SIGNIFICANT GRASSY & HERBACEOUS ROADSIDE VEGETATION IN ARMSTRONG CREEK AND MT DUNEED

Prepared by
Phil Hunter BAppSc (PksRec & Herit)
Geelong Field Naturalists Club Inc.

January 2019

GEELONG FIELD NATURALISTS CLUB

ANOTHER DENNIS FAMILY COMMUNITY
ASHBURY
ARMSTRONG CREEK

SIGNIFICANT GRASSY & HERBACEOUS ROADSIDE VEGETATION IN ARMSTRONG CREEK AND MT DUNEED

Table of Contents

Introduction

The roadsides of Armstrong Creek and Mt Duneed near Geelong, Victoria, contain many locally threatened or vulnerable plants. These grasses and herbs are remnants of the once extensive grassy woodlands of the Otway Plains (Lunt, Barlow & Ross 1998, p. 33) and Victorian Volcanic Plains (DELWP 2018a).
Grassy woodlands have been drastically reduced across much of south-eastern Australia as a result of agricultural and urban development, and much of what remains is highly fragmented, often with the native ground layer severely depleted or missing (Marriott & Marriott 1998, pp. viii & ix).

The roadside vegetation in Armstrong Creek and Mt Duneed is significant, as much of this ground layer remains intact, and there is a good diversity of native grasses and herbs. It represents the Grassy Woodland EVC (Ecological Vegetation Class) 175 and Plains Grassy Woodland EVC 55 (DELWP 2018a; M Trengove 2018, personal communication, 12 October), which are both listed as Endangered in the Otway Plain and Victorian Volcanic Plain Bioregions (DELWP 2018b).

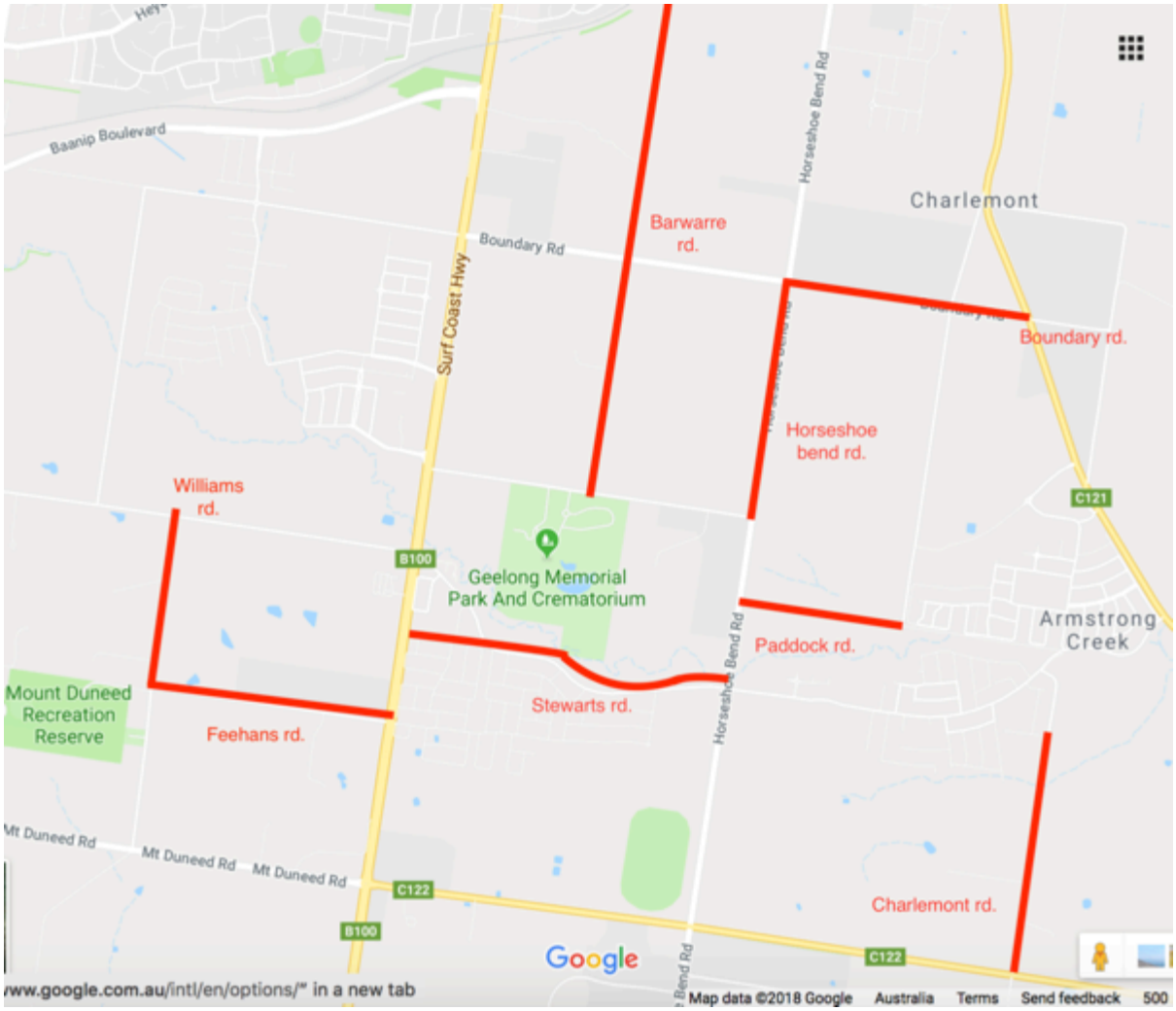
These vegetation remnants are important as they provide a snapshot of what the local landscape looked like prior to European settlement, contain rare species, provide habitat for local fauna, and are a resource for future generations. Unfortunately they are under threat from pressures such as urban expansion, roadworks, weeds and neglect. Carefully considered and appropriate management is needed to protect and restore them (Carr et al. 2001, p. 35).

