



SWAN REGION REGIONAL CONSERVATION PLAN



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Conservation and Attractions**



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Sunray everlasting (*Rodanthe manglesii*), Wandoo National Park. Photo – Marnie Mallie, DBCA
Western swamp tortoise (*Pseudemydura umbrina*), Moore River National Park. Photo – Nick Rodriguez, DBCA

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1 Introduction

Each of the nine Parks and Wildlife Service regions identified and prioritised conservation actions through structured decision-support processes undertaken between 2021 and 2023. Information about how the plans were developed is outlined in the *Regional conservation planning approach*, which should be read in conjunction with this plan.

2 Regional context

The Swan Region spans approximately 2.26 million hectares between Moore River and Myalup and extends over 100km inland from the coast. The region includes the Perth metropolitan area, the major regional centre of Mandurah and a number of small towns. There are 45 local government authorities (LGAs) in the region, most of which are within the Perth metropolitan area. The region includes the Swan Coastal District, Perth Hills District and Regional Parks Unit.

The region covers a major proportion of the Swan Coastal Plain and Northern Jarrah Forest biogeographic sub-regions and extends into a small proportion of the Avon Wheatbelt sub-region (based on Interim Biogeographic Regionalisation for Australia, or IBRA). The reserve system constitutes approximately 31 per cent of the terrestrial area of the region and 62 per cent of the remaining vegetated area.

Approximately 54 per cent remains as remnant vegetation. In the eastern half of the region a relatively intact mosaic of natural landscapes and vegetation occurs such as forests, woodlands, heaths, riparian ecosystems, rivers and rock outcrops. In the western half of the region, the landscape is highly fragmented but includes high conservation value coastal plain, woodlands, heaths, wetlands, estuaries, beaches, marine ecosystems and islands. The far eastern part of the region is also highly fragmented due to the extensive level of land clearing that has occurred for agricultural purposes.

The region is floristically diverse and contains a network of regionally, nationally and internationally significant wetlands, including three Ramsar wetlands, 25 wetlands of national importance, and many of the last remaining, intact vegetated freshwater claypans in the agricultural zone.

Terrestrial biodiversity values in the Swan Region are subject to a number of threatening processes including habitat loss and fragmentation due to clearing, climate change, competition and predation from introduced species, habitat degradation through disease, weed invasion, altered hydrological regimes and inappropriate fire regimes. The provision of conservation advice to land use planning and native vegetation clearing decision makers continues to be a key focus for the Swan Region.

In the marine environment, the Swan Region has management responsibility for the Marmion, Shoalwater Islands and Swan Estuary marine parks, Carnac Island Nature Reserve and the Swan Canning Riverpark. Priorities include management of recreational use of the waters; specific impacts on threatened fauna; unsustainable marine resource impacts from industry; introduction of pests, pollution and storm water; changes and impacts to coastline geomorphology; and risks associated with a changing climate, particularly extreme weather events.

Through the South West Native Title Settlement, the department has entered into Co-operative Management Agreements (CMAs) with the six Noongar Native Title Agreement groups. The Settlement enables Noongar people to have a voice in how *Conservation and Land Management Act 1984* lands and waters in the south-west are managed. For the Swan

Region, CMAs are in place between the department and Whadjuk, Ballardong, Yued and Gnarla Karla Boodja Aboriginal Corporations. As of 1 December 2025, the Swan Region has no formal or informal joint management arrangements with Traditional Owners, but these arrangements are expected to be developed in the future. This will support integration of Traditional Owner participation and knowledge into reserve management.

An overview of the Swan Region is provided in [Table 1](#) and [Figure 1](#).

Table 1 Overview of the conservation assets of the Swan Region (December 2025).

Region	Swan		
Interim Biogeographic Regionalisation of Australia (IBRA) regions	Swan Coastal Plain sub-regions (SWA1, SWA2), Northern Jarrah Forest sub-region (JF1), Avon Wheatbelt sub-region (AVW2)		
Integrated Marine and Coastal Regionalisation of Australia (IMCRA) regions	Northern portion of the Leeuwin-Naturalise (LNE), southern portion of the Central West Coast (CWC)		
Landscape description	The region contains a relatively intact mosaic of natural landscapes and ecosystems in JF1. The western half of the region in SWA2 is highly fragmented, however contains reserves and landscape units of high conservation value. The far east of the region (AVW2) is also highly fragmented due to extensive land clearing and agriculture.		
Department-managed land	Tenure classification	No.	Area (ha)
	Legislated lands and waters		
	National park	19	122,300
	Conservation park	22	22,235
	Nature reserve	154	54,905
	Section 5(1)(g) reserve	19	28,036
	Section 5(1)(h) reserve	43	7326
	State forest	13	473,968
	Timber reserve	7	28,730
	Marine park	3	16,610
	Marine reserve - <i>Land Administration Act 1997</i>	2	7
	Section 131 freehold	1	50
	Crown freehold – department-managed	353	6788
	River reserve - <i>Swan Canning Rivers Management Act 2006</i>	6	3596
	Total	642	764,550
	Department interest in lands and waters		
	Crown freehold – department interest	170	16,499
	Crown Reserve - department interest	2	509
	Unallocated Crown land - department interest	4	30
	Total	176	17,038
	Total area of all lands and waters encompassed by the region (and portion managed by the department)		2,259,684 (34%)
Remnant vegetation	Approximately 54.0% of the total area of land encompassed by the region includes remnant vegetation, with approximately 63.9% of this remnant vegetation occurring on department-managed land.		
Threatened¹ and Priority² fauna species	Extinct (3), critically endangered (11), endangered (25), vulnerable (27), conservation dependent (4), migratory (62), other specially protected (2), Priority 1 (4), Priority 2 (7), Priority 3 (15), Priority 4 (17)		
Threatened and Priority flora species	Extinct (4), critically endangered (21), endangered (30), vulnerable (22), Priority 1 (58), Priority 2 (70), Priority 3 (120), Priority 4 (71)		
Threatened and Priority ecological communities	Collapsed (0), critically endangered (15), endangered (7), vulnerable (0), Priority 1 (14), Priority 2 (7), Priority 3 (14), Priority 4 (1)		
Wetlands	Wetlands of International Importance under the Ramsar Convention (3), Wetlands of National Importance (25)		

¹ Threatened species and ecological communities listed under the *Biodiversity Conservation Act 2016* (BC Act).

² Priority species and ecological community lists are maintained by the department; Priority is not a listing category under the BC Act.

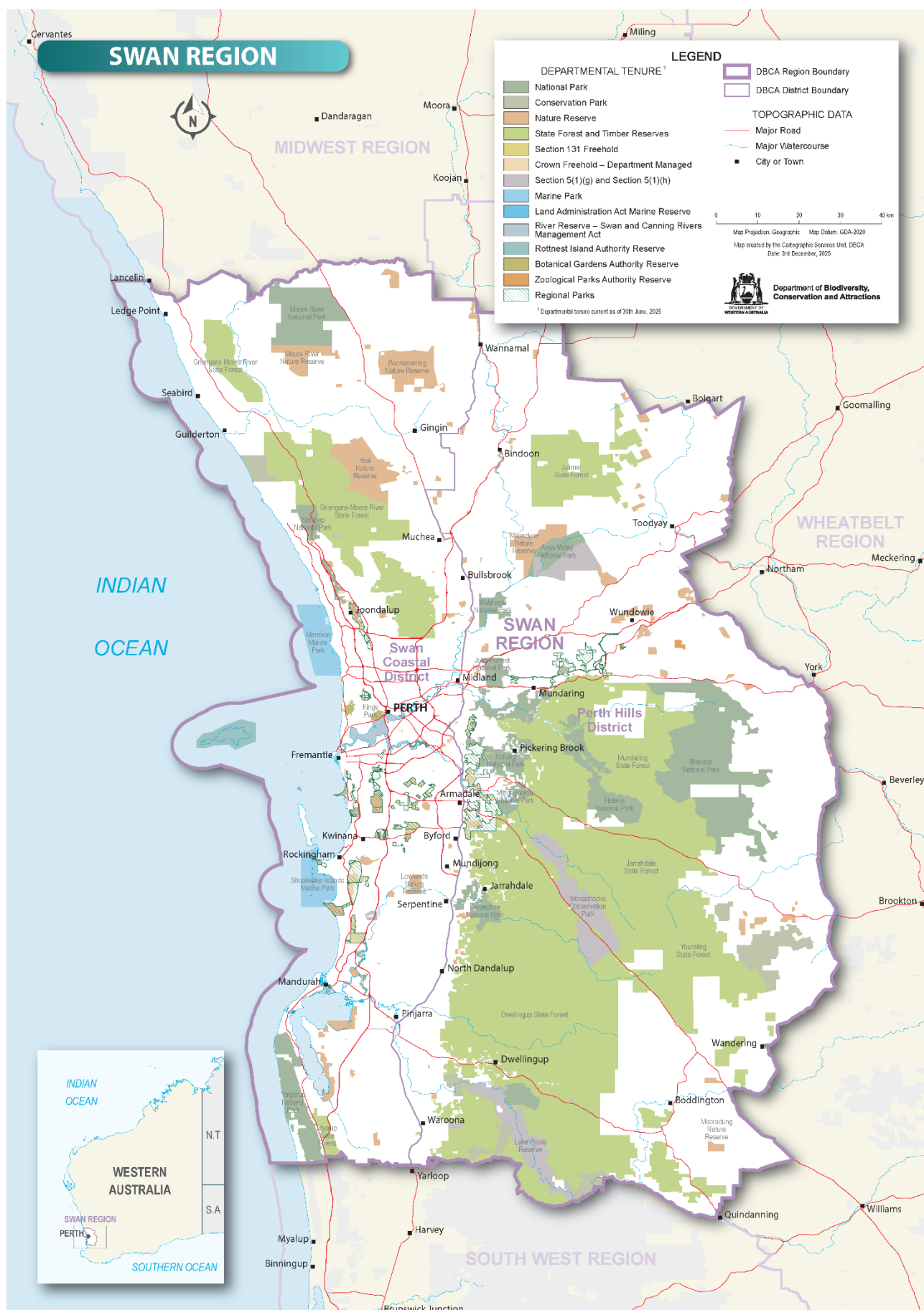


Figure 1 Swan Region department-managed land and waters (December 2025).

3 Identification of priority reserves and landscapes

To determine priorities for landscape-scale threat mitigation, the Swan Region applied the following approach to identifying priority reserves and landscapes when undertaking the Landscape action prioritisation process, in accordance with the *Regional conservation planning approach*.

3.1.1 Identification of priority landscapes

The Swan Region overlays two IBRA Swan Coastal Plain sub-regions (SWA1, SWA2), the Northern Jarrah Forest sub-region (JF1) and Avon Wheatbelt sub-region (AVW2). To provide finer scale analysis of the Jarrah Forest sub-region, the Swan Region applied the Landscape Management Unit (LMU) corporate dataset (2014). LMUs are an agglomeration of vegetation complexes and ecological vegetation systems, as defined and mapped by Matiske and Havel (2002), to form more compact management units that recognise underlying ecological characteristics.

3.1.2 Categorisation of land into management units

To assist in planning and prioritising across department-managed tenure, the Swan Region categorised land into approximately 344 management units. Management units that could be effectively managed as one entity were grouped.

3.1.3 Identify priority management units

To identify management units of highest priority to focus resources and effort, the Swan Region compared the outputs from existing strategic regional conservation planning and spatial prioritisation processes. The region considered the output of a spatial conservation prioritisation using Marxan software which identified areas within the conservation reserve network that should be prioritised for allocation of limited resources, based on biodiversity features (Ramalho et al. 2013). The region also considered the Strategic Assessment of the Perth and Peel Regions which applied a conservation prioritisation using Zonation software to identify areas that maximised the representation of suitable habitat for multiple species over large landscapes to create a hierarchical ranking of sites according to conservation priority (Whitehead et al. 2017).

In addition, the region applied a basic geographic information system (GIS) analysis using corporate datasets to determine the relative value of each management unit in relation to representativeness of vegetation, diversity and rarity.

The list of priority management units was further refined following a review by regional conservation staff. Landscape connectivity, representativeness of vegetation, threatening processes and values were considered. Through this assessment, the Swan Region identified 30 priority reserves and landscapes.

The Swan Region's priority management units are listed in [Appendix 1](#).

4 Regional conservation actions

The conservation actions identified and prioritised through the regional conservation planning process are organised into the following sections:

- 1) Highest priority actions assessed through the prioritisation processes (as described in the *Regional conservation planning approach*) are outlined in [section 5](#).

These actions will be implemented by regional staff as the highest priority, focused on those actions that are on, or benefit, department-managed land^{3,4} and/or involve addressing key information requirements for the management of threatened and Priority species and ecological communities both on and off department-managed land⁵.

