Local Biodiversity Strategy

Shire of Victoria Plains

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Executive Summary

The Shire of Victoria Plains is committed to preserving its rich biodiversity, recognising it as fundamental to the region's ecosystems and essential for the survival of all life on Earth. Situated at the convergence of three bioregions (Jarrah Forest, Swan Coastal Plains, and Avon Wheatbelt 2), the Shire boasts a remarkable variety of species. However, after European settlement, excessive deforestation was done for economical interest, which left the Shire of Victoria Plains with minimum remanent vegetation. In addition, the biodiversity in the Shire now faces significant environmental risks, including invasive species, historical deforestation, weed infestations, salination, wildfires and climate change. These challenges underscore the urgent need for proactive conservation measures. Threats such as invasive species and habitat degradation threaten endemic species like *Acacia* sp. New Norcia and *Grevillea gillingarra*, demanding immediate action to safeguard their future.

The Shire's biodiversity strategy outlines a comprehensive framework for addressing current issues and achieving long-term conservation goals. The biodiversity strategy of Shire of Victoria Plains has been developed to assist the Shire to continue its commitment of saving biodiversity and address the knowledge gaps in the Shire. The biodiversity strategy is based on current information and federal, state, and regional legislation. The Shire appreciates the insights and knowledge shared by the Traditional Owners are particularly valued, as they bring a deep, ancestral understanding of the local environment that is crucial to our conservation efforts.

The primary objective of the strategy is to establish a resilient ecosystem through strategic ecological infrastructure and enhanced vegetative cover. By fostering partnerships with stakeholders, including carbon offset companies, the strategy aims to achieve measurable milestones in biodiversity conservation over the next decade. The ultimate goal is to ensure future generations can enjoy a thriving natural environment through proactive management and community engagement.

The Shire of Victoria Plains plans to implement its biodiversity strategy over a 10-year period, with a goal of significantly improving biodiversity. Progress will be monitored and evaluated for adoptive management. An Implementation Plan will outline the expenses, council duties, dates, and performance indicators for each action.

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The Shire of Victoria Plains acknowledges the Yued people, the **Traditional Owners** of the land we live and work on and recognises their continuing connection to the land and waterways.

We pay our respect to their past, present and emerging Elders. In addition, we extend our respects to all aboriginal and Torres strait Islander People.

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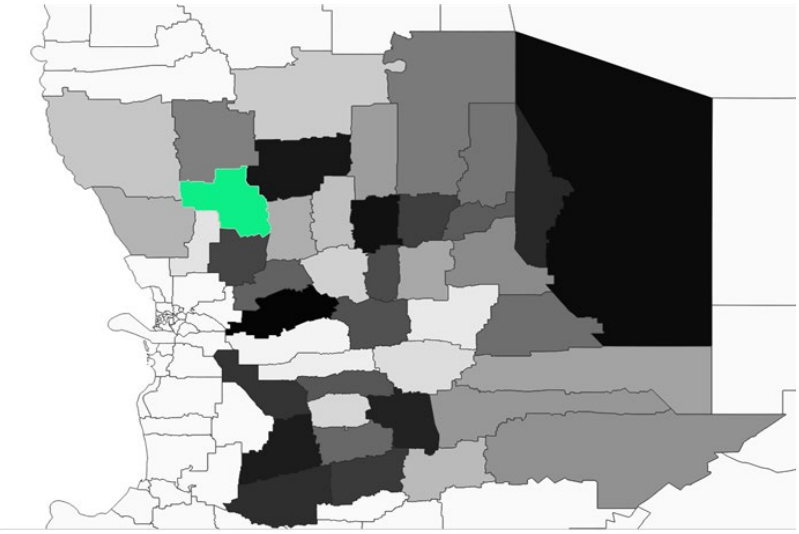
About the Shire

The Shire of Victoria Plains is a local government area located in the Wheatbelt region of Western Australia. Covering an area of approximately 2,569 square kilometres, the Shire encompasses the towns of Calingiri, Bolgart, New Norcia, Yerecoin, and Piawaning. Among the diverse inhabitants of the Shire of Victoria Plains, the Yued people stand as stewards of ancient wisdom, deeply connected to the land's biodiversity and guardians of its rich cultural heritage. The economy of the Shire is primarily based on agricultural practices, with a focus on wheat, sheep and cattle farming. The Shire also has the grain receival facility in Calingiri that serves as key hub for transporting grain to market.

Known for its diverse landscapes, the Shire is home to a variety of flora and fauna, making it an important area for biodiversity conservation. The variety of biodiversity includes acacia, eucalyptus, and banksia, as well as a variety of endemic species. The Shire has a number of natural reserves which protect and provide habitat to organisms such as western swamp tortoise and Carnaby's cockatoo.

In recent years, the Shire has taken steps to protect and preserve its biodiversity through the implementation of conservation programs and initiatives. These efforts include the establishment of conservation reserves, the restoration of degraded habitats, and the promotion of sustainable land management practices. By working to protect its natural resources, the Shire is ensuring that future generations will be able to enjoy the benefits of its unique biodiversity.



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1.0 Introduction

Biodiversity and its Importance

Biodiversity refers to the total variety of life on Earth, encompassing numerous species with genetic and taxonomic variation across different habitats. This diversity includes thousands of unique habitats, millions of species, and trillions of individuals with variable characteristics. Australia, in particular, boasts immense biodiversity, with approximately 85% of its plant species being endemic (Cresswell, Janke, & Johnston, 2021). Biodiversity plays a vital role in enhancing wildflower tourism, which is currently thriving in the region. Protecting and connecting high-biodiversity areas is essential for sustaining this flourishing industry.

Figure 1.1: Importance of biodiversity around us

The security of life on Earth is enhanced by greater biodiversity, which plays a vital role in ecological processes and systems. For instance, diverse tree species are essential for carbon storage and climate stabilization, while pollinators and soil microorganisms contribute to agricultural productivity. Moreover, many unique plants found in Australian ecosystems are sources of medicinal compounds that treat various diseases. Biodiversity thus provides numerous ecosystem services, many of which are free, demonstrating its profound impact on human well-being and the environment, as illustrated in Figure 1.1.

Cultural Ties to Biodiversity by Indigenous Peoples

The Yued people of the Noongar nation are the traditional custodians of the boodja (lands) of which the Shire of Victoria Plains encompasses. The caring and healing of country has been their responsibility for thousands of generations and has recently been disrupted due to western colonisation. Despite the changing political, social and economic landscape, the Yued people continue to meet their cultural obligations where possible.

The Noongar people have deep spiritual connections to boodja, which underpins this custodianship or responsibility. Through a westernised system, there are 'formal' records of culturally significant sites throughout the Shire of Victoria Plains; however, it should be recognised and understood that all lands, waters and skies are culturally significant as it ties not only into customs and practices, but also oral traditions and narratives that have been passed on for thousands of generations.

2.0 Overview of Biodiversity in Victoria Plains

The Shire of Victoria Plains, situated within the Jarrah Forest (JF1), Swan Coastal Plain (SWA1) and Avon Wheatbelt 2 (AW2) bioregions of Western Australia, boasts a rich tapestry of biodiversity, offering a glimpse into the diverse ecosystems that characterize the region. The division of the Shire in the bioregions is shown below in Figure 2.1.

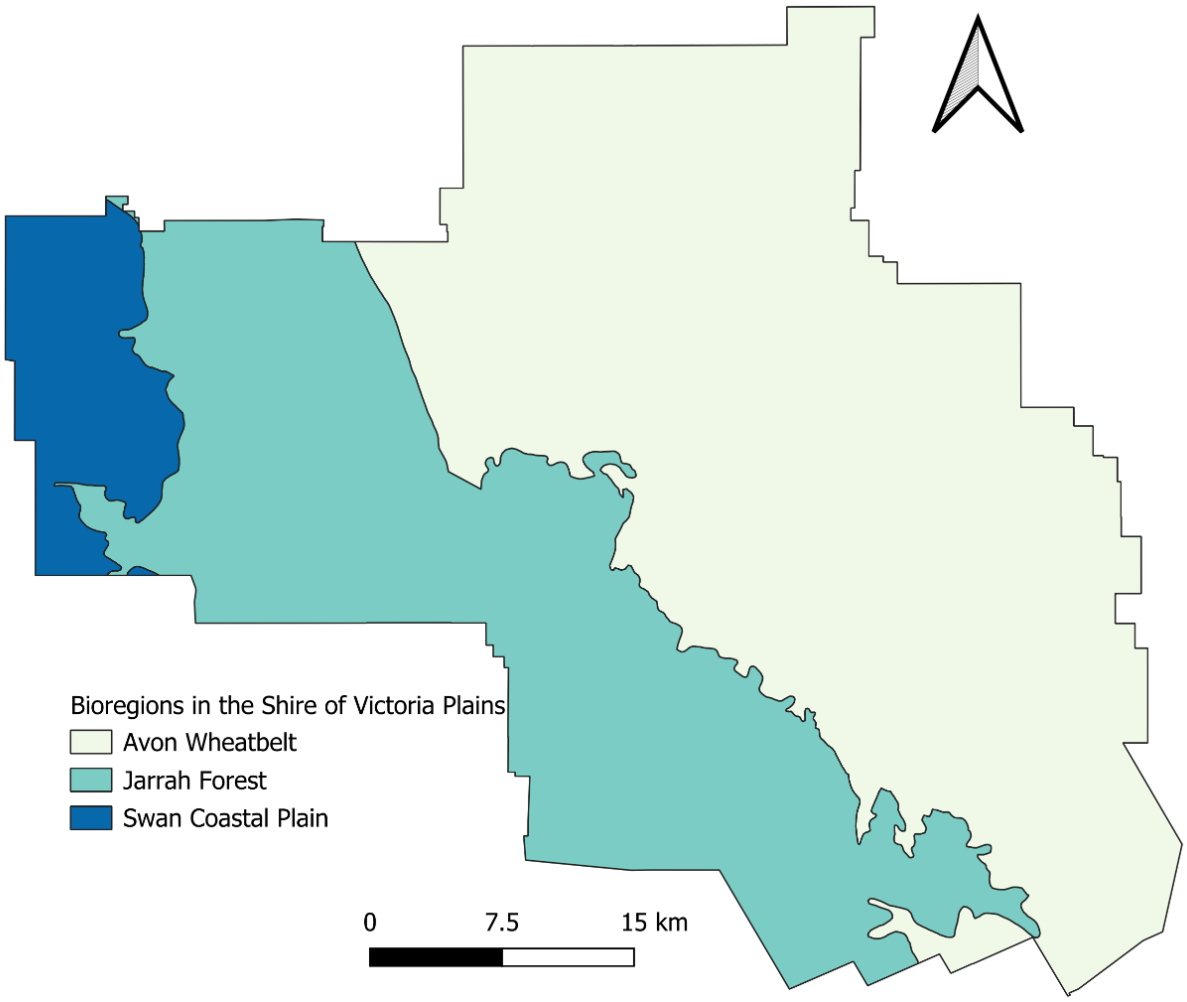


Figure 2.1: Division of the Shire of Victoria plains within different bioregions of Western Australia (Department of Climate Change, Energy, the Environment and Water, 2012)

The remarkable array of flora and fauna plays a vital part in maintaining the ecological balance of the area. With its vast agricultural lands and beautiful natural reserves, the Shire is home to numerous endemic species of wildflowers such as *Dryandra nobilis*, *Conospermum densiflorum* and *Gastrolobium villosum*, showcasing the region's biodiversity. The Shire of Victoria Plains also encompasses several reserves and State Forest within its boundaries as shown in Figure 2.2. The reserves include Boodadong Nature Reserve, Gillingarra Nature Reserve, Koodjee Nature Reserve, Mogumber Nature Reserve, Rica Erickson Nature Reserve, Sevenmile Well Nature Reserve and Wyening Nature Reserve. Detailed information on the reserves, along with their corresponding bioregions and vegetation associations, can be found in **Appendix A**.

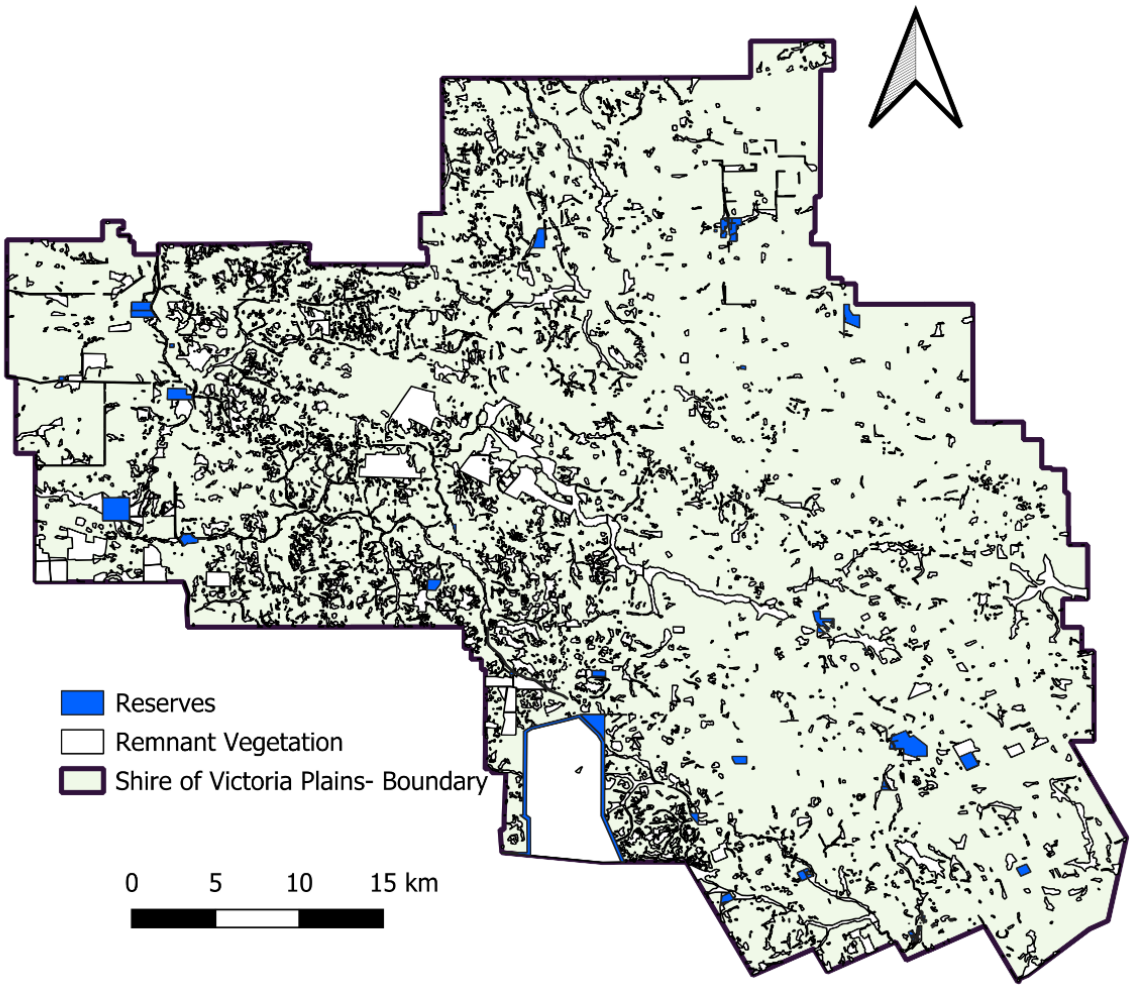


Figure 2.2: Map illustrating the major natural reserves in Shire along with water tributaries (Landgate, 2024).

