

RESILIENT HILLS & COASTS

# Bushfire & Biodiversity

## **Part C: Discussion and Recommendations**



*“The sheer scale and severity of Black Summer challenged Australian communities, the environment, fire agencies and our science. The lives and livelihoods affected by these bushfires, and the impact left in their wake, motivate us to look to the future to prepare ourselves for the next challenge”* Robb Webb, CEO, AFAC

Prepared for Resilient Hills & Coasts by the Nature Conservation Society of South Australia

## Acknowledgements and citation

### First Nations people

Resilient Hills & Coasts partners acknowledge the traditional owners of the lands and waters of the Adelaide Hills, Fleurieu Peninsula and Kangaroo Island. We acknowledge the deep feelings of attachment and the relationship of Aboriginal people to country and respect their ongoing custodianship.

### Governance and contributions

This Discussion Paper is one of three milestones (Part C), delivered by the Resilient Hills & Coasts Bushfire and Biodiversity Project. The other deliverables from this project include:

- Part A: Literature Review
- Part B: Spotlight Studies.

The project was governed by the Resilient Hills & Coasts Steering Committee, with additional direction provided by the project's Working and Advisory Groups (see table below). The project was managed and overseen by the Resilient Hills & Coasts Coordinator Olivia Davies, and later Jen St Jack. The table below lists the people that were involved.

Representation	Organisation or group	Person
Working Group	Adelaide Hills Council Alexandrina Council Kangaroo Island Council Mount Barker District Council District Council of Yankalilla City of Victor Harbor Southern and Hills Local Government Association Resilient Hills & Coasts Landscapes Hills and Fleurieu Landscapes Kangaroo Island Regional Development Australia Adelaide Hills, Fleurieu and Kangaroo Island	Tonia Brown and Andrew Kirkley Monika Rhodes Anna Osman Greg Sarre Corey Jackson and Amy Williams Lee Jeffery Graeme Martin Olivia Davis and Jen St Jack Che Biggs and then Caroline Dorr Will Durack Sue Arlidge
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Consultant and project delivery	Nature Conservation Society of South Australia	Bec Duffield, Kirsty Bevan, Nicole Fickling, Tessa Roberts, Elen Shute, Rhys Morgan

## Content development and reviews

Resilient Hills & Coasts engaged the Nature Conservation Society of South Australia (NCS) as the consultant to develop and deliver the project milestones. The NCS undertook the research and content development, with advice from the Working and Advisory Groups. The NCS worked closely with Resilient Hills & Coasts Coordinators Olivia Davies and Jen St Jack. Draft versions of all documents were provided to the Steering Committee, the Working and Advisory Groups and other stakeholders, on account of their knowledge and expertise. The following people are further acknowledged.

- The NCS Project Lead Bec Duffield and the NCS Research Team Nicole Fickling, Tessa Roberts, Elen Shute and Rhys Morgan. The NCS CEO Kirsty Bevan is appreciated for her review and QA of all deliverables.
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- Jason Higham and Damon Ezis (both Department for Environment and Water) for providing feedback on the project and the spotlight studies.

All members of the Working Group and Advisory Group who attended meetings, were involved in consultation, and provided input, are sincerely appreciated.

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## Version

Version	Authors	Review and finalisation	QA and approval	Date
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Final Draft	Bec Duffield, Nicole Fickling, Tess Roberts	Bec Duffield 12 June 2023	Kirsty Bevan	13 June 2023
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## About Resilient Hills & Coasts

Resilient Hills & Coasts (RH&C) is a collaborative, cross-sector partnership in the Adelaide Hills, Fleurieu Peninsula and Kangaroo Island region, working to strengthen the resilience of communities, economies and natural and built environments to a changing climate.

Members of the partnership include six councils (Adelaide Hills, Alexandrina, Kangaroo Island, Mount Barker, Victor Harbor and Yankalilla); the Southern Hills Local Government Association; two Landscape Boards (Kangaroo island Landscape Board and Hills and Fleurieu Landscape Board); Regional Development Australia (RDA) Adelaide Hills, Fleurieu and Kangaroo Island; and the Government of South Australia (Resilient Hills and Coasts, 2020).

The RH&C region covers 8,752km<sup>2</sup> and includes a mixture of farming, conservation, and residential land uses, within rural, semi-rural, urban, and peri-urban settings.

## Language statement

The term ‘First Nations people’ has been used when referring to Australia’s first people (AIATSIS n.d.). The term ‘Indigenous’ has been used as it relates to fire management by First Nations people, as this was the description provided through foundational and supporting literature. It is recognised that this term may not reflect the diverse culture, language, family groups, beliefs, and practices.

## Abbreviations

Abbreviation	Name
RH&C	Resilient Hills & Coasts
RH&C SC	Resilient Hills & Coasts Steering Committee
BMCs	Bushfire Management Committees
LGA	Local Government Authority (Councils)
NCS	Nature Conservation Society of South Australia
SA	South Australia
MLR	Mount Lofty Ranges
DEW	Department for Environment and Water
CFS	Country Fire Service (South Australia)
SAFECOM	South Australian Fire Emergency and Community Services
NVC	Native Vegetation Council
NVB	Native Vegetation Branch
CRC	Cooperative research centre
EPBC	Environment Protection and Biodiversity Act

## Definitions

Term	Meaning
Resilient Hills & Coasts region	The Adelaide Hills, Fleurieu Peninsula and Kangaroo Island region.
Resilient Hills & Coasts	A collaborative, cross-sector partnership in the Adelaide Hills, Fleurieu Peninsula and Kangaroo Island region, working to strengthen the resilience of communities, economies and natural and built environments to a changing climate.
Spotlight study	The specific studies developed by the RH&C Bushfire and Biodiversity project
Wildfire	For the purpose of this document, a wildfire means the same event as a Bushfire. It is unplanned and ignited deliberately or through natural causes.
Bushfire	A bushfire is an unplanned fire event that can be ignited deliberately or through natural causes.

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## Attachments

- Attachment 1: Bushfire and Biodiversity reference library.
- Attachment 2: List of the candidate case studies (now spotlight studies) and assessment criteria and ranking.
- Attachment 3: Complete analysis of RH&C stakeholders.
- Attachment 4: Stakeholder map using interest, influence, and informed levels.

## About this Discussion paper

This Discussion and opportunities paper (hereafter referred to as Discussion paper) is based on a Bushfire and Biodiversity literature review and stakeholder consultation. This Discussion paper explores the project issues, and identifies opportunities based on the identified problem (see section 4). The literature review, prepared as a separate document, provides an overview and critique of the bushfire and biodiversity subject matter (the why and what), whereas this Discussion paper summarises the knowledge and identifies potential solutions (the how); and facilitates as a knowledge base to generate future discussion between stakeholders.

This work was delivered using a methodology that comprised five highly iterative components. These were:

- Project communication: regular meetings with key experts and stakeholders and documenting key information outputs from these meetings.
- Sourcing relevant literature (number=396) and managing the reference library using Zotero
- Development of 12 priority spotlight studies that related to bushfires and biodiversity.
- A detailed and evidence-based literature review - see Part A - Literature Review.
- Stakeholder mapping and stakeholder consultation.

The methodology is further described in Section 2.

This Discussion and opportunities paper comprises the following sections:

- This section provides an overview of the Discussion Paper.
- Section 1 summarises the key learnings and knowledge obtained from this project.
- Section 2 provides a brief overview of the project methodology.
- Section 3 gives context to the Resilient Hills & Coasts Bushfire and Biodiversity Project.
- Section 4 focuses on the emerging challenges and the change that is needed to mitigate against the likelihood of future bushfires and biodiversity loss within the RH&C region.
- Section 5 assesses the capacity of Resilient Hills & Coasts stakeholders for bushfire mitigation and preparedness, and biodiversity protection. The stakeholder analysis considers the stakeholder influence and interest, in addition to proposing how informed each stakeholder might be. The recurring messages and key themes from the stakeholder consultation have been summarised as “key themes” in this section.
- Section 6 summarises the key information that was obtained through reviewing the literature and developing the spotlight studies.
- Section 7 provides a brief synopsis for each of the spotlight studies and the key messages.
- Section 8 evaluates the range of project opportunities that could be implemented in the Resilient Hills & Coasts region, and then identifies some priority options using a systematic and multi-criteria approach. This comprises two activities that do not require funding, and an additional five potential projects that will require funding. These four options are further assessed using a SWOT analysis.

# 1. What we learnt – a synopsis of the case studies, literature review and stakeholder consultation

As South Australia continues to rebuild and recover from the catastrophic and unprecedented 2019-2020 Black Summer bushfires (hereafter referred to as 2019-2020 bushfires), there is an ongoing trend towards identifying and implementing strategies to ensure that households and landowners are better prepared. The importance of preparedness was highlighted in several reviews and inquiries, including the Australian Governments 'Royal Commission into National Natural Disaster' and the South Australian 'Independent Review into South Australia's 2019-20 Bushfire Season'. The Australian Government has also committed to providing up to \$200 million in funding under the Disaster Ready fund in 2023-24.

Anthropogenically driven climate change is increasing the likelihood of more bushfires, floods, droughts, and storms in South Australia, in the Resilient Hills & Coasts region specifically. This will impact on people, communities, and economies, but will also have a considerable impact on the biodiversity assets of the region, that are already stressed by habitat clearance, fragmentation, weeds, predation, disease, dieback and competing land demands.

The twelve spotlight studies covered a diversity of topics (as selected by the RH&C Working Group), and range from examples of community resilience programs (i.e. NSW Hotspots), landscaping and management of green spaces in peri-urban settings, to identifying the multiple functions of best practice fire management. The spotlight studies addressed any perceptions (if identified) and highlighted knowledge gaps and assumptions. This information can be used by RH&C to develop communication material such as "MythBusters" or "FAQs" to ensure that households and the community have the right information, including where there are knowledge gaps, or the information is inconclusive.

The extensive literature review addressed biodiversity, bushfires, fire ecology, climate change, and community resilience, in isolation and in association with one another (see Resilient Hills & Coasts Bushfire and Biodiversity Literature Review). A brief synopsis of the information obtained through the literature review and spotlight studies is provided below.

- Climate change will continue to impact the RH&C region, with conditions that will increase the likelihood of bushfires (see literature review), influence or change fuel loads (i.e., increasing flammable weed biomass – spotlight study #8), reduce the opportunity for prescribed burning (see literature review and spotlight study #5), and have significant impacts on nature and biodiversity (see literature review).
- The relationship between fire (bushfires and prescribed) and biodiversity is highly complex and will depend on a range of factors (see literature review). The response of species, vegetation complexes, and ecological communities will broadly depend on fire regime (location, scale, frequency, and intensity), post-burn threats and post-burn weather events. More specifically, there are a range of ecological drivers that include (but are not limited to), germination strategies, soil seed bank health, population dynamics, and breeding strategies.
- Communicating Bushfire prevention and preparedness must include a coherent and strong message about "shared responsibility" (see literature review). Similarly, the shared responsibility concept should also include biodiversity conservation.
- Biodiversity resilience strategies are required to protect threatened species against the impact of catastrophic bushfires or inappropriate prescribed burning, but also to mitigate against other



climate change consequences such as drought and floods and other threats such as habitat fragmentation and modification. The resilience of some biodiversity assets can be improved with the use of ecological burns, at the right scale and timing, however this requires strong evidence that the species, or ecological community, will respond favourably to fire.

- There are a range of “future-proofing” approaches, including translocation (see literature review), establishing insurance populations, best-practice management of novel habitats that are being used by threatened species (see spotlight study #9), and managing feral animals and weed invasion.
- There is not enough evidence to suggest that roadside vegetation, and native vegetation in general (as fuel), is exclusively responsible for increasing or decreasing the landscape bushfire risk to life and assets (see spotlight study #1) as fire behaviour is also determined by topography and weather. It is acknowledged that during a bushfire, burning roadsides could pose a risk to people. However, there are behavioural-change strategies that can reduce this risk, and this includes following the CFS recommendations to “leave early”, thus ameliorating against being “trapped” by burning vegetation.
- The expansion of the peri-urban areas (also called the urban to rural interface) is increasing the fire risk to people, community, natural values, and biodiversity. There is a need to identify and prioritise the most vulnerable areas and spaces and develop an approach for communicating both bushfire preparedness strategies and biodiversity values (see spotlight studies #10 and #11). This will require a cross-sector and cross-agency tactic.
- Since the 2019-2020 bushfires, there has been an emerging interest and public support, for fire management led by First Nations people. Indigenous fire management is implemented for a range of reasons that include cultural connection to country, to enhance biodiversity and landscape health, and to reduce fuel loads (see literature review). South Australia's First Nations people have a deep and ongoing connection to Country, and one aspect of caring for Country includes the use of fire. It is critical to empower First Nations to contribute to current bushfire management and ensure that the decision or approach to undertake Indigenous fire management is solely that of the First Nations groups of the RH&C region.
- There are opportunities to implement restoration or management approaches that integrate bushfire preparedness and biodiversity outcomes (see spotlight studies #2 and #5 and Driscoll et al., 2010). This will require a best-practice framework that carefully considers objectives, possible trade-offs, balancing priorities, identifying site specificity with consideration of landscape context, and understanding potential risks (including for biodiversity). This requires a cross-agency approach between local and state government and the CFS.
- Communicating information about fire ecology, and that fires are a natural part of the landscape, is important so communities understand that one cannot essentially prevent all fires igniting or from occurring. However, bushfire mitigation actions can be strategically implemented to reduce exposure and vulnerability (see literature review). This reinforces the importance of preparedness and “shared responsibility”.
- Understanding the mechanisms and barriers to community resilience is the foundation for ensuring that communities are better psychologically and materially prepared for bushfires before, during, and after the event. This requires identifying and targeting each community or demographic group, and understanding the values, drivers, and barriers of this group.

- Bushfire exposure is known to be inequitable, as lower socio-economic groups are more vulnerable to the impacts from bushfires.
- A localised and grass roots approach is needed to ensure that communities and households are better prepared against future bushfires and have the knowledge to also manage properties to ensure protection of biodiversity.

Key information documented from the stakeholder consultation resulted in six recurring messages, these include:

- Engaged and well-informed individuals and households are critical for community and biodiversity resilience against bushfires.
- It is important to have the right information, that uses the right words and the right message, and focuses on what people can do.
- A tenure-blind and landscape-scale management approach is required for ensuring bushfire preparedness and biodiversity protection.
- Data and knowledge sharing between agencies is improving since the 2019-2020 bushfires – ongoing exchange of information is critical.
- A balanced approach between biodiversity conservation and fire management needs to be a priority. We need to act but recognise the problem is complex and we don't have all the answers. Choices and priorities need to be based on the best information at the time, with a view to being adaptive and responsive as new information becomes available.

## Future opportunities

Findings from the review of peer reviewed and grey literature, in combination with results from the stakeholder consultation (see section 5) and the spotlight studies, formed the basis of identifying and prioritising future project opportunities. The NCS proposes 7 key opportunities that will strengthen bushfire and biodiversity work, address conflicts and imbalances, and improve community and biodiversity resilience within the RH&C region. The priority opportunities are discussed further in section 8 and noted below (in order of priority).

**Before any of these opportunities are further developed, it is suggested that critical precursor work be undertaken.**

- Additional and extensive stakeholder engagement that occurs over a longer period (i.e. 6 to 9 months). The identified options could be explored, co-designed and prioritised with these key stakeholder groups.
- Work with stakeholders to agree on a) common language; b) messaging requirements; c) existing or emerging policy and stakeholder tension; and d) communication priorities. This information could be captured in a Bushfire and Biodiversity Stakeholder Communication Strategy.

Options that do not require funding (can happen now).

- Advocate for:
  - a strong South Australian Biodiversity Act that uses evidence to prioritise the protection of the state’s nature and biodiversity.
  - greater investment in initiatives that achieve multiple outcomes (such as biodiversity protection, bushfire preparedness and community resilience).
  - greater longer-term investment in bushfire prevention and preparedness activities.
  - a review of planning laws and regulations in the context of current and future peri-urban areas, to reduce bushfire exposure risk to people, and ensure ongoing protection of biodiversity assets.
  - the use of “shared responsibility” to be applied equally to biodiversity protection and bushfire prevention.
  - more research and development of self-assessment tools that enable landholders and households to monitor and evaluate the fire risk and biodiversity assets on their properties.
- Continue with the current cross-agency collaboration, as a formalised Community of Practice, that represents the bushfire and biodiversity stakeholders from the RH&C region (councils, Regional Development Australia, DEW, landscape boards, CFS and SES) and expand the participation according to additional stakeholder engagement, including the addition of Fire Prevention Officers (FPOs) and representation from First Nations groups.

