



**Swan Region Strategy for Natural Resource Management
2020 -2023**

Perth NRM

Unit 3 / 11 Brodie Hall Drive

Bentley, WA 6102

13 565 953 466

**Ngala kaaditj Noongar moort keyen kaadak nidja boodja.
We acknowledge the Noongar people as the original custodians of this land.**

Contents

Executive Summary.....	2
Regional Overview	4
Strategic Framework and Objectives	7
Implementation and Prioritisation.....	7
Stakeholder Engagement.....	9
Strategic Objective 1: Enhance priority threatened ecological communities throughout the Swan Region.	10
Strategic Objective 2: Protect and conserve priority threatened species within the Swan Region.....	13
Strategic Objective 3: Protect and enhance Wetlands throughout the Swan Region.....	16
Strategic Objective 4: Protect and enhance Rivers and Waterways throughout the Swan Region	20
Strategic Objective 5: Increase community NRM capacity and capabilities to adopt best practices.....	24
Strategic Objective 6: Increase community awareness of NRM projects and encourage participation.	26
Strategic Objective 7: Increase capacity in agricultural systems to adapt to market and climate demands.	29
Strategic Objective 8: Encourage adoption of sustainable agricultural practices within the Swan Region.	30
Monitoring, Reporting, Evaluation, and Improvement.....	31

Executive Summary

The purpose of the Swan Region Strategy for Natural Resource Management ('the Strategy') is to provide an integrated framework for natural resource management in the Swan Region of Western Australia ('the Region'). The previous Strategy expired in 2020 after five years in operation. This updated regional NRM Strategy guides NRM investment into the region and prioritises actions until 2023. After this period, Perth NRM will assess whether an updated *Swan Region Strategy for Natural Resource Management* is more appropriate.

Perth NRM is the custodian of the Strategy and works to reflect the best available knowledge at the time of writing. The Strategy was developed with community and stakeholder consultation. It is a whole-of-region and multi-stakeholder plan intended to provide a focus for natural resource management in the Swan Region (Figure 1). Therefore, its intent is to reflect stakeholder aspirations and priorities for the Region. The development of this Strategy demonstrates the partnerships fostered between Perth NRM and our stakeholders

The Strategic Objectives include the determination of actions developed in collaboration with key stakeholders in the Region. Program logics are developed for major program initiatives, and project activities are monitored for progress towards the delivery of outcomes. Perth NRM annually reviews the Strategy to evaluate its effectiveness and identify improvement opportunities.

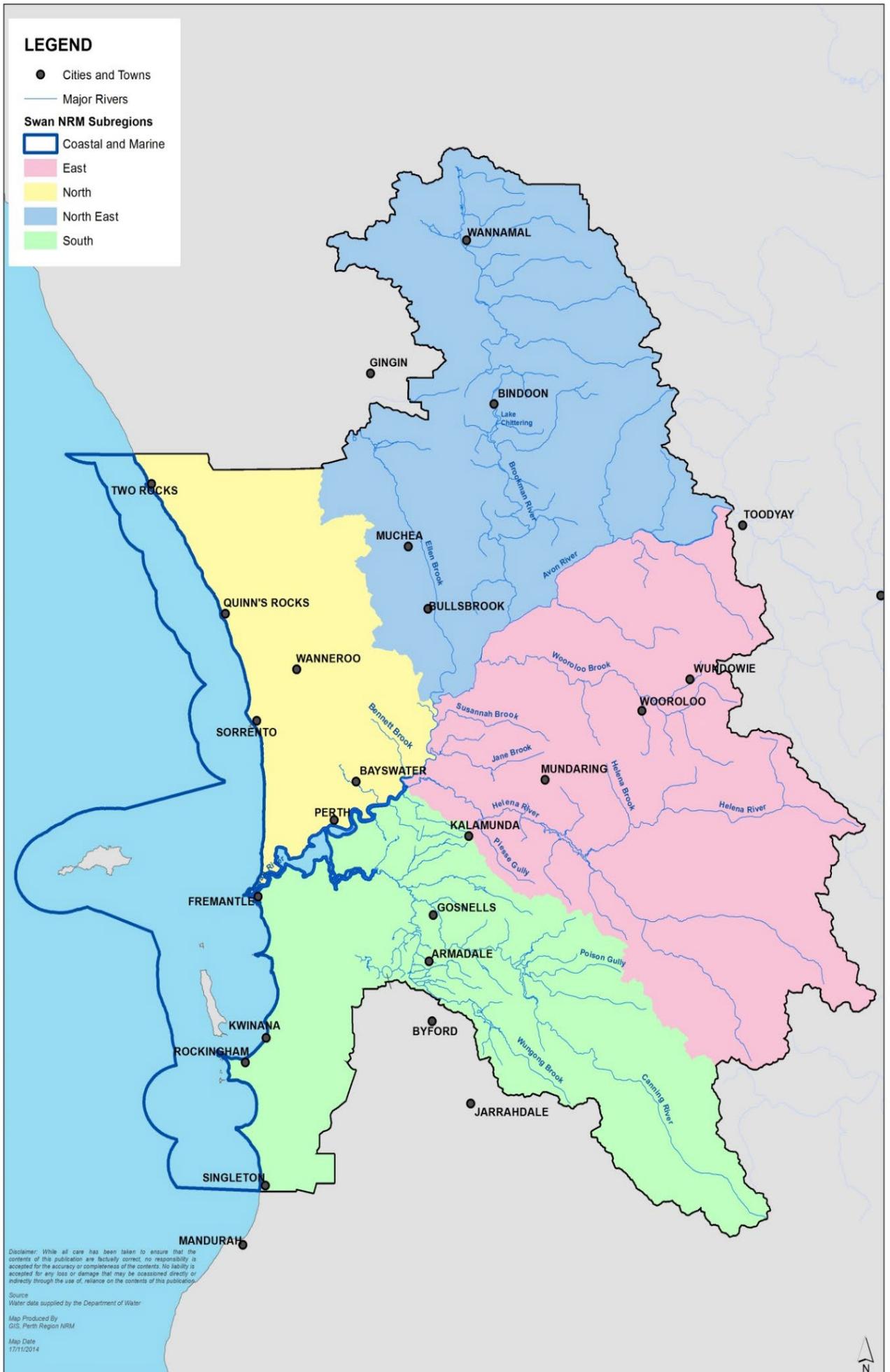


Figure 1: The Swan NRM Region and sub-regional catchment areas.

Regional Overview

The Swan Region covers over 1 million hectares including the Perth Metropolitan area, the Swan and Canning river catchments, and extends three nautical miles offshore to include islands such as Rottnest and Garden Island. The Swan Region is part of an internationally recognised biodiversity hotspot, due to its high floral diversity and endemism (uniqueness) with less than 30% remaining throughout the landscape. There are over 2,200 species of plants within the Swan Region and the diversity concentrates on the Pinjarra Plain, the Foothills of the Darling Escarpment, and the Bassendean Dune woodlands.

The Swan Region includes the Swan Coastal Plain Interim Biogeographic Regionalisation for Australia (IBRA) region and the Jarrah Forest IBRA region (Figure 2). Both IBRA regions contain assemblages of ecosystem communities and support species identified under the Environmental Protection and Biodiversity Conservation Act (EPBC Act 1999). Extensive clearing across the Swan Coastal Plain IBRA has resulted in this region having one of the highest densities of threatened flora, fauna, and ecological communities of anywhere in Western Australia. Both the Jarrah Forest and Swan Coastal Plain IBRA regions are under a high level of biodiversity stress, with clearing, fragmentation, infestations of *Phytophthora* dieback, and exotic weeds the major threats.

The value of natural resource assets is often driven by the extent of their threatened status, functional role within an ecosystem, or their natural capital value to businesses and production. For example, species and ecosystems listed as threatened or rare under the EPBC Act 1999 attract greater investment in their management than more common or lesser-known species or ecosystems (i.e., invertebrates or reptiles). While listing species under the EPBC Act 1999 assists the prioritisation of NRM actions, it can be a limitation in smaller regions where many species or ecosystems have been absent from the landscape for decades.

The Traditional Owners of the land and waterways within the Swan Region are the *Whadjuk* People of the Noongar Nation. The Whadjuk People have a cultural connection to *Boodja* (Country) spanning more than 60,000 years. Through lore, customs and language, Whadjuk People have maintained a spiritual connection to *Boodja* with sites of particular significance including *Ngooloomayup* (Carnac Island), *Meeandip* (Garden Island), *Gargangara* (North Armadale), and *Kaarta Gar-up* (Kings Park) to name a few.

Waterways lie at the heart of Noongar culture, both literally and spiritually. These include the *Dyarlgarro Beeljar* (Canning River), *Derbal Yiragan* (Perth estuary), their tributaries, and the flow of lakes and wetlands running parallel to the coast and at the foot of the Darling Scarp. Regional wetlands and waterways in the Swan Region maintain continual significance towards economic, spiritual, and cultural value to Aboriginal people. The entire Perth population with diverse cultures and communities have their own respective values, histories, and connections to our river systems and wetlands.

Perth is the capital city of Western Australia and covers almost half the Swan Region (~47%). It is a fast growing city, with the current population of 2.1 million expected to rise to 5 million in 2055. The combination of rich and productive natural assets and outdoor lifestyle choices have made the Region a highly sought-after destination for visitors and migrants. Supporting the growing population of Perth is a productive and diverse agricultural system covering large areas of the east and north-east subregions (Figure 3). The Swan Region is a major contributor of fresh food for the Perth market, with around 5,000 hectares of irrigated land used for this purpose. In addition, there is around 190,000 hectares of land managed to produce cereal and other crops.

The key threats to agricultural assets in the region include urban expansion, competing land uses, high production costs, declining soil health and climate change. While there have been areas of improved stewardship of the land through the awareness, understanding and adoption of regenerative farming practices, challenges remain. Dryland salinity in the Ellen Brook and Brockman River catchments, soil compaction in the Swan Valley, and the persistent decline in rainfall remain as some of the challenges for the Swan region.

