

community environmental recovery action plan

CERAP



CERAP

St Andrews Catchment • November 2012

St Andrews Catchment

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# What is a cerap?

The St Andrews Community Environmental Recovery Action Plan is a package of documents developed with the St Andrews community that identifies actions to care for and manage the environmental and agricultural values of St Andrews.

The St Andrews CERAP has drawn upon many different sources of information (Nillumbik CERAP Literature Review 2011). The findings were then presented to the St Andrews community over two workshops in May 2011 to determine the community's vision for land management in St Andrews and their priorities.

## The CERAP consists of:

- ***The Nillumbik CERAP Literature Review 2011*** – this provides details on the wide range of information sources that were used to prepare this (and the two other CERAPs for Christmas Hills and Strathewen) CERAP.
- **The Community Environmental Recovery Action Plan (CERAP) – *St Andrews Catchment – July 2012*** – this is the main CERAP document and contains the detailed descriptions of:
  - the St Andrews area (e.g. climate, geology, topography, land use history, waterways and biodiversity)
  - the environmental and agricultural values of St Andrews and the key threats
  - the actions needed to protect and enhance these values
  - examples of community-based projects that could be undertaken.
- ***The St Andrews Community Environmental Recovery Action Plan Map*** – this map depicts the three main land management zones in St Andrews and identifies the types of actions landholders in each zone can do to help care for and manage the environmental and agricultural values of St Andrews.
- ***The CERAP Fact Sheets*** – this is a series of updateable information sheets that provide more detail on various specific aspects of land management. Fact sheets in the series at the time of printing include:
  - Managing bush blocks
  - Dams and waterways
  - Weed mapping and monitoring
  - Erosion
  - Native fauna in Nillumbik
  - Land classes - Christmas Hills
  - Land classes - St Andrews
  - Land classes - Strathewen
  - Landcare
  - Legal responsibilities for weeds and pest animals
  - Controlling pest animals
  - Property management planning
  - Revegetation
  - Weed control.

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Photo by Sue Aldred

# 1. Executive Summary

This Community Environmental Recovery Action Plan (CERAP) for St Andrews provides a vision, goals and actions to guide sustainable management of the St Andrews catchment over the next five years. It is intended to be a document for use by the community and covers important issues for catchment management in St Andrews. It includes appropriate activities to undertake individually and in conjunction with other land managers, for instance your neighbours, Nillumbik Shire Council and Melbourne Water. A careful read will reveal just how precious our local landscape is and how we need to protect it for the future.

The vision for the CERAP, developed in consultation with the community, is:

“The St Andrews community working together to ensure that their land, water and biodiversity are healthy, resilient and productive”

The goals which have been identified by the community to fulfil this vision are:

**Table 1:** Community identified goals for environmental recovery

| SUBJECT           | GOALS   |
|-------------------|---|
| Agriculture       | To encourage adoption of best practices in all agricultural landscapes.<br>To identify sustainable agricultural enterprises for the future.<br>To protect existing environmental values on farms. |
| Waterway health   | To manage the catchment for protection and improvement of water quality.  |
| Biodiversity      | To protect and enhance native vegetation and fauna populations.<br>To secure important biolinks by protecting and enhancing remnant native vegetation and linking core areas.                     |
| Rural living      | To encourage adoption of sustainable land management practices.<br>To encourage protection and enhancement of biodiversity values.  |
| Capacity building | Implement sustainable land management practices in a cooperative way that supports effective individual action.   |

A number of key challenges to catchment management in St Andrews have been identified. These include continuing changes to rural development, the need to maintain ecological values, erosion, pest plants and animals, climate change and fire. In particular, the February 2009 bushfires adversely affected the St Andrews catchment, causing loss of human lives and substantial damage to agriculture, native flora and fauna and infrastructure.

The CERAP contains a range of specific actions for land holders under the categories mentioned above; namely Agriculture, Waterway health, Biodiversity and Rural living.

Community-building and capacity-building activities primarily fall under the responsibility of community groups and Nillumbik Shire Council and are key to the successful implementation of the Plan. Such activities are aimed at involving and engaging subsets of land holders, for instance farmers, immediate neighbours or owners of bush blocks who all have similar land management goals.

The CERAP contains two case studies – of a farm and a bush block – to illustrate some of the issues involved in these different land uses and their potential solutions.

In addition to this Plan, the following resources have been developed to assist you in taking positive action to protect and enhance your property. These resources include:

- a series of best practice factsheets providing detailed information on weeds, pest animals, native fauna and flora, waterways, erosion and agriculture
- a catchment map summarising the environmental values, agricultural values, significant threats and what can be done to help.

## 2. Introduction

This Community Environmental Recovery Action Plan (CERAP) identifies long term goals and actions for the St Andrews community to undertake in the environmental recovery of the St Andrews catchment over the next five years (a catchment is an area of land bound by hills or mountains from which all run-off water flows to the same low point). The goals and actions relate to agricultural areas, bushland and waterways. Many of these areas within the catchment were affected by the February 2009 bushfires.

The St Andrews CERAP has been developed in partnership with the St Andrews Landcare Group and interested members of the community through a series of community workshops and other stakeholder consultations. It is a living document, intended for easy revision and updating to provide ongoing direction for achieving the vision and goals of the Plan.

The implementation of actions by individuals is voluntary. The Plan is meant to be used as a guide for prioritising actions both for you to take in **your property** and for you to contribute to within **your community**.

The CERAP is informed by the **Nillumbik CERAP Literature Review** (2011), which identifies and reviews existing documentation including legislation; federal, state and regional policy; municipal strategies and plans and local information. For those implementing the CERAP, easy access to information is also provided by the best practice factsheets and St Andrews catchment summary map. These have been prepared in conjunction with the CERAP and are available on the St Andrews Landcare and Nillumbik Shire Council websites.



### 2.1 Vision, principles and goals

The vision that underpins the CERAP is:

**'The St Andrews community working together to ensure that their land, water and biodiversity are healthy, resilient and productive'**

Implementation of the actions and demonstration projects included in the CERAP will ensure that the vision is realised.

Management of the St Andrews catchment will be shaped by six guiding principles, now and into the future.

#### **Principle 1: Community awareness**

Members of the St Andrews community understand and value good land management. They understand its importance and are willing to invest and actively participate in actions that result in good land management.

#### **Principle 2: Extension and technical support**

The St Andrews community has access to technical support through a variety of local, regional and state resources and expertise.

#### **Principle 3: Incentives**

Incentives are provided and promoted to encourage cost-sharing arrangements that support research and on-ground works that have a public and private benefit.

#### **Principle 4: On-ground works**

The implementation of the CERAP will provide coordinated and effective on-ground projects that demonstrate sustainable land management and conservation.

#### **Principle 5: Coordination**

The St Andrews community works in partnership with Nillumbik Shire Council and other stakeholders towards a healthy, resilient, productive community and landscape.

#### **Principle 6: Research and investigation**

Essential and locally relevant land management knowledge is compiled, accessible and used to make good decisions in programs, investment, standards and planning.



The following goals were established by the community.

**Table 1: Community-identified goals for environmental recovery**

| SUBJECT           | GOALS   |
|-------------------|---|
| Agriculture       | To encourage adoption of best practices in all agricultural landscapes.<br>To identify sustainable agricultural enterprises for the future.<br>To protect existing environmental values on farms. |
| Waterway health   | To manage the catchment for protection and improvement of water quality.  |
| Biodiversity      | To protect and enhance native vegetation and fauna populations.<br>To secure important biolinks by protecting and enhancing remnant native vegetation and linking core areas.                     |
| Rural living      | To encourage adoption of sustainable land management practices.<br>To encourage protection and enhancement of biodiversity values.  |
| Capacity building | Implement sustainable land management practices in a cooperative way that supports effective individual action.   |

Source: St Andrews community workshop 5 June 2011

This CERAP aims to inspire and assist the community to undertake both individual and collaborative action. It also provides supporting documentation and justification to support requests to external organisations for funding and other support. Projects will require commitment from a lead organisation, a project management team and people from the community, as well as agencies. This will provide a combination of local knowledge, experience, technical knowledge and skills.

## 2.2 History of land use

The first people who moved across this land were the indigenous clan known as the Wurundjeri, who had adapted to living on the land over thousands of years. In 1835, the township of Melbourne was claimed by Europeans and a way of life 40,000 years old declined for the Wurundjeri.

Remnants of the native bush and animals that co-existed with them still exist in Nillumbik today. Some areas have been conserved by the establishment of reserves and the Kinglake National Park that now covers 21,600 hectares. Established in 1928 with 4000 hectares, the park's first ranger was Shelley Harris, who lived and went to school in Queenstown.

The first gold in Victoria was discovered in Warrandyte in 1851 and the area from Warrandyte to Queenstown, known as the Caledonian Diggings, became part of the St Andrews Mining Division. European settlement began in the district of St Andrews in late 1853 with the discovery of gold in Spanish Gully and Smiths Gully by George Boston and his party. Within months of the 1853 discovery, a mining village known as Market Square grew opposite Queenstown Cemetery as part of the rush to the Caledonian Diggings. Gold was being extracted from One Tree Hill and gullies and creeks in the surrounding area. By 1890, records show that nearly 25,000 ounces of gold had been extracted. The landscape was radically altered, not only by the diggings but by the removal of trees for fuel and props. There are still many mine shafts and tunnels in St Andrews, hidden away by the regrowth of native bush and blackberry.

During the Great Depression of 1929-1933, the Victorian Government supplied picks and shovels to men who wished to fossick for gold in Queenstown. The Shire of Eltham was deeply concerned about the sanitary conditions and the threat of a serious disease outbreak. A group of local miners and the local Anglican Minister, Rev. Whitworth, purchased a block of land and erected a log hut for shelter and a kitchen where the men and their families could take refuge. (In the late 1940s the hut burnt down; in 1951, the land was donated to St Andrews CFA who continue to occupy the place today.)

As the gold ran out, some families stayed and turned their talent to farming their land. Orchards were cultivated, especially along the fertile creek flats, growing a variety of fruit: apples, pears, plums, peaches and quinces. The names of some of these early orchardists are still present in street names. The Ninks were known as the 'peach kings' because they grew the best peaches. They also grew grapes, not for wine but for leaves. They would wrap the peaches in an individual leaf, making the presentation of the fruit delectable and obtaining a higher price at market. The Ninks also had a sawmill in Ninks Road in the early 1900s.

By the 1940s, most of the orchards had been sold. Only a few remnants of old trees remain in the district, but a close look at many creek flats will reveal the furrows where the trees were planted.

### *Bushfire history of St Andrews*

1 February 1898 became known as Red Tuesday after fires in Gippsland killed 12 people and destroyed countless homes and entire townships. Lilydale, Kangaroo Ground and St Andrews (Queenstown) were also under severe threat. In the following years, many major fires occurred in the area. The local paper, Evelyn Observer, called for brigades to be formed after terrible fires in February 1914. As the state again sweltered and burned with fires fanned by gale force winds, more local communities began to raise subscriptions to establish community fire brigades.

11 February 1927 saw fires burning extensively from St Andrews (Queenstown) to Panton Hill, Yarra Glen and Warrandyte, going on to threaten Croydon. After this fire many of the brigades purchased knapsacks, fire rakes and axes. Private vehicles were used to assist with fighting fires.

The Memorial Tower built in 1925 on Garden Hill in Kangaroo Ground commemorates those who died in the First World War. Its use as a fire-spotting tower was established as early as 1937, and there was an intention to have a caretaker who could raise the alarm if a fire was seen and hoist a flag on the tower. It is recorded that the tower became staffed in 1948.

The year 1939 was very hot, and drought had affected the creeks and streams leaving them dry. Many fires were burning in early January. Fires began in the Toolangi forests around 1 January, and these went on to join up with others throughout the state, becoming the fire now known as Black Friday, 13 January 1939. Newspapers in the cities called for volunteers to join the fight against the fires.

These fires touched Arthurs Creek, St Andrews, Panton Hill, Strathewen, Healesville, Yarra Glen, Warrandyte and the rest of the state. An estimated four to five million acres were burned and about 700 houses, a hospital, guesthouses, hotels and timber mills were lost. It is recorded that 71 people perished during the fires, which were ultimately controlled by rainfall.

1962 was another devastating year for wildfire, with one outbreak occurring on 14 January in Panton Hill and others in Christmas Hills, Chum Creek and The Basin. All these fires were fanned by hot north winds. Two local people were killed in Blooms Road, North Warrandyte. Many homes in St Andrews and Panton Hill were destroyed, later to be rebuilt by church groups and service clubs. In February 2009, St Andrews was devastated by the Black Saturday bushfires.

*The Ninks were known as the 'peach kings' because they grew the best peaches. They also grew grapes, not for wine but for leaves. They would wrap the peaches in an individual leaf, making the presentation of the fruit delectable and obtaining a higher price at market.*



## 2.3 Existing land use

Private land use in the St Andrews area outside the township is primarily rural living on small properties of cleared or partly cleared land or bush properties of up to 40 hectares. The land use on cleared land is generally grazing by horses, goats or beef cattle with conservation use on bush blocks. Most of these properties have residential owners. However, there are also a significant number of absentee owners.

The slope and soil characteristics of the St Andrews landscape generally preclude intensive agriculture. However, a small number of agricultural holdings of 10

to 100 hectares support agricultural enterprises such as wine grapes or grazing. The pattern of settlement and development means that the land is fragmented and is no longer suited to single-property, large commercial-scale agricultural holdings.

### Property statistics

The following data shows the spatial distribution of the separate properties in the St Andrews Landcare catchment. A summary of the data is provided below in Table 2. In some cases, more than one property may belong to a single owner.

**Table 2:** Spatial distribution of properties in the St Andrews Landcare catchment

|                    | Up to 0.4 ha | > 0.4 ha to 1 ha | >1 to 4 ha | >4 to 10 ha | >10 to 40 ha | >40 to 100 ha | >100 to 400 ha | Total   |
|--------------------|--------------|------------------|------------|-------------|--------------|---------------|----------------|---------|
| No. properties (%) | 99 (30%)     | 27 (8%)          | 38 (13%)   | 113 (34%)   | 33 (10%)     | 15 (5%)       | -              | 325     |
| AREA (%)           | (0.9%)       | (0.7%)           | (3.6%)     | (36.7%)     | (25.9%)      | (32.5%)       | -              | 2,286.0 |



Photo by Sue Aldred

## 3. Catchment Description

A catchment is an area of land that collects water, which drains to the lowest point in that area.

Rain falling on the land will make its way to the lowest point, via groundwater, aquifers, creeks, dams, lakes, rivers, wetlands or stormwater systems.

Together with rivers, creeks, lakes and dams, a catchment includes groundwater, stormwater, wastewater and water-related infrastructure. Catchments are connected from top to bottom, so what happens upstream in a catchment has a large influence further down the catchment.

Human activities across a whole catchment, such as pollution, soil erosion and the spread of weeds, can adversely affect the quality of water and the environment at the bottom of the catchment.

This is why it is important to manage a catchment as a whole, rather than in parts.

### 3.1 St Andrews catchment area

St Andrews comprises part of the catchment and valley of the Diamond Creek and its tributaries, including Black Calf and Wild Dog Creeks. Diamond Creek has some small areas of floodplain. The creek valleys are surrounded by a landscape of mainly moderate to steep hills that merge with long ridges of rugged terrain on the northern, western and southern boundaries. Most of the steeper, more rugged hills remain forested, while most of the low hills and flats have been cleared for agriculture.

### 3.2 Climate

Between December and February, maximum daily temperatures in St Andrews average between 23° C and 26° C, but can soar above 40° C, especially when hot conditions prevail across the state. Between June and August, maximum daily temperatures average between 10° C and 14° C, but they can occasionally drop below 0° C, causing frost. The average annual rainfall is 793 millimetres. Low temperatures tend to limit growth in winter and lower rainfall limits growth in the summer months.

### 3.3 Geology and soils

The geology of the St Andrews area is primarily dominated by sedimentary rocks such as siltstones and mudstones which were deposited during the Silurian period approximately 440 million years ago. There are also unconsolidated gravels, sands, silts and clays which mainly occur along local waterways in the area.

The soils of the hills are light-textured yellow, brown or red duplex (meaning there is a sharp distinction between A (top) and B (second) soil horizons in the top 10 centimetres of the soil). Shallow light-textured gradational soils occur on the crests and steeper slopes. Grey clay with a uniform profile occurs along drainage lines and floodplain areas. This landscape has a high erosion hazard due to the hard-setting soil surfaces which tend to increase run-off and the dispersible clay subsoils. Sheet, gully and tunnel erosion occur on sloping land. Where drainage lines have little or no protective vegetation, erosion of the stream bed and banks is common.

### 3.4 Topography

The aerial photo in **Figure 1** shows the physiographic features of the St Andrews catchment including topography, aspect, cleared land and bushland. Ridgelines and valleys are visible. The brownish grey areas are bushland, the light green areas are generally cleared land with northerly and westerly slope aspects, and the dark green areas are cleared land, predominantly with southerly and easterly slope aspects. Managing for slope aspect is particularly important for pastures on grazing properties, some horticultural crops and in planning to manage the risk of bushfires.

### 3.5 Waterways

Diamond Creek is a tributary of the Yarra River originating in the Kinglake Ranges. It runs through the St Andrews catchment in a north-east to south-west direction. The Port Phillip and Westernport Regional River Health Strategy (Melbourne Water 2007) identifies this waterway as being of Very High regional importance. Diamond Creek supports a diverse biological community of fish, vertebrates, invertebrates and streamside vegetation (Melbourne Water 2003). Within the St Andrews catchment, native vegetation is generally present along the length of Diamond Creek, although some areas support only patchy vegetation.

Wild Dog Creek originates in private property in the east and also supports relatively intact vegetation along its length.

Yow Yow Creek is also present as a tributary of Diamond Creek originating to the east of the catchment.

### 3.6 Native vegetation cover

St Andrews supports large areas of relatively intact native vegetation providing habitat for an abundance of significant and unique flora and fauna. Areas of cleared land used for agricultural purposes support scattered native trees. Diamond Creek and its tributaries also provide ecological values.

St Andrews supports large areas of relatively intact native vegetation providing habitat for an abundance of significant and unique flora and fauna.



Photo by Sue Aldred



Recovering vegetation in the St Andrews catchment

Indigenous vegetation, particularly eucalypt species, is tightly linked to soil and land and type.

- The woodlands on the well-drained, exposed areas such as crests and slopes contain Bundy Box (*E. goniocalyx*), Red Stringybark (*E. macrorhyncha*) and Red Box (*E. polyanthemus*).
- Yellow Box (*E. melliodora*), Messmate (*E. obliqua*), Red Stringybark (*E. macrorhyncha*) and Narrow-leaf Peppermint (*E. radiata*) occur on the lower slopes.

- Candlebark Gum (*E. rubida*), Swamp Gum (*E. ovata*), and Manna Gum (*E. viminalis*) are the dominant trees along drainage lines.

- Red Ironbark (*E. tricarpa*) can occur in small patches of open forest, usually on older soils.

Non-eucalypt plant species are also strongly associated with particular land types. An excellent text for understanding these patterns is Leo Costermans' *Native Trees and Shrubs of South-Eastern Australia* (Costermans, 2009).



**Figure 1:** Aerial photo of the St Andrews catchment

# 4. Agricultural Land Capability

Assessing land capability or 'land class' allows us to gauge the inherent risks and opportunities for our land to provide for and sustain our current and/or proposed land uses. Land capability varies according to the geology, soil type, topography, aspect and climate.

In general terms, land with a high capability rating (e.g. land class 1), will be more suitable to being modified for agricultural use.

## 4.1 Land management units

Land Management Units (LMUs) provide us with a means for systematic review of land characteristics and are broad measures of land capability. The aggregation of lands with common characteristics into LMUs provides us with a general indication of the capacity of our land to sustain various land uses.

The five LMUs in St Andrews catchment are as follows:

- Floodplain LMU: Very gently sloping to flat, gradient <1% - 3%
- Gently undulating LMU: Gradient 3% - 15%
- Moderately undulating LMU: Gradient 15% - 25%
- Steep LMU: Gradient 25% - 35%
- Rugged terrain LMU: Gradient 35% - >40%.

The location of each LMU is identified in **Figure 2**.