Requires project development and secured funding (plan for the future).

- In partnership with other stakeholders, such as CFS, educate and inform landowners, households, and community on best practice management, to be better prepared against bushfires and ensure biodiversity resilience, by using a common language (\$750,000 to \$1,000,000 as a 3-year pilot). This program could be co-developed with key stakeholders and focussed on the provision of customised education materials, workshops, and demonstrations to empower landowners with the skills and knowledge to make informed decisions about strategies on fire and biodiversity management– see page 42.
- Create a “Bushfire and Biodiversity Advocate” position that address message ambiguities and policy tensions to ensure effective and consistent communication. This position would work across fire agencies, government, and the not-for-profit sector to identify the barriers to better fire related outcomes for natural assets and biodiversity, without compromising safety and the protection of assets and property and provide solutions. Conflicts related to planning, environment risk assessment and operations could be identified and communicated to ensure all stakeholders were aware of current and emerging challenges – see page 43.
- Provide the financial resources needed for First Nations people to be involved in fire management in the RH&C region, at their interest and discretion, that may or may not include cultural burns (\$370,000 for 2.5 years). There is a critical role for First Nations people to be involved in fire and biodiversity management within the RH&C region, however this should not be expressed or determined by people that are not First Nations – see page 42.

- Pilot a “fire-wise” or “fire-smart” peri-urban land management project (private and public areas) to address bushfire preparation and biodiversity protection (\$290,000 to \$390,000 for 2 years), that focusses on 3-4 locations. In recognition that more people are moving into the peri-urban environment, which increases bushfire risk and arguably threatens biodiversity, if property is not managed appropriately. The project would identify risks and management and develop decision making and management tools and “test” these at the pilot locations– see page 44.
- Conceptually map existing data and information tools to identify what information is available (and who manages it), what is missing (as needed by stakeholders) and assess the cost-benefit-application of current mapping tools. Once this is completed, a review of information tools that are available in other states, as outlined in the Literature Review, could further assist with identifying new ways to empower community and households. This exercise seeks to ensure that all stakeholders are a) aware of current available data and how it can be used to support their specific role, b) have an opportunity to communicate the type of data or mapping tool that they would find beneficial in balancing out bushfire preparedness and biodiversity conservation, and c) demonstrate the types of decision making tools that are available in other states and territories – see page 45.

There are 3 other suggestions that will strengthen community and biodiversity resilience within the RH&C region. These could be undertaken by individual councils or as a discrete RH&C project if funding is secured.

- Consider innovative approaches, on council land, for reducing exposure to bushfires and ensuring biodiversity resilience at a local and landscape scale. As discussed within various spotlight studies, there are opportunities to trial on-ground work to achieve biodiversity outcomes, while also decreasing fuel load or reducing bushfire exposure, such as green fire breaks, weed control, and lower flammable landscaping (green and hard) materials. An open-house and open-garden event could be promoted that demonstrates exemplar property management.
- Identify the higher risk and more vulnerable communities or areas. Bushfire exposure is not always equal across communities and demographic groups. Some people are more vulnerable than others due to socio-economic factors, language barriers and physical or mental challenges. The development of targeted engagement and education strategies to these groups, could ensure that they are able to be better prepared against bushfires, and a greater understanding about managing properties for biodiversity.
- Consider applying for a grant that would fund a bushfire and biodiversity knowledge-broker service to support local councils. These knowledge-brokers would seek to ensure that all council staff are kept up to date with new and emerging research and initiatives, and have an across-discipline understanding about bushfires, biodiversity, climate change and community resilience. This initiative would also add value to the other project options identified.

## 2. Project methodology

The Resilient Hills & Coasts Bushfire and Biodiversity Project (RH&C Bushfire and Biodiversity project) comprised five interconnected core elements. The initial project design included the delivery of three discrete deliverables at different times. However, the iterative nature of the project, and the ongoing

need to review new literature and address emerging information gaps, resulted in a modified methodology and process. The project methodology is diagrammatically represented as Figure 1.

### *Project inception and project communication*

A project management plan was developed outlining tasks, communication, milestones, scheduling, engagement, and risk. This served as an agreed approach between RH&C and Nature Conservation Society of South Australia (the consultant, hereafter referred to as NCS). Regular meetings were convened with the RH&C Working and Advisory Groups.

The first two RH&C Working Group meetings focused on the key issues and concerns of the members, results were documented and guided the delivery of the literature reviews and spotlight studies.

### *Sourcing relevant literature and literature management*

The NCS established a 'Zotero' Reference Library for managing and analysing information from key publications, both peer reviewed and grey literature. The NCS Research Team used a range of search engines to source documents and was provided with several links by the RH&C Coordinator. These were then imported into 'Zotero' and tagged as relevant.

The Zotero library was managed by NCS throughout the project and there are 396 documents in the library. An export of the reference library is available as Attachment 1.

### *Development of spotlight studies*

The spotlight studies were developed to provide a better understanding about issues that are related to bushfires and biodiversity. Where possible, the studies:

- Explored the subject matter and used evidence to support the key findings
- Provided real life examples
- Identified where the information is lacking, or if there are conflicting viewpoints.

Initially twenty-six options were proposed for the spotlight studies, using a template provided by NCS that considered the risk of subjectivity, the information available, and criteria for scoring each option. The template is available as Attachment 2. The RH&C Working Group selected twelve priority case studies from the twenty-six provided by NCS.

During the literature review, NCS identified that there was a lot of crossover of content, and the prioritised topics would be addressed with multiple sources of evidence. To address this the NCS developed spotlight studies, not case studies, which allowed the use of various examples and evidence to address the spotlight study topic. The key information and subheadings to guide the development of the spotlights studies were agreed between RH&C and NCS and included a) summary; b) key findings; c) relevance to RH&C; d) adaptability and climate change; e) scalability and implementation; f) social license; g) risks; h) knowledge gaps, caveats and assumptions; and i) further work in RH&C region.

### *Development of literature review*

The literature review framework identified ten key questions and topics:

- What are the key elements of bushfire management?

- What is the legislative and governance framework for bushfire preparedness and biodiversity conservation at the state and federal level? How does this compare to other states and territories?
- Who has responsibility for bushfire safety? What and how is shared-responsibility relevant?
- What are the bushfire risks and biodiversity threats in the RH&C region?
- Improving knowledge on fires and bushfires – fire ecology, fire behaviour, fire risk.
- First Nations fire management – background, fire management for biodiversity, fire management for fuel reduction, fire management in the RH&C region.
- Fire and biodiversity – plants and fire, fauna and fire, human fire management and effects on biodiversity.
- Climate change and impacts on bushfires and biodiversity - climate change impacts in the RH&C, climate change impacts on biodiversity in the RH&C, bushfire preparedness and climate change.
- Community resilience against future bushfires and preventing biodiversity loss – the role of resilience, barriers to resilience, ensuring support for biodiversity resilience.
- New research and evaluation – key findings from the Bushfires and Natural Hazards Cooperative Research Centre (CRC) and the Commonwealth Scientific and Industrial Research Office (CSIRO) review into the 2019-2020 bushfires.

A systematic and unbiased review of the literature was undertaken and evaluated against these ten key questions and topics. The key concepts and ideas were documented and any contradictory results or conclusions, knowledge gaps or non-definitive results were highlighted. The literature review is titled ‘Resilient Hills & Coasts Bushfires, Biodiversity and Community Resilience – Part A Literature Review’.

### *Stakeholder mapping and stakeholder consultation*

A broad stakeholder analysis was undertaken that considered all the possible stakeholders that would have an influence and/or interest in this RH&C Bushfire and Biodiversity project. The stakeholders were identified according to their responsibility on statutory requirements, strategic direction, tactical and operational work, and implementation of activities. Using a strategic framework, the stakeholders were also assessed against the PESTLE (University of Sydney n.d.) elements of political, economics, social, technological, legal, and environmental factors. These are the factors that can influence bushfires and biodiversity within the RH&C region.

After the initial stakeholder analysis, NCS produced a stakeholder map that placed each stakeholder according to their “interest” (their likely concern about the project) and “influence” (their ability to impact the project). It was also necessary to better understand how “informed” each stakeholder group is about bushfires and biodiversity. This was achieved by using symbols to represent a scale from a “basic to significant understanding” (see Figure 6).

The NCS in partnership with the RH&C Coordinator met with stakeholders to discuss the wider issues about bushfire preparedness and biodiversity conservation. The proposed spotlight studies were used to generate discussion and stakeholders were invited to provide feedback on these, and the RH&C Bushfire and Biodiversity project in general. Information documented during the stakeholder meetings

were reviewed and summarised into short dot points. The key recurring messages that emerged were grouped into themes and are further discussed in section 5 of this paper.

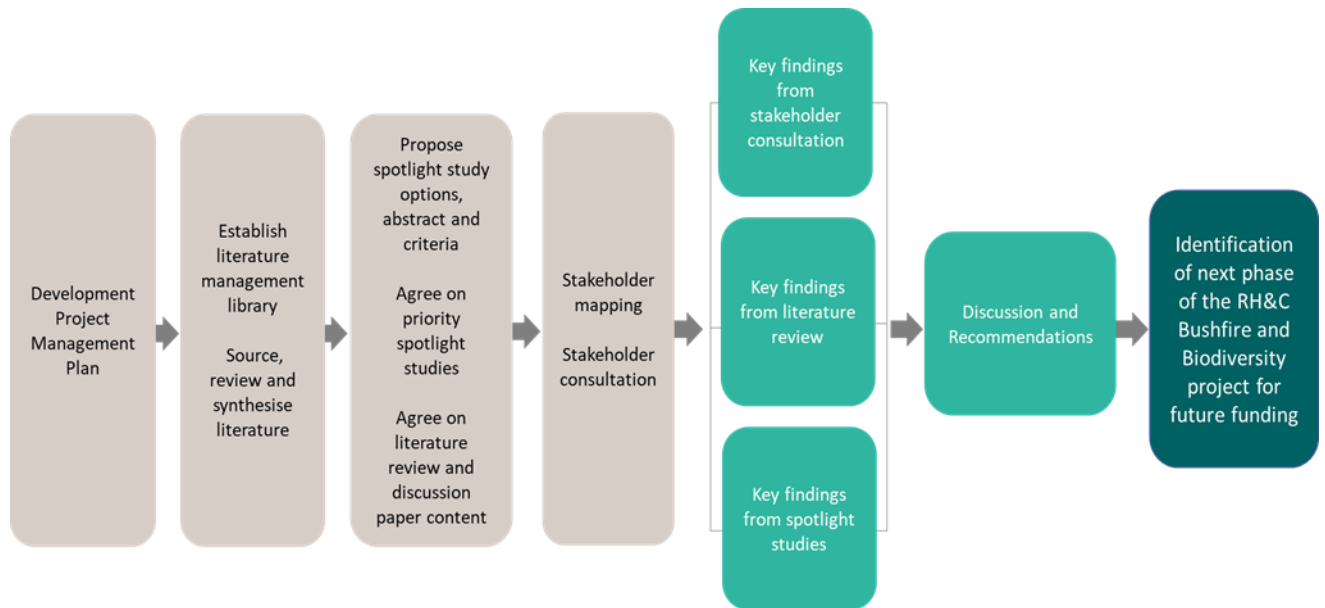


Figure 1: Schematic that illustrates the project delivery.

### 3. Project context

#### 3.1 Background

In 2016, the Resilient Hills & Coasts’ Climate Change Adaptation Plan was developed by RH&C with significant input from community, business, government, industry, and academia (Resilient Hills and Coasts, 2016). The Adaptation Plan reflects community values and identifies priority actions to reduce the vulnerability of those values to climate risks. Arising from that work, the RH&C Action Plan 2020-2025 focuses on three priorities for action:

- Climate-ready development: Leverage leadership and networks to encourage residential and infrastructure development that avoids natural hazards, is built to maximise resilience, and is energy efficient and water sensitive.
- Climate risk reduction: Support partners and communities to map, understand, plan for and adapt to climate risks, especially those arising from coastal, bushfire and urban heat hazards.
- Resilient agriculture: Build on and spread regional best practice in enabling agriculture that is regenerative, water smart, resilient to a variable climate, and supports carbon farming as part of a zero emissions pathway.

This Bushfire and Biodiversity project comes from the ‘Climate risk reduction’ priority and is funded under the Commonwealth’s Preparing Australian Communities Local Stream grant, auspiced through the Southern & Hills Local Government Association.

The bushfires of 2019-2020 had a devastating effect within the RH&C council regions of Mount Barker, Adelaide Hills, and Kangaroo Island with loss of life, destruction of homes and biodiversity, and impacted livelihoods. The proceeding 2021 Cherry Gardens bushfire, although at a reduced scale

compared to the 2019-2020 bushfires, reinforced the vulnerability of the regions and landscapes, and the necessity to be better prepared and resilient, while still protecting biodiversity assets.

To address the ongoing bushfire risk, particularly in the context of climate change, RH&C partners identified the need to consider bushfire preparedness (and resilience) while also ensuring that the regions biodiversity and nature is protected and maintained. The NCS were engaged to work with RH&C to undertake an evidence-based review of bushfire mitigation and preparation and biodiversity literature, with a view to identify perceptions, opportunities for mutually beneficial (biodiversity and fire management) strategies and propose future tactics and initiatives.

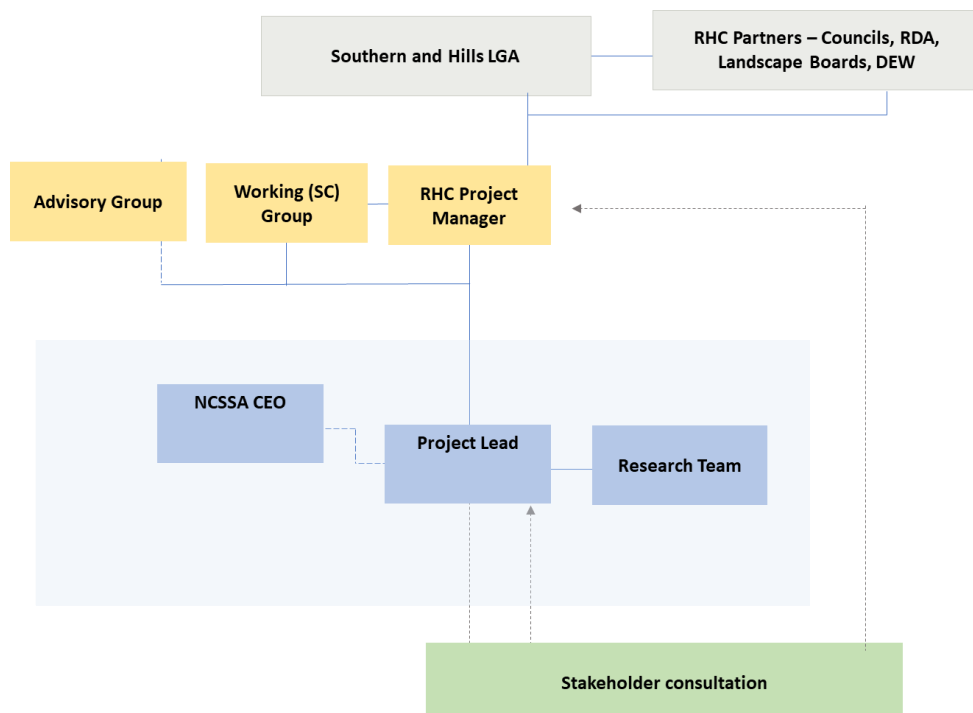
The strategic aim was identified at the commencement of the project, supported by three underpinning objectives. The strategic aim is to:

- Identify and evaluate initiatives to support the communities of Adelaide Hills, Fleurieu Peninsula, and Kangaroo Island to build bushfire resilience while securing biodiversity outcomes.

To achieve the above aim, the underpinning objectives include:

- Identify and address knowledge and capability gaps and opportunities to support long term bushfire risk reduction and biodiversity resilience at property and regional scales.
- Evaluate and propose the best interventions and solutions to apply across the six Council areas.
- Ensure buy-in and support from a range of stakeholders including agencies, individuals, interest groups, First Nations groups, and communities.

The RH&C project was auspiced by the Southern and Hills Local Government Association, the regional local government association of the six partner councils. The governance for this project, as delivered by NCS, is illustrated as Figure 2. The RH&C Coordinators worked closely with the NCS Project Lead and were involved in the stakeholder consultation (see section 5).





