Silver Banksia rail corridor remnant at Minhamite as one of the largest remaining populations of Silver Banksia on the VVP
- 6.2.4** Identify and prioritise landholdings in the stony knoll shrublands west of Lake Corangamite to rehabilitate and restore habitat for the Corangamite Water Skink. Identify and map opportunities for consolidating and reconnecting existing habitats.
- 6.2.5** Protect and manage key sites for the Corangamite Water Skink, restoring rocky habitats, replanting shrublands and managing stock access. Establish formal (long term) protection agreements where possible.

**6.2.4** Develop a research partnership to identify any genetic differences between VVP populations of Silver Banksia and Buloke and populations in adjacent bioregions. Determine the importance of seed provenance in preserving VVP populations and identify and manage any inbreeding issues.

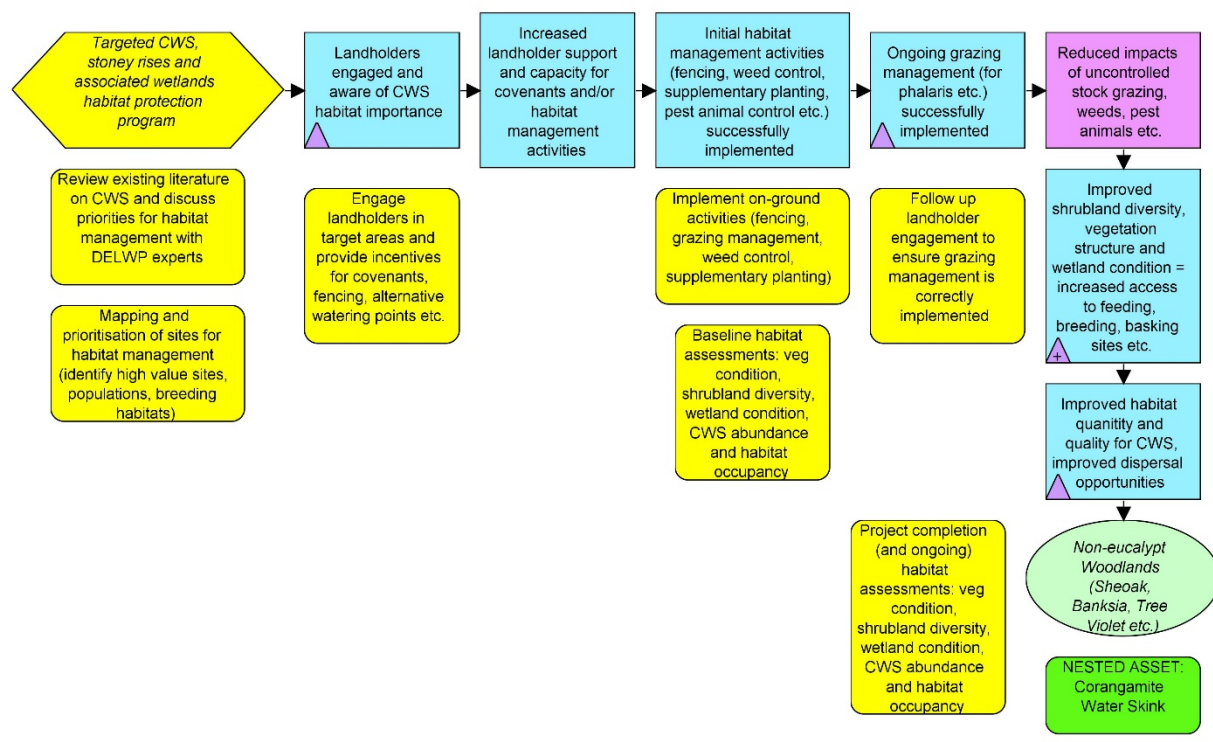
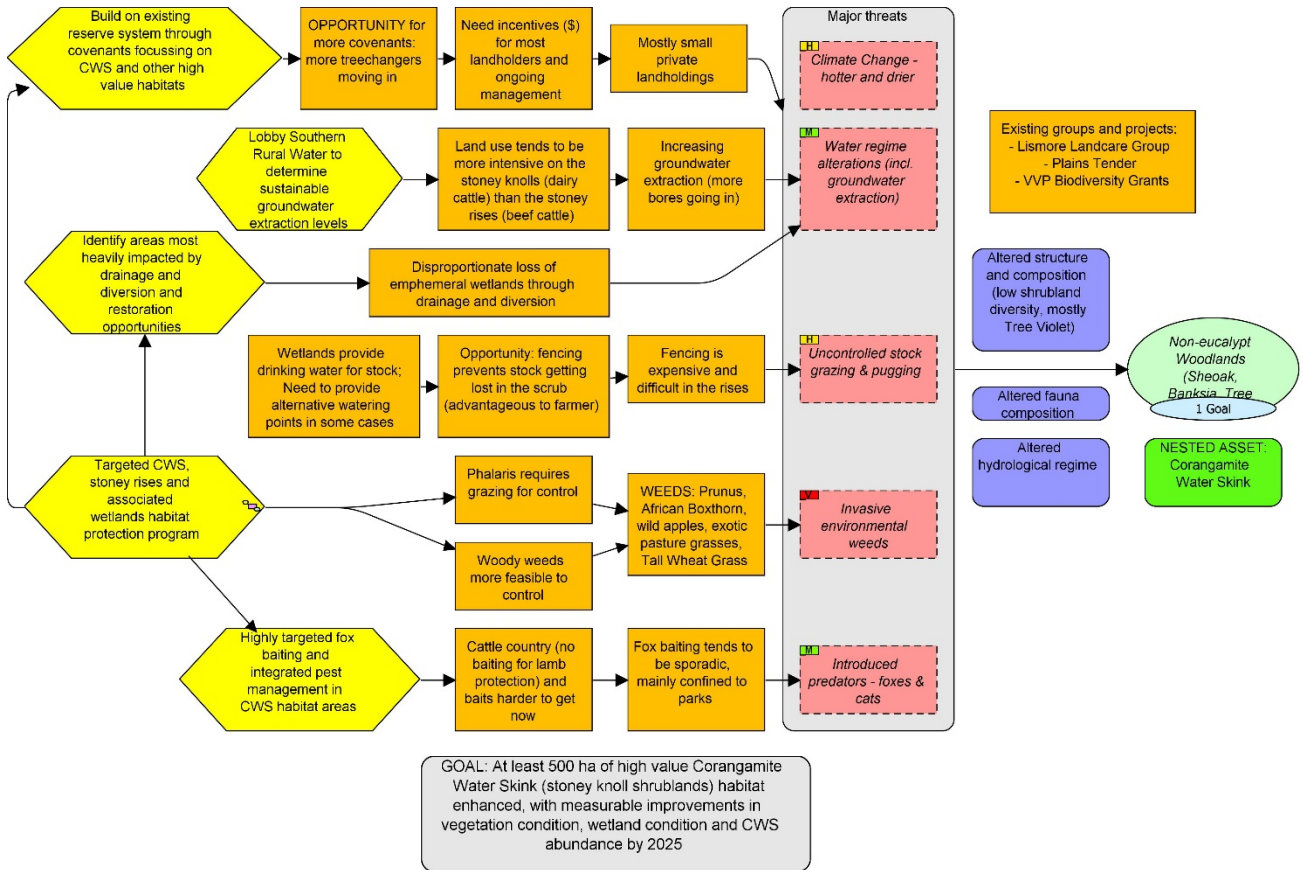
Figures 6.2 and 6.3 show the location of priority project areas for conserving non-eucalypt woodlands. Details of the prioritisation process are included in Appendix 1.