One of the most defining features of the Shire is its varied landscape, which stretches across fertile plains, rolling hills, and pockets of native bushland. This native remnant vegetation forms a mosaic of habitats that support a wide range of plant and animal species, each harbouring its unique assemblage of life.

Regarding flora, the Shire of Victoria Plains boasts a diverse botanical landscape, with species adapted to the region's climatic conditions. Native vegetation such as eucalyptus, acacias, and banksias are spread across the landscape, providing important habitat and food sources for a myriad of wildlife. Wetland areas, including ephemeral lakes and seasonal streams, support a variety of aquatic plants, contributing to the overall biodiversity of the region.

The Shire's biodiversity extends beyond its plant life, encompassing a remarkable diversity of fauna. The area is home to numerous species of mammals, birds, reptiles, and amphibians, many of which are endemic to the region. Iconic Australian animals such as kangaroos, western swamp tortoises and echidnas roam the countryside, while bird enthusiasts can spot a plethora of avian species, from colourful parrots to black cockatoos.

Table 01: Current status of biodiversity in the Shire of Victoria Plains

Biodiversity Asset	Biodiversity Status
Native vegetation	The Shire exhibits minimal remaining vegetation due to decades of anthropogenic activities. The clearance of thriving trees for agricultural expansion and other developmental purposes has significantly depleted its natural green cover. The remaining cover is home to unique ecosystems such as Banksia woodlands of the Swan Coastal Plain and Eucalypt woodlands of the WA Wheatbelt, both listed as endangered and critically endangered ecological communities under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999*.
Native Flora	The Shire harbors diverse endemic flowers, offering scenic beauty and vital habitats for pollinators. However, pollution and climate change are causing a yearly decline in wildflower and pollinator populations. According to local reports, flora species such as *Grevillea gillingarra*, a native plant with a small population remaining on the Earth's surface, are struggling to survive .
Native Fauna	The fauna of the Shire includes a variety of species, but many are facing dire threats. Threatened species like the black cockatoos (*Zanda* sp.), peregrine falcon (*Falco peregrinus*), dibbler (*Parantechinus apicalis*) and shield-backed trapdoor spider (*Idiosoma nigrum*) are struggling to survive in their shrinking habitats. Unfortunately, some species have already been driven to extinction, such as the long-tailed hopping mouse (*Notomys longicaudatus*) and big-eared hopping mouse (*Notomys macrotis*).
Wetland, rivers, and streams	The wetlands, streams and rivers in Shire are facing a continued decline due to lack of water caused by the reduction of rainfall in the Shire. The low water levels are jeopardizing the ecosystem supported by these waterbodies.
Biodiversity knowledge	The biodiversity of the Shire remains inadequately explored, revealing significant gaps in our understanding that require attention and further research to be addressed.

To ensure the preservation and enhancement of biodiversity within the Shire of Victoria Plains, a comprehensive biodiversity strategy is imperative. This strategy will encompass conservation efforts, habitat restoration and community engagement. By prioritizing the protection of native ecosystems, promoting biodiversity-friendly land use and fostering partnerships with local stakeholders, the Shire can safeguard its natural heritage for future generations to enjoy.

2.1 Vegetation Complexes and Vegetation Associations

A vegetation complex is a broad classification that identifies plant communities in relation to the landforms and soils they occupy. It gives a landscape-scale perspective of how ecosystems are distributed, aiding in the identification of biodiversity corridors and the ecological services they offer. These complexes are crucial for understanding the overarching ecological patterns across bioregions.

In the Shire of Victoria Plains, many vegetation complexes have been significantly reduced, with most retaining less than 30% of their pre-European extent. For example, The Coolakin complex, which originally covered 11,375 hectares, now retains only 29.55% of its area, of which 6.94% is located within the Shire of Victoria Plains. Similarly, the Yalanbee, Y6 complex has just 7.82% remaining in the Shire. These significant reductions in native vegetation are concerning for the long-term sustainability of the local ecosystems and biodiversity.

Overall, the percentage of remaining vegetation complexes in the Shire is only 28.50%, indicating a substantial loss of native vegetation. This underscores the importance of implementing targeted conservation efforts to protect and restore these critical natural habitats for future biodiversity. A map of the vegetation complexes within the Shire of Victoria Plains has been included in **Appendix B**.

Table 02: Vegetation complexes within the Shire of Victoria Plains

Geomorphological Province	Vegetation Complex Name	% remaining of Pre_European mapped in the bioregion*)	Pre-European Extent in the Shire of Victoria Plains (ha)	Current Extent in the Shire of Victoria Plains (ha)	% Remaining	Proportion of the Vegetation Complex Class Mapping extent within each LGA* (%)
Darling Plateau	Cooke	82.4%	100.70	65.30	64.84	0.27
Darling Plateau	Coolakin	39.2%	11,375.16	3,361.77	29.55	6.94
Darling Plateau	Michibin	25.6%	9,448.54	1,398.50	14.80	5.62
Darling Plateau	Nooning	17.9%	2,300.54	412.80	17.94	35.57
Darling Plateau	Pindalup	76.8%	468.28	414.08	88.43	0.28
Darling Plateau	Swamp	75.7%	2.17	1.69	77.60	0.00
Darling Plateau	Williams	25.9%	463.21	155.65	33.60	1.60
Darling Plateau	Yalanbee, Y5	66.2%	2,265.11	1,379.50	60.90	1.79
Darling Plateau	Yalanbee, Y6	46.5%	15,479.72	4,460.39	28.81	7.82
Dandaragan Plateau	Cullula Complex	51.2%	4,395.13	1,295.68	29.48	16.92
Dandaragan Plateau	Mogumber Complex-North	47.7%	1,294.60	491.42	37.96	5.92
Dandaragan Plateau	Wannamal Complex	50.7%	71.82	27.76	38.65	2.88
Swan Coastal Plain	Moore River	34.4%	305.77	206.59	67.56	3.61
Total			**47,970.76**	**13,671.12**	**28.50**	

**Government of Western Australia. (2019). 2018 South West Vegetation Complex Statistics. Current as of March 2019.*

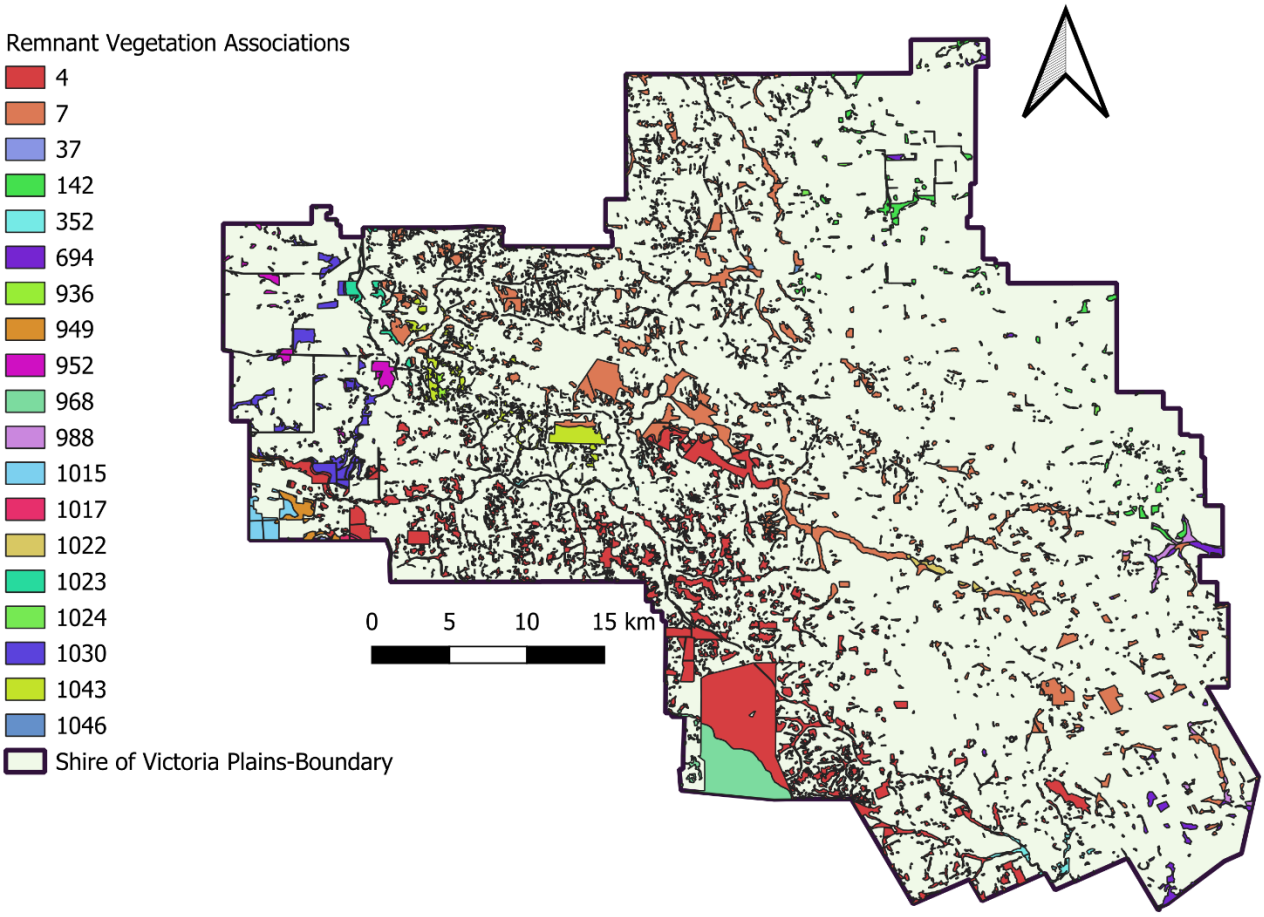


Figure 2.4: Current Extent of Vegetation Associations in the Shire of Victoria Plains (DPIRD, 2023)

On the other hand, **vegetation associations** refer to more specific groups of plant species that usually occur together in a particular habitat. They focus on the structure and composition of plant communities, such as woodland, heath, or thicket, and play a crucial role in understanding habitat types.

For the Shire of Victoria Plains, both vegetation complexes and associations are vital tools for conserving biodiversity. They help monitor the condition of native vegetation, assess impacts from human activities, and guide conservation or restoration efforts. The details of the vegetation associations within the Shire of Victoria Plains are illustrated in Figure 2.4 above and outlined in Table 03 below. Further comprehensive information is available in **Appendix B**, specifically in **Table B1**.

Table 02: Retention status of Shire of Victoria Plains vegetation associations at bioregion level

IBRA Region Code	IBRA Region Name*	Vegetation Association*	Pre-European Extent (ha)	2018 Extent (ha)	% Remaining in bioregion
AVW	Avon Wheatbelt	4	10,333.42	1,855.47	17.96
JAF	Jarrah Forest	4	1,022,712.69	277,087.18	27.09
SWA	Swan Coastal Plain	4	15,897.08	3,029.71	19.06
AVW	Avon Wheatbelt	7	144,189.50	15,279.52	10.60
JAF	Jarrah Forest	7	30,999.82	6,078.81	19.61
SWA	Swan Coastal Plain	7	56.14	11.93	21.26
AVW	Avon Wheatbelt	37	3,901.93	1,069.78	27.42
JAF	Jarrah Forest	37	2,492.74	1,852.23	74.31
SWA	Swan Coastal Plain	37	15,617.85	5,404.74	34.61
AVW	Avon Wheatbelt	142	637,707.53	79,309.95	12.44
JAF	Jarrah Forest	142	37.31	5.41	14.51
SWA	Swan Coastal Plain	142	190.89	24.18	12.67
AVW	Avon Wheatbelt	352	630,577.61	108,887.52	17.27
JAF	Jarrah Forest	352	31,606.76	6,467.09	20.46
SWA	Swan Coastal Plain	352	1,441.77	359.95	24.97
AVW	Avon Wheatbelt	694	173,921.56	12,637.36	7.27
JAF	Jarrah Forest	694	152.50	6.19	4.06
SWA	Swan Coastal Plain	694	38.12	18.22	47.79
AVW	Avon Wheatbelt	936	1,925.44	169.71	8.81
JAF	Jarrah Forest	936	306.56	101.64	33.15
AVW	Avon Wheatbelt	949	5,013.92	1,276.83	25.47
JAF	Jarrah Forest	949	1,462.42	531.22	36.32
SWA	Swan Coastal Plain	949	209,983.26	120,287.93	57.28
AVW	Avon Wheatbelt	952	19,791.12	6,183.10	31.24

IBRA Region Code	IBRA Region Name*	Vegetation Association*	Pre-European Extent (ha)	2018 Extent (ha)	% Remaining in bioregion
JAF	Jarrah Forest	952	535.03	246.28	46.03
SWA	Swan Coastal Plain	952	38,848.89	4,291.07	11.05
AVW	Avon Wheatbelt	968	1,497.82	338.96	22.63
JAF	Jarrah Forest	968	140,823.45	68,154.69	48.40
SWA	Swan Coastal Plain	968	136,188.20	9,017.32	6.62
AVW	Avon Wheatbelt	988	94,338.35	27,553.73	29.21
SWA	Swan Coastal Plain	988	1,372.05	892.89	65.08
SWA	Swan Coastal Plain	1015	19,556.98	6,639.02	33.95
JAF	Jarrah Forest	1017	11,846.91	9,028.80	76.21
SWA	Swan Coastal Plain	1017	5,681.10	2,521.71	44.39
AVW	Avon Wheatbelt	1022	456.21	177.46	38.90
AVW	Avon Wheatbelt	1023	1,522,680.40	165,123.60	10.84
JAF	Jarrah Forest	1023	14,925.28	3,096.12	20.74
SWA	Swan Coastal Plain	1023	9.79	1.06	10.88
AVW	Avon Wheatbelt	1024	738,926.59	84,606.91	11.45
JAF	Jarrah Forest	1030	236.12	42.28	17.91
SWA	Swan Coastal Plain	1030	134,788.56	86,013.90	63.81
JAF	Jarrah Forest	1043	5,095.15	1,416.86	27.81
AVW	Avon Wheatbelt	1046	861.78	45.20	5.24

Legend		*<10% (15%)*
		<30% (40%)
		>40%

2.2 Ecological Linkages

Guiding Principles for Establishing Ecological Linkages (Del Marco et al 2004, Davis and Brooker 2008, Molloy et al. 2009):

1. Aim for a heterogeneous matrix of habitats rather than a homogenous one. Utilise existing native vegetation matrix and complex landscapes with minimal disturbance.
2. The widest possible diversity of habitat types should be sought within a linkage with similar habitats (preferably) with less than 500 m – 1000 m apart.
3. Where continuous stands of native vegetation are not available, ecological linkages should be made up of remnants that form stepping stones between larger intact patches.
4. Provision of large regional linkages is preferable in supporting a wide range of communities and species, supporting their movement over generations to localised corridors.
5. Regional corridors should be 500 m wide where possible and a minimum of 300 m.
6. The number of linkages connecting to any given patch should be maximized as this improves overall connectivity and long-term viability.
7. Ecological linkages should be selected along directions that facilitate normal migrations and aid in adaptation of species and assemblages to climate change, such as North-South, East-West, high points in the landscape, riparian communities. Patches at high points in the landscape, in the line of sight of other patches are important for species dispersal and home range utilisation.
8. Re-vegetation is a viable strategy for establishing or strengthening corridors in cleared landscapes, with priority given to opportunities to expand existing remnant vegetation. Aim to form continuous vegetated linkages or corridors at least 100 m wide. If this is not possible, ensure stepping stones of reconstructed or created habitat are at least 2 ha to 4 ha in size and no more than 500 m to 1000 m apart.
9. Avoid or mitigate impacts of gaps in linkages caused by roads and other barriers to fauna mobility.
10. Open canopies over highly disturbed understorey may be of little value, except for highly mobile species.