## 4. The need for change

Climate change, land-use intensification, fires, floods, droughts, and housing developments, present a significant challenge for households and communities to be better prepared against bushfires. Biodiversity and nature are also exposed to these challenges, and at risk of being negatively impacted by large scale and inappropriate bushfire prevention activities. As noted by the CFS, the increasing frequency and severity of weather, on account of hotter summers, requires an innovative approach to planning and preparation against bushfire hazards (Government of South Australia, 2021).

The cost of bushfire response and recovery versus bushfire preparation is significantly different. The economic impact from the 2019-2020 bushfires has been estimated as >\$10 billion (Penman et al 2022) in contrast to the \$30 million mitigation spend of the federal government over 5 years (2014-2018). The cost to individuals and households was not explicitly detailed in the literature reviewed but the Australian Business Roundtable for Disaster Resilience and Safer Communities (2013) found, for particular events, that for every dollar spent on disaster mitigation (such as bushfire preparation) between three and eight dollars is saved in terms of damages avoided (Aither 2019). However, it is also noted that the benefits of preparation and mitigation is typically not documented or analysed (Aither 2019), so the effectiveness of this work is often implied rather than proven.

The International Union for Conservation of Nature forecasts that currently 28 percent of species are threatened with extinction worldwide (IUCN n.d), and Australia, with one of the highest extinction rates in the world (Australian Government, 2022), has 1,790 species that are currently identified as threatened with extinction (Ecological Society of South Australia 2019). The RH&C region sits within a nationally recognised biodiversity hotspot (the Mount Lofty Ranges) but the nature and biodiversity assets continue to be threatened by climate change; changed land use and population growth; clearance and fragmentation; introduced or over abundant species; and large scale disasters such as bushfires.

Currently, bushfire protection and prevention legislation at the state, territory, and federal level (i.e., South Australia's *Fire and Emergency Services Act 2005* and the Australian Governments *National Emergency Declaration Act 2020*) is interpreted as privileging bushfire protection and prevention above biodiversity and other culturally significant values (McDonald & McCormack, 2022). An article by Keenan (2020) states that the federal government will focus on recovery and response, and there is a dichotomy between the roles of key agencies as a fire service agency that prioritise protecting lives and property compared to land management agencies (i.e., DEW and NPWSA) who focus on risk reduction in the context of environmental and social values. It is unclear if during emergency services operations, the protection of life and property is favoured over the protection of nature and biodiversity. If this is the case, it could present a risk to the biodiversity assets within RH&C region, as implementation of bushfire management activities, authorised or unauthorised, could have a negative impact on biodiversity, at a site-specific and population-scale (see literature review and spotlight studies). This potential conflict and "trade-off" is discussed by Driscoll et.al (2010) with concluding statements suggesting there is a need to invest in research that identifies the asset protection and extinction risk (to threatened species) that results from specific fire management approaches (see spotlight studies #2 and #5)

There are real and perceived bushfire risks to households, communities and businesses across the RH&C region and an ongoing fear of more frequent and intense bushfires (RH&C Working Group meeting #1, August 2022). These challenges are further amplified as development within the RH&C

peri-urban space intensifies (Government of South Australia, 2021), exposing these communities and surrounding areas, to greater bushfire risk. Under these pressures, there is a time critical need for information provision that addresses community concern and fear and provides guidance about how these people can be better prepared against bushfire hazards.

Since the 2019-2020 bushfires, information on bushfire recovery, and more recently bushfire preparation, are considerable and often provided through diverse means by various agencies. Although there is arguably an increase in information since the 2019-2020 bushfires focusing on bushfire mitigation and preparation, this does not mean that communities are better prepared or more resilient. The acceptance and uptake of information, along with the activation and implementation of changed behaviours, should not be assumed, and there needs to be confidence that the provision of information and bushfire preparedness tools results in resilient and better prepared communities and households.

When the provision of information is not fit for purpose or clear, households and community could either not implement the right or safe strategies, or they could interpret information as ambiguous or threatening (Bushfire CRC 2014). Research conducted by Bushfire CRC (2014) indicates that worry and anxiety can impact on the ability of people to accurately process information about threats, and despite commitment and intention, effective bushfire preparation is often not implemented. The findings from this research suggested that people at higher risk have higher levels of intention, but lower levels of bushfire preparedness due to inaction. This reinforces the need for both effective communication and active monitoring of action or non-action (addressing the barriers as noted above). It is also suggested that effective bushfire risk communication and messaging will be determined by successful engagement and provision of information through the right channels (Cooper et al 2020).

As highlighted in the spotlight studies, there are considerable knowledge gaps and assumptions about the causes and influences of bushfire risk, and the ways that communities can be better prepared and resilient. This lack of information, or lack of confidence in information, should not prevent the recognition of priority initiatives that address bushfire preparedness and biodiversity conservation in the context of a changing climate. There is a time critical need to address these issues with scope to adapt and improve as new learnings emerge.

Key findings and recommendations from the recently published Australia's Megafires (2023) reinforce a need for change to ensure biodiversity protection and resilience in the context of bushfires (Rumpff et al., 2023). These are summarised below:

- Adequate and ongoing fire management funding is needed for work in between bushfire periods that will build resilience.
- Establish a permanent collaborative national body for biodiversity in relation to fire.
- Adequately fund and formally embed biodiversity representatives into incident management teams (e.g., legislation and policy) and work with councils and CFS to have an agreed position on high value biodiversity assets (also see spotlight study 5).
- Enhance the capacity of individuals and groups to have responsibility for biodiversity conservation.
- Improve the biodiversity knowledge of operational fire staff, both on-ground and control-room levels.

Figure 3 summarises the key recommendations from the chapter 35 of "Australia Megafires: Biodiversity Impacts and Lessons from 2019-2020" (Woinarski et al., 2023). The section highlighted in

blue is most relevant to the RH&C Bushfire and Biodiversity project as these are effectively preparation activities that could be implemented.

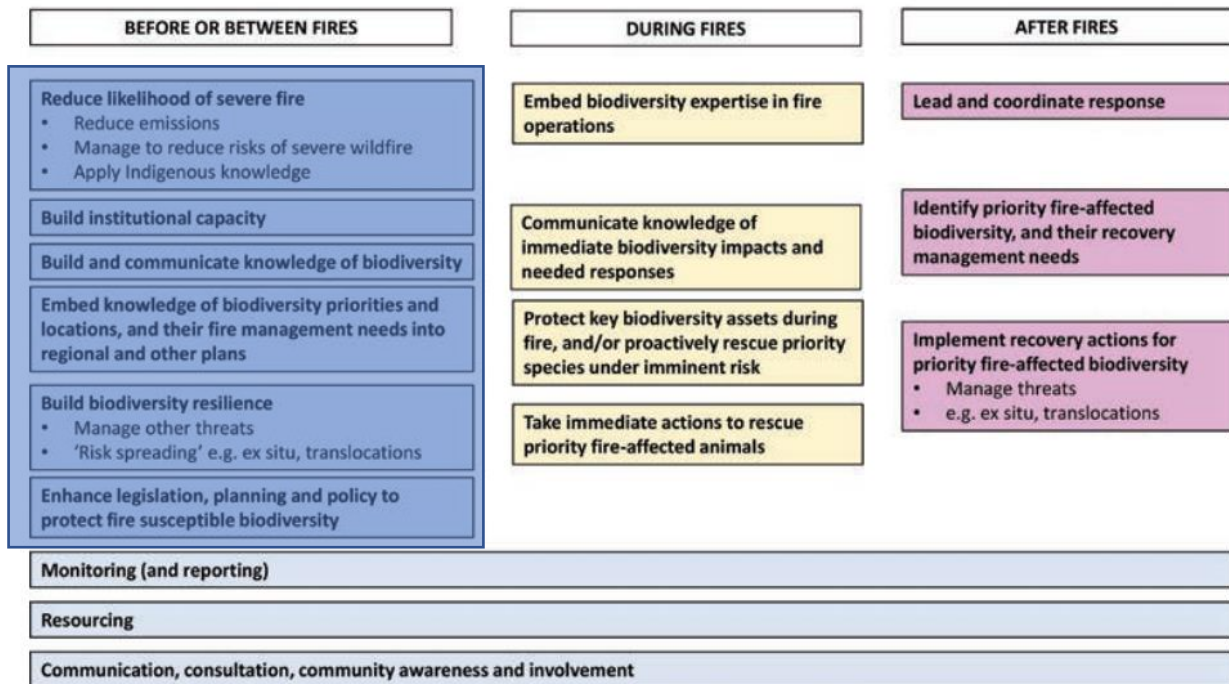


Figure 3: Australia’s Megafires key recommendations. Source: Woinarski et.al (2023).

It is also noted that any attempt to influence change and have a demonstrable and positive impact, will require adequate funding over a sufficient time scale. The diagram below conceptually illustrates the implementation of one of the recommended options (see section 8) and how the greatest impact is achieved with increased time and investment. This concept is relevant to all the options that NCS is recommending within this document.

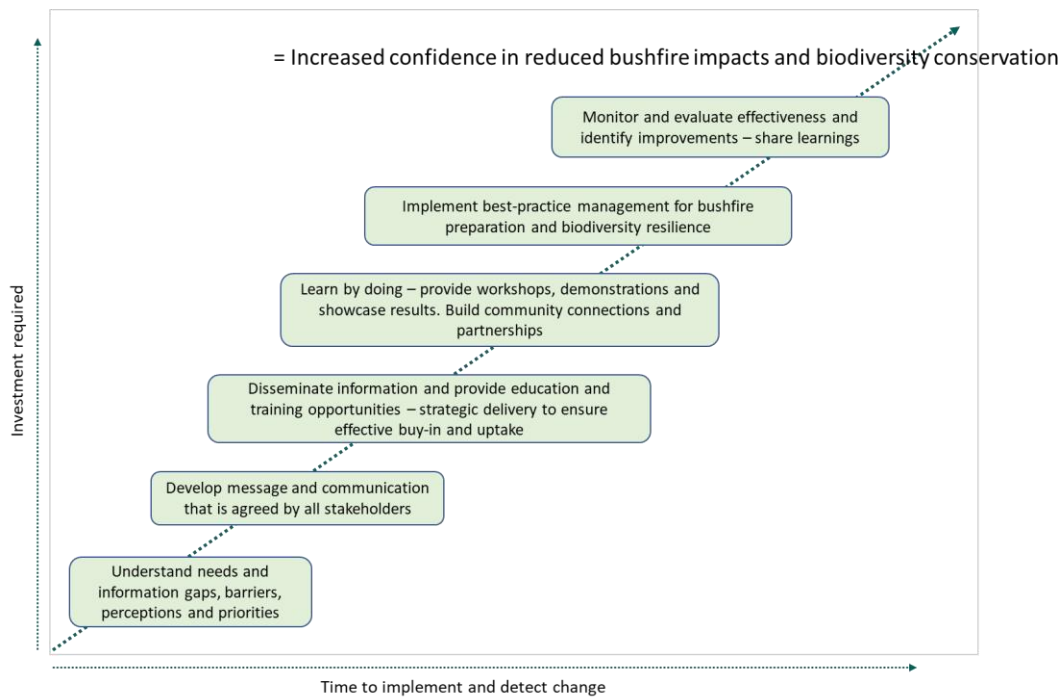


Figure 4: A greater impact is likely with increased time and increased investment.

## 5. Stakeholders

### 5.1 Stakeholder mapping

For this RH&C Bushfire and Biodiversity project, stakeholders were defined according to the International Association for Public Participation (IAP2): “any individual, group of individuals, organisations, or political entity with a stake in the outcome of a decision” (International Association for Public Participation n.d – see [here](#)).

A total of sixty-one specific stakeholders were identified at the beginning of the project and grouped according to the industry or group they represented. There were twelve groups including: conservationist/biodiversity; fire ecologist; fire management; First Nations people; individuals; industry and primary producer; industry representative/peak body; landowner; local government; local business; state government/agency; federal government/agency; and other entity. During the stakeholder analysis, it was noted that many of the identified stakeholders represented more than one interest, and this was noted accordingly. To better understand the role of each stakeholder, further categories were considered:

- Key role/s – statutory (fire preparation and mitigation and/or biodiversity); strategic planning (fire preparation and mitigation and/or biodiversity); tactical planning (fire preparation and mitigation and/or biodiversity); operations (fire preparation and mitigation and/or biodiversity); implementation (fire preparation and mitigation and/or biodiversity), and
- The ability of each stakeholder to influence factors related to political, economic, social, technological, legal and environment was also evaluated (the strategic PESTLE framework).

The stakeholder analysis was undertaken at a high-level. Once the members of RH&C have confirmed their priority future project/s, and the relevant stakeholders identified, this information will be

important to better understand who needs to be engaged and involved, and the type of influence that these groups will have on the delivery and success of the project.

The full analysis is provided as Attachment 3 and an example is provided below as Figure 5.

Figure 5: Example Stakeholder Analysis table

Representation	Stakeholder name	Key Responsibility										PESTLE element (Yes, No, Possibly)					
		Statutory/legal		Strategic		Tactical		Operational		Implementation		Political	Economic	Social	Technological	Legal	Environmental
		BP	Bio	BP	Bio	BP	Bio	BP	Bio	BP	Bio						
Conservationist	E-NGO's	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Conservationist	Conservation Council SA (Peak Body)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
State agency	CFS	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Individuals	Community groups	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Local agency	Local Council <sup>1</sup>	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Local agency	Local Council - biodiversity focus	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Local agency	Local Council - fire prevention officers	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Local agency	Local Council - elected members	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Local agency	Local Council - planners	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
State agency	Department Transport <sup>2</sup>	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
State agency	DEW - Natural values team	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Primary production	Forestry SA <sup>3</sup>	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green

The stakeholders were initially mapped according to their interest and influence. The **interest** was defined as the *likelihood of having a concern or buy-in to the project* and subject matter (i.e., bushfires and biodiversity) and its likely outcomes whereas the **influence** was assessed as the *ability to resist or support the projects activities* – see Figure 6.



Figure 6: Stakeholder analysis of RH&C Bushfire and Biodiversity project. Each circle represents the assumed knowledge and understanding ("informed"). The larger orange circle highlights stakeholders that have a high interest and medium-high influence.

As the project developed, the NCS Research Team identified that ongoing and relevant communication, engagement, and partnerships heavily influenced the knowledge of individuals, community, and stakeholders, which drives behavioural change. As a result, the stakeholder analysis was expanded to include **informed**, that being the probability of a stakeholder having an understanding about bushfires (risk and preparedness) and biodiversity (threats and conservation strategies). The stakeholder map (Figure 6) includes this information (“informed”) as a coloured circle, with the size of the dot related to the level of understanding that each stakeholder group will likely have (basic through to significant). It is important to note that this has not been verified with RH&C, and therefore should only be used as a guide to identify where education and awareness could be prioritised for stakeholder groups. This figure is also provided as an attachment (see Attachment 4).

The larger orange circle represents stakeholders that will likely have a high interest and/or buy-in toward RH&C Bushfire and Biodiversity projects or work, with a medium to high influence. Most of these stakeholders are already involved in this project. Additional stakeholders that could be considered include the Department of Primary Industries and Regions (SA), other climate change alliances (depending on future initiatives), carbon farming industry, First Nations groups, environmental peak bodies and/or eNGO’s (for example SANA – South Australia’s Nature Alliance), council FPOs and the Department for Infrastructure and Transport.

## 5.2 Stakeholder consultation

Consultation with key project stakeholders was undertaken over a period of five weeks in November to December 2022 and then again during February 2023. It is noted that this served as the initial consultation, and further engagement should occur prior to implementing any of the proposed projects. The people consulted were suggested by the RH&C Project Coordinator or identified as a stakeholder by NCS. Consultation was provided through:

- A drop-in-session: All members of the Working Group and Advisory Group were offered an opportunity to drop into an online meeting at their convenience. The key purpose of this session was to further discuss the potential case studies and provide a platform for people that might not normally be vocal during the regular project Working Group meetings.
- One to one consultation: The case study subjects were “tested” on stakeholders who provided valuable feedback on their suitability. Although the original intention of the consultation was for the meetings to be structured with consistent questions and topic exploration, the scope was adapted to allow flexibility and a more in-depth conversation that drew on each individuals strengths and knowledge.

The stakeholders to be consulted were established in partnership with the RH&C Coordinator. Twenty individuals from nine different agencies were either consulted via a one-to-one meeting, or through a drop-in session (and sometimes both) – see Table 1.

The proposed case studies (note – later renamed to spotlight studies) provided a conversation “starting point” and individuals were asked questions based on their role and experience. The discussion was noted by NCS as it related to 1) concerns and barriers 2); conflict points and challenges; and 3) opportunities for improvement/future steps. Verbal and written information was considered and evaluated by NCS. The key findings have been summarised in section 7.