**Figure 6.2.** Stoney knoll shrublands priority project area showing Natureprint scores, conservation reserves and Corangamite Water Skink records.



**Priority Project #1: Habitat management project targeting high value Corangamite Water Skink habitat within the stony knoll shrublands priority area.**



**PROJECT GOAL:** At least 500 ha of high value Corangamite Water Skink (stony knoll shrublands) habitat enhanced, with measurable improvements in vegetation condition, wetland condition and CWS abundance by 2025

**PROJECT ACTIVITIES: Targeted CWS, stony rises and associated wetlands habitat protection program**

- Obtain funding for the project
- Review existing literature on CWS and discuss priorities for habitat management with DELWP experts
- Mapping and prioritisation of sites for habitat management (identify high value sites, populations, breeding habitats)
- Engage landholders in target areas and provide incentives for covenants, fencing, alternative watering points etc.
- Baseline habitat assessments: veg condition, shrubland diversity, wetland condition, CWS abundance and habitat occupancy
- Follow up landholder engagement to ensure grazing management is correctly implemented
- Secure funding contracts with landholders (with scheduled payments in accordance with agreed activities)
- Implement on-ground activities (fencing, grazing management, weed control, supplementary planting)
- Project completion (and ongoing) habitat assessments: veg condition, shrubland diversity, wetland condition, CWS abundance and habitat occupancy



Photo: high value Corangamite Water Skink habitat at Dreeite Nature Conservation Reserve