- 2) Actions identified through the regional conservation planning process that are not the highest priority are outlined in [section 6](#).

These actions will be considered in works programming as opportunities arise. They include:

- a) Actions to be led by the region that went through the benefit-cost analysis (for Landscape and Targeted actions) and the risk assessment and value of information analysis process (for Learn actions) and were assessed to not be in the highest priority category.
- b) Actions with a benefit-cost score of zero⁶ or less were excluded from prioritisation category allocation, as they have been estimated to deliver no value or may be detrimental based on the information available during the regional conservation planning process. These actions are included for regions to consider should prioritisation process factors change over time (for example new information that improves feasibility or certainty).

³ **Department-managed land** includes lands and waters managed under the Parks and Wildlife Service's legislation (the *Conservation and Land Management Act 1984* and *Swan and Canning Rivers Management Act 2006*). It also applies to 1) those lands for which the department under a Memorandum of Understanding (MOU) with the Department of Planning, Lands and Heritage, manages pest animals, weeds and fire on unallocated Crown land (UCL) and unmanaged reserves (UMR) outside the metropolitan area, regional centres and townsites (2004), where resources are available and subject to native title considerations; and 2) Crown lands where the department has a management interest (for example UCL lands that were purchased or identified with the aim of adding them to the formal conservation estate but remain under the management of the *Land Administration Act 1997*).

⁴ Actions off, but that will benefit, department-managed land were assessed through the Landscape and Targeted action prioritisation processes. These include actions that:

- are on lands adjacent to department-managed land (for example neighbouring properties, buffers)
- are undertaken in partnership with joint management partners (including potential joint management partners) off department-managed land (relationship building)
- incorporate multiple tenure types, including department-managed land.

⁵ Learn actions undertaken by regions on non-department-managed land were included in the Learn action prioritisation process, even if they may not directly benefit department-managed land. This is because information about threatened and Priority species and communities is essential to inform their status, and subsequent management actions either on department-managed land or for the department to encourage actions on other lands.

⁶ Zero was defined as 0.0000000001.

- c) *Landscape and Targeted actions identified through the action development processes that are off, and do not directly benefit, department-managed land, and/or that rely on third parties for implementation where all costs are not incurred by the region.

These were not assessed through the prioritisation processes. This is because the primary focus of regions is to implement actions on, or that benefit the lands for which they have a management responsibility, and/or because the benefit-cost analysis could not be accurately applied due to cost and feasibility uncertainty (as these were outside the region's control). These actions include liaison and advocacy, land acquisition and transfer, and education and awareness.

- d) *Proposed/new translocation and germplasm collection and storage actions.

These actions were considered through the Targeted action screening and action development processes but were not included in the regional conservation prioritisation processes, as these actions are dependent on approval processes and considerations at a state-wide level led by other areas of the department.

An asterisk (*) denotes the action types that have not been through the regional conservation planning prioritisation processes.

- 3) Learn actions that were beyond the region's capacity and/or expertise to address are outlined in [section 7](#).

The region will pursue collaboration opportunities to address these information requirements as they arise with other business areas of the department and/or external parties.

Conservation actions to be led by the region have been assigned to the relevant overarching biodiversity conservation strategy as outlined in the department's [Biodiversity Conservation Framework](#). Multiple other business areas of the department contribute to achieving these overarching strategies. Therefore, the region may not deliver actions aligned to all the overarching strategies, and regional conservation plans do not reflect all the conservation activities implemented by other business areas of the department.

Many actions identified through the regional conservation planning process align with multiple overarching strategies, therefore they were assigned based on the nature of the action (what the action is focused on doing) rather than the objective (what the action is focused on achieving).

Action numbers

The action number in square brackets is a unique code for specific actions that may be grouped in a summarised format in this plan. The action number can be used to reference the detailed information documented through the prioritisation process for that action within the supporting datasets. The letters of the action number denote the prioritisation process (LA = Landscape action, LE = Learn action and TA = Targeted action). For Learn and Targeted actions, letters also denote the threatened or Priority biodiversity asset type (EC = ecological community, FA = fauna and FL = flora). The numbers are random (they do not relate to their priority).

5 Highest priority actions assessed through prioritisation processes

Conservation reserves



Expand and effectively manage a comprehensive, adequate and representative conservation reserve system to protect biodiversity, cultural and social values.

FLORA

- Repair fence at population 1A of *Lasiopetalum pterocarpum* in Serpentine National Park and install barriers or close informal access paths around the site [TA-FL-285].

ECOLOGICAL COMMUNITIES

- Manage recreational access to the Stromatolite-like freshwater microbialite community of coastal brackish lakes ecological community at Lake Clifton using signage and rehabilitation of access paths to minimise physical crushing impacts on the thrombolites [TA-EC-206].

LANDSCAPES

- Implement field surveillance programs to identify and determine the extent of threatening processes including invasive species (for example weeds, feral pigs and cats), unauthorised access and associated illegal issues, and climate related changes (for example drought events) at Chandler [LA-027], Flint [LA-037], Inglehope [LA-048], Leona [LA-072], Randall [LA-120] and Wearne [LA-150] forest blocks.

Species and ecological communities



Maintain viable, intact and healthy ecological communities and populations of species, especially those that are threatened, significant or iconic, while allowing the sustainable use of natural resources and facilitating nature-based tourism.

FAUNA

- Install artificial aestivation tunnels for western swamp tortoise (*Pseudemydura umbrina*) at Ellen Brook, Twin Swamps, Lake Wannamal and Moore River nature reserves [TA-FA-280, TA-FA-281].
- Construct drought refuge ponds for western swamp tortoise (*Pseudemydura umbrina*) at Lake Wannamal, Moore River and Twin Swamps nature reserves [TA-FA-283].
- Improve water levels in wetlands and ponds through bunds/earthworks and/or supplementation with a groundwater bore and line ponds to retain water where required for western swamp tortoise (*Pseudemydura umbrina*) at Ellen Brook, Lake Wannamal, Twin Swamps and Moore River nature reserves [TA-FA-284].

- Continue to support Perth Zoo captive breeding of western swamp tortoise (*Pseudemydura umbrina*) and supplement Moore River and Twin Swamps nature reserves populations with captive-bred individuals. Maintain introduced predator fencing and implement integrated fox control and quenda relocation at Twin Swamps and Ellen Brook nature reserves when the tortoise is most vulnerable. In addition, undertake black rat control and utilise scare towers for Australian raven at Twin Swamps and Ellenbrook nature reserves. Continue fox control at Moore River and Lake Wannamal nature reserves [TA-FA-459].
- Undertake a desktop survey of claypans and *Goodenia* sp. records to identify a list of prospective habitat areas for short tongue bee species *Neopasiphae simplicior* [LE-FA-001] and *Leioproctus douglasiellus* [LE-FA-002]. Undertake surveys to determine presence or absence of the bee in these areas.

FLORA

- Monitor population 2A of *Calytrix breviseta* subsp. *breviseta* to determine seedling success [LE-FL-001].
- Implement a prescribed burn at population 2 of *Diplolaena andrewsii* within John Forrest National Park, given the favourable response of population 2D to prescribed fire [TA-FL-277].
- Continue permanent transects of tall donkey orchid (*Diuris drummondii*) population 42 [LE-FL-022].
- Implement an early autumn prescribed burn of population 1 of *Lasiopetalum pterocarpum* within Serpentine National Park, given positive historical population response following bushfire [TA-FL-283].
- Survey for additional Hort's Styphelia (*Styphelia capillaris*) populations in suitable habitat [LE-FL-016].
- Determine threats to:
 - *Andersonia* sp. Saxatilis (F. & J. Hort 3324) [LE-FL-015]
 - *Androcalva fragifolia* [LE-FL-007]
 - Mogumber bell (*Darwinia carnea*) (population 7) [LE-FL-019]
 - *Grevillea evanescens* (population 1) [LE-FL-005]
 - sandplain duck orchid (*Paracaleana dixonii*) (population 2) [LE-FL-020]
 - granite duck orchid (*Paracaleana granitica*) [LE-FL-010]
 - spiral bush (*Spirogardnera rubescens*) (populations 1, 3A, 3B, 3C, 7) [LE-FL-023]
 - York sun orchid (*Thelymitra yorkensis*) (populations 2, 3, 4, 5, 9 and 10) [LE-FL-011].
- Implement blackberry (*Rubus* sp.) and watsonia (*Watsonia* sp.) control following implementation of an early autumn prescribed burn of population 1 of *Lasiopetalum pterocarpum* within Serpentine National Park [TA-FL-284].
- Monitor populations of threatened and Priority flora including:
 - *Grevillea bracteosa* subsp. *bracteosa* response to fire events in the Bindoon training area to inform fire management requirements of the species [LE-FL-018]
 - *Grevillea curviloba* (previously subsp. *incurva*) (population 12A) [LE-FL-012]

- *Grevillea evanescens* (populations 1, 2, 5B, 6) [LE-FL-004]
- *Hibbertia glomerata* subsp. *ginginensis* [LE-FL-009]
- *Lepidosperma rostratum* (populations 1A, 1B, 3A) [LE-FL-003]
- sandplain duck orchid (*Paracaleana dixonii*) populations post-fire [LE-FL-017]
- dwarf pea (*Ptychosema pusillum*) (population 1) [LE-FL-006]
- spiral bush (*Spirogardnera rubescens*) (populations 3B, 3C) [LE-FL-014]
- *Synaphea* sp. Fairbridge Farm (D. Papenfus 696) (populations 2, 3A, 3B, 3C, 3D, 3E, 5) [LE-FL-008]
- *Synaphea* sp. Pinjarra (R. Davis 6578) (populations 1, 2, 3, 4) [LE-FL-013].
- Review flora species listed in the Threatened and Priority Flora Database (TPFL) and/or Western Australian Herbarium records without an assigned 'TPFL population number' at the time of the flora screening process, to determine survey, monitoring or other actions required.

ECOLOGICAL COMMUNITIES

- Map known occurrences of the Coastal shrublands on shallow sands, southern Swan Coastal Plain ('floristic community type 29a') ecological community to clarify status [LE-EC-004].
- Monitor the recovery of the Communities of tumulus springs (organic mound springs, Swan Coastal Plain) ecological community from fire and seek to prevent fire in peat-based systems [LE-EC-002].
- Investigate the status of occurrences of Herb rich saline shrublands in clay pans ecological community, including WN021MNR - Mindarra - Bindoon Moora Road, Muckenburrah, Bullsbrook, Austin Bay, Punrack Road Moore River nature reserves and Austin Cove [LE-EC-001].
- Determine microbial assemblage, map thrombolites and implement baseline and ongoing water quality monitoring of the Stomatolite-like freshwater microbialite community of coastal brackish lakes ecological community [LE-EC-006].

Threatening
processes



Reduce the impacts of key threatening processes, including altered hydrology, climate change and priority pest animals, weeds and diseases, on biodiversity, ecological processes and sustainable land uses.

ALTERED HYDROLOGY

- Investigate methods to decrease nutrient inputs to the eastern catchment of the Stomatolite-like freshwater microbialite community of coastal brackish lakes ecological community [LE-EC-003].

FIRE REGIMES

- Undertake targeted and ongoing liaison and input into the Burn Options Program and prescribed fire planning processes recommending the introduction of prescribed fire with

moderate intensity to stimulate regeneration of threatened flora species at Drummond Nature Reserve within the Julimar system [LA-053].

- Undertake targeted ongoing liaison and input into the Burn Options Program and prescribed fire planning processes to implement strategies that seek to minimise impacts from fire on claypan wetlands at Drummond Nature Reserve within the Julimar system [LA-052].
- Liaise with departmental staff and the Department of Fire and Emergency Services (DFES) regarding fire operational practices to mitigate impacts to banksia woodland within the Red Gully system during prescribed burning and bushfire suppression operations [LA-125].
- Undertake targeted ongoing liaison and input into the Burn Options Program and prescribed fire planning processes to achieve and maintain a fine scale mosaic of vegetation floristic, structural and temporal states that allows for the retention of older fuels, considering current fuel age and severity mapping. Recommend the application of fire regimes under frequencies and conditions that facilitate the landscape-scale development of fine-grained mosaics, maximise patchiness and low severities and minimise the risk of large-scale high severity bushfires, considering current fuel age and severity mapping within Banksiadale Forest Block [LA-023], Flint Forest Block [LA-038], Inglehope Forest Block [LA-049], Julimar system [LA-054], Lowlands Nature Reserve [LA-077], Monadnocks Reserve [LA-095], Red Gully system [LA-128], Serpentine system [LA-132] and Wandoo National Park [LA-143].