Habitat fragmentation is recognised as contributing to biodiversity decline (McKinney 2002). Landscape connectivity is essential for both plant and animal species population viability. However, pressures from expanding urban areas and land clearing have negative impacts on landscape connectivity. It is becoming increasingly apparent that there is a role for private land conservation to play in the maintenance of habitat corridor networks and landscape connectivity.

In the Perth Metropolitan Region and the Southwest of Western Australia, regional ecological linkages were identified by WALGA's Biodiversity Projects (Del Marco et al. 2004, Molloy et al. 2009). Regional linkages connect regionally significant natural areas and provide a framework within which Local Governments can identify local ecological linkages. The local linkages identified within Figure 2.5 aim to connect locally significant natural areas. The viability of any natural area depends on its proximity to other natural areas, the quality of linkages or barriers in the landscape between them (Del Marco et al 2004). Ecological linkages should include the major variations in plant communities and fauna habitat typical of the region.

To provide continuity with connecting boundaries to neighbouring Shires, connectivity analysis was based on the methodology detailed in the Shire of Northam Local Biodiversity Strategy prepared by WALGA (2015). 'Patches' were defined as a mapped, contiguous unit of vegetation derived from the current remnant vegetation extent (DPIRD, 2020). A measure of fragmentation was considered a proxy for connectivity for this analysis to inform the designation of ecological linkages. Fragmentation provides a measure for each patch based on its size how closely each border surrounding patches. The measure was based on the following expression:

F (S, P, d) = Area (S within P buf d) / Area (P buf d);

whereby S is the set of all remnants in the landscape, P is each remnant, and d is a buffer distance.

Effectively, this expression calculates the sum of all remnant vegetation within the specified buffer area for each patch of remnant vegetation. The set of buffer distances considered was 10m, 20m, 50m, and 100m, with the final result being the mean of the outcome for each buffer distance. Low numbers correspond to

greater patch fragmentation and vice versa. To represent 'grades' of fragmentation, the results were grouped as follows:

Value range	Legend description
0 – 0.2	1
0.2 – 0.4	2
0.4 – 0.6	3
0.6 – 0.8	4
> 0.8	5

Areas of comparatively low fragmentation (shown in **Appendix C**) were then assessed visually to determine the most likely pathways of ecological linkage with consideration to the following:

- 'Regional Connectivity' is a measure for a patch and a network to which it belongs in how the network deviates from the "ideal" shape of a well-connected network (a circle). Ecological linkages were selected to be continuations of existing regional ecological linkage mapping for the Perth Metropolitan Region (WALGA, 2004) and the ecological linkages mapped in the neighbouring Shire of Chittering (Shire of Chittering, 2010).
- 'Fragmentation' - measure for a patch and its immediate surrounds and how this local network deviates from the ideal circle. Thin, small patches not closely bordering large patches are considered highly fragmented and large compact patches are considered least fragmented
- A 'patch' - defined as a mapped contiguous unit of vegetation, based on the combine layer of the 2019 native vegetation extent mapping (DPIRD 2020).

Road reserves are managed as road reserves and not LNAs. However, road reserves are mapped and classified according to roadside conservation committee protocols and can act as corridors and buffers.

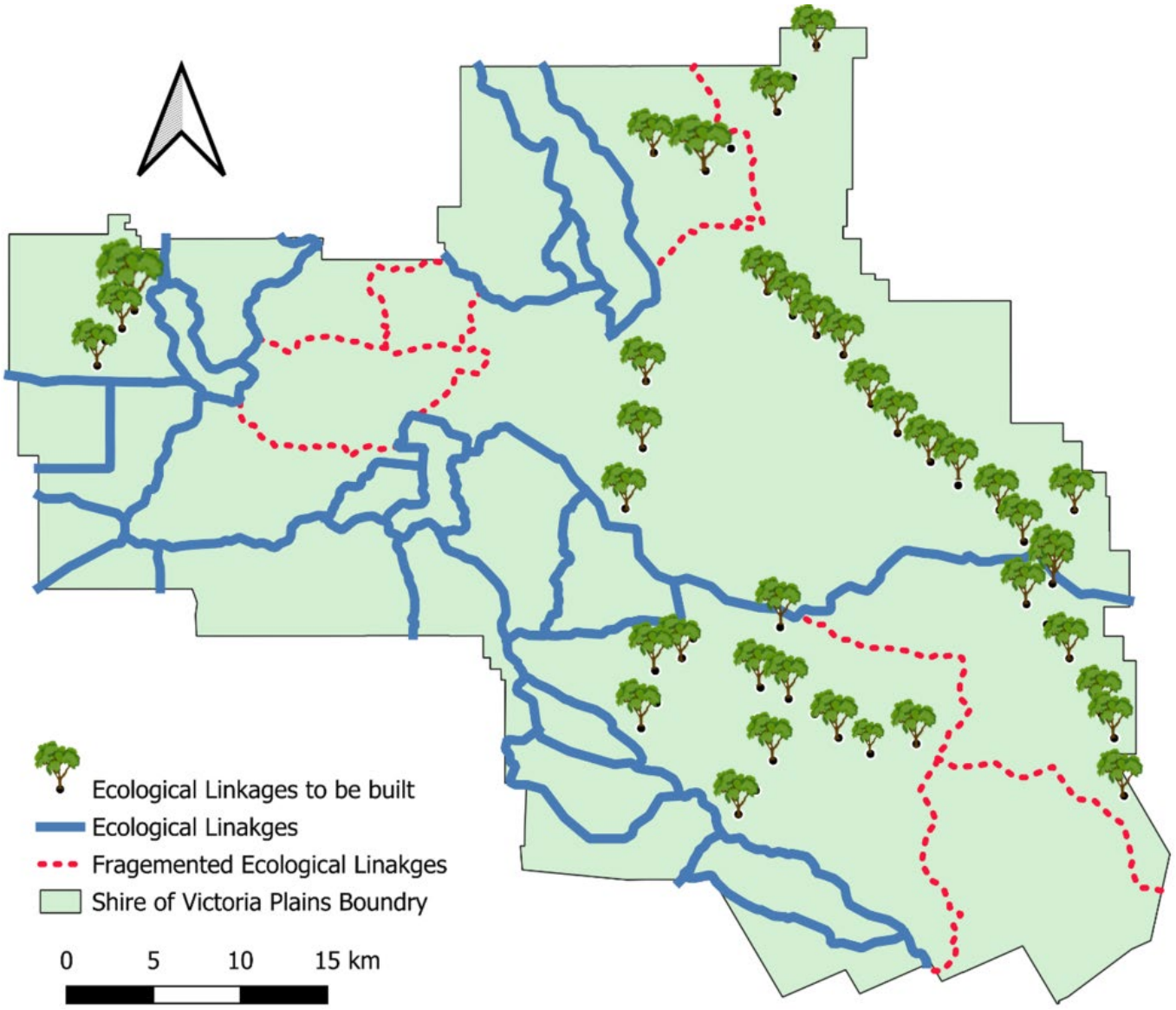


Figure 2.5: Ecological linkages in the Shire of Victoria Plains (The ecological linkages are made by the distance of 10m, 30m, 50m and 100m, the fragmented ecological linkages are made by using 200m to 500m buffer)

3.0 Contributions of Rica Erickson to the Shire of Victoria Plains

The understanding of the Shire of Victoria Plains' rich biodiversity owes much to the tireless field work of Rica Erickson. Through careful botanical surveys and detailed records of local fauna and flora, her works now form the basis for understanding and conserving the area.

Biodiversity documentation: By undertaking surveys, Erickson has provided catalogues of species in the Shire which give us some knowledge about those varieties. These details are vital for planning conservation programs and sustainable land use strategies.

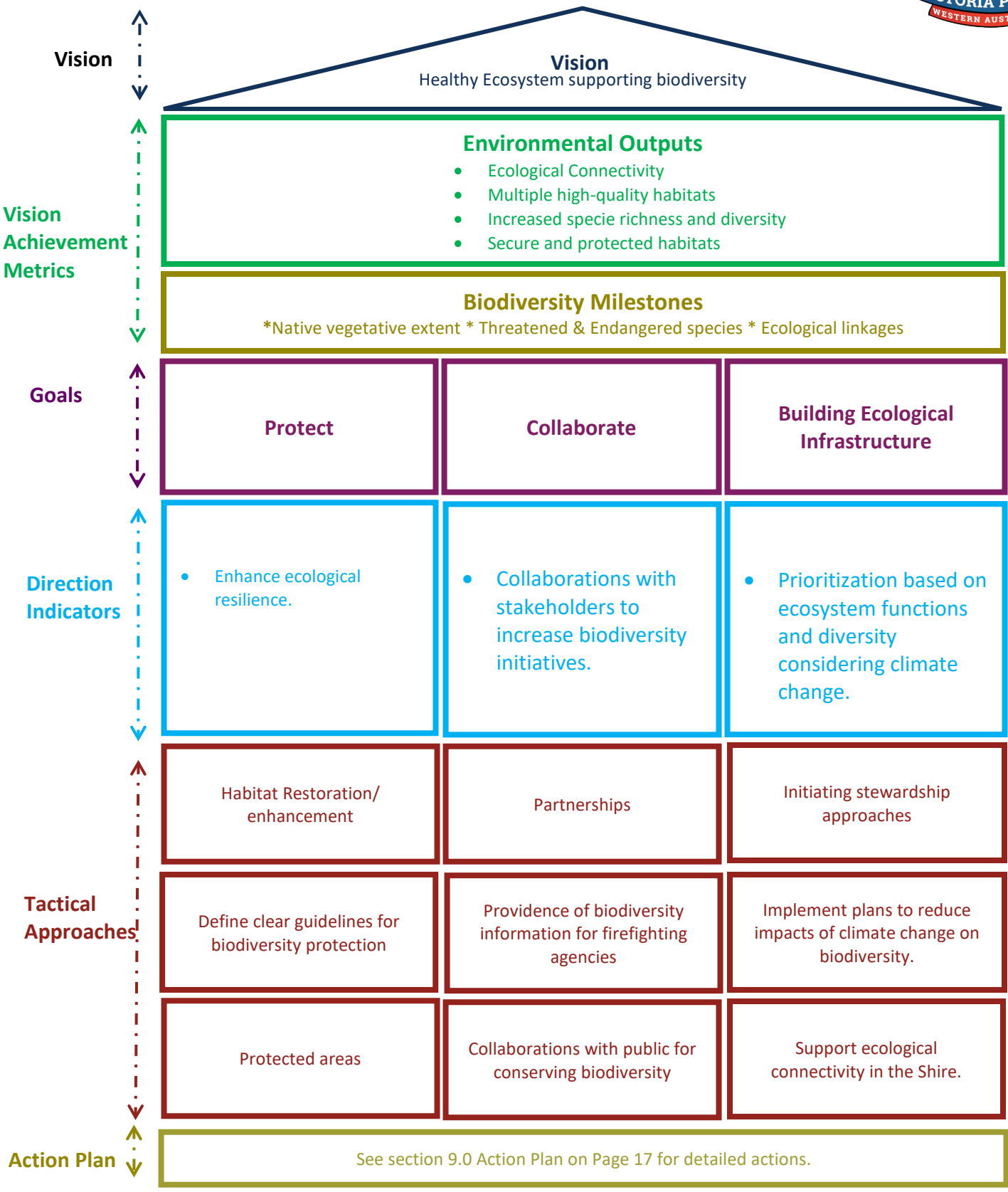
Literary Legacy: Rica Erickson's *Field Guide to the Wildflowers of Western Australia* (1951) was a foundational work that raised awareness about the region's unique flora and the importance of conserving native species. Her detailed research on insectivorous plants like Sundews and Trigger plants played a crucial role in their conservation. Additionally, Erickson's numerous publications, including those highlighting the ecological richness of the Victoria Plains region, serve as enduring educational tools that inspire a deeper understanding of the environment. These works not only celebrate Western Australia's biodiversity but also enhance its intrinsic value by fostering public appreciation and encouraging conservation efforts. Erickson's legacy continues through resources like the Rica Erickson Nature Reserve and her influential books, which remain key to environmental education and biodiversity protection.

Environmental education: Erickson has fostered a culture of environmental awareness and stewardship through her writing, speaking and outreach efforts. Her efforts to advocate for ecosystem conservation has enabled communities to actively participate in the protection and restoration of local ecosystems.

Conservation inspiration: Rica Erickson's estate is a guiding light for conservation efforts on Shire of Victoria Plains' land. Her unwavering commitment to documenting and protecting the Region's natural treasures inspires present and future generations to prioritize biodiversity conservation as an integral part of current development.