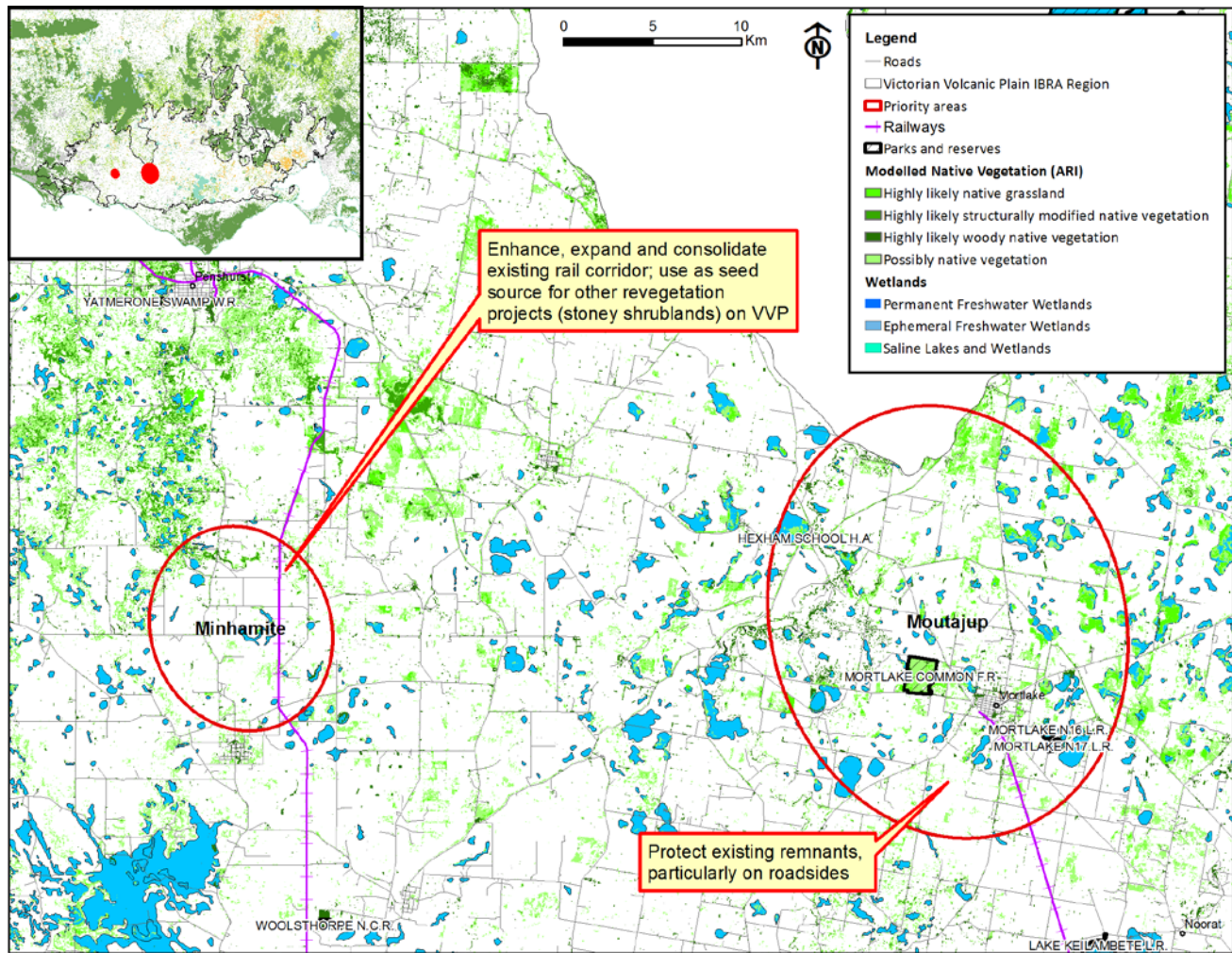


Figure 6.3. Other high priority project areas for enhancing and expanding non-eucalypt woodland populations.

### 6.3. Wetland Protection Program

#### Objective

*By 2030, at least 5 priority ephemeral freshwater wetland habitat areas (including at least 50 individual wetlands) and 10 priority “drought refuge” wetlands are being managed to achieve natural drying-flooding regimes and an Index of Wetland Condition score of at least 50%.*

Principal Action	High priority project areas*
Targeted protection and management of ephemeral wetlands including Seasonally Inundated Herbaceous Freshwater Wetlands	<b>Stoney rise woodlands area, Dunkeld, Moollort Plains</b> (includes Merrin-Merrin complex), Dundonnell, Stoney Knoll Shrublands Area
Implement state government offsets program	<b>Werribee Plains</b>
Targeted protection, management and restoration of natural hydrological regimes for identified drought refuge wetlands	<b>Condah</b> , Stoney Rise Woodlands area, Bryans Swamp – Marneys Swamp, Lake Elingamite area, Lake Purrumbete area

\*Highest priority sites are ranked in bold. Prioritisation is based on Steps 1 and 2 of the INFFER process (see Panell et al. 2012)

#### Supporting Actions

**6.3.1** Identify and map important drought refuge wetlands (based on latest ARI modelling) and determine management actions

**6.3.2** Review AVIRA database (used to develop Waterway Health Strategies for Catchment Management Authorities) and incorporate recommendations about priority sites

**6.3.3** Identify opportunities and priorities for enhancing connectivity in each project area using ARI wetland connectivity modelling (in conjunction with research by Elisa Raulings from Greening Australia), particularly for drought refuge wetland areas near Bryan’s Swamp, Lake Elingamite and Lake Purrumbete

**6.3.4** Identify priority landholdings with high value wetland assets in each priority project area

**6.3.5** Continue to run Plains Tender program

**6.3.6** Support the development of a “Living Landscapes” approach to wetland conservation for high wetland density areas such as Dundonnell and the stoney knoll shrublands

The following map (Figure 6.4) shows the results of a prioritisation process to identify focus areas for conserving freshwater wetlands. Details of the prioritisation process are included in Appendix 1.