PEST ANIMALS

- Implement fox control across Anstey-Keane Damplands and liaise with the LGA in relation to cat prohibited areas and feral cat management. Undertake fauna monitoring as part of introduced predator control program [LA-006].
- Implement fox control within Lupton Conservation Park (portion not already baited as part of Western Shield program). Undertake fauna monitoring as part of introduced predator control program [LA-084].
- Implement a feral pig and goat management program to reduce the impact on vegetation within the Avon Valley system [LA-017].
- Implement a feral pig management program based on surveillance outcomes in Quindanning Reserve [LA-116], Moore River [LA-102], Red Gully [LA-127] and the Yeal [LA-162] systems.
- Implement a feral pig management program at Kooljerrenup Nature Reserve [LA-066] and Yalgorup National Park [LA-157].
- Manage the kangaroo population at Lowlands Nature Reserve at the determined sustainable level [LA-076].

WEEDS

- Control grassy and bulbous weeds around populations of flora that short tongue bee species *Leioproctus douglasiellus* [TA-FA-101] and *Neopasiphae simplicior* [TA-FA-437]

associate with including *Goodenia* sp. and *Anthotium junciforme* in and around claypans across the Swan Region.

- Investigate potential methods for controlling perennial grass weeds in *Grevillea curviloba* populations in road and rail reserves [LE-FL-002].
- Implement a weed control program targeting woody weeds including coast teatree (*Gaudium laevigatum*) at the White Road occurrence of the *Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a) ecological community [TA-EC-185].
- Continue the weed control program targeting blackberry (*Rubus fruticosus*) at the Neaves Road Nature Reserve occurrence of the Communities of tumulus springs (organic mound springs, Swan Coastal Plain) ecological community [TA-EC-193].
- Assess the impacts of weeds on the Sedgeland in Holocene dune swales of the southern Swan Coastal Plain ecological community [LE-EC-005].

6 Actions identified through the regional conservation planning process that are not the highest priority

Conservation
reserves



Expand and effectively manage a comprehensive, adequate and representative conservation reserve system to protect biodiversity, cultural and social values.

FAUNA

- Investigate options to restrict visitor access to all Australian sea lion (*Neophoca cinerea*) haul out areas at high risk of disturbance [LE-FA-003].
- Design and implement land uses, including revegetation, on the ex-plantation areas of State Forest 65 (Gnangara, Pinjar and Yanchep) that provide a food resource for Carnaby's black cockatoo (*Zanda latirostris*) that is greater than fallow ex-plantation [TA-FA-338].
- Promote regeneration and revegetation of areas within and adjacent to breeding habitat, non-breeding feeding habitat and night roosts for Carnaby's black cockatoo (*Zanda latirostris*) based on mapping of important habitats across the Swan Region. Achieve works through liaison and the provision of advice and support to community groups and landowners and, where demonstrated appropriate, on department-managed land [TA-FA-349].
- Implement habitat rehabilitation/revegetation (10–20 hectares) at Twin Swamps Nature Reserve and at newly acquired lands at Lake Wannamal and Ellen Brook nature reserves for western swamp tortoise (*Pseudemydura umbrina*) including around newly constructed ponds [TA-FA-294].

*Land acquisition and transfer actions

- Investigate the potential acquisition of suitable areas (water source or dam) of freehold land in catchment areas outside of Ellen Brook Nature Reserve (areas immediately outside/within range). Implement preliminary establishment works (earthworks and bunding, build ponds, revegetation and fencing) for western swamp tortoise (*Pseudemydura umbrina*) [TA-FA-290].

FLORA

- Continue to manage recreation activities within John Forrest National Park to avoid impacts to populations of *Diplolaena andrewsii* and restrict access to populations at risk from mountain bike activity through the installation of barriers and rehabilitation of unauthorised tracks (focusing on populations 2A and 2C) [TA-FL-278].
- Install signage and close off-road vehicle (ORV) access routes if and where ORV use is observed on any of the granite outcrops containing slender-leafed duck orchid (*Paracaleana gracilicordata*) [TA-FL-289].

*Land acquisition and transfer actions

- Investigate the potential acquisition of populations in intact bushland remnants of grass wattle (*Acacia anomala*) (populations 8, 13 in Bush Forever site 291 and 1, 2 and 3 in Bush Forever site 86) [TA-FL-173] and *Chamelaucium lullfitzii* (populations 1 and 6 north of Ippolito Road) [TA-FL-274] and create conservation reserves.
- Investigate opportunities to transfer UCL containing populations 1, 2 and 3 of bush flame pea (*Chorizema varium*) [TA-FL-275] and population 1 of *Marianthus paralius* [TA-FL-287] to conservation estate.

ECOLOGICAL COMMUNITIES

- Maintain fencing and prevent access and potential damage by unauthorised vehicles to the Port Kennedy Scientific Park occurrence of Sedgelands in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19) [TA-EC-203].

LANDSCAPES

- Implement field surveillance program to identify, and determine the extent of, threatening processes including invasive species (for example weeds, feral pigs and cats), unauthorised access and associated illegal activities, and climate related changes (for example drought events) at Amphion [LA-003], Banksiadale [LA-024], Kennedy [LA-062], and Pindalup [LA-113] forest blocks and Quindanning Reserve [LA-117]. Implement threat mitigation works as required.
- Regularly patrol, close tracks and repair boundary fencing at Anstey-Keane Damplands [LA-010], Lowlands Nature Reserve [LA-081], Lupton Conservation Park [LA-085], Modong Nature Reserve [LA-093], Paganoni Swamp [LA-109], Treasure Forest Block bushland [LA-140], Yalgorup National Park [LA-161] and the Yeal system [LA-165] to control unauthorised access. Implement enforcement and compliance activities targeting unauthorised access. Publicise enforcement outcomes to enhance public education

campaigns. Increase the presence of conservation management activities and engagement with interested community members.

- Clearly demarcate the boundary of reserves within the Austin Bay system [LA-014], Chandler Forest Block [LA-035], Greater Brixton Street Wetlands [LA-046], the Julimar system [LA-060], Monadnocks Reserve [LA-097], Serpentine [LA-133] and Wandoo [LA-148] national parks and Kooljerrenup Nature Reserve [LA-070]. Install fencing, heavy-duty gates and signage as required. Regularly patrol and close tracks to control unauthorised access. Implement enforcement and compliance activities targeting unauthorised access and utilise camera surveillance. Publicise enforcement outcomes to enhance public education campaigns. Increase the presence of conservation management activities and engagement with interested community members or stakeholders.

Species and
ecological
communities



Maintain viable, intact and healthy ecological communities and populations of species, especially those that are threatened, significant or iconic, while allowing the sustainable use of natural resources and facilitating nature-based tourism.

FAUNA

- Engage with marine park visitors and maintain signage in relation to the maintenance of appropriate distances, in-boat and onshore, from Australian sea lion (*Neophoca cinerea*) on haul out beaches across the Swan Region. Initiate enforcement action when required, consistent with the Regional Compliance Plan advice on interactions that breach legislation [TA-FA-334].
- Continue monitoring program using remote cameras to detect black-flanked rock wallaby (*Petrogale lateralis lateralis*) presence/persistence in Avon Valley [LE-FA-007].
- Implement camera monitoring of known populations of brush-tailed phascogale (*Phascogale tapoatafa*) pre- and post-fire to learn how they respond to prescribed burns [LE-FA-005].
- Identify habitat requirements for the brush-tailed phascogale (*Phascogale tapoatafa*) on the Swan Coastal Plain and survey for additional populations in secure habitat [LE-FA-004].
- Supplement hollow availability at jarrah forest, scarp and western wheatbelt breeding sites across the Swan Region by installing and maintaining artificial nest hollows for forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*). Avoid sites that are already well supplied with artificial hollows [TA-FA-340].
- Undertake nesting hollow repair at known breeding sites for Carnaby's black cockatoo (*Zanda latirostris*) and supplement hollow availability by installing and maintaining artificial nest hollows across the Midwest, South Coast, Swan, Warren and Wheatbelt regions [TA-FA-351].

- Determine threats to Swan Region populations of Perth slider (*Lerista lineata*) [LE-FA-006].
- Improve water levels in wetlands and ponds through bunds/earthworks and/or supplementation with groundwater bore for western swamp tortoise (*Pseudemydura umbrina*) at Ellen Brook Nature Reserve [TA-FA-434].
- Improve water levels in wetlands and ponds through bunds/earthworks and/or supplementation with groundwater bore and line ponds with plastic or clay to retain water for western swamp tortoise (*Pseudemydura umbrina*) at Twin Swamps Nature Reserve [TA-FA-435].

*Liaison actions

- Develop guidance for pruning and tree removal not affiliated with land use planning and native vegetation clearing approvals to minimise disturbance to western ringtail possum (*Pseudocheirus occidentalis*) across the South Coast, South West, Swan and Warren regions. Disseminate to the public, contractors and local government authorities, including procedures for the requirement of *Biodiversity Conservation Act 2016* (BC Act) section 40 authorisation [TA-FA-122].
- Install signage and fencing and/or have seasonal beach closures to control visitor access (vehicles, dogs) at key defendable breeding sites for fairy tern (*Sternula nereis nereis*) in their breeding season across the Midwest, Pilbara, South West, Swan and Warren regions [TA-FA-223].
- Evaluate the need for and implement appropriate techniques to create new breeding sites for fairy tern (*Sternula nereis nereis*) where deemed necessary to maintain viable breeding sites [TA-FA-346].
- Implement and publicise enforcement programs to counter illegal taking of Baudin's black cockatoo (*Zanda baudinii*) [TA-FA-332] and Carnaby's black cockatoo (*Zanda latirostris*) [TA-FA-350] through shooting throughout their range.

*Proposed/new translocations

- Establish one additional translocated population of western swamp tortoise (*Pseudemydura umbrina*), supported by the Perth Zoo captive breeding program.

FLORA

- Continue to monitor *Andersonia gracilis* population 20 until plants recruit to determine recruitment interval after bushfire [LE-FL-073].
- Monitor populations 2, 3 and 4 *Calytrix simplex* subsp. *simplex* and survey adjacent conservation estate for additional populations [LE-FL-074].
- Monitor *Conostylis caricina* subsp. *elachys* populations post-burn and assess the impact of other threatening processes such as kangaroo grazing [LE-FL-087].
- Investigate fire response of *Eryngium* sp. *Ferox* (G.J. Keighery 16034) [LE-FL-034] and *Hakea oligoneura* [LE-FL-042].
- Investigate the response of *Senecio leucoglossus* to disturbance [LE-FL-056].

- Monitor star orchid (*Thelymitra stellata*) population data and assess threats in liaison with WA Native Orchid Society Group [LE-FL-026].
- Determine threats and potential causes of decline for:
 - *Calothamnus graniticus* subsp. *leptophyllus* [LE-FL-061]
 - blue boronia (*Cyanothamnus tenuis*) [LE-FL-081]
 - *Darwinia* sp. Westdale (F. Hort 864) [LE-FL-063]
 - *Grevillea bracteosa* subsp. *bracteosa* (populations 15A, 16, 17A, 19A 19B, 26) [LE-FL-039]
 - *Lasiopetalum caroliae* (populations 2, 4, 5A, 8) [LE-FL-057]
 - *Lechenaultia hortii* [LE-FL-082]
 - scarlet lechenaultia (*Lechenaultia laricina*) (population 3) [LE-FL-038]
 - *Styphelia brevicuspis* [LE-FL-030].
 - *Synaphea stenoloba* (population 4) [LE-FL-070]
 - Crystal Brook star orchid (*Thelymitra magnifica*) (populations 1A, 1B, 3, 4A, 4B, 5A, 5B, 7A, 8 and 9) [LE-FL-041]
 - *Verticordia citrella* (population 2) [LE-FL-103].
- Monitor populations of threatened and Priority flora including:
 - *Acacia anarthros* (populations 12A, 12B, 12C) [LE-FL-047]
 - grass wattle (*Acacia anomala*) (population 4) [LE-FL-066]
 - leafless rock wattle (*Acacia aphylla*) (populations 1A, 3A, 3B, 14A, 19B) [LE-FL-093]
 - *Acacia browniana* var. *glaucescens* (population 7) [LE-FL-032]
 - *Acacia cuneifolia* (populations 2A, 3A, 4, 7, 16A) [LE-FL-105]
 - *Acacia horridula* [LE-FL-089]
 - *Andersonia gracilis* significant outlier at Greater Brixton Street Wetlands [LE-FL-055]
 - *Andersonia* sp. Audax (populations 5, 6A, 7) [LE-FL-059]
 - golden catspaw (*Anigozanthos humilis* subsp. *chrysanthus*) (populations 1E, 1I, 1K, 1L, 7, 14A, 14B, 14D) [LE-FL-085]
 - slender tailflower (*Anthocercis gracilis*) (populations 4, 5G, 5H) [LE-FL-094]
 - stalked water ribbons (*Aponogeton hexatepalus*) (populations 1A, 1B, 1C, 19A) [LE-FL-079]
 - *Asterolasia grandiflora* (populations 1A, 1D, 3A, 7A, 4, 15, 16A, 16B, 17, 18) [LE-FL-090]
 - summer honeypot (*Banksia mimica*) (populations 3B, 3C, 5A, 5C, 7A, 8, 9, 15A) [LE-FL-067]
 - *Calothamnus graniticus* subsp. *leptophyllus* (populations 1B, 3, 5A, 6) [LE-FL-062]
 - *Calytrix oncophylla* (population 1) [LE-FL-112]
 - *Chordifex chaunocoleus* (populations 1A, 1B, 1D) [LE-FL-045]
 - *Comesperma rhadinocarpum* (population 5) [LE-FL-113]
 - *Conospermum undulatum* (populations 1A, 1B, 1E, 1H, 3, 4A, 4B, 4D, 4E, 4F, 4G, 4H, 4K, 4L, 4M, 4N, 4O, 4P, 4Q, 4R, 4S, 5, 6, 7, 8A, 8B, 9, 10A, 10B, 10C, 10D, 10E, 10F, 11A, 11C, 11D, 12, 13A, 14A, 15, 16F, 16H, 17, 18B, 18C, 18E, 18F, 18G, 18J, 18M, 18N, 18O, 19A, 19B, 23A, 24A) [LE-FL-060]
 - *Conostylis pauciflora* subsp. *pauciflora* (population 5) [LE-FL-096]