This report focuses on grassy and herbaceous vegetation on well preserved roadsides within the City of Greater Geelong area. Its purpose is to emphasise the value of these areas, highlight their important attributes, and suggest management techniques to help conserve and restore them.

This report can be used in conjunction with *City of Greater Geelong Biodiversity Management Plan* (Carr et al. 2001), which identifies sites of biodiversity significance within the city including strategic directions for management, and Precinct Plans and documents found on the DELWP website at http://planning-schemes.delwp.vic.gov.au/updates-and-amendments (2018c) which identifies future land use in Armstrong Creek and Mt Duneed.

Roadside locations

Map 1 below shows the location of roadsides referred to in this report.



Map 1. Location of significant roadside vegetation in Armstrong Creek and Mt Duneed

All roadsides referred to in this report, are marked with signage as shown in Figure 1. These signs were erected by City of Greater Geelong in the 1990s to protect roadside vegetation within the shire (G Stockton 2018, personal communication, 23 July).

Figure 1. Biodiversity Conservation sign on Charlemont Rd

Why are these roadsides worth protecting?

The roadsides in the Armstrong Creek/Mt Duneed area are some of the best examples of remnant vegetation within the City of Greater Geelong.

These areas have not been exposed to some of the pressures on other larger reserves, such as cultivation, logging, ongoing grazing, and rabbits. As a result, plants have had an opportunity to regenerate, the pre-existing vegetation and diversity has remained largely intact, and there are fewer opportunistic weeds.

These roadsides also:

- Reflect the local character of Armstrong Creek and Mt Duneed.
- Contain locally rare plant species.
- Provide habitat for local fauna, including birds, insects, mammals and reptiles.
- Showcase attractive indigenous plants.
- Contain hardy established plants that require little upkeep or maintenance.
- Provide reference points of pre-European vegetation for future planning and revegetation works.

- Provide seed collection points of local provenance for revegetation projects.

- Preserve local plant genetics and appearance (genotypes & phenotypes).

Apart from these important values, many of the roadsides represent Plains Grassy Woodland EVC 55, which is listed as a threatened ecological community and critically endangered under the Federal Government's *Environment Protection and Biodiversity Conservation Act* 1999 (DSEWPaC 2011).

What threatens this roadside vegetation?

- Encroachment from weeds. They smother native species, and limit their ability to regenerate. Native species have already disappeared from these roadsides in recent years due to weeds (G Stockton 2018, personal communication, 23 July).

  The following noxious weeds for the Corangamite Region (Agriculture Victoria 2017a) are prevalent on roadsides referred to in this report and pose a major threat to the remaining native vegetation.

  C – refers to regionally controlled weeds (landowners have the responsibility to take all reasonable steps to prevent the growth and spread of these weeds).
  R – refers to restricted weeds (trade of these weeds and their propagules is prohibited) (Agriculture Victoria 2017b).

  African Boxthorn C
  Angled Onion R
  Blackberry C
  Boneseed C
  Bridal Creeper R (see Figure 2)
  Cape Broom C
  Chilean Needlegrass R
  Flaxed-leaved Broom C
  Gorse C
  Hawthorn R
  Paterson's Curse C
  Serrated Tussock C
  Soursob R
  Sweet Briar C
  Wild Watsonia C (see Figure 3)

  Other weeds that threaten these roadsides include Bulbil Sparaxis (Figure 4), Cocksfoot, Phalaris, Kikuyu, Paspalum and Panic Veldtgrass.