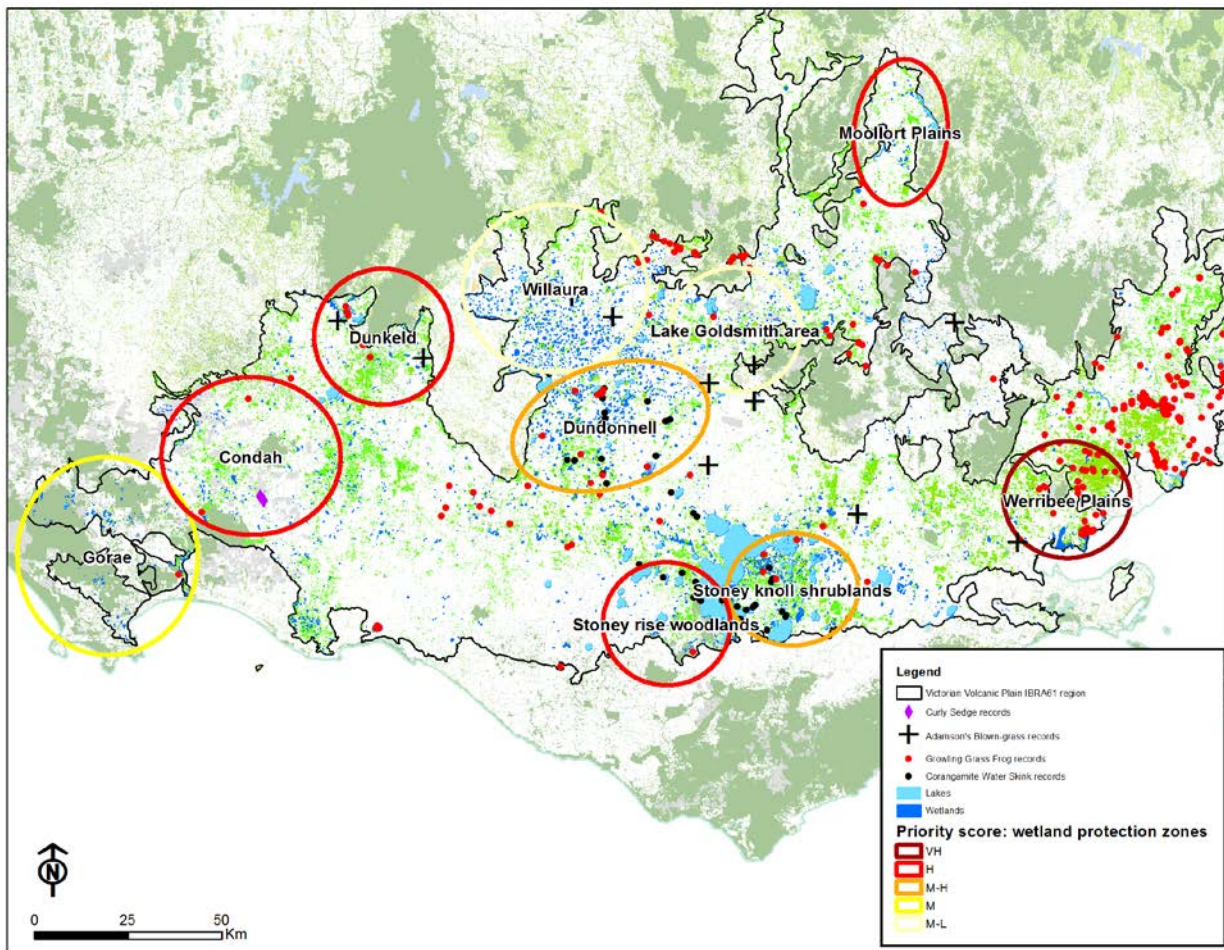


Figure 6.4. Prioritisation of potential project areas for focussing conservation efforts on freshwater wetlands.



## 6.4. Lake Protection Program

### Objectives:

*By 2020, lake water levels have been increased to reduce water salinity from hypersaline to saline (<200 parts per thousand) for at least 3 priority lake systems (Lake Corangamite, Lake Murdeduke and Cundare Pool.*

*By 2030, all core infestations of invasive weeds (Tall Wheat Grass, African Boxthorn & Spiny Rush) are contained and emerging weed threats are eradicated or controlled at low levels sufficient to maintain threatened species populations (esp. Salt-lake Tussock Grass and Spiny Peppergrass) across at least 4 lake systems (Lake Beeac, Lake Corangamite, Loigh Calvert and Lake Gnarpurt).*

*By 2030, Bryan's Swamp and Lake Weeranganuk have been buffered from adjacent land use practices, fringing vegetation has been enhanced to "good" levels at Lake Purumbete and Lake Elingamite and stock have been excluded across 90% of lake frontages at Lake Murdeduke and Lake Corangamite.*

Principal Action	High priority project areas*
Increase freshwater inflows and outflows to restore natural hydrology and reduce salinity	<b>Lake Corangamite, Lake Murdeduke</b> , Cundare Pool, Lake Bookar
Manage invasive weed threats (especially African Boxthorn, Spiny Rush & Tall Wheat Grass) to lake frontages, focussing on threatened species habitats	<b>Lake Beeac, Lake Corangamite</b> , Lough Calvert, Lake Gnarpurt
Revegetation to buffer high value lake frontages from adjacent land use impacts (focus on cropping areas)	<b>Bryans Swamp &amp; Marney's Swamp</b> , Lake Bullen-Merri, Lake Weeranganuk (include habitat for CWS)
Enhance fringing vegetation	Lake Purumbete, Lake Elingamite,
Fencing to exclude stock	<b>Lake Murdeduke</b>
Control foxes to protect aquatic birds	Lake Anderson (important Brolga flocking site)
Revegetation to stabilise lunette	Lake Colongulac

\*Highest priority sites are ranked in bold. Prioritisation is based on Steps 1 and 2 of the INFFER process (see Panell et al. 2012)

### Supporting Actions

**6.4.1** Review operating roles for diversion schemes associated with Lake Corangamite and Cundare Pool/ Lake Martin to allow increased freshwater inflows (CCMA; in progress).

**6.4.2** Protect the natural springs of Lake Corangamite and undertake regular monitoring to determine how these relatively freshwater areas influence conservation values.

**6.4.3** Ongoing monitoring of salinity levels and water quality at sites affected by drainage

- 6.4.4 Ongoing monitoring of aquatic bird numbers at drought refuge sites and sites impacted by rising salinity
- 6.4.4 Review AVIRA database (used to develop Waterway Health Strategies for Catchment Management Authorities) and incorporate recommendations about priority sites
- 6.4.5 Identify opportunities and priorities for enhancing connectivity using ARI wetland connectivity modelling (in conjunction with research by Elisa Raulings from Greening Australia)
- 6.4.6 Determine threats and management priorities for Lake Bookar and Lake Elingamite
- 6.4.7 Review RAMSAR status for Cundare Pool (seek support from DELWP)

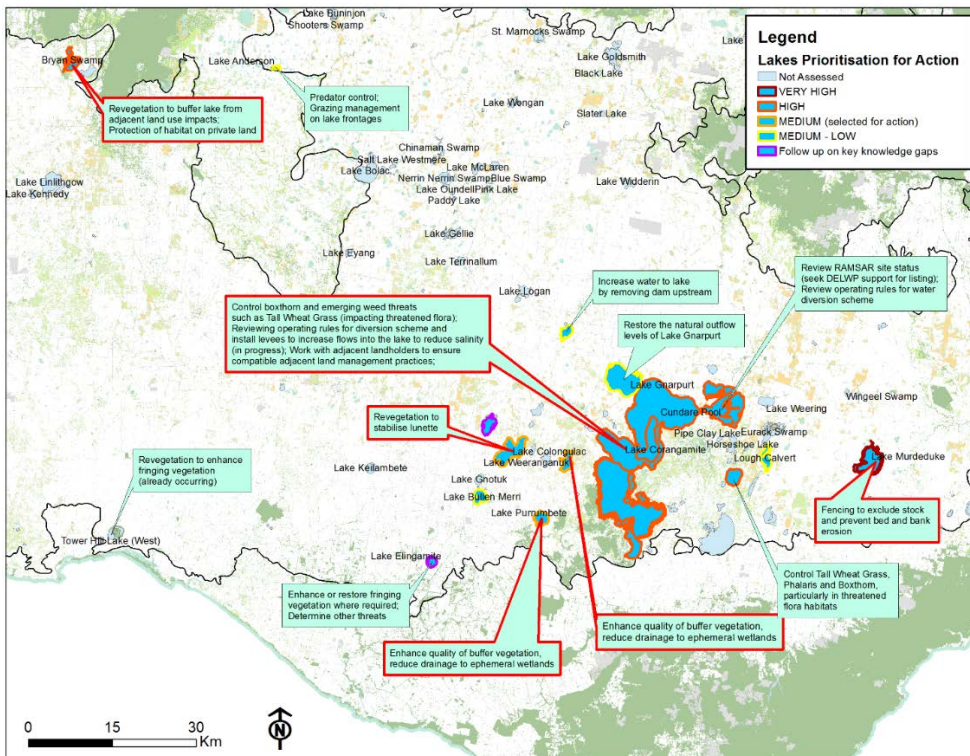


Figure 6.5. High priority actions to conserve high value lakes, focussing on Western District Lakes Ramsar site.