- blue boronia (*Cyanothamnus tenuis*) (populations 4A, 12) [LE-FL-110]
- fine-leaved Darwinia (*Darwinia acerosa*) (populations 4A, 4B, 4C) [LE-FL-077]
- scarp Darwinia (*Darwinia apiculata*) (population 3A) [LE-FL-064]
- *Darwinia foetida* (population 2) [LE-FL-036]
- *Darwinia pimelioides* (populations 1A, 2A, 3) [LE-FL-037]
- *Darwinia thymoides* subsp. St Ronans (J.J. Alford & G.J. Keighery 64) (population 1) [LE-FL-083]
- tall donkey orchid (*Diuris drummondii*) (population 6) [LE-FL-076]
- dwarf bee orchid (*Diuris micrantha*) (population 3) [LE-FL-024]
- Purdie's donkey orchid (*Diuris purdiei*) (populations 2, 3, 5, 6, 7, 9, 10B, 13, 15) [LE-FL-058]
- Hackett's hopbush (*Dodonaea hackettiana*) (population 1) [LE-FL-111]
- *Drakaea elastica* (populations 1, 7, 29, 30, 31, 37A, 37C, 38A, 38D) [LE-FL-043]
- *Eleocharis keigheryi* (population 17) [LE-FL-033]
- Wabbling Hill mallee (*Eucalyptus argutifolia*) (populations 17A, 17B) [LE-FL-084]
- *Eucalyptus* x *graniticola* (population 1) [LE-FL-052]
- *Goodenia arthrotricha* (population 7) [LE-FL-069]
- spindly Verreauxia (*Goodenia verreauxii*) (population 5) [LE-FL-106]
- *Grevillea bracteosa* subsp. *bracteosa* (population 17B) [LE-FL-104]
- *Grevillea candolleana* (population 8) [LE-FL-044]
- tangled grevillea (*Grevillea flexuosa*) (populations 1B, 1R, 1S, 3G, 3H, 3I, 3J, 3N, 4) [LE-FL-065]
- pouched grevillea (*Grevillea saccata*) (populations 5B, 5C, 5D, 5E, 5H) [LE-FL-095]
- *Haemodorum loratum* [LE-FL-088]
- aquatic pennywort (*Hydrocotyle lemnoides*) (populations 2A, 3) [LE-FL-097]
- *Lasiopetalum cardiophyllum* (population 5) [LE-FL-102]
- cushion lechenaultia (*Lechenaultia pulvinaris*) (populations 13A, 13B, 13D, 15A, 15B, 16A, 16C, 19A) [LE-FL-101]
- southern tetraria (*Morelotia australiensis*) (populations 4A, 5A, 5B, 10) [LE-FL-091]
- sandplain duck orchid (*Paracaleana dixonii*) (population 2) [LE-FL-028]
- *Parsonsia diaphanophleba* (populations 1, 3) [LE-FL-107]
- summer pimelia (*Pimelea rara*) (populations 1A, 1B, 2A, 2B, 3, 4A, 5, 7, 10B, 11A, 11B) [LE-FL-098]
- Narrogin pea (*Pultenaea pauciflora*) (population 19A) [LE-FL-035]
- floating bog-rush (*Schoenus natans*) (population 2A) [LE-FL-071]
- *Synaphea stenoloba* (populations 1C, 2A, 2C, 4D, 5, 7, 12) [LE-FL-040, LE-FL-048].
- cinnamon sun orchid (*Thelymitra dedmaniarum*) (population 1F) [LE-FL-031]
- *Trithuria australis* (population 2) [LE-FL-080].
- Survey for additional populations of threatened flora including:
 - *Androcalva fragifolia* [LE-FL-025]
 - *Conostylis caricina* subsp. *elachys* [LE-FL-053]
 - white china orchid (*Cyanicula ixioides* subsp. *candida*) populations [LE-FL-068]
 - *Grevillea crowleyae* in Lupton Conservation Park and adjacent department-managed land such as Wearne Forest Block and Wandoo National Park [LE-FL-078]

- *Haemodorum loratum* [LE-FL-108]
- *Jacksonia velveta* in areas to the north of population 7 in surrounding department-managed land (State forest 67) and alert industry to the potential presence of the species [LE-FL-049]
- *Meionectes tenuifolia* [LE-FL-050]
- *Schoenus pennisetis* [LE-FL-109]
- *Schoenus* sp. Toodyay (G.J. Keighery & N. Gibson 2918) [LE-FL-029]
- *Senecio leucoglossus* [LE-FL-072].
- Monitor populations pre- and post-burn to determine an appropriate fire regime for:
 - *Lasiopetalum decoratum* [LE-FL-100]
 - southern tetraria (*Morelotia australiensis*) [LE-FL-027]
 - cormybose pithocarpa (*Pithocarpa corymbulosa*) [LE-FL-099].

*Proposed/new translocations

- Consider new flora translocation proposals for threatened flora species including:
 - Bentham's wattle (*Acacia benthamii*)
 - *Andersonia gracilis*
 - *Androcalva fragifolia*
 - *Austrostipa bronwenae*
 - *Austrostipa jacobiana*
 - *Baeckea* sp. Youndegin Hill (A.S. George 15772)
 - *Banksia nivea* subsp. Morangup (M. Pieroni 94/2)
 - *Boronia humifusa*
 - *Chordifex gracilior*
 - white china orchid (*Cyanicula ixiooides* subsp. *candida*)
 - *Eremophila glabra* subsp. *chlorella*
 - *Grevillea althoferorum* subsp. *fragilis*
 - *Grevillea florida*
 - *Grevillea* sp. Toodyay West (F. Hort et al. 3296)
 - *Hemiandra* sp. Watheroo (S. Hancocks 4)
 - *Hibbertia glomerata* subsp. *ginginensis*
 - *Jacksonia velveta*
 - *Lasiopetalum decoratum*
 - granite duck orchid (*Paracaleana granitica*)
 - *Parsonsia diaphanophleba*
 - cormybose pithocarpa (*Pithocarpa corymbulosa*)
 - *Ptilotus pyramidatus*
 - *Schoenus* sp. Toodyay (G.J. Keighery & N. Gibson 2918)
 - moth triggerplant (*Stylidium scabridum*)
 - *Stylidium semaphorum*
 - Hort's styphelia (*Styphelia capillaris*)
 - *Styphelia* sp. Wandoo (F. & J. Hort 2441)
 - *Synaphea rangiferops*
 - *Synaphea* sp. Fairbridge Farm (D. Papenfus 696)
 - *Synaphea* sp. Pinjarra (R. Davis 6578)
 - *Thysanotus anceps*
 - *Tripterococcus* sp. Brachylobus (A.S. George 14234)
 - *Trithuria australis*
 - Swan hydatella *Trithuria occidentalis*.

ECOLOGICAL COMMUNITIES

- Continue to monitor water levels and quality of the Aquatic root mat community number 1 of caves of the Swan Coastal Plain [LE-EC-026].
- Investigate likely habitat and survey for other occurrences of Threatened Ecological Communities (TEC) including Coastal shrublands on shallow sands, southern Swan Coastal Plain (floristic community type 29a) [LE-EC-009].
- Investigate status of new occurrences of Herb rich shrublands in clay pans on private land, including Tonkin 01, BICKLEYRD06, BRENTWD08, BRENTWD11, BRENTWD14, Kenwick03, Kenwick05, Kenwick06, Kenwick07 [LE-EC-021].
- Monitor the recovery of the Perth to Gingin ironstone association from fire [LE-EC-013].
- Investigate status of Yangedi swamp occurrence of the Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain [LE-EC-024].
- Map known occurrences of TECs to clarify status including:
 - *Acacia* shrublands on taller dunes [LE-EC-017]
 - *Banksia ilicifolia* woodlands, southern Swan Coastal Plain (floristic community type 22) [LE-EC-020]
 - Low lying *Banksia attenuata* woodlands or shrublands (floristic community type 21c) [LE-EC-016]
 - Northern Spearwood shrublands and woodlands [LE-EC-019]
 - Quindalup *Eucalyptus gomphocephala* and/or *Agonis flexuosa* woodlands (floristic community type 30b) [LE-EC-008]
 - Southern Swan Coastal Plain *Eucalyptus gomphocephala* – *Agonis flexuosa* woodlands (floristic community type 25) [LE-EC-012]
 - Swan Coastal Plain *Banksia attenuata* – *Banksia menziesii* woodlands (floristic community type 23b) [LE-EC-018].
- Investigate likely habitat and survey for other occurrences of TECs including:
 - *Acacia* shrublands on taller dunes [LE-EC-023]
 - Low lying *Banksia attenuata* woodlands or shrublands (floristic community type 21c) [LE-EC-022]
 - *Banksia ilicifolia* woodlands, southern Swan Coastal Plain (floristic community type 22) [LE-EC-027]
 - Quindalup *Eucalyptus gomphocephala* and/or *Agonis flexuosa* woodlands [LE-EC-015]
 - Southern Swan Coastal Plain *Eucalyptus gomphocephala* – *Agonis flexuosa* woodlands (floristic community type 25) [LE-EC-011]
 - Swan Coastal Plain *Banksia attenuata* – *Banksia menziesii* woodlands (floristic community type 23b) [LE-EC-025].

Threatening processes



Reduce the impacts of key threatening processes, including altered hydrology, climate change and priority pest animals, weeds and diseases, on biodiversity, ecological processes and sustainable land uses.

ALTERED HYDROLOGY

- Work within the catchment to increase flows to Lake McLarty. Install culverts under Mills Road. Review drainage across catchment and adjust to increase paddock water flow into main McLarty drain. Work with the LGA with respect to roadside drainage. Continue to manage flows to Lake Mealup via the weir. Install a flow control structure in the Mealup main drain to raise groundwater levels under lower Lake Mealup [LA-089].
- Work with upstream neighbours to reduce nutrient input from farming properties into the McLarty–Mealup System. Manipulate lake levels to bind existing nutrients to sediments at Lake Mealup. Maintain, improve and monitor Lot 68 living stream system. Harvest or remove material associated with bulrush (*Typha orientalis*) removal programs and within Lot 68 [LA-090].
- Determine the causes of rising salinity at selected Yalgorup Lakes wetlands and implement actions to minimise additional further increases including working with the Department of Water and Environmental Regulation (DWER) to manage groundwater conditions and extraction rates, culvert alterations at Lake Preston North and drainage alterations at Lake Josephine [LA-159].
- Install signage at fire water points across the western mud minnow (*Galaxiella munda*) distribution (South West, Swan and Warren regions) to provide advice to users on how to minimise potential impacts to the species [TA-FA-110].