**Table 1: List of organisation engaged during the formal stakeholder consultation.**

Organisation	Number of individuals
Yankalilla Council	1
Onkaparinga Council	3
External stakeholder	1
DEW	2
CFS	1
Mt Barker Council	6
DEW – Native Vegetation Council	1
Alexandrina Council	1
Hills Fleurieu Landscape Board	1
NSW Hotspots Program	1
Technical Officer Parks and Reserves (note Tonia Brown was present for some of the discussion)	2

\* attended drop in session

### 5.3 Key stakeholder messages

There were six reoccurring themes that emerged from the consultation. It is important to note that the key messages were not always expressed by all individuals, nor were they always supported by all individuals that were engaged.

*Engaged and well-informed individuals and households are critical for community resilience against bushfires and biodiversity resilience.*

A personalised, face to face approach that focusses on education and building trust, rather than compliance, was preferred and viewed as more effective. This was considered critical, particularly in peri-urban and/or areas with life stylers, high turnover of home/land ownership, new developments, and socio-economic challenges/vulnerable communities – **how to ensure that all sectors of the community have long-term resilience against bushfires (and other climate change) impacts?** It was noted as a challenge, “we don’t know (yet) how to effectively achieve this as it’s not a one-stop-shop, and it requires long-term investment and ongoing reiteration of key messages”. It is critical to understand what community need (information, services, connection, upskilling etc) that will allow them to bounce back from bushfires and prepare for future events (and disasters more broadly).

NCS response – It is agreed that understanding effective community resilience (noting that it requires a range of options and opportunities) is a critical part of any future project. It is also noted however that recovery from the 2019-2020 bushfires have provided funding opportunities (for affected regions) to support resilience initiatives, and the learnings and outcomes from these outcomes will benefit the wider regional South Australia (eg TACSI Fire to Flourish Program [here](#)). There are reviews and recommendations about the response and recovery to the 2019-2020 bushfires (The Royal Commission into National Natural Disaster Arrangements, 2020) however, long-term investment is needed as resilience is not just about coping with change, but also anticipating change. NCS also recommends that community resilience strategies include a range of demographic groups and households to ensure that vulnerable and minority groups are included, and where relevant, prioritised. This was reinforced through the literature review (see section 7) and development of the spotlight studies.

*A tenure-blind and landscape-scale approach is required – this presents complexities.*

Although there was minor support for focussing on public managed lands (e.g., roadsides), the majority of stakeholders believed that solutions and next steps (and subsequent recommendations and options) should be **founded on a tenure-blind approach**. Bushfires, community, and biodiversity resilience needs to be addressed at a **landscape scale level for effectiveness**.



Discussions about modelling fire “risk” and biodiversity assets and implementing community resilience approaches were considered more effective if considered across multiple council regions.

NCS response: There are opportunities to partner with other council regions that cover some of the same Bushfire Management Area as RH&C. It is agreed that future priorities and/or initiatives should not be confined to private or public lands as bushfires and biodiversity loss is a cross-tenure issue; this was demonstrated in the 2019-2020 bushfires and Cherry Gardens bushfire. The importance of a tenure-blind approach was described by Gill et.al (2014) and is even more relevant now: “*wider recognition of the all-tenure, whole-of-landscape, whole-of-community approach to biodiversity conservation and fire management is needed if the probability of further (biodiversity) extinctions is to be reduced*”. NCS also supports the implementation of initiatives, whether on-ground, establishing demonstration sites, or targeted communication and knowledge-brokering, to be initially conducted as pilot programs (using a well-designed framework) to provide opportunities to identify improvements for long-term benefits.

*Have the right information that uses the right words and the right message and focus on what people can do.*

**Correct, clear and appropriately delivered messaging** underpins the success of bushfire preparation, biodiversity, and community resilience. Several stakeholders noted that it is critical that individuals and community are empowered by knowing how they can be better prepared (against bushfires) and implement strategies to ameliorate biodiversity loss. However, it was also noted that **communication needs to be well balanced** – it is important to be transparent about what households and individuals can and cannot influence, while still enabling them to take personal responsibility for bushfire prevention. As an example, it is unlikely that community and individuals can prevent all bushfires and/or fire behaviour under catastrophic conditions, but they can implement strategies to reduce their exposure and/or ensure that they can safely evacuate an area.

Some of the stakeholders engaged specifically mentioned that it is crucial to shift away from “bushfire prevention” (it’s not realistic) and reinforce the notion of “preparing to reduce impact.” The application of different bushfire prevention activities within the RH&C region is likely to have different outcomes. For example, one stakeholder commented that prescribed burning can be effective for up to 5 years, whereas mechanical management ranges from 6 months to 5 years. It was further suggested by another stakeholder that “we should not just be asking if information is needed, but asking who actually needs the information and what information do they actually need?”

Several stakeholders **acknowledged community anxiety and concern** about bushfires is often ingrained and trying to shift mindsets (i.e., native vegetation and roadsides as a “trap”) is challenging, and sometimes not possible. This needs to be recognised and better understood as it is a key challenge for many councils. One of the spotlight studies (see spotlight study #1) identified that it is important to educate community on how to self-assess and identify the risk at the site specific level and understand how to mitigate against this risk and be better prepared.

It was suggested that some of the critical information to convey to people should include:

- The basic 101s that people can understand and apply (including foundational fire ecology information – see Literature Review section 3)
- Myths and “unsubstantiated beliefs” that can result in unnecessary native vegetation clearance or an expectation that agencies (i.e., councils) address the “fire risk” by removing vegetation.

- Legal requirements and an understanding about what shared responsibility is, and how this benefits communities.

NCS response: One of the spotlight studies identified (the Hotspots program) that success was due to its consistent and agreed messaging across agencies (Kate McShea personal communication) – see spotlight study #12. There is an opportunity for local councils, other RH&C partners and CFS to work together to develop and communicate agreed messages. It is also important that any key messages are provided with prescriptive instructions, for example CFS encourages the leave early choice however there is no specificity in terms of “when” to leave early, and it is unclear if it is even possible to provide this specificity. Strahan (2021) remarks that defensive property preparation, undertaken by those who intend to leave early, is significantly more limited than those defending or waiting to see. Future projects could consider what (exactly) people need to know (correct and relevant information), where they source their information from and how this information is best conveyed and communicated (and through what agency/source).

*Data and knowledge sharing between agencies is improving since the 2019-2020 bushfires – ongoing information exchange (as this project has done) is critical.*

Many stakeholders remarked, casually, that communication and information sharing was much better post the 2019-2020 bushfires. There was strong support for **ongoing, frequent, and focussed communication and conversations across agencies and stakeholders**. Although none of the stakeholders specifically stated how or what influenced communication breakdowns, it was noted that this RH&C project has provided an opportunity to learn what other projects and knowledge existed, and that communication has been better when compared to pre-2019-2020 bushfires. A few of the stakeholders also expressed concern about the potential risks of not knowing “who was doing what” and that this could result in “duplicating work in some areas, and not addressing other areas” or different communication language being used which could lead to confusion in messaging. In some instances, stakeholders indicated that knowing what data existed and how they could access it, would be advantageous.

NCS response: Grants/funding timelines and high priority work (particularly in response to recovery) does not always accommodate an opportunity to pause and ensure that knowledge is being shared. This is not uncommon when there is limited funding, tight deadlines, and agency specific priorities. A conceptual data/model mapping exercise could be beneficial in context of : 1) what data is available; 2) redundancy/updates required; 3) who needs the information; 4) what information it provides; 5) weaknesses and assumptions; 6) who manages, vets and updates the data; 7) matching inputs with outputs; and 8) end users. Discussions suggest that the RH&C partners are only just starting to better understand what other agencies are doing and/or the projects and initiatives that are in the pipeline. The continued sharing of information will strengthen new funding proposals.

*Prioritise a balanced approach between biodiversity conservation and fire management - accepting reasonable trade-offs. We need to act but recognise the problem is complex and we don't have all the answers.*

There was general agreement that **bushfires and biodiversity, layered with climate change, community dynamics and unique settings and circumstances, is complex**. This is even more so the case for Mount Lofty Ranges as a fragmented landscape with ongoing land-use pressure, population increase and an expansion of the peri-urban area (see spotlight studies #10 and #11). There was also implicit support for accepting that “we don't have all the answers but need to act now” to appropriately manage the landscape for biodiversity outcomes while also considering the right bushfire preparation activities.

The FPOs at Adelaide Hills and Mount Barker councils similarly supported the need for a balanced approach between biodiversity conservation and fire management. One stakeholder suggested that there should be a major narrative shift towards “managing for biodiversity, that will also help with asset protection” rather than “fuel reduction and asset protection burns that will also benefit biodiversity”. This could be explored further.

*First Nations people are important stakeholders and engagement needs to be respectful, inclusive, and given the time it deserves.*

At the beginning of the project, it was recognised that there is an opportunity to work with First Nations people to better manage areas for both biodiversity conservation and fuel management. This was initially proposed as a priority case study (now called spotlight study), however there were some stakeholders that did not support the development of the case study, as it was proposed. It was their view that the consideration of cultural burns and cultural fire management should be determined by First Nations people. It was also noted that the use of the term “cultural burn” should be used cautiously as some First Nations groups prefer to use other terms such as land management or fire management.

NCS response: It is recognised and strongly agreed that First Nations groups need to be provided with the opportunity to identify if and how they want to be involved in leading and implementing land management within the RH&C. NCS also believes that this initiative requires financial support, significant time and the capacity to build relationships, beyond the normal grant timelines. The NCS sourced and reviewed many published documents about First Nations Fire Management, that provide important learnings that will benefit RH&C. This information has been discussed in the literature review (see section 4 and 8).

### *Off the record consultation*

NCS also consulted with non-RH&C stakeholders, but who have experience in bushfire planning and biodiversity management and were considered valuable for their expertise. As these conversations were off the record conversations, they have been treated anonymously, however, the information is summarised as NCS believes it is highly relevant. There were three key messages.

- Policy and legislative reforms are required if biodiversity assets are to be better protected and prioritised in fire management.
- Engaging and working with councils FPOs is critical. Further relationship building is required to agree on consistent messaging, identify FPOs priority issues and better understand what support FPOs need to ensure biodiversity conservation is considered in the context of fire management.
- There are always going to be diverging perspectives/unfounded perceptions/myths. Managing this is critical and requires a strong, and agreed, communication process (ideally a dedicated position/s working across all agencies and stakeholders).

NCS response: NCS agrees that engaging with Councils FPOs is crucial as they have an instrumental role in educating landowners and community. It is also noted that development of South Australia’s first proposed Biodiversity Act could ensure stronger protection for biodiversity across the State and address any conflict or compatibility with other legislation. Local councils, or other members of the RH&C group (such as CFS and DEW), could consider developing an across-agency communicate that provides regular updates, emerging research, myth busting, Q and A and short case studies, or seek additional funds for RH&C to facilitate as, or act as a knowledge broker (see section 8 on future opportunities).

## 6. Summary of key information

This section outlines the key information that was synthesised from the literature review, spotlight studies and stakeholder engagement. This information has been grouped into five broad themes that underpin bushfire preparedness and biodiversity conservation, in context of climate change, within the RH&C region. These could be modified to form “principles” to assist the RH&C to prioritise future work and initiatives.

### *Building community resilience and biodiversity protection*

Under climate change, more frequent and/or severe weather events (i.e., bushfires, droughts, and floods) are predicted for Australia. Therefore, improving the capacity of communities and regions to cope with the impact of shocks and stressors is vital. Resilience is crucial for communities to withstand and persevere after disasters or other impacts. Vulnerability and resilience can be addressed not only in response to impacts, but in anticipation. Building resilience may involve reducing vulnerability or improving coping mechanisms to shocks and stressors. For example, ensuring appropriate fire breaks are in place around properties, is a way of reducing vulnerability. Supporting communities to be resilient, psychologically and materially, before, during, and after a bushfire, requires a deep understanding about that community and demographic group.

Biodiversity values can also be strategically embedded into community resilience programs, as research indicates that people value and prioritise nature and biodiversity considerations in fire management (see spotlight study #7).

### *The fire and biodiversity relationship is complex*

The relationship between fire and biodiversity conservation is complex. Fire has shaped Australian ecosystems for tens of millions of years (Keeley & Pausas, 2022). It is simultaneously a key driver of ecological processes such as seed germination, and an increasing threat to many species and ecosystems, particularly as fire has begun encroaching on habitats that have never been known to burn (e.g., de Bie et al., 2021; Ward et al., 2023; Woinarski et al., 2015). Since 2022, ‘*Fire regimes that cause declines in biodiversity*’ has been classed as a *Key Threatening Process* under the Commonwealth *Environment Protection Biodiversity and Conservation Act, 1999* (the EPBC Act).

In healthy, well-connected ecosystems with large and geographically dispersed populations, bushfires should not threaten biodiversity. However, fire can threaten the survival of species within a landscape if they have small remnant populations, populations that are geographically concentrated, or exist in poorly-connected habitat islands that mean they can’t escape, or recolonise easily. It used to be assumed that maintaining a mosaic of vegetation with different fire ages throughout the landscape would benefit biodiversity by creating a wider range of niches (the ‘pyrodiversity begets biodiversity’ hypothesis), but a recent review shows limited evidence for this (Jones & Tingley, 2022). Maintaining some long-unburnt habitat has been shown to be important for some species (e.g. Farnsworth et al. 2014; Davis & Doherty, 2015; Taylor et al., 2012; Woinarski et al. 2023), and may be more important than fire-age diversity *per se* (Taylor et al. 2012). Inappropriate fire regimes have been identified as a threat to over 800 native species, and 65 threatened ecological communities in Australia. Threats are context-specific, and depending on the habitat type and what individual species are present, an inappropriate fire regime could include: burns that are too frequent or not frequent enough; burns that occur during the wrong season and interfere with critical life processes such as reproduction; or fire at the wrong intensity/severity (some plants benefit from very high temperature fires, others from cooler burns) (DCCEEW, 2022). To conserve biodiversity into the future, it will become increasingly important

to establish more appropriate fire regimes, and to maximise the extent and connectivity of native habitats and species. Fire interacts with other disturbance factors, including weeds and feral predators, and all these measures will need to be considered to address these threat multipliers.

### *The critical role of First Nations people in fire management*

Since the 2019-2020 bushfires, there has been increasing interest in Indigenous land management (see literature review, section 4). In other parts of Australia, Indigenous fire management has been embedded into biodiversity, fuel management, and carbon mitigation (see literature review – section 4). In South Australia, there is some ongoing First Nations management of country using fire, but in other regions it has been discontinued ([see here](#)). The literature review highlights the many benefits (environmental, social, and cultural) from cultural burns, and notes that Indigenous fire management is highly nuanced and landscape-specific, and there are many factors to consider for application to landscapes within the RH&C region which will be best determined by First Nations people.

A summary of key findings from the 2019-2020 bushfires advocated for Indigenous land management to “learn from Traditional Owners on how to reduce landscape risk through better integrated cultural land management knowledge and practices “ (Natural Hazards Research Australia, 2023) and the Royal Commission stated a requirement to “have regard” to “any ways in which traditional land and fire management practices of Indigenous Australians could improve Australia’s resilience to natural disasters” (The Royal Commission into National Natural Disaster Arrangements, 2020).

There was strong interest from the project’s Working Group and Advisory Group to find ways to support, and hopefully secure longer-term funding, to provide First Nations people with an opportunity to trial cultural burns/fire management within the RH&C, for multiple purposes such as fuel reduction, biodiversity conservation and connecting to country. There was also a strong opinion, that this should not be initiated or agreed, without the involvement of First Nations people.

### *With our changing climate, bushfire preparedness and biodiversity conservation are time critical - act and adapt, knowing that information is often deficient or redundant.*

In Australia, the Bureau of Meteorology (n.d) states that “significant changes observed in recent decades”, indicates that climate change is influencing the frequency and severity of dangerous bushfire conditions. The RH&C Climate Change Adaptation Plan defines climate change projection for the region, and predicts that by 2070 the annual number of severe fire risk days will increase by 65% in the Adelaide Hills, Fleurieu Peninsula and Kangaroo Island regions (Resilient Hills and Coasts, 2016). The plan also describes predicted increases in extreme heat days over 35°C, increases in fire danger weather, and increases in the number of days of severe fire danger rating in under various climate change scenarios (Resilient Hills and Coasts, 2016). Specifically, this can impact on the ability of agencies and individuals to be prepared for bushfires by:

- Limiting the opportunity to undertaken fuel reduction burns (prescribed burning).
- Reducing the effectiveness of prescribed burns.
- Increasing the risk of prescribed burns impacting on other areas due to inclement weather.