Rica Erickson's contributions are an integral part of the Shire's biodiversity strategy, providing a solid foundation for ongoing conservation efforts. Her legacy is aligned with the Shire's natural landscape fabric and reminds us of its value and the importance of preserving its ecological beauty for future generations.

4.0 Vision, Goals and Tactical Approaches



5.0 Major Identified Threats to Biodiversity in the Shire of Victoria Plains

Biodiversity is currently threatened by anthropogenic activities: habitats are being cleared, and species are going extinct. The statistic in Australia warrants for careful contemplation. As of December 2020, the *EPBC* Act listed 1,900 species and subspecies, including 93 that are extinct, and 87 threatened ecological communities (Dickman & Lindenmayer, 2021). However, these figures are likely an underestimation due to gaps in data, ongoing taxonomic revisions, and recent environmental impacts such as drought and bushfires. Furthermore, approximately 70% of living organisms in Australia remain undiscovered, unnamed, documented, and classified (Cresswell, Janke, & Johnston, 2021). Major threats to the Shire are listed below in Figure 5.1.

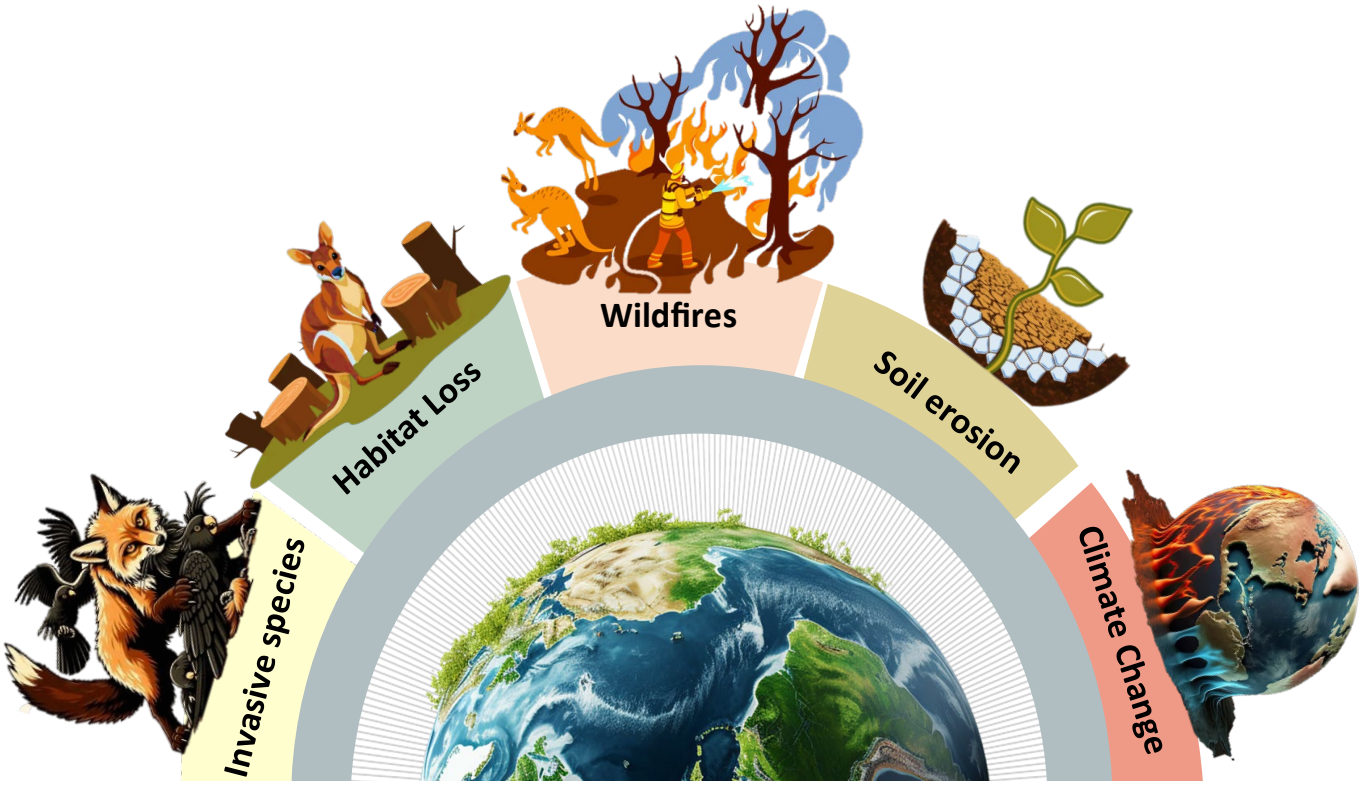


Figure 5.1: Major identified threats to biodiversity

5.1 Invasive species

Invasive species are the animals or plants that are not indigenous to the area, pose a significant threat to the biodiversity and proliferate in the environment after introduction in that region. Some notable examples of invasive species in the Shire of Victoria Plains are rabbits, foxes, cats, and pigs. The introduction of these

invasive species is done by anthropogenic activities either as a pet, for consumption purposes or sport. A study by Kearney *et al*. (2019) found that 82% of Australian threatened taxa was affected by invasive species in 2018. This highlights the adverse impact of invasive species around Australia.

Invasive species not only compete with the native flora and fauna for resources but also disrupts the ecosystem, leading to habitat alteration. Historical records of the Shire of Victoria Plains dating back to 1950 have documented the instances of disturbances caused by invasive species of weeds and rabbits. Feral cats, renowned for their highly efficient predatory behaviour, hunt native wildlife, contributing to the decline of biodiversity in the Shire. According to a report by Doherty *et al*. (2016), feral cats are solely responsible for killing a million Australian birds daily. Despite the Shire's renowned display of wildflowers, which adds to their natural beauty, rabbits pose a significant threat to the flora. The Shire believes that multiple unknown species have been struggling to survive under the influence of feral and invasive animals.

5.2 Habitat loss

In the Shire of Victoria Plains, habitat loss, deforestation and fragmentation have emerged as critical challenges impacting biodiversity conservation. The conversion of natural landscapes to agricultural and urban development has led to significant habitat loss (Neldner, 2018). Therefore, native species, including endemic flora and fauna, face heightened threats due to the shrinking availability of suitable habitats. Furthermore, deforestation practices have accelerated the decline of biodiversity by directly removing vital habitats and disrupting ecological processes. Fragmentation worsens these issues by creating isolated patches of habitat, which can lead to genetic isolation, reduced species mobility, and increased vulnerability to ecological disturbances (Gonçalves-Souza, Verburg, & Dobrovolski, 2020).

These combined factors have profound implications for biodiversity within the Shire of Victoria Plains, threatening the long-term survival of native species and compromising the resilience of local ecosystems. The consequences of habitat loss, fragmentation, and deforestation within the Region are spatially illustrated in the map depicting remnant vegetation, as presented in Figure 5.2.

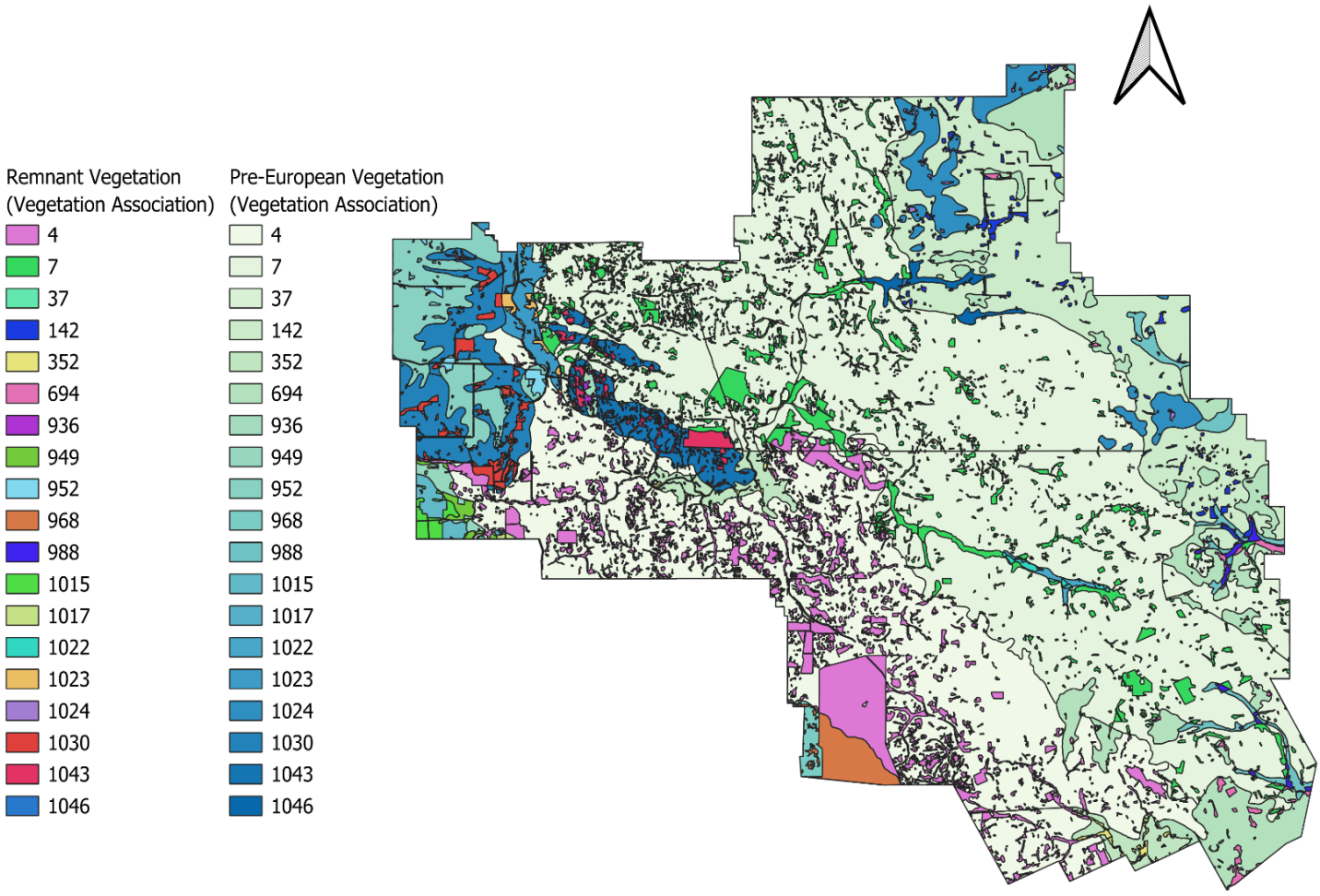


Figure 5.2: Pre-European and Current Extent of Vegetation Associations in the Shire of Victoria Plains (WALGA, 2020; DPIRD, 2023).

5.3 Wildfires

Wildfires present significant threats to biodiversity within the Shire of Victoria Plains. The rapid spread of flames can result in the destruction of vegetation, which is crucial habitat for numerous animal species. Consequently, the loss of these habitats can lead to displacement and endangerment of wildlife populations. Moreover, the reduction in vegetation diversity disrupts the delicate balance of biodiversity within the ecosystem, often resulting in the replacement of native species with opportunistic ones. This disruption extends to essential ecosystem processes like nutrient cycling and water filtration, contributing to soil erosion and degradation.

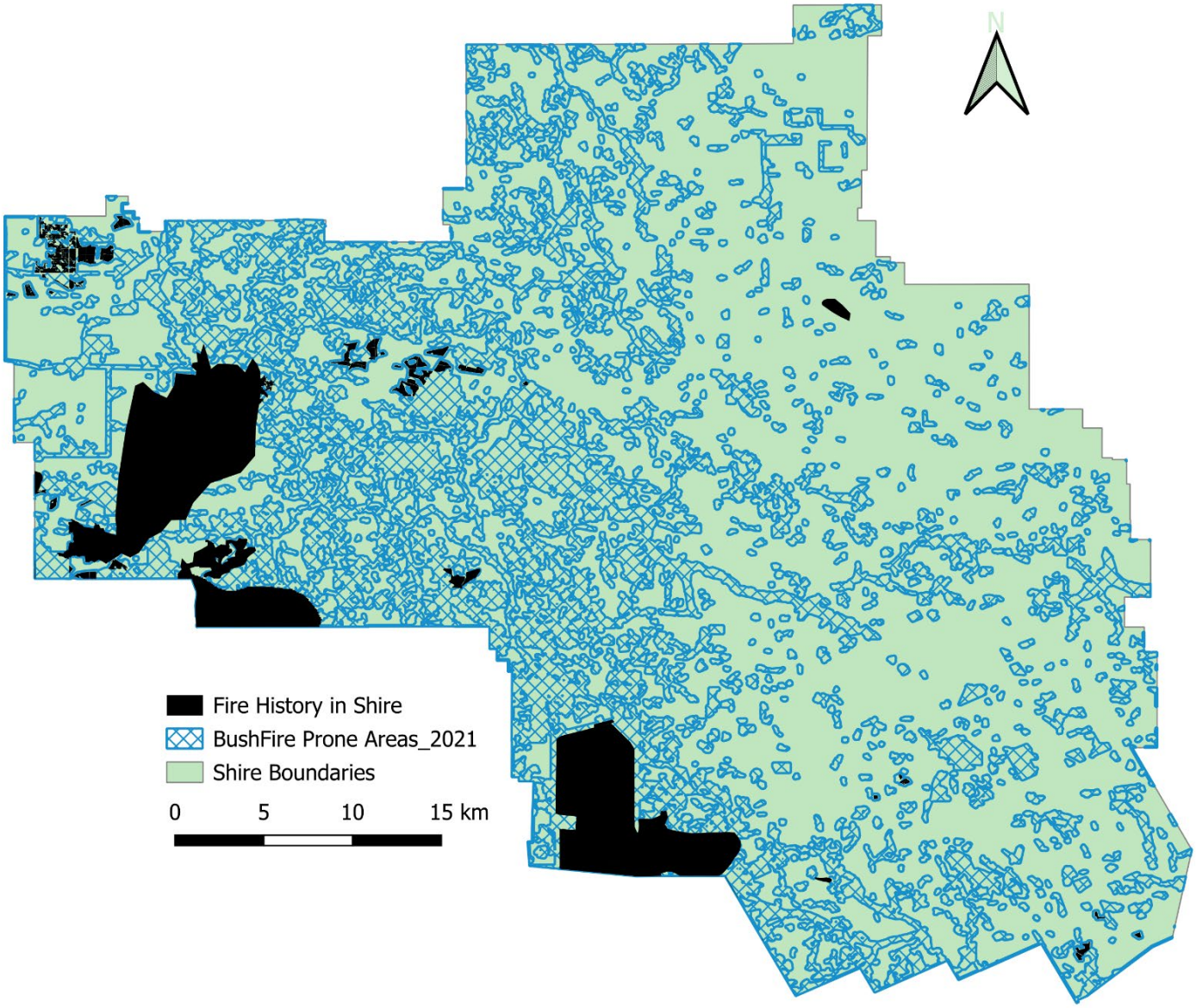


Figure 5.3: The map illustrates bushfire prone areas and fire history in the Shire (DFES, 2021)

The direct impact of wildfires on wildlife is profound, often causing injuries and fatalities as animals attempt to flee the flames. Furthermore, wildfires compel wildlife to alter their behaviour, affecting foraging patterns, migration routes, and breeding habitats. These changes can have long-term ramifications for population dynamics and biodiversity. Another significant threat to biodiversity arises from altered wildfire regimes. While wildfires play a crucial role in the proliferation of certain species, changes in fire patterns are pushing imperilled species closer to extinction. Many ecological communities are experiencing decline due to the

impact of inappropriate fire regimes and other threatening processes, which often exacerbate the effects of fire. Additionally, preexisting threats may further jeopardize the long-term availability of populations and species affected by fire.