DISEASE

- Survey to determine the presence or extent of Phytophthora dieback and design and implement a Phytophthora dieback management program to prevent introduction, minimise or contain the spread of the pathogen in Austin Bay system [LA-015], Avon Valley system [LA-020], Julimar [LA-056], Moore River [LA-103], Red Gully [LA-129] and Yeal systems [LA-163], Amphion [LA-004], Banksiadale [LA-025], Chandler [LA-029], Flint [LA-040], Inglehope [LA-050], Kennedy [LA-064], Leona [LA-074], , Pindalup [LA-115], Randall [LA-122] and Wearne forest blocks [LA-152], Lowlands Nature Reserve [LA-078], Lupton Conservation Park [LA-087], Monadnocks Reserve [LA-096], Paganoni Swamp [LA-110] and Wandoo National Park [LA-144]. Maintain hygiene protocols and minimise disturbance activities to reduce soil movement and limit potential spread into uninfested areas. Prevent access to infested areas and areas sensitive to infection and liaise with relevant stakeholders in relation to Phytophthora dieback management approaches.

ENVIRONMENTAL IMPACT ASSESSMENT AND ADVICE

- Mark and protect known numbat (*Myrmecobius fasciatus*) logs and burrows during disturbance operations where this isn't currently a standard condition in the South West and Swan regions [TA-FA-140].
- Survey for additional populations of Cossack's spider orchid (*Caladenia dorrienii*) to inform industry environmental impact assessment surveys [LE-FL-046].

*Liaison actions

- Continue to liaise with holders of active mining leases in State forest regarding their obligations under the mining lease approval and the BC Act on management practices that may impact on populations 1 and 2 of Quindanning spider orchid (*Caladenia hopperiana*) in Quindanning Reserve [TA-FL-273].
- Provide input to land use planning and environmental approvals and liaise with decision making authorities to achieve protection of the largest and most intact sub-populations of *Conospermum undulatum* that are at risk from urban, industrial and infrastructure development (populations 4A-E, 4L-T, 17, 18H, 19B-D, 11C-D, 16B-E, and 16S) [TA-FL-276].
- Liaise with stakeholders in relation to environmental impact assessment processes for development associated with wetlands on-reserve and adjacent lands for populations 1, 6 and 7 of *Eremophila glabra* subsp. *chlorella* [TA-FL-139].
- Identify large and intact occurrences of the *Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a) TEC, as well as occurrences where specific protection is available through land use planning and environmental approvals. Liaise with decision making authorities to achieve protection of important occurrences in conservation reserves [TA-EC-192].
- Provide advice to, and liaise with, DWER and other environmental approval and land use planning decision makers to ensure that hydrological impacts on occurrences of the following TECs are avoided or minimised:
 - Communities of tumulus springs (organic mound springs, Swan Coastal Plain) [TA-EC-195]
 - Sedgeland in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19) [TA-EC-204]
 - Stromatolite-like freshwater microbialite community of coastal brackish lakes (Lake Clifton) [TA-EC-207].

This action focuses on impacts from adjacent and nearby land use proposals, and groundwater and surface water extraction and use.

FIRE REGIMES

- Undertake targeted ongoing liaison and input into the Burn Options Program and prescribed fire planning processes to achieve and maintain a fine scale mosaic of vegetation floristic, structural and temporal states that allows for the retention of older fuels, considering current fuel age and severity mapping. Recommend the application of fire regimes under frequencies and conditions that facilitate the landscape-scale development of fine-grained mosaics, maximise patchiness and low severities, and

minimise the risk of large-scale high severity bushfires or prescribed burns within Anstey-Keane Damplands [LA-008], Amphion Forest Block [LA-002], Austin Bay system [LA-012], Chandler Forest Block [LA-028], Kennedy Forest Block [LA-063], Paganoni Swamp [LA-108], Pindalup Forest Block [LA-114], Quindanning Reserve [LA-118], Leona Forest Block [LA-073], Randall Forest Block [LA-121], Treasure Forest Block bushland [LA-138] and Wearne Forest Block [LA-151],

- Undertake targeted ongoing liaison and input into the Burn Options Program and prescribed fire planning processes to recommend:
 - A fuel reduction program of rotational low intensity seasonal prescribed burns to reduce the likelihood of entire swamps/creek systems burning and minimise the potential for a single fire event to negatively impact on fire sensitive species within Chandler [LA-033], Randall [LA-124] and Wearne forest blocks [LA-154]. Create a mosaic of seral stages that considers habitat availability and connectivity across the landscape. Support burning with high moisture differentials, maximising the effectiveness of edaphic barriers to fire, retaining some unburnt vegetation and maintaining vertical vegetation structure.
 - Low intensity prescribed burns (in spring) in tuart woodlands in Treasure Forest Block bushland [LA-137] and Yalgorup National Park [LA-158].
 - Strategies that seek to minimise impacts on peat-based wetlands in Modong Nature Reserve [LA-092] and the Moore River [LA-104] and Yeal systems [LA-166] from prescribed burning. Where feasible apply perimeter buffer zones with lower fuel loads that provide protection from unplanned high intensity fire. Prescribed burns in the vicinity of peatlands will be undertaken in moist conditions when the peat is not flammable due to its high moisture content. Increase and improve liaison with DFES and brigades to minimise impacts of bushfire suppression operations to the wetlands. Implement post-fire weed management focusing on the removal of woody weeds and grasses.
 - Introduction of low intensity, patchy fire (high-intermediate rainfall area) in spring, or late autumn after opening rains, when fuels in the forest matrix are dry enough to burn at low intensity, but outcrop vegetation is unlikely to burn at the Julimar [LA-059] and Serpentine [LA-136] systems, Chandler [LA-034], Flint [LA-042], Leona [LA-075], Randall [LA-123] and Wearne forest blocks [LA-153], Monadnocks Reserve [LA-099], and Wandoo National Park [LA-146]. In addition, introduce low to moderate intensity fire into the landscape in late summer/early autumn under conditions such that fire-maintained outcrop communities are likely to burn without damaging fire intolerant communities.
 - Strategies that seek to minimise impacts to tuart woodlands in Paganoni Swamp surrounding peat-based wetlands from prescribed fire [LA-106].
 - Maintaining a portion of the Amphion [LA-005], Chandler [LA-030], Flint [LA-039] and Kennedy [LA-065] forest blocks, Avon Valley system [LA-019] and Lupton Conservation Park [LA-086] as fire exclusion reference areas (FERA) for fire research purposes. Manage fuels to minimise the risk of bushfire to the FERAs.

- Implementation of Fire Management Information Note No E5 - Granite Outcrops for all eight populations of *Paracaleana gracilicordata* [TA-FL-288].
- Undertake targeted ongoing liaison and input into Burn Options Program and prescribed fire planning processes to implement strategies that seek to minimise impacts from fire on claypan wetlands within Anstey-Keane Damplands. Increase and improve liaison with DFES and brigades to minimise impacts of bushfire suppression operations to the claypan wetlands [LA-007].
- Install signage at the Greater Brixton Street Wetlands regarding no use of machines during fire operations. Increase and improve liaison with DFES and brigades regarding appropriate fire management [LA-044].
- Undertake pre- and post-prescribed burn and post-bushfire monitoring of western ringtail possum (*Pseudocheirus occidentalis*) to inform fire management strategies [LE-FA-008].
- Implement quokka (*Setonix brachyurus*) burn exclusion areas based on the development of a GIS product that details populations across the northern jarrah forest in relation to time since last fire at a burn and landscape scale. Update to ensure changes caused by bushfires or prescribed burns are incorporated and considered [TA-FA-233].
- Identify known nesting trees for forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) [TA-FA-208], Baudin's black cockatoo (*Zanda baudinii*) [TA-FA-206] and Carnaby's black cockatoo (*Zanda latirostris*) [TA-FA-207] during prescribed burn planning processes and initiate on-ground protection measures prior to and during the prescribed burn where operationally practical.
- Implement a fire management strategy for western swamp tortoise (*Pseudemydura umbrina*), including fuel reduction prescribed burning in wet years in spring, at Twin Swamps Nature Reserve [TA-FA-288].
- Implement an early autumn prescribed burn of selected populations of leafless rock wattle (*Acacia aphylla*) within Beelu National Park (populations 4, 10B) [TA-FL-132] and Mokine Nature Reserve (population 1) [TA-FL-133].
- Implement a prescribed burn of populations 2A and 4 (50 plants) of scarlet lechenaultia (*Lechenaultia laricina*) [TA-FL-141].
- Implement an autumn prescribed burn in the Lupton Conservation Park (R26666) for populations 4 to 20 of Narrogin pea (*Pultenaea pauciflora*) [TA-FL-143].
- Implement fire management strategies that seek to minimise impacts from fire on all star orchid (*Thelymitra stellata*) populations during autumn prescribed burns in the Midwest and Swan regions [TA-FL-154].

PEST ANIMALS

- Implement a fox control program within the Austin Bay system [LA-013], Boonanarring Nature Reserve within the Red Gully system [LA-126], Kooljerrenup Nature Reserve [LA-069], Lowlands Nature Reserve [LA-080] and the McLarty–Mealup system [LA-088]. Undertake fauna monitoring as part of introduced predator control programs.

- Implement a fox control program at Paganoni Swamp. Undertake fauna monitoring as part of feral animal control program. Investigate stomach contents of foxes taken during control operations to determine impact on native fauna species and seasonality of feeding patterns [LA-105].
- Increase post-fire fox control in known quokka (*Setonix brachyurus*) localities across approximately 5000 hectares [TA-FA-348].
- Implement a feral pig management program to reduce the impact on wetlands and creeklines within Chandler [LA-031] and Flint forest blocks [LA-043], Monadnocks Reserve [LA-100] and Serpentine system [LA-134].
- Implement a feral pig management program to reduce the impact on granite outcrops and associated fringing vegetation in Chandler [LA-032] and Flint forest blocks [LA-041], Julimar system [LA-058], Monadnocks Reserve [LA-098], Serpentine system [LA-135] and Wandoo National Park [LA-145].
- Maintain fence around the claypan wetland at Drummond Nature Reserve within the Julimar system and implement a feral pig management program in the surrounding vegetation [LA-055].
- Install fence around Little Julimar within the Julimar system and implement feral pig management program to reduce impact on granite outcrops and associated fringing vegetation [LA-057].
- Implement a feral pig management program to reduce the impact on high value claypan wetlands and riparian areas within Wandoo National Park [LA-147].
- Implement feral pig control in known quokka (*Setonix brachyurus*) localities of the northern jarrah forests around Jarrahdale and Dwellingup across roughly 5000 hectares in response to fire management or where the need for management is identified [TA-FA-125].
- Undertake feral pig management in western swamp tortoise (*Pseudemydura umbrina*) habitat at Lake Wannamal and Moore River nature reserves [TA-FA-296].
- Exclude feral pigs to protect populations 1 and 2 of Quindanning spider orchid (*Caladenia hopperiana*) in Timber Reserve 17125 [TA-FL-271].
- Install exclusion cages on individuals of population 5 of dwarf bee orchid (*Diuris micrantha*) and design and implement a feral pig control program. Control narrowleaf cottonbush (*Gomphocarpus fruticosus*) and other environmentally significant weeds if invading [TA-FL-137].
- Implement a feral pig control program to protect all eight populations of slender-leafed duck orchid (*Paracaleana gracilicordata*). Program to be consistent with the landscape-scale control program being implemented across the Swan Region [TA-FL-290].
- Implement rabbit control within Lowlands Nature Reserve [LA-082].
- Implement rabbit control within Treasure Forest Block bushland. Engage with private property landholders and LGAs to broaden the scope of control and reduce the impacts of rabbits across the Lake Clifton area [LA-141].

- Remove nest competition by feral bees by managing apiarist license conditions and the use of contractors for forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) [TA-FA-352] and Baudin's black cockatoo (*Zanda baudinii*) [TA-FA-339] across their breeding range.
- Protect important breeding areas for forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) [TA-FA-033] and Carnaby's black cockatoo (*Zanda latirostris*) [TA-FA-090] by undertaking feral beehive control across the South West, Swan and Warren regions. Evaluate known clusters of active breeding sites for feral bees and develop a control program as required.

*Liaison actions

- Implement introduced predator control programs for rats, foxes and feral cats to protect key breeding sites for fairy tern (*Sternula nereis nereis*) including on department-managed land or in liaison with LGAs across the Midwest, South West and Swan regions. Monitor the effectiveness of this action to inform future introduced predator control programs [TA-FA-071].

