Biodiversity Indicator Framework

Reporting on Victoria's biodiversity

VICTORIA State Government | Energy, Environment and Climate Action

Acknowledgement of Country

The Victorian Government proudly acknowledges Victoria's Aboriginal community, their rich culture and pays respect to Elders past and present.

We acknowledge Aboriginal people as Australia's first peoples, the oldest continuing living culture in the entire world, and as the Traditional Owners and custodians of the land on which we work and live.

We recognise that Aboriginal cultures and communities are diverse, and the value we gain in celebrating and supporting these cultures and communities.

We acknowledge that Aboriginal people have profound cultural, spiritual, and economic connections to land, biodiversity and resources through their relationship with Country.

We recognise the intrinsic connection of Traditional Owners to Country and acknowledge their contribution in the management and reading of land, water, and the natural landscape.

We also acknowledge the ongoing legacy of colonisation on Aboriginal Victorians. The attempts to disconnect Traditional Owners from Country and culture.

We embrace the spirit of reconciliation, working towards the equality of outcomes and ensuring an equal voice. We have distinct legislative obligations to Traditional Owner groups that are paramount in our responsibilities in managing Victoria's biodiversity.

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Foreword from the Chief Biodiversity Officer

Victoria is home to a diverse range of flora and fauna species, and together they make up many different ecosystems within our terrestrial, aquatic and marine environments.

Unfortunately, Victoria's biodiversity faces a range of threats and threatening processes, putting our species and habitats at risk. Maintaining biodiversity is not only important for species and their habitats, but it also ensures functioning ecosystems and their processes. As humans, we rely on these processes to deliver a range of ecosystem services that provide benefits to our economy and communities, further emphasising the importance of protecting our natural environment.

The Biodiversity Indicator Framework represents a new approach to monitoring and reporting on Victoria's biodiversity, bringing together a suite of indicators that together help build our understanding of how Victoria's biodiversity is tracking, enabling reporting on the effectiveness of our collective threat management efforts and helping identify where improvements can be made under an adaptive management framework.

The Biodiversity Indicator Framework aims to better assess and report on native species' status and trends, as well as measure effectiveness of management actions. Reporting on these indicators will allow us to track progress towards targets and goals of Protecting Victoria's Environment - Biodiversity 2037 (Biodiversity 2037) and support evidence-based decision making and investment and action from a range of sectors including government, business, Traditional Owners, non-government organisations and the broader community.

The success of monitoring and reporting within the Biodiversity Indicator Framework relies heavily on collaboration between the Victorian Government, Traditional Owners, conservation partners, research institutions, and citizen scientists. Together, we can collectively work towards supplying data and strengthening our indicators to ensure we have the best understanding of Victoria's biodiversity. This in turn will help identify and communicate where our collective efforts are working well and where we are observing the most significant declines in our species and habitats to trigger further investigation and action.

The Victorian Government acknowledges the integral role that Traditional Owners play in keeping Country healthy. Through the Biodiversity Indicator Framework, we aim to partner and work alongside Traditional Owners to support implementation of their own Country Plans and reporting priorities. The Biodiversity Indicator Framework acknowledges that there are two ways of knowing and recognises the roles of Western science and Traditional Owner knowledge in informing decisions and actions to manage and heal Country and species.

We will continue to build and improve the Biodiversity Indicator Framework over time, to ensure our biodiversity indicators are current, informative, and tell the most accurate story for Victoria's biodiversity.

Introduction

Biodiversity and healthy ecosystems are essential for the processes that support all life on earth. Victoria is home to a diverse range of landscapes, habitats, species, and ecosystems across both land and water. Victoria's natural environment not only supports an array of plants and animal species, but also sustains important, inter-connected and inter-dependent functions and processes that in turn provide important ecosystem services to Victoria's economy and communities.

What is Biodiversity?

Biodiversity encompasses all components of the living world: the number and variety of plants, animals, and other living things, including fungi and micro-organisms, across our land, rivers, coast, and ocean. It includes the diversity of their genetic information, the habitats, and ecosystems within which they live, and their connections and interactions with other life forms and the natural world.

Traditional Owners in Victoria have a deep connection to and understanding of Country. Traditional Owners define their identity and spirituality by their connection to their Country, and healthy Country is integral to Traditional Owner wellbeing, including social, economic, environmental, and cultural outcomes.

Victoria's native plants and animals are facing a range of ongoing threats and threatening processes, including habitat loss and fragmentation, invasive species, climate change and associated increases in the frequency and intensity of bushfires and floods. The increasing rate of biodiversity loss calls for greater action to halt the decline of Victoria's unique species and habitats.

Protecting Victoria's Environment – Biodiversity 2037 is Victoria's 20-year plan to stop the decline of our native plants and animals and improve our natural environment.

Since its release in 2017, implementation of Biodiversity 2037 has focused on reporting on biodiversity actions. However, monitoring and reporting on the changes occurring in Victoria's environment are also key to achieving the vision and goals of Biodiversity 2037. Observing and recording changes, progress and declines, allows government and land managers to investigate the drivers and causes underpinning environmental changes and options to address these.

Understanding where, how, and why changes are occurring provides the opportunity for ongoing improvements to policy interventions and management actions to support better biodiversity protection and outcomes.

Why do we need to monitor and report on Biodiversity?

Monitoring and reporting on Biodiversity provides the information necessary to detect trends in biodiversity improvement or decline, track progress towards key targets, assess the effectiveness of our collective management actions and to help guide research investment.

Importantly it helps with understanding and reporting on the state and health of Country and Victoria's biodiversity over time.

The Biodiversity Indicator Framework sets out a new approach to monitoring and reporting against biodiversity indicators across the state, spanning several key themes of biodiversity. These indicators aim to tell a fuller story of what is happening across Victoria's biodiversity including assessment of status and trends as well as effectiveness of our management actions.

Importantly, the Biodiversity Indicator Framework acknowledges that there are two ways of knowing, both western and cultural and will remain flexible in how it reports on the Health of Country.

Biodiversity Indicator Framework

Effective monitoring, evaluation, and reporting are critical for understanding changes in Victoria's biodiversity. The Biodiversity Indicator Framework is the mechanism for reporting on the status, trends, progress, and outcomes of Victoria's biodiversity. Five key themes (Figure 1) underlie the structure of the Framework, with each theme addressing an important component for understanding changes in biodiversity and the effects of efforts to manage Victoria's native flora and fauna. In combination, these themes provide the structure for monitoring and reporting on biodiversity more comprehensively and holistically.

Biodiversity indicators sit nested within themes and have been developed to provide an evidence-based understanding of the biodiversity patterns, trends, and changes occurring in Victoria. All indicators have been purposefully selected and developed to ensure meaningful and comprehensive biodiversity reporting, support improved transparency and accountability, track changes over time, and facilitate timely policy and management responses to reported changes.

As needed, additional indicators may be developed and incorporated into the Biodiversity Indicator Framework – for example, to help support targeted monitoring and reporting to address key gaps in our current data and knowledge.

The Biodiversity Indicator Framework aligns with the vision and goals of the Biodiversity 2037 strategy and the Global Biodiversity Framework.

Theme	Category of indicators
State of Biodiversity	Status and trends
Expected Survival	Predicted future persistence of species and their habitats
Biodiversity Management	Biodiversity actions and outputs occurring across the state
Management Effectiveness	Biodiversity outcomes arising from policies and actions
Working Together	The contributions, connections, and value Victorians place on protecting nature

Figure 1. The structure of the Biodiversity Indicator Framework.

Monitoring and reporting on Country

Healthy Country is fundamental to the health and wellbeing of Traditional Owners. Traditional Owners have a deep connection to and understanding of Country, including the land, biodiversity, and resources on Country.

The effects of an often-violent colonial history have significantly disrupted connection to Country through the forced removal and dispossession of Traditional Owners from Country. It has been a long and continued journey for Traditional Owners to rebuild cultural knowledge and regain access to Country and to cultural management practices. DEECA is committed to supporting Traditional Owners to continue using and rebuilding cultural knowledge and connection to Country through meaningful partnerships and self-determination.

Traditional Owners view the natural world within an interconnected ecological, cultural and livelihood system, which is often not recognised or appreciated in Western approaches and systems. DEECA has heard from Traditional Owners and acknowledges the importance of managing, caring for, and monitoring Country holistically, embedding biocultural values into cultural landscape management. DEECA also acknowledges and respects that Traditional Owners and Aboriginal Victorians have been reading and managing Country for millennia.

Traditional Owner nations and groups are unique and have their own priorities, obligations, and reporting frameworks for understanding, managing, and healing Country. As the Victorian Government has developed Biodiversity 2037 to guide our work, many Traditional Owners have developed Country Plans and aligned strategies and plans that express their values and objectives and prioritise holistic cultural objectives as the basis for management planning. Several of these plans have biocultural and other indicators and reporting frameworks that report on the health of Country and changes to Country.

Traditional Owners also have their own methods and processes for identifying important species and places, as well as management practices and actions. This is important to acknowledge as there is the opportunity to innovatively collaborate with interested Traditional Owners to support meaningful partnerships and report on Country based on priorities and objectives.

The Biodiversity Indicator Framework aims for biodiversity planning, management, and decision- making to better recognise two ways of knowing. Recognising that Indigenous knowledge systems are different to Western knowledge systems, and that two ways of knowing should be used together to inform management and decision-making related to Country. This includes in how we prioritise data capture, interpret results, and have reporting align with and support reading and healing of Country.

DEECA recognises the importance of both knowledge systems, but also that incorporating or integrating cultural knowledge directly into Western decision-support tools and frameworks may not be possible or culturally appropriate. The aspiration is to create a framework that acknowledges and honours both, with the use of bridging tools an important approach until we reach that point. In the process of developing this monitoring and reporting framework for biodiversity, DEECA has discussed with several Traditional Owners, approaches to support their own reporting on Country (including within Country Plans), and any potential alignments between reporting frameworks and opportunities to collaborate.