Although an increase in bushfire frequency and intensity will likely impact on biodiversity within RH&C, there are a range of other climate change induced factors that will also affect biodiversity (see literature review section 6.1). The environmental change in temperature, rainfall, atmospheric carbon dioxide, coupled with unpredictable and extreme events such as storms, floods, droughts and fires, are

ecological stressors on many threatened species and ecological communities (Hoffmann et al., 2019). Some of the potential effects on biodiversity include (but are not limited to):

- A shift in species habitat range – changing the location of where species can occur or changing the species assemblage of an ecological community (Butt et al., 2021; Nunez et al., 2019).
- Modifying the morphology (the size and shape) and phenology (the flowering season according to season) of species.
- Phenological changes that alter the life cycle of plants and animals due to seasonal variability.

*Nature protection and biodiversity conservation values can still be considered in bushfire preparedness strategies.*

As it applies to bushfire responses (suppression and containment), Federal and State legislation that governs emergency management could be orientated towards protecting human lives and infrastructure before biodiversity assets. Biodiversity legislation such as the EPBC Act allows for exemptions under the Act if activities occurred before July 2020, or they have not changed, for fire management, including for example: situations where it is necessary to maintain access and fire breaks; roadside weed control; control burns; and maintaining infrastructure (Department of Climate Change, Energy, the Environment and Water, 2022). It is also noted that there are some fire prevention activities that may not require approval under this legislation (see Part A: Literature Review). While there could be scope to amend emergency and biodiversity legislation to strengthen protection for biodiversity assets during bushfire emergencies, there are other things that can be done to further embed biodiversity conservation values in bushfire preparedness activities, outside of any individual emergency response during a bushfire. Research has found that broad community support exists for bushfire preparation activities that consider biodiversity (Moskwa et al., 2018), suggesting that many individuals would be motivated to go above and beyond legislative requirements for biodiversity protection.

An exemplar model of embedding biodiversity conservation values in fire preparation is the NSW Hotspots program. This program provides landowners with information about fire behaviour and ecology and supports them to prepare bushfire emergency plans in collaboration with their neighbours, while considering impacts on biodiversity. The program is jointly managed by the NSW Rural Fire Service and the Nature Conservation Council of NSW, ensuring that fire-management and biodiversity knowledge are both adequately represented.

Other ways in which biodiversity values can be promoted within fire preparedness activities include providing plant selection guides for gardens and revegetation projects that maximise habitat for native species while minimising fire-risk (see spotlight study #2), suppressing highly flammable weeds and replacing with lower flammability native grasses (see spotlight study #8), and developing strategies for decision-making and management in situations where invasive weeds present a fire hazard (e.g. Aleppo pines, blackberry) but are critical habitat for threatened species (see spotlight study #9).

## 7. Summary of Spotlight Studies

The project developed twelve (12) discrete spotlight studies that were identified as a priority by the RH&C Working Group. The initial intent of the project was to develop twelve distinct and evidence-based case studies selected from twenty-six potential studies. The RH&C Working Group was provided with a title, abstract and confidence levels on the likelihood of information being available. While building the content, it was clear that some of the subject matter was best presented as spotlight

studies as there was a need to draw in a range of research and information, rather than focus on one specific study (with the exception of one, spotlight study #12). Some of the spotlight studies are exploratory (investigates subject matter and documents foundational information), while others are explanatory (provides outcomes and consequences of a particular issue, state, or problem).

A summary of each spotlight study is provided in this section, along with key messages that address truths or unfounded perceptions (myths). Also see “Bushfire Myths and Misconceptions” (Leonard & Kachel, 2019) - [here](#).

### *Spotlight 1: Perceptions about roadside vegetation as a fire risk*

Summary: Vegetation borders many main roads and is often the only remaining remnant vegetation for an area. Roadside vegetation is valued as critical wildlife corridors and habitat for rare and threatened plant species (Tiang et al. 2021) as well as having aesthetic and amenity benefits (Native Vegetation Council 2018). Conversely, vegetation along roadsides is often thought to present a heightened fire risk (increased fuel load) (Molina et al. 2019) and/or prevent safe access and escape during an active bushfire incident. Whether roadside vegetation increases or decreases the risk to life, assets or biodiversity, depends on many factors. In Southern Spain, the biotic and abiotic features of the roadside vegetation, such as dominant species or morphotype, connectivity to other stands of vegetation, flammability of species or communities, overall fuel load, and weather/climatic conditions, have all been used to determine the risk or impact of fire via likelihood modelling (Molina et al. 2019). While high levels of fine fuels may cause a high fire hazard (DENR, 2012), other types of vegetation such as native grasslands and trees also serve as important fire breaks (Walker & Morgan 2022). The roadside vegetation and bushfire cause and effect discussion is complex and dependent on various factors that are often interrelated. Indiscriminate vegetation clearing along roadsides to lower fuel levels, is not necessarily an appropriate or effective way to completely reduce fire risk as other influencers may still be present. To address this, it is critical to educate the community on how to assess and identify risk at the site-specific level.

#### Key messages

- Roadside vegetation has a critical role to play in the landscape as it supports biodiversity, provides ecosystem services, and has an amenity value.
- Roadside vegetation will burn, as will all other vegetation, however there is no evidence to suggest that all roadside vegetation will solely cause a “fire wick” as the spread of fire is dependent on other factors such as climate, topography and preceding weather conditions.
- Maintaining a “defendable” space around assets will reduce the vulnerability of assets to roadside vegetation fire.
- Fire within roadside vegetation can create a safety risk of obstructing access and egress for fire response (i.e., suppression and protection of biodiversity assets) therefore roads and tracks need to be maintained accordingly.
- Individuals can reduce their risk from being “trapped” by a fire along a roadside if they decide to leave early, as is recommended by the CFS.

## *Spotlight 2: Designing restoration projects with multiple benefits – reducing bushfire exposure, improving biodiversity and mitigating against climate change*

Summary: Revegetation and restoration projects can be designed to benefit biodiversity and mitigate against climate change via carbon sequestration, while also contributing to reducing bushfire risk. Many non-native species are known to increase fuel loads or spread of fire, increasing the associated risk of exposure to fire (Setterfield et al., 2013; Ehrenfeld, 2010). There is also concern that revegetation and restoration projects will increase the risk of exposure to bushfires (Jellinek et al. 2013). Review of the relevant literature indicates that although revegetation activities may increase the available fuel load, it does not fundamentally increase the risk of exposure to bushfires.

### Key messages

- Invasive weed species such as gorse and introduced pasture grasses are highly flammable and can be a greater fire risk compared to native species.
- There are examples of “green fire breaks” being effective in reducing exposure to bushfires however these are overseas examples in settings dissimilar to the RH&C region.
- Using fire simulation models, pasture fuel loads had a greater influence on fire risk when compared to a revegetation planting.

## *Spotlight 3: The multiple functions of best-practice fire management: addressing fuel reduction, asset protection and biodiversity resilience.*

Summary: “Best practice fire management” that considers fire risk from multiple viewpoints may be able to appropriately reduce fire fuels while maximising asset protection and biodiversity resilience. Currently, there are many guidelines and information resources that claim to be “best practice” but are only considerate for certain contexts (e.g., fuel reduction only). As defining “best practice fire management” is a complex challenge, Driscoll et al. (2010) developed a decision theory framework to help fire managers to choose the best actions to meet multiple objectives, i.e., reducing fire fuel near assets while not impacting local biodiversity or threatened species. This approach would require substantial collaboration across organisations/groups, government sectors, and community to be effective.

### Key messages:

- It was noted that there is deficient or ambiguous information about how to effectively balance asset protection and biodiversity. This was also documented in the Royal Commission into National Natural Disaster Arrangements (2020).
- Information on best-practice management is typically targeted towards singular objectives and rarely multiple objectives such as balancing the reduction of fuel load to address bushfire risk while also improving or maintaining biodiversity.
- There are principles for “best-practice fire management” that could be used to develop future work, and a decision-making framework that could be adapted to assist landowners to identify strategies to reduce their fire risk, and how they impact on biodiversity.
- Potential biodiversity impacts in response to prescribed burning, will depend on frequency and scale, and also connectivity to a large area of vegetation.



- Where possible, fire management should address multiple objectives such as reducing bushfire exposure and protecting local biodiversity and nature.

#### *Spotlight 4: The differential exposure to bushfire hazards and engagement with bushfire preparedness activities due to socio-economic factors*

Summary: The 2019/2020 bushfires impacted 19 million hectares in Australia and caused an estimated \$4 to \$5 billion of economic loss. Studies indicate that there is also greater and unequal bushfire exposure across different demographic groups, where those within a lower socio-economic situation are likely to be disadvantaged (Akter and Grafton 2021). This suggests that if bushfire preparation is to be inclusive of all demographics, including vulnerable groups, then all regions and all communities should be prioritised. Identification and quantification of the socio-economic factors that affect bushfire exposure may help to guide education and support programs to improve future resilience.

#### Key messages:

- There are many factors for poor bushfire preparedness which can include social isolation, language barriers, knowledge of local area, and access to particular communication platforms.
- There is evidence that people in disadvantaged socio-economic situations are more vulnerable and exposed to bushfire risks, often due to remoteness; and that there may be lower levels of concern and awareness of natural disasters compared to the non-low socio-economic group.

#### *Spotlight 5: Strategic bushfire preparation activities to reduce long-term biodiversity impacts*

Summary: There is considerable information on biodiversity bushfire recovery and the required actions to mitigate against biodiversity loss, however, there is less focus, or evidence, on bushfire preparation activities to reduce long-term biodiversity impacts. Prescribed burning is increasingly being implemented to reduce the likelihood of catastrophic, intense, and large-scale fires, and the inability of species to recover. The ability to reduce bushfire impacts on biodiversity will depend on scale, intensity, connectivity, and other population mitigation strategies that have been implemented, and the specific target species and/or vegetation community.

#### Key messages:

- There is support for the use of prescribed burns to achieve fire risk reduction and ecological goals under the right circumstances.
- Weed management, population loss mitigation strategies, and improving information availability and knowledge for fire managers are three key areas that should be considered to improve biodiversity resilience.
- The relationship between fire and biodiversity, is extremely complex and further research is required to understand the response of specific species and ecosystems to fire (prescribed and unplanned) and management actions.

#### *Spotlight 6: Integrating biodiversity-focused representation into incident management teams*

Summary: Australian states and territories operate different models for incorporating biodiversity-focused representatives into fire incident management teams. Natural assets such as national parks are generally recognised as important and valuable, and individuals with biodiversity knowledge are increasingly being incorporated into emergency response teams during bushfire emergencies. These individuals advise on priorities and on the ecological impacts of firefighting strategies, e.g., identifying

and protecting the highest value areas, or advising on appropriate placement of containment lines. However, “natural values” representatives have more decision-making authority in some jurisdictions than others. During the Black Summer bushfires, 2019-2020, where natural values officers’ roles were advisory rather than part of the decision-making hierarchy, actions to protect biodiversity assets sometimes came down to staff availability, and the confidence and assertiveness of individual natural values officers to advocate for the protection of particular assets in the incident room (de Bie et al., 2021). Biodiversity assets were sometimes sacrificed in order to protect property, such as sheds being prioritised over protecting a national park (de Bie et al., 2023). This spotlight study examines the models that operate in South Australia, which has a large but advisory Natural Values Team, and Victoria, which designates an individual as Victoria’s Wildlife Controller during emergencies.

Key messages:

- Continue to have individuals with knowledge of local biodiversity conservation embedded within incident management teams is key to ensuring that important biodiversity assets are prioritised during bushfire emergency responses.
- In some Australian states, biodiversity representatives’ roles are advisory, while in others they hold decision-making power. Where they lack decision-making power, there is greater risk of biodiversity assets being de-prioritised in fire-fighting operations.
- South Australia has a well-established Natural Values Team that routinely advises on fire-fighting priorities, but it lacks decision-making power. By contrast, Victorian emergency management legislation embeds a Controller-level position within the decision-making hierarchy during emergencies.

*Spotlight 7: Using community connection to nature to modify behaviours and attitudes towards fire management for biodiversity, highlighting iconic species*

Summary: As human populations are becoming increasingly urbanised, people have less opportunity to be immersed and connected to nature. Research has indicated that nature connectedness is positively associated with “pro-environmental” behaviours (Martin et al., 2020). Similarly, in a survey of Adelaide Mount Lofty Ranges and Lower Eyre Peninsula residents, most people reported that they have a connection to the nature on their property and surroundings, and that they want to see more protection of biodiversity (Moskwa et al. 2018). Most of these residents (90%) also indicated that they believe biodiversity is important to consider in bushfire policy. These findings indicate that fostering residents’ connection to nature may shift or strengthen their attitudes towards implementing fire management strategies that also benefit biodiversity.

Key messages:

- There is conflict in both policy and public views, in the context of vegetation management: Current policy favours risk mitigation over biodiversity protection, yet residents of the Mount Lofty Ranges evenly support a focus on bushfire risk and biodiversity in vegetation management.
- There needs to be an improved understanding of bushfire risk mitigation and the conservation of biodiversity by landowners, researchers and those involved in policy, planning and land management. This was referred to as having a “sophisticated understanding” that could drive behavioural changes so people can live successfully and sustainably with bushfire.

- Showcasing iconic species could help to boost public connection with nature and increase knowledge around the complexities of vegetation management for biodiversity protection.

### *Spotlight 8: Integrating weed management and native grass restoration to reduce bushfire risk and improve biodiversity*

Summary: Weed invasions and infestations are a common and ongoing issue in rural, peri-urban, and urban areas. Weeds such as perennial pasture grasses or other non-native herbs, increase fuel loads in native ecosystems such as grasslands, and across the landscape more broadly. Within the Adelaide and Mount Lofty Ranges (AMLR) area, an estimated 99% of native grasslands and 90% of grassy woodland ecosystems have been lost since colonisation (Fairney, 2022). Native grasslands have a lower fuel load compared to exotic species (Bull, 2011 -see Figure 1). Many native grass species remain green in summer and are considered by some to mitigate against bushfires (Delpratt, 2018b; Myers, 2014). Research has shown that fuel loads increased by two times, and fire intensity by up to three times, in grasslands invaded with exotic species compared to uninvaded native kangaroo (Themeda triandra) grasslands (Walker & Morgan, 2022). High fire intensity and changed fire regimes negatively affect biodiversity (Gill et al., 2014). It is therefore suggested that best-practice weed management at an appropriate scale and location, may improve biodiversity outcomes, as well as reducing bushfire risk to built assets and human life. This spotlight study discusses several examples of fuel reduction restoration and weed control management.

#### Key messages:

- Native grassland habitats are poorly represented in the RH&C region, and restoration projects that combined weed management with native grass restoration, at the right scale and location with adequate investment, could reduce fire risk and improve biodiversity outcomes.
- Grasslands invaded with weeds can have far higher fuel load and increased fire intensity risk compared to uninvaded native kangaroo grass ecosystems, but require ongoing maintenance to reduce weeds and biomass.
- Landscapes Hills and Fleurieu is already promoting the use of native grasses to reduce fire risk, and this messaging could be expanded throughout the RH&C region to foster public support for the use of native grasses in restoration, and conservation on private land.

### *Spotlight 9: Management of novel habitats – balancing fire risk and biodiversity resilience*

Summary: The concept of novel ecosystems, and their role and function in biodiversity conservation, continues to be debated (Miller and Bestelmeyer, 2016). Novel ecosystems are modified components (biotic and abiotic) of an ecosystem, resulting from human induced actions and interventions. This does not mean that novel systems and habitat have no biodiversity value, and there is a risk that if community and households view these habitats (as they are usually weedy) as a fire risk and thus reduce or remove them. This has implications for the biodiversity assets that rely on them. Dense blackberry (an introduced species) thickets occur throughout the Mount Lofty Ranges with considerable accumulation of dead plant material that is considered a high fuel load and bushfire hazard. Although an introduced species and declared weed, blackberry can also function as critical habitat for the endangered southern brown bandicoot (*Isoodon obesulus obesulus*) when good quality native habitat is absent (Packer et al., 2016). Other threatened native species have adapted to using novel habitats, such as yellow-tailed black cockatoos (*Calyptorhynchus funereus whitei*) that rely on the introduced Aleppo pines as a crucial alternate food source (Milne, 2020). An evidence based and site-specific approach is required that

balances out bushfire risks with maintaining areas that are currently being used, or those that have a connectivity value, for these threatened species.