Figure 2. Bridal Creeper on Williams Rd

Figure 3. Wild Watsonia on Williams Rd

Figure 4. Bulbil Sparaxis growing on a roadside in Mt Duneed

- Dumping of rubbish and garden waste, including material from potential weedy species.

- Mowers and slashers spreading weed seeds from site to site. For example, Wild Watsonia (Figure 3) is easily spread when slashing occurs after bulbils have formed on the flowering stem. This is its only means of spread (Carr et al. 2001, Part 2, Appendix 3, p. iv).

- Damage to vegetation from redevelopment of infrastructure and roads (see examples in Figures 5 and 6 of species lost to a new subdivision in Armstrong Creek). Unfortunately the current signage referred to on page 5 is limited in its ability to protect the vegetation, due to an invalid phone number.

- 'Tidying up' of roadside vegetation by adjacent landowners, developers and Council to make it 'neat.' Includes use of herbicides, persistent mowing and brushcutting.

- Lack of community awareness as to the value of these areas.

- Damage to vegetation by rabbits.

Figure 5. *Pelargonium rodneyanum* (Magenta Stork's-bill) (as shown on front cover) existed here on Boundary Rd prior to creation of a new subdivision

Figure 6. *Calocephalus lacteus* (Milky Beauty-heads) on Horseshoe Bend Rd prior to grading by machinery

Significant roadside vegetation

Please note, species lists are not comprehensive, and in some cases, just limited to genera, e.g. *Lepidosperma* sp. Trees and shrubs have been excluded from the lists for the purpose of this report, but are discussed where overstorey is relevant. Mistletoe (although not grassy or herbaceous) has been discussed and included in species lists, due to its noteworthy existence.

Williams Rd (Whites Rd to Feehans Rd)

- Remnant vegetation is healthy on both sides of the road, including the overstorey (see Figure 7 below).

Figure 7. Williams Rd remnant vegetation

- This is probably one of the best roadsides for diversity in the area. *Bossiaea prostrata* (Creeping Bossiaea) (Figure 8) and *Opercularia* sp. (Stinkweed) are not recorded on any other roadsides listed in this report. *Burchardia umbellata* (Milkmaids) (Figure 9), *Pimelea humilis* (Common Rice-flower) (Figure 10) and *Arthropodium strictum* (Chocolate Lily) (Figure 11) are not locally common.

Figure 8. *Bossiaea prostrata* (Creeping Bossiaea) on Williams Rd

Figure 9. *Burchardia umbellata* (Milkmaids) on Williams Rd

Figure 10. *Pimelea humilis* (Common Rice-flower) on Williams Rd

Figure 11. *Arthropodium strictum* (Chocolate Lily) on Williams Rd

- Native grasses are prolific on this roadside, particularly further up the hill. See Figure 12 picture of *Austrostipa* sp. (Spear Grass) below.

Figure 12. *Austrostipa* sp. (Spear Grass) on Williams Rd

- This roadside vegetation provides important habitat for woodland birds, many of which are uncommon in the local area. Species observed here between 2016 and 2018 include Rufous Whistler, Red-browed Finch, Grey Fantail, Common Bronzewing, Yellow-rumped Thornbill, Spiny-cheeked Honeyeater, Brown-headed Honeyeater, New Holland Honeyeater, Grey Shrike-thrush and Yellow-tailed Black-Cockatoo (feeding on sheoak).

- Bridal Creeper, Wild Watsonia, Panic Veldtgrass and Cocksfoot are some of the biggest weed threats to this vegetation.

Plant species:

Arthropodium strictum (Chocolate Lily)
Austrostipa nodosa (Knotty Spear Grass)
Austrostipa pubinodis (Spear Grass)
Austrostipa semibarbata (Fibrous Spear Grass)
Austrostipa sp. (Spear Grass)
Bossiaea prostrata (Creeping Bossiaea)
Burchardia umbellata (Milkmaids)
Dianella revoluta var. *revoluta* (Black-anther Flax-lily)
Einadia nutans (Nodding Saltbush)
Gonocarpus tetragynus (Common Raspwort)
Lomandra filiformis (Wattle mat-rush)
Lysiana exocarpi (Harlequin Mistletoe)
Microlaena stipoides (Weeping Grass)
Opercularia sp. (Stinkweed)
Pimelea humilis (Common Rice-flower)
Rytidosperma caespitosum (Common Wallaby Grass)
Rytidosperma fulvum (Copper-awned Wallaby Grass)
Rytidosperma geniculatum (Kneed Wallaby Grass)
Rytidosperma laeve (Smooth Wallaby Grass)
Rytidosperma racemosum (Slender Wallaby Grass)
Themeda triandra (Kangaroo Grass)
Tricoryne elatior (Yellow Rush-lily)

Paddock Rd (ex Lake Rd) (Horseshoe Bend Rd to Batten Rd)

- Healthy overstorey vegetation exists along both sides of the road, dominated by *Allocasuarina verticillata* (Drooping Sheoak) (rare in the City of Greater Geelong), and hence this site is listed as having high conservation significance (Carr et al. 2001, Part 2, Appendix 1).