5.4 Soil Erosion

The Shire of Victoria Plains, primarily characterized by agricultural lands, has experienced significant soil erosion, dating back to the 19th century as documented reports indicate instances of salination. Extensive deforestation in the region has accelerated soil degradation, threatening the integrity of local ecosystems. Soil erosion can stem from various factors, including excessive chemical use, overgrazing, topsoil removal due to flooding or drought. Disturbed soil often paves the way for the colonization of weedy plant species, further exacerbating the impact on terrestrial flora and fauna. Additionally, soil erosion detrimentally affects crucial bacterial species responsible for soil nitrification, which is essential for sustaining plant life.

5.5 Climate Change

In addition to the myriad threats already faced by biodiversity, climate change presents an unprecedented challenge, exacerbating existing pressures and imposing new ones on ecosystems in the Shire of Victoria Plains. The risk of climate change compounds the struggles of already vulnerable species, pushing them to the brink of extinction. Over the past few years, evident signs of climate change have manifested in the region, with minimal rainfall and increasingly intense winds becoming the new norm, as clearly apparent from Figure 5.4. These shifts are not only evident in anecdotal observations but also substantiated by data from weather radars, which reflect the changing climatic patterns across the Shire.

One notable impact of climate change is the observable decline in the abundance of wildflowers, a cherished feature of the Shire's landscape. These vibrant blooms, once plentiful, are now becoming scarce due to the prolonged dry spells and altered precipitation patterns brought about by climate change. As rainfall becomes more erratic and droughts more frequent, the ability of wildflowers to germinate, grow, and reproduce is compromised, leading to diminished populations and biodiversity.

Furthermore, the repercussions of climate change extend beyond flora to fauna, with iconic species like the black cockatoos feeling the brunt of these environmental shifts. These majestic birds, known for their striking

appearance and distinctive calls, rely on specific environmental conditions for breeding, foraging, and nesting. However, as climate change disrupts these conditions, their habitats become increasingly inhospitable. Prolonged droughts limit the availability of food sources, such as native seeds and fruits, leading to malnutrition and reproductive failure among black cockatoos. Additionally, extreme weather events, such as heatwaves and storms, pose direct threats to their survival, further exacerbating their population decline. The consequences of climate change are not confined to individual species but reverberate throughout the entire ecosystem, disrupting ecological processes and interactions.

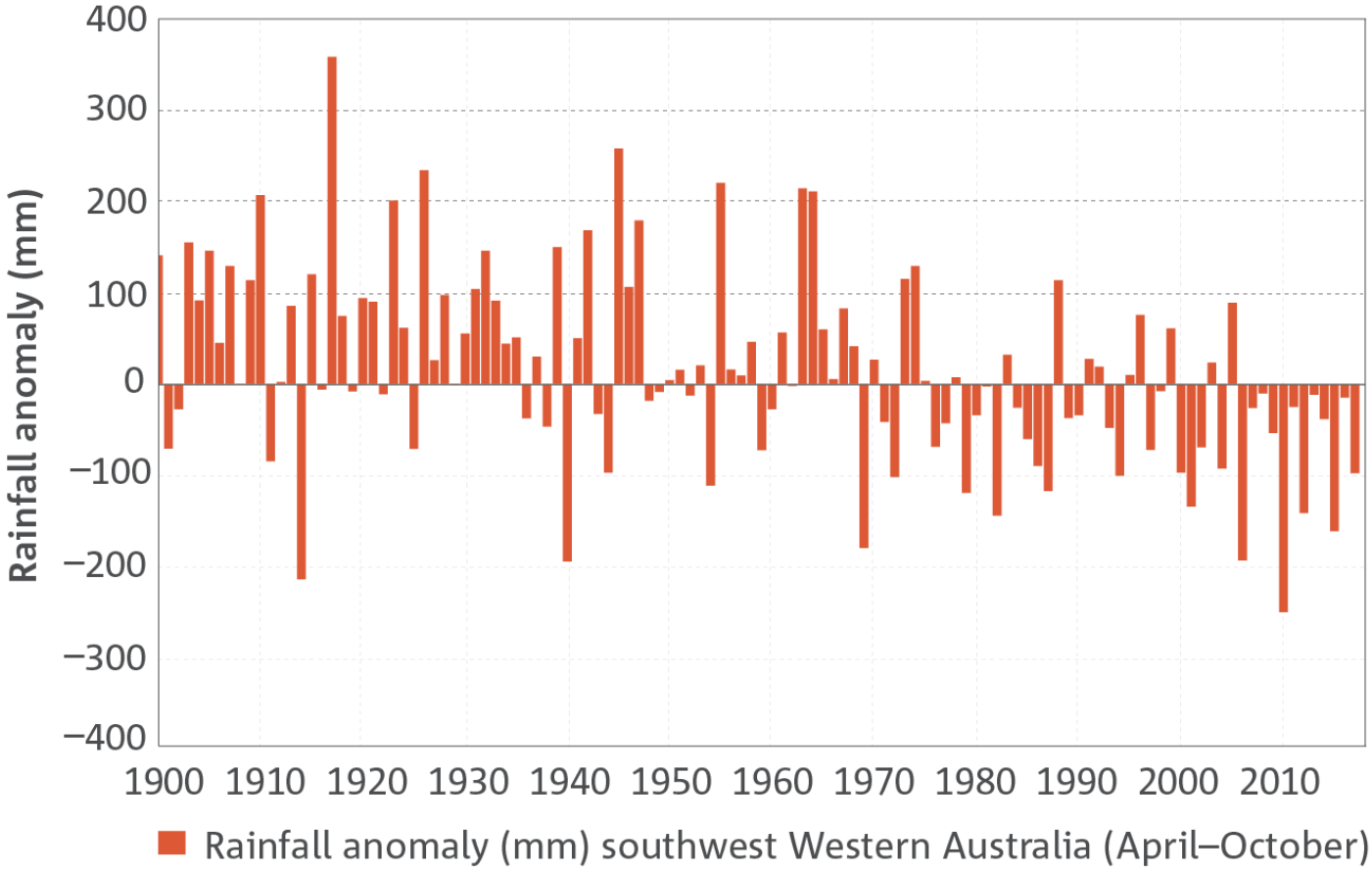


Figure 5.4: Anomalies of April to October rainfall for southwest Western Australia. Anomalies are calculated with respect to 1961 to 1990 averages (CSIRO, 2018).

6.0 A Snapshot of Past Events Impacting Biodiversity in the Shire of Victoria Plains

1887
- Liberal land laws by John Forrest - 100 acres of Crown land ownership

1893
- Homestead Act by John Forrest - 160 acres of Crown land as a gift

1894
- Bank loans for land clearance
- Technical aid from Bureau of Agriculture for land clearance

1950
- Devastation by invasive species
- Rabbit pest control by myxomatosis
- Degradation by salt enchroachment at peak
- Weed identification

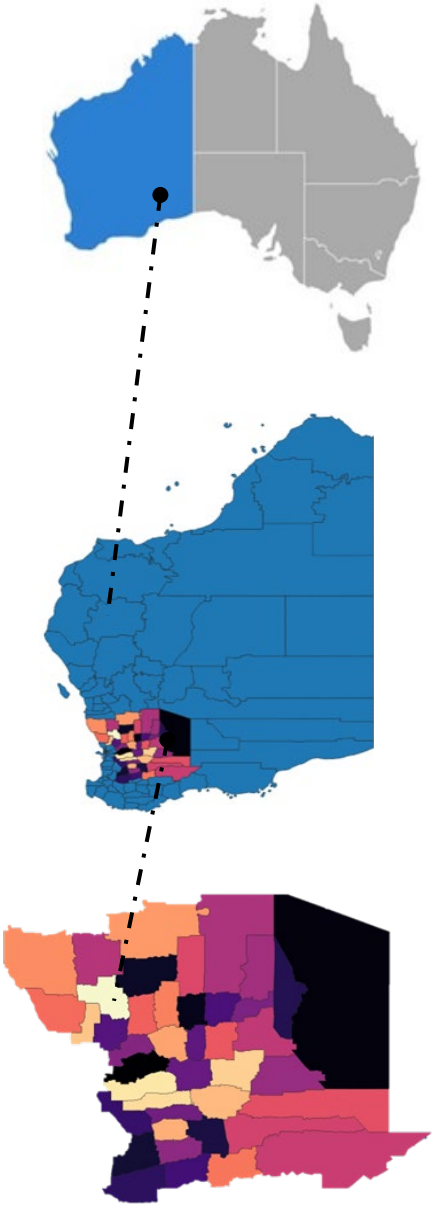
1955
- 2-4D herbicides used for cape tulip, star thistle and Paterson's curse

1960
- 1080 poison for rabbit and foxes killing non-target species

1962
- Roadside herbicide spray killing the vegetation in 20m patch of buffer zones

1964
- Edgar Lewis (MLA Moore) illustrated facts that land clearance increased by 44%, pasture area increased by 88%, wheat acreage increased by 50%, bushels increased by 90%, sheep population increased by 60% and cattle increased by 200%.

7.0 Legal and Strategic Frameworks for Biodiversity Conservation: National, State, Regional, and Local



7.1. National Legislations

- *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*
- *Nature Repair Act 2023*
- Australia's Strategy for Nature 2019-2030
- Threatened Species Action Plan 2022-2032
- Comprehensive, Adequate and Representative Reserve System for Forests in Australia

7.2. State Legislations

- *Biodiversity Conservation Act 2016*
- *Environmental Protection Act 1986*
- *Native Vegetation Policy for Western Australia*
- *Biosecurity and Agricultural Management Act 2007*
- *Aboriginal Heritage Act 1972*
- *Conservation and Land Management Act 1984*
- *Planning and Development Act 2005*

7.3 Shire Strategic and Regulatory Framework

- *Public Places and Local Government Property Local Law 2018*
- *Integrated Strategic Plan (2022) (Strategic Priority 3.2)*
- *Local Planning Scheme No. 5 (2012)*
- *Public Places and Local Government Property Local Law 2018*

Please Note:
Regulatory Framework for Native Vegetation Clearance
In Western Australia, it is illegal to clear native vegetation or collect native plants and animals without proper authorization. Landowners can find information regarding what actions are authorized under the *Environmental Protection Act (EP Act)* and the *Biodiversity Conservation Act (BC Act)* by visiting the Department of Water and Environmental Regulation's website or consulting local government resources.

8.0 A Snapshot of Conservation Approaches in the Shire

The Shire of Victoria Plains has a rich history of environmental conservation efforts, marked by various initiatives and milestones despite extensive deforestation for economic interests in the past. The conservation efforts began with Rica Erickson in the 1950s, with documentation of biodiversity of the region. Her publications were eye openers for the residents and piqued their interests in environmental issues. The timeline in Table 8.1 below includes the list of the efforts from past to most recent ones. The Shire was also declared as the most progressive one for conservation practices in the 1990s. Most recent initiatives include seed collecting and revegetation in 2023.

Table 8.1: Timeline Of Conservational Approaches in the Shire

Year	Conservation Approaches
1950s	Efforts of Rica Erikson to document biodiversity in the Shire.
1980	Unprecedented interest of community in environmental matters.
1983	Farmers took action to manage flooding and soil erosion.
1984	Volunteers and the Men of the Trees organisation planted 4000 trees.
1990	Shire and volunteers planted 10000 trees: 6000 in Bolgart and Calingiri, and 4000 in Yerecoin and Piawaning.
1990	Increased awareness that sustainability is impossible without Landcare.
1994	Land Conservation Officer was appointed.
1996	Rica Erickson was honoured with a reserve named after her.
1997	Yerecoin Revegetation Strategy focused on the Moore River East Branch.
1998	• The Shire of Victoria Plains was recognised as the most progressive Shire in conservation by the Land Management Committee. • Funding secured for the rehabilitation and protection of the Moore River. • Students from Russia, Sri Lanka, Albania, Bosnia, Ethiopia, and Japan gathered in Victoria Plains for revegetation. • Funding obtained to address rising groundwater and salinity in town boundaries. • Farm and catchment planning initiated for Calingiri. • New Norcia Land Conservation District Committee was formed.
1999	• Environmental awareness programs held for school children. • A thesis study titled "Hydrological Study of Moora, Gillingarra & Dandaragan Area" was conducted. • Salinity Management Strategy was prepared.

Year	Conservation Approaches
1999-2000	The Wyening Mission Property was selected by Greening Australia (WA) for establishing a native plant and seed orchard and a seed bank for native species.
2002	A River Restoration Workshop was organised by the Shire of Victoria Plains.
2003	• School children created seed balls for revegetation. • The Shire of Victoria Plains distributed free trees.
2005	A CD was created to guide tourists on a drive, explaining the unique natural features of the region.
2005-2008	The Catchment Demonstrative Initiative project secured $1 million in funding to support sustainable practices, including farm forestry, salt land grazing, and riparian fencing along the Moore River.
2011	Recovery and protection of threatened natural assets in the Moore River Catchment by the Moore Catchment Council.
2012	Improvement of habitat and connectivity in the farming landscape for birds within the Moore River Catchment.
2016	Protection of habitats for threatened flora and fauna in the Moore Catchment.
2017	Food plants for the endangered Carnaby's cockatoo were planted in Gillingarra.
2020	A Bioblitz was conducted at Carrah Farm.
2023	Seed collection of (Mortlock River mallee) *Eucalyptus sargentii* subsp. onesis (P3) • Stored under 5°C and less than 20% humidity • Seeding done in an area and fenced

9.0 Action Plan

9.1 Execution, Monitoring, and Assessment

Shire of Victoria Plains will implement this Plan between 2024 and 2035, aligning with the timeframe of the proposed Action Plan. The initiatives outlined within the Plan are instrumental in achieving Council's overarching goal of valuing and preserving Victoria Plains' distinctive and fragile biodiversity, aiming to prevent our species from fading into oblivion.