Key messages:

- Novel ecosystems may be important for biodiversity, especially where good quality native habitat is absent.
- One novel ecosystem example is blackberry thickets: Current legislation requires landowners and (in some situations) landscape boards, to control blackberry, but in some locations it is important habitat for endangered southern brown bandicoots, who use the dense cover to shelter from predators and as a corridor of connectivity to patches of fragmented/degraded landscapes.
- When undertaking fire preparation and risk management, biodiversity assets and habitats with a known or potential to support biodiversity, should be considered at each site, but also within a broader landscape and population viability context.
- When removing weeds in novel ecosystems, a gradual and adaptive approach should be taken that integrates restoration of native vegetation, and considers the overarching conservation goals like habitat connectivity and ecosystem function.

*Spotlight 10: Provision of landscaping advice to landowners and households that will consider bushfire risk reduction and biodiversity conservation*

Summary: As there is an increasing trend towards people moving into peri-urban environments, such as those that exist within the Resilient Hills and Coast footprint, bushfire risk to property, life, and livelihood also increases. This presents several challenges, largely around balancing bushfire “prevention” and biodiversity protection within the peri-urban setting (sometimes referred to as wildland-urban interface). Public and private green spaces, that being open-air natural or vegetated spaces, with native or non-native plant species, are valued for their health, wellbeing, recreational, biodiversity and community connectedness benefits. However, they could also be considered a fire risk if adjacent to, or surrounding, residential properties. As development and population increases, there is growing demand for public green spaces and this could impose additional stress on owners such as local council, to create and maintain the space, and to ensure that bushfire risk is minimised. Conversely, property owners will need to be diligent with their own bushfire preparedness to reduce the risk of a fire starting on their property and moving into public green spaces. As urban fringe development brings populations closer to conservation parks, there is an increased use of prescribed burning to address bushfire risks (Westerling 2008). The “wildland-urban interface” of South-west WA presents a strong case study with interview data suggesting that community acknowledge, and are concerned by, the prescribed burning impacts on biodiversity. More specifically, analysis found that bushfire policy within these “wildland-urban interfaces” have trade-offs for biodiversity, nature, wellbeing, and regional fiscal growth (Ruane et al 2022).

Key messages:

- Provision of clear landscaping advice for landowners is crucial in reducing the risk of exposure to bushfires.
- Landscaping guidance should include information regarding plant selection, garden design, native vegetation management, and infrastructure design while balancing risk reduction and biodiversity conservation.

- Substantial information exists but fit-for-purpose guidance with a South Australian focus (and RH&C region) could be developed further to provide households with the capacity to be better prepared against bushfires, without unnecessarily impacting on biodiversity.

### *Spotlight 11: Managing urban and peri-urban green spaces to reduce the risk of exposure to bushfires*

Summary: As there is an increasing trend towards people moving into peri-urban environments, such as those that exist within the Resilient Hills and Coast footprint, bushfire risk to property, life, and livelihood also increases. This presents several challenges, largely around balancing bushfire “prevention” and biodiversity protection within the peri-urban setting (sometimes referred to as wildland-urban interface). Public and private green spaces, that being open-air natural or vegetated spaces, with native or non-native plant species, are valued for their health, wellbeing, recreational, biodiversity and community connectedness benefits. However, they could also be considered a fire risk if adjacent to, or surrounding, residential properties. As development and population increases, there is growing demand for public green spaces and this could impose additional stress on owners such as local council, to create and maintain the space, and to ensure that bushfire risk is minimised. Conversely, property owners will need to be diligent with their own bushfire preparedness to reduce the risk of a fire starting on their property and moving into public green spaces. As urban fringe development brings populations closer to conservation parks, there is an increased use of prescribed burning to address bushfire risks (Westerling 2008). The “wildland-urban interface” of South-west WA presents a strong case study with interview data suggesting that community acknowledge, and are concerned by, the prescribed burning impacts on biodiversity. More specifically, analysis found that bushfire policy within these “wildland-urban interfaces” have trade-offs for biodiversity, nature, wellbeing, and regional fiscal growth (Ruane et al 2022).

#### Key messages:

- Effective management of urban and peri-urban greenspaces is heavily dependent on planning and design, continued management, and policy requirements.
- While there are some fire risks associated with urban green spaces and vegetation, prescribed burning in native vegetation and the use of low flammability plants in constructed green spaces, are key management actions to reduce the risk of exposure to bushfires.
- Appropriate planning and design are also crucial to ensure adequate access and egress from houses, neighbourhoods, and regions in a bushfire risk situation.
- A review of current policy on zoning, roads, and urban green spaces may identify conflicts or uncertainty about preparedness activities and obligations.

### *Spotlight 12: Educating and training landowners, households and community on best practice fire management and biodiversity – the New South Wales Hotspots Program as an exemplar*

Abstract: Improving community expertise and confidence has been identified as a key requirement for resilience in semi-urban bushfire affected and fire prone communities (Pooley et al., 2010). This approach is exemplified by the New South Wales Hotspots Fire program (hereafter referred to as Hotspots or the Program) that aims to “increase community understanding, confidence, and capacity to sustainably manage fire for ecological and First Nations cultural outcomes, whilst protecting life and property”. The Program is an across-agency and across-sector partnership that utilises a multi-disciplined approach of fire preparation, fire ecology and first-nations knowledge. Through targeted

and customised education materials, workshops, demonstrations and field days, community have been empowered to make better decisions. This approach could be readily adapted to the Resilient Hills & Coasts region if co-designed and piloted with key stakeholders.

Key messages:

- The principles of the Hotspots program align with bushfire preparedness and biodiversity protection objectives, through building resilience by creating well prepared and well-informed communities who can support fire agencies and land managers in their fire management planning, without compromising biodiversity conservation.
- Biodiversity conservation in fire management is showcased by the Hotspots program which “provides private landowners and land managers with the skills and knowledge to actively participate in fire management for the protection of life and property, while at the same time ensuring biodiversity is protected and maintained” (NSW Rural Fire Service n.d - [here](#)).
- The outcome of the Hotspots workshops is that landowners learn about fire ecology, see a demonstration burn (weather permitting), create a Fire Management Plan for their own property with help of Hotspots personnel, and are empowered to organise a prescribed burn on their property with the NSW Rural Fire Service. Some landowners form on-going groups to share knowledge and hold follow-up discussions with Hotspots personnel.

## 8. Future opportunities

### 8.1 Potential project, programs, and products

There are many possible projects, programs, products, and outputs that complement bushfire preparedness and biodiversity conservation objectives. These can also fill an existing knowledge gap, or strengthen existing activities/information, to ensure effective bushfire preparedness and biodiversity conservation. These potential opportunities were identified through the literature review, development of the spotlight studies and feedback from stakeholders. They have been assessed by NCS, in the context of the RH&C Bushfire and Biodiversity Project and the need for change (see section 4) and prioritised according to:

- Do immediately (high impact and low to medium effort and investment) – potential for quick and critical achievements. These may not require funding.
- Schedule and plan (high impact and high effort and investment) – major project/work that should be well planned and scheduled within funding sought and secured.
- Fill in (low impact and low effort and investment) – it can be implemented when there are work “gaps”.
- Postpone or delegate elsewhere (low impact and high effort and investment) – this requires considerable investment and/or could be out of scope and is likely to have a lesser impact or result.

In some cases, the identified output was considered a deliverable that could be incorporated into the other options. This is noted as “integrate”.

The prioritisation approach used by NCS can also be used by RH&C when designing future projects to assist with ranking and selecting key activities (see Figure 7).

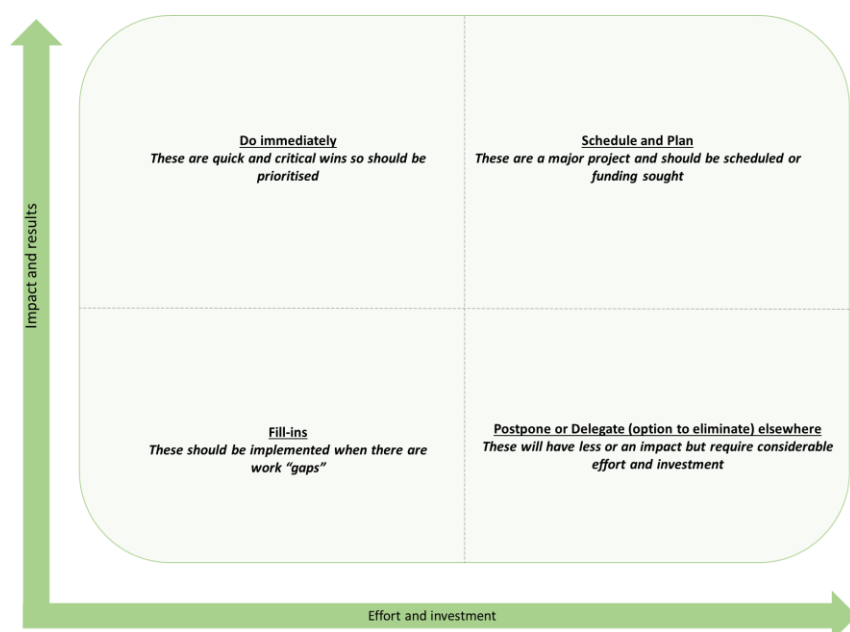


Figure 7: Example prioritisation matrix

The range of options that were derived from the literature review, spotlight studies, stakeholder consultation and final review of this draft discussion paper are provided as Table 2.

The options that are considered to have the greatest impact or result, “do-immediately” and “schedule and plan” have been further appraised and scored using an additional set of criteria (Table 3). Based on the results from scoring and ranking, the NCS have short-listed five specific projects that are recommended for future funding, these are discussed within section 8.2 and evaluated against a SWOT analysis framework (strengths, weaknesses, opportunities, and threats) – see section 8 and Table 4.

**Table 2: Potential deliverables that could address the objectives of community and biodiversity resilience in preparation of bushfires and climate change (note -source=the information that assisted with generating the idea and end-user=the people that the product/service is intended for).**

Ref.	Option	Source	End-user (assumes RH&C will also be end-user)	Notes/justification	Supported by > 3 of the RH&C representatives	Recommendation
1	Educating and training landholders, households and community on best practice fire management and biodiversity conservation	Literature review, spotlight study #12 and discussion with stakeholders	Community, households, landholders, first nations peoples, councils	<ul style="list-style-type: none"> <li>Several models that serve as a foundation for applying within Resilient Hills and Coast (Queensland, NSW and Tasmania).</li> <li>High likelihood of success if adequate investment and across-agency collaboration.</li> <li>Allow time for co-design and then test over a period of 3 years with a view to have as a long-term project.</li> <li>Can deliver outputs from many of the other identified options.</li> </ul>	Yes	Schedule and Plan
2	Develop a feasibility study OR proof of concept for a spatially explicit bushfire and biodiversity model that meets the needs of local council decision making	Literature and discussions with stakeholders	Council officers (FPO, biodiversity and planning)	<ul style="list-style-type: none"> <li>In response to the 2019/20 bushfires, there are various models in progress, or being planned for development and there is a risk of duplicating work that will be delivered via a different agency or missing out on an opportunity to review the usefulness of new models (that can be applied to RH&amp;C).</li> <li>In terms of “time-critical” it can be postponed.</li> <li>This might be better delivered by DEW or CFS.</li> </ul>	No	Postpone or delegate
3a	Assessing, evaluating, and communicating the outcomes from fire management within RH&C region	Literature and discussions with stakeholders	Council, decision makers, community	<ul style="list-style-type: none"> <li>Collaboration between FPO and biodiversity officers, supported by DEW and CFS, to evaluate outcomes from previous fire management activities.</li> <li>A MERI framework will be developed at the commencement of the project to provide the foundation for evaluating and communicating outcomes.</li> </ul>	No	Integrate
3b	Identify, establish and showcase “best-practice” demonstration sites within the RH&C region	Literature, spotlight studies, discussions with stakeholders	Community, households	<ul style="list-style-type: none"> <li>There is an assumption that these sites exist, or there are candidate sites that could be established.</li> <li>As fire, and its interaction with biodiversity and climate is so complex, learnings from</li> </ul>	No	Integrate



Ref.	Option	Source	End-user (assumes RH&C will also be end-user)	Notes/justification	Supported by > 3 of the RH&C representatives	Recommendation
				a demonstration site might not be widely applicable.		
4	Funding First Nations groups to propose an engagement and involvement model for bushfire and biodiversity resilience	Literature, discussion with stakeholders	First nations groups, community, councils	<ul style="list-style-type: none"> <li>Ensures meaningful engagement and partnerships and provides first nations people with the opportunity to determine how they want to be engaged and involved.</li> <li>It is noted that Mt Barker Council is delivering the Fire to Flourish project that will work with traditional owners to explore fire management - <a href="#">here</a></li> </ul>	Yes	Schedule and Plan
5	Create and fund a “Bushfire and Biodiversity Advocate” role—addressing ambiguities and tensions	Literature, spotlight studies and discussion with stakeholders	All RH&C stakeholders, particularly those involved in the next stage	<ul style="list-style-type: none"> <li>It could be a critical precursor to other options.</li> <li>It can be delivered through the current RH&amp;C partnership model, if funding is secured.</li> <li>The position would work closely with the biodiversity sector and the bushfire management sector, including CFS, council FPO’s and the Bushfire Management Committees (BMCs).</li> <li>The position (or project) could advocate for change, including policy and planning reform and be involved in the creation of the new Biodiversity Act.</li> </ul>	Yes	Schedule and Plan
6	Using nature to activate and build up community resilience within Resilient Hills and Coast	Literature, spotlight studies and discussion with stakeholders	Community, households	<ul style="list-style-type: none"> <li>This is considered more of an “approach” rather than a stand-alone deliverable.</li> <li>Opportunity to use this approach for many other suggested options.</li> </ul>	Yes	Integrate
7	Self-assessment mapping tools for use by the general public to identify their fire danger based on location, property and personal preparedness.	Literature review (including review of other states and territories)	Community and general public	<ul style="list-style-type: none"> <li>It is possible that elements of BMAP2 could address this.</li> <li>This is best delivered and overseen by CFS (NSW tool was via their fire agency).</li> <li>Considerable investment that is relevant across South Australia, not just the RH&amp;C region.</li> <li>Currently there is insufficient information for the tool and will require more research and information collation.</li> </ul>	No	Schedule and Plan
8	Mapping or identifying known sites where roadside vegetation was less impacted by a recent fire, even though	Spotlight study (#1), discussion with stakeholders	Community	<ul style="list-style-type: none"> <li>Useful for addressing roadside vegetation as a fire risk (or acting as a “fire wick”) however there are many other co-variables that could have influenced the roadside being unburnt (wind,</li> </ul>		Postpone or delegate

Ref.	Option	Source	End-user (assumes RH&C will also be end-user)	Notes/justification	Supported by > 3 of the RH&C representatives	Recommendation
	surrounding areas were burnt.			<p>firefighting efforts, topography etc).</p> <ul style="list-style-type: none"> <li>This option could also be an output of one of the other recommended options.</li> </ul>		
9	Repeating a community survey to better understand household attitudes about bushfire prevention strategies and biodiversity after the 2019/20 fires	Spotlight study (#4, #7), literature review, discussion with stakeholders	RH&C and committee members, councils	<ul style="list-style-type: none"> <li>This will require considerable investment with potentially little impact, as the results from the survey could be the same as pre 2019/20 bushfires.</li> <li>This information probably already exists via Fire Prevention Officer knowledge and experience and/or BMCs</li> </ul>		Fill-in
10	Develop a “best-practice” framework and guidelines for decision making about revegetation and property management for climate mitigation, biodiversity and reducing bushfire risk	Case study (#2, #43 #8), literature review, discussion with stakeholders	Community, households, and council officers	<ul style="list-style-type: none"> <li>The document could also include foundational information (currently provided by NVC and CFS) on landholder responsibilities and legal requirements and basic fire ecology. It is expected that considerable desk-top research will be required and consultation with many stakeholders.</li> <li>Possibly legal implications if providing this advice.</li> <li>Arguably, a lot of this information already exists (CFS, DEW, NVC, Councils). Should this information be provided under the auspices of a climate alliance? Or is it better provided by a statutory agency (NVC, CFS)?</li> </ul>		Postpone or delegate
11	Across-agency partnership to develop fire notes specifically on fire and biodiversity, that is based on evidence (as done in WA) – select iconic species and communities.	Spotlight study (#5, #7, #9)	DEW, CFS and council officers	<ul style="list-style-type: none"> <li>This provides an opportunity to educate people on the use of novel habitats by threatened species and ensure that it is management appropriately (e.g. spotlight study 10 – bandicoot and blackberry).</li> <li>Provides Fire Prevention Officers with information to share with landowners and households (and evidence about what should and shouldn't be cleared/managed).</li> <li>Can mobilise support for prescribed burning/ecological burns if community are better educated.</li> <li>Core work that is undertaken by DEW, however RH&amp;C priority could be sourcing this information and developing into “RH&amp;C Bushfire and Biodiversity Technical Notes”.</li> </ul>		Integrate