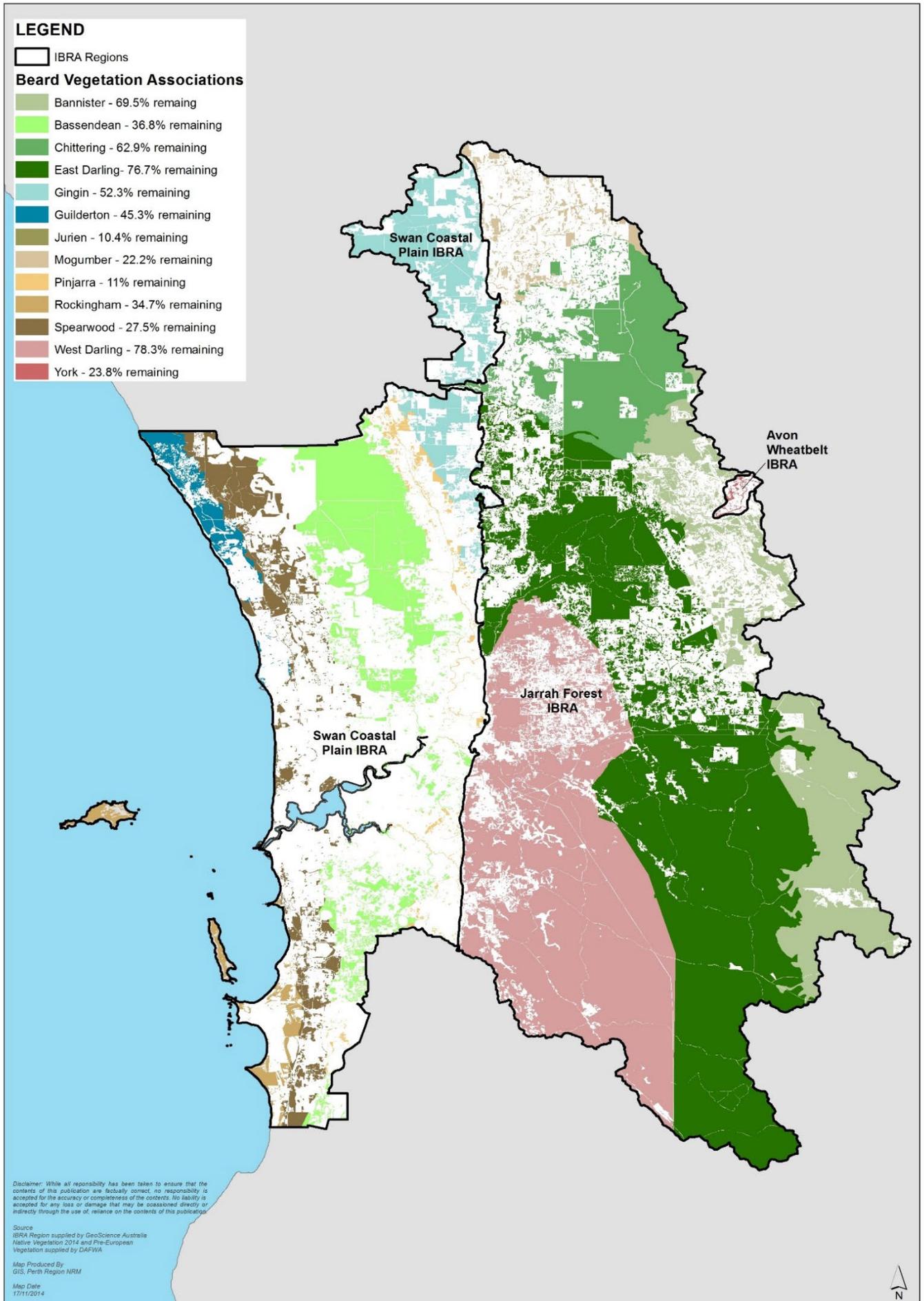


Figure 2: IBRA regions and Beard Vegetation Associations across the Swan NRM Region.

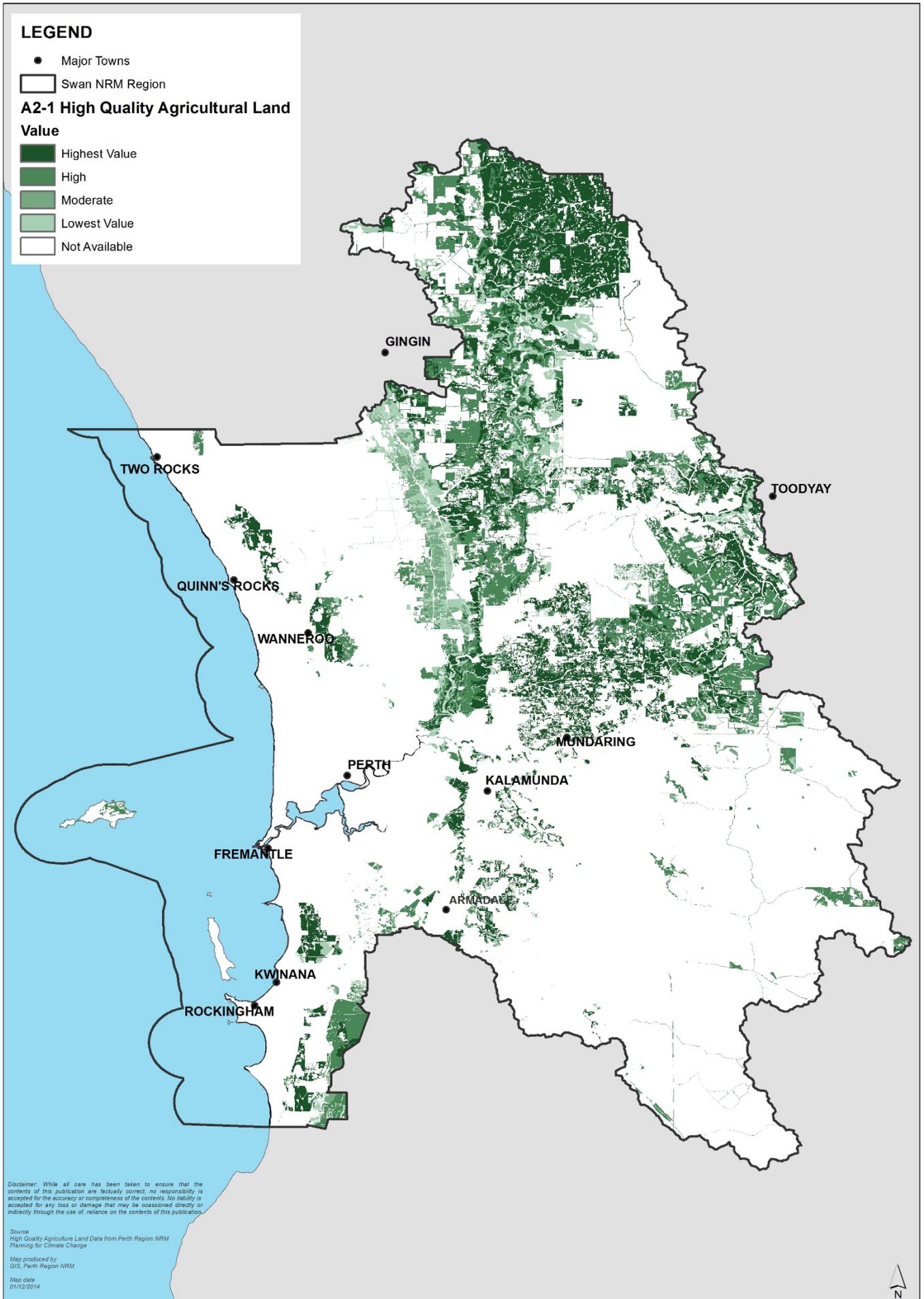


Figure 3: High Quality Agricultural Land across the Swan NRM Region.

Strategic Framework and Objectives

Strategic Framework	
Vision: The natural resources of the Swan Region are protected and managed sustainably in their own right and for the enhancement of the quality of life for present and future generations.	
Aspirational Goals	
Land use and development is sustainable and appropriate to land capability and suitability	Water quality (marine and freshwater) is maintained, and water resources are used sustainably
Residents and visitors value and enjoy access to high quality natural areas	Biodiversity and ecosystem function is protected, managed, and restored
Aboriginal cultural heritage values are integral to the way we view and manage the environment	Air is healthy for the community and the environment
Strategic Objectives	
1. Enhance priority threatened ecological communities throughout the Swan Region	2. Protect and conserve priority threatened species and priority places within the Swan Region
3. Protect and enhance Wetlands throughout the Swan Region	4. Protect and enhance Rivers and Waterways throughout the Swan Region
5. Increase community NRM capacity and capabilities to adopt best practices	6. Increase community awareness of NRM projects and encourage participation of Aboriginal groups
7. Increase capacity in agricultural systems to adapt to market and climate demands	8. Encourage adoption of sustainable agricultural practices within the Swan Region
Implementation Plans and Service Delivery	
Community Participation Plan	Indigenous Participation Plan
Engagement and Communications Plan	Threatened Species Project Plan
Threatened Ecological Communities Project Plan	Sustainable Agriculture and RALF Project Plan
MERI	
Annual reports, quarterly reports via MERIT, community consultation, MCAS, indicator measures	

Implementation and Prioritisation

Perth NRM is one of 54 regional NRM groups across Australia charged with the responsibility of developing and maintaining a natural resource management strategy for their region. The seven NRM groups in Western Australia are all non-profit community-based organisations with responsibilities for coordinating and delivering natural resource management activities in their region.

Within the Swan region, Perth NRM is one of many organisations and groups who will implement the Strategy through their investment and activities. Perth NRM will provide leadership on NRM matters at a regional level and develop partnerships with stakeholders for the successful implementation of the Strategy.

Partnerships and collaboration are essential for effective NRM, particularly in a stakeholder rich environment such as the Perth Metropolitan area. The challenges are large, but so are the opportunities if we can apply our collective intelligences and experience. Central to the successful implementation of the Strategy are the stakeholders including government, community, Aboriginal people, business, education, and research providers.