The hilly landscape and soil type of the St Andrews catchment facilitates a significant erosion hazard. Specifically:

- all sloping land has high to moderate hazard for sheet, gully and tunnel erosion.
- the steeper slopes have a moderate to high hazard for mass movement (land slips).
- all streamlines have a high hazard for stream bed and bank erosion and sedimentation.

## 4.2 Agricultural land quality

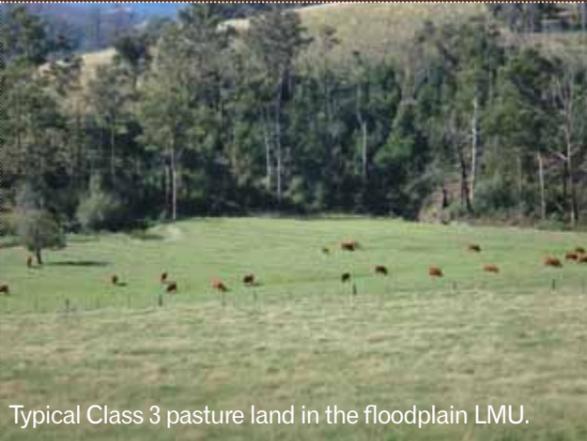
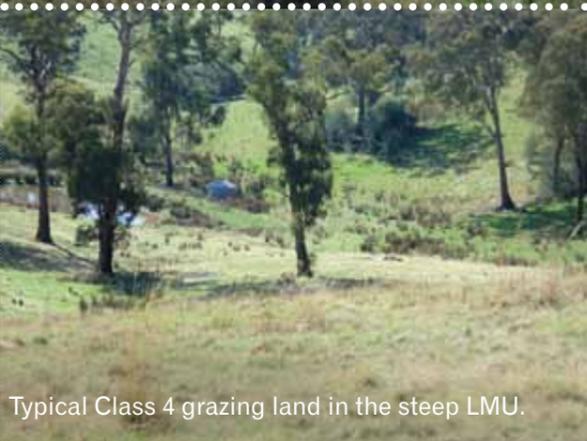
This section expresses the degree of agricultural versatility and production potential across the St Andrews catchment in terms of five classes of agricultural land quality. It is important to note that this only provides a broad guide and should not be used to justify significant changes in land use.

Prior to undertaking any significant change to land use, or if you have only recently purchased your land, it is strongly recommended that you prepare a detailed land capability assessment of your land. This is best achieved as a component of a detailed 'Property Management Plan' (sometimes referred to as a 'Whole Farm Plan'). Nillumbik Shire Council can assist landholders with the preparation of such plans.

**Table 3** presents a five-class description of agricultural land quality across the St Andrews catchment and the map at **Figure 3** depicts a broad spatial interpretation of this information. This mapping is largely based on slope classes and hence does not incorporate important components of land capability such as local hazards (e.g. known tunnel erosion), variation in remnant vegetation cover, aspect, soil type, soil moisture and the presence of minor drainage lines.

**Table 3:** Land class descriptions for St Andrews Landcare catchment

| LAND CLASS                   | EXPLANATION   | PHOTO REPRESENTATION OF LAND CLASS  |
|------------------------------|---|---|
| <b>Class 1<br/>Very high</b> | Agriculturally versatile land, with high inherent productive potential through possessing deep permeable, friable, structurally resilient and fertile soils, a flat to gently undulating land form, and a growing season of up to 11 to 12 months either under natural rainfall or irrigation. Suitable for intensive irrigated cropping and grazing.           | This land class does not exist in the St Andrews catchment.   |
| <b>Class 2<br/>High</b>      | Agriculturally versatile, but requiring more inputs to achieve the same productivity as Class 1. Slope is greater, soils more variable, and the growing season is limited: up to 9 to 10 months, or extended to 12 months if irrigation water is available. Suitable for high production extensive cropping and grazing, and vines or orchards with irrigation. | <br>Typical Class 2 agricultural land in the gentle undulating LMU. |

| LAND CLASS                  | EXPLANATION   | PHOTO REPRESENTATION OF LAND CLASS   |
|-----------------------------|---|--|
| <b>Class 3<br/>Moderate</b> | Land capable of supporting grazing but limited in versatility. Generally unsuited to cropping either because of limitations due to slope, drainage, lack of topsoil depth, weaker structure, water-holding capacity or presence of rock. Fertility levels are moderate to low, and annual growing season can be limited to approximately 7 to 8 months due to dryness or wetness. With high inputs, moderate to high animal production may be achieved. | <br>Typical Class 3 pasture land in the floodplain LMU.<br><br>Typical Class 3 grazing land in the moderately undulating LMU. |
| <b>Class 4<br/>Low</b>      | Vegetation must be avoided.   | <br>Typical Class 4 grazing land in the steep LMU.  |
| <b>Class 5<br/>Very Low</b> | Land capable of supporting grazing under moderate to low stocking rates, but only in situations where legally cleared paddocks exist. Slopes are moderate to steep, with shallow infertile soils that need care in their management. Fertility levels are generally low. High inputs may not be economic. Erosion hazard is high. Forest is often the best and most stable form of land use. Removal of remnant indigenous vegetation must be avoided.  | <br>Typical Class 5 rugged terrain LMU in the background.   |

### 4.3 Agricultural case study

## Developing a beef cattle farm at Alf and Joanna Gonnellas property in St Andrews

A case study with Alf and Joanna Gonnella, St Andrews

Alf and Joanna Gonnella have farmed their 36 hectares property on Mittons Bridge Road for 27 years. Lately, they have weathered 10 years of drought, the Black Saturday fire and then the floods.

Twenty-seven years ago the farm was in very poor condition. Rabbits were everywhere, the hill was covered in bracken and the lower land was infested with blackberries, Tea Tree and rushes. Alf and Joanna's vision allowed them to see the productive beef grazing property it is today.

It took four years to rid the property of weeds and rabbits and to sow all the land to pasture. Alf and Joanna say the two most important land management tasks are constant vigilance in controlling and eradicating weeds and sound pasture management.

The property comprises three St Andrews Land Management Units (LMUs): *Gently Undulating Land* (of

*High* agricultural quality) and *Floodplain* and *Moderately Undulating Land* (both of *Moderate* agricultural quality).

To assist rotational grazing and pasture management and to maximise production, the farm's six paddocks are fenced along LMU boundaries. Each paddock has its own stock water, either supplied from dams or reticulated from tanks to paddock troughs.

The 2009 fire burnt out the whole property and seriously weakened the pastures. This allowed pasture weeds including Blackberry, Sweet Vernal Grass, Bent Grass and Capeweed to establish in many areas. Thankfully, all the cattle survived unscathed.

After the fire, serious erosion occurred on the bare soil of the exposed hill paddock and had to be controlled. Alf decided that this was the highest priority paddock for pasture renovation, and this occurred in Autumn 2010.

The new pasture is a mix of Cocksfoot, perennial Ryegrass, White Clover, Red Clover and Subterranean Clover with very few weeds.

The property currently supports 36 Limousin breeding cows, with numbers limited by the condition of the pastures. However, the success with the new pasture has encouraged Alf and Joanna to continue their pasture improvement program progressively across the remaining paddocks over the next few years. This will start with the two floodplain paddocks in 2012. These are a priority as they are the most productive paddocks on the farm, supporting hay production as well as strong grazing. Pasture improvement will enable a higher stocking rate, greater production, and a stronger more vigorous pasture will minimise weed invasion.

Until three years ago the pasture fertiliser was always super and potash (phosphorous and potassium). The Gonnellas now use a seaweed fertiliser spray and dry-spread chicken manure. Recent soil tests also indicated that the soils were too acidic for pasture, and lime was applied to all paddocks in 2011.

Alf and Joanna are also concerned about the condition of the Diamond Creek and the surrounding vegetation. The fire and flooding seriously damaged both, and the protective fencing was destroyed.

There are signs that the creek erosion is healing and native vegetation is recovering, but many weeds have established, including rushes, thistles, Blackberry and willows. Along with pasture renovation, the priority is weed control and to re-fence and protect the creek and its native vegetation.

Joanna said, "We were not farmers when we started and we've made mistakes on the way, but we've turned wasteland into a productive farm and it's given us great enjoyment."

The Gonnellas' message to landholders is to keep on top of rabbits and weeds, manage pastures correctly and stick at it. It is consistent work but not hard work. And to prospective landholders they say, "Take your responsibilities for looking after the land seriously. Bad management is not neighbourly and causes problems for the whole community."



After the fire, serious erosion occurred on the bare soil of the exposed hill paddock and had to be controlled.



"We were not farmers when we started and we've made mistakes on the way, but we've turned wasteland into a productive farm and it's given us great enjoyment."

"Take your responsibilities for looking after the land seriously. Bad management is not neighbourly and causes problems for the whole community."

## 5. Ecological Values

Ecological values are generally defined as the benefits that space, water, minerals, flora and fauna and other aspects of natural ecosystems provide for native life forms.

The St Andrews area is within the **Highlands Southern Fall Bioregion**. Bioregions are relatively large land areas characterised by broad landscape-scale natural features – hills, valleys, creeks, vegetation – as well as the environmental processes that influence them. These environmental and ecological processes include climate, geomorphology, geology, soils and vegetation. Bioregions are used as the broad-scale mapping units for biodiversity planning in Victoria, adopted under Victoria's 1997 Biodiversity Strategy.

The Highlands Southern Fall Bioregion is the southerly section of the Great Dividing Range and is predominantly hilly. The geology that underpins the bioregion is largely sedimentary and granitic rock with shallow stony soils and yellow duplex soils.

Significant plant (flora) and animal (fauna) records within the St Andrews area are detailed in **Appendix 1**. Plants or animals can be listed as being of national or state significance, this may mean that the population of the species is poorly known, or rare or threatened with extinction. Two St Andrews flora species, Matted Flax-lily (*Dianella amoena*) and Clover Glycine (*Glycine latrobeana*) are of national significance, and nine state significant flora species have been previously recorded in the area. Two nationally significant fauna species, Growling Grass Frog (*Litoria raniformis*) and Spot-tailed Quoll (*Dasyurus maculatus*) and 16 state significant fauna species have also been recorded in the area.

The locations of these species are held in the DSE database called the Victorian Biodiversity Atlas.

It is worth noting that significant species records need to be treated with caution as surveys across the area may be incomplete and it is highly likely that further survey efforts would reveal additional significant species.

### **The North East Regional Organisation of Councils (NEROC) Report**

In 1997, the former North East Regional Organisation of Councils (NEROC) published a report on significant fauna sites and habitats for north-east Melbourne. The NEROC Report, written by local field ecologist Cam Beardsell, provides a comprehensive description of sites of faunal significance and the species of native animals that require conservation management. The document also maps important fauna conservation sites (NEROC sites) and provides recommendations to conserve fauna habitat across the region. Copies of this report can be obtained by contacting Nillumbik Shire Council on 9433 3111.

Six NEROC sites of significance cover parts of the St Andrews catchment. Three of these sites are considered part of the Nillumbik Upland Hills (NUH), and the northern tip of the catchment is covered by Kinglake Ranges (KR).

**Figure 4** shows the habitat and faunal significance for each NEROC site.



Photo by Sue Aldred

## 5.1 Ecological vegetation classes

In addition to the NEROC findings all vegetation – trees, shrubs, herbs, grasses, - in an area or catchment can be categorised into Ecological Vegetation Classes (EVCs). These EVCs represent different vegetation communities and are identified and mapped across Victoria by DSE. They are a valuable tool in biodiversity planning and conservation assessment. EVCs help to give us a better understanding of our landscape and why it looks the way it does and why certain plants grow in certain areas. DSE provides two sets of EVC mapping: Pre-1750 EVC mapping and 2005 EVC mapping.

- Pre-1750 mapping identifies the estimated extent of vegetation (EVCs) that occurred in Victoria prior to European settlement. It is a modelled dataset based on field data, soils, rainfall, topography and historical records.
- 2005 mapping identifies the current extent of native vegetation and EVCs and their decline since 1750.

The pre-1750 mapping identifies ten EVCs in the St Andrews catchment (**Figure 5**). The 2005 DSE mapping identifies that, while these EVCs are all still present, their distribution is greatly reduced (**Figure 6**).

EVCs help to give us a better understanding of our landscape and why it looks the way it does and why certain plants grow in certain areas.

Remnant vegetation within St Andrews is dominated by two EVCs, Grassy Dry Forest and Herb-rich Foothill Forest.

Grassy Dry Forest occupies drier sites on exposed aspects and crests of ridges or on the drier areas of sheltered slopes. It is dominated by a low to medium height open forest of eucalypts including Red Stringybark, Bundy Box and Red Box to 20 metres tall. The understorey consists of a sparse shrub layer, including Spreading Wattle and Common Cassinia, and is dominated by a high diversity of grasses and herbs including Honey-pots, Grey Parrot-pea, Ivy-leaf Violet, Red-anther Wallaby-grass, Wattle Mat-rush, Grey Tussock-grass and Weeping Grass.

Herb-rich Foothill Forest occupies the eastern and southerly aspects on lower slopes and in gullies. It is a medium to tall open forest to 25 metre, dominated by a range of eucalypts including Narrow-leaf Peppermint and Messmate Stringybark. It contains a large shrub/understorey tree layer, dominated by Blackwood, over a sparse to dense medium shrub layer dominated by Common Cassinia, Prickly Currant-bush and Dusty Daisy-bush. It is characterised by a high diversity of herbs and grasses in the ground layer including Common Raspwort, Ivy-leaf Violet, Hairy Speedwell, Saw-sedge, Tasman Flax-lily, Grass Trigger-plant, Weeping Grass and Common Apple-berry.

There are slightly smaller remnants of Valley Grassy Forest on fertile well-drained colluvial or alluvial soils on gently undulating lower slopes and valley floors, Damp Forest on higher elevations and Wet Forest in protected gullies adjacent to Kinglake National Park, Riparian Forest along Diamond Creek and Creekline Herb-rich Woodland on minor creeks and tributaries. St Andrews also contains minor occurrences of Gully Woodland, Shrubby Foothill Forest and Heathy Dry Forest.



Herb-rich Foothill Forest occupies the eastern and southerly aspects on lower slopes and in gullies.



## 5.2 Biolinks

The resilience of our ecosystem can be improved by creating and maintaining biolinks. The idea of a biolink was developed as a land use tool aimed to maintain and improve biodiversity values. Initially targeted at fauna, their key objective was to identify areas where connectivity could be improved to assist animals to move through the landscape. Biolinks can in part be understood as wildlife corridors which help species move across the landscape rather than being restricted to small isolated patches. However, biolinks can benefit not only flora and fauna species, but whole ecological communities. In areas dominated by agriculture or fragmented by development, the development of biolinks may help to restore connections between habitats.

Biolinks can effectively increase the size and connectivity of existing reserves, parks and privately owned areas of habitats. They allow species of plants and animals to remain in areas, as well as to adapt and evolve, thus maximising their opportunities to respond positively to challenges such as climate change. Without such biolinks, species and populations will become isolated and gradually disappear. Important biolinks were identified in the NEROC Report and St Andrews supports several strategic biolinks through Diamond Creek and between NEROC sites NUHB82, NUHB84 and NUHB83 (see NEROC map **Figure 4**). The Kinglake to Warrandyte habitat link also occurs in this area.

Within the catchment most habitat links are intact and in good condition. However, there are some areas that have only poor or degraded links. The quality of these links may be increased by fencing them off and allowing for natural regeneration, or – if natural regeneration is inadequate – revegetation using locally indigenous species. Domestic cats and dogs must also be controlled in habitat link areas if they are to serve their purpose. Restoring and/or creating biolinks requires co-operation between land managers.

## BioSites

A BioSite is a physical area of land (or water) which contains biological assets with particular attributes. Such attributes might be the presence of rare or threatened plants or animals or the conditions required for their survival. We have seven BioSites in our areas shown in **Figure 7**. They range from regional to national significance and cover approximately half of the St Andrews catchment. These BioSites are detailed below.

### 5030 – Kinglake National Park – Diamond Creek

Headwaters (State significant). These are perennial streams at the foot of the Kinglake Ranges. The main tributaries rise in high rainfall catchments at the top of the Great Dividing Range. The BioSite includes fast-flowing streamlets, small waterfalls and rock cascades which have formed incised valleys as they descend from the plateau. The site meets the significance criteria for ecological integrity and viability, richness and diversity, and rarity and conservation at a state level for fauna and, to a lesser extent, flora.

**5024 – Diamond Creek – Upper Reaches** (Regionally significant). This BioSite ranges along Diamond Creek from School Road at St Andrews to Kinglake National Park at the north end of Ninks Road. It covers approximately 640 hectares and supports relatively intact and extensive stands of Red Stringybark Herb-rich Foothill Forest. It meets the significance criteria for ecological integrity and viability, richness and diversity, and rarity and conservation at a regional level for flora and fauna.

**4884 – Yow Yow Creek – Wild Dog Creek** (State significant). This BioSite covers the lower and middle reaches and intervening areas of Yow Yow and Wild Dog Creeks, abutting King Lake National Park. It is located north-east of St Andrews, covering approximately 450 hectares of foothills comprising Herb-rich Foothill Forest, and Creepline Grassy Woodland.

**5275 – St Andrews Caledonia Reserve** (Nationally significant). This site meets the significance criteria for ecological integrity and viability, richness and diversity, and rarity and conservation at a national level for flora. It contains a number of national and state significant flora species. These include Silurian Leek Orchid (*Prasophyllum pyriforme*), Wine-lipped Spider Orchid, Emerald-lip Greenhood (*Pterostylis smaragdina*), Pale Swamp Everlasting (*Helichrysum aff. Rutidolepis*) (Lowland Swamps), Austral Crane's-bill (*Geranium solanderi var. solanderi*), Round-leaf Pomaderris, Matted Flax-lily (*Dianella amoena*) and Slender Tick-trefoil (*Desmodium varians*).

**5274 – St Andrews Flora Reserve** (State significant). This site meets the significance criteria for ecological integrity and viability, richness and diversity, and rarity and conservation at a state level for flora and contains the state significant flora species Wine-lipped Spider Orchid and Velvet Appleberry. Currently identified threats include grazing by exotic (rabbits, deer) and native (wallaby, eastern grey kangaroo) species, habitat loss, inappropriate fire regimes and competition and invasion by environmental weeds and garden escapees.

**5261 – Diamond Creek** – Cottles Bridge to St Andrews (State significant): This site encompasses Diamond Creek from Cottles Bridge-Strathewen Road at Cottles Bridge to School Road at St Andrews. The site includes the hills and gullies to the west of the creek at Watts Lane and between Youngs Road and School Road, and covers approximately 300 hectares. It lies in the foothills of the Eastern Uplands with ridges, hill-crests, hill-slopes, gullies, valleys, creeks, stream/floodplain and dams. It meets the significance criteria for ecological integrity and viability, richness and diversity, and rarity and conservation at a state level for flora and fauna

**5261- Kinglake National Park – Black Calf Creek/ Wild Dog Creek** (State significant): This site meets the significance criteria for ecological integrity and viability, richness and diversity and rarity and conservation for flora. It contains state significant flora species Wine-lipped Spider Orchid and provides a wildlife corridor for fauna.



Photo by Sue Aldred

## 5.3 Shire of Nillumbik overlays

Two Environmental Significance Overlays from the Nillumbik Planning Scheme, ESO 1 – Sites of Fauna and Habitat Significance, and ESO 4 – Waterways, occur in the St Andrews catchment (See **Figure 8**).

The overlays have stated environmental objectives, permit requirements and decision guidelines to ensure that any planning decisions take into account the environmental values within these areas.



## 5.4 ABZECO ecological mapping

ABZECO Consultants have been engaged by the Nillumbik Shire Council to revise ecological mapping. This will distinguish between two ecological categories: low to moderate habitat and Core habitat (see **Figure 9**).

Areas mapped as Core are considered likely to be relied upon by rare or threatened plants and animal species.

Areas mapped as low to moderate habitat include vegetated areas of lower quality than the Core areas, but also include some un-vegetated land that could be revegetated to provide buffer protection for Core areas and increase ecological connectivity.

This study is yet to be considered by Council at the time of printing.