Ref.	Option	Source	End-user (assumes RH&C will also be end-user)	Notes/justification	Supported by > 3 of the RH&C representatives	Recommendation
12	Expand to role of the Natural Values team to work across councils in RH&C, to identify priority biodiversity areas and management risks to these assets.	Spotlight study (#5, #6)	DEW and council officers	<ul style="list-style-type: none"> <li>This could be challenging as DEW staff are unlikely to have the time and resources to do this, and it may be out of scope of their role.</li> <li>At a minimum, regular workshops or QnA sessions (i.e., twice/year) between key NV team (relevant to RH&amp;C region) and council staff would be beneficial.</li> </ul>		Fill-in
14	Develop “fire-wise” peri-urban land management for bushfire preparation and biodiversity protection (landscaping and management of green spaces)	Literature review, spotlight studies (#10, #11)	Community, households, councils and other landowners, schools, building sector	<ul style="list-style-type: none"> <li>Addresses the increased fire risk of MLR peri-urban landscape, and the biodiversity threats in this area.</li> <li>Facilitates collaboration with other climate alliances.</li> <li>A multi-disciplinary approach that requires also working with developers, landscape architects and builders.</li> </ul>		Schedule and Plan
15	Evaluating outcomes from burning for biodiversity and bushfire preparation in the RH&C region – setting future directions and shared responsibilities.	Literature review (including review of other states and territories i.e. Tasmania review)	RH&C stakeholders and possibly community and households	<ul style="list-style-type: none"> <li>A lot of this work is already being delivered via DEW and CFS.</li> <li>The emphasis would be on sourcing the information, analysing monitoring data.</li> <li>Future priorities are already scheduled via DEW Burning on Private Lands program - risk of duplication?</li> </ul>		Postpone or delegate
16	Supporting local government to develop an “Integrated RH&C Biodiversity and Bushfires Management” Framework.	Literature review (including review of other states and territories)	Council	<ul style="list-style-type: none"> <li>Provides a framework for councils to better understand how to manage (on their land) or advise others, about managing properties.</li> <li>Facilitates an across-tenure and across-council approach.</li> <li>Content development can be overlaid with specific council requirements, and consideration of overarching foundational documents (bring together key objectives and KPI's under RH&amp;C Plan.</li> </ul>		Schedule and Plan
17	Data mapping to identify what information is available (and who manages it) and what data is missing (as required by stakeholders) and cost-benefit-application of current mapping tools.	Literature review and stakeholder discussions	Council, community and other decision makers	<ul style="list-style-type: none"> <li>Ensures transparency about what data is available and who has the data (and where the data can be sourced).</li> <li>Provides opportunities for local decision makers to identify what data they need to inform their operation and delivery.</li> <li>Identifies any overlap to ensure future efficacy.</li> </ul>		Schedule and Plan

Ref.	Option	Source	End-user (assumes RH&C will also be end-user)	Notes/justification	Supported by > 3 of the RH&C representatives	Recommendation
18	Advocate for change	Stakeholder discussions and stakeholder review.	Various	<ul style="list-style-type: none"> <li>Enables quick wins that don't necessarily require funding or investment.</li> <li>The outcomes from the advocacy would be considerable.</li> <li>The advocacy and support could be provided by local councils and other members of the RH&amp;C project.</li> <li>Adds value to other work that is occurring.</li> </ul>	Yes	Do immediately
19	Formalise a bushfires and biodiversity Community of Practice for ongoing sharing of information and working collaboratively	Stakeholder discussions and stakeholder reviews.	Local council, DEW, landscape board, planners, developers, environmental organisations	<ul style="list-style-type: none"> <li>Enable ongoing sharing of information to ensure that work undertaken by councils, DEW and the CFS complements but doesn't duplicate.</li> <li>Ensures opportunities for collaborations and partnerships.</li> <li>Will allow adaptability as people/organisations can opt in or opt out, depending on the priorities and focus.</li> <li>It can be convened by one of the RH&amp;C partners, and extended to other local council region.</li> <li>Provides an opportunity to work closely with BMCs and Fire Prevention Officers.</li> </ul>	Yes	Do immediately

Table 3: Scoring of the high impact-high result “do immediately” and “schedule and plan” options using multiple scoring criteria.

OPTIONS FOR CONSIDERATION  <sup>1</sup> does not require funding (although it might help)	Criteria - Score 0-3 (0=unlikely, 1=possible 2=likely 3=highly likely)									Relevance to political, economic, social, technological, environmental and legal factors. Symbol representation = X (no)? (possibly), ✓ (yes)					
	Lost cost: High benefit	Social licence	High return on investment	Negligible assumptions (less assumptions=higher score)	Future proofing	Addresses community fear/anxieties	High risk if no action is taken	Currently does not exist	Total Score	Political	Economic	Social	Technological	Legal	Environmental
Educating and training landholders, households and community on best practice fire management and biodiversity conservation.	1	3	2	2	2	3	3	3	19	?	X	✓	✓	✓	✓
Develop “fire-wise” peri-urban land management information and tools for bushfire preparation and biodiversity protection (landscaping and management of green spaces).	2	3	2	1	3	3	3	1	18	?	✓	✓	✓	?	✓
Advocate for change <sup>1</sup>	3	1	2	1	3	2	2	3	17	✓		✓		✓	✓
Create and fund a “Bushfire and Biodiversity Advocate” role– addressing ambiguities and tensions.	1	2	2	1	3	2	3	2	16	✓	X	✓	?	✓	✓
Formalise a bushfires and biodiversity Community of Practice.	3	2	2	1	2	1	1	3	15	✓		✓			

OPTIONS FOR CONSIDERATION  <sup>1</sup> does not require funding (although it might help)	Criteria - Score 0-3 (0=unlikely, 1=possible 2=likely 3=highly likely)									Relevance to political, economic, social, technological, environmental and legal factors. Symbol representation = X (no)? (possibly), ✓ (yes)					
	Lost cost: High benefit	Social licence	High return on investment	Negligible assumptions (less assumptions=higher score)	Future proofing	Addresses community fear/anxieties	High risk if no action is taken	Currently does not exist	Total Score	Political	Economic	Social	Technological	Legal	Environmental
Data mapping to identify what information is available (and who manages it) and what data is missing (as required by stakeholders) and cost-benefit-application of current mapping tools.	2	1	2	2	2	1	3	2	15	✓	X	X	✓	✓	✓
Funding First Nations groups to provide RH&C stakeholders with a model of engagement and involvement.	2	1	2	2	2	1	3	2	15	✓	X	✓	X	X	✓
Self-assessment mapping tools for use by the general public to identify their fire danger based on location, property and personal preparedness.	1	2	2	1	1	2	1	3	13	?	X	✓	✓	X	✓
Supporting local government to develop an "Integrated RH&C Biodiversity and Bushfires Management" Framework.	2	1	1	2	2	1	1	1	11	✓	X	X	?	✓	✓

## 8.2 Recommended options for future funding

The two options that are proposed, and do not require funding are briefly discussed below.

### *RH&C partners work together and advocate for change*

Members of the RH&C could work together to develop mutually agreed position statements, and publicly advocate for change that will improve bushfire preparedness, community resilience and biodiversity protection. Although focussed on the RH&C region, this could have a state-wide benefit as many of the advocacy issues are relevant across South Australia. Some of the key issues that will result in positive change includes:

- a strong South Australian Biodiversity Act that uses evidence to prioritise the protection of the state's nature and biodiversity.
- Seeking and supporting greater investment in initiatives that achieve multiple outcomes (such as biodiversity protection, bushfire preparedness and community resilience).
- The need for increased and longer-term investment in bushfire prevention and preparedness activities.
- The need to review planning laws, codes and regulations in context of the current and future peri-urban expansion, to reduce bushfire exposure to people, and ensure ongoing protection of biodiversity assets that often remain as remnants within the peri-urban setting.
- Use the term “shared-responsibility” and highlight that it needs to be applied equally to biodiversity protection and bushfire prevention.
- Identify the value of new research that addressed knowledge gaps, and development of self-assessment tools that enable landholders and households to monitor and evaluate the fire risk and biodiversity assets on their roadsides (as an example).

### *Formalise a bushfire and biodiversity Community of Practice.*

One of the key messages from stakeholder consultation was the importance of collaboration and ongoing open communication. It was also noted that the RH&C Bushfire and Biodiversity project was highly valued for generating a discussion (amongst stakeholders) about the importance of identifying biodiversity values (and potential threats to these values) in the context of climate change and bushfire preparedness, and the opportunity it provided participating members to stay abreast of new and emerging work.

Ongoing communication across these project partners is critical and to do this the partners could formalise their partnership as a Community of Practice (with a Terms of Reference as agreed) to ensure members are aware and support new and future work, work together to provide solutions and are aware of developing issues. The Community of Practice could include additional stakeholders such as council planners, FPOs, BMCs, Department for Infrastructure and Transport, SA Water and SA Power Network and bring in other sectors (such as planning, developers, businesses).

The **five priority projects that are being recommended for future development** and funding are discussed in more detail in this section.

*Educate and train landowners, households and community on best practice fire management and biodiversity conservation.*

This proposed project would seek to find the right balance between fire management to protect life, property, assets, and habitat and biodiversity conservation. Communities would be empowered through information provision, workshops, training days and demonstration sites. There are several programs that are implemented in other states that serve as an exemplar, including the NSW Hotspots Program, evaluated in spotlight study #12. Other similar programs include the Queensland ‘Fire and Biodiversity Consortium’ and Tasmania’s ‘Community Protection Planning Process’. The coordinated, cross-agency involvement and partnerships is a strength in the programs in other states and could be replicated within the RH&C region. There is also the opportunity to work across the three RH&C BMA’s (Fleurieu, Adelaide Mount Lofty Ranges and Kangaroo Island) thus involving additional Councils and associated climate ready initiatives (including Resilient South and Resilient East) or to focus on a specific region of RH&C, such as the high-risk peri-urban environment.

It is advised that this project carefully consider other bushfire resilience work that has been implemented within the RH&C region to ensure that there is no duplication, and focus on gap areas and priority stakeholders, and/or to consider a) the most vulnerable and exposed; and b) to protect/manage important biodiversity assets (this could include showcasing the use of fire to improve threatened species populations, improving habitat, or ensuring biodiversity resilience).

Research and stakeholder consultation indicated that the success of this type of project is based on it being delivered out of government, such as a partnership between the relevant fire agency and an environmental NGO.

This project could be implemented in two discrete stages 1) extensive review of biodiversity and bushfire community programs and co-design of project model (0-12months). This stage will focus on the design of the project and development of a detailed project management plan and case for change, 2) implementation of project in priority areas and priority communities (12 months to 3 years) as a pilot, with funds allocated to an independent and targeted review at the end of the 3 years.

<b>Example of project outputs</b>	<ul style="list-style-type: none"> <li>• Development of project model and long-term growth strategy (internal) and case for change (consultant – optional).</li> <li>• Selection of key areas and community groups, and demonstration sites</li> <li>• Development of information material, provision of training and workshops, identifying need and interest across the three BMAs</li> <li>• Review of effectiveness and recommendations for expanding the program, develop a case for change or business case for a long-term program (i.e., 10 years).</li> </ul>
<b>Timeline</b>	<ul style="list-style-type: none"> <li>• 3 years at a minimum</li> </ul>
<b>Approximate cost</b>	<ul style="list-style-type: none"> <li>• \$750,000 to \$1 million over three-year period. Includes wages for fire ecologist and CFS personnel/fire practitioner. Also funding for First Nations involvement.</li> </ul>

*Fund and support First Nations groups to be involved in bushfire management and biodiversity protection in the RH&C region.*

This project seeks to provide funding for First Nations people to work together to identify if, and how, they would like to be involved in bushfire and biodiversity initiatives within RH&C. It is acknowledged that since the 2019-2020 bushfires, there has been increased interest and support for cultural burns to manage fuel loads, enhance biodiversity and landscape resilience and facilitate First Nations people



connection with country (see section 4 in the literature review). It is also recognised that these objectives are often expressed by non-aboriginal people and the interest and/or desire to implement such work, needs to be at the discretion and initiation of First Nations people. Finally, NCS understands that effective fire management requires meaningful collaboration and partnerships between our first nations people, scientists, policy, decision makers and community – however the best way to achieve this cannot be proposed without initial direction and agreement from First Nations groups within the RH&C region.

It is suggested that a funded Cultural Liaison Consultant be established to identify senior members and representatives of First Nations groups and provide RH&C with a Communique or Position Statement that outlines how these partnerships can be best achieved and map out a path forward (including recommendations for on-ground interventions). Funding should also be available to cover honorariums for First Nations participation and workshops (including on-country options). This project could work with Mt Barker Councils project *Fire to Flourish* [here](#).

It is recommended that this project is only progressed if there has been consultation and agreement with representatives from RH&C First Nations groups.

<b>Example of project outputs</b>	<ul style="list-style-type: none"> <li>• Engagement of First Nations Consultant</li> <li>• Co-development (with consultant and representatives of First Nations groups) of project deliverables and milestones, production of “Proposal for engaging with RH&amp;C First Nations groups” and “First Nations Fire and Landscape Health Recommendations” (all of these to be agreed at the commencement of the project)</li> <li>• Presentations and workshops with communities that represents a range of demographics to improve understanding about First Nations deep cultural connection and knowledge of the landscape.</li> </ul>
<b>Timeline</b>	<ul style="list-style-type: none"> <li>• 2.5 years at a minimum</li> </ul>
<b>Approximate cost</b>	<ul style="list-style-type: none"> <li>• \$370,000. Including \$150,000 Cultural Liaison Consultant/s; \$100,000 honorariums/key experts; On-country workshops (First Nations people) \$100,000; workshops, meetings and demonstrations: \$20,000.</li> </ul>

*Fund a Bushfire and Biodiversity Advocate to address message ambiguities and policy tensions to ensure effective and consistent communication.*

This project would work across fire agencies, government, and the not-for-profit sector to identify the barriers to achieving better fire related outcomes for natural assets and biodiversity, without compromising safety and the protection of assets and property. Conflicts related to planning, environment risk assessment and operations could be identified and communicated to ensure all stakeholders were aware of current and emerging challenges.

It is also believed that accurate, consistent, and locally relevant communication is the most effective way of ensuring trust and uptake of information, ultimately contributing to buy-in of shared responsibility and community resilience against future change and events (see literature review and section 2 of this document). The spotlight studies include information and evidence that can be used to debunk common myths, however, the way this information is communicated, and the way it is disseminated, should be carefully planned to ensure the message is understood and trusted and provided to the right audience.

It is noted that this could be a precursor stage to the recommended project “Educate and train landowners, households and community on best practice fire management and biodiversity conservation”.

<b>Example of project outputs</b>	<ul style="list-style-type: none"> <li>• Engagement of Project Officer to identify the “grey areas” between fire management and biodiversity</li> <li>• Work closely with FPO’s to document tensions between bushfire preparedness and biodiversity</li> <li>• Prepare a community engagement plan that included agreed messages and communication style</li> <li>• Provide recommendations paper on how to resolve any policy or messaging tensions, test the agreed communication with a sample of demographic groups within the RH&amp;C region.</li> </ul>
<b>Timeline</b>	<ul style="list-style-type: none"> <li>• 2 years</li> </ul>
<b>Approximate cost</b>	<ul style="list-style-type: none"> <li>• \$290,000. Including 0.8 FTE Project Officer \$250,000, Consultant to work with stakeholders to develop agreed messaging and a communication strategy \$30,000 (includes surveys/interviews support), \$10,000 (includes consultant costs such as honorariums or fees for group representative). Additional operational expenses such as travel.</li> </ul>

*Pilot a “fire-wise” peri-urban land management project for bushfire preparation and biodiversity protection (landscaping and management of green spaces)*

Resilient Hills & Coasts and the State Bushfire Management Plan (Government of South Australia, 2021) identify the growing risk to life, property and biodiversity as the peri-urban environment expands, particularly within the Mount Lofty Ranges (see spotlight study #12). This peri-urban environment is the “interface” between urban development and rural or native bushland areas in Adelaide (Gurtner et al 2022). As these peri-urban environments become populated with increased housing density, there is increased exposure to bushfire hazards (Gurtner et al 2022) and greater risk to biodiversity (Bardsley et al 2005). Research suggests that the peri-urban environment has a human population of “dynamic and heterogenous communities” (Koksal et al 2020) that may have diverse needs, expectation, and behaviour (Gurtner et al).