Perth NRM uses the Delphi method to prioritise NRM actions and locations based on group opinion and surveying experts, knowledge holders, Noongar Elders, and community leaders. From a regional perspective, responses from stakeholders are aggregated and considered with data available including bioregional network analysis, multicriteria analysis shell (Figure 4), or recovery plans for threatened species and/or ecosystems. These decision support tools account for planning needs, climate change modelling, species trajectories, and ecological condition to ensure local actions benefit the region at a landscape scale.

Priority Areas for Conservation and Restoration Activities in the Swan NRM Region

LEGEND

Priority Areas for Asset Management - Protection, Rehabilitation and Strategic Conservation Activities

- Priority 1 - High Biodiversity and High Connectivity Values
- Priority 2 - High Biodiversity and Moderate Connectivity Values
- Priority 3 - Moderate Biodiversity and Moderate Connectivity Values
- Priority 4 - High Biodiversity Value Isolated Patch

Priority Areas for Improving Ecological Connectivity - Revegetation Activities

- Priority 1 - Regional Connectivity
- Priority 2 - Local Connectivity

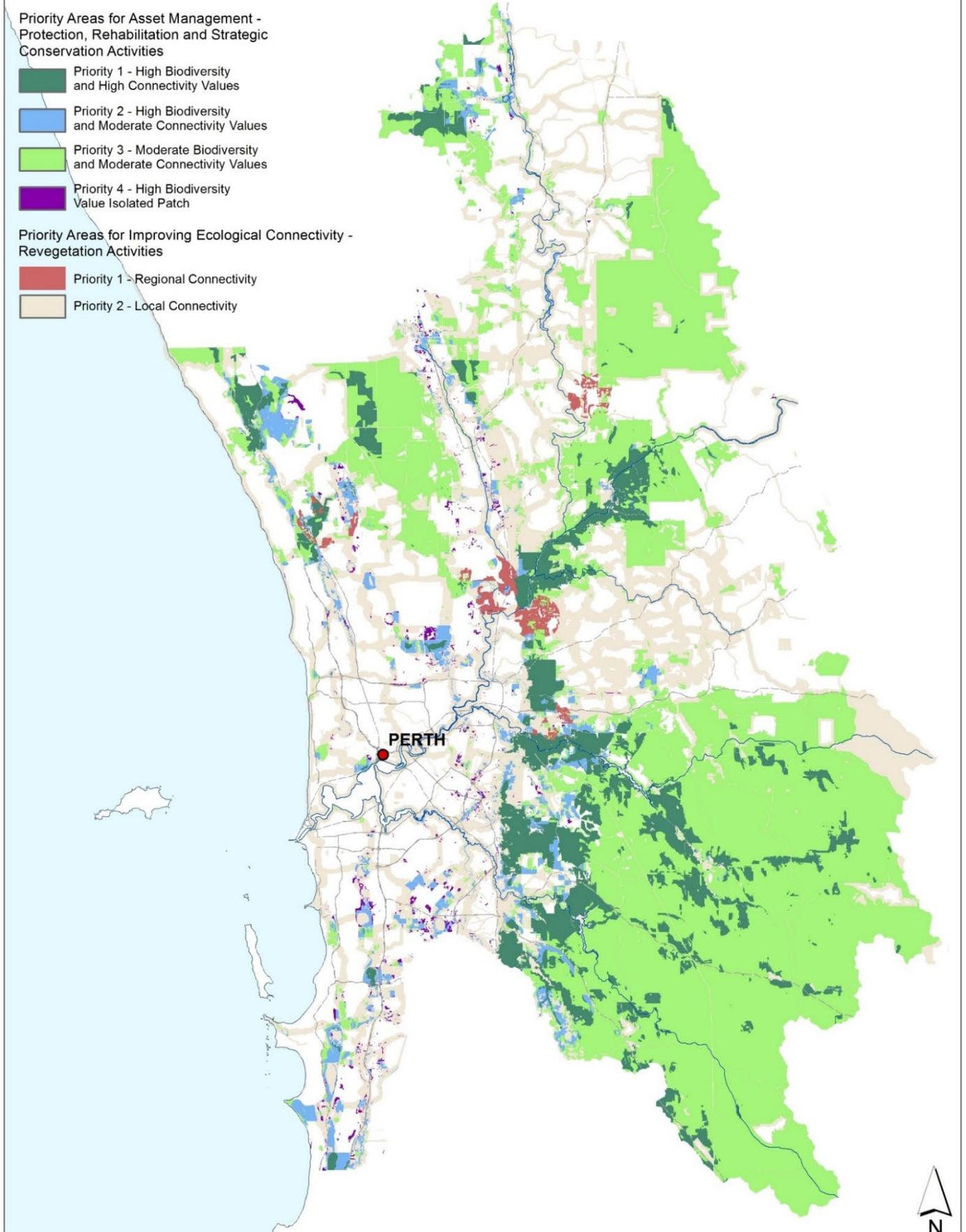


Figure 4: Priority areas for conservation and restoration activities in the Swan NRM Region

Stakeholder Engagement

Perth NRM has fostered strong relationships with community groups across the Swan Region and continue to develop these through all our programs. The NRM Strategy organises these relationships and aligns actions towards strategic objectives and shared aspirations for the Region. This Strategy informs the way we collaborate with key partners and stakeholders and enable the broader community to participate in NRM activities. Perth NRM engages with stakeholders to determine suitable NRM actions required across the region. Their recommendations are the foundation for the aspirational goals identified in the Strategic Framework.

Perth NRM focuses on strengthening our relationships with a wide diversity of stakeholder groups. However, Aboriginal engagement with NRM projects has remained underrepresented given the complexities and multicultural facets of the Aboriginal community within the Swan Region. With the implementation of this Strategy, Perth NRM aims to engage with and work closely with the Southwest Aboriginal Land and Sea Corporation (SWALSC) and the new Aboriginal Corporations as part of the delivery of the Community Participation Plan and corresponding Indigenous Engagement Plan.

Stakeholder engagement was critical in identifying suitable actions detailed in the Strategy and corresponding Strategic Objectives and Aspirational Goals detailed in the Strategic Framework. Their involvement included:

- Project planning and implementation conducted in partnership with the key stakeholders, frequently through formal meetings, including teleconferences for remote members.
- Regular one-to-one meetings at Perth NRM, on-site or remotely, as part of the coordination and administration of the project delivery.
- Perth NRM conference and training events for attendance by community leaders and decision makers.
- Partnership and support of community-based organisations, ranging from assistance with on-site events through to provision of facilities for meetings or communication of their activities.
- Coordination and facilitation of grant programs for the community. Support is also provided for community groups applying for federal, state, or local government grants and for philanthropic funds.
- Community-based events such as agricultural field days, community festivals and education events (e.g., Science Week).
- Use of a diverse range of communication channels including the website, social media, newspapers, direct correspondence, television, and radio.

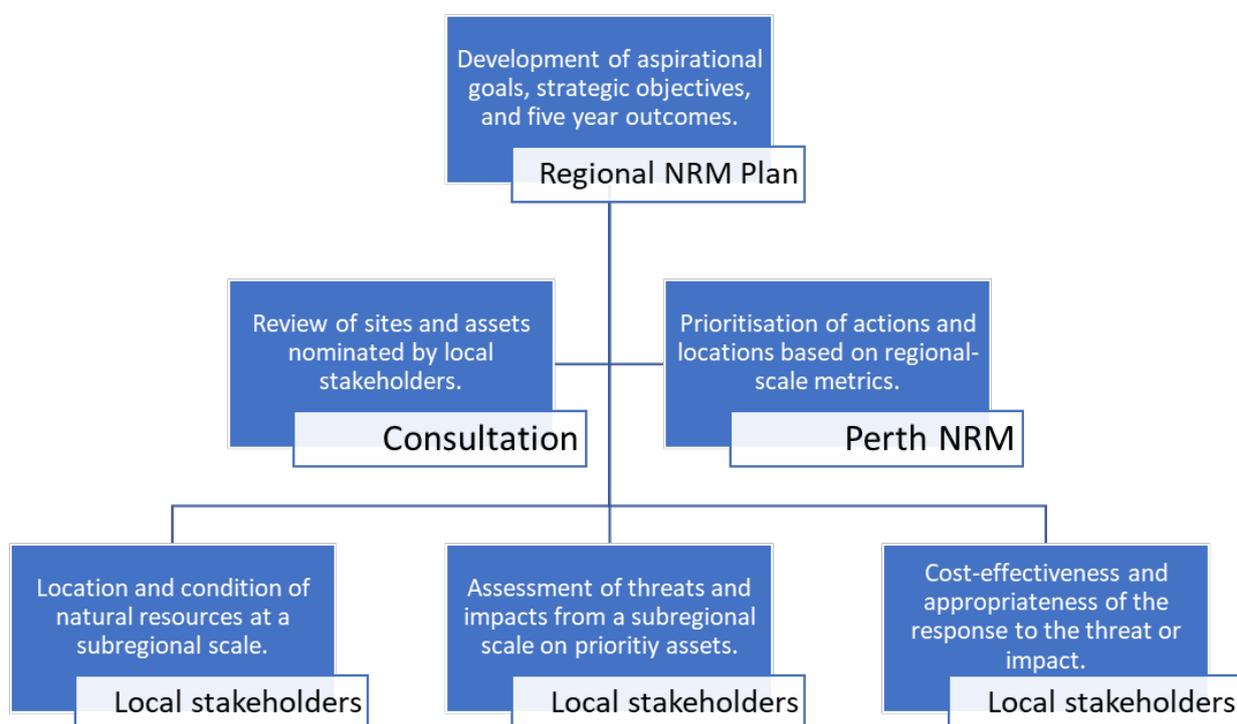


Figure 5: Stakeholder engagement process and development of the Strategic Framework.

Strategic Objective 1: Enhance priority threatened ecological communities throughout the Swan Region.

5 Year Outcome: Implementation of priority actions is leading an Investment Priority: improvement in the condition of EPBC Act listed Threatened Ecological Communities.

Issue

The Swan Region is part of an internationally recognised biodiversity hotspot, due to its high floral diversity and endemism (uniqueness) and the fact that less than 30% remains (Critical Ecosystem Partnership Fund 2014). The Southwest of Western Australia contains around half of Australia's known flowering plants, ferns, and cycads, with 79% of the plant's species unique to the area. Within the Swan Region, there are over 2,200 species of plants, with diversity concentrated on the Pinjarra Plain, the Foothills of the Darling Escarpment, and the Bassendean Dune woodlands.