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## APPENDIX 1 PRIORITISATION TABLES (Prioritisation of potential project areas)

Table 1: Prioritisation of project areas focusing on terrestrial habitats

Id	Project Area	Asset	VALUES Description	VALUE Score	THREAT Description	THREAT Score	ACTIONS	FEASIBILITY Description	FEASIBILITY Score	PRIORITY Score	RANK
3	<b>Mooramong</b> (includes Blacks Creek, Mt William Rd and surrounding land)	Plains Grassland, Non-eucalypt woodlands	Last remaining free population of Eastern Barred Bandicoot, Silver Banksia and Sweet Bursaria shrublands, Striped Legless Lizard and various EPBC-listed threatened flora; substantial grasslands	VH	Land use change to cropping; windfarm developments	H	Engage surrounding landholders and wind farm developers to take proactive approach to offsets/conservation; Increase EBB population through predator control and habitat expansion	Action to increase EBB at Mooramong in EBB Recovery Plan	M-H	VH	1
8	<b>Cressy-Shelford Road area</b>	Plains Grassland	Plains Grassland including large, relatively intact areas; Stronghold for Spiny Riceflower (P2), Golden Sun Moth and Striped Legless Lizard; Scattered records of Fragrant Leek-orchid (P1), Small Golden Moths (P1) Maroon Leek-orchid, Button Wrinklewort, Clover Glycine, Trailing Hopbush	VH	Invasive weeds (Phalaris); Land use change to cropping/pigs/ horses; Changing land ownership	M/H	Improve signage protect high value areas on roadsides; Control invasive weeds; Long term protection; Restoration; Targeted engagement of landholders; Recovery actions for Fragrant Leek-orchid and Small Golden Moths	Funding	H	VH	1





9	<b>Lethbridge-Teesdale</b> (includes Talltree Road)	Plains Grassland	Plains Grassland and Plains Grassy Woodland; Parks Victoria reserves; Silver Banksia stands; Isolated occurrences of Golden Sun Moth, Striped Legless Lizard, Large-fruit Groundsel, Small Golden Moths, Clover Glycine and other threatened flora	<b>VH</b>	Land use change to cropping; Changing land ownership; Clearing and conversion	<b>M-H</b>	Engage urban and peri-urban landholders with incentives for improved management; Engage windfarms in proactive approach to offsets		<b>H</b>	<b>VH</b>	1
12	<b>Glenthompson</b>	Plains Grassy Woodland	Hoary Sunray, Clover Glycine and other threatened flora; high quality roadside remnants	<b>VH</b>	Land use change to cropping; Inappropriate biomass removal regime (grazing); Inappropriate roadside maintenance activities; Invasive Weeds (South African Weed Orchid); Shrub encroachment	<b>M</b>	Engage CFA (particularly with regard to timing of burns), private landholders and LGA to improve management of roadsides; Restoration to enhance, expand and consolidate existing remnants (including existing sites);		<b>H</b>	<b>VH</b>	1
16	<b>Werribee Plains</b>	Plains Grassland	Stronghold for Spiny Riceflower (P1); important habitat for Golden Sun Moth and Striped Legless Lizard, Small Golden Moths;	<b>VH</b>	Urbanisation (clearing and conversion); Invasive Weeds (esp. <i>Nasella</i> spp.);	<b>H</b>	Lobby state government to implement offset program		<b>VH</b>	<b>VH</b>	1

			large, contiguous grassland area with VH Natureprint score		Lack of management						
17	<b>Whittlesea Plains</b>	Plains Grassland	Plains Grassy Woodland & Plains Grassland; Stronghold for Matted Flax-lily, critical habitat area for Golden Sun Moth, isolated occurrences of Striped Legless Lizard, Curly Sedge (E), River Swamp Wallaby Grass (V)	<b>VH</b>	Urbanisation (clearing and conversion); Invasive Weeds (esp. <i>Nasella</i> spp.); Lack of management	<b>H</b>	Lobby state government to implement offset program		<b>VH</b>	VH	1
1	<b>Dundonnell</b>	Plains Grassland	Striped Legless Lizard and Golden Sun Moth; Contains 2 out of 5 remaining populations of Fragrant Leek-orchid ( <i>Derinallum</i> and <i>Vite Vite</i> ; E; PRIORITY 1 species); Basalt Rustyhood (E; PRIORITY 1 species); Small Golden Moths; Stony rise shrublands including banksia, bursaria and Tree Violet; <i>Craspidia</i> ; Large intact system; Brolga habitat;	<b>VH</b>	Changing property size, landholders; Inappropriate biomass removal regime; Invasive weeds; Feral predators	<b>M</b>	Restoration; Landholder engagement and incentives for improved management; Engage windfarms in proactive approach to offsets	Funding	<b>M-H</b>	H-VH	2