- This roadside is Plains Grassy Woodland EVC 55 (Carr et al. 2001, Part 2, Appendix 1).

- The western end of this roadside has some small healthy patches of native grasses with good inter-tussock space throughout (see Figure 13).

Figure 13. Healthy stands of *Austrostipa* sp. on Paddock Rd

- *Drosera hookeri* (Grassland Sundew) (Figures 14 & 15) is a locally rare species, not found on any other roadsides mentioned in this report. Gorse and annual grasses (seen in these images) are beginning to encroach on this small population.

- A small population of *Arthropodium strictum* (Chocolate Lily) and *Hypericum gramineum* (Small St. John's Wort) (both locally uncommon species) occur on this roadside.

- The Restless Flycatcher is a locally rare woodland bird that was observed on this roadside in May 2018.

- Gorse is prolific on Paddock road and one of the biggest weed threats to the remnant vegetation. Figure 16 shows it encroaching on native grasses. Gorse also provides harbour for rabbits (CRC Weed Management 2003, p. 1), which adds intense grazing pressure to the native vegetation.

- Other weed issues on this roadside include Bridal Creeper, Cape Broom, Angled Onion, Panic Veldtgrass, Phalaris and Cocksfoot.

Figure 14. *Drosera hookeri* (Grassland Sundew) plants on Paddock Rd

Figure 15. Close up of *Drosera hookeri* (Grassland Sundew) on Paddock Rd

Figure 16. Gorse encroaching on native grasses, Paddock Rd

- The *City of Greater Geelong Biodiversity Management Plan* (Carr et al. 2001, Part 2, Appendix 1) recommends control of Gorse and Phalaris on this site.

Plant species:

Arthropodium strictum (Chocolate Lily)
Austrostipa semibarbata (Fibrous Spear Grass)
Austrostipa pubinodis (Spear Grass)
Dianella revoluta var. *revoluta* (Black-anther Flax-lily)
Drosera hookeri (Grassland Sundew)
Einadia nutans (Nodding Saltbush)
Gonocarpus tetragynus (Common Raspwort)
Hypericum gramineum (Small St. John's Wort)
Lomandra filiformis (Wattle Mat-rush)
Microlaena stipoides (Weeping Grass)
Poa labillardierei (Common Tussock-grass)
Poa morrisii (Velvet Tussock-grass)
Rytidosperma caespitosum (Common Wallaby Grass)
Rytidosperma racemosum (Slender Wallaby Grass)
Rytidosperma setaceum (Bristly Wallaby Grass)
Themeda triandra (Kangaroo Grass)

Boundary Rd (Horseshoe Bend Rd to Barwon Heads Rd)

- There are some open grassland areas on this roadside (see Figure 17 below) dominated by *Themeda triandra* (Kangaroo Grass) that contain a good diversity of forb species. Ongoing mowing is probably assisting these species by limiting grassy biomass and weed growth and opening up inter-tussock spaces.

Figure 17. Open grassland on Boundary Rd dominated by *Themeda triandra* (Kangaroo Grass).

- Four locally rare forbs are found on this roadside, including *Chrysocephalum apiculatum* (Common Everlasting)*, Pimelea curviflora* (Curved Rice-flower)*, Astroloma humifusum* (Cranberry Heath) and *Pelargonium rodneyanum* (Magenta Stork's-bill) (Figures 18, 20–22). No other roadsides referred to in this report contain these species. *Pelargonium rodneyanum* is noted as rare in the City of Greater Geelong (Carr et al. 2001, p. 128).

- *Hypericum gramineum* (Small St. John's Wort) (Figure 19) is a locally uncommon species found on this roadside.