The Swan Region includes the Swan Coastal Plain Interim Biogeographic Regionalisation for Australia (IBRA) region and the Jarrah Forest IBRA region. Extensive clearing across the Swan Coastal Plain IBRA has resulted in this region having one of the highest densities of threatened flora, fauna, and ecological communities anywhere in Western Australia. Both the Jarrah Forest and Swan Coastal Plain IBRA regions are under a high level of biodiversity stress, with clearing, fragmentation, and infestations of *Phytophthora dieback* and exotic weeds the major threats.

Historical policies over the last 180 years have supported or facilitated the unsustainable use or removal of natural resources, resulting in significant losses of natural and cultural heritage. Across the Southwest, it is estimated that only 40% of native vegetation present before European settlement remains. The concentration of settlement on the Swan Coastal Plain has resulted in the loss of 65% of habitat and approximately 80% of wetlands have been either cleared, filled, or developed. Often, the legacy of past land management means it is not possible to restore the natural environment back to its original state. Therefore, the focus is on building resilience in the system and preventing the further loss of key natural assets.

Response

Under the Strategy, natural resource management actions will address threats to high priority ecological communities. These threatened ecological communities include Banksia Woodlands, Subtropical Temperate Saltmarshes, claypans of the Swan Coastal Plain, and *Corymbia calophylla/Kingia australis* Woodlands. Ecosystems and project locations are to be managed within a landscape system to maximise synergies, address cumulative impacts, and manage large scale threats such as climate change. A systems approach underpins our understanding of the critical assets and ecological processes that are essential for the overall health and functioning of the Region's natural systems.

Swan Region Strategy priority TECs

Priority TECs under the Environmental Protection and Biodiversity Conservation 1999 Act (EPBC Act) under current investment:

- Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain
- Banksia Woodlands of the Swan Coastal Plain ecological community
 - *Swan Coastal Plain *Banksia attenuata* - *Banksia menziesii* woodlands ('floristic community type 23b') Clay Pans of the Swan Coastal Plain
 - *Low lying *Banksia attenuata* woodlands or shrublands ('floristic community type 21c')
- *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils of the Swan Coastal Plain

- *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands of the Swan Coastal Plain
- Shrublands and Woodlands of the eastern Swan Coastal Plain
- Shrublands and Woodlands on Muchea Limestone of the Swan Coastal Plain
- Shrublands and Woodlands on Perth to Gingin ironstone (Perth to Gingin ironstone association) of the Swan Coastal Plain
- Subtropical and Temperate Coastal Saltmarsh

TECs under the EPBC Act to be considered as priorities for future funding:

- Aquatic Root Mat Community in Caves of the Swan Coastal Plain
- Eucalypt woodlands of the Western Australian Wheatbelt
- Sedgeland in Holocene dune swales of the southern Swan Coastal Plain
- Thrombolite (microbial) community of coastal freshwater lakes of the Swan Coastal Plain (Lake Richmond)
- Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community
 - *Southern Swan Coastal Plain *Eucalyptus gomphocephala* - *Agonis flexuosa* woodlands (floristic community type 25)

*denotes associated TECs recognised under the WA Biodiversity Conservation Act 2016 (BC Act)

WA TECs under the BC Act to be considered as priorities for future funding:

- Pools of the Avon and Dale Rivers
- Brackish microbial community number 1 (Lake Walyungup)
- Microbialites and microbial mats of coastal hypersaline lakes (Rottneest Island)
- Wandoo woodland over dense low sedges of *Mesomelaena preissii* on clay flats
- Wooded wetlands that support colonial waterbird nesting areas
- Litter Dependent Invertebrate Community of the northern Jarrah Forest
- Coastal shrublands on shallow sands, southern Swan Coastal Plain ('floristic community type 29a')
- Granite communities of the northern Jarrah Forest
- Northern Spearwood shrublands and woodlands ('floristic community type 24')
- Acacia shrublands on taller dunes, southern Swan Coastal Plain ('floristic community type 29b')
- *Posidonia australis* complex seagrass meadows
- Central Northern Darling Scarp Granite Shrubland Community

Determination of Actions

Perth NRM considers multiple factors when determining priority ecological communities within remnant vegetation across the Region.

Preference is given to sites which include multiple priority assets (e.g., multiple TECs, or a TEC that is habitat for a threatened species) or are in proximity to other priority sites, so that investment can deliver co-benefits.

Perth NRM will engage with community and expert stakeholders across the Region and undertake a Multi-Criteria Analysis (MCAS) process with a module focussing on biodiversity conservation. The process will assess and weight numerous environmental and social values including ecological intactness, representativeness and protectability, to identify sites where activities will effectively benefit large areas of high value assets and optimise value and efficiency of investment.

Consultation with sub-regional NRM groups, Landcare groups, and land managers and consideration of TEC Recovery Plans and Threat Abatement Plans enables PNRM to identify gaps in the delivery of priority recovery

and management actions so that the most effective management actions are resourced, as well as generating opportunities to form partnerships and lever investment to increase value and impact.

Aboriginal consultation is currently delayed by the finalisation of the new Aboriginal Corporations as part of implementation of the Southwest Native Title Settlement. Perth NRM, as custodians of the Swan Region Strategy, maintain good relations with advocacy groups and two-way learning research projects such as the Clean Air and Urban Landscapes Hub (CAUL) at University of Western Australia and the Danjoo Koorliny movement.

The Swan Region Strategy pursues a comprehensive, adequate, and representative conservation reserve network, with high value ecological linkages that build landscape resilience and integrity.

Perth NRM provides technical leadership and supports project delivery through coordinating the planning and reporting of project service activities and outcomes, allocation of resources, and any adaptive management or negotiations required over the course of delivering a project.

- Weed control is planned to reduce impacts of the most serious weeds. Targeted weed species will be identified by assessing the current and potential ecological impact of invasive plant species present on or near TECs as part of previous weed mapping and field visit activities. Partnerships with expert weed managers, and where necessary the engagement of experienced ecological weed control professionals with knowledge of endemic flora, will ensure that best management practices are applied to efficiently achieve maximum weed reduction and minimum off target damage.
- Feral animal control will reduce the impacts of pest animals that are not currently being adequately managed and reduced. Qualified and experienced feral animal control managers will apply best management practice and ensure the control of targeted species is safe, humane, and in accordance with industry standards and regulations. Where necessary, neighbouring landholders will be consulted and provide consent to participate in the feral control program.
- Disease management will be undertaken to reduce the threat of the Phytophthora dieback disease. Experienced dieback interpreters and field operators will monitor disease fronts via mapping and photo monitoring. Areas requiring treatment, either for a new infestation or when the effectiveness of a previous treatment has expired, phosphite solution will be applied to vegetation by foliar spray and injections.
- Seed and propagation material collected will be used to provide provenance stock for revegetation work and to improve the condition of or extend TEC habitat. Seed collection activities will be staged to coincide with the ripening times of different plants, and seed collected will be processed and stored appropriately to the various species.
- Fencing is proposed to reduce unregulated vehicular and foot access where these contribute to disease, fire, dumping and trampling risks, and to reduce the impacts of grazing by high density contained native animals on remnant vegetation and revegetation works. Various types of fencing, ranging from lightweight temporary wire to heavy duty vehicle exclusion cable fencing will be installed as required.
- Revegetation is planned to extend critical habitat in response to habitat loss and degradation. A plant list will be developed including a broad range of plant species endemic to each site with appropriate proportions of canopy, mid story, understory, and ground covering species to restore the original vegetation community. Plants will be sourced from an accredited nursery and planted in autumn and winter to follow significant rainfall events and any necessary site preparation. Follow-up and infill planting will be completed as needed following monitoring of seedling survival.

- Debris management will be delivered at sites requiring professional intervention due to the presence of hazardous substances or where debris limits the delivery of activities. Removal of debris will be in accordance with regulation and OSH standards.

Implementation Overview	
Possible Delivery Partners	
South-East Regional Council for Urban Landcare, Eastern Region Landcare Ellen-Brockman Integrated Catchment Council, and Department of Biodiversity, Conservation, and Attractions.	
Action	Target Measure
Collecting, or synthesising baseline data	Number of baseline data sets collected and/or synthesised
Controlling access - fencing	Length (km) installed
Controlling pest animals	Area (ha) treated for pest animals - initial
Debris removal	Area (ha) of debris removal
Flora survey	Number of flora surveys conducted
Managing disease	Area (ha) treated for disease
Removing weeds	Area (ha) treated for weeds - initial
Seed collection	Number of days collecting seed
Weed distribution survey	Number of weed distribution surveys conducted
Revegetating habitat	Area (ha) of revegetated habitat maintained
Pest animal survey	Number of pest animal surveys conducted
Water quality survey	Number of water quality surveys
Plant survival survey	Number of plant survival surveys conducted

Strategic Objective 2: Protect and conserve priority threatened species within the Swan Region.

5 Year Outcome: The trajectory of species targeted under the Threatened Species Strategy, and other EPBC Act priority species, is stabilised or improved.

Issue

Extensive land use changes across the Swan Region have resulted in this region having one of the highest densities of threatened flora and fauna in Western Australia.

Clearing alone has resulted in the loss of 65% of terrestrial habitat and approximately 80% of wetland habitat on the Swan Coastal Plain.

Following habitat loss from clearing, fragmentation and isolation of remnant habitat puts further pressure on species that require large home ranges or need to move across the landscape to follow seasonal migrations.

A range of pest animals are present in the Swan Region, where they predate upon native wildlife, and compete for limited food, water, and shelter resources.

Weeds and Phytophthora dieback further reduce the condition and subsequently the habitat value of remnant vegetation for endemic species.

The cumulative impact of these processes is that many species of flora and fauna in the Swan Region are now recognised as critically endangered, endangered, or vulnerable by federal and state authorities.

Contemporary views are that decision making should be occurring at scales appropriate for the management of ecological processes (often landscape scale) while still protecting specific assets, such as threatened species. A

whole of system approach enables natural resource managers to tackle multiple threats and address the cause as well as the symptoms such as local extinction.