## 5.5 Roadsides

St Andrews roadsides generally support native vegetation, which varies in quality from low to high conservation value. Council's *Roadside Management Plan* is the strategic document which guides the implementation of roadside maintenance activities. This Plan focuses on balancing the sometimes competing interests on roadsides between human safety, fire risk, management of remnant native vegetation located on roadsides and ensuring a safe and efficient transport network and utility corridor.

This Plan contains updated information regarding the environmental values of roadsides in Nillumbik based on revised conservation value mapping work undertaken in winter/spring 2010. This provides guidance to Council about where resources should be allocated to protect the more valuable of these roadside reserves. The Plan has a strong emphasis on operational management of roads so that works activities do not adversely impact flora and fauna values of roadsides (see **Figure 10**).



## 5.6 Waterway health

The St Andrews catchment falls within the Middle Yarra system. The waterways within this system are highly valued especially the Yarra main stem and tributaries and have areas of natural beauty, support many recreational activities and important animal species such as platypus. These waterways incorporate significant Indigenous and European heritage values. Community feedback has also outlined a broad spectrum of values across the Middle Yarra system, reflecting its size and diversity.

Diamond Creek is the major waterway that runs through our catchment. It is recognised in the *Port Phillip and Westernport River Health Strategy* as being of very high importance in the region due to its ability to support important creekside plants, provide habitat for fish and other aquatic creatures and its water quality. The management objective for river health is to maintain ecologically healthy rivers, and Diamond Creek's current condition is rated as good. The targets identified in **Table 4** are intended to maintain that condition.

**Table 4:** Melbourne Water's Diamond Creek management targets

| ASPECT                | CURRENT RATING | TARGET               |
|-----------------------|----------------|----------------------|
| Water quality         | Excellent      | Excellent (maintain) |
| Aquatic life          | Good           | Good (maintain)      |
| Habitat and stability | Good           | Excellent            |
| Vegetation            | Good           | Excellent            |
| Flow                  | Excellent      | Excellent (maintain) |

Melbourne Water has identified the following as a priority for the St Andrews catchment:

- Revegetation of streamside areas for vegetation, amenity and birds- particularly through linking high quality habitat in the upper reaches of the Diamond Creek.

In 2010, a study was commissioned by Melbourne Water to examine the effects of the 2009 bushfires on Steeles, Diamond and Arthurs Creeks. The results of this study, known as a geomorphic study, found various threats to river health following the 2009 bushfires.

Direct effects included the burning of vegetation and ground cover, which generates ash and increases soil water repellence. This in turn affected faunal survival, catchment hydrology and sediment transport. The key indirect post-bushfire effects included changes in stream flow, erosion and sedimentation. These are triggered, and/or exacerbated by rainfall events and have an impact on the following:

- aquatic fauna and flora
- flooding
- channel erosion and sedimentation
- waterways health targets in the catchment and downstream
- stability of bridges, rock chutes, dams and other waterways infrastructure.



Diamond Creek is the major waterway that runs through our catchment.



Photo by Sue Aldred



## 5.7 Ecological case study

# Caring for a bush block in St Andrews

A case study of Michael and Sue Aldred's property

Michael and Sue Aldred purchased a 100 acre bush block on Mittons Bridge Road, St Andrews in 2006. The property supports various intact vegetation types including Herb Rich Foothill Forest, Grassy Dry Forest, Valley Grassy Forest and Riparian Forest vegetation. The property was covered by a Trust for Nature covenant when purchased, a Section 173 agreement and two Environmental Significance Overlays under the Nillumbik Planning Scheme. Native vegetation on the property is part of an identified habitat link.

Two regionally rare flora species are known on the property: Common Sunray (*Triptilodiscus pygmaeus*) and Shining Buttercup (*Ranunculus glabrifolius*). Significant fauna known to use the property include the Brush-tailed Phascogale, the Barking Owl and the Painted Honey Eater.

When purchased, there were some dense infestations of woody weeds including Sweet Pittosporum (*Pittosprum undulatum*) and Blackberry (*Rubus fruticosus* spp. Agg). Burgan (*Kunzea leptospermoides*) was also out of balance in some areas. Grassy species such as Panic Veldt Grass (*Ehrharta erecta*), and Sweet Vernal Grass (*Anthoxanthum odoratum*) also occur. Since the 2009 fires, seedlings of Spear Thistles (*Cirsium* spp.) and Fleabane (*Conyza canadensis*) are more prevalent. Neighbours have not returned since the fires and woody weeds on the adjacent block have emerged to threaten the property, including Bluebell Creeper (*Sollya heterophylla*), Early Black Wattle (*Acacia decurrens*) and Bracelet Honey Myrtle (*Melaleuca armillaris*). Roadsides and adjacent paddocks are also potential sources for windblown weed seeds.

Rabbits occur on the block, and with increased new growth since the 2009 fires, numbers have increased. Also, some of the drainage lines in the property have developed erosion problems since the fires.

The Aldreds cut and painted Sweet Pittosporum with herbicide early on and this has not required much follow up control. They have participated in Melbourne Water's Stream Frontage program to control invasive Blackberry along the creek. This has allowed native plants to thrive. Burgan was being thinned in high biodiversity areas prior to the fire. Since the fires other native wattle species have re-established in high density. Burgan is regenerating to

some extent but is greatly reduced and is no longer the dominant mid-storey species as it was on some areas of the property before the 2009 fires. Michael and Sue continue to target new and emergent weeds as they see them, and occasionally continue their weed works into the neighbouring property.

The Aldreds have avoided the poison-baiting of rabbits and have explored other options. They have implemented a successful 'soft jaw' trapping program, assisted by a local contractor, and control rabbits by shooting.

Immediately after the fires, they applied measures to control soil erosion caused by a lack of protective vegetation. Measures included simply moving fallen burnt timber across slopes, log check dams, coir logs, and planting native understorey species as well as grasses and sedges in waterways and gullies. They now continue with control measures using rocks and engineering works through the national Caring for Our Country funding scheme.

'As time goes on we are seeing the bush here recovering from the fires,' said Sue. 'One of the first things we did was to just pull fallen branches across slopes to stop soil being washed away. It was amazing how effective it was. One of the biggest things we have learned since the fires is that you have to be patient and to sometimes let nature take its course. For the future we just want to keep this place as natural as possible. The only introduced plants we plant here are veggies in our garden. We have lots of hollows for animals but we are thinking of putting a couple of nesting boxes close to the house so we can see what is about, and are also considering installing a remote sensor camera.'



“One of the biggest things we have learned since the fires is that you have to be patient and to sometimes let nature take its course. For the future we just want to keep this place as natural as possible.”

# 6. Community Engagement and Capacity-Building

To achieve the actions identified in this CERAP, we need to see ourselves as land managers, not just landholders and residents. We need to be aware of the problems and acknowledge them as important issues. We need to be prepared to act, know what measures to take, at what scale and with whom to cooperate.

Catchment management involves:

- protecting remnant indigenous vegetation
- reconnecting fragmented native habitat
- protecting rare or endangered species
- managing invasive plants and animals
- improving pastures and soils
- protecting and enhancing waterway health.

These are all complex tasks and interconnected issues. They require cooperation between neighbours and ultimately people across the wider catchment. Major community engagement and capacity-building programs will be needed to support us in this work.

Capacity-building programs generally fall into the categories of awareness raising, information and knowledge, skills and training, and facilitation and support. By building peoples' ability and motivation to act, the capacity-building activities can contribute to greater and more effective community engagement and action in developing and implementing this CERAP.

Potential participants in capacity-building could include the following:

- subsets of landholders with specific land use interests (e.g. farmers, owners of bush blocks, and various land managers) or those located within specific neighbourhoods
- community groups (e.g. Landcare, the CFA, Fireguard groups)
- regional organisations (e.g. Port Phillip and Westernport Catchment Management Authority, Melbourne Water, industry groups and learning institutions)
- Government agencies (local, state and federal)
- Private technical and financial advisers/facilitators.

When planning for capacity-building, a range of approaches for engaging various participants should be considered. It is important to avoid the 'one size fits all' approach, as most on-ground action is in the hands of individual landholders and local groups, and we have differing interests and needs.

In particular, the targeting process should consider those people who are not currently engaged but whose participation is critical for achieving CERAP outcomes.

Detailed consideration is needed to the following questions to maximise the success of engagement and capacity-building actions.

- What specific behaviour and practice changes are required to achieve the priority outcomes?
- What are the specific, critical capacity-building activities that will most effectively support the achievement of these changes?
- What prerequisite and co-requisite activities are required to successfully undertake these capacity-building activities?
- What has already been done and is the proposed activity building on this?

- Where geographically within the catchment should capacity-building activities be targeted in order to best achieve priority outcomes?
- Who within the target areas should be specifically identified for involvement in capacity-building?
- When should specific capacity-building activities be undertaken and in what order? Which are time critical, and which cannot be undertaken until others have been completed?
- Which are the most appropriate delivery mechanisms in terms of who delivers the services (e.g. local government, catchment management authority, community support network, educational institution or other organisation/group)? What should be their approach?
- Who will supply the resources?



# 7. Challenges for Management of the St Andrews Catchment

This section gives a brief overview of areas of the catchment and some of the challenges faced. Actions to address challenges are to be found in Section 8.

## Agriculture

Historically, St Andrews farmers and their businesses along with their community, have a proud history of resilience and adaptation to change. They have built their prosperity by adapting to industry and community needs, providing timbers for mining, bark for roofs, bark for tanning, firewood collection and fuel for industry. This was followed later by orcharding and dairying.

Currently, St Andrews agricultural uses are grazing cattle, goats and horses, several vineyards, as well as some olive and fruit growing. Agricultural properties range from small scale up to 40 plus hectares.

Some agricultural areas of higher quality in St Andrews have also attracted 'tree change' migration – the growth of small, lifestyle-oriented farm businesses. While individual agricultural enterprises may be run on a commercial basis their small scale provides insufficient income for the farm family whose livelihood relies on off-farm income and capital growth. This trend is likely to continue for the foreseeable future.

Challenges for the farming sector in our catchment include drought, water scarcity, increased running costs and reduced viability of traditional commercial agricultural enterprises. Climate change, growing urbanisation and new patterns of land use, threats from the introduction and spread of weeds and pests, and changing community and consumer expectations are further threats.

## Pasture quality

The quality of pasture is, of course, an important issue for our farmers.

Pasture deterioration leads directly to inter-related components and drivers of soil degradation including topsoil depletion, compaction, increased water run-off, erosion, loss of soil fertility, acidification and a crash in soil biota. This in turn causes degradation of local waterways and water-bodies as a result of an increase in sediment and nutrient load.

Pasture deterioration also exposes areas to weed invasion, creating new weed hot-spots which then become threats to nearby agriculture and biodiversity. Sustainable pasture management is a topic of farm planning in itself. Pasture mismanagement, such as over-grazing, is a consequence of poor knowledge. It is a drain on the ecological, productive and economic resources of a property and hence would never be knowingly practiced. This highlights that fact that good community education is the precursor to sustainable property management.



Photo by Sue Aldred

## Ecological values and native vegetation

There is strong appreciation for the bush in the St Andrews community and awareness of the catchment's ecological values. The bush landscapes of St Andrews have always attracted many residents and visitors to the area and justly continue to do so. Much of the remnant bushland in St Andrews is privately owned.

The protection and enhancement of our existing remnant bush with its animal and plant populations is the best way to conserve biodiversity across these landscapes. Native animals struggle to replenish their population numbers when they have to move between small areas of habitat in a fragmented landscape with little connectivity. Fragmentation is worsened after disturbance events such as bushfire. Therefore, large natural areas of remnant vegetation are of fundamental importance for nature conservation and are irreplaceable. All other things being equal, large remnants are inherently more valuable than groups of small, fragmented patches that add up to the same size.

If areas of bushland have become degraded, natural regeneration of native plant species is best; as we have seen post-fire the bush is uniquely adapted to fire. Research shows that restoration of bushland through revegetation or re-introduction is unlikely to return that area to its original condition with all of its inherent ecological processes and resilience. These ecological processes are vital in the services they provide to the human community – carbon sinks for example. Restoration should be targeted firstly to areas which are of high quality, moving on to those of lower quality when time permits. Threats to biodiversity such as weed incursion should be treated at their source.

While the St Andrews area supports large areas of relatively intact native vegetation, there are also scattered mature native trees in agricultural paddocks. These provide a range of productivity benefits such as shelter for stock, reduction of wind and water erosion, and seeds for regeneration (in the paddocks and elsewhere). They can be important habitat for native fauna by providing a conduit or stopping off point for animal movement between patches of intact vegetation, and they may also be a source of food. These trees are threatened by ringbarking and uncontrolled grazing in agricultural areas with biodiversity values. As a result, they are prone to dieback. There is also a lack of protection for scattered native trees.

Our waterways and their unique riparian plants need protection too. When creeks and significant gullies are left unfenced, stock may have access to graze and trample riparian vegetation. Creek banks become trampled and begin to erode and water quality is reduced. This practice often goes hand in hand with overgrazing of pastures, particularly in times of low rainfall or overstocking.

Private landholders with remnant bush on their property need to be aware of their responsibilities regarding noxious weed control, and of legislation that protects native vegetation, such as the *Planning and Environment Act 1987* that requires a permit to remove, destroy or lop native vegetation.

Challenges to our bushland, includes clearing for housing, weed invasion and fragmentation.

## Erosion

The St Andrews catchment generally has highly erodible soils on account of their thin topsoil and highly dispersive easily dissolved subsoils. The likelihood of erosion is greater in areas that have:

- steep slopes
- disturbed topsoil
- concentrated flows of water
- vertical drops in the bed of drainage lines
- poor coverage of vegetation
- high rabbit populations.

A combination of these factors increases the risk.

Much of the steep land of the St Andrews catchment was bared of vegetation by the 2009 fires. This resulted in higher volumes of faster flowing rainfall run-off. This caused a significant spike in erosion. Fortunately, the natural recovery of vegetation across the catchment has been dramatic and this has helped to stabilise rainfall run-off and erosion rates. Engineered solutions to stabilising active erosion sites have been required in situations where the activity of the erosion has been a serious threat to infrastructure or the natural/productive environment.

The sediment load that is generated via an accelerated rate of erosion has serious consequences for downstream waterways and water-bodies. This includes siltation of in-stream pools and other water-bodies which alters the aquatic ecological conditions and degrades the in-stream biota.

## Pest plants

Pest plants – weeds – are rightly considered by many St Andrews landholders to be a high priority for land management. The St Andrews catchment contains, and always has done, a wide range of weeds. They include long established agricultural weeds, environmental weeds of bushland, and weeds of waste spaces. Weeds of greatest concern are aggressively invasive environmental weeds and new incursions of environmental weeds.

Weeds reduce the natural values of bushland and some particularly invasive types of weeds are capable of eliminating individual local plant species or entire vegetation communities. On agricultural land, weeds reduce grazing productivity, lower cropping capability and contaminate produce. Other weeds can injure or poison stock and pets. Weeds in both bushland and agricultural land provide a harbour for pest animals and disease.

St Andrews landholders have witnessed extensive opportunistic invasions of weeds, some familiar and some new, since the 2009 fires. Weeds have colonised land that was used for pasture before the fires and may out-compete fire-affected pasture species. Weeds have also appeared in what were previously intact areas of bushland where the natural ground cover was destroyed. These weeds have been spread by airborne seed, carried by birds and animals, or encroached from roadsides. Poor machine hygiene following the movement of trucks, earth moving and other machinery during the clean up and rebuilding process also brought weeds on to properties in the area. Garden escapee plants, whether 'natives' or exotics, have also benefited in some cases from the post-fire environment and widened their range. Landholders have been overwhelmed with many decisions post-fire, properties have changed hands and frequently sound land management practices have fallen off the agenda.

We are now faced with challenges in controlling weeds in this post-fire environment. While some species have not proven to be as problematic as first feared, significant work is required to contain them and control further spread. Factors in this control are complex and include landholders developing an understanding of weed biology, improving our knowledge about the impact of weeds on our native ecosystems and improving our ability to identify weed species. Knowledge of these factors all contribute to empowering the landholder to confidently identify and treat weeds. A further challenge in St Andrews and other fire affected areas are properties with absentee landholders and new and emerging pest plants.

The Shire of Nillumbik lists 126 species as local environmental weeds. In addition to the Shire list, other weeds are declared pest plants under the provisions of the *Catchment and Land Protection Act 1994*. While these primarily threaten agriculture, many have severe impacts on native plant communities. New and emerging weeds are becoming of great concern, particularly Chilean Needle Grass, Serrated Tussock and Bridal Creeper (*Smilax*).

Significant factors in the spread of weeds are a lack of knowledge about their impact on native ecosystems

## Pest animals, including domestic cats and dogs

The pattern of settlement and fragmentation of the landscape in St Andrews has allowed the spread of feral animals, which are predators of native flora and fauna. Roaming cats and dogs are predators too – a problem linked to increased urbanisation. St Andrews has also experienced an increase in some pest animals since the 2009 fires.

Some pest animals are of particular importance in the catchment, as follows:

### Rabbits

Rabbits have recovered and increased in numbers post-fire due to a number of factors – higher rainfall, green pick and additional harbour in regenerating bush.

Rabbits threaten the values of our public and private lands. The Department of Primary Industries is able to use the provisions of the CaLP Act 1994 to enforce rabbit control on private land.

The most appropriate method for rabbit control will depend on your situation, available resources, and preferences.

All methods must comply with relevant agricultural chemical, animal welfare, and firearms legislation. Baiting for rabbits with 1080 poison is not usually undertaken in closely settled areas because of the unacceptable risk to domestic pets.

The Council offers subsidies to landholders for rabbit control works if you are working with your neighbours in a Rabbit Action Group. These generally cover approximately one third of works' costs.

### Foxes

Foxes too are increasing in the St Andrews area as they breed up due (in part) to high rabbit numbers.

Foxes are identified in the NEROC Report as a threat to regional biodiversity. They penetrate deep into residential areas and cause serious environmental damage through predation and the spread of disease on native animals. They may also attack newborn livestock, raid chicken coops and disturb domestic pets. Coordinated action by a group of landowners will provide a higher level of control.

As for rabbits, the most appropriate method for fox control will depend upon your situation, available resources and preferences.

### Wild Deer

Wild deer are one of Australia's worst emerging pest problems, causing damage both to the natural environment and agricultural businesses. Populations in St Andrews may be expanding once again, with deer invading new areas post-fire.

Integrated control of deer should be implemented now while the population is emerging. Shooting is generally regarded as the best option for control of deer, although a high level of skill and a specialist rifle is required.

### Wild Dogs

Wild dogs are declared 'established pest animals' under the CaLP Act 1994. They are a major threat to livestock and production on private land in provincial Victoria, including the St Andrews catchment, and they prey on native fauna. An integrated approach should be applied to managing wild dogs. A control program may include baiting, trapping, shooting, exclusion fencing, and encouraging good animal husbandry practices to minimise attacks on stock.

The Department of Primary Industries offers support to producers after wild dog attacks.

### Domestic animals

Direct predation by cats and dogs can be devastating to many indigenous animals, most particularly to ground-dwelling and foraging species such as quail, bush-rats, frogs and even possums. Cats will readily climb and take birds, gliders and bats. Dogs that are regularly allowed to roam free from their property can form packs and will attack larger native mammals.

Landowners should contain domestic animals within restricted areas on their property, not only to protect biodiversity but to safeguard their pets.

## Burgan

Burgan (*Kunzea ericoides*) can be of concern. It is a native shrub species and occurs naturally in the St Andrews catchment but it commonly colonises disturbed areas and can alter the structure of native vegetation by out-competing other shrub and understorey species to reduce biodiversity. Burgan can also colonise areas near infrastructure such as dwellings and sheds and become a fire hazard. Planned removal of Burgan from these areas may be an appropriate strategy. It is important to note that Burgan removal may require a permit, so check with Council prior to commencing works.

*Burgan (Kunzea ericoides) can also colonise areas near infrastructure such as dwellings and sheds and become a fire hazard. Planned removal of Burgan from these areas may be an appropriate strategy.*

## Fire

Fire has always been present on the Australian continent, and has been significant in shaping much of the landscape. St Andrews is no exception; it is a fire-prone landscape with climate, hill slopes, aspect and vegetation types that all act to influence the degree of fire hazard. The history of bushfires, projections for future temperature and rainfall all indicate increased drought and bushfire events.