Based on these discussions, an overarching goal of the Biodiversity Indicator Framework is to support Healthy Country and biocultural diversity. DEECA acknowledges that there will be different ways to include and incorporate reporting on the health of Country. For example, this could include reporting on cultural and biocultural indicators within the Biodiversity Indicator Framework; co-developing biocultural indicators for inclusion in both the Biodiversity Indicator Framework and Country Plans; having Traditional Owner-led Health of Country chapters in the Biodiversity Indicator Framework with a cultural narrative to interpret results; and/or supporting Country Plan reporting. Discussions will be ongoing over time, with reporting and narratives on Healthy Country to be modified and adapted to suit the needs and priorities of different Traditional Owner groups at their own discretion.

DEECA will continue to partner with Traditional Owners on approaches to reporting on biodiversity and Country, seeking alignment if and where appropriate, and supporting groups to report on the health of Country. Approaches will be flexible to meet the needs of individual Traditional Owner groups.

Indigenous Cultural Intellectual Property and Data Sovereignty

Traditional Owners have asked DEECA to commit to recognising Indigenous Data Sovereignty and implement processes to recognise the rights of Traditional Owners to govern the collection, ownership, and use of data about their communities, people, land, and resources. Indigenous Data Sovereignty is the right of Indigenous Peoples to own and control the data, knowledge and/or information that is about or relates to them and their Country. Indigenous Data Sovereignty includes Indigenous people having governance of data that is generated by State infrastructure. It also requires access and control of data for governance, and information that adequately reflects Indigenous cultural diversity, worldviews, and priorities.

Indigenous data includes information, interviews, surveys, statistics, reports, sound recordings, films, photographs, health records, mapping of Country, records and samples of plants and animals, languages, knowledge, art and stories. Indigenous data is often collective data and is important to Indigenous people to share and have access to, to pass down through the generations for nurturing and refining.

DEECA is implementing a pathway towards an Indigenous Data Sovereignty Policy that includes the collection and management of biodiversity data. While the Guiding Principles of Indigenous Data Sovereignty have been established, work is currently being undertaken to establish departmental systems, processes, and tools that will support the delivery of a future Indigenous Data Sovereignty Policy.

The intellectual property of Traditional Owner Groups that seek partnerships and collaborations on monitoring and reporting within the Biodiversity Indicator Framework will be protected in line with this future Indigenous Data Sovereignty Policy and its Guiding Principles.

Monitoring biodiversity

Biodiversity Indicators

Accurately capturing and describing changes in biodiversity variables over time provides the basis for guiding evidence-based decision making and management interventions. Ecosystems are inherently complex and understanding all factors and interactions that are contributing to changes in biological systems is not feasible. However, monitoring and reporting on a carefully selected set of biodiversity indicators can provide the clearest possible picture of the status and drivers underlying changes to Victoria's biodiversity and evaluate the effectiveness of collective management actions.

The Biodiversity Indicator Framework currently contains 31 indicators that have largely been designed to apply across various environments (e.g., freshwater, marine and terrestrial; Figure 2). The extent to which environments are represented within indicators is dependent on data availability. As environments become better represented by appropriate data, they will be progressively incorporated into the Biodiversity Indicator Framework. The indicator set within the Biodiversity Indicator Framework is not static and indicators may be replaced over time by other indicators that better represent all environments or new indicators may be developed as data and resources become available, or as advised by Traditional Owners.

This document describes the overarching structure of the Biodiversity Indicator Framework, the content of indicators, and how they should be interpreted. The results of indicators will be reported on regularly in the 'Victoria's Biodiversity Report', which will be available to partners and the wider community. The Biodiversity Indicator Framework is also supported by a technical background document that describes the data inputs and analysis underlying each indicator, and a data collection paper that informs data collection priorities for indicator reporting (see Appendix).

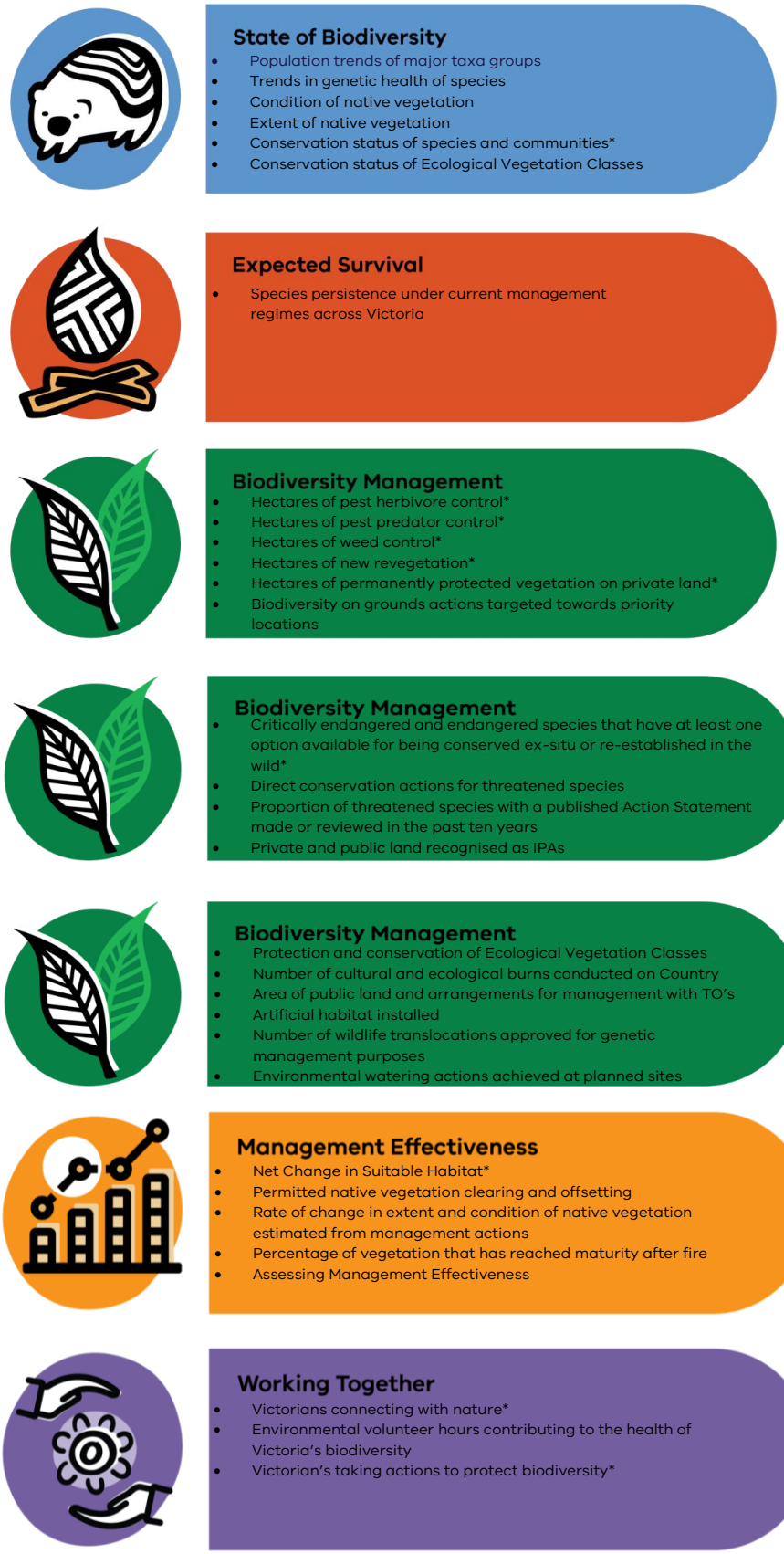

*Figure 2. List of biodiversity indicators within the Biodiversity Indicator Framework (*this indicator can demonstrate progress towards a Biodiversity 2037 target).*

Policy setting

The ***Flora and Fauna Guarantee Act 1988*** (FFG Act) requires the development of a Biodiversity Strategy that includes proposals for achieving the objectives of the Act, targets to measure the achievement of objectives, and a monitoring, evaluation and reporting framework. **Protecting Victoria's Environment - Biodiversity 2037** is the current Biodiversity Strategy under the FFG Act. The Biodiversity Indicator Framework supports the goals and vision of Biodiversity 2037 by monitoring and reporting on changes in Victoria's biodiversity, forecasting future changes, quantifying management outputs, and assessing the effectiveness of management actions.

The Biodiversity Indicator Framework has also been structured to align with the **Global Biodiversity Framework** (GBF), whereby the Australian Government has committed to demonstrating progress towards meeting global targets and updating its National Biodiversity Strategy and associated Plans. For example, alignment with the GBF includes indicators that report on; the extent of natural ecosystems; percentage of threatened species improving in status; reducing the threat posed by invasive species; newly protected areas; and the maintenance of genetic diversity. The Biodiversity Indicator Framework will therefore be an important contributor for reporting on GBF targets.

Process for identifying and selecting indicators

Given the complexity of biological systems, indicators are unlikely to cover all aspects of biodiversity, yet as a comprehensive set, the biodiversity indicators selected for the Biodiversity Indicator Framework assess key components of biodiversity and management from multiple, complementary angles. The selection and development of indicators for inclusion within the Biodiversity Indicator Framework involved extensive consultation across government and external sector and research partners.

A series of consultations to identify and select indicators were held for:

- the structure of the Biodiversity Indicator Framework including the key themes
- the selection of indicators
- identification of key gaps within the framework and indicators

The Biodiversity Indicator Framework contains a revised set of pre-existing core policy indicators and newly developed indicators that are supported by already available data. Gaps that have been identified in the Biodiversity Indicator Framework are described within this document. DEECA will continue to work across government agencies, with Traditional Owners, with other land and water managers, and the research sector, to continue to fill these gaps in our reporting as resources and opportunities become available. We acknowledge that not all Traditional Owner groups have been ready to engage with the Biodiversity Indicator Framework and it will therefore be regularly reviewed and updated to better reflect Traditional Owner priorities.

Indicator currency, accuracy and development will be reviewed as appropriate. This means new indicators are likely to be included as data becomes available, or how indicators are reported may change due to advances in technology and methodology, data and/or research, and two-ways of knowing. This document is designed to be flexible, particularly in relation to reporting on Country.