Each action outlined in the Plan will adhere to principles of manageability, significance, attainability, and financial viability, ensuring a targeted and conscientious approach to biodiversity conservation. A dedicated steering committee within the Shire will oversee the implementation process, conducting regular meetings

to execute actions, monitor progress and assess outcomes. Updates on the Strategy success and progress will be provided in Shire's Annual Report.

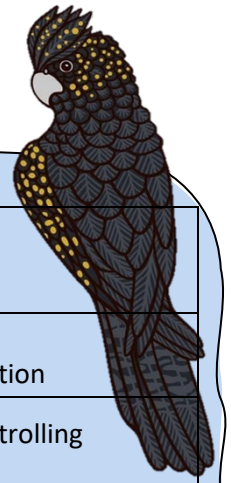
A comprehensive review of the Strategy will be conducted after five years to evaluate its effectiveness and address emerging threats. The Shire will be promptly informed about the possible changes to the Action Plan if required.

The Shire will implement the strategy via utilizing the existing resources, seeking out of grant fundings, and acquiring support from external stakeholders, including governmental and non-governmental agencies whose role and priorities are to manage biodiversity conservation and environmental health. Most of the actions in the Strategy can be completed by collaboration amongst the Shire and key stakeholders.

Our vision is to cultivate a healthy ecosystem for biodiversity in the Shire, fostering conditions where organisms can thrive and flourish. The goals outlined in the Local Biodiversity Strategy are designed to mitigate the impact of anthropogenic activities on native species while ensuring the economic viability of the Shire. These goals support biodiversity conservation efforts:

- fostering partnerships,
- enhancing protection measures, and
- building ecological infrastructure.

9.2 Protect



Tactical Approach	Actions	Timeframe	Success
Habitat restoration & enhancement	Actions 1.1 Protect current remnant vegetation	2 years	Economic growth without disturbing remnant vegetation
	Action 1.2 Respond to existing issue of invasive species (foxes, weeds, feral cats, and feral pigs)	On-going	Effective initiatives for controlling invasive species
Define clear guidelines for biodiversity protection	Action 1.3 Develop template to support considerations of implications to biodiversity when assessing planning proposals	1 year	Template developed and in use
	Action 1.4 Develop a standardized voluntary planning agreement (VPA) which outlines council's expectations regarding management of native vegetation and habitats for proponents in relation to preservation of or offsetting of impacts to biodiversity on private land or land managed by organisations	5 years	Standard VPA adopted by the council
Create protect areas	Action 1.5 Integrate Local Biodiversity Strategy objectives into the Shire's Local Planning Strategy (when reviewed).	3 years	Integration of Local Biodiversity Strategy objectives into the revised Local Planning Strategy, ensuring all planning decisions reflect biodiversity conservation goals.
	Action 1.6 Installing signage at biodiversity sensitive site or hotspots to alert people so they can be careful	3 years	Quantifiable improvements in biodiversity indicators over time

9.3 Collaborate

Tactical Approach	Actions	Timeframe	Success
Partnerships	Actions 2.1 Collaborate with traditional owners to foster deeper connection to indigenous cultural heritage and biodiversity	On-going	At least two initiatives signed each year with the Yued Aboriginal Ranger Program.
	Action 2.2 Provide support to industry and private landowners to implement landscape-scale invasive species control and habitat connectivity	4 years	Develop opportunities for integration land management practices and cultural practices for biodiversity.
	Action 2.3 Investigate the option to partner with the authorities, universities, traditional owners, and neighbouring councils to restore priority biodiversity assets and reduce biodiversity threat.	5 years	Partnerships established, and the documented reduction of biodiversity threats.
Providence of biodiversity information to firefighters	Action 2.4 *Knowledge of vulnerable species *Maps of species *Fire suppression for endangered Fauna	On-going	Maps of vulnerable species and understanding of their habitat.
Collaborations with public for conserving biodiversity	Action 2.5 Support existing and emerging groups and other conservation groups that value and protect our biodiversity to strengthen stewardship for the environment	On-going	Expansion of collaborative partnerships leveraging resources and expertise effectively.
	Action 2.6 Promote environmental education and community activities that foster responsible behaviour and positive attitudes towards biodiversity conservation.	3 years	Assess changes in knowledge, attitudes, and behaviours towards biodiversity conservation through surveys conducted before and after educational initiatives.

9.4 Build Ecological Infrastructure

Tactical Approach	Actions	Timeframe	Success
Initiating stewardship approach	Actions 3.1 Develop a baseline of existing environmental assets in Victoria Plains through an assets and connection study	3 years	Study is completed.
	Action 3.2 Foster effective communication among stakeholders for biodiversity improvement.	2 years	Effective communication developed.
	Action 3.3 Develop detailed maps and brochures highlighting flora-rich roads and strategically build parking spots (P-stops) around biodiversity hotspots to enhance eco-tourism.	3 years	Completed maps and brochures. Minimum 5 parking spots built for seeing wildflowers.
	Action 3.4 Develop a GIS database to record and map areas significant for biodiversity i.e. wildlife corridors, known habitat of threatened species, and other important biodiversity features.	On-going	Shire Wise mapping layer incorporated in decision making and readily used for conservation efforts.
Plans to reduce impacts of climate change on biodiversity	Action 3.5 Support monitoring and research to assess the impacts of climate change on biodiversity	3 years	Research studies or monitoring done to calculate the impact of climate change on local biodiversity.
	Action 3.6 Develop a map which will provide guidance on where in the Shire the biodiverse carbon planting will be supported.	2 years	Map developed and in use.
Collaborations with public for conserving biodiversity	Action 3.7 Implement targeted restoration within council reserves to enhance connectivity and habitat areas.	4 years	Improved biodiversity in council.
	Action 3.8 Identify and designate suitable offset sites within the Shire, collaborating with businesses to jointly mitigate their carbon emissions while simultaneously enhancing local biodiversity	On-going	Biodiversity off-set site map developed, adopted for use and informed to the stakeholders.

References

CSIRO. (2018). *State of the Climate 2018: Anomalies of April to October rainfall for southwestern and southeastern Australia*. Retrieved from https://www.csiro.au/en/research/environmental-impacts/climate-change/State-of-the-Climate/Previous/State-of-the-Climate-2018/Australias-changing-climate

Dickman, C. R., & Lindenmayer, D. B. (2021). Australia's natural environment: A warning for the world. In *Sustainability and the new economics: Synthesising ecological economics and modern monetary theory* (pp. 33-49). Cham: Springer International Publishing. https://d1wqtxts1xzle7.cloudfront.net/104648407/Dickman_Lindenmayer_2022_Australia_s_environment-libre.pdf

DFES. (2021). *Bush fire prone areas 2021 (OBRM-019)*. Office of Bushfire Risk Management. https://catalogue.data.wa.gov.au/dataset/bush-fire-prone-areas-2021-obrm-019

Cresswell, I. D., Janke, T., & Johnston, E. L. (2021). *Australia state of the environment 2021: Overview*. Independent report to the Australian Government Minister for the Environment, Commonwealth of Australia. https://doi.org/10.26194/f1rh-7r05

Landgate. (2024). *Reserves*. WA Government Open Data. https://catalogue.data.wa.gov.au/dataset/reserves

Department of Climate Change, Energy, the Environment and Water. (2012). *Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Regions) - 2012*. Australian Government. https://fed.dcceew.gov.au/datasets/a5a9a356105b4a728d0606194d8bdf38_0/explore

WALGA. (2020). *2020 vegetation extent by statewide pre-European vegetation mapping*. Data WA. https://catalogue.data.wa.gov.au/dataset/2020-vegetation-extent-by-statewide-pre-european-vegetation-mapping

DPIRD. (2023). *Native vegetation extent*. DPIRD Geographic Information Services. https://catalogue.data.wa.gov.au/dataset/native-vegetation-extent

WALGA. (2020). *2020 vegetation extent by vegetation complexes*. WALGA. Retrieved from https://catalogue.data.wa.gov.au/dataset/2020-vegetation-extent-by-statewide-pre-european-vegetation-mapping

Kearney, S. R., Van Etten, E. J., Tingley, R., & Beeton, N. J. (2019). The threats to Australia's imperilled species and implications for a national conservation response. *Pacific Conservation Biology*, *25*(3), 175-189. https://doi.org/10.1071/PC18024

Del Marco, A., Taylor, R., Clarke, K. Savage, K. Cullity, J. and Miles, C. (2004). Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region. Western Australian Local Government Association, West Perth.

Davis, R.A. and Brooker, L. (2008). Ecological Linkages and Urban Fauna at Risk on the Swan Coastal Plain, Perth, Western Australia. Final Report. Unpublished report prepared for the Swan Catchment Council.

Molloy, S., Wood, J., Hall, S., Wallrodt, S. and Whisson, G. (2009). Southwest Regional Ecological Linkages Technical Report, Western Australian Local Government Association and Department of Environment and Conservation, Perth.

WALGA (2015). Shire of Northam Local Biodiversity Strategy February 2015. Available from: https://www.northam.wa.gov.au/Assets/Documents/Content/our-council/Local_Biodiversity_Strategy.pdf

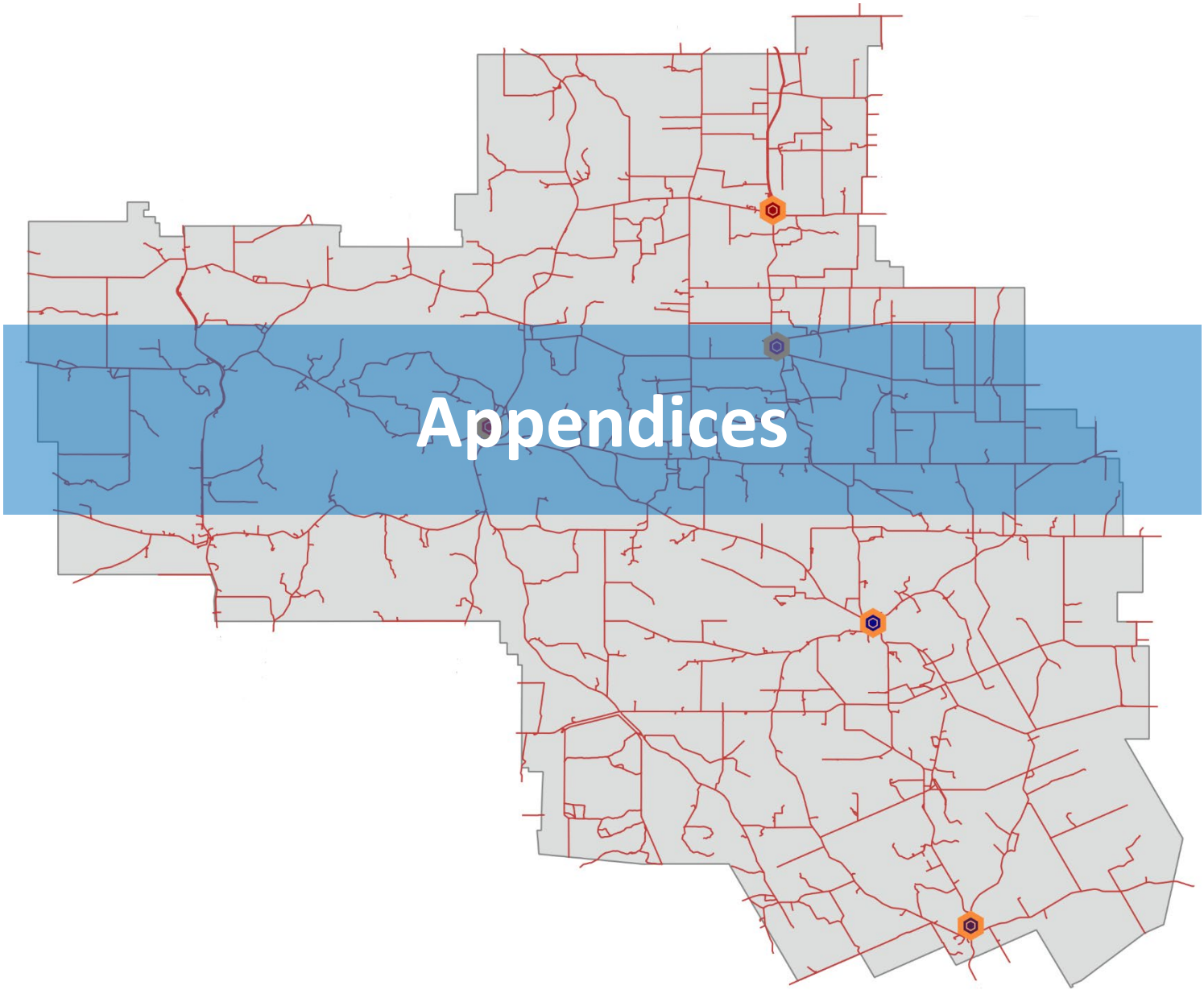
McKinney, M. (2002) "Urbanisation, Biodiversity, and Conservation" Bioscience, Vol. 52, No. 10, pp883-890

Shire of Chittering (2010) Shire of Chittering Local Biodiversity Strategy. Available from: https://www.chittering.wa.gov.au/documents/17/local-biodiversity-strategy

Doherty, T. S., Glen, A. S., Nimmo, D. G., Ritchie, E. G., & Dickman, C. R. (2016). Invasive predators and global biodiversity loss. *Proceedings of the National Academy of Sciences*, 113(40), 11261-11265. https://doi.org/10.1073/pnas.1601008113

Neldner, J. (2018). The Impacts of Land Use Change on Biodiversity in Australia. In: R. Thackway, ed., *Land Use in Australia: Past, Present and Future*. Canberra, Australia: The Australian National University, pp.115–125.