WEEDS

- Implement weed management programs targeting environmentally significant weeds at Anstey-Keane Damplands [LA-009], Greater Brixton Street Wetlands [LA-045], Lowlands [LA-079] and Kooljerrenup nature reserves [LA-068], Paganoni Swamp [LA-111], Yalgorup National Park [LA-160], Treasure Forest Block bushland [LA-139] and Austin Bay [LA-011] and Yeal systems [LA-164]. Map vegetation condition and weed distribution prior to commencement of weed management and after initial treatment.
- Implement weed management program within the McLarty–Mealup system targeting bulrush (*Typha orientalis*). Implement revegetation in conjunction with catchment council. Map vegetation condition and weed distribution prior to commencement of weed management and after initial treatment [LA-091].
- Implement targeted weed control program focusing on grassy weeds coming in from the reserve boundary in the Red Gully system. Map vegetation condition and weed distribution prior to commencement of weed management and after initial treatment [LA-130].
- Control invasive weeds at Ellen Brook (*Eucalyptus* spp.) and Twin Swamps (perennial grasses) nature reserves where they are shown to invade the wetland areas and alter western swamp tortoise (*Pseudemydura umbrina*) habitat [TA-FA-295].
- Continue watsonia (*Watsonia* spp.) control program at populations 2 and 3 of *Diplolaena andrewsii* within the John Forrest National Park [TA-FL-280].
- Implement a watsonia (*Watsonia meriana*) control program at population 2 of *Diplolaena andrewsii* following the implementation of a prescribed burn of the population within John Forrest National Park [TA-FL-279].
- Implement weed control of the one-leaf cape tulip (*Moraea flaccida*) infestation threatening population 2A of *Eremophila glabra* subsp. *chlorella* within Mogumber Nature Reserve [TA-FL-138].

- Undertake ongoing surveillance and control of blackberry (*Rubus sp.*) and watsonia (*Watsonia spp.*) across all populations of *Lasiopetalum pterocarpum* (excluding translocations) that occur in Serpentine National Park [TA-FL-286].
- Implement weed control focusing on bulbous and grassy weeds to protect population 1 of *Ptilotus pyramidatus* [TA-FL-292].
- Implement weed mapping program and assess which occurrences of the *Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a) ecological community are most at risk to guide weed management programs [LE-EC-010].
- Research the threat of weed succession (peas and grasses) in claypan ecological communities containing *Ornduffia submersa* populations [LE-FL-051].
- Assess the impacts of weeds on the Communities of tumulus springs (organic mound springs, Swan Coastal Plain) ecological community [LE-EC-007].
- Implement weed control programs for ecological communities targeting the following:
 - Invasive grasses at occurrence 3 (Dundas Road) of *Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a) [TA-EC-187].
 - Perennial veldt grass (*Ehrharta calycina*) and African lovegrass (*Eragrostis curvula*) at the Hawkevale Bushland Nature Reserve occurrence of *Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a) TEC. Maintain fence to limit pedestrian and vehicle access [TA-EC-189].
 - Perennial grasses at the Twin Swamps occurrence of the Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain (floristic community type 15) [TA-EC-196].
 - Guildford grass (*Romulea rosea*), *Sparaxis bulbifera*, blue lupin (*Lupinus cosentinii*) and arum lily (*Zantedeschia aethiopica*) at the Timaru Nature Reserve (Reserve 46373) occurrence of the Perth to Gingin ironstone association [TA-EC-198].
 - Spiny rush (*Juncus acutus*) and narrowleaf cottonbush (*Gomphocarpus fruticosus*) at the Lake Cooloongup and Lake Walyungup occurrences of the Sedgeland in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19) [TA-EC-200].
 - Onion weed (*Asphodelus fistulosus*), *Trachyandra divaricata* and Geraldton carnation weed (*Euphorbia terracina*) at the Port Kennedy Scientific Park occurrence of Sedgeland in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19) [TA-EC-201].
 - Slender thistle (*Carduus pycnocephalus*), wild oat (*Avena fatua*), buffalo grass (*Stenotaphrum secundatum*), *Aster subulatus*, annual beardgrass (*Polypogon monspeliensis*) and narrowleaf cottonbush (*Gomphocarpus fruticosus*) at the Lake Clifton occurrence of Stromatolite-like freshwater microbialite community of coastal brackish lakes (Lake Clifton) [TA-EC-205].



FLORA

*Proposed germplasm collection and storage priorities

- Consider seed collection and storage priorities for threatened flora species including:
 - *Acacia brachypoda*
 - *Acacia cummingiana*
 - *Acacia oncinophylla* subsp. *oncinophylla*
 - *Acacia oncinophylla* subsp. *patulifolia*
 - *Austrostipa bronwenae*
 - *Austrostipa jacobsoniana*
 - *Boronia capitata* subsp. *gracilis*
 - Cossack spider orchid (*Caladenia dorrienii*)
 - Quindanning spider orchid (*Caladenia hopperiana*)
 - sandplain white spider orchid (*Caladenia speciosa*)
 - Mogumber bell (*Darwinia carnea*)
 - *Darwinia* sp. Westdale (F. Hort 864)
 - *Diplolaena andrewsii*
 - dwarf bee orchid (*Diuris micrantha*)
 - dwarf hammer orchid (*Drakaea micrantha*)
 - Boyagin mallee (*Eucalyptus exilis*)
 - Cadda Road mallee (*Eucalyptus* x *balanites*)
 - *Eucalyptus loxophleba* x wando
 - *Eucalyptus* x *mundijongensis*
 - *Grevillea christineae*
 - *Grevillea corrugata*
 - Drummond's grevillea (*Grevillea drummondii*)
 - *Grevillea evanescens*
 - *Grevillea ornithopoda*
 - *Grevillea* sp. Ocean Reef (D. Pike Joon 4)
 - *Hakea oligoneura*
 - lantern sea-berry (*Haloragis luminosa*)
 - *Hibbertia leptotheca*
 - *Lasiopetalum membranaceum*
 - *Lasiopetalum pterocarpum*
 - *Lasiopetalum trichanthera*
 - *Marianthus paralius*
 - *Meionectes tenuifolia*
 - sandplain duck orchid (*Paracaleana dixonii*)
 - Darling Range duck orchid (*Paracaleana ferricola*)
 - granite duck orchid (*Paracaleana granitica*)

- *Phyllangium palustre*
- *Platysace ramosissima*
- tuart rufous greenhood (*Pterostylis frenchii*)
- *Ptilotus pyramidatus*
- *Schoenus capillifolius*
- *Schoenus pennisetis*
- *Senecio leucoglossus*
- *Synaphea odocoileops*
- *Synaphea rangiferops*
- *Tetralthea spartea*
- Cleopatra's needles (*Thelymitra apiculata*)
- Crystal Brook star orchid (*Thelymitra magnifica*)
- star orchid (*Thelymitra stellata*)
- York sun orchid (*Thelymitra yorkensis*)
- granite pink (*Tribonanthes purpurea*)
- *Verticordia serrata* var. *Udumung* (D. Hunter & B. Yarran 941006).

Community engagement



Promote public and stakeholder awareness and understanding of biodiversity, the threats facing it and its conservation, including through involvement in conservation programs, to encourage stewardship and support for conservation initiatives.

FAUNA

*Education and awareness

- Establish a community education and awareness program in collaboration with the GeoCatch citizen science survey program (Ringtail Tally) for western ringtail possum (*Pseudocheirus occidentalis*), focusing on urban areas in the South Coast, South West and Swan regions. The main activities include workshops and newsletters, co-ordinated by Wirambi Landcare [TA-FA-118].
- Implement an education program targeting primary producers to promote awareness of the impacts of illegal shooting on cockatoos and enforcement programs to counter illegal taking of forest red-tailed black cockatoo (*Calyptrorhynchus banksii naso*) through poaching and shooting [TA-FA-327]
- Encourage community involvement in the conservation and management of forest red-tailed black cockatoo (*Calyptrorhynchus banksii naso*) through the support of the Cockatoo Care and Birdlife programs and expand community involvement to raise awareness and support for survey effort and to reduce further clearing of land on private property [TA-FA-336].
- Develop and implement strategies to reduce the incidence of motor vehicle collisions with forest red-tailed black cockatoo (*Calyptrorhynchus banksii naso*) [TA-FA-330], Baudin's black cockatoo (*Zanda baudinii*) [TA-FA-331] and Carnaby's black cockatoo

(*Zanda latirostris*) [TA-FA-329] across their range, including the identification of hotspots, signage, road and drainage design, and planting of food resources .

- Educate the public and promote the use of non-lethal means of mitigating fruit damage by Baudin's black cockatoo (*Zanda baudinii*) in orchards in the South West, Swan and Warren regions [TA-FA-210].
- Implement an education program targeting primary producers to promote awareness of the impacts of illegal shooting to Carnaby's black cockatoo (*Zanda latirostris*) across its range in the Midwest, South Coast, South West, Swan, Warren and Wheatbelt regions [TA-FA-325].
- Educate and encourage landowners and managers of properties containing or neighbouring western swamp tortoise (*Pseudemydura umbrina*) habitat to manage and protect for conservation at Twin Swamps, Lake Wannamal and Ellen Brook nature reserves [TA-FA-289].

*Liaison actions

- Liaise with DFES in relation to fire management strategies for populations of western swamp tortoise (*Pseudemydura umbrina*) at Ellen Brook, Lake Wannamal, Twin Swamps and Moore River nature reserves, and develop Fire Management Plans [TA-FA-286].
- Liaise with DFES in relation to known locations of short tongue bee *Neopasiphae simplicior* [TA-FA-278] and *Leioproctus douglasiellus* [TA-FA-333] and vegetation that needs to be protected during fire operations across the Swan Region. Produce Fire Management Plans as per the Regional Parks model for high priority sites and/or populations.

FLORA

- Liaise with WA Native Orchid Society Group in relation to providing education and reporting of illegal picking of Quindanning spider orchid (*Caladenia hopperiana*) or inappropriate activities impacting populations 1 and 2 [TA-FL-272].
- Investigate fire requirements of fine-leaved darwinia (*Darwinia acerosa*) and implement trials with willing landholders [LE-FL-092].
- Survey for additional populations of threatened flora including:
 - tuart rufous greenhood (*Pterostylis frenchii*) populations in liaison with Adopt an Orchid [LE-FL-054]
 - Narrogin pea (*Pultenaea pauciflora*) in private property bushland to the northwest of population 24 [LE-FL-075].
- Organise a local media release to educate orchid enthusiasts in the Mogumber area of the Swan Region and throughout the Midwest Region to minimise vegetation trampling when visiting populations of Cleopatra's needles (*Thelymitra apiculata*) [TA-FL-153].
- Implement surveys for *Trithuria australis* in collaboration with Mandurah Herbarium volunteers [LE-FL-086].

*Liaison actions

- Liaise with the LGA regarding their obligations under the BC Act in relation to clearing and maintenance works that may impact population 1A of *Austrostipa jacobsoniana* occurring within the road reserve [TA-FL-135].
- Liaise with private property landholders regarding their obligations under existing subdivision approvals and the BC Act, promote awareness and understanding of existing subdivision conditions, and minimise illegal clearing to protect populations of tangled grevillea (*Grevillea flexuosa*) [TA-FL-281].
- Liaise with private property landholders in relation to fencing populations of tangled grevillea (*Grevillea flexuosa*) to protect them from kangaroo grazing [TA-FL-282].
- Notify the LGA of their obligations under the BC Act in relation to clearing and maintenance works that may impact population 2B of scarlet lechenaultia (*Lechenaultia laricina*) occurring within or adjacent to road reserve [TA-FL-140].
- Liaise with and educate ORV clubs and companies to promote responsible driving (staying off granite outcrops) to minimise impacts to all populations of slender-leafed duck orchid (*Paracaleana gracilicordata*) occurring within the Jarrahdale State Forest and Monadnock Conservation Park [TA-FL-291].
- Notify and ensure ongoing liaison with road, gas pipeline and rail stakeholders of their obligations under the BC Act in relation to clearing and maintenance works that may impact populations 2, 4, 5, 6, 7A and 8 of *Synaphea odocoileops* occurring within or adjacent to road or rail reserves in the Swan and South West regions. Undertake weed control at populations 6 and 8 for bulbil watsonia (*Watsonia meriana*), African lovegrass (*Eragrostis curvula*) and annual weeds [TA-FL-144].
- Notify and ensure ongoing liaison with land managers, including road and rail stakeholders, of their obligations under the BC Act in relation to clearing and maintenance works that may impact populations 1A, 1B, 3, 6B, 6C, 6D and 7A of *Synaphea* sp. Fairbridge Farm occurring within or adjacent to road or rail reserves [TA-FL-145].
- Continue liaison with LGAs, rail operator and Main Roads to identify opportunities for funding and resources for weed control, fence construction and fire management for all *Synaphea* sp. Fairbridge Farm populations on road and rail reserves (1A, 1B, 2, 3, 6B, 6C, 6D). Continue liaison with land manager regarding protection of population 7A in Alison Baird Reserve [TA-FL-147].
- Liaise with rail operator to manage African lovegrass (*Eragrostis curvula*), watsonia (*Watsonia meriana*) and perennial veldt grass (*Ehrharta calycina*) in rail reserves of *Synaphea* sp. Fairbridge Farm (populations 2, 3) [TA-FL-146].
- Undertake ongoing liaison with stakeholders regarding their obligations under the BC Act in relation to clearing and maintenance works that may impact *Synaphea* sp. Pinjarra Plain (populations 1-12) [TA-FL-293] and *Synaphea* sp. Serpentine (population 1) [TA-FL-294] occurring within or adjacent to road or rail reserves.