Supporting principles for inclusion

Principles for indicator inclusion within the Biodiversity Indicator Framework were developed at the initial phases of project planning. These ensured that indicators were available (i.e., informed by available data), meaningful, and aligned with one of the Framework themes. These principles include:

- Availability of data
- Existing indicators that are meaningful and when combined report on biodiversity holistically
- Contributes to understanding one of the identified themes of the Biodiversity Indicator Framework
- Feasible to collect data and report against through time
- Has a meaningful policy and scientific basis
- Uncertainty is addressed or acknowledged
- Interpretation of results can draw on two-ways of knowing

Five Themes

State of Biodiversity

Biodiversity maintains the critical ecosystem processes and functions that support life. The State of Biodiversity theme focuses on the recent status and trends of important features that impact Victoria's biodiversity. For example, indicators in this theme report on estimates of population occupancy and abundance trends, categories of population genetic health, the conservation status of species and vegetation communities, and measures of the condition and extent of native vegetation. State of Biodiversity provides our most up-to-date assessments of the current state of Victoria's biodiversity and utilises data and information that provide comparisons of the recent past, up to the present. Critical to interpretations of the state of Victoria's biodiversity is Traditional Owner perspectives and insight into the health of Country and how metrics reported on in this theme may help inform or be guided by reading of Country and be presented in a two-ways of knowing approach.

Indicators

Population trends of major taxa groups

Reports on: An index of population changes that displays relative population trends of major taxa groups since 2000.

Description: Recording the occupancy and abundance of species is critical for capturing changes in population trends over time. Detecting and reporting on population changes provides an important insight into the population level health of Victoria's species and how well we are implementing Victoria's 20-year plan (Biodiversity 2037) to stop the decline of our native plants and animals.

The Victorian Biodiversity Index (VBX) has been specifically designed to detect population trends and enable reporting on these changes. The VBX analyses species monitoring data, collated across a range of species in the Victorian Biodiversity Atlas (VBA), to detect patterns of occupancy and abundance. This is applied at a state-wide scale and includes a greater range of species and data/monitoring approaches, compared to other nationally focused indices. The VBX can detect population changes from the year 2000 up until the present, as before 2000, there is insufficient survey data for many species. The VBX is the first state-based biodiversity index in Australia and provides Victoria with a powerful tool for understanding how, over time, species are responding to management actions and the impacts of large-scale threats, such as bushfire and climate change.

What does this tell us? Outputs from the VBX provide a picture of whether populations of broad animal and plant taxa groups are declining, increasing, or remaining stable over time. The VBX includes both common and threatened species and over time has the capacity to identify biodiversity responses to large-scale management actions and threats. Trends in the VBX reflect data collection efforts and the VBX therefore relies on regular data inputs from a wide range of species to generate evidence-based population trends.

Trends in genetic health of species

Reports on: The proportion of species in major taxa groups that change genetic risk categories.

Description: The genetic health of a population is indicative of genetic diversity, risk of inbreeding depression, and impacts on evolutionary potential. Genetic health is often linked to population persistence, with small, fragmented, and isolated populations generally having reduced capacity to respond to changing environmental conditions and at an elevated risk of local or complete extinction.

The Victorian Genetic Risk Index (GRI) categorises a species risk of extinction relative to its genetic health, by estimating its immediate or future risk of losing genetic diversity, adaptability, and population fitness. In the GRI, species are categorized as having either a low, medium, high, very high or uncertain genetic risk based on available genetic and demographic data. Over time, we can calculate the proportional changes in genetic risk categories to generate a trend in the genetic health of Victorian species. While the GRI estimates extinction risk due to genetic health at the species level, species can be grouped together to also describe proportional changes and the overall trend of genetic health for

broad species groups (e.g. amphibians, birds, invertebrates or plants).

What does this tell us? Monitoring changes in genetic risk to species or broad flora and fauna groups over time provides critical information on extinction risk. Results from the GRI can therefore guide conservation planning, prioritisation, and policy, for example, by informing management actions such as genetic rescue, translocations, or other genetic interventions. The GRI can also guide sampling and data collection priorities when the genetic health of a particular species is unknown or to assess the effectiveness of management actions to alleviate genetic decline.

Condition of native vegetation

Reports on: The current condition of native vegetation and changes in condition over time.

Description: Across Victoria, there has been significant declines in native vegetation condition due to extensive land clearing, establishment of invasive species, removal of indigenous land management practices, and from disturbances caused by bushfire, timber harvesting, extreme weather events, diseases or infestations, and/or intolerances of native species to changing climates. Estimating changes in native vegetation condition across the state allows us to better understand if habitat quality is declining, remaining stable or improving.

This indicator reports on modelled native vegetation condition, which has been validated by on ground assessments, to estimate how much the vegetation differs from an undisturbed reference state. When vegetation differs considerably from its reference state it is considered in low condition. The current condition of native vegetation is quantified by comparing against a benchmark, which represents the average characteristics of a mature and apparently long-undisturbed state of the same vegetation type. Trends in how vegetation condition is changing over time is calculated by comparing condition scores over multiple years.

What does this tell us? Native vegetation condition scores are displayed spatially, allowing us to assess the condition of native vegetation visually across the state. Reporting on hectares of native vegetation in different condition categories allows us to understand how much of the state's native vegetation is in poor and good condition. Condition scores can be combined to give an average score across the state, by Traditional Owner Country, or across broad habitat types. Monitoring and reporting on native vegetation condition can assist with investigating the causes behind the observed changes. It can also be used to prioritise biodiversity management actions and to understand how effective regulations and current management are and combined with Extent of native vegetation (see below) can contribute to assessments of progress against the Biodiversity 2037 target of a net gain of the overall extent and condition of habitats across terrestrial environments.

Extent of native vegetation

Reporting on: The current extent of native vegetation and changes in extent over time.

Description: Seventy percent of Victoria's native vegetation has been cleared since European colonisation and settlement. Using satellite and aerial surveys, combined with on-ground validation, we can measure and report on current native vegetation extent (in hectares), which allows us to identify where changes in extent have occurred over time, across each of the main vegetation types. This also allows us to calculate where in Victoria native vegetation extent is declining, remaining stable, or increasing.

What does this tell us? Calculating and reporting on habitat extent allows us to identify if and where changes to habitat availability and native vegetation cover are occurring. Monitoring and reporting on native vegetation extent can also be used to prioritise biodiversity management actions and to understand the effectiveness of regulations and current management. Reporting on the extent of native vegetation also contributes to measuring progress toward the Biodiversity 2037 target of a net gain of the overall extent and condition of habitats across terrestrial environments.

Conservation status of species and communities

Reporting on: Trends in conservation status changes across major taxa groups and ecological communities.

Description: Species and ecological communities are assigned a conservation status based on their assessed level of extinction risk. The species conservation status refers to its conservation listing under the Flora and Fauna Guarantee Act 1988 (FFG Act) and is used to inform management and as the basis of Action Statements under the FFG Act. This indicator reports on the number of species and ecological communities listed under different conservation status categories (e.g., Endangered, Vulnerable) and the trend of how many species and ecological communities are being down-listed or up-listed over time. For the purposes of reporting, species are combined into major phylogenetic taxa groups, such as mammals, birds, fish, amphibians, reptiles, invertebrates, monocots (grasses), and dicots (flowering plants).

What does this tell us? Although a relatively coarse measure, conservation status is an internationally recognised method for categorising a species risk of extinction. Monitoring and reporting on the status and changes in conservation status, across species and ecological communities (i.e., how many species are up- or down-listed over time), allows us to broadly measure the state of Victoria's threatened species and demonstrate progress towards the Biodiversity 2037 state-wide target that no vulnerable or near-threatened species have become endangered.

Conservation status of Ecological Vegetation Classes

Reporting on: Trends in conservation status changes of Victorian Ecological Vegetation Classes.

Description: This indicator reports on the status and trends in the Conservation Status of Victorian Ecological Vegetation Classes (EVCs). EVCs are vegetation types used to describe patterns Victoria's native terrestrial vegetation. EVCs underpin many of Victoria's key biodiversity practices and policies, including spatial planning for reservation, revegetation, condition assessments, community engagement and land management and planning.

Each EVC is assigned a Conservation Status of collapsed, endangered, vulnerable, depleted, rare or of least concern. Assessment of the conservation status is based on the broad concepts of inherent rarity, degree of threat (including consideration of historic, on-going, and future impacts) and importance for supporting other significant features (for example, as a drought refuge for native fauna). Conservation status is a measure of the current extent and quality for each EVC, when compared to its original (pre-1750) extent and condition.

What does this tell us? The conservation status of EVCs can be used to assess the level of risk to vegetation types across Victoria. EVCs are assigned a Conservation Status to assess and report on public and private land values and used by DEECA and various organisations for strategic planning, prioritisation of conservation effort and resource allocation. This can trigger management actions and/or policy decisions that support the conservation of threatened EVC's.

Expected Survival

Species and their habitats currently face a range of pressures that threaten their future persistence. Since European colonisation, threats including habitat loss and degradation, introduced species, changed fire and water regimes and climate change, have all had significant negative impacts on biodiversity.

The impacts of climate change are expected to further test and stress ecosystem resilience, meaning that transformational adaptation may be required to improve the likelihood of species persistence in some circumstances.

The Expected Survival theme monitors and reports on the estimated capacity for species and their habitats to persist into the future, under a changing climate. Expected Survival enables us to understand a particular species' expected survivorship under different environmental and management scenarios and can inform and prioritise management intervention options. This may include informing where novel interventions are needed or where management efforts, despite best endeavours, are unlikely to ensure survivorship.

Indicators

Species persistence under current management regimes across Victoria.

Reporting on: The percentage of species with available forecast data that have a persistence probability greater than 90% in 50 years under current management actions.

Description: This indicator utilizes species forecast analyses to predict the likelihood of species persistence in 50 years' time under current management actions. Specifically, species forecast estimates the percentage of species that are predicted to persist in 50 years under current management actions (with a >90% predicted chance of future survival used as the threshold for persistence). A species' persistence assumes at least one extant population present in Victoria in 50 years under current management. The percentage of species predicted to persist is calculated by comparing the number of species with a favourable species forecast with those that do not.