The 2009 fires burned over half of the Diamond Creek catchment in the northern area of St Andrews, causing loss of life and damage to property and the environment. Much flora and fauna was burnt and local waterways suffered subsequent damage.

Substantial damage also occurred to road infrastructure, and erosion damage occurred to drainage infrastructure, culverts and bridges. This denied some property owners access to their properties. Subsequent rain led to further erosion and flood damage in both burnt and unburnt areas downstream.

In most cases, native vegetation burnt in the bushfires is regenerating by natural processes. Indeed, many plants and animals have evolved to survive fire events, and are reliant on fire to regenerate and maintain their health. However, biodiversity is dependent on appropriate fire regimes (fire intensity, frequency, season, extent and type). Frequent and intense fires may alter the composition of various vegetation communities. High fuel levels may result in fire temperatures at levels which destroy large eucalypts that provide habitat for fauna species.

In many cases, weeds are invading and must be controlled before they become established. Where erosion is occurring, planting of native vegetation or direct seeding may be required to stabilise soils and assist with the natural regeneration process.

## Climate change

The report published by Land and Water Australia in 2008, *Glimpsing Victoria's Future Climate* provides climate change projections for Victoria. It indicates that Victoria's climate in future decades will differ from that of the past.

Temperature projections are for continued warming. Rainfall projections are more mixed but mostly indicate a drying trend, particularly during winter and spring. The combination of projected warming and less rainfall has significant implications for agriculture and stream flow.

By 2030, annual rainfall in Victoria is projected to decrease by up to 5 per cent relative to the climate of around 1990. By 2070, a decrease of 5 to 10 per cent is likely under a low greenhouse gas emission scenario, or a 10 to 20 per cent decrease under a high emission scenario. Winter and spring rainfall is likely to decrease, whereas changes in summer and autumn rainfall are less certain. Projections show an increase in rainfall intensity and an increase in the number of dry days. This suggests that Victoria's rainfall patterns will have longer dry spells interrupted by heavier rainfall events.

By 2030, annual average temperatures over Victoria are projected to increase by at least 0.6° C, relative to the climate around 1990. By 2070, this increase is at least 1.0° C under a low emission scenario, and at least 2.5° C under a high emission scenario.

Along with the increase in mean temperatures, an increase in the frequency of very hot days and nights is likely. Projections indicate that by 2030 Victoria will experience a few more days per year above 35° C than now, and about twice as many by 2070 under a high emission scenario. Conversely, the frequency of frosts and very cold days and nights is likely to decline.

The combination of projected warming and less rainfall has adverse implications for run-off and water storage. By 2030, stream flow into Victorian dams is projected to decline by 7 to 35 per cent relative to historical average flows.

In summary, this drying and warming scenario will induce a range of threats to agriculture, including the following:

- declining productivity due to increased drought and bushfires
- crop yields benefiting from warmer conditions and higher carbon dioxide levels, but vulnerable to reduced rainfall
- reduced water availability
- greater exposure of stock and crops to heat-related stress and disease
- earlier ripening and reduced grape quality
- less winter chilling for fruit and nuts
- southern migration of some pests
- a potential increase in the distribution and abundance of some exotic weeds.

These climate change induced threats to agriculture are likely to create a greater demand for agricultural land and agricultural production in cooler, higher rainfall regions in the state. This could include the St Andrews catchment.

**By 2030, annual average temperatures over Victoria are projected to increase by at least 0.6° C**

Climate change is also predicted to have a marked impact on biodiversity through many factors such as changes in vegetation structure including a decrease in foliage quality and reduction in range for the majority of vertebrate species. Increased temperatures are expected to result in changes to vegetation composition. It is likely that changes in structure, productivity and foliage quality will have flow-on effects to other aspects of biodiversity. Climatologists suggest that climate change will result in a drying climate and more intense and frequent fires, with the following impact on biodiversity:

- smaller areas of refugia as a result of larger scale fires, slowing the re-colonisation of burnt areas and the recovery of populations, possibly resulting in local extinctions
- increased fire mortality of drought-stressed plants, notably eucalypts
- reduced post-fire recruitment of flora
- loss of core areas of biodiversity.



Photo by Richard Francis

# 8. Actions

Sustainable catchment management is complex, especially in St Andrews with its mix of private and public land in key environmentally sensitive areas.

Actions have to be planned at the catchment level and require collaboration between land managers and coordination of works across private and public land property boundaries. For instance, an action initiated by an individual property owner may fall under the responsibility of, say, Parks Victoria, Melbourne Water or Nillumbik Shire. In such cases, collaborative work between landholders, Landcare and other agencies can achieve greater, longer term sustainable outcomes.

Such a context, however, may be challenging for some landholders (both public and private) and this is where community education in caring for our catchment and capacity-building to work together effectively become crucial (see Section 6).

The following table outlines potential land management actions, together with the relevant responsible agencies. They are grouped into themes of agriculture, waterway health, biodiversity and rural living.

## 8.1 Agriculture

### Goals

- To encourage adoption of 'best practices' in all agricultural landscapes.
- To identify sustainable agricultural enterprises for the future.

| ACTIONS  | RESPONSIBILITY  |
|--|---|
| <p><b>Minimise weeds now and in the long-term.</b></p> <ul style="list-style-type: none"> <li>• Prevent and intervene early to eradicate new weeds.</li> <li>• Garden escapees e.g bluebell creeper, Cootamundra Wattle, and other weedy wattles plus spear thistle.</li> <li>• Contain and reduce the level and impact of existing weeds.</li> <li>• Maintain achievements in weed management.</li> <li>• Collaborate with neighbours, Nillumbik Shire Council, Parks Victoria and Melbourne Water to prioritise and control weeds.</li> <li>• Educate yourself about key weeds in your area.</li> </ul> <p>Important weeds in St Andrews are: Paterson's Curse (particularly in the headwaters of Wild Dog Creek), Blackberry (particularly in the headwaters of Yow Yow Creek), Chilean Needle Grass, Serrated Tussock, Pittosporum, Broom.</p> | <p><b>Landholders and Landcare</b></p>  |
| <p><b>Improve weed knowledge and control in the community.</b></p> <ul style="list-style-type: none"> <li>• Provide information for new property managers.</li> <li>• Conduct education programs relating to key weeds, such as Pittosporum and Broom.</li> <li>• Provide support to undertake weed control works.</li> <li>• Promote the benefits of weed management for landholders' own and adjacent properties.</li> <li>• Provide an expert person to confirm species identification. (Photographs are useful but are not sufficient to provide confidence in species identification).</li> <li>• Hold weed management field days in the catchment.</li> <li>• Identify garden plants that have the potential to become bushland invaders.</li> </ul>   | <p><b>Landcare, Council, Parks Victoria, Department of Primary Industries and Melbourne Water</b></p> |
| <p><b>Provide whole property/farm planning advice sessions and/or courses.</b></p> <ul style="list-style-type: none"> <li>• Include sections on land capability, biodiversity, weed and pest animal control, erosion control, farm water management, soil and pasture management and bushfire planning.</li> <li>• Target new land managers.</li> </ul>  | <p><b>Landcare, Council and Department of Primary Industries</b></p>                                  |
| <p><b>Control pest animals.</b></p> <ul style="list-style-type: none"> <li>• Conduct workshops on rabbit control.</li> <li>• Utilise skilled contractors for rabbit control.</li> <li>• Form rabbit actions groups.</li> </ul>   | <p><b>Landholders, Landcare and Council</b></p>   |
| <p><b>Implement pest animal control programs.</b></p> <ul style="list-style-type: none"> <li>• Continue targeted pest control programs, especially for rabbits and foxes.</li> <li>• Education on pest animal species and their effects.</li> <li>• As above but including deer and goats in areas adjoining National Parks.</li> </ul>  | <p><b>Landholders, Council, Parks Victoria and Melbourne Water</b></p>                                |
| <p><b>Reduce gully erosion.</b></p> <ul style="list-style-type: none"> <li>• Undertake coordinated action to reduce erosion across properties.</li> <li>• Improve Shire design and construction techniques for road drainage.</li> <li>• Improve property managers' knowledge of drainage construction through access to improved information and design advice.</li> <li>• Educate construction crews.</li> <li>• Educate landowners in erosion issues.</li> </ul>  | <p><b>Landholders, Melbourne Water, Landcare and Council</b></p>                                      |

## 8.1 Agriculture (continued)

| ACTIONS  | RESPONSIBILITY  |
|--|---|
| <p><b>Promote vigorous pasture growth and appropriate grazing management.</b></p> <ul style="list-style-type: none"> <li>• Improve agency advisory services to land managers.</li> </ul>   | <p><b>Landcare and Council and DPI</b></p>                                  |
| <p><b>Improve the community's knowledge about fire and post-fire issues.</b></p> <ul style="list-style-type: none"> <li>• Investigate the findings of other studies into regeneration after fire to understand the nature of natural succession and fuel-load build-up.</li> <li>• Draw on local knowledge of fire history.</li> <li>• Improve knowledge, particularly for new property managers, through improved information access to CFA fire plans and strategies.</li> <li>• Improve knowledge of land managers through improved information access, particularly on ways to respond to seasonal variability and extremes of weather.</li> </ul>         | <p><b>CFA, Council and Department of Sustainability and Environment</b></p> |
| <p><b>Educate small-scale agricultural producers.</b></p> <ul style="list-style-type: none"> <li>• Encourage small-scale agricultural producers to maintain agricultural land in sound condition by applying sustainable practices.</li> <li>• Provide short courses to focus on viable enterprises and value-adding and producing sales to tourists and customers of farmers markets.</li> <li>• Promote land use match with land capability.</li> </ul>  | <p><b>Landcare, Department of Primary Industries and Council</b></p>        |
| <p><b>Protect high quality agricultural land from further development.</b></p>   | <p><b>Council</b></p>   |
| <p><b>Protect existing scattered paddock trees and limit dieback.</b></p> <ul style="list-style-type: none"> <li>• Fence to protect selected trees from stock and routine agricultural practices in the paddock.</li> <li>• Propagate local trees for paddock use.</li> <li>• Plant shade trees away from isolated paddock trees for stock.</li> <li>• Don't apply fertiliser in tree root zones.</li> <li>• Reduce herbicide spray drift as much as possible.</li> <li>• Don't burn logs, stumps or fallen branches. (If they are in an inconvenient place, move logs to a more appropriate remnant vegetation area or creek as wildlife habitat.)</li> </ul> | <p><b>Landholders and Landcare</b></p>                                      |
| <p><b>Promote natural regeneration.</b></p> <ul style="list-style-type: none"> <li>• Install temporary fencing to enclose areas twice the size of tree canopies to encourage regeneration.</li> <li>• Manage grazing to help young plants survive.</li> <li>• Control herbivores such as rabbits, hares and goats.</li> <li>• Plant additional paddock trees in appropriate areas.</li> </ul>  | <p><b>Landholders</b></p>   |
| <p><b>Develop a plan to manage Burgan for fire prevention purposes.</b></p> <ul style="list-style-type: none"> <li>• It is important to note that Burgan removal may require a permit or may be protected under a property specific covenant or Section 173 Agreement. So check with Council prior to commencing works.</li> <li>• Make sure other native flora species are not destroyed during the removal program, by using appropriate removal techniques.</li> </ul>  | <p><b>Landholders</b></p>   |

## 8.2 Waterway health

### Goal

- To manage the catchment for protection and improvement of water quality.

| ACTIONS   | RESPONSIBILITY                                      |
|---|---|
| <p>Exclude stock from waterways by fencing and providing alternative reticulated water supply.</p>  | <p><b>Landholders</b></p>                           |
| <p>Develop design guidelines for the design of private roads and drains.</p>  | <p><b>Council</b></p>                               |
| <p>Provide workshops about impacts of land uses on waterway quality.</p>  | <p><b>Landcare and Melbourne Water</b></p>          |
| <p>Promote Melbourne Water's Stream Frontage Management Program to private landholders with freehold or licenced waterway frontage. The program provides support for a works such as fencing, off-stream stock watering, weed control and revegetation. These grants are designed so the landholder is responsible for implementing works and an ongoing program.</p> | <p><b>Melbourne Water and Landcare</b></p>          |
| <p>Work with other municipalities, Parks Victoria and Committees of Management to complement works on private property, through Melbourne Water's Corridors of Green Program.</p>   | <p><b>Council</b></p>                               |
| <p>Support community groups to access Melbourne Water's Community Grants Program when working on public land.</p>   | <p><b>Melbourne Water, Council and Landcare</b></p> |



Photo by Sue Aldred

## 8.3 Biodiversity

### Goals

- To protect and enhance native vegetation habitat for fauna populations.
- To secure important biolinks by protecting and enhancing remnant native vegetation and linking core areas.

| ACTIONS  | RESPONSIBILITY                     |
|--|------------------------------------|
| <p><b>Protect flora and fauna in your area.</b></p> <ul style="list-style-type: none"> <li>• Control domestic cats and dogs so that they do not pose a threat to native fauna, particularly in habitat links.</li> <li>• Control pest animals such as feral cats, foxes, rabbits and deer.</li> <li>• Control pest plants in known habitat areas to maintain and enhance existing fauna habitat and protect significant flora and fauna.</li> <li>• Retain timber in native vegetation areas, to provide habitat for hollow-dependent species.</li> <li>• Promote community awareness of significant species.</li> <li>• Be aware that some predatory native fauna may also be affected by poisoning regimes aimed at rabbits.</li> <li>• Establish a monitoring program to record fauna findings.</li> <li>• Enter into a voluntary agreement through Trust for Nature or Land for Wildlife.</li> </ul> | <p><b>Landholders</b></p>          |
| <p><b>Monitor and record fauna species in the catchment.</b></p> <ul style="list-style-type: none"> <li>• Provide training for volunteers.</li> <li>• Set up a centralised portal to store and access data. This could include an online volunteer database for community members to record data, set up by the Landcare group with support from Council.</li> </ul>   | <p><b>Landcare and Council</b></p> |
| <p><b>Help the community reduce the impact of uncontrolled domestic pets and other pest animals.</b></p> <ul style="list-style-type: none"> <li>• Educate landholders on the potential impacts on native fauna by not controlling domestic pets.</li> <li>• Provide technical support, perhaps with the help of external consultants.</li> <li>• Monitor for pest animals and also numbers of uncontrolled domestic cats and dogs.</li> <li>• Implement and enforce bylaws to control domestic cats and dogs and conditions in important fauna habitat links that prohibit dogs and cats.</li> <li>• Implement integrated pest animal management programs across land tenures.</li> </ul>  | <p><b>Council</b></p>              |
| <p><b>Reduce stock access to native vegetation.</b></p> <ul style="list-style-type: none"> <li>• Remove and replace fencing as appropriate and control weeds.</li> <li>• Reduce stock levels in accordance with land capability and season.</li> <li>• Fence around remnant vegetation where possible and fence off areas that can act as corridors to link core areas of native vegetation.</li> </ul>  | <p><b>Landholders</b></p>          |

## 8.3 Biodiversity (continued)

| ACTIONS  | RESPONSIBILITY                              |
|--|---|
| <p><b>Protect and restore native vegetation and ecological values.</b></p> <ul style="list-style-type: none"> <li>• Prioritise areas for protection and restoration. Use DSE 2005 EVC mapping and analyse the recommendations from the ABZECO ecological mapping. These recommendations should guide restoration priorities in conjunction with community engagement.</li> <li>• Ensure that all new landholders are made aware of ecological values within their property and understand their responsibilities to maintain native vegetation and the benefits of linking core areas.</li> <li>• Educate landholders about the benefits of protecting and retaining native vegetation.</li> <li>• Revegetate areas where natural regeneration is not adequate.</li> <li>• Apply planning tools to reinforce the importance of native vegetation (e.g. planning overlays).</li> <li>• Educate farmers about the value of scattered native trees in paddocks and ways to allow their regeneration.</li> </ul> | <p><b>Landcare and Council</b></p>          |
| <p><b>Protect and establish seedlings from scattered native paddock trees.</b></p>   | <p><b>Landholders</b></p>                   |
| <p><b>Implement weed control programs and help the community to control weeds.</b></p> <ul style="list-style-type: none"> <li>• Implement appropriate weed mapping and monitoring programs, including support for the Landcare group to do this.</li> <li>• Increase community education and capacity to control weeds, and community understanding about the potential impacts of garden escapees and which garden species may be invasive.</li> <li>• Provide extension and technical support to landholders, through Council and also the Department of Primary Industries.</li> <li>• Augment existing roadside weed control program.</li> <li>• Work with local nurseries to discourage selling potentially invasive species.</li> </ul>  | <p><b>Council</b></p>                       |
| <p><b>Liaise with Council to determine priority weeds and infestations.</b></p>  | <p><b>Landcare</b></p>                      |
| <p><b>Apply to the Nillumbik Shire Council Land Management Incentive Program.</b></p>  | <p><b>Landholders</b></p>                   |
| <p><b>Investigate the possibility of implementing a controlled burning regime on private or public land or both.</b></p>   | <p><b>Landholders, Landcare and CFA</b></p> |
| <p><b>Educate the community about the effects of bushfire.</b></p> <ul style="list-style-type: none"> <li>• Increase community knowledge about the effects of fire on native flora and fauna.</li> <li>• Increase awareness of activities landholders can take to protect large remnant trees (e.g. raking up all loose material for one metre around the base of trees).</li> </ul>   | <p><b>CFA, Landcare and Council</b></p>     |

## 8.4 Rural living

### Goals

- To encourage adoption of sustainable land management practices.
- To encourage protection and enhancement of biodiversity values.

| ACTIONS   | RESPONSIBILITY                                      |
|---|---|
| <p><b>Carry out strategic planning for the future of 'rural living' in the Shire.</b></p>   | <p><b>Council</b></p>                               |
| <p><b>Conduct research and development where critical information is lacking. The following themes are important:</b></p> <ul style="list-style-type: none"> <li>• catchment biophysical functions</li> <li>• socio-economic research</li> <li>• decision tool development including 'best practice' guides</li> <li>• alternative production or management practices.</li> </ul>   | <p><b>Council</b></p>                               |
| <p><b>When planning for capacity building, avoid the 'one size fits all' approach.</b></p> <ul style="list-style-type: none"> <li>• Consider individual landholders and local groups with differing interests and needs, such as subsets of landholders with specific land use interests (e.g. farmers, owners of bush blocks, and Melbourne Water) or those located within specific neighbourhoods.</li> <li>• Engage people who are not necessarily currently engaged but whose participation would be useful for achieving CERAP outcomes, such as students, community groups (e.g. the fire brigade), industry groups, government officers including local government community support officers and coordinators, and educational institutions.</li> <li>• Establish networks and forums (e.g. NERWG) to ensure program / project coordination between all relevant agencies and community organisations in relation to enhancing biodiversity and sustainable agriculture.</li> </ul> | <p><b>Landcare, Melbourne Water and Council</b></p> |



Photo by Sue Aldred

## 9. Potential Demonstration Projects

While all goals and problems need to be tackled over time, there will always be inadequate financial and personnel resources. Accordingly, priorities need to be identified. It is also good practice to have a range of projects developed and ready to activate as opportunities arise. Public funding associated with natural resource management is now typically project-based. A well-known recent example of this at the Australian Government level is the 'Caring for Our Country' funding.

Priority projects over the next five years emerged from the community workshops and are provided below.

The scale of the projects may be geographically contained within the St Andrews catchment, developed across two or more of the St Andrews, Strathewen and Christmas Hills CERAP areas or Shire-wide.