Response

Under the Strategy, natural resource management actions will address threats to and protect or restore critical habitat of high priority threatened species. These threatened species include iconic species like Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*), Western Swamp Tortoise (*Pseudemydura umbrina*), Woylie (*Bettongia penicillata*) and Chuditch (*Dasyurus geoffroii*). There are also numerous obscure threatened species deserving of special focus and investment to assist with their recoveries.

Species are to be managed within a landscape system to maximise collaboration opportunities and management synergies, address cumulative impacts, and manage large scale threats such as climate change.

A systems approach underpins our understanding of the critical assets and ecological processes that are essential for the overall health and functioning of the Region's natural systems.

Implementation of the Strategy draws on the best available knowledge and analytical tools, along with expert input, and focuses on building population movement, genetic diversity, or ecological integrity in the face of a changing climate.

Swan Region Strategy priority threatened species (identified in the EPBC Act and BC Act):

Mammals:

- Australian sea lion
- Black flanked rock wallaby
- Numbat
- Chuditch
- Woylie
- Western ringtail possum

Aquatic animals:

- Blackstripe minnow
- Carter's Freshwater Mussel
- Western swamp tortoise

Birds:

- Carnaby's cockatoo
- Baudin's Cockatoo
- Forest Red Tailed Cockatoo
- Australasian Bittern
- Eastern Curlew

Plants:

- *Grevillea althoferorum* subsp. *fragilis*,
- *Stylidium semaphorum*,
- *Trithuria occidentalis*
- *Calytrix breviseta* subsp. *breviseta*,
- *Lasiopetalum pterocarpum*,
- *Synaphea stenoloba*,
- *Thelymitra deadmaniarum*
- *Austrostipa jacobiana*,
- *Ptilotus pyramidatus*,

- *Synaphea* sp. *Pinjarra*
- *Andersonia gracilis*
- *Acacia aphylla*
- *Grevillea flexuosa*
- *Diplolaena andrewsii*

Determination of Actions

Perth NRM considers multiple factors when determining priority threatened species to target for resourcing and delivering recovery actions.

Preference is given to threatened species habitats which include multiple priority assets (e.g., multiple threatened species, or threatened species habitat within a TEC) or are connected or in proximity to other priority sites, so that investment can deliver co-benefits.

Perth NRM will engage with community and expert stakeholders across the region and undertake a Multi-Criteria Analysis (MCAS) process with a module focussing on biodiversity conservation.

The process will assess and weight numerous environmental and social values including ecological intactness, representativeness and protectability, which combined with consideration of threatened species behaviours and needs and threatening processes, will enable the selection of sites and activities that will effectively benefit threatened species populations and large areas of high value habitat and optimise value and efficiency of investment.

Consultation with sub-regional NRM groups, Landcare groups, conservation scientists and land managers and consideration of Threatened Species Recovery Plans and Threat Abatement Plans enables Perth NRM to identify gaps in the delivery of priority recovery and management actions so that the most effective management actions are resourced, as well as generating opportunities to form partnerships and lever investment to increase value and impact.

A proactive approach to managing the relationship between Aboriginal knowledge holders and species recovery managers within the Region will ensure that impacts to ethnographic values of distinct species are considered on a landscape scale rather than in isolation. Aboriginal consultation is currently delayed by the finalisation of the new Aboriginal Corporations as part of implementation of the Southwest Native Title Settlement. Perth NRM, as custodians of the Swan Region Strategy, maintain good relations with advocacy groups and two-way learning research projects.

Projects are developed by assessing sites, management activities and partnership opportunities against numerous environmental, financial, and social criteria. Perth NRM will work with partners to ensure industry best practice is used in delivery of activities.

- Removing weeds – to reduce the impacts of weeds to threatened species habitat, and the threats posed by significant weeds adjacent to that habitat. Targeted weed species will be identified by assessing the current and potential ecological impact of invasive plant species present on or near habitat as part of previous weed mapping and field visit activities. Management will be undertaken in accordance with abatement plans, guidelines, or the approved methods of conservation advice for threatened species habitat.
- Controlling pest animals – to reduce the impacts of pest animals on threatened species. Pest animal control will be undertaken by qualified and experienced trappers, shooters and baiters applying best management practices to ensure management of target species is safe, humane and target specific and in

accordance with biosecurity guidelines, threat abatement plans, and the ethical expectations outlined in the codes of practice for feral animal control. Pest animal management will be carried out in accordance with the relevant threat abatement plans for goats, rabbits, foxes, feral cats, and pigs.

- Habitat augmentation- such as using artificial nesting tubes to increase availability of nesting hollows in a registered nesting site for Carnaby’s black cockatoo. Design, location, and installation will follow recommendations from the DBCA and environmental professionals including Birdlife Australia.
- Research – Expert field ecologists and conservation scientists may be contracted to conduct research on the genetics of nominated species. The results of research will inform the scheduling of other actions including translocation and revegetation.
- Adaptive management – Perth NRM will implement an adaptive management response to challenges encountered as part of the review and evaluation processes

Implementation Overview	
Possible Delivery Partners	
Australian Wildlife Conservancy, Ellen-Brockman Integrated Catchment Council, Eastern Region Landcare and Department of Biodiversity, Conservation, and Attractions.	
Action	Target Measure
Collecting, or synthesising baseline data	Number of baseline data sets collected and/or synthesised
Controlling pest animals	Area (ha) treated for pest animals - initial
Fauna survey	Number of fauna surveys conducted
Habitat augmentation	Number of structures or installations
Removing weeds	Area (ha) treated for weeds - initial
Weed distribution survey	Number of weed distribution surveys conducted
Establishing and maintaining breeding programs	Number of breeding sites and/or populations
Pest animal survey	Number of pest animal surveys conducted
Plant survival survey	Number of plant survival surveys conducted
Revegetating habitat	Area of habitat revegetated (ha)

Strategic Objective 3: Protect and enhance Wetlands throughout the Swan Region

5 Year Outcome: Restoration of, and reduction in threats to, the ecological character of Ramsar Sites, through the implementation of priority actions

Issue

The Swan Coastal Plain is dominated by wetlands, with over a quarter of the land area originally comprised of ‘areas of seasonally, intermittently, or permanently waterlogged soils or inundated land, whether natural or otherwise, fresh or saline, e.g., waterlogged soils, ponds, billabongs, lakes, swamps, tidal flats, estuaries, rivers, and their tributaries’ (Wetlands Advisory Committee 1977).

The Swan Region hosts two internationally recognised Ramsar wetlands, sixteen nationally important wetlands and hundreds of regionally and locally significant wetlands.

Over 80% of wetlands in the Swan Region have been severely impacted by land use change.

Despite the work of land managers, and NRM and volunteer groups, numerous degrading processes remain prevalent due to a lack of adequate investment in the maintenance and improvement of their ecological condition and character.

Immediate threats include continued urban expansion and clearing, groundwater extraction and disturbance of drainage, climate change, weeds, feral animals, and unregulated access.

Response

Under the Strategy, natural resource management actions will address threats to and protect or restore high priority or strategic wetlands. These high priority wetlands include the Forrestdale Lake, Thomson's Lake and Becher Point Ramsar wetlands, and the Brixton Street and Ellen Brook nationally important wetlands. There are also numerous opportunities to support protection and recovery of nationally, regionally, and locally significant wetlands.

Wetlands are to be managed within a landscape system to maximise collaboration opportunities and management synergies, address cumulative impacts, and manage large scale threats such as climate change.

A systems approach underpins our understanding of the critical assets and ecological processes that are essential for the overall health and functioning of the Region's natural systems.

Implementation of the Strategy draws on the best available knowledge and analytical tools, along with expert input, and focuses on building population movement, genetic diversity, or ecological integrity in the face of a changing climate.

Swan Region Strategy priority wetlands

Ramsar Wetlands:

- Forrestdale and Thomson's Lakes
- Becher Point Wetlands

Nationally Important Wetlands:

- Booragoon Swamp
- Brixton Street Swamps
- Ellen Brook Swamps System
- Gibbs Road Swamp System
- Herdsman Lake
- Joondalup Lake
- Palmer Barracks
- Perth Airport Woodland Swamps
- RAAF Caversham
- Rottnest Island Lakes
- Spectacles Swamp
- Swan Canning Estuary
- Wannamal Lake system
- Chandala Swamp
- Loch McNess System
- Chittering-Needonga Lakes

Regionally and Locally Significant wetlands:

- Conservation Category Wetlands
- Rehabilitation Potential Wetlands
- Multiple Use Wetlands

Determination of Actions

Perth NRM considers multiple factors when determining priority wetlands to support through projects and investment within the region.

Preference is given to wetlands which include multiple priority assets (e.g., a wetland that is habitat for one or more threatened species, or a wetland that is associated with one or more TECs) or are in proximity to other priority sites, so that investment can deliver co-benefits.

Perth NRM will engage with community and expert stakeholders across the region and undertake a Multi-Criteria Analysis (MCAS) process with a module focussing on wetlands and waterways. The process will assess and weight numerous environmental and social values including ecological intactness, representativeness and protectability, identifying wetland project sites where activities will effectively benefit large areas of high value assets and optimise value and efficiency of investment.

Consultation with sub-regional NRM groups, Landcare groups, and land managers and consideration of relevant Ramsar Information Sheets, Management Plans and Threat Abatement Plans enables Perth NRM to identify gaps in the delivery of priority recovery and management actions so that the most effective management actions are resourced, as well as generating opportunities to form partnerships and lever investment to increase value and impact.

Aboriginal consultation is currently delayed by the finalisation of the new Aboriginal Corporations as part of implementation of the Southwest Native Title Settlement, although Perth NRM, as custodians of the Swan Region Strategy, maintain good relations with advocacy groups and two-way learning research projects such as the Clean Air and Urban Landscapes Hub (CAUL) at University of Western Australia and the Danjoo Koorliny movement.

The Swan Region Strategy pursues a comprehensive, adequate, and representative (CAR) conservation reserve network, with high value ecological linkages that build landscape resilience and integrity.

Perth NRM provides technical leadership and supports project delivery through coordinating the planning and reporting of project service activities and outcomes, allocation of resources, and any adaptive management or negotiations required over the course of delivering a project.