What does this tell us? Predicting species persistence using species forecasting provides an important indicator of the future outlook for Victoria's biodiversity. This indicator estimates whether current management actions are sufficient to stop localised Victorian extinctions over the next 50 years and can provide evidence-based information on the effectiveness of current management actions and supports the updating of management decisions, including identifying the potential need for novel solutions.

Biodiversity Management

Biodiversity Management actions aim to conserve, protect, and enhance ecosystems, species, flora and fauna and their habitats. Both targeted and landscape level management actions are essential to halt biodiversity decline and support positive outcomes for species and their habitats in the face of increasing threats.

This theme quantifies the reported actions being undertaken to reduce pressures and improve biodiversity outcomes across the state. Not yet adequately captured in this theme is the key role played by Traditional Owners in managing and healing Country.

The indicators reported in this theme are largely output focused, with several used to determine progress in achieving Biodiversity 2037 contributing targets.

Indicators

Hectares of pest herbivore control

Reporting on: Hectares of reported actions to manage the threat of introduced herbivores across the state.

Description: Introduced herbivores are having significant negative impacts on native flora and fauna through competition for habitat, food, and shelter. Introduced herbivores such as rabbits, goats, feral horses, deer, and feral pigs also degrade ecosystems by browsing, over grazing, disturbing soil, spreading weeds and pathogens and reducing water quality. This indicator reports on the total effective treatment area over which reported actions to manage pest herbivores were undertaken to the relevant DEECA management standards. This indicator reports on both the total hectares of action and the hectares of action that have occurred in priority locations annually since 2017.

Introduced herbivore species included in this reporting are deer species, rabbits, goats, feral horses and feral pigs. It also includes over- abundant native sea urchins that can have significant impacts on reef habitats in Victoria. Priority locations are determined through analysis of the most current published version of Strategic Management Prospects as the areas where specific management actions have the highest relative biodiversity benefit (except for sea urchin control, as all marine reef habitats are considered priority locations).

What does this tell us? Introduced herbivores have a negative impact on Victoria's biodiversity. This indicator reports on all areas with herbivore control across the state and allows us to identify the proportion of actions that are occurring in priority areas. Results from this indicator are also used to determine progress toward Biodiversity 2037 contributing targets for on-ground herbivore management.

Hectares of pest predator control

Reporting on: Hectares of reported action to manage the threat of introduced predators across the state.

Description: Introduced predators are one of leading causes of biodiversity decline across Victoria and Australia. This indicator reports on the total effective treatment area over which reported actions to manage pest predators were undertaken to the relevant DEECA management standards. This indicator reports on both the total hectares of action and the hectares of action that have occurred in priority locations annually since 2017. Pest predator species included in this reporting are foxes and feral cats. Priority locations are determined through analysis of the most current published version of Strategic Management Prospects as the areas where specific management actions have the highest relative biodiversity benefit.

What does this tell us? Pest predators are having significant negative impacts on native fauna. This indicator reports on all areas with pest predator control across the state and allows us to identify the proportion of actions that are occurring in priority areas. Results from this indicator are also used to determine progress toward Biodiversity 2037 contributing targets for on- ground pest predator management.

Hectares of weed control

Reporting on: Hectares of reported action to manage the threat of weeds across the state.

Description: Invasive plants and weeds are one of the most significant threats to Victoria's biodiversity. Introduced plants compete with native plants for space and resources and degrade habitat quality.

This indicator reports on the total effective treatment area over which reported actions to control weeds were undertaken to the relevant DEECA management standards. This indicator reports on both the total hectares of action and the hectares of action that have occurred in priority locations annually since 2017.

Priority locations are determined through analysis of the most current published version of Strategic Management Prospects as the areas where specific management actions have the highest relative biodiversity benefit.

What does this tell us? Weeds are having significant negative impacts on native species. This indicator reports on all areas with weed control across the state and allows us to identify the proportion of actions that are occurring in priority areas. Results from this indicator are also used to determine progress toward Biodiversity 2037 contributing targets for on-ground weed management.

Hectares of new revegetation

Reporting on: Hectares of reported revegetation to improve habitat connectivity across the state.

Description: More than half of the state's native vegetation has been cleared since European settlement, causing significant declines in native vegetation condition and extent.

This indicator records the total hectares of revegetation that has been conducted using relevant DEECA management standards aligned to a location-appropriate Ecological Vegetation Class (including climate adjusted) standard and hectares of revegetation that have occurred in priority locations since 2017.

This indicator does not include natural regeneration or supplementary planting within existing vegetation. Priority locations are determined through analysis of the most current published version of Strategic Management Prospects as the areas where specific management actions have the highest relative biodiversity benefit in terms of improving connectivity between habitats.

What does this tell us? Revegetation is required to increase the extent of native vegetation across the state. This indicator reports on all areas of revegetation across the state and allows us to identify the proportion of these actions that are occurring in priority areas. Results from this indicator are also used to determine progress toward the Biodiversity 2037 contributing target for revegetation.

Hectares of permanently protected native vegetation on private land

Reporting on: Hectares of reported new permanently protected native vegetation on private land across the state.

Description: The permanent protection of native vegetation on private land through legally binding agreements aims to care for and protect the natural environment. Victoria historically has experienced the highest proportion of native vegetation clearance in Australia since colonisation. Importantly, two thirds of Victoria is private land, of which greater than 70% has been cleared of native vegetation.

This indicator reports on the total hectares of native vegetation on private land that has been permanently protected, as well as hectares that have been protected since 2017. More specifically, it measures the area of native habitat on private land that has been protected -in-perpetuity, either placed on the property title of the land, private land that has been declared an Indigenous Protected Area or transferred to the crown.

Total hectares protected includes areas of permanent protection, while hectares protected since 2017 excludes offset covenants. Covenants and on-title agreements facilitated through offset arrangements are for the purposes of achieving Victoria's no net loss objective of the Native Vegetation Regulations arising from the permitted clearing of native vegetation elsewhere. Commonwealth Government offsets in Victoria can be included if they are listed in the credit register database.

What does this tell us? Private land contains large areas of native vegetation. This indicator reports on the total hectares of private land that has recently become permanently protected, as well as area protected since 2017. Results from this indicator are used to determine progress toward the Biodiversity 2037 contributing target for new permanently protected areas.

Biodiversity on-ground actions targeted towards priority locations

Reporting on: The proportion of landscape-scale biodiversity management actions that are occurring in priority locations.

Description: Biodiversity 2037 priority areas are considered high-ranking locations where management actions occurring there make the greatest contribution towards the Biodiversity 2037 contributing targets. Priority locations refer to the locations across Victoria where management actions will maximise benefits to threatened (and other) species. Hectares of activity in priority locations represent only a part of the total management effort across Victoria.

What does this tell us? It is important to ensure that we are directing our efforts into areas that will benefit the greatest number of species through biodiversity action and/or threat reduction. This indicator reports on the aggregated hectares of management action that are occurring in locations defined as priority areas.

Critically endangered and endangered species that have at least one option available for being conserved ex-situ or re-established in the wild.

Reporting on: The percentage of all Critically Endangered and Endangered species that have at least one conservation option available to them.

Description: Critically Endangered and Endangered species are at risk of extinction and require management options to ensure their long- term persistence. This indicator calculates the percentage of all species listed as Critically Endangered or Endangered that have at least one option for being conserved ex situ or re- established in the wild (where feasible under climate change).

What does this tell us? Australia has one of the highest rates of species' extinctions globally. Of the threatened species listed under the FFG Act, a significant proportion are classified as Critically Endangered and Endangered. It is important to know and understand the options available to these species to ensure timely conservation action should they require it. This indicator enables reporting on one of the state-wide targets of Biodiversity 2037. Although a coarse measure of improving outcomes for Victoria's biodiversity, this indicator is important to ensure emergency preparedness and response for Critically Endangered and Endangered species, should they need it in the future.

Direct conservation actions for threatened species

Reporting on: Number of direct (targeted) management actions undertaken for threatened species to improve the likelihood of threatened species' persistence and recovery, for species which do not sufficiently benefit from landscape scale actions.

Description: Not all species benefit from standard landscape scale actions. This indicator provides a measure of activity for species that require appropriate 'direct' intervention(s) to improve the likelihood of their persistence in the long-term. These include actions such as translocations, captive management, supplementary feeding, and other interventions. The 'appropriateness' of management actions will be determined through associated tools and documents including, but not limited to; Specific Needs Assessments, Action Statements, Species Forecast Reports and Victorian-approved National Recovery Plans. Some specific direct actions, such as the number of wildlife translocations and artificial habitat installations are also reported on separately in this theme.

What does this tell us? Biodiversity 2037 seeks to ensure Victoria's natural environment is valued, healthy and actively cared for. One approach under the strategy is to implement broad-scale threat management that benefits multiple species. However, it is also important to ensure actions are undertaken for those threatened species that do not sufficiently benefit from broadscale management. This indicator provides a measure of activity for species that require appropriate 'direct' intervention(s) to ensure their conservation in the longer-term.

Proportion of threatened species with a published Action Statement made or reviewed in the past ten years

Reporting on: The proportion of threatened species with a current Action Statement published to the DEECA website, as a proportion of the total number of threatened species listed under the FFG Act.

Description: The Flora and Fauna Guarantee Act 1988 (FFG Act) establishes a legal and administrative structure to enable and promote the conservation of Victoria's native flora and fauna. Action statements are one of several legislative tools used to inform conservation and investment decisions to support the recovery of threatened species and communities as well as manage and mitigate potentially threatening processes. They set out what has been done in the past, and identifies potential future actions intended to conserve and manage a threatened species or community.

This measure indicates the proportion of threatened species with a current Action Statement, as a proportion of the total number of threatened species listed. Current is defined by being created or updated within the past 10 years.

What does this tell us? An Action Statement is an instrument under the FFG Act prepared to inform conservation and investment decisions to protect, conserve and restore threatened species and ecological communities, as well as manage and mitigate potentially threatening processes. It is important that these tools remain current to ensure conservation actions for threatened species are being informed by the most up-to-date knowledge.