The final selection of projects and their scale requires decision by the St Andrews community in consultation with Council, Nillumbik Natural Environment Recovery Working Group (NERWG) and as needed, the other CERAP communities.

|   |   |
|---|---|
| <b>PROJECT TITLE:</b> Enhancing agricultural and environmental assets in St Andrews catchment by controlling weeds and pest animals |   |
| <b>LOCATION</b>   | Headwaters of Wild Dog and Yow Yow Creeks area  |
| <b>GOALS</b>  | To encourage adoption of best agricultural practices.<br>To protect and enhance native vegetation and fauna populations.  |
| <b>EXISTING INFORMATION:</b>  | <b>From Literature Review</b> (Figures in brackets indicate the reference number in the Literature Review).<br><i>Environment Protection and Biodiversity Conservation Act 1999</i> (3.2.1).<br><i>Flora and Fauna Guarantee Act 1988 / Protected Flora list and Action Statements</i> (3.3.1).<br><i>Australia's Biodiversity Conservation Strategy 2010 – 2030</i> . (4.2.1).<br><i>National Recovery Plan for the Southern Bell Frog 2010</i> (4.2.5).<br><i>Victoria's Resources On-line</i> (4.3.7).<br><i>Recovery Plan for Twelve Threatened Spider-Orchid Caladenia R. Br. Taxa of Victoria and South Australia</i> (4.3.14).<br><i>Sites of Faunal and Habitat Significance in NE Melbourne 1997 – the NEROC Report</i> (4.4.1).<br><i>Port Phillip and Westernport Regional Catchment Management Strategy 2004-2009</i> (4.4.2).<br><i>Port Phillip and Westernport Native Vegetation Plan 2006</i> (4.4.3).<br><i>Nillumbik Weed Action Plan 2008</i> (5.5.3).<br><i>Nillumbik Rabbit Action Plan 2009</i> (5.3.4).<br><i>Roadside Management Plan</i> (5.3.5).<br><i>Nillumbik Biodiversity Strategy and Action Plan</i> (5.3.6).<br><i>Parks Victoria and Nillumbik Shire Fox Control Program</i> (5.3.8).<br><i>Watsons Creek State of the Environment Summary 1999</i> (6.1.3).<br><i>Watsons Creek Catchment Management Plan</i> (6.1.4).<br><i>Rabbit Control Program 2009/10</i> (6.1.6). |
|   | <b>Problems</b><br><b>Weeds</b><br>Impact of Blackberry and Patterson's Curse as established weeds.<br>Impacts of Serrated Tussock and Chilean Needle Grass as emerging noxious weeds.<br>Pest animals<br>Impact of rabbits and foxes.  |
| <b>PROJECT DESCRIPTION</b>  | <b>Effects of weeds and feral animals</b><br><b>Weeds</b><br>Loss of pasture from weed invasion stimulated by the effects of fire.<br>Reduced carrying-capacity of pasture and associated animal production.<br>Potential for adverse animal health issues.<br>Weed invasion replacing remnant vegetation and disrupting ecological processes.<br><b>Feral animals</b><br>Spread of blackberries by foxes.<br>Selective grazing by rabbits of more vulnerable plant species.<br>Loss of stock by fox predation.<br>Invasion of rabbits from inadequate control on neighbouring properties.<br>Adverse impacts on the use of standard farming practices.<br>Reduced availability of pasture through grazing by rabbits.<br>Soil erosion due to lack of ground cover and soil disturbance.<br>Loss of native flora and fauna by predation.  |

|                            |  |
|----------------------------|--|
| <b>Continued</b>           |  |
| <b>PROJECT DESCRIPTION</b> | <b>Causes / Why this is happening</b><br><b>Weeds</b><br>Weeds are often able to out-compete recovering fire-affected pasture species or quickly colonise bare land.<br>Lack of ability to identify weed species by property owners.<br>Inadequate control works by property owners (potentially due to limitations in time, financial resources or equipment to implement control works).<br>Weed invasion from roadsides.<br>Inadequate knowledge of impact of weeds on native ecosystems.<br>Invasion of garden escape weeds into agricultural land.<br><b>Pest animals</b><br>More post-fire growth harbours them, and they are therefore harder to find and control.<br>Better feed in wet conditions encourages breeding.<br>Lack of awareness.<br>Inadequate control of pest animals (potentially due to limitations in time, financial resources or equipment to implement control works).<br>Increase in pest animals due to increase in fresh post-fires growth.<br>Inadequate control of domestic cats and dogs.  |
|                            | <b>Actions</b><br><b>Weeds</b><br><b>Research and investigation</b><br>Identify and map priority weeds.<br>Conduct informed expert annual monitoring along Wild Dog and Yow Yow Creeks.<br><b>Coordination</b><br>Collaborate with Nillumbik Shire Council and other organisations involved with weed control on adjoining public land, waterways and road corridors (e.g. Parks Victoria and Melbourne Water).<br><b>Community awareness</b><br>Improve knowledge of new landholders.<br>Educate for weed control (e.g. Pittosporum, Broom and other local environmental weeds etc).<br>Consult with landholders with a weed problem to provide support and discuss the benefits for their property (e.g. improvement in land values).<br>Increase landholder awareness of the need to control Serrated Tussock and Chilean Needle Grass as emerging weeds<br><b>Extension and technical support</b><br>Provide an experienced person to confirm species identification. (Photographs are seen as a useful aid but not sufficient to provide confidence in species identification).<br>Provide whole farm planning advice or courses.<br>Appropriate authorities, conduct weed management field days in the catchment.<br><b>Incentives</b><br>Council support for provision of a commercial contractor (two persons and a vehicle) to assist control weeds on private land with in-kind work from landholders in follow-up control.<br><b>On-ground works</b><br>Co-operative action between neighbouring landowners to manage weeds across property boundaries.<br>Control of Paterson's Curse in the headwaters of Wild Dog Creek.<br>Control of Blackberry in the headwaters of Yow Yow Creek.<br>Increased works for control of Serrated Tussock and Chilean Needle Grass as emerging weeds. |

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| <b>PROJECT DESCRIPTION</b>          | <p><b>Pest animals</b></p> <p><b>Research and investigation</b><br/>Investigate the long-term outlook for different pest species and priorities for taking action. Conduct informed expert annual monitoring along Wild Dog and Yow Yow Creeks.</p> <p><b>Coordination</b><br/>Collaborate with Nillumbik Shire Council, Parks Victoria and Melbourne Water.</p> <p><b>Community awareness</b><br/>Improve knowledge, particularly of new property managers through improved access to information.</p> <p><b>Extension and technical support</b><br/>Whole farm planning advice or courses.<br/>Improve capacity of landholders to adequately control pest animals on their land.</p> <p><b>Incentives</b><br/>Access to machinery and equipment for rabbit control.<br/>Access to rabbit control contractors and coordinated rabbit control program.</p> <p><b>On-ground works</b><br/>Targeted continuation of feral pest program, especially for rabbits and foxes.<br/>Integrated pest animal management programs across land tenures.<br/>Implementation of bylaws to control domestic cats and dogs.<br/>Implementation of conditions in important fauna habitat links that prohibit dogs and cats.</p> |
|                                     | <p><b>Key stakeholders list</b> (state and regional agencies / local government / community)</p> <p>Nillumbik Shire Council, St Andrews Landcare Group, landholders in the headwaters of Wild Dog and Yow Yow creeks, Melbourne Water, DPI, DSE, PPWCMA, CFA.</p>  |
| <b>PROJECT STAKEHOLDER AND TEAM</b> | <p><b>Project Team</b></p> <p>A core project management team and an organisation responsible for leading the project needs to be identified from key stakeholders. (It is useful to include involvement from the Urban Weed Management Initiative.)</p>  |
|                                     | <p><b>Objectives</b></p> <p>Pest plants and animals managed to protect agricultural and conservation assets in the headwaters of Wild Dog and Yow Yow Creeks.</p>  |
| <b>PROJECT DEVELOPMENT</b>          | <p><b>Targets</b></p> <p>This is a primary task for the Project Management Team. (Targets need to be measurable and capable of being reported on annually).</p>  |
|                                     | <p><b>Methodology</b></p> <p>This must relate to proposed actions. This is a primary task for the Project Management Team.</p>   |

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| <b>POTENTIAL FUNDING AND RESOURCING</b> | <p>Caring for Our Country 2011-2012.<br/>Environmental Stewardship Program. This program gives landholders access to 15-year grants so that they can take long-term action on their land to reduce grazing intensity, control weeds and feral animals, and protect key species and ecological communities.<br/>Port Phillip and Westernport CMA Community Grants Program.<br/>Nillumbik Shire Council Land Management Incentive Program.</p> |
| <b>MONITORING AND REPORTING</b>         | <p>This relates to reporting on attainment of project targets. This is a primary task for the Project Management Team.</p>   |

| <b>PROJECT TITLE:</b> Control of tunnel and gully erosion |   |
|---|---|
| <b>GOAL</b>   | To achieve sustainable land use in agricultural landscapes.   |
|   | <p><b>Project Objective</b></p> <p>To increase understanding of gully and tunnel erosion control by demonstrating site planning and land rehabilitation techniques.</p>   |
| <b>INTRODUCTION</b>                                       | <p>The St Andrews landscape has geology of very old sedimentary rock. It comprises part of the catchment and valley of the Diamond Creek and its tributaries, including Black Calf and Wild Dog Creeks. Diamond Creek has occasional small areas of floodplain. The creek valleys are surrounded by predominantly moderate to steep hills that merge with long ridges of rugged terrain on the northern, western and southern boundaries. Most of the steep and rugged hills remain under forest, while most of the low hills and flats have been cleared for agriculture.</p> <p>The soils on the hills are light-textured yellow, brown or red duplex. Shallow light-textured gradational soils occur on the crests and steeper slopes, and grey clay of uniform profile occurs along drainage lines and floodplain. This landscape has a high erosion hazard due to its hard-setting surfaces, which tend to increase run-off, and its dispersible clay subsoils. Sheet, gully and tunnel erosion occurs on sloping land. Erosion of the bed and banks is occurring where drainage lines are denuded of protective vegetation.</p>   |
|   | <p><b>Rationale</b></p> <p>The landscape has a high erosion hazard due to the dispersible nature of clay subsoils and the hard-setting surface of soils. Hard-setting surfaces reduce rainfall absorption, which in turn increases run-off. Higher volumes and velocity of run-off cause sheet and gully erosion on sloping land.</p> <ul style="list-style-type: none"> <li>Tunnel erosion occurs when water can seep into the subsoil through pathways such as rabbit burrows, old root channels or areas of pooling. Seepage water carries away dispersed clay particles, causing subsurface tunnels that eventually collapse, creating holes.</li> <li>Gully erosion initially occurs when high energy surface water follows, causing gutters to develop in drainage lines. As the gutters deepen subsurface seepage carries away dispersed clay particles from the subsoil. This creates an overhang of surface soil at the gully head that eventually collapses. Lateral surface flows and subsurface seepage commonly cause erosion of gully sides that can result in further headward erosion.</li> </ul> <p>Soil erosion of varying severity is occurring at many sites in the catchment. This is mainly where drainage lines erode due to excessive run-off, where tunnel erosion occurs on sloping land, and where erosion of bed and banks of streams is occurring from stock access and associated denuding of protective vegetation.</p> <p>The purpose of this project is to demonstrate: (1) stabilisation methods for existing eroding sites (gullies, tunnels and roadsides), and (2) measures to prevent soil erosion.</p> |

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| <b>EXISTING INFORMATION</b> | <p><b>From Literature Review</b></p> <p>The literature review that accompanies the St Andrews CERAP includes a substantial body of relevant information and information leads.</p>  |
|                             | <p><b>Other sources</b></p> <p>Extension advice from relevant government agencies.</p>  |
| <b>PROJECT DESCRIPTION</b>  | <p><b>Problems</b></p> <p>Widespread tunnel and gully erosion.</p>  |
|                             | <p><b>Effects</b></p> <ul style="list-style-type: none"> <li>• Loss of groundcover.</li> <li>• High risk of erosion occurring more widely on sloping land with low levels of vegetation protection and high run-off.</li> <li>• Locally significant areas of serious tunnel and gully erosion and loss of soil.</li> <li>• New gullies forming from collapsing tunnels.</li> <li>• Silting of dams, and damage to stock water sources and water quality.</li> <li>• Roadways and driveways threatened.</li> </ul>   |
|                             | <p><b>Causes / Why this is happening</b></p> <ul style="list-style-type: none"> <li>• Grazing pressure that exceeds carrying-capacity for a particular land capability.</li> <li>• Steep land bared by fires in a naturally fire-prone environment.</li> <li>• Increased volumes and velocity of water flows resulting in gully and tunnel erosion.</li> <li>• Lack of landholder knowledge.</li> <li>• Highly erodible and surface-sealing soils.</li> <li>• Naturally fire prone environment.</li> <li>• Inadequate design of roads and farm driveways.</li> <li>• Loss of vegetative cover on steep areas after fire, exposing areas of high erosion risk.</li> <li>• Low capability of waterways to support increased high energy run-off.</li> <li>• Silt/sediment movement due to erosion in catchment, impacting on assets.</li> </ul>   |
|                             | <p><b>Actions</b></p>   |
|                             | <p><b>Coordination</b></p> <ul style="list-style-type: none"> <li>• Coordinated approach across properties to tackle the shared gully erosion problems.</li> </ul>  |
|                             | <p><b>Community awareness</b></p> <ul style="list-style-type: none"> <li>• Promote land use in line with land capability.</li> </ul> <p><b>Extension and technical support</b></p> <ul style="list-style-type: none"> <li>• Promote vigorous pasture growth and appropriate grazing management in catchments.</li> <li>• Improve agency advisory services to land managers.</li> <li>• Improve Shire design and construction techniques for road drainage and educate construction crews.</li> <li>• Improve property managers knowledge of drainage construction through improved information access and design advice.</li> <li>• Improve knowledge of property managers through improved information access and whole farm planning advice or courses.</li> </ul> <p><b>Incentives</b></p> <ul style="list-style-type: none"> <li>• Provide incentives through the existing 'Sustainable Agricultural Rebate' offered by Nillumbik Shire Council.</li> </ul> |

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| <b>PROJECT STAKEHOLDERS AND TEAM</b>    | <p><b>Key stakeholders list</b> (state and regional agencies / local government / community)</p> <p>Community of St Andrews, Shire of Nillumbik, DPI, Melbourne Water.</p>   |
|   | <p><b>Project Team</b></p> <p>A core project management team and an organisation responsible for leading the project need to be identified.</p>  |
| <b>PROJECT DEVELOPMENT</b>              | <p><b>Targets</b></p> <p>To improve property managers awareness and knowledge about common soil erosion problems in the catchment, their cause and prevention, and methods to rehabilitate eroded land.<br/>This is a task for the selected Project Management Team. The targets need to be measurable and capable of being reported on an annual basis.</p>   |
|   | <p><b>Methodology</b></p> <p>The key elements of the methodology are to create awareness and knowledge in the land manager community about soil erosion, to demonstrate practical measures in the field, and provide incentives for on-ground action.</p> <p><b>Awareness and knowledge:</b></p> <ul style="list-style-type: none"> <li>• Hold field days on catchment management to improve catchment hydrology for prevention of erosion.</li> <li>• Hold field days at eroded sites to examine and understand the causes, effects and rehabilitation techniques.</li> <li>• Provide easy access to information on prevention and management of soil erosion.</li> <li>• Provide whole farm planning advice and/or courses.</li> </ul> <p><b>Demonstration sites:</b></p> <ul style="list-style-type: none"> <li>• Select demonstration site(s).</li> <li>• Demonstrate site planning for rehabilitation, and demonstrate the rehabilitation techniques for the common erosion problems in the catchment.</li> </ul> <p><b>Incentives:</b></p> <ul style="list-style-type: none"> <li>• Provide incentives through the existing 'Sustainable Agricultural Rebate' offered by Nillumbik Shire Council.</li> </ul> |
| <b>POTENTIAL FUNDING AND RESOURCING</b> | <p>Melbourne Water, Nillumbik Shire Council, Australian Government (Caring for Our Country), Department of Primary Industries, landholders.</p>  |
|   | <p><b>Monitoring And Reporting</b></p> <p>This is a task for the selected Project Management Team. It relates to reporting on attainment of targets.</p>   |

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| <b>PROJECT TITLE:</b> Demonstrating best practice in controlling tunnel and gully erosion |   |
| <b>LOCATION</b>   | Eroding gully commencing at culvert at number 1640 Heidelberg-Kinglake Road, St Andrews.  |
| <b>GOAL</b>   | Adoption of sustainable practices in all agricultural landscapes.   |
|   | <p><b>Project objective</b></p> <p>To demonstrate best practice in:</p> <ul style="list-style-type: none"> <li>• planning, stabilisation and maintenance methods for existing eroding sites (gullies, tunnels and roadsides)</li> <li>• soil conservation measures on-site and in the catchment</li> <li>• sub-catchment management to improve hydrological conditions.</li> </ul>  |
| <b>PROJECT DESCRIPTION</b><br>A brief summary of the project                              | <p><b>CERAP information</b></p> <p>The St Andrews landscape generally has a high erosion hazard due to hard-setting surface soils, which increase run-off, and the dispersible nature of clay subsoils. Sheet, gully and tunnel erosion occurs on sloping land. Where drainage lines are denuded of protective vegetation, erosion of the bed and banks is occurring. There are many sites where soil erosion of varying severity is occurring. Erosion mainly occurs as gully erosion where drainage lines receive excessive run-off, as tunnel erosion on sloping land and as erosion of stream beds and banks where waterways without protective vegetation are accessed by stock.</p> <p>At the subject site, tunnel erosion has occurred when water seeped into the subsoil through pathways such as rabbit burrows, old root channels or areas of pooling. Seepage water carried away dispersed clay particles, resulting in subsurface tunnels, which eventually collapsed and created the holes in the ground. The large gully erosion developed when high energy surface water flows caused gutters to develop in the drainage line. As the gutters deepened, subsurface seepage carried away dispersed clay particles from the subsoil, which created overhanging surface soil at the gully head that continuously collapses. Lateral surface flows and subsurface seepage have also caused erosion of gully sides, resulting in further areas of lateral headward erosion.</p> |
|   | <p><b>Problems</b></p> <p>This site has severe tunnel and gully erosion. An extensive gully occupies the drainage line from the culvert at the main road to the property boundary (about 400 metres) where the gully is about 4 metres deep by 5 metres wide. The active gully head has advanced about 30 metres in the last 12 months. Lateral erosion occurs along both sides. Above the gully, extensive tunnel erosion occurs for about 400 metres and extending, with a series of collapsed tunnels up to 1 metre deep. The condition of the land will deteriorate further without improved catchment management and extensive erosion control site-works</p>  |
|   | <p><b>Causes / Why this is happening</b></p> <p>The underpinning reasons for soil erosion at this site are:</p> <ul style="list-style-type: none"> <li>• the inherent highly erodible subsoil clays and surface sealing soils</li> <li>• an extended history of native vegetation clearing</li> <li>• heavy grazing</li> <li>• low levels of pasture management in the catchment generally, which has caused increased volumes and velocity of water flows.</li> </ul> <p>Poor road drainage design in parts of the catchment may have exacerbated the problem. These detrimental changes to the catchment are a result of past unsustainable land use.</p>   |
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| <b>PROJECT DESCRIPTION</b><br>A brief summary of the project | <p><b>Actions</b></p> <p><b>Planning and coordination</b></p> <p>This demonstration of best practice will require significant planning and coordination between several stakeholders.</p> <p><b>Hydrological improvement works in the catchment</b></p> <p>Measures required for long term catchment improvement, including improved catchment hydrology to reduce pressure at the erosion gully include:</p> <ul style="list-style-type: none"> <li>• achieving vigorous pasture growth and appropriate grazing management on agricultural land</li> <li>• maintaining and enhancing the condition of native vegetation</li> <li>• improved design and construction on public and private roads.</li> </ul> <p><b>On-site erosion control works</b></p> <p>To halt the gully and tunnel erosion and restore the drainage line to a stable functioning capacity, significant earthworks, head control structures and land protection works are required. These in turn require sound technical planning and coordination.</p> <ul style="list-style-type: none"> <li>• Earthworks are needed to stockpile topsoil, collapse tunnels, batter gully sides, shape gully heads and construct protective water diversion banks.</li> <li>• On completion of shaping earthworks, topsoil can be re-spread and the sites revegetated with a mix of grasses and woody vegetation.</li> <li>• An engineered drop-structure in the gully head will prevent further movement of the gully head and grade control structures may be needed to stabilise the gully floor.</li> <li>• The gully line and tunnel treatment should be permanently fenced from grazing animals.</li> </ul> <p><b>Coordination and extension</b></p> <ul style="list-style-type: none"> <li>• As soil erosion control and poor catchment hydrology are shared problems, a coordinated approach is needed across all properties in the sub-catchment to tackle the problem.</li> </ul> <p><b>Fundamental requirements are:</b></p> <ul style="list-style-type: none"> <li>• organising the planning of works (which projects and programs are needed)</li> <li>• development of program of works (who does what and when)</li> <li>• a community agreement on works and overseeing implementation (formalising the program).</li> <li>• As this project is 'best practice' demonstration, it will require a program of awareness and education activities centring on the sub-catchment and erosion sites during the planning, construction and post-construction, ongoing management of the sub-catchment, and maintenance of erosion control sites stages.</li> <li>• Sub-catchment works, requiring demonstration, include correct road construction, pasture improvement and management, and bushland enhancement.</li> </ul> <p><b>Participants</b></p> <p>St Andrews land managers, Nillumbik Shire Council, Melbourne Water DPI.</p> |
|  | <p><b>PROJECT STAKEHOLDERS AND TEAM</b></p> <p>A Project Team will be responsible for developing a work program for the project actions and costings.</p> <p>The Project Team will comprise a sub-committee of the St Andrews Community Group, Council and Melbourne Water.</p>  |
|  | <p><b>POTENTIAL FUNDING AND RESOURCING</b></p> <p>Project funding would require integration of Council's funding with that of Melbourne Water's River Health Incentives Program. Without preliminary planning, it is difficult to estimate the project cost. However, it is likely to be about \$60,000 for the technical planning and on-site erosion control and revegetation measures. Coordination and extension would cost extra.</p>   |

Continued

**MONITORING AND REPORTING**

After completion of works, conduct appropriate follow-up maintenance of restored sites until they are stabilised (repair rain damage and areas of subsidence and encourage protective plant growth).