- Cocksfoot, Chilean Needlegrass, Bulbil Sparaxis, Cape and Flax-leaved Broom are some of the major weed threats to this site

Figure 18. *Chrysocephalum apiculatum* (Common Everlasting) on Boundary Rd

Figure 19. *Hypericum gramineum* (Small St. John's Wort) on Boundary Rd

Figure 20. *Astroloma humifusum* (Cranberry Heath) on Boundary Rd

Figure 21. Close up of *Astroloma humifusum* (Cranberry Heath) on Boundary Rd

Figure 22. *Pelargonium rodneyanum* (Magenta Stork's-bill) on Boundary Rd

Plant species:

Acaena sp. (Sheep's Burr)
Astroloma humifusum (Cranberry Heath)
Austrostipa bigeniculata (Tall Spear Grass)
Austrostipa sp. (Spear Grass)
Chrysocephalum apiculatum (Common Everlasting)
Convolvulus angustissimus (Australian Bindweed)
Dianella revoluta var. *revoluta* (Black-anther Flax-lily)
Einadia nutans (Nodding Saltbush)
Gonocarpus tetragynus (Common Raspwort)
Hypericum gramineum (Small St. John's Wort)
Lepidosperma sp. (Sword-sedge)
Lomandra filiformis (Wattle Mat-rush)
Microlaena stipoides (Weeping Grass)
Pelargonium rodneyanum (Magenta Stork's-bill)
Pimelea curviflora (Curved Rice-flower)
Rytidosperma racemosum (Slender Wallaby Grass)
Rytidosperma setaceum (Bristly Wallaby Grass)
Schoenus sp. (Bog-rush)
Themeda triandra (Kangaroo Grass)
Tricoryne elatior (Yellow Rush-lily)

Horseshoe Bend Rd (Boundary Rd to Burvilles Rd)

- The majority of native species here occur under trees, particularly where remnant *Allocasuarina verticillata* (Drooping Sheoak) grows.

- A healthy stand of *Lepidosperma* sp. (Sword-sedge) and *Gahnia filum* (Chaffy Saw-sedge) (Figures 23 & 24) occurs close to the Boundary Rd intersection.

Figure 23. *Gahnia filum* (Chaffy Saw-sedge) on Horseshoe Bend Rd

Figure 24. Close up of *Gahnia filum* on Horseshoe Bend Rd

- Large *Allocasuarina verticillata* (Drooping Sheoak) trees support healthy clumps of Harlequin Mistletoe (*Lysiana exocarpi*) (see Figure 25). This parasitic plant provides food for birds such as honeyeaters and the Mistletoebird (Barlow 2011) and is noted as rare in the Geelong Otway region (Mayfield 2013, p. 281).

- Chilean Needlegrass, Cocksfoot, Bridal Creeper and Briar Rose are some of the major weed threats to this site.

Figure 25. Harlequin Mistletoe (*Lysiana exocarpi)* on Horseshoe Bend Rd

Plant species:

Acaena sp. (Sheep's Burr)
Austrostipa bigeniculata (Tall Spear Grass)
Dianella revoluta var. *revoluta* (Black-anther Flax-lily)
Distichlis distichophylla (Australian Salt-grass)
Einadia nutans (Nodding Saltbush)
Gahnia filum (Chaffy Saw-Sedge)
Geranium sp. (Crane's-bill)
Lepidosperma sp. (Sword-sedge)
Lepidosperma sp.2 (Sword-sedge)
Lomandra filiformis (Wattle Mat-rush)
Lysiana exocarpi (Harlequin Mistletoe)
Microlaena stipoides (Weeping Grass)
Rytidosperma caespitosum (Common Wallaby Grass)
Rytidosperma racemosum (Slender Wallaby Grass)
Rytidosperma setaceum (Bristly Wallaby Grass)
Schoenus sp. (Bog-rush)
Themeda triandra (Kangaroo Grass)

Feehans Rd

- There are at least nine different native grass species, and at least four sedge species on Feehans Rd. Healthy stands of *Lepidosperma* sp. (Sword-sedge) exist here (see Figure 26 below).

Figure 26. *Lepidosperma* sp. (Sword-sedge) on Feehans Rd

- Watsonia is a very dominant weed on this roadside, and in some cases has formed dense monocultures, particularly at the western end. It is a major threat to the existing native vegetation, as shown in Figure 27 where it is encroaching on *Lepidosperma* sp. (Sword-sedge) and *Dianella revoluta* var. *revoluta* (Black-anther Flax-lily).

- Other weed threats on this roadside are Gorse, Bulbil Sparaxis, and Buffalo Grass.