Private and public land recognised as Indigenous Protected Areas

Reporting on: Area (hectares) of land recognised as Indigenous Protected Areas.

Description: Indigenous Protected Areas (IPAs) are areas of land and sea that Traditional Owners have agreed to manage for biocultural values including biodiversity conservation. This indicator reports on the area in hectares of land and sea managed or owned by Indigenous groups as protected areas within Victoria. An Indigenous Protected Area is an area where Traditional Indigenous Owners have entered into an agreement with the Australian Government to promote biodiversity and cultural resource conservation.

What does this tell us? Measuring the area of land and seas that are managed or owned by Traditional Owner groups is an important reflection of Traditional Owner self-determination. Indigenous Protected Areas are important for both biodiversity conservation as well as the healing of Country. Reporting on this indicator will contribute to understanding progress towards the global goal of protecting 30% of lands and sea by 2030.

Protection and conservation of Ecological Vegetation Classes

Reporting on: The total hectares and extent (as a percentage) of each Ecological Vegetation Class (EVC) that is formally protected across public and private land.

Description: Protecting native habitat contributes to improving the extent, quality, representativeness and resilience of biodiversity and the species that rely on these habitats to persist. This indicator measures the total hectares and percentage of each EVC that is protected and conserved across public and private land, compared to its estimated pre-1750 coverage.

What does this tell us? Formally protected land, such as through State and National parks provides refuge for species in an increasingly fragmented and degraded landscape. It is important to understand the degree to which these EVCs are protected to determine those at risk and in need of intervention.

Reporting on this indicator will contribute to understanding progress towards the global goal of protecting 30% of lands and sea by 2030 (i.e. Target 3 under the Global Biodiversity Framework). In the first instance it will include reporting on Protected Areas recognised under the National Reserve System, including parks and reserves, Indigenous Protected Areas and on-title conservation covenants. Progressively it will also report on Other Effective Conservation Measures that are a component of Target 3 of the Global Biodiversity Framework.

Number of cultural and ecological burns conducted on Country

Reporting on: The number of cultural and ecological burns conducted on Country.

Description: Across many of Victoria's ecosystems, fire is a key factor in maintaining biodiversity and promoting regeneration of native flora species. This indicator measures the total number of ecological and cultural burns conducted on Country annually. These measures will be reported on separately as they can have different objectives.

Ecological burns are defined as planned burns to maintain and improve ecological resilience and help regenerate forests, other habitat types and/or increase populations of targeted threatened species.

Cultural fire is defined as 'fire deliberately put into the landscape authorized and led by Traditional Owners of that Country, for a variety of purposes, including but not limited to ceremony, protection of cultural and natural assets, fuel reduction, regeneration and management of food, fibre and medicines, flora regeneration, fauna habitat protection and healing Country's spirit' – Victorian Traditional Owner Cultural Fire Strategy.

What does this tell us? Right way fire is a critical element to the regeneration and maintenance of diversity across Victorian ecosystems. This indicator provides important insights into support for self-determination and provides a way to track fire management practises that specifically target improved biodiversity outcomes. While cultural burns may have ecological benefits, it's important to note that for Traditional Owners cultural fire is a way to connect and heal community and Country.

Area of public land and partnerships for management with Traditional Owners

Reporting on: Area of public land covered by an agreement to work with Traditional Owners.

Description: Traditional Owners have been caring for and reading Country for millennia. This indicator measures the area of public land covered by an agreement to work with Traditional Owners. This includes joint or cooperative management where Traditional Owners have an arrangement to manage or use land for cultural or economic gain.

What does this tell us? Traditional Owners have a deep, place-based cultural knowledge and understanding of their Country that they have used to keep Country healthy for millennia. Due to the impacts of colonisation, displacement, and dispossession, the ability and opportunity to read Country and utilize traditional ecological knowledge and practices to protect, manage and heal Country has been limited from Traditional Owners. Joint, cooperative, and sole Management ensures that the knowledge and culture of the Traditional Owner group of the appointed land is recognised in the management of that land.

Reporting on this indicator reflects the rightful management of Country back in the hands of Traditional Owner groups, whether that be for cultural, environmental or economic objectives.

Artificial habitat installed

Reporting on: The number of artificial habitat structures installed to support native species.

Description: Extensive land clearing and other forms of disturbance such as fire and flood can cause displacement of animals through a reduction in available habitats. Management is therefore required to provide artificial habitat to and support species or populations persistence in the short to long term.

Artificial habitats are defined as human made structures that act as a substitutes for natural habitat structures. Examples of artificial habitat used in reporting include artificial hollows, nest boxes, insect hotels, breeding shelters, artificial reefs, etc.

What does this tell us? Results from this indicator inform on the aggregated number of artificial habitats and structures that have been installed across the state (e.g. number of nest boxes).

Number of wildlife translocations approved for genetic management purposes

Reporting on: The number of permits that are approved to undertake wildlife translocations for genetic management purposes.

Description: Loss of genetic diversity can lead to population decline and increased extinction risk. In a fragmented landscape where populations are often isolated, translocating individuals into populations has demonstrated the potential to reduce the immediate effects of poor population genetic health, including inbreeding depression. This indicator measures the number of permits that are approved by DEECA to undertake wildlife translocations for genetic management.

What does this tell us? Successful translocations can help alleviate the population stressors associated with a lack of genetic diversity.

Environmental watering actions achieved at planned sites

Reporting on: the proportion of environmental watering actions achieved at planned sites. A sub indicator will report on the number of watering actions that have involved Traditional Owners in either the planning or delivery of environmental watering actions.

Description: This indicator provides information on the proportion of environmental watering actions that are achieved each year at planned sites. These watering actions aim to deliver appropriate flow regimes in specific rivers and wetlands to support the abundance, diversity and distribution of priority flora, fauna. The number of planned sites is determined by the VEWH based on information included in their seasonal watering plan for each reporting year, which identifies priority watering actions across the state to achieve the maximum benefits from the available volumes of environmental water. Water is then delivered to planned sites identified by Traditional Owners, CMAs and Melbourne Water.

What does this tell us? Water for the environment supports the ongoing health of local waterways, native plants, animals, and local communities that rely on them. This indicator is an important indication of delivery of water for the environment.

Management Effectiveness

The Management Effectiveness theme reports on the effectiveness of biodiversity policy and management actions and provides evidence-based metrics that can be used for improving biodiversity outcomes across Victoria. Reporting on Management Effectiveness allows for assessments of whether management actions are delivering on biodiversity outcomes, including reductions in target pest species and improvements in native species persistence. If current management approaches are no longer effective at achieving desired outcomes, it may indicate that new approaches are required, or that new science and knowledge is needed to improve predictions of biodiversity benefit.

Monitoring and reporting on Management Effectiveness will help, for example, inform if disturbance and/or impacts from climate change result in historic approaches to biodiversity management being considered no longer as effective and will assist in triggering investigations of potential novel interventions and transformational adaptation actions required to respond to these challenges.

Indicators

Net Change in Suitable Habitat

Reporting on: Average per cent Change in Suitable Habitat expected over 50 years from sustained improved management.

Description: Change in Suitable Habitat (CSH) is a purpose-built, scientific measure developed by DEECA, to assess the most effective options for improving the future of native species across the state under climate change. Change in Suitable Habitat considers the type, extent and configuration of habitat for a species, and the factors that influence how much a species can make use of this habitat.

Change in Suitable Habitat is the increase in likelihood that a species will still exist at a location at a future time (e.g. 50 years) in response to sustained management of relevant threats. It is expressed as the percentage increase in likelihood when comparing sustained management to no management.

Three results are generated from reporting on this indicator:

1. The average per cent CSH expected over 50 years from sustained management for threatened species (FFG-listed species), averaging across all threatened species that have available data. This contributes to the overarching Biodiversity 2037 target.

2. The average per cent CSH expected over 50 years from sustained management for all species, averaging across all species that have available data. This contributes to a Biodiversity 2037 target.

3. The per cent of all species with a positive per cent CSH expected over 50 years from sustained improved management. This is determined by the proportion of all species that have a CSH >2% over the next 50 years.

These three results assess the number of species, as a proportion for which there is data, which are experiencing an increasing likelihood of persistence under the management conditions at the time of analysis.

What does this tell us? Net CSH is used in Biodiversity 2037 to drive a hierarchy of targets. Based on a sustained period of investment at a plausible, increased level, the long-term aspiration is to establish and maintain appropriate management that will deliver (on average) a 100% net positive Change in Suitable Habitat in 50 years for threatened species, with co-benefits for non-threatened species. Reporting on Net CSH over time provides information about the coverage and targeting of management actions and the effectiveness of these in achieving biodiversity outcomes.

Permitted native vegetation clearing and offsetting

Reporting on: The number of known vegetation permits approved, hectares of permitted vegetation removed, and hectares of native vegetation protected under an offset agreement.

Description: Native vegetation is a critical component of Victoria's biodiversity, provides habitat for fauna, and delivers a range of ecosystem services that contribute to land productivity and Victoria's economy, human health and well-being. In Victoria, the removal of native vegetation is regulated, unless an exemption applies, and a permit is required to remove destroy, or lop native vegetation. These regulations are known as the native vegetation removal regulations that apply a three-step approach of avoid, minimise and offset.

For some sites where native vegetation has been permitted to be removed, native vegetation offsets may be required. An offset compensates for biodiversity losses arising from the permitted native vegetation removal. Offset sites are secured in perpetuity and managed to maintain and improve their native vegetation condition.

This indicator calculates the number of permits approved and the hectares of native vegetation permitted to be cleared each year.

This indicator also measures the number of new offset agreements and the hectares of native vegetation secured under them.

This indicator will help demonstrate the effectiveness of the Native Vegetation Regulations – no net loss policy and counterbalancing measures for impacts of native vegetation clearing exemptions on Crown land.

What does this tell us? This indicator provides important insights into the total area of native vegetation that is permitted to be removed across Victoria. Results from this indicator also contribute to understanding progress towards achieving the goal of 'no net loss' to Victoria's biodiversity from the permitted removal of native vegetation. This indicator can also tell us how much native vegetation is being secured under offset agreements.