Conduct management measures for the restored site within the wider context of the landscape (e.g. protective fencing and grazing control including for rabbits).

Take measures in the catchment to improve hydrologic condition and minimise run-off energy (e.g. pasture management, revegetation and rabbit control).

**PROJECT TITLE:** Agricultural futures for St Andrews catchment

**GOAL**

Retain agriculture in the St Andrews catchment.

**Project Objective**

To develop sufficient information about the agricultural potential of the high quality agricultural land in St Andrews to enable investment in alternative agricultural enterprises. To make the information widely available through Council's rural land use webpage.

**INTRODUCTION**

The St Andrews landscape geology is of very old sedimentary rock. It comprises part of the catchment and valley of the Diamond Creek and its tributaries, including the Black Calf and Wild Dog Creeks. The Diamond Creek has occasional small areas of floodplain. The valleys of all creeks are surrounded by a landscape of predominantly moderate to steep hills through the catchment that merge with long ridges of rugged terrain on the northern, western and southern boundaries. Most of the steep and rugged hills remain in forest, while most of the low hills and flats have been cleared for agriculture.

The soils of the hills are light-textured yellow, brown or red duplex. Shallow light-textured gradational soils occur on the crests and steeper slopes and grey clay of uniform profile occurs along drainage lines and floodplain. They form the Gently Undulating Land Management Unit. Small areas of the lower slopes (up to 5 per cent gradient) have been classified as high quality for agriculture. They have a growing season up to 9 to 10 months, extended to 12 months if irrigation water is available. They have moderate fertility and are suited to orchards and potentially other horticulture on the deeper soils. Annual rainfall is approximately 750 millimetres, and the growing season is approximately 8 to 9 months, extended to 12 months if irrigation water is available.

**Rationale**

St Andrews has potential for high yields per hectare on small farming businesses where high quality land management units are located and there is access to water. There could be a much greater diversity in agricultural industries including vegetables, fruit, grapes/wine, floriculture, nurseries and livestock production. The purpose of this project is to scope the agricultural potential of the Diamond Creek catchment to increase agricultural diversification and to capitalise on farmers markets, which would attract regional visitors willing to pay premium prices for fresh quality local produce.

**EXISTING INFORMATION**

The literature review that accompanies the St Andrews CERAP includes a substantial body of relevant information and information leads.

**Other sources**

Advice from relevant government agencies and industry organisations.

Continued

**Problem**

Reduced viability of traditional commercial agricultural enterprises.  
Lack of information about alternative enterprises.  
Minimal information about soil suitability and available water resources.  
Many people purchasing rural land without knowledge and skills required for farming.

**Effect**

Experienced farmers leaving their industries.  
High quality agricultural land being underutilised.

**Causes / Why this is happening**

Small properties do not have economies of scale.  
Opportunities to sell land for life style purposes, which commands higher land prices than can be justified for commercial agriculture.

**Actions**

Protect high quality agricultural land from further development.  
Identify source, volume and availability of water resources for agriculture.  
Use a more intensive definition of high quality land management units, resulting in high resolution soil mapping for decision-making about soil suitability for particular agricultural enterprises.  
Gather information on type and value of suitable agricultural enterprises, including their strengths, weaknesses and opportunities.  
Identify and elaborate market trends and value-adding that could provide opportunities for small growers.  
Publicise alternative farming opportunities.  
Provide education and training in production systems, enterprise business practice and farming sustainability.  
Support the development of farmers markets.

**PROJECT DESCRIPTION**

**PROJECT STAKEHOLDERS AND TEAM**

**Key stakeholders list (state and regional agencies / local government / community)**

St Andrews community, Nillumbik Shire Council, DPI, Agribusiness Forum.

**Project Team**

A core project management team and a lead organisation need to be identified.

**PROJECT DEVELOPMENT**

**Targets**

Targets should be developed by the Project Management Team. They need to be measurable and capable of being reported on an annual basis.

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| <b>PROJECT DEVELOPMENT</b>      | <b>Methodology</b>  |
|                                 | To be developed for the chosen actions.<br>Council should strengthen protection of high quality agricultural land from further development.<br>Work with Southern Rural Water to identify source, volume and availability of water resources for agriculture.<br>Undertake a high definition survey of high quality land management units in St Andrews, resulting in high resolution soil mapping for decision-making about soil suitability for particular agricultural enterprises.<br>Collate information on type and value of suitable agricultural enterprises, including their strengths, weaknesses and opportunities, and include them on Council's rural land use webpage.<br>Identify and elaborate market trends and value-adding that could provide opportunities for small growers.<br>Publicise alternative farming opportunities in St Andrews.<br>Provide education and training in production systems, enterprise business practice, and farming sustainability for residents interested in investing in alternative agricultural enterprises.<br>Identify and provide means to support the development or expansion of farmers markets in the Shire. |
|                                 | <b>POTENTIAL FUNDING AND RESOURCING</b>   |
|                                 | Victorian Government's Farmers Markets Support Program – funding for rural, regional and peri-urban councils to undertake feasibility studies into proposed farmers markets, establish new markets and expand on existing ones.   |
| <b>MONITORING AND REPORTING</b> | These require development by the Project Management Team. They relate to reporting on attainment of targets.  |

**PROJECT TITLE:** Two Men and a Truck

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| <b>LOCATION</b> | The St Andrews community is delineated by the upper reaches of the Diamond Creek catchment and its tributaries, including the Black Calf and Wild Dog Creeks.  |
| <b>GOALS</b>    | Agricultural and biodiversity assets effectively protected from weed invasion.<br>Improved ability of landholders to identify weed species and implement timely and species-specific control measures. |
|                 | <b>Project Objectives</b>  |
|                 | To greatly improve the effectiveness of weed control on private land throughout the St Andrews locality.   |

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| <b>PROJECT DESCRIPTION</b>            | Effective and lasting weed control is only achieved through the development of a well-planned approach using a combination of control options. Control options aim to prevent weeds coming onto the property, reducing seed set and weed germination. To effectively employ these control options, landholders need to be aware of the problems of different weed species, be able to identify and detect weeds in the field, and plan control options which aim at both prevention and intervention.  |
|                                       | <b>Strategies</b><br>Two strategies are proposed: <ul style="list-style-type: none"> <li>practical assistance in the field from a dedicated weed control unit ('Two Men and a Truck') who would operate in St Andrews for set periods at key control times for target species during the year</li> <li>a series of educational activities to assist landholders to accurately identify weed species in the field.</li> </ul>   |
|                                       | <b>Practical assistance</b><br>At key seasonal weed control times, a weed control unit contracted to St Andrews Landcare would be dedicated to the task of timely weed control on private land and not used for any other contracting work. This approach would minimise waiting times for landholders and treat weeds when most vulnerable.<br>Costs of weed control measures would be shared with landholders (the proportion to be decided when numbers and costs are better assessed) The members of the unit would be well-trained and part of their role would be to provide practical and specific advice on weed control.<br>Landholders would register an EOI with the St Andrews Landcare Project Committee to participate in the program. All efforts should be made to use a local contractor with experience in bushland and agricultural contexts. Reference will be made to the relevant CERAP findings and advice.   |
|                                       | <b>Education</b><br>To achieve effective weed control landholders need to know which plants are weed species. Landholders have regularly asked for assistance in identifying weeds, and workshops organised by St Andrews Landcare have been well-attended. The 'walk and talk' model on private property has worked well, and it is proposed to revisit this approach across the fire-affected area. It is proposed that this be done at a mini-catchment level with groups of neighbours (e.g. Ninks Road, Olives Lane).<br>The field-based workshops would cover: <ul style="list-style-type: none"> <li>identification</li> <li>biology of weeds (know your enemy)</li> <li>planning for control (when, where, how)</li> <li>control (including non-chemical approaches)</li> <li>control demonstrations (e.g. cut and paint, fill and drill, weed burner).</li> </ul> Easy-to-use references based on the above workshops that are specific to local conditions could be developed in paper-based form and as a web-based resource on St Andrews Landcare's website and linked to the 'Best Practice Guide' located on Council's website. |
| <b>Problems</b>                       | Weed problems identified in the St Andrews CERAP include the invasion of new species of weeds since the fires, weed competition with pasture species, the explosion of weeds since the fires and subsequent wet conditions and concerns about particular weed species in a variety of situations.  |
| <b>Causes / Why this is happening</b> | Weeds have been able to out-compete pasture species recovering after fire, landholders have been unable to identify weed species before they become a problem, and landholders have a lack of time, financial resources and equipment to carry out control works.  |

|  |   |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |
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| <b>PROJECT DESCRIPTION</b>                                       | <b>Actions and targets</b>  |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |
|  | <p>Amongst other measures, the St Andrews community has identified education, technical support and support with on-ground control works as key actions to control local weeds. These are described more fully in the project description.</p> <p><b>Targets</b></p> <ul style="list-style-type: none"> <li>• Landholders able to identify all weeds of agricultural land and bushland in the St Andrews locality.</li> <li>• Weed control plans prepared by landholders.</li> <li>• Landholders utilising the specialist weed control unit to control priority weeds in a strategic manner.</li> <li>• Emerging weeds controlled and the impact of established weeds significantly diminished.</li> </ul>  |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |
| <b>PROJECT STAKEHOLDERS AND TEAM</b>                             | <b>Project team</b>   |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |
|  | <p>The St Andrews Landcare group will be responsible for project management. This will be achieved through a volunteer sub-committee / project management team that will be responsible for financial management of the project, daily coordination of the weeds management unit and the organisation of workshops.</p>   |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |
| <b>POTENTIAL FUNDING AND RESOURCING</b>                          | <b>Funding</b>  |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |
|  | <p><b>Weed Control Unit ('Two Men and a Truck')</b></p> <p>The major cost will be for the contracted weed control unit comprising two operators with machinery and herbicides. It is expected that the weed control unit will be contracted to operate for approximately 90 days per year.</p> <p><i>Estimated cost of contractor for 90 days</i></p> <table border="0"> <tr> <td><b>Labour</b></td> <td><b>\$45,000</b></td> </tr> <tr> <td><b>Machinery and herbicide</b></td> <td><b>\$18,000</b></td> </tr> <tr> <td colspan="2"><hr/></td> </tr> <tr> <td>Total</td> <td>\$63,000</td> </tr> </table> <p>Cost per day      \$700</p> <p><i>Note the above does not include the cost of a vehicle.</i></p> <p><i>Cost sharing basis</i></p> <p>High public benefit/low private benefit – Landholder contribution 33 per cent<br/> High private and public benefit – Landholder contribution 50 per cent<br/> High private benefit/low public benefit – Landholder contribution 66 per cent</p> <p><b>'Walk and Talk' Weed Workshops</b></p> <p>Proposal is for four workshops annually using a professional weed specialist.</p> <p><i>Estimated cost</i></p> <table border="0"> <tr> <td>Weed specialist for 4 half-day workshops (16 hours @ \$120/hour)</td> <td>\$1,920</td> </tr> <tr> <td>Materials</td> <td>\$100</td> </tr> <tr> <td colspan="2"><hr/></td> </tr> <tr> <td><b>Total</b></td> <td><b>\$2,020</b></td> </tr> </table> | <b>Labour</b> | <b>\$45,000</b> | <b>Machinery and herbicide</b> | <b>\$18,000</b> | <hr/> |  | Total | \$63,000 | Weed specialist for 4 half-day workshops (16 hours @ \$120/hour) | \$1,920 | Materials | \$100 | <hr/> |  | <b>Total</b> |
| <b>Labour</b>  | <b>\$45,000</b>   |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |
| <b>Machinery and herbicide</b>                                   | <b>\$18,000</b>   |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |
| <hr/>  |   |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |
| Total  | \$63,000  |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |
| Weed specialist for 4 half-day workshops (16 hours @ \$120/hour) | \$1,920   |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |
| Materials  | \$100   |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |
| <hr/>  |   |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |
| <b>Total</b>   | <b>\$2,020</b>  |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |
| <b>MONITORING AND REPORTING</b>                                  | <b>Monitoring And Reporting</b>   |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |
|  | <p>Performance indicators will be:</p> <ul style="list-style-type: none"> <li>• number of landholders participating in contracted weed control</li> <li>• effectiveness of contracted weed control based on landholder reports</li> <li>• number of landholders participating in weed 'walk and talk' workshops</li> <li>• degree of landholder satisfaction with workshops.</li> </ul>   |               |                 |                                |                 |       |  |       |          |  |         |           |       |       |  |              |

**PROJECT TITLE:** Protecting and enhancing St Andrews biolinks

|                             |   |
|-----------------------------|---|
| <b>GOAL</b>                 | To secure important biolinks by protecting and enhancing remnant native vegetation and linking core areas.  |
|                             | <b>Project Objective</b>  |
|                             | <p>To increase community capacity to understand local ecological values and adequately deal with threats to them.</p> <p>To protect and enhance St Andrews biolinks.</p> <p>To improve habitat for native flora and fauna species.</p>  |
| <b>INTRODUCTION</b>         | <p>Two nationally significant flora species, Matted Flax-lily (<i>Dianella amoena</i>) and Clover Glycine (<i>Glycine latrobeana</i>) and nine state significant flora species have been previously recorded within the project area. Two nationally significant fauna species, Growling Grass Frog (<i>Litoria reniformis</i>) and Spot-tailed Quoll (<i>Dasyurus maculates</i>) and 16 state significant fauna species have been recorded within the project area. This project aims to protect and enhance habitat for these and many more native species while allowing natural ecosystem processes to persist. This project aims to enhance the local community capacity to understand the importance of these values and how to maintain them.</p>  |
| <b>EXISTING INFORMATION</b> | <b>From Literature Review</b>   |
|                             | <p>The following plans provide management advice specific to significant species recorded within the St Andrews catchment:</p> <ul style="list-style-type: none"> <li>• <i>National Recovery Plan for the Matted Flax-lily (Dianella amoena)</i> (Carter 2010)</li> <li>• <i>National Recovery Plan for the Clover Glycine (Glycine latrobeana)</i> (Carter and Sutter 2010)</li> <li>• <i>National Recovery Plan for the Southern Bell Frog (Litoria reniformis)</i> (Clemann and Gillespie 2010)</li> <li>• <i>Significant Impact Guidelines for the endangered Spot-tailed Quoll (Dasyurus maculatus maculates)</i> (southeastern mainland population) and the use of 1080 (SEWPAC 2009)</li> <li>• <i>Flora and Fauna Guarantee Act Action Statement No. 15.</i> (Backhouse 2003).</li> <li>• <i>Powerful Owl (Ninox strenua)</i> (State Significant) <i>Flora and Fauna Guarantee Act Action Statement No. 92.</i> (Webster, Humphries and Lowe 2004).</li> <li>• <i>Brush-tailed Phascogale (Phascogale tapoatafa)</i> (State Significant) <i>Flora and Fauna Guarantee Act Action Statement No. 79.</i> (Humphries and Seebeck 2003).</li> <li>• <i>Barking Owl (Ninox connivens)</i> (State Significant) <i>Flora and Fauna Guarantee Act Action Statement No. 116.</i> (Clemann and Loyn 2003).</li> <li>• <i>Painted Honeyeater (Grantiella picta)</i> (State Significant) <i>Flora and Fauna Guarantee Act Action Statement No. 193.</i> (Silveira and Menkhorst 2003).</li> </ul> |
| <b>PROJECT DESCRIPTION</b>  | <b>Problem</b>  |
|                             | <p>Potential adverse impacts to native flora and fauna populations through:</p> <ul style="list-style-type: none"> <li>• loss of scattered trees on agricultural land</li> <li>• loss of native vegetation on smaller properties being used for rural living</li> <li>• weed infestation</li> <li>• pest animals</li> <li>• domestic cats and dogs.</li> </ul>  |

|                                      |  |
|--------------------------------------|--|
| <b>PROJECT DESCRIPTION</b>           | <b>Effect</b>  |
|                                      | <p><b>Loss of scattered trees on agricultural land</b></p> <p>The incremental loss of scattered trees on agricultural land reduces the capacity for faunal movement and also reduces the capacity of natural regeneration of native plants. (Scattered trees on agricultural land provide stepping stones for some fauna to move between habitat areas and also act as a seed source for regeneration of trees if stock is removed or trees are fenced.)</p> <p>Loss of native vegetation on smaller properties being used for rural living</p> <p>Incremental losses of native vegetation associated with fragmented rural living landscapes reduce faunal movement through biolinks.</p> <p><b>Weed infestation</b></p> <p>This leads to a decrease in diversity or change in fauna species using an area of native vegetation. (Weed infestation in native vegetation alters the habitat structure and resources available to native fauna and out-competes native flora.)</p> <p><b>Pest Animals</b></p> <p>Pests reduce native fauna populations. (Pest animals including domestic cats and dogs can disturb and/or compete with native fauna for resources and be active predators). Rabbits and deer browse on native vegetation and can impact on significant species.</p> |
|                                      | <b>Causes / Why this is happening</b>  |
|                                      | <b>Actions</b>   |
| <b>PROJECT STAKEHOLDERS AND TEAM</b> | <b>Key stakeholders list</b>   |
|                                      | <b>Project Team</b>  |

Overgrazing on agricultural land.  
Lack of protection of native vegetation.  
Lack of understanding of biodiversity values.  
Increased density of human population.  
Lack of landowner ability to respond to some threats.

The following actions are required for the project. Actions need to be quantified in measurable goals to allow project evaluation and improvement.

The following actions are proposed.

- Implement a program to enhance community education and capacity to ensure that all new landholders are made aware of ecological values within their property and understand their responsibilities to maintain native vegetation.
- Retain and regenerate native tree species in paddocks by removing stock or fencing select trees.
- Fence strategic areas to allow natural regeneration of native species. Investigate follow up planting if regeneration is inadequate.
- Implement a fencing program to prevent stock access to areas of native vegetation.
- Implement an integrated weed control program focusing on Blackberry (*Rubus fruticosus spp. agg.*), Cootamundra Wattle (*Acacia baileyana*), Montpellier Broom (*Genista monspessulana*) and Flax-leaf Broom (*Genista linifolia*) through biolink areas.
- Implement a fox baiting control program.

Melbourne Water, Parks Victoria, Nillumbik Shire Council, St Andrews Landcare Group, DSE, PPWCMA, etc.