Figure 27. Watsonia encroaching on *Lepidosperma* sp. (Sword-sedge) on Feehans Rd

Plant species:

Anthosachne scabra (Common Wheat-grass)
Atriplex semibaccata (Creeping Saltbush)
Austrostipa semibarbata (Fibrous Spear Grass)
Austrostipa sp. (Spear Grass)
Dianella revoluta var. *revoluta* (Black-anther Flax-lily)
Einadia nutans (Nodding Saltbush)
Gonocarpus tetragynus (Common Raspwort)
Lepidosperma sp. (Sword-sedge)
Lepidosperma sp.2 (Sword-sedge)
Lomandra filiformis (Wattle Mat-rush)
Microlaena stipoides (Weeping Grass)
Rytidosperma caespitosum (Common Wallaby Grass)
Rytidosperma geniculatum (Kneed Wallaby Grass)
Rytidosperma racemosum (Slender Wallaby Grass)
Rytidosperma setaceum (Bristly Wallaby Grass)
Schoenus sp. (Bog-rush)
Themeda triandra (Kangaroo Grass)

Charlemont Rd (Lower Duneed Rd to residential area)

- This roadside typifies Plains Grassy woodland EVC 55, probably once dominated by *Eucalyptus camaldulensis* (River Red Gum). It is low lying in the landscape and prone to periodical flooding. Most of the roadside is currently open grassland (see Figure 28 below).

Figure 28. Open grassland on Charlemont Rd

- Significant species found on this roadside include *Poa labillardierei* (Common Tussock-grass), *Bothriochloa macra* (Red-leg grass), *Veronica gracilis* (Slender Speedwell), *Tricoryne elatior* (Yellow Rush-lily) (both shown in Figure 29), and *Acaena* sp. (Sheep's Burr) (see Figure 30). The majority of these plants are found in and around stands of *Themeda triandra* (Kangaroo Grass).

- Regular mowing of this roadside is probably favouring these native species listed above, as explained in Boundary Rd on page 18.

- Problem weeds on this roadside are Kikuyu and Paspalum.

Figure 29. *Tricoryne elatior* (Yellow Rush-lily) & *Veronica gracilis* (Slender Speedwell) on Charlemont Rd

Figure 30. *Acaena* sp. (Sheep's Burr) on Charlemont Rd

Plant species:

Acaena sp. (Sheep's Burr)
Austrostipa sp. (Spear Grass)
Bothriochloa macra (Red-leg grass)
Dianella revoluta var. *revoluta* (Black-anther Flax-lily)
Distichlis distichophylla (Australian Salt-grass)
Geranium sp. (Crane's-bill)
Gonocarpus tetragynus (Common Raspwort)
Lepidosperma sp. (Sword-sedge)
Lomandra filiformis (Wattle Mat-rush)
Microlaena stipoides (Weeping Grass)
Poa labillardierei (Common Tussock-grass)
Rytidosperma racemosum (Slender Wallaby Grass)
Themeda triandra (Kangaroo Grass)
Tricoryne elatior (Yellow Rush-lily)
Veronica gracilis (Slender Speedwell)

Stewarts Rd

- This is an old closed road, now mainly used by pedestrians. Much of the roadside is treed, with a dense understorey of *Acacia paradoxa* (Hedge Wattle) in places. In open areas there are stands of remnant native grasses. Significant species include *Dichelachne crinita* (Long-hair Plume-grass) and a small rhizomatous *Poa* species (Tussock Grass) (see Figure 31 below).

Figure 31. *Poa* sp. (Tussock Grass)

- Rabbits are prevalent in this area, and a major threat to the native vegetation.
- Problem weeds are Bridal Creeper, Soursob, Angled Onion and Cocksfoot.

Plant species:

Acaena sp. (Sheep's Burr)
Austrostipa bigeniculata (Tall Spear Grass)
Austrostipa semibarbata (Fibrous Spear Grass)
Dichelachne crinita (Long-hair Plume-grass)
Lomandra filiformis (Wattle mat-rush)
Microlaena stipoides (Weeping Grass)
Poa sp. (Tussock Grass)
Rytidosperma geniculatum (Kneed Wallaby Grass)
Rytidosperma racemosum (Slender Wallaby Grass)
Rytidosperma setaceum (Bristly Wallaby Grass)
Themeda triandra (Kangaroo Grass)

Barwarre Rd (Burvilles Rd to Reserve Rd)

- Much of this roadside is well treed with large healthy specimens of *Allocasuarina verticillata* (Drooping Sheoak), *Eucalyptus leucoxylon* subsp*. connata* (Yellow Gum), *Exocarpos cupressiformis* (Cherry Ballart), *Bursaria spinosa* (Sweet Bursaria), *Myoporum insulare* (Common Boobialla) and *Acacia implexa* (Lightwood) throughout. Some of these are depicted in Figure 32 below.

Figure 32. View of Barwarre Rd from southern end looking north

- Key features of this roadside include three species not present on any other roadsides mentioned in this report. They include *Pimelea glauca* (Smooth Rice-flower) (Figure 33), *Haloragis heterophylla* (Varied Raspwort) (Figure 34), and *Austrostipa elegantissima* (Feather Spear Grass) (mainly at the northern end of the site) (see Figure 35). *Pimelea glauca* is noted as rare in the City of Greater Geelong (Carr et al. 2001, p. 128).