- Removing weeds – to reduce the impacts of weeds to wetland habitats and adjacent vegetation. Targeted weed species will be identified by assessing the current and potential ecological impact of invasive plant species present on or near habitat as part of weed mapping and field visit activities. Management will be undertaken in accordance with abatement plans, guidelines, or the approved methods of conservation advice for wetland habitats.
- Feral animal control– to reduce the impacts of pest animals on wetland habitats. Qualified and experienced feral animal control managers will apply best management practice and ensure the control of targeted species is safe, humane and target specific and in accordance with biosecurity guidelines, threat abatement plans, and the ethical expectations outlined in the Codes of practice for feral animal control. Where necessary, neighbouring landholders will be consulted and provide consent to participate in the feral control program.

- Fencing is proposed to reduce unregulated vehicular and foot access where these contribute to disease, fire, dumping and trampling risks, and to reduce the impacts of grazing by high density contained native animals on remnant vegetation and revegetation works. Various types of fencing, ranging from lightweight temporary wire to heavy duty vehicle exclusion cable fencing will be installed as required.
- Seed and propagation material collected will be used to provide provenance stock for revegetation work and to improve the condition of wetland habitat. Seed collection activities will be staged to coincide with the ripening times of different plants, and seed collected will be processed and stored appropriately to the various species.
- Revegetation will extend critical habitat in response to habitat loss and degradation. Plants used will include a broad range of plant species endemic to each site with appropriate proportions of canopy, mid story, understory, and ground covering species to restore the original vegetation community. Plants will be sourced from an accredited nursery and planted in dryer conditions to enable access to seasonally inundated areas. Follow-up and infill planting will be completed as needed following monitoring of seedling survival.
- Debris management will be delivered at sites requiring professional intervention due to the presence of hazardous substances or where debris limits the delivery of activities. Removal of debris will be in accordance with regulation and OSH standards.
- Research and Monitoring – Expert field ecologists and conservation scientists may be contracted to conduct eDNA monitoring and research on changes in species represented at nominated project sites. The results of research will inform the scheduling of future management actions.
- Adaptive management – Perth NRM will implement an adaptive management response to challenges encountered as part of the review and evaluation processes

Implementation Overview	
Possible Delivery Partners	
South-East Regional Council for Urban Landcare, Eastern Region Landcare, Ellen-Brockman Integrated Catchment Council, and Department of Biodiversity, Conservation, and Attractions, Local Government Authorities, Universities	
Action	Target Measure
Collecting, or synthesising baseline data	Number of baseline data sets collected and/or synthesised
Controlling access - fencing	Length (km) installed
Controlling pest animals	Area (ha) treated for pest animals - initial
Debris removal	Area (ha) of debris removal
Flora survey	Number of flora surveys conducted
Removing weeds	Area (ha) treated for weeds - initial
Seed collection	Number of days collecting seed
Weed distribution survey	Number of weed distribution surveys conducted
Revegetating habitat	Area (ha) of revegetated habitat maintained
Pest animal survey	Number of pest animal surveys conducted
Water quality survey	Number of water quality surveys
Plant survival survey	Number of plant survival surveys conducted

Strategic Objective 4: Protect and enhance Rivers and Waterways throughout the Swan Region

5 Year Outcome: The implementation of priority actions is leading to an improvement in the condition of rivers and waterways in the Swan Region.

Issue

The Swan-Canning River system is composed of a highly varied range of aquatic and riparian habitats, occupying urban, agricultural, and intact natural landscapes from the coast up into the hill catchments.

The rivers, estuaries and tributaries of the Swan-Canning River system have been significantly impacted by historic land-use change, ongoing agricultural, residential, recreation, and industrial activities.

Immediate threats include loss and degradation of riparian and aquatic habitat, over-extraction, erosion, pollution, sedimentation, pest plants and animals, and climate change.

Management of the system at a regional level is complicated by the high number of private and government land managers, and changing priorities, actions, and funding opportunities at every level of government.

Response

Under the Strategy, high priority and strategic habitats throughout the Swan-Canning River system will be targeted with actions which will address threats to and protect or restore aquatic and riparian habitat and improve water quality.

Waterways will be managed within a landscape system at a catchment scale to maximise collaboration opportunities and management synergies, address cumulative impacts and manage large scale threats such as climate change.

A systems approach underpins our understanding of the critical assets and ecological processes that are essential for the overall health and functioning of the Region's natural systems.

Implementation of the Strategy draws on the best available knowledge and analytical tools, along with expert input, and focuses on building population movement, genetic diversity, or ecological integrity in the face of a changing climate.

Swan Region Strategy priority rivers and waterways

Estuaries:

- Swan-Canning

Rivers:

- Swan
- Canning
- Avon
- Helena
- Brockman
- Darkan
- Southern

Brooks:

- Wooroloo
- Susannah
- Ellen

- Bennett
- Henley
- Jane
- Churchman
- Munday
- Bickley
- Yule
- Wungong
- Julimar
- Lesmurdie
- Claisebrook
- Piesse
- Whistlepipe

Creeks:

- Blackadder
- Bannister
- Bullcreek
- Christmastree

Drains

- Bayswater
- South Belmont
- Mills Street

Determination of Actions

Perth NRM considers multiple factors when determining priority aquatic and riparian habitats to support through projects and investment within the Region.

Preference is given to aquatic and riparian habitats which include multiple priority assets (e.g., riverbank vegetation that is associated with one or more TECs, or that form part of a regional ecological corridor) or are in proximity to other priority sites, so that investment can deliver co-benefits. Sites that are strategic for water quality improvement are also given preference for investment.

Perth NRM will engage with community and expert stakeholders across the region and undertake a Multi-Criteria Analysis process with a module focussing on wetlands and waterways. The process will assess and weight numerous environmental and social values including ecological intactness, representativeness and protectability, identifying aquatic and riparian project sites where activities will effectively benefit large areas of high value assets and optimise value and efficiency of investment.

Consultation with sub-regional NRM groups, catchment and Landcare groups, and land managers and consideration of relevant Catchment Management Plans and Water Quality Improvement Plans enables Perth NRM to identify gaps in the delivery of priority recovery and management actions so that the most effective management actions are resourced, as well as generating opportunities to form partnerships and lever investment to increase value and impact.

Aboriginal consultation is currently delayed by the finalisation of the new Aboriginal Corporations as part of implementation of the Southwest Native Title Settlement, although Perth NRM, as custodians of the Swan Region

Strategy, maintain good relations with advocacy groups and two-way learning research projects such as the Clean Air and Urban Landscapes Hub (CAUL) at University of Western Australia and the Danjoo Koorliny movement.

Perth NRM seeks to improve the health of the Swan-Canning River system through targeted direct community action including:

- Community direct action to reduce nutrient and sediment runoff into the estuaries by protecting, enhancing and/or revegetating native vegetation:
 - habitat improvement of priority fringing vegetation, wetlands, and other vegetation areas
 - Aquatic weed management, including continuing efforts to prevent the establishment of new aquatic weed species and terrestrial weed management
 - establishing living drains draining to reduce nutrient inflow
- Community engagement and education:
 - an education program to improve community awareness and encourage the behavioural changes needed to reduce sediment and nutrient loads originating from gardens and the urban environment entering the Swan-Canning System
 - improving the community's understanding of the natural values of the Swan Canning River system.
- Direct Community Action grants - the allocation of funds to community groups for on-ground actions.
- Communication – articles, social media posts, media releases and events to maximize outreach across the catchment. Coordination of these communications and events will relay the launch, progress, and end performance of the project to the wider community. Communication and events will aim to improve volunteerism, active citizenry, knowledge of river management in the community.
- Education - conduct and facilitate incursions, excursions, engagement events, and professional development for teachers, to maximize outreach across the catchment. Coordination of education material will relay the progress of project to students and teachers through direct engagement. Education will aim to improve knowledge of river management with student cohorts and promote volunteerism through the wider community.
- Removing aquatic/terrestrial weeds –weed species will be prioritised through assessments of current and potential ecological impact of invasive plant species present on or near the river system. Partnerships with expert environmental weed managers with knowledge of endemic flora will ensure that best management practices are applied to efficiently achieve maximum weed reduction of priority weeds with minimum off target damage.
- Revegetation– Site preparation activities will be undertaken as necessary to maximise revegetation and rehabilitation results. Seed and propagation material will be collected to provide provenance stock for revegetation work representative of the endemic vegetation complexes of each site. Plants will be propagated using accredited nurseries and planted in autumn and winter to follow significant rainfall events in terrestrial areas but also potentially during dry conditions for riparian or wetland areas as appropriate. Follow-up and infill planting will be completed as needed following monitoring of seedling survival.
- Access Control - Fencing to reduce unregulated vehicular and foot access where these contribute to disease, fire, dumping and trampling risks, and to reduce the impacts of grazing by high density contained

native animals on remnant vegetation and revegetation works. Various types of fencing, ranging from lightweight temporary wire to heavy duty vehicle exclusion cable fencing will be installed as required.

- Debris management - may require professional intervention due to the presence of hazardous substances or where debris limits the delivery of activities. Removal of debris will be in accordance with regulation and OSH standards.
- Habitat augmentation - with artificial reef structures will follow design, location, and installation guidelines from the DBCA and environmental professionals including Nature Conservancy Australia.
- Drainage Management – Drain-to-living-stream conversions will be delivered under the guidance of hydrological, environmental, and engineering experts and in partnership with asset custodians including local government, state government, and utility providers.
- Disease management - Actions to reduce the threat of the Phytophthora dieback disease will involve qualified dieback interpreters to monitor disease fronts via site assessments, mapping, and photo monitoring. Where initial or follow-up dieback treatment is necessary, phosphite solution will be applied to vegetation using foliar spray and stem injections.
- Monitoring and reporting - implement an adaptive management response to challenges to planned scheduling and opportunities for improvement identified as part of review and evaluation processes.