A lead organisation and a core project management team including representatives of key stakeholders need to be identified.

|   |   |
|---|---|
| <b>PROJECT DEVELOPMENT</b>              | <b>Targets</b> (The targets need to be measurable and capable of being reported on an annual basis.)  |
|   | <p>Potential indicators for developing measureable targets are:</p> <ul style="list-style-type: none"> <li>• percentage of households in the catchment to receive educational information relating to the project in the next Nillumbik Shire Council rates mail out</li> <li>• number of kilometres of fencing erected in key locations</li> <li>• number of hectares of vegetation allowed to naturally regenerate in key locations</li> <li>• number of native paddock trees fenced and protected</li> <li>• number of properties with mapping and weed control programs</li> <li>• number of properties with fox baiting control programs.</li> </ul> |
| <b>POTENTIAL FUNDING AND RESOURCING</b> | <b>Methodology</b>  |
|   | <p>To be developed for chosen actions.</p>  |
| <b>MONITORING AND REPORTING</b>         | <p>See <a href="#">Caring For Our Country</a></p> <p>See Port Phillip and Westernport Catchment Management Authority Community Grants.</p> <p>See Department of Sustainability and Environment, Communities for Nature grants. In 2012, funding was obtained through the Victorian Government's Communities for Nature grant program. The grant provides \$600,000 over four years for Landcare Groups to work on threatened species projects across the Shire.</p> <p>This relates to reporting on attainment of targets.</p>  |



Photo by Sue Aldred

# 10. Monitoring and Reporting

This CERAP is a living document, intended to provide ongoing use to the St Andrews community in guiding sustainable catchment management. In time, as the St Andrews CERAP is implemented, the condition of the catchment will change. Some actions will no longer be necessary or will need to be revised, and new actions will become useful and important. Research into the ecology of the St Andrews area and innovation in catchment management will play a role in this.

Accordingly, the CERAP should be reviewed every five years in order to revise its vision and goals, assess and revise its current list of actions and develop new actions. Community input will be vital to this process.

The following key principles will be taken into account when conducting the review of the St Andrews CERAP:

- be relevant and useful for all partners and stakeholders
- be simple, cost-effective, affordable and practical by:
  - avoiding duplication of effort
  - using data for multiple purposes
  - ensuring that users can obtain the data
  - ensuring that users can easily find out whether suitable data already exists
- recognise that catchment management outcomes occur over a range of time-scales (often outside funding periods)
- recognise that most targets set within the first five years will represent only the earliest stages of progress towards remedying key catchment issues
- allow meaningful interpretation of data over time
- specify assumptions within strategies and decision-making processes.



Photo by Sue Aldred

# Appendix 1

## Significant flora and fauna records within the St Andrews Landcare area

| Common Name                   | Scientific Name                                      | EPBC Listing | VROT Listing | FFG Listing | Last Record | Number of Records | Habitat  |
|-------------------------------|--|--------------|--------------|-------------|-------------|-------------------|--|
| <b>NATIONALLY SIGNIFICANT</b> |  |              |              |             |             |                   |  |
| Matted Flax-lily              | <i>Dianella amoena</i>                               | Endangered   | Endangered   | -           | 2002        | 2                 | Grasslands and grassy woodlands.   |
| Clover Glycine                | <i>Glycine latrobeana</i>                            | Vulnerable   | Vulnerable   | Listed      | 2002        | 1                 | Dry sclerophyll forest, native grassland and woodland, usually on flat sites with loose, sandy soil. |
| <b>STATE SIGNIFICANT</b>      |  |              |              |             |             |                   |  |
| Wine-lipped Spider-orchid     | <i>Caladenia oenochila</i>                           | -            | Vulnerable   | -           | 2006        | 5                 | Damp and valley sclerophyll forests.   |
| Velvet Apple-berry            | <i>Billardiera scandens s.s.</i>                     | -            | Rare         | -           | 2002        | 3                 | Unknown  |
| Pale-flower Crane's-bill      | <i>Geranium sp. 3</i>                                | -            | Rare         | -           | 2002        | 3                 | Well drained soils tolerating dryness once established.  |
| Slender Tick-trefoil          | <i>Desmodium varians</i>                             | -            | Poorly Known | -           | 2002        | 2                 | Plains grassland and crevices in escarpments.  |
| Emerald-lip Greenhood         | <i>Pterostylis smaragdina</i>                        | -            | Rare         | -           | 2002        | 2                 | Well drained - loamy soil in open forest.  |
| Round-leaf Pomaderris         | <i>Pomaderris vacciniifolia</i>                      | -            | Vulnerable   | -           | 2005        | 2                 | Moist loamy soils in moist forest and scrubs.  |
| Pale Swamp Everlasting        | <i>Helichrysum aff. rutidolepis (Lowland Swamps)</i> | -            | Vulnerable   | -           | 2002        | 1                 | Swampy areas.  |
| Austral Crane's-bill          | <i>Geranium solanderi var. solanderi s.s.</i>        | -            | Vulnerable   | -           | 1999        | 1                 | Occurs on a range of soil types and situations.  |
| Silurian Leek-orchid          | <i>Prasophyllum pyriforme s.s.</i>                   | -            | Endangered   | -           | 2001        | 1                 | Grassy forest or grassland on sandy or clay loam.  |
| <b>Total</b>                  |  |              |              |             | <b>2006</b> | <b>23</b>         |  |

| Common Name                   | Scientific Name                 | EPBC Listing | VROT Listing    | FFG Listing | Last Record | Number of Records | Habitat  |
|-------------------------------|---------------------------------|--------------|-----------------|-------------|-------------|-------------------|--|
| <b>NATIONALLY SIGNIFICANT</b> |                                 |              |                 |             |             |                   |  |
| Growling Grass Frog           | <i>Litoria raniformis</i>       | Vulnerable   | Vulnerable      | Listed      | 1992        | 1                 | In water or very wet areas in woodlands, shrublands, and open/disturbed areas.   |
| Spot-tailed Quoll             | <i>Dasyurus maculatus</i>       | Endangered   | Endangered      | Listed      | 2003        | 1                 | Mature wet forest habitat.   |
| Swift Parrot                  | <i>Lathamus discolor</i>        | Endangered   | Endangered      | Listed      | *           | 1                 | Dry sclerophyll eucalypt forests and woodlands.  |
| <b>STATE SIGNIFICANT</b>      |                                 |              |                 |             |             |                   |  |
| Brush-tailed Phascogale       | <i>Phascogale tapoatafa</i>     | -            | Vulnerable      | Listed      | 1991        | 5                 | Open dry foothill forest with little ground cover, typically associated with Box, Ironbark and Stringybark Eucalyptus. |
| Speckled Warbler              | <i>Pyrholaemus sagittatus</i>   | -            | Vulnerable      | Listed      | 1992        | 4                 | A wide range of Eucalyptus-dominated communities that have a grassy understorey, often on rocky ridges or in gullies.  |
| Spotted Quail-thrush          | <i>Cinclosoma punctatum</i>     | -            | Near Threatened | -           | 1992        | 4                 | Sclerophyll woodlands dominated by Eucalyptus trees and sparse understorey vegetation.                                 |
| Lace Goanna                   | <i>Varanus varius</i>           | -            | Vulnerable      | -           | 2004        | 3                 | Rainforests, wet sclerophyll forests, woodland and coastal scrub.  |
| Mountain Galaxias             | <i>Galaxias olidus</i>          | -            |                 | Listed      | 1992        | 3                 | Clear flowing streams with sand, gravel or boulder bottoms.  |
| Barking Owl                   | <i>Ninox connivens</i>          | -            | Endangered      | Listed      | 1986        | 2                 | Open woodlands and forest-edge habitats where forests adjoin farmlands.  |
| Common Bent-wing Bat          | <i>Miniopterus schreibersii</i> | -            |                 | Listed      | 1989        | 2                 | Habitat preference is associated with foraging areas and proximity to suitable roosting caves.                         |
| Black-eared Cuckoo            | <i>Chrysococcyx osculans</i>    | -            | Near Threatened | -           | 1990        | 1                 | Dry open woodlands, eucalypt forests and shrublands and vegetation along creek beds.                                   |
| Common Dunnart                | <i>Sminthopsis murina</i>       | -            | Vulnerable      | -           | 1986        | 1                 | Open forests, woodlands and heathland areas.   |

APPENDIX 1 continued

| Common Name              | Scientific Name                   | EPBC Listing | VROT Listing    | FFG Listing | Last Record | Number of Records | Habitat  |
|--------------------------|-----------------------------------|--------------|-----------------|-------------|-------------|-------------------|--|
| <b>STATE SIGNIFICANT</b> |                                   |              |                 |             |             |                   |  |
| Eastern Horseshoe Bat    | <i>Rhinolophus megaphyllus</i>    | -            | Vulnerable      | Listed      | 1990        | 1                 | Habitat preference is associated with foraging areas and proximity to suitable roosting caves.                 |
| Hooded Robin             | <i>Melanodryas cucullata</i>      | -            | Near Threatened | Listed      | 2003        | 1                 | Eucalypt tall open forests and Acacia shrublands.  |
| Nankeen Night Heron      | <i>Nycticorax caledonicus</i>     | -            | Near Threatened | -           | 1992        | 1                 | Well-vegetated wetlands. Found along shallow river margins, mangroves, floodplains, swamps, parks and gardens. |
| Painted Honeyeater       | <i>Grantiella picta</i>           | -            | Vulnerable      | Listed      | 1991        | 1                 | Eucalypt forests and woodlands, particularly where heavily infested with mistletoe.                            |
| Powerful Owl             | <i>Ninox strenua</i>              | -            | Vulnerable      | Listed      | 2003        | 1                 | Drier forest types with many live hollow bearing eucalypt trees.   |
| Southern Toadlet         | <i>Pseudophryne semimarmorata</i> | -            | Vulnerable      | -           | 1992        | 1                 | Lower elevations in damp areas usually under leaf litter, logs or rocks.                                       |
| Square-tailed Kite       | <i>Lophoictinia isura</i>         | -            | Vulnerable      | Listed      | *           | 1                 | Coastal and sub-coastal open forests and woodlands, and inland along wooded watercourses.                      |
| <b>Total</b>             |                                   |              |                 |             | <b>2004</b> | <b>34</b>         |  |



community environmental recovery action plan

Photo by Sue Aldred





Figure 4

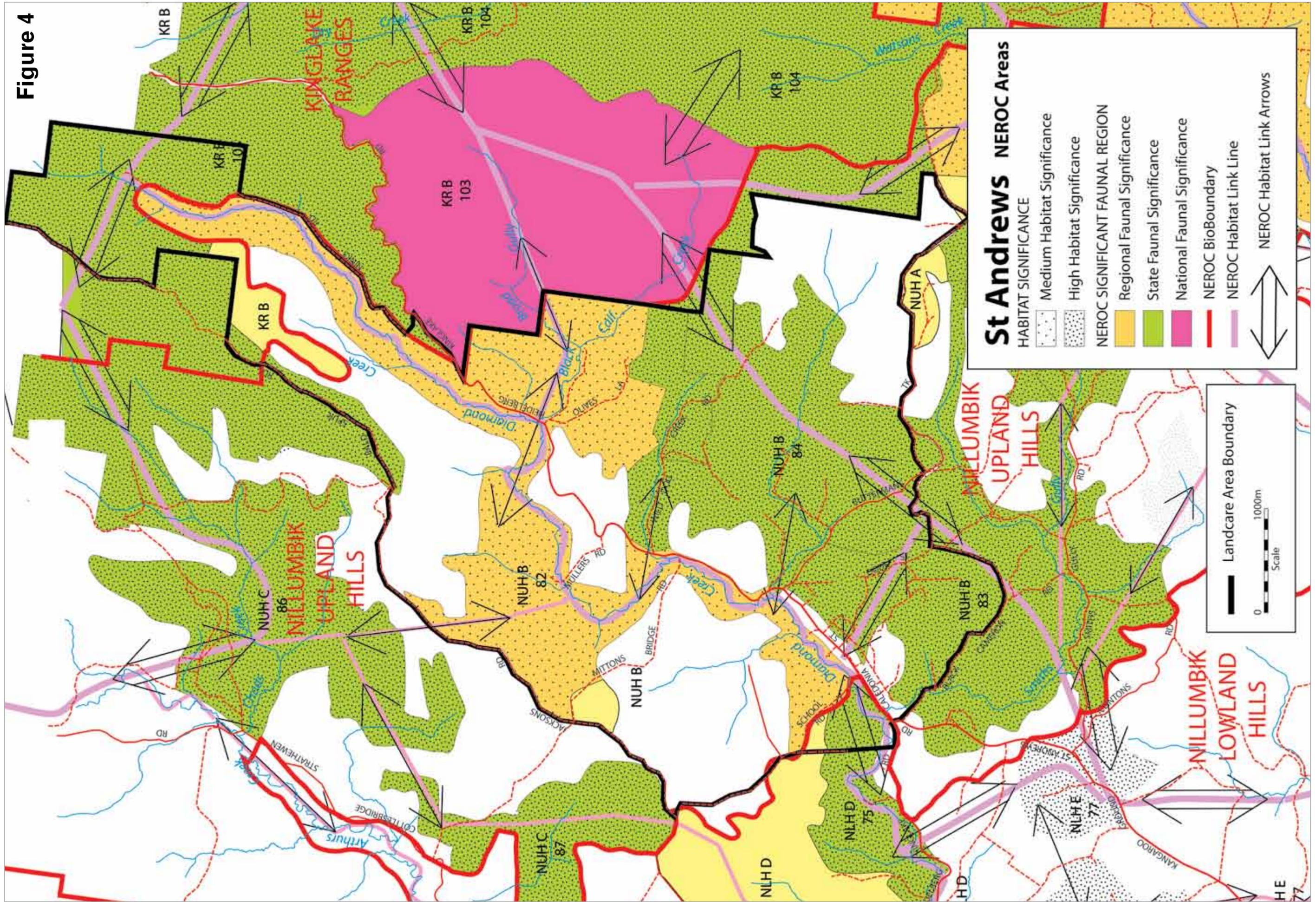
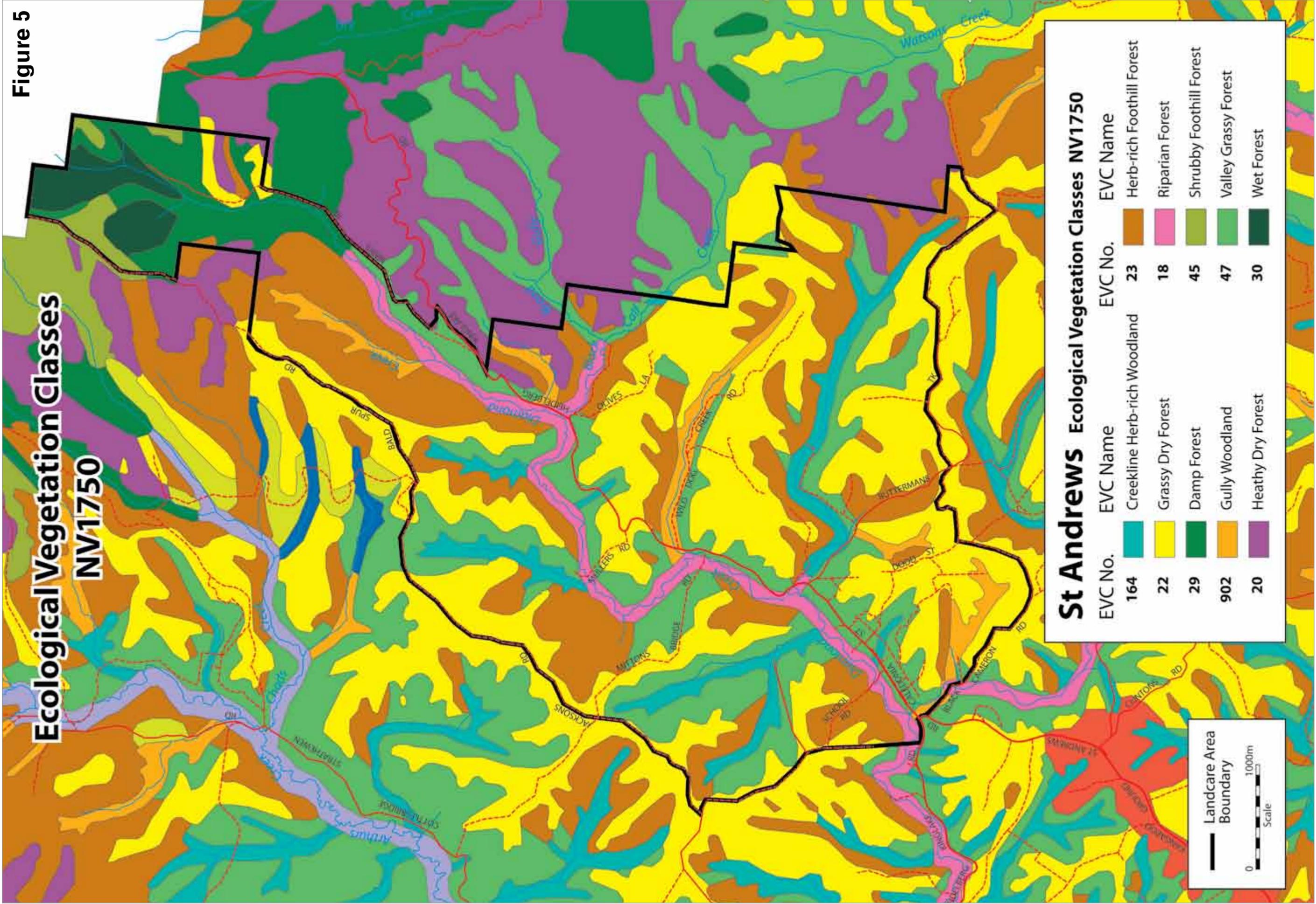


Figure 5

# Ecological Vegetation Classes NV1750



## St Andrews Ecological Vegetation Classes NV1750

| EVC No. | EVC Name                     | EVC No. | EVC Name                  |
|---------|------------------------------|---------|---------------------------|
| 164     | Creekline Herb-rich Woodland | 23      | Herb-rich Foothill Forest |
| 22      | Grassy Dry Forest            | 18      | Riparian Forest           |
| 29      | Damp Forest                  | 45      | Shrubby Foothill Forest   |
| 902     | Gully Woodland               | 47      | Valley Grassy Forest      |
| 20      | Heathy Dry Forest            | 30      | Wet Forest                |