- Other significant features include healthy stands of *Lepidosperma* sp. (Sword-sedge) throughout, and small populations of *Pimelea humilis* (Common Rice-flower), *Burchardia umbellata* (Milkmaids) and a small *Poa* species (Tussock Grass). The sheoaks also support many healthy clumps of *Lysiana exocarpi* (Harlequin Mistletoe).

- Weeds are heavily encroaching on some of the remaining patches of grasses and forbs. Soursob, Bridal Creeper and Kikuyu are some of the major issues on this roadside (see Bridal Creeper smothering a *Gahnia filum* plant in Figure 36). Other weed problems include Boneseed, Watsonia, Bulbil Sparaxis, Angled Onion, Cocksfoot and Phalaris.

Figure 33. *Pimelea glauca* (Smooth Rice-flower) on Barwarre Rd

Figure 34. *Haloragis heterophylla* (Varied Raspwort) on Barwarre Rd

Figure 35. *Austrostipa elegantissima* (Feather Spear Grass) on Barwarre Rd

Figure 36. Bridal Creeper smothering *Gahnia filum* on Barwarre Rd

Plant species:

Acaena sp. (Sheep's Burr)
Austrostipa bigeniculata (Tall Spear Grass)
Austrostipa elegantissima (Feather Spear Grass)
Austrostipa sp. (Spear Grass)
Burchardia umbellata (Milkmaids)
Dianella revoluta var. *revoluta* (Black-anther Flax-lily)
Gahnia filum (Chaffy Saw-Sedge)
Gonocarpus tetragynus (Common Raspwort)
Haloragis heterophylla (Varied Raspwort)
Lepidosperma sp. (Sword-sedge)
Lomandra filiformis (Wattle mat-rush)
Lysiana exocarpi (Harlequin Mistletoe)
Microlaena stipoides (Weeping Grass)
Pimelea glauca (Smooth Rice-flower)
Pimelea humilis (Common Rice-flower)
Poa sp. (Tussock Grass)
Rytidosperma caespitosum (Common Wallaby Grass)
Rytidosperma fulvum (Copper-awned Wallaby Grass)
Rytidosperma geniculatum (Kneed Wallaby Grass)
Rytidosperma racemosum (Slender Wallaby Grass)
Schoenus sp. (Bog-rush)
Themeda triandra (Kangaroo Grass)

Recommendations for management

- Urgently secure increased funding for roadside conservation works in Armstrong Creek and Mt Duneed.

- City of Greater Geelong continue to commit to long-term protection, conservation and rehabilitation works on these roadsides, as listed in these recommendations.

- Where possible, protect areas of high quality roadside vegetation and significant plants, as mentioned in this report:

    - discourage all roadworks, machinery, graders etc. in these areas.
    - temporarily erect fencing, and/or barrier mesh if necessary
    - upgrade roadside conservation signs as shown on page 5, including a relevant phone number.

- Where damage to significant species is unavoidable, encourage seed collection and propagation, and translocation of original plants. Focus should be on locally rare or uncommon species. Plantings should occur in a protected zone in close proximity to the site, where the landscape and soil type closely resembles the original location.

- Control all regionally controlled noxious weeds on roadsides in Armstrong Creek and Mt Duneed.
  Control other weeds in areas of high quality vegetation and around significant plants.

    - When using chemicals, avoid off target damage to native vegetation by using selective herbicides, and the cut and paint method for woody weeds.
    - Pre-emergent herbicides and other chemicals that leave residue in the soil should be avoided.
    - Refer to *City of Greater Geelong Biodiversity Management Plan* (Carr et al. 2001, Part 2, Appendix 3) for control methods of specific weeds.

- Facilitate natural regeneration of native species in and around significant areas (there is expected to be healthy quantities of native seed still remaining in the soil profile). Strategies include:

    - Careful herbicide application as described above.
    - Hand pulling of weeds where necessary.
    - Mowing and brushcutting weeds and rank vegetation.
    - Raking and collection of grassy biomass on the ground.
    - Selective and spot burning to activate the seedbank.
    - Collection and broadcasting of native seed from on-site.

- Continue ongoing mowing of grassy roadsides, such as Boundary Rd and Charlemont Rd to reduce weeds and grassy biomass.

- Maintain good mower hygiene to ensure weeds are not being spread from site to site. Avoid slashing weeds with mature seed, e.g. Chilean Needlegrass, Wild Watsonia. Slashing of Wild Watsonia should only occur while the plant is in the very early flowering stage (Carr et al. 2001, Part 2, Appendix 3, p. iv).