Implementation Overview	
Possible Delivery Partners	
South-East Regional Council for Urban Landcare, Eastern Region Landcare, Ellen-Brockman Integrated Catchment Council, and Department of Biodiversity, Conservation, and Attractions, Local Government Authorities, Universities, The Nature Conservancy	
Action	Target Measure
Collecting, or synthesising baseline data	Number of baseline data sets collected and/or synthesised
Controlling access - fencing	Length (km) installed
Controlling pest animals	Area (ha) treated for pest animals - initial
Debris removal	Area (ha) of debris removal
Fauna survey	Number of fauna surveys conducted
Flora survey	Number of flora surveys conducted
Habitat augmentation	Number of structures or installations
Managing disease	Area (ha) treated for disease
Removing weeds	Area (ha) treated for weeds - initial
Seed collection	Number of days collecting seed
Weed distribution survey	Number of weed distribution surveys conducted
Revegetating habitat	Area (ha) of revegetated habitat maintained
Pest animal survey	Number of pest animal surveys conducted
Water quality survey	Number of water quality surveys
Plant survival survey	Number of plant survival surveys conducted

Strategic Objective 5: Increase community NRM capacity and capabilities to adopt best practices.

5 Year Outcome: Increase community capacity and adoption of best management practices that improve and protect the condition of soil, biodiversity, and vegetation.

Issue

To deliver the best possible environmental outcomes, it is essential to support individuals, groups and organisations delivering the work on the ground, whether they are community volunteers, landholders or NRM professionals. Training and development are needed to ensure best practice standards are maintained and individuals have the capacity to undertake the work effectively. Without a focus on sector-wide capacity and capability building and subsequent support there is the risk of ineffective management activities unintended consequences.

Community groups and networks are often the eyes and ears for the natural environment, noticing change and reporting local environmental issues or challenges. Environmental management in the Region is heavily reliant on their stewardship but this contribution is not well recognised or rewarded and is undervalued in terms of the limited investment in the long-term capacity of environmental groups.

Response

The Strategy recognises the contribution of community groups to natural resource management and supports them through building stronger networks, encouraging collaboration, facilitating capacity building, and pursuing funding. Perth NRM seeks to increase capacity and capability by engaging with all tiers of government, industry and business and locally organised environmental groups through our Landcare and Coastcare and sustainable agriculture initiatives.

Regular Community Capacity Assessments of environmental groups in the Swan Region have been instrumental in identifying key capacity gaps and informing the development of training programs and opportunities for collaboration. Perth NRM liaises with key NGOs and land managers to address issues raised through the Community Capacity Assessments. Regular training to maintain capacity around on-ground management including best practice approaches to rehabilitation, addressing threatening processes (e.g., pest plants and animals) and biosecurity (e.g., Phytophthora Dieback) is required. Significant capability gaps must be addressed if the community is to continue their significant contribution to regional conservation and biodiversity protection. Critical gaps include succession planning and the transfer of operational and administrative knowledge, better youth engagement and working jointly with Traditional Owners on projects in the Swan Region. Aboriginal people are generally under-represented in land management and protection in the Region, but Elders in the Noongar community hold valuable traditional ecological knowledge which could be better utilised to improve and more effectively manage the land and waterways. Access to land and capacity building programs will increase natural resource management employment opportunities and support the development of Aboriginal enterprises.

Social media and diverse on-line opportunities now provide greater opportunities for community involvement in the protection and management of our Region's assets. On-line seminars and social media forums together with face-to-face workshops and field-based activities facilitated by Perth NRM and our partners are a chance for environmental volunteers, landholders, and land managers to increase and share their knowledge. Regular evaluation identifies key topics to address including emerging threats, successful on-ground management practices and skills gaps.

Determination of Actions

The Strategy aims to contribute to a thriving NRM sector of environmental managers and volunteers by continuing to deliver capacity and capability building opportunities, supporting networks, and facilitating the

sharing of knowledge. The purpose of the field days and workshops are to raise the standard of environmental management across the Region to deliver enhanced environmental outcomes and improve species trajectories overall. Perth NRM has also developed an *Indigenous Participation Plan* to increase the participation of the Noongar community in environmental management within the Region. Community groups can also engage in various pathways of consulting with and including the Noongar community in their environmental activities outlined in the Strategy.

- Communication – preparation and sharing of reports, articles, social media posts, and events to maximize outreach across the Region. Coordination of these communications and events will share the information to all sectors engaged in environmental management in the Region. Communication will aim to increase awareness and knowledge, improve volunteerism, and encourage active citizenship.
- Education - conduct and facilitate activities to increase knowledge and skill including on-line and face to face events to maintain capacity of skills for on-ground and administration work and increase capability to address needs around succession planning, youth participation and Aboriginal engagement.
- On-ground management – Direct and in-direct support of on-groundwork by environmental volunteers, NGOs, landholders, and land managers, including identification and prioritisation of works, provision of expert knowledge and coordination of support for rehabilitation and restoration activities including addressing threats (e.g., invasive species).
- Administration and governance – Direct and indirect support of administration of environmental volunteer organisations including supporting networking and partnerships, grant writing, financial control, work health and safety, insurance, and incorporation of groups to ensure that groups can function effectively and are sustainable in the long term. Continuing engagement of members of the Environmental Umbrella Group Collective (EUGC) will be instrumental to the success of building capability of environmental volunteers. EUGC members include representatives from government, non-government, and community-based organisations.
- Aboriginal engagement - Direct and in-direct support of on-groundwork by environmental volunteers, NGOs, landholders, and land managers to engage with the Aboriginal community of the Swan Region, through formal structures, individuals, and community-based organisations. Co-design and facilitate capacity building programs with the Aboriginal community to support land and cultural heritage management. Promotion of Traditional Ecological Knowledge, language and culture is a key part of Perth NRM’s work as facilitating environmental groups to build their own networks and connections. The organisation will continue to engage with SWALSC and foster relationships with the Regional Native Title Body Corporates (RNTBCs). Support of employment and development of Aboriginal enterprises will continue.
- Planning, monitoring, reporting and evaluation- Direct and in-direct support of on-groundwork by environmental volunteers, NGOs, landholders, and land managers to monitor, report and evaluate their projects. This includes using published strategies and plans to develop projects, utilising tools like program logics, supporting collection of data for reporting and evaluation including grant acquittal, promoting the use of digitally based tools e.g., GIS systems, cameras/sensors, and implementing mechanisms to evaluate work and engagement.

Implementation Overview
Possible Delivery Partners
Noongar Elders and Knowledge Holders, Southwest Aboriginal Land and Sea Council, Australian Wildlife Conservancy, Ellen-Brockman Integrated Catchment Council, South-East Regional Council for Urban

Landcare, Department of Biodiversity, Conservation and Attractions including Kings Park - Botanic Gardens and Parks Authority and Perth Zoo, Environmental Umbrella Group Collective .	
Action	Target Measure
Field Days	Number of field days
Communications materials	Number of communication materials published
Training Workshops	Number of training / workshop events
On-ground works	Number of on-ground works
Administrative/Governance Support	Number of support activities

Strategic Objective 6: Increase community awareness of NRM projects and encourage participation.

5 Year Outcome: Increase community awareness and participation in natural resource management projects that improve and protect the condition of soil, biodiversity, and vegetation.

Issue

Many community members are unaware of the natural assets in their area, or the role nature plays in providing ecosystem services such as clean air, water, and food. There is little acknowledgement that human life and the economy are dependent on a healthy environment. The degrees of separation between people and the source of their food, clean air and water means it is more difficult to see how their everyday decisions impact on the environment and consequently, their wellbeing.

Environmental volunteers are aging and there is a need to engage a new generation in environmental volunteering. Social media has shown the to be effective in engaging and involving younger generations. Opportunities to increase community involvement through empowering them to make decisions and develop plans are also needed.

Currently, Aboriginal people are under-represented in land management and protection in the Region. Elders in the Noongar community hold valuable traditional ecological knowledge which could be better utilised to improve and more effectively manage the land and waterways.

Response

A critical step in affecting change is to ensure people see the consequences of their actions and provide them with practical information about how they can make a positive difference. The evidence is that simple messages, sustained over time can be effective (sun smart, road safety, etc.) if they connect people with the bigger picture and actions can be practically applied. Public awareness campaigns are needed to reinforce the community’s role as custodians of the land, sea, air, and waterways.

The natural environment is often best appreciated and promoted when people can make direct contact with nature. It is important to involve young people in local environmental issues and harness energy from experts within the community by inviting Landcare groups or agency staff to get involved in teaching and learning. School students are inspired by meaningful projects that build creativity and make them active participants in the future of the planet. A diversity of approaches is needed, such as direct experiences in the bush, social media presences, and exposure to traditional ecological knowledge and culture.

Indigenous knowledge in land management practices is an essential ingredient for the integrity and sustainability of natural ecosystems. It is important that traditional ecological knowledge (TEK) is recognised and considered alongside contemporary natural resource management knowledge. To achieve this, TEK must be collected, maintained, and managed in a culturally sensitive manner.

Perth NRM continues to seek ways to engage with the Noongar Community and to promote TEK, in our programs and projects. The Southwest Native Title Settlement has now been formalised and the Aboriginal Corporations (Regional Native Title Body Corporates, RNTBCs) are being finalised including the transfer of land and finances through a state government led process. At the time of preparation of the Strategy these formal systems had not been put in place and it was unclear how engagement would work as it is a different system to the one that was previously overseen by SWALSC. Perth NRM has contacted the three RNTBCs that will operate in our Region and are waiting to hear back from their initial Boards. It is expected that the RNTBCs will be fully functioning in late 2022 or early 2023 but their priorities may take some time to determine and communicate. Once the three RNTBCs are fully operational it will give Perth NRM a clear path to engage with the Traditional Owners who can speak for Country and enable expression of how they would like to participate and incorporate their knowledge in work and future strategies.

Determination of Actions

The Strategy includes activities involving Noongar Elders and Noongar community leaders in educating the community to deliver a practical management outcome. Such mechanisms enhance the sharing of traditional ecological knowledge and identify how scientific theory, community engagement, and TEK can complement one other. This should enable greater participation by the Noongar community in natural resource management and facilitate intergenerational transfer of knowledge.

Aboriginal Engagement - Direct and in-direct engagement with the Noongar Community to increase their knowledge of formal NRM programs and encourage participation of First Nation's people.

Direct

- Contracting Noongar Elders to conduct Welcome to Country and/or to provide TEK and stories at events
- Working in partnership with the SWALSC, Reconciliation WA and the new Aboriginal Corporations (RNTBCs) to strengthen Noongar culture, language and TEK
- Invite representatives from the Noongar Community to participate in formal meetings as part of the design, delivery, and evaluation of projects, and
- Directly support and grow Noongar businesses through the purchasing of services and supplies.

Indirect engagement

- Support local government and other service providers to work more effectively and partner with the Noongar community e.g., facilitate engagement in local government NRM projects
- Facilitate connections between community-based organisations to facilitate the sharing of TEK and Culture e.g., Friends Groups and the Noongar community
- Communicate Noongar Community participation in natural resource management through social and traditional media
- Use diverse media channels to promote and celebrate Aboriginal Cultural Heritage including promoting key national days and programs e.g., NAIDOC Week.

Promotion and dissemination of project outputs and outcomes are used to engage a wider audience than the immediate NRM community. Social media as well as approaches like codesigning content with community members, working with subregional NRM groups, content experts, field technicians, farmers, and Noongar knowledge holders are frequently used and successful. How content can be codesigned, communicated and disseminated to wider audiences is detailed in the *Engagement and Communications Plan* as part of the Strategic Framework.

Community engagement – Direct and in-direct engagement to strengthen partnerships and facilitate engagement by the wider community:

- Sustain partnerships with key organisations to deliver environment and sustainable agriculture projects (including contracting of key services e.g., environmental activities at TEC sites)
- Facilitate connections between community-based organisations, government, business and the NRM and agriculture sector e.g., Rehabilitation activities with Landcare, Coastcare, education providers and corporates
- Invite representatives from key stakeholders to participate in formal meetings as part of the design, delivery, and evaluation of projects
- Work with the key stakeholders to coordinate conferences, workshops, field days and training events to increase knowledge, build skills and showcase leading practices
- Provide opportunities for the wider Perth community to understand and participate in natural resource management e.g., citizen science programs, education programs, householder engagement through ReWild Perth, tree planting through Landcare and Coastcare, engagement at community events and festivals, corporate volunteering programs.
- Communication – Direct and in-direct communication to increase community awareness and engagement
 - Regularly use social media to promote participation by the community, environment, and agricultural leaders in natural resource management, e.g., RLP funded events
 - Utilise the Perth NRM website to disseminate information on environment program, sustainable agriculture and Traditional Ecological Knowledge and language
 - Identify opportunities through community and public media to promote understanding and celebrate NRM achievements
 - Promote key national days and programs e.g., World Environment Day.

Implementation Overview	
Possible Delivery Partners	
Noongar Elders and Knowledge Holders, Southwest Aboriginal Land and Sea Council, Australian Wildlife Conservancy, Ellen-Brockman Integrated Catchment Council, South-East Regional Council for Urban Landcare, Kings Park - Botanic Gardens and Parks Authority, Perth Zoo, and Department of Biodiversity, Conservation and Attractions.	
Action	Target Measure
Communication materials	Number of communication materials published
Community/stakeholder forums	Number of networking events
Community/stakeholder meetings	Number of one-on-one interactions

Strategic Objective 7: Increase capacity in agricultural systems to adapt to market and climate demands.

5 Year Outcome: Increase in the capacity for agriculture systems to adapt to changes in climate and market demands for information on provenance and sustainable production.

Issue

Western Australia does not have a food security plan or an understanding of how declining access to natural resources, land degradation, pest/disease resistance, climate change and population growth will impact on our capacity to feed our growing population. A lack of baseline information required for more informed decision making and facilitating collaboration between the key stakeholders in our food supply chains is needed. Without a foundational understanding on the capacity in agricultural systems to adapt to market and climate demands, the region is in a vulnerable and precarious position when adapting to market changes and disruptions.

Declining rainfall. The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report stated the following for the Southern Area of Australia – *“With medium confidence, a projected reduction in mean rainfall, particularly in the cool season, leading to an increase in aridity and in meteorological, agricultural, and ecological droughts. But when it looks at the south-west, it is far more emphatic. Significant rainfall decreases in 1910-2019, attributable to human influence, increase in agricultural and ecological drought (high confidence), rainfall very likely to continue decreasing under all future scenarios”*.

Response

To improve the adaptability of our agricultural system, there are three key actions to be undertaken. The Strategy outlines how these will be achieved briefly, with more detail outlined in the *Sustainable Agriculture and RALF Project Plan*. Firstly, to establish a clearer understanding of the impact that constrains agricultural systems including the degradation of natural resources, herbicide resistance, climate change and population growth will have on our capacity to feed West Australians in the future. Secondly, is to establish an alliance of the key stakeholders in our food supply chains and facilitate a strategic approach and framework to develop a food security plan for Western Australia. Lastly, is to develop a plan with priorities, recommendations, and actions in collaboration with the key stakeholders. Indigenous engagement underpins each stage and focusses on respective farming systems and foods.

Underpinning this work, we will continue to support the establishment of an agreed-to (national) Natural Capital Accounting (NCA) framework and its utilisation by farmers and industry stakeholders. NCA is quickly evolving as the preferred means to understanding and verifying if a farming practice is beneficial to the farming enterprise and the landscape. In effect, enabling farmers to identify and share farming practices that can viably restore the natural capital that underpins our food systems, and to verify good land stewardship credentials.

Determination of Actions

The community aspires to create more sustainable food systems and also improve the wellbeing (including financial) of farmers. Actions are determined with input from farmers and community groups to balance stewardship of our natural resources with profitability. Doing so ensures farmers and land managers adopt more sustainable NRM practices to build the capacity in the agricultural systems to adapt to market and climate demands as per the *Sustainable Agriculture and RALF Project Plan*.

Implementation Overview	
Possible Delivery Partners	
Regen WA Committee, Agricultural Networks, Farmers, Department of Primary Industries and Regional Development (DPIRD), Department of Water and Environmental Regulation (DWER) and Curtin University.	
Action	Target Measure
Collecting, or synthesising baseline data	Number of baseline data sets collected and/or synthesised
Community/stakeholder meetings	Number of one-on-one technical advice interactions
Conferences	Number of conferences / seminars
On-ground	Number of on-ground works
Communication materials	Number of communication materials published

Strategic Objective 8: Encourage adoption of sustainable agricultural practices within the Swan Region.

5 Year Outcome: Increase in the awareness and adoption of agricultural management practices that improve and protect the condition of soil, biodiversity, and vegetation.

Issue

The agricultural assets for the region are rich and diverse, with large areas of the east and north-east subregions well suited to agricultural production (Figure 3). The Swan Region is a major contributor of fresh food for the Perth market, with around 5,000 hectares of irrigated land utilised for this purpose. In addition, there is around 190,000 hectares of land utilised for production of cereal and other crops. The key threats to agricultural assets in the region include urban expansion, competing land uses, high production costs, declining soil health, and climate change. Other issues include dryland salinity in the Ellen Brook and Brockman River catchments and soil compaction in viticultural areas.

Response

The link between future prosperity and the functioning of natural systems is not evident in everyday economic decisions by many agricultural practitioners and farmers. Decision-making processes in some agricultural systems continue to not ascribe monetary value to natural resource assets. For agricultural producers, an integrated approach to capacity building based on partnerships between peak industry groups, NRM groups, researchers and government ensures that high quality information is relevant, reliable, and readily available to growers. Information that is ‘in my backyard’ and generated through local grower group activity is more likely to drive sustainable practice change on-farm.

Determination of Actions

Landholder capacity building programs offer important sustainable property management information and identify gaps in the knowledge. With an expanding urban footprint, there is a need to engage the wider community in the concept of environmental stewardship and acknowledge the important role that all private landholders can have in protecting and managing the Region’s natural assets and contribute to the long-term viability of the agricultural sector. The Noongar community has helped incorporate knowledge and is a relationship fostered in the implementation of *Indigenous Participation Plan* and *Sustainable Agriculture and RALF Project Plan*.

- Engaging and working with farmers, community and industry stakeholders to identify and share practices that protect or enhance the condition of soil, biodiversity, vegetation, and water (natural capital). This will include testing NCA as a measure-to-manage metric for understanding if a practice is viably beneficial to adopt.
- Facilitating partnerships that will best deliver agriculture outcomes,
- Assisting farmers, community groups and agricultural industries to develop new projects and seek new funding opportunities

Implementation Overview	
Possible Delivery Partners	
Danjoo Koorliny Project, Centre for Social Impact at UWA, Regen WA Committee, Agricultural Networks, Farmers, Department of Primary Industries and Regional Development (DPIRD), Department of Water and Environmental Regulation (DWER) and Curtin University.	
Action	Target Measure
Collecting, or synthesising baseline data	Number of baseline data sets collected and/or synthesised
Community/stakeholder engagement	Number of one-on-one technical advice interactions
Conferences	Number of conferences / seminars
On-ground actions	Number of on-ground works
Communication materials	Number of communication materials published

Monitoring, Reporting, Evaluation, and Improvement

Implementation of the Strategy is supported by the ongoing evaluation of projects and initiatives. This enables the Strategy to be monitored and measured over time and informs adaptive management opportunities. To gather information against the implementation actions and key evaluation questions, Perth NRM will lead a streamlined annual reporting cycle using data gathered during the implementation of the corresponding project plans. This is demonstrated in the logic below.



Perth NRM uses program logics and MERI plans to help establish, evaluate, and report on projects delivered in the Swan Region through Regional Land Partnership (RLP) program funding. The Swan Region Strategy also addresses issues and priorities that are outside of our RLP remit (as currently funded). Some of these issues are being managed by other stakeholders in the region, or by Perth NRM as determined by different funding requirements.

Perth NRM is developing tools for establishing, measuring, and evaluating a Collective Impact approach to the strategy. This approach will help more stakeholders in the region to collectively share, measure, track and demonstrate progress towards achieving impact with the Strategy.

This Strategy is provided to Perth NRM's Board of Management for approval. The Strategy has been developed with deep conversation with stakeholders about on-going and/or changing issues and priorities. Input from stakeholders, the community, the MCAS process and other evaluation tools will inform the next iteration of the Perth NRM Strategy.