Rate of change in extent and condition of native vegetation estimated from management actions

Reporting on: Reports on rates of changes over time in the extent and condition of native vegetation estimated from management actions.

Description: The Victorian Government's policy objective for native vegetation - a reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation, leading to a Net Gain - aims to address the circumstances and consequences of native vegetation management across the whole landscape.

This indicator estimates the rate of change in extent and condition of terrestrial native vegetation on public and private land in Victoria, measured through habitat condition scores. It will measure the rate of losses and gains in the condition and extent of native vegetation and habitat, as measured by a combined quality-quantity measure across the state over a specific period of time. It will consider data and estimates of the benefit or impact of actions delivered through volunteer actions, government programs and investment, entitled uses, exemptions and insufficient management of threats, as well as permitted clearing, offsets and native vegetation credits.

What does this tell us? Since colonisation, approximately half of Victoria's native vegetation has been cleared for agricultural and urban development, including more than 70% of the original cover on private land. In recent decades, in response to increasing recognition of the land protection and biodiversity conservation issues associated with this loss of native vegetation, the rate of clearing has been slowed by regulations and there has been an increasing policy focus on better management of remaining vegetation, more strategic revegetation and improved offsetting of unavoidable losses. It is important to understand the relative amounts and rates of positive and negative contributions to native vegetation extent and condition and also demonstrate the rate of progress against the net gain target.

Percentage of vegetation that has reached maturity after fire.

Reporting on: The percentage of vegetation that has reached maturity after fire.

Description: Vegetation growth stage structure and Tolerable Fire Intervals (TFI's) provide useful information for fire management. Appropriately managing fuels and conducting burns to protect, maintain and improve ecosystem values and build ecosystem resilience across the landscape is a key objective under the Code of Practice for *Bushfire Management on Public Land 2012*.

To understand the effects of fire (natural and planned) on the environment, DEECA measures and monitors the timing, number and extent of fire in different vegetation groups using their TFI. Burning below TFI can be detrimental to ecosystem resilience, while allowing fire to go too far beyond its TFI may also negatively impact biodiversity as fire is an important component in the regeneration of many flora species.

This indicator shows the percentage of vegetation on public land above the minimum TFI. The minimum TFI is defined as the "minimum time required between two successive fire events at a site [...] in order that a vegetation community or its constituent species can persist and have every reasonable chance of reaching maturity and setting seeds" (Cheal 2010).

Why is this important? Reporting on vegetation that has reached maturity after fire provides information on the resilience of vegetation communities to future disturbance. This information is used to assess the potential impact (both positive and negative) of future planned burn strategies on public land.

Assessing Management Effectiveness

Reporting on: The effectiveness of management actions.

Description: In time separate indicators will be developed to assess the effectiveness of each management output listed in the Management Actions theme.

What does this tell us? Management is critical to protect and maintain biodiversity. This includes by reducing the threat posed by invasive species and replacing lost habitat (revegetation). Management actions are also costly, and it is therefore critical that this investment is both cost effective and generating the predicted biodiversity outcomes.

Working Together

The Working Together theme outlines the contribution Victorians are making to protect nature toward the 'Victorians Valuing Nature' goal of Biodiversity 2037.

Victorians are passionate about the environment, and many are already playing a key role in its protection. For example, Victoria has a long history of people participating in volunteering programs to protect nature. However more needs to be done, and soon, so we as a community can better protect biodiversity.

Evidence shows that people who develop a greater personal connection with nature are also more likely to value and take action to protect nature. A network of agencies are working together on a program of social research and on-ground activities to encourage all Victorians to develop a greater personal connection with nature, spend more meaningful time in nature, and to do more to act to protect it. These actions were identified by experts as high priorities as they can make the biggest difference for biodiversity; we encourage all Victorians to undertake more of these actions more often.

Indicators

Victorians connecting with nature

Reporting on: The proportion of Victorians who have developed a personal connection with nature.

Description: Since 2018, the annual Victorians Value Nature survey has been capturing the proportion of Victorians who have developed a personal connection with nature, using a well- established research-based tool. Connection with nature is a growing area of research of great interest to many sectors all over the world, due to its potential to motivate people to take action.

Alongside this target, the proportion of Victorians who can access and spend time in nature is also reported.

It is important to note that 'connecting with nature' refers to an enduring nature-based identity, experience, and philosophy whereas the activity 'spending time in nature' is used to describe experiences in nature.

What does this tell us? This indicator will help track progress toward the target of "All Victorians connecting with nature"; and better understand the attitudes, motivations, and behaviours of Victorians with different levels of connection with nature. Combined with the broader survey data, it will also provide insights into how we might help more people spend time in nature to develop a greater personal connection with nature, and how we might encourage more people to take more actions to protect biodiversity, more often.

Environmental volunteer hours contributing to the health of Victoria's biodiversity

Reporting on: Volunteer hours of Victorians acting to protect nature that are supported through government funded volunteering programs.

Description: Victoria has a strong history of environmental volunteering, with volunteers contributing enormously to improving our environment, our local communities and our economy. Many Victorians give their time freely to a wide variety of environmental causes and organisations, including Landcare, Friends, local environment and Coastcare groups. This indicator reports on the number of hours of contribution environmental volunteers make in acting to protect Victoria's natural environment, that are supported through the Government funded Victorian Landcare Facilitator Program.

What does this tell us? Across the state, local environmental volunteering significantly contributes to protecting and improving biodiversity which contributes to Biodiversity 2037 healthy environment goals. It is important to capture the collective efforts of environmental volunteers in Victoria to understand the impact of volunteering to improving biodiversity.

Victorians taking actions to protect biodiversity

Reporting on: The proportion of the community who are undertaking at least one of the seven priority actions to protect biodiversity.

Description: DEECA reports on the ways all Victorians can take action to protect biodiversity. The actions are prioritised because of their estimated impact on biodiversity:

Get involved:

- Pick up other people's litter when visiting parks or natural areas (1)
- Collect data for a citizen science program (2)
- Plant trees, provide other kinds of habitat or remove weeds to support wildlife (outside own property) (3)
- Be a champion for nature:
- Advocate for the environment or support advocacy organisations that address environmental issues (4)
- Enjoy nature in your own backyard:
- Plant trees, provide other kinds of habitat, or remove weeds to support wildlife on own property (5)
- Be a responsible pet owner:
- Comply with off-leash restrictions for dogs (6)
- Restrict or control cat access to outdoors (7)

This additional action is reported under the 'Connecting with nature' target:

- Get out there: Spend time in nature.

What does this tell us? An initial target of 5 million Victorians acting to protect the environment was set for Biodiversity 2037.

Tracking Victorian's ongoing participation in these actions, and their attitudes and motivations is helping agencies identify how they can encourage more Victorians to take action.

The program is working together with partner agencies to build on people's connection with nature and other pathways to encourage more people to take more actions, more often. There are also opportunities to further refine the targets to provide interim indicators of progress. For example, for the 'Restrict or control cat access to outdoors' action, our research and partners recommend that stray cats are adopted, in addition to better containment of 'owned' cats which roam, to help reduce the pressure free- roaming cats place on native animals.

In development

During the development of the Biodiversity Indicator Framework several gaps were identified that were considered important for biodiversity monitoring and reporting. These gaps include how healthy is Victoria's soil, how connected is Victoria's landscape, how diverse are habitat patches across Victoria, how will Victoria's flora and fauna respond to climate change, and how cultural flows and cultural watering by Traditional Owners support Victoria's flora and fauna? Indicators to report on these gaps are currently being investigated or developed and will be incorporated into future updated versions of the Biodiversity Indicator Framework when and where data becomes available. More broadly, the indicator set in the Biodiversity Indicator Framework will be regularly reviewed, to ensure that indicators are still relevant and meaningful, to replace indicators as required, and to update indicators as new data and/or analyses become available. This includes updating indicators, so they are more representative of Victoria's environments, by including more data collected from marine and freshwater ecosystems.

DEECA will continue to work with and support Traditional Owner groups in reporting on Health of Country as appropriate and as desired by each group. Traditional Owners engagement will also be critical for interpreting the results generated from indicator reporting.

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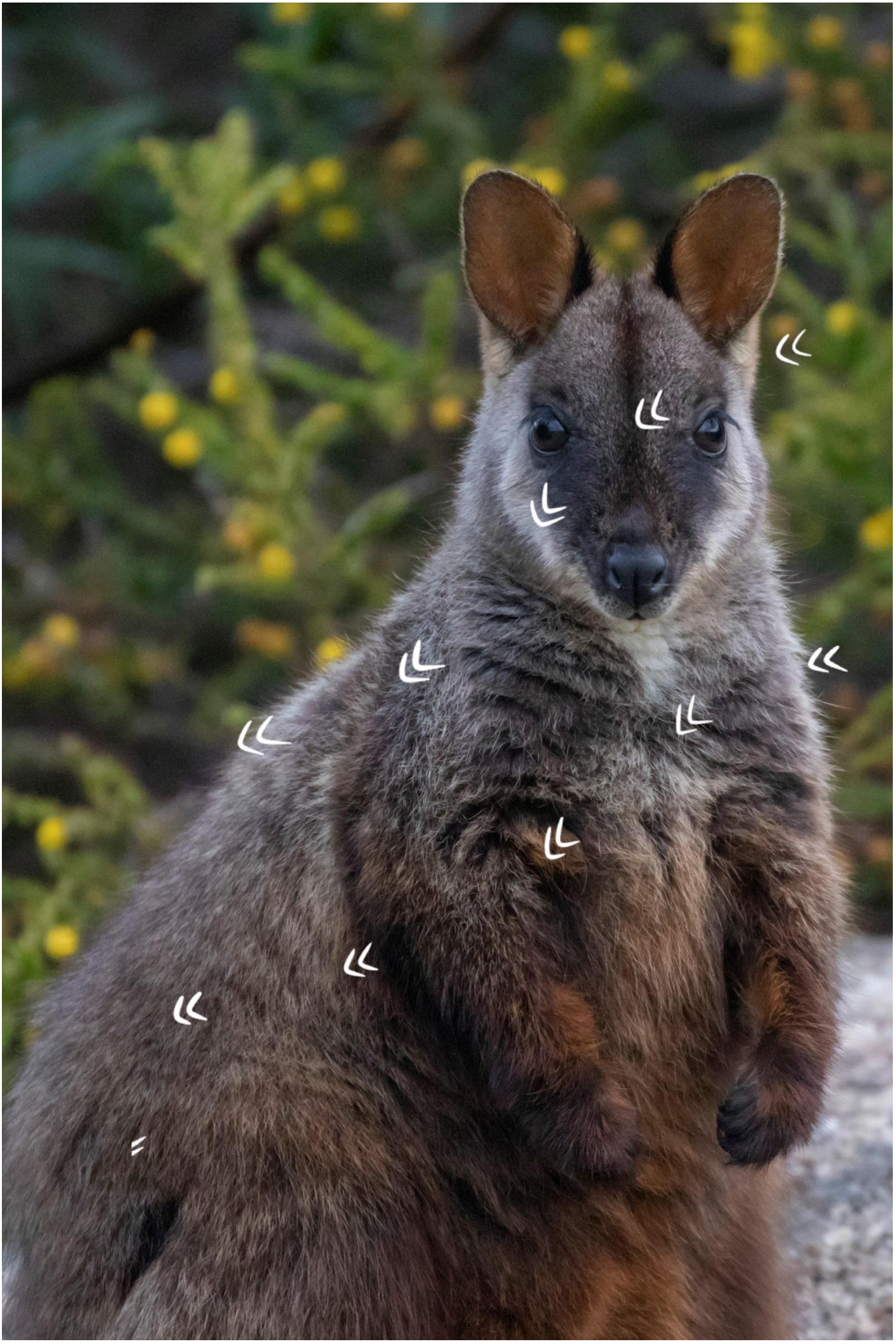
35	Aurora bluetail	Marcia Riederer
41	Flying fox	Marcia Riederer
46	Southern brush-tailed rock-wallaby	Marcia Riederer