4	<b>Dunkeld</b> (Victoria Valley)	Plains Grassy Woodland	Plains Grassy Woodland: Important habitat for Striped Legless Lizard & Golden Sun Moth; Spiny Rice Flower (CR), Adamson's Blown-grass (E), Gorae Leek-orchid (E) Salt-lake Tussock Grass (V) and Clover Glycine (V)	<b>H-VH</b>	Land use change to cropping; Inappropriate biomass removal regime; Roadside clearing and conversion; Spray drift	<b>M</b>	Work with existing landcare group to protect, enhance and restore a viable network of grassy woodland habitats	Active landcare group in area and "champions" for conservation; Receptive landholders (includes treechangers)	<b>VH</b>	H-VH	2
20	<b>Moutajup</b>	Non-eucalypt woodlands	Banksia shrublands; extensive non-eucalypt woodland habitats	<b>H</b>	Track upgrade; Inappropriate biomass removal regime (fire)	<b>H/VH</b>	Lobby Victrack to protect existing sites		<b>H/VH</b>	H-VH	2
6	<b>Crossroads - Stoneleigh</b>	Plains Grassland	Large intact areas, good roadsides and largest population of Striped Legless Lizard	<b>VH</b>	Land use change to cropping	<b>M</b>	Engage private landholders to improve management of existing areas		<b>H</b>	H	3
7	<b>Minhamite</b>	Non-eucalypt woodlands	One of largest remaining areas of Silver Banksia on VVP (rail reserve)	<b>H</b>	Invasive weeds (woody)	<b>L</b>	Enhance, expand and consolidate existing rail corridor; use as seed source for other revegetation projects (stony shrublands) on VVP	Active community group currently seeking to enhance and restore Banksia shrublands	<b>VH</b>	H*	3

10	<b>Stony Knoll Shrublands</b>	Stony Rises Shrublands	Corangamite Water Skink (core habitat area) including rocky areas interspersed with wetlands, Striped Legless Lizard, Spiny Peppergrass and lake frontage areas; Brolga; Growling Grass Frog	H	Rock crushing; Invasive weeds (Tall Wheat Grass, Nassella spp., African Boxthorn, Blackberry)	H	Control invasive weed threats (Tall Wheat Grass, Nassella spp., African Boxthorn and Blackberry); Protect significant cultural heritage sites; Revegetation of stony shrublands to expand and consolidate existing habitats		M	H	3
2	<b>Byaduct/ Branxholme</b>	Stony Rises Shrublands	Stony shrublands: Silver Banksia, Sweet Bursaria, Tree Violet etc.	H	Stone crushing; Inappropriate biomass removal regime; Invasive weeds	M	Revegetation to expand and consolidate roadside habitats (investigate opportunities on road Victrack and rail ARTC corridors) ; use as seed source for other projects	Funding	M-H	M-H	4
5	<b>Moyston</b>	Plains Grassy Woodland	Plains Grassy Woodland: extensive relatively intact areas (also degraded areas)	M	Inappropriate biomass removal regime; Land use change to cropping; Fertilizer application	H	Single large landholder owns a large proportion of the asset	Landholder may be receptive to conservation efforts but no guarantee	M?	M-H	4

11	<b>Willaura</b>	Plains Grassland	Striped Legless Lizard, Nationally threatened flora; roadside remnants	<b>H</b>	Land use change to cropping; Spraying; Inappropriate roadside maintenance activities	<b>M</b>	Engage CFA, private landholders and LGA to improve management of roadsides		<b>M-H</b>	M-H	4
13	<b>Orford</b>	Plains Grassland	Some native grassland present but relatively intact areas highly restricted	<b>M</b>	Land use change to Blue Gums (ongoing impacts on hydrology); Roadside grazing (high intensity); Windfarm developments	<b>L</b>	Improve roadside management and weed control		<b>M</b>	M	5
14	<b>Clunes</b>	Plains Grassy Woodland, Plains Grassland and non-eucalypt woodlands	Buloke stands; Important population of Stiff Groundsel (P1); scattered occurrences of Fragrant Sun-orchid (P1), Golden Sun Moth, Striped Legless Lizard, Fragrant Leek-orchid (P1), River Swamp Wallaby Grass, threatened Dianella sp.	<b>M</b>	Land use change to cropping (including centre-pivots)	<b>M</b>	Landholder engagement and incentives to protect and enhance existing areas; Restoration to enhance, expand and consolidate existing remnants (including existing sites)		<b>H</b>	M	5



15	<b>Berribank</b>	Plains Grassland	Isolated occurrences of Striped Legless Lizard, Hoary Sunray, SRF	<b>M</b>	Agricultural intensification	<b>M</b>	Landholder engagement and incentives to protect and enhance existing areas; Restoration to enhance, expand, consolidate and reconnect existing remnants (includes existing sites)		<b>H</b>	<b>M</b>	5
18	<b>Meredith - Ballan</b>	Plains Grassland	Plains grassland; Isolated occurrences of Striped Legless Lizard and Golden Sun Moth	<b>M</b>	Invasive weeds (including Nassella spp. and woody weeds); Inappropriate biomass removal regime	<b>M</b>	Control invasive weed threats (Tall Wheat Grass, Nassella spp., African Boxthorn and Blackberry); Landholder engagement and incentives to improve biomass management		<b>H</b>	<b>M</b>	5
19	<b>Penshurst</b>	Non-eucalypt woodlands	Non-eucalypt woodlands and shrublands	<b>M</b>	Agricultural intensification and related threats	<b>M</b>	Landholder engagement and incentives to protect and enhance existing areas;		<b>M</b>	<b>M</b>	5

**Table 2: Prioritisation of project areas focusing on freshwater wetlands**

Id	NAME	VALUES	VALUE Score	THREATS	THREAT Score	ACTIONS	FEASIBILITY	FEASIBILITY Score	PRIORITY score	RANK
8	<b>Werribee Plains</b>	High number of Seasonally Inundated Herbaceous Wetlands	H	Horses, invasive weeds (high - <i>Nasella</i> spp.)	VH	Compulsory acquisition for offsets (completed), wetland restoration	Compulsory so easy land access	H	VH	1
1	<b>Stoney rise woodlands</b>	Endangered eucalypts, diverse habitat types, threatened species including Corangamite Water Skink (EPBC: EN), good condition	H	Stock grazing, invasive weeds, drainage (altered hydrological regime)	H	Long term protection, management, restoration	Mostly private land, small properties, treechangers	H	H	2
4	<b>Dunkeld</b>	Threatened orchids (incl. Goraie leek-orchid EPBC: EN), Adamson's Blown-grass (EPBC: EN), high number of Seasonally Inundated Herbaceous Wetlands, woodlands	H	Stock grazing (high threat), invasive weeds (high threat)	H	Protection, management, wetland restoration	Funding required, landholder willingness relatively high	H	H	2
7	<b>Moollort Plains</b>	Red Gum swamps, Merrin-Merrin complex	H	Stock grazing (also some cropping), altered drainage	M	Long-term protection (currently good take-up), management, wetland restoration	Landholders relatively receptive	H	H	2