- Liaise with Fairbridge Farm in relation to installation of fencing to protect populations 4A, 4B and 13 of *Synaphea stenoloba* and liaise with the LGA and Main Roads in relation to installation of fencing to protect populations 4C and 4D [TA-FL-148].
- Liaise with Fairbridge Farm in relation to implementation of a weed control program targeting watsonia (*Watsonia spp.*), geophyte and grassy weeds to protect population 4A, 4B and 13 of *Synaphea stenoloba*. Liaise with LGA and Main Roads in relation to implementation of a weed control program targeting watsonia (*Watsonia spp.*), geophyte and grassy weeds to protect population 4C and 4D [TA-FL-149].
- Notify and ensure ongoing liaison with road and rail stakeholders of their obligations under the BC Act in relation to clearing and maintenance works that may impact populations 5 and 12 of *Synaphea stenoloba* occurring within or adjacent to road or rail reserves [TA-FL-150].
- Liaise with industry regarding obligations under the BC Act in relation to clearing and maintenance works that may impact populations 1 and 2 of *Synaphea stenoloba* as well provide advice on active management that could be applied by industry [TA-FL-151].
- Continue liaison with stakeholders regarding their obligations under the BC Act in relation to any development proposals associated with wetlands surrounding the Ellen Brook Nature Reserve that could potentially impact population 1 of Swan hydatella (*Trithuria occidentalis*) [TA-FL-155].

ECOLOGICAL COMMUNITIES

- Liaise with the Peel–Harvey Catchment Council regarding the condition of the Elongate fluvatile delta system – Peel–Harvey inlet ecological community [LE-EC-014].

*Liaison actions

- Implement weed control programs targeting *Melaleuca* sp., *Pinus* sp. and coast teatree (*Gaudium laevigatum*) at Sultana Road occurrence of *Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a [TA-EC-191].
- Liaise with the LGA in relation to implementation of a weed control program targeting African lovegrass (*Eragrostis curvula*) and wild gladiolus (*Gladiolus caryophyllaceus*) at the Maida Vale occurrence of *Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a) ecological community [TA-EC-186].
- Liaise with private property landholders in relation to the maintenance of fencing to exclude pedestrian access and prevent trampling of occurrences of Communities of tumulus springs (organic mound springs, Swan Coastal Plain) on private land [TA-EC-194].
- Liaise with private property landholder in relation to the maintenance of fencing around occurrence 2 of Perth to Gingin ironstone association to exclude stock and reduce grazing impacts [TA-EC-199].
- Implement weed control programs targeting perennial grasses at the Austin Cove occurrence of Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain (floristic community type 15) [TA-EC-197].

- Liaise with the LGA in relation to the implementation of a weed control program targeting Geraldton carnation weed (*Euphorbia terracina*), narrowleaf cottonbush (*Gomphocarpus fruticosus*) and bulrush (*Typha orientalis*) at the Lake Richmond occurrence of the Sedgeland in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19) [TA-EC-202].

7 Learn action collaboration opportunities

FAUNA

Mammals

- Implement a consistent statewide monitoring program to determine distribution and population trends of chuditch (*Dasyurus geoffroii*) at a species level.
- Monitor the impacts of fire on black-flanked rock-wallaby (*Petrogale lateralis lateralis*) to understand how to introduce prescribed burns into their habitat while protecting populations.
- Implement monitoring program to determine distribution and habitat preference and requirements of red-tailed phascogale (*Phascogale calura*).
- Research post-fire response of red-tailed phascogale (*Phascogale calura*).
- Establish a monitoring program with an effective methodology to survey western ringtail possum (*Pseudocheirus occidentalis*) across its range to determine the trajectory of the species and the extent of its habitat to inform management.
- Monitor the Yalgorup National Park western ringtail possum (*Pseudocheirus occidentalis*) population to determine if there are genetic differences from other populations. Apply findings to determine the value of the Yalgorup population as a translocation source.
- Implement strategic research projects to increase our understanding of the seasonal changes in quokka (*Setonix brachyurus*) movement patterns and their use of the greater landscape.
- Implement strategic research projects to increase our understanding of the impact of fire on quokka (*Setonix brachyurus*) including implementation of a cross-regional monitoring plan to assess populations post-fire and inform advice regarding fire exclusion areas and understand interactions with invasive species post-burn to inform baiting possibilities.

Birds

- Collaborate with BirdLife to improve data flow regarding surveying and monitoring work on (*Calidris canutus*) and hooded plover (*Thinornis cucullatus*).
- Map forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) and Baudin's black cockatoo (*Zanda baudinii*) water sources across the landscape and liaise with DWER to support maintaining water resources/stream flows.

- Develop tools to detect illegal shooting to quantify its impact on forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) and Baudin's black cockatoo (*Zanda baudinii*) to guide future liaison actions.
- Undertake research on the effects of prescribed burning on habitat critical for black cockatoo species (*Calyptorhynchus banksii naso*, *Zanda baudinii* and *Zanda latirostris*) across the Swan Region.
- Develop a cross-regional monitoring protocol to track and monitor the movements of black cockatoos (*Calyptorhynchus banksii naso*, *Zanda baudinii* and *Zanda latirostris*) using the most appropriate technology.
- Consolidate information available on feeding, roosting and nesting habitat of black cockatoo species (*Calyptorhynchus banksii naso*, *Zanda baudinii* and *Zanda latirostris*) to improve input into environmental impact assessment and land use planning processes and to develop a better understanding of distribution, habitat use, tenure distribution (including area/proportion of habitat in secure reserves) and movement patterns between regions. Work collaboratively to map critical breeding/feeding/roosting habitats to understand where conservation effort should be focused.
- Survey potential black cockatoo (*Calyptorhynchus banksii naso*, *Zanda baudinii* and *Zanda latirostris*) habitat occupied by feral bees and determine, through liaison with the apiary industry, where the use of fipronil to control feral bees is appropriate. Liaise with Biodiversity and Conservation Science and Australian Pesticides and Veterinary Medicine Authority to implement a fipronil trial with the view to adopting as an effective control method for feral bees utilising black cockatoo hollows.
- Determine habitat use and preference and distribution of the western false pipistrelle (*Falsistrellus mackensiei*).
- Identify where active malleefowl (*Leipoa ocellata*) mounds are along the western edge of their range in the Perth Hills area to inform fire management practices. Place radio trackers on this population to understand their distribution.
- Investigate the effectiveness of different feral predator control regimes on the persistence and recovery of malleefowl (*Leipoa ocellata*) populations.
- Engage with BirdLife Australia to identify nesting sites of southern giant petrel (*Macronectes giganteus*) and the associated threats in these locations to advise management.
- Map nesting sites of eastern osprey (*Pandion cristatus*) and ensure data is added to the corporate dataset.
- When monitoring fairy tern (*Sternula nereis nereis*) populations, expand capacity to include research surrounding the interactions between the terns and trophic cascades and how to respond adaptively to their impacts.
- Establish efficient and effective information sharing pathways across the regions for fairy tern (*Sternula nereis nereis*).

- Review the requirements for breeding birds and support the regular banding of fairy tern (*Sternula nereis nereis*) at each breeding site to monitor movement and dispersal of individuals between populations and sites.
- Monitor the interactions and movement patterns between the coastal and inland populations of hooded plover (*Thinornis cucullatus*) to determine population extents and habitat protection priorities.
- Investigate the use of air photography to survey large marri trees at the southern edge of the Swan Region to identify nest sites for Carnaby's black cockatoo (*Zanda latirostris*).
- Establish a species-wide population estimate for Carnaby's black cockatoo (*Zanda latirostris*).

Reptiles

- Implement a monitoring plan for western spiny-tailed skink (*Egernia stokesii badia*) across its range at targeted sites in both pastoral and agricultural zones to determine population trajectories.
- Use the known locations of Perth slider (*Lerista lineata*) to target areas of similar habitat for further survey of this species to determine if it even needs to be listed as a Priority species.
- Ascertain home ranges of western swamp tortoises (*Pseudemydura umbrina*) using standard telemetry or GPS tags.
- Intensively monitor wild, fenced populations of western swamp tortoise (*Pseudemydura umbrina*) for evidence of kills by foxes or feral cats.
- Compare western swamp tortoise (*Pseudemydura umbrina*) survival rates and growth of captive-only released animals with individuals head-started in the wild.

Fish

- Develop a freshwater fish research and monitoring program to coordinate stakeholders and encourage information sharing to determine genetic differences between populations, breeding grounds, movement patterns, and the impacts of water quality, sedimentation issues and increasing nutrients for South Coast, South West, Swan and Warren region threatened fish species including western mud minnow (*Galaxiella munda*), black-striped minnow (*Galaxiella nigrostriata*), salamanderfish (*Lepidogalaxias salamandroides*) and Balston's pygmy perch (*Nannatherina balstoni*).
- Work with researchers to develop genetic techniques (such as eDNA) to survey habitat across the range of freshwater fish including western mud minnow (*Galaxiella munda*), black-striped minnow (*Galaxiella nigrostriata*) and Balston's pygmy perch (*Nannatherina balstoni*).
- Investigate the impact of *Gambusia* species on salamanderfish (*Lepidogalaxias salamandroides*) and Balston's pygmy perch (*Nannatherina balstoni*) and implement feral fish control if species are adversely affected.

Invertebrates

- Compare the records of male trapdoor spider specimens with local rainfall records to determine the period in late winter to autumn that species including *Idiosoma macleayi*, *Idiosoma nigrum*, *Idiosoma schoknechtorum* and *Idiosoma sigillatum* are moving above ground, to inform potential prescribed fire exclusion periods.
- In consultation with experts, develop a survey methodology for application by departmental staff to investigate the full distribution of the trapdoor spider nigrum-group (*Idiosoma*) (including *Idiosoma macleayi*, *Idiosoma nigrum*, *Idiosoma schoknechtorum* and *Idiosoma sigillatum*). Investigate DNA techniques for non-destructive burrow sampling, for example swabbing silk or eDNA of soil.
- Identify and compare habitat surrogates for trapdoor spider species (kwongan, woodland and shrubland) including *Idiosoma macleayi*, *Idiosoma nigrum*, *Idiosoma schoknechtorum* and *Idiosoma sigillatum*.
- Survey Wattening, Drummond and Camerer nature reserves for *Idiosoma nigrum* with assistance from the Western Australian Museum.
- Develop a routine monitoring program for Carter's freshwater mussel (*Westralunio carteri*), *Westralunio inbisi inbisi* and *Westralunio inbisi meridiemus* across the South Coast, South West, Swan and Warren regions in conjunction with external groups.
- Undertake studies and apply learnings regarding Carter's freshwater mussel (*Westralunio carteri*) biology, life history and interactions with other species to inform management actions.
- Undertake targeted surveys and water quality monitoring in the Hotham River in the Peel, Arthur River, upper reaches of the Swan/Avon and in pools of agricultural areas for Carter's freshwater mussel (*Westralunio carteri*).

Marine⁷

- Develop and implement a triage system to direct where and when management actions need to occur based on a centralised database for reporting adverse incidents for marine turtles and mammals (for example marine debris, vessel strikes, deaths, strandings).
- Utilise the stranding database to capture information on subantarctic fur seal (*Arctocephalus tropicalis*).
- Establish monitoring systems to investigate habitat use and the impacts from vessel strike, seismic activity and marine debris on blue whale (*Balaenoptera musculus*).
- Undertake population trend analysis for all whale species including blue whale (*Balaenoptera musculus*), southern right whale (*Eubalaena australis*) and humpback whale (*Megaptera novaeangliae*) to determine a trajectory of recovery.

⁷ The 'marine' grouping includes marine mammals, marine reptiles and marine fish, including sharks and rays.

- Develop a standardised monitoring program to identify breeding habitat and range extensions of southern right whale (*Eubalaena australis*).
- Monitor humpback whale (*Megaptera novaeangliae*) abundance, distribution and patterns of habitat use to quantify the impact of nature-based tourism.
- Expand the monitoring program for Australian sea lion (*Neophoca cinerea*) to determine abundance, breeding sites, breeding cycle timing and investigate the impact of increased tourism and marine interaction activities on breeding and haul out locations/populations.
- Implement formal and informal monitoring programs for commercial operations focusing on Australian sea lion (*Neophoca cinerea*) interactions.