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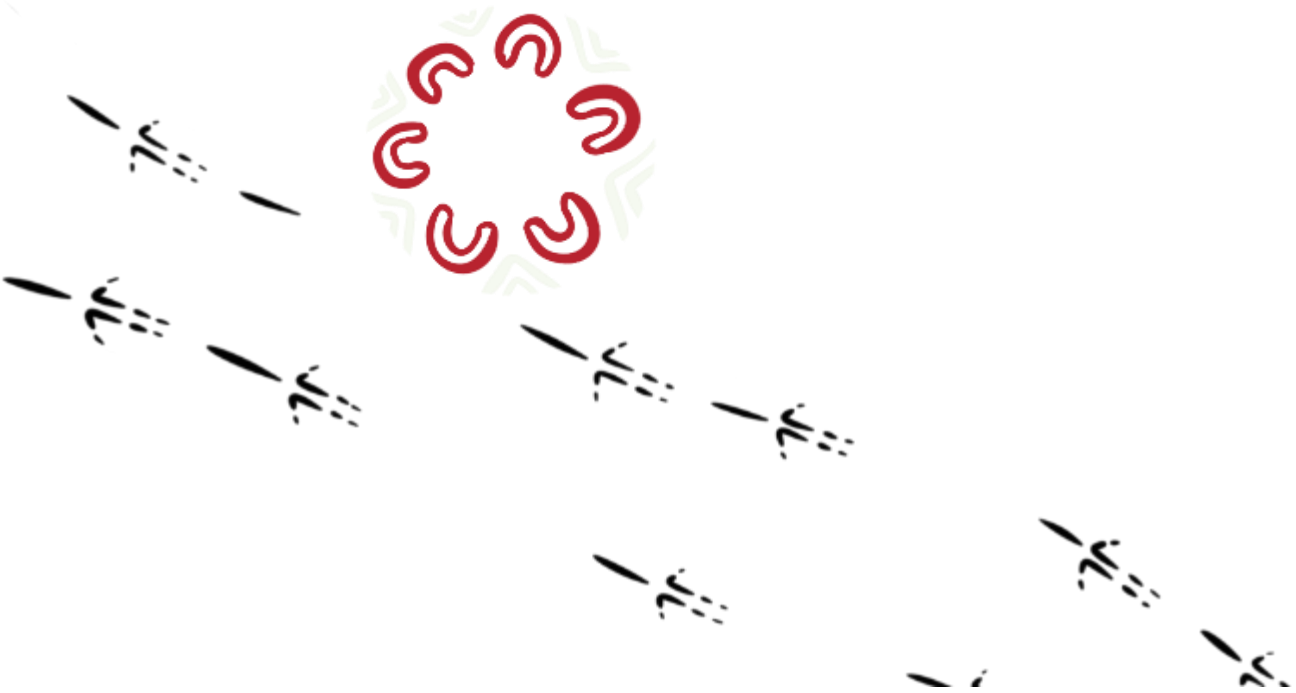

Acknowledgment

We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it. We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

We are committed to genuinely partner, and meaningfully engage, with Victoria's Traditional Owners and Aboriginal communities to support the protection of Country, the maintenance of spiritual and cultural practices and their broader aspirations in the 21st century and beyond.

Appendix: Data Collection Priorities

Understanding changes in Victoria's biodiversity

VICTORIA State Government | Energy, Environment and Climate Action

Why we need data collection and monitoring

Victoria's biodiversity is facing a range of ongoing threats and threatening processes, including habitat loss and fragmentation, invasive species, and a changing climate. The increasing rate of biodiversity loss calls for greater action to halt the decline of Victoria's unique species and habitats.

Monitoring and reporting on important biodiversity and management metrics provides the information necessary to detect trends and patterns to inform programs and policy. This includes identifying successes in management actions and areas for improvement, tracking progress towards the goals and vision of Biodiversity 2037, prioritising knowledge gaps, and importantly assessing the current health of Country and biodiversity.

Observing and recording changes, progress and declines, allows government and other land managers to analyse the drivers and causes underpinning environmental changes. Understanding where, how, and why changes are occurring provides the opportunity for ongoing improvements to policy interventions and management actions to support better biodiversity outcomes and to heal Country.

Purpose of this document

This document provides a high-level summary of the broad types of data that are needed to support and inform DEECA's biodiversity tools and reporting, including the Biodiversity Indicator Framework. DEECA uses biodiversity reporting and decision support tools to assess changes in biodiversity and to direct management responses and actions. The key data types outlined in this document should be prioritised when planning data collection and designing monitoring programs, whether that is in relation to vegetation condition quadrats, flora, and fauna surveys, or assessing the effectiveness of on-ground management projects.

Key objectives

The key objectives of this document are to:

- Describe the key data types required to understand and report on changes in Victoria's biodiversity.
- Encourage the sector to standardize data collection and contribute data to improve monitoring, reporting, and decision support tools.
- Work toward the uptake of standardised monitoring protocols that generate consistent and reliable data across projects.
- Highlight the importance of intellectual property including Indigenous data sovereignty and aspirations to heal Country.

What we hope to achieve – Working Together

To provide programs, projects, and data collectors with a summary of the broad data types that will offer the most benefit to understanding and responding to changes in Victoria's biodiversity. It is important that data collection priorities are made clear, and methodologies standardized, so that results can contribute to biodiversity tools and frameworks and achieve the greatest biodiversity benefits. When everyone contributes data, we can then detect broader patterns and trends across Victoria. Working together, we can improve the quality and consistency of biodiversity data, monitoring and reporting, to improve biodiversity policy and management interventions. Importantly, via a collaborative approach, we can also achieve the goals and visions set out in **Biodiversity 2037.**

Theme	Category of indicators
State of Biodiversity	Status and trends of Victoria's flora and fauna
Expected Survival	The predicted future persistence of species and ecosystems
Biodiversity Management	The biodiversity actions occurring across the state
Management Effectiveness	Biodiversity outcomes of actions and investment across the state
Working Together	The contributions, connections, and value Victorians place on protecting nature

Biodiversity Indicator Framework

The Biodiversity Indicator Framework sets out the approach to monitoring and reporting against key biodiversity indicators across the State.

The Biodiversity Indicator Framework is structured via five key themes and an overarching Health of Country theme (Table 1, Figure 1), with each theme addressing an important component for understanding changes in biodiversity and managing Victoria's native flora and fauna. In combination, these themes provide the structure for monitoring and reporting on biodiversity comprehensively and holistically.

To accurately report on biodiversity patterns and provide the evidence-base to inform policy and programs in a timely way, the Biodiversity Indicator Framework requires regular, consistent, and specific data inputs. The broad data types required by the Biodiversity Indicator Framework and other tools are described in this document.

Figure 1. Structure of the Biodiversity Indicator Framework

Key data types

The following descriptions represent the key data types that DEECA prioritizes to support biodiversity monitoring and reporting and to inform decision support tools.

Activity Data

Activity data captures outputs of management actions that aim to protect, improve, and manage ecosystems, flora and fauna and their habitats. Projects that contribute to activity data include predator and herbivore control, revegetation, weeding, and the installation of artificial habitat (e.g. nest boxes). Activity data needs to be recorded spatially, identifying hectares of action, in addition to any other relevant metrics (e.g. number of nest boxes installed). Mapped data is then compiled by DEECA so that it is available for analysis and reporting and used to track progress toward Biodiversity 2037 targets.

Vegetation Condition and Extent

Vegetation condition represents the degree to which a given site differs from its desired state. DEECA uses vegetation condition assessments to inform statewide assessments of the condition and extent of Victoria's vegetation and enables vegetation condition or quality to be accounted for in native vegetation planning and investment decision-making processes (Figure 2.) Vegetation assessments are conducted in defined quadrats (plots). The calculated habitat score indicates the quality of the vegetation expressed as a percentage or on a scale of zero to 1.