10	<b>Condah</b>	Extensive and diverse wetland complex, very high cultural importance, threatened species including Curly Sedge (EPBC: VU)	H	Invasive weeds (high threat), stock grazing in northern part	M	Existing plan and management through Gunditj Mirring traditional owners	Good access to land through IPA and properties but adjacent landholders not overly receptive	H	H	2
2	<b>Stony knoll shrublands</b>	fair condition, threatened species (Corangamite Water Skink (EPBC: EN), Growling Grass Frog (EPBC: VU), Poa grasslands	M	Stock grazing, invasive weeds, altered drainage	H	Long term protection, wetland restoration, management (Living Landscapes approach proposed)	Incentives required, fencing expensive, cultural resistance to change	M	M-H	3
6	<b>Dundonnell</b>	Brolga, banksia shrublands on rises	M	Stock grazing, invasive weeds, altered drainage	M	Long-term protection (currently good take-up), restoration	Landholder receptivity relatively high	H	M-H	3
9	<b>Gorae</b>	Swamp Fireweed (EPBC: VU), Relatively ephemeral wetlands (most deeper)	M	Stock grazing	M	Management, protection	Treechangers present	M	M	4
3	<b>Willaura</b>	Brolga, threatened species including Adamson's Blown-grass (EPBC: EN) and White Sunray (VIC: e)	M	Land use change to cropping (high threat), stock grazing (low threat), invasive weeds	H	Long term protection, management	Expensive	L	M-L	5
5	<b>Lake Goldsmith area</b>	Brolga, threatened flora including Adamson's Blown-grass (EPBC: EN), White Sunray (VIC: e), Swamp Everlasting (VIC: v), Salt-lake Tussock-grass (EPBC: VU) around lake	M	Land use change to cropping (high threat), stock grazing (medium threat)	H	Long term protection, management	Landholder receptivity relatively low	L	M-L	5



**Table 3: Prioritisation of project areas focusing on permanent lakes**

NAME	Original Category	X_SUBCATEG	Salinity category (08)	Values	Values SCORE	THREATS	Threat SCORE	ACTIONS	Feasibility SCORE	PRIORITY	RANK
<b>Lake Murdeduke</b>	Perm saline	Deep (>5m)	Saline (100-200ppt)	Highest numbers of breeding waterbirds; very high diversity of waterbirds particularly duck species and migratory waders including Freckled Duck (730), Pink-eared Duck and rare vagrant waders such as Wilson's phalarope; also Spotless Crake and Brolga, Yarra Pygmy Perch; threatened flora such as Golden Dodder	VH	Bank and shoreline erosion; Rising salinity (altered water regime due to reduction in inflow); inappropriate stock access; agricultural runoff	H	Fencing to exclude stock; increase inflows	H (fencing to exclude stock); L (increasing inflow)	VH	1
<b>Lake Beeac</b>	Semi saline	Hypersaline lake	Brackish (5-50ppt)	Large number (internationally significant number) of Banded Stilts (up to several thousand) and other species such as Red-necked Avocet and Whiskered Tern), Grasslands (TBC) biosite, Spiny Peppergrass (isolated occurrences along western shore), Salt-lake Tussock-grass, Hairtail	VH	Bank and shoreline erosion, Altered water regime, pollution (leachate from old Beeac Tip - this issue has now been rectified), Boxthorn, Tall Wheat Grass and Phalaris impacting threatened flora	M	Weed control	H	H	2

<p><b>Lake Corangamite</b></p>	<p>Perm saline</p>	<p>Shallow (&lt;5m)</p>	<p>Hypersaline (200-320ppt)</p>	<p>Highest numbers of breeding waterbird species noted in 2008 survey (14 including colonies of Pelicans, Straw-necked Ibis and Sacred Ibis on islands like Wool Wool and Vaughan); Freckled Duck (up to 500), Double-banded Plover, Banded Stilt (up to 6000), Yarra Pygmy Perch (198); Threatened flora in fringing vegetation such as Salt-lake Tussock-grass and Spiny Peppergrass. Noted that islands now connected back to surrounding land due to reduced water levels so pelican colonies now gone; Yarra Pygmy Perch have migrated up the Woody Yaloak. Freshwater springs remain an important value and may provide important localised areas of reduced salinity</p>	<p>VH</p>	<p>Altered water regime (Woody Yaloak diversion scheme), bank and shoreline erosion, salinity increase, Boxthorn (impacting threatened flora), Reduced water level (connecting islands back to surrounding land); Emerging weed threats Tall Wheat Grass and Spiny Rush (northern end?)</p>	<p>VH</p>	<p>Control boxthorn (impacting threatened flora); Increase in-flows (Gnarkeet 'Chain of Ponds' Creek flows into river, also Lake Terangpom); Catchment protection - ensure compatible adjacent land management practices; Review operating rules for diversion scheme (currently being reviewed by CCMA). Protect natural springs and determine how these fresher water areas influence values in area. Investigate options to protect 2800ha of private land to facilitate complete</p>	<p>M</p>	<p>H</p>	<p>2</p>
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								innundation of lake.			
<b>Lake Milangil</b>	Perm saline	Shallow (<5m)	Moderately Saline (50-100ppt)	High numbers of breeding waterbird species (6, including the Endangered Gull-billed Tern - 74 nests); Good diversity and no's of Freckled Duck, Blue-billed Duck, Musk Duck, Pink-eared Duck (6000) & Blue-winged Shoveller; springs occur on its western edge	VH	Altered water regime	H	Restore the natural outflow levels of Lake Milangil	M	H	2