Landcare Area Boundary

Scale  
0 1000m

Figure 6

# Ecological Vegetation Classes NV2005

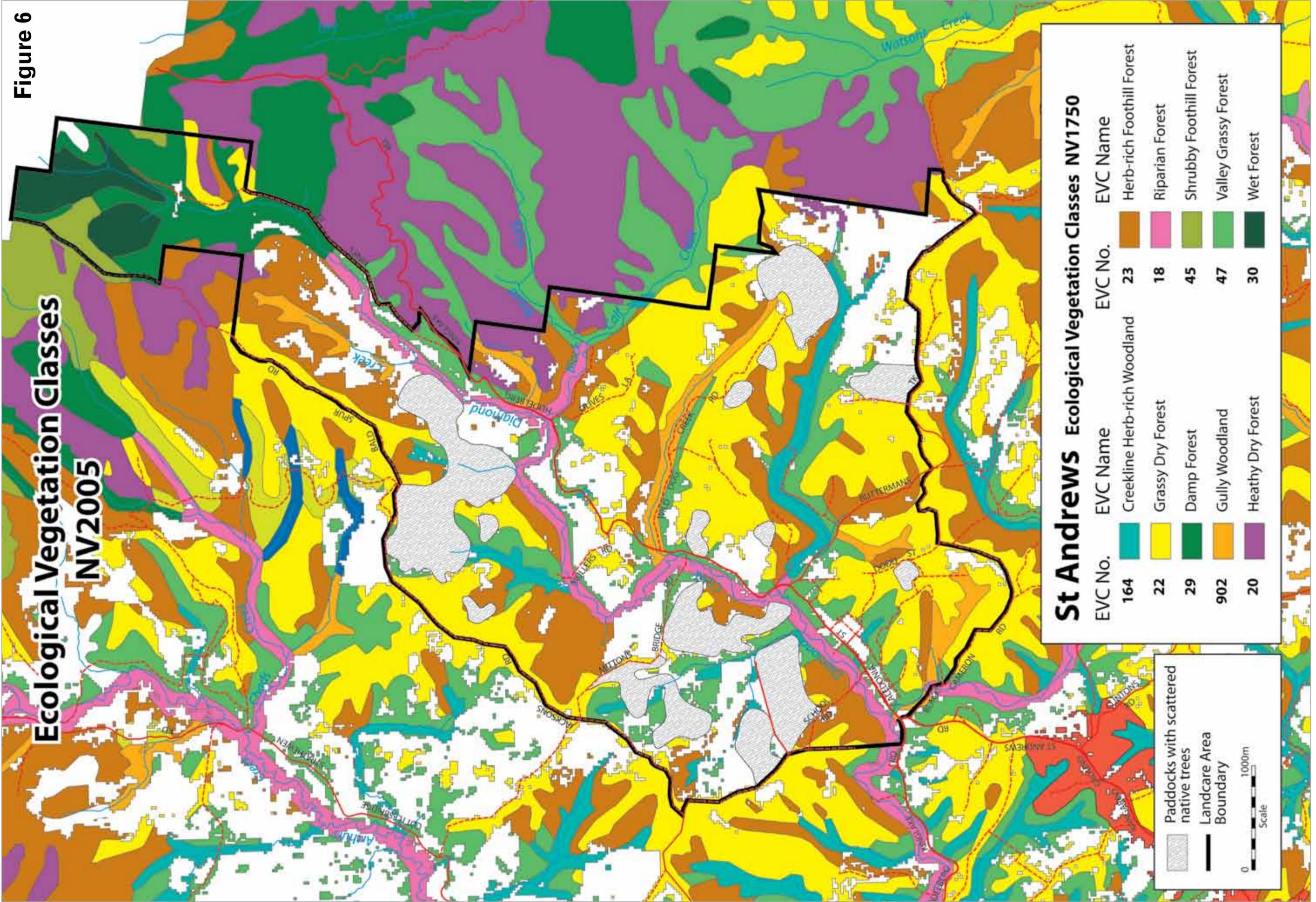
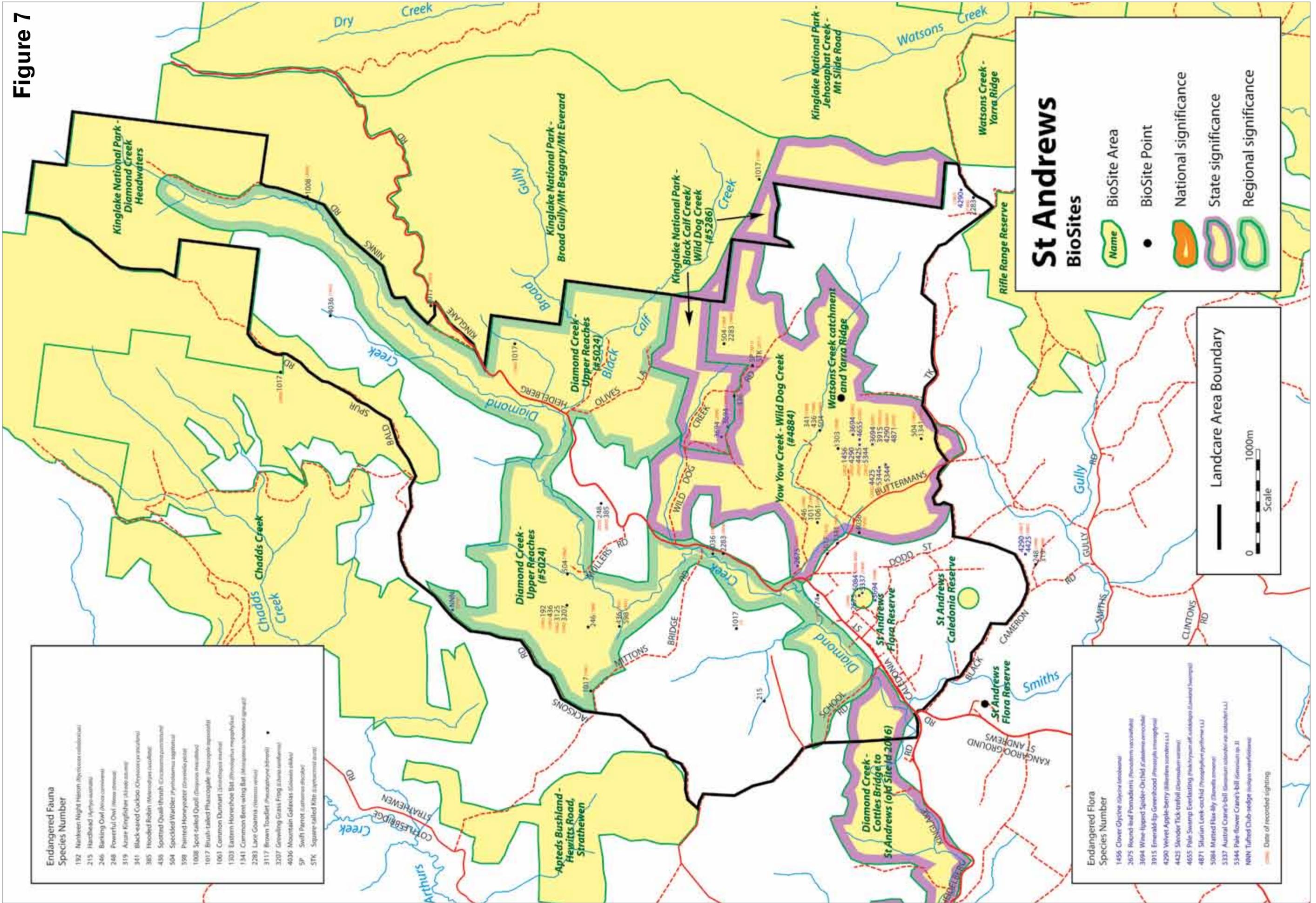


Figure 7



**Endangered Fauna**

| Species Number | Species Name   |
|----------------|--|
| 192            | Nankeen Night Heron ( <i>Nycticorax calonicus</i> )      |
| 215            | Hardhead ( <i>Acryps australis</i> )                     |
| 246            | Barking Owl ( <i>Ninox connexa</i> )                     |
| 319            | Acute Kingfisher ( <i>Alcedo acuta</i> )                 |
| 341            | Black-eared Cuckoo ( <i>Chrysocolaptes</i> )             |
| 365            | Hooded Robin ( <i>Melicospiza cucullata</i> )            |
| 438            | Spotted Quail-Finch ( <i>Cranium parvum</i> )            |
| 504            | Speckled Warbler ( <i>Pycnonotus nigricollis</i> )       |
| 598            | Painted Honeyeater ( <i>Grampella picta</i> )            |
| 1008           | Spot-tailed Quail ( <i>Turnix maculosa</i> )             |
| 1017           | Bush-tailed Phascogale ( <i>Phascogale</i> )             |
| 1061           | Common Dunnart ( <i>Sminthopsis macrura</i> )            |
| 1303           | Eastern Horseshoe Bat ( <i>Hypsignathus monstrosus</i> ) |
| 1341           | Common Bent-wing Bat ( <i>Myotis schreibersii</i> )      |
| 2283           | Live Goanna ( <i>Hemias tigris</i> )                     |
| 3117           | Brown Toadlet ( <i>Pseudophryne phryne</i> )             |
| 3207           | Groening Grass Frog ( <i>Litoria umbrosa</i> )           |
| 4036           | Mountain Galaxias ( <i>Galaxias olidus</i> )             |
| 5P             | Swift Parrot ( <i>Lathamus occidens</i> )                |
| 5TK            | Square-tailed Kite ( <i>Elanus cafer</i> )               |

**Endangered Flora**

| Species Number | Species Name                                    |
|----------------|---|
| 1455           | Clover ( <i>Glycine lewkeana</i> )              |
| 2075           | Round-leaf Pomadourri ( <i>Pomadourri</i> )     |
| 3694           | Wine-flipped Spider-Orchid ( <i>Caladenia</i> ) |
| 3915           | Emerald-lip Greenhood ( <i>Protophyma</i> )     |
| 4290           | Velvet Apple-Berry ( <i>Illicium</i> )          |
| 4425           | Slender Tick trefoil ( <i>Desmodium</i> )       |
| 4655           | Pale Swamp Everlasting ( <i>Chrysanthemum</i> ) |
| 4871           | Silurian Leek-orchid ( <i>Protophyma</i> )      |
| 5084           | Matted Flax-lily ( <i>Thymelicum</i> )          |
| 5337           | Austral Crane's-bill ( <i>Stemodia</i> )        |
| 5344           | Pale-flower Crane's-bill ( <i>Stemodia</i> )    |
| NNN            | Tufted Club-ridge ( <i>Wedelia</i> )            |

Date of recorded sighting

Figure 8

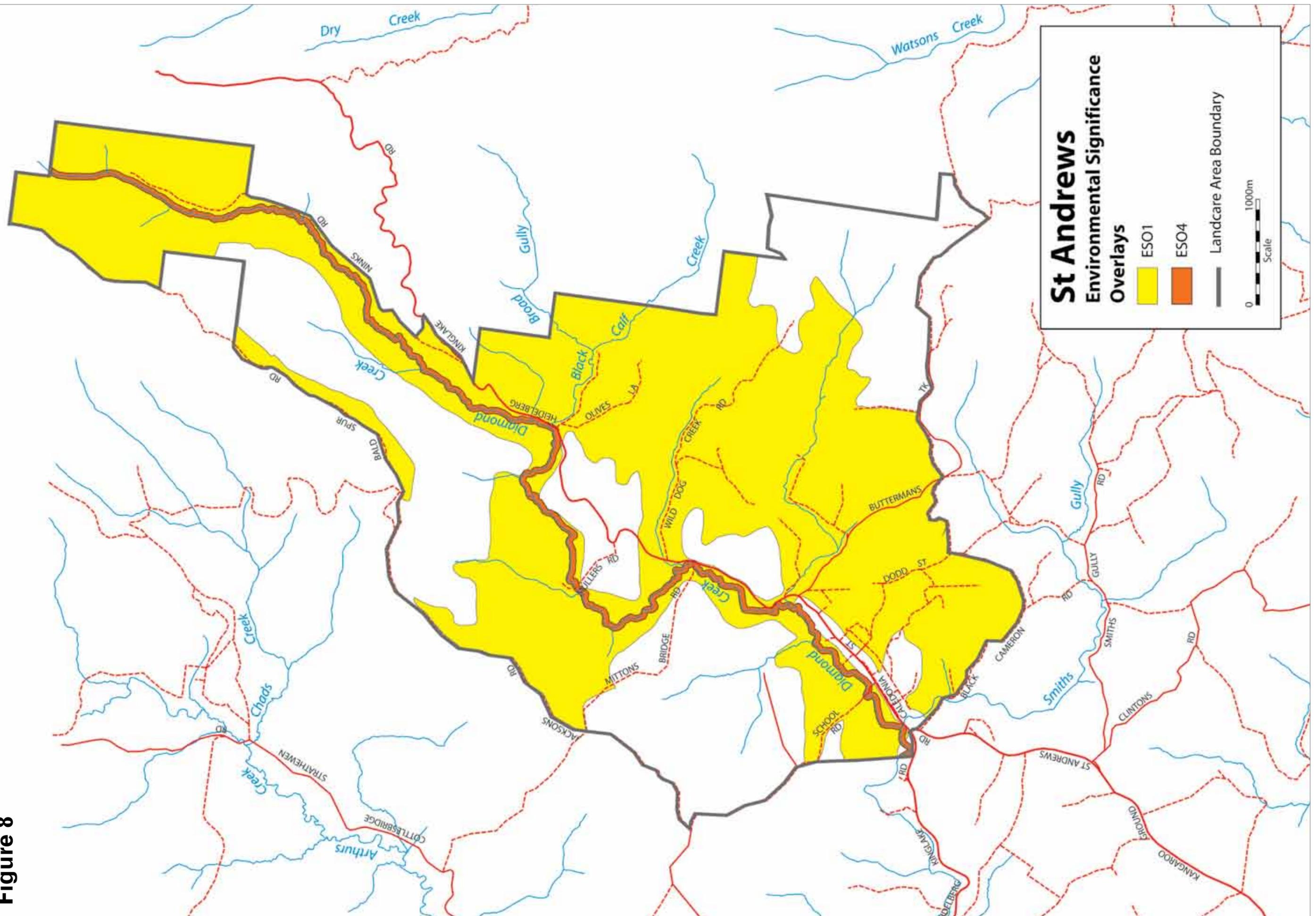
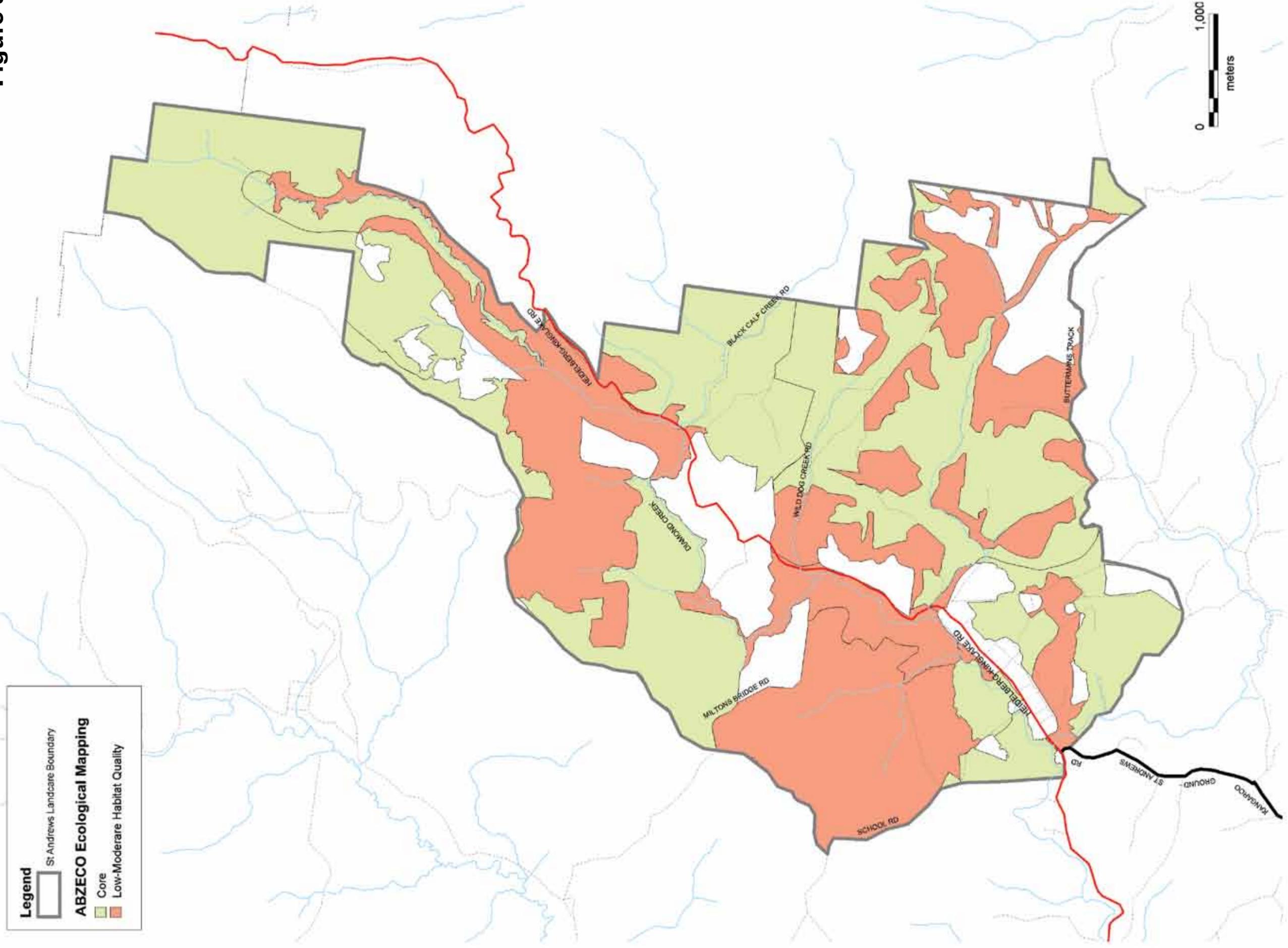


Figure 9



**Legend**

- St Andrews Landcare Boundary

**ABZECO Ecological Mapping**

- Core
- Low-Moderate Habitat Quality

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 Print on: 31/08/2012
   
 Print by: TB

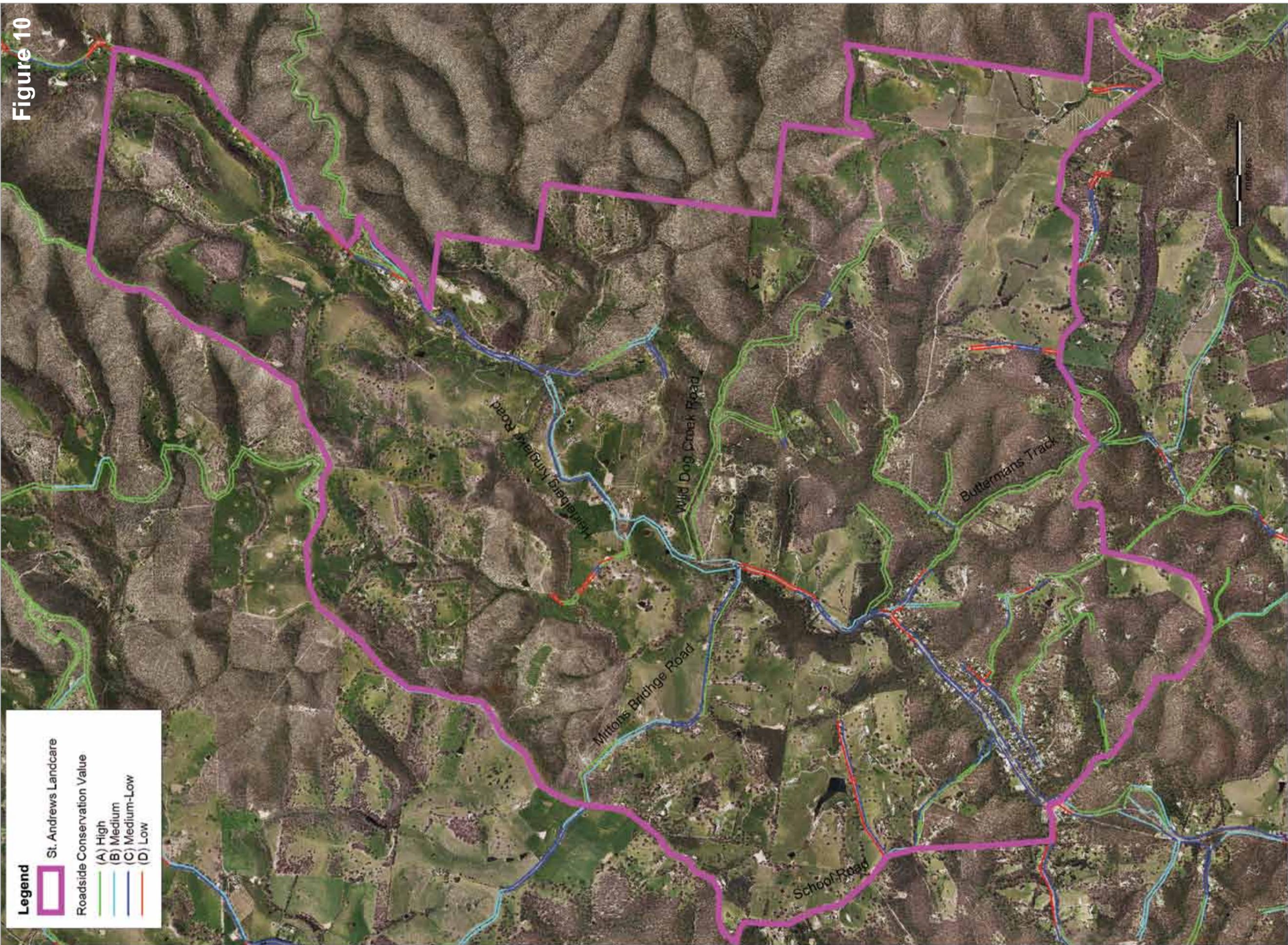


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Figure 10



**Legend**

- St. Andrews Landcare
- Roadside Conservation Value
  - (A) High
  - (B) Medium
  - (C) Medium-Low
  - (D) Low



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## St. Andrews Roadside Conservation Value