This project is recommended to commence by mapping the peri-urban environment and identifying the specific bushfire risks and the biodiversity assets within the area. This could be limited to the RH&C region or expanded to include other areas within the Mount Lofty Ranges and draw in other climate alliance partnerships such as Resilient South and Resilient West. The project would seek to have an in depth understanding about values and priorities of the peri-urban demographic group to understand how information could then be tailored, communicated and how the community would like to be engaged. The specific bushfire risk to peri-urban residents, and the threats to biodiversity from peri-urban developments, would be communicated to key communities and priority demographic groups. It is suggested that a range of tools be considered including brochures, street meetings, workshops, and online decision-making tools. Although targeted towards residents, it is also an opportunity to involve other stakeholders including planners, developers, architects and landscape architects, and council open space/garden staff.

<b>Example of project outputs</b>	<ul style="list-style-type: none"> <li>• Literature review on bushfires and biodiversity in peri-urban environment, determination of agreed geographical range of the high risk “peri-urban” environment.</li> <li>• Investigate and document the demographic groups in the region, work with key stakeholders to identify fire risk and key biodiversity assets that are threatened (and juxtapose these against one another).</li> <li>• Identify barriers to engaging with priority landowners/stakeholders.</li> <li>• Develop a range of information tools (online, decision making tools, landscaping fact sheets, workshops, demonstration sites) that will effectively engage households in the peri-urban environment.</li> </ul>
<b>Timeline</b>	<ul style="list-style-type: none"> <li>• 2 years</li> </ul>
<b>Approximate cost</b>	<ul style="list-style-type: none"> <li>• \$290,000 to \$390,000. Including 0.8 FTE Project Officer \$250,000, Consultant to work with stakeholders to develop information tools \$50,000 to \$150,000 (depending on communication approaches) Additional operational expenses such as travel.</li> </ul>

### *Conceptual data and information mapping*

A review of all data and information tools (but printed and online) that is relevant to bushfire preparedness and biodiversity protection, particularly within the RH&C region, could provide a critical platform for identifying what information is readily available (publicly) and what information is missing or outdated. The initial stakeholder consultation identified that some people are not always aware of what data existed and how data and information can be accessed.

A conceptual data/information review would organise all the data that is available to support decision making in the RH&C region and identify the specific attributes and formatting. Specifically, the review could consider 1) what data is available; 2) data redundancy/updates required; 3) who needs the information; 4) what information it provides; 5) weaknesses and assumptions; 6) who manages, vets and updates the data; 7) matching inputs with outputs; and 8) end users. Once this information is summarised, the relationships and useability of the data can be identified, and then the key gaps or opportunities for improving the datasets and information tools can be proposed.

This work would require the engagement of a consultant that worked with various organisations including local councils, DEW (science and fire management), landscape boards, CFS and the BMCs.

<b>Example of project outputs</b>	<ul style="list-style-type: none"> <li>• Initial sourcing of all data relevant to bushfire preparedness and biodiversity protection.</li> <li>• Review all data and information tools and evaluate according to a set of criteria (as proposed).</li> <li>• Review all data and information tools in other states (see Part A – Literature Review)</li> <li>• Conduct multiple workshops with key stakeholders to present summary of the data review and ensure that the information is correct.</li> <li>• Provide a recommendations paper that identifies improvements and data gaps, and innovative decision-making tools.</li> </ul>
<b>Timeline</b>	<ul style="list-style-type: none"> <li>• 18 months (12 months data sourcing and review and 6 months consultation and final report).</li> </ul>
<b>Approximate cost</b>	<ul style="list-style-type: none"> <li>• Estimated to be \$100,000-\$150,000 but will depend on how accessible the data and information tools are, and the interest from stakeholders in sharing information.</li> </ul>

### 8.3 Other recommendations to strengthen and value-add to future bushfire and biodiversity work

*Consider novel and innovative approaches for reducing exposure to bushfires and ensuring biodiversity resilience at a local and landscape scale.*

As discussed within various spotlight studies, there are opportunities to trial on-ground work that will result in biodiversity outcomes, while also decreasing fuel load or reducing bushfire exposure, such as green fire breaks, prescribed burns and less flammable landscaping (green and hard) materials. There are other approaches such as threatened species translocation and establishment of insurance populations that could mitigate against regional population loss.

The use of mapping and online decision tools could also be considered to enable individual landowners to work through a range of questions related to location, vegetation, house and built structure materials, individual health and property facilities, to identify their bushfire danger (see New South Wales [here](#) and Tasmania tools [here](#) ). There is also the option to prepare reports that provide an overview of biodiversity values within an area so residents are better informed on how to manage their property for biodiversity conservation while being bushfire smart.

*Identify the higher risk and more vulnerable communities or areas – move away from low-hanging fruit.*

Bushfire exposure is not always equal across communities and demographic groups and some people are more vulnerable than others due to socio-economic factors, language and cultural barriers, physical or mental challenges and remoteness. The key focus will be on understanding the barriers to these groups being prepared and/or their fears (founded or unfounded) that influences their attitudes and behaviour.

This project would focus on firstly identifying and then prioritising (e.g. mapping) the vulnerable groups and identify engagement and education strategies tailored to each group to increase the likely uptake by these groups. Some demographic groups to consider include a) non-English-speaking groups (or English as a second language); b) literacy challenges; c) poor health/physical functionality challenges; d) low socio-economic groups; e) physical disabilities; f) mental health conditions; g) First Nations people; h) senior citizens; and i) migrant communities.

*Consider the potential for a bushfire and biodiversity knowledge-broker.*

The information regarding bushfires and biodiversity is evolving with new and emerging findings from research and projects in response to the 2019-2020 bushfires. To maintain a current understanding of trends, data and information, a bushfire and biodiversity knowledge-brokering role would be valuable. This role would seek to stay abreast of issues and information regarding bushfires and biodiversity, as relevant to RH&C region, and tailor this information to feed to council staff, including biodiversity-focussed, planning officers and FPOs, landowners and the community. Communiques could then be developed and provided to stakeholders and supported by workshops and/or Q and A sessions. If this is considered out of scope for the RH&C partners model, it is suggested that this service be delivered by an alternative agency as in-kind, or via external funding (such as Hills and Fleurieu Landscape Board and Kangaroo Island Landscape Board).



Table 4: The analysis of priority projects that require funding for bushfire preparedness and biodiversity protection in the RH&C region.

Future project Funding focus	SWOT Analysis				Risk of a “do-nothing” approach	Assumptions that underpin successful delivery	Readiness - how ready the project is to be implemented
	Strengths	Weaknesses	Opportunities	Threats			
Educating and training landowners, households and community on best practice fire management and biodiversity conservation	<ul style="list-style-type: none"> <li>• Can adapt the hotspots program as a model for the project (evidence of success).</li> <li>• Ability to kick off as a pilot and then modify, improve, or extend accordingly.</li> <li>• Fosters across agency partnerships.</li> <li>• Empowers individuals to take responsibility.</li> </ul>	<ul style="list-style-type: none"> <li>• Unclear about how to identify the priority areas for implementation (see spotlight Study 12 – risks)</li> <li>• Requires considerable funding and investment.</li> <li>• Uncertainty about having enough information, or the right information.</li> <li>• Relies heavily on ongoing funding.</li> </ul>	<ul style="list-style-type: none"> <li>• Could value add and/or work with other similar programs already operating, such as work being done by local council.</li> <li>• Allows the provision of relevant and fit for purpose information that is tailored to the situation, site and needs of individuals.</li> </ul>	<ul style="list-style-type: none"> <li>• Disagreement or different priorities between key stakeholders and agencies.</li> <li>• Taking on too much too soon without testing the application and success.</li> <li>• Components could be currently delivered elsewhere.</li> <li>• If delivered by the wrong agencies there might not be a social license or buy-in by community.</li> </ul>	<ul style="list-style-type: none"> <li>• An uninformed community that make poor decisions.</li> <li>• Ongoing expectation of councils and state government to be responsible for bushfire risk reduction and biodiversity conservation.</li> <li>• Ongoing biodiversity decline</li> <li>• Opportunity loss of being able to demonstrate the options for integrating biodiversity protection into bushfire preparedness strategies.</li> </ul>	<ul style="list-style-type: none"> <li>• Without any initial community consultation, unsure if this is what is needed.</li> <li>• Key messages can be agreed between agencies and stakeholders.</li> <li>• Sufficient buy-in and uptake by households and community.</li> </ul>	Possible but would benefit from 12 months engagement and consultation to co-design and agree on what is achievable (has been suggested as stage 1 of the project in spotlight study 12)
Funding First Nations groups to provide RH&C stakeholders with a model of engagement and involvement.	<ul style="list-style-type: none"> <li>• The project model will be determined and created by First Nations people.</li> <li>• There is a greater chance of success if the model of engagement is determined by First Nations groups.</li> <li>• First Nations groups will know who needs to be involved, when they need to be involved and how they should be involved.</li> </ul>	<ul style="list-style-type: none"> <li>• Partnerships need to be established before funding is sought and need to get First Nations support for RH&amp;C to seek funding.</li> <li>• No recent history of first nations fire management within the RH&amp;C region.</li> </ul>	<ul style="list-style-type: none"> <li>• Improved and meaningful partnership with First Nations people.</li> <li>• Improved understanding about how First Nations people within RH&amp;C want to be engaged and involved.</li> <li>• Opportunity for the four groups to spend time on country and work together (noting- underpinning assumption that this is wanted).</li> <li>• Generate a social license.</li> </ul>	<ul style="list-style-type: none"> <li>• Unrealistic timelines result in a rushed deliverable, or a deliverable that has not involved all First Nations groups.</li> <li>• Inability to get buy-in and participation from First Nations groups.</li> <li>• Not all nominated First Nations people are involved.</li> <li>• Could expose First Nations groups to antagonistic and opposing views.</li> <li>• Key participants are not appropriately remunerated or offered appropriate remuneration.</li> </ul>	<ul style="list-style-type: none"> <li>• Poor management of the RH&amp;C landscape with ongoing biodiversity loss and increased fuel load.</li> <li>• Opportunity loss of demonstrating the value and effectiveness of First Nations fire management.</li> <li>• Potentially deteriorating relationship and trust between indigenous and non-indigenous people.</li> </ul>	<ul style="list-style-type: none"> <li>• Without having prior agreement, assumes that First Nations groups are interested and have capacity.</li> <li>• Unreasonable to expect deliverables within a brief time frame.</li> <li>• This project needs to be at a time and when, it is a priority for First Nations people.</li> </ul>	Unlikely, should only proceed in consultation with First Nations people, and after securing “in-principle” approval.

Future project Funding focus	SWOT Analysis				Risk of a “do-nothing” approach	Assumptions that underpin successful delivery	Readiness - how ready the project is to be implemented
	Strengths	Weaknesses	Opportunities	Threats			
Fund a bushfire and biodiversity advocate to address message ambiguities and policy tensions.	<ul style="list-style-type: none"> <li>Ensures ongoing collaboration between key fire management and biodiversity agencies/stakeholders.</li> <li>Identifies and addresses any tensions between key stakeholders so community are not presented with conflicting views.</li> <li>Provides foundational messages that can also be used by partners and future projects.</li> </ul>	<ul style="list-style-type: none"> <li>Some of this work could be achieved through option 1.</li> <li>Will not result in any immediate on-ground deliverables.</li> <li>Potentially overambitious – as some of the complexities could be related to legislative and policy reform.</li> </ul>	<ul style="list-style-type: none"> <li>Outcomes from the project will benefit other related projects.</li> <li>Identifies grey areas that can be addressed.</li> <li>Opportunity to develop agreed consistent messaging and narrative.</li> <li>Potential to influence policy and planning regulations for better outcomes.</li> </ul>	<ul style="list-style-type: none"> <li>Working in silos and key messages/communication conflict with other agencies.</li> <li>Duplicating similar work being undertaken by CFS and councils.</li> <li>Delays implementation of strategies the prepare against bushfires and address biodiversity loss.</li> </ul>	<ul style="list-style-type: none"> <li>Key messages are not effectively conveyed, or there is no uptake by target audience (i.e., landowners).</li> <li>Ongoing tension about bushfire management and biodiversity.</li> </ul>	<ul style="list-style-type: none"> <li>Assumes that there are tensions or ambiguities that need to be addressed.</li> <li>Assumes that key stakeholders will be willing to be involved.</li> <li>Assumes that information is not already being effectively conveyed to community.</li> </ul>	Yes
Pilot “fire-wise” peri-urban land management and information for bushfire preparation and biodiversity protection (landscaping and management of green spaces).	<ul style="list-style-type: none"> <li>Addresses the high fire risk areas and areas that are expected to increase in population and housing.</li> <li>Targets a specific audience with a specific risk.</li> <li>Can address vulnerable communities and demographics.</li> <li>Could reduce risk of fires in other areas if the peri-urban zone is management more appropriately.</li> </ul>	<ul style="list-style-type: none"> <li>There could be policy and planning constraints that impacts on the delivery of the work.</li> <li>As a pilot, the outcomes may not be transferrable to other areas in RH&amp;C region.</li> </ul>	<ul style="list-style-type: none"> <li>High likelihood of success as working from people’s values.</li> <li>Opportunity to myth bust and address perceptions.</li> <li>Prioritises vulnerable and minority groups to ensure resilience building is inclusive across RH&amp;C region.</li> <li>Provides improved understanding about the needs, concerns and challenges of vulnerable communities so that communication approach can be relevant and effective.</li> </ul>	<ul style="list-style-type: none"> <li>Opportunity for across sector and across agency collaboration.</li> <li>Opportunity for working with other climate change partnerships (i.e. Resilient South and Resilient West).</li> <li>Could serve as an exemplar for expanding into other areas of South Australia where there is increased urbanisation and population growth.</li> </ul>	<ul style="list-style-type: none"> <li>Communities within existing peri-urban setting continue to be exposed to bushfire risks.</li> <li>Ongoing risk of biodiversity loss within the peri-urban setting.</li> <li>Inappropriate future development exposes communities and biodiversity to impacts from bushfires.</li> </ul>	<ul style="list-style-type: none"> <li>Could be focussing on a very small sector of community (question – is this a good ROI).</li> <li>Components of this project could be addressed by project 1 and project 5.</li> <li>Is there enough evidence to actually shift people’s attitude.</li> <li>Assumes we know who these target stakeholders are and how to best reach them.</li> </ul>	Possibly, would need to be clear on who the target stakeholders are and confident that the work will yield a return on investment.

Future project Funding focus	SWOT Analysis				Risk of a “do-nothing” approach	Assumptions that underpin successful delivery	Readiness - how ready the project is to be implemented
	Strengths	Weaknesses	Opportunities	Threats			
Conceptual data and information mapping.	<ul style="list-style-type: none"> <li>Provides a one-stop shop for identifying all the different data sets and information tools.</li> <li>Enables an independent and transparent process for reviewing how fit for purpose information is, and where are the gaps.</li> <li>Integrates the information from a range of key stakeholders such as DEW, CFS, BMCs and local council</li> </ul>	<ul style="list-style-type: none"> <li>The investment required might be greater than the estimate as it will depend on the data available and the complexity of the data.</li> <li>The scope of the exercise needs to be further developed.</li> </ul>	<ul style="list-style-type: none"> <li>Can learn from the data and information tools that are available in other states, and consider these for a SA context.</li> <li>Could assist with any actions or interventions that are required under SA new Biodiversity Act.</li> <li>Provide councils and other decision makers with tailored data and information tools that facilitates the consideration of biodiversity in bushfire prevention activities.</li> </ul>	<ul style="list-style-type: none"> <li>It requires a considerable investment that might not provide a tangible return.</li> <li>The recommendations and proposals (for improvements) might not be possible due to organisational constraints and cyber security issues.</li> <li></li> </ul>	<ul style="list-style-type: none"> <li>The right type of information is not available for all stakeholders, thus better decision making is not possible.</li> <li>Duplication or redundancy of information.</li> </ul>	<ul style="list-style-type: none"> <li>Data is accessible and data custodians are willing to share.</li> <li>The work will result in realistic and relevant recommendations and improvements.</li> <li>That this work has not a</li> </ul>	Yes – although it will require agreement between key agencies that have ownership over current datasets.



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