<b>Lake Murdeduke</b>	Perm saline	Shallow (<5m)	Saline (100-200ppt)	Highest numbers of breeding waterbirds; very high diversity of waterbirds particularly duck species and migratory waders including Freckled Duck (730) and rare vagrant waders such as Wilson's phalarope; also Spotless Crake and Brolga, Yarra Pygmy Perch	VH	Bank and shoreline erosion; Rising salinity (altered water regime due to reduction in inflow); inappropriate stock access; agricultural runoff	H	Fencing to exclude stock; increase inflows	H (fencing to exclude stock); L (increasing inflow)	H	2
<b>Bryan Swamp &amp; Marneys Swamp</b>	Deep marsh	Red gum		Outstanding freshwater habitat with high habitat diversity, providing drought refuge for many freshwater species; important stronghold for Growling Grass Frog, threatened waterbirds (eg. Royal Spoonbill, Musk Duck, Brolga) and nationally threatened flora such as Wetland Blown-grass	H	Land use change to cropping	M?	Revegetation to buffer lake from adjacent land use impacts; protection of habitat on private land	H	H	2
<b>Cundare Pool/ Lake Martin</b>	Open water	Shallow (<5m)	Saline (100-200ppt)	Large numbers of Banded Stilts (2895), Hoary Headed Grebe (1250), Brine Shrimp, Growling Grass Frog, Salt-lake Tussock-grass; Important water source for Lake Corangamite	M-H	Bank and shoreline erosion; inappropriate stock grazing, disturbance to nesting birds (shooting),	L	Review RAMSAR site status (seek DELWP support for listing); review operating rules for water diversion scheme	H	H	2

						water availability					
<b>Lake Anderson</b>	Semi saline	Salt pan		Important Broga flocking site; threatened flora and waterbirds	H	L? (Land use change to cropping); M (fox predation)	L-M	Predator control & grazing management on lake frontages	H	M	3
<b>Lake Colongulac</b>	Perm saline	Shallow (<5m)		Freckled Duck (200), Blue-billed Duck (1008), Blue-winged Shoveller (2055), Great-crested Grebe (2000); variety of shoreline habitats including nays, spits, cliffs and islands, Eel harvesting, large mats of Ruppia; diversity of habitats present	H	Bank and shoreline erosion, effluent from Camperdown (noted that this was much worse historically with direct transfer of waste from abattoir, butter factory etc.)	M	Revegetation to stabilise lunette	M	M*	3
<b>Lake Gnarpurt</b>	Perm saline	Shallow (<5m)	Moderately Saline (50-100ppt)	Large numbers and diversity of waterbirds including Pink-eared Duck (4385), Great Crested Grebe (172) and Freckled Duck (32); Eel harvesting	H	Bank and shoreline erosion, Altered water regime (quarry constructed on creek inflow); weed incursions of pasture species	M	Restore the natural outflow levels of Lake Gnarpurt	L (increase water supply); H (weed control)	M	3
Lake Terangpom	Open water	Shallow (<5m)	Brackish (5-50ppt)	Moderately large flocks of duck species such as Freckled Duck, Blue-billed Duck, White-winged Tern and Little Curlew;	H	Bank and shoreline erosion; Altered water regime, salinity	M	Restore the natural outflow levels of Lake Terangpom	M	M	3

				Significant freshwater input to Lake Corangamite (acts as a basin for stream flow from Kooraweera lake system)							
<b>Lough Calvert (including Eurack Swamp)</b>	Perm saline	Shallow (<5m)		Grasslands (TBC) biosite, Spiny Pepperpress, Brolga	H	Drainage scheme (associated with lower Lough lake); Inappropriate stock access	M	Fencing; review grazing lease	L (increase water supply); H (weed control)	M	3
<b>Lake Purrumbete (and associated ephemeral wetlands)</b>	Open water	Deep (>5m)	Fresh (0-5 ppt)	Freshwater drought refuge, macroinvertebrate diversity/abundance	M	Predatory exotic fish (salmonids eg. trout, redfin); deepening of natural drainage of ephemeral wetlands (neighbouring landholder); inappropriate species plantings in buffer vegetation	L (lake); H (ephemeral wetlands)	Enhance quality of buffer vegetation, reduce drainage to ephemeral wetlands. Investigate protection options for ephemeral wetlands	H	M*	3
<b>Lake Tooliorook</b>	Open water	Shallow (<5m)	Brackish (5-50ppt)	Freshwater drought refuge	M	Recreation issues; Altered hydrological regime (dam on Mundy)	M	Release water by removing dam	M	M	3
<b>Lake Weeranganuk</b>	Perm saline	Shallow (<5m)		Corangamite Water Skink habitat, Salt-lake Tussock Grass	M	Introduced pasture grasses; Foxes and cats	M	Revegetation to establish buffer (including feeding habitat	H	M*	3



								for Corangamite Water Skink); Weed control			
<b>Lake Bullen Merri</b>	Perm saline	Deep (>5m)	Brackish (5-50ppt)	Brackish drought refuge; permanent water - important recreational values (fishing and watersports)	M-L	Nitrification (nutrient levels already high), Increasing salinity, inappropriate stock access	L-M	Revegetation to establish buffer from adjacent land use impacts and reduce nutrients; fencing	M	M	3
<b>Lake Bookar</b>	Perm saline	Shallow (<5m)	Saline (100-200ppt)	Pink-eared Duck (2410), Hoary-headed Grebe (6597), Freckled Duck (200); and others; Grasslands (TBC) biosite; several islands occur at high water levels, fringing lake habitats	H	Altered water regime (unclear as to the cause). Other threat unknown	L	Restore the natural flows into and out of Lake Bookar	?	M?	3?
<b>Lake Elingamite</b>	Open water	Shallow (<5m)	Fresh (0-5 ppt)	Freshwater drought refuge, listed as important wetland; presence of fringing vegetation	H	?	M?	Enhance or restore fringing vegetation where required	M?	M?	3?