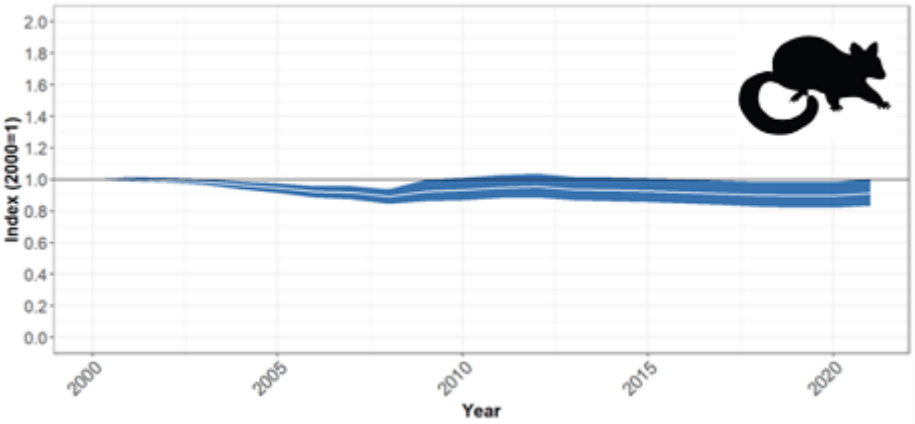

Figure 3. Example population trends for 103 mammal species between 2000-2020

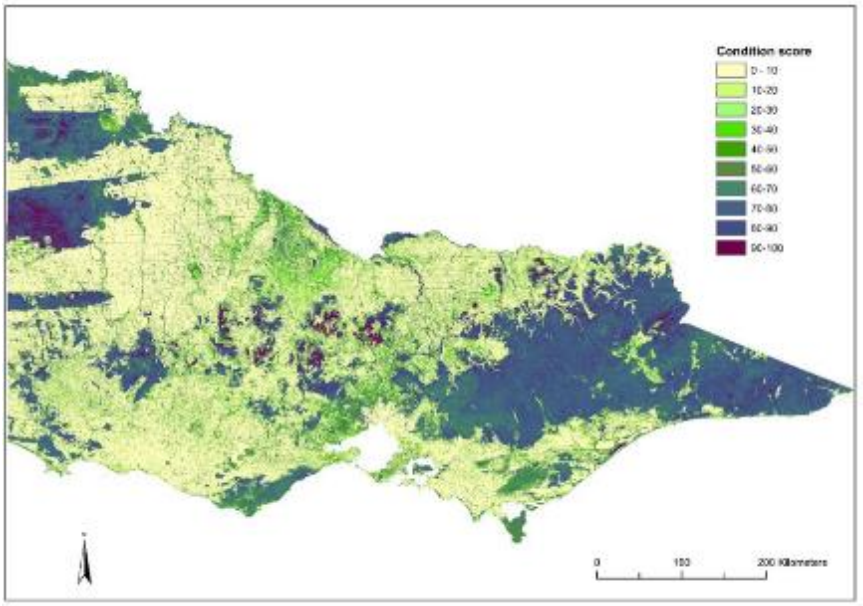

Figure 2. Example of vegetation condition across Victoria

Species Abundancy and Occupancy

Several methods can be used to assess species occupancy and abundance (e.g. remote sensing cameras, various trapping methods, aerial surveys, transects etc.). The State uses the Victorian Biodiversity Index (VBX) to detect populations trends in taxa groups (Figure 3), which relies on robust abundance data. Most critical to the VBX is that data can be averaged into yearly change in species abundance (including density, relative abundance or occupancy) relative to a baseline year. This means that monitoring to detect species abundance must be time series data that employs standardised methods across years (for a minimum of 2 years). Environmental DNA (eDNA) is another emerging method capable of capturing presence/absence data.

Genetics

Genetic data can be used to directly estimate genetic diversity within populations, and also effective population size and extent of gene flow between populations, enabling more informed conservation management decisions. However, currently:

- Genetic data are broadly lacking for Victorian plant species, including threatened species, and the majority of Victorian invertebrate species.
- Some form of genetic data is available for more than 50% of vertebrate species, but the majority of that data is not useful for informing species' genetic risks.
- The highest proportion of informative genetic data is available for freshwater fishes and mammals, and *critically endangered* and *endangered* species.

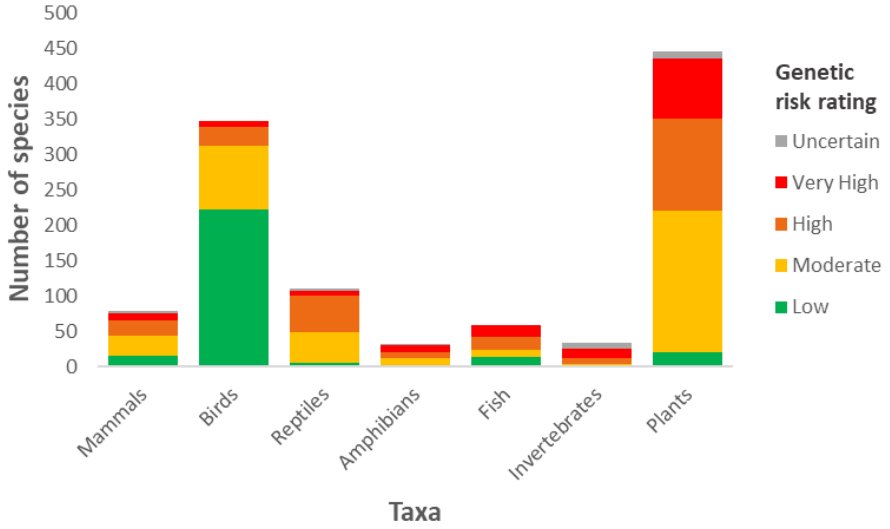

Figure 4. Proportion of species in certain categories of genetic risk across taxa groups (2020)

When analysing genetic data, genetic traits such as evidence of inbreeding or population genetic structure based on empirical genetic data are most valuable for estimating genetic risk. Specifically, evidence of genetic structure of populations, evidence for inbreeding within populations, relative diversity within populations, and whether there was evidence for reduced effective size of populations (Ne). Demographic traits, such as dispersal capacity, generation time, and population cohesion can be useful proxies for assessing genetic risk to populations, estimated population size or geographic extent when actual genetic data are lacking or difficult to acquire. DEECA uses the Victorian Genetic Risk Index (Figure 4), which considers genetic and demographic data, to determine the genetic health of populations and species. Genetic samples (e.g. tissue, hair, blood, scat etc.) should be appropriately stored and extracted data archived for future use.

Reading Country

Traditional Owners have a holistic understanding of Country, and a deep cultural knowledge that they have used to keep Country healthy for millennia. This knowledge is held within Country and can be accessed and interpreted by reading Country and its rhythms (i.e., responses, signals and indicators observed in the environment) in line with cultural Law/ Lore systems. Traditional Owners have passed on cultural knowledge and methods of reading Country from one generation to the next.

Traditional Owners have a range of integral and holistic tools for reading and healing Country, including fire, water, and vegetation management, as well as language, songlines and Cultural Lore.

DEECA recognises that reading Country is a key way for Traditional Owners to understand connection and changes to Country through time, and to collect knowledge and data in a culturally appropriate way. Traditional Owners may utilise alternative methods to Western science to read Country and observe change in the landscape over time, informed by cultural values. This may include cultural assessments or other methods.

It is important to recognise that Traditional Owners will have important species and knowledge gaps that they will want prioritised, and these may change over time. These may not necessarily align with Western priorities and will likely be different for each Traditional Owner group. Prioritisiation for collection of other activity data types should recognise this.

DEECA is committed to exploring together with Traditional Owners how new research can better support Country planning and data priorities.

Intellectual Property and Traditional Owner Data Sovereignty

Indigenous Data Sovereignty includes Indigenous people having governance of data that is generated by state infrastructure. It also requires access and control of data for governance: information that adequately reflects Indigenous cultural diversity, worldviews, and priorities. Indigenous Data includes information, interviews, surveys, statistics, reports, sound recordings, films, photographs,

health records, mapping of Country, records and samples of plants and animals, languages, knowledge, art and stories. Indigenous data is often collective data and is important to Indigenous people to share and have access to, to pass down through the generations for nurturing and refining. DEECA is implementing a pathway to an Indigenous Data Sovereignty Policy for the collection of biodiversity data. More broadly the UN Sustainable Development Goals consider data collection and management vital for building the sovereignty of Indigenous populations.

Outlook and Next Steps

Targeted data collection and monitoring will provide reliable and robust information on the trends & trajectories of Victoria's biodiversity. This will allow for a greater insight into the drivers of biodiversity change and directly inform biodiversity reporting under the Biodiversity Indicator Framework. Prioritizing these data types will improve our understanding of Victoria's biodiversity and our ability to improve biodiversity outcomes via management and policy. Currently, the key data collection priorities described here are applicable to all three broad habitat types - i.e. terrestrial, marine and freshwater - except for habitat condition and extent, which is currently only appropriate in terrestrial ecosystems. DEECA is working to incorporate marine and freshwater habitats into habitat condition and extent, and this will be available soon. DEECA is also conducting a gap analysis to prioritise specific species and locations for monitoring and data collection and a power analysis tool to inform the design of monitoring projects. These updates will be available in 2024.

How to contribute data

Activity Data: Organisations can provide biodiversity management activity data to DEECA (e.g., Pest predator/herbivore control, revegetation, weed control etc.). Reported activities must meet delivery standards described in agreements, or at a minimum should meet DEECA's Output Delivery standards. Data can be submitted by using DEECA biodiversity information systems (ActivityKit) or by providing shapefiles that meet the Biodiversity 2037 activity data requirements.

- Activity Data (environment.vic.gov.au)

Species Abundance, Occupancy and Habitat Data: Time-series animal surveys and vegetation quadrat data are the most valuable data for detecting population trends and status, and to assess vegetation condition. Survey, quadrat, and any other species observations can be submitted to the Victorian Biodiversity Atlas (VBA).

- Victorian Biodiversity Atlas (environment.vic.gov.au)

eDNA records should also be submitted to the VBA

Genetic Data: Reports or papers that contain population genetic data can be sent to biodiversity.knowledge@deeca.vic.gov.au for inclusion in the Genetic Risk Index.

For *general enquiries*, including information on data collection methods and prioritisation tools, please contact: Biodiversity Knowledge (DEECA) biodiversity.knowledge@deeca.vic.gov.au

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