- Ongoing rabbit control in areas such as Stewarts Rd.

- Ongoing removal of dumped rubbish on roadsides.

- Discourage plantings of non-indigenous species on these roadsides. For indigenous plantings use locally collected seed (5–10 km provenance) where possible.

- Increase public awareness of the value of local roadside vegetation, locally rare plants, threats, and conservation works being carried out. Promote through local developers i.e. Warralily, Villawood, social media and free newspapers such as the *Armstrong Creek Times*.

- Conduct flora surveys on other roadsides in Armstrong Creek and Mt Duneed to determine whether significant species exist.

Conclusion

The roadside vegetation in Armstrong Creek and Mt Duneed is a valuable asset, with many locally rare or vulnerable plants. Unfortunately this habitat is under pressure from many threats, and if no intervention is taken, these areas will continue to degrade with some species likely to disappear forever. Urgent action is necessary to reverse this tide.

It is hoped this report thrusts these areas into the spotlight to help secure funding and ongoing commitment from land managers to help conserve and restore it. Should this occur, these precious areas will remain healthy assets, providing valuable habitat for native fauna, and enriching the lives of the community for generations to come.

References

Agriculture Victoria 2017a, *Victorian Noxious Weeds List*, viewed 7 August 2018, <http://agriculture.vic.gov.au/__data/assets/pdf_file/0009/365094/Victorian-noxious-weeds-list-by-common-name-20-July-2017.pdf>.

Agriculture Victoria 2017b, *Invasive Plant Classifications,* viewed 8 August 2018, <http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/weeds/invasive-plant-classifications>.

Barlow, B 2011, *Mistletoe dispersal – birds. Dispersal and germination,* Australian National Botanic Gardens, viewed 7 August 2018, <https://www.anbg.gov.au/mistletoe/dispersal-germination.html>.

Carr, GW, McMillan, SE, Trengove, MH, White, MD, McMahon, ARG, Silveira, CE 2001, *City of Greater Geelong Biodiversity Management Plan,* Ecology Australia Pty Ltd, Fairfield, VIC.

CRC Weed Management 2003, *Weed Management Guide. Gorse (Ulex europaeus),* viewed 7 August 2018, <https://www.environment.gov.au/biodiversity/invasive/weeds/publications/guidelines/wons/pubs/u-europaeus.pdf>.

Department of Environment, Land, Water and Planning (DELWP) 2018a, *NatureKit*, viewed 9 October 2018, <http://maps.biodiversity.vic.gov.au/viewer/?viewer=NatureKit>.

Department of Environment, Land, Water and Planning (DELWP) 2018b, *Bioregional Conservation Status for each BioEVC*, viewed 9 October 2018, <https://www.environment.vic.gov.au/__data/assets/pdf_file/0012/50511/Bioregional-Conservation-Status-for-each-BioEVC.pdf>.

Department of Environment, Land, Water and Planning (DELWP) 2018c, *Planning, Browse Amendments,* viewed 29 September 2018, <http://planning-schemes.delwp.vic.gov.au/updates-and-amendments>.

Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) 2011, *Nationally Threatened Ecological Communities of the Victorian Volcanic Plain: Natural Temperate Grassland & Grassy Eucalypt Woodland,* viewed 13 October 2018, <http://www.environment.gov.au/system/files/resources/e97c2d51-08f2-45e0-9d2f-f0d277c836fa/files/grasslands-victoria.pdf>.

Lunt, I, Barlow, T, & Ross, J 1998, *Plains Wandering: Exploring the Grassy Plains of South-Eastern Australia,* Victorian National Parks Association Inc. and Trust For Nature (Victoria).

Marriott, N & Marriott, J 1998, *Grassland Plants of South-Eastern Australia*, Blooming Books, Hawthorn, VIC.

Mayfield, E 2013, *Flora of the Otway Plain and Ranges 2*, CSIRO Publishing, Collingwood, VIC.

Acknowledgments

The author gratefully acknowledges the assistance of the following people in the preparation of this report:

Deborah Evans (Geelong Field Naturalists Club)

Barry Lingham (Geelong Field Naturalists Club)

Rod Lowther (Geelong Field Naturalists Club)

Jane Currie (City of Greater Geelong)

Travis Turner (City of Greater Geelong)

Mark Trengove (Mark Trengove Ecological Services)

Graeme Stockton (West Coast Indigenous Nursery)

Graeme Lorimer (Biosphere Pty Ltd)

The author also wishes to thank the Dennis Family Corporation for the financial grant to assist in printing and promotion of this report.