Gonçalves-Souza, D., Verburg, P. H., & Dobrovolski, R. (2020). Habitat loss, extinction predictability, and conservation efforts in the terrestrial ecoregions. *Biological Conservation*, 248, 108579. https://doi.org/10.1016/j.biocon.2020.108579



Appendices

Appendix A

Table A1: Vegetative Complexes and Vegetative Associations in Reserves of the Shire of Victoria Plains

Reserve Number	Reserve Class	Reserve-Area	Vegetative-Complex	System	Vegetative Association
134	C	3.9052	Michibin - Mi	MOGUMBER	4
249	C	5.6656		WALEBING	7
402	C	22.393	Yalanbee - Y6, Coolakin-Ck	MOGUMBER	4
2332	C	101.6856	Cullula Complex	MOGUMBER	4
2332	C	404.6856		MOGUMBER	952
2332	C	404.6856		KOOJAN	1030
2332	C	404.6856		MOGUMBER	4
2391	C	37.5978		BANNISTER	4
2391	C	37.5978	Coolakin - Ck	MOGUMBER	4
2394	C	40.4686		GOOMALLING	694
3345	A	258.9735	Cullula Complex	MOGUMBER	4
3345	A	258.9735	Moore River	KOOJAN	1030
6779	A	40.477		MOGUMBER	4
7615	A	52.6474	Coolakin - Ck, Michibin-Mi	MOGUMBER	4
8588	C	55.4	Michibin - Mi-Nooning-No	MOGUMBER	4
9822	C	6.5324	Coolakin - Ck	YORK	352
9826	C	1.3223		YORK	352
9827	C	1.9645		GOOMALLING	694
12036	C	0.4047		MOGUMBER	7
16631	C	0.1012		WALEBING	1022
16738	C	2.1625		WALEBING	7
17138	C	2.0234		WALEBING	7
17655	C	247.9784		WALEBING	7
17766	C	0.1012		WALEBING	1022

Reserve Number	Reserve Class	Reserve-Area	Vegetative-Complex	System	Vegetative Association
17955	C	2.8833		YORK	352
18183	C	0.2023		VICTORIA PLAINS	142
18203	C	12.3202		VICTORIA PLAINS	142
18204	C	0.1659		VICTORIA PLAINS	142
18205	C	2.0734		VICTORIA PLAINS	142
18984	C	0.1012		YORK	352
19716	C	2.2428		WALEBING	1022
19716	C	2.2428		WALEBING	7
19948	C	0.2001		YORK	352
20121	C	11.5595		WALEBING	1022
20277	C	2.1442		WALEBING	7
20320	C	0.2023		WALEBING	1022
20320	C	0.2023		WALEBING	7
20543	C	1.2141		VICTORIA PLAINS	142
20707	C	0.7993		YORK	352
20738	A	126.8968		MOGUMBER	1023
20738	A	126.8968		KOOJAN	1030
20991	C	16.1874		WALEBING	7
21260	C	0.4047		WALEBING	7
21472	C	0.1012		WALEBING	1022
21867	C	0.1012		YORK	352
22222	C	0.9477		WALEBING	1022
23201	A	80.8438		WALEBING	7
23584	C	0.0989		VICTORIA PLAINS	142
24590	C	32.3749		MOGUMBER	4
24894	C	0.5768		WALEBING	7

Reserve Number	Reserve Class	Reserve-Area	Vegetative-Complex	System	Vegetative Association
25236	C	0.2137		WALEBING	7
25259	C	8.3669		KOOJAN	1030
25332	C	1.2014		YORK	352
26211	C	5.7288		WALEBING	7
26577	C	52.9387		WALEBING	7
26685	C	2.6203		VICTORIA PLAINS	142
26841	C	53.0138	Michibin - Mi	MOGUMBER	4
27527	C	0.2162		YORK	352
27595	A	124.4333	Coolakin - Ck, Yalanbee-Y6	MOGUMBER	4
27905	C	2.891		VICTORIA PLAINS	142
28299	C	0.1022		MOGUMBER	4
28378	C	0.2001		VICTORIA PLAINS	142
29100	C	1105.972	Coolakin - Ck, Pindalup-Pn	CHITTERING	968
29100	C	1105.972	Yalanbee - Y6,Yalanbee - Y5	MOGUMBER	4
30522	C	1.5834		KOOJAN	1030
30593	C	0.2499		YORK	352
31411	C	6.6192		WALEBING	7
31991	C	3.5576		VICTORIA PLAINS	694
31991	C	3.5576		VICTORIA PLAINS	142
31992	C	0.1647		WALEBING	7
34141	C	3.9543		WALEBING	7
34663	C	0.6971		WALEBING	7
35120	C	0.1012		YORK	352
36193	C	0.4607		WALEBING	7
36639	C	0.18		WALEBING	7
37081	C	2.6013		YORK	352

Reserve Number	Reserve Class	Reserve-Area	Vegetative-Complex	System	Vegetative Association
37477	C	0.44		MOGUMBER	4
37643	C	0.007		YORK	352
37801	C	0.6		WALEBING	7
38121	C	2.0234		YORK	352
38404	C	0.6036		VICTORIA PLAINS	142
38989	C	0.1214		WALEBING	7
39103	C	10.2838		YORK	352
39255	C	0.1012		YORK	352
39322	C	74.9267		WALEBING	7
40036	C	0.0616		YORK	352
40297	C	6.0804		MOGUMBER	1023
40608	C	6.025		VICTORIA PLAINS	142
41042	C	99.4339		VICTORIA PLAINS	142
41573	A	25.3637	Coolakin - Ck,Yalanbee - Y6	MOGUMBER	4
41841	C	0.2116		WALEBING	7
42324	C	0.7797		YORK	352
43769	C	2.2403		WALEBING	7
43906	C	0.9235		WALEBING	7
44054	C	0.2024		YORK	352
44315	C	0.8864		WALEBING	1022
44315	C	0.8864		WALEBING	7
44779	C	0.0094		WALEBING	7
45774	C	7.2831	Michibin - Mi	MOGUMBER	352
45774	C	7.2831		MOGUMBER	4
46238	C	0.4561		WALEBING	7

Reserve Number	Reserve Class	Reserve-Area	Vegetative-Complex	System	Vegetative Association
47082	C	1.8997		WALEBING	1022
47392	C	0.3025		MOGUMBER	7
47876	C	2.5716		YORK	352
48706	C	0.1853		WALEBING	7
48709	C	1.4408		WALEBING	7
49118	C	2.5799		YORK	352
50176	C	14.016		MOGUMBER	4
50200	C	0.1012		YORK	352
50201	C	0.1012		YORK	352
50841	C	89.7234		VICTORIA PLAINS	694
50841	C	89.7234		VICTORIA PLAINS	142

Appendix B: Vegetation Complexes, Systems, and Vegetation Associations

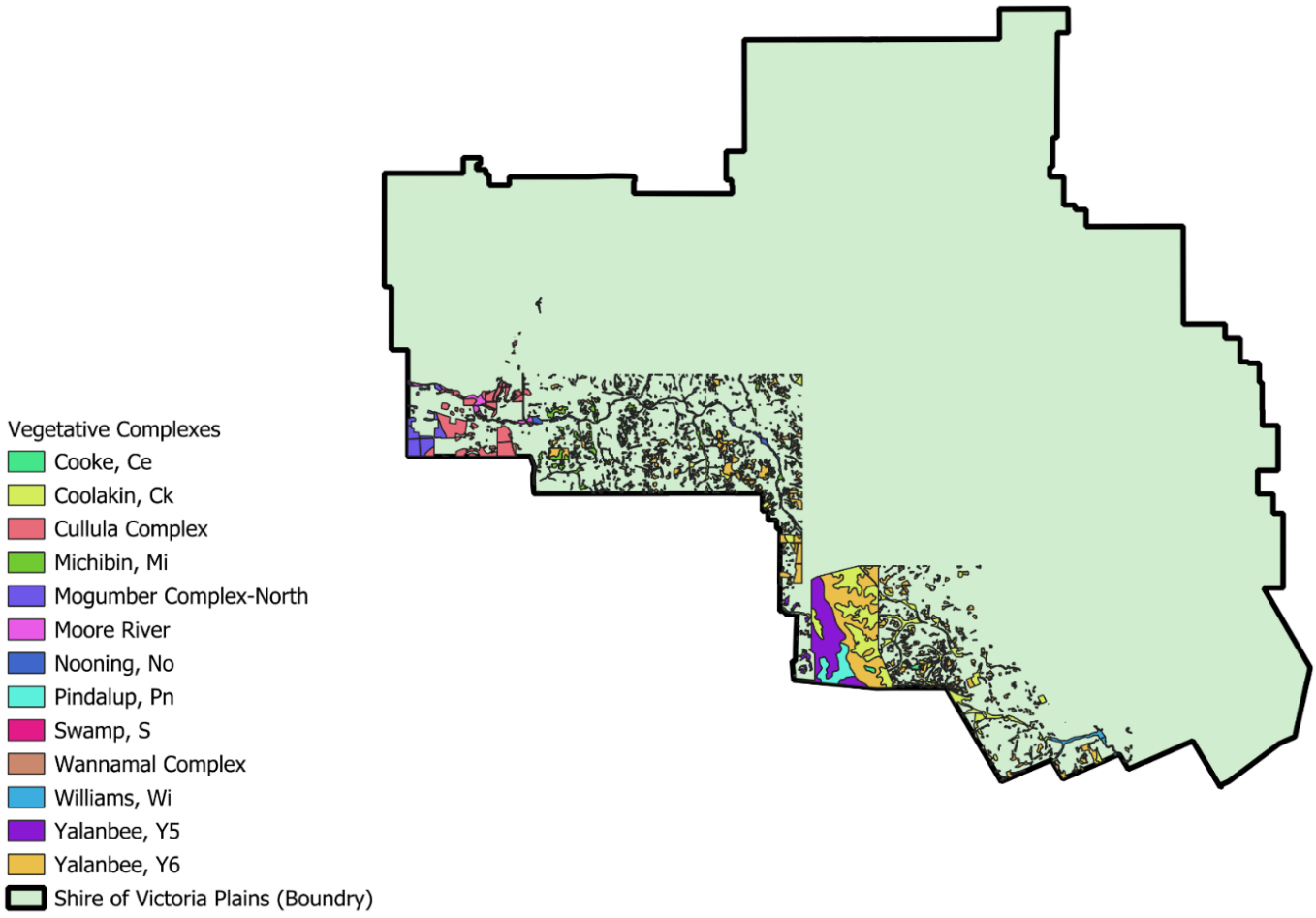


Figure B1: ***Vegetative Complexes in the Shire of Victoria Plains (WALGA, 2020)***

Table B1: Summary of Systems and Vegetation associations in each bioregion in the Shire of Victoria Plains

Bioregion	System	Vegetation Association	Flora Description	Structure Description	Pre-European Extent in the Shire of Victoria Plains (ha)	Current Extent in the Shire of Victoria Plains (ha)	% of Vegetation Associations Remaining
Avon Wheatbelt	Victoria Plains	142	Wheatbelt; York gum, salmon gum etc. Eucalyptus loxophleba, E. salmonophloia. Goldfields; gimlet, redwood etc. E. salubris, E. oleosa. Riverine; rivergum E. camaldulensis. Tropical; messmate, woolyb	Woodland other	24978.288	1281	5.13
Avon Wheatbelt	Walebing	1024	Wattle, casuarina and teatree acacia-allocasuarina-melaleuca alliance.	Thicket	70.645	3	4.25
Avon Wheatbelt	Victoria Plains	7	Wheatbelt; York gum, salmon gum etc. Eucalyptus loxophleba, E. salmonophloia. Goldfields; gimlet, redwood etc. E. salubris, E. oleosa. Riverine; rivergum E. camaldulensis. Tropical;	Woodland other	3015.733	235	7.79

Bioregion	System	Vegetation Association	Flora Description	Structure Description	Pre-European Extent in the Shire of Victoria Plains (ha)	Current Extent in the Shire of Victoria Plains (ha)	% of Vegetation Associations Remaining
			messmate, woolyb				
Avon Wheatbelt	Victoria Plains	1046	York gum, mulga, melaleuca or casuarina Tecticornia spp., Eucalyptus loxophleba, Acacia aneura, Melaleuca spp., Allocasuarina spp.	Samphire with scattered medium or low trees	861.782	45	5.22
Avon Wheatbelt	Victoria Plains	1024	Wattle, casuarina and teatree acacia-allocasuarina-melaleuca alliance.	Thicket	4907.561	208	4.24
Avon Wheatbelt	Victoria Plains	988	Tecticornia spp. with Melaleuca spp. Acacia spp	Samphire with thicket/scrub	1539.154	237	15.39
Avon Wheatbelt	Victoria Plains	142	Wheatbelt; York gum, salmon gum etc. Eucalyptus loxophleba, E. salmonophloia. Goldfields; gimlet, redwood etc. E. salubris, E. oleosa. Riverine; rivergum E. camaldulensis.	Woodland other	396.584	72	18.15

Bioregion	System	Vegetation Association	Flora Description	Structure Description	Pre-European Extent in the Shire of Victoria Plains (ha)	Current Extent in the Shire of Victoria Plains (ha)	% of Vegetation Associations Remaining
			Tropical; messmate, woolyb				
Avon Wheatbelt	Victoria Plains	694	Mixed heath with scattered tall shrubs Acacia spp., PROTEACEAE and MYRTACEAE.	Scrub-heath	6725.966	374	5.56
Avon Wheatbelt	Walebing	1022	York gum, mulga, melaleuca or casuarina Tecticornia spp., Eucalyptus loxophleba, Acacia aneura, Melaleuca spp., Allocasuarina spp.	Samphire with scattered medium or low trees	456.207	177	38.79
Avon Wheatbelt	Walebing	988	Tecticornia spp. with Melaleuca spp. Acacia spp	Samphire with thicket/scrub	887.828	144	16.22
Avon Wheatbelt, Jarrah Forest	Bannister	4	Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo.	Woodland southwest	4008.562	704	17.56
Avon Wheatbelt,	Goomalling	694	Mixed heath with scattered tall shrubs Acacia spp.,	Scrub-heath	4464.123	392	8.78

Bioregion	System	Vegetation Association	Flora Description	Structure Description	Pre-European Extent in the Shire of Victoria Plains (ha)	Current Extent in the Shire of Victoria Plains (ha)	% of Vegetation Associations Remaining
Jarrah Forest			PROTEACEAE and MYRTACEAE.				
Avon Wheatbelt, Jarrah Forest	Mogumber	7	Wheatbelt; York gum, salmon gum etc. Eucalyptus loxophleba, E. salmonophloia. Goldfields; gimlet, redwood etc. E. salubris, E. oleosa. Riverine; rivergum E. camaldulensis. Tropical; messmate, woolyb	Woodland other	13010.033	2423	18.62
Avon Wheatbelt, Jarrah Forest	Mogumber	352	Wheatbelt; York gum, salmon gum etc. Eucalyptus loxophleba, E. salmonophloia. Goldfields; gimlet, redwood etc. E. salubris, E. oleosa. Riverine; rivergum E. camaldulensis. Tropical; messmate, woolyb	Woodland other	1904.041	190	9.98
Avon Wheatbelt,	Walebing	694	Mixed heath with scattered tall shrubs Acacia spp.,	Scrub-heath	2024.194	76	3.75