FLORA

- Research *Andersonia gracilis* population genetic structure to identify genetically important populations.
- Investigate the time it takes for dwarf green kangaroo paw (*Anigozanthos viridis* subsp. *terraspectans*) populations to grow post-burn.
- Investigate the taxonomy of *Anthotium* sp. Darling Range (F. Hort & B. Hort 2431).
- Research *Austrostipa jacobsoniana* fire response through post-fire monitoring.
- Research critical habitat requirements including soil and hydrology to inform the selection of an *Austrostipa jacobsoniana* translocation site.
- Investigate the genetic differences between the Swan, South West and Wheatbelt summer honeypot (*Banksia mimica*) populations and determine whether populations are clonal.
- Review genetics and taxonomy of *Boronia capitata* subsp. *gracilis* (northern outlier, population 8).
- Survey for new *Conostylis pauciflora* subsp. *pauciflora* populations in suitable habitat.
- Investigate differences in pollinator species for northern and southern glossy-leaved hammer orchid (*Drakaea elastica*) populations.
- Determine pollinator species for dwarf hammer orchid (*Drakaea micrantha*).
- Collect genetic material from northern range dwarf bee orchid (*Diuris micrantha*) (populations 1, 3).
- Assess the taxonomy of *Grevillea crowleyae*.
- Conduct genetic analysis and review population demographics following the merging of *Grevillea curviloba* subsp. *incurva* and *Grevillea curviloba* subsp. *curviloba* into one species *Grevillea curviloba* to identify important populations.
- Investigate the taxonomy of disjunct colourful snakebush (*Hemiandra* sp. Watheroo (S. Hancocks 4)) populations (11 & 14) located in Wandoo National Park.
- Monitor populations 3B, 4, 5A, 5C and 9A of *Macarthuria keigheryi*.

- Investigate the biology and ecology of dwarf pea (*Ptychosema pusillum*) further to determine important populations and possibilities for management.
- Taxonomic review for genus *Synaphea* with specific focus on clarifying *Synaphea odocoileops* and *Synaphea gracillima*.
- Investigate fire response of Cleopatra's needles (*Thelymitra apiculata*).
- Investigate pollination dynamics and techniques to increase Cleopatra's needles (*Thelymitra apiculata*) seed output.
- Research fire ecology of star orchid (*Thelymitra stellata*).
- Investigate ecology of granite pink (*Tribonanthes purpurea*) (time of flowering) and determine a suitable monitoring method (potentially like orchids and other geophytes that respond to seasonal rainfall).
- Investigate soil seed bank dynamics of:
 - *Andersonia gracilis*
 - *Beyeria cinerea* subsp. *cinerea*.
- Investigate presence, viability and genetic variation seed banks of:
 - *Darwinia thymoides* subsp. St Ronans (J.J. Alford & G.J. Keighery 64)
 - *Grevillea bipinnatifida* subsp. *Pagna*
 - *Haloragis scoparia* and elegant tinsel lily (*Calectasia elegans*).

ECOLOGICAL COMMUNITIES

- Investigate other likely habitat for Aquatic root mat community number 1 of caves of the Swan Coastal Plain.
- Survey in other potential habitat to determine status of Banksia woodland of the Gingin area restricted to soils dominated by yellow to orange sands Priority Ecological Community (PEC), inclusive of opportunistic survey for *Ptychosema pussillam* when in area.
- Investigate condition and composition of the *Casuarina obesa* association.
- Research the biochemistry of microbial mats within the Stromatolite-like freshwater microbialite community of coastal brackish lakes.
- Investigate overall distribution and distinctiveness of the Wooded wetlands which support colonial waterbird nesting areas PEC.
- Assess the impacts of weeds on:
 - Perth to Gingin Ironstone Association
 - Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain.
- Implement a monitoring program to investigate the hydrology and floristics of:
 - Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain
 - Sedgeland in Holocene dune swales of the southern Swan Coastal Plain.
- Investigate the fire response of:
 - *Banksia attenuata* woodland over species rich dense shrublands
 - Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain

- Sedgelands in Holocene dune swales of the southern Swan Coastal Plain
- Woodlands of deep seasonal wetlands of the Swan Coastal Plain.
- Investigate status of occurrences of the following TECs on private land:
 - *Banksia attenuata* woodland over species rich dense shrublands (floristic community type 20a) (occurrences Victoria 24, VICTORIA22, MARIJINUP01)
 - *Eucalyptus calophylla* - *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (occurrences BRENTWD12, VICTORIA19, VICTORIA28, Kenwick08, Kenwick10, Kenwick11)
 - Shrublands and woodlands on Muchea Limestone (occurrences BROOKRD04, BICKLEYRD05, BRENTWD15, BRENTWD09, BROOKRD20, BRENTWD26, Kenwick02)
 - Shrublands on dry clay flats (floristic community type 10a) (occurrences BROOK1, Kenwick04).

8 References

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- Whitehead AL, Kujala H and Wintle BA 2016. Dealing with Cumulative Biodiversity Impacts in Strategic Environmental Assessment: A New Frontier for Conservation Planning. *Conservation Letters* 10(2), p195-204.

Appendix 1: Priority management units identified through the prioritisation process for landscape scale threat mitigation actions for priority reserves and landscapes

Table 2 Swan Region priority management units.

Priority reserve or landscape	Component reserves	Responsibility	Area (ha)
Amphion Forest Block	F 14	Perth Hills District	3,279
Anstey-Keane Damplands	1621/702, 2149/329, 2503/183, 2524/394, 2506/799, 2512/890, 2940/255, R 32926, Lot 63	Regional Parks	368
Austin Bay system	Austin Bay Nature Reserve (R 38749, R 4990), Carrabungup Austin Bay Nature Reserve (1019/647, 805/72, 2978/606, 4007/679)	Swan Coastal District - Mandurah work centre	1,979
Avon Valley system	Avon Valley National Park (R 30192), Moondyne Convention Centre (R 50852), Mandoon Farm (R 50853), R 30193, R 51385, Moondyne Stronghills Reserve (R 36763)	Perth Hills District	15,694
Banksiadale Forest Block	F 14	Perth Hills District	2,551
Chandler Forest Block	F 22	Perth Hills District	7,814
Flint Forest Block	F 13, F 67, O 151 67, O 151 25,	Perth Hills District	8,250
Greater Brixton Street Wetlands	R 49200	Swan Coastal District - Wanneroo work centre	115
Inglehope Forest Block	F 14	Perth Hills District	6,065
Julimar system	F 61, Drummond Nature Reserve (R 42808), Flat Rock Gully Nature Reserve (R 22096)	Perth Hills District	29,199
Kennedy Forest Block	F 14	Perth Hills District	3,754
Kooljerrenup Nature Reserve	R 23756, R 51944	Swan Coastal District - Mandurah work centre	1,240
Leona Forest Block	F 22, F 13	Perth Hills District	7,292
Lowlands Nature Reserve	R 51784	Swan Coastal District - Mandurah work centre	1,312
Paganoni Swamp	2832/50, 2832/51	Regional Parks	721

Priority reserve or landscape	Component reserves	Responsibility	Area (ha)
Pindalup Forest Block	F 14	Perth Hills District	4,570
Quindanning Reserve	O 171 25	Perth Hills District	2,405
Randall Forest Block	F 22	Perth Hills District	6,460
Red Gully system	Boonanarring Nature Reserve (R 41805), Fynes Nature Reserve (R 46899, R 47808, 2654/215), Fynes to Boonanarring link (2745/13, 2778/389, 2801/899, 2745/531, 2810/80, 1497/392, 2807/572), Boonanarring East (2818/646, 2802/835)	Swan Coastal District - Wanneroo work centre	17,282
Serpentine system	Serpentine National Park (R 39825, F 28862, 22 (Serpentine Forest Block), R 16634	Perth Hills District	8,341
Treasure Forest Block Bushland	F 16	Swan Coastal District - Mandurah work centre	1,082
Wandoo National Park	R 47883	Perth Hills District	46,336
Lupton Conservation Park	R 26666	Perth Hills District	9,443
McLarty-Mealup system	Lake McLarty Nature Reserve (R 44978, R 39404); Lake Mealup Nature Reserve (R 6627); McLarty Nature Reserve (R 24739, 1646/890)	Swan Coastal District - Mandurah work centre	350
Modong Nature Reserve	R 25886	Regional Parks	156
Monadnocks Reserve	R 39826	Perth Hills District	15,999
Moore River system	R 28462, 2754/532	Swan Coastal District - Wanneroo work centre	23,274
Wearne Forest Block	O 146 25, F 67	Perth Hills District	14,571
Yalgorup National Park	Yalgorup National Park (R 11710, R 25912)	Swan Coastal District - Mandurah work centre	11,110
Yeal system	Yeal Nature Reserve (R 42450), Wilbinga Conservation Park (R 49994), F 65 (Caraban FMP17, Caraban FMP18, Pinjar Bushland 4 South Yeal FMP27), Yanchep Bushland 1	Swan Coastal District - Wanneroo work centre	32,721

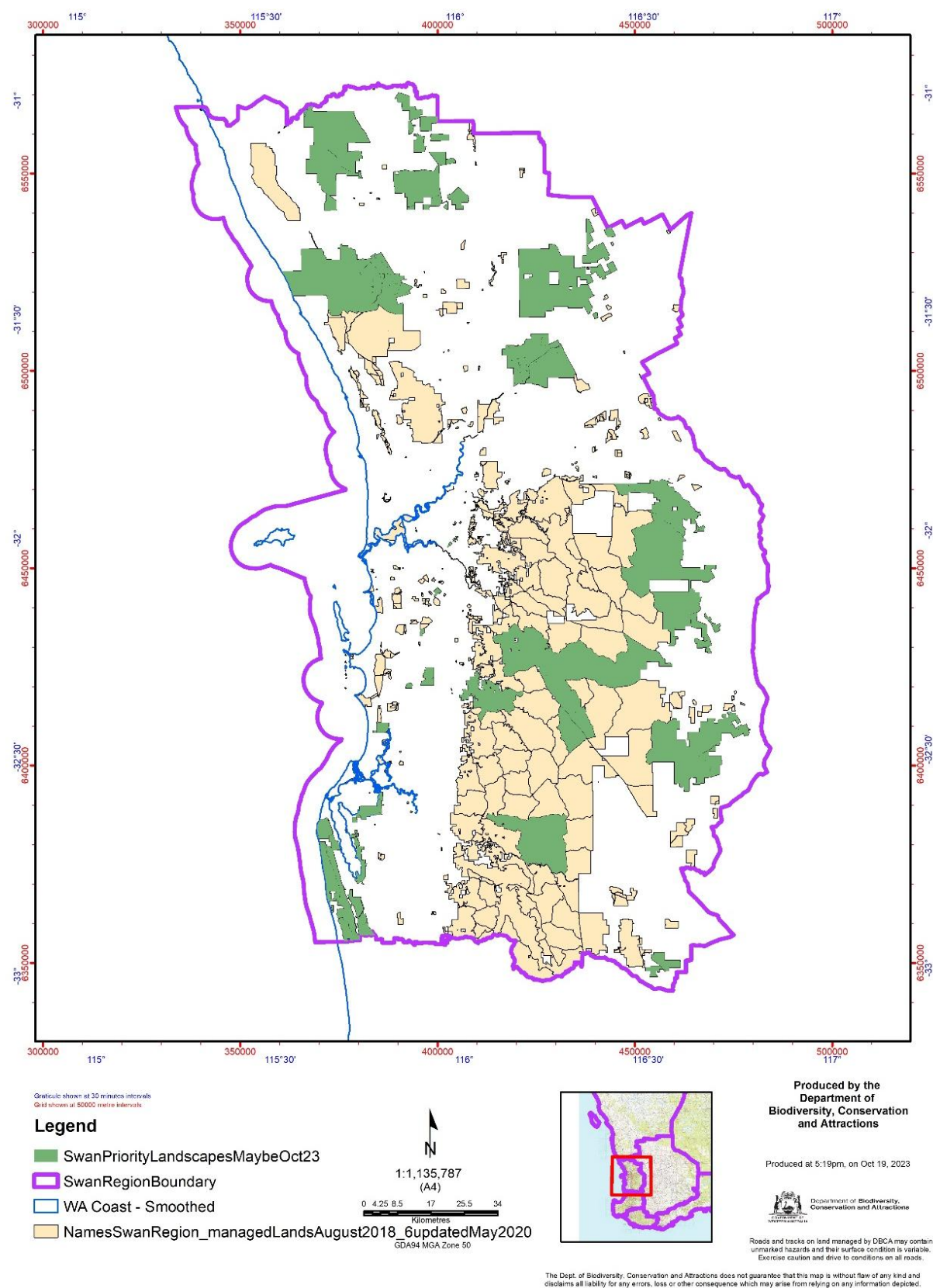


Figure 2 Swan Region priority landscapes.



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Conservation and Attractions**