Bioregion	System	Vegetation Association	Flora Description	Structure Description	Pre-European Extent in the Shire of Victoria Plains (ha)	Current Extent in the Shire of Victoria Plains (ha)	% of Vegetation Associations Remaining
Jarrah Forest			PROTEACEAE and MYRTACEAE.				
Avon Wheatbelt, Jarrah Forest	Walebing	7	Wheatbelt; York gum, salmon gum etc. Eucalyptus loxophleba, E. salmonophloia. Goldfields; gimlet, redwood etc. E. salubris, E. oleosa. Riverine; rivergum E. camaldulensis. Tropical; messmate, woolyb	Woodland other	95319.469	10192	10.69
Avon Wheatbelt, Jarrah Forest	Walebing	4	Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo.	Woodland southwest	722.737	358	49.53
Avon Wheatbelt, Jarrah Forest	York	352	Wheatbelt; York gum, salmon gum etc. Eucalyptus loxophleba, E. salmonophloia. Goldfields; gimlet, redwood etc. E. salubris, E. oleosa. Riverine; rivergum E. camaldulensis.	Woodland other	1676.421	256	15.27

Bioregion	System	Vegetation Association	Flora Description	Structure Description	Pre-European Extent in the Shire of Victoria Plains (ha)	Current Extent in the Shire of Victoria Plains (ha)	% of Vegetation Associations Remaining
			Tropical; messmate, woolyb				
Avon Wheatbelt, Jarrah Forest, Swan Coastal Plain	Mogumber	4	Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo.	Woodland southwest	59305.692	13529	22.81
Jarrah Forest	Chittering	968	Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo.	Woodland southwest	2514.056	1874	74.54
Jarrah Forest	Koojan	1030	Other acacia, banksia, peppermint, cypress pine, casuarina, York gum Acacia spp., Banksia spp., Agonis flexuosa, Callitris spp., Allocasuarina spp., Eucalyptus loxophleba.	Low woodland or open low woodland	5827.68	1243	21.33
Jarrah Forest	Mogumber	1043	Low shrubs of mixed composition.	Heath	5095.146	421	8.26

Bioregion	System	Vegetation Association	Flora Description	Structure Description	Pre-European Extent in the Shire of Victoria Plains (ha)	Current Extent in the Shire of Victoria Plains (ha)	% of Vegetation Associations Remaining
Jarrah Forest	Mogumber	952	Low shrubs of mixed composition.	Heath	414.887	221	53.27
Jarrah Forest	Mogumber	37	Wattle, casuarina and teatree acacia-allocasuarina-melaleuca alliance.	Thicket	18.919	9	47.57
Jarrah Forest, Swan Coastal Plain	Gingin	4	Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo.	Woodland southwest	57.343	42	73.24
Jarrah Forest, Swan Coastal Plain	Gingin	1017	Jarrah, banksia or casuarina Eucalyptus marginata, Banksia spp., Allocasuarina spp.	Low forest, woodland or low woodland with scattered trees	70.565	48	68.02
Jarrah Forest, Swan Coastal Plain	Koojan	952	Low shrubs of mixed composition.	Heath	6776.383	364	5.37
Jarrah Forest, Swan Coastal Plain	Gingin	949	Other acacia, banksia, peppermint, cypress pine, casuarina, York	Low woodland or open low woodland	925.226	387	41.83

Bioregion	System	Vegetation Association	Flora Description	Structure Description	Pre-European Extent in the Shire of Victoria Plains (ha)	Current Extent in the Shire of Victoria Plains (ha)	% of Vegetation Associations Remaining
			gum Acacia spp., Banksia spp., Agonis flexuosa, Callitris spp., Allocasuarina spp., Eucalyptus loxophleba.				
Jarrah Forest, Swan Coastal Plain	Mogumber	1023	Wheatbelt; York gum, salmon gum etc. Eucalyptus loxophleba, E. salmonophloia. Goldfields; gimlet, redwood etc. E. salubris, E. oleosa. Riverine; rivergum E. camaldulensis. Tropical; messmate, woolyb	Woodland other	2371.751	430	18.13
Jarrah Forest, Swan Coastal Plains	Mogumber	936	Wheatbelt; York gum, salmon gum etc. Eucalyptus loxophleba, E. salmonophloia. Goldfields; gimlet, redwood etc. E. salubris, E. oleosa. Riverine; rivergum E. camaldulensis. Tropical;	Woodland other	306.563	102	33.27

Bioregion	System	Vegetation Association	Flora Description	Structure Description	Pre-European Extent in the Shire of Victoria Plains (ha)	Current Extent in the Shire of Victoria Plains (ha)	% of Vegetation Associations Remaining
			messmate, woolyb				
Swan Coastal Plain	Gingin	1015		Scrub-heath / Heath	1230.32	504	40.96
Swan Coastal Plain	Gingin	1030	Other acacia, banksia, peppermint, cypress pine, casuarina, York gum Acacia spp., Banksia spp., Agonis flexuosa, Callitris spp., Allocasuarina spp., Eucalyptus loxophleba.	Low woodland or open low woodland	2565.28	250	9.74

Appendix C: Fragmentation Map

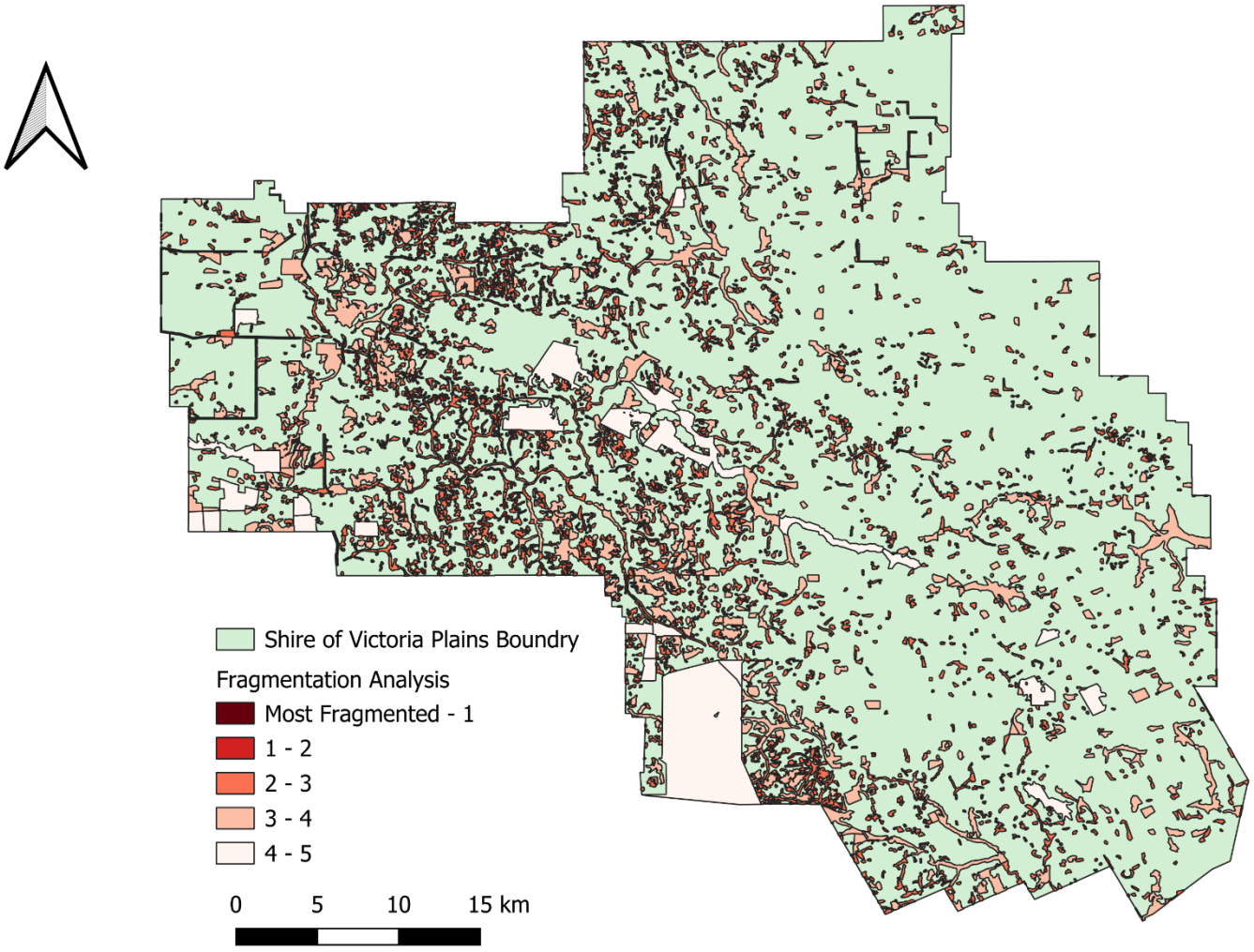


Figure C1: Fragmentation Analysis in the Shire of Victoria Plains

Appendix D: Threatened Biodiversity

Table D1: Threatened and priority-listed flora within the Shire of Victoria Plains

Scientific Name	Status	Scientific Name	Status
Acacia alata var. *platyptera*	4	*Eucalyptus sargentii* subsp. *onesis*	3
Acacia anarthros	3	*Eucalyptus subangusta* subsp. *virescens*	3
Acacia browniana var. *glaucescens*	2	*Eucalyptus x carnabyi*	4
Acacia chapmanii subsp. *australis*	T	*Frankenia bracteata*	1
Acacia cummingiana	3	*Gastrolobium rotundifolium*	3
Acacia drummondii subsp. *affinis*	3	*Glyceria drummondii*	T
Acacia dura	2	*Goodenia arthrotricha*	T
Acacia oncinophylla subsp. *oncinophylla*	3	*Grevillea bracteosa* subsp. *bracteosa*	T
Acacia pulchella var. *reflexa acuminata* bracteole variant	3	*Grevillea drummondii*	4
Acacia ridleyana	3	*Grevillea florida*	3
Acacia sp. New Norcia	1	*Grevillea gillingarra*	T
Allocasuarina grevilleoides	3	*Guichenotia impudica*	3
Anigozanthos humilis subsp. *chrysanthus*	4	*Guichenotia tuberculata*	3
Asterolasia grandiflora	4	*Gyrostemon* sp. Bolgart	1
Babingtonia triandra	2	*Hakea chromatropa*	1
Baeckea sp. Youndegin Hill	1	*Hibbertia elegans*	1
Banksia chamaephyton	4	*Hibbertia leptopus*	2
Banksia dallanneyi subsp. *pollosta*	3	*Hibbertia miniata*	4
Banksia fuscobractea	T	*Hibbertia propinqua*	4
Banksia kippistiana var. *paenepeccata*	3	*Hydrocotyle lemnoides*	4
Banksia mimica	T	*Hibbertia subvillosa*	3
Banksia pteridifolia subsp. *vernalis*	3	*Banksia serratuloides* subsp. *serratuloides*	T
Lasiopetalum rotundifolium	T	*Isopogon autumnalis*	3
Beaufort eriocephala	3	*Lasiopetalum cenobium*	1

Scientific Name	Status	Scientific Name	Status
Caladenia multiplex	2	*Tricostularia* sp. Mogumber	2
Caladenia speciosa	4	*Lechenaultia magnifica*	1
Calothamnus accedens	4	*Synaphea panhesya*	1
Calothamnus brevifolius	4	*Lepidobolus densus*	4
Calothamnus pachystachyus	4	*Lepidosperma* sp. Meckering	3
Calytrix calingiri	3	*Lepyrodia curvescens*	2
Chamaescilla gibsonii	3	*Verticordia rutilastra*	3
Conospermum densiflorum subsp. *unicephalatum*	T	*Melaleuca sciotostyla*	T
Conospermum scaposum	3	*Melaleuca sclerophylla*	3
Conostylis caricina subsp. *elachys*	1	*Persoonia rudis*	3
Cyanicula ixioides subsp. *ixioides*	4	*Persoonia sulcata*	4
Darwinia carnea	T	*Petrophile biternata*	3
Darwinia thymoides subsp. *St Ronans*	4	*Petrophile clavata*	2
Daviesia localis	1	*Petrophile plumosa*	3
Desmocladus biformis	3	*Platysace ramosissima*	3
Dielsiodoxa leucantha subsp. *leucantha*	3	*Regelia megacephala*	4
Diuris recurva	4	*Schoenus benthamii*	3
Drosera orbiculata	1	*Schoenus natans*	4
Eleocharis keigheryi	T	*Spirogardnera rubescens*	T
Eremophila glabra subsp. *chlorella*	T	*Stylidium cymiferum*	3
Eucalyptus macrocarpa x *pyriformis*	3	*Stylidium longitubum*	4
Eucalyptus pruiniramis	T	*Stylidium periscelianthum*	3
Eucalyptus recta	T	*Stylidium sacculatum*	3
Stylidium scabridum	4	*Synaphea rangiferops*	2
Stylidium sp. Moora	2	*Synaphea sparsiflora*	2
Stylidium vinosum	1	*Synaphea grandis*	4

Scientific Name	Status	Scientific Name	Status
Styphelia allittii	3	*Verticordia insignis* subsp. *eomagis*	3
Styphelia caudata	3	*Verticordia lindleyi* subsp. *lindleyi*	4
Tetratheca plumosa	1	*Verticordia muelleriana* subsp. *muelleriana*	3
Thelymitra apiculata	4	*Verticordia paludosa*	4
Thomasia sp. Green Hill	T	*Verticordia huegelii* var. *tridens*	3
Thysanotus cymosus	3	*Trithuria occidentalis*	T
Tricoryne sp. Wongan Hills	2	*Triglochin protuberans*	3

Legends	
	Threatened
	Priority 01
	Priority 02
	Priority 03
	Priority 04

Table D2: Threatened and priority-listed fauna within the Shire of Victoria Plains

Scientific Name	Common Name	Class	Status
Calyptorhynchus banksii naso	Forest red-tailed black cockatoo	Bird	Vulnerable
Falco peregrinus	Peregrine falcon	Bird	Specially Protected
Idiosoma mcclementsorum	Julimar shield-backed trapdoor spider	Invertebrate	Priority 2
Idiosoma nigrum	Shield-backed trapdoor spider	Invertebrate	Endangered
Notamacropus irma	Western brush wallaby	Mammal	Priority 4
Numenius minutus	Little curlew	Bird	Specially Protected - Migratory
Oxyura australis	Blue-billed duck	Bird	Priority 4
Parantechinus apicalis	Dibbler	Mammal	Endangered
Throscodectes xederoides	Mogumber bush cricket, Northern throsco	Invertebrate	Priority 3
Zanda latirostris	Carnaby's cockatoo	Bird	Endangered
Zanda baudinii	Baudin’s cockatoo	Bird	Endangered

Table D3: List of Threatened and Priority-listed Ecological Communities

Scientific Name	WA Status	Commonwealth Status
Banksia woodlands of the Swan Coastal Plain	Priority 3	Endangered
Eucalypt woodlands of the WA Wheatbelt	Priority 3	